

Ending the Tobacco Problem: A Blueprint for the Nation

ISBN
978-0-309-10382-4

732 pages
6 x 9
HARDBACK (2007)

Richard J. Bonnie, Kathleen Stratton, and Robert B. Wallace, Editors,
Committee on Reducing Tobacco Use: Strategies, Barriers, and
Consequences, Institute of Medicine

 Add book to cart

 Find similar titles

 Share this PDF



Visit the National Academies Press online and register for...

- ✓ Instant access to free PDF downloads of titles from the
 - NATIONAL ACADEMY OF SCIENCES
 - NATIONAL ACADEMY OF ENGINEERING
 - INSTITUTE OF MEDICINE
 - NATIONAL RESEARCH COUNCIL
- ✓ 10% off print titles
- ✓ Custom notification of new releases in your field of interest
- ✓ Special offers and discounts

Distribution, posting, or copying of this PDF is strictly prohibited without written permission of the National Academies Press. Unless otherwise indicated, all materials in this PDF are copyrighted by the National Academy of Sciences. Request reprint permission for this book

ENDING THE TOBACCO PROBLEM

A BLUEPRINT FOR THE NATION

Committee on Reducing Tobacco Use:
Strategies, Barriers, and Consequences
Board on Population Health and Public Health Practice

Richard J. Bonnie, Kathleen Stratton, and Robert B. Wallace, *Editors*

INSTITUTE OF MEDICINE
OF THE NATIONAL ACADEMIES

THE NATIONAL ACADEMIES PRESS
Washington, D.C.
www.nap.edu

THE NATIONAL ACADEMIES PRESS 500 Fifth Street, N.W. Washington, DC 20001

NOTICE: The project that is the subject of this report was approved by the Governing Board of the National Research Council, whose members are drawn from the councils of the National Academy of Sciences, the National Academy of Engineering, and the Institute of Medicine. The members of the committee responsible for the report were chosen for their special competences and with regard for appropriate balance.

This study was supported by Grant ID Number 6210 between the National Academy of Sciences and the American Legacy Foundation. Any opinions, findings, conclusions, or recommendations expressed in this publication are those of the author(s) and do not necessarily reflect the view of the organizations or agencies that provided support for this project.

Library of Congress Cataloging-in-Publication Data

Institute of Medicine (U.S.). Committee on Reducing Tobacco Use: Strategies, Barriers, and Consequences.

Ending the tobacco problem : a blueprint for the nation / Committee on Reducing Tobacco Use: Strategies, Barriers, and Consequences, Board on Population Health and Public Health Practice ; Richard J. Bonnie, Kathleen Stratton, and Robert B. Wallace, editors.

p. ; cm.

Includes bibliographical references and index.

ISBN-13: 978-0-309-10382-4 (hardback : alk. paper)

ISBN-10: 0-309-10382-7 (hardback : alk. paper) 1. Tobacco use—United States—Prevention. 2. Smoking—United States—Prevention. 3. Public health—United States. I. Bonnie, Richard J. II. Stratton, Kathleen R. III. Wallace, Robert B., 1942- IV. Title.

[DNLM: 1. Tobacco Use Disorder—prevention & control—United States. 2. Health Policy—United States. 3. Smoking—legislation & jurisprudence—United States. 4. Smoking—prevention & control—United States. 5. Smoking Cessation—legislation & jurisprudence—United States. WM 290 I585e 2007]

HV5763.I67 2007

362.29'660973—dc22

2007027676

Additional copies of this report are available from the National Academies Press, 500 Fifth Street, N.W., Lockbox 285, Washington, DC 20055; (800) 624-6242 or (202) 334-3313 (in the Washington metropolitan area); Internet, <http://www.nap.edu>.

For more information about the Institute of Medicine, visit the IOM home page at: www.iom.edu.

Copyright 2007 by the National Academy of Sciences. All rights reserved.

Printed in the United States of America.

The serpent has been a symbol of long life, healing, and knowledge among almost all cultures and religions since the beginning of recorded history. The serpent adopted as a logotype by the Institute of Medicine is a relief carving from ancient Greece, now held by the Staatliche Museum in Berlin.

Suggested citation: IOM (Institute of Medicine). 2007. *Ending the tobacco problem: A blueprint for the nation*. Washington, DC: The National Academies Press.

*“Knowing is not enough; we must apply.
Willing is not enough; we must do.”*

—Goethe



INSTITUTE OF MEDICINE
OF THE NATIONAL ACADEMIES

Advising the Nation. Improving Health.

THE NATIONAL ACADEMIES

Advisers to the Nation on Science, Engineering, and Medicine

The **National Academy of Sciences** is a private, nonprofit, self-perpetuating society of distinguished scholars engaged in scientific and engineering research, dedicated to the furtherance of science and technology and to their use for the general welfare. Upon the authority of the charter granted to it by the Congress in 1863, the Academy has a mandate that requires it to advise the federal government on scientific and technical matters. Dr. Ralph J. Cicerone is president of the National Academy of Sciences.

The **National Academy of Engineering** was established in 1964, under the charter of the National Academy of Sciences, as a parallel organization of outstanding engineers. It is autonomous in its administration and in the selection of its members, sharing with the National Academy of Sciences the responsibility for advising the federal government. The National Academy of Engineering also sponsors engineering programs aimed at meeting national needs, encourages education and research, and recognizes the superior achievements of engineers. Dr. Charles M. Vest is president of the National Academy of Engineering.

The **Institute of Medicine** was established in 1970 by the National Academy of Sciences to secure the services of eminent members of appropriate professions in the examination of policy matters pertaining to the health of the public. The Institute acts under the responsibility given to the National Academy of Sciences by its congressional charter to be an adviser to the federal government and, upon its own initiative, to identify issues of medical care, research, and education. Dr. Harvey V. Fineberg is president of the Institute of Medicine.

The **National Research Council** was organized by the National Academy of Sciences in 1916 to associate the broad community of science and technology with the Academy's purposes of furthering knowledge and advising the federal government. Functioning in accordance with general policies determined by the Academy, the Council has become the principal operating agency of both the National Academy of Sciences and the National Academy of Engineering in providing services to the government, the public, and the scientific and engineering communities. The Council is administered jointly by both Academies and the Institute of Medicine. Dr. Ralph J. Cicerone and Dr. Charles M. Vest are chair and vice chair, respectively, of the National Research Council.

www.national-academies.org

**COMMITTEE ON REDUCING TOBACCO USE:
STRATEGIES, BARRIERS, AND CONSEQUENCES**

- RICHARD J. BONNIE, L.L.B.** (*Chair*), John S. Battle Professor of Law and Director, Institute of Law, Psychiatry, and Public Policy, University of Virginia School of Law, Charlottesville
- ROBERT B. WALLACE, M.D., M.Sc.** (*Vice Chair*), Irene Ensminger Stecher Professor of Epidemiology and Internal Medicine, Department of Epidemiology, College of Public Health, University of Iowa, Iowa City
- DAVID ABRAMS, Ph.D.**, Director, Office of Behavioral and Social Sciences Research, and Associate Director, NIH Office of the Director, National Institutes of Health, Bethesda, MD
- NEAL BENOWITZ, M.D.**, Professor of Medicine, Psychiatry, and Biopharmaceutical Sciences, University of California, San Francisco
- DIANA BONTÁ, Dr.P.H.**, Vice President, Public Affairs, Southern California Region, Kaiser Permanente, Pasadena, CA
- JONATHAN CAULKINS, Ph.D.**, Professor of Operations Research and Public Policy, Qatar Campus and H. John Heinz III School of Public Policy and Management, Carnegie Mellon University, Pittsburgh, PA
- ROBERTA FERRENCE, Ph.D.**, Director, Ontario Tobacco Research Unit, Toronto, Ontario
- BRIAN FLAY, D.Phil.**, Professor of Public Health, College of Health and Human Sciences, Oregon State University, Corvallis
- BONNIE HALPERN-FELSHER, Ph.D.**, Associate Professor, University of California, San Francisco
- JEFFREY HARRIS, M.D., Ph.D.**, Professor of Health Economics, Massachusetts Institute of Technology, Cambridge, MA
- ROBERT RABIN, J.D., Ph.D.**, A. Calder Mackay Professor of Law, Stanford Law School, Stanford, CA
- MICHAEL SLATER, Ph.D.**, Social and Behavioral Sciences Distinguished Professor, School of Communication, Ohio State University, Columbus
- CAROLINE SPARKS, M.A., Ph.D.**, Associate Professor of Prevention and Community Health and Deputy Director of the Prevention Research Center, School of Public Health and Health Services, George Washington University, Washington, DC
- CASS SUNSTEIN, J.D.**, Karl N. Llewellyn Distinguished Service Professor of Jurisprudence, University of Chicago Law School, IL

STUDY STAFF

KATHLEEN STRATTON, Ph.D., Study Director

AMBER CLOSE, M.F.S., Senior Program Associate

MELISSA FRENCH, M.A., Senior Program Associate (through August 2005)

AMY GELLER, M.P.H., Research Associate (through August 2004)

DAVID GILES, Research Assistant (through January 2007)

REBECCA KLIMAN HUDSON, M.P.H., Research Associate (through August 2004)

SHEYI LAWYOYIN, M.P.H., Senior Program Assistant (through October 2005)

RENIE SCHAPIRO, Consultant

KRISTINA VAN DOREN-SHULKIN, Senior Program Assistant

MONIQUE B. WILLIAMS, Ph.D., Program Officer

ROSE MARIE MARTINEZ, Sc.D., Director, Board on Population Health and Public Health Practice

Reviewers

This report has been reviewed in draft form by individuals chosen for their diverse perspectives and technical expertise, in accordance with procedures approved by the National Research Council's Report Review Committee. The purpose of this independent review is to provide candid and critical comments that will assist the institution in making its published report as sound as possible and to ensure that the report meets institutional standards for objectivity, evidence, and responsiveness to the study charge. The review comments and draft manuscript remain confidential to protect the integrity of the deliberative process. We wish to thank the following individuals for their review of this report:

Lois Biener, Ph.D., University of Massachusetts, Boston
Richard Clayton, Ph.D., University of Kentucky
Phillip Cook, Ph.D., Duke University
Gordon DeFriese, Ph.D., University of North Carolina
Paul Fischer, M.D., Center for Primary Care
Gary Giovino, Ph.D., State University of New York, Buffalo
Jack Henningfield, Ph.D., Johns Hopkins University
Howard Koh, M.D., M.P.H., Harvard School of Public Health
Harold Pollack, Ph.D., University of Chicago
Eric A. Posner, J.D., University of Chicago Law School
Steven Schroeder, M.D., University of California, San Francisco

Although the reviewers listed above have provided many constructive comments and suggestions, they were not asked to endorse the conclusions

or recommendations nor did they see the final draft of the report before its release. The review of this report was overseen by **Nancy E. Adler, Ph.D.**, University of California, San Francisco, and **Robert S. Lawrence, M.D.**, Johns Hopkins University. Appointed by the National Research Council and Institute of Medicine, they were responsible for making certain that an independent examination of this report was carried out in accordance with institutional procedures and that all review comments were carefully considered. Responsibility for the final content of this report rests entirely with the authoring committee and the institution.

Preface

“Cigarette smoking is a health hazard of sufficient importance in the United States to warrant appropriate remedial action.” So stated the Advisory Committee to the Surgeon General of the Public Health Service in its seminal Report in 1964 (p. 33). Since then, the Surgeon General has issued 28 more reports on tobacco and health, most recently in 2005. The health effects of cigarette smoking and use of other tobacco products, including smokeless tobacco, are by now well-known.

Cigarette-smoking has decreased considerably in the United States since 1964 when about 52 million adults (representing 42 percent of the adult population) smoked, and public health leaders and tobacco control specialists deserve praise for what they have been able to accomplish over the past four decades. However, there are still approximately 44 million smokers in this country, and cigarette smoking is the “underlying cause” of more than 440,000 deaths a year in the United States.

Why has there not been greater progress in ending the tobacco problem? Although many social, economic, and political factors have played a role, perhaps the most important one is that the tobacco industry obscured the addictive properties and health risks of smoking, impeded and delayed many tobacco control interventions, and has so far successfully thwarted meaningful federal regulatory measures. As a result, more than forty years after the first Surgeon General’s report, the necessary “remedial action” has not yet been taken. This report presents a two-prong strategic plan for intensifying and accelerating public health efforts, thereby taking long strides toward ending the tobacco problem in the United States. The first prong of the plan calls for making better use of tobacco control interven-

tions known to be effective. These steps can be implemented immediately. The second prong of the committee's plan calls for federal legislative action to transform the current legal structure of tobacco control and for deploying innovative new regulatory approaches. Taken together, the blueprint outlines the strong measures that will be needed to reduce substantially the prevalence of cigarette-smoking and to assure that other forms of tobacco use are simultaneously contained or reduced. How quickly this can be done depends on how quickly the plan is implemented.

This is not the first time the Institute of Medicine (IOM) has addressed the need for strong remedial measures to control tobacco use. In 1994, the IOM issued *Growing Up Tobacco Free*, a report outlining a blueprint for reducing tobacco use among children and adolescents. The recommendations in that report figured prominently in the drafting of the FDA's Tobacco Rule—promulgated in 1996 but invalidated by the United States Supreme Court in 2000. In 2001, the IOM issued *Clearing the Smoke*, a report assessing the science base for reduced-risk tobacco products and specifying principles to guide federal legislative and administrative action. Although the IOM principles have provided a foundation for legislative proposals in both houses of Congress over the past 5 years, federal law remains unchanged.

The blueprint for action presented in this report is both comprehensive and specific. Although the recommendations are more detailed than those offered in most IOM reports, the committee followed the path plowed by the two previous IOM reports on tobacco policy, recognizing that the key elements of the blueprint require strong and unambiguous legislative and administrative action at all levels of government.

The committee commissioned 16 papers reviewing the literature in many of the areas of tobacco control covered in the report, and these papers are published in an appendix accompanying the committee's report (prepared as a CD). We asked the authors (most of whom also served as members of the committee) to draw conclusions from their work and, if indicated, to make policy recommendations. To avoid any confusion, it bears emphasis that the recommendations appearing in the committee's report represent the consensus judgment of the committee as a whole and are endorsed by all members of the committee except where otherwise indicated. In contrast, the recommendations appearing in the individually authored chapters in the Appendix should not be attributed to the committee itself.

The title of the committee's report warrants some explanation. What does the committee mean by "ending the tobacco problem"? We do not mean eliminating smoking and other forms of tobacco use altogether. That is both unrealistic and unnecessary. Instead, we have in mind reducing tobacco use so substantially that it no longer has a significant impact on public health.

The magnitude of tobacco's impact on the public health is inextricably linked to the highly addictive property of cigarettes and other tobacco products as they are currently designed and used. Four out of five current adult cigarette smokers are addicted to them, and the average length of a smoking career is several years. One strategy that should be explored, as the committee explains in Chapter 7, is gradually reducing the nicotine content of tobacco products so that they are no longer addictive. If that were accomplished, the residual use of tobacco decades from now might not amount to a significant public health problem.

Unless and until a nicotine reduction strategy is successfully implemented, however, the central aim for tobacco policy must continue to be reducing the number of tobacco users through a two-pronged strategy of reducing initiation and facilitating cessation. Harm reduction (reducing the risks of consumption) is, at best, an ancillary component of a comprehensive strategy for protecting the public health.

What levels of cigarette smoking, smokeless tobacco use, and cigar smoking would be "acceptable" from a public health perspective? Reducing the current adult prevalence of cigarette smoking in half (from about 21 percent to about 10 percent) would still leave more than 20 million adult smokers. That is not good enough. Is 5 percent good enough? 3 percent?

Ultimately, the committee concluded that answering this question has little practical significance at the present time. We see no reason to go through the hypothetical exercise of identifying particular initiation and prevalence rates that would signal "ultimate" success. Setting such targets requires delicate judgments based on data not now available and circumstances that cannot now be foreseen. There will be time enough for another committee to set these targets in the coming years. For the next decade or two, the aim must be to reduce initiation and increase cessation as much as possible without stimulating a substantial black market and its associated costs.

Speaking for the Committee on Reducing Tobacco Use, I hope that the recommendations outlined in this report are implemented with vigor, speed, and perseverance. Many components of the committee's plan can be implemented immediately without any federal action. However, if Congress moves quickly to empower FDA and the states to launch new regulatory initiatives recommended in this report, the nation will be on a promising course toward ending the tobacco problem by 2030.

Richard J. Bonnie, *Chair*
Committee on Reducing Tobacco Use

Contents

SUMMARY	1
INTRODUCTION	29
PART I: BACKGROUND	
1 EPIDEMIOLOGY OF TOBACCO USE: HISTORY AND CURRENT TRENDS	41
Growth of the Tobacco Problem, 41	
Decline in Tobacco Use: 1965–2005, 45	
Recent Trends: A Closer Look, 51	
Emerging Challenges, 68	
Summary, 70	
References, 71	
2 FACTORS PERPETUATING THE TOBACCO PROBLEM	77
Nature of Nicotine Addiction, 77	
Smoking Cessation, 82	
Smoking Initiation, 88	
Atypical Patterns of Tobacco Use, 93	
Populations at Greater Risk of Continuing Smoking, 95	
Conclusion, 97	
References, 99	
3 CONTAINING THE TOBACCO PROBLEM	107
Public Health Takes on the Tobacco Industry: 1964–1988, 109	
Advances in Tobacco Control: 1988–2005, 116	

Tobacco Control in the Years Ahead: Will Progress Continue?, 128
 Summary, 136
 References, 137

PART II: A BLUEPRINT FOR REDUCING TOBACCO USE

- 4 REDUCING TOBACCO USE: A POLICY FRAMEWORK 145**
 Product Safety and Consumer Sovereignty, 145
 The Policy Context, 146
 The Ethical Context, 148
 An Aside on the Paternalism Problem, 150
 Tobacco Products Are Inherently Dangerous, 152
 Blueprint Outline, 154
 References, 154
- 5 STRENGTHENING TRADITIONAL TOBACCO CONTROL MEASURES 157**
 Comprehensive State Programs, 158
 Funding for Comprehensive State Programs, 172
 Excise Tax, 182
 Smoking Restrictions, 189
 Youth Access, 203
 Retail Shipments, 207
 Prevention Interventions, 210
 Media Campaigns to Prevent Smoking, 223
 Cessation Interventions, 231
 Community Mobilization, 241
 Special Populations with Higher Rates of Cigarette Smoking, 247
 Projected Impact of Strengthening Existing Tobacco Control Measures, 249
 References, 253
- 6 CHANGING THE REGULATORY LANDSCAPE 271**
 Federal Regulatory Authority Is Needed, 272
 Empowering FDA to Regulate Tobacco, 275
 A Regulatory Philosophy, 277
 Tobacco Product Characteristics Should Be Regulated, 279
 Messages on Tobacco Packages Should Promote Health, 289
 The Retail Environment for Tobacco Sales Should Be Transformed to Promote the Public Health, 299
 The Federal Government Should Mandate Industry Payments for Tobacco Control and Should Support and Coordinate State Funding, 308

	Tobacco Advertising Should Be Further Restricted, 319	
	Youth Exposure to Smoking in Movies and Other Media Should Be Reduced, 330	
	Surveillance and Evaluation Should Be Enhanced, 333	
	Summary, 335	
	References, 336	
7	NEW FRONTIERS OF TOBACCO CONTROL	341
	Tobacco Policy Analysis and Development, 341	
	Reducing the Nicotine Content of Cigarettes, 346	
	Conclusion, 353	
	References, 353	
	INDEX	355
	APPENDIXES¹	
A	ABRAMS: COMPREHENSIVE SMOKING CESSATION FOR ALL SMOKERS	
B	BONTÁ: CLEAN AIR LAWS	
C	FERRENCE: WARNING LABELS AND PACKAGING	
D	FLAY: THE LONG-TERM PROMISE OF EFFECTIVE SCHOOL-BASED SMOKING PREVENTION PROGRAMS	
E	HALPERN-FELSHER: ADOLESCENTS' AND YOUNG ADULTS' PERCEPTIONS OF TOBACCO USE	
F	HALPERN-FELSHER: INTERVENTIONS FOR CHILDREN AND YOUTH IN THE HEALTH CARE SETTING	
G	HALPERN-FELSHER: REDUCING AND PREVENTING TOBACCO USE AMONG PREGNANT WOMEN, PARENTS, AND FAMILIES	
H	HALPERN-FELSHER: SMOKING IN THE MOVIES	

¹All appendixes are available on a CD in the back of the report and at http://www.nap.edu/catalog.php?record_id=11795.

- I KINNEY: STATE STATUTES GOVERNING DIRECT SHIPMENT OF ALCHOLIC BEVERAGES TO CONSUMERS
- J LEVY: THE ROLE OF PUBLIC POLICIES IN REDUCING SMOKING PREVALENCE
- K MENDEZ: COMMISSIONED SIMULATION MODELING OF SMOKING PREVALENCE AS AN OUTCOME OF SELECTED TOBACCO CONTROL MEASURES
- L RABIN: CONTROLLING THE RETAIL SALES ENVIRONMENT
- M RIBISL: SALES AND MAREKTING OF CIGARETTES ON THE INTERNET
- N SLATER: MEDIA CAMPAIGNS AND TOBACCO CONTROL
- O SPARKS: ADVOCACY AS A TOBACCO CONTROL STRATEGY
- P WALLACE: SPECIAL POPULATIONS WITH HIGHER RATES OF CIGARETTE SMOKING

Summary

ABSTRACT *The ultimate goal of the committee is to end the tobacco problem; in other words, to reduce smoking so substantially that it is no longer a significant public health problem for our nation. While that objective is not likely to be achieved soon, the report aims to set the nation irreversibly on a course for doing so. After reviewing the ethical grounding of tobacco control, the committee sets forth a blueprint as a two-pronged strategy. The first prong envisions strengthening and fully implementing traditional tobacco control measures known to be effective. The second prong envisions changing the regulatory landscape to permit policy innovations that take into account the unique history and characteristics of tobacco use, such as strong federal regulation of tobacco products and their marketing and distribution. Aggressive policy initiatives will be necessary to end the tobacco problem. Any slackening of the public health response may reverse decades of progress in reducing tobacco-related disease and death.*

The substantial decline (58.2 percent) in the prevalence of smoking among adults since 1964 has been characterized as one of the 10 greatest achievements in public health in the 20th century, but today about 21 percent of U.S. adults smoke, despite clear evidence of the numerous health, economic, and social consequences associated with tobacco use.

Tobacco use causes 440,000 deaths in the United States every year (CDC 2005), with secondhand smoke responsible for 50,000 of those

deaths (DHHS 2006). All told, deaths associated with smoking account for more deaths than AIDS, alcohol use, cocaine use, heroin use, homicides, suicides, motor vehicle crashes, and fires combined.

The economic consequences of tobacco use are in the billions of dollars. Lost work productivity attributable to death from tobacco use amounts to more than \$92 billion per year. Private and public health care expenditures for smoking-related health conditions are estimated to be \$89 billion per year. In addition, the states and the federal government spend millions of dollars annually on tobacco use prevention and research efforts that could be directed to other needs.

Concerns about the waning momentum in tobacco control efforts and about declining public attention to what remains the nation's largest public health problem led the American Legacy Foundation to ask the Institute of Medicine (IOM) to conduct a major study of tobacco policy in the United States. The IOM appointed a 14-member committee and charged it to explore the benefits to society of fully implementing effective tobacco control interventions and policies, and to develop a blueprint for the nation in the struggle to reduce tobacco use. To carry out its charge, the committee conducted six meetings in which the committee members heard presentations from individuals representing academia, nonprofit organizations, and various state governments. The committee also reviewed an extensive literature from peer-reviewed journals, published reports, and news articles. The background information and supporting evidence for the committee's report are contained within 16 signed appendixes written by committee members and three commissioned papers written by outside researchers.

The committee found it useful to set some boundaries on its work concerning the goal ("reducing tobacco use") and the time frame within which it should be achieved. To make its task manageable and well-focused, the committee decided to focus its literature review and evidence gathering on reducing cigarette smoking, without meaning to overlook or dismiss the health consequences of other forms of tobacco use. However, the committee believes that its recommendations, although derived from the evidence regarding interventions to reduce cigarette smoking, are fully applicable to smoking of other tobacco products and that most of the recommendations are also applicable to smokeless tobacco products. First of all, trends in smokeless use and cigarette use tend to move in tandem, suggesting that the population-level factors at work at any given time are affecting all forms of tobacco use. Although some smokers may switch to smokeless tobacco as a "risk-reducing" tactic, thereby offsetting some of the gains from smoking cessation, successful efforts to curtail smoking initiation do not appear to be compromised by increased initiation of smokeless use. Second, the committee believes that most of the interventions shown to be effective for

smoking (cessation, health-based interventions, school-based interventions, media efforts, sales restrictions, marketing restrictions) can be implemented in behavior-specific or product-specific manner, and that there is no apparent reason why their effectiveness would be weakened in relation to use of smokeless products if they were sensitively designed. Overall, therefore, the committee believes that it is reasonable to assume that implementation of its blueprint will, in the aggregate, lead to a reduction in all forms of tobacco use. Thus the committee refers throughout the report to the goal of “reducing tobacco use.”

The overarching goal of reducing smoking subsumes three distinct goals: reducing the rate of initiation of smoking among youth (IOM 1994), reducing third-party environmental tobacco smoke exposure (NRC 1986), and helping people quit smoking. For the purposes of this report, the committee sets to one side additional strategies that might reduce the harm of smoking for smokers who cannot quit, a topic dealt with extensively in another recent IOM report (IOM 2001).

Another important question regarding the scope of the committee’s work concerns the time frame. The committee wanted to design a blueprint for achieving substantial reductions in tobacco use, but to have a realistic opportunity for doing so, an ample period of time is needed. Yet, the target should not be so far in the distance as to lose its connection with current conditions or to outstrip the committee’s collective capacity to imagine the future. The committee decided to set a 20-year horizon for its projections and for the policies that it recommends.

The common interest of all nations in reducing tobacco use has been declared and effectuated by the World-Health-Organization–sponsored Framework Convention for Tobacco Control, which went into effect in 2005 and has been ratified by 142 nations (unfortunately not including the United States). The United States has a direct stake in reducing smuggling of tobacco products into this country that could undermine domestic tobacco control efforts, and the committee also recognizes the compelling importance of international tobacco control efforts for world health. However, the committee’s charge was to develop a tobacco control blueprint for the nation, not for the world. We hope, though, that some of the measures recommended in this report will provide useful models for other countries, just as the domestic interventions undertaken by other countries in recent years served as useful models for us.

In sum, the ultimate goal of the committee’s blueprint is to reduce smoking so substantially that it is no longer a significant public health problem for our nation; this is what is meant by the phrase “ending the tobacco problem” used in the title of this report. While that objective is not likely to be achieved in 20 years, the report aims to set the nation irreversibly on a course for doing so.

REPORT OVERVIEW

The committee's report is divided into two parts. Part I, comprising Chapters 1 through 3, provides the context for the committee's proposed policy blueprint. Chapter 1 discusses the extraordinary growth of tobacco use during the first half of the 20th century and its subsequent reversal in 1965 in the wake of the 1964 Surgeon General's report. This chapter also closely examines recent trends in tobacco use. Chapter 2 summarizes the ways in which the addictive properties of nicotine make it so difficult for people to quit, thereby sustaining tobacco use at high levels, and the factors associated with smoking initiation, especially the failure of adolescents to appreciate the risks and consequences of addiction when they become smokers. Chapter 3 reviews the history of tobacco control and concludes by projecting the likely prevalence of smoking over the next 20 years if current trends remain unchanged or if tobacco control efforts are weakened.

Part II of the committee's report presents a blueprint for reducing tobacco use. After reviewing the ethical grounding of tobacco control in Chapter 4, the committee sets forth its blueprint as a two-pronged strategy. The first prong, presented in Chapter 5, envisions strengthening traditional tobacco control measures that are currently known to be effective. Chapter 5 closes with a projection of the likely effects over the next two decades of implementing the policies outlined in this part of the blueprint. The second prong, described in Chapter 6, envisions changing the regulatory landscape to permit new policy innovations that take into account the unique history and characteristics of tobacco use.

Building on the foundation laid in Chapter 6, Chapter 7 briefly explores new frontiers of tobacco control, and urges the federal government to establish the necessary capacity for long-term tobacco policy development. The committee specifically reviews a proposal for gradually reducing the nicotine content of cigarettes. Although the committee acknowledges that this proposal requires further investigation and careful assessment before it is implemented, carrying it out offers a reasonable prospect of substantially curtailing and eliminating the public health burden of tobacco use.

Tobacco Use Since 1965

Wide-angle comparisons of measures of smoking behavior between 1965 and 2005 clearly show that the rates of tobacco consumption and smoking prevalence have declined among adults, the rate of smoking initiation has declined among adolescents, and the rate of smoking cessation has increased. However, a closer look at the trends over the past two decades tells a somewhat more complex story of both modest progress and some backsliding. For instance, although smoking prevalence has continued to

decline in the new millennium, it appears that progress in some areas may now be stalling.

Between 1965 and 2005, the percentage of adults who once smoked and who had quit more than doubled from 24.3 to 50.8 percent. Furthermore, the percentage of adults who had never smoked more than 100 lifetime cigarettes increased by approximately 23 percent from 1965 (44 percent) to 2005 (54 percent). Smoking initiation among adolescents and young adults has also declined since the mid-1960s. Among adolescents aged 12 to 17 years, 125.5 of every 1,000 smoked a cigarette for the first time in 1965. In 2003, 102.1 per 1,000 youths in the same age range had smoked a cigarette for the first time. The reduction in smoking initiation saved more than half a million adolescents from having a first cigarette between 1965 and 2004.

The steady decline in tobacco use since 1965 can be divided into two phases, the first running from 1965 to about 1980 and the second running from 1980 to the present. During the initial period, there was a sharp decline in smoking prevalence due to reduced initiation and increased cessation, accompanied by a modest increase in the average number of cigarettes smoked per day by smokers. However, since then, the continued decline in smoking prevalence has been accompanied by a substantial decline in cigarettes smoked per day among those who smoke. The committee believes that a substantial portion of the declines in smoking prevalence and smoking intensity over the past 25 years is attributable to tobacco control interventions, especially price increases and the emergence of a strong anti-smoking social norm.

Current trends, however, suggest that the annual rate of cessation among smokers remains fairly low, that the decline in the initiation rate may have slowed, and that overall adult prevalence may be flattening out at around 20 percent. These trends suggest that substantial and sustained efforts will be required to further reduce the prevalence of tobacco use and thereby reduce tobacco-related morbidity and mortality.

Factors Perpetuating the Tobacco Problem

What factors are perpetuating the tobacco problem? First and foremost, tobacco products are highly addictive because they contain nicotine, one of the most addictive substances used by humans. Nicotine addiction stimulates and sustains long-term tobacco use, with all of its serious health hazards and social costs, and poses significant challenges to smoking cessation efforts at both the individual and the population levels. Although an overwhelming majority of smokers (90 percent) regret having begun to smoke, overcoming the grip of addiction and the associated withdrawal symptoms is difficult; most smokers must try quitting several times before

they are successful. Progress in helping smokers who want to quit achieve successful and permanent cessation requires that a variety of cessation technologies—both clinical and population based—be readily available to the smoking population, and that they be used, and that they be effective.

Second, factors such as distorted risk and harm perceptions, which are associated with the initiation and maintenance of tobacco use among young smokers, pose a continuing obstacle for prevention and control strategies. Unfortunately, many youth view themselves as invulnerable to addiction and its associated harm. They are also sensitive to the social factors and norms that promote smoking, such as the influences exerted by peers, family members, and the exposure to smoking in the media. These influences tend to override the information about the risks of smoking. Therefore, to substantially reduce the rate of smoking initiation, it will be necessary to do a better job of counteracting the perceived benefits of smoking and to develop new tools that make the personal risks of starting to smoke more salient.

All new smokers are not young, however; some initiate smoking during their college years, which helps to explain why some new smokers have characteristics that differ from those of usual smokers. Specifically, they tend to have higher levels of education and income than other smokers. It is also noteworthy that some new smokers smoke at lower levels, and some never reach a level of dependence. It will be important for tobacco control experts to pay close attention to these emerging trends and to design appropriate interventions to respond to them.

On the other side of the ledger are smokers who have a more difficult time quitting, such as “hardcore” smokers with a long career of smoking and individuals with psychiatric comorbidities or special circumstances, including incarceration and homelessness. These groups have not been the primary targets of traditional cessation treatments or research studies. Achieving success in substantially reducing tobacco use will require taking stock of the progress made with current tobacco prevention and control strategies and identifying where they fall short in responding to emerging smoking trends and the characteristics and behaviors of subpopulations of smokers with particular vulnerabilities.

The Consequences of Unchanged or Weakened Tobacco Control

The committee has tried to project the likely public health consequences of intensified or weakened investments in tobacco control compared with those of the status quo. The good news is that even if tobacco control activities remain at present levels, smoking prevalence is likely to decline from about 21 percent in 2005 to a little less than 16 percent in 2025. This continued decline will occur because of the system’s inertia: there are currently more middle-aged and older smokers than there would have been had their

birth cohorts passed through the ages of tobacco initiation under higher tobacco prices and stronger tobacco controls. Over time, as those birth cohorts are replaced by aging younger cohorts who had lower rates of initiation, the prevalence of tobacco use will continue to decline. Shortly after 2025, however, the decline in prevalence appears likely to plateau at about 15 percent, well above the Healthy People 2010 target of 12 percent.

This steady-state scenario should be compared with a worst-case scenario, based on a weakening of tobacco control policies and programs. If a significant retrenchment occurred, the projected smoking prevalence in 2025 would be about 17 percent, resulting in approximately 4 million more people smoking than would otherwise occur. Although the momentum generated by the last four decades of tobacco control is unlikely to be erased altogether—the model does not take into account new smoking fads, other changes in demand, or industry innovations—these projections do show that a weakened commitment to tobacco control will affect millions of lives.

A BLUEPRINT FOR REDUCING TOBACCO USE

The committee believes that substantial and enduring reductions in tobacco use cannot be achieved simply by expecting past successes to continue. Continued progress will require the persistence and nimbleness needed to counteract industry innovations in marketing and product design as well as the larger cultural and economic forces that tend to promote and sustain tobacco use. The challenge is heightened by the fact that the customary tools of tobacco control may not be effective in reducing use among some tobacco users. Any slackening of the public health response not only will reduce forward progress but also may lead to backsliding.

Over the past 10 to 15 years, the operating assumptions of tobacco control policies in the United States and elsewhere in the world have fundamentally changed. The old paradigm that shaped public opinion and policymaking on tobacco control efforts tended to emphasize consumer freedom of choice and to decry all government intervention as paternalistic. In retrospect, however, the committee believes that these assumptions were rooted in the tobacco industry's successful efforts to deny and obscure the addictiveness and health consequences of tobacco use and on an array of resulting market failures, including information asymmetry between producers and users, distorted consumer choice due to information deficits, and product pricing that did not reflect the full social costs of tobacco use (especially the effects on nonsmokers). As the scientific evidence about addiction and initiation has grown and the tobacco industry's strategies have been exposed in the course of state lawsuits and other tobacco-related litigation, public understanding of tobacco addiction has quickly deepened and, as a result, the ethical and political context of tobacco policymaking has been

transformed. A widespread popular consensus in favor of aggressive policy initiatives is now emerging, and this shift in popular sentiment has also been accompanied by support across most of the political spectrum.

From a policy standpoint, many analysts think of the tobacco problem as a product safety problem. In an economic and social system that values freedom of choice, consumers are generally permitted to select products and activities as they see fit. If they want to assume risks, they are permitted to do exactly that. Government does not guarantee absolute safety, nor should it. Of course, some dangers are too high to be acceptable. So long as consumers are properly informed, however, the presumption has traditionally been in favor of consumer sovereignty and freedom of choice. Yet, even most libertarians will admit that the tobacco market has been characterized by severe market failures, as noted above. They acknowledge the legitimacy of interventions aiming to prevent youth smoking, to disseminate accurate information and correct misinformation, and to assure that nonsmokers are protected from involuntary exposure to tobacco smoke if the market does not function properly. The residual issue concerns the legitimacy of interventions that burden the choices of the minority of smokers who do not want to quit.

The notion of consumer sovereignty—of unambivalent respect for private choices—runs into serious difficulty when the underlying product creates serious long-term harms and has addictive properties, when its use is usually initiated by young people who lack a full and vivid appreciation of the associated risks, and when most users want to quit. Even in such circumstances, consumer sovereignty should not be abandoned but must be rethought to take account of the unique characteristics of tobacco products.

Cigarettes and other tobacco products are not ordinary consumer products. For no other lawful consumer product can it be said that the acknowledged aim of national policy is to suppress consumption. The committee's major goal here is to set forth a framework for reducing tobacco use, and its associated morbidity and mortality, while being duly respectful of the interests of consumers who choose to smoke and do not want to quit.

The committee makes 42 recommendations in the report, 22 regarding ways to strengthen traditional tobacco control measures and 20 regarding the new regulatory landscape. This summary highlights 19 key recommendations that represent the major components of the committee's blueprint for ending the tobacco problem. A listing of all 42 recommendations organized by chapter can be found at the end of this summary.

Strengthening Traditional Tobacco Control Measures

The first prong of the committee's blueprint assumes that the existing legal structure of tobacco control remains unchanged. It envisions steps

taken to strengthen traditional tobacco control measures that are known to be effective.

Support Comprehensive State Tobacco Control Programs

The committee finds compelling evidence that comprehensive state tobacco control programs can achieve substantial reductions in tobacco use. To effectively reduce tobacco use, states must maintain over time a comprehensive, integrated tobacco control strategy. However, large budget cutbacks in many states' tobacco control programs have seriously jeopardized further success. In the committee's view, states should adopt a funding strategy designed to provide stable support for the level of tobacco control funding recommended by the Centers for Disease Control and Prevention (CDC). The committee also finds that Master Settlement Agreement payments are not a reliable source of funds in most states. Tobacco excise tax revenues pose a potential funding stream for state tobacco control programs. Setting aside about one-third of the per-capita proceeds from tobacco excise taxes would help states fund programs at the level suggested by CDC.

Recommendation 1: Each state should fund state tobacco control activities at the level recommended by the CDC. A reasonable target for each state is in the range of \$15 to \$20 per capita, depending on the state's population, demography, and prevalence of tobacco use. If it is constitutionally permissible, states should use a statutorily prescribed portion of their tobacco excise tax revenues to fund tobacco control programs.

Increase Excise Taxes

It is well established that an increase in price decreases cigarette use and that raising tobacco excise taxes is one of the most effective policies for reducing use, especially among adolescents. Many states have increased their tobacco excise taxes, but these increases vary widely and there is some evidence of cross-state smuggling. The committee believes that equalizing tobacco excise tax rates across the states would help remedy this problem. Furthermore, an increase in the federal excise tax would have the dual purposes of reducing consumption and making more funds available for tobacco control programs.

Recommendation 2: States with excise tax rates below the level imposed by the top quintile of states should substantially increase their own rates to reduce consumption and to reduce smuggling and tax evasion. State excise tax rates should be indexed to inflation.

Recommendation 3: The federal government should substantially raise federal tobacco excise taxes, currently set at 39 cents a pack. Federal excise taxes should be indexed to inflation.

Strengthen Smoking Restrictions

The committee finds that smoking restrictions serve three purposes: (1) they protect nonsmokers from the health effects and the noxious odors of secondhand smoke; (2) they help smokers quit, cut down on their smoking, and avoid relapses; and (3) they reinforce a nonsmoking social norm. Clean air laws have done more to reduce tobacco consumption than any intervention other than cigarette price increases. The committee believes that smoking restrictions are a critical part of any tobacco control strategy. Smoking restrictions should be strengthened and should have broad coverage, including nonresidential indoor locations, health care facilities, correctional facilities, and residential complexes. The committee also believes that local government bans on indoor and outdoor smoking should not be preempted by state laws.

Recommendation 4: States and localities should enact complete bans on smoking in all nonresidential indoor locations, including workplaces, malls, restaurants, and bars. States should not preempt local governments from enacting bans more restrictive than the state ban.

Limit Youth Access to Tobacco Products

A reasonably enforced youth-access restriction is an essential element of modern tobacco control. Age verification, as contained in the 1996 FDA (Food and Drug Administration) Rule, as well as placing product displays behind the counter and banning self-service modes of access to tobacco work effectively to reduce youth access. Although a considerable number of states and localities currently license tobacco sales outlets and impose youth-access restrictions, weak enforcement in many states suggests that the potential deterrent threat of license suspension or revocation is not being realized.

Recommendation 11: All states should license retail sales outlets that sell tobacco products.

The number of Internet tobacco retailers has increased dramatically in recent years, generating concerns about minors accessing tobacco products and consumers evading excise tax payments. Given the inadequacy of current point-of-sale age verification for Internet transactions and the difficulty

of policing Internet tobacco transactions, as well as constitutional barriers to additional, state-imposed delivery requirements, the only practical way to effectively regulate online tobacco retailers is through legislation prohibiting both online tobacco sales and direct shipment of tobacco products to consumers.

Recommendation 12: All states should ban the sale of tobacco products directly to consumers through mail order or the Internet or other electronic systems. Shipments of tobacco products should be permitted only to licensed wholesale or retail outlets.

Intensify Prevention Interventions

The most fully developed programs for preventing tobacco use by youth have been implemented in school settings. School-based programs will and should remain the mainstay of group-oriented or individually-oriented tobacco use prevention activities. However, because teenage smoking initiation rates remain high, the committee also believes that investing in programs for families and health care providers is warranted, even though the evidence base remains thin. Furthermore the committee supports the funding of mass media campaigns, which a recent state-of-the-science panel of the National Institutes of Health identified as one of three effective approaches for reaching the general population and preventing tobacco use among adolescents and young adults.

Recommendation 13: School boards should require all middle schools and high schools to adopt evidence-based smoking prevention programs and implement them with fidelity. They should coordinate these in-school programs with public activities or mass media programming, or both. Such prevention programs should be conducted annually. State funding for these programs should be supplemented with funding from the U.S. Department of Education under the Safe and Drug-Free School Act or by an independent body administering funds collected from the tobacco industry through excise taxes, court orders, or litigation agreements.

Recommendation 15: A national, youth-oriented media campaign should be funded on an ongoing basis as a permanent component of the nation's strategy to reduce tobacco use. State and community tobacco control programs should supplement the national media campaign with coordinated youth prevention activities. The campaign should be implemented by an established public health organization with funds provided by the federal government, public-private partnerships, or

the tobacco industry (voluntarily or under litigation settlement agreements or court orders) for media development, testing, and purchases of advertising time and space.

Increase Smoking Cessation Interventions

Almost half of the estimated 44.5 million current adult smokers in the United States will die prematurely of a tobacco-related disease if nothing is done to help them stop smoking. A large number of randomized clinical trials and other research studies confirm the efficacy of smoking cessation interventions. Despite the availability of many successful interventions, only a small proportion of tobacco users receive any type of intervention. To enhance program utilization and smoking cessation rates among the general population, smokers must know that safe, effective, and accessible cessation programs, including medications, are available. The health care setting is an ideal venue in which individuals can be screened for their smoking behaviors and comprehensive smoking cessation services can be targeted to populations with a high prevalence of smoking. Ensuring the uptake of cessation interventions will require health insurance benefit packages to cover these services.

Recommendation 16: State tobacco control agencies should work with health care partners to increase the demand for effective cessation programs and activities through mass media and other general and targeted public education programs.

Recommendation 20: All insurance, managed care, and employee benefit plans, including Medicaid and Medicare, should cover reimbursement for effective smoking cessation programs as a lifetime benefit.

Projected Impact of Strengthening Traditional Tobacco Control Measures

What would be the impact on national tobacco use prevalence in 2025 of implementing these traditional tobacco control measures aggressively? In order to address this question, the committee modeled the effects of the following policies:

- Tax increases of \$1 and \$2 per pack
- Nationwide implementation of clean air laws for all work sites (including bars)
- Comprehensive media campaigns targeting youth and adults and funded at the levels recommended by the CDC (i.e., beyond the

levels that have been used in the past) to prevent initiation and to increase quit attempts, heighten consumer demand for proven cessation programs, and to increase smoker's health literacy about the value of using evidence-based treatments when trying to quit

- Comprehensive cessation policies (full coverage of pharmacotherapy and behavioral therapy, training and coverage for tobacco brief interventions, multisession quit lines, internet interventions, and free nicotine replacement therapy)
- Universal implementation of school-based prevention sufficient to cut the rate of smoking initiation by 10 percent
- Heavy enforcement of youth-access laws, accompanied by publicity and high penalties
- All of these things being done together with \$1- or \$2-per-pack tax increases

The committee's projections suggest that these individual policies, particularly the cessation interventions and tax increases, could have a substantial effect on tobacco use prevalence over time. Indeed, collectively they are projected to meet the Healthy People 2010 smoking prevalence target of 12 percent in about 2020, with a 10 percent prevalence reached in 2025.

Overall, however, the committee finds these model projections only modestly encouraging. On the positive side, the actions outlined in this chapter seem to be powerful and effective. Implementing this set of recommendations fully might allow the important goal of a 10 percent smoking prevalence to be achieved, albeit not until 2025. On the other hand, removing any single one of the comprehensive policy's components would prevent the modeled prevalence from hitting the 10 percent target in 2025. Hence the success of these strategies is, in some sense, fragile, requiring absolute commitment to full implementation. Given the recent retrenchment in tobacco control efforts, one might worry whether that level of commitment can be achieved and sustained.

Realistically, the committee is doubtful that the prevalence of smoking among adults will drop significantly below 15 percent or that the rate of smoking initiation will permanently fall below 15 percent if the basic legal structure of the tobacco market, and the tobacco control community's responses to that market, remain unchanged. Although achieving these levels would be a major improvement, they are not satisfactory from a public health standpoint simply because of the large numbers of premature deaths and other serious harmful consequences that would inevitably follow. The steps outlined so far are surely necessary in the short run, but the nation should be prepared to do more over the long run.

CHANGING THE REGULATORY LANDSCAPE

The second prong of the committee's blueprint envisions a much more substantial federal presence in antismoking efforts, characterized by a fundamentally transformed legal structure. The committee believes that the time has come for Congress to exercise its acknowledged authority to regulate tobacco products while freeing the states to supplement federal action with measures that serve the national objective of suppressing tobacco use and that are compatible with federal law. Under a transformed legal structure, a federal regulatory agency, most likely the FDA, would be given plenary regulatory authority and the states would be liberated to take aggressive actions against smoking now forbidden by federal law.

If Congress preempts direct state regulation of tobacco product characteristics and packaging, it should allow complementary state regulation in other domains of tobacco regulation, including marketing and distribution, and should make its intentions regarding the narrow scope of preemption clear in the legislative record.

Recommendation 23: Congress should repeal the existing statute preempting state tobacco regulation of advertising and promotion “based on smoking and health” and should enact a new provision that precludes direct state regulation only in relation to tobacco product characteristics and packaging while allowing complementary state regulation in all other domains of tobacco regulation, including marketing and distribution. Under this approach, federal regulation sets a floor while allowing states to be more restrictive.

Empower FDA to Regulate Tobacco

Congress should confer broad authority on the FDA to regulate the manufacture, distribution, marketing, and use of tobacco products. Requiring tobacco products to be “safe” is not an available option, of course, and prohibition of the existing products is not a feasible regulatory strategy. Overall, the regulatory standard should be to “protect the public health” by reducing initiation, promoting cessation, preventing relapse, reducing consumption, and reducing product hazards. This standard incorporates its own limitation because it will require the agency to evaluate the likely consumer responses to any proposed regulation, including the likelihood of product substitution and the creation of black markets that could nullify the anticipated public health benefits of the regulation.

Recommendation 24: Congress should confer upon the FDA broad regulatory authority over the manufacture, distribution, marketing, and use of tobacco products.

Recommendation 25: Congress should empower the FDA to regulate the design and characteristics of tobacco products to promote the public health. Specific authority should be conferred

- to require tobacco manufacturers to disclose to the agency all chemical compounds found in both product and the product's smoke, whether added or occurring naturally, by quantity; to disclose to the public the amount of nicotine in the product and the amount delivered to the consumer based on standards established by the agency; to disclose to the public research on their product, as well as behavioral aspects of its use; and to notify the agency whenever there is a change in a product;
- to prescribe cigarette testing methods, including how the cigarettes are tested and which smoke constituents must be measured;
- to promulgate tobacco product standards, including reduction of nicotine yields and reduction or elimination of other constituents, wherever such a standard is found to be appropriate for protection of the public health, taking into consideration the risks and benefits to the population as a whole, including users and non-users of tobacco products; and
- to develop specific standards for evaluating novel products that companies intend to promote as reduced-exposure or reduced-risk products, and to regulate reduced-exposure and reduced-risk health claims, assuring that there is a scientific basis for claims that are permitted.

Strengthen Health Warnings on Tobacco Packages

Tobacco packages can be an effective channel for health communications. The currently mandated federal health warnings are inadequate and should be strengthened to promote greater understanding of the health risks of tobacco use and to discourage consumption. Aside from printed health warnings, regulatory authorities can convey other health-related information on or with tobacco packages, including information about quitting. Congress should empower FDA to update warnings and other package-based health communications on a regular basis. In addition, the agency should be empowered to ban such terms as “light” as well as other descriptors, signals, or practices that have the purpose or effect of leading consumers to believe that smoking the cigarette brand with that descriptor may result in a lower risk of disease or may be less hazardous to their health than smoking other brands of cigarettes.

Recommendation 26: Congress should strengthen the federally mandated warning labels for tobacco products immediately and should

delegate authority to the FDA to update and revise these warnings on a regular basis upon finding that doing so would promote greater public understanding of the risks of using tobacco products or reduce tobacco consumption. Congress should require or authorize the FDA to require rotating color graphic warnings covering 50 percent of the package equivalent to those required in Canada.

Recommendation 28: Congress should ban, or empower the FDA to ban, terms such as “mild,” “lights,” “ultra-lights,” and other misleading terms mistakenly interpreted by consumers to imply reduced risk, as well as other techniques, such as color codes, that have the purpose or effect of conveying false or misleading impressions about the relative harmfulness of the product.

Transform the Retail Environment

Effective measures for restricting the commercial distribution of tobacco products to youth are only a starting point. Tobacco is not an ordinary consumer product and should not be treated as such. The sale of tobacco products to adults, although permitted, is disfavored as a matter of public policy. The retail environment should be designed to effectuate the public health goals of discouraging tobacco use and reducing the numbers of people with tobacco-related diseases.

Recommendation 30: Congress and state legislatures should enact legislation regulating the retail point of sale of tobacco products for the purpose of discouraging consumption of these products and encouraging cessation. Specifically:

- All retail outlets choosing to carry tobacco products should be licensed and monitored. (See also youth access section in Chapter 5.)
- Commercial displays or other activity promoting tobacco use by or in retail outlets should be banned, although text-only informational displays (e.g., price or health-related product characteristics) may be permitted within prescribed regulatory constraints.
- Retail outlets choosing to carry tobacco products should be required to display and distribute prescribed warnings about the health consequences of tobacco use, information regarding products and services for cessation, and corrective messages designed to offset misstatements or implied claims regarding the health effects of tobacco use (e.g., that “light” cigarettes are less harmful than other cigarettes).

- Retail outlets choosing to carry tobacco products should be required to allocate a proportionate amount of space to cessation aids and nicotine replacement products and, after regulatory clearance by the FDA or a designated state agency, to “qualifying” exposure-reduction products. (The FDA or a suitable state health agency should promulgate a list of “qualifying” exposure-reducing products.)

Recommendation 32: State governments should develop and, if feasible, implement and evaluate legal mechanisms for restructuring retail tobacco sales and restricting the number of tobacco outlets.

Recommendation 33: Congress should empower the FDA to restrict outlets in order to limit access and facilitate regulation of the retail environment, and thereby protect the public health.

Coordinate State Tobacco Control Through a Federal Assessment on Tobacco Companies

In Recommendation 2, the committee urges the low-tax states to raise their excise taxes to what is now the upper quintile of state tax rates. If that recommendation were implemented by all the states, it would substantially decrease, if not eliminate, the incentive for cross-state smuggling. However, if the states do not deal successfully with this problem on their own, the increasing variation in state tobacco excise taxes should be addressed by the federal government. The committee offers a new federal funding scheme (the National Tobacco Control Funding Plan, described below) as a back-up plan to support and coordinate state tobacco control programs while giving the states with low tobacco excise taxes the incentive to raise them.

Recommendation 34: If most states fail to increase tobacco control funding and reduce variations in tobacco excise tax rates as proposed in Recommendations 1 and 2, Congress should enact a National Tobacco Control Funding Plan raising funds through a per-pack remedial assessment on cigarettes sold in the United States. Part of the proceeds should be used to support national tobacco control programs and the remainder of the funds should be distributed to the states to subsidize state tobacco control programs according to a formula based on the level of state tobacco control expenditures and state tobacco excise rates. The plan should be designed to give states an incentive, not only to increase state spending on tobacco control, but also to raise cigarette taxes, especially in low-tax states. Congress should assure that any

federal coordination mechanism affecting the coverage and collection of state tobacco excise taxes applies to Indian tribes.

Restrict Advertising and Promotion by Manufacturers

The scientific evidence documenting the relationship between exposure to tobacco advertising and tobacco consumption has accumulated, and prevailing scientific opinion is that the relationship is a causal one.

Recommendation 35: Congress and state legislatures should enact legislation limiting visually displayed tobacco advertising in all venues, including mass media and at the point-of-sale, to a text-only, black-and-white format.

Recommendation 36: Congress and state legislatures should prohibit tobacco companies from targeting youth under 18 for any purpose, including dissemination of messages about smoking (whether ostensibly to promote or discourage it) or to survey youth opinions, attitudes and behaviors of any kind. If a tobacco company wishes to support youth prevention programs, the company should contribute funds to an independent non-profit organization with expertise in the prevention field. The independent organization should have exclusive responsibility for designing, executing, and evaluating the program.

CONCLUSION

The committee recognizes that important advances in reducing tobacco use have been made over the past two decades. Accordingly, the recommendations offered in Chapter 5 of the report seek to emphasize and strengthen tobacco control interventions that have proven effective over time. If this part of the blueprint is successfully implemented and sustained, it could have a significant impact on tobacco use; but even an optimistic projection leaves prevalence at 10 percent in 2025, and a more realistic projection might be 15 percent. The main argument presented in Chapter 6 is that a more substantial long-term impact requires a change in the current legal framework of tobacco control and the adoption of regulatory innovations that take into account the unique history and characteristics of tobacco. It is too soon to project the effects of such new regulatory initiatives, but the committee believes that a concerted effort to transform the regulatory environment is a necessary condition for ending the tobacco problem in the United States.

COMPLETE LIST OF RECOMMENDATIONS

Strengthening Traditional Tobacco Control Measures

Recommendation 1: Each state should fund state tobacco control activities at the level recommended by the CDC. A reasonable target for each state is in the range of \$15 to \$20 per capita, depending on the state's population, demography, and prevalence of tobacco use. If it is constitutionally permissible, states should use a statutorily prescribed portion of their tobacco excise tax revenues to fund tobacco control programs.

Recommendation 2: States with excise tax rates below the level imposed by the top quintile of states should also substantially increase their own rates to reduce smuggling and tax evasion. State excise tax rates should be indexed to inflation.

Recommendation 3: The federal government should substantially raise federal tobacco excise taxes, currently set at 39 cents a pack. Federal excise tax rates should be indexed to inflation.

Recommendation 4: States and localities should enact complete bans on smoking in all nonresidential indoor locations, including workplaces, malls, restaurants, and bars. States should not preempt local governments from enacting bans more restrictive than the state ban.

Recommendation 5: All health care facilities, including nursing homes, psychiatric hospitals, and medical units in correctional facilities, should meet or exceed JCAHO standards in banning smoking in all indoor areas.

Recommendation 6: The American Correctional Association should require through its accreditation standards that all correctional facilities (prisons, jails, and juvenile detention facilities) implement bans on indoor smoking.

Recommendation 7: States should enact legislation requiring leases for multiunit apartment buildings and condominium sales agreements to include the terms governing smoking in common areas and residential units. States and localities should also encourage the owners of multiunit apartment buildings and condominium developers to include nonsmoking clauses in these leases and sales agreements and to enforce them.

Recommendation 8: Colleges and universities should ban smoking in indoor locations, including dormitories, and should consider setting a smoke-free campus as a goal. Further, colleges and universities should ban the promotion of tobacco products on campus and at all campus-sponsored events. Such policies should be monitored and evaluated by oversight committees, such as those associated with the American College Health Association.

Recommendation 9: State health agencies, health care professionals, and other interested organizations should undertake strong efforts to encourage parents to make their homes and vehicles smoke free.

Recommendation 10: States should not preempt local governments from restricting smoking in outdoor public spaces, such as parks and beaches.

Recommendation 11: All states should license retail sales outlets that sell tobacco products. Licensees should be required to (1) verify the date of birth, by means of photographic identification, of any purchaser appearing to be 25 years of age or younger; (2) place cigarettes exclusively behind the counter and sell cigarettes only in a direct face-to-face exchange; and (3) ban the use of self-service displays and vending machines. Repeat violations of laws restricting youth access should be subject to license suspension or revocation. States should not preempt local governments from licensing retail outlets that sell tobacco products.

Recommendation 12: All states should ban the sale and shipment of tobacco products directly to consumers through mail order or the Internet or other electronic systems. Shipments of tobacco products should be permitted only to licensed wholesale or retail outlets.

Recommendation 13: School boards should require all middle schools and high schools to adopt evidence-based smoking prevention programs and implement them with fidelity. They should coordinate these in-school programs with public activities or mass media programming, or both. Such prevention programs should be conducted annually. State funding for these programs should be supplemented with funding from the U.S. Department of Education under the Safe and Drug-Free School Act or by an independent body administering funds collected from the tobacco industry through excise taxes, court orders, or litigation agreements.

Recommendation 14: All physicians, dentists, and other health care providers should screen and educate youth about tobacco use during

their annual health care visits and any other visit in which a health screening occurs. Physicians should refer youth who smoke to counseling services or smoking cessation programs available in the community. Physicians should also urge parents to keep a smoke-free home and vehicles, to discuss tobacco use with their children, to convey that they expect their children to not use tobacco, and to monitor their children's tobacco use. Professional societies, including the American Medical Association, the American Nursing Association, the American Academy of Family Physicians, the American College of Physicians, and the American Academy of Pediatrics, should encourage physicians to adopt these practices.

Recommendation 15: A national, youth-oriented media campaign should be funded on an ongoing basis as a permanent component of the nation's strategy to reduce tobacco use. State and community tobacco control programs should supplement the national media campaign with coordinated youth prevention activities. The campaign should be implemented by an established public health organization with funds provided by the federal government, public-private partnerships, or the tobacco industry (voluntarily or under litigation settlement agreements or court orders) for media development, testing, and purchases of advertising time and space.

Recommendation 16: State tobacco control agencies should work with health care partners to increase the demand for effective cessation programs and activities through mass media and other general and targeted public education programs.

Recommendation 17: Congress should ensure that stable funding is continuously provided to the national quitline network.

Recommendation 18: The Secretary of the U.S. Department of Health and Human Services, through the National Cancer Institute, the Centers for Disease Control and Prevention, and other relevant federal health agencies, should fund a program of developmental research and demonstration projects combining media techniques, other social marketing methods, and innovative approaches to disseminating smoking cessation technologies.

Recommendation 19: Public and private health care systems should organize and provide access to comprehensive smoking cessation programs by using a variety of successful cessation methods and a staged disease management model (i.e. stepped care), and should specify the

successful delivery of these programs as one criterion for quality assurance within those systems.

Recommendation 20: All insurance, managed care, and employee benefit plans, including Medicaid and Medicare, should cover reimbursement for effective smoking cessation programs as a lifetime benefit.

Recommendation 21: While sustaining their own valuable tobacco control activities, state tobacco control programs, CDC, philanthropic foundations, and voluntary organizations should continue to support the efforts of community coalitions promoting, disseminating, and advocating for tobacco use prevention and cessation, smoke-free environments, and other policies and programs for reducing tobacco use.

Recommendation 22: Tobacco control programs should consider populations disproportionately affected by tobacco addiction and tobacco-related morbidity and mortality when designing and implementing prevention and treatment programs. Particular attention should be paid to ensuring that health communications and other materials are culturally-appropriate and that special outreach efforts target all high-risk populations. Standard prevention or treatment programs that are modified to reach high-risk populations should be evaluated for effectiveness.

Changing the Regulatory Landscape

Recommendation 23: Congress should repeal the existing statute preempting state tobacco regulation of advertising and promotion “based on smoking and health” and should enact a new provision that precludes all direct state regulation only in relation to tobacco product characteristics and packaging while allowing complementary state regulation in all other domains of tobacco regulation, including marketing and distribution. Under this approach, federal regulation sets a floor while allowing states to be more restrictive.

Recommendation 24: Congress should confer upon the FDA broad regulatory authority over the manufacture, distribution, marketing, and use of tobacco products.

Recommendation 25: Congress should empower the FDA to regulate the design and characteristics of tobacco products to promote the public health. Specific authority should be conferred

- to require tobacco manufacturers to disclose to the agency all chemical compounds found in both product and the product's smoke, whether added or occurring naturally, by quantity; to disclose to the public the amount of nicotine in the product and the amount delivered to the consumer based on standards established by the agency; to disclose to the public research on their product, as well as behavioral aspects of its use; and to notify the agency whenever there is a change in a product;
- to prescribe cigarette testing methods, including how the cigarettes are tested and which smoke constituents must be measured;
- to promulgate tobacco product standards, including reduction of nicotine yields and reduction or elimination of other constituents, wherever such a standard is found to be appropriate for protection of the public health, taking into consideration the risks and benefits to the population as a whole, including users and non-users of tobacco products; and
- to develop specific standards for evaluating novel products that companies intend to promote as reduced-exposure or reduced-risk products, and to regulate reduced-exposure and reduced-risk health claims, assuring that there is a scientific basis for claims that are permitted.

Recommendation 26: Congress should strengthen the federally mandated warning labels for tobacco products immediately and should delegate authority to the FDA to update and revise these warnings on a regular basis upon finding that doing so would promote greater public understanding of the risks of using tobacco products or reduce tobacco consumption. Congress should require or authorize the FDA to require rotating color graphic warnings covering 50 percent of the package equivalent to those required in Canada.

Recommendation 27: Congress should empower the FDA to require manufacturers to include in or on tobacco packages information about the health effects of tobacco use and about products that can be used to help people quit.

Recommendation 28: Congress should ban, or empower the FDA to ban, terms such as "mild," "lights," "ultra-lights," and other misleading terms mistakenly interpreted by consumers to imply reduced risk, as well as other techniques, such as color codes, that have the purpose or effect of conveying false or misleading impressions about the relative harmfulness of the product.

Recommendation 29: Whenever a court or administrative agency has found that a tobacco company has made false or misleading communications regarding the effects of tobacco products, or has engaged in conduct promoting tobacco use among youth or discouraging cessation by tobacco users of any age, the court or agency should consider using its remedial authority to require manufacturers to include corrective communications on or with the tobacco package as well as at the point of sale.

Recommendation 30: Congress and state legislatures should enact legislation regulating the retail point of sale of tobacco products for the purpose of discouraging consumption of these products and encouraging cessation. Specifically:

- All retail outlets choosing to carry tobacco products should be licensed and monitored. (See also youth access section in Chapter 5.)
- Commercial displays or other activity promoting tobacco use by or in retail outlets should be banned, although text-only informational displays (e.g., price or health-related product characteristics) may be permitted within prescribed regulatory constraints.
- Retail outlets choosing to carry tobacco products should be required to display and distribute prescribed warnings about the health consequences of tobacco use, information regarding products and services for cessation, and corrective messages designed to offset misstatements or implied claims regarding the health effects of tobacco use (e.g., that “light” cigarettes are less harmful than other cigarettes).
- Retail outlets choosing to carry tobacco products should be required to allocate a proportionate amount of space to cessation aids and nicotine replacement products and, after regulatory clearance by the FDA or a designated state agency, to “qualifying” exposure-reduction products. (The FDA or a suitable state health agency should promulgate a list of “qualifying” exposure-reducing products.)

Recommendation 31: Congress should explicitly and unmistakably include production, marketing, and distribution of tobacco products on Indian reservations by Indian tribes within the regulatory jurisdiction of FDA. Authority to investigate and enforce the Jenkins Act should be transferred to the Bureau of Alcohol, Tobacco, Firearms and Explosives. State restrictions on retail outlets should apply to all outlets on Indian reservations.

Recommendation 32: State governments should develop and, if feasible, implement and evaluate legal mechanisms for restructuring retail tobacco sales and restricting the number of tobacco outlets.

Recommendation 33: Congress should empower the FDA to restrict outlets in order to limit access and facilitate regulation of the retail environment, and thereby protect the public health.

Recommendation 34: If most states fail to increase tobacco control funding and reduce variations in tobacco excise tax rates as proposed in Recommendations 1 and 2, Congress should enact a National Tobacco Control Funding Plan raising funds through a per-pack remedial assessment on cigarettes sold in the United States. Part of the proceeds should be used to support national tobacco control programs and the remainder of the funds should be distributed to the states to subsidize state tobacco control programs according to a formula based on the level of state tobacco control expenditures and state tobacco excise rates. The plan should be designed to give states an incentive, not only to increase state spending on tobacco control, but also to raise cigarette taxes, especially in low-tax states. Congress should assure that any federal coordination mechanism affecting the coverage and collection of state tobacco excise taxes applies to Indian tribes.

Recommendation 35: Congress and state legislatures should enact legislation limiting visually displayed tobacco advertising in all venues, including mass media and at the point-of-sale, to a text-only, black-and-white format.

Recommendation 36: Congress and state legislatures should prohibit tobacco companies from targeting youth under 18 for any purpose, including dissemination of messages about smoking (whether ostensibly to promote or discourage it) or to survey youth opinions, attitudes and behaviors of any kind. If a tobacco company wishes to support youth prevention programs, the company should contribute funds to an independent non-profit organization with expertise in the prevention field. The independent organization should have exclusive responsibility for designing, executing, and evaluating the program.

Recommendation 37: The Motion Picture Association of America (MPAA) should encourage and facilitate the showing of anti-smoking advertisements before any film in which smoking is depicted in more than an incidental manner. The film rating board of the MPAA should consider the use of tobacco in the movies as a factor in assigning mature film ratings (e.g., an R-rating indicating Restricted: no one under age 17 admitted without parent or guardian) to films that depict tobacco use.

Recommendation 38: Congress should appropriate the necessary funds to enable the U.S. Department of Health and Human Services to conduct a periodic review of a representative sample of movies, television programs, and videos that are offered at times or in venues in which there is likely to be a significant youth audience (e.g., 15 percent) in order to ascertain the nature and frequency of images portraying tobacco use. The results of these reviews should be reported to Congress and to the public.

Recommendation 39: State tobacco control agencies should conduct surveillance of tobacco sales and use and the effects of tobacco control interventions in order to assess local trends in usage patterns; identify special groups at high risk for tobacco use; determine compliance with state and local tobacco-related laws, policies, and ordinances; and evaluate overall programmatic success.

Recommendation 40: The Secretary of HHS, through FDA or other agencies, should establish a national comprehensive tobacco surveillance system to collect information on a broad range of elements needed to understand and track the population impact of all tobacco products and the effects of national interventions (such as attitudes, beliefs, product characteristics, product distribution and usage patterns, and marketing messages and exposures to them).

New Frontiers in Tobacco Control

Recommendation 41: Congress should direct the Centers for Disease Control and Prevention to undertake a major program of tobacco control policy analysis and development and should provide sufficient funding to support the program. This program should develop the next generation of macro-level simulation models to project the likely effects of various policy innovations, taking into account the possible initiatives and responses of the tobacco industry as well as the impacts of the innovations on consumers.

Recommendation 42: Upon being empowered to regulate tobacco products, the FDA should give priority to exploring the potential effectiveness of a long-term strategy for reducing the amount of nicotine in cigarettes and should commission the studies needed to assess the feasibility of implementing such an approach. If such a strategy appears to be feasible, the agency should develop a long-term plan for implementing the strategy as part of a comprehensive plan for reducing tobacco use.

REFERENCES

- CDC (Centers for Disease Control and Prevention). 2005. Annual smoking-attributable mortality, years of potential life lost, and productivity losses—United States, 1997–2001. *MMWR (Morbidity and Mortality Weekly Report)* 54(25):625-628.
- DHHS (U.S. Department of Health and Human Services). 2006. *The Health Consequences of Involuntary Exposure to Tobacco Smoke: A Report of the Surgeon General*. Atlanta, GA: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, Coordinating Center for Health Promotion, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health.
- IOM (Institute of Medicine). 1994. *Growing Up Tobacco Free: Preventing Nicotine Addiction in Children and Youth*. Washington, DC: National Academy Press.
- IOM. 2001. *Clearing the Smoke: Assessing the Science Base for Tobacco Harm Reduction*. Washington, DC: National Academy Press.
- NRC (National Research Council). 1986. *Environmental Tobacco Smoke: Measuring Exposures and Assessing Health Effects*. Washington, DC: National Academy Press.

Introduction

In 1964, almost half of the adults in the United States smoked cigarettes. Today, the prevalence of cigarette smoking among adults is 20.9 percent (CDC 2006). This substantial decline led the Centers for Disease Control and Prevention to characterize the reduction of smoking as one of the 10 greatest achievements in public health in the 20th century (CDC 1999). It was a great achievement, but the mission remains unfinished. Tobacco use still causes 440,000 deaths in the United States every year (CDC 2005), with secondhand smoke responsible for 50,000 of those deaths (DHHS 2006). All told, approximately one in every five deaths is smoking-related, accounting for more deaths than those from AIDS, alcohol use, cocaine use, heroin use, homicides, suicides, motor vehicle crashes, and fires combined (Healthy People 2010 2005).

The health consequences of tobacco use are numerous (CDC 2005). Each year between 1997 and 2001, smoking caused 160,000 deaths from cancer that affect the lips, mouth, throat, stomach, pancreas, lungs, cervix, kidney, and bladder. Smoking caused 140,000 deaths annually from hypertension, stroke, heart disease, and other cardiovascular problems. The third largest specific cause of smoking-related death is respiratory diseases, comprising 100,000 deaths annually. Smoking is a major cause of morbidity and mortality from infectious diseases, including influenza, pneumococcal pneumonia, tuberculosis, and others (Arcavi and Benowitz 2004). Smoking during pregnancy and infant exposure to tobacco smoke also causes poor birth outcomes such as prematurity, low birth weight, respiratory problems in the newborn, and sudden infant death syndrome (CDC 2004; DHHS 2006).

Although cigarette smoking is often referred to as the single leading preventable cause of death in the United States, other forms of tobacco are also dangerous. For example, men who report moderate inhalation and smoke at least five cigars a day experience lung cancer deaths at about two-thirds the rate of men who smoke one pack of cigarettes a day. Cigar smokers experience higher rates of lung cancer, heart disease, and chronic obstructive lung disease than nonsmokers. Cigar smokers who inhale are 6 times more likely to die from oral cancer and 39 times more likely to die from laryngeal cancers than nonsmokers (NCI 1998). Bidis and Kreteks are associated with increased risks of cancers in the gastrointestinal and respiratory systems as well as other respiratory problems. Smokeless tobacco contains 28 carcinogens and is associated with the risk of oral cancer. It is also associated with gum recession and a condition called leukoplakia, a precancerous change in buccal and gingival mucosa (CDC 2004).

The health consequences of tobacco use have substantial economic effects. Because of smoking-related mortality, more than 3.3 million years of potential life among men and 2.2 million years of potential life among women are lost annually (compared with the life expectancies among nonsmokers). The lost productivity attributable to these years of life lost amounts to more than \$92 billion annually (CDC 2005).¹ Other economic costs of tobacco use amount to more than \$155 billion every year. Private and public health care expenditures for smoking related health conditions are an estimated \$89 billion, including \$28.4 billion in federal and state payments to Medicaid. Health care expenditures for secondhand smoke alone are approximately \$5 billion per year (Lindblom and McMahon 2005).

Other social costs associated with tobacco use include the costs associated with smoking-related fires and casualties and degradation of the environment. Smoking is the fifth most frequent cause of residential fires—the leading cause of fire deaths. In addition, states and the federal government spend millions of dollars annually on prevention and research efforts relating to tobacco use. In FY 2002, for instance, state and federal funding for tobacco control programs totaled \$861.9 million, or \$3.16 per capita (CDC 2002). In FY 2005, state spending alone totaled \$538.4 million, or \$2.76 per capita (data for state and national funding combined since FY 2002 are not available).

Tobacco use will not disappear in the United States simply because of the momentum of past achievements. The decline in tobacco use achieved over the last several decades is likely to flatten out in the coming decade, and strong measures are likely to be needed to maintain continued progress

¹This estimate of years of potential life lost and its associated productivity losses does not include deaths from burns or deaths from secondhand smoke.

thereafter. One problem is that the annual rate of cessation, never very high, has been flat since 2002. In addition, a major impediment to achieving a permanent long-term reduction in the prevalence of tobacco use is the high smoking initiation rate among teenagers. Notwithstanding substantial investment in tobacco control efforts in recent years, prevalence of current smoking among high school seniors remains at about 20 percent, and most of these individuals will remain smokers as adults. Approximately 90 percent of adult smokers began smoking as teenagers (SAMHSA 2006).

THE COMMITTEE'S CHARGE

Concerns about the waning momentum of tobacco control efforts and about declining public attention to what remains the nation's largest public health problem led the American Legacy Foundation to ask the Institute of Medicine (IOM) to conduct a major study of tobacco policy in the United States. The IOM appointed a 14-member committee and charged it to assess past progress and future prospects in tobacco control and to develop a blueprint for reducing tobacco use in the United States. The study's statement of task is presented in Box I-1.

To carry out its charge, the committee conducted six meetings between May 2004 and June 2005 at which the members heard presentations from individuals representing academia, nonprofit organizations, and various state governments. The committee also reviewed an extensive literature from peer-reviewed journals, published reports, and news articles. The background information and supporting evidence for the committee's report are contained in 12 signed appendixes written by committee members and three commissioned papers written by outside researchers.

The committee found it useful to set some boundaries on its work concerning the goal ("reducing tobacco use") and the time frame within which it should be achieved. To make its task manageable and well-focused, the committee decided to focus its literature review and evidence gathering on reducing cigarette smoking, without meaning to overlook or dismiss the health consequences of other forms of tobacco use. However, the committee believes that its recommendations, although derived from the evidence regarding interventions to reduce cigarette smoking, are fully applicable to smoking of other tobacco products and that most of the recommendations are also applicable to smokeless tobacco products. First of all, trends in smokeless use and cigarette use tend to move in tandem, suggesting that the population-level factors at work at any given time are affecting all forms of tobacco use. Although some smokers may switch to smokeless tobacco as a "risk-reducing" tactic, thereby offsetting some of the gains from smoking cessation, successful efforts to curtail smoking initiation do not appear to be compromised by increased initiation of smokeless use. Second, the

BOX I-1 Statement of Task

The nation has made tremendous progress in reducing tobacco use over the past 40 years. Despite extensive knowledge about successful interventions to reduce tobacco use, approximately one-quarter of American adults still smokes. Tobacco-related illnesses and death place a huge burden on our society. A committee at the Institute of Medicine will examine which prevention and treatment interventions are most promising to reduce tobacco use further, the barriers to action, and which policies need to be changed or adopted. The committee will also explore the benefits to society of fully implementing effective tobacco control interventions and policies. The committee's recommendations will be broad reaching, targeting federal, state, local, non-profit, and for-profit entities. The purpose of this committee is to generate a blueprint for the nation in the struggle to reduce tobacco use.

committee believes that most of the interventions shown to be effective for smoking (cessation, health-based interventions, school-based interventions, media efforts, sales restrictions, marketing restrictions) can be implemented in behavior-specific or product-specific manner, and that there is no apparent reason why their effectiveness would be weakened in relation to use of smokeless products if they were sensitively designed. Overall, therefore, the committee believes that it is reasonable to assume that implementation of its blueprint will, in the aggregate, lead to a reduction in all forms of tobacco use. Thus the committee refers throughout the report to the goal of “reducing tobacco use.”

The overarching goal of reducing smoking subsumes three distinct goals: reducing the rate of initiation of smoking among youth (IOM 1994), reducing third-party environmental tobacco smoke (ETS) exposure (NRC 1986), and helping people quit smoking. For the purposes of this report, the committee sets to one side additional strategies that might reduce the harm of smoking for smokers who cannot quit, a topic dealt with extensively in another recent IOM report (IOM 2001).

Another important question regarding the scope of the committee's work concerns the time frame. The committee wanted to design a blueprint for achieving substantial reductions in tobacco use, but to have a realistic opportunity for doing so, an ample period of time is needed. Yet, the target should not be so far in the distance as to lose its connection with current conditions or to outstrip the collective capacity to imagine the future. The committee decided to set a 20-year horizon for its projections and for the policies that it recommends.

In sum, the ultimate goal of the committee's blueprint is to reduce tobacco use so substantially that it is no longer a significant public health

problem; this is what is meant by the phrase “ending the tobacco problem” used in the title of this report. While that objective is not likely to be achieved in 20 years, the report aims to set the nation irreversibly on a course for doing so.

The committee also needed to decide what it means to formulate a “blueprint.” One possible approach was for the committee to regard its task as a purely scientific one—simply to offer technical advice to policymakers. Under this approach, the committee would confine itself to the task of evaluating the effectiveness (and perhaps the costs) of various policy tools for reducing smoking, leaving it to policymakers to take individual liberty, justice, and other values into account in deciding which policies to implement. However, such a restrained approach struck the committee as incompatible with the specific, direct, and emphatic nature of the instruction we had been given “to generate a blueprint for the nation in the struggle to reduce tobacco use.” Accordingly, the committee’s recommendations are direct and specific.

The Policy Context

For many years, a policy paradigm emphasizing consumer freedom of choice and decrying unwarranted “paternalism” dominated public opinion and policymaking on tobacco. In retrospect, however, the committee believes that predominant emphasis on consumer choice in public opinion during this period was largely shaped by the tobacco industry’s successful efforts to deny and obscure the addictiveness and health consequences of tobacco use, and on an array of resulting market failures, including information asymmetry between producers and users, distorted consumer choice due to information deficits, and product pricing that did not reflect the full social costs (especially the effects on nonsmokers). As the scientific evidence about addiction and the health effects of tobacco use has grown, and the industry’s deceptive strategies have been exposed in the course of state lawsuits and other tobacco-related litigation, public understanding of tobacco addiction has quickly deepened and the ethical and political context of tobacco policymaking has been transformed.

Consequently, over the past 10–15 years, the operating assumptions of tobacco policy in the United States and elsewhere in the world have fundamentally changed. As shown in Chapters 3 and 5, a widespread popular consensus is now emerging in favor of aggressive policy initiatives, and this shift in popular sentiment has also been accompanied by support across most of the political spectrum.

In this context, it is worth pausing to take note of the ethical foundation for taking strong steps to reduce tobacco use. From a traditional public health perspective, the legitimacy and importance of reducing tobacco use

lies in the enormous social costs attributable to tobacco-related disease; reducing tobacco use increases overall population health. Further, even within a libertarian paradigm, each of the subsidiary goals of tobacco policy is clearly justified: reducing exposure to ETS prevents harm to nonsmokers; preventing initiation by youth is justified by the recognized shortcomings of adolescent judgment; and promoting cessation helps to restore the liberty of smokers who are able to quit. Ethically speaking, the most controversial interventions are those aimed exclusively at reducing use by the minority of adult smokers who do not want to quit. This is the nub of the so-called paternalism problem.

However, since every intervention aimed at current smokers serves the interests and express wishes of the subset who want to quit, interventions designed to protect the health of adult smokers do not necessarily rest on a paternalistic foundation. Instead, they entail both liberty-enhancing effects (achieved by assisting addicted smokers to quit) and liberty-restricting effects (insofar as they also “burden” the choices of smokers who do not want to quit or object to the restrictions and costs imposed on them). Thus ethical analysis of tobacco control interventions within the libertarian paradigm requires a weighing of liberty-reducing effects of particular intervention against the liberty-enhancing effects of these interventions for nonsmokers whose freedom to avoid ETS exposure is protected, youths whose long-run autonomy is preserved, and adult smokers whose ability to quit is enhanced (and therefore regard the intervention as a benefit rather than a cost). This problem is addressed further in Chapter 4.

Limits of the Charge

Reducing tobacco use is, of course, a global challenge. According to a recent World Health Organization (WHO) study, tobacco-related diseases will kill 6.4 million people a year by 2015, accounting for 10 percent of all deaths worldwide. There are now many millions of smokers in the world, served by increasingly aggressive transnational tobacco companies. The common interest of all nations in reducing tobacco use has been declared and effectuated by the WHO-sponsored Framework Convention for Tobacco Control, which went into effect in 2005 and has been ratified by 142 nations (unfortunately not including the United States). The United States has a direct stake in reducing smuggling of tobacco products into this country that could undermine domestic tobacco control efforts, and the committee also recognizes the compelling importance of international tobacco control efforts for world health. However, the committee’s charge was to develop a tobacco control blueprint for the nation, not for the world. We hope, though, that some of the measures recommended in this report will provide useful models for other countries, just as the domestic

interventions undertaken by other countries in recent years served as useful models for us.

This is not a report about a research agenda. Many gaps in current knowledge were noted in our deliberations, and the committee is concerned that current National Institutes of Health expenditures on tobacco use (including both initiation and cessation) are not commensurate with the disease burden of smoking and other forms of tobacco use. However, our charge was to propose a blueprint for tobacco control, not for research.

OUTLINE OF REPORT

The committee's report is divided into two parts. Part I, comprising Chapters 1 through 3, provides the context for the committee's proposed policy blueprint. Chapter 1 discusses the extraordinary growth of tobacco use during the first half of the 20th century and its subsequent reversal in 1965 in the wake of the 1964 Surgeon General's report on the harmful health effects of smoking. Chapter 1 also examines closely recent trends in tobacco use. Chapter 2 summarizes the ways in which the addictive properties of nicotine make it so difficult for people to quit, thereby sustaining tobacco use at high levels. Chapter 2 also reviews the salient factors associated with smoking initiation, especially the failure of adolescents to appreciate the risk and consequences of addiction when they become smokers. The chapter concludes by discussing several recent trends in smoking epidemiology that may pose problems for tobacco control in the future.

Chapter 3 reviews the history of tobacco control. After the 1964 Surgeon General's report, the public's opinion toward smoking changed dramatically. However, until the mid 1980s, antismoking efforts had little success in combating the financial and political power of the tobacco industry. Tobacco control efforts began to make progress when grassroots initiatives galvanized public concern about the health effects of environmental tobacco smoke and began to erode pro-smoking social norms. The tobacco policy debate became transformed in the late 1980s and 1990s, when the public recognized the addictive nature of nicotine, the continued importance of teenage initiation in sustaining the public health burden of tobacco use, and the tobacco industry's extensive efforts to manipulate and deceive the public. Chapter 3 concludes by projecting the likely prevalence of smoking over the next 20 years if current trends remain unchanged or if tobacco control efforts are weakened.

Part II of the committee's report presents a blueprint for reducing tobacco use. After reviewing the ethical grounding of tobacco control in Chapter 4, the committee sets forth its blueprint as a two-pronged strategy and offers a vast array of recommendations. The first prong, presented in Chapter 5, envisions strengthening traditional tobacco control measures.

The committee summarizes the evidence regarding the effectiveness of the tobacco control methods now being deployed and makes recommendations for broadening and strengthening them. For the most part, the chapter emphasizes state and local initiatives supported by public health partnerships and community advocacy programs. The two pillars of the blueprint are substantial increases in excise taxes on tobacco and smoke-free-air laws with broad coverage. In addition, the blueprint includes other elements of comprehensive state programs, such as youth access restrictions, school-based prevention programs, programs aimed at families and health care systems, media campaigns, smoking cessation programs, and grassroots community advocacy. Chapter 5 closes with a projection of the likely effects over the next two decades of implementing the policies outlined.

The premise of Chapter 6 is that a more substantial long-term impact on reducing tobacco use requires a change in the current legal framework of tobacco control. The second prong of the blueprint envisions changing the regulatory landscape to permit new policy innovations that take into account the unique history and characteristics of tobacco. Under the proposed approach, federal power would enhance and support state efforts in the traditional domains of tobacco control while taking aggressive steps in the currently under-regulated areas of tobacco marketing, distribution, and product design. A key feature of the federal program would be the exercise of regulatory jurisdiction by the Food and Drug Administration. In addition, the federal government would also play a more substantial role in funding and coordinating state tobacco control activities.

One of the most important aims of the plan outlined in Chapter 6 is to establish a platform for major innovations in tobacco control. However, any major innovations will have to be formulated with great care, based on thorough analysis of the possible consequences. It will be essential, therefore, for the federal government to create a capacity for tobacco policy research and development. In Chapter 7 the committee recommends that a new policy development office undertake a major program of policy analysis, based on improved statistical models, and that it explore new frontiers of tobacco control, including proposals to gradually reduce the nicotine content of cigarettes.

REFERENCES

- Arcavi L, Benowitz NL. 2004. Cigarette Smoking and Infection. *Archives of Internal Medicine* 165:2206-2216.
- CDC (Centers for Disease Control and Prevention). 1999. Ten great public health achievements—United States, 1900–1999. *MMWR (Morbidity and Mortality Weekly Report)* 48(12):241-243.
- CDC. 2002. *Tobacco Control State Highlights 2002: Impact and Opportunity*. Albuquerque M, Kelly A, Schooley M, Fellows JL, Pechacek TF. Atlanta, GA.

- CDC. 2004. *The Health Consequences of Smoking: A Report of the Surgeon General*. Web Page. Available at: http://www.cdc.gov/tobacco/data_statistics/sgr/sgr_2004/index.htm; accessed May 25, 2007.
- CDC. 2005. Annual smoking-attributable mortality, years of potential life lost, and productivity losses—United States, 1997-2001. *MMWR (Morbidity and Mortality Weekly Report)* 54(25):625-628.
- CDC. 2006. Tobacco use among adults—United States, 2005. (*MMWR Morbidity and Mortality Weekly Report*) 55(42):1145-1148.
- DHHS (U.S. Department of Health and Human Services). 2006. *The Health Consequences of Involuntary Exposure to Tobacco Smoke: A Report of the Surgeon General*. Atlanta, GA: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, Coordinating Center for Health Promotion, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health.
- Healthy People 2010. 2005. *Leading Health Indicators*. Web Page. Available at: http://www.healthypeople.gov/document/html/uih/uih_4.htm; accessed May 7, 2007.
- IOM (Institute of Medicine). 1994. *Growing Up Tobacco Free: Preventing Nicotine Addiction in Children and Youth*. Editors Lynch BJ, Bonnie RJ. Washington, DC: National Academy Press.
- IOM. 2001. *Clearing the Smoke: Assessing the Science Base for Tobacco Harm Reduction*. Washington, DC: National Academy Press.
- Lindblom E, McMahon K. 2005. *Toll of Tobacco in the United States of America*. Web Page. Available at: <http://www.tobaccofreekids.org/research/factsheets/pdf/0072.pdf>; accessed August 11, 2006.
- NCI (National Cancer Institute). *Cigars: Health Effects and Trends. Smoking and Tobacco Control Monograph No. 9* ed. 1998.
- NRC (National Research Council). 1986. *Environmental Tobacco Smoke: Measuring Exposures and Assessing Health Effects*. Washington, DC: National Academy Press.
- SAMHSA (Substance Abuse and Mental Health Services Administration). 2006. *Results from the 2005 National Survey on Drug Use and Health: National Findings*. Web Page. Available at: <http://oas.samhsa.gov/nsduh/2k5nsduh/2k5results.pdf>; accessed November 28, 2006.

PART I

BACKGROUND

1

Epidemiology of Tobacco Use: History and Current Trends

Since at least the colonial era, tobacco has been a popular commodity in the United States, with tobacco use increasing almost exponentially from the 1800s to the mid-1960s (DHHS 2000a). The invention of the cigarette fueled this dramatic rise in tobacco consumption, and cigarette smoking quickly outpaced the use of any other form of tobacco product (Brandt 2007). When tobacco use peaked in the mid-1960s, more than 40 percent of the U.S. adult population smoked cigarettes (National Center for Health Statistics 2005). This chapter reviews the growth of tobacco use over the 20th century, and the dramatic reversal of that trend beginning in 1965. The chapter examines recent trends in the epidemiology of smoking over the past four decades, takes a close look at the characteristics of smokers and those who have quit smoking, and discusses variations in the prevalence rate of smoking by sociodemographic characteristics and state of residence. Finally, the chapter highlights some possible threats to continued progress in reducing smoking in the United States.

GROWTH OF THE TOBACCO PROBLEM

In the late 19th and early 20th centuries, Americans consumed tobacco primarily in the form of chewing tobacco and cigars. According to Giovino, the per-capita consumption of tobacco products in the early 1880s was approximately 6 pounds of tobacco per person aged 18 and older; 56 percent of that tobacco was in the form of chewing tobacco, whereas only 1 percent took the form of manufactured cigarettes (Giovino 2002). For several reasons, cigarettes became the preferred tobacco product of Americans over

the 20th century; in particular, cigarettes served as a more efficient vehicle for the absorption of nicotine and a less expensive form of tobacco. Also, by the 1880s, cigarette production had been mechanized with the advent of the Bonsack machine, which made it possible to produce additional units for little or no additional cost, and the prices of cigarettes were cut in half (Chaloupka et al. 2002; Giovino 2002). The lower price made cigarettes more accessible to a wider clientele (DHHS 2000b). By the 1950s, manufactured cigarettes represented 80 percent of per-person tobacco consumption (Giovino 2002).

In 1900, on a per-capita basis, American adults smoked approximately 54 cigarettes per year. That number increased almost exponentially until its peak in 1963, when an estimated 4,345 cigarettes were consumed per adult in that year alone, as shown in Figure 1-1 (ALA 2006). This growth in consumption occurred for many reasons, but was driven largely by the mass production of cigarettes; the mildness, packaging, addictiveness, and convenience of the product; glamorization of smoking in movies and on television; and persuasive advertising campaigns (Chaloupka et al. 2002; DHHS 2000a; Giovino 2002).

The milder flavor of the Turkish and domestic blended tobacco products also increased the appeal of cigarettes to a wider clientele. In the early twentieth century, cigarette manufacturers developed new blends using American-grown tobacco, such as sugared burley tobaccos (Giovino 2002). Manufacturers also used new methods of curing the tobacco, including flue

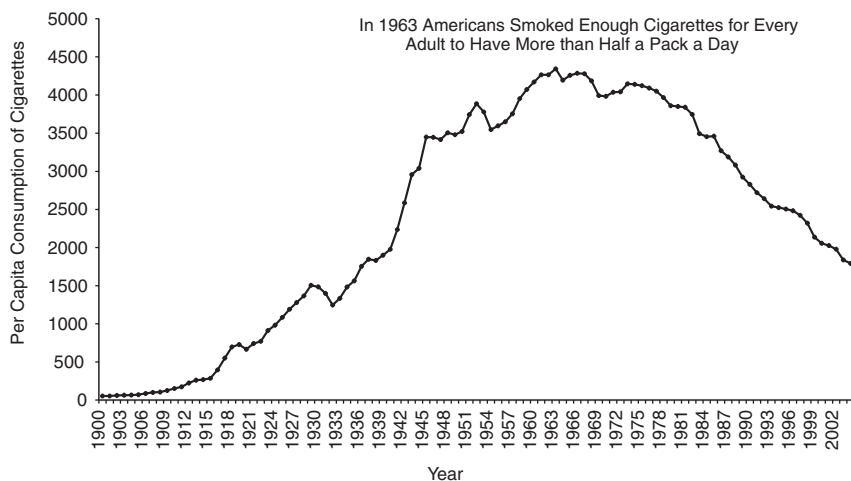


FIGURE 1-1 Per capita consumption of cigarettes among adults ages 18 years and older from 1900 to 2004.

SOURCES: (ALA 2004, 2006; Capehart 2004).

curing. This process results in a product called “bright tobacco,” which has a high sugar content and a medium nicotine content (IOM 2001). These production changes created cigarettes that were milder and less alkaline than other forms of tobacco. The more acidic nature of these cigarettes allowed the nicotine in their smoke to be efficiently absorbed by the lungs. This feature provided cigarettes an advantage over cigars, as cigar smoke is absorbed in the mouth rather than in the lungs. More nicotine is absorbed with cigarettes compared to cigars due to the much larger surface area of the lung compared to the mouth. In addition, nicotine more quickly gets into the brain via the carotid artery following pulmonary absorption compared to buccal absorption, in which it travels through the liver before getting to the brain. Furthermore, as cigarettes are inhalable, they require less skill to use than cigars (DHHS 2000b; Giovino 2002). Thus people who may have abstained from smoking because they were intimidated by the cigar were drawn to the ease of smoking a cigarette (DHHS 2000b). The efficient absorption of nicotine has the added effect of making cigarettes more addictive than other forms of tobacco (Giovino 2002). These two features combined in order to drive high addiction rates among soldiers in World War I, to whom cigarettes were distributed without charge (Burns et al. 1997; DHHS 2000a; Schoenberg 1933).

Intensity and innovation in advertising have been hallmark features of the cigarette industry throughout its history. In 1913, Camel became the first cigarette brand to gain nationwide popularity, following a mass marketing campaign by the R. J. Reynolds Company that introduced this “American blend” cigarette to the American public through a teaser advertisement (R.J. Reynolds 2006). Other companies followed suit, especially after World War I, as heavy advertising propelled the demand for cigarettes on a national scale (Schoenberg 1933). Ernster reported that Lucky Strike drew women’s attention with the diet slogan “Reach for a Lucky Instead of a Sweet” (Ernster 1985). Throughout the 1930s and 1940s, meanwhile, the Brown and Williamson Company included health claims in its ads for Kool, the first menthol cigarette distributed nationwide, claiming that smoking menthol cigarettes could protect against colds and soothe the throat (IOM 2001; R.J. Reynolds 2006).

The boom period of tobacco consumption occurred between the 1920s and the mid-1960s (DHHS 2000b). During this period, tobacco users shifted from the traditional practices of using chewing tobacco, inhaling snuff, and smoking cigars and pipes, to smoking cigarettes, and the number of tobacco users increased as the rising number of initiates, including many women, became cigarette smokers (DHHS 2000b; Giovino 2002). The manufactured cigarette was convenient because it was already rolled and, along with the safety match, it provided an easy, portable, and disposable indulgence (DHHS 2000b).

Over the 20th century, cigarette consumption fell only a few times before 1965: during the Great Depression, at the end World War II, and in 1953 and 1954 (Giovino 2002). The drop in consumption during the Great Depression was directly related to the decline in real disposable income,¹ whereas the declines in the early 1950s followed the first real claims of tobacco's harmful effects on health, which linked smoking to the development of cancer (Giovino 2002; Hamilton 1972; Havrilesky and Barth 1969). Hamilton (1972) showed that the reduction in consumption in the mid-1950s was attributable to the health scare associated with the use of tobacco products and that the effect of this public concern negated any market boost that might have come from advertising. Other studies suggest that the positive health claims in cigarette advertising made during this period might have had an indirect negative effect on tobacco consumption by giving the impression that protection was needed, thereby reinforcing the health scare (IOM 2001).

To mollify the public's growing concern about the health effects of smoking, tobacco companies introduced filtered cigarettes in the 1950s and the so-called low-tar cigarettes in the 1960s. Filters reduce tar and nicotine yields on government test machines. The market share of filtered cigarettes jumped from less than 5 percent in 1953 to almost 20 percent 2 years later. By 1960, more than half of all cigarettes consumed had filters (Giovino 2002). In 2004 and 2005, 99 percent of cigarettes on the market had filters (FTC 2007). The market share of low-tar cigarettes, those purportedly yielding less than or equal to 15 milligrams of tar, increased from 2 percent to more than 55 percent in the 20 years between 1967 and 1987. By 2003, almost 85 percent of cigarettes distributed within the United States were low-tar products (FTC 2005; Giovino 2002).

Some manufacturers added chemicals to cigarettes to improve their flavor and aroma. One such chemical was menthol, an additive with an anesthetizing effect that was claimed to sooth the throat (Gardiner 2004; IOM 2001). Because menthol did indeed make the passage of tobacco smoke into the throat a smoother experience, consumers inhaled more deeply. In 1963, 16 percent of cigarettes sold in the United States contained menthol. The market share of menthol cigarettes peaked at slightly under 30 percent in the 1980s (FTC 2005; Giovino 2002; Giovino et al. 2004).

¹Historical records show that per capita cigarette consumption rises and falls in tandem with changes in price and in real incomes (DHHS 2000b). Although demand for cigarettes is what economists call "relatively inelastic" because of their addictiveness, that just means that consumption responds less than proportionally to changes in price, not that consumption is unresponsive to price. Several studies have estimated the price elasticity of the demand of cigarettes at approximately -0.40 , which implies that a 10 percent increase in the price would result in a 4 percent decrease in consumption (Chaloupka et al. 2002; Hamilton 1972).

DECLINE IN TOBACCO USE: 1965–2005²

Despite the development of new products purportedly reducing smokers' exposure to tobacco toxins, Americans have greatly reduced their tobacco consumption since the publication of the first Surgeon General's report on the harmful effects of cigarette smoking in 1964. In fact, cigarette consumption has declined substantially since the mid-1960s (see Figure 1-1 for annual trends). By 1983, the annual per-capita consumption of cigarettes had declined approximately 20 percent from the 1963 level to 3,494 cigarettes per adult; by 2004, it had declined an additional 49 percent to 1,791 cigarettes, its lowest level in 67 years (ALA 2006; Capehart 2005). The halving of per-capita consumption of cigarettes over the last 20 years stems from a decline in smoking prevalence coupled with a decline in the number of cigarettes smoked per day among those who smoke.³

The percentage of adults who currently smoke (see Box 1-2 for a definition of this and other terms) has also declined in the past 40 years, as indicated in Figure 1-2. In 1965, 41.9 percent of Americans ages 18 years and over, or approximately 52.2 million adults, smoked either every day or on some days (National Center for Health Statistics 2005). The percentage of adults who are current smokers declined steeply between 1965 and 1991, with an estimated 39 percent drop in the prevalence of cigarette smoking. By 2005, the prevalence of adult cigarette smoking had declined to half the 1965 rate. An estimated 20.9 percent of American adults, or 45.1 million people, were current smokers in 2005 (CDC 2006b).

The reduction in the prevalence of current smokers was driven by an increase in the rate of smoking cessation as well as a decrease in the rate of smoking initiation. Between 1965 and 2005, the percentage of adults who once smoked and who had quit more than doubled from 24.3 to 50.8 percent, as shown in Figure 1-3 (CDC 2006b; TIPS 2005a). Furthermore, the percentage of adults who have never smoked more than 100 lifetime cigarettes increased by approximately 23 percent from 1965 (44 percent) to 2005 (54 percent) (CDC 2005c; TIPS 2005b).

Smoking initiation among adolescents and young adults has also declined since the mid-1960s, as estimated by the National Survey on Drug Use and Health (NSDUH) (SAMHSA 2005). In 1965, among adolescents aged 12 to 17 years, 125.5 of every 1,000 smoked a cigarette for the first time. In 2003, 102.1 per 1,000 youths in the same age range had smoked a cigarette for the first time (Figure 1-4). The reduction in smoking initiation saved more than half a million adolescents from having a first cigarette between 1965 and 2004. Young adults (individuals ages 18 to 25 years) have

²See Box 1-1 for a list of commonly used data sets regarding tobacco use.

³As discussed in a subsequent section, mean number of cigarettes per day consumed by current smokers rose steadily until 1979, when the trend reversed.

BOX 1-1 Commonly Used Data Sets

BRFSS	Behavior Risk Factor Surveillance Survey. State-level prevalence of current tobacco use and cessation among adults (ages 18 years and older). All 50 states have participated since 1996.
CPS	Current Population Survey Tobacco Use Supplement. National- and state-level prevalence of tobacco use and cessation behavior among individuals ages 15 years and older.
MTF	Monitoring the Future. National-level prevalence of cigarette use, age at initiation, and cessation behavior among students in the 8th, 10th, and 12th grades, as well as young adults.
NHIS	National Health Interview Survey. National-level prevalence of tobacco use and cessation behavior among adults. Surveillance data have been collected since 1965, with changes in the definitions of current and former smoker made in 1991.
NSDUH	National Survey on Drug Use and Health. Formerly the National Household Survey on Drug Abuse. National-level prevalence of tobacco use by specific form, including bedes and kreteks among individuals ages 12 years and older. Surveillance since 2002.
YBRSS	Youth Behavior Risk Surveillance System.

traditionally been less likely to initiate smoking behavior than adolescents, but their initiation rates also declined, from an annual level of 89.4 first-time smokers per 1,000 people in 1965 to one of 67.5 per 1,000 in 2003 (SAMHSA 2005). It should be noted, however, that despite this overall decline in initiation since 1965, trends over the past twenty years are not entirely encouraging. Developments in youth and young adult initiation over the past two decades are discussed in further detail later in the chapter when the committee more closely reviews recent developments.

Industry Response

These reductions in smoking over the past half century represent hard-won successes for tobacco control programs, because efforts to reduce tobacco consumption have frequently been countered by the tobacco industry in ways designed to maintain its customer base. Just as it did in the early part of the 20th century, the tobacco industry has recently attempted to use pricing, new product development, and advertising to counteract health-driven declines in tobacco consumption (Chaloupka et al. 2002).

BOX 1-2 Definition of Terms

Smoker	<p>Adult:^a person aged 18 years or over who has smoked at least 100 cigarettes in his or her lifetime.</p> <p>Adolescent: (a) a person between the ages of 12 and 17 years who has smoked even once or twice,^b (b) a person between the ages of 12 and 17 years who has ever smoked, even one or two puffs.^c</p>
Current Smoker	<p>Adult (1965 to 1991): a person who was ever a smoker who reported smoking now.</p> <p>Adult: (1992 to present): a person who was ever a smoker who reported that he or she currently smokes either every day or on some days.</p> <p>Adolescent: a person between the ages of 12 and 17 who smokes on one or more days in the past 30 days.</p>
Former Smoker	<p>Adult (1965 to 1991): a person who was ever a smoker who no longer smokes.</p> <p>Adult (1991 to present): a person who was ever a smoker who no longer smokes every day or on some days.</p>
Heavy Smoker	<p>Adult: a current smoker who smokes at least 25 cigarettes in one day.</p> <p>Adolescent: a high school senior who smoked in the past 30 days and smoked at least one-half pack of cigarettes per day.^d</p>

^aDefinitions for adults come from the National Health Interview Survey.

^bMonitoring the Future.

^cYouth Behavior Risk Surveillance System and Youth Tobacco Survey.

^dMonitoring the Future.

SOURCE: Adapted from text in Giovino (2002).

The tobacco industry has dramatically increased its investment in advertising and promotional expenditures since the 1960s. From 1963 to 2003, total advertising and promotional expenditures by the five largest tobacco manufacturers increased from \$1.5 billion (indexed for inflation) to \$15.15 billion, the largest amount ever reported to the Federal Trade Commission (FTC 2005). Expenditures have risen particularly dramatically in recent years; the \$15.15 billion spent in 2003 represents a 48 percent increase over the \$10.25 billion spent in 2000, and an increase of 170 percent over the \$5.62 billion spent in 1990 (FTC 2005).

It should be noted, however, that the allocation of these advertising and promotional expenditures has changed substantially in recent years. As



FIGURE 1-2 Current smoking prevalence among adults, selected years from 1965 to 2005 (all years for which NHIS data on annual smoking prevalence are available are included). Solid lines represent changes in smoking prevalence between consecutive years. Dotted lines represent approximate changes in smoking prevalence between nonconsecutive years. For years 1965 to 2004, age-adjusted data are provided. For 2005, crude data are provided.

SOURCES: (CDC 2006b; National Center for Health Statistics 2006).

the industry's advertising opportunities have become increasingly limited, tobacco companies have dedicated significant portions of their marketing budgets to price discounts and other promotions at the retail level (Chaloupka et al. 2002; White et al. 2006). As discussed further below, the main target of these price-oriented promotions is current smokers.

Manufacturers have also developed new products with the hopes of countering prevalent health concerns. Marketing campaigns have promoted purportedly low-tar, low-nicotine, and low-yield products, catering to perceptions that such cigarettes are safer or less harmful than the alternatives (Giovino et al. 1996). Taking advantage of the increasing popularity of these purportedly low-yield products, the R.J. Reynolds Company repositioned the Winston brand in 1997, claiming that its product was made with "100 percent tobacco" and "no additives" (Arnett 1999). Manufacturers have also promoted menthol-containing products, in response to consumer perceptions that such cigarettes were less harmful than nonmenthol brands (Gardiner 2004; IOM 2001; Pollay and Dewhirst 2002).

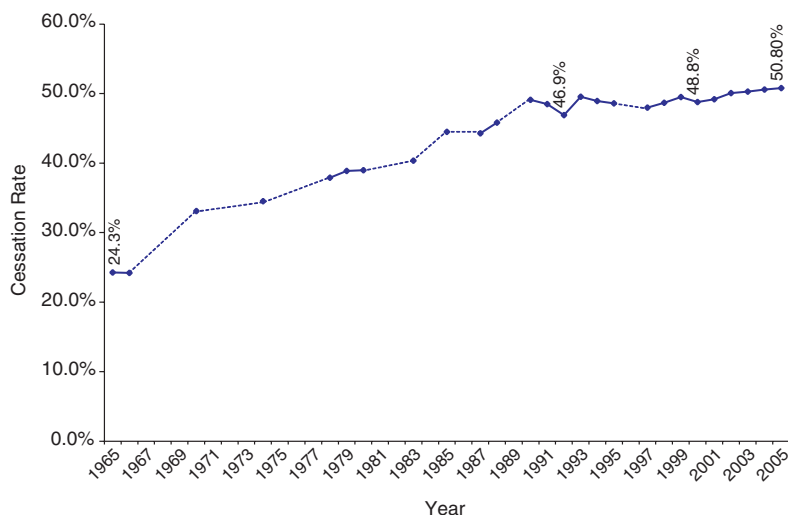


FIGURE 1-3 Cessation rate among adult EVER smokers selected years from 1965 to 2005 (all years for which NHIS data on annual cessation prevalence are available are included). Solid lines represent changes in cessation prevalence between consecutive years. Dotted lines represent approximate changes in cessation prevalence between nonconsecutive years.

SOURCES: (TIPS 2005a; CDC 2003, 2004b, 2005a,b, 2006b).

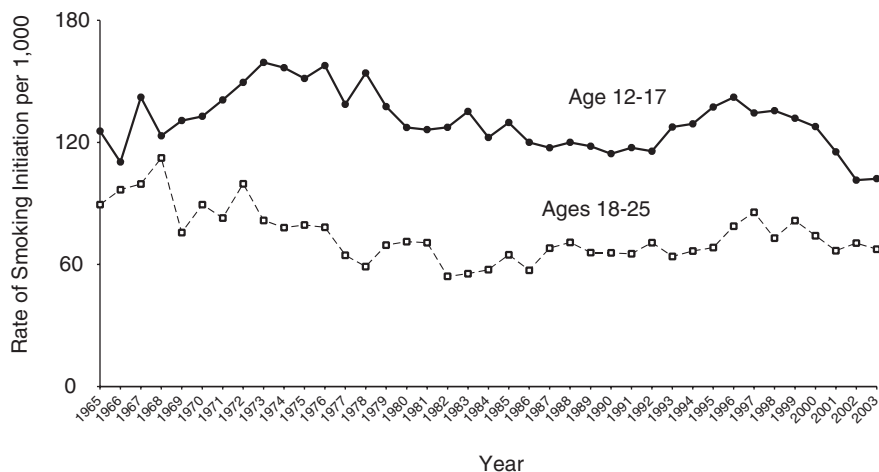


FIGURE 1-4 Smoking initiation rates among adolescents and young adults, 1965 to 2003.

SOURCE: (SAMHSA 2005).

Cigarette manufacturers also sought to expand the market for their products by recruiting women and youth smokers. Marketing efforts toward women increased dramatically in the late 1960s and early 1970s (Ernster 1985; Pierce et al. 1994). Products such as Virginia Slims grew popular through campaigns that depicted stylish, independent, and healthy women. In the 1980s and 1990s, manufacturers also turned increasingly to advertising directed toward youth to grow their market. For example, in 1988 R.J. Reynolds introduced the Joe Camel cartoon character, which quickly proved to be powerfully appealing to adolescents (DiFranza et al. 1991; Pierce et al. 1999). Between 1989 and 1993, Camel's market share among adolescents increased by 64 percent (CDC 1994). Moreover, although advertising in magazines with high youth readership has declined since tobacco companies committed to avoid targeting youth as a condition of the Master Settlement Agreement, cigarette companies continue to promote their products in magazines that reach high percentages and numbers of young readers (FTC 2005; Krugman et al. 2005).

In addition to the techniques mentioned above, the tobacco industry has frequently turned to pricing strategies to increase tobacco consumption. The real price of cigarettes declined between 1955 and 1980 (Gruber 2001; IOM 1994). A doubling of the federal excise tax between 1982 and 1983 and an increase in the wholesale price of cigarettes preceded an estimated 5 percent decline in per-capita consumption between 1983 and 1984 (Chaloupka et al. 2002; Gruber 2001; IOM 1994). The tobacco industry responded by offering "branded generics," discounted cigarettes marketed specifically at young adults who were more likely to quit smoking in response to the price increase. Many smokers switched to discounted generic brands, and the decline in consumption slowed by the early 1990s as the market share of discounted brands rose to nearly 40 percent (Chaloupka et al. 2002; Gruber 2001).

On April 2, 1993, a day referred to as Marlboro Friday, Philip Morris, Inc., led the industry in cutting the prices of premium brand cigarettes by offering Marlboros for a 40-cent-per-pack discount (Chaloupka et al. 2002; Gruber 2001; IOM 1994). The wholesale price of Marlboro's premium cigarettes dropped from 123 cents per pack to 84 cents per pack to compete with discounted brands, which cost only 83 cents per pack, and deeply discounted brands, listed at 57 cents (Bulow and Klemperer 1998). That price cut helped to recapture the market for premium brands and to boost Philip Morris's profits, as more than 80 percent of the company's sales were in premium brands in 1997 (Bulow and Klemperer 1998).

After the Master Settlement Agreement in November 1998, the price of all brands was increased, in large part to cover the cost of the settlement. As a result, the price of premiums returned to their pre-Marlboro Friday nominal price (Bulow and Klemperer 1998). Premium brands have maintained

their dominance in the market over the past decade, actually gaining market share throughout the 1990s (Bulow and Klemperer 1998). Part of the reason for this increase in market share is the effect of discounting (Bulow and Klemperer 1998). In 2003, of the \$15.15 billion reportedly spent on advertising and promotion, \$10.8 billion (approximately 71 percent) was allocated to price discounts paid to retailers or wholesalers. These discounts allowed for reduced prices for consumers (FTC 2005). The percentage of disposable income that smokers spent on cigarettes fell from 1993 through 1998 but rose consistently through 2002 (Capehart 2004). The effect of price on consumption is discussed in more detail in Chapter 5.

RECENT TRENDS: A CLOSER LOOK

Wide-angle comparisons of measures of smoking behavior between 1965 and 2005 clearly show that the rates of tobacco consumption and smoking prevalence have declined among adults, the rate of smoking initiation has declined among adolescents, and the rate of smoking cessation has increased. However, a closer look at the trends over the past two decades tells a somewhat more complex story of both modest progress and some backsliding. For instance, although smoking prevalence has continued to decline in the new millennium, it appears that progress in some areas may now be stalling. These recent trends are examined more closely in this section.

Adult Prevalence

In 1985, nearly 30 of every 100 American adults were current smokers; by 2005, that figure had fallen to approximately 21 in 100 adults (CDC 2006b; National Center for Health Statistics 2005). That said, a closer look at the trend reveals a steep decline in the number of adults who were current smokers from 1985 through 1990, a slight increase in 1991-1992, and a relatively flat, although downward-sloping, curve from 1992 through 2005, as illustrated in Figure 1-2 (CDC 2006b; Mendez and Warner 2004; National Center for Health Statistics 2005). Moreover, although a reduction in the prevalence of adults who are current smokers occurred each year during the first half of this decade, data for 2005 reveals no change in adult prevalence from the previous year (CDC 2006b; TIPS 2006).

Data on the prevalence of smoking among men ages 25 to 64 years and women ages 35 to 64 each display a flattening of this downward-trending curve from the early 1990s through the mid-2000s for both genders (see Figures 1-5 and 1-6). Mendez and Warner were optimistic that smoking prevalence would continue to fall on course, as it had in the early 2000s, but they concluded that major reductions, such as those presented in the

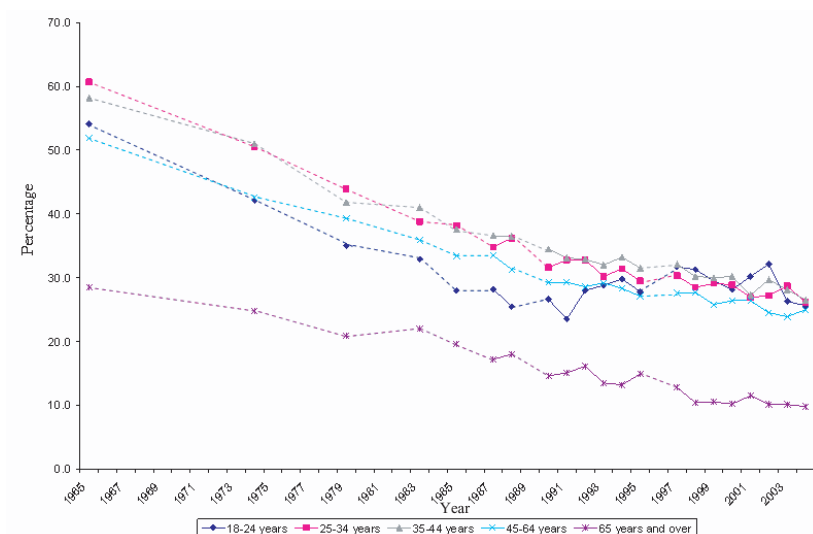


FIGURE 1-5 Age-specific prevalence rates among adult males, selected years, 1965 to 2003 (all years for which NHIS data on annual smoking prevalence are available are included). Solid lines represent changes in smoking prevalence between consecutive years. Dotted lines represent approximate changes in smoking prevalence between nonconsecutive years.

SOURCE: (National Center for Health Statistics 2006).

Healthy People 2010 target, were unrealistic (Mendez and Warner 2004). Predictive models of smoking prevalence reduction are presented and discussed further in Chapters 3 and 5 of this report.

Prevalence of Smoking Among Youth

From 1999 to 2006, the prevalence of daily smoking⁴ among 12th graders decreased dramatically, according to data from the Monitoring the Future survey. In 1999, the prevalence of daily smoking among 12th graders (23.1 percent) was roughly equal to that among adults (23.3 percent); by 2006, the rate of daily smoking for 12th graders had fallen to 12.2 percent⁵ (Johnston et al. 2006). This is a genuinely noteworthy decline. However, because trends in youth smoking behavior tend to fluctuate substantially, it is important to view this recent trend within a broader time frame. When

⁴Daily smoking is defined as an average of one or more cigarettes per day.

⁵Prevalence of daily smoking in 10th graders dropped from 15.9 percent in 1999 to 7.6 percent in 2006. Prevalence of daily smoking in 8th graders dropped from 8.1 percent to 4 percent over that time period as well.

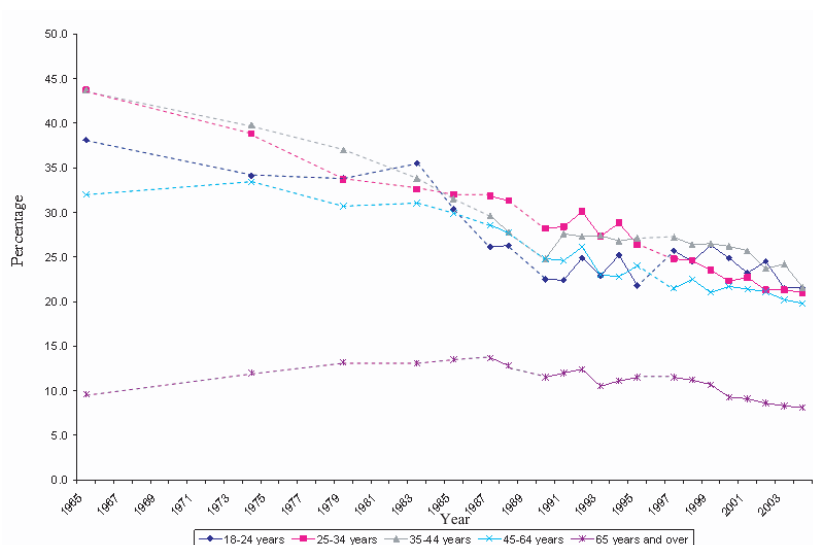


FIGURE 1-6 Age-specific prevalence rates among adult females, selected years, 1965 to 2003 (all years for which NHIS data on annual smoking prevalence are available are included). Solid lines represent changes in smoking prevalence between consecutive years. Dotted lines represent approximate changes in smoking prevalence between nonconsecutive years.

SOURCE: (National Center for Health Statistics 2006).

the decline in the prevalence of daily smoking among youth is viewed over a 15-year perspective, the long-term decline can be seen to be more modest. Comparison of the rates of daily smoking among 12th graders in 2006 with those in 1992, for example, reveals that daily smoking prevalence has dropped from 17.2 to 12.2, a 5 percentage point net decrease (Johnston et al. 2006), showing that much of the decline in youth prevalence rates in this century has simply offset the significant increase in youth smoking that had occurred in the 1990s. A similar pattern is shown by trends in 30-day prevalence (current smoking) among high school youth (see Figure 1-7 for the 12th grade data).

Not all indicators show a continuing downward trend, however. Daily smoking did not decline at all among 8th graders and 10th graders in 2006 (Johnston et al. 2007). Moreover, 2005 data from a separate source, the Centers for Disease Control and Prevention's Youth Behavior Risk Surveillance System (YRBSS), show a slight rise in the prevalence of use among high school youth (combining grades 9 through 12) between 2003 and 2005, from 21.9 to 23 percent (CDC 2006a).

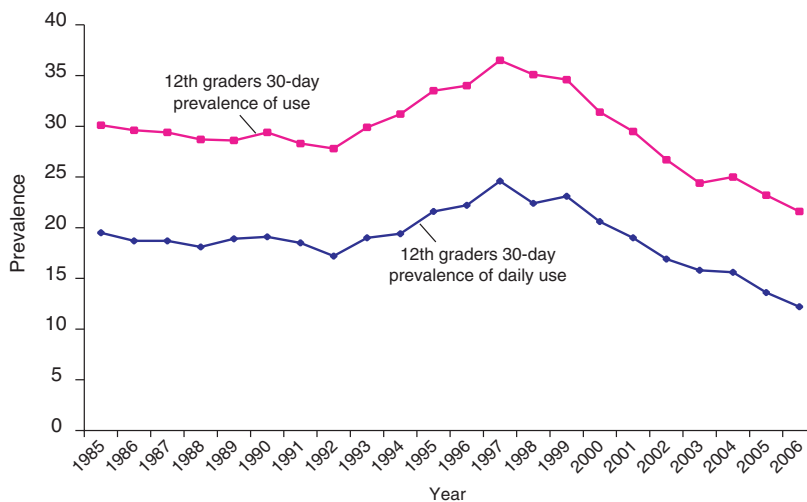


FIGURE 1-7 Smoking prevalence among 12th graders for selected years, 1985 to 2005.

SOURCE: (Johnston 2005, 2006, 2007).

In sum, there has been an impressive decline in the prevalence of youth smoking in the 21st century. However, trends of various measures of youth cigarette smoking from the last 15 years indicate that youth smoking rates tend to fluctuate considerably more than adult rates, and that it is likely that this recent decline will flatten out, or even turn upward again. In any case, the endemic level of youth smoking remains disturbingly high.

Intensity of Consumption

On average, smokers are smoking less than they did three decades ago; daily consumption among smokers began falling in 1979 (see Figure 1-8). Decreased daily consumption among smokers appears to be attributable largely to reduced smoking among heavy smokers; specifically, as shown in Figure 1-9, the percentage of smokers consuming more than 25 cigarettes per day was significantly smaller in 2004 than it was in 1993. Meanwhile, the percentage of smokers consuming between 5 and 14 cigarettes per day has increased since 1993, and the percentage of smokers consuming between 15 and 24 cigarettes per day has remained relatively flat over this time period (CDC 2005b).

The combined effect of the declining prevalence of adult smokers and the declining quantity smoked has led to a substantial decline in per-capita consumption over the last 20 years. Overall, per-capita consumption among

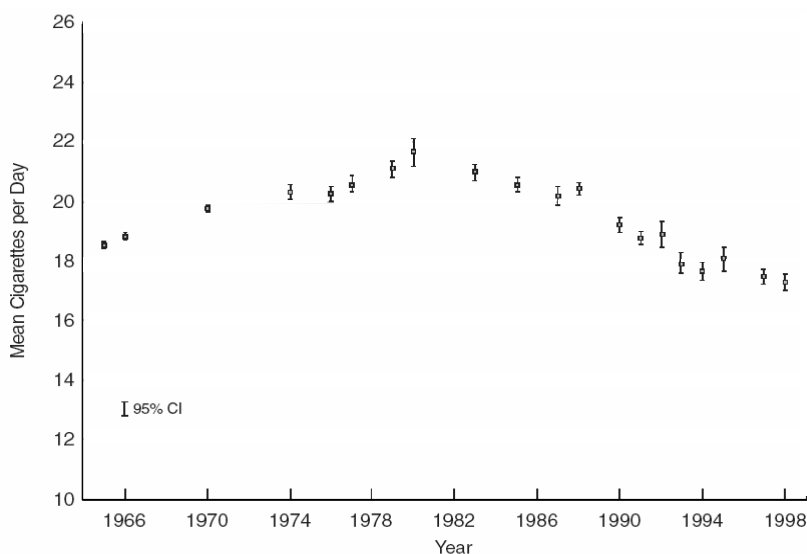


FIGURE 1-8 Mean number of cigarettes per day for all current smokers in each NHIS Survey Year. NOTE: Average number of cigarettes per day standardized to the age and race distribution of NHIS 1965. Brackets indicate 9 percent confidence intervals on the estimates.

SOURCE: (Burns et al. 2003).

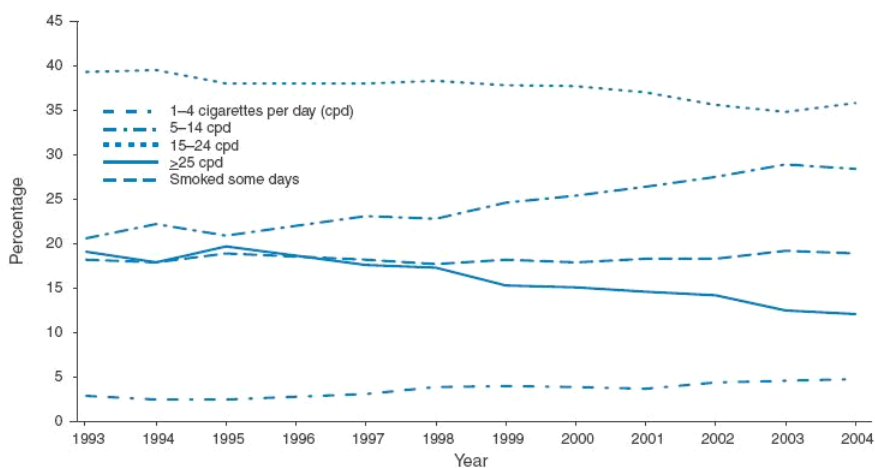


FIGURE 1-9 Percentage of daily smokers and smokers who smoked some days by number of cigarettes smoked, 1993 to 2004.

SOURCE: (CDC 2005b).

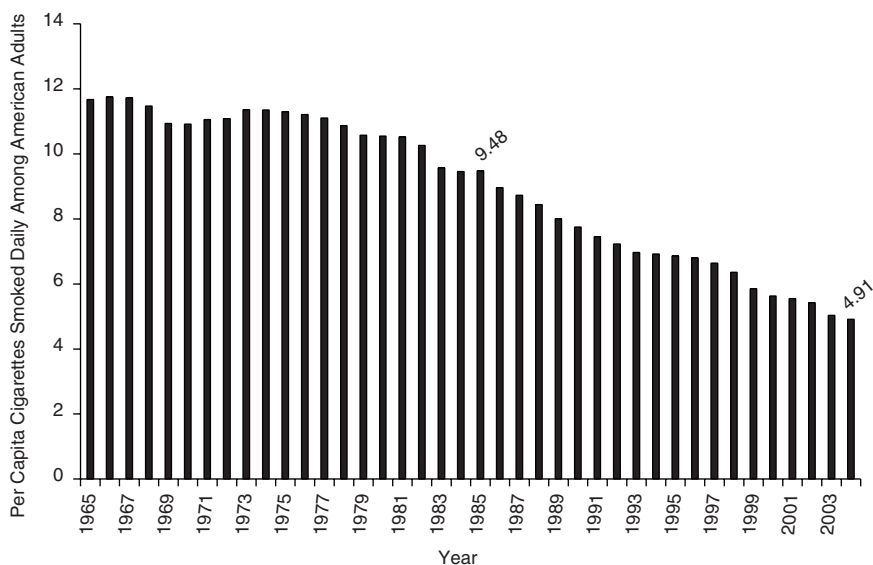


FIGURE 1-10 Daily per capita consumption of cigarettes among adults ages 18 and over, 1985 to 2004.

SOURCE: Calculations based on figures from ALA, 2006.

adults has decreased more than 48 percent since 1985, although it has declined unevenly from year to year, with annual changes ranging from 0.75 percent between 1994 and 1995 to 7.9 percent between 1998 and 1999 (following the Master Settlement Agreement and price increases) (ALA 2006) (see Figure 1-10).

Initiation

Recent data from the National Survey on Drug Use and Health (NSDUH) on smoking initiation rates⁶ among adolescents (ages 12–17 years) reveal a striking decline from 1996 through 2005. As suggested earlier, however, this recent decline must be seen in the context of the significant increases in initiation rates among youth that occurred in the early 1990s (see Figure 1-4). Thus, what might initially appear to be a sign of dramatic recent progress merely signals only slight reductions in smoking initiation rates among youth over the past decade. In 2001, for example, the smoking initiation rate was 115.3 per 1,000 youth, almost equal to the rate in 1992.

⁶NSDUH defines initiation as the percentage of nonsmokers who initiated cigarette use (sometimes referred to as “first use”) within the past 12 months.

Moreover, the modest successes in reducing smoking initiation rates among adolescents during the past two decades have been offset by net increases in initiation among young adults (between 18 and 25 years of age) during the same time period. Figure 1-4 reveals that between 1985 and 2003, smoking initiation rates among young adults increased 4.3 percent, from 64.7 per 1,000 individuals to 67.5 per 1000 (SAMHSA 2005). The reduction in smoking initiation among adolescents and the increase in smoking initiation among young adults thus indicate delayed smoking initiation rather than pure abstinence, which could signify a moving target for antismoking campaigns. This conclusion is supported by prevalence data as well (Johnston et al. 2006).

Smoking Cessation

The rate at which smoking cessation increased in the 1960s and 1970s has slowed over time, as evidenced by the flattening of Figure 1-3. A comparison of the annual smoking cessation rates⁷ between 1992 and 2005 reveals that the largest annual increase occurred between 1992 and 1993, at 5.32 percent. During four periods (1993–1994, 1994–1995, 1995–1996, and 1999–2000), the smoking cessation rate actually declined from the previous year. The rates of cessation increased approximately 4 percent in the first five years of the 2000s. In 2000, 48.8 percent of adult ever smokers had quit smoking (TIPS 2005a). In 2005, 50.8 percent of adults who had ever smoked had quit smoking (CDC 2006b). Cessation seems to be approaching an asymptote, however, because the rate has increased an average of only 0.50 annually since 2002 (CDC 2004b, 2005a, 2005b, 2006b).

Correlates of Current Smoking

Tobacco use varies among individuals according to socioeconomic and demographic characteristics as well as by geography. Although smoking prevalence has declined overall since the 1960s, large disparities in rates of tobacco use among racial and ethnic groups and by socioeconomic status persist. The most vulnerable subpopulations—young people who start smoking early, individuals who are poor or uneducated, and some racial and ethnic minorities—are at the highest risk of being lifelong smokers. This section compares the differences in the prevalence of current smoking compared by age, race, sex, educational attainment, poverty status, and

⁷The percentage of ever smokers who are former smokers. Although this term technically refers to results from a cohort study, it is used in this chapter more generally to refer to results from any study design.

geographic location. This section also highlights the subpopulations most in need of targeted efforts.

Age

Figures 1-5 and 1-6 show the trends in age-specific smoking prevalence among males and females, respectively (National Center for Health Statistics 2005). Older individuals (ages 65 years and older) are much less likely than young adults to be current smokers. This trend has been consistent for four decades. However, prevalence rates among adults younger than age 65 years have tended to converge. According to NSDUH data, young adults ages 18 to 25 years had the highest rate of current use of any tobacco product (44.3 percent) (SAMHSA 2006).

The oldest age group (those ages 65 years and older) comprises people who were in their youth when smoking prevalence and consumption were highest. The low prevalence of current smoking among individuals in this age group reflects the combined effect of smoking cessation efforts and smoking-related mortality. Figure 1-11 shows the trends in smoking cessation rates⁸ among four age groups. Individuals age 65 years and older are most likely to have been former smokers, and the cessation rate among individuals in that group has risen dramatically since 1965. However, quit rates have actually declined among adults ages 25 to 44 years since the mid-1990s and have flattened among those ages 18 to 24 years.

Understanding the natural history of smoking (also referred to as the “smoking career”) would help tobacco control programs identify the critical ages to be targeted for interventions. Unfortunately, few studies have followed the trajectory of the natural history of smoking from initiation to cessation. Compared with the careers of users of illegal drugs, which peak in the 20s and then trail off by the mid-30s, careers of cigarette smokers follow a different trajectory. This is partly because tobacco is more addictive than most other drugs, and smokers do not mature out of consuming tobacco, possibly because tobacco use doesn’t interfere with adult functioning, such as employment (Bachman et al. 2001; Kandel 2002). Unlike age-specific prevalence rates for illegal drug use, those for tobacco use remain elevated and flat beyond the late 20s (Chassin et al. 2000; 1996; Kandel 2002). Chen and Kandel (1995) monitored a cohort of adolescents and found that more than half of males and just under half of females were still smoking at ages 34 and 35, whereas 25.3 percent of males and 14.3 percent of females were using marijuana and 18.2 percent of males and 12.7 percent of females were using other illicit drugs at that same age.

⁸Percentage of ever smokers who are former smokers.

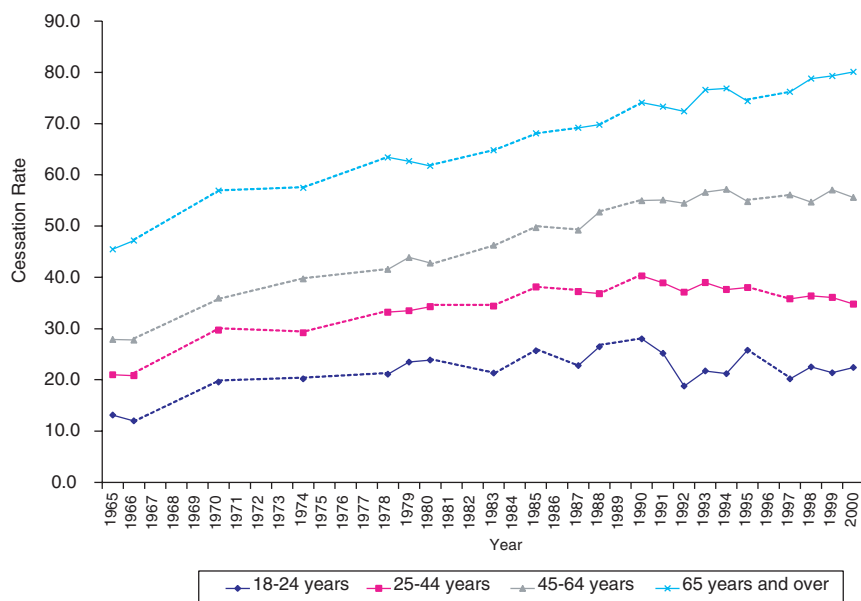


FIGURE 1-11 Age-specific cessation rates of ever smokers, selected years, 1965 to 2000 (all years for which NHIS data on prevalence of cessation are available are included). Solid lines represent changes in cessation prevalence between consecutive years. Dotted lines represent approximate changes in cessation prevalence between nonconsecutive years.

SOURCE: (TIPS 2005a).

It is difficult to predict how long a middle-aged smoker, for example, will continue before quitting, because smoking careers are highly dependent on the age at initiation, the quantity smoked, and the presence of nicotine dependence. Moreover, the quantity smoked, as well as the presence of nicotine dependence, is correlated with the age at initiation. With all else being equal, the older that a person is when he or she starts smoking, the likelihood that he or she will quit is higher and the probability that he or she will become dependent is lower (Hyland et al. 2004; Kandel 2002). Those who are dependent are more than twice as likely as nondependent smokers to continue smoking (Breslau et al. 2001). Hyland and colleagues (2004) found that there was a gradient in the cessation rate by age of initiation: 37.3 percent of those who started smoking when they were age 15 or younger had quit, 41.3 percent of those who started smoking when they were ages 16 to 19 years had quit, and 47.6 percent of those who started smoking when they were older than age 19 years had quit.

Race and Ethnicity

For the majority of years that smoking prevalence has been tracked by race, only African Americans and whites were compared. During many of those years, African American adults were reportedly more likely to be current smokers than were whites. Data from the National Health Interview Survey (NHIS) indicate that this differential may be reversing, starting with a convergence of the rates in the late 1990s and slightly lower rates among African Americans than among whites in the early 2000s. This is likely due to a drop in African American adolescent smoking, which continued into young adult years (CDC 1998). Race-specific smoking rates among adults are presented in Table 1-1. In 2004, approximately 22 percent of non-Hispanic whites and 20 percent of non-Hispanic African Americans were current smokers.

Data collected over the past decade and a half allow the rates of smoking among additional racial and ethnic groups to be identified and compared. Hispanics are less likely to be current smokers than non-Hispanic whites and non-Hispanic African Americans. An estimated 15.0 percent of Hispanic adults were current smokers in 2004, an 11 percent reduction in prevalence since 2002 (CDC 2004b, 2005b). Although Hispanics are less likely than non-Hispanics to be current smokers, Hispanic smokers are less likely to quit. In 2000, the rate of Hispanic smokers who had quit was 42.9 percent, whereas the rate was 49.2 percent among non-Hispanic smokers of all races (ALA 2006).

American Indian and Alaska Natives have the highest prevalence of current smoking in the United States. According to the 2004 NHIS, more than one-third of American Indian and Alaska Native adults currently smoke cigarettes. (Note that the estimates of the prevalence for the American Indian and Alaska Native population are based on small sample sizes and have wide variances. They should be interpreted with some caution.)

Asians have the lowest prevalence of current smoking among adults compared with those for all other racial and ethnic groups. In 2004, 11.3 percent of Asians were current smokers. Asians were 85 percent less likely than the general population of adults to be smokers. Asian women have

TABLE 1-1 Current Smoking Prevalence (Percent) by Race, 2002–2004

	2004	2003	2002
Non-Hispanic white	22.2	22.7	23.6
Non-Hispanic African American	20.2	21.3	22.6
Hispanic	15	16.4	16.7
American Indian or Alaska Native	33.4	39.7	40.8
Asian	11.3	11.7	13.3

SOURCE: (CDC 2004a, 2005b, 2005c).

the lowest prevalence of smoking of any group highlighted in the data: less than 5 percent in 2004 (CDC 2004b, 2005b).

Ethnic differences in smoking behavior are subsumed within the broad racial categories, concealing important differentials that could reflect a negative effect of American acculturation (Shelley et al. 2004). Data from the NSDUH reveal disparities in the rates of smoking among some Asian and Hispanic subgroups (CDC 2004a). In 1999 and 2000, Korean Americans were more likely to smoke than the general population (27.2 versus 26.5 percent), and the prevalence of smoking among Vietnamese-Americans was equal to the overall rate. Among Hispanics, Puerto Ricans were the most likely to smoke, with a prevalence rate of 30.4 percent. Puerto Ricans were the only group of Hispanics to be more likely to smoke than non-Hispanic whites or African Americans (CDC 2004a). Chinese American men were reported to have high rates of smoking in regional studies but not in the national survey (Shelley et al. 2004).

Racial differences in smoking status tend to obscure the depth of racial disparities in health that stem from tobacco smoking. Even though African Americans are no more likely to smoke than whites, they are more likely to suffer smoking-related mortality than whites (CDC 1998; Gadgeel et al. 2001). Some have suggested that the smoking-related mortality differential between African Americans and whites is because African Americans overwhelmingly smoke menthol cigarettes, which are potentially more addictive (e.g., [IOM 2001]). In 2000, 68.9 percent of African American smokers aged 12 years and older smoked menthol cigarettes, whereas 22.4 percent of white smokers and 29.2 percent of Hispanic smokers smoked menthol cigarettes (Giovino et al. 2004).

Smoking cessation rates for African Americans are lower than those for whites (37.4 percent versus 50.3 percent in 2000) (ALA 2006), although these data might reflect the lag in smoking cessation among African Americans compared to whites. A recent study shows that promotional offers from the tobacco industry may be working to keep African American smokers from quitting. White and colleagues (2006) found that 43.0 percent of African American smokers reported that they used a promotional offer “every time I saw one,” whereas the rates were 39.1 percent for whites, 24.3 percent for Hispanics, 31.9 percent for Asian/Pacific Islanders, and 39.6 percent for other groups. Also, African Americans who smoked menthol brands (Newport or Kool) were more than twice as likely to use the promotional coupons as African Americans who smoked other brands (White et al. 2006).

Gender

Men are more likely to smoke than women. On average, men are also more likely to be heavy smokers and to smoke more cigarettes per day

(Giovino 2004). The greater prevalence of smoking among men is evident among groups subdivided by race and ethnicity and has persisted for decades. The gender gap in smoking has narrowed considerably since the 1970s, however (Giovino 2004). Since the mid-1980s, the prevalence of smoking among men and women has declined at similar rates. The difference in quit rates between men and women has also narrowed over time, particularly since the mid-1990s, and the rates are converging (Giovino 2004).

In 2004, 23.4 percent of men and 18.5 percent of women were current smokers.⁹ The gender difference is even larger within racial subgroups. Among Hispanics, for example, men are almost twice as likely as women to be smokers (prevalences of 18.9 percent among men and 10.9 percent among women). The rate of smoking among Asian men is almost four times higher than that among Asian women: 17.8 versus 4.8 percent. Differences in current smoking prevalence by gender are smaller among non-Hispanic whites, African Americans, and American Indians and Alaska Natives than among Asians or Hispanics, but are still evident (CDC 2005b).

Educational Attainment and Income

Smokers are increasingly likely to be poor and uneducated. As a result, smoking has contributed significantly to the disparity in the rates of mortality between those with lower levels and those with higher levels of educational attainment (Wong et al. 2002). According to NHIS, adults aged 25 years and over with a general educational development (GED) diploma were more likely to be current smokers than those with any other level of education (CDC 2004b). More than 40 percent of adults with a GED were current smokers in 2005. This group was followed by those who have completed 9 to 11 years of schooling, just under one-third of whom were current smokers. In general, current smoking prevalence decreased with increasing years of education (CDC 2006b).

Individuals whose household incomes are below the poverty threshold are significantly more likely to be smokers than those with incomes at or above the poverty level. In 2005, an estimated 29.9 percent of individuals living below the poverty level reported being a current smoker whereas 20.6 percent of those who had income levels at or above the threshold reported being a current smoker (CDC 2006b).

Dichotomous measures of socioeconomic status (SES) conceal the gradient effect of SES on smoking that has persisted over decades. Gilman and

⁹Although data for 2005 has been published by CDC breaking down adult smoking prevalence by gender (23.9 percent of men and 18.1 percent of women were current smokers in 2005), 2005 data on the gender difference among racial subgroups is still unavailable (CDC 2006b).

colleagues (2003) found graduated rates of smoking behavior measures by several indicators of adult and childhood SES,¹⁰ showing that the smoking risk decreased and the rate of cessation increased among those at successively higher levels of SES. They also found that those with lower SES were more likely to initiate smoking, progress to become regular smokers, and sustain a smoking career than those with higher SES.

Figure 1-12 shows the smoking prevalence by four levels of income among the five major racial/ethnicity groups in the United States and among the total population, as estimated by Barbeau and colleagues (2004). The researchers based their findings on data from the 2000 NHIS, which revealed an overall weighted smoking prevalence rate of 25.9 percent. They found that when the smoking rates among all races and ethnicities are taken into account, smoking is the most prevalent among those who are poor (34.7 percent) and nearly poor (34.2 percent), lower among the middle income group (31.4 percent), and the lowest among the higher income subpopulation (20.7 percent). Within the total population and among whites and African Americans, there is a clear gradient in smoking prevalence level of income. Those in the higher income classification (representing individuals with annual incomes at 300 percent of the poverty level or higher and comprising 45 percent of the total sample) were significantly less likely to smoke than those at lower income levels. The gradient effect was much less pronounced among the lower-income classifications, although individuals in the middle (those with annual incomes between 200 and 299 percent of the poverty level) income category were less likely to be current smokers than those in the poor and near-poor categories. This phenomenon held true across the total population and among whites and African Americans (Barbeau et al. 2004).

The gradient effect is not evident among other racial/ethnic groups, however. Higher income was not protective against smoking for American Indians and Alaska Natives or Hispanics. For Asians, those in the highest and lowest income categories demonstrated a significantly reduced prevalence of smoking, whereas those in the middle-income category had the highest smoking rates of all groups divided by income levels (Barbeau et al. 2004).

The effects of income and education on smoking behavior are not clear-cut. Data from the 1999 and 2000 National Household Survey on Drug Abuse (NHSDA; NHSDA was renamed the National Survey on Drug Use and Health [NSDUH] in 2002) indicate an interaction between income and educational attainment and their effects on smoking prevalence. Figure 1-13 shows the difference in the ranking of smoking prevalence by educational attainment and various family income levels (SAMHSA 2002). College

¹⁰As indicated by maternal education, parental occupation, and household poverty status.

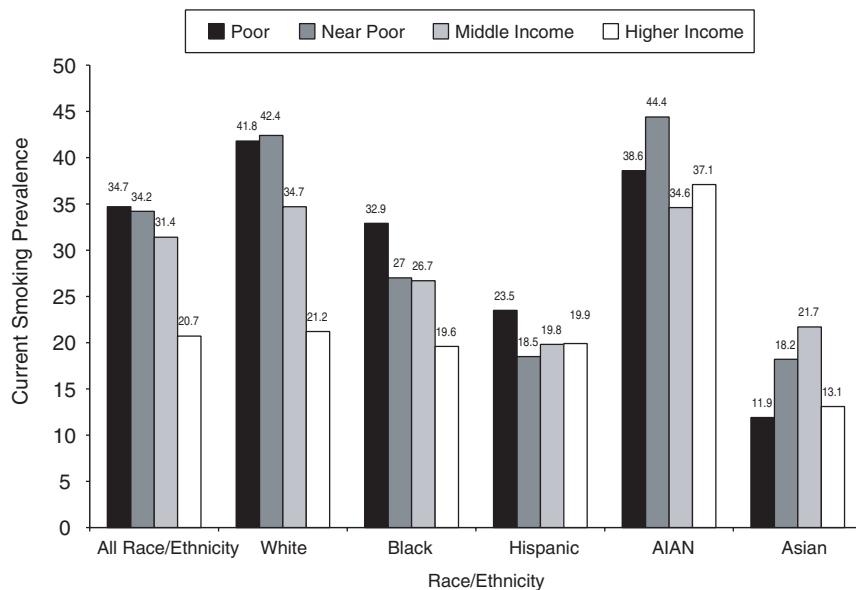


FIGURE 1-12 Adult smoking prevalence rates by race/ethnicity and poverty status. SOURCE: (Barbeau et al. 2004).

graduates at all income levels are less likely to smoke. People with some college education with the lowest levels of family income (less than \$20,000 annually) are the most likely to be smokers, but at higher levels of income, their smoking rates are below those of people with no college education (high school graduates and those who did not graduate from high school). Those who did not graduate from high school with lower income levels are less likely to be smokers than high school graduates and people with some college education. At the high levels of income, however, those who did not graduate from high school are the most likely to smoke.

State of Residence

Smoking prevalence and cessation vary widely by region and state. Regional smoking prevalence rates range from approximately 17 percent in the West to more than 23 percent in the Midwest, according to data from the Tobacco Use Supplement of the Current Population Survey for 2001–2002 (Hartman et al. 2004). Among the four regions defined here, the South has the second highest prevalence of smoking, but it contains three of the six states where smoking is the most prevalent (Kaiser Family Foundation 2006). The West had the highest quit rate according to these data: 39.5 percent of

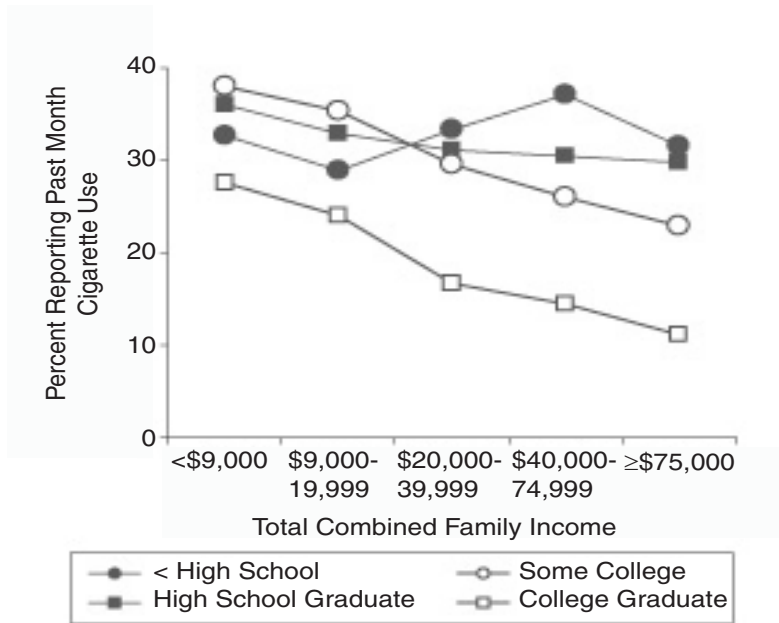


FIGURE 1-13 Prevalence of current cigarette use by family income and educational attainment.

people who have ever smoked reported having some cessation activity¹¹ in the past year, including quitting. The least cessation activity occurred in the South, where 31.2 percent of ever smokers had cessation activity in the past year. Figures 1-14 and 1-15 provide trends in smoking prevalence and smoking cessation by U.S. state and territory in 2004, respectively.

In 2004, the prevalence of current smoking among adults in 49 states, the District of Columbia, Puerto Rico, and the Virgin Islands was estimated by using data from the Behavior Risk Factor Surveillance Survey (CDC 2005c). Hawaii was excluded from the analysis because of insufficient data. Among the 52 locations for which smoking behavior was described, the current smoking rates varied widely. In the states ranking the highest among current smokers, more than a quarter of the adult population currently smokes. Those states include Kentucky (27.6 percent), West Virginia (26.9

¹¹Defined as a) daily smokers having one or more (24-hour or longer) quit attempts in the past year, b) current some-day smokers who had previously smoked daily about 12 months ago, c) former smokers who quit less than 3 months prior to the interview, and d) former smokers who quit 3 or more months prior to interview.

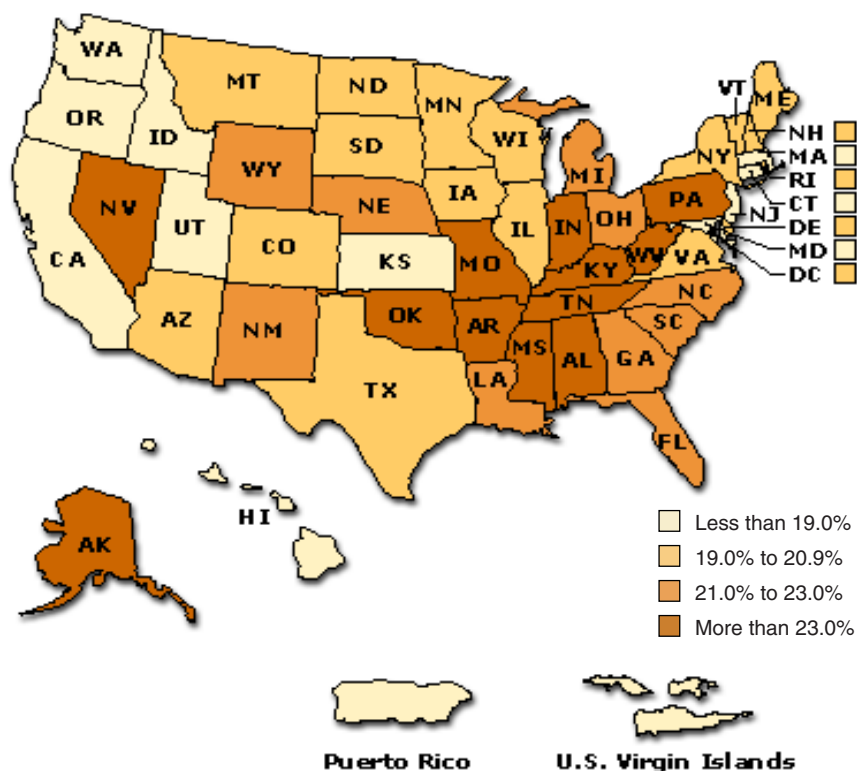


FIGURE 1-14 Smoking prevalence among adults by state or territory, 2005. SOURCE: (Kaiser Family Foundation 2006). Located at: <http://www.statehealthfacts.org/cgi-bin/healthfacts.cgi?previewid=292&action=compare&category=Health+Status&subcategory=Smoking&topic=Adult+Smoking+Rate>.

percent), Oklahoma (26.1 percent), Tennessee (26.1 percent), Ohio (25.9 percent), and Arkansas (25.7 percent). The states that ranked the lowest in current smoking had prevalence rates of less than 15 percent. Only two of the contiguous 48 states met this criterion: California with 14.9 percent and Utah with 10.5 percent. Puerto Rico and the Virgin Islands also had very low current smoking prevalence rates: 12.7 and 9.5 percent, respectively.

State-level cessation rates ranged from 42.5 percent in Kentucky to 62.5 percent in Connecticut. Kentucky, the state with the highest smoking prevalence rate, also had the lowest quit rate (CDC 2005c). Of the six states with the lowest quit rates, three (Tennessee with 45.9 percent, Ohio with 49.0 percent, and Kentucky with 46.1 percent) also ranked in the top six in smoking prevalence. All six of the states ranking the highest among current

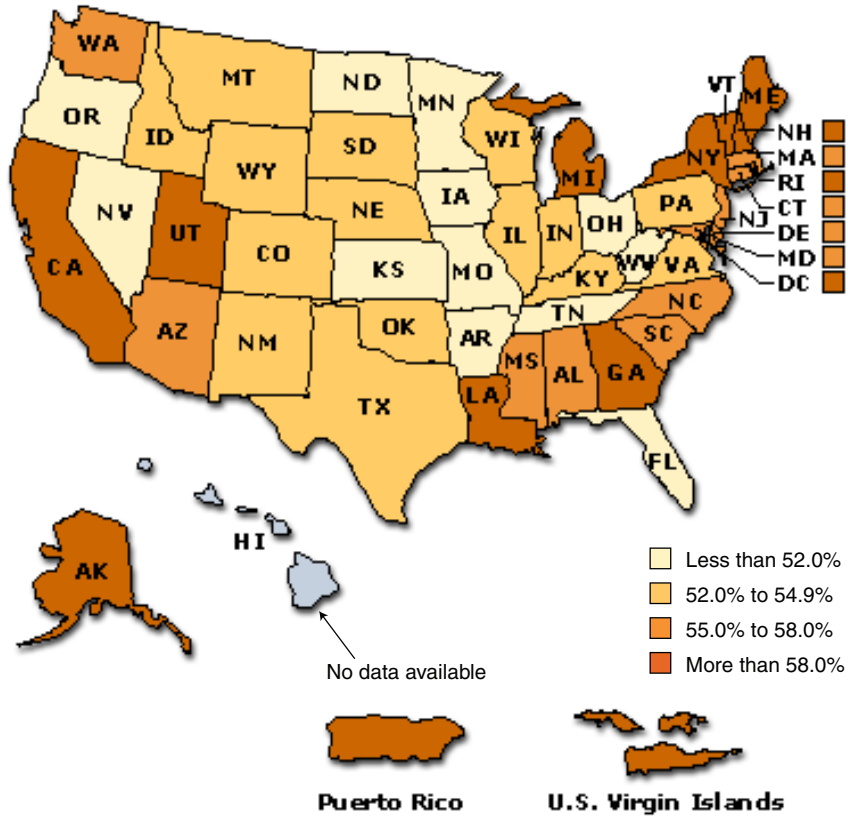


FIGURE 1-15 Smoking cessation prevalence among adults by state or territory, 2004.

SOURCE: (Kaiser Family Foundation 2006). Located at: <http://www.statehealthfacts.org/cgi-bin/healthfacts.cgi?previewid=3&action=compare&category=Health+Status&subcategory=Smoking&topic=Attempts+to+Quit+Smoking>.

smokers had quit rates of less than 50 percent. In the states with the highest quit rates, 60 percent or more of individuals who had ever smoked had quit. These included Utah (60.1 percent), Vermont (60.5 percent), California (62.0 percent), and Connecticut (62.5 percent). All four of these states had smoking prevalence rates at or below 20.0 percent.

Many factors contribute to the differences in the smoking cessation prevalence and smoking cessation rates among states, including the demographic and social characteristics of the state populations. The communities with large percentages of poor populations and populations with low levels of education tend to have the highest prevalence of smoking (Dell et al.

2005). As discussed in Chapter 5, it is likely that variations in the levels of tobacco control activities among the states also account for some of these variations in smoking prevalence. It is widely accepted that California's lower prevalence is attributable at least in part to the intensity of tobacco control efforts in that state (CDC 1996). Kuiper and colleagues (2005) present evidence that comprehensive state programs reduce the prevalence of smoking among adults and adolescents at the state and national levels. Jemal and colleagues (2003) examined comprehensive smoking cessation programs among 33 states and found that the intensity of the program had a very large negative correlation with the prevalence of current smoking ($r = -0.81$, $p < 0.0001$) and a large positive correlation with the quit rate ($r = 0.82$, $p < 0.0001$) among adults ages 30 to 39 years. The impact of comprehensive state tobacco control programs is discussed in more detail in Chapter 5 of this report.

States with a high prevalence of smoking among adults also have high rates of smokers who made no attempt to change their behavior in the last year (Burns and Warner 2003), suggesting that environment plays a role in sustaining smoking behavior or promoting cessation efforts.

Comorbidity

Several recent studies have documented a relationship between mental illness and smoking among adults and adolescents (Black et al. 1999; Lasser et al. 2000; Upadhyaya et al. 2002). As used by Lasser and colleagues (2000), the term "mental illness" in this context is defined very broadly to include major depression, bipolar disorder, dysthymia, panic disorder, agoraphobia, social phobia, simple phobia, generalized anxiety disorder, alcohol abuse, alcohol dependence, drug abuse, drug dependence, antisocial personality, conduct disorder, or nonaffective psychosis (Lasser et al. 2000). Adults who currently experience symptoms of these disorders smoke more than 44 percent of the cigarettes consumed in the United States (Lasser et al. 2000). Lasser and colleagues also found that adults with a lifetime history of mental illness (broadly defined as above) were more likely to be current smokers than adults with no history of mental illness. Adults with mental illnesses manifesting within the past month were the most likely to smoke and the least likely to quit. Figure 1-16 compares the smoking prevalence and cessation rates by mental illness status. The study also revealed that those with a larger number of mental illness comorbidities have a greater likelihood of smoking and a greater tendency to smoke heavily.

EMERGING CHALLENGES

Although the prevalence of smoking among adults continues a 40-year decline, some recent trends suggestive of a flattening in rates of adult smok-

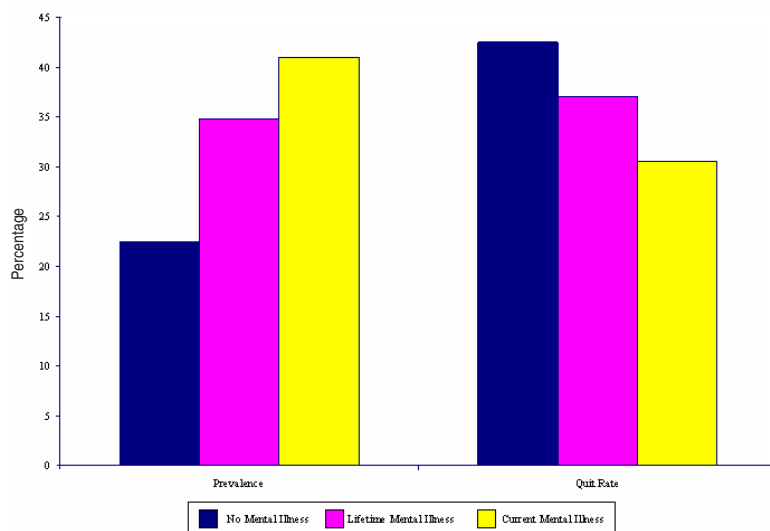


FIGURE 1-16 Current smoking prevalence and quit rates among individuals ages 15 to 54 years by mental illness status.

SOURCE: (Lasser et al. 2000).

ing and cessation raise an important question: Are tobacco control programs confronting a hardening target? The term “hardening” is used in this context to refer to the residual smokers who either resist cessation efforts or who have more difficulty quitting than former smokers (Burns and Warner 2003). For the purposes of this report, the key question is the one posed by a recent National Cancer Institute monograph: Is achieving abstinence harder, and do changes to interventions need to be made? This chapter has identified several subpopulations that appear to pose an elevated risk of life-long smoking. Because these groups are more likely to continue to smoke despite cessation efforts, it seems likely that more aggressive efforts may be needed to reach them and to change their behavior.

Another potentially worrisome trend is the increase in initiation by young adults (18–24) and a possible increase in occasional smoking that may be associated with it. Such an increase was shown in one national survey (CDC 2005b), but not in another, (see Figure 1-9). Occasional smokers differ from heavier or hard-core smokers in many ways: occasional smokers are more highly educated whereas hard-core smokers have lower levels of education; occasional smokers are more likely to be racial and ethnic minorities whereas hard-core smokers are more likely to be white; and hard-core smokers tend to begin smoking at an earlier age (Augustson and Marcus 2004). Whether an increase in occasional smoking, if it is occurring, signals a more difficult challenge for tobacco control is not altogether clear.

SUMMARY

The phenomenal increase in tobacco use over the course of the 20th century was finally reversed in the wake of the publication of the Surgeon General's important report in 1964. The data reviewed in this chapter suggest that the gradual decline in tobacco use since 1965 can be divided into two phases, the first running from 1965 to about 1980 and the second running from 1980 to the present. During the initial period, there was a sharp decline in smoking prevalence, accompanied by a modest increase in the average number of cigarettes smoked per day by smokers. Since then, however, the continued decline in smoking prevalence has been accompanied by a substantial decline in cigarettes smoked per day among those who smoke. As will be explained in Chapters 3 and 5, the committee believes that a substantial portion of the declines in smoking prevalence and smoking intensity over the past 25 years is attributable to tobacco control interventions, especially price increases and the emergence of a strong antismoking social norm.

In the committee's opinion, the data suggest that the Surgeon General's 1964 report and the dissemination of information on the adverse health effects of smoking had a strong impact on smoking prevalence. However, industry efforts to respond to the health threat of smoking by promoting filtered and so-called "light" cigarettes tended to counteract the effects of antismoking messages and to sustain smoking by those who smoked the most heavily. This interpretation would explain the increase in smoking intensity during this initial phase of tobacco control activity. During the second phase of tobacco control efforts, however, the tobacco industry's dominance of the playing field was finally challenged by strong advocacy at the local and state levels and by significant increases in price. These efforts not only sustained the downward trend in prevalence but also helped to cut down on the intensity of smoking among a significant portion of smokers.

If this overall interpretation is correct, it suggests that continued implementation of strong tobacco control interventions will be needed to sustain progress. However, it also tends to highlight some important warning signs. First, tobacco control efforts will need to address the needs of a residual population of smokers who are particularly difficult to influence (e.g., smokers with mental illness). Second, a disturbing increase in later-onset, less frequent smoking by 18- to 25-year-olds could portend a growing cohort of new smokers who may be overlooked by traditional prevention programs for teens and by traditional cessation programs developed for older smokers. Finally, the volatile and frequently high rate of initiation of smoking among teens poses a continuing obstacle to society's long-term goal of reducing the public health burden of tobacco use.

REFERENCES

- ALA (American Lung Association). 2004. Trends in Tobacco Use. New York: American Lung Association.
- ALA. 2006. Trends in Tobacco Use. New York: American Lung Association.
- Arnett JJ. 1999. Winston's "No Additives" campaign: "straight up"? "No bull"? *Public Health Reports* 114(6):522-527.
- Augustson E, Marcus S. 2004. Use of the current population survey to characterize subpopulations of continued smokers: a national perspective on the "hardcore" smoker phenomenon. *Nicotine and Tobacco Research* 6(4):621-629.
- Bachman JG, O'Malley PM, Johnston LD, Schulenberg JE, Ludden AB, Merline AC. 2001. *The Decline of Substance Use in Young Adulthood: Changes in Social Activities, Roles, and Beliefs*. Research Monographs in Adolescence. Mahwah, NJ: Lawrence Erlbaum Associates, Inc.
- Barbeau EM, Krieger N, Soobader MJ. 2004. Working class matters: socioeconomic disadvantage, race/ethnicity, gender, and smoking in NHIS 2000. *American Journal of Public Health* 94(2):269-278.
- Black DW, Zimmerman M, Coryell WH. 1999. Cigarette smoking and psychiatric disorder in a community sample. *Annals of Clinical Psychiatry* 11(3):129-136.
- Brandt AM. 2007. *The Cigarette Century: The Rise, Fall, and Deadly Persistence of the Product That Defined America*. New York: Basic Books.
- Breslau N, Johnson EO, Hiripi E, Kessler R. 2001. Nicotine dependence in the United States: prevalence, trends, and smoking persistence. *Archives of General Psychiatry* 58(9):810-816.
- Bulow J, Klemperer P. 1998. The tobacco deal. *Brookings Papers on Economic Activity. Microeconomics* 1998:323-394.
- Burns DM, Lee L, Shen LZ, Gilpin E, Tolley HD, Vaughn J, Shanks TG. 1997. *Cigarette smoking behavior in the United States. Changes in Cigarette Related Disease Risks and Their Implication for Prevention and Control. Smoking and Tobacco Control Monograph No. 8*. Bethesda, MD: DHHS, National Institutes of Health, National Cancer Institute. Pp. 13-112.
- Burns DM, Major JM, Shanks TG. 2003. *Changes in Number of Cigarettes Smoked per Day: Cross-Sectional and Birth Cohort Analyses Using NHIS. Those Who Continue to Smoke: Is Achieving Abstinence Harder and Do We Need to Change Our Approach? Smoking and Tobacco Control Monograph 15*. Bethesda, MD: U.S. Department of Health and Human Services, National Institutes of Health, National Cancer Institute. Pp. 83-99.
- Burns DM, Warner KE. 2003. *Smokers who have not quit: is cessation more difficult and should we change our strategies? Those Who Continue to Smoke: Is Achieving Abstinence Harder and Do We Need to Change Our Approach? Smoking and Tobacco Control Monograph 15*. Bethesda, MD: U.S. Department of Health and Human Services, National Institutes of Health, National Cancer Institute. Pp. 11-32.
- Capehart T. 2004. *The Changing Tobacco User's Dollar*. Washington, DC: Economic Research Service, U.S. Department of Agriculture.
- Capehart T. 2005. *Tobacco Outlook: Tobacco Acreage Plunges for 2005 Crop Year*. Washington, DC: Economic Research Service, U.S. Department of Agriculture.
- CDC (Centers for Disease Control and Prevention). 1994. Changes in the cigarette brand preferences of adolescent smokers—United States, 1989–1993. *MMWR (Morbidity and Mortality Weekly Report)* 43(32):577-581.
- CDC. 1996. Cigarette smoking before and after an excise tax increase and an antismoking campaign—Massachusetts, 1990–1996. *MMWR (Morbidity and Mortality Weekly Report)* 45(44):966-970.

- CDC. 1998. Tobacco use among US racial/ethnic minority groups, A report of the Surgeon General, 1998, Executive Summary. *Tobacco Control* 7:198–209.
- CDC. 2003. Cigarette smoking among adults—United States, 2001. *MMWR. (Morbidity and Mortality Weekly Report)* 52(40):953–980.
- CDC. 2004a. Prevalence of cigarette use among 14 racial/ethnic populations—United States, 1999–2001. *MMWR. (Morbidity and Mortality Weekly Report)* 53(3):49–52.
- CDC. 2004b. Cigarette smoking among adults—United States, 2002. *Journal of the American Osteopathic Association* 104(8):324–327.
- CDC. 2005a. Cigarette smoking among adults—United States, 2003. *MMWR (Morbidity and Mortality Weekly Report)* 54(20):509–528.
- CDC. 2005b. Cigarette smoking among adults—United States, 2004. *MMWR (Morbidity and Mortality Weekly Report)* 54(44):1121–1124.
- CDC. 2005c. State-specific prevalence of cigarette smoking and quitting among adults—United States, 2004. *MMWR (Morbidity and Mortality Weekly Report)* 54(44):1124–1127.
- CDC. 2006a. Cigarette use among high school students—United States, 1991–2005. *MMWR (Morbidity and Mortality Weekly Report)* 55(26):724–726.
- CDC. 2006b. Tobacco use among adults—United States, 2005. *MMWR (Morbidity and Mortality Weekly Report)* 55(42):1145–1148.
- Chaloupka FJ, Cummings KM, Morley CP, Horan JK. 2002. Tax, price and cigarette smoking: evidence from the tobacco documents and implications for tobacco company marketing strategies. *Tobacco Control* 11(Suppl 1):162–172.
- Chassin L, Presson CC, Pitts SC, Sherman SJ. 2000. The natural history of cigarette smoking from adolescence to adulthood in a midwestern community sample: multiple trajectories and their psychosocial correlates. *Health Psychology* 19(3):223–231.
- Chassin L, Presson CC, Rose JS, Sherman SJ. 1996. The natural history of cigarette smoking from adolescence to adulthood: demographic predictors of continuity and change. *Health Psychology* 15(6):478–484.
- Chen K, Kandel DB. 1995. The natural history of drug use from adolescence to the mid-thirties in a general population sample. *American Journal of Public Health* 85(1):41–47.
- Dell JL, Whitman S, Shah AM, Silva A, Ansell D. 2005. Smoking in 6 diverse Chicago communities—a population study. *American Journal of Public Health* 95(6):1036–1042.
- DHHS (U.S. Department of Health and Human Services). 2000a. *Reducing Tobacco Use: A Report of the Surgeon General*. Atlanta, GA: DHHS, CDC, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health.
- DHHS. 2000b. *Reducing Tobacco Use: A Report of the Surgeon General*. Atlanta, GA DHHS.
- DiFranza JR, Richards JW, Paulman PM, Wolf-Gillespie N, Fletcher C, Jaffe RD, Murray D. 1991. RJR Nabisco's cartoon camel promotes camel cigarettes to children. *Journal of the American Medical Association* 266(22):3149–3153.
- Ernster VL. 1985. Mixed messages for women. A social history of cigarette smoking and advertising. *New York State Journal of Medicine* 85(7):335–340.
- FTC (Federal Trade Commission). 2005. *Cigarette Report for 2003*. Washington, DC: FTC.
- FTC. 2007. *Cigarette Report for 2004 and 2005*. Washington, DC: FTC.
- Gadgeel SM, Severson RK, Kau Y, Graff J, Weiss LK, Kalemkerian GP. 2001. Impact of race in lung cancer: analysis of temporal trends from a surveillance, epidemiology, and end results database. *Chest* 120(1):55–63.
- Gardiner PS. 2004. The African Americanization of menthol cigarette use in the United States. *Nicotine and Tobacco Research* 6(Suppl 1):S55–S65.
- Gilman SE, Abrams DB, Buka SL. 2003. Socioeconomic status over the life course and stages of cigarette use: initiation, regular use, and cessation. *Journal of Epidemiology and Community Health* 57(10):802–808.
- Giovino GA. 2002. Epidemiology of tobacco use in the United States. *Oncogene* 21(48): 7326–7340.

- Giovino GA. 2004. *Epidemiology of Tobacco Use in the United States*. PowerPoint Presentation presented to the IOM meeting Reducing Tobacco Use.
- Giovino GA, Sidney S, Gfroerer JC, O'Malley PM, Allen JA, Richter PA, Cummings KM. 2004. Epidemiology of menthol cigarette use. *Nicotine and Tobacco Research* 6(Suppl 1):S67-S81.
- Giovino GA, Tomar SL, Reddy MN, Peddicord JP, Zhu B-P, Escobedo LG, Eriksen MP. 1996. *Attitudes, knowledge, and beliefs about low-yield cigarettes among adolescents*. National Cancer Institute. The FTC Cigarette Test Method for Determining Tar, Nicotine, and Carbon Monoxide Yields of U.S. Cigarettes (Smoking and Tobacco Control, Monograph 7). Bethesda, MD: National Institutes of Health. Pp. 39-57.
- Gruber J. 2001. Tobacco at the crossroads: the past and future of smoking regulation in the United States. *The Journal of Economic Perspectives* 15(2):193-212.
- Hamilton JL. 1972. The demand for cigarettes: advertising, health scare, and the cigarette advertising ban. *Review of Economics and Statistics* 54:401-411.
- Hartman A, Willis G, Lawrence D, Gibson JT. 2004. *The 2001–2002 Tobacco Use Supplement to the Current Population Survey (TUS-CPS): Representative Survey Findings*. Web Page. Available at: http://riskfactor.cancer.gov/studies/tus-cps/results/data9899/cps_results.pdf.
- Havrilesky T, Barth R. 1969. Tests of market share stability in the cigarette industry 1950–1966. *The Journal of Industrial Economics* 17(2):145-150.
- Hyland A, Li Q, Bauer JE, Giovino GA, Steger C, Cummings KM. 2004. Predictors of cessation in a cohort of current and former smokers followed over 13 years. *Nicotine and Tobacco Research* 6(Suppl 3):S363-S369.
- IOM (Institute of Medicine). 1994. *Growing Up Tobacco Free: Preventing Nicotine Addiction in Children and Youth*. Washington, DC: National Academy Press.
- IOM. 2001. *Clearing the Smoke: Assessing the Science Base for Tobacco Harm Reduction*. Washington, DC: National Academy Press.
- Jemal A, Cokkinides VE, Shafey O, Thun MJ. 2003. Lung cancer trends in young adults: an early indicator of progress in tobacco control (United States). *Cancer Causes and Control* 14(6):579-585.
- Johnston LD, O'Malley PM, Bachman JG, Schulenberg JE. 2006. *Monitoring the Future: National Results on Adolescent Drug Use: Overview of Key Findings, 2005*. (NIH Publication No. 07-6202). Bethesda, MD: National Institute on Drug Abuse. P. 71.
- Johnston LD, O'Malley PM, Bachman JG, Schulenberg JE. 2007. *Monitoring the Future: National Results on Adolescent Drug Use: Overview of Key Findings, 2006*. (NIH Publication No. 07-6202). Bethesda, MD: National Institute on Drug Abuse.
- Kaiser Family Foundation. 2006. *Percent of Adults Who Are Smokers, 2004*. Web Page. Available at: <http://www.statehealthfacts.kff.org/cgi-bin/healthfacts.cgi?action=compare&category=Health+Status&subcategory=Smoking&topic=Smoking+Rate>; accessed April 3, 2006.
- Kandel DB. 2002. *Natural History of Smoking and Nicotine Dependence*. In The Royal Society of Canada, ed. Proceedings of the Royal Society of Canada 2002 Symposium on Addictions: Impact on Canada. Ottawa, Ontario: Royal Society of Canada.
- Krugman DM, Quinn WH, Sung Y, Morrison M. 2005. Understanding the role of cigarette promotion and youth smoking in a changing marketing environment. *Journal of Health Communication* 10(3):261-278.
- Kuiper NM, Nelson DE, Schooley M. 2005. *Evidence of Effectiveness: A Summary of State Tobacco Control Program Evaluation Literature*. Atlanta, GA: DHHS, CDC, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health.

- Lasser K, Boyd JW, Woolhandler S, Himmelstein DU, McCormick D, Bor DH. 2000. Smoking and mental illness: a population-based prevalence study. *Journal of the American Medical Association* 284(20):2606-2610.
- Mendez D, Warner KE. 2004. Adult cigarette smoking prevalence: declining as expected (not as desired). *American Journal of Public Health* 94(2):251-252.
- National Center for Health Statistics. 2005. *Health, United States, 2005*. Hyattsville, MD: U.S. Government Printing Office.
- National Center for Health Statistics. 2006. *Health, United States, 2006*. Hyattsville, MD: U.S. Government Printing Office.
- Pierce JP, Gilpin EA, Choi WS. 1999. Sharing the blame: smoking experimentation and future smoking-attributable mortality due to Joe Camel and Marlboro advertising and promotions. *Tobacco Control* 8(1):37-44.
- Pierce JP, Lee L, Gilpin EA. 1994. Smoking initiation by adolescent girls, 1944 through 1988. An association with targeted advertising. *Journal of the American Medical Association* 271(8):608-611.
- Pollay RW, Dewhirst T. 2002. The dark side of marketing seemingly "Light" cigarettes: successful images and failed fact. *Tobacco Control* 11(Suppl 1):I18-I131.
- R.J. Reynolds. 2006. *R.J. Reynolds Tobacco Company History*. Web Page. Available at: <http://www.brownandwilliamson.com/company/profileHistory.aspx>; accessed April 5, 2006.
- SAMHSA (Substance Abuse and Mental Health Services Administration). 2002. *The NHSDA Report: Tobacco Use, Income, and Educational Level*. Web Page. Available at: <http://oas.samhsa.gov/2k2/Tob/tob.pdf>; accessed May 19, 2006.
- SAMHSA. 2005. *Table 4.18A Numbers (in Thousands) of Persons Who Initiated Cigarette Use in the United States, Their Mean Age at First Use, and Rates at First Use (Per 1,000 Person-Years of Exposure): 1965-2003, Based on 2002-2004 NSDUHs*. Web Page. Available at: <http://oas.samhsa.gov/NSDUH/2k4nsduh/2k4tabs/Sect4peTabs1to50.htm#tab4.18a>; accessed May 18, 2006.
- SAMHSA. 2006. *Results from the 2005 National Survey on Drug Use and Health: National Findings*. Web Page. Available at: <http://oas.samhsa.gov/nsduh/2k5nsduh/2k5results.pdf>; accessed November 28, 2006.
- Schoenberg EH. 1933. The demand curve for cigarettes. *The Journal of Business of the University of Chicago* 6(1):15-35.
- Shelley D, Fahs M, Scheinmann R, Swain S, Qu J, Burton D. 2004. Acculturation and tobacco use among Chinese Americans. *American Journal of Public Health* 94(2):300-307.
- TIPS (Tobacco Information and Prevention Source). 2005a. *Percentage of Adult Ever Smokers Who Are Former Smokers (Prevalence of Cessation), Overall and by Sex, Race, Hispanic Origin, Age, and Education, National Health Interview Surveys, Selected Years-United States, 1965-2000*. Web Page. Available at: http://www.cdc.gov/tobacco/research_data/adults_prev/adstat4print.htm; accessed October 26, 2006.
- TIPS. 2005b. *Percentage of Adults Who Were Current, Former, or Never Smokers, Overall and by Sex, Race, Hispanic Origin, Age, and Education, Ever Smokers Who Are Former Smokers (Prevalence of Cessation), Overall and by Sex, Race, Hispanic Origin, Age, and Education, National Health Interview Surveys, Selected Years-United States, 1965-2000*. Web Page. Available at: http://www.cdc.gov/TOBACCO/research_data/adults_prev/adstat1.htm; accessed December 1, 2006.
- TIPS. 2006. *Smoking Prevalence Among U.S. Adults*. Web Page. Available at: http://www.cdc.gov/tobacco/research_data/adults_prev/prevali.htm; accessed December 7, 2006.
- Upadhyaya HP, Deas D, Brady KT, Kruesi M. 2002. Cigarette smoking and psychiatric comorbidity in children and adolescents. *Journal of the American Academy of Child and Adolescent Psychiatry* 41(11):1294-1305.

- White VM, White MM, Freeman K, Gilpin EA, Pierce JP. 2006. Cigarette promotional offers who takes advantage? *American Journal of Preventive Medicine* 30(3):225-231.
- Wong MD, Shapiro MF, Boscardin WJ, Ettner SL. 2002. Contribution of major diseases to disparities in mortality. *New England Journal of Medicine* 347(20):1585-1592.

2

Factors Perpetuating the Tobacco Problem

Over the past 40 years, much progress has been made in reducing the number of individuals who initiate tobacco use and in increasing the percentage of tobacco users who have quit. Current trends, however, indicate that reductions in the initiation of tobacco use have slowed and that the annual rate of cessation among smokers remains fairly low. This chapter provides an overview of the factors that impede additional progress and suggests that substantial and sustained efforts will be required to further reduce the prevalence of tobacco use and thereby reduce tobacco-related morbidity and mortality summarized in the introduction of this report and in numerous Surgeon General reports (see Box 2-1). First and foremost, tobacco products are highly addictive because they contain nicotine, one of the most addictive substances used by humans. Nicotine's addictive power thus poses significant challenges to smoking cessation efforts at both the individual and the population levels. Second, factors such as distorted risk and harm perceptions, which are associated with the initiation and maintenance of tobacco use among young smokers, pose a continuing obstacle for prevention and control strategies. Finally, the apparent concentration of heavy smoking among populations with particular vulnerabilities and a possible emerging trend toward the later onset of less frequent smoking suggest that new approaches and strategies may be needed to reduce the prevalence of tobacco use on a permanent basis.

NATURE OF NICOTINE ADDICTION

Nicotine is considered a highly addictive substance (DHHS 1988; Royal College of Physicians 2000; WHO 2003). The science base supporting this

BOX 2-1 Surgeon General's Reports on Tobacco Use 1964–2006

- 1964 Smoking and Health: Report of the Advisory Committee to the Surgeon General of the Public Health Service
- 1967 The Health Consequences of Smoking: A Public Health Service Review
- 1968 The Health Consequences of Smoking: 1968 Supplement to the 1967 Public Health Service Review
- 1969 The Health Consequences of Smoking: 1969 Supplement to the 1967 Public Health Service Review
- 1971 The Health Consequences of Smoking: A Report of the Surgeon General
- 1972 The Health Consequences of Smoking: A Report of the Surgeon General
- 1973 The Health Consequences of Smoking
- 1974 The Health Consequences of Smoking
- 1975 The Health Consequences of Smoking
- 1976 The Health Consequences of Smoking: Selected Chapters from 1971 through 1975
- 1978 The Health Consequences of Smoking, 1977–1978
- 1979 Smoking and Health: A Report of the Surgeon General
- 1980 The Health Consequences of Smoking for Women: A Report of the Surgeon General
- 1981 The Health Consequences of Smoking—The Changing Cigarette: A Report of the Surgeon General
- 1982 The Health Consequences of Smoking—Cancer: A Report of the Surgeon General
- 1983 The Health Consequences of Smoking—Cardiovascular Disease: A Report of the Surgeon General
- 1984 The Health Consequences of Smoking—Chronic Obstructive Lung Disease: A Report of the Surgeon General
- 1985 The Health Consequences of Smoking—Cancer and Chronic Lung Disease in the Workplace: A Report of the Surgeon General
- 1986 The Health Consequences of Involuntary Smoking: A Report of the Surgeon General
- 1988 The Health Consequences of Smoking—Nicotine Addiction: A Report of the Surgeon General
- 1989 Reducing the Health Consequences of Smoking—25 Years of Progress: A Report of the Surgeon General
- 1990 The Health Benefits of Smoking Cessation: A Report of the Surgeon General
- 1992 Smoking and Health in the Americas: A Report of the Surgeon General
- 1994 Preventing Tobacco Use Among Young People: A Report of the Surgeon General
- 1998 Tobacco Use Among U.S. Racial/Ethnic Minority Groups
- 2000 Reducing Tobacco Use: A Report of the Surgeon General
- 2001 Women and Smoking: A Report of the Surgeon General
- 2004 The Health Consequences of Smoking: A Report of the Surgeon General
- 2006 The Health Consequences of Involuntary Exposure to Tobacco Smoke: A Report of the Surgeon General

SOURCE: (CDC 2006).

claim has been reviewed in-depth by the Institute of Medicine (IOM) in its 2001 report, *Clearing the Smoke: Assessing the Science Base for Tobacco Harm Reduction* (IOM 2001), and by the U.S. Department of Health and Human Services in the 1988 Surgeon General's report, *The Health Consequences of Smoking: Nicotine Addiction* (DHHS 1988). These reports highlight the research literature showing that nicotine, through a complex set of mechanisms and actions that affect the neurochemistry of the brain, establishes and maintains dependence on tobacco use. The evidence derives from animal and human studies, from molecular biology and neurochemistry to behavioral studies. The evidence, in fact, is overwhelming. One of the main implications of addiction is the loss of control of drug (nicotine) use. This means that when a person would like to stop or reduce the level of consumption of an addictive drug, like nicotine, it is difficult to do so.

Physical dependence on nicotine is associated with psychoactive as well as positive and negative reinforcing effects, the development of tolerance, and the experience of withdrawal symptoms. Dependence is associated with direct and indirect effects of nicotine on brain neurotransmitters, which are directly related to the behaviors associated with addiction and withdrawal. In addition, behavioral factors, including conditioning, play an important role along with the neurochemical effects. Finally, there are some physiological effects of cigarette smoke independent of the nicotine that might contribute to the overall pleasure and addictive properties of nicotine.

Nicotine from cigarette smoke is rapidly absorbed in the lungs, from which it is quickly passed into the brain. Nicotine exerts its actions by binding to nicotinic cholinergic receptors (nAChRs) in the brain (Dani and De Biasi 2001). Composed of five subunits, the main receptor mediating nicotine dependence is believed to be the $\alpha 4\beta 2$ nicotinic cholinergic receptor. Mice lacking the $\beta 2$ subunit gene do not self-administer nicotine, nor do they exhibit other behavioral effects associated with nicotine exposure. The $\alpha 4$ subunit is associated with nicotine sensitivity. Mutations of that subunit lead to increased sensitivity to nicotine-induced reward behaviors as well as to effects on tolerance and sensitization (Tapper et al. 2004).

Nicotine affects many neurotransmitter systems: dopamine, norepinephrine, acetylcholine, serotonin, γ -aminobutyric acid, glutamate, and endorphins. The major effect of nicotine is to stimulate release of these transmitters. The result of dopamine release is critical to the reinforcing effects of nicotine and occur in the mesolimbic area, the corpus striatum, and the frontal cortex. A pathway of particular importance to drug-induced reward involves the dopaminergic neurons in the ventral tegmental area of the midbrain and the release of dopamine in the shell of the nucleus accumbens. Dopamine release signals a pleasurable experience. For example, the threshold for intracranial self-stimulation in rats, a model for brain reward, is lowered acutely with nicotine exposure, indicating greater reward.

As would be expected with substances associated with tolerance and addictive properties, neuroadaptation occurs with chronic nicotine exposure. A suspected biological correlate of this is an increase in nAChRs in the brain. This increase is thought to reflect nicotine-mediated desensitization, meaning that more nicotine is required to deliver the same neurochemical effect. For example, nicotine withdrawal in rodent models is associated with increased threshold for intracranial self-stimulation, indicating reduced reward due to inadequate dopamine release. Independent of nicotine effects, cigarette smoking is associated with decreased activity of monoamine oxidase enzymes in the brain, which are associated with the degradation of dopamine. Inhibition of monoamine oxidase activity would augment nicotine effects of increasing dopamine levels and contribute to positive reinforcement, tolerance, and addiction.

As most smokers report, stopping smoking is acutely associated with withdrawal symptoms of irritability, restlessness, anxiety, problems getting along with friends and family, difficulties concentrating, increased hunger and eating, and cravings for tobacco. Another symptom is the lack of pleasure or enjoyment, known as anhedonia. These symptoms are believed to be due to the relative deficiency in dopamine release, related to nicotine-mediated changes in receptor function and structure. Nicotine addiction is thus sustained by a combination of positive effects of nicotine on neurotransmitter levels related to pleasure and arousal, the dampening effect of those pleasure or reward mechanisms over time, and the need for continued nicotine exposure to avoid the negative affects related to the decreased neurotransmitter levels, particularly that of dopamine, that would occur without nicotine. However, in addition to the pharmacological mechanisms of nicotine, conditioning is also thought to play an important role in tobacco addiction.

With regular drug use, specific moods or other environmental factors, known as “cues,” become associated with the pleasurable or rewarding effects of the drug. This association between the cues and the anticipated pleasure associated with the drug, known as conditioning, is a powerful contributor to addiction (O’Brien 2001). Smoking is maintained in part by conditioning. For example, smoking becomes associated with specific behaviors, such as drinking a cup of coffee or alcohol. Repetition of these coexisting behaviors over time leads to the behavior becoming a cue the person to want to smoke. Behaviors can be conditioned to either the positive or negative reinforcing effects of nicotine. For example, because smoking becomes associated with relieving the negative affects of nicotine withdrawal, the smoker can associate smoking with relieving other negative feelings, such as stress. Managing conditioned behaviors is often an important factor in the success of nicotine cessation.

Smoking also facilitates nicotine dependence through sensorimotor factors associated with the act of smoking. Several studies have found that sensorimotor factors play an important role in maintaining smoking behavior in some smokers (Brauer et al. 2001; Naqvi and Bechara 2005; Rose 2006; Rose et al. 2000, 2003). A number of researchers, including Rose and colleagues, have used nicotinized and denicotinized cigarettes to study the separate roles of pharmacological actions of nicotine and the sensory/behavioral aspects of cigarette smoking on smoking withdrawal and smoking behavior (Rose et al. 2000). The results of those studies indicate that smoking denicotinized cigarettes can produce satisfaction as well as psychological rewards and can reduce the craving sensations. This finding is consistent with reports from smokers who described positive feelings as they inhale cigarette smoke but who do not experience these feelings when these sensory effects are blocked (Rose 1988; Rose et al. 1999). It has been suggested that the stimulation of nicotinic receptors on vagal nerve endings in the respiratory tract plays a role in mediating the immediate subjective effects of cigarette smoking (Rose et al. 1999).

The findings from this body of work thus suggest that airway sensory replacement may be an important aspect to be considered when determining the smoking cessation strategies to be used for some smokers (Rose et al. 1999; Westman et al. 1995).

In recent years, a body of research literature on the genetics of tobacco use has emerged. Over the past decade, researchers have cast some light on the role of genetic factors in tobacco use and dependence (Hall et al. 2002; Kendler et al. 1999; Lerman and Berrettini 2003; Li 2003, 2006; Madden et al. 1999; Sullivan and Kendler 1999). A review of a number of studies with twins suggests a significant genetic component in the initiation and maintenance of tobacco use (Kendler et al. 1999; Sullivan and Kendler 1999). On the basis of findings from studies of families, adopted children, and twins, Sullivan and Kendler estimate that a genetic influence may contribute approximately 60 percent to the possibility of smoking initiation, with environmental and personal influences contributing the remainder (Sullivan and Kendler 1999). Genetic influences are also estimated to contribute significantly (about 70 percent) to nicotine dependence.

Tyndale (2003), meanwhile, has reported on differences in the estimates of genetic influences on smoking initiation by gender, with rates ranging from 32 to 70 percent among females and 31 to 61 percent among males (Tyndale 2003). Estimates of the genetic influence on smoking persistence range from 4 to 49 percent among females and from 50 to 71 percent among males. Additional studies indicate that the age of smoking onset, the amount smoked, and smoking persistence are also influenced by genetics (Heath et al. 1999; Koopmans et al. 1999; Madden et al. 1999).

The number of studies that have assessed the role of specific genes in smoking behavior continues to grow. The work of Malaiyandi and colleagues (2005), for example, suggests that cytochrome P450 (CYP) 2A6, the liver enzyme which mediates the conversion of nicotine to cotinine, may play an important role in smoking (Malaiyandi et al. 2005). In a review of recent genetic studies of nicotine dependence, Li (2006) presents evidence that several genes may be implicated in nicotine dependence (Li 2006). Some of these genes include gamma-aminobutyric acid 2, which modulates neuronal excitability; nicotinic acetylcholine receptor alpha4, (CHRNA4), which modulates tolerance to nicotine; decarboxylase and brain-derived neurotropic factor, which influence dopamine and serotonin, which play important roles in the reward system of addiction; and the catechol-O-methyltransferase gene, which plays a role in the dopaminergic circuits central to the reward system. These and future studies of the role of genetic influences on smoking have the potential to further the understanding of nicotine addiction and its treatment.

The role of genetics in identifying the best treatment strategies for subgroups of smokers is another important emerging area of research. Pharmacogenetics researchers have examined a variety of polymorphisms and gene variances in smokers and their response to a number of current and widely used cessation pharmacotherapies for nicotine dependence. The results of these studies suggest that specific subgroups of smokers have a significantly higher probability of abstinence when they use nicotine patches, nicotine nasal spray, and bupropion treatment (Lerman et al. 2002, 2004; Swan et al. 2005). However, these studies generally involve small numbers of subjects and the genetic associations need to be replicated. It is expected that continuing research in this area will provide results that can better guide clinicians in selecting the best treatment options for individuals who want to quit smoking and will aid the in development of new drug targets that will help in cessation (Lee and Tyndale 2006).

SMOKING CESSATION

Once the grip of nicotine addiction has taken hold, quitting is hard. Epidemiological data from the 2004 National Health Interview Survey (NHIS) suggest that of the 44.5 million U.S. adults who were current smokers, about 40.5 percent (or 14.6 million) of smokers reported that they had stopped smoking for at least 1 day in the preceding 12 months in an effort to quit (CDC 2005b). Although the number of smokers who attempt to quit is significant, actual quit rates are about 5 percent, and in studies that include biochemical verification of abstinence, the actual quit rate is about 3 percent (Shiffman 2004). Some researchers suggest that each year only about 2 percent of smokers will quit permanently (Hughes 2003;

Shiffman 2004). Eventually, however, 50 percent of individuals who have ever smoked will quit (CDC 2005a).

Many smokers regret having engaged in smoking behavior. One major study of smokers in four countries (the United States, Canada, the United Kingdom, and Australia) found an overwhelming high level of regret among adult smokers (about 90 percent). This finding was consistent across the four countries (Fong et al. 2004). Regret was defined as responses of strong agreement and agreement with the statement “If you had to do it over again, you would not have started smoking.” Although the overall level of regret was high, it was more likely to be experienced by older smokers, women, and those who had tried to quit more often.

With such high levels of regret, it is not surprising that 70 percent of smokers report an interest in quitting (Fiore et al. 2000; Hughes 1999; Hymowitz et al. 1997). Interest in quitting, however, does not translate into immediate plans or actions to quit (Larabie 2005). When smokers interested in quitting are queried about their specific plans to quit, only 10 to 20 percent report a plan to quit in the next month (Etter et al. 1997). Eventually, however, about 70 percent of smokers will make at least one quit attempt (Fiore et al. 2000).

Individuals who contemplate taking steps to quit often engage in a process of weighing the pros and cons of smoking (Velicer et al. 1999). In a comprehensive review of the literature spanning five decades, McCaul and colleagues found that the primary factor motivating smokers to quit is a health concern (McCaul et al. 2006). This finding was robust across retrospective studies of former smokers, cross-sectional studies of current smokers, and prospective studies of smokers in cessation studies. Health concerns were also reported as a primary motivating factor among smokers in the Community Intervention Trial for Smoking Cessation (COMMIT) cohort study of smokers monitored for 13 years. Smokers who had made one serious attempt to quit in the period from 1993 to 2001 reported the most common reasons for quitting were concerns for current and future health (92 percent), expense (59 percent), concern for effects on others (56 percent), and setting a good example for children (52 percent) (Hyland et al. 2004). These results are similar to those found in an early COMMIT survey (1988 to 1993) (Hymowitz et al. 1997).

Physicians are in a unique position to encourage smoking cessation by their patients (Fiore et al. 2000; Russell et al. 1979; Schroeder 2005). Physician counseling and intervention are estimated to double the likelihood of quitting (Goldstein et al. 1997). Many physicians, however, miss clinical opportunities to counsel patients. Schroeder (2005) notes that only a minority of physicians are aware of and implement the 5 A's (ask, advise, assess, assist, and arrange) of cessation treatment.

A number of factors may contribute to physicians' limited participation

in encouraging patients to stop smoking. External factors such as time constraints, lack of financial incentives, or reimbursement for cessation services can be a hindrance (Schroeder 2005), as can the lack of smoking cessation educational resources in the practice setting or in the community (Tremblay M et al. 2001). Physicians' lack of knowledge, expertise, or skill in smoking cessation, as well as their negative beliefs and perceptions regarding their role in getting patients to quit have also been noted (Schroeder 2005; Tremblay et al. 2001). Physicians, for example, may believe that patients can't quit or do not fully understand that patients may try and fail a number of times before they are successful at quitting. Physicians may also fear a negative response from a patient if quitting smoking is addressed in the clinical visit (Schroeder 2005). Strategies to support physicians in engaging patients to quit smoking need to be identified and tested. Schroeder (2005), for example suggests a shortcut option encouraging physicians to ask, advise, and refer. Such strategies, however, will require enhanced support for community resources available for referral, such as quitlines.

Stages of Change

The desire or intention to quit smoking, along with an eventual attempt to quit smoking, has been viewed by many researchers as a series of transitional change stages by proponents of the transtheoretical model of change. The stages of change include precontemplation, contemplation, preparation, action, and maintenance (Prochaska and DiClemente 1983). Early studies that used the model found that cessation activity differed substantially by stage of change and that stages of change were, in turn, predictive of quit attempts and the success of quitting at 1 and 6 months (DiClemente et al. 1991).

Wewers and colleagues (using data from Current Populations Surveys conducted in 1992–1993, 1995–1996, and 1998–1999) used the Stages-of-Change Model to study movement in the readiness to quit among Americans in the 1990s (Wewers et al. 2003). The percentage of individuals in each stage of change over the three survey periods ranged from 63.7 to 59.1 in the precontemplation stage (not seriously thinking of stopping within the next 6 months), 33.2 to 28.7 percent in the contemplation stage (planning on quitting in the next 6 months but not in the next 30 days or planning on quitting in the next 30 days but making no quitting attempts in the past 12 months), and 9.3 to 7.7 percent in the preparation stage (planning on quitting in the next 30 days and making a quit attempt of at least 24 hours duration in the past 12 months). Overall, the study results indicated very little movement in the stages of readiness to change among the U.S. population in the 1990s.

Some surveys examining the stages of change and quitting have de-

scribed mixed results. Etter (2004) reported an association between smoking prevalence and stages of change: a higher prevalence of smoking was associated with a lower motivation to quit, as were fewer quit attempts and higher levels of cigarette consumption (Etter 2004). These findings were reported on the basis of data from all 50 U.S. states; these results were seen in the 1996 and 1999 Behavioral Risk Factor Surveillance System surveys but not in the 1993 survey.

Although the Stages-of-Change Model has been useful in moving cessation research from a focus on smoking and not smoking end points to the process of change from smoking to nonsmoking, questions have been raised about the need to elucidate more clearly other variables that may be implicit in the stages of change (intention to change, past quit attempts, current behavior, and the duration of the current behavior) but that are not explicitly assessed in research studies of stages of change and quitting (Etter and Sutton 2002). Recently, West (2005) has questioned the stages of change paradigm as a description of the cessation process. He found that the majority of smokers stop smoking impulsively, without going through stages of precontemplation and contemplation. Of course, this does not mean that concerns about health and the other harmful effects of smoking have not played an important role in the attempt to quit.

Quitting Attempts

Understanding which smokers will eventually take steps to quit, who will be successful at quitting, and how long smoking abstinence will endure can be difficult to discern from the literature. Difficulties arise because periods of cessation vary, as do definitions of "abstinence." Definitions of smoking cessation in the literature typically range from a 24-hour point-prevalence abstinence rate to a 6-month prolonged period of abstinence (Velicer and Prochaska 2004). Some researchers account for whether the smoker has had smoking lapses or was totally abstinent during the period of cessation reviewed (Hughes et al. 2004). Cessation outcomes can also vary depending on whether quitting was unaided or assisted with behavioral or pharmacological therapies. What is clear is that smoking careers can be long in duration. Birth cohort data from NHIS indicate that half of 15- to 17-year-olds who reported smoking at least 100 cigarettes in their lifetime will likely continue to smoke for 16 to 20 years (Pierce and Gilpin 1996). The literature also reinforces the view that nicotine addiction and tobacco dependence show some similarities with chronic diseases that are characterized by periods of relapse and remission (Fiore et al. 2000); thus the path to smoking cessation will include cycles of abstinence, lapses, relapse, and abstinence.

Smokers who move from contemplating quitting to action typically

fail. A study of self-quitters (Garvey et al. 1992) found that the majority of relapses occurred in the first few days and weeks post-cessation. Although most self-quitters (87.2 percent) relapsed within 1 year of their quit date, the majority of relapses occurred in the first few days and weeks after stopping: 13 percent relapsed by 1 day after quitting, 32 percent by 3 days, 49 percent by 1 week, and 62 percent by 2 weeks.

The results of another study of motivated self-quitters support the findings of an early relapse to smoking (Hughes et al. 1992). That study reported smoking cessation results by the use of two measures: one measure that reflected complete abstinence and another measure that reflected some smoking (smoking an average of one cigarette per day or less since the last follow-up and observer verification of no smoking of more than 10 cigarettes on any 2 days). The study findings, which used biochemical verification, indicated that 33 percent of self-quitters were abstinent at 2 days, 24 percent at 7 days, 22 percent at 14 days, 19 percent at 1 month, 11 percent at 3 months, 8 percent at 6 months, and 3 percent at 6 months. By using the more relaxed criteria, 47 percent were abstinent at 2 days, 38 percent at 7 days, 32 percent at 14 days, 27 percent at 1 month, 20 percent at 3 months, and 11 percent at 6 months.

Under a worst case scenario of unsuccessful quitting attempts, Piasecki and colleagues described cessation attempt “fatigue,” or a decrease in motivation and ability to stay abstinent (Piasecki et al. 2002). Cessation attempt fatigue is noted to be associated with lower expectations for cessation success, a reduced ability to cope or to believe in having the capacity to quit or stay abstinent, and fewer resources to exert control over behaviors or actions related to tobacco use. Smoking lapses and relapses to smoking, however, do not necessarily represent total quit failures but, rather, represent learning experiences along the pathway to cessation.

Early on in a cessation attempt, smokers may face a number of circumstances that encourage a smoking lapse, including symptoms associated with nicotine addiction (withdrawal, negative affect, urges, and cravings), the presence of social environmental factors such as smokers in the environment, or easy access to tobacco products (Brauer et al. 1996; Piasecki 2006). Although any smoking behavior after quitting has been identified as a very strong predictor of an eventual relapse (Kenford et al. 1994; Shiffman et al. 2006; Westman et al. 1997), it may not necessarily be a final outcome. Hyland and colleagues (2006) found that quit attempts in the previous year and a longer duration of past quit attempts were important predictors of new quit attempts, suggesting that some smokers will continue to attempt to abstain from smoking, despite past lapses or relapses (Hyland et al. 2006).

Other researchers note that smokers with failed quit attempts may reduce the intensity of smoking and the level of addiction for several months

after a relapse (Knoke et al. 2006). The ability to reduce smoking levels may prime relapsed smokers to be more successful in latter quit attempts. Results from the Community Intervention Trial for Smoking Cessation (surveys from 1988, 1993, and 2001) found a significant increase in quitting among participants who were able to reduce their daily cigarette consumption by 50 percent. Those who reduced their cigarette consumption by more than 50 percent were 1.7 times more likely to quit smoking by 2001 than those who did not reduce their cigarette consumption (Hyland et al. 2005).

Smokers who attempt to quit smoking with the use of some assistance tend to fare better than self-quitters; however, many smokers may not be informed about effective cessation methods (Hammond et al. 2004). Although it is not the intention of the committee to provide an exhaustive review of cessation therapies, it is important to highlight current guidelines for assisting smokers with quitting. The U.S. Department of Health and Human Services' Clinical Practice Guideline for Treating Tobacco Use and Dependence identifies three counseling and behavioral therapies that are effective in helping smokers quit. These include providing smokers with practical counseling that focuses on (1) problem-solving skills and skills training for relapse prevention and stress management, (2) providing social support as part of treatment, and (3) helping smokers obtain social support outside of treatment.

Current guidelines also recommend eight effective pharmacotherapies that can assist smokers in their attempts to quit. Five therapies are nicotine-based (nicotine gums, patches, nasal sprays, inhalers, lozenges/tablets), two are antidepressant medications (bupropion and nortriptyline), and one is a medication (clonidine) that is used for the treatment of hypertension (Fiore et al. 2000; Foulds 2006; Henningfield et al. 2005). Recently, varenicline, a nicotinic cholinergic receptor partial agonist, has been marketed for smoking cessation. Bupropion, nicotine inhalers, nasal sprays, and nicotine patches are considered first-line medication treatments that double long-term abstinence rates compared with those achieved with placebo. Nicotine gum, also a first-line treatment, improves the long-term abstinence rate by about 30 to 80 percent. There is emerging evidence from a few studies that selected use of combinations of nicotine replacement therapies (a nicotine patch with either a nicotine gum or a nicotine nasal spray) may have greater efficacy than a single form of nicotine replacement, but this has not been proven (Fiore et al. 2000).

Summary

The previous sections can be summarized succinctly: nicotine in cigarettes and other forms of tobacco is highly addictive. Once addiction takes

hold, it is difficult to stop using nicotine-containing products, although a number of therapies can improve the chances of quitting. Tobacco use is also harmful to one's health and to the health of others. Since 1964 (see Box 2-1 for a list of Surgeon General reports published from 1964 to 2006) the evidence has been building that, "smoking harms nearly every organ of the body, causing many diseases and reducing the health of smokers in general" (CDC 2004). More recently, the Surgeon General reported that, "secondhand smoke causes premature death and disease in children and in adults who do not smoke" (DHHS 2006). As a result, 90 percent of smokers regret having started to smoke, 70 percent want to quit and have made at least one quit attempt, and, at any given time, 40 percent are actively trying to quit or are thinking of quitting within the next six months.

SMOKING INITIATION

Given the clear and consistent evidence that smoking is addictive, quitting is difficult, and smoking is harmful to the health of everyone exposed to tobacco smoke, why do new smokers emerge each year? Because about 90 percent of adult smokers initiated smoking before the age of 18 years (DHHS 1994), addressing this question requires an understanding of why youths begin to smoke. Explanations of adolescent risk taking, including tobacco use, often point to adolescents' underestimation of the chance that a negative outcome will occur to them (Elkind 1967; Reyna and Farley 2006; Slovic 2001), a sense of personal invulnerability to harm (Elkind 1967, 1978), a failure to appreciate the personal applicability of known risks (Arnett 2000; Romer and Jamieson 2001b), and a general immaturity that impairs judgment (Steinberg and Cauffman 1996). Theories of health behavior have incorporated this notion, theorizing that perceptions of low risk are related to engagement in health-compromising behaviors (see, for example, the Health Belief Model (Rosenstock 1974), the Theory of Planned Behavior (Ajzen 1985), Self-Regulation Theory (Kanfer 1970), and theories of decision making [e.g., (Janis and Mann 1977)]; see also Transtheoretical Model of Change (Pallonen et al. 1998; Prochaska 1994; Prochaska and DiClemente 1983; Prochaska et al. 1992). This section provides a review of the literature on adolescents' and young adults' tobacco-related perceptions.

Perceptions of Risks of Using Tobacco

The literature on perceptions about tobacco use among adolescents and young adults is reviewed elsewhere in this report. A number of studies have assessed the extent to which adolescents and young adults recognize and appreciate the risks of smoking. Although some studies show that smokers

either overestimate (Borland 1997; Kristiansen et al. 1983; Viscusi 1990; 1991; Viscusi et al. 2000) or underestimate (Schoenbrun 1997; Sutton 1997) the particular risks of smoking compared with the actual risk from epidemiological data, most studies agree that adolescents and young adults are aware of many of the risks involved with tobacco use. In particular, they are aware that smoking involves a significant risk of lung cancer and other health outcomes (Jamieson and Romer 2001a). However, the literature also indicates that adolescents are not aware of the full extent to which smoking is harmful (Arnett 2000; Covington and Omelich 1992; Eiser and Harding 1983; Halpern-Felsher et al. 2004; Hansen and Malotte 1986; Leventhal et al. 1987; Virgili et al. 1991), nor do they fully understand the extent to which tobacco use can shorten the life span (Romer and Jamieson 2001a). More importantly, adolescents are less likely to believe that the risk of addiction and the related health consequences apply to them. To complicate matters, adolescents show an incomplete understanding of the addictive nature of tobacco use that is related, in part, to their inaccurate assessment of smoking risks and their belief that they can quit at any time and therefore avoid addiction (Arnett 2000; Slovic 1998). Furthermore, they believe that smoking risks can be counteracted by altering the amount that they smoke, when they smoke, or what they smoke (e.g., “light” versus regular cigarettes) (Kropp and Halpern-Felsher 2004).

Whether such perceptions, or misperceptions, actually motivate or predict tobacco use is a complicated question. For example, although the concept of adolescent invulnerability is widely used to explain why adolescents smoke, the few studies that have examined the relationship between personal risk perceptions and tobacco use have yielded mixed results. Although some studies find that adolescents who have smoked perceive greater personal risks (Gerrard et al. 1996; Johnson et al. 2002; Resnicow et al. 1999), others show that smokers perceive less personal risk (Arnett 2000; Covington and Omelich 1992; Eiser and Harding 1983; Goldberg et al. 2002; Urberg and Robbins 1981; 1984; Virgili et al. 1991). The following sections details smokers’ (particularly adolescent smokers’) risk-related beliefs regarding several such aspects of tobacco use.

Beliefs Regarding the Effects of Smoking

Adolescent smokers tend to overestimate some smoking risks and underestimate others. In general, they understand that smoking causes lung cancer, but they also overestimate the degree to which it does. Jamieson and Romer reported that among 14- to 22-year olds surveyed in the Annenberg Tobacco Survey, 70 percent of smokers and 79 percent of nonsmokers overestimated the risk of lung cancer attributed to smoking (Jamieson and Romer 2001b). The survey respondents also underestimated the degree

to which smoking can shorten a smoker's life. Although the majority of smokers (68 percent) and nonsmokers (79 percent) recognize that smoking shortens one's life, close to 26 percent of smokers and 18 percent of nonsmokers responded that they did not know whether this was actually the case. When asked more specifically about the number of years that smoking can shorten a life span, 44 percent of smokers and 48 percent of nonsmokers correctly identified that smoking can shorten one's life by 5 to 10 years; however, 28 percent of smokers and 19 percent of nonsmokers reported that they did not know. A high proportion of respondents also reported inaccurate assessments of the lethality of smoking compared with those of other behaviors. Many of those surveyed failed to recognize that smoking causes more deaths than gunshots and car accidents (42 percent) or alcohol and the use of other drugs (62 percent).

Another important finding from the Annenberg Tobacco Study concerns "optimism bias," that is, smokers' belief that the smoking risk is lower for themselves than for others engaging in similar behaviors (Weinstein 1989). In other words, an abstract understanding of the nature and the magnitude of smoking risks does not necessarily translate into a personalized appreciation of the hazards to oneself. In their analysis of the survey data, Romer and Jamieson found that, among smokers who correctly estimated that half of lifetime smokers die from smoking-related causes, 40 percent viewed their own smoking as less than "very risky" (the scale ranged from "very risky" to "not at all risky"). Among respondents who estimated that 60 percent or more of lifetime smokers die from smoking-related causes, 25 percent did not view their own smoking as very risky (Romer and Jamieson 2001a). Arnett reported similar results from a survey of both adolescents and adults (Arnett 2000). Arnett found that in both of these groups, smokers were more than twice as likely as nonsmokers to doubt that they would die from smoking, even if they were to smoke for 30 to 40 years. Moreover, a nontrivial proportion of adolescent smokers (29 percent) doubted slightly or strongly that they would die from smoking if they smoked for 30 to 40 years. Other studies have also shown that participants who reported that they smoked rated the chance that a negative health outcome as well as a negative social outcome (e.g., getting into trouble) would occur lower than did participants who did not smoke (Arnett 2000; Halpern-Felsher et al. 2004; Virgili et al. 1991). Furthermore, risk perceptions vary by level of smoking (Chassin et al. 2000; Halpern-Felsher et al. 2004; Soldz and Cui 2002) or stage of smoking (Pallonen et al. 1998; Prokhorov et al. 2002), with individuals who have smoked longer and more often perceiving fewer risks than those who have smoked for shorter periods and less often. Similarly, studies have found that perceived health and social risks are related to behavioral intentions and that these intentions are the most important and immediate determinants of behavior (Ajzen 1985; Distefan

et al. 1998; Fishbein and Ajzen 1975; Pallonen et al. 1998; Parsons et al. 1997; Prokhorov et al. 2002).

Beliefs Regarding Addiction and Cessation

Researchers have also examined the extent to which adolescents understand the grip of addiction and the implications of addiction on quitting. The results of these studies indicate that, although adolescents might be aware of the health and long-term risks of smoking in general, they are much less aware of the addictive nature of smoking. There are also indications that adolescent smokers might be less worried about the long-term risks of smoking, in part because they believe that they can quit smoking easily and at any time.

Weinstein and colleagues examined youth and adult smokers' beliefs about the difficulty of quitting smoking and the nature of addiction (Weinstein et al. 2004). On the basis of data from two nationwide surveys, they found that most (96 percent) smokers, both youth and adults, agreed that the longer you smoke, the harder it is to quit. A high proportion of both groups also agreed that signs of addiction appear very quickly if a teenager starts smoking half a pack of cigarettes a day: 80 percent of youth and 79 percent of adults said signs of addiction appeared in a few months or less. The youths examined in that study also tended to claim that they were less addicted than the average smoker.

Similarly, Jamieson and Romer found that a substantial proportion of smokers understood that the properties of tobacco are addictive, but they did not fully appreciate the implications for quitting (Jamieson and Romer 2001b). Their survey results showed that, whereas 82 percent of smokers agreed that cigarettes have addictive chemical properties, nearly 60 percent of those smokers believed that quitting is either very easy or possible for most people if they really try. These findings are consistent with those reported by Arnett who showed that nearly 60 percent of adolescents believed that they could smoke for a few years and then quit (Arnett 2000). However, most of them do not quit. Smoking continues beyond the high school years, with 63 percent of 12th grade daily smokers still smoking daily 7 to 9 years later, even though only 3 percent of them estimated in high school that they would still be smoking in 5 years (Johnston et al. 2004).

Beliefs Regarding So-Called "Light" Cigarettes

Another area where smokers, including adolescents, have a distorted understanding of the risks of smoking is in the comparative effects of so-called "light" cigarettes and regular cigarettes. Adolescents often smoke

“light” cigarettes to counteract the risks of smoking. In a study conducted by Kropp and Halpern-Felsher, the participants were found to believe—incorrectly—that they would be significantly less likely to get lung cancer (and other adverse health outcomes) if they smoked “light” cigarettes rather than regular cigarettes (Kropp and Halpern-Felsher 2004). Adolescents also mistakenly thought that it would take significantly longer to become addicted to “light” cigarettes and that their chances of quitting smoking were higher with “light” cigarettes than with regular cigarettes, even though it is now well established that most smokers achieve the same level of exposure to nicotine and tobacco-related toxins when they smoke so-called “light” cigarettes (IOM 2001). They also “agreed” or “strongly agreed” that regular cigarettes deliver more tar than “light” cigarettes and that “light” cigarettes deliver less nicotine than regular cigarettes. Although some of the adolescents in that study were aware of the health risks and addictive properties associated with “light” cigarettes, the data showed that some 22 percent of the adolescents were uncertain about the differences between regular and “light” cigarettes and that between 25 percent and 35 percent of the adolescents mistakenly thought that health risks were more likely to be associated with regular cigarettes than with “light” cigarettes.

Adolescent Weighing of Risks and Benefits in Smoking Initiation

Halpern-Felsher and colleagues (Appendix E) also discuss other personal and behavioral factors that influence smoking behavior in adolescents, including the reasons adolescents smoke and how they weigh smoking pros and cons. According to Halpern-Felsher and colleagues, the motivation for adolescents to start smoking can result from a variety of factors: curiosity about a means to relieve stress and boredom, peer and social influence, parental influence, and as a means to decrease appetite or increase the intoxicating effects of alcohol and drugs (Conrad et al. 1992; Turner et al. 2006; Vuckovic et al. 2003).

Although adolescents tend to minimize the risks of smoking, they also have a tendency to exaggerate the benefits of smoking, especially given the influences of a variety of factors such as those mentioned above. One tool used to understand how perceived benefits motivate individuals to smoke, compared with how perceived risks deter smoking, is the Decisional Balance Inventory which incorporates a weighing of both the benefits (pros) and the risks (cons) in predicting behavior and behavioral change. The tool assesses three factors: social pros (e.g., kids who smoke have more friends), coping pros (e.g., smoking relieves tension), and cons (e.g., smoking stinks). Using this Inventory, Prokhorov and colleagues found that scores on the smoking pros scale increased and that those on the cons scale decreased, as adolescents were more susceptible to smoking (Prokhorov et al. 2002). Pallonen

also found a positive relationship between perceived smoking benefits and nonsmokers' likelihood of smoking, whereas the cons of smoking were less predictive of smoking (Pallonen et al. 1998). Researchers have also noted that adolescent smokers tend to perceive that benefits are more likely to occur and that risks are less likely to occur compared with adolescents who have not smoked (Goldberg et al. 2002; Halpern-Felsher et al. 2004).

Summary

In summary, research suggests that adolescents misperceive the magnitude of smoking harms and the addictive properties of tobacco and fail to appreciate the long-term dangers of smoking, especially when they apply the dangers to their own behavior. When taken together with the general tendencies of adolescents to take a short-term perspective and to give substantial weight to peer influences, they tend to unduly discount the risks and overstate the benefits of smoking. These distorted risk perceptions are associated with adolescents' decisions to initiate tobacco use, a decision that they will later regret.

ATYPICAL PATTERNS OF TOBACCO USE

The discussion has thus far focused on what may be regarded as the "standard" pattern of tobacco use. The typical case of tobacco addiction involves a person who began smoking as a teenager; rapidly escalated to daily use and to nicotine addiction; and eventually has a "smoking career" of 15 to 20 years of frequent daily use, characterized by heavy regret and punctuated by unsuccessful efforts to quit. In this section, the committee calls attention to patterns of smoking that deviate from this typical pattern (e.g., an increase in occasional, and perhaps non-addictive or less addictive, smoking to highlight the challenges that they pose for tobacco use prevention and control efforts).

One pattern of occasional smoking is nondaily smoking. Most smokers smoke cigarettes every day. Nondaily smoking was once thought to occur only in the first few years of initiation, before the development of nicotine dependence. However, research conducted since 1990 suggests that occasional smoking is becoming more frequent among U.S. smokers, whereas daily smoking is declining. A survey of 32 Minnesota work sites conducted from 1987 to 1990 found that 18.3 percent of smokers were nondaily smokers (Henrikus et al. 1996). At follow-up two years later, 21.5 percent were nondaily smokers, suggesting that the rate of occasional smoking was increasing. Results from the Behavior Risk Factor Surveillance Survey (BRFSS) showed that the median proportion of "some-day" smokers among adults aged 18 years and older increased from 17.2 percent in 1996

to 24.0 percent in 2001 (CDC 2003). However, whether such an increase in nondaily smoking is occurring remains uncertain. Data from NHIS of individuals 18 years and older do not support this finding; the mean rate of some-day smoking remained fairly constant between 1993 (18.4 percent) and 2004 (18.7 percent) (CDC 2005a; Hyland et al. 2005).

Nondaily smokers among adults are younger, are highly educated, have higher income levels, are more likely to be racial and ethnic minorities (African American, Hispanic, and Asian) and male, and are more likely to have begun smoking after age 19 years (CDC 2003; Hassmiller et al. 2003; Husten et al. 1998; Hyland et al. 2005). About half of nondaily smokers had been regular smokers of 10 or more cigarettes per day in the past. Many more nondaily smokers than daily smokers reported a strong intent to quit smoking.

The rate of nondaily smoking varies widely by state. An analysis of nondaily smokers based on NHIS longitudinal data from 1996 through 2002 revealed wide state-by-state variations in the rate of nondaily smoking (as a proportion of all current smokers), ranging from 15.2 percent in Kentucky to 41.2 percent in Washington, D.C. (CDC 2003). From 1996 to 2001, the prevalence of nondaily smoking increased in 38 states. Nondaily smokers were more likely to be young and were slightly more likely to be men than women. The nondaily smoking prevalence was, in general, the highest in states or territories with the lowest overall smoking prevalence (such as California, Utah, and Puerto Rico) and the lowest in states with the highest smoking prevalence (for example, Kentucky and West Virginia).

Nondaily smoking may represent a transitional stage toward quitting for some smokers. In the 1990 California Tobacco Survey of smokers 18 years of age or older, 15.4 percent of smokers were classified as occasional smokers (smoking on some days but not every day and smoking on 25 days or less in the past month) (Evans et al. 1992). Two-thirds of these smokers were considered not to be in the process of taking up smoking based on their age (25 years or older). Twenty percent of occasional smokers had been daily smokers in the previous year, indicating that it is possible to switch from daily to occasional smoking. Furthermore, many of the occasional smokers were planning to quit within the next 6 months, suggesting that occasional smoking may be a transition to quitting (Evans et al. 1992).

Several explanations for an increasing prevalence of nondaily smoking have been proposed (CDC 2003). These include some tobacco control interventions that make it more difficult to smoke, such as smoking bans in public places and the increased price of cigarettes in recent years. Another explanation is that some nondaily smokers are still in the uptake phase of smoking or have previously been daily smokers who are in the process of trying to quit. The recent increase in initiation of smoking among individuals over 19 years of age may also contribute to the increased prevalence

of nondaily smokers. Individuals who start smoking at a later age perhaps become less dependent in general than those who start at a younger age.

Another atypical pattern of smoking that poses a quandary for tobacco prevention and control efforts is daily light smoking (i.e., smoking less than five cigarettes per day). Since 1993, data from NHIS show that the proportion of light smokers has increased from 2.9 percent in 1993 to 4.8 percent in 2004 (CDC 2005a). Although these light smokers (or “chippers”) may smoke daily, they do not develop nicotine dependence. They are, however, similar to dependent smokers on a number of parameters, including puff number and duration, as well as blood nicotine absorption and elimination levels. They also show cardiovascular responses similar to those of dependent smokers (Brauer et al. 1996; Shiffman 1989; Shiffman et al. 1990, 1992). These findings challenge classical theories of nicotine dependence (Shiffman 1989).

Studies that have examined the smoking attitudes and behaviors of smokers have also found perplexing similarities and differences between those of light smokers and those of dependent smokers. Presson and colleagues found that future chippers closely resembled future heavy smokers in viewing smoking as not very harmful to their health (Presson et al. 2002). Future chippers differed from heavy smokers, however, in that they had social environments with low levels of risk (i.e., low levels of smoking among peers and family members). Other studies have found that light smokers and heavy smokers tend to differ in their motives and attitudes toward smoking. Smoking behavior among light smokers tends to be influenced by social and sensory motives (the pleasure of handling cigarettes and smoking itself) rather than pharmacological or addiction-related reasons, such as cravings and habit (Shiffman et al. 1994). Notwithstanding the lack of classical nicotine dependence among low-level smokers, the scientific evidence on the harmful effects of exposure to low levels of nicotine (DHHS 2006) and the potential transitional nature of individuals in this subpopulation of smokers argue for focusing special attention on helping these individuals stop smoking.

POPULATIONS AT GREATER RISK OF CONTINUING SMOKING

A variety of individual and group characteristics and behaviors have been associated with higher rates of tobacco product use. Wallace (Appendix P) provides a review of some of these populations: adult smokers with mental illness, children and adolescents with mental illness and conduct disorders, inmates in correctional institutions, military recruits, homeless individuals, gamblers, and some individuals with disabling conditions.

Wallace notes that there have been a few recent national surveys suggesting that the majority of cigarettes in the United States are sold to per-

sons with a lifetime history of some type of psychiatric morbidity, but this needs additional confirmation (Breslau 1995; Breslau et al. 1991, 1993, 1994; Grant et al. 2004; Hughes et al. 1986; Lasser et al. 2000).

Children with psychiatric and behavioral comorbidities and adverse experiences are at risk for smoking initiation. Children with attention-deficit/hyperactivity disorder (ADHD) were found to have a higher risk of cigarette use initiation and smoking maintenance, as well as abuse of other substances, than those in non-ADHD comparison groups (Daley 2004; Lambert and Hartsough 1998; Wilens et al. 1997). Wallace also notes that a body of literature has associated a host of adverse experiences—including direct physical or sexual abuse, the presence of depressive effect, suicide attempts, sexually transmitted diseases, and an impoverished, dysfunctional household environment—with substantially increased risks of smoking initiation (De Von Figueroa-Moseley et al. 2004; Dube et al. 2003; McNutt et al. 2002; Nichols and Harlow 2004).

Furthermore, Wallace notes that, although the research literature is not extensive, higher rates of smoking have been documented among incarcerated individuals, homeless individuals, and other populations. Among these populations, the highest rates of smoking have been reported among inmates. Hughes and Boland (1992) and Lightfoot and Hodgins (1988) reported a 77 percent smoking rate in the past 6 months among inmates in a penitentiary for men. High rates (71 percent) of current smoking have also been reported among women arrested in New York City (Durrh and Rosenberg 2004). The higher rates of smoking among prisoners may be influenced by the intersection of a number of other factors associated with higher rates of smoking, such as substance abuse, lower socioeconomic status, and high rates of psychiatric comorbidities among incarcerated individuals (Andersen 2004).

The literature describes a group of “hardcore” smokers who have never attempted to quit smoking. This subgroup of smokers is often described as a small but intractable public health problem. Using data from the 1998-99 Tobacco Use Supplement of the Current Population Survey, Augustson and Marcus (2004) defined “hardcore” smokers as established daily smokers (smoking for at least 5 years) who smoke more than 15 cigarettes per day with no reported history of quit attempts and who are over 25 years of age (Emery et al. 2000). They found that “hardcore” smokers represent 24.7 percent of heavy chronic smokers, 17.6 percent of all established smokers, and 13.7 percent of all current smokers. They are also more likely to be male, unmarried, not working, and to have lower education levels. Warner and Burns (2003) suggest that “hardcore” smokers represent members of a group of smokers whose behavior may be especially resistant to change (Warner and Burns 2003).

Genetic vulnerability may be one reason some “hardcore” smokers

find it difficult to stop smoking. Emerging genetic and pharmacogenetic studies have identified a potential role for gene variances in frustrated cessation attempts. One study, for example, found that smokers with a variant CYP2B6 gene have increased cravings for cigarettes following cessation and are about one and one half times more likely to relapse during treatment (Lerman et al. 2002). Information on genetic variants related to dopamine, serotonin, and nicotine metabolism, as well as other mechanisms that play important roles in nicotine addiction and maintenance, will be important to understand and better assist “hardcore” smokers and other smokers who have difficulty quitting.

There seems to be little doubt that a subset of the population of long-term smokers is more heavily addicted and less amenable to cessation interventions. It is likely that these smokers are particularly vulnerable to nicotine addiction on the basis of predisposing personal characteristics and environmental stresses. These observations have two important implications: first, it is clear that specialized cessation interventions will be needed to assist them with quitting. Second, a realistic assessment of the prospects of achieving a substantial reduction in the prevalence of tobacco use must take the size of the “hardcore” target populations into account.

CONCLUSION

Smoking prevalence reflects the combined effects in any given period of the changes in the number of new smokers and in the number of smokers who have quit (Niaura and Abrams 2002). This chapter has provided an abridged overview of an extensive body of literature on the factors that affect the trends in smoking prevalence, with particular attention given to how the unique nature of nicotine addiction poses significant challenges to the success of tobacco control efforts.

At the center of the story emerging from this literature is the fact that nicotine addiction stimulates and sustains long-term tobacco use, with all of its serious health hazards and social costs. The literature also indicates that, although an overwhelming majority of smokers (90 percent) regret having begun to smoke, overcoming the grip of addiction and the associated withdrawal symptoms is difficult; most smokers must try quitting several times before they are successful. Progress in helping smokers who want to quit and achieve successful and permanent cessation requires that a variety of cessation technologies, both clinical and population-based, be readily available to the smoking population, that they be used, and that they be effective. This task is discussed further in Chapter 5 of this report.

While tackling the difficult challenge of helping addicted smokers quit, the fact that thousands of individuals begin smoking each day must also

be addressed. Most of these new smokers are youth and adolescents who, in part because of their developmental stage, do not clearly understand the full range of risks and consequences of smoking or who discount these long-term health risks because of a belief that they do not apply to them personally.

These distortions of judgment include a failure of youth and adolescents to appreciate the risk and grip of addiction when they begin smoking. Tolerance and dependence to nicotine can occur early on after initiation (Bottorff et al. 2004; DHHS 1994; DiFranza et al. 2000; IOM 1994), and the early initiation of smoking is related to the number of years that a person will smoke and the quantity of cigarettes smoked per day in childhood. Less is known about initiation and subsequent intensity after adolescence (Escobedo et al. 1993; Taioli and Wynder 1991). Unfortunately, many youths view themselves as invulnerable to addiction and its associated harm. They are also sensitive to the social factors and norms that promote smoking, such as the influences exerted by peers, family members, and the exposure to smoking in the media. These influences tend to override the information about the risks of smoking. Therefore, to substantially reduce the rate of smoking initiation, it will be necessary to do a better job of counteracting the perceived benefits of smoking and to develop new tools that make the personal risks of starting to smoke more salient.

All new smokers are not young, however. Some initiate smoking during their college years, which helps to explain why some new smokers have characteristics that differ from those of usual smokers: they tend to have higher levels of education and income than other smokers. It is also noteworthy that some new smokers smoke at lower levels, and some never reach a level of dependence. It will be important for tobacco control experts to pay close attention to these emerging trends and to design appropriate interventions to respond to them.

On the other side of the ledger are smokers who have a more difficult time quitting. “Hardcore” smokers with a long career of smoking and individuals with psychiatric comorbidities or special circumstances, including incarceration and homelessness, have not been the primary targets of traditional cessation treatments or research studies. Achieving success in substantially reducing tobacco use will require taking stock of the progress made with current tobacco prevention and control strategies, identifying where they fall short in responding to emerging smoking trends, and identifying the characteristics and behaviors of subpopulations of smokers. Success will also require the rigorous implementation of known, effective strategies and pushing the envelope to develop new and innovative approaches that can build on the existing tools and strategies used to help people quit smoking.

REFERENCES

- Ajzen I. 1985. *From Intentions to Actions. Action Control from Cognition to Behavior*. New York: Springer-Verlag.
- Andersen HS. 2004. Mental health in prison populations. A review—with special emphasis on a study of Danish prisoners on remand. *Acta Psychiatrica Scandinavica. Supplementum* (424):5-59.
- Arnett JJ. 2000. Optimistic bias in adolescent and adult smokers and nonsmokers. *Addictive Behaviors* 25(4):625-632.
- Augustson E, Marcus S. 2004. Use of the current population survey to characterize subpopulations of continued smokers: a national perspective on the “hardcore” smoker phenomenon. *Nicotine and Tobacco Research* 6(4):621-629.
- Borland R. 1997. What do people’s estimates of smoking-related risk mean? *Psychology and Health* 12:513-521.
- Bottorff JL, Johnson JL, Moffat B, Grewal J, Ratner PA, Kalaw C. 2004. Adolescent constructions of nicotine addiction. *Canadian Journal of Nursing Research* 36(1):22-39.
- Brauer LH, Behm FM, Lane JD, Westman EC, Perkins C, Rose JE. 2001. Individual differences in smoking reward from de-nicotinized cigarettes. *Nicotine and Tobacco Research* 3(2):101-109.
- Brauer LH, Hatsukami D, Hanson K, Shiffman S. 1996. Smoking topography in tobacco chipper and dependent smokers. *Addictive Behaviors* 21(2):233-238.
- Breslau N. 1995. Psychiatric comorbidity of smoking and nicotine dependence. *Behavior Genetics* 25(2):95-101.
- Breslau N, Andreski P, Kilbey MM. 1991. Nicotine dependence in an urban population of young adults: prevalence and co-morbidity with depression, anxiety and other substance dependencies. *NIDA Research Monograph* 105:458-459.
- Breslau N, Kilbey MM, Andreski P. 1993. Nicotine dependence and major depression. New evidence from a prospective investigation. *Archives of General Psychiatry* 50(1):31-35.
- Breslau N, Kilbey MM, Andreski P. 1994. DSM-III-R nicotine dependence in young adults: prevalence, correlates and associated psychiatric disorders. *Addiction* 89(6):743-754.
- CDC (Centers for Disease Control and Prevention). 2003. Prevalence of current cigarette smoking among adults and changes in prevalence of current and some day smoking—United States, 1996-2001. *MMWR (Morbidity and Mortality Weekly Report)* 52(14):303-304, 306-307.
- CDC. 2004. *The Health Consequences of Smoking: A Report of the Surgeon General*. Web Page. Available at: http://www.cdc.gov/tobacco/data_statistics/sgr/sgr_2004/index.htm; accessed May 25, 2007.
- CDC. 2005a. Cigarette smoking among adults—United States, 2004. *MMWR (Morbidity and Mortality Weekly Report)* 54(44):1121-1124.
- CDC. 2005b. State-specific prevalence of cigarette smoking and quitting among adults—United States, 2004. *MMWR (Morbidity and Mortality Weekly Report)* 54(44):1124-1127.
- CDC. 2006. *Surgeon General’s Reports*. Web Page. Available at: <http://www.cdc.gov/Tobacco/sgr/index.htm>; accessed August 17, 2006.
- Chassin L, Presson CC, Pitts SC, Sherman SJ. 2000. The natural history of cigarette smoking from adolescence to adulthood in a midwestern community sample: multiple trajectories and their psychosocial correlates. *Health Psychology* 19(3):223-231.
- Conrad KM, Flay BR, Hill D. 1992. Why children start smoking cigarettes: predictors of onset. *British Journal of Addiction* 87(12):1711-1724.

- Covington MV, Omelich CL. 1992. *Perceived Costs and Benefits of Cigarette Smoking Among Adolescents: Need Instruments, Self-Anger and Anxiety Factors. Anxiety: Recent Developments in Cognitive, Psychophysiological and Health Research*. Washington, DC: Hemisphere Publishing Corporation. Pp. 245-261.
- Daley KC. 2004. Update on attention-deficit/hyperactivity disorder. *Current Opinion in Pediatrics* 16(2):217-226.
- Dani JA, De Biasi M. 2001. Cellular mechanisms of nicotine addiction. *Pharmacology, Biochemistry and Behavior* 70(4):439-446.
- De Von Figueroa-Moseley C, Landrine H, Klonoff EA. 2004. Sexual abuse and smoking among college student women. *Addictive Behaviors* 29(2):245-251.
- DHHS (U.S. Department of Health and Human Services). 1988. *The Health Consequences of Smoking: Nicotine Addiction (A Report of the Surgeon General)*. Rockville, MD: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, Center for Health Promotion and Education, Office on Smoking and Health.
- DHHS. 1994. *Preventing Tobacco Use Among Young People (A Report of the Surgeon General)*. Rockville, MD: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, Center for Health Promotion and Education, Office on Smoking and Health.
- DHHS. 2006. *The Health Consequences of Involuntary Exposure to Tobacco Smoke: A Report of the Surgeon General*. Atlanta, GA: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, Coordinating Center for Health Promotion, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health.
- DiClemente CC, Prochaska JO, Fairhurst SK, Velicer WF, Velasquez MM, Rossi JS. 1991. The process of smoking cessation: an analysis of precontemplation, contemplation, and preparation stages of change. *Journal of Consulting and Clinical Psychology* 59(2):295-304.
- DiFranza JR, Rigotti NA, McNeill AD, Ockene JK, Savageau JA, St Cyr D, Coleman M. 2000. Initial symptoms of nicotine dependence in adolescents. *Tobacco Control* 9(3):313-319.
- Distefan JM, Gilpin EA, Choi WS, Pierce JP. 1998. Parental influences predict adolescent smoking in the United States, 1989-1993. *Journal of Adolescent Health* 22(6):466-474.
- Dube SR, Felitti VJ, Dong M, Giles WH, Anda RF. 2003. The impact of adverse childhood experiences on health problems: evidence from four birth cohorts dating back to 1900. *Preventive Medicine* 37(3):268-277.
- Durrah TL, Rosenberg TJ. 2004. Smoking among female arrestees: prevalence of daily smoking and smoking cessation efforts. *Addictive Behaviors* 29(5):1015-1019.
- Eiser JR, Harding CM. 1983. Smoking, seat-belt use and perception of health risks. *Addictive Behaviors* 8(1):75-78.
- Elkind D. 1967. Egocentrism in adolescence. *Child Development* 38(4):1025-1034.
- Elkind D. 1978. Understanding the Young Adolescent. *Adolescence* 13:127-134.
- Emery S, Gilpin EA, Ake C, Farkas AJ, Pierce JP. 2000. Characterizing and identifying "hard-core" smokers: implications for further reducing smoking prevalence. *American Journal of Public Health* 90(3):387-394.
- Escobedo LG, Marcus SE, Holtzman D, Giovino GA. 1993. Sports participation, age at smoking initiation, and the risk of smoking among US high school students. *Journal of the American Medical Association* 269(11):1391-1395.
- Etter JF. 2004. Associations between smoking prevalence, stages of change, cigarette consumption, and quit attempts across the United States. *Preventive Medicine* 38(3):369-373.
- Etter JF, Perneger TV, Ronchi A. 1997. Distributions of smokers by stage: international comparison and association with smoking prevalence. *Preventive Medicine* 26(4):580-585.
- Etter JF, Sutton S. 2002. Assessing "stage of change" in current and former smokers. *Addiction* 97(9):1171-1182.

- Evans N, Gilpin E, Pierce J, Burns D, Borland R, Johnson M, Bal D. 1992. Occasional smoking among adults: evidence from the California Tobacco Survey. *Tobacco Control* 1:169-175.
- Fiore MC, Bailey WC, and Cohen SJ. 2000. *Treating Tobacco Use and Dependence (Clinical Practice Guideline)*. Rockville, MD: U.S. Department of Health Human Services. Public Health Service.
- Fishbein M and Ajzen I. 1975. *Belief, Attitude, Intention, and Behavior: An Introduction to Theory and Research*. Reading, MA: Addison-Wesley.
- Fong GT, Hammond D, Laux FL, Zanna MP, Cummings KM, Borland R, Ross H. 2004. The near-universal experience of regret among smokers in four countries: findings from the International Tobacco Control Policy Evaluation Survey. *Nicotine and Tobacco Research* 6(Suppl 3):S341-S351.
- Foulds J. 2006. The neurobiological basis for partial agonist treatment of nicotine dependence: varenicline. *International Journal of Clinical Practice* 60(5):571-576.
- Garvey AJ, Bliss RE, Hitchcock JL, Heinold JW, Rosner B. 1992. Predictors of smoking relapse among self-quitters: a report from the Normative Aging Study. *Addictive Behaviors* 17(4):367-377.
- Gerrard M, Gibbons FX, Benthin AC, Hessling RM. 1996. A longitudinal study of the reciprocal nature of risk behaviors and cognitions in adolescents: what you do shapes what you think, and vice versa. *Health Psychology* 15(5):344-354.
- Goldberg JH, Halpern-Felsher BL, Millstein SG. 2002. Beyond invulnerability: the importance of benefits in adolescents' decision to drink alcohol. *Health Psychology* 21(5):477-484.
- Goldstein M, Niaura R, Willey-Lessne C, Depue J, Eaton C, Rakowski W, Dube` C. 1997. Physicians counseling smokers: A population based survey of patients' perceptions of health care provider-delivered smoking cessation interventions. *Archives of Internal Medicine* 157(12):1313-1319.
- Grant BF, Hasin DS, Chou SP, Stinson FS, Dawson DA. 2004. Nicotine dependence and psychiatric disorders in the United States: results from the national epidemiologic survey on alcohol and related conditions. *Archives of General Psychiatry* 61(11):1107-1115.
- Hall W, Madden P, Lynskey M. 2002. The genetics of tobacco use: methods, findings and policy implications. *Tobacco Control* 11(2):119-124.
- Halpern-Felsher B, Biehl M, Kropp RY, Rubinstein ML. 2004. Perceived risks and benefits of smoking: differences among adolescents with different smoking experiences and intentions. *Preventive Medicine* 39(3):559-567.
- Hammond D, McDonald PW, Fong GT, Borland R. 2004. Do smokers know how to quit? Knowledge and perceived effectiveness of cessation assistance as predictors of cessation behaviour. *Addiction* 99(8):1042-1048.
- Hansen WB, Malotte CK. 1986. Perceived personal immunity: the development of beliefs about susceptibility to the consequences of smoking. *Preventive Medicine* 15(4):363-372.
- Hassmiller KM, Warner KE, Mendez D, Levy DT, Romano E. 2003. Nondaily smokers: who are they? *American Journal of Public Health* 93(8):1321-1327.
- Heath AC, Kirk KM, Meyer JM, Martin NG. 1999. Genetic and social determinants of initiation and age at onset of smoking in Australian twins. *Behavior Genetics* 29(6):395-407.
- Henningfield JE, Fant RV, Buchhalter AR, Stitzer ML. 2005. Pharmacotherapy for nicotine dependence. *A Cancer Journal for Clinicians* 55(5):281-299; quiz 322-323, 325.
- Hennrikus DJ, Jeffery RW, Lando HA. 1996. Occasional smoking in a Minnesota working population. *American Journal of Public Health* 86(9):1260-1266.
- Hughes GV, Boland FJ. 1992. The effects of caffeine and nicotine consumption on mood and somatic variables in a penitentiary inmate population. *Addictive Behaviors* 17(5):447-457.
- Hughes JR. 1999. Four beliefs that may impede progress in the treatment of smoking. *Tobacco Control* 8(3):323-326.

- Hughes JR. 2003. Motivating and helping smokers to stop smoking. *Journal of General Internal Medicine* 18(12):1053-1057.
- Hughes JR, Gulliver SB, Fenwick JW, Valliere WA, Cruser K, Pepper S, Shea P, Solomon LJ, Flynn BS. 1992. Smoking cessation among self-quitters. *Health Psychology* 11(5):331-334.
- Hughes JR, Hatsukami DK, Mitchell JE, Dahlgren LA. 1986. Prevalence of smoking among psychiatric outpatients. *American Journal of Psychiatry* 143(8):993-997.
- Hughes JR, Keely J, Naud S. 2004. Shape of the relapse curve and long-term abstinence among untreated smokers. *Addiction* 99(1):29-38.
- Husten CG, McCarty MC, Giovino GA, Chrismon JH, Zhu B. 1998. Intermittent smokers: a descriptive analysis of persons who have never smoked daily. *American Journal of Public Health* 88(1):86-89.
- Hyland A, Borland R, Li Q, Yong HH, McNeill A, Fong GT, O'Connor RJ, Cummings KM. 2006. Individual-level predictors of cessation behaviours among participants in the International Tobacco Control (ITC) Four Country Survey. *Tobacco Control* 15(Suppl 3):iii83-iii94.
- Hyland A, Levy DT, Rezaishiraz H, Hughes JR, Bauer JE, Giovino GA, Cummings KM. 2005. Reduction in amount smoked predicts future cessation. *Psychology of Addictive Behaviors* 19(2):221-225.
- Hyland A, Li Q, Bauer JE, Giovino GA, Steger C, Cummings KM. 2004. Predictors of cessation in a cohort of current and former smokers followed over 13 years. *Nicotine and Tobacco Research* 6(Suppl 3):S363-S369.
- Hyland A, Rezaishiraz H, Bauer J, Giovino GA, Cummings KM. 2005. Characteristics of low-level smokers. *Nicotine and Tobacco Research* 7(3):461-468.
- Hymowitz N, Cummings KM, Hyland A, Lynn WR, Pechacek TE, Hartwell TD. 1997. Predictors of smoking cessation in a cohort of adult smokers followed for five years. *Tobacco Control* 6(Suppl 2):S57-S62.
- IOM (Institute of Medicine). 1994. *Growing Up Tobacco Free: Preventing Nicotine Addiction in Children and Youth*. Washington, DC: National Academy Press.
- IOM. 2001. *Clearing the Smoke: Assessing the Science Base for Tobacco Harm Reduction*. Washington, DC: National Academy Press.
- Jamieson P, Romer D. 2001a. A Profile of Smokers and Smoking. In Slovic P, Editor. *Smoking: Risk, Perception, and Policy*. Thousand Oaks, CA: Sage Publications. Pp. 29-47.
- Jamieson P, Romer D. 2001b. What Do Young People Think They Know About the Risks of Smoking? In Slovic P, Editor. *Smoking: Risk, Perception, and Policy*. Thousand Oaks, CA: Sage Publications. Pp. 51-63.
- Janis IL, Mann L. 1977. *Decision Making: A Psychological Analysis of Conflict, Choice, and Commitment*. New York: Free Press.
- Johnson RJ, McCaul KD, Klein WM. 2002. Risk involvement and risk perception among adolescents and young adults. *Journal of Behavioral Medicine* 25(1):67-82.
- Johnston L, O'Malley P, Bachman J, Schulenberg J. 2004. *Cigarette Smoking Among American Teens Continues to Decline, but More Slowly Than in the Past*. Web Page. Available at: http://www.monitoringthefuture.org/pressreleases/04cigpr_complete.pdf; accessed April 6, 1905.
- Kanfer FH. 1970. *Self Regulation: Research, Issues and Speculations*. New York, Appleton Century-Crofts.
- Kendler KS, Neale MC, Sullivan P, Corey LA, Gardner CO, Prescott CA. 1999. A population-based twin study in women of smoking initiation and nicotine dependence. *Psychological Medicine* 29(2):299-308.

- Kenford SL, Fiore MC, Jorenby DE, Smith SS, Wetter D, Baker TB. 1994. Predicting smoking cessation. Who will quit with and without the nicotine patch. *Journal of the American Medical Association* 271(8):589-594.
- Knoke JD, Anderson CM, Burns DM. 2006. Does a failed quit attempt reduce cigarette consumption following resumption of smoking? The effects of time and quit attempts on the longitudinal analysis of self-reported cigarette smoking intensity. *Nicotine and Tobacco Research* 8(3):415-423.
- Koopmans JR, Slutske WS, Heath AC, Neale MC, Boomsma DI. 1999. The genetics of smoking initiation and quantity smoked in Dutch adolescent and young adult twins. *Behavior Genetics* 29(6):383-393.
- Kristiansen CM, Harding CM, Eiser JR. 1983. Beliefs About the Relationship Between Smoking and Death. *Basic and Applied Social Psychology* 4:253-261.
- Kropp RY, Halpern-Felsher B. 2004. Adolescents' beliefs about the risks involved in smoking "light" cigarettes. *Pediatrics* 114(4):e445-e451.
- Lambert NM, Hartsough CS. 1998. Prospective study of tobacco smoking and substance dependencies among samples of ADHD and non-ADHD participants. *Journal of Learning Disabilities* 31(6):533-544.
- Larabie LC. 2005. To what extent do smokers plan quit attempts? *Tobacco Control* 14(6):425-428.
- Lasser K, Boyd JW, Woolhandler S, Himmelstein DU, McCormick D, Bor DH. 2000. Smoking and mental illness: A population-based prevalence study. *Journal of the American Medical Association* 284(20):2606-2610.
- Lee AM, Tyndale RF. 2006. Drugs and genotypes: how pharmacogenetic information could improve smoking cessation treatment. *Journal of Psychopharmacology* 20(Suppl 4):7-14.
- Lerman C, Berrettini W. 2003. Elucidating the role of genetic factors in smoking behavior and nicotine dependence. *American Journal of Medical Genetics. Part B, Neuropsychiatric Genetics* 118(1):48-54.
- Lerman C, Shields PG, Wileyto EP, Audrain J, Pinto A, Hawk L, Krishnan S, Niaura R, Epstein L. 2002. Pharmacogenetic investigation of smoking cessation treatment. *Pharmacogenetics* 12(8):627-634.
- Lerman C, Wileyto EP, Patterson F, Rukstalis M, Audrain-McGovern J, Restine S, Shields PG, Kaufmann V, Redden D, Benowitz N, Berrettini WH. 2004. The functional mu opioid receptor (OPRM1) Asn40Asp variant predicts short-term response to nicotine replacement therapy in a clinical trial. *Pharmacogenomics* 4(3):184-192.
- Leventhal H, Glynn K, Fleming R. 1987. Is the smoking decision an "informed choice"? Effect of smoking risk factors on smoking beliefs. *Journal of the American Medical Association* 257(24):3373-3376.
- Li MD. 2003. The genetics of smoking related behavior: a brief review. *American Journal of the Medical Sciences* 326(4):168-173.
- Li MD. 2006. The genetics of nicotine dependence. *Current Psychiatry Reports* 8(2):158-164.
- Lightfoot LO, Hodgins D. 1988. A survey of alcohol and drug problems in incarcerated offenders. *International Journal of the Addictions* 23(7):687-706.
- Madden PA, Heath AC, Pedersen NL, Kaprio J, Koskenvuo MJ, Martin NG. 1999. The genetics of smoking persistence in men and women: a multicultural study. *Behavior Genetics* 29(6):423-431.
- Malaiyandi V, Sellers EM, Tyndale RF. 2005. Implications of CYP2A6 genetic variation for smoking behaviors and nicotine dependence. *Clinical Pharmacology and Therapeutics* 77(3):145-158.
- McCaul KD, Hockemeyer JR, Johnson RJ, Zetocha K, Quinlan K, Glasgow RE. 2006. Motivation to quit using cigarettes: a review. *Addictive Behaviors* 31(1):42-56.

- McNutt LA, Carlson BE, Persaud M, Postmus J. 2002. Cumulative abuse experiences, physical health and health behaviors. *Annals of Epidemiology* 12(2):123-130.
- Naqvi NH, Bechara A. 2005. The airway sensory impact of nicotine contributes to the conditioned reinforcing effects of individual puffs from cigarettes. *Pharmacology, Biochemistry and Behavior* 81(4):821-829.
- Niaura R, Abrams DB. 2002. Smoking cessation: progress, priorities, and prospectus. *Journal of Consulting and Clinical Psychology* 70(3):494-509.
- Nichols HB, Harlow BL. 2004. Childhood abuse and risk of smoking onset. *Journal of Epidemiology and Community Health* 58(5):402-406.
- O'Brien CP. 2001. Drug addiction and abuse. In : Hardman JG and Limbird LE, eds. *The Pharmacological Basis of Therapeutics* . 10 ed. New York: Goodman and Gilman. Pp. 621-642
- Pallonen UE, Prochaska JO, Velicer WF, Prokhorov AV, Smith NF. 1998. Stages of acquisition and cessation for adolescent smoking: an empirical integration. *Addictive Behaviors* 23(3):303-324.
- Parsons JT, Siegel AW, Cousins JH. 1997. Late adolescent risk-taking: effects of perceived benefits and perceived risks on behavioral intentions and behavioral change. *Journal of Adolescence* 20:381-392.
- Piasecki TM. 2006. Relapse to smoking. *Clinical Psychology Review* 26(2):196-215.
- Piasecki TM, Fiore MC, McCarthy DE, Baker TB. 2002. Have we lost our way? The need for dynamic formulations of smoking relapse proneness. *Addiction* 97(9):1093-1108.
- Pierce JP, Gilpin E. 1996. How long will today's new adolescent smoker be addicted to cigarettes? *American Journal of Public Health* 86(2):253-256.
- Presson CC, Chassin L, Sherman SJ. 2002. Psychosocial antecedents of tobacco chipping. *Health Psychology* 21(4):384-392.
- Prochaska JO. 1994. Strong and weak principles for progressing from precontemplation to action on the basis of twelve problem behaviors. *Health Psychology* 13(1):47-51.
- Prochaska JO, DiClemente CC. 1983. Stages and processes of self-change of smoking: toward an integrative model of change. *Journal of Consulting and Clinical Psychology* 51(3):390-395.
- Prochaska JO, DiClemente CC, Norcross JC. 1992. In search of how people change. Applications to addictive behaviors. *American Psychologist* 47(9):1102-1114.
- Prokhorov AV, de Moor CA, Hudmon KS, Hu S, Kelder SH, Gritz ER. 2002. Predicting initiation of smoking in adolescents: evidence for integrating the stages of change and susceptibility to smoking constructs. *Addictive Behaviors* 27(5):697-712.
- Resnicow K, Smith M, Harrison L, Drucker E. 1999. Correlates of occasional cigarette and marijuana use: are teens harm reducing? *Addictive Behaviors* 24(2):251-266.
- Reyna VF, Farley F. 2006. Risk and rationality in adolescent decision-making. *Psychological Science in the Public Interest* 7(1):1-44.
- Romer D, Jamieson P. 2001a. Do adolescents appreciate the risks of smoking? Evidence from a national survey. *Journal of Adolescent Health* 29(1):12-21.
- Romer D, Jamieson P. 2001b. The Role of Perceived Risk in Starting and Stopping Smoking. In Slovic P, Editor. *Smoking: Risk, Perception, and Policy*. Thousand Oaks, CA: Sage Publications. Pp. 64-80.
- Rose JE. 1988. The role of upper airway stimulation in smoking. *Progress in Clinical and Biological Research* 261:95-106.
- Rose JE. 2006. Nicotine and nonnicotine factors in cigarette addiction. *Psychopharmacology* 184(3-4):274-285.
- Rose JE, Behm FM, Westman EC, Bates JE, Salley A. 2003. Pharmacologic and sensorimotor components of satiation in cigarette smoking. *Pharmacology, Biochemistry and Behavior* 76(2):243-250.

- Rose JE, Behm FM, Westman EC, Johnson M. 2000. Dissociating nicotine and nonnicotine components of cigarette smoking. *Pharmacology, Biochemistry and Behavior* 67(1):71-81.
- Rose JE, Westman EC, Behm FM, Johnson MP, Goldberg JS. 1999. Blockade of smoking satisfaction using the peripheral nicotinic antagonist trimethaphan. *Pharmacology, Biochemistry and Behavior* 62(1):165-712.
- Rosenstock IM. 1974. *Historical Origins of the Health Benefit Model*. The Health Belief Model and Personal Health Behavior. Thorofare, NJ: Charles B. Sclick. Pp. 1-8.
- Royal College of Physicians. 2000. *Nicotine Addiction in Britain*. London, England: Royal College of Physicians.
- Russell MAH, Wilson C, Taylor C, Baker CD. 1979. Effect of general practitioners' advice against smoking. *British Medical Journal* 2(231).
- Schoenbrun M. 1997. Do smokers understand the mortality effect of smoking? *American Journal of Public Health* 87:755-759.
- Schroeder SA. 2005. What to do with a patient who smokes. *Journal of the American Medical Association* 294(4):482-487.
- Shiffman S. 1989. Tobacco "chippers"—individual differences in tobacco dependence. *Psychopharmacology* 97(4):539-547.
- Shiffman S. 2004. *Smoking Cessation*. Presentation at the October 14, 2004, Meeting of the IOM Committee on Reducing Tobacco Use: Strategies, Barriers, and Opportunities, Chicago, IL.
- Shiffman S, Ferguson SG, Gwaltney CJ. 2006. Immediate hedonic response to smoking lapses: relationship to smoking relapse, and effects of nicotine replacement therapy. *Psychopharmacology* 184(3-4):608-618.
- Shiffman S, Fischer LB, Zettler-Segal M, Benowitz NL. 1990. Nicotine exposure among non-dependent smokers. *Archives of General Psychiatry* 47(4):333-336.
- Shiffman S, Kassel JD, Paty J, Gnys M, Zettler-Segal M. 1994. Smoking typology profiles of chippers and regular smokers. *Journal of Substance Abuse* 6(1):21-35.
- Shiffman S, Zettler-Segal M, Kassel J, Paty J, Benowitz NL, O'Brien G. 1992. Nicotine elimination and tolerance in non-dependent cigarette smokers. *Psychopharmacology* 109(4):449-456.
- Slovic P. 1998. Do adolescent smokers know the risks? *Duke Law Journal* 47(6):1133-1141.
- Slovic P. 2001. *Smoking: Risk, Perception, and Policy*. Thousand Oaks, CA: Sage Publications.
- Soldz S, Cui X. 2002. Pathways through adolescent smoking: a 7-year longitudinal grouping analysis. *Health Psychology* 21(5):495-504.
- Steinberg L, Cauffman E. 1996. Maturity of judgment in adolescence: Psychosocial factors in adolescent decision making. *Law and Human Behavior* 20:249-272.
- Sullivan PF, Kendler KS. 1999. The genetic epidemiology of smoking. *Nicotine and Tobacco Research* 1(Suppl 2):S51-S57; discussion S69-S70.
- Sutton SR. 1997. Are smokers unrealistically optimistic about the health risks? *Risk and Human Behaviour Newsletter* 1:3-5.
- Swan GE, Valdes AM, Ring HZ, Khroyan TV, Jack LM, Ton CC, Curry SJ, McAfee T. 2005. Dopamine receptor DRD2 genotype and smoking cessation outcome following treatment with bupropion SR. *Pharmacogenomics* 5(1):21-29.
- Taioli E, Wynder EL. 1991. Effect of the age at which smoking begins on frequency of smoking in adulthood. *New England Journal of Medicine* 325(13):968-969.
- Tapper AR, McKinney SL, Nashmi R, Schwarz J, Deshpande P, Labarca C, Whiteaker P, Marks MJ, Collins AC, Lester HA. 2004. Nicotine Activation of 4* Receptors: Sufficient for Reward, Tolerance, and Sensitization. *Science* 306(5698):1029-1032.

- Tremblay M, Gervais A, Lacroix C, O'Loughlin J, Makni H, Paradis G. 2001. Physicians taking action against smoking: an intervention program to optimize smoking cessation counselling by Montreal general practitioners. *Canadian Medical Association Journal* 165(5):601-607.
- Turner K, West P, Gordon J, Young R, Sweeting H. 2006. Could the peer group explain school differences in pupil smoking rates? An exploratory study. *Social Science and Medicine* 62(10):2513-2525.
- Tyndale RF. 2003. Genetics of alcohol and tobacco use in humans. *Annals of Medicine* 35(2):94-121.
- Urberg K, Robbins R. 1981. Adolescent perception of the costs and benefits associated with cigarette smoking: sex differences and peer influence. *Journal of Youth and Adolescence* 10(5):353-361.
- Urberg K, Robbins R. 1984. Perceived vulnerability in adolescents to the health consequences of cigarette smoking. *Preventive Medicine* 13(4):367-376.
- Velicer WF, Norman GJ, Fava JL, Prochaska JO. 1999. Testing 40 predictions from the transtheoretical model. *Addictive Behaviors* 24(4):455-469.
- Velicer WF, Prochaska JO. 2004. A comparison of four self-report smoking cessation outcome measures. *Addictive Behaviors* 29(1):51-60.
- Virgili M, Owen N, Sverson HH. 1991. Adolescents' smoking behavior and risk perceptions. *Journal of Substance Abuse* 3(3):315-324.
- Viscusi WK. 1990. Do smokers underestimate risks? *Journal of Economy* 98(6):1254-1270.
- Viscusi WK. 1991. Age variations in risk perceptions and smoking decisions. *Review of Economics and Statistics* 73:577-588.
- Viscusi WK, Carvalho I, Antonanzas F, Rovira J, Brana FJ, Portillo F. 2000. Smoking risks in Spain: part III—determinants of smoking behavior. *Journal of Risk and Uncertainty* 21(2-3):213-234.
- Vuckovic N, Polen MR, Hollis JF. 2003. The problem is getting us to stop. What teens say about smoking cessation. *Preventive Medicine* 37(3):209-218.
- Warner KE, Burns DM. 2003. Hardening and the hard-core smoker: concepts, evidence, and implications. *Nicotine and Tobacco Research* 5(1):37-48.
- Weinstein N, Slovic P, Waters E, Gibson G. 2004. Public understanding of the illnesses caused by cigarette smoking. *Nicotine and Tobacco Research* 6(2):349-355.
- Weinstein ND. 1989. Optimistic biases about personal risks. *Science* 246(4935):1232-1233.
- West R. 2005. Time for a change: putting the Transtheoretical (Stages of Change) Model to rest. *Addiction* 100(8):1036-1039.
- Westman EC, Behm FM, Rose JE. 1995. Airway sensory replacement combined with nicotine replacement for smoking cessation. A randomized, placebo-controlled trial using a citric acid inhaler. *Chest* 107(5):1358-1364.
- Westman EC, Behm FM, Simel DL, Rose JE. 1997. Smoking behavior on the first day of a quit attempt predicts long-term abstinence. *Archives of Internal Medicine* 157(3):335-340.
- Wewers ME, Stillman FA, Hartman AM, Shopland DR. 2003. Distribution of daily smokers by stage of change: Current Population Survey results. *Preventive Medicine* 36(6):710-720.
- WHO (World Health Organization). 2003. *Policy Recommendations for Smoking Cessation and Treatment of Tobacco*. Web Page. Available at: http://www.who.int/tobacco/resources/publications/tobacco_dependence/en/index.html; accessed June 6, 2007.
- Wilens TE, Biederman J, Mick E, Faraone SV, Spencer T. 1997. Attention deficit hyperactivity disorder (ADHD) is associated with early onset substance use disorders. *Journal of Nervous and Mental Disease* 185(8):475-482.

3

Containing the Tobacco Problem

The trends in cigarette smoking charted in Chapter 1 reflect the push and pull of social forces that tend to promote tobacco use and those that tend to reduce it. Tobacco use in the United States dates back to before colonization, and it has probably had its detractors almost as long. This chapter reviews public health efforts to contain tobacco use over the past four decades. It is not meant to present a nuanced account of the economic, political, and social forces that have shaped the nation's response to tobacco use over this period. Fortunately, interested readers can find the full story in recent books by Richard Kluger and Allan Brandt (Brandt 2007; Kluger 1997). The brief review presented below is designed to highlight key features of the story as seen through the lens of public health.

The introduction of mass-produced, finished cigarettes in the 1880s was followed by mass marketing campaigns that have made cigarettes one of the most highly promoted products in the nation's history. As the appeal of cigarette smoking grew, however, so did the strength and vehemence of the antitobacco activists. Some opponents had moral or religious objections to smoking, and they and others decried its presumed health dangers in the context of a contemporary populist health and hygiene movement. Cigarettes were called a "poison" and even "coffin nails" during those antitobacco campaigns (Burnham 1989; DHHS 2000; Tate 1999).

The antitobacco activists claimed some victories in the early 20th century, including the passage of laws in several states that prohibited tobacco use by both adults and minors (DHHS 2000; Outlook 1901). Their gains, however, were short-lived. Smoking was becoming embedded in the American culture. Cigarette use among soldiers in the Civil War—as in

wars to follow—helped promote its popularity and respectability (DHHS 2000). There was no medical consensus regarding health dangers; in fact, many physicians openly smoked and sometimes even promoted the product (DHHS 2000; Walsh 1937). The anti-tobacco forces were unable to stem the growing popularity of cigarettes over the first half of the next century (DHHS 2000; Schudson 1984).

By the middle of the 20th century, researchers were studying the health effects of smoking. In 1952, an article in *Reader's Digest* reporting on the emerging evidence linking smoking and cancer aroused public concern (Norr 1952). More than 10 years later, publication of the 1964 Surgeon General's report (HEW 1964) was widely regarded as a turning point in the history of smoking in the United States and the point of departure for the modern tobacco control movement (DHHS 2000).

The 1964 report consolidated the growing body of research that linked smoking to lung cancer, chronic bronchitis, and emphysema, disseminating the emerging data on tobacco's adverse effects to a wide audience (HEW 1964). The report's authoritative voice—the Surgeon General is the country's top health officer—and compelling documentation were impossible to ignore. The steady growth in smoking prevalence that had begun in 1920s came to a halt.

After publication of the report, public debate over smoking could never again be divorced from its documented adverse health effects. Smoking could no longer be viewed exclusively as a matter of consumer choice based on the idea that tobacco is an ordinary consumer good. Smoking had officially become a medical problem and a public health challenge. As the 1964 report stated, "cigarette smoking is a health hazard of sufficient importance in the United States to warrant appropriate remedial action" (HEW 1964).

The Surgeon General's report stimulated a significant change in public attitudes about smoking and new public health and public policy responses. The story of the past four decades, however, is not one of unmitigated public health success. The decades following the report's release can be divided into two periods. The first phase, which lasted through the late 1980s, was characterized by largely unsuccessful efforts by those involved in the antismoking movement to gain political footing against the tobacco industry, a commercial giant with many tools at its disposal. Beginning in the mid-1980s, however, the understanding of the tobacco problem and the tools used to combat it underwent dramatic transformations. Smoking came to be recognized as a form of drug addiction, one that typically begins by the age of 18 years and that is fostered by the marketing and other actions of cigarette companies. In addition, the harms that smoking causes to nonsmokers, as well as smokers, also changed the political landscape of tobacco control efforts.

PUBLIC HEALTH TAKES ON THE TOBACCO INDUSTRY: 1964–1988

The initial declines in smoking following the release of the 1964 Surgeon General's report came largely from motivated smokers quitting in response to the highly publicized and frightening findings about tobacco's dangers. With some 70 million tobacco users in the country and with so many Americans—from farmers, factory workers, and cigarette manufacturers to retailers, advertising agencies, and the media—tied economically to smoking, however, dramatic political change did not occur overnight. Moreover, in the turbulent 1960s, the country's attention was focused on such pressing political issues as civil rights, Vietnam, and the War on Poverty (Kluger 1996).

Educational Initiatives

Public education was the first line “remedial action” taken in response to the Surgeon General's call. The American Cancer Society was an early leader. Other voluntary health groups, such as the American Lung Association and the American Heart Association, with their core missions of public education, were also well positioned to take early leadership roles. The three groups worked independently of one another until 1981, when they formed the Coalition on Smoking OR Health. State and local leaders of these organizations began to form similar coalitions in their areas, extending the antismoking effort in states and local communities (DHHS 2000). The American Medical Association (AMA) did not become an advocate for tobacco control until the mid-1980s, when Board of Trustees member Ronald Davis urged the AMA to testify before Congress (Kluger 1996).

New programs to aid in smoking cessation and prevention were developed and implemented. The 1960s saw a rapid introduction of new behavioral approaches to smoking cessation, with novel ideas appearing almost every year. By the 1980s, pharmacological approaches were attracting attention. The National Cancer Institute's Smoking and Tobacco Control Program was a major source of research funding (Shiffman 1993).

School-based prevention programs were also developed and introduced in the 1970s and 1980s, sometimes as a part of alcohol or other substance abuse programs. These programs used a variety of approaches, which varied on the basis of local preferences. Later, the Centers for Disease Control and Prevention issued its Guidelines for School Health Programs to Prevent Tobacco Use and Addiction to provide a national framework and impetus for these programs (CDC 1994).

It took time for antismoking coalitions to coalesce, but anti-tobacco advocacy and grassroots efforts came to play a key role in containing the

tobacco problem. A notable early development came in 1966 when John F. Banzhaf successfully petitioned the Federal Communications Commission (FCC) to invoke the Fairness Doctrine and mandate reply time on television and radio for the cigarette commercials glamorizing smoking. This action ultimately led to an FCC requirement, beginning in 1967, that stations run one free counter advertisement from health groups for every three cigarette commercials that they aired. The American Cancer Society, working with top advertising agencies that donated their time, took the lead in producing graphic and compelling counter advertisements. Banzhaf went on to form Action on Smoking and Health, a national antismoking consumer organization that was reported to have 60,000 members by 1979 (Kluger 1996).

Congressional initiatives gave some support to the public education efforts, giving what seemed to be at least a symbolic win to the nascent tobacco control movement. Within a year of the publication of the Surgeon General's report, the U.S. Congress passed the Cigarette Labeling and Advertising Act of 1965, which required cigarette packages to contain the message "Warning: Cigarette Smoking May Be Hazardous To Your Health" (CDC 2005).

As additional scientific evidence documenting the dangers of smoking continued to emerge, the 1969 Public Health Cigarette Smoking Act upgraded the warning to read "Warning: The Surgeon General Has Determined That Cigarette Smoking Is Dangerous To Your Health" (CDC 2005). The law also banned all cigarette advertising on television and radio, effective January 1, 1971 (Borio 1993).

By 1981 a Federal Trade Commission (FTC) staff report had concluded that the health warning on packages was "worn out" and was having little impact on public knowledge and attitudes about smoking. The warning was too abstract and difficult to remember, and it was not seen as personally relevant (Hinds 1982). Congress responded with the Comprehensive Smoking Education Act of 1984, which required the use of four, more specific, labels on cigarette packages and cigarette advertisements that would be rotated on a regular basis (CDC 2005).

The new warnings reflected the steady flow of research findings tying smoking to increasing numbers of serious conditions. By the time that the 1989 Surgeon General's report was released, the list of conditions that scientific studies had linked to smoking included various cancers—including lung, laryngeal, oral, and esophageal cancers—as well as pulmonary disease, heart disease, and fetal growth retardation. This growing body of research helped power the tobacco control movement.

The Tobacco Industry's Response

Even as public health forces were coalescing and making policy inroads, the tobacco industry was fully engaged as a formidable opponent. Tobacco

has been entrenched in American society for so long that it is extremely difficult to sort out the precise roles of various commercial, medical, social, and cultural forces in sustaining the tobacco problem. The tobacco industry's forceful strategies, however, have provided a powerful counterforce to the public health effort. As the 2000 Surgeon General's report would later state, in admittedly simplified terms: "The history of tobacco use can be thought of as a conflict between tobacco as an agent of economic gain and tobacco as an agent of human harm" (DHHS 2000).

The medical establishment was initially slow to embrace the imperatives of the growing findings about smoking and health. The tobacco industry, on the other hand, quickly sprung into action in the early 1950s to counter the studies connecting smoking to higher mortality rates. In the late 1950s, cigarette manufacturers created the Tobacco Institute, which claimed to represent not only cigarette producers and distributors but also hundreds of thousands of farmers and others with economic interests in tobacco (Kluger 1996). The Tobacco Institute was the driver of the industry's extensive public relations and lobbying campaigns for decades. It sought to underscore the economic importance of tobacco and, together with the industry's Council for Tobacco Research (initially called the Tobacco Industry Research Council), to undermine the scientific evidence identifying the risks of smoking and documenting its effects on health. By disputing the scientific findings about the dangers of smoking, the industry sought to reassure its customers and to obscure the public's understanding of the risks.

The industry also assertively sought to counter and displace the message about the dangers of smoking with a message tapping into the American spirit of individualism, freedom, and unease with government paternalism. The industry's message was simple: Smoking is an individual's free choice and no one else's business and certainly not the government's business.

Although the voluntary health organizations leading the early public education effort tended to avoid controversy and politics, tobacco interests built a powerful presence on Capitol Hill. They sustained their influence by lobbying, making campaign contributions, and building allegiances with members from tobacco growing states, many of whom held key leadership positions (Kluger 1996).

Through their efforts, tobacco industry advocates were able to influence key legislation. For example, Congress denied the Consumer Product Safety Commission jurisdiction over cigarettes, reversing the position taken by the agency's first chairman, who said that the commission had authority to regulate or even ban cigarettes. Tobacco was also expressly exempted from regulation under the Toxic Substances Control Act (1976), even though the law was intended to regulate chemical substances which present "unreasonable risk of injury to health of the environment." Although the nicotine in tobacco is highly addictive, tobacco is also explicitly exempted

from regulation under the Controlled Substances Act (1970). Without these congressionally enacted exemptions, tobacco products would have been subject to strong regulation—indeed, they theoretically could have been removed from the market under these statutes if the applicable regulatory agency had been so inclined (Kluger 1996).

As they sought protection from potentially damaging legislation, tobacco companies also spent billions of dollars marketing cigarettes to ensure a steady stream of customers. Their products were killing some 400,000 people a year and causing widespread morbidity, while the public health community scrambled to stem the damage. The major companies, aggressively competing for market share and for new smokers, hired top public relations companies to reshape the image of old brands and draw in new populations of smokers (Kluger 1996).

With women accounting for an increasing proportion of smokers and with the women's liberation movement advocating for female freedom and independence, women became a ready target for tobacco industry marketing. In 1967, companies rapidly increased their advertising in women's magazines and Philip Morris launched its Virginia Slims cigarette featuring the memorable slogan "You've Come a Long Way Baby." The rate of smoking initiation among girls younger than age 18 years rose abruptly in 1967, the year that the Virginia Slims campaign began, peaking in 1973 at more than double the rate in 1967 (Pierce et al. 1994).

By the late 1980s, the R.J. Reynolds Company recast its Camel cigarette brand with a cartoon figure, Joe Camel, and initiated a marketing effort that would prove especially popular with young people. Following this image redesign, Camel's youth market share ballooned. Although the tobacco companies insisted for decades that they were not targeting underage smokers, industry papers that would later become public indicated otherwise (Kluger 1996).

The tobacco companies also competed for smokers who were concerned about the dangers of smoking by marketing a succession of new low-tar and "light" cigarettes that offered smokers an alternative to quitting. These products emit lower levels of tar, carbon monoxide, and nicotine than other cigarettes, as measured by the standard FTC machine testing method. The implication that low-tar cigarettes would therefore reduce the dangers of smoking made these products the choice of increasingly large numbers of customers. Research later showed, however, that the benefits of low-tar products are not what the FTC figures might suggest, because smokers alter their smoking patterns to compensate for the reduced nicotine delivery and because the standard smoking machine used by the FTC does not accurately simulate how smokers smoke. Therefore, people who switched to these brands did not significantly lower their health risks (Harris et al. 2004; IOM 2001; NCI 2001).

Companies also turned their attentions internationally, as free trade agreements and the collapse of communism in the late 1980s opened markets in Asia and Eastern Europe that previously were controlled by local monopolies. The big international tobacco companies introduced marketing campaigns in countries that until then had not seen extravagant cigarette advertisements, due to the state previously controlling all tobacco sales. The introduction of more varied and better-tasting American cigarettes, sometimes cheaper thanks to market competition, exported the tobacco problem to developing countries, even as rates were declining in the United States (Sugarman 2001). As a result, more than 95 percent of the world's smokers now live outside the United States. According to World Health Organization projections, by the year 2020, 10 million people will die annually from tobacco-related illnesses, and 70 percent of these individuals will be in developing countries (WHO 2005).

Even when Congress passed legislation that seemed to promote the tobacco control effort, the public health gains often turned out to be illusory. The 1965 health warning legislation, for example, actually represented an important success for tobacco interests. Without it, a much tougher FTC proposal would have taken effect, putting in place a stronger warning on packages and also on advertisements. Congress temporarily blocked a warning on advertisements, a requirement that the industry was eager to avoid. Preemption language in the bill also stripped states of the authority to impose tougher requirements on packages or advertisements. The legislation kept regulatory action centered in Congress, where tobacco interests were most powerful (DHHS 2000).

The industry also recognized—though it presented a contrary message to the public—that the mild warnings that Congress required in the 1965 and 1969 acts might prove helpful in suits by smokers who claimed that the companies had not informed them of the dangers of smoking. Indeed, in 1992, the U.S. Supreme Court ruled in a case brought on behalf of a smoker, Rose Cipollone, that the 1969 act preempts state tort suits based on negligent failure to warn of the dangers of smoking, to the extent that such suits were based on a claim that the manufacturers' and sellers' post-1969 advertising ought to have included additional or more clearly stated warnings about the health consequences of cigarette smoking (Rabin 2001a). The trade-offs involved in the labeling legislation, as well as doubts about the impact of the product warnings, have led some public health experts to question whether the legislation was a public health victory (IOM 1994). Surgeon General Luther Terry, who issued the 1964 report, would later go so far as to call the 1965 law, "a hoax on the American people" (DHHS 2000).

The broadcast ban on tobacco advertising was probably also a net benefit to the industry. Between 1967 and 1970, when public health advocates aired counter advertisements as part of the Fairness Doctrine, cigarette

consumption dropped at a much faster rate than either before or after this period (DHHS 1989). Several studies have found that the ads were driving at least some of the downturn in smoking (Farrelly et al. 2003; Hamilton 1972; O’Keefe 1971; Warner 1989). When the congressional broadcast ban took effect (without much industry resistance), those advertisements disappeared from the nation’s living rooms, and the tobacco control movement lost one of its more effective tools for reducing tobacco use. Whatever the public health benefits of banning broadcast tobacco advertising, it was to the industry’s advantage to get the counter advertisements off the air.

After the television advertising ban, tobacco companies vastly increased their marketing budgets, shifting a large portion of advertising dollars into promotional activities aimed at (1) putting cigarettes in the hands of prospective users; (2) positioning cigarettes in prominent and accessible places at points of sale; and (3) creating good will for the companies with the public, community leaders, and politicians (IOM 1994). In 1975, the tobacco industry spent \$491 million on all types of cigarette advertising and promotion in the United States. By 1985 that figure had nearly quintupled to \$2.48 billion, and it continues to multiply (FTC 2005).

The industry prevailed in the courts as well. Of more than 200 tort claims filed on behalf of individual smokers between the mid-1950s and the early 1990s, not a single lawsuit succeeded. Tort litigation against the tobacco industry seemed to be dead. In a first wave of litigation, which began in the 1950s, the companies successfully argued that, absent a foreseeable risk of harm, consumers must bear the risks of using nondefective products. In the second wave, which began in the early 1980s, the industry successfully argued that smokers continued to smoke even with knowledge of the associated health risks (Rabin 1993).

The industry message that smoking was an individual choice—indeed, a right—and that others had no business depriving smokers of that pleasure resonated powerfully within American society. Even as antismoking forces were gathering steam and public knowledge of the dangers of smoking was high, smoking was widely seen as a personal decision, even if it was a self-destructive one. For those who were not smokers or tied to the tobacco industry, it could be a justification for steering clear of the controversy over smoking. As the remainder of this chapter reveals, however, new and increasing concerns about the health consequences of tobacco use would soon begin to reshape public opinion regarding smoking.

The Campaign Against Secondhand Smoke

Research about the harmful effects of secondhand smoke began to emerge in the 1970s. As nonsmokers sought to assert their right to a smoke-free environment, they introduced a new justification for tobacco control.

Eventually, this movement would weaken the claims of smokers' rights and transform public perceptions and the tobacco policy debate. In the end, this shift also played a major role in reducing smoking altogether by changing social norms and helping smokers quit or reduce smoking.

Early research on secondhand smoke left many uncertainties about the nature and scope of the risk that tobacco smoke posed to nonsmokers, and specific scientific findings supporting nonsmokers' rights claims did not emerge until the late 1980s. However, public health officials and grassroots antismoking groups—particularly the Group Against Smokers' Pollution, or GASP, founded in 1971—did not wait. They embraced the early indications that smoking could harm nonsmokers, while locating their campaign for smoke-free environments in the context of a broader environmental protection movement along with a growing consumer health consciousness (Bayer and Colgrove 2002).

The 1972 Surgeon General's report (HEW 1972) noted the potential hazards of secondhand smoke. By the mid-1970s, government at all levels and private companies were beginning to respond to calls for smoke-free areas. In 1973, domestic airlines were required to have a no-smoking section, and a year later smoking was restricted on interstate buses. Much of the action was taking place at the state and local levels. In 1973, Arizona became the first state to create smoke-free public places; in 1974, Connecticut became the first state with a law restricting smoking in restaurants; and in 1975, Minnesota became the first state to have a comprehensive workplace smoking ban (DHHS 2000).

The tobacco industry tried to focus attention on the lack of definitive data about the risks of secondhand smoke, but the threat to nonsmokers had caught the attention of the media and the public. By the late 1970s, a Roper poll commissioned by the Tobacco Institute found that almost 60 percent of respondents believed that smoking was probably harmful to nonsmokers, and even 40 percent of smokers agreed that their smoking probably endangered others (The Roper Organization Inc. 1978).

The campaign against secondhand smoke continued to gain momentum in the 1980s, with states and localities passing a variety of restrictions on smoking in public places. By 1986, 41 states and the District of Columbia had statutes restricting smoking (Bayer and Colgrove 2002). That year, reports from the National Academy of Sciences and the Surgeon General contributed to the sense of urgency about secondhand smoke. The report by the National Academy's National Research Council stated that secondhand tobacco smoke increases the risk of lung cancer in nonsmokers by 30 percent and is harmful to children (NRC 1986). Surgeon General C. Everett Koop's 1986 report (DHHS 1986), *Health Consequences of Involuntary Smoking*, acknowledged the limitations of the data but called for immediate measures to protect nonsmokers.

Congress banned smoking on all airline flights of 2 hours or less in 1987, and 3 years later effectively extended that prohibition to all domestic flights. Smoking was also banned in federal buildings and in child care facilities that received federal funds.

The 1992 release of the Environmental Protection Agency's landmark report, *Respiratory Health Effects of Passive Smoking: Lung Cancer and Other Disorders*, added to the momentum for smoke-free spaces (EPA 1992). The report concluded that secondhand smoke is a Class A carcinogen, meaning that it is a definite cause of human cancer. According to the Environmental Protection Agency report, secondhand smoke causes some 3,000 deaths from lung cancer a year among nonsmokers.

Secondhand smoke gave new momentum to the efforts of tobacco control advocates, setting the stage for a fundamental shift in the political dynamic of tobacco control and in the public discourse and understanding of tobacco control efforts during the last decade of the 20th century.

ADVANCES IN TOBACCO CONTROL: 1988–2005

The tobacco control movement coalesced around the secondhand smoke issue, which turned out to be only the first of several issues to pose unprecedented challenges to commercial tobacco interests. While the science on the adverse effects of secondhand smoke continued to emerge, a second scientific front opened to counter the industry focus on freedom of choice: advances in neuroscience demonstrated that nicotine is a highly addictive drug. This finding permanently transformed the debate about smoking and reshaped the public policy agenda. The emphasis on addiction also cast smoking among adolescents and youth in a new light and stimulated a third front in the tobacco wars.

Nicotine: An Addictive Drug

Historically, the term addiction has been associated with stereotypical images of compulsive drug use, deviance, and criminality; heroin has been viewed as the prototypical addictive drug in the United States (HEW 1964). Beginning in the mid-1960s, however, scientific criteria for addiction (often labeled “drug dependence”) have emphasized the hallmark behavioral features of drug use, including a loss of control, and experts in the field have attempted to disassociate the clinical condition itself from the social and moral connotations and images traditionally linked with the term addiction. Equally important have been the major advances in neuroscience research that have identified the neurobiological substrates of addiction (IOM 1996) (see Chapter 2).

By the early 1980s, researchers reported that laboratory animals worked to acquire nicotine; this behavior is a hallmark of addiction to a substance.

Studies also demonstrated nicotine's psychoactive effects, another component of addiction. Brain mechanisms for behavioral reinforcement and compulsive use were characterized (IOM 2001). Epidemiological studies showing that large majorities of smokers had tried and failed to quit added to the evidence of addiction.

The 1988 Surgeon General's report (DHHS 1988), *Health Consequences of Smoking: Nicotine Addiction*, detailed how nicotine meets the criteria for an addictive drug, concluding that smokers smoke because they are addicted and that nicotine is the addictive agent. A growing number of scientific and medical organizations, including the World Health Organization, the American Medical Association, and the American Psychiatric Association, declared nicotine addictive or dependence producing.

The medical consensus that nicotine is an addictive drug transformed the concept of smoking from a bad habit of weak-willed people to a pathophysiological process that produces compulsive behavior. Increasingly, scientific studies have documented the pharmacological and structural effects of nicotine on the nervous system, which ultimately leads to specifiable changes in the brain.

The highly addictive nature of nicotine undermines the tobacco industry's longstanding position that smoking is a "free choice" and, by drawing attention to the similarities between tobacco addiction and addiction to other psychoactive drugs, establishes the empirical and ethical foundation for more aggressive regulation. Although the FDA regulates nicotine patches and other nicotine-containing products used as aids for smoking cessation, FDA commissioners had traditionally declined to assert any jurisdiction over cigarettes. In the late 1980s, Scott Ballin, director of the Coalition on Smoking OR Health, petitioned the FDA to regulate low-tar cigarettes and the new smokeless brand Premier on the basis of their implied health claims that these products are less harmful than ordinary cigarettes (Kessler 2000). In response to the petition, FDA Commissioner David Kessler decided to explore a broader regulatory approach than one based on the "implied health claims" associated with low-tar cigarettes. In 1991, he created a team of FDA lawyers, scientists, and policy makers to study the policy implications of the finding that nicotine is an addictive drug. In particular, they explored whether the FDA could regulate nicotine under the Federal Food, Drug, and Cosmetic Act (Kessler 2000).

The statutory definition of drugs under the FDA law refers to "articles (other than food) intended to affect the structure or any function of the body." Kessler's team would spend the next several years documenting both that nicotine affects the structure or function of the body and that the tobacco industry intends it to have that effect. The phrase "intended to" required evidence that nicotine was not merely an unavoidable component of tobacco but was also an ingredient that cigarette makers intended to

affect the structure or function of the body. Using internal industry documents that had become available in lawsuits and from industry insiders, FDA policy makers documented in the industry's own words how tobacco companies manipulate nicotine levels and rely on the addictive qualities of nicotine to hook users (Kessler 2000).

Most Smokers Become Addicted as Adolescents

In the early 1990s, as the FDA tobacco team was exploring policy options, national experts on tobacco use had begun to highlight the importance of smoking among youth. Studies showed that nearly 90 percent of adult smokers began smoking by the time they were 18 years old and that every day some 3,000 young people began to smoke (DHHS 1994; IOM 1994; Pierce et al. 1989). In 1992, Congress passed the so-called Synar Amendment to limit youth access to tobacco by requiring states to control access as a condition of receiving federal substance abuse block grants (IOM 1994).

In 1994, two major reports highlighted the problem of smoking among youth: the Surgeon General issued *Preventing Tobacco Use Among Young People* (DHHS 1994), and the Institute of Medicine (IOM) released *Growing Up Tobacco Free: Preventing Nicotine Addiction in Children and Youth* (IOM 1994). Those reports described the problem of initiation of smoking and nicotine addiction among youth and the factors promoting use of tobacco use among young people. The IOM report recommended specific actions that could be used to address the problem, including proposals to curtail youth access to tobacco products, restrict youth-oriented tobacco marketing, limit advertising to a text-only format, narrow the preemption provision of the 1969 federal cigarette labeling law, and enact comprehensive federal regulation of tobacco products.

The recognition that most smokers become addicted in their teens further undermined the industry arguments against regulation based on free choice. Secondhand smoke findings demonstrated that smoking endangers nonsmokers, evidence of nicotine addiction established that the decision to continue smoking is not always a free choice, and now studies showed that the overwhelming majority of smokers are already on the path toward addiction before they turn 18 years of age (IOM 1994). The public may respond negatively to paternalistic, "Nanny State" policies aimed at changing the behavior of competent adults, but protecting children is a powerful justification for regulating dangerous products. Moreover, industry marketing in the 1990s (epitomized by R.J. Reynolds' Joe Camel campaign) clearly had special appeal to children and teens and suggested that the industry was actually targeting young people, a suspicion subsequently borne out by internal industry documents.

The focus on youth and the revelations in industry documents caught on with the public. A 1993 Roper poll asked a sample of registered voters whether they mostly agreed or mostly disagreed with the following statement: “Even though tobacco companies say they don’t want kids to smoke, they really do everything they can to get teenagers and young people to take up smoking” (Marttila and Kiley Inc. 1993a). Of those polled, 64 percent said they mostly agreed, while 73 percent of the respondents reported an unfavorable or very unfavorable overall impression of the tobacco industry (Marttila and Kiley Inc. 1993b).

FDA Commissioner Kessler decided to focus the FDA regulatory approach on tobacco use among youth. Kessler, a pediatrician, called nicotine addiction a “pediatric disease” (Hilts 1995). On August 23, 1996, he joined President Bill Clinton in the White House Rose Garden to announce historic regulations that, for the first time, would put cigarettes under FDA control. The regulations declared cigarettes “nicotine-delivery devices” (DHHS 2000). Relying on the scientific foundation laid in the 1994 reports by the Surgeon General and the IOM, the new FDA regulations limited youth access to tobacco and controlled tobacco advertising and promotion targeted at young people. Immediately, tobacco companies challenged the regulations in federal court, initiating litigation that would eventually find its way to the U.S. Supreme Court (DHHS 2000).

States Take the Lead

In the early 1990s, while the FDA was exploring a federal role in regulating tobacco, states and localities had already begun to take action to contain the tobacco problem. Grassroots antitobacco advocacy was a driving force behind the creation of smoke-free spaces, and increasingly activists began to initiate other antismoking programs at the state and local levels. New antitobacco coalitions in the states began to effect important policy changes.

The burst of state action began in 1988, when the people of California passed Proposition 99, a referendum that increased the excise tax on tobacco from 10 to 35 cents per pack and earmarked 20 percent of the new revenues for a statewide antismoking campaign. California designed and put in place a comprehensive program that included mass media counter marketing campaigns, school-based programs, community-based interventions, and a research component. Massachusetts, Arizona, and a succession of other states followed with citizen referenda or legislation increasing tobacco excise taxes to various degrees and designating some of the money for antitobacco activities.

Historically, federal, state, and local governments have taxed cigarettes primarily to generate revenues, especially in response to budget crises. In

recent years, however, many states have viewed tobacco excise tax increases as a tool for reducing demand for tobacco while providing funding for public health measures (Rabin and Sugarman 2001). Many studies have found that the overall consumption of cigarettes declines with increases in the price of cigarettes (DHHS 2000) (see Chapter 5). Although figures on the “price elasticity” of demand for cigarettes vary somewhat, the general rule is that a 10 percent increase in the real price reduces overall consumption by about 4 percent and the rate of smoking among youth by 7 percent.

In addition to tax revenues, in the 1990s states received funds from philanthropic organizations and the federal government to create comprehensive tobacco control programs. The National Cancer Institute’s American Stop Smoking Intervention Study (ASSIST) demonstration program, a partnership with the American Cancer Society, funded 17 state health departments from 1991 to 1999. The program’s goal was to “alter states’ social, cultural, economic, and environmental factors that promote smoking” (NCI 2005). The Centers for Disease Control and Prevention’s Initiatives to Mobilize for the Prevention and Control of Tobacco program (IMPACT) funded tobacco control initiatives in the other states (except California).

Also in the early 1990s, the Robert Wood Johnson Foundation (RWJF), under President Steven Schroeder, became the first philanthropy in the United States to make a major commitment to tobacco control. Over the next decade, the RWJF invested more than \$400 million dollars in research, policy, and communications programs aimed at reducing the harm caused by tobacco (Bornemeier 2005). In 1994, RWJF created the SmokeLess States program, administered by the AMA, to support nongovernmental coalitions to educate the public and policy makers about the risks of tobacco use. The program was meant to augment the federal funding that was going to state governments and expand upon the innovations under way in California.

By the mid-1990s, every state had funds from one or more of these sources to build tobacco control programs. In 1999, the CDC replaced ASSIST and IMPACT with a nationwide program that provided funds to all 50 states and the District of Columbia. The Smokeless States program continued until 2004. Comprehensive state programs contained various initiatives, such as launching counter advertising and public education campaigns, establishing smoke-free workplaces and public spaces, increasing prices through taxation, supporting treatment programs for tobacco dependence, enforcing youth access restrictions, and monitoring performance and evaluating programs (IOM/NRC 2000). Some states, including California, Massachusetts, and Florida, pioneered innovative models that included edgy youth-oriented media campaigns that challenged youth not to let the tobacco industry manipulate them into smoking.

The state-based programs reflected a shift in tobacco control—from a reliance on efforts directed at individual behavioral change to community

approaches designed to change social and environmental influences on smoking behavior. Research suggested that this new emphasis would be beneficial, as studies had shown that interventions directed solely at individuals were not likely to result in large-scale declines in smoking prevalence (NCI 1991).

The tobacco industry recognized the potential of this new approach for reducing tobacco use and sought to defeat local initiatives and limit the scope and impact of the increasing activities of the states. The industry charged that advocacy activities amounted to illegal lobbying by public agencies (Aguinaga-Bialous and Glantz 1999; Gerlach and Larkin 2005). An evaluation of the ASSIST program, based in part on internal industry documents, found that the industry's strategy was to burden the states with requests for documents under the federal Freedom of Information Act and accuse ASSIST staff and local coalition members with using funds for illegal lobbying, causing confusion over what actions the ASSIST program could legally take (NCI 2005). To stem the movement toward smoke-free spaces, the industry tried, often successfully, to convince state legislatures to enact lax statewide laws while precluding more stringent local ordinances (ANR 2004).

New Litigation Strategies

Commercial tobacco interests were also becoming increasingly engaged on another battleground. From the 1950s until the early 1990s, tobacco companies were consistently victorious against tobacco control efforts in the courts. Litigation had thus shown little promise as a tool for tobacco control (Rabin 1993). However, the findings about nicotine addiction, the revelations that companies had concealed and misrepresented health information, and new opportunities to aggregate cases in so-called class actions transformed the litigation landscape in the 1990s (Rabin 2001a).

Attorneys who had previously not been involved in tobacco litigation began suing tobacco companies on behalf of large groups of smokers (Rabin 2001b). The first tobacco class action was *Broin v. Philip Morris*, filed in 1991 on behalf of flight attendants who claimed that they were injured by secondhand smoke prior to the airline smoking ban. A \$349 million settlement was reached before the trial concluded.

The nationwide class action suit *Castano v. American Tobacco*, filed in 1994, brought together some of the country's leading plaintiff attorneys. Nicotine addiction was the centerpiece of the case, which drew on emerging evidence that companies tried to conceal and misrepresent the addictive properties of nicotine and that they knowingly addicted their customers. Although a federal appellate court eventually decertified the class in the *Castano* case, subsequent individual tort suits and class actions suits

continued to develop the addiction argument. Some suits were successful, although not all rulings were upheld on appeal. Other pending cases accuse tobacco companies of fraud over use of words like “light” and “low-tar” to imply that cigarettes with these characteristics are less hazardous to a person’s health. Potentially the most significant case of this kind, *Schwab v. Philip Morris*, was certified as a class action in a federal district court in New York in 2006. The “third wave” of tobacco litigation, beginning in 1994, has been summarized by Douglas et al. (2006) and Janofsky (2005). In what proved to be a pivotal legal milestone in the history of tobacco control, in 1994 Mississippi Attorney General Michael Moore filed a suit against the tobacco companies to recover the state’s Medicaid expenditures on residents with tobacco-related illnesses. Because the state was the injured party under Moore’s legal theory, he bypassed the industry’s customary defense in suits filed by smokers that the smokers were responsible for their own injuries (Fisher 2001). Soon every state filed similar suits.

Moore and several other state attorneys general negotiated a so-called global settlement with the major tobacco companies in 1997. The proposed agreement would have bound the industry to various tobacco control efforts, including restrictions on advertising and promotion, and would have accepted FDA jurisdiction over cigarettes. The agreement would also have settled all pending state suits and would have immunized the companies from all class action litigation. According to Stanford law professor (and committee member) Robert Rabin: “Beyond doubt, [the agreement] was a testament to the awesome threat posed by the [states’] litigation strategy” (Rabin 2001b).

Congressional approval was required for the agreement to be binding. Legislation sponsored by Senator John McCain to implement the settlement and put in place other measures favored by tobacco control advocates became a target for aggressive lobbying by both those for and those against the bill. The legislation divided the tobacco control advocates, with some leaders—including David Kessler and former Surgeon General C. Everett Koop—opposing it on the ground that it was too favorable to the tobacco companies. The proposed legislation was caught up in a filibuster and never received a floor vote (Pertschuk 2001).

However, a short time later—on November 23, 1998—the attorneys general of 46 states, the District of Columbia (and American territories such as Guam and Puerto Rico) signed the Master Settlement Agreement (MSA) with the major tobacco companies (National Association of Attorneys General 1998).

The MSA required companies to pay an estimated \$206 billion to the 46 states between 2000 and 2025. (Four states—Florida, Minnesota, Mississippi, and Texas—had previously reached a settlement that obligated the

companies to pay those states more than \$40 billion.) Because the MSA did not envision FDA jurisdiction or other federal action, it did not require congressional approval; the required approval came from state legislatures and the courts.

The MSA also required the companies to support a new charitable foundation—which came to be the American Legacy Foundation—to reduce teenage smoking and substance abuse and to prevent tobacco-related diseases. The MSA placed numerous restrictions on industry marketing and promotion, including the elimination of cartoon characters and billboard advertising and restrictions on tobacco company sponsorships of various events. The MSA also constrained the industry's political activity, disbanding the Tobacco Institute and the Council for Tobacco Research, and included a number of other provisions (National Association of Attorneys General 1998).

In return for these concessions, the tobacco companies that signed the agreement received protection from lawsuits by state Medicaid programs. The agreement also contained provisions to protect manufacturers from new competitors by providing for reductions in their required payments if the participating companies lost market share to other companies as a result of the agreement.

The MSA did not prohibit suits by or on behalf of smokers or by the federal government. In 1999, the Clinton Administration filed a landmark lawsuit against the major cigarette companies under the Racketeer Influenced and Corrupt Organizations Act (RICO) and the Bush Administration continued to prosecute the litigation. On the basis of the evidence introduced at the trial, which began in 2004 in the U.S. District Court for the District of Columbia, the federal government argued that the companies “engaged in and executed—and continue to engage in and execute—a massive 50-year scheme to defraud the public, including consumers of cigarettes, in violation of RICO,” and that the companies’ “past and ongoing conduct indicates a reasonable likelihood of future violations.” Although the government originally sought “disgorgement of Defendants’ ill-gotten gains,” the U.S. Court of Appeals for the District of Columbia Circuit ruled out disgorgement and limited the scope of the remedy to “forward-looking” actions designed to prevent continued RICO violations. District Judge Gladys Kessler subsequently found that the defendants were liable under RICO and imposed a remedial order aimed at preventing future violations including bans on the use of misleading terms such as “light” and requiring corrective statements in a variety of channels to overcome the defendants’ past efforts to deny the addictive character and adverse health effects of smoking. (For further discussion of the RICO remedy, see Chapter 6.)

Momentum Builds

Major advances in tobacco control occurred both in the courts and in legislatures during a short period of time, thereby reversing the political momentum that long seemed to favor the tobacco industry in Congress and state legislatures. Thus, by end of the 1990s, tobacco control advocates were energized and optimistic about further gains in the 50-year effort to end the tobacco problem. At about this time, the architects of Healthy People 2010 (DHHS 2002) set an ambitious goal of reducing the prevalence of smoking among adults (defined as smoking at least 100 cigarettes in their lifetimes and who now report smoking cigarettes every day or on some days) in half—from the 1998 baseline of 24 percent, to 12 percent in 2010. For high school students the target was a 54 percent drop from the 1999 smoking prevalence rate of 35 percent to a rate of 16 percent in 2010 (smokers in high school were defined as those having smoked one or more cigarettes in the previous 30 days).

Despite setbacks and persistent opposition, important milestones in tobacco control were attained in the 1990s and early 2000s. The MSA and the four-state settlement placed some controls on the industry and provided for large payments to the states. The American Legacy Foundation, established and funded pursuant to the MSA, sponsored a nationwide counter advertising campaign, the first in 30 years. The campaign, modeled on the “truth” campaign in Florida, was linked to 22 percent of the decline in the rate of smoking among youth between 1999 and 2002. The overall rate of smoking among students in grades 8, 10, and 12 dropped from 25.3 percent to 18 percent during that period. This translates into approximately 300,000 fewer young smokers (Farrelly et al. 2005) (see Chapter 5 and Slater, Appendix N).

Studies have also linked comprehensive tobacco control activities to decreases in smoking among youth. A recent study of state expenditures on tobacco control found, “clear evidence that tobacco control funding is inversely related to the percentage of youth who smoke and the average number of cigarettes smoked by young smokers” (DHHS 1994; Tauras et al. 2005). The smoking rates in states with the most aggressive programs declined more than the national average. Recently, in Maine, for example, the rates of smoking declined 59 percent among middle schools students and 48 percent among high school students between 1997, when the state began its campaign, and 2003 (Tobacco Free Kids 2004).

Aggressive state antismoking campaigns also contributed to the overall decrease in the prevalence of smoking among adults beginning in the late 1990s. Early evidence of the impact of these programs came from the California Tobacco Control Program, which was associated with nearly twice the rate of decline in smoking prevalence as that in the rest of the United

States between 1989 and 1993 (Gilpin et al. 2001). The National Cancer Policy Board (a joint program of the IOM and the National Research Council) examined the evidence on the effectiveness of state programs and concluded in a 2000 report that, “multi-faceted state tobacco control programs are effective in reducing tobacco use” (IOM/NRC 2000). The evidence on the effects of the state programs is reviewed in Chapter 5.

A growing number of states, localities, and workplaces have become smoke-free. Nine states—California, Connecticut, Delaware, Maine, New York, Massachusetts, Rhode Island, Vermont, and Washington—have comprehensive, statewide smoke-free laws (ALA 2005, 2006). The laws in Florida, Idaho, and Utah exempt only stand-alone bars. Studies and economic data show that fears that restaurants and bars would suffer economically from smoking bans have not generally been borne out. Some of the strongest evidence of the impact of secondhand smoke policies comes from New York City, where a comprehensive smoking ban took effect on March 30, 2003. In the year after the law took effect, business receipts for restaurants and bars increased, the rate of employment rose, and the number of liquor licenses increased. Virtually all establishments are complying with the law, which has the support of most New Yorkers (Tobacco Free Kids 2006). According to a 2005 report, 18.4 percent of adults in New York City smoke, a decline from 19.2 percent a year earlier and a decline from 21.6 percent from 2 years earlier. These declines are significantly steeper than those for the nation overall (Perez-Pena 2005).

A substantial increase in cigarette prices has also occurred over the past decade. The federal excise taxes on cigarettes rose from 24 cents to 39 cents per pack between 1993 and 2002, many states raised their cigarette taxes, and the major manufacturers increased prices by about a dollar per pack, including 45 cents a pack to cover the cost of the MSA (Capehart 2001). In 1997, premium brands cost about \$1.90 per pack, and by 2003 the cost had increased to about \$3.60 a pack, with higher prices in states with higher taxes (Derthick 2004).

The exposure of the tobacco companies’ deceptive marketing practices not only resulted in widespread criticism of the industry but also created a new justification for legal action and regulation. A dramatic measure of how much had changed was the new corporate stance of the country’s largest cigarette company, Philip Morris USA. In the fall of 1999, Philip Morris acknowledged in a public statement that smoking causes cancer and that nicotine is addictive (Meier 1999). A few months later, Philip Morris officially took the position that cigarettes should be regulated (AP 2000). Only a few years earlier, the company’s chief executive officer (who had since left the company), along with the chief executive officers of other major tobacco companies, testified before a congressional committee (under oath) that he did not believe that nicotine is addictive (Waxman 1994).

More effective smoking cessation techniques that use pharmacological and behavioral methods recently became available, although many smokers still lack access to quitting services. The federal government released clinical practice guidelines to provide health care professionals with the latest information available on effective treatment strategies to help smokers quit. A subcommittee of the federal government's Interagency Committee on Smoking and Health developed a National Action Plan for Tobacco Cessation aimed at preventing 3 million premature deaths and helping 5 million smokers quit. In February 2004, the day before the plan was released at a news conference, Secretary of Health and Human Services Tommy Thompson announced the establishment of the National Quitline Network with an allocation of \$25 million per year. The subcommittee estimated to reach its goals; however, the cost of the quit line would be \$3.2 billion a year. Ten months later, Thompson announced the toll-free number for this quit line (1-800-QUITNOW). In early 2005, the Centers for Medicare and Medicaid Services announced that smoking cessation counseling would become a covered Medicare benefit, the second of the subcommittee's six recommendations to be addressed (Michael Fiore, personal communication, June 30, 2005).

One important objective of many tobacco control advocates has not been realized, however. In 2000, the U.S. Supreme Court ruled 5-4 that the Federal Food, Drug, and Cosmetic Act does not give the FDA the authority to regulate tobacco (*FDA v. Brown & Williamson Tobacco Corp.* [98-1152] 529 U.S. 120, 2000). This left in place the incongruous situation in which the FDA and other agencies have authority over products that cause far less harm than cigarettes while cigarettes continue to evade meaningful federal regulation.

After the Supreme Court's decision, attention turned to Congress. In 2004, a Senate bill giving the FDA the authority to regulate tobacco was attached to a \$10 billion buyout of tobacco growers. Although the bill passed by a large margin in the Senate, the provisions related to the FDA were eliminated in conference committee. Comprehensive and bipartisan bills were reintroduced in 2007. Like its predecessors, the Family Smoking Prevention and Tobacco Control Act (S.625 and HR 1008) would give the FDA wide-ranging authority over the manufacture, distribution, and promotion of tobacco products (Legal Resource Center for Tobacco Regulation 2005).

Among other important provisions, S.625 and HR 1008 would revive the 1996 FDA Tobacco Rule, strengthen cigarette package warnings and authorize the FDA to prescribe stronger warnings in the future, and give the FDA the authority to require cigarettes to meet health-based performance standards. The bill has widespread support among tobacco control advocates as well as the endorsement of Philip Morris USA. Notwithstanding the

broad powers that it would give the FDA, some tobacco control advocates oppose it because it would legitimize tobacco products and might deter the development and marketing of reduced-risk products.

Since the 1980s, tobacco companies have experimented with novel tobacco- and cigarette-like products designed to reduce the toxicity of smoking and the level of secondhand smoke emissions. These products have taken various forms over the years, including cigarette-like devices that heat rather than burn tobacco and, more recently, cigarettes with reduced carcinogen emissions. Harm reduction products, also referred to as PREPs (potential reduced-exposure products), are potentially beneficial, but there is not yet enough scientific evidence to determine their effectiveness in reducing harm from smoking (IOM 2001).

Companies have test marketed PREPs in recent years, but few have been introduced and few are marketed nationally. In 2005, Vermont, joined by several other states, sued the R.J. Reynolds company over the company's claims that its Eclipse cigarette, which heats tobacco without actually burning it, might reduce the risk of cancer and other health problems (AP 2005).

Although congressional action on tobacco had been stalled since 2004 until recently, important litigation victories have continued to occur. In 2006, U.S. District Judge Gladys Kessler ruled in favor of the federal government in its massive RICO case against the tobacco companies alleging that they had engaged in misleading conduct for decades as part of a broad conspiracy (*United States v. Philip Morris USA Inc., et al.*, 99-CV-2496, 2006). As noted above, Judge Kessler's remedial order was limited to actions designed to prevent future violations of RICO because earlier rulings had precluded "backward-looking" remedies such as disgorgement of the profits made by the defendant cigarette manufacturers:

[T]he Court is enjoining Defendants from further use of deceptive brand descriptors which implicitly or explicitly convey to the smoker and potential smoker that they are less hazardous to health than full flavor cigarettes, including the popular descriptors "low tar," "light," "ultra light," "mild," and "natural." The Court is also ordering Defendants to issue corrective statements in major newspapers, on the three leading television networks, on cigarette "onserts," and in retail displays, regarding: (1) the adverse health effects of smoking; (2) the addictiveness of smoking and nicotine; (3) the lack of any significant health benefit from smoking "low tar," "light," "ultra light," "mild," and "natural" cigarettes; (4) Defendants' manipulation of cigarette design and composition to ensure optimum nicotine delivery; and (5) the adverse health effects of exposure to secondhand smoke.

Judge Kessler's RICO rulings regarding liability and remedy are now on appeal. In addition, findings similar to those made by Judge Kessler have

provided the factual foundation for substantial punitive damages awards in states courts. Although some of these awards have been reduced on appeal on the grounds that they were unconstitutionally excessive, the courts have rarely questioned the factual basis for the findings or the suitability of some award for punitive damages for the industry's "reprehensible conduct" (see generally, Guardino and Daynard 2005).

TOBACCO CONTROL IN THE YEARS AHEAD: WILL PROGRESS CONTINUE?

Has Momentum Slowed?

The public health community has made significant progress over the past decade, but there are also worrisome signs that progress may be stalling. It is difficult to sustain public attention on an endemic health problem over an extended period. Other pressing public health concerns, such as obesity and disparities in the provision of health care, have increasingly commanded the attention of both public and private leaders in the health care sector. Budgetary constraints in federal agencies, such as NIH and the CDC have affected tobacco control research. Moreover, in recent years many states have chosen to cut tobacco control funding and to divert MSA payments to needs other than tobacco control (GAO 2006).

Billions of dollars are flowing to the states from the MSA and the accompanying four-state settlement. By the end of 2003, the 46 MSA states had received more than \$46 billion. Each state determines how much of that money will be allocated for tobacco control activities, however, and with states experiencing serious budget shortfalls in the early years of the new millenium, many chose to divert substantial portions of those funds to help balance budgets and meet other state needs. Additionally, some states used the stream of money to secure bonds, forfeiting future MSA funds to get money immediately. Even when the states were not experiencing such a deep financial crisis, less than 5 percent of MSA funds to the states were being spent on tobacco control (Gross et al. 2002; Schroeder 2002).

The CDC has recommended minimum levels that states need to spend to achieve successful tobacco prevention and cessation (CDC 1999). As of December 2004, only three states—Delaware, Maine, and Mississippi—met that minimum. The District of Columbia and 37 states fund tobacco control programs at less than half the CDC minimum or provide no funds at all. Some of the states with the most innovative programs, including Minnesota, Florida, and Massachusetts, have substantially reduced their tobacco control budgets. 2005 marked the third straight year that states overall cut their tobacco control expenditures (Campaign for Tobacco Free Kids 2004).

When support for tobacco control wanes, earlier progress in reducing tobacco use can quickly be reversed by the social forces that tend to promote smoking. Industry expenditures on traditional advertising have declined in the wake of the marketing restrictions imposed by the MSA. However, promotional activities remain very strong, as the companies concentrate on direct contact with potential consumers and retail promotions, particularly price discounts. As a result of a heavy emphasis on price promotions, tobacco companies spent a record \$15.15 billion on cigarette advertising and promotion in the United States in 2003 (the year for which latest data are available), which represents an increase of 21.5 percent over that in 2002, 35.0 percent over that in 2001, and 58 percent over that in 2000. The amount for the 2003 is more than twice what companies were spending just 5 years earlier (FTC 2005). As marketing to underage smokers has been curtailed, companies have increasingly targeted the 18- to 21-year-old market (Tobacco Free Kids 2005).

Tobacco companies are spending \$28 on marketing tobacco products for every dollar that the states spend on tobacco prevention efforts, according to a report by a coalition of public health agencies. Stated in another way, tobacco companies spend more money on marketing in a single day than 46 states and the District of Columbia spend on preventing smoking in a year (Tobacco Free Kids 2004).

The market share of nonparticipating discount cigarettes marketers has increased since the agreement was signed, even though MSA provisions were designed to avoid such an increase. As a result, most funding for the American Legacy Foundation ended after 5 years because continued funding was conditioned on maintenance of at least a 99.05 percent market share among the four companies that signed the agreement (American Legacy Foundation 2003).

Many smokers still lack access to effective cessation services; and physicians do not routinely address tobacco use with patients, despite the dissemination of national clinical guidelines. Several recommendations of the Interagency Committee on Smoking and Health, including investing in research into new tobacco dependence interventions, have not been addressed. Current treatments result in long-term success at quitting among only 10 to 30 percent of smokers (Fiore et al. 2004).

The Consequences of Unchanged or Weakened Tobacco Policies and Programs

In sum, over the last decade considerable progress in building a strong foundation for continued efforts to reduce tobacco use has been made, but the momentum appears to have slowed. Indeed, there are genuine reasons for concern that the infrastructure for tobacco control is eroding while the

tobacco industry's efforts to promote and maintain demand are continuing to increase. It is these concerns that led the American Legacy Foundation to ask the IOM to evaluate strategies that can be used to continue to reduce tobacco use and to examine barriers to the implementation of those strategies. As a part of this undertaking, the committee believed that it was necessary to consider the likely consequences not only of intensified tobacco control activities but also of standing still or even a weakened investment in tobacco control efforts. Thus the committee decided to explore the available tools for projecting trends in tobacco use under different sets of assumptions. Scientists who do this type of work create mathematical models of the "system" of tobacco use, quantifying the factors that affect the outcomes of interest, such as the prevalence of use, tobacco-related mortality, and health expenditures.

No one can ever be certain what will happen in the future, and predictions in this domain are complicated by the fact that the system of tobacco use is complex in the technical, as well as the everyday, sense of the word. However, certain aspects of future patterns of use, morbidity, and mortality are relatively predictable because they display considerable inertia and lagged behavior. For example, even if, starting today, not one additional person were to begin smoking, the prevalence of tobacco use would still decline relatively slowly over time. Likewise, even if, starting today, every current smoker were to decide to quit and were able to do so permanently, there would still be substantial smoking-related morbidity and premature mortality for many years to come.

The committee's charge requires it to estimate the consequences of adopting or not adopting particular tobacco control policies and programs on future patterns of use. Making that sort of projection is inevitably somewhat speculative. Careful use of certain technical tools can lead to better-informed projections than mere human intuition can produce, however, particularly for systems with lags and inertia. Accordingly, the committee surveyed the macrolevel tobacco policy simulation literature thoroughly and commissioned analyses based on two macro- or population-level tobacco simulation models: the SimSmoke model (Levy, Appendix J) and the System Dynamic Model (Mendez, Appendix K). Although the committee is confident that these two models represent the state of the art in the domain of tobacco policy, it is important to emphasize that this body of knowledge is rather incomplete compared with the enormous knowledge base concerning the individual-level consequences of smoking and past and current patterns of smoking. The models may also appear to be incomplete compared with the completeness of the policy simulation tools available in other policy domains. (Particular limitations of the state of the art in tobacco policy modeling are outlined in Chapter 7.) The limitations of the

models must be taken into account in deciding how much weight should be given to projections based on them.

Both of the models used in the committee's analyses are what might be called "compartmental" or "stocks-and-flows" models. They track over time the number of people in various "states," such as the number of female smokers in the past year between the ages of 25 and 34 years. Levels of these "stocks" change over time because of "flows" in and out because of smoking initiation, cessation, and relapse and underlying demographic changes (aging, death, etc.). For the present purposes, the most important difference between these two models concerns what each takes as inputs. The System Dynamic Model projects the consequences of particular initiation and cessation rates. It answers questions of the form, "Suppose that the rate of smoking initiation fell by 10 percent. What would that imply for smoking prevalence in 15 years?" The SimSmoke model backs up one step and uses policies as inputs. The SimSmoke model's policy modules translate evidence pertaining to historical policy actions into estimated effects on flow rates, which then, in turn, affect smoking prevalence over time.

The modeling commissioned by the committee is focused on smoking prevalence because the committee believes that prevalence can be projected more reliably than smoking-related morbidity and mortality. (As indicated above, however, that does not mean that model-based projections of future rates of smoking prevalence are necessarily accurate; the accuracy of these projections is limited by the inevitable uncertainty of the future and by the limitations of the models or the data used by the modelers.)

Projections Based on the Status Quo

The first question of interest to the committee in carrying out its charge is what trends can be expected in tobacco use prevalence if the level and intensity of tobacco control remain unchanged. Figures 3-1 and 3-2 give those projections by use of the SimSmoke model and System Dynamic Model, respectively. Specifically, the SimSmoke model projects what would happen if the tobacco control policies of 2005 were maintained with no additions or retrenchments. The System Dynamic Model shows what might occur if the smoking initiation and cessation rates of 2005 were maintained in the future. The models reveal that there is good news and bad news for public health with regard to reducing tobacco use in the future.

The good news is that both models show that, even if tobacco control activities remain at present levels, smoking prevalence will decline from 2006's estimated 20.9 percent to a little less than 16 percent in 2025. This continued decline will occur because of the system's inertia: there are currently more middle-aged and older smokers than there would have been

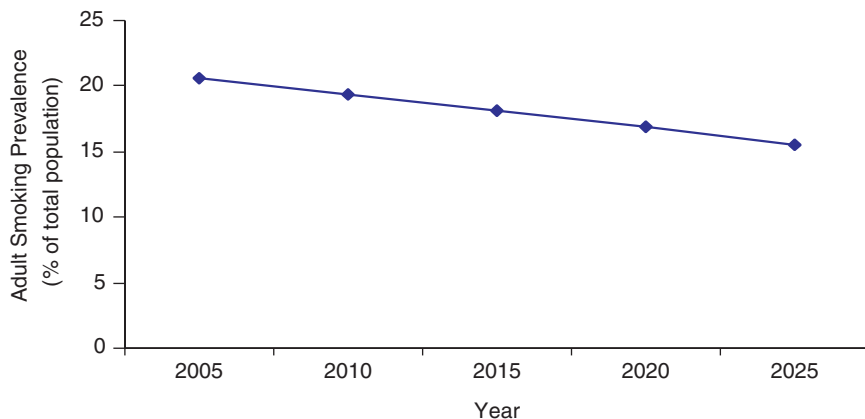


FIGURE 3-1 Estimated adult smoking prevalence from the SimSmoke Model (2005 to 2025) assuming no change in the tobacco control environment (status quo scenario).

had those birth cohorts passed through the ages of tobacco initiation under higher tobacco prices and stronger tobacco controls. Over time, as those birth cohorts are replaced by aging younger cohorts who had lower rates of smoking initiation, the prevalence of smoking will continue to decline.

The System Dynamic Model projects further into the future than SimSmoke, in this case, until the year 2050; and this projection gives the

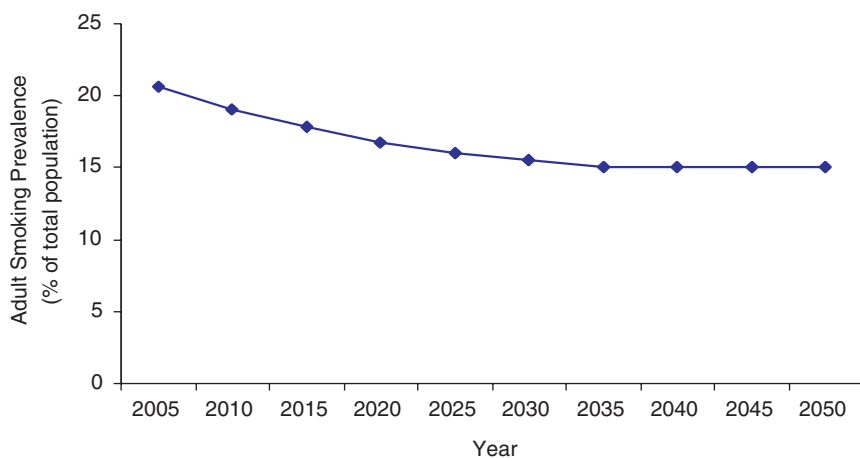


FIGURE 3-2 Estimated adult smoking prevalence from the System Dynamic Model (2005 to 2050) assuming no change in the tobacco control environment (status quo scenario).

bad news. One must keep in mind that the further into the future that one projects, the greater the uncertainty of the projection is; however, the System Dynamic Model shows that shortly after 2025, the decline in prevalence will plateau well above the Healthy People 2010 target of 12 percent, halting at about 15 percent.

Projections Based on Weakened Tobacco Control

Both of these two, independent models give similar projections under base-case conditions, but future conditions could look quite different. As noted above, the risk of backsliding in tobacco control is considerable. With this in mind, the SimSmoke model was used to project a worst-case scenario based on a weakening of tobacco control policies and programs. Table 3-1 (Table 4 from Levy, Appendix J) shows the SimSmoke model projections of the consequences of various adverse changes in the baseline assumptions about the intensity of various tobacco control policies and programs. Specifically, the envisioned changes are reductions in tobacco prices of 40 and 80 cents per pack (whether these are due to reduced production costs, tax cuts, or price reductions in the face of competition from discount brands and Internet sales); the elimination of enforcement and publicity for clean air laws (but leaving the laws in place), elimination of media campaigns aimed at adults and youth, such as the American Legacy Foundation and Massachusetts state campaigns; elimination of quit lines; and, finally, the effects of all these changes together.

Any of these actions alone would increase the smoking prevalence in 2025 relative to the baseline or status quo projection of 15.5 percent prevalence. If all of these retrenchments occurred, the projected smoking prevalence in 2025 would be 17.1 percent, which would result in approximately 4 million more people smoking than would otherwise be the case (see also

TABLE 3-1 SimSmoke Model Prediction of Trends in Adult Smoking Prevalence (2005 to 2025) Assuming a Decline in Selected Tobacco Control Measures

Measure	Smoking Prevalence (%)				
	2005	2010	2015	2020	2025
40-cent-per-pack price reduction	20.6	19.6	18.6	17.6	16.3
80-cent-per-pack price reduction	20.6	19.9	18.9	18.0	16.7
Clean air law reduction	20.6	19.3	18.1	17.0	15.6
Adult media campaign reduction	20.6	19.4	18.2	17.0	15.7
Youth media campaign reduction	20.6	19.3	18.3	17.2	15.8
Cessation program reduction	20.6	19.3	18.1	17.0	15.6
All	20.6	20.0	19.2	18.4	17.1

Figure 3-3). Although the momentum generated by the last four decades of tobacco control is unlikely to be erased altogether, these projections do show that a weakened commitment to tobacco control will affect millions of lives; and the model does not take into account new smoking fads, other changes in demand, or industry innovations.

In Chapter 1, the committee observed that the patterns and trends of tobacco use differ substantially in different regions and states and that these differences arise to some extent from differences in the nature and the intensity of tobacco control activities. To depict the range of possible outcomes, the System Dynamic Model was used to project what would happen to smoking prevalence if, over the next 4 years (by 2010), the entire country's smoking initiation rates rose and smoking cessation rates fell to match those prevailing in Kentucky, the state with highest smoking prevalence, in 2005. If this were to occur, national smoking prevalence could rise—and could rise substantially, to 23.5 percent by 2025, an increase of approximately 11 million smokers. It is unlikely that tobacco control initiatives throughout the country would lose ground so quickly, but this calculation graphically makes the point that the inertial continuation of past trends should not be taken for granted. The committee also used the System Dynamic Model to estimate the changes in smoking prevalence that would occur if the country were to reach Kentucky's 2005 smoking initiation and smoking cessation levels in 2015 and 2020, scenarios that are more realistic. As shown in Figure 3-4, the results were equally disturbing: even imagining that it would take 15 years for smoking initiation and smoking cessation rates to reach Kentucky's levels, the model predicts that there would be more than 17 million more smokers by 2025 than under the status quo scenario displayed in Figure 3-5.

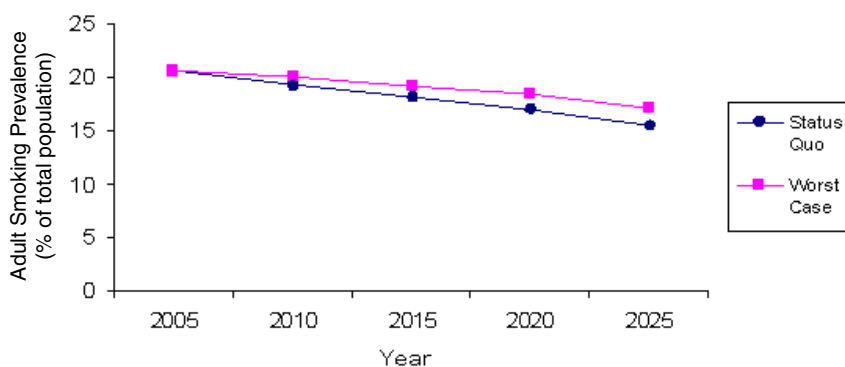


FIGURE 3-3 Comparison of SimSmoke Model estimates of adult smoking prevalence (2005 to 2025) under the status quo and worst-case scenarios.

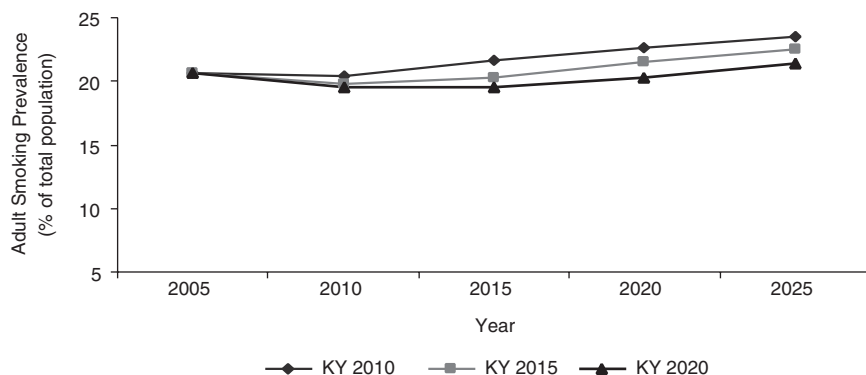


FIGURE 3-4 System Dynamic Model estimated adult smoking prevalence assuming the U.S. matched the 2004 initiation and cessation rates of Kentucky by 2010, 2015, and 2020.

Conversely, the committee wondered what would happen to overall national tobacco use prevalence if, over the next few years, tobacco control efforts intensified to the point that the entire country had initiation and cessation rates by 2010 that matched those of California in 2004. California was selected for this purpose because it is, to some extent, a model state with respect to both tobacco control policies and tobacco use. The projected trajectory is parallel to the national projection, but it plateaus at substantially lower levels, eventually reaching the 10 percent target of Healthy People 2010—albeit in 2050, almost two generations later than the 2010 milestone (Figure 3-6). Accordingly, there would appear to be substantial room for advances in tobacco control efforts to make a positive

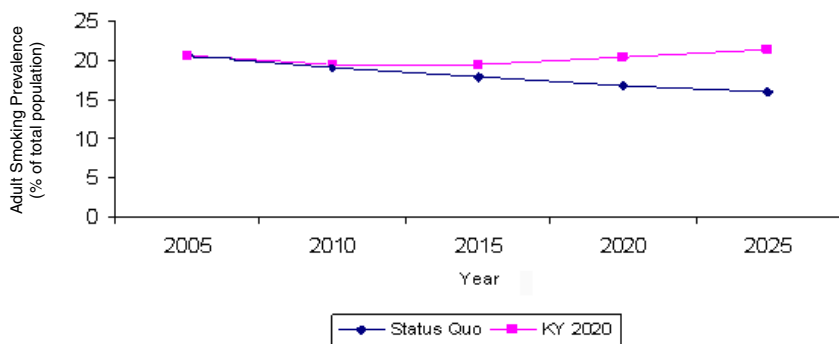


FIGURE 3-5 System Dynamic Model estimated adult smoking prevalence comparing Kentucky 2020 scenario with the status quo scenario.

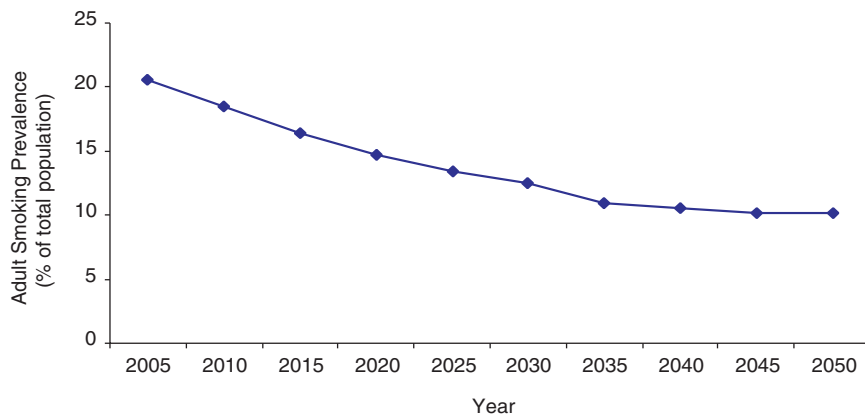


FIGURE 3-6 System Dynamic Model estimated adult smoking prevalence assuming the U.S. reaches California's 2004 initiation and cessation rates by 2010.

difference. The effects of intensified tobacco control activities are explored in Chapter 5.

SUMMARY

This chapter has documented the progress in building a strong foundation for state tobacco control activities that has been made over the last decade. However, there are genuine reasons for concern that the infrastructure for tobacco control is eroding while the tobacco industry's efforts to promote and maintain demand are continuing to increase.

The committee has tried to project the likely public health consequences of intensified or weakened investments in tobacco control compared with those of standing still. The good news is that even if tobacco control activities remain at present levels, smoking prevalence is likely to decline from 2006's estimated 20.9 percent to a little less than 16 percent in 2025. As noted above, this continued decline will occur because of the system's inertia: There are currently more middle-aged and older smokers than there would have been had their birth cohorts passed through the ages of tobacco initiation under higher tobacco prices and stronger tobacco controls. Over time, as those birth cohorts are replaced by aging younger cohorts who had lower rates of initiation, the prevalence of tobacco use will continue to decline. Shortly after 2025, however, the decline in prevalence appears likely to plateau at about 15 percent, well above the Healthy People 2010 target of 12 percent.

This steady-state scenario should be compared with a worst-case scenario, based on a weakening of tobacco control policies and programs.

If a significant retrenchment occurred, the projected smoking prevalence in 2025 would be about 17 percent, resulting in approximately 4 million more people smoking than would otherwise occur. Although the momentum generated by the last four decades of tobacco control is unlikely to be erased altogether, these projections do show that a weakened commitment to tobacco control will affect millions of lives; and the model does not take into account new smoking fads, other changes in demand, or industry innovations.

Finally, the committee projected the likely effect on overall national tobacco use prevalence if, over the next few years, tobacco control efforts intensified to the point that the initiation and cessation rates for the entire country were equivalent to those for California in 2004. The projected trajectory is parallel to the national projection, but it plateaus at substantially lower levels, eventually reaching 10 percent—albeit in 2050, almost two generations from now.

With these projections in mind, the committee considered what steps should be taken, not only to solidify progress already achieved and prevent backsliding, but also to set the country on a sure course for reducing tobacco use substantially by 2025. Part Two of the report presents the committee's "Blueprint for the Nation."

REFERENCES

- Aguinaga-Bialous S, Glantz SA. 1999. Arizona's tobacco control initiative illustrates the need for continuing oversight by tobacco control advocates. *Tobacco Control* 8(2):141-151.
- ALA (American Lung Association). 2005. *State of Tobacco Control: 2005*. New York: American Lung Association.
- ALA. 2006. *American Lung Association Says More State Taking Strong Action to Protect Citizens From Tobacco Use*. Web Page. Available at: <http://www.lungusa.org/site/apps/nl/content3.asp?c=dvLUK9O0E&cb=40408&ct=2059325>; accessed July 24, 2006.
- American Legacy Foundation. 2003. *American Legacy Foundation Calls Lorillard Plan to Tie Up Funding Unwarranted And Harmful*. Web Page. Available at: http://www.americanlegacy.org/americanlegacy/skins/alf/display.aspx?CategoryID=160386b2-d43a-4f67-890a-98e135a8ee6c&ObjectID=ab6fa256-833a-4d26-9f57-a3d8019874a8&Action=display_user_object&Mode=user&ModuleID=ad3a024a-b2d6-4593-874f-9b66136bc614; accessed July 21, 2006.
- ANR (Americans for Nonsmokers' Rights). 2004. *Preemption: Tobacco Control's #1 Enemy*. Berkeley, CA: Americans for Nonsmokers' Rights Foundation.
- AP (Associated Press). 2000, February 29. Phillip Morris open to tobacco regulation. *USA Today*.
- AP. 2005, July 27. Vermont: State Files Suit Against Tobacco Company. *The New York Times*.
- Bayer R, Colgrove J. 2002. Science, politics, and ideology in the campaign against environmental tobacco smoke. *American Journal of Public Health* 92(6):949-954.
- Borio G. 1993. *Tobacco Timeline*. Web Page. Available at: http://www.tobacco.org/resources/history/Tobacco_Historynotes.html; accessed August 4, 2006.

- Bornemeier J. 2005. Taking on Tobacco: The Robert Wood Johnson Foundation's Assault on Smoking. Issacs S, Knickman J, Eds. *To Improve Health and Health Care, Vol. VIII*. San Francisco, CA: Jossey-Bass. Pp. 3-28.
- Brandt AM. 2007. *The Cigarette Century: The Rise, Fall, and Deadly Persistence of the Product That Defined America*. New York: Basic Books.
- Burnham JC. 1989. American physicians and tobacco use: two Surgeons General, 1929 and 1964. *Bulletin of the History of Medicine* 63(1):1-31.
- Capehart TC. 2001. *Trends in the Cigarette Industry After the Master Settlement Agreement*. Washington, DC: Economic Research Service, U.S. Department of Agriculture.
- CDC (Centers for Disease Control and Prevention). 1994. Guidelines for school health programs to prevent tobacco use and addiction. *MMWR (Morbidity and Mortality Weekly Report)* 43(RR-2):1-18.
- CDC. 1999. *Best Practices for Comprehensive Tobacco Control Programs—August 1999*. Atlanta, GA: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health.
- CDC. 2005. *Selected Actions of the U.S. Government Regarding the Regulation of Tobacco Sales, Marketing, and Use*. Web Page. Available at: <http://www.cdc.gov/tobacco/overview/regulate.htm>; accessed July 24, 2006.
- Derthick MA. 2004. *Up In Smoke: From Legislation to Litigation in Tobacco Politics*. Washington, DC: CQ Press.
- DHHS (U.S. Department of Health and Human Services). 1986. *The Health Consequences of Involuntary Smoking: A Report of the Surgeon General*. Rockville, MD: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, Center for Health Promotion and Education, Office on Smoking and Health.
- DHHS. 1988. *The Health Consequences of Smoking: Nicotine Addiction (A Report of the Surgeon General)*. Rockville, MD: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, Center for Health Promotion and Education, Office on Smoking and Health.
- DHHS. 1989. *Reducing the Health Consequences of Smoking: 25 Years of Progress (A Report of the Surgeon General)*. Rockville, MD: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health.
- DHHS. 1994. *Preventing Tobacco Use Among Young People (A Report of the Surgeon General)*. Rockville, MD: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, Center for Health Promotion and Education, Office on Smoking and Health.
- DHHS. 2000. *Reducing Tobacco Use: A Report of the Surgeon General*. Atlanta, GA: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health.
- DHHS. 2002. *Healthy People 2010: Understanding and Improving Health*. Washington, DC: U.S. Government Printing Office.
- Douglas CE, Davis RM, Beasley JK. 2006. Epidemiology of the third wave of tobacco litigation in the United States, 1994-2005. *Tobacco Control* 15(Suppl 4):iv9-iv16.
- EPA (Environmental Protection Agency). 1992. *Respiratory Health Effects of Passive Smoking: Lung Cancer and Other Disorders*. Washington DC: Office of Health and Environmental Assessment, Office of Research and Development, U.S. Environmental Protection Agency.
- Farrelly MC, Davis KC, Haviland ML, Messeri P, Healton CG. 2005. Evidence of a dose—response relationship between “truth” antismoking ads and youth smoking prevalence. *American Journal of Public Health* 95(3):425-431.

- Farrelly MC, Niederdeppe J, Yarsevich J. 2003. Youth tobacco prevention mass media campaigns: past, present, and future directions. *Tobacco Control* 12(Suppl 1):i35-i47.
- Fiore MC, Croyle RT, Curry SJ, Cutler CM, Davis RM, Gordon C, Heaton C, Koh HK, Orleans CT, Richling D, Satcher D, Seffrin J, Williams C, Williams LN, Keller PA, Baker TB. 2004. Preventing 3 million premature deaths and helping 5 million smokers quit: a national action plan for tobacco cessation. *American Journal of Public Health* 94(2):205-310.
- Fisher L. 2001. Mississippi: the unsung hero of tobacco control, USA. *Cancer Causes and Control* 12:965-967.
- FTC (Federal Trade Commission). 2005. *Cigarette Report for 2003*. Washington, DC: Federal Trade Commission.
- GAO (General Accounting Office). 2006. *Tobacco Settlement: States' Allocations of Fiscal Year 2005 and Expected Fiscal Year 2006 Payments*. Washington, DC: GAO.
- Gerlach KK, Larkin MA. 2005. *To Improve Health and Health Care, Vol. VIII*. San Francisco, CA: Jossey-Bass.
- Gilpin EA, Emery SL, Farkas AJ, Distefan JM, White MM, Pierce JP. 2001. *The California Tobacco Control Program: A Decade of Progress, Results from the California Tobacco Surveys, 1990-1998 (Final Report)*. La Jolla, CA: University of California, San Diego.
- Gross CP, Soffer B, Bach PB, Rajkumar R, Forman HP. 2002. State expenditures for tobacco-control programs and the tobacco settlement. *New England Journal of Medicine* 347(14):1080-1086.
- Guardino SD, Daynard RA. 2005 (unpublished). *Punishing Tobacco Industry Misconduct: The Case for Exceeding a Single Digit Ratio Between Punitive and Compulsory Charges*. Web Page. Available at: <http://law.bepress.com/cgi/viewcontent.cgi?article=2236&context=expresso>; accessed July 26, 2007.
- Hamilton JL. 1972. The demand for cigarettes: advertising, health scare, and the cigarette advertising ban. *Review of Economics and Statistics* 54:401-411.
- Harris JE, Thun MJ, Mondul AM, Calle EE. 2004. Cigarette tar yields in relation to mortality from lung cancer in the cancer prevention study II prospective cohort, 1982-8. *BMJ* 328(7431):72.
- HEW (Department of Health, Education, and Welfare). 1964. *Smoking and Health: Report of the Advisory Committee to the Surgeon General of the Public Health Service*. Washington, DC: U.S. Department of Health, Education, and Welfare; Public Health Service.
- HEW. 1972. *The Health Consequences of Smoking: A Report of the Surgeon General 1972*. Washington, DC: Health Services and Mental Health Administration, Public Health Service, U.S. Department of Health, Education, and Welfare.
- Hilts PJ. 1995, March 9. FDA head calls smoking a pediatric disease. *The New York Times*.
- Hinds MD. 1982, January 30. Tougher cigarette warnings gain support. *The New York Times*.
- IOM (Institute of Medicine). 1994. *Growing Up Tobacco Free: Preventing Nicotine Addiction in Children and Youth*. Washington, DC: National Academy Press.
- IOM. 1996. *Pathways of Addiction: Opportunities in Drug Abuse Research*. Washington, DC: National Academy Press.
- IOM. 2001. *Clearing the Smoke: Assessing the Science Base for Tobacco Harm Reduction*. Washington, DC: National Academy Press.
- IOM/NRC (National Research Council). 2000. *State Programs Can Reduce Tobacco Use*. Washington, DC: National Academy Press.
- Janofsky M. 2005, August 14. Big Tobacco, in Court Again. But the Stock Is Still Up. *The New York Times*. P. 21.
- Kessler D. 2000. *A Question of Intent: A Great American Battle with a Deadly Industry*. New York: PublicAffairs.

- Kluger R. 1996. *Ashes to Ashes: America's Hundred-Year Cigarette War, the Public Health, and the Unabashed Triumph of Philip Morris*. New York: Alfred A. Knopf.
- Kluger R. 1997. *Ashes to Ashes, American's Hundred-Year Cigarette War, the Public Health, and the Unabashed Triumph of Philip Morris*. New York: Vintage Books.
- Legal Resource Center for Tobacco Regulation Litigation and Advocacy, University of Maryland School of Law. 2005. Congress Considers FDA Regulation of Tobacco Products. *Tobacco Regulation Review* 4(1):1,3.
- Marttila and Kiley Inc. 1993a. Even though tobacco companies say they don't want kids to smoke, they really do everything they can to get teenagers and young people to take up smoking. *Public Opinion Online (for Roper Center at University of Connecticut)*.
- Marttila and Kiley Inc. 1993b. Overall impression of the tobacco industry is very favorable, somewhat favorable, somewhat unfavorable, or very unfavorable. *Public Opinion Online (for Roper Center at University of Connecticut)*.
- Meier B. 1999, October 13. Phillip Morris admits evidence shows smoking causes cancer. *The New York Times*.
- National Association of Attorneys General. 1998. *Master Settlement Agreement*. Web Page. Available at: http://www.naag.org/upload/1109185724_1032468605_cigmsa.pdf; accessed August 2, 2005.
- NCI (National Cancer Institute). 1991. *Strategies to Control Tobacco Use in the United States: A Blueprint for Public Health Action in the 1990s (Monograph 1)*. Bethesda, MD: National Institutes of Health.
- NCI. 2001. *Risks Associated with Smoking Cigarettes with Low Machine-Measured Yields of Tar and Nicotine (Monograph 13)*. Bethesda, MD: National Institutes of Health.
- NCI. 2005. ASSIST: Shaping the Future of Tobacco Prevention and Control. *Tobacco Control Monograph Series*. Vol. 8, NIH Publication Number 05-5645. Bethesda, MD: National Institutes of Health.
- Norr R. 1952. Cancer by the Carton. *The Reader's Digest*:7-8.
- NRC (National Research Council). 1986. *Environmental Tobacco Smoke: Measuring Exposures and Assessing Health Effects*. Washington, DC: National Academy Press.
- O'Keefe M. 1971. The anti-smoking commercials: a study of television's impact on behavior. *Public Opinion Quarterly* 35:242-248.
- Outlook. 1901. The anti-cigarette crusade. *Outlook* 67(11):607-608.
- Perez-Pena R. 2005, June 11. Smoking in State and City Is at New Low, Surveys Say. *The New York Times*.
- Pertschuk M. 2001. *Smoke in Their Eyes: Lessons in Movement Leadership From the Tobacco Wars*. Nashville, TN: Vanderbilt University Press.
- Pierce JP, Fiore MC, Novotny TE, Hatziandreu EJ, Davis RM. 1989. Trends in cigarette smoking in the United States. Projections to the year 2000. *Journal of the American Medical Association* 261(1):61-65.
- Pierce JP, Lee L, Gilpin EA. 1994. Smoking initiation by adolescent girls, 1944 through 1988. An association with targeted advertising. *Journal of the American Medical Association* 271(8):608-611.
- Rabin R. 1993. Institutional and Historical Perspectives on Tobacco Tort Litigation. Rabin R, Sugarman S, Editors. *Smoking Policy: Law, Politics, and Culture*. Pp. 110-130.
- Rabin RL, Sugarman SD. 2001. *Regulating Tobacco: Premises and Policy Actions*. New York: Oxford University Press.
- Rabin R. 2001a. The Third Wave of Tobacco Tort Litigation. Rabin RL, Sugarman SD, Eds. *Regulating Tobacco: Premises and Policy Options*. New York: Oxford University Press. Pp. 176-206.
- Rabin R. 2001b. The tobacco litigation: a tentative assessment. *DePaul L. Rev.* 51:331-358.

- Schroeder SA. 2002. Conflicting dispatches from the tobacco wars. *New England Journal of Medicine* 347(14):1106-1109.
- Schudson M. 1984. *Advertising, the Uneasy Persuasion: Its Dubious Impact on American Society*. New York: Basic Books.
- Shiffman S. 1993. Smoking cessation treatment: any progress? *Journal of Consulting and Clinical Psychology* 61(5):718-722.
- Sugarman S. 2001. Rabin RL, Sugarman SD, Eds. International Aspects of Tobacco Control and the Proposed WHO Treaty. *Regulating Tobacco: Premises and Policy Options*. New York: Oxford University Press. Pp. 245-284.
- Tate C. 1999. *Cigarette Wars: The Triumph of "The Littel White Slaver."* New York: Oxford University Press.
- Tauras JA, Chaloupka FJ, Farrelly MC, Giovino GA, Wakefield M, Johnston LD, O'Malley PM, Kloska DD, Pechacek TF. 2005. State tobacco control spending and youth smoking. *American Journal of Public Health* 95(2):338-344.
- The Roper Organization Inc. 1978. *A Study of Public Attitudes Toward Cigarette Smoking and the Tobacco Industry in 1978—Volume 1*.
- Tobacco Free Kids. 2004. *A Broken Promise to Our Children: The 1998 State Tobacco Settlement Six Years Later*. Web Page. Available at: <http://www.rwjf.org/files/research/TOBACCO%20FREE%20KIDS%20-%20fullreport%2012-04.pdf>; accessed June 23, 2007.
- Tobacco Free Kids. 2005. *Tobacco Company Marketing to College Students Since the Multi-state Settlement Agreement Was Signed*. Web Page. Available at: <http://www.tobaccofreekids.org/research/factsheets/pdf/0135.pdf>; accessed April 5, 2006.
- Tobacco Free Kids. 2006. *Smoke-Free Laws: Protecting Our Rights to Breathe Clean Air*. Web Page. Available at: <http://tobaccofreekids.org/reports/shs/>; accessed April 5, 2006.
- Walsh JJ. 1937. Cigarettes and pathology. *Commonwealth* 25(24):665.
- Warner KE. 1989. Effects of the antismoking campaign: an update. *American Journal of Public Health* 79(2):144-151.
- Waxman H. 1994. *Hearing on the Regulation of Tobacco Products—House Committee on Energy and Commerce—Subcommittee on Health and the Environment*. Web Page. Available at: http://www.henrywaxman.house.gov/issues/health/tobacco_leg_highlights.htm; accessed August 7, 2006.
- WHO (World Health Organization). August 2, 2005. *Tobacco*. Web Page. Available at: http://www.who.int/substance_abuse/facts/tobacco/en/ <http://www.who.int/tobacco/en/>; accessed August 2, 2005.

PART II

A BLUEPRINT FOR REDUCING TOBACCO USE

4

Reducing Tobacco Use: A Policy Framework

The committee was charged with developing a blueprint for reducing tobacco use in the United States. As shown in Part I, a continued gradual decline in the prevalence of tobacco use can probably be expected over the next 20 years as a result of the social, economic, and demographic forces already at work. However, reductions in tobacco use substantial enough to eliminate tobacco use as a public health problem are not likely to occur if the nation simply waits for past successes to continue. Ending the tobacco problem will require the persistence and nimbleness needed to counteract industry innovations in marketing and product design, as well as the larger cultural and economic forces that tend to promote and sustain tobacco use, especially among young people. The challenge is heightened by the fact that heavy tobacco users may increasingly be harder to reach effectively with the customary tools of tobacco control. Any slackening of the public health response not only will reduce forward progress but also may lead to backsliding. Chapters 5 to 7 offer a detailed blueprint for strong remedial actions to reduce tobacco use and aiming, eventually, to erase tobacco as a significant public health problem. This chapter aims to establish the normative context for the blueprint that follows.

PRODUCT SAFETY AND CONSUMER SOVEREIGNTY

At bottom, the tobacco problem is a product safety problem. In an economic and social system that values freedom of choice, consumers are generally permitted to select products and activities as they see fit. If they want to assume risks, they are permitted to do exactly that. Government

does not guarantee absolute safety, nor should it. Of course, some dangers are too high to be acceptable. So long as consumers are properly informed, however, the presumption has traditionally been in favor of consumer sovereignty and freedom of choice. Yet, even most libertarians will admit that the tobacco market has been characterized by severe market failures, including information asymmetry between producers and users, distorted consumer choice due to information deficits, and product pricing that has not reflected the full social costs of the product's use (especially the effects on nonsmokers). They acknowledge the legitimacy of interventions aiming to prevent youth smoking, to disseminate accurate information and correct misinformation, and to assure that nonsmokers are protected from involuntary exposure to tobacco smoke if the market does not function properly. The residual issue concerns the legitimacy of interventions that burden smokers' choices for the purpose of getting them to quit. The overarching task for the nation is to consider thoughtfully how consumer freedom can be respected while also taking into account the unique properties of tobacco and tobacco products. The committee's major goal here is to set forth a framework for reducing tobacco use, and its associated morbidity and mortality, while being duly respectful of the interests of consumers and the companies that satisfy consumer needs.

THE POLICY CONTEXT

During the first six decades of the 20th century, tobacco use became deeply embedded in the economic and cultural life of the United States and in many parts of the world, sowing the seeds of a massive public health problem. The prevalence of smoking among adults in the United States was 42 percent in 1965. The tide turned in the 1960s as the adverse health effects became known, but the prevalence of smoking among adults was still 21 percent in 2005. Absent a major initiative, the prevalence of smoking among adults is likely to level off in 2025 at about 15 percent (see Chapter 3).

Aggressive policy initiatives were impeded for four decades by the tobacco industry's political and legal strategy of denying and obscuring the addictive properties of nicotine and the real health effects of tobacco use. All this also was reinforced by widespread popular acceptance of consumer freedom to smoke (characterized by its defenders, somewhat ironically, as the "right to be foolish"). In retrospect, it is surprising and puzzling that strong measures to discourage smoking were regarded as unduly paternalistic even by people who otherwise might have been expected to favor strong consumer protection measures. *Laissez-faire* more or less prevailed despite the seriousness of the problem.

Until the late 1980s, the operating assumptions of tobacco policy in the United States were rooted in the society's general preference for individual

liberty and freedom of choice, especially in matters that affect individual health. Thus, although it has been widely understood for many years that smoking poses serious health risks, the prevailing assumption was that the weighing of the benefits and the health risks of consumer products, including tobacco products, is up to the consumer and that government efforts to force people to make healthy choices would amount to an unacceptable form of paternalism. The underlying intuition is that people are and ought to be free to make their own choices and are responsible for the consequences of their choices. This perspective was also reflected in the unbroken line of jury verdicts and judicial decisions refusing to hold tobacco companies liable for smoking-induced disease and death among informed consumers.

The first major change in tobacco policy was consistent with the antipaternalism principle and with traditional economic theory. The nonsmokers' rights movement, which took root in California in the late 1970s, called attention to the fact that some of the costs of smoking are borne by third parties and urged lawmakers to adopt bans on smoking in public buildings and workplaces. The antismoking movement received a major boost when the U.S. Environmental Protection Agency classified environmental tobacco smoke as a carcinogen in 1992 (EPA 1992). Although the tobacco industry disputed the nature and the extent of the risks associated with exposure to sidestream smoke and continues to do so, the evidence documented suggesting the considerable health dangers of environmental tobacco smoke has been definitively summarized by the Surgeon General (DHHS 2006), and the moral legitimacy of smoking restrictions in enclosed public places is now taken for granted.

In the late 1990s, the weaknesses in the libertarian point of view began to seep into public understanding and to transform the policy debate about tobacco. This profound change in the political dynamic occurred as a result of three intertwined developments.

The first important development was a profound change in public understanding as the addictive nature of nicotine became scientifically established (DHHS 1989). The simultaneous proliferation of nicotine replacement treatments (NRTs) and other cessation tools, along with evidence of their effectiveness, helped to reinforce public understanding of the grip of nicotine addiction and the need for stronger measures to help people quit. This development also began to erode the anti-paternalism objection against efforts to reduce consumption directly on the grounds that many people who have become hooked would like to quit.

The second convergent development was a concerted focus on the problem of smoking initiation. It became clear that almost all adult smokers began smoking as teenagers and that prevention of the initiation of smoking needed to be a core aim of tobacco policy. (Although it is not the only

aim, prevention of smoking initiation is essential if the nation is to achieve a long-term permanent reduction in prevalence.) Understanding of nicotine addiction as a “pediatric disease” (Kessler 1995) also strengthened the ethical case for aggressive efforts to reduce smoking initiation by teenagers, even if the measures also had spillover effects on adult smokers. Reports by the Surgeon General and the Institute of Medicine in 1994 established the scientific foundation for a youth-oriented policy initiative (eventually spearheaded by Food and Drug Administration [FDA] Commissioner David Kessler in 1995) and also galvanized public opinion against the tobacco industry for targeting young people (DHHS 1994; IOM 1994).

Third, the state Medicaid lawsuits and other tobacco litigation led to revelations of industry deception and duplicity and confirmed the industry’s role in fostering and perpetuating tobacco use. These disclosures weakened the force of the antipaternalism principle as a constraint on tobacco policy and eroded the supposition that smokers have freely assumed the risks of smoking and are responsible for the often fatal consequences. Instead of being a champion of individual freedom and consumer sovereignty, the tobacco industry is now more often seen as a vector of disease and death, bringing public understanding into alignment with the premises of the public health community.

In sum, over the past 15 years, the operating assumptions of tobacco policy in the United States and elsewhere in the world have changed dramatically in part because of the fundamental realization that tobacco use is grounded in addiction to nicotine and that nicotine addiction typically begins before smokers become adults. Most smokers actually start smoking and become addicted while they are adolescents; and most addicted adult smokers want to quit, try to quit, and would rather be nonsmokers. The deeper public understanding of tobacco addiction has, over a short time, transformed the ethical and political context of tobacco policy-making. A widespread popular consensus in favor of aggressive policy initiatives is now emerging, and this shift in popular sentiment has also been accompanied by support across most of the political spectrum (see material in Chapter 5 on the proliferation of state laws and local ordinances prohibiting indoor smoking and on increases in state tobacco excise taxes).

THE ETHICAL CONTEXT

The committee believes that this shift in popular sentiment rests on a solid ethical footing, and that the blueprint is securely grounded in either of two ethical frameworks.

From a traditional public health perspective, the legitimacy and importance of reducing tobacco use is grounded in the enormous social costs attributable to tobacco-related disease: reducing tobacco use increases over-

all population health. Implementing the blueprint would reduce tobacco use and the attendant social costs to a degree that exceeds the costs of the proposed interventions. Moreover, studies of cost-effectiveness show that the tobacco control interventions are less costly per year of life saved and per quality-adjusted life year than many other standard public health interventions (see, for example, Cromwell et al. 1997; Tengs et al. 2001; Warner 1997). Admittedly, these traditional public health calculations do not include the “savings” to society in health care costs or social security payments attributable to premature death, but the committee does not regard these “savings” as a social benefit.

Once the question of “savings” due to premature mortality is set aside, the “public health” case for aggressive, cost-effective measures is generally acknowledged to be a powerful one. The main ethical objection raised to tobacco control policies has been raised by people who eschew the public health paradigm in favor of a non-consequentialist ethical paradigm grounded in an analysis of individual rights. In the context of tobacco use, the rights-based framework most often invoked is libertarian. The committee recognizes that strict adherents to this perspective may resist any regulation of consumer products, including tobacco, that is not designed to promote informed choice or to reduce external harms. However, product regulation is common in many domains, dating at least to the Pure Food and Drug Act of 1906, and certain characteristics of tobacco products might make tighter control acceptable even to those who tend to embrace a libertarian approach toward regulation of most consumer products. We outline those characteristics next.

The first point to be noted is that, even within a libertarian framework, each of the subsidiary goals of tobacco policy has some justification: reducing exposure to ETS prevents harm to people other than the smokers themselves, preventing initiation of tobacco use by youth is arguably justified by the recognized shortcomings of adolescent judgment, and promoting cessation helps to restore the liberty of smokers who do succeed in quitting (rather than contracting their liberty). In this respect, it is important to recall that 90 percent of adult smokers eventually regret having become smokers, about 70 percent have tried to quit, and—at any given moment—40 percent are either actively trying to quit or thinking about making a quit attempt within the next six months (see Chapter 2).

The most ethically controversial policies aiming to reduce tobacco use are those aimed exclusively at reducing use by the minority of adult smokers who do not want to quit. This is the nub of the so-called paternalism problem. However, since every intervention aimed at current smokers serves the interests and the express wishes of the subset of smokers who do want to quit, interventions designed to protect the health of adult smokers do not necessarily rest on a paternalistic foundation. Instead, they entail both

liberty-enhancing effects (achieved by assisting addicted smokers to quit) and liberty-restricting effects (insofar as they also “burden” the choices of smokers who do not want to quit or who object to the restrictions or costs imposed on them). Thus ethical analysis of tobacco control interventions within the libertarian paradigm requires a weighing of the liberty-reducing effects of particular intervention against the liberty-enhancing effects of these interventions for nonsmokers whose freedom to avoid ETS exposure is protected, for youths whose long-run autonomy is preserved, and for adult smokers whose ability to quit is enhanced (and who therefore regard the intervention as a benefit rather than a cost).

Even within these boundaries, however, burdens on individual smokers that are intrusive or coercive do require heightened justification. The more restrictive the intervention (and, consequently, the greater the burden on smokers’ freedom) the stronger the case must be that the intervention protects youths or nonsmokers or helps smokers quit. That important principle is embraced by the committee in its evaluation of each of the tobacco control interventions considered in the following chapters.

AN ASIDE ON THE PATERNALISM PROBLEM

It can also be argued that paternalism in this context is a justified response to irremediable deficiencies in smokers’ capacity to successfully exercise self-interested decision-making about whether they should continue to smoke. Although the committee’s blueprint need not rest on this argument, many committee members do find elements of it convincing, and that is why we summarize it here.

The argument runs as follows: (1) virtually all addicted adults begin smoking (and probably become addicted) while they are adolescents before they have developed the capacity to exercise mature judgment about whether or not to become a smoker; (2) the preferences expressed when people begin to smoke, which tend to ignore long-term health risks, are inconsistent with the health-oriented preferences they later come to have, and they soon regret the decision to have become a smoker; and (3) once smokers begin to be concerned about the health dangers of smoking, their judgment is often distorted by optimism bias (“the harms will happen to other people, not to me”), thereby weakening their motivation to quit.

Adolescent Initiation

As shown in Chapter 2, between 80–90 percent of smokers start smoking before they turn 18 years of age. When they begin to smoke, they typically lack a full and vivid appreciation of the consequences of smoking and the grip of addiction, even if they have a roughly accurate understanding of

the statistical evidence. When young people begin to smoke, they typically fail to appreciate the serious possibility that they will continue smoking for many years (see Chapter 2).

Inconsistent Preferences and Regret

Many people neglect long-term risks to their health, simply because they tend to have a short-term perspective when they consider the risks and the benefits of a particular behavior. In the language of economists, they apply a high “discount rate” to future harms. This neglect of the long-term danger is especially serious for young people. Because the most serious health risks of smoking do not come to fruition for many years, young smokers often treat those risks as if they were trivial. Even adult smokers often fail to take adequate account of the associated risks, simply because those risks are not likely to materialize for decades. Smokers themselves will typically change their minds later on, reflecting a difference between their preferences when they start smoking and the preferences that they have later in life, when they want to quit. (Economists call this problem “inter-temporal inconsistency.”) In short, when people begin to smoke, at whatever age, they tend to give more weight to the pleasures of smoking and too little weight to the possible impact of smoking on their long-term well-being. Once people have become addicted, they give more weight to the health concerns and regret having become smokers. Most of them want to stop.

Optimism Bias

In some domains, people are unrealistically optimistic about risks, believing that they are immune from the dangers that others who are similarly situated face. For smokers, the problem of unrealistic optimism takes three distinct forms. First, many smokers, even those who have an adequate sense of the statistical realities, falsely believe that they are unlikely to face the risks that most smokers face. Second, many smokers, both young and old, are unrealistically optimistic about their future health and their longevity if they quit at some later point. Third, many smokers believe, falsely, that they will quit in the near future. Taken together, these forms of unrealistic optimism can be deadly.

More than four decades after the Surgeon General’s initial report (HEW 1964) on the health risks of smoking, policymakers have not addressed these three problems with anything like the seriousness that they deserve. To be sure, the problem of addiction plays a large role in current thinking; and both states and localities, along with the private sector, have adopted commendable steps to protect and to inform young people. However, the whole notion of consumer sovereignty—of unambivalent respect for private

choices—runs into serious difficulty when the underlying product creates serious long-term individual and societal harms, has addictive properties, and is usually chosen by young people who fail to appreciate the associated risks.

TOBACCO PRODUCTS ARE INHERENTLY DANGEROUS

As they are now designed, tobacco cigarettes are inherently dangerous products that would not be allowed to enter the marketplace if their effects were known and if they were being introduced for the first time. For example, the nicotine in tobacco products would meet the criteria for classification of a Schedule 1 drug under the Controlled Substances Act, tobacco smoke could be classified as a “toxic substance” posing an “unreasonable risk” under the Toxic Substances Control Act, and tobacco cigarettes (and perhaps other tobacco products) could be characterized as “unreasonably dangerous product[s]” under the Consumer Product Safety Act, if tobacco products were not exempted from regulation by the specific exclusionary language in each of these statutes. If tobacco products were within FDA jurisdiction under the Federal Food, Drug, and Cosmetics Act, pre-market approval from the FDA would be required, and it could safely be predicted that such approval would not be forthcoming in light of the addictive properties of nicotine and the multitude of dangerous constituents in tobacco smoke.

However, tobacco products were introduced into the marketplace not only before their adverse effects were understood but also before any modern consumer protection or environmental health legislation had been enacted. The early efforts to suppress the sale of cigarettes, largely on moral and hygienic grounds, occurred at the state level, but most of the early bans had been repealed by 1925. The advent of mass production capabilities in the late 19th century, waning opposition from temperance groups during the first third of the 20th century, and the explosion of smoking during and after World War II catapulted the cigarette to the status of one of the most successfully marketed consumer products in the nation’s history. Given such a deep entrenchment in the cultural, social, and commercial life of the country, it is hardly surprising that the burden of demonstrating the need for any substantial regulatory restriction has rested on the proponents of regulation. As indicated in Chapter 3, however, this burden has now been convincingly met. The harmfulness of cigarettes is no longer disputed, even by the manufacturers; and the rhetoric of personal freedom has been softened by a general recognition of the powerful grip of nicotine addiction, the purposeful manipulation of that addictive potential by the manufacturers, and the hazardous effects of secondhand smoke on nonsmokers. Hence the burden has been shifting to the tobacco companies to explain why they

should be permitted to continue to promote and market this admittedly dangerous product.

The central point is that cigarettes and other tobacco products are not ordinary consumer products. For no other lawful consumer product can it be said that the acknowledged aim of national policy is to suppress consumption. For alcohol, the generally accepted aim of national policy is to suppress underage drinking and excessive or otherwise irresponsible use by adults; reducing adult consumption per se is not the nation's goal. Indeed, in many respects, state and federal governments aim to facilitate alcohol consumption, such as by liberalizing access (IOM/NRC 2004). Similarly, although firearms are indisputably dangerous products, and their unlawful sale, possession, and use is suppressed, their lawful use is widely regarded as a valued constitutional right, and many aspects of recent changes in state law have been designed to facilitate access to weapons by lawful purchasers and owners. In terms of its goal, tobacco policy has more in common with the nation's policy toward marijuana and other illegal drugs than it does with policies pertaining to alcohol or firearms.

It has become commonplace for critics of aggressive tobacco control measures to invoke the classic slippery slope argument, claiming that restrictions on tobacco will lead down the slope to measures taking away food and drinks that people like on the ground that they are not healthy enough. After all, it is said, if the "nanny state" is empowered to suppress tobacco use, it will go after the Big Mac[®] next. This argument underappreciates the extent to which tobacco products are unlike ordinary consumer products. Tobacco is a highly addictive, carcinogenic, and deadly product. Foods rich in fats or carbohydrates may lead to overweight and increase disease risks if consumed in excess, but they are not addictive or inherently dangerous. It therefore bears repeating that tobacco is the only lawful consumer product for which the nation's unequivocal aim is to suppress consumption altogether—rather than promoting informed, healthy choices and moderation.

That being the case, governments at all levels must play a central role in the effort to overcome and reverse the forces that create and sustain tobacco use. Governments have both the authority and the obligation to establish and sustain conditions under which people can be healthy while respecting the constitutional liberties and other important values (IOM 1988, 2003). People trust and expect the government to protect children from hazards such as poisons, lead, and tobacco; to prevent the tobacco industry from misleading people and drawing them into or sustaining an addictive behavior that they will regret; to counteract industry efforts to stimulate and sustain demand for its dangerous products; and to help people quit if they want to do so.

BLUEPRINT OUTLINE

The committee's blueprint for reducing tobacco use in the United States reflects a two-pronged strategy. The first prong envisions strengthening traditional tobacco control measures; the second envisions changing the regulatory landscape to permit new policy innovations. Chapter 5 reviews the current legal structure and framework of tobacco policy and focuses on intensifying and strengthening the tools of tobacco control known to be effective. The emphasis in that chapter is largely, although not exclusively, on state and local initiatives. This is because almost all of the energy and innovation in tobacco control are currently generated at the state and local levels and are undergirded by public health partnerships and supported by community-based advocacy efforts. Policy changes are typically enacted and implemented through state laws and local ordinances, although the federal government plays a secondary role—often supporting state and local efforts, but sometimes impeding them.

Chapter 6 envisions a much more substantial federal presence characterized by a fundamentally transformed legal structure under which a federal regulatory agency, most likely the FDA, is given plenary regulatory authority while the states are liberated to take aggressive actions now forbidden by federal law. Federal power would be exercised to bolster and support state efforts in the traditional domains of tobacco control while the agency takes bold steps in under-regulated areas, including the use of more effective health warnings and constraints on industry advertising and promotional activity, with particular attention given to claims regarding so-called reduced-risk products. The federal government would also play a more substantial role in funding and coordinating state tobacco control activities.

Chapter 7 presents opportunities for policy innovations that can open new frontiers of tobacco control. One such possibility is gradually reducing the nicotine content of cigarettes. Implementation of a nicotine-reduction strategy or any other bold initiative aiming to end the tobacco problem will require sophisticated policy research, and the committee urges the federal government to create a robust capacity for tobacco policy research and development.

REFERENCES

- Cromwell J, Bartosch WJ, Fiore MC, Hasselblad V, Baker T. 1997. Cost-effectiveness of the clinical practice recommendations in the AHCPR guideline for smoking cessation. *Journal of the American Medical Association* 278(21).
- DHHS (U.S. Department of Health and Human Services). 1989. *Reducing the Health Consequences of Smoking: 25 Years of Progress (A Report of the Surgeon General)*. Rockville, MD: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health.

- DHHS. 1994. *Preventing Tobacco Use Among Young People (A Report of the Surgeon General)*. Rockville, MD: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, Center for Health Promotion and Education, Office on Smoking and Health.
- DHHS. 2006. *The Health Consequences of Involuntary Exposure to Tobacco Smoke: A Report of the Surgeon General*. Atlanta, GA: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, Coordinating Center for Health Promotion, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health.
- EPA (Environmental Protection Agency). 1992. *Respiratory Health Effects of Passive Smoking: Lung Cancer and Other Disorders*. Washington, DC: Office of Health and Environmental Assessment, Office of Research and Development, U.S. Environmental Protection Agency.
- HEW (Department of Health, Education, and Welfare). 1964. *Smoking and Health: Report of the Advisory Committee to the Surgeon General of the Public Health Service*. Washington, DC: U.S. Department of Health, Education, and Welfare; Public Health Service.
- IOM (Institute of Medicine). 1988. *The Future of Public Health*. Washington, DC: National Academy Press.
- IOM. 1994. *Growing Up Tobacco Free: Preventing Nicotine Addiction in Children and Youth*. Washington, DC: National Academy Press.
- IOM. 2003. *The Future of the Public's Health in the 21st Century*. Washington, DC: The National Academies Press.
- IOM/NRC (National Research Council). 2004. *Reducing Underage Drinking: A Collective Responsibility*. Washington, DC: The National Academies Press.
- Kessler D. 1995. Nicotine addiction in young people. *New England Journal of Medicine* 333:186-189.
- Tengs TO, Osgood ND, Chen LL. 2001. The cost-effectiveness of intensive national school-based anti-tobacco education: Results from the Tobacco Policy Model. *Preventive Medicine* 33(6):558-570.
- Warner KE. 1997. Cost effectiveness of smoking-cessation therapies. *Pharmacoeconomics* 11:538-549.

5

Strengthening Traditional Tobacco Control Measures

During the 1990s, substantial progress was made in laying the foundation for an effective tobacco control policy, but that progress has stalled for at least three reasons. First, it is difficult to sustain public attention on endemic problems; in particular, on the challenges of prevention and cessation. Public attention (including the priority-setting driven by public opinion) is easily diverted to the crisis of the moment, and in times of austerity, expenditures on prevention and cessation efforts always seem to be the most dispensable. These tendencies explain in part why the political commitment needed for a sustained effort is lacking. Second, the political and commercial power of the tobacco industry remains substantial, even following the disclosures of past misconduct arising out of recent state reimbursement litigation, the Master Settlement Agreement (MSA), and the U.S. Justice Department's suit under the Racketeering Influenced and Corrupt Organization Act. Third, all the tobacco control measures described in Chapter 3 have had to be implemented in the context of a largely unregulated market in which tobacco products continue to be aggressively promoted. These promotion efforts are still at work, and it is difficult for public health programs to keep up, especially when the economy falters and public revenues fall short. The behavioral potential of aggressive prevention and cessation efforts is amply illustrated by the successes achieved in California, Massachusetts, and other states. So, too, however, is the fragility of these efforts—when the money disappeared, so did the programs.

The nation needs to muster the political will to intensify the efforts implemented so successfully during the 1990s and to build on them. These

comprehensive state programs, as well as their individual components, have been shown to be effective. Failure to sustain these efforts will cost lives. This chapter of the committee's report outlines the core components of tobacco control as they have been implemented within the existing legal structure. It should be emphasized, however, that one of the constraints on the current legal structure is that no federal agency has regulatory jurisdiction over tobacco products. Another constraint is that the federal statute regulating the labeling and advertising of cigarettes forecloses state regulation of advertising and marketing of cigarettes "based on smoking and health." This unfortunate circumstance, addressed in Chapter 6, preempts most state efforts to regulate the appearance, display, promotion, and placement of cigarettes in retail outlets.

Chapter 5 begins with a discussion of the effectiveness of comprehensive state programs, as well as the states' current approaches toward funding these programs. The states' expenditures for tobacco control are placed in the context of the revenue streams generated by tobacco excise taxes and payments received under the MSA.

The remainder of the chapter focuses on seven key substantive elements of comprehensive state programs:

- Tobacco excise taxes
- Smoking restrictions with broad coverage
- Youth-access restrictions with adequate enforcement
- Prevention programs based in schools, families, and health care systems
- Media campaigns
- Cessation programs
- Grassroots community advocacy

The recommendations made throughout the chapter are meant to set forth a blueprint for strengthening and intensifying current tobacco control policies and programs, assuming that the current legal structure of tobacco control remains unchanged. The chapter closes with a projection of the likely impact of following (or not following) this blueprint on the national prevalence of tobacco use over the next 20 years.

COMPREHENSIVE STATE PROGRAMS

During the early days of tobacco use prevention, after the publication of the 1964 Surgeon General's report (HEW 1964), many state health departments relied on the funds in their state budgets for tobacco control and treatment. Interventions tended to be targeted toward smoking cessation for individuals. By the late 1980s, however, funding for comprehensive state

tobacco control programs increased, beginning with California and then expanding to all states.

California launched the first statewide comprehensive tobacco control program in 1990, one and a half years after the passage of Proposition 99. This landmark referendum mandated an increase in state tobacco taxes and directed 20 percent of the revenues to tobacco control programs (Bal 1998; Glantz and Balbach 2000; Najera 1998). At that time, the National Cancer Institute (NCI) was already preparing to launch the seven-year national American Stop Smoking Intervention Study (ASSIST) program. In 1991, the ASSIST program funded community-level interventions to prevent tobacco use in 17 states (NCI 2005; Stillman et al. 2003).

By the mid-1990s, every state in the United States had some funding for comprehensive tobacco control, either from the ASSIST program or from the Initiatives to Mobilize for the Prevention and Control of Tobacco Use (IMPACT) program, funded by the Centers for Disease Control and Prevention (CDC). In addition, from 1994 through 2000, some states¹ also received funding for tobacco control efforts from the Robert Wood Johnson Foundation's (RWJF) SmokeLess States program (Gerlach and Larkin 2005; Tauras et al. 2005). In addition to educational and cessation programs, the funding supported statewide coalitions of individuals and organizations that pursued action strategies to strengthen tobacco control policies.

The ASSIST program promoted three types of interventions: program services, policy changes, and mass media. However, the ASSIST program guidelines stated that “efforts to achieve priority public policy objectives should take precedence over efforts to support service delivery” (NCI 2005, p.23). Mass media initiatives were intended to support those policy changes. The four ASSIST program priority policy areas were eliminating environmental tobacco smoke (ETS), increasing tobacco excise taxes, limiting tobacco advertising and promotion, and reducing youth access (NCI 2005).

Evaluation of Comprehensive State Programs

In 2005, the CDC's Office on Smoking and Health (OSH) released a summary of the literature on evidence of the effectiveness of state tobacco control programs (Kuiper et al. 2005). Organized by major reviews and five outcome indicators (tobacco-related mortality, prevalence, consumption, cessation, and smoke-free legislation and policy), the results are generally organized by state. The evidence provided can be considered a guide to state health departments for measuring the success of their comprehensive

¹Smokeless States funded all states and the District of Columbia in its final round of grants in 2000.

tobacco control programs. Of the five indicators of success, one is a health outcome—tobacco-related mortality—and three are markers that lead to improved health outcomes: decreases in smoking prevalence, decreases in consumption of tobacco products, and smoking cessation. The fifth indicator, smoke-free legislation and policy, is an intermediate outcome that alters the environment that supports tobacco use.

This review appeared six years after the publication of the CDC's Best Practices for Comprehensive Tobacco Control Programs. Published in 1999, Best Practices had concluded that the evidence was sufficiently compelling to encourage all states to pursue comprehensive programs. This conclusion was drawn on the basis of analyses of the excise tax-funded state programs in California, Massachusetts, Oregon, and Maine, as well as the agency's experience in providing assistance to four other states: Florida, Minnesota, Mississippi, and Texas. The 2005 review reiterates the effectiveness of these programs, while also documenting the successes of other state programs that have appeared since 1999.

Over the past decade and a half, a number of investigators have tried to assess the contribution of comprehensive state programs to policy changes and reductions in smoking (DHHS 2000; Elder et al. 1996; Siegel 2002; Stillman et al. 2003; Tauras et al. 2005; Wakefield and Chaloupka 2000; Warner 2000). By design, a comprehensive tobacco control program consists of several elements (e.g., antismoking media campaigns, counseling services, and school-based prevention initiatives), and some authors have focused on evaluating the effectiveness of individual program components. Later in this chapter, the committee refers, for instance, to several studies that have assessed the impacts of state-sponsored antismoking media campaigns on smoking prevalence and changes in smoking-related beliefs. This section reviews studies that have looked at the effects of comprehensive programs as a whole.

One study that evaluated state programs throughout the country found that a program's intensity had a very large negative correlation with the prevalence of current smoking ($r = -0.81$, $p < .0001$) and a large positive correlation with the quit rate ($r = 0.82$, $p < .0001$) among adults 30 to 39 years of age (Jemal et al. 2003). Another study determined that states with better-funded programs have lower prevalence and consumption rates (Tauras et al. 2005). However, many states have substantially cut their tobacco control programs' budgets in recent years.

Description of Programs

Over the course of the 1990s, several other states—including Arizona, Florida, Massachusetts, and Oregon—followed California's lead and developed their own comprehensive tobacco control programs (Wakefield

and Chaloupka 2000). Studies reviewing the effects of each of these states' efforts have been published, and many of these are listed in CDC's 2005 literature summary (Kuiper et al. 2005). As the first two states in the country to implement comprehensive programs, California and Massachusetts have received a particularly large amount of attention. A specific examination of these two states' pioneering efforts reveals that comprehensive state programs can be effective in reducing tobacco use and tobacco-related disease, especially when they are fully-funded and operational.

California

In November 1988, California voters passed Proposition 99, which increased the state tobacco tax by 25 cents per pack of cigarettes. One year later, the California Assembly passed legislation that distributed the revenue earned from the tobacco tax increase as follows: 35 percent for hospital services, 20 percent for a health education account, 10 percent for physician services, 5 percent for research, and 5 percent for environmental conservation concerns (25 percent of the funds remained unallocated). Funds from the health education and research accounts were used for the creation of a statewide tobacco control program. The California Tobacco Control Program (CTCP), the first of its kind in the country, debuted in the spring of 1990 (Bal 1998; Najera 1998; TERO 2000).

Together, the California Department of Health Services (CDHS) and the California Department of Education (CDE), along with the University of California, support a decentralized network of local health departments (LHDs), schools, researchers, and competitive grantees that forms the core of the CTCP. The CDE's Healthy Kids Program Office oversees the program's school-based components, whereas the University of California administers various research activities through its Tobacco Related Disease Research Program. The Tobacco Control Section of CDHS, which receives approximately two-thirds of the available funds from the Health Education Account, coordinates the public health elements of the program. These elements include programs conducted at the local level by LHDs and community organizations; a statewide media campaign; cessation counseling services (such as the California Smokers' Helpline); a materials clearinghouse; and four networks that seek to better integrate California's African American, American Indian, Asian and Pacific Islander, and Hispanic populations into the state's tobacco control efforts. California has also coordinated its efforts with other tobacco control initiatives, including the RWJF's SmokeLess States program (CDHS 1998; State of California 2004; TERO 2000, 2003).

Throughout the 1990s, the CTCP's funding fluctuated dramatically. Between 1989–1990 and 1995–1996, for instance, the program experienced

a 60 percent reduction in funding (from \$131.3 million to \$53.4 million). In addition, although the CTCP's budget more than doubled between 1995–1996 and 1997–1998 (from \$53.4 million to \$140.7 million), funding declined yet again in 1998–1999 as well as in 1999–2000 (Independent Evaluation Consortium 2002).

In its first few years, before these major budget fluctuations, the CTCP embraced a mix of policy, media, and program interventions to address a range of factors contributing to tobacco use (CDHS 1998). By 1993, however, looming budget cuts necessitated a more focused approach. Anticipating funding reductions, program administrators revised the CTCP's structure and priorities to streamline the state's tobacco control efforts. Administrators refocused the program's activities into four clearly defined areas: (1) reducing exposure to secondhand smoke, (2) countering the influence of the tobacco industry, (3) reducing youth access to tobacco products, and (4) providing cessation services (CDHS 1998). Since then, however, the CTCP has suffered additional reductions in funding, including a budget cut of 30 percent (\$46 million) in FY 2002. Consequently, the gap between tobacco control funding and tobacco industry spending has widened considerably, especially in comparison to the more intensive and better-funded early years of the program. By 2002, California—once the trailblazer in comprehensive tobacco control programming—had fallen to 20th in state rankings for per-capita funding for tobacco control (TEROC 2003).

Massachusetts

Massachusetts modeled much of its tobacco control program after that of the CTCP. In November 1992, Massachusetts voters passed a ballot initiative (commonly known as Question 1) that—like Proposition 99 in California four years earlier—increased the state tobacco tax by 25 cents per pack of cigarettes. Although the Massachusetts Constitution prohibits the earmarking of tax revenue (as the California legislature had done with money earned from its tobacco tax increase), the drafters of Question 1 composed language that urged—but did not mandate—the state to allocate revenue collected from the tobacco tax to a statewide tobacco control program. Following passage of the initiative, Massachusetts legislators soon allocated revenue from the tobacco tax to a newly created Health Protection Fund for the financing of a tobacco-control program (Cady 1998; Connolly and Robbins 1998; Nicholl 1998).

Administered by the Massachusetts Department of Public Health, the Massachusetts Tobacco Control Program (MTCP) began operating in October 1993 with the launch of a mass media campaign, which used a wide spectrum of media, including television, radio, newspapers, and billboards, to disseminate its antismoking message throughout the state. In the follow-

ing months, the MTCP started implementing additional tobacco control initiatives with an emphasis on three priority areas: (1) preventing youth from starting to smoke, (2) reducing smoking prevalence among adults, and (3) reducing nonsmokers' exposure to ETS. Massachusetts, like California, embraced a localized approach to achieve these goals. Although the MTCP first managed local programs by program type, it soon restructured its operations by organizing localities into six regional networks. Representatives from local tobacco control programs, along with MTCP representatives, began meeting monthly within their respective regional networks to ensure statewide cohesion and better facilitate exchanges of information. In addition, the MTCP has funded community coalitions to organize mobilization efforts, as well as boards of health and LHDs, to enact and enforce tobacco control regulations. Statewide programming, meanwhile, has included the media campaign and the Try to Stop Resource Center, which offers the Smoker's Quitline, a website (www.trytostop.org) for smokers seeking cessation support, and educational materials. The Center for Tobacco Prevention and Control at the University of Massachusetts Medical School performs research on tobacco use and nicotine dependence (Connolly and Robbins 1998; Hamilton et al. 2002; MDPH 2002a, 2002b).

Massachusetts has also mirrored California in coordinating its activities with other tobacco control initiatives. From 1991 through 1999, for instance, Massachusetts was 1 of 17 states in the country to participate in the NCI's ASSIST program. Massachusetts participated in various training programs and information exchanges with its fellow ASSIST states, as well as with California and other states with tobacco control programs (Celebucki et al. 1998).

As with the CTCP, the MTCP's early years represented its most intensive period of funding and activity. From 1994 to 1997, for example, the \$7.09 per-capita spent on tobacco control in Massachusetts represented the highest investment of its kind in the country. Budgetary cuts have threatened the effectiveness of the MTCP throughout its history, however, and even in the first 3 years of its existence, the MTCP experienced a pattern of decreasing expenditures (Wakefield and Chaloupka 2000). These early reductions, however, pale in comparison with the cuts that occurred at the beginning of the 2000s. Although funds from the MSA helped increase the MTCP's budget in FY 2000, funding levels dropped again in FY 2001. In addition, between FY 2002 and FY 2003, as the state faced acute budget shortfalls, it decreased the MTCP's budget from \$34 million to \$5.5 million. These cuts resulted in a serious reduction of the MTCP's activities, including the elimination of almost all local programming and the discontinuation of the media campaign. Since these cuts occurred, surviving elements of the program have operated at a level far below that of the previous decade (Hamilton et al. 2003; MDPH 2002a, 2006).

Description of Evaluations

From the start, both California and Massachusetts incorporated evaluation mechanisms into their tobacco control programs. California developed a multidimensional evaluation structure that comprised local program assessments, in-house surveys, and an independent review. Through the “10 percent” clause, which requires local grantees to devote 10 percent of their program budgets to evaluation, the state can review the effects of programs carried out at the local level, where most CTCP activities take place. The CDHS’s in-house data-gathering efforts, meanwhile, have included the Behavior Risk Factor Survey, the California Adult Tobacco Survey, and the California Youth Tobacco Survey. CDHS contracts with the University of California San Diego (UCSD) to operate the much larger California Tobacco Survey (CTS). UCSD conducts this survey every 3 years through interviews of individuals from randomly selected households, and reaches approximately 78,000 adults and 6,000 youth. The CTS provides CDHS with statewide smoking prevalence rate estimates (broken down into county and regional estimates) as well as data on attitudinal changes (Russell 1998).

The CTCP’s enabling legislation mandated an independent evaluation of the program. The Gallup Organization has conducted this independent review, subcontracting various elements of its evaluation to Stanford University and the University of Southern California (USC). In their reviews, Gallup and its subcontractors have examined the overall impact of the program as well as the relative effectiveness of its various components (media campaigns, local initiatives, school-based programs, etc.). Other surveys used in the evaluation of the CTCP include the CDHS’s annual survey of the rate of illegal sales of tobacco products to minors and occasional surveys targeting specific issues, such as the Field Institute poll on the number of smoke-free bars in the state. The Evaluation Task Force, with members from across the United States and Canada, advises the state on evaluation efforts (Independent Evaluation Consortium 2002; Russell 1998).

Massachusetts has used a similar multidimensional approach to evaluating the MTCP’s success in reducing tobacco use. From October 1993 through March 1994, MTCP conducted the Massachusetts Tobacco Survey, a baseline survey that collected data on tobacco use among adults and youth through randomized telephone interviews. Beginning in March 1995, MTCP began conducting the Massachusetts Adult Tobacco Survey, a monthly follow-up cross-sectional survey, to monitor changes in tobacco use and related attitudes. In addition, along with the RWJF, the MTCP funded longitudinal surveys to evaluate the program’s impact on adults and youth. Finally, like California, Massachusetts commissioned an independent assessment of its tobacco control program. In evaluating the success of the

MTCP, Abt Associates Inc. has reviewed data on smoking prevalence, quit attempts, smoking cessation, exposure to ETS, incidents of tobacco sales to minors, and changes in attitudes regarding tobacco use and tobacco-control policy (Hamilton et al. 2002). Frequent budget cuts, however, have impacted the regularity of the MTCP's surveillance efforts, restricting the extent and consistency of program evaluation (Hamilton et al. 2002).

Findings Regarding Effects

The results of the evaluations and surveys mentioned above, along with the findings from a number of peer-reviewed studies, indicate that California and Massachusetts have made progress in their tobacco control efforts; this progress is most notable when the respective programs have been well-funded and fully-implemented. On the basis of data from the CDC's Behavior Risk Factor Surveillance System, Figure 5-1 illustrates the successes that both states have had in reducing tobacco use in comparison with the rest of the country. Figure 5-1 shows that a 23.2 percent reduction in the prevalence of current smoking in California took place between 1990 (the first full year of the state's tobacco control program) and 2005, whereas the reduction in the U.S. median during the same period was

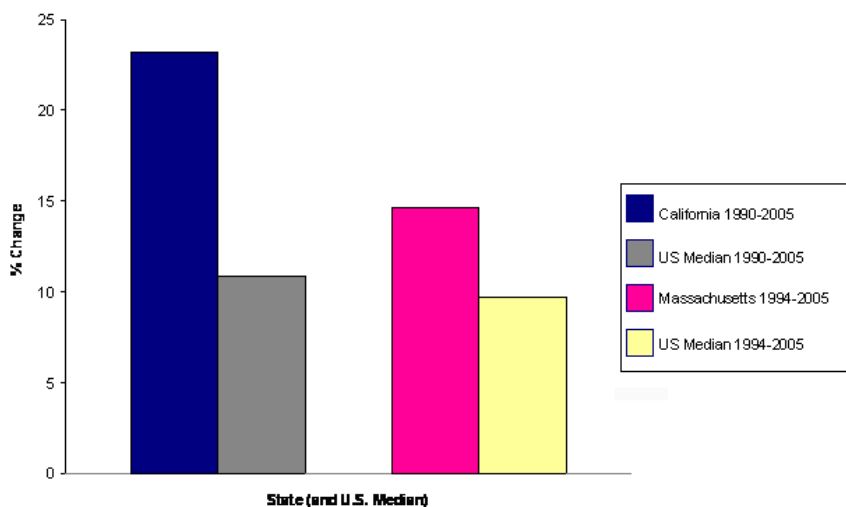


FIGURE 5-1 Percent reduction in current adult smokers in California and Massachusetts from the first year of their tobacco control programs (1990 and 1994, respectively) to 2005 (the year for which the most current data are available) compared with the percent reduction in the U.S. median for the same two time periods, based on data from the Behavior Risk Factor Surveillance System.

SOURCE: (CDC 2006a).

10.9 percent. In Massachusetts, meanwhile, a 14.6 percent reduction took place between 1994 (the first full year of the implementation of its tobacco control program) and 2005. During those same years, the U.S. median experienced a smaller reduction of 9.7 percent.

California

During the CTCP's early years, California experienced significant declines in the prevalence rate of smoking among adults. To determine whether the declines could be attributed to the program or to alternative factors (e.g., national trends or demographic changes) Siegel and colleagues (2000) compared data for California with data for the rest of the country. They found that California's rate of decline in adult smoking prevalence between 1990 and 1994 was 0.39 percent per year, whereas the rate of decline in the rest of the United States was only 0.05 percent per year. Restriction of the analysis to various demographic groups did not significantly affect the results. Consequently, Siegel and colleagues suggested that the greater reduction in adult smoking prevalence in California in comparison to that of the rest of the country in the early 1990s could be due to the implementation of the CTCP (Siegel et al. 2000).

It is important to note, however, that California's adult smoking prevalence rate has remained relatively level since the mid-1990s (CDHS 2002).² In an evaluation of the CTCP's activities from 1989 to 1996, Pierce and colleagues (1998) divided the program's first 7 years into two distinct periods. They found that during Period 1 (January 1989 to June 1993), adult smoking prevalence and per-capita cigarette consumption declined more than 50 percent faster than in previous years and more than 40 percent faster than in the rest of the United States. During Period 2 (July 1993 to December 1996), however, the rate of decline for both adult smoking prevalence and per-capita cigarette consumption slowed, with the prevalence declining at only 15 percent and consumption declining at only 34 percent of the Period 1 rate of decline. Furthermore, although the rate of decline in cigarette consumption remained substantially higher than the rate recorded in the rest of the United States during Period 2, California's rate of decline in adult smoking prevalence no longer exceeded that of the rest of the United States. This slowdown coincided with decreased financing of tobacco control programs by the state (Pierce et al. 1998).

Fichtenberg and Glantz (2000), meanwhile, analyzed the CTCP's effectiveness in relation to the rate of decline of deaths attributable to heart

²The increase in smoking prevalence in 1996 is generally considered to be a result of the fact that the CDC revised its definition of the term "current smoker," which resulted in the inclusion of more "occasional smokers."

disease in California. They found that between 1989 and 1992, both per-capita cigarette consumption rates and the annual rate of mortality from heart disease declined significantly more in California than in the rest of the country. Reflecting the trends noted above, however, the rates of decline slowed noticeably after 1992. Consequently, Fichtenberg and Glantz concluded that the CTCP was initially effective in reducing deaths from heart disease but that cutbacks in the scale and funding of the program weakened further progress (Fichtenberg and Glantz 2000).

The last independent evaluation of the CTCP to be released by the Gallup Organization and its partners (Stanford and USC) assessed the program's overall impact in relation to Californians' exposure to its various elements and messages, as reported in surveys conducted in 1996–1997, 1998, and 2000. The evaluation concluded that the CTCP has had an impact on behavior, as counties with greater exposure to the program showed better outcomes than counties with less exposure, including a greater decline in adult smoking prevalence between 1996 and 2000, lower perceived access to cigarettes among 10th graders, and an increase from 1996 to 2000 in the proportion of adults with complete smoking bans in their homes (Independent Evaluation Consortium 2002).

The CTCP has also had success in reducing tobacco use among youth. A study released in 2005 associated the CTCP with reduced uptake and smoking rates among adolescents and young adults. The authors found that the rate of “ever puffing” declined by 70 percent among 12- to 13-year-olds from 1990 to 2002, by 53 percent among 14- to 15-year-olds from 1992 to 2002, and by 34 percent among 16- to 17-year-olds from 1996 to 2002. The study identified similar patterns for smoking experimentation (smoking one or more cigarettes ever) and established smoking (smoking more than 100 cigarettes in a lifetime). Although the smoking prevalence among young adults (ages 18 to 24 years) remained constant in the rest of the country from 1992 to 2002, the prevalence among young adults in California decreased significantly (by 18 percent) from 1998–1999 to 2001–2002 (Pierce et al. 2005). Gilpin and colleagues found a similar behavioral trend when they compared the results of two 3-year longitudinal studies (1993–1996 and 1996–1999) that measured smoking initiation rates at the baseline among California adolescents who had never smoked. The authors identified a lower rate of initiation at follow-up in the cohort of the second study than in that of the first study (Gilpin et al. 2005).

Data published by CDHS indicate that California has continued to make progress in reducing tobacco use among youth. According to CDHS, from 2000 to 2004, the 30-day smoking prevalence rate among high school students in California decreased from 21.6 percent to 13.2 percent (CDHS 2005). Figure 5-2 shows that although the rate of decline in smoking prevalence among youth in California mirrored the rate of decline in the rest of

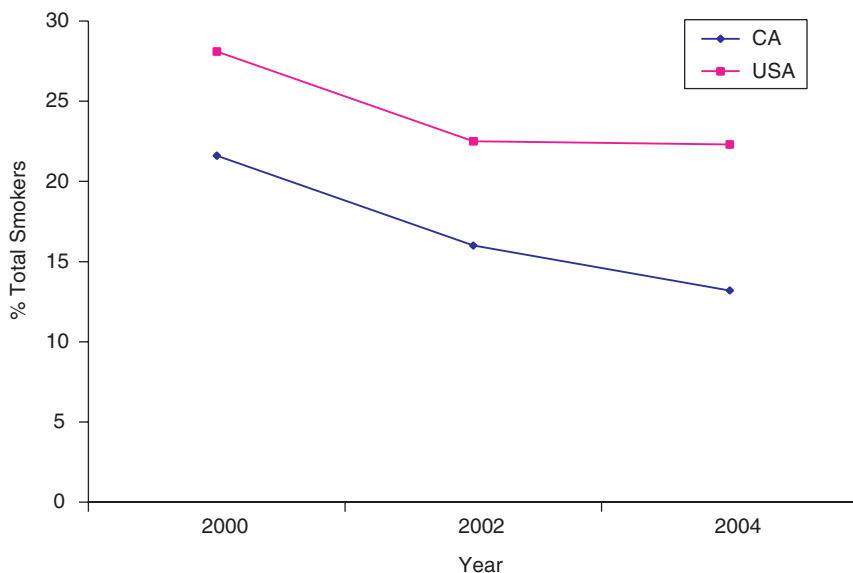


FIGURE 5-2 Thirty-day smoking prevalence among high school students (9th to 12th grades) in California and the United States between 2000 and 2004. Data for 2000 are from the National Youth Tobacco Survey, and data for 2002 and 2004 are from the California Student Tobacco Survey.

SOURCE: (CDHS 2005).

the country from 2000 to 2002, the smoking prevalence rate among youth declined at a greater rate in California than in the United States as a whole from 2002 to 2004. Figure 5-3 depicts the smoking rates among youth over the course of the 1990s in both California and the United States (excluding California). Although the rates rose in California as well as in the rest of the country in the early part of the decade, by the mid-1990s the smoking prevalence rate among youth in California began to decline, whereas the prevalence nationwide continued to increase for several more years.

Massachusetts

Like California, Massachusetts has made progress in reducing tobacco use, with both adult smoking prevalence and per-capita cigarette consumption trending downward since the implementation of the MTCP. Figure 5-1 illustrates Massachusetts's success in reducing the prevalence of smoking among adults, showing that from 1994 to 2005 Massachusetts experienced

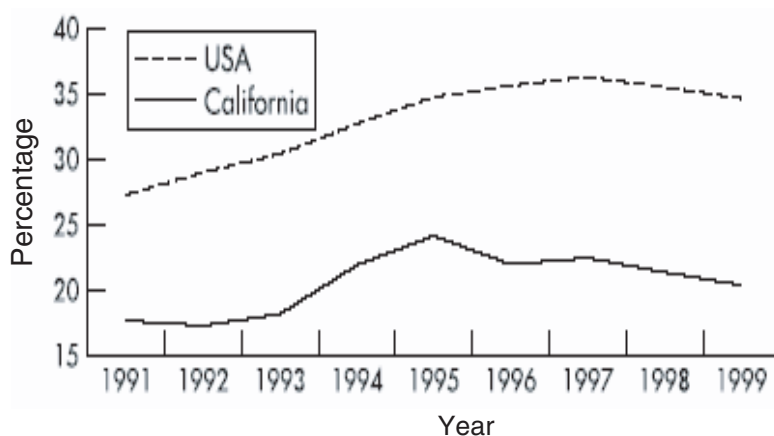


FIGURE 5-3 Smoking rates for high school seniors in California and the United States excluding California, 1991 to 1999 Monitoring the Future.

SOURCE: (Farrelly et al. 2003).

a greater percent change in the prevalence of current adult smokers than did the U.S. median.

In its last independent evaluation of the MTCP, Abt Associates Inc. similarly assessed the program by comparing state and national data. Controlling for demographic characteristics and comparing current smoking prevalence rates in Massachusetts with those in 41 states without comprehensive tobacco control programs, Abt Associates found that adult smoking prevalence rates declined more rapidly in Massachusetts than in the comparison states. According to the Abt analysis, the adjusted prevalence rate in Massachusetts declined between 1990 and 2000, from 22.7 percent to 20.5 percent (an annual rate of 0.9 percent), whereas the adjusted prevalence rate in the comparison states declined from 22.0 percent to 21.7 percent (an annual rate of 0.4 percent). Consequently, Abt Associates concluded (like Siegel and colleagues in the case of California) that the decline in the adult smoking prevalence rate in Massachusetts could be attributed to the existence of the MTCP and not to national trends or demographic changes. Abt also noted that Massachusetts experienced a drop (40 percent) in per-capita cigarette consumption from 1992 to 2001, two times greater than the drop (20 percent) experienced in the rest of the country, excluding California. Furthermore, the decline in youth smoking prevalence in Massachusetts was found to be greater than that in the rest of the United States (Hamilton et al. 2003). The results of a similar analysis that reviewed data obtained through 1999 were published in 2002 (Weintraub and Hamilton 2002).

An earlier review (the results of which were published by the CDC in 1996) sought to determine the impact of the state's excise tax and tobacco control program on per-capita cigarette consumption and adult smoking prevalence. In doing so, the authors compared the rates in Massachusetts with those in the rest of the United States during two time periods: the 3 years leading up to the passage of Question 1 on the state ballot initiative (1990 to 1992) and the years immediately following the implementation of the excise tax and establishment of the MTCP (1993 to 1996). Although they determined that smoking prevalence rates in Massachusetts required further study, they found that per capita cigarette consumption decreased significantly from the first period to the second. During the first period, consumption in Massachusetts declined by 6.4 percent, whereas that in the rest of the country declined by 5.8 percent (except for California, where consumption declined by 11.0 percent). From 1992 to 1996, however, per-capita consumption declined by 19.7 percent in Massachusetts, 15.8 percent in California, and just 6.1 percent in the remaining states and the District of Columbia. The authors reasoned that because real cigarette prices actually fell in 1993 (because of price reductions by the tobacco industry), the excise tax alone could not account for the decline in cigarette consumption that continued through 1996. Consequently, they concluded that Massachusetts's tobacco control program played a role alongside tax increases in reducing the rate of tobacco use in the years immediately following the passage of Question 1 (CDC 1996).

Biener and colleagues (2000a) confirmed and added to the findings of the 1996 CDC study. They found that although Massachusetts and 48 comparison states experienced similar declines (15 percent and 14 percent respectively) in per-capita cigarette consumption from 1988 to 1992, Massachusetts experienced a greater annual decline (more than 4 percent) than the comparison states (less than 1 percent annually) following the establishment of excise tax and the establishment of the MTCP. As the authors of the CDC study had already observed, the decline in Massachusetts occurred even though price reductions for cigarettes effectively negated the potential effects of the excise tax increase. The authors also determined that after 1992 Massachusetts experienced a greater rate of decline in adult smoking prevalence than did the comparison states. The prevalence of smoking declined by 0.43 percent per year in Massachusetts but by only 0.03 percent in the comparison states. On the basis of these findings, the authors concluded that tobacco control programs such as the MTCP can reduce the rates of tobacco use and the related health risks (Biener et al. 2000a).

Massachusetts's success in reducing the rates of tobacco use among youth has fluctuated over time, however. In its last review of the MTCP, Abt Associates reported that although the prevalence of smoking among youth in Massachusetts and the United States as a whole actually grew during

the early 1990s, Massachusetts managed to reverse this trend in the second half of the decade, with the prevalence of smoking among youth falling more rapidly in Massachusetts from 1995 to 2001 (from 36 to 26 percent) than in the rest of the country (35 to 29 percent) (Hamilton et al. 2003). A separate study conducted by Soldz and colleagues (2002) identified similar trends. On the basis of data from the triennial Massachusetts Prevalence Study, Soldz and colleagues found that although the prevalence increased at both the state and national levels from 1990 to 1993, Massachusetts managed to reverse this trend in the latter half of the decade. Comparing data from the 1996 and 1999 surveys, the authors determined that over the 3-year period, the rate of cigarette use among students in grades 7 through 12 dropped from 30.7 percent to 23.7 percent. The percent decline in Massachusetts, they found, was greater than the declines seen in neighboring states and in the nation as a whole. Furthermore, the decrease in the rate of cigarette use was broad-based, occurring in numerous subsets of the youth population in Massachusetts. The prevalence rate declined among students in middle school as well as high school, boys and girls, and African Americans and whites. Soldz and colleagues concluded that the scale of this decline, especially in comparison with the smaller regional and national declines, strongly demonstrated the effectiveness of the MTCP in reducing the rate of cigarette use among Massachusetts youth (Soldz et al. 2002).

On the basis of data from the CDC's Youth Behavior Risk Survey, Figure 5-4 illustrates the progress that Massachusetts made during the mid-to-late 1990s in reducing the rate of tobacco use among youth, reflecting the conclusions reached by the independent evaluation as well as by Soldz and colleagues (2002). Figure 5-4 also shows, however, that after these two studies were conducted, the smoking prevalence rate among youth in the state began to decline at a slower rate than that among youth in the country as a whole. This slowdown coincides with the sharp reductions made to the MTCP's budget during the early part of the 2000s. Although, in light of 2005 data, the smoking prevalence rate among youth in Massachusetts once again compares favorably with that among youth in the United States at large, the prevalence of smoking among youth in the state has essentially stalled, indicating an end to the declines seen in the latter half of the 1990s.

Summary

The evidence presented and reviewed above shows that comprehensive state programs have achieved substantial reductions in the rates of tobacco use in both California and Massachusetts. This is particularly true of the early years of the CTCP and MTCP, when both states aggressively funded and implemented their tobacco control programs. Evaluations of Florida's

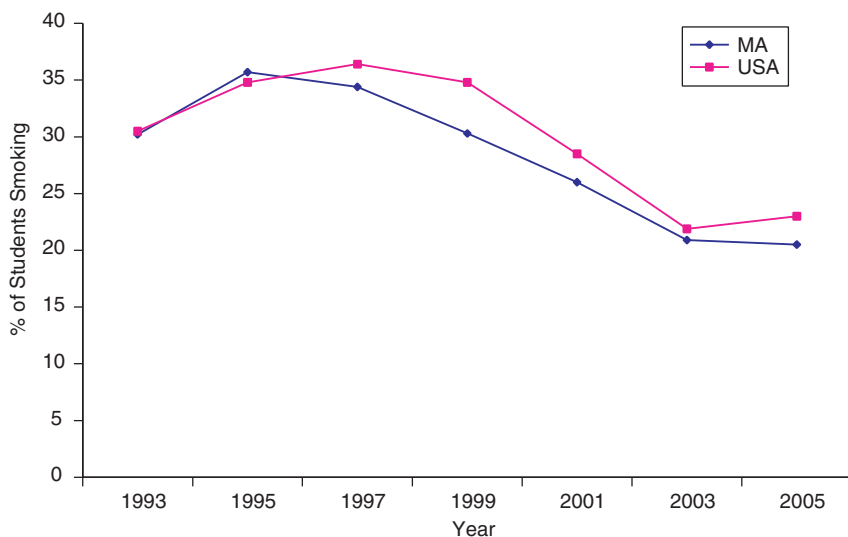


FIGURE 5-4 Comparison of the rate of current cigarette use among high school students (grades 9 to 12) in Massachusetts with the U.S. median, based on data from the Youth Risk Behavior Surveillance System.
SOURCE: (CDC 2006b).

youth-themed “truth” campaign, as well as programs in other states, such as Arizona, Oregon, and—most recently—New York, also indicate that statewide tobacco control programs can be effective in reducing the rates of tobacco use (Bauer et al. 2000; CDC 1999a; 2001; RTI International 2005; Siegel 2002; Sly et al. 2001a; Wakefield and Chaloupka 2000). In recent years, however, large budget cutbacks to many states’ tobacco control programs, including that of Massachusetts, have jeopardized continued success. To effectively reduce tobacco use, states must maintain, over time, a comprehensive and integrated tobacco control strategy.

FUNDING FOR COMPREHENSIVE STATE PROGRAMS

After the end of the ASSIST program, when the responsibility for tobacco prevention shifted from NCI to OSH at CDC, OSH implemented a Tobacco Control Program to sustain comprehensive state tobacco control programs. Under that program each state can receive approximately \$1 million per year for comprehensive tobacco control efforts (CDC 2003). Suggested levels of funding per capita are included to assist states in allocating funds from various sources. However, state governments are not funding

such efforts at the levels that the CDC recommends for best practices (Tauras et al. 2005), either from general funds or from payments under the MSA (revenues received under the MSA have typically been siphoned off by state governments to support programs other than those for tobacco control). In this section, the committee summarizes state expenditures on tobacco control and the sources of revenues that are funding these programs.

State Tobacco Control Expenditures

Expenditures on tobacco control vary widely among states (Figure 5-5 [Prevention Spending Dollars per person] and Table 5-1). In FY 2005, per-capita state expenditures on tobacco control varied from more than \$11 in Delaware (\$11.87) and Maine (\$11.14) to nothing (aside from the CDC grant) in the District of Columbia, Michigan, Missouri, New Hampshire, South Carolina, and Tennessee. The mean per-capita state expenditure was \$2.76.

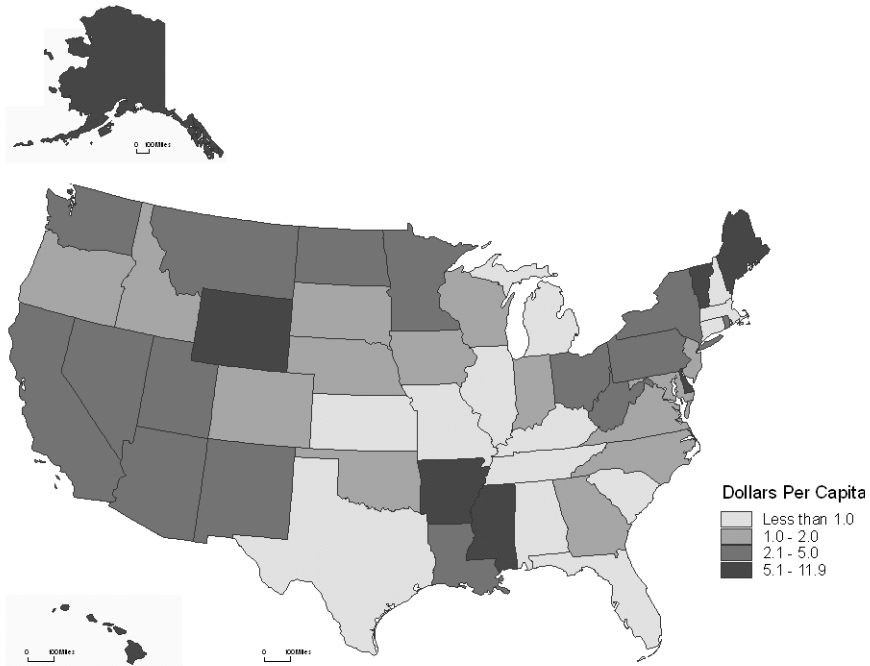


FIGURE 5-5 FY 2005 state tobacco control spending per capita (based on 2000 census data).

TABLE 5-1 Per-Capita State Tobacco Control Revenues and Expenditures, 2005

State	MSA Payment Received per Capita (\$)	Net Excise Tax Revenue per Capita (\$)	Prevention Spending per Capita (\$)
Alabama	22.91	33.63	0.08
Alaska	34.71	77.06	6.70
Arizona	19.48	54.99	4.50
Arkansas	19.74	47.51	6.58
California	12.01	30.23	2.18
Colorado	20.31	26.74	1.00
Connecticut	34.74	74.61	0.02
Delaware	32.17	103.60	11.87
District of Columbia	66.95	35.43	0.00
Florida	24.48	27.38	0.06
Georgia	19.11	27.66	1.40
Hawaii	31.66	68.62	7.35
Idaho	17.89	34.87	1.47
Illinois	23.88	51.38	0.89
Indiana	21.38	53.94	1.78
Iowa	18.94	29.88	1.74
Kansas	19.76	43.79	0.28
Kentucky	27.77	12.35	0.67
Louisiana	32.35	31.11	2.53
Maine	38.46	72.09	11.14
Maryland	28.56	50.51	1.79
Massachusetts	40.54	65.01	0.60
Michigan	27.60	109.67	0.00
Minnesota	37.56	32.58	3.80
Mississippi	42.54	15.24	7.03
Missouri	25.91	17.74	0.00
Montana	30.01	62.72	2.77
Nebraska	22.16	39.14	1.69
Nevada	19.45	64.58	2.20
New Hampshire	34.31	75.61	0.00
New Jersey	29.29	92.84	1.31
New Mexico	20.90	33.04	2.75
New York	21.64	49.32	2.08
North Carolina	18.47	4.89	1.86
North Dakota	36.32	28.23	4.83
Ohio	28.28	48.86	4.69
Oklahoma	19.14	30.37	1.39
Oregon	21.38	63.65	1.02
Pennsylvania	29.82	83.79	3.75
Rhode Island	43.71	123.70	2.38
South Carolina	18.29	6.41	0.00
South Dakota	29.46	34.85	1.99
Tennessee	27.54	19.70	0.00
Texas	24.74	23.60	0.35
Utah	12.70	24.33	3.22

TABLE 5-1 continued

State	MSA Payment Received per Capita (\$)	Net Excise Tax Revenue per Capita (\$)	Prevention Spending per Capita (\$)
Vermont	43.04	75.69	7.72
Virginia	18.41	15.77	1.84
Washington	22.21	55.72	4.61
West Virginia	31.24	54.21	3.26
Wisconsin	24.62	54.87	1.86
Wyoming	32.05	44.06	7.70

NOTES:

Data for states not part of the MSA from the Campaign for Tobacco-free Kids.

Figures do not reflect the \$1 million given to each state by CDC (explains why some state have \$0 for prevention spending).

Used Census 2000 data—not significantly different from 2005 data.

CA and NY MSA monies are only those given to the state and not the state and localities.

On average, states spend about half of CDC's recommended minimum level for comprehensive state tobacco control programs including the nine components specified in Best Practices for Comprehensive Tobacco Control Programs community programs to reduce tobacco use, chronic disease programs to reduce the burden of tobacco-related diseases, school programs, enforcement, statewide programs, countermarketing, cessation programs, surveillance and evaluation, and administration and management (CDC 1999c). In 1995, the CDC's recommended range of per-capita spending for the nation as a whole was \$5.85 to \$15.85. The CDC identified such an expenditure range to take into account important variations among states, including overall population (and therefore the possibility of achieving economies of scale), as well as tobacco use prevalence and demographic factors.

According to the CDC, "approximate annual costs to implement all of the recommended program components have been estimated to range from \$7 to \$20 per capita in smaller states (population under 3 million), \$6 to \$17 per capita in medium-sized states (population 3 million to 7 million), and \$5 to \$16 per capita in larger states (population over 7 million)" (CDC 1999c). In recommending funding ranges for each state, CDC generally works within these estimates, although it should be noted that for the states with smaller populations, CDC recommends an upper estimate higher than \$20 (for example, in Delaware, the District of Columbia, Montana, North Dakota, Rhode Island, South Dakota, Vermont, and Wyoming). California has the lowest lower estimate of \$5.12 per capita, and Wyoming has the highest upper estimate of \$30.01.

The committee reviewed the methodology that CDC uses to calculate

these estimated general ranges. The agency first identified best practices for each of the nine components of a comprehensive program and then calculated funding ranges (in millions) for each program component for each state—taking population, tobacco-use prevalence, and demographic factors into account—totaled the lower and upper estimates of each component on a state-by-state basis to find a total state program cost, and then calculated the per-capita ranges for each state. The scientific evidence that has emerged since 1999 appears to have substantiated CDC's judgment regarding best practices in each of the relevant domains, and the committee sees no reason to question the CDC's expert judgments regarding the likely costs of implementing these practices in various states. Accordingly, the committee has decided to use the CDC estimates as a template for its recommendations regarding state tobacco control expenditures.

Revenue Sources for State Tobacco Control Programs

What are the revenue sources of state funding for tobacco control? It might be expected that a certain percentage of revenues produced by tobacco excise taxes and the Master Settlement Agreement would be “earmarked” or set aside for tobacco control. However, few states have adopted this strategy, and there is very little correlation between the amounts generated by these two tobacco-related revenue streams and the amount expended on tobacco control.

State Tobacco Excise Taxes

States vary widely in their tobacco excise tax rates and in the amount of revenue that those taxes produce per capita (Table 5-1), ranging in FY 2005 from more than \$80 per capita in Rhode Island (\$124), Michigan (\$110), Delaware (\$104), New Jersey (\$93), and Pennsylvania (\$84) to less than \$15 per capita in North Carolina (\$5), South Carolina (\$6), and Kentucky (\$12). As these numbers suggest, and as Figure 5-6 shows, per-capita excise tax revenues are the highest in the Northeast and the lowest in the Southeast. The average per-capita excise tax revenue in all states was \$47.80, and two-thirds of the states had revenues of at least \$32 per capita.

In recent years, largely in response to state budget shortfalls, there has been a dramatic increase in the average tobacco excise tax rates and the number of states increasing their tax rates. According to Farrelly and colleagues (2003), in 2002 alone, 21 states raised their cigarette taxes, more states than in the past 5 years combined, and the average state cigarette excise tax rate increased significantly from 31 cents per pack (in 2002 dollars) in 1990 to 62 cents per pack in early 2003. These increases have exacerbated what were already substantial disparities in tobacco excise tax

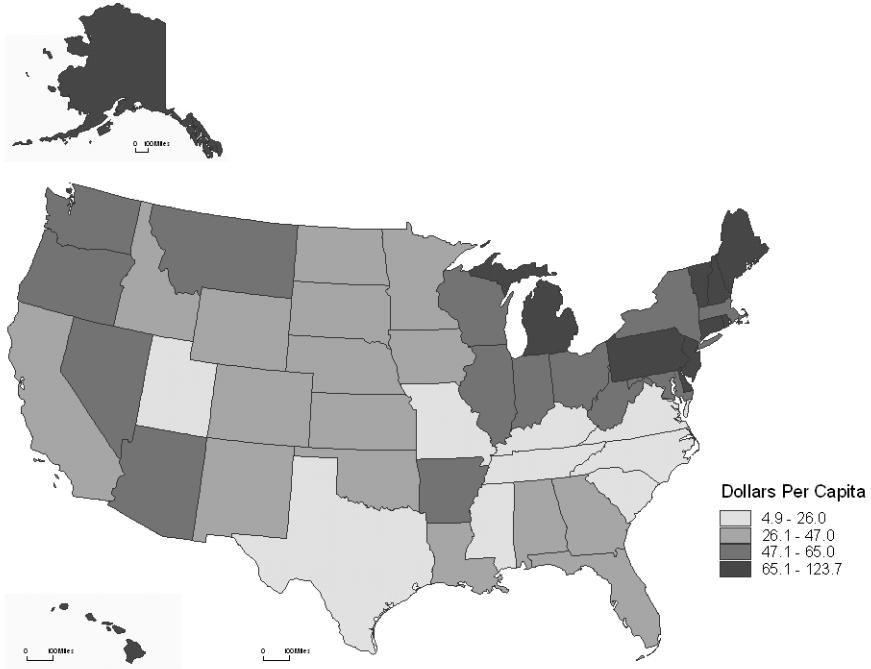


FIGURE 5-6 Per-capita tobacco excise tax revenues collected by state 2005, based on 2000 census data.

rates across the country and the attendant problems of interstate smuggling (Farrelly et al. 2003).

California was the first state to earmark a portion of its excise tax revenues for tobacco control efforts. As noted, a voter initiative, Proposition 99, increased the state tobacco tax by 25 cents per pack of cigarettes in 1988, and in 1990 the California Assembly enacted legislation distributing the revenue earned from the tobacco tax increase. The legislation directed that 20 percent of the revenues be allocated to a health education account, and funds from the health education and research accounts finance a statewide tobacco control program. Only in California, Oregon, and Utah have excise taxes served as a major designated source of funding for tobacco control.

Whether tax revenues should be earmarked for specific purposes is a controversial issue in public finance, and there is no compelling reason why tobacco control activities should be funded from any particular source of revenues (in fact, as noted above, Massachusetts was constitutionally precluded from earmarking the revenues generated by its 1992 tobacco excise tax increase to tobacco control). In addition, earmarking of a specified

proportion of revenues represents a pre-commitment to prioritize tobacco control expenditures in a way that would preclude the weighing of other priorities. However, the argument for earmarking a presumptive (but reversible) portion of tobacco excise tax revenues to tobacco control does have a common-sense persuasive force (Hamilton et al. 2005), and a decision to link tobacco excise tax revenues to tobacco control efforts represents a modest political commitment to sustain these activities.

In light of the traditional political separation between decisions about revenues (including excise tax rates) and expenditure decisions, it is perhaps unsurprising that per-capita state excise tax revenues and per-capita tobacco control expenditures are only modestly correlated (Figure 5-7).

Master Settlement Agreement Allocations

Another important element in the political economy of tobacco control is the MSA. On average in 2005, the states received \$27.46 per capita from the proceeds of the MSA. Because these calculations were based on projected Medicaid expenditures for tobacco-related diseases, they varied substantially (Table 5-1), from a low of \$12.01 per capita in California to a high of \$66.95 in the District of Columbia (Figure 5-8).

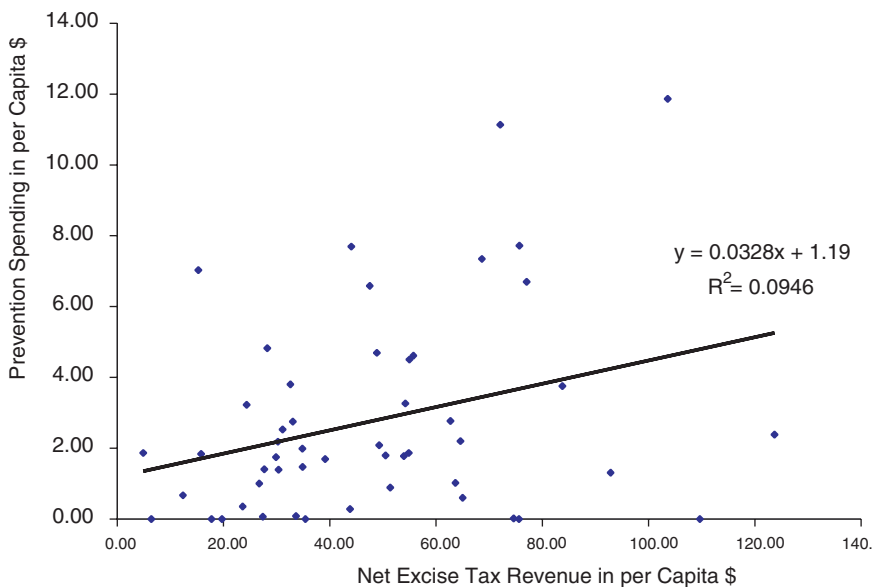


FIGURE 5-7 Correlation between per-capita tobacco control spending and per-capita excise tax revenues.

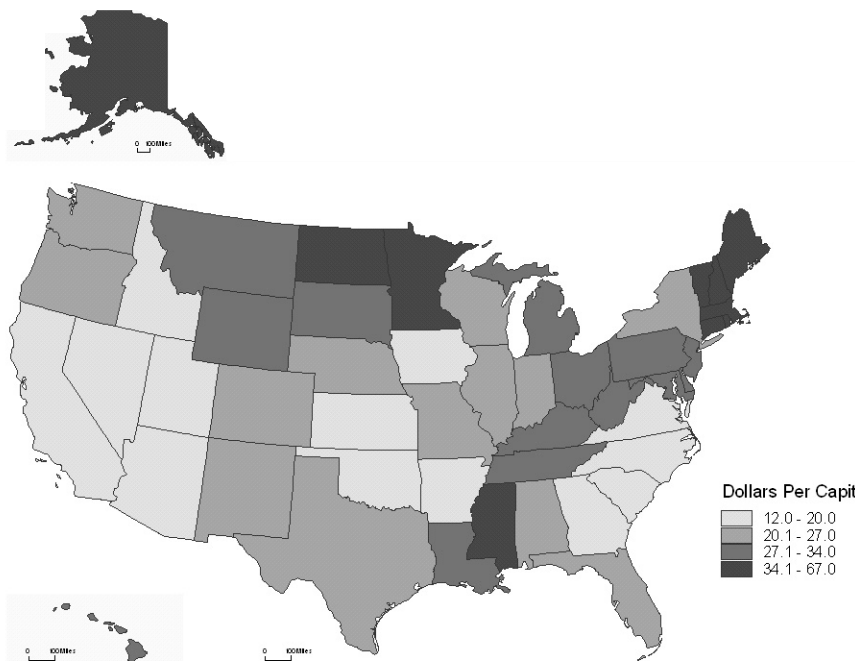


FIGURE 5-8 Per-capita payments received from the MSA, by state, in FY 2005 (based on 2000 census data).

The MSA does not stipulate how the states should spend the settlement funds. Consequently, the 46 states, the District of Columbia, and the five territories party to the MSA have developed various regulations, structures, and mechanisms for allocating settlement payments. A November 2005 report jointly issued by the American Cancer Society, the American Heart Association, the American Lung Association, and the Campaign for Tobacco-Free Kids illustrates the diverse approaches that the states have used to administer these funds over the past several years (AHA et al. 2005). Although some states regularly apply payments directly to their general budgets, others have established specific funds to which they direct their MSA allotments. Delaware law, for instance, mandates that all settlement payments be deposited into the Delaware Health Fund, which finances health-related programs, including the state's tobacco control efforts. Kansas law, meanwhile, directs the entirety of the state's MSA payments (after the first \$70 million, which was placed into the state's general fund) into the Kansas Endowment for Youth fund, which finances a range of youth-related programs. And Michigan and Nevada direct portions of their MSA allotments to education

scholarship funds. Just a few states, however, such as Nevada and Virginia, explicitly require portions of their settlement funds to be applied to tobacco control efforts.

Several tobacco-producing states apply large portions of their MSA payments to funds that assist citizens and businesses traditionally dependent on the tobacco industry. North Carolina law requires that 50 percent of the state's annual MSA receipts be placed in a fund that provides assistance to tobacco-dependent communities. An additional 25 percent is allocated to a separate fund that directly aids tobacco farmers and tobacco manufacturing workers, among others. Similarly, Virginia law allocates 50 percent of the commonwealth's MSA-derived funds to the Tobacco Indemnification and Community Revitalization Trust Fund, which provides economic assistance to tobacco growers and tobacco-dependent communities (AHA et al. 2005).

In recent years, budget shortfalls have compelled a number of states to divert MSA payments from tobacco-control-related funds and programs, such as those listed above (AHA et al. 2005). Largely to address such shortfalls, 15 states have also opted to securitize future MSA proceeds (GAO 2006). California, for instance, securitized its future settlement payments to fund its FY 2003 and FY 2004 budgets (AHA et al. 2005). In electing to securitize MSA proceeds, states receive advance income by issuing bonds backed by future MSA payments. States must pay to service the debt accrued through securitization, however; and in FY 2005 four states, including California, applied 100 percent of their MSA payments to servicing this debt (in addition, New Jersey allocated 99.9 percent of its MSA payments to debt servicing). In an April 2006 review of how states spend their MSA payments, the U.S. Government Accountability Office (GAO) calculated that servicing of securitization debt represented 24 percent of the total MSA funds allocated by states in FY 2005 (GAO 2006).

GAO also reported that between FY 2004 and FY 2005, the portion of MSA payments allocated to cover budget shortfalls decreased dramatically, from 44 to 4 percent, with states applying the largest portion of MSA-derived funds (32 percent) in FY 2005 to health-related programs (e.g., health care services, health insurance, and health research). It should be noted, however, that although the portion of funds allocated to such programs increased, the actual dollar amount decreased between FY 2004 and FY 2005, because fewer states obtained money up front through securitization. Allocations of MSA payments to tobacco control programs, meanwhile, remain extremely low, averaging just 4.7 percent of total MSA payments in FY 2005. In fact, since GAO began reviewing state allocations of MSA money, the percentage apportioned to tobacco control efforts has not exceeded 6 percent (GAO 2006). GAO does not anticipate any change in allocations to tobacco control programs for FY 2006.

Sloan and colleagues (2005) found that the mean total annual spending from settlement funds was \$30.65 per capita from FY 2000 to FY 2004. Median spending was about \$25 per capita. However, less than half of that money was spent on health-related activities, and very little of it was spent on tobacco control efforts. Approximately one-fourth of the state budgets reported during this period allocated no money to tobacco control. Among budgets that allocated anything to tobacco control, the usual allocation was less than \$2.50 per capita (see Figure 3 in the article by Sloan and colleagues 2005). States tended to spend less on tobacco control if they had more seniors, more individuals under the age of 18 years, and higher per-capita incomes. Not surprisingly, tobacco-producing states tended to spend smaller amounts of their MSA proceeds on tobacco control (Sloan et al. 2005).

In sum, only a small proportion of MSA revenues is devoted to tobacco control, and MSA revenues are specifically earmarked for this purpose in only a handful of states. In some states, however, the modest appropriations from MSA payments have accounted for a significant proportion of tobacco-control-related expenditures. Gross and colleagues (2002), for instance, determined that even though the percentage of MSA funds directed to tobacco control was very low, “when the tobacco-control-program expenditures from all 50 states were considered in aggregate, over half of the funding was derived from settlement income” (Gross et al. 2002). This proportion is probably much lower now because so many states have used their MSA funds to shore up budget gaps.

Summary and Recommendation

In the committee’s view, states should adopt a funding strategy designed to provide stable support for the level of tobacco control funding recommended by the CDC. MSA payments are not a reliable source of funds in most states. The most sensible approach would be to allocate a suitable share of tobacco excise tax revenues to tobacco control efforts. History suggests that these taxes are not likely to be reduced once they have been increased; moreover, high excise taxes also serve the goal of reducing tobacco use (see below) while raising revenues for tobacco control efforts and other public purposes. In most states, the CDC’s recommended expenditure target (about \$16 per capita for the nation as a whole) could be achieved by setting aside about one-third of the proceeds from the tax. The committee recognizes that explicit earmarking is forbidden by some state constitutions and is presumptively unacceptable in other states. However, even if formal earmarking is unacceptable, legislators responsible for public health expenditures should embrace a political strategy of linking the amount of the tobacco control budget line to a percentage of tobacco excise tax revenues.

Recommendation 1: Each state should fund state tobacco control activities at the level recommended by the CDC. A reasonable target for each state is in the range of \$15 to \$20 per capita, depending on the state's population, demography, and prevalence of tobacco use. If it is constitutionally permissible, states should use a statutorily prescribed portion of their tobacco excise tax revenues to fund tobacco control programs.

EXCISE TAX

It is well established that an increase in the price of cigarettes decreases their use and that raising tobacco excise taxes is one of the most effective policies for reducing the use of tobacco. From a policy perspective, one of the unresolved questions is whether price increases act synergistically with other tobacco control interventions to decrease consumption. After a brief review of the literature on these topics, the committee addresses the proper level of excise taxation solely on the basis of tobacco control considerations and comments on the practical difficulties presented by disparate levels of state excise taxes.

Price Increases Decrease Cigarette Use

Over a period of more than three decades, economists and health policy analysts have accumulated a large body of evidence on the effect of price on cigarette consumption. The effect of price on cigarette use has also been the subject of numerous recent reviews (Chaloupka 1999, (Chaloupka and Warner 2000; Leverett et al. 2002; Pinilla 2002) and meta-analyses (Gallet and List 2003). The conclusion reached by virtually every study of every demographic group in both developed and developing countries is that an increase in cigarette price reduces the level of cigarette use. A recent cross-sectional study of 70 countries based on aggregate consumption data found a price elasticity in the range of -0.49 to -0.57 percent (Blecher and van Walbeek 2004).

Price has been found to affect virtually every measure of cigarette use, including per-capita consumption, as derived from aggregate macrolevel data, as well as smoking prevalence and the number of cigarettes smoked daily, as derived from individual microlevel data (Hu et al. 1995a). Recent studies with microlevel data have found that higher cigarette prices increase the probability that a current adult smoker will make an attempt to quit (Levy et al. 2005) and that a young adult smoker will stop smoking (Tauras 2004b). In a study of adult smokers, access to low-taxed cigarettes was found to deter cessation attempts (Hyland et al. 2005). The June 2006 National Institutes of Health (NIH) state-of-the-science panel on tobacco

use (NIH 2006b) found that an increase in the unit price of tobacco products increases the rate of tobacco use cessation and reduces the level of consumption among individuals across a wide spectrum of racial and socioeconomic groups.

Just as increases in cigarette taxes deter consumption, declines in cigarette prices have been found to increase the level of consumption. In one Canadian study, for example, tax cuts in certain provinces slowed the rate of decline of smoking by inducing more smokers to start and leading fewer smokers to quit (Hamilton et al. 1997). Another study suggested that the price decrease in Canada in the early 1990s may have contributed to an increase in the rate of smoking among youth in the province of Ontario (Waller et al. 2003). In the United States, the increase in the rate of smoking among youth in the early 1990s has been attributed to declines in cigarette prices (Gruber 2001).

Cigarette Price Increases Reduce Cigarette Use by Adolescents

Although some studies have reported mixed or negative findings, the most recently published research generally supports the finding that higher cigarette prices discourage youth from smoking (Chaloupka 1999; Chaloupka and Pacula 1998; Chapman and Richardson 1990; Ding 2003; Gruber 2001; Harris and Chan 1999; Liang et al. 2003). Increased cigarette prices have been found to deter smoking among young people when investigators controlled for peer effects (Powell et al. 2005).

Some recent research has attempted to distinguish between the effects of price on adolescent experimentation with cigarettes and the effects of price on cigarette use among established adolescent smokers. One recent study, based on microlevel data from a 1993 national youth survey, found that cigarette price affects the latter group but not the former group (Emery et al. 2001). However, another study, based on the Growing Up Today Study of 1999, found that adolescents residing in states with the highest quartile of cigarette tax rates had a lower probability of experimental smoking (Thomson et al. 2004). Still another recent study suggested that cigarette prices do affect the probability that adolescent males, but not adolescent females, will initiate smoking. Adolescent female smoking initiation was found to depend on perceptions of being overweight or the desire to lose weight (Cawley et al. 2004).

Some of the inconsistencies in past research may have resulted from inaccurate measurement of the actual prices that teenagers paid for cigarettes. One study suggested that region-specific average retail prices or tax rates may incorrectly gauge the actual prices paid by youth smokers and that perceived price is a more specific measure of the smoker's actual out-of-pocket costs (Ross and Chaloupka 2003).

The June 2006 NIH state-of-the-science panel on tobacco use (NIH 2006b) determined that increases in excise taxes are effective in preventing tobacco use among adolescents and young adults, even though recent studies have found that increases in cigarette tax induce smokers to seek out tax-exempt cigarettes, to take advantage of coupon offers, and to avoid the impact of tax hikes in other ways (Hyland et al. 2004).

Do Cigarette Price Increases Act Synergistically with Other Antismoking Interventions?

Researchers have attempted to untangle the effects of price increases from those of other antitobacco policies, including informational campaigns and restrictions on public smoking, that are often carried out concurrently with governmental tax increases (Scollo et al. 2003; Stephens et al. 2001). Although many studies have established that cigarette price increases and other antismoking policies act independently to suppress demand, the question of a possible synergistic effect remains unanswered. Put differently, could antismoking policies raise the price elasticity of demand, or could price increases enhance the effectiveness of other antismoking interventions?

A number of studies have identified the independent effects of cigarette price increases and local restrictions on smoking at work sites or public places, in both the United States and Canada (Chaloupka 1999; Keeler et al. 1993; Stephens et al. 1997; Tauras 2004a; Yurekli and Zhang 2000). Other studies have identified the independent effects of tax increases and state or local tobacco control campaigns. Early research in this area was based on the antismoking campaigns in California and Massachusetts. Thus a study of quarterly cigarette sales data from 1980 to 1992 in California found that the antismoking campaign and cigarette taxation both contributed to the decline in the level of cigarette use (Hu et al. 1995b). Likewise, a study of the Massachusetts tobacco control campaign found declines in consumption greater than those expected from tax increases alone (CDC 1996).

Recent work on the interaction between price changes and other antismoking policies has extended beyond the initial experiences of California and Massachusetts. In one cross-sectional study, increases in state tobacco control funding were found to reduce smoking, even when prices are taken into account (Farrelly et al. 2003). Another study reported independent effects of cigarette price and state-level media campaigns on the probability of making a quit attempt of at least 3 months' duration (Levy et al. 2005). The combination of antismoking programs and increased tobacco taxes reduced the level of cigarette consumption among youth more than expected as a result of price increases alone (Wakefield and Chaloupka 2000).

Some studies have noted the combined effect of price increases and other antismoking measures, but made an attempt to identify specific contribution of each strategy. Thus cigarette smoking among adults declined after New York City raised local cigarette taxes, made available cessation services, distributed nicotine patches for free, and instituted legal action to ban smoking in public places in 2002 (Frieden et al. 2005). A study in the state of Oregon, reported in *Morbidity and Mortality Weekly Report*, found that the combination of an excise tax increase and the state's Tobacco Prevention and Education Program diminished the level of cigarette use (CDC 1999a).

A recent study focused on the impact of the 1998 MSA in the United States, specifically, the effect of the agreement on retail cigarette prices and aggregate cigarette consumption (Sloan et al. 2004). By 2002, the MSA was estimated to have reduced the rate of cigarette consumption by 13 percent among 18- to 20-year-olds, 5 percent among 21- to 65-year-olds, and 13 percent among those 65 years of age and older. The decline in consumption was mediated primarily through the effect of the MSA on cigarette prices, but there was evidence that MSA-associated policies, aside from increased prices, reduced consumption among younger smokers.

How High Should Tobacco Excise Taxes Be?

At the present time, state governments are the primary taxing authorities for tobacco products. During 2005, the consumption-weighted average state excise tax was 76.73 cents per pack (Capehart 2005). By contrast, the federal excise tax has been 39 cents per pack since 2002. Of an estimated total consumption of 388 billion cigarettes in 2004, only 5 billion (or 1.3 percent) were sold through federally tax-exempt outlets, including Indian reservations, military bases, and shipments to Puerto Rico (Capehart 2005).

Tax Evasion

When cigarette excise taxes are evaluated solely from a public health perspective (i.e., exclusively as an instrument for deterring consumption), the level to which the tax might justifiably be raised is limited only by concerns that higher taxes stimulate tax avoidance, such as by creating a demand for nontaxed or lower-taxed cigarette products or for other tobacco product substitutes. Broadly speaking, there are at least three avoidance strategies: (1) producing cigarettes at home, (2) ordering cigarettes to be shipped by mail or package delivery service from sellers who do not collect the tax, and (3) physically purchasing and importing cigarettes from a lower-tax jurisdiction.

The first cigarette tax evasion strategy, home production, has traditionally constituted a negligible fraction of the overall market and, until that situation changes, all that is required is basic monitoring to make sure that the market is not growing substantially. The second cigarette tax evasion strategy, interstate shipping, has become an increasing concern with the proliferation of internet sites selling untaxed cigarettes. The committee addresses this problem below and recommends legislation prohibiting both online tobacco sales and direct shipment of tobacco products to consumers.

The third cigarette tax evasion strategy, smuggling from states with low excise taxes to states with high excise taxes, has traditionally been the greatest concern due to the great variation in state-level excise taxes and the porosity of state borders with respect to commerce. Even if the price within the United States were uniform, policymakers would still have to consider the prospect of smuggling from other countries. International black markets could develop in which foreign cigarettes are smuggled into the country to avoid equalizing excise taxes, or U.S.-manufactured cigarettes could be exported and then illegally re-imported. International smuggling, however, does not appear to be a substantial concern at the present time. The committee will address the smuggling problem later in this chapter.

External Costs

Aside from the impact on consumption, other factors may be relevant to policymakers in selecting the proper level of an excise tax. One key concern is the “efficient” level of taxation that requires smokers to fully internalize the social costs of their smoking (Chaloupka and Warner 2000). From an economic perspective, the main purpose of excise taxes is to make the cigarette consumer who decides to buy cigarettes pay not only for the cigarettes themselves but also pay an amount equivalent to the costs that their smoking imposes on the rest of society. Such a “Pigouvian tax” raises the price of cigarettes to an economically efficient level by internalizing the external costs of consumption.

Computations of the external cost per pack of cigarettes, however, have hinged on exactly how the external costs of smoking are defined. As Chaloupka and Warner observed, “there is no complete consensus on precisely what consequences warrant inclusion, and even for those for which there is consensus, estimates of the magnitude of the true social externalities vary widely” (Chaloupka and Warner 2000, p. 1579). For example, some economists would regard the injury that a smoking mother confers on her children as an internal cost within the family, whereas others would count it as an external cost. Thus a study by Hay (1991) estimated that the costs

of the long-term intellectual and physical consequences of smoking-related low-birth-weight disabilities implied a tax of \$4.80 per pack (Hay 1991). Although economists would generally agree that the effects of ETS outside the family should be considered an external cost, an earlier estimate of the external costs (15 cents per pack) by Manning and colleagues (1989) was later criticized because the authors did not have full information on the consequences of ETS exposure at the time (Chaloupka and Warner 2000).

Other economists have pointed out that many smokers would like to quit and regret having made the decision to become a smoker. As discussed in Chapter 2, individuals typically become smokers when they are adolescents, at a time when the costs of smoking are not fully understood or anticipated. In this sense, the adolescent did not take into account the “costs” being imposed on the older addicted smoker who now regrets his or her earlier decision. From that standpoint, many current smokers favor higher prices, and that very fact should be taken into account in analyzing the most efficient level of taxation. In general, it takes a peculiarly strong faith in consumer rationality to apply the standard Pigouvian calculus to an inherently hazardous product to which people become addicted as teenagers.

Regressivity

Whatever the most efficient level of taxation, another concern is that higher taxes may be regressive; that is, poorer people may pay more per capita than would people with higher incomes because the prevalence of smoking is considerably higher among people with lower incomes and less education than among people with higher incomes and more education (see Chapter 1). Ordinarily, there might well be a legitimate concern when a tax increases the price of a good, simply because increases in the prices of goods particularly affect those who are the least able to pay. Tobacco is not an ordinary good, however. Its consumption is (and is perceived to be) a harm to many of its consumers. To the extent that the pool of smokers includes a disproportionate number of less educated and lower-income people, a tax may well benefit them rather than harm them. To the extent that an excise tax decreases smoking initiation and helps to spur decreases in smoking, its beneficial effects may well be concentrated among the poorer members of society. For this reason, the concern about the regressivity of any tax increase seems to the committee to be somewhat overstated, even misplaced. Nevertheless, the main implication of concern regarding the regressivity of tobacco excise taxes, in the committee’s view, is that distributional concerns should be taken into account and that higher taxes should be coupled with state financing of cessation programs and services, especially for lower-income smokers.

New Measures

The states and the federal government should use tobacco excise taxes for the dual purposes of reducing consumption and funding tobacco control programs. Taking into account only tobacco control considerations, the committee believes that the ideal situation would be a uniform level of tobacco excise taxation for the entire nation at the highest feasible level. Feasibility here refers to the need to minimize cross-border smuggling and to minimize an unfair and politically unacceptable impact on current smokers, especially disadvantaged populations. A uniform tax would presumably be most efficiently administered at the federal level, although the revenues could be distributed to the states according to a mutually agreeable formula that would lead the states to refrain from exercising their own taxing authority; however, a plan under which the federal government “preempts” the field of tobacco excise taxation may be regarded as too radical at the present time.³ Another possibility would be for the federal government to coordinate a system that creates incentives for states to reduce the disparities in state excise taxes. In Chapter 6, the committee presents the outline of a plan under which the federal government would link the availability of federal subsidies for a state’s tobacco control expenditures to the amount of these tobacco control expenditures and the level of the state’s tobacco excise tax. Among other purposes, this plan is designed to use federal spending leverage to induce states with lower tobacco excise taxes to raise them, reducing the disparities in state excise taxes.

Unless and until the federal government takes on such a coordinating role, cross-state smuggling is likely to remain a serious problem. For the purposes of the policy blueprint being outlined in this chapter, the committee’s assumption is that the current legal structure of tobacco control will remain unchanged. On the basis of that assumption, the states will retain the responsibility to coordinate their own efforts. To help them do that, while increasing the overall level of tobacco excise taxation, the committee recommends the tobacco excise tax rates of the states in the top quintile become the target for the remaining states. (Currently, the lower bound rate for the top quintile is about \$1.25 per pack. If states with lower rates were to move their tax rates toward those in the top quintile, the variation

³ Congress probably has the constitutional power to adopt such a solution as part of a comprehensive plan of regulating tobacco and protecting the public health under the commerce clause. See *Moorman Manufacturing Co. v. Blair*, 437 U.S. 267, 280 (1978). In addition, Congress also has the authority to condition the state’s receipt of federal funds for tobacco control on the states’ refraining from imposing tobacco excise taxes. See *South Carolina v. Dole*, 483 U.S. 203 (1987). In practice, however, Congress has rarely restricted the states’ taxing power. See Walter Hellerstein and Charles MacClure, *Congressional Intervention in State Taxation: a Normative Analysis of Three Proposals*, 2004 *State Tax Today* 40-3 (2004).

in state excise tax rates—and the frequency of smuggling—would be substantially lowered.) As noted earlier, all states should earmark a statutorily prescribed portion of their excise tax revenues sufficient to fund tobacco control programs at a level recommended by the CDC.

Recommendation 2: States with excise tax rates below the level imposed by the top quintile of states should also substantially increase their own rates to reduce smuggling and tax evasion. State excise tax rates should be indexed to inflation.

The federal tobacco excise tax has traditionally served as a tool for raising revenue rather than as an instrument of tobacco control. However, for the reasons summarized above, the committee thinks that the federal tobacco excise tax rate should be increased substantially—at least on the order of \$1.00 per pack—even if the federal government’s overall role in tobacco control remains a supportive one. The possibility of a more substantial federal role in tobacco control is explored in Chapter 6.

Recommendation 3: The federal government should substantially raise federal tobacco excise taxes, currently set at 39 cents a pack. Federal excise tax rates should be indexed to inflation.

SMOKING RESTRICTIONS

As noted in Chapter 3, grassroots advocacy for clean air laws was the first major achievement of contemporary tobacco control efforts. Despite continuing progress in expanding the reach of legislation restricting smoking in venues with significant public exposure, the task remains incomplete. Coverage of the existing state “smokefree indoor air” laws varies significantly. Table 5-2 summarizes the coverage of state laws as of the first quarter of 2005 (CDC 2005c). This section reviews current smoking restrictions and their effects in nonresidential indoor locations (workplaces and public accommodations), group residential locations (hospitals, nursing homes, and correctional facilities), private residences, and public outdoor areas.

Workplaces and Public Accommodations

The CDC data presented in Table 5-2 indicate that as of late 2005, most states now have some restrictions on smoking on public transportation, with 23 states banning it completely and 19 states requiring either separate ventilated areas or designated smoking areas. Similarly, 44 states have placed restrictions on smoking in government work sites. 16 of these states have enacted complete smoking bans in government workplaces.

TABLE 5-2 Scope of State Indoor Air Restrictions as of 4th Quarter, 2005

Location	Banned (100% Smoke Free)	Separate Ventilated Areas	Designated Areas	Any Restriction	No Restrictions
Bars	6	2	4	12	39 ^b
Commercial day care centers	29 ^a	3	6 ^b	38	13
Enclosed arenas	12	3	14	29	22 ^b
Government work sites	16	6	22 ^b	44	7
Grocery stores	13	3	19 ^b	35	16
Home-based day care centers	23 ^a	3	1	27	24 ^b
Hospitals	15	4	24 ^b	43	8
Hotels and motels	1	1	17	19	32 ^b
Malls	10	4	5	19	32 ^b
Prisons	4	2	3	9	42 ^b
Private work sites	11	4	16 ^b	31	20
Public transportation	23 ^b	3	16	42	9
Restaurants	11	2	21 ^b	34	17

^aIncludes 13 states where smoking is banned when children are on the premises for commercial day care centers and 21 states for those of home-based day care centers.

^bIncludes Washington, D.C.

SOURCE: (CDC 2005c).

However, 20 states still have no restrictions at all on smoking in private-sector work sites. Of course, employers are free to adopt smoking restrictions on their own, and in 1998–1999, almost 70 percent of U.S. workers reported that their workplaces had an official policy prohibiting smoking in work areas and public or common areas, up from 46.5 percent in 1993 (CDC 2005e).

Table 5-2 also shows that 38 states either have weak regulations for restaurants (limiting smoking to designated areas) or have no restrictions at all. Bars are, of course, less regulated, with 39 states having no restrictions. In recent years, however, local governments have been more inclined to adopt comprehensive workplace restrictions that include restaurants and bars. New York City and Washington, D.C., are two prominent examples. As of October 2006, 342 municipalities ban smoking in restaurants and 252 municipalities require smoke-free bars (ANRF 2006). The trend toward coverage of restaurants and bars seems largely responsive to concerns about the plight of workers whose employment choices may be limited and to the failure of the market to respond to nonsmoker preferences for smoke-free venues.

Effects of Workplace Restrictions

Smoking restrictions serve three purposes: (1) they protect nonsmokers from the health effects and the noxious odors of secondhand smoke; (2) they help smokers quit, cut down on their smoking, and avoid relapses; and (3) they reinforce a nonsmoking social norm. Clean air laws, in fact, have done more to reduce consumption than any intervention other than price increases for cigarettes.

Effects on Nonsmokers ETS, or secondhand smoke, is a known carcinogen and has been associated with a variety of adverse health effects in nonsmokers, including lung cancer and coronary disease (EPA 1992). It is estimated that 43 percent of nonsmokers have biological evidence of secondhand smoke exposure (DHHS 2006) and that 3,000 lung cancer deaths and 35,000 to 62,000 coronary heart disease deaths in nonsmokers are attributable to such exposure (CDC 2002). In fact, for every eight smokers who die from smoking, one nonsmoker dies from secondhand smoke exposure (Schoenmarklin and Tobacco Control Legal Consortium 2004). In 2002, the International Agency for Research on Cancer (IARC) estimated that involuntary smoking increases the risk of an acute coronary heart disease event by 25 to 35 percent, and that the excess risk of lung cancer due to exposure to a spouse's secondhand smoke is approximately 20 percent for women and 30 percent for men (IARC 2002).

Involuntary smoking has been found to also have adverse effects on the respiratory system. Very strong evidence of a causal relationship exists for

chronic respiratory symptoms (IARC 2002). In addition, exposure to secondhand smoke is associated with an increased risk of sudden infant death syndrome (SIDS), asthma, bronchitis, and pneumonia in young children. The CDC considers ETS exposure to be a serious public health hazard that can be effectively prevented through effective regulation designed to reduce exposure (TIPS 2006a). Furthermore, it is estimated that secondhand smoke exposure costs the United States more than \$5 billion per year in direct medical costs and approximately \$4.68 billion per year in lost productivity costs, although these figures are considerably lower than estimates from just 15 years ago. This difference is attributed to reductions in both the number of people smoking and the rate of ETS exposure for nonsmokers (Behan et al. 2005).

A study of hospitality workers in New York showed that the percentage of hospitality workers exposed to ETS declined by 85 percent within the 12 months after the state's smoke-free indoor ban took effect. During the same period, hospitality workers reported a 57 percent decline in sensory symptoms of ETS exposure, such as eye irritation, runny nose or sneezing, and sore or scratchy throat, and a 37 percent decline in upper respiratory symptoms, including wheezing, coughing, phlegm, and shortness of breath (Farrelly et al. 2005).

Effects on Consumption by Smokers Substantial evidence indicates that workplace smoking restrictions have been effective in decreasing cigarette consumption and increasing smoking cessation among active smokers. Various studies have shown that smoke-free workplace laws reduce smoking prevalence by amounts ranging from 3.8 percent to 6 percent and consumption among continuing users by 2 percent to 14 percent (Bonta, Appendix B). One 2002 study estimated that a smoke-free policy for all U.S. workplaces would decrease per capita cigarette consumption for the entire population by 4.5 percent (Fichtenberg and Glantz 2002). In addition, studies have shown that workplace smoking restrictions increase smoking cessation. Data collected during the Community Intervention Trial for Smoking Cessation, known as COMMIT, shows that those who reported a smoke-free work site between 1988 and 1993 were 25 percent more likely to attempt to quit smoking than those who were allowed to smoke at work (Glasgow et al. 1997). One study in California demonstrated that employees at smoke-free work sites are up to 38 percent more likely to quit smoking than those who work in areas with no workplace laws against smoking (Moskowitz et al. 2000).

Studies have shown that the prevalence of smoking is 4 percent higher in states without comprehensive clean indoor air laws and that the average annual consumption is 14 packs per person higher in such states (Emont et al. 1992). Overall, clean air laws may reduce smoking prevalence by

roughly 10 percent in the general population. In addition, states with stringent smoking restrictions have an average quit rate of 50 percent, whereas states without strong smoking laws have an average quit rate of 44 percent (Bonta, Appendix B).

Ireland was the first country to institute comprehensive nationwide smoke-free workplace legislation, and initial reports indicate that the ban has been a public health success and has met with substantial public approval. In fact, survey results show, somewhat counterintuitively, that 83 percent of Irish smokers reported that they felt the ban was a “good” or a “very good” thing. Not only did the law dramatically decrease ETS in workplaces, pubs, and other public places, but also 80 percent of Irish smokers who reported quitting smoking after implementation of the ban said that the law made them more likely to quit and 88 percent said that the law helped prevent relapse. In addition, 46 percent of Irish smokers who continued smoking after the ban was implemented indicated that the law made them more likely to quit, and 60 percent reported that it decreased their overall consumption (Fong et al., in press; Fong et al. 2006).

Effects on Patronage in Restaurants and Bars Opponents of smoking bans in restaurants and bars argue that these restrictions would have a deleterious effect on business and employment in the hospitality sector. Recent research has shown, however, that this has not been the experience in jurisdictions with bans on smoking in restaurants and bars. A 2004 literature review by Scollo and Lan covering 21 studies of smoke-free policies found that there was “no negative economic impact from the introduction of smoke-free policies in restaurants and bars” (Scollo and Lal 2004). The New York City Department of Health’s First Annual Independent Evaluation of New York’s Tobacco Control Program reported in 2004 that after the passage of New York’s Clean Indoor Air Act (CIAA), which banned smoking in all places of employment, including restaurants and bars, there was little change in the patronage of bars. The report also found that restaurants and industry employment, alcohol excise tax revenues, and bar licenses suffered no adverse effects (RTI International 2004). Additionally, a 2002 CDC report on a smoking ban in restaurants and bars in El Paso, Texas concluded that no statistically significant changes in restaurant and bar revenues occurred after the smoking ban took effect (CDC 2004b). Moreover, residents of areas that have instituted indoor smoking bans have indicated increasing support for such restrictions. Since the implementation of New York’s CIAA, for instance, popular support for indoor smoking bans has grown with each passing year. By the beginning of 2005, 79 percent of adults in New York State reported that they supported the CIAA (RTI International 2005).

Recommendation 4: States and localities should enact complete bans on smoking in all nonresidential indoor locations, including workplaces, malls, restaurants, and bars. States should not preempt local governments from enacting bans more restrictive than the state ban.

Hospitals and Health Care Facilities

Implementation of smoking bans in hospitals and health care facilities increased substantially during the 1980s and early 1990s, largely because of the mandate of the Joint Commission on Accreditation of Healthcare Organizations (JCAHO) that all hospitals be smoke-free. This organization, which evaluates and accredits more than 15,000 health care organizations and programs nationwide, promulgated the nonsmoking standard effective December 31, 1993. Hospitals were quick to comply with the new standard, and by the end of 1994, more than 96 percent of hospitals had done so and more than 40 percent had enacted even stricter restrictions (Fee and Brown 2004). Hospital smoking bans were originally instituted because of a concern for the health of patients and reflected an effort to capitalize on the JCAHO restrictions by emphasizing the health risks of smoking. Studies conducted since the bans went into effect have indicated that they not only protect patient health, but also reduce smoking among hospital employees (Fee and Brown 2004). Some concern has been raised about the wisdom of a ban on patient smoking in psychiatric hospitals, but research has shown that such bans have been implemented with little adverse effect (Smith et al. 1999).

Few states have enacted bans on smoking in nursing homes, although most require designated smoking areas if smoking is permitted. However, both federal and most state laws permit a total ban. According to Bergman, in 2003 about 64 percent of nursing homes did not allow smoking inside, with the remaining 36 percent limiting smoking to designated areas (Bergman 2003).

Recommendation 5: All health care facilities, including nursing homes, psychiatric hospitals, and medical units in correctional facilities, should meet or exceed JCAHO standards in banning smoking in all indoor areas.

Correctional Facilities

Despite the substantial evidence of the effectiveness of workplace smoking bans and their widespread adoption in hospitals, correctional facilities have been reluctant to take aggressive steps to eliminate smoking. Unlike JCAHO, neither the American Jail Association nor the American

Correctional Association has mandated smoke-free policies for its institutions, although both have adopted resolutions supporting such restrictions (Hammond and Emmons 2005). According to a 2002 survey, at least 38 state correctional departments had enacted some form of ban (Bonta, Appendix B), but very few of these have instituted total bans (Hammond and Emmons 2005). However, there is a discernible trend in the direction of stricter policies. On July 15, 2004, the Federal Bureau of Prisons established a nearly total ban for employees and inmates at 105 prisons. Also, in 2004, California passed a law eliminating tobacco products from prisons and youth correctional facilities (Bonta, Appendix B).

The relatively modest level of restriction on smoking in correctional facilities is somewhat surprising, given the significant implications of secondhand smoke exposure in such facilities. First, the sheer size of the population is cause for concern, as approximately 2 million inmates are incarcerated in jails and prisons at any one time (BJS 2005). Second, the problem of secondhand smoke exposure is particularly acute in correctional facilities because about 60 percent of inmates are smokers and the mandatory enclosure and poor ventilation in many prisons can create very high levels of ETS (Hammond and Emmons 2005). Partially because of these concerns, the U.S. Supreme Court ruled in 1993 that inmates do not have a constitutional right to smoke and that exposure to unreasonable levels of ETS may constitute “cruel and unusual punishment” under certain circumstances (*Helling v. McKinney*, 509 U.S. 25 [1993]). Indeed, studies have shown that smoke-free prison policies have been effective in dramatically reducing ETS exposure, particularly in crowded or poorly ventilated areas (Hammond and Emmons 2005). In addition, banning smoking can improve overall inmate health and may reduce health care costs in prisons. Consequently, part of the motivation for California’s recent legislation was the estimated \$280 million in health care costs attributable to inmate cigarette smoking (The Monitor’s View 2005).

There are practical concerns, however, about instituting smoke-free policies. Specifically, prison administrators fear that total smoking bans may lead to an increase in inmate-staff tensions and the rise of a black market for tobacco products. This concern may be somewhat overstated, though, as a 2001 survey of the 51 U.S. prison systems that had instituted bans revealed that only 2 of these systems reported any increased violence and 20 percent reported increased inmate-staff tension following the implementation of the ban (Hammond and Emmons 2005). However, these findings may be attributable to under-enforcement of the bans that have gone into effect. Patrick and Marsh report that tobacco use inside prisons often does not cease even years after universal bans are enacted (Patrick and Marsh 2001). These factors tend to mitigate the effectiveness of bans in correctional facilities. However, in the committee’s view, the positive health

effects of protecting staff, nonsmoking inmates, and visitors from ETS justify an indoor ban as well as the costs of meaningful enforcement.

Recommendation 6: The American Correctional Association should require through its accreditation standards that all correctional facilities (prisons, jails, and juvenile detention facilities) implement bans on indoor smoking.

Multi-Unit Residential Locations

Residents of apartment buildings are exposed to ETS entering the air from common areas and neighboring units, and these exposures have led to a steady stream of litigation, especially on behalf of children and medically vulnerable adults, aiming to force landlords to adopt smoking restrictions. The housing market is slowly beginning to respond to a growing grassroots support for smoke-free multiunit housing, particularly in California. Recent polling data reveal that 82 percent of those living in apartments in California support smoking restrictions in their buildings and 69 percent favor separate nonsmoking sections (Wilcox 2005). Several California-based organizations that promote smoke-free housing have been created. Most notable among these is an organization whose website, *www.smokefreeapartments.org*, features more than 130 apartment owners with more than 1,400 nonsmoking units, according to the most recent estimates. In addition, in 2006 the California Apartment Association, in response to member demand, began offering information on how to create smoke-free areas. However, support for apartment smoking restrictions is not limited to California. A 2003 analysis of apartment renters in Minneapolis, Minnesota, concluded that 79 percent of nonsmokers preferred that their buildings be smoke-free (Hennrikus et al. 2003). In addition, a 2003 survey of Washington State tenants found that 67 percent were interested or very interested in smoke-free housing (Tacoma-Pierce County Health Department 2003).

Despite the growing support for smoke-free housing and the fact that there is no legal impediment to legislating such a ban, virtually no legislative action has addressed smoking in multiunit residential buildings (outside common areas). No state statutes have regulated smoking in any type of private residences. For instance, in 2004, the city of Thousand Oaks, California, took an unprecedented step by adopting a resolution that one-third of the units available in every new publicly-funded apartment building in the city be designated as nonsmoking; it was the first municipality in the country to take such a step (Smokefree Apartment House Registry 2004). Similarly, in August 2005, the housing authority in Cadillac, Michigan,

voted to ban smoking in an apartment complex for seniors, making it 1 of less than 10 public housing authorities nationwide that have instituted such bans (Older Americans Report 2005). Self-imposed restrictions by landlords and developers also appear to be rare.

Some occupants of multiunit residences have initiated litigation to require landlords to provide smoke-free housing. Victims of ETS exposure may pursue legal action against fellow tenants or landlords via common-law remedies, claims of safety and health code violations, or the federal Fair Housing Act. Common-law lawsuits have been the most common, although most are settled out of court, and very few cases have reached the appellate level (Schoenmarklin and Tobacco Control Legal Consortium 2004). Plaintiffs have occasionally been successful in raising common-law property or tort claims, although such cases are rare. Some of the more successful theories include breach of warranty of habitability, breach of the covenant of quiet enjoyment, or nuisance.

Legal experts have generally been skeptical regarding the prospects of victory in such lawsuits because a plaintiff must prove that living conditions have been made unbearable as a result of secondhand smoke (Osterwalder and Beeman 2005). There are indications that legal precedent may be changing, however, as a couple was recently evicted from their condominium in Boston, Massachusetts, after neighbors complained about excessive cigarette smoke. This was the first case of its kind in the United States, and some believe that this case may have a nationwide impact (Blumberg 2005).

Rather than direct regulation, the most sensible policy is to stimulate competition for smoke-free lease terms among condominium developers and owners of multiunit dwellings while encouraging landlords to make entire buildings smoke-free, perhaps with financial incentives.

Recommendation 7: States should enact legislation requiring leases for multiunit apartment buildings and condominium sales agreements to include the terms governing smoking in common areas and residential units. States and localities should also encourage the owners of multiunit apartment buildings and condominium developers to include nonsmoking clauses in these leases and sales agreements and to enforce them.

To encourage the development and enforcement of nonsmoking clauses in leases and sales agreements, states and localities should modify any law that is perceived by landlords and developers to preclude nonsmoking clauses or to inhibit their enforcement.

College Campuses

The recent increase in smoking among 18–24 year olds highlights the importance of implementing smoking policies on college campuses. In 2005, the American College Health Association (ACHA) encouraged colleges and universities to move toward tobacco-free campuses, while taking a step-by-step approach to their policies. The ACHA strongly urged colleges and universities to prohibit tobacco use in all public buildings on campus (including classrooms, libraries, museums, stadiums, dormitories, building entrances, and dining facilities) and within twenty feet of these buildings. In addition, the ACHA urged colleges and universities to prohibit tobacco advertising in campus-controlled venues, and to prohibit the sale of tobacco products or provision of free sampling of tobacco products on campus (ACHA 2005).

According to the American Nonsmokers' Rights Foundation (2007), about 43 colleges and universities have adopted a completely smoke-free campus, including all indoor and outdoor spaces throughout the groups of the college or university. In a study conducted by Halperin and Rigotti (2003) of public universities' tobacco control policies, it was found that approximately half of the universities surveyed banned smoking in all residence halls and dormitories. Half of the universities also had written policies prohibiting smoking within a certain distance of all campus building entrances. However, many colleges fall well below the recommended guidelines. Halperin and Rigotti (2003) found that only 68 percent of the universities reported that no tobacco products were sold on campus, and that of the universities that did sell tobacco products, more than two-thirds (69 percent) allowed students to use their meal cards or student accounts to purchase tobacco products. Only half of the schools surveyed had written policies in place that banned the advertisement of tobacco products on campus.

Such policies restricting or prohibiting smoking on college campuses or in residential areas have been effective. For example, a study by Wechsler and colleagues (2001) found that current smoking prevalence was significantly lower among residents of smoke-free college housing as compared with residents of unrestricted housing. Cigar use was also found to be lower among students living in smoke-free residences compared to those residing in unrestricted housing. Students living in smoke-free residences were also less likely to initiate smoking (if they had not smoked regularly before age 19) compared to those living in unrestricted dorms. Borders and colleagues (2005) found that preventive education programs on campus were associated with lower odds of smoking and that designated smoking areas were associated with higher odds of smoking.

Despite the potential effectiveness of these college smoking bans, these tobacco restrictions on college campuses have been met with ambivalence. As suggested by Loukas and colleagues (2006), college officials may need to

address the issue of changing student attitudes about smoke-free campuses as policies are instated.

Recommendation 8: Colleges and universities should ban smoking in indoor locations, including dormitories, and should consider setting a smoke-free campus as a goal. Further, colleges and universities should ban the promotion of tobacco products on campus and at all campus-sponsored events. Such policies should be monitored and evaluated by oversight committees, such as those associated with the American College Health Association.

Residences and Privately-Owned Vehicles

The proportion of Americans living in smoke-free homes is uncertain. In 1999, more than 60 percent of U.S. homes reported having a strict smoking ban (no smoking allowed at any time or in any place in the home) (Levy et al. 2004). The most pertinent question, however, is what proportion of smokers are not allowed to smoke in their own homes. In 2006, Borland and colleagues published the results of a two-wave cohort survey that examined the prevalence of smoke-free policies in the residences and vehicles of smokers. Only 27.9 percent of U.S. smokers from the second-wave cohort reported having total smoking ban in their homes, although 57.1 percent of smokers reported that they do not smoke in their cars when nonsmokers are present (Borland et al. 2006).

The aim of the U.S. Department of Health and Human Services (DHHS), as described in Healthy People 2010, is to reduce the percentage of children regularly exposed to tobacco smoke at home to 6 percent. According to baseline data used to establish this target (from the National Health Interview Survey), 20 percent of children 5 years of age and younger lived in a home in which someone smoked at least 4 days a week in 1998 (CDC 2005a; DHHS 2001; 2006). By 2004, this rate fell to 11 percent, according to the U.S. Environmental Protection Agency's 2004 National Survey on Environmental Management of Asthma and Children's Exposure to Environmental Tobacco Smoke (EPA 2006).

Meanwhile, according to an analysis of the 1999 National Youth Tobacco Survey, 13.4 percent of middle school students and 17.0 percent of high school students reported daily exposure to cigarette smoke while they were in a car (Farrelly et al. 2001). Exposure to ETS in vehicles is an important concern, as levels of secondhand smoke in vehicles can be particularly high, even exceeding levels in bars in which smoking is permitted. Vehicles thus represent an environment in which ETS exposure can be seriously detrimental to an individual's health, particularly to that of a child or infant (OTRU 2006).

Persuading parents to adopt smoke-free policies in their homes and cars provides an opportunity for furthering the multiple goals of tobacco control in a morally compelling context. Clean air rules in homes and cars protect children from highly injurious toxic exposures, facilitate smoking cessation by parents and other family members who smoke, and reduce the rate of smoking initiation by teenagers, especially when clean air laws are combined with parental monitoring and authoritative messages (even by parents who smoke).

Protecting Children from ETS

Not surprisingly, the most important source of ETS exposure to young children is parental smoking (DHHS 2006; Jordaan et al. 1999). National data indicate that although the percentage of U.S. children exposed to secondhand smoke in the home declined substantially throughout the 1990s, about 25 percent of children between the ages of 3 and 11 years still live with at least one smoker (DHHS 2006; TIPS 2006b). Furthermore, young children of smoking mothers continue to be exposed to ETS at a higher level than any other group of nonsmokers (Behan et al. 2005).

Children who are regularly exposed to ETS are at greater risk for a variety of respiratory ailments, including asthma, bronchitis, and pneumonia (AAP 1986; DiFranza and Lew 1996; Etzel 1997; Gortmaker et al. 1982; Mannino et al. 1996). In addition, such children are also at risk of suffering cognitive impairments. Yolton and colleagues, for instance, estimated that more than 21.9 million children are at risk of reading deficits due to exposure to secondhand smoke. They also found that exposure to smoke is associated with deficits in math and visuospatial reasoning (Yolton et al. 2005). Exposure to ETS has also been linked to serious conditions in infants, such as low birth weight and SIDS (ANR 2005; DHHS 2006). The children of smokers also miss more days of school because of illness than the children of nonsmokers (Mannino et al. 1996). Overall, annual health care costs as a direct result of children's passive exposure to tobacco smoke is in the range of \$5 billion (Aligne and Stoddard 1997).

The demonstrable health risks of persistent smoke exposure in the home has led many courts to take parental smoking into account in custody and visitation disputes (see *Pierce v. Pierce*, 860 N.E.2d 1087, Ohio Ct. App. 2006). These orders typically direct smoking parents to refrain from smoking in the home when children are present and sometimes up to 48 hours before they will be present (Banzhaf 2005). Some commentators have argued that, at least under some circumstances, smoking in the home can amount to child endangerment or medical neglect warranting assertion of family court jurisdiction as a basis for mandating changes in parental behavior (Chinnock 2003). Several jurisdictions at both the local and state

levels, meanwhile, have enacted or approved legislation prohibiting smoking in vehicles in which a child is present (Belluck 2007; OTRU 2006).

Reducing Smoking

Not only do household bans benefit children by reducing the adverse health effects from secondhand smoke exposure, but they also lead to reduced smoking and increased cessation by adults as well. Farkas and colleagues have conducted two studies that demonstrate this effect. Smokers who lived under a total smoking ban were more likely to report a quit attempt in the previous year, and those who made quit attempts were less likely to relapse (Farkas et al. 2000). In fact, smoke-free homes are associated with lower rates of smoking prevalence than smoke-free workplaces (Bonta, Appendix B). Similarly, a survey of Oregonians found that a full household smoking ban resulted in a doubling of the odds of a subsequent quit attempt and that for those contemplating a quit attempt (i.e., those with an intention to quit within the next month), a full ban led to a lower relapse rate (Pizacani et al. 2004). Further evidence from a survey of high school students indicates that a more restrictive home smoking policy is associated with a greater likelihood of being in an earlier stage of smoking uptake and a lower 30-day smoking prevalence (Wakefield et al. 2000). The results of studies of households with smoking bans in Australia have been even more dramatic: the odds of quitting smoking were found to be 4.5 times greater in households with a smoking ban (Siahpush et al. 2003). This evidence suggests that the social context of smoking is an important factor for smokers and that eliminating smoking from the living environment increases the rate of smoking cessation.

Reducing Initiation

Household smoking bans also have the effect of reducing smoking among youth, as the effects of parents as role models appear to be a major factor in determining children's future smoking behavior. Studies indicate that 12-year-old children of parents who smoke are roughly twice as likely to begin smoking between the ages of 13 and 21 years as those whose parents do not smoke. Also, in addition to less smoking by parents, stricter family monitoring and rules regarding smoking were related to a lower risk of smoking initiation (Hill et al. 2005). Farkas and colleagues found that adolescents age 15 to 17 years were 74 percent less likely to be smokers if they lived in houses with smoking restrictions (Farkas et al. 2000). Other studies have verified that strong home smoking bans are associated with lower rates of smoking uptake, prevalence, and consumption among teenagers (Wakefield et al. 2000). A panel convened in June 2006 by NIH found in its review of the scientific literature on tobacco use that clean indoor air policies and laws regulating exposure to tobacco smoke have indeed proven

effective in preventing tobacco use among adolescents and young adults (NIH 2006b). In addition, a new Canadian study has raised the possibility that not only do parents influence their children's future smoking behavior by setting an example, but parents may also physically "prime" their children to become smokers by exposing them to nicotine. The study found that the presence of cotinine in the saliva at a young age was a significant predictor of future smoking addiction (Ubelacker 2005).

Recommendation 9: State health agencies, health care professionals, and other interested organizations should undertake strong efforts to encourage parents to make their homes and vehicles smoke free.

The committee believes that a voluntary approach to reducing parental smoking in homes and vehicles is preferable to a legal prohibition. However, the committee does support otherwise appropriate legal interventions in custody or abuse cases involving parents whose smoking endangers the health of their children.

Outdoor Spaces

Smoking in outdoor spaces is the last frontier in the progressive restriction of smoking and can be expected to be controversial. Bayer and Colgrove (2002) and Chapman (2000) doubt that these restrictions can be defended on the basis of ETS exposure by nonsmokers and therefore contend that banning outdoor smoking is unambiguously paternalistic. Moreover, such bans would be difficult to enforce with an equal hand, and their enforcement would likely create a public backlash against smoke-free policies in general (Chapman 2000). Proponents of outdoor smoking restrictions, on the other hand, argue that such measures are scientifically justifiable because the nature of the atmospheric dispersion of ETS will cause nonsmokers to be exposed to equally high or higher levels of ETS in outdoor environments than they are in indoor environments (Repace 2000). Others point out that banning outdoor smoking has additional benefits, aside from reducing exposure to ETS, including reducing the fire risk, decreasing litter, and protecting the public from nuisance (Bloch and Shopland 2000). Concerns about the offensiveness of smoking are especially pronounced in crowded locations (e.g., on crowded beaches or in parks). Furthermore, the declarative effects of enacting and enforcing these restrictions are substantial because they send a powerful message about the social disapproval of smoking, a message that will not be lost on children and adolescents.

Despite the controversial nature of restrictions in outdoor places, there is a growing movement to institute such bans in California, which has

been on the forefront of many innovations in tobacco control. Survey data indicate that a majority of Californians support a ban on smoking in outdoor public places such as parks, beaches, golf courses, and sports stadiums (Gilpin et al. 2004). In November 2003, Solana Beach, California became the first municipality in the county to ban smoking on beaches, and a number of other cities in California have since followed suit. Effective January 1, 2004, the California legislature enacted a ban on smoking within 20 feet of all entrances to government buildings and state university and community college buildings. In addition, on January 25, 2005, San Francisco adopted the most expansive “curb-to-curb” outdoor smoking ban in the state, prohibiting smoking in city parks, plazas, piers, gardens, and recreational fields (Bonta, Appendix B).

Given the competing values at stake, the committee believes that this is an issue that should be resolved at the community level.

Recommendation 10: States should not preempt local governments from restricting smoking in outdoor public spaces, such as parks and beaches.

YOUTH ACCESS

In 1992, Congress enacted the Synar Amendment, aimed at addressing the continuing illegal sales of tobacco to minors. The legislation required that all states enact and enforce youth tobacco access laws and prescribed loss of federal block grant substance abuse and treatment funding as a sanction for noncomplying states. Under regulations subsequently adopted by the DHSS, the states were required to reduce the rate of retailer violations of youth-access laws to 20 percent or less by 2003. In a complementary effort, the Food and Drug Administration (FDA) adopted a comprehensive set of youth-access regulations in 1996 that included a major compliance check program under the auspices of the FDA. As noted above, however, the U.S. Supreme Court invalidated the FDA program in 2000 on the grounds that tobacco regulation was outside the scope of the agency’s authority.

Although every state has baseline legislation prohibiting tobacco sales to minors (usually the restriction of tobacco sales to those younger than age 18 years), both the Synar Amendment and the failed FDA effort reflected the fact that in the 1990s, states and localities were not enforcing youth-access provisions with any vigor. In 1996, once the rules promulgated by the Synar Amendment came into effect, the logical inquiry was whether the legislation would exert an independent positive influence on state and local enforcement practices. In an analysis of 1997 substance abuse block grant applications from all states, DiFranza concluded that “states and DHHS are violating the statutory requirements of the Synar Amendment rendering

it ineffective” (DiFranza 1999). However, in a recent review of the experience resulting from implementation of the Synar Amendment, DiFranza and Dussault (2005) gave a more positive assessment, concluding that the Synar Amendment led to universal adoption of youth-access restrictions, that DHHS pressured some states to embrace compliance testing in lieu of retailer education alone, and that most states made considerable progress in achieving the goal of reducing retailer violation rates in random inspections to 20 percent. They reiterated, however, that some states did not implement the law aggressively and that the federal government failed to put enough pressure on these states to improve their performance (DiFranza and Dussault 2005).

Even though youth-access restrictions are taken more seriously now than they were a decade ago, there is still little evidence that increased retailer compliance has had a meaningful impact on the availability of tobacco to minors or that retailer compliance has had any independent effect in reducing the rates of youth smoking initiation or levels of cigarette consumption. In the late 1990s, a number of studies of communities that engaged in proactive enforcement were conducted. Those studies were aimed at assessing the efficacy of these efforts. Rigotti concluded that “[t]hese studies have yet to provide conclusive evidence that interventions using retailer education or law enforcement alone can change the ease with which young people obtain tobacco products” (Rigotti 2001). The June 2006 NIH state-of-the-science panel on tobacco use, however, listed youth-access restrictions as one of several effective interventions for preventing tobacco use among adolescents and young adults (NIH 2006b).

Although the available evidence does not point toward an optimal level of enforcement for youth-access restrictions, it does seem clear that a visible effort to enforce supply-side access restrictions is warranted, not necessarily because it has substantial independent value but, rather, because it is a complementary component of a comprehensive package of control initiatives. Among other reasons, meaningful enforcement is needed to demonstrate that the public commitment to reducing tobacco use in the critical early years of smoking initiation is not half-hearted (Bonnie 2001). As a previous Institute of Medicine report observed in 1994:

In the long run, the real public health benefit of a reinvigorated youth-access policy lies not in its direct effect on consumer choices but rather in its declarative effects—that is, in its capacity to symbolize and reinforce an emerging social norm that disapproves of tobacco use. Legal restrictions often have important educative effects and thereby help to shape attitudes and beliefs. They do this best when they are congruent with an emergent social norm accompanied by a strong social consensus, precisely the conditions that now exist in the context of tobacco control. . . . Con-

versely, overt failure to implement the youth-access restrictions actually undermines the tobacco-free norm; an unenforced restriction is probably worse than no restriction at all. Unenforced laws convey the message that the intent is not to be taken seriously and thereby undermine school and community attempts to educate youth regarding the serious health consequences of tobacco use. . . . The message should be strong and unequivocal that tobacco use is unhealthful and socially disapproved. Youth-access laws are an essential part of that message (IOM 1994a).

A reasonably enforced youth-access restriction is an essential element of modern tobacco control efforts, and there is, in fact, widespread agreement among tobacco control activists and public health experts regarding the provisions that should be incorporated in a model law (IOM 1994b). The principal guideposts featured in such a program are as follows:

- Establish a minimum legal smoking age of at least 18 years
- Require that retailers establish proof of age by checking identification
- License tobacco retailers
- Require periodic assessments of retailers' compliance
- Establish administrative or civil law penalties for illegal sales
- Prohibit self-service displays of tobacco products

One important question is whether the regulation of youth access should be left exclusively to state control, which has been the traditional approach with the exception of the brief period when the FDA's Tobacco Rule was in force. In the committee's opinion, the main advantage of federal action in this area is that it provides an opportunity to establish a uniform licensing mechanism for the retail sale of tobacco products. The committee therefore endorses revival of the FDA's Tobacco Rule, which prescribes minimum requirements for retailers to prevent sales to minors and allows the states to implement more stringent requirements (see Chapter 6).

Whether or not the FDA's Tobacco Rule is revived, the states should take the following steps to reduce tobacco sales to minors:

Recommendation 11: All states should license retail sales outlets that sell tobacco products. Licensees should be required to (1) verify the date of birth, by means of photographic identification, of any purchaser appearing to be 25 years of age or younger; (2) place cigarettes exclusively behind the counter and sell cigarettes only in a direct face-to-face exchange; and (3) ban the use of self-service displays and vending machines. Repeat violations of laws restricting youth access should be subject to license suspension or revocation. States should not preempt local governments from licensing retail outlets that sell tobacco products.

A considerable number of states and localities currently license tobacco sales outlets. The weak enforcement of youth-access laws in many states, however, suggests that the potential deterrent threat of license suspension or revocation is not being realized. States should adopt a graduated penalty scheme whereby initial offenses are tied to fines but repeat violators face license suspension and revocation. Wherever possible, enforcement authority should reside in a public health agency.

The age verification requirement of the above recommendation follows the mandate contained in the FDA's 1996 Tobacco Rule and should be regarded as a baseline for effective monitoring of compliance. As recommended by the IOM committee in 1994 the FDA's 1996 Tobacco Rule set the federal minimum age requirement for the purchase of tobacco products at 18 years, but left the states free to adopt more stringent regulations, including adopting a minimum age of purchase higher than 18 years. The committee favors that approach, which would be effectuated by the proposed Family Smoking Prevention and Tobacco Control Act (discussed in Chapter 6). Although raising the minimum purchase age on a national basis would stretch the law too far from social reality, states should be permitted to experiment with a 21-year-old minimum age requirement for the purchase of tobacco products.

The remainder of the recommendation fills two gaps in the MSA. The MSA failed to adopt the behind-the-counter mandate prescribed by the FDA's 1996 Tobacco Rule. Placing product displays behind the counter not only prevents shoplifting, largely by youths, but also tends to reduce the likelihood of spontaneous impulse purchases. Similarly, the MSA failed to address the problem of youth access to vending machines, leaving it to the states to enact restrictions. This self-service mode of access to tobacco is an open invitation to violation of the proscriptions on underage sales. In view of the unlikely prospect of adult-only venues being closely policed for potential violations, the committee's strong recommendation would be for an outright ban on vending machine sales of cigarettes. The FDA's 1996 Tobacco Rule endorsed limiting such machines to adult-only facilities, and the 1994 IOM report *Growing Up Tobacco Free* similarly endorsed a ban and cautiously qualified an absolute prohibition by stating that "less restrictive alternatives to a complete ban should be adopted only if shown to be effective" (IOM 1994a).

The committee reaffirms all of the specific recommendations pertaining to youth access recommended by the IOM in 1994, including requiring sales units to contain at least 20 cigarettes (thereby banning so-called kiddie packs or "loosies") and making it an offense for an adult to purchase tobacco products for a minor.

RETAIL SHIPMENTS

The number of Internet tobacco retailers has increased dramatically in recent years (Ribisl, Appendix M) (Parmet and Banthin 2005), generating concerns about minors accessing tobacco products and consumers evading excise tax payments. Those concerns appear to be well founded, as research findings and anecdotal data suggest that both access by minors and avoidance of excise taxes have contributed to the popularity of Internet tobacco vendors. For example, following New York City's increase to \$1.50 in excise tax per pack of cigarettes in 2002, there was an 89 percent increase in cigarettes purchased outside of the city, 18.1 percent of which were purchased over the Internet (Ribisl, Appendix M). Evasion of state excise taxes for Internet tobacco purchases is a pervasive problem. While studies suggest that few minors are now obtaining cigarettes online, researchers believe that as states adopt more restrictive approaches to retail tobacco sales, more youth may seek to purchase cigarettes from Internet retailers (Ribisl, Appendix M).

Regulation of Internet tobacco sales has presented numerous challenges for state officials, particularly because a large number of online tobacco vendors are located either outside of the United States or on Native American tribal lands (Ribisl, Appendix M). Although the federal Jenkins Act requires Native American retailers to report Internet tobacco sales to the applicable state tax administrator to facilitate collection of excise taxes from consumers (Jenkins Act, 2005), investigation and enforcement of Jenkins Act violations have been virtually nonexistent to date (GAO 2002). However, the prospects for state enforcement have recently increased by judicial decisions recognizing states' implied rights of action against online vendors under the Jenkins Act (Banthin 2004; Campaign for Tobacco-Free Kids 2003). In July 2005, a federal judge ordered a tribal Internet seller to provide Washington State officials with its list of customers within the state to facilitate the collection of excise taxes from those residents (Washington State Department of Revenue 2005).

The nature of Internet sales—conducted anonymously and in the privacy of the consumer's home—has also frustrated state efforts to police online sales, as officials have no practical way of ensuring that Internet vendors accurately verify the purchasers' ages. In fact, recent studies have revealed that most Internet tobacco vendors fail to verify their customer's age, and those that purport to do so have largely been ineffective in obtaining age verification. One study found that only 6.3 percent of Internet vendors requested that buyers submit a copy of their photo identification before a sale, and the companies that do require age verification often fulfill the orders submitted without the requested identification (Ribisl, Appendix M). Many online vendors merely require consumers to type in a valid birth date or click on a box indicating that they are 18 years or older (Ribisl,

Appendix M). Alternatively, the website may state that by submitting an order, the customer is certifying that he or she is of legal age to purchase tobacco products (Ribisl, Appendix M). Upon surveying commonly used age verification protocols, researchers have concluded that existing approaches do little to deter minors from purchasing tobacco products online (Ribisl, Appendix M) (Parmet and Banthin 2005).

Given the inadequacy of current point-of-sale age verification for Internet transactions, many states have enacted legislation to prescribe verification requirements. In 2000, Rhode Island became the first state to impose an age-verification requirement on vendors seeking to ship tobacco products into the state (Rhode Island Public Laws. Chapter 321, Section 1. Providence, RI, 1996; Rhode Island Public Laws. Chapter 210, Section 1. Providence, RI, 2000; Parmet and Banthin 2005). Before shipping any tobacco product, retailers must obtain a copy of the customer's government-issued identification, as well as a written attestation from the consumer certifying the accuracy and authenticity of the identification. In addition, the retailer must deliver the product to the address listed on the identification and must use a delivery service that requires the signature of the addressee or another adult (General Laws of Rhode Island, Chapter 392, Section 1. Section 11-9-13.11. Providence, RI, 2005). Since the passage of the Rhode Island law, a number of states have enacted similar legislation, requiring age verification at both the point of sale and the point of delivery of tobacco products, whereas others have imposed additional obligations for Internet retailers. For example, California's youth-access law requires that retailers check back with consumers via a phone call to confirm the delivery of tobacco products and ensure that the consumer's credit card statement reflects that a tobacco purchase had been made (California Business & Professions Code. Section 22963. Sacramento, CA, 2004).

In 2003, Maine imposed age-verification requirements on both retailers and delivery personnel; the law required retailers to use only carriers that deliver packages only to the actual purchaser, require the purchaser to sign for the package, and require recipients to present a valid government-issued photo identification to the delivery person as a condition of and before delivery (Maine Revised Statutes Annotated. Title 22, Sections, 1551, 1555-A et seq. Augusta, ME, 2005). This law was met with resistance by state carrier companies (Kesich 2004), and in May 2005 a federal district court enjoined enforcement of the provisions of the statute applying to carriers, and the Court of Appeals for the First Circuit affirmed a year later (*N.H. Motor Transportation Association v. Rowe*, 448 F.3d 66 (1st Cir. 2006)). The Court of Appeals held that the provision required carriers to determine whether to impose the delivery conditions listed in the statute, thereby delaying the delivery of packages containing tobacco, as well as

other packages, and was preempted by a federal law regulating cargo carriers. Although the federal courts struck down the Maine statute's applicability to carriers, the provisions requiring retailers to request and verify the purchaser's age were unaffected. These restrictions are similar to those imposed by other states, suggesting that courts will continue to uphold state laws that regulate retailers' actions but that do not impose significant requirements on carriers.

To facilitate enforcement of existing legislation regulating online tobacco transactions, state officials have forged private agreements with credit card and delivery companies to restrict Internet sales and delivery of tobacco products. In March 2005, state attorneys general and the federal Bureau of Alcohol, Tobacco, Firearms, and Explosives announced an agreement with all major credit card companies under which the companies promise to prevent their cards from being used in transactions in which Internet vendors fail to comply with age verification requirements or to register their sales with state governments (US Fed News 2005). Although the response by online tobacco companies suggests that the agreement had an initial impact on retailers (Cooper 2005; Michel 2005; Tedeschi 2005), concerns remain that tobacco vendors will circumvent the deal by accepting payments from third-party payment processing companies that will serve as intermediaries between the credit card companies and the online retailers (National Journal Group 2005).

The difficulties of enforcing age verification and tax collection requirements have led some states to prohibit Internet sales and shipments of tobacco to consumers altogether. In 2000, New York State enacted Public Health Law 1399-II, which prohibits direct shipment of cigarettes to state residents and bans carriers from transporting such shipments (2005). Brown and Williamson challenged the constitutionality of the law, but the Second Circuit Court held that any burden on interstate commerce was significantly outweighed by the statute's benefits, and therefore the law did not violate the Commerce Clause (Brown & Williamson Tobacco Corp. v. Pataki, 320 F.3d 200, 2d Cir. 2003). Of course, the problem of enforcement remains. In July 2005, the New York attorney general announced an agreement between the state and the DHL courier company in which the carrier agreed to stop shipping cigarettes directly to residents (Times Wire Services 2006).

State attorneys general have had considerable success in forging agreements with carriers to end the shipment of tobacco products purchased over the Internet. In November, 2005, UPS announced that it would stop delivering cigarettes bought online (UPS Reviews 2005). Federal Express maintains a policy of shipping only between licensed dealers or from a distributor to a dealer and will not ship directly to consumers (Times Wire Services 2006; Tuttle 2006). However, the U.S. Postal Service declined a request by the National Association of State Attorneys General to cease

shipping cigarettes directly to consumers (Kempner 2005), on the grounds that it was not able to inspect mail without a search warrant and that it would be impractical for postal clerks to decide which packages to accept or reject (Cooper 2005). In June 2005, after these failed negotiations with the U.S. Postal Service, Rep. John McHugh of New York introduced legislation that would forbid carriers from transporting cigarettes and other tobacco products and would impose a \$100,000 fine for each violation (Ovarian Cancer Research and Information Amendments of 1993. H.R. 2810, 103rd Congress, 1993).

In the committee's view, given the difficulty of policing Internet tobacco transactions and constitutional barriers to additional, state-imposed delivery requirements, the only practical way to effectively regulate online tobacco retailers is through legislation prohibiting both online tobacco sales and shipment of tobacco products directly to consumers. This approach is supported not only by the states' interests in reducing sales to youth and facilitating excise tax collections, but also by the states' more general interest in reducing the convenience of tobacco purchases and thereby reducing consumption (see discussion of the goal of transforming the retail tobacco market in Chapter 6). Statutes restricting direct shipment of alcoholic beverages provide a precedent for such legislation, as most states either explicitly prohibit direct shipment of alcoholic beverages to consumers or do so practically by requiring that all transactions for alcoholic beverages take place within the state's licensed distribution system (see Kinney, Appendix I). Under a similar legislative scheme, shipment of tobacco products would be restricted to licensed wholesale or retail outlets, and consumers would be permitted to purchase these products only in face-to-face transactions in licensed retail settings.

Recommendation 12: All states should ban the sale and shipment of tobacco products directly to consumers through mail order or the Internet or other electronic systems. Shipments of tobacco products should be permitted only to licensed wholesale or retail outlets.

PREVENTION INTERVENTIONS

The most fully developed programs for preventing tobacco use by youth have been implemented in school settings. School-based programs will remain the mainstay of group-oriented or individually-oriented prevention activities. The committee also believes, however, that investing in programs for families and health care providers is warranted, even though the evidence base remains thin. Support for these efforts should be augmented as the evidence base develops.

School-Based Interventions

Reviews and meta-analyses of school-based prevention have produced mixed results. On the one hand, meta-analyses have established that school-based prevention programs that are interactive, that teach about social influences, and that provide opportunities to learn and practice social skills have an average effect size of 0.24, which represents a 12 percent reduction in the rate of initiation of smoking among adolescents. On the other hand, some programs purporting to be of the same nature, such as Drug Abuse Resistance Education (see the meta-analysis by Ennett et al. [1994]) and the Hutchinson project (Peterson et al. 2000) have produced no significant effects.

The NIH's June 2006 state-of-the-science panel noted that previous research showed the short-term effectiveness of school-based interventions in preventing tobacco use among adolescents (NIH 2006b). Wiehe and colleagues (2005) conducted a meta-analysis of eight studies with individuals in 12th grade or age 18 years or older at follow-up and reported that only one program, Life Skills Training (Botvin and Eng 1982) produced significant long-term effects (Wiehe et al. 2005). Skara and Sussman (2003), meanwhile, found 25 studies with long-term follow-up, 15 of which reported effects 2 or more years after the intervention, with an average relative reduction of 11.4 percent (Skara and Sussman 2003). That review also indicated that program effects were less likely to decline if programs included extended programming or booster sessions in high school.

Findings from Prevention Programs That Are School-Based Only

The reviews cited above suggest that only those programs that included 15 or more interactive sessions in middle school, that taught about social influences, and that provided opportunities to learn and practice social skills are effective in the long term. In a review prepared for this report, Flay (Appendix D) found descriptions of three such school-based programs (the Tobacco and Alcohol Prevention Project [TAPP], Life Skills Training, and Project SHOUT [Students Helping Others Understand Tobacco]) that produced an average short-term (grade 8 or 9) relative reduction in smoking onset of 22 percent that increased to 28 percent at long-term follow-up (grades 10 to 12).

TAPP (Hansen et al. 1988) was a 15-session social-influences-oriented program developed in the early 1980s. The core components of the social influences approach have been employed in many evaluated programs and Hansen (1988) provides a good description of the theory and content of this approach. It has two main core elements: (1) resistance skills training to teach skills to resist the specific and general social pressures to smoke, and

(2) normative education to correct student misperceptions of prevalence and acceptability of use. Programs using this approach also often involve active learning or the use of the Socratic or dialectic teaching approaches, open discussion, the use of peers or older admired youth as instructors, and behavioral rehearsals to ensure that skills are learned well. TAPP included the above core elements plus inoculation against mass media messages, information about parental influences, information about the consequences of use, and the making of a public commitment not to smoke. Peer opinion leaders were used to assist teachers with program delivery.

TAPP was evaluated in two cohorts of seventh grade classes in a non-randomized study in Los Angeles County. Only cohort 1, conducted in two moderately-sized school districts, was followed into grade 10. Health education and social studies teachers received 2 days of training prior to delivering the program. By the end of eighth grade the relative reduction (RR) in past-month smoking was 26.2 percent. By the end of grade 10 there was a 19.1 percent RR in past-month smoking and 18.3 percent RR in ever smoking. In a secondary analysis of only those students present at all waves of the study, the RR in past-month smoking was 43 percent.

This was an early study of the social influences approach, and it demonstrated that the approach can be very effective. The use of peer leaders probably enhanced what program effects would have occurred with teacher-only delivery (Klepp et al. 1986, Tobler 1992). The whole-sample result is preferred as the initial estimate of program effects because it provides a more realistic assessment of what would happen under real-world conditions; however, note that the larger effect obtained for students present throughout the study could be obtained if all schools were to implement the program faithfully.

Life Skills Training (LST) is one of the most researched school-based smoking prevention or any other kind of substance use prevention program. Developed by Gil Botvin (Botvin and Eng 1982), LST consists of 30 classroom sessions with 15 delivered in grade 7, 10 in grade 8, and 5 in grade 9 (usually the first year of high school). The program was designed to teach students a wide array of personal and social skills. These include content similar to other smoking prevention programs that focus on social influences (Glynn 1989; Hansen 1988), including learning and practicing refusal and other assertion skills, information about the short- and long-term consequences of smoking, correction of misperceptions of the prevalence of use by same-age peers, and information about the decreasing acceptability of smoking in society. Other generic program content addresses the development of communication skills and ways to develop personal relationships.

Multiple studies over 25 years have demonstrated the effectiveness of the LST program when delivered by different providers, in different kinds of schools, and for different kinds of students (Botvin 2000; Botvin and Griffin

2002). Only one study has included medium-term follow-up through high school (Botvin et al. 1995). This was a follow-up of the largest single trial, conducted in 56 suburban and rural schools serving largely (91 percent) white students in three geographical regions of New York State (Botvin et al. 1990). Schools were assigned randomly to two experimental conditions (one day or video-taped teacher training) or a control condition. Level of implementation ranged from 27 to 97 percent by teacher reports, with about 75 percent of the students receiving 60 percent or more of the intervention. Six program schools and 18 percent of the students were excluded from the analysis of program effects because of poor implementation. At the end of grade 9 the RR was a relatively small 8.9 percent (1.63 percent versus 1.48 percent) for weekly smoking, reflecting the low prevalence of weekly smoking at this age. At the end of twelfth grade, the RRs were 19.7 percent (33 percent versus 26.5 percent) and 20.4 percent (27 percent versus 22 percent) for monthly and weekly smoking, respectively. For the high-implementation group, the medium-term RRs were both 28 percent. However, the RRs for the (almost) complete sample provide the most appropriate estimate of what effects could be obtained under real-world conditions—indeed, they may still be an overestimate of the effects that might be obtained when the program developer is not involved—although larger effects might be obtained with full, high-quality, implementation.

Independent evaluations of LST have found similar or larger short-term effects. In a nonrandomized trial in Spain, where the program was delivered by teachers to grade 9 students, a 21 percent RR in average monthly smoking at the end of grade 10 reduced to 11 percent by the end of grade 12 (Fraguela et al. 2003). Independent evaluations of LST in Midwestern states found a short-term RR of 22 percent in a randomized trial in rural Iowa (Spoth et al. 2002; Trudeau et al. 2003) and short-term RRs of 43 percent in current smoking and 9 percent in ever-use in Indianapolis (Zollinger et al. 2003). Another small-scale (three schools per condition) randomized evaluation in Pennsylvania found small immediate effects for girls only, and these had decayed by the end of grade 7 and were no longer apparent by the end of grades 8–10 (Smith et al. 2004). In a nonrandomized trial of a German adaptation of the life skills approach in 106 German-speaking elementary schools in Austria, Denmark, Luxembourg, and Germany, a 10 percent RR in ever smoking and less than 1 percent RR in past-month smoking were reported (Hanewinkel and Asshauer 2004).

Project SHOUT (Eckhardt et al. 1997; Elder et al. 1993) used trained college undergraduates to teach 18 sessions to 7th and 8th graders that included information on the health consequences of smoking, celebrity endorsements on nonuse, the antecedents and social consequences of tobacco use, decision making, resistance skills advocacy (writing letters to tobacco companies, magazines, and film producers; participating in community ac-

tion projects designed to mobilize them as antitobacco activists), a public commitment to not use tobacco, and positive approaches to encouraging others to avoid tobacco or quit. A unique aspect of this program was the use of newsletters and individualized phone calls in later grades. In 9th grade, five newsletters were mailed to students and two to their parents, and each student received four phone calls from trained undergraduate counselors that were individually tailored to their tobacco use status at the end of 8th grade or the prior phone call. During 11th grade approximately half of the students received two more newsletters that focused on tobacco company tactics to recruit new smokers; information on recent city, state, or national legislation regarding tobacco; cessation advice; and information on secondhand smoke. They also received one phone call that focused on eliminating smoking in restaurants and other public places, and the rights of customers and employees in those places affected by the potential ban.

The program was evaluated in 22 schools with ethnically diverse populations in the San Diego area, some suburban and some rural. Schools were assigned randomly to program and control conditions after matching on pretest levels of tobacco use. Effects observed at the end of grade 8 (14.6 percent versus 10.8 percent, RR = 22 percent) were not statistically significant. However, by the end of grade 9 the intervention produced a relative reduction in tobacco use in the past month of 30.3 percent (19.8 percent versus 13.2 percent). By the eleventh grade, the average RR was 44.1 percent (12.6 percent versus 7 percent). For the group that did not receive the grade 11 intervention, the RR decayed to only 9.5 percent. The pattern of effects observed for this study suggests that much of the medium-term effect was due to personal attention via newsletters and phone calls in grades 9 and 11. Indeed, one has to wonder if the personal attention set up a response bias among respondents, such as those who received personalized newsletters and phone calls were motivated to tell the researchers what they wanted to hear; however, lack of a differential response rate to the surveys by condition speaks against this, at least in part. Considerable research suggests that the power of similar-age peers and the power of college-age counselors for high school students should not be underestimated. Although the cost of the intervention as studied was kept down by the use of volunteer students, it is not clear how easily this model can be disseminated. The results also strongly suggest, however, that even a brief intervention during high school was enough to actually increase the effect observed at the end of grade 9.

Results from three social influence and social competence programs with 15 or more sessions over 2–4 years, preferably with some content in high school, had significant medium-term effects (i.e., at grades 10–12): an average of a 27.6 percent (range 18.7–44.1) relative reduction in smoking. The extraordinary effects of Project SHOUT may have been due to the added content on tobacco industry activities, the teaching and encourage-

ment of advocacy skills, and the personal attention. These results need to be replicated. The medium-term effects suggest that a minimal personal contact intervention of this kind in high school could increase the effects of any other program delivered in middle school.

Findings for School Plus Community/Media Programs

The reviews cited above (plus that of Flay [2000]) also suggest that the addition of mass media or community-based components to such programs can increase their effectiveness. Flay (Flay, Appendix D) found four such programs (North Karelia, Minnesota Class of 1989, the Midwestern Prevention Project, and the Vermont mass media and school project) and they produced a 40 percent relative reduction in smoking onset in the short term that fell to 31 percent at long-term follow-ups. The maintenance of such programs might keep their effectiveness levels as high as 40 percent.

Vartiainen and colleagues (1983, 1986, 1990, 1998) tested a 10-session social influences program delivered by trained health education teachers and peer leaders in the province of North Karelia, Finland. A community-wide heart disease prevention program and mass media campaign modeled on the Stanford three-cities project (Farquhar et al. 1977) was going on throughout North Karelia at the same time. Two schools received the 10-session program from the project health educator and trained peer leaders and two schools received a 5-session version from regular teachers. Two schools from another province, where there was no prevention program, were used as controls. At the end of grade 9 the RR (average of lifetime, monthly, and weekly) was 44.6 percent (for both program conditions), which decayed to 38.7 percent by grade 11. By 3 years beyond the end of high school, the RR had decayed to 22.9 percent in the health educator condition and 37.3 percent in the teacher condition; by 10 years beyond high school, the average RR was 20 percent with the two conditions not significantly different. These results can only be interpreted as the joint effects of the school-based smoking prevention program and the community-wide heart disease prevention campaign (which had a reduction of smoking as one of its targets). Thus these results suggest effects that are larger than those of the school-based programs reviewed above. The larger effects obtained by regular teachers suggests that programs might be more effective when delivered by regular classroom teachers than when delivered by visitors to classrooms, possibly because of the ongoing relationships that teachers establish with students. However, the long-term effects were no different.

The Minnesota Class of 1989 project was another in which a school-based prevention curriculum was tested in the context of a community-wide heart disease prevention program (Perry et al. 1989). The community pro-

gram consisted of community education—including mass media—and organization activities—including screening, cessation clinics, and workplace education—designed to reduce three cardiovascular risk factors: smoking, cholesterol levels, and blood pressure (Luepker et al. 1994; Mittelmark et al. 1986). The school-based smoking prevention program (Perry et al. 1992, 1994) was based on the Minnesota Smoking Prevention Program (Arkin et al. 1981; Murray et al. 1994), one of the early social influences programs, and included material on diet and exercise as well as tobacco. Seven sessions on smoking prevention were delivered by peer leaders assisted by teachers in 7th grade. In 8th and 9th grades an additional 10 sessions concerning tobacco use were delivered by teachers. The classroom components were supplemented by the development of health councils through which students participated in other cardiovascular risk reduction projects.

The smoking prevention program was evaluated with a design in which students in all of the schools in one community received both the community-wide cardiovascular intervention and the school-based smoking prevention program, and students in all the schools in another community did not. All students in one cohort were surveyed every year from grade 6 to grade 12. As in all school-based studies, attrition occurred continuously over the 6 years, and by grade 12 only 45 percent of the original participants were surveyed. There were no differences in smoking rates at sixth grade. By the end of seventh grade, after the core smoking prevention content had been delivered, weekly smoking prevalence was about 40 percent lower in the program condition, and this effect was maintained through 12th grade, 3 years after the end of direct smoking prevention instruction and a year after the end of general community education.

Like the North Karelia project, this study demonstrates that school-plus-community programming can have substantial effects that are maintained to a large extent through the end of high school.

The Midwestern Prevention Project (also known as Project STAR, Students Taught Awareness and Resistance) tested a school-plus-community (and mass media) version of the social influences approach in eight communities in the Kansas City metropolitan area. The school-based component consisted of 10 sessions delivered by classroom teachers to 6th or 7th grade students (depending on the year of transition to middle school) and 5 sessions delivered the following year (when a parent-involvement component was also implemented). Of these schools, 8 were assigned randomly to conditions, 24 other schools elected to deliver the program and 18 others elected to wait till after the project. Mass media programming was available to all communities every year. Other community-based programming started in the third year and likewise was available in all communities. At the 2-year follow-up, the RR was 37.5 percent (Pentz et al. 1989). By grades 9–10, it was 18 percent (Johnson et al. 1990). These results are difficult to

interpret because all students were exposed to the mass media and community components. The mass media programming, in particular, would be expected to reduce the difference between groups because the control group would no longer be a real control, and it might have reduced students' rate of onset relative to if they had not been exposed to the community program. This might explain the relatively fast decay.

The Vermont Mass Media Project tested the effectiveness of a mass media social influences smoking prevention program when delivered in the context of a school-based program. Worden and colleagues (1988) undertook a careful development process to develop television and radio spots that would discourage cigarette smoking by adolescents. They randomly assigned two communities to the program condition (mass media plus school) and two matched communities to a school-only condition. There was no true control group. In the program communities, they purchased the time for airing the spots (734 TV spots in year 1 decreasing to 348 by year 4, and 248 radio spots in year 1 increasing to 450 by year 4) and provided schools with the school-based program (four sessions in each of grades 5–8 and three sessions in each of grades 9 and 10—each student in the study cohort was exposed to 4 years of program during grades 5–8, 6–9, or 7–10) and teacher training to deliver them. Neither schools nor students were told about the media programming, and the mass media programming never mentioned the school program. Thus, as far as students were concerned, there was no linkage between the two programs.

The RRs in weekly smoking among the school plus mass media program group compared to the school-only program group were 36.6 percent (14.8 percent versus 9.1 percent) at the end of the program (grades 9–11) and 28.8 percent 2 years later at grades 10–12 (Flynn et al. 1992, 1994, 1995). Larger effects were observed for daily smoking—44 percent RR at the end of the program and 36 percent a year later. It is difficult to estimate what the effects of the school-only program might have been, and, therefore, the relative contributions of the school and mass media programming. Nevertheless, this study demonstrates that well-designed media programming can produce large effects above those of the school-only program, about 80 percent of which are maintained for at least 2 years.

Summary Regarding School-Based Prevention

Flay (Appendix D) suggested, in part on the basis of the results described above, and after making adjustments for levels of adoption and implementation, that the implementation of effective school-based programs in the nation's schools could reduce smoking onset by age 24 by 10 percent, and that effective school-based programs combined with coordinated

complementary mass media or community programming could reduce the rate of smoking onset by age 24 by 20 percent.

Recommendation 13: School boards should require all middle schools and high schools to adopt evidence-based smoking prevention programs and implement them with fidelity. They should coordinate these in-school programs with public activities or mass media programming, or both. Such prevention programs should be conducted annually. State funding for these programs should be supplemented with funding from the U.S. Department of Education under the Safe and Drug-Free School Act or by an independent body administering funds collected from the tobacco industry through excise taxes, court orders, or litigation agreements.

Parent- or Family-Based Interventions

Extensive research shows that youths reared in homes in which parents have authoritative parenting styles characterized by warmth and involvement, clear and firm boundaries, and active monitoring are less likely to engage in health risk behaviors, including tobacco use (Andersen et al. 2004; Chassin et al. 2005; Clark et al. 1999; Cohen et al. 1994; Kerr and Stattin 2000; O’Byrne et al. 2002; Simons-Morton et al. 2004; Stattin and Kerr 2000; Steinberg et al. 1994). Research also shows that youth are more likely to smoke if their parents or others in the household smoke. Despite compelling evidence showing associations between parent smoking and adolescent smoking (Chassin et al. 1996; Fagan et al. 2005; Flay et al. 1998; Jackson and Henriksen 1997; Simons-Morton et al. 2004; Tilson et al. 2004), few adolescent tobacco interventions include a parent or family component and little research has evaluated the effects of parent- or family-based interventions. Moreover, the available intervention studies have serious methodological limitations, including the fact that they have small sample sizes that typically include parents who are already motivated, they have little likelihood of being faithfully replicated, and they assess only short-term outcomes.

Some interventions have been successful at increasing parent-child communication about the risks associated with tobacco and the reasons not to smoke. Programs have also had some success at changing attitudes toward smoking among youth and knowledge about tobacco through parental influences and communication between parents and their children. Few interventions and evaluations have been aimed at increasing parental monitoring of health risk behaviors, and even fewer studies have examined whether changes in parental behaviors and increased parent-child communication about tobacco use results in changes in actual youth smoking behaviors.

Those few studies that have been conducted, however, have shown mixed results, with most showing no positive effect of these activities on smoking initiation or cessation rates.

Part of the explanation for the relative lack of parental interventions is that research has not focused on identifying the causal mechanisms and processes by which parents influence their children's tobacco use to produce practical applications. It is plausible that parents can directly prevent their children from smoking by monitoring and restricting their activities, restricting their access to tobacco, and discouraging or disallowing their children from associating with peers who use tobacco. Alternatively, parents might have an indirect effect on adolescent tobacco use by spending time discussing tobacco-related risks with their children and suggesting alternative activities in which their children might engage (Halpern-Felsher, Appendix G).

In the absence of more substantial evidence, the committee is reluctant to include any definitive recommendation on parental and family interventions in this blueprint, aside from recommending that increasing the proportion of smoke-free homes be included as a marker of progress in tobacco control efforts. Instead, the committee emphasizes the need for more evaluation of parent interventions and their effects on youth smoking behaviors. The committee also recommends more research on how and why parental monitoring of their children's activities and other means of involvement in their children's lives might influence youth behavior. Such mechanistic information will allow determination of the most proximal influences on youth behavior that can be translated into parental interventions.

Health Care-Based Interventions

In addition to providing primary health care for children, adolescents, and families, the annual health visit provides a potentially pivotal opportunity for physicians to provide clinical preventive services that can reduce children's and adolescents' engagement in health risk behaviors, including tobacco use. As such, a number of national guidelines concerning physicians' provision of preventive services have been developed (e.g., Guidelines for Adolescent Preventive Services; Bright Futures; Guidelines for Health Supervision of Infants, Children, and Adolescents; Health Supervision Guidelines; The Clinician's Handbook of Preventive Services: Put Prevention into Practice; and Guide to Clinical Preventive Services).

In general, these guidelines recommend that all children and adolescents have an annual health care visit during which all patients receive confidential preventive services, including screening, education, and counseling in a number of areas such as the biomedical, emotional, and sociobehavioral aspects of their lives (e.g., alcohol and tobacco use, sexual behavior, violence, and

safety). Furthermore, the guidelines recommend that pediatricians discuss substance use as part of routine health care during prenatal visits (Kulig 2005). The guidelines suggest that, in addition to inquiring about tobacco use in general, physicians should specifically query youth about the extent to which they use tobacco; about the settings in which they use tobacco; and whether their tobacco use has had a negative impact on their social, educational, or vocational activities (Kulig 2005). Furthermore, physicians should ask their patients about tobacco use in the home, including whether the child's parents, siblings, or other members of the household use tobacco (Kulig 2005). Health care providers need to encourage smoke-free homes and provide guidance and assistance to parents and youth on the various means of smoking cessation, including counseling and the use of nicotine replacement products and other pharmacological treatments.

Despite these guidelines, research shows that physicians' rates of patient screening, educating, and counseling on tobacco use during routine visits are less than optimal. Physicians cite a number of barriers to their provision of clinical preventive services such as (1) their large number of patients, resulting in constraints on the amount of time that they may spend with each patient; (2) inadequate reimbursement relative to the time and effort required to provide such services; (3) fear of alienating patients and their families; (4) insufficient education and training; (5) a lack of dissemination to physicians of research supporting positive tobacco treatment outcomes and the negative effects of the failure to intervene; and (6) a lack of information about how to access referral and treatment resources (Kulig 2005). Research also suggests that whether physicians do, in fact, screen their adolescent patients about their tobacco use may be related to their overall willingness to deliver preventive services (Ozer et al. 2004).

Recent research indicates that the rates of screening, educating, and counseling of youth about tobacco use during routine medical exams can be significantly increased through skills-based training of health care providers and the implementation of clinical administrative tools, such as reminders and charting forms. Little research has been conducted, however, on whether increased rates of screening, educating, and counseling by physicians result in reduced rates of tobacco initiation or greater rates of cessation (Halpern-Felsher, Appendix F).

In addition to primary health care visits, another time in which health care providers can be effective in screening for tobacco use and referring smoking cessation is during an emergency room (ER) visit. Smokers are disproportionately more likely to visit an ER compared with nonsmokers, accounting for 40 percent of adult patients attending ERs (Boudreaux et al. 2005; Lowenstein et al. 1995). Children and adolescents raised by caregivers who smoke are also more likely to visit an ER, especially for respiratory-related illnesses such as asthma or bronchitis. Beyond acute or

emergency care needs, ERs are increasingly used by adults as their primary source of health care (Bernstein et al. 1997; Lowenstein et al. 1995). Therefore, the ER visit provides a timely and convenient opportunity, as well as the relevant patient population, for smoking screening and cessation efforts. Bernstein and Cannata (2006) showed that smokers who visit an ER have at least some interest in quitting, and that the motivation to quit is highest among patients who believe that their purpose for the ER visit is due to a smoking-related illness.

Citing these and other statistics on tobacco use among ER patients, guidelines (e.g., a joint task force comprised of individuals from the American College of Emergency Physicians, Council of Emergency Medicine Residency Directors, Emergency Medicine Residents Association, and Emergency Nurses Association; see Bernstein et al., in press) have been developed, and recommend that emergency room health care providers screen, counsel, and refer patients who smoke to cessation programs, with particular emphasis placed on referring patients to the national smokers' Quitline. Despite these recommendations, tobacco screening and referral among ER health care providers is low. While ER providers are more likely to inquire about tobacco use, they are much less likely to inquire about their patients' desire to quit or to advise or refer smoking cessation. For example, Vokes et al. (2006) showed that only 56 percent of ER patients were screened about their smoking status, with higher rates of screening for patients who had a tobacco-related illness. While 56 percent of patients who smoke were advised to quit, only 13 percent were provided with a smoking cessation referral.

Tobacco-related preventive services in the ER setting may be met with some resistance in part because ER providers do not believe that they are the correct source for initiating smoking cessation efforts. Instead, ER providers view primary health care providers as responsible for screening, counseling, and treatment concerning tobacco use (Bernstein and Cannata 2006). ER providers also feel reluctant to provide tobacco-related intervention because of perceptions that such brief interventions are not efficacious or that they have limited time for such provision of care (Bernstein et al. 2006). Nevertheless, Schroeder and other researchers argue that smoking prevention and cessation should take place for all smokers during all ER visits, and can be accomplished in a brief, 30-second intervention in which ER providers "ask, advise, and refer" their patients, with referral being to the national Quitline (Bernstein et al. 2006; Schroeder 2006; Vokes et al. 2006).

Tobacco-related screening and intervention efforts are not limited to the physician, nor do they need to be conducted solely through direct patient-provider communication. Triage or treatment nurses, social workers, health educators, and trained peer counselors can also deliver the messages. Tobacco screening, advice, and referral can be conducted through direct communica-

tion or through computerized self-assessments, kiosks in the waiting rooms, or brochures provided throughout the ER departments (see Bernstein et al., in press, for a review). These efforts can also be extended to pediatric emergency rooms, in which screening and cessation efforts can take place directly with youths who might be smoking as well as with their caregivers. Providing the clear message about the effects of second-hand smoke on children, especially when a child presents to the ER with respiratory illness, is likely to be a powerful deterrent.

Empirical data showing the efficacy of providing tobacco screening, counseling, and referral in the ER setting is limited and an inadequate number of studies have been conducted to inform the development of ER interventions. Nonetheless, evidence is accumulating suggesting that ER visits can indeed be a source of public health interventions (e.g., injury prevention), and that this public health message can be extended to tobacco cessation as well.

Notwithstanding the absence of evaluation research, the committee is persuaded by the uniform endorsement of clinical guidelines and by the general literature on physician interventions that the increased use of preventive interventions by physicians and other primary care providers during routine, acute, and ER visits for youth and adults is a worthwhile investment. For this reason, the committee believes that physicians, dentists, and other health care providers should screen and counsel their patients about their tobacco use, not only during annual health visits, but also in any other clinical context in which health screening is being undertaken, such as in emergency rooms.

Recommendation 14: All physicians, dentists, and other health care providers should screen and educate youth about tobacco use during their annual health care visits and any other visit in which a health screening occurs. Physicians should refer youth who smoke to counseling services or smoking cessation programs available in the community. Physicians should also urge parents to keep a smoke-free home and vehicles, to discuss tobacco use with their children, to convey that they expect their children to not use tobacco, and to monitor their children's tobacco use. Professional societies, including the American Medical Association, the American Nursing Association, the American Academy of Family Physicians, the American College of Physicians, and the American Academy of Pediatrics, should encourage physicians to adopt these practices.

MEDIA CAMPAIGNS TO PREVENT SMOKING

Media campaigns have recently been used as an important measure to reduce initiation of tobacco use. Before we review them and the evidence of effectiveness, we comment on the Fairness Doctrine campaign, one of the first and one of the most effective tobacco control interventions, which focused on adult smokers.

The Fairness Doctrine Campaign

In the early decades of television broadcasting, media outlets allotted little airtime to educating the public about the health risks of tobacco use, whereas cigarette advertisements appeared on the airwaves with great regularity (Warner 1985). In 1967, however, the Federal Communications Commission (FCC) issued a ruling that required stations airing cigarette commercials to also provide airtime for antismoking messages. The FCC based its decision on the so-called Fairness Doctrine, which required broadcasters to offer balanced coverage of controversial issues of public importance (Cummings and Clarke 1998a; Farrelly et al. 2003).

The FCC's ruling resulted in the implementation of television's first major antismoking campaign. Between 1967 and 1970, public service announcements (PSAs) on the health consequences of tobacco use appeared on television, often during prime time viewing hours, which was a rarity for non-revenue-producing spots (Cummings and Clarke 1998a). Advocates of antismoking media campaigns have pointed to the leveling off of cigarette sales during that time period and to television viewers' increased knowledge of the health risks of tobacco use as evidence of the PSAs' effectiveness (Cummings and Clarke 1998b; Farrelly et al. 2003; Warner 1979, 1985). According to Warner, between 1967 and 1970 (when the antismoking messages mandated by the Fairness Doctrine appeared on the airwaves), per-capita cigarette consumption decreased with each successive year. This represents the first 4-year decline in per-capita cigarette consumption in the 20th century (Warner 1979, 1985). In comparing the actual annual per-capita cigarette consumption to predictions of what the level of consumption would have been if the antismoking initiatives of the 1960s and early 1970s had not taken place, Warner found that the antismoking PSAs that aired from 1968 to 1970 were associated with a significant decline in the level of cigarette consumption. He concluded that had the FCC not mandated antismoking messages, the predicted level of consumption would have been 19.5 percent greater than the actual level of consumption (Warner 1977).

By January 1971, however, federal laws banning the advertisement of cigarettes on television and radio had come into effect, and the FCC could no longer require media outlets to donate airtime for antismoking PSAs

under the Fairness Doctrine. Consequently, the number of PSAs addressing tobacco use declined drastically over the next two decades (Cummings and Clarke 1998b; Dorfman and Wallack 1993). In the end, no other large-scale national antismoking media campaign would occur for almost 30 years (Farrelly et al. 2005).

State Campaigns

During the 1990s, the antismoking media campaign emerged as a key component of many states' tobacco control efforts. California, Florida, and Massachusetts organized some of the earliest and most prominent statewide media campaigns (Pechmann and Reibling 2000), with a number of other states following suit in the latter part of the decade. Noting the importance of these state-funded antismoking media campaigns in preventing tobacco use, in 2005 the CDC reported the estimated monthly exposure of adolescents to anti-tobacco advertisements in 37 states and the District of Columbia between 1999 and 2003. The CDC study found that exposure to the media campaigns among adolescents increased considerably between 1999 and 2002, but then dropped in 2003 when states across the country, facing serious budget crises, scaled back or eliminated their antismoking media campaigns. Noting that the lack of substantial change in youth smoking prevalence between 2002 and 2004 might have been attributable to reduced exposure to antismoking media campaigns, the CDC called on states to better ensure that adolescents are exposed to state-funded antitobacco advertisements. In its review, the CDC study highlighted the discouraging declines in expenditures in Florida and Massachusetts, and to a lesser extent California, given these three states' early dedication to funding antismoking media campaigns (CDC 2005f).

California

California launched its media campaign in April 1990 as one part of the newly established CTCPC. Californians voted in November 1998 to increase the tax on cigarette sales by 25 cents per pack, and approximately 20 percent of the revenue earned from that tax was allotted to the Health Education Account to fund the media campaign and other educational initiatives (Stevens 1998). At the time of its inception, the campaign was the largest and most expensive statewide antismoking media campaign in the United States and featured paid advertisements in a wide variety of media, including television, radio, billboards, and newspapers (Popham et al. 1993, 1994a; Stevens 1998).

During the campaign's initial phase (April 1990 through June 1991),

CDHS spent more than \$28.6 million and produced more than 50 television spots, 50 radio announcements, 20 outdoor advertisements, and 40 newspaper advertisements (Popham et al. 1994a). The campaign initially focused on achieving two main goals: (1) increasing general awareness of the dangers of secondhand smoke and (2) convincing the public that the tobacco industry had employed manipulative strategies in marketing its products (Stevens 1998). To achieve the second goal, CDHS developed advertisements holding the tobacco industry responsible for smoking-related deaths and disease. “Industry Spokesperson,” one of the first ads aired in the campaign, portrayed a group of tobacco industry executives discussing the need to recruit new smokers to replace those that had either quit or died from smoking. The advertisement closes with the cynical declaration, “We’re not in this business for our health” (Stevens 1998). Another advertisement, “Testifiers,” exposed the industry’s attempts to minimize the public’s knowledge about the health consequences of smoking. Representatives of the tobacco industry were shown giving circuitous testimony and denying the adverse health effects of smoking (Dorfman and Wallack 1993). The strategy of exposing the tobacco industry’s marketing methods has since emerged as a central theme in other state and national media campaigns (Farrelly et al. 2005).

Despite the large financial investment that the state made during the first 15 months of the media campaign, funding levels fluctuated throughout the rest of the 1990s. Per-capita annual expenditures stood at about 50 cents between 1990 and 1993, fell to about 35 cents between 1994 and 1996, and then rose to about 90 cents from 1997 to 1998 (Friend and Levy 2002). Furthermore, in the latter half of the decade, California’s media campaign lost one of its most effective tools when the state prohibited the airing of advertisements that attacked the tobacco industry. In 2001, however, a newly integrated media campaign once again featured the failings of the industry (Givel et al. 2001).

Because antismoking media campaigns generally constitute just one element of statewide comprehensive tobacco control programs, evaluating the direct effects of such campaigns can be difficult. The studies that have looked specifically at California’s media campaign, however, have indicated that it has proven somewhat effective in altering tobacco-related attitudes and behavior. In evaluating the first year of the campaign (1990–1991), Popham and colleagues (1994) collected and analyzed data from the campaign’s two main target groups, students in grades 4 through 12 and adult smokers. Although they reported some mixed results, Popham and colleagues pointed to increased levels of campaign awareness and desired changes in attitudes relating to health and smoking among youth as evidence of the campaign’s beneficial impact (Popham et al. 1994b). In a

1995 study, Hu and colleagues (1995) sought to disentangle the effects of the media campaign from the effects of other factors that may have played a role in reducing tobacco use in California in the early 1990s. Controlling for increased cigarette prices and the tobacco industry's own advertising efforts, they found that the media campaign's antismoking messages reduced aggregate cigarette sales (Hu et al. 1995b). In addition, upon reviewing the empirical literature on the effectiveness of state-funded media campaigns, including results from the aforementioned studies, Friend and Levy determined that the California campaign, in conjunction with other tobacco control efforts, could be associated with decreases in smoking rates. They noted, however, that the evidence indicated that California's media campaign proved most effective during its first few years of implementation (Friend and Levy 2002).

Massachusetts

Massachusetts's media campaign closely mirrored California's in both its origins and scope. Like California, Massachusetts organized its media campaign within the broader framework of a comprehensive tobacco control program. In early 1993, having increased the per-pack cigarette tax by 25 cents, the state established the MTCP. The MTCP unveiled the country's second statewide antismoking media campaign in October of that year (CDC 1996; Friend and Levy 2002; Miller 1998).

Massachusetts's campaign focused on three main themes: (1) ETS, (2) smoking cessation, and (3) the health risks (Friend and Levy 2002). Under the tagline "It's time we made smoking history," the campaign featured a wide variety of stylistic approaches. Several studies have indicated that the most effective spots in Massachusetts's campaign were those that evoked feelings of outrage, sadness, and fear (Biener 2000, 2002; Biener et al. 2000b). One series of ads portrayed real people suffering from smoking-related diseases, including Janet Sackman, a cigarette model who lost her vocal cords to cancer; Victor Crawford, a tobacco lobbyist who died from throat cancer; and Wayne McClarren, a former Marlboro Man who was shown dying from lung cancer (Biener 2000). Like California, Massachusetts also highlighted the practices of the tobacco industry. The state's 1999 media campaign, under the slogan "Where's the Outrage?," presented statistics on smoking-related deaths and exposed efforts by the tobacco industry to recruit young smokers (Biener 2002).

From 1993 to 2000, MTCP spent approximately \$13 million per year on antitobacco advertising (Biener et al. 2000b), representing one-third of MTCP's total expenditures (Biener et al. 2000a). Much of that investment, however, was made in the first 3 years of the campaign (CDC 1996). The state, in fact, repeatedly cut the campaign's budget

throughout the latter half of the 1990s (Friend and Levy 2002), and in FY 2001 effectively eliminated the campaign, as the state began to reduce the scale of the tobacco program in general (Hamilton et al. 2003).

Several researchers have sought to determine the impact of Massachusetts's media campaign on tobacco use in the state. In a 2000 study, Siegel and Biener reported the results of a 4-year longitudinal study of a cohort of Massachusetts youth, concluding that exposure to television antismoking advertisements had a significant effect on younger adolescents. Although they could not identify a significant effect among 14- to 15-year-olds, they found that 12- to 13-year-olds who had reported exposure to antismoking advertisements at the baseline were significantly less likely to be established smokers by the time that follow-up interviews were conducted (Siegel and Biener 2000). In another 2000 study, Biener and colleagues analyzed Massachusetts adults' level of exposure and receptivity to antismoking television advertisements. With 88 percent of the cohort reporting some exposure to the advertisements, and 56 percent reporting seeing an advertisement at least once a week, Biener and colleagues concluded that the Massachusetts media campaign had achieved a high level of penetration among adults. Finding that only 12 percent of the cohort held a negative opinion of at least one advertisement, Biener and colleagues determined that the media campaign was well received by Massachusetts adults in general. They also found that the most effective advertisements for adults who had quit smoking or who were preparing to quit were those that elicited strong negative emotions (Biener et al. 2000b). In a separate study, Biener determined that Massachusetts youth responded to antitobacco television advertisements in a manner similar to adults (Biener 2002). Finally, based on their review of the empirical literature, Friend and Levy determined that Massachusetts's antismoking media campaign, like California's, could be associated with decreased smoking rates, specifically in conjunction with a comprehensive tobacco control program. They concluded, however, that Massachusetts's efforts, like California's, were most successful in the earliest years of the media campaign (Friend and Levy 2002).

Florida

Unlike California and Massachusetts, Florida did not initiate a state-wide antismoking media campaign until the end of the decade, nor did Florida fund its program with excise tax revenues (Friend and Levy 2002). Instead, the state used funds from a settlement that it reached with the tobacco industry in August 1997, which provided the state with \$11.3 billion over the course of 25 years (Givel and Glantz 2000; Sly et al. 2001b).

After establishing the Florida Tobacco Pilot Program (FTPP) in early

1998, state officials immediately set out to develop and implement a large-scale antitobacco media campaign (Givel and Glantz 2000). Unique to Florida, this campaign would focus exclusively on youth (Sly et al. 2002). While performing background research, FTTP staff determined that the program's target audience perceived traditional PSAs as preachy and severe. Consequently, FTTP incorporated efforts to work with youth representatives in developing a media campaign that would be better received by younger viewers. Industry manipulation emerged as a theme of particular resonance. At the March 1998 Teen Tobacco Summit, youth participants, angered by the tobacco industry's marketing practices, selected "truth" as the campaign's brand name. The state and its partners would continue to solicit youth input even after the campaign's initiation (Givel and Glantz 2000; Zucker et al. 2000).

During the campaign's first 10 months, 12 advertisements appeared on the airwaves statewide (Sly et al. 2001b). The campaign also included outdoor signage, print ads, and posters. T-shirts, baseball caps, and other merchandise featuring the "truth" brand complemented the advertisements. In addition, in the summer of 1998, youths, politicians, and celebrities participated in a cross-state train tour that promoted the "truth" campaign and its message (Zucker et al. 2000).

Initially, the 1997 settlement forbade Florida from attacking the industry and limited the antitobacco campaign to 2 years. In September 1998, however, Florida reached a new agreement with the tobacco industry that lifted the ban on industry attacks as well as the 2-year time limit. Subsequently, the "truth" campaign turned to exposing the industry's manipulative tactics. To capture the attention of young and savvy viewers, the campaign produced advertisements in a range of styles, from high-tech to home video. One advertisement that appeared in the wake of the 1998 settlement renegotiation portrayed the tobacco industry as the villain in a mock film trailer. Another, "Demon Awards," showed the tobacco industry accepting an award for the amount of deaths it has caused; fellow attendees included Hitler and Stalin (Givel and Glantz 2000; Zucker et al. 2000).

Data from Florida indicate that the "truth" campaign quickly succeeded in reducing tobacco use among youth. In their review of the literature on the effectiveness of statewide antismoking media campaigns, Farrelly and colleagues point to the results of the Florida Youth Tobacco Survey, which indicate that after the first year of the campaign, the rate of smoking among middle school and high school students dropped by 18 percent and 8 percent, respectively (Farrelly et al. 2003). The CDC declared the drop in teen smoking following the first year of the campaign to be "the largest annual reported decline observed in this nation since 1980" (CDC 1999b). Several studies, meanwhile, have established the "truth" campaign's success in generating high levels of message and campaign awareness (Sly et al.

2001a; Zucker et al. 2000), and a 2001 study, based on longitudinal survey results, associated exposure to the media campaign with a lower likelihood of youth smoking initiation (Sly et al. 2001b). Finally, in comparing the effectiveness of Florida's media campaign with a similar national effort (see below), Niederdeppe and colleagues found that Florida teenagers were less likely than teenagers in the rest of the United States to have smoked in the previous 30 days. Moreover, that study determined that Florida teenagers had higher levels of antitobacco awareness and held less favorable opinions of the tobacco industry than their national counterparts (Niederdeppe et al. 2004).

American Legacy Foundation's National truth[®] Campaign

As already described, antismoking media campaigns have, in recent years, primarily been implemented at the state level. In February 2000, however, the American Legacy Foundation (Legacy) launched the first comprehensive national antismoking media campaign in the United States since the Fairness Doctrine era (Farrelly et al. 2005).

Modeled closely after Florida's program, Legacy's own truth[®] campaign promoted a similar counterindustry message (Niederdeppe et al. 2004). In an effort to appeal to the campaign's target audience (youth between the ages of 12 and 17 years), Legacy featured trendy teenagers in its truth[®] advertisements and (borrowing another element from Florida's campaign) marketed its message as an integrated brand, complementing the television spots with promotional items, street marketing, and a website (Farrelly et al. 2002).

Unlike the directive-oriented "Just Say No" antismoking PSAs of the 1970s and 1980s, the Legacy-produced advertisements vividly delivered stark facts on industry marketing practices and the health consequences of smoking. One prominent ad from the truth[®] campaign, "Body Bags," portrayed a group of youth piling bags outside the headquarters of a tobacco company. They announced through a megaphone, that the bags represented the 1,200 people killed by tobacco each day (Farrelly et al. 2002, 2005).

Between 2000 and 2002, Legacy spent approximately \$100 million per year on the truth[®] campaign (Farrelly et al. 2005). To evaluate the effectiveness of this substantial investment, in 1999, it began sponsoring the Legacy Media Tracking Surveys, which, among other indicators, measured exposure to ETS, access to tobacco products, knowledge and attitudes regarding tobacco use, intention to quit, and awareness of the truth[®] campaign and its messages among 12- to 17-year-olds and 18- to 24-year-olds. Survey results showed significant increases in campaign awareness among youth, as well as growing support for campaign-sponsored messages just 10 months into the campaign (Farrelly et al. 2002). Data have also revealed

an accelerated national decline in youth smoking following the initiation of Legacy's national truth[®] campaign (Farrelly et al. 2005).

Effectiveness of Media Campaigns

National or statewide media campaigns intended largely or primarily to discourage the uptake of smoking by youth appear to be, in most cases, reasonably effective in achieving their goal. This finding was reaffirmed by the NIH's June 2006 state-of-the-science panel, which identified mass media campaigns as one of three effective approaches to reaching the general population and preventing tobacco use among adolescents and young adults (NIH 2006b).

Effect sizes, as noted in the technical appendix (Slater, Appendix N), appear to average about 6 percent relative to the preexisting rate—that is, the rate of smoking among youth in the particular population being studied falls about 6 percent. These effects appear to be reasonably consistent in studies that use a variety of different evaluation designs within regional and national field intervention contexts.

Although these effect sizes are modest and cost of achieving them is high, the reach of television and other media-based campaigns is exceptionally broad; a 6 percent relative effect size in the context of a media campaign represents a substantial number of young people, especially in a national campaign. Slater (Appendix N) suggests that the absolute prevalence of smoking among American youth is probably about 2 percent less than it would be in the absence of such campaigns and that further efforts might make that prevalence another 1 percent lower. In other words, if such media campaign efforts were to end and their effects to date were to dissipate, the prevalence of smoking in each succeeding cohort of youth might be expected to be 3 percent higher than it would be if such campaigns were to continue. This means that millions more American youth will begin smoking over the next twenty years than would otherwise be the case. It should also be noted that the effects of campaigns to discourage the uptake of smoking by youth are probably conservative, in that they do not take into account the possible effects on uptake among youth younger or older than the target age or the likely reinforcement of public support for local, regional, or national tobacco control policy efforts.

It also should be noted that most evaluations of such campaigns have taken place in contexts in which a variety of other community or regional education or control efforts are taking place. In most cases it is not possible to distinguish the extent to which the effects of media campaigns are facilitated by such efforts or, conversely, to identify the extent to which such local efforts are supported by media campaigns. (There is some empirical evidence regarding the reinforcing effects of media efforts on in-school

smoking prevention curricula; see Appendix D for information on such curricula.) Some evaluations, however, (Farrelly et al. 2005) have examined the independent effects of potential media exposure, suggesting that the effects that they find are attributable to the media campaign. Given these uncertainties, it is probably best to assume that it is preferable, whenever possible, to run such campaigns simultaneously with more comprehensive, community-based efforts.

Finally, media campaigns do have various effects, and it is entirely possible for an expensive campaign to have no effect or even effects that result in the rates of smoking moving in the wrong direction. It is essential to ensure that media interventions be research-based, with rigorous testing of the messages and periodic evaluation of their effects, and that they be independent from political pressures that might lead to efforts being driven by political agendas rather than by data (Pechmann and Slater 2005). Finally, it should be noted that it is considerably more cost-effective to purchase media time and space nationally than on a state-by-state basis.

Recommendation 15: A national, youth-oriented media campaign should be funded on an ongoing basis as a permanent component of the nation's strategy to reduce tobacco use. State and community tobacco control programs should supplement the national media campaign with coordinated youth prevention activities. The campaign should be implemented by an established public health organization with funds provided by the federal government, public-private partnerships, or the tobacco industry (voluntarily or under litigation settlement agreements or court orders) for media development, testing, and purchases of advertising time and space.

CESSATION INTERVENTIONS

An estimated 44.5 million adults in the United States are smokers, and these individuals comprise about 20.9 percent of the adult population (CDC 2005g). If nothing is done to help them stop smoking, almost half of them will die prematurely of tobacco-related diseases. On the basis of projections of future smoking prevalence by use of current smoking trends among adults in the United States, there will be at least 33 million smokers 20 years from now, regardless of how well the next generation of young people is prevented from initiating tobacco use and becoming addicted to tobacco.

Abundant epidemiological evidence demonstrates that populations who quit smoking have improved health status and lower rates of morbidity and mortality compared with those of populations that do not quit. Increased

population smoking cessation rates will likely decrease cigarette smoking prevalence rates more quickly than an approach focusing exclusively on reducing initiation rates. Accelerating cessation among current smokers will produce immediate benefits, saving millions of lives and billions of dollars over the next decade (see work of Levy, Appendix J and Mendez, Appendix K, and later in this chapter “Projected Impact of Strengthening Measures”).

In general, the committee favors a comprehensive, coordinated system of care management for cessation treatment. Such a comprehensive system of care management has five key components: (1) motivating more smokers to make more frequent quit attempts; (2) educating smokers to use evidence-based interventions when they do try to quit; (3) reducing the extraordinarily high rates of relapse after cessation; (4) ensuring that all smokers receive continuity of care management and follow-up, including access to the best care available and full insurance reimbursement; and (5) structuring the comprehensive system of care to provide additional levels of more intensive/specialized treatment (i.e., stepped-care) for smokers that need them (i.e., those who fail to quit with lesser levels of care). Stepped-care is especially important for smokers who are hardest to reach and hardest to treat, such as those at disproportionate risk of treatment failure (e.g., underserved, low-income, uninsured smokers and those with comorbid psychiatric/substance abuse and medical disorders—see also Wallace, Appendix P). The overriding challenge is to educate and motivate more smokers to try to quit and to provide suitable access to effective cessation interventions for as many smokers as possible.

Effective Interventions Exist

A large number of randomized clinical trials and other research studies confirm the efficacy of smoking cessation interventions (Fiore et al. 2000; Hopkins et al. 2001; Task Force on Community Preventive Services 2005) (see Abrams, Appendix A). Interventions can be categorized in terms of the type of intervention, the venue, the intensity, the duration, and the cost. Interventions may be behavioral, pharmacological, or both. They can be administered by health care or other professionals, lay volunteers, or they can be self-administered. They can be guided interventions available in print media, on the telephone, via the Internet, or through purchase of over-the-counter treatments. They may be administered incidentally to other activities, such as at the workplace, during health care visits, and during educational activities. Interventions may include brief episodes of counseling or prolonged programs addressing both cessation and cessation maintenance.

In general, greater intensity of treatment (duration and number of

contacts, more modalities of intervention) improves cessation outcomes (for details see Abrams, Appendix A). At the risk of oversimplification, the committee believes that intervention intensity can be classified into three broad categories: (1) minimal, (2) moderate, and (3) maximal. Abstinence at a minimum of 6 months follow-up is related to the intensity of the intervention in a dose-response fashion. Abstinence rates range from (1) about 5–10 percent for smokers quitting on their own or using self-help materials; (2) 10–20 percent for brief, moderate intensity interventions; (3) 20 percent to over 30 percent for maximally intensive individual or combined pharmacological and behavioral interventions (Fiore et al. 2000).

Along with behavioral therapy, pharmacotherapy is an important adjunct to smoking cessation treatments. Currently marketed pharmacotherapies include nicotine replacement products (gums, patches, nasal sprays, inhalers, and lozenges), bupropion, and other recent agents such as Varenicline—a novel $\alpha_4\beta_2$ nicotinic receptor partial agonist pharmacotherapy. In clinical trials, existing pharmacotherapies can improve cessation rates by 1.2 to 2.5 times, on average, compared with those achieved with a placebo (Fiore et al. 2000). Combined behavioral and pharmacological treatment can triple to quadruple cessation rates but these results are not as consistent across studies. The limitations of the pharmacotherapies are that their effectiveness is moderate (achieving cessation rates of 10 to 20 percent, depending on the population of smokers and whether concomitant behavioral therapies are used) and the fact that many dependent smokers have already tried these therapies and failed to quit smoking when they have used them. Most studies of re-treatment with the same medication find that cessation rates are very low.

Thus it is imperative that new medications and other new psychosocial treatments or modes of delivery be developed to aid smoking cessation. Such medications might be more effective than existing medications, which is particularly important for highly nicotine-dependent smokers. Even if new medications are not more effective than the currently available medications, new medications would provide an alternative to current medications and would encourage more smokers who failed cessation in the past to consider making another quit attempt using the new medication. In addition to medications, helping smokers who have repeatedly failed to quit may require more intensive and specialized treatments such as a stepped-care approach (for details see Abrams et al. 1996, 2003). Services might also include a comprehensive system of care management that enables smokers to obtain better continuity of care and follow-up. Smokers with higher levels of nicotine dependence and those with comorbid psychiatric/substance abuse disorders might especially benefit from new pharmacotherapy and a new systems of care management (for details see Abrams, Appendix A and Wallace, Appendix P).

In moving from clinical trials to large-scale community dissemination research, intervention strategies generally shift from treating highly motivated volunteers to reaching out to a more diverse, less-motivated population of smokers. In this community-wide effort, interventions with different types, modes, methods, and channels of delivery are used to reach defined subpopulations on the basis of geography, demography (e.g., age, gender, race, ethnicity, or impoverishment), clinical status (e.g., the presence of a psychiatric comorbidity or pregnancy), health plan, insurance status, or other group status (e.g., youth smokers in secondary schools). Each high-prevalence group represents special challenges to community-based tobacco control efforts. Interventions that are translated from clinical to community settings reveal considerable variability in outcome effectiveness and effect sizes are therefore more difficult to calculate with confidence.

The Limitations of Cessation Programs

Although cessation programs have much to offer, they also have limitations and shortcomings. Less than 50 percent of the 44.5 million current smokers make a quit attempt each year. Of those that try to quit, over 70 percent do so on their own without use of evidence-based programs, and, of those, over 90 percent will relapse. Most programs are evaluated for a maximum of only 6 to 12 months, and efficacy beyond that point may not be well understood; long-term relapse rates have also been documented. Furthermore, randomized trials of interventions are often conducted with smokers who are motivated to quit and who are free of many impediments to program participation; such trials possibly yield higher cessation rates than would occur in general community settings (for details see Abrams, Appendix A).

Less intensive, less costly, and less specialized programs, however, can reach more smokers, with the most intensive interventions being reserved for those that require them. (Abrams et al. 1996, 2003; Orleans 1993). For example, a two-tiered intervention based on intensity and cost might consist of (1) standard care, such as brief behavioral therapy and over-the-counter nicotine replacement therapy; and (2) intensive specialized care, such as the use of multiple clinical sessions and prescription medications, and treatment delivery by addiction specialists. Smokers who either fail standard care or have comorbid complications can be placed on more advanced specialized care. An explicit clinical trial of stepped-care has not yet been published, but many delivery systems implicitly use some form of stepped-care in their intervention programs, in addition to the minimal levels of care recommended by U.S. Public Health Service Guidelines (Fiore et al. 2000).

The Challenge: Increasing Rates of Smoking Cessation at the Population Level

Despite the presence of many successful interventions, the impact of smoking cessation efforts on reducing population smoking prevalence is currently small and falls far short of its potential. The NIH's June 2006 state-of-the-science panel on tobacco use summarized this challenge as follows: "Most adult smokers want to quit, and effective interventions exist. However, only a small proportion of tobacco users receive intervention. This gap represents a major national quality-of-care problem" (NIH 2006b, p. 11). Interventions are underused for a variety of reasons pertaining to the individual consumer (a lack of knowledge of or demand for cessation programs) as well as to systems and organizational barriers, such as the failure to provide accessible, comprehensive, convenient, continuous, and affordable treatments. Achieving higher cessation rates can be attained by increasing the demand for and use of existing evidence-based cessation interventions by (1) reaching more smokers with cessation messages—including education about the quitting process—as well as the availability and the safety of smoking cessation modalities and products for tobacco use cessation, such as nicotine replacement therapies; (2) motivating more quit attempts among people who now make none, and more frequent quit attempts among those who now try by providing meaningful incentives to quit; (3) increasing the use of evidence-based interventions when smokers are attempting to quit; (4) providing continuity of care, tailored and targeted interventions, and a stepped-care model for those with smoking histories and other individual susceptibility characteristics (e.g., comorbidity) who need more intensive and specialized treatments; and (5) providing adequate and aligned financial, political, and policy initiatives to fully integrate all the effective components into a comprehensive, multilevel system of care, commensurate with the need to address the nation's largest preventable cause of disease and death.

Currently, the demand among smokers for cessation programs and services remains modest, despite the desire of most smokers to quit (NIH 2006b) and the increasingly restrictive environmental and normative social climate against smoking. A multifaceted approach to increasing the demand for smoking cessation programs can include increasing restrictions on smoking, mass media campaigns, financial incentives, and efforts to create a strong consumer-driven demand for attractive smoking cessation products and services. These same strategies were identified by the NIH's state-of-the-science panel as effective methods of increasing the use of cessation interventions (NIH 2006b).

Data addressing the demand for cessation services among smokers are available. For example, Zhu and colleagues (2000) reported that 78 per-

cent of smokers believed that they were just as likely to quit on their own as with assistance, but smokers who believed that cessation assistance was effective were twice as likely to intend to quit or make a quit attempt and more than three times as likely to use intervention assistance when quitting (Zhu et al. 2000). Hammond and colleagues (2004) surveyed smokers' perceived effectiveness of cessation methods and found that the great majority of respondents said they wanted additional information on where to get help quitting (87 percent), how to quit (86 percent), the benefits of quitting (85 percent), and toll-free quitlines (70 percent), and that they wanted access to a website that would provide more information about cessation (68 percent). Respondents had inadequate awareness of the availability and utility of clinical cessation intervention methods, such as counseling (Hammond et al. 2004). Yong and colleagues (2005) reported that older smokers (those older than age 60 years) perceived themselves to be less vulnerable to harm (self-exempting beliefs), less concerned about the health effects of smoking, less confident about being able to quit (self-efficacy), and less willing to try to quit. However, respondents' knowledge of cigarette prices, health providers' advice, inexpensive medications, and health risk information was associated with a greater intent to quit and more quit attempts (Yong et al. 2005).

Although the best mix of smoking cessation strategies remains unclear, the overarching objective is readily apparent: In order to enhance program use and population cessation rates, smokers must know that safe, effective, and accessible cessation programs—including medications—are available. It is important to point out that from an population perspective, overall impact is a product of “reach \times efficacy” (Abrams et al. 1996). Thus reaching a larger number of smokers with a somewhat less effective intervention can produce a greater number of people who quit than reaching a small number of people with a more effective intervention. Getting more smokers to use even a minimal intensity cessation program generally doubles the likelihood of success and therefore makes an important contribution to the overall impact on population smoking prevalence rates.

Recommendation 16: State tobacco control agencies should work with health care partners to increase the demand for effective cessation programs and activities through mass media and other general and targeted public education programs.

Disseminating Cessation Programs

Well-performed studies on the ability to disseminate smoking cessation programs to the community provide reasonable and reliable data as a

basis for projecting the impact, on a populationwide basis, of the efficient implementation of the best available practices. An important example is the use of quitlines, which can increase smoking abstinence by as much as 30 to 50 percent over the rate achieved under control conditions (Fiore et al. 2000). On the basis of the growing body of evidence from smoking cessation program dissemination research trials and the extensive deliberations of an expert panel, Fiore and colleagues recommended funding a national telephone quitline as a means of reaching more smokers, achieving an additional 5 million quitters per year, and saving 3 million lives over the next two decades (Fiore et al. 2004).

Quitlines have proven to be an effective smoking cessation intervention. Recognizing their value in helping individuals to stop smoking and acknowledging recommendations for a more robust, countrywide quitline, DHHS established a national quitline network in 2004. The network increased funding to states with existing quitlines, offered grants for the creation of quitlines in states that did not yet provide the service, and made available smoking cessation counselors in states without quitlines (DHHS 2004).

Given the demonstrated success of smoking quitlines and the ease by which most Americans can now access them, the national quitline network is an important cessation tool that should be maintained with adequate funding. Other emerging technologies are also beginning to show promise such as the use of tailored evidence-based cessation programs delivered on a 24/7/365 basis via the internet, either alone or in combination with quitlines, or brief primary care interventions in physician's offices (for details see Abrams Appendix A).

Recommendation 17: Congress should ensure that stable funding is continuously provided to the national quitline network.

The quitline is a highly useful intervention because advertising the availability of the quitline helps to stimulate demand and accessing it provides a low-cost service for facilitating cessation. What other steps should be taken to stimulate awareness of and demand for cessation technologies? Would a large-scale social marketing campaign be cost-effective? Unfortunately, important gaps in knowledge on how to expand cessation awareness and demand remain, particularly for some large and important smoking populations, such as youth. Some evidence indicates that mediated communication efforts can be effective in facilitating smoking cessation (Snyder et al. 2004), but expanding the use of cessation technologies will require improved communication, education, and marketing.

At present, the evidence on how best to combine media interventions, other social marketing techniques, and innovative strategies for dissemi-

nating cessation technologies is inconclusive. Without such evidence it is premature to endorse a major national media and social marketing effort intended to accelerate smoking cessation rates. The immediate goal should be to identify successful combined strategies, with the intent of implementing them on a national scale with public funding, with resources provided by public-private partnerships, or with funds provided under court orders or litigation settlements with tobacco companies.

Recommendation 18: The Secretary of the U.S. Department of Health and Human Services, through the National Cancer Institute, the Centers for Disease Control and Prevention, and other relevant federal health agencies, should fund a program of developmental research and demonstration projects combining media techniques, other social marketing methods, and innovative approaches to disseminating smoking cessation technologies.

If such projects show success, future efforts should be national in scope and should be implemented by a public health organization with no ties to the tobacco industry and with funds provided by the federal government, public-private partnerships, or the tobacco industry (whether voluntarily or under litigation settlement agreements or court orders) for media development, testing, and purchases of advertising time and space. Regional, state, or local funding should be provided to supplement the national campaign with coordinated cessation activities.

Delivering Cessation Services

Targeting populations with a high smoking prevalence at the community level is part of any important tobacco control program (for a discussion on these populations, see Wallace, Appendix P). However, for the general delivery of cessation services within the health care system, the adoption of an integrated, multilevel, systems approach is needed to maximize the potential for carrying out all the components of effective cessation programs in an organized, evidence-based manner. It is important to align clinical policies and delivery system structures to support and finance tobacco cessation as a chronic, refractory, addictive condition and to approach it as one might approach the chronic management of hypertension, diabetes, or asthma. Such an approach would ensure continuous engagement with smokers and provide coordinated, tailored interventions before, during, and after they quit smoking. Smokers must be supported in their cessation efforts at every level of the infrastructure of health care delivery systems through the use of aligned policies, financial incentives, and full reimbursement for the costs that they incur in their cessation efforts.

Ideally, health care delivery systems, such as managed care organizations and mental health clinics, not only should foster comprehensive smoking cessation management but also should track the type and extent of care delivered within that system over time as a matter of quality assurance. For example, a managed health care organization may have a policy that requires all providers in all settings (e.g., emergency rooms, primary care, and specialty care settings) to screen for smokers and to develop, document, and implement an individualized treatment plan for each smoking member of the health plan. Surveillance and measurement of key performance and quality indicators will improve accountability, fidelity, and adherence to best practices. Such activities are already in place in quality assurance programs, such as those promoted by the National Committee for Quality Assurance.

Recommendation 19: Public and private health care systems should organize and provide access to comprehensive smoking cessation programs by using a variety of successful cessation methods and a staged disease management model (i.e. stepped care), and should specify the successful delivery of these programs as one criterion for quality assurance within those systems.

All health care delivery organizations should have in place a comprehensive care management system for smoking cessation that includes continuity of care, appropriate tracking systems and quality indicators and properly aligned structural and financial incentives to support providers' and smokers' efforts to treat their condition in much the same manner as other chronic conditions like diabetes. They should also target populations with high rates of comorbidity and high smoking prevalences.

Reimbursement for Smoking Cessation Services

Evidence suggests that institutions investing in comprehensive smoking cessation programs or services (e.g., health care facilities and worksites) will receive a substantial return on their investment within 2 to 3 years (AHIP 2004). Warner and colleagues (2004) simulated the financial impact and cost effectiveness of a smoking cessation program in a hypothetical managed care organization (MCO) using data from three large MCOs (Warner et al. 2004). Quitters gained an average of 7.1 years of life, with a direct coverage cost of \$3,417 for each year of life saved. The net cost to the MCO was \$0.41 per patient per month. With the costs of health care expenditures for smokers and productivity losses from smoking estimated to be more than \$167 billion per year (CDC 2005d) the expected savings from the implementation of effective cessation programs could be substantial.

In recent years, there has been significant improvement in private, federal, and state insurance coverage for some components of the evidence-based treatments recommended in the U.S. Public Health Service clinical guidelines (Fiore et al. 2000; Task Force on Community Preventive Services 2001). For example, Medicare announced that as of March 2005 it will cover up to two cessation attempts per year, and that each attempt may include four counseling sessions, for a total of eight sessions per year. Pharmacotherapy for smoking cessation is also covered by the new Medicare prescription drug benefit. The NIH's state-of-the-science panel on tobacco use found "strong evidence" supporting the effectiveness of reducing out-of-pocket costs and reimbursing providers for cessation services (NIH 2006b). However, in the United States overall, insurance coverage remains spotty, and covered cessation treatment programs typically invest only in the minimum recommended level of coverage. A 2002 national survey of MCOs found that 30 percent had no written policy on coverage for tobacco cessation services and 42 percent provided no coverage for behavioral interventions (McPhillips-Tangum et al. 2004). In 1998, only half of the 5 million Medicaid recipients nationwide who were current smokers were eligible for any type of smoking cessation treatment benefit (Schauffler et al. 2001).

States purchase health insurance for more than 5 million employees and retirees. In a survey of state employee insurance plans conducted in 2002 and 2003, only 6 of 45 states required smoking cessation coverage that was fully consistent with the U.S. Public Health Service guidelines for all employees (Fiore et al. 2000). To capture the demonstrable benefits of cessation programs, various public and private health insurance programs available in the United States should provide reimbursement for a broad range of effective smoking cessation interventions.

In sum, insurance and benefit coverage for smoking cessation programs remains an important problem. Identifying funds for these programs is always a challenge, but two important sources of additional revenues for cessation services that have been used in some venues are tobacco excise taxes and court-ordered litigation settlements from tobacco companies.

Recommendation 20: All insurance, managed care, and employee benefit plans, including Medicaid and Medicare, should cover reimbursement for effective smoking cessation programs as a lifetime benefit.

For a smoker, it is long journey from starting to smoke and enjoying smoking to wanting to stop and successfully stopping. For much of that journey the smoker is not actively attempting to quit. Thus there are many opportunities to enhance cessation success rates at many points along the smoker's journey. Opportunities range from becoming more aware of the

risks of smoking and the benefits of cessation to learning about the tools available for cessation, understanding the process of cessation and what to expect, becoming motivated to make frequent and serious quit attempts, not becoming discouraged by relapse, and eventually quitting for good. There is substantial room to improve the overall cessation outcome rate at every step of the way during this journey. This extraordinary opportunity can only be fully realized by strengthening and developing policies that support a comprehensive smoking cessation care management system that addresses each and every step in the journey from current smoker to lifetime ex-smoker.

COMMUNITY MOBILIZATION

Community coalitions played a central role in the acceleration of successful tobacco control efforts from 1988 to 2000. The scientific literature bearing on the effects of coalition activity is reviewed by Sparks in Appendix O and the following discussion is drawn from the information presented.

The most important functions of these community coalitions were that they mobilized organized grassroots support for tobacco control activities, gave a voice to the community in policymaking, and held governments and businesses accountable for their decisions. Mobilizing communities for advocacy has become a mainstream public health tool over the past generation. One area in which success has been documented is alcohol policy, specifically, in relation to drunk driving and underage drinking (IOM/NRC 2004). Ironically, one of the ingredients of success in the alcohol policy domain has been participation in local coalitions by some segments of the alcohol industry. This experience poses a stark contrast to the efforts of the tobacco industry to terminate community action in the smoking domain, in which the tobacco industry uses the false claim that community action and advocacy amount to “lobbying,” which is often limited by federal and state laws. The value at stake in these disputes with the tobacco industry is not only public health but also local self-determination.

From the beginning, public policy advocacy was an integral part of comprehensive state tobacco control programs because they emphasized population-level changes, including changes in legislation and public policy. For example, the ASSIST program promoted three types of interventions (program services, policy, and mass media) and the guidelines stated that “efforts to achieve priority public policy objectives should take precedence over efforts to support service delivery” (NCI 2005, p. 23). Mass media initiatives were intended to support those policy changes, which meant that media advocacy that engaged the news media in support of prevention policies was the focus of media initiatives, whereas social marketing

played a secondary role. The four ASSIST program priority policy areas were eliminating ETS, raising tobacco taxes, limiting tobacco advertising and promotion, and reducing youth access.

The CDC identifies governmental and voluntary policies that promote clean indoor air and restrict access to tobacco products as well as other policy objectives as best practices, citing the successes of the California, Massachusetts, and Oregon community coalitions in achieving policy and program objectives (CDC 1999c). Statewide programs that promote media advocacy and countermarketing campaigns are also cited among the best practices, based on the CDC's review of core documents from the California and Massachusetts campaigns.

There have been few efforts to analyze the contributions of the state tobacco control coalitions to comprehensive state programs, and it has been especially difficult to measure the impacts of their advocacy initiatives. Most investigators who have evaluated state programs observe that state coalitions have played a key role in the achievement of policy changes that reduce tobacco consumption; yet, those investigators have also commented on the difficulty of measuring the extent to which coalition activities at the state or local level were responsible for either policy change or health outcomes. One reason that the link between community action and reductions in tobacco use is difficult to document is that public health methodology for measuring complex community and population-based social and policy changes is not as well developed as it is for measuring individual and small group changes (Sparks, Appendix O). However, evidence from the domain of alcohol policy convincingly demonstrates the effects of mobilizing community coalitions, both on the enactment of new policies to reduce underage drinking and alcohol-impaired driving and on the actual changes in the prevalence of consumption as well as the targeted alcohol problems (IOM/NRC 2004).

Even without quantitative studies of the efficacy of policy advocacy, most people in the tobacco control community assume that without citizen advocacy, it is doubtful that the changes in tobacco taxes, smoke-free workplace laws, restrictions on smoking in public accommodations, and restrictions on sales to youth would have occurred. This assumption is reasonable because decision makers do not decide to strengthen tobacco control policies unless an active citizenry demands such change. In this sense, tobacco control policies are the end point of coalition advocacy initiatives, and their effectiveness can be measured by counting the hundreds, possibly thousands, of local and state tobacco control policies adopted during the 1990s (Gerlach and Larkin 2005). The Surgeon General's report, *Reducing Tobacco Use*, called the emergence of statewide coalitions the most important advance in comprehensive programs and concluded that comprehensive state programs, such as those in California and Massachu-

setts, provide evidence that such programs reduce smoking (Public Health Service 2000).

Tobacco Industry Reaction to Successful Public Policy Advocacy

The tobacco industry immediately recognized the potential power of an advocacy strategy by state coalitions when such coalitions began to be formed. The industry attacked the ASSIST program from its inception (NCI 2005; Trochim et al. 2003; White and Bero 2004) to reduce the threat of citizen action. Analysis of internal documents from members of the tobacco industry indicates that the tobacco industry deliberately pursued a campaign to equate citizen advocacy efforts with lobbying and to limit those activities (NCI 2005; White and Bero 2004). Congress eventually prohibited anyone receiving federal funds from lobbying state and local governments (Federal Acquisition Streamlining Act of 1994 Pub. L. No. 103-355, 108 Stat. 3243). The tobacco industry used the Freedom of Information Act to divert state health department resources and threatened lawsuits against state health departments and individual state employees for violating the lobbying restriction (NCI 2005). The MSA also prohibits the American Legacy Foundation from engaging in any political activities or lobbying. The industry's position equates advocacy with lobbying and cites Internal Revenue Service regulations that forbid public agencies from using public money for lobbying (White and Bero 2004).

In reaction to the tobacco industry's position, federal agencies and many state health departments have severely limited advocacy activities that were—and that still are—perfectly legal. Lobbying, a well-understood term in various legal contexts, such as in the statutes governing tax-exempt foundations, refers to direct communication to a legislator on specific legislation or grassroots communication to the members of the general public urging them to take action on specific legislation (Gerlach and Larkin 2005; IOM 1988; Wallack et al. 1993). As the term is used in public health, however, “advocacy” refers to a much broader concept and set of activities, such as organized social action aiming to create a shift in public opinion and to mobilize resources and forces to support an issue, policy, or constituency (Wallack et al. 1993), or the process of educating policymakers and members of the community about certain health-related issues and the measures that can be taken to address them (Gerlach and Larkin 2005).

Gerlach and Larkin point out that as early as the first year of the SmokeLess States program, the RWJF's support of the Coalition for Tobacco-Free Colorado was challenged as lobbying by the tobacco industry (Gerlach and Larkin 2005). In response, the RWJF was careful to make a distinction between lobbying, (which the SmokeLess States program would not fund) and advocacy (which it would). Coalitions were free to use their

own funds for such activities; indeed, the Foundation encouraged and finally insisted that coalitions find such funds. Both the RWJF and the NCI ASSIST program held training workshops for state coalitions on policy advocacy. As the report on the ASSIST program from NCI makes clear policy advocacy and lobbying are not the same thing (NCI 2005, p. 352).

The tobacco industry's strong opposition to public health advocacy is a good indication of how important advocacy initiatives should be in any blueprint for future tobacco control efforts. The industry attacks have weakened federal and state willingness to fund advocacy programs. The potential for future gains is thus endangered if state health departments, foundations, and community organizations become hesitant to openly acknowledge how critical citizen advocacy is to successful policy change.

States and local communities should not be barred from using federal funds for tobacco control advocacy efforts at the state or local levels, as long as such activities do not involve lobbying (i.e., contacting legislators about a specific bill or urging constituents to do so). Advocating policies that would promote the public health and education of the public or legislators about the effects of adopting new policies (or of failing to do so) does not constitute lobbying. The CDC should encourage citizen participation in the democratic process and should clarify the distinction between legitimate citizen advocacy and restricted lobbying.

Maintaining Momentum

Recent evidence of the impact of advocacy by mobilized communities lies in the continuing adoption of smoke-free cities and towns across the United States. As of October 2006, 519 municipalities have enacted local smoke-free laws, including some localities that have banned smoking in restaurants and bars (ANRF 2006). Smoke-free movements' success has also accelerated at the state level; 19 states and Washington, D.C., have now enacted smoke-free state laws, many of which include workplaces, restaurants, and bars (Table 5-3). Even as funding for coalitions has become less secure, these policy successes continue to occur with a momentum that was unanticipated in the late 1990s. The success of smoke-free policies in the past 5 years shows the importance of continued federal and state support for community-level strategies for tobacco control efforts as well as the need for broad demonstration programs.

The evidence reviewed above indicates that the comprehensive approach used in the 1990s, including policy advocacy, has resulted in many policy changes for tobacco control efforts that, in turn, have had an effect on the prevalence of tobacco use. There are two main reasons to continue such a comprehensive approach and a focus on policy advocacy. The first, which is specific to tobacco control, is that, if all state and local policies for

TABLE 5-3 Summary of Smoke Free State Laws

State	Enactment Date	Provisions (Effective Date)
California	July 1994	Restaurants (01/01/95) and bars (01/01/98)
Utah	1994, March 2006	Workplaces (05/01/06), restaurants (01/01/95), and bars (01/07/09)
South Dakota	February 2002	Workplaces (07/01/02)
Delaware	May 2002	Workplaces, restaurants, and bars (11/27/02)
Florida	November 2002	Workplaces and restaurants (07/01/03)
New York	March 2003	Workplaces, restaurants, and bars (07/24/03)
Connecticut	May 2003	Restaurants (10/01/03) and bars (04/01/04)
Maine	June 2003	Restaurants and bars (01/01/04)
Idaho	April 2004	Restaurants (07/01/04)
Massachusetts	June 2004	Workplaces, restaurants, and bars (07/05/04)
Rhode Island	April 2005	Workplaces and restaurants (03/10/05), bars (03/31/05)
North Dakota	June 2005	Workplaces (08/01/05)
Vermont	June 2005	Restaurants and bars (09/01/05)
Montana	April 2005	Workplaces and restaurants (10/01/05), bars (09/01/09)
Washington	November 2005	Workplaces, restaurants, and bars (12/08/05)
New Jersey	January 2006	Workplaces, restaurants, and bars (04/15/06)
District of Columbia	January 2006	Workplaces (04/03/06), restaurants and bars (01/01/07)
Colorado	March 2006	Restaurants and bars (07/01/06)
Louisiana	June 2006	Workplaces and restaurants (01/01/07)
Hawaii	July 2006	Workplaces, restaurants, and bars (11/16/06)

NOTE: Workplaces includes both public and private nonhospitality workplaces, including, but not limited to, offices, factories, and retail stores. Restaurants includes any attached bar in the restaurant. Bars include freestanding bars without separately ventilated rooms.

SOURCE: See <http://www.no-smoke.org/pdf/SummaryUSPopList.pdf>.

tobacco control are counted, policy advocacy has had its greatest effect in altering the normative environment supporting tobacco use. Even though formal evaluation data for a meta-analysis may be scant, state health departments have broadened the scope of their tobacco control activities. Accordingly, state officials can document changes in social norms that support tobacco-free environments and public support for tobacco control efforts, and they can also list changes in public policy that limit tobacco use. A cadre of public health advocates was trained intensively through the ASSIST, IMPACT, and SmokeLess States program coalition initiatives. Not only should this cadre be maintained, but funding and resources also should be available so that these advocates may provide training for the next generation of tobacco control workers in the 50 states and the other territories in the United States. The momentum of public advocacy should not be lost.

The second, and even more crucial, reason to continue to support a comprehensive approach is that continuing to implement and evaluate comprehensive social and environmental interventions is essential to the continued development of effective public health promotion efforts. Understanding of how to implement such interventions, as well as how to develop methods for evaluating the effectiveness of such interventions, cannot advance if the federal government, state governments, and national nonprofit foundations do not take the lead in advancing the public's health through such initiatives. Involvement in broad initiatives is critical to the training of future public health professionals who need practice in population-based solutions to public health problems. Such initiatives, with their national focus, are so costly, however, that they require federal coordination and support. As an example of the kind of advances that the field needs, OSH's recent release of Key Outcome Indicators for Evaluating Comprehensive Tobacco Control Programs (CDC 2005b) illustrates how program evaluation of complex initiatives can be enhanced. The OSH tobacco control program requires that states receiving funds for tobacco control efforts develop action plans based on logic models, in which community mobilization and policy and regulatory actions lead to defined short-, intermediate-, and long-term outcomes for tobacco control efforts. Detailed outcome indicators then make it possible to measure success quantitatively.

Recommendation 21: While sustaining their own valuable tobacco control activities, state tobacco control programs, CDC, philanthropic foundations, and voluntary organizations should continue to support the efforts of community coalitions promoting, disseminating, and advocating for tobacco use prevention and cessation, smoke-free environments, and other policies and programs for reducing tobacco use.

SPECIAL POPULATIONS WITH HIGHER RATES OF CIGARETTE SMOKING

As Chapter 1 illustrates, tobacco use and tobacco-related diseases impact segments of society differentially. Prevention and cessation problems need to be attentive to the special circumstances and outreach needs of these subgroups. For example, Native-American and Alaska Native adults are more likely to smoke than white, Asian-American, or Hispanic-American adults.⁴ Not surprisingly, members of subgroups with a high smoking prevalence are more likely to experience tobacco-related morbidity and mortality such as from heart disease or lung cancer, thereby contributing significantly to health disparities. Although African Americans have a similar smoking prevalence to whites, African Americans are more susceptible to developing and dying from lung cancer and are less likely to quit smoking than white smokers. At least one study shows that Hispanic-American smokers are less likely than white smokers to receive cessation advice from health care providers (Levinson et al. 2004).

Attention should also be given to the special circumstances and needs of recent immigrants from countries where smoking is socially acceptable. For example, smoking rates among Southeast Asian adults, Korean men in particular, have been shown to be significantly higher (34–43 percent) than in the U.S. male population (Kandula et al. 2004; Ma et al. 2004). For new immigrant populations and populations for whom English is a second language, access to culturally competent and linguistically appropriate interventions could be a key requirement for engaging them in prevention and cessation programs (Baezconde-Garbanati and Garbanati 2000; Orleans and Fishman 2000). Research into the design and impact of culturally sensitive intervention programs, however, is limited. Such research should be further developed to enhance the evidence base on how to best address the needs of an increasingly diverse population (NIH 2006a).

Other populations at increased risk for tobacco use are described by Wallace in Appendix P. These groups include individuals with psychiatric disorders and a history of substance abuse, among others. Typical approaches to smoking cessation in populations with comorbidities and risk behaviors can help individuals to stop smoking, but long-term abstinence has been shown to be more difficult to achieve. Research is also needed on how best to design smoking cessation intervention and their effectiveness in the treatment of individuals with co-occurring conditions.

Wallace (Appendix P) also notes, that “the themes of poverty, lower socioeconomic status and health and social disparities pervade many of the high risk groups for tobacco use” (Wallace, Appendix P). The rate of smok-

⁴There are wide gender differences within each ethnic category, with male adults having higher rates than female adults.

ing among adults who are below the poverty level is about 32.9 percent (CDC 2004a). Persons with low socioeconomic status may have less access to health care that might be needed to address smoking-related morbidities. While data on the prevalence of smoking among homeless individuals is difficult to obtain, reports from international studies indicate that prevalence rates can range from 75 to 85 percent (Folsom and Jeste 2002). Identifying and eliminating disparities in tobacco use and related morbidity and mortality is an important part of the CDC's goal for ensuring success in tobacco control programs, leading many state programs to include a stated emphasis on disparities in their strategic plans. State- and locally-supported prevention and treatment programs need to assess the proportion of their population who fall into these categories and to consider modifying prevention and treatment programs to ensure that they reach these populations effectively.

Military personnel are another population at high risk of tobacco use. Following a significant decline in cigarette smoking from 51 percent in 1980 to 30 percent in 1998, cigarette smoking rates have begun to increase (Hamlett-Berry 2004). More recently, a 2005 Department of Defense Survey of Health-Related Behaviors Among Active Duty Military Personnel found that about one third of military personnel reported smoking in the past month across all branches of service (Bray et al. 2006). The prevalence of smoking in the past month was highest (38.2 percent) among army personnel. Veterans who have separated from active duty also show higher smoking rates than those found in the general civilian population. Reporting data from a 1999 health survey of veterans who received care from the Veterans Health Administration, (Miller et al. 2001) found the prevalence of smoking to be 33 percent compared to 23 percent in the adult civilian population. Military service has been suggested by some researchers as a risk factor for smoking (Klevens et al. 1995). Veterans could benefit from cessation services from the Veterans Administration or from state and locally provided treatment programs. Active duty military personnel could also benefit from prevention and cessation services from the Department of Defense.

Recommendation 22: Tobacco control programs should consider populations disproportionately affected by tobacco addiction and tobacco-related morbidity and mortality when designing and implementing prevention and treatment programs. Particular attention should be paid to ensuring that health communications and other materials are culturally-appropriate and that special outreach efforts target all high-risk populations. Standard prevention or treatment programs that are modified to reach high-risk populations should be evaluated for effectiveness.

PROJECTED IMPACT OF STRENGTHENING EXISTING TOBACCO CONTROL MEASURES

This chapter has outlined a blueprint for how the country can strengthen and intensify current tobacco control policies and programs, assuming that the current legal structure of tobacco control efforts remains unchanged. What would be the impact on national tobacco use prevalence of following, or not following, this blueprint, relative to prevalence based on the baseline projections outlined at the end of Part I of the committee's report?

Table 5-4 (from Table 3 of Levy, Appendix J) shows that the SimSmoke model projects considerable potential benefit if the policies outlined in this chapter are pursued aggressively. Specifically, the policies modeled by the SimSmoke model are as follows:

- Tax increases of \$1 and \$2 per pack
- Nationwide implementation of clean air laws for all work sites (including bars)
- Comprehensive media campaigns targeting youth and adults and funded at the levels recommended by the CDC (i.e., beyond the levels that have been used in the past) to prevent initiation and to increase quit attempts, heighten consumer demand for proven cessation programs and to increase smoker's health literacy about the value of using evidence-based treatments when trying to quit
- Comprehensive cessation policies (full coverage of pharmacotherapy and behavioral therapy, training and coverage for tobacco brief interventions, multisession quit lines, internet interventions, and free nicotine replacement therapy)
- Universal implementation of school-based prevention sufficient to

TABLE 5-4 Projected Adult Smoking Prevalence Through 2025 Under Status Quo and Best-Case Policy Scenarios

Policy Scenario	2005	2010	2015	2020	2025
Status quo	20.6%	19.3%	18.1%	16.9%	15.5%
\$1.00 tax increase	20.6%	18.4%	17.1%	15.9%	14.5%
\$2.00 tax increase	20.6%	17.8%	16.4%	15.1%	13.7%
Clean air laws	20.6%	18.6%	17.4%	16.3%	14.9%
Media campaign	20.6%	18.1%	16.9%	15.8%	14.4%
Cessation treatment	20.6%	18.2%	16.7%	15.3%	13.8%
Education programs	20.6%	19.2%	17.6%	16.1%	14.6%
Youth-access policies	20.6%	19.1%	17.6%	16.2%	14.7%
All policies with \$1.00 tax	20.6%	15.5%	13.4%	11.8%	10.2%
All policies with \$2.00 tax	20.6%	14.9%	12.9%	11.2%	9.7%

- cut the rate of smoking initiation by 10 percent
- Heavy enforcement of youth-access laws, accompanied by publicity and high penalties
- All of these things being done together with \$1- or \$2-per-pack tax increases

Empirical data concerning interactions among multiple policy interventions implemented simultaneously are sparse. The SimSmoke model makes the reasonable but still untested assumption that “when more than one policy is in effect, the percentage reductions are multiplicatively applied,” implying that “the relative effect is independent of other policies but the absolute effect is smaller when another policy is in effect” (Levy, Appendix J). For example, if two policies that would each reduce a model flow by 10 percent are both implemented together, they reduce that flow by 19 percent since $(1-10 \text{ percent}) \times (1-10 \text{ percent}) = 81 \text{ percent}$, which is a 19 percent reduction. Hence the results of an estimated “all-policies” analysis are less certain than those of an analysis of individual policies.

The individual policies, particularly the cessation interventions and tax increases, could have a substantial effect on tobacco use prevalence over time. Indeed, collectively they are projected to meet the Healthy People 2010 smoking prevalence target of 12 percent in about 2020, with a 10 percent prevalence reached in 2025. The potential impact of full implementation of the blueprint presented in this chapter is depicted in Figure 5-9, which compares the SimSmoke model projections under the best-case conditions with the status-quo and worst-case projections presented in Chapter 3.

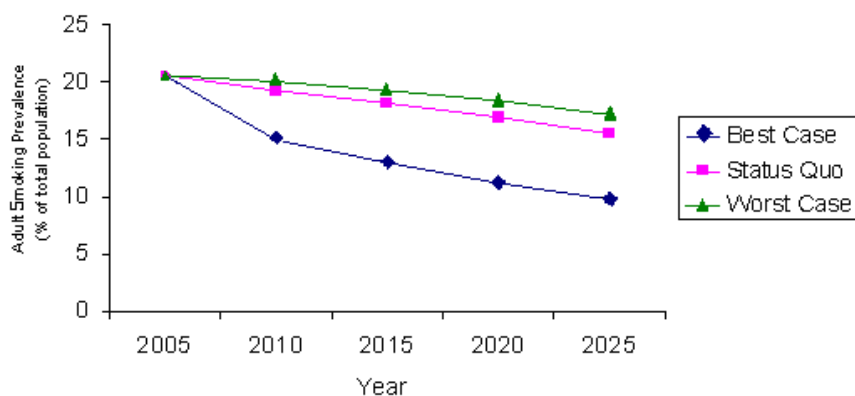


FIGURE 5-9 Comparison of SimSmoke model estimates of adult smoking prevalence, 2005 to 2025, under the best-case, status-quo, and worst-case scenarios.

Overall, however, the committee finds these model projections only modestly encouraging. On the positive side, the actions outlined in this chapter seem to be powerful and effective. Implementing this set of recommendations fully might allow the important goal of a 10 percent smoking prevalence to be achieved, albeit 15 years later than envisioned in *Healthy People 2010*. On the other hand, removing any single one of the comprehensive policy's components would prevent the modeled prevalence from hitting the 10 percent target in 2025. Hence, the success of these strategies is, in some sense, fragile, requiring absolute commitment to full implementation. Given the recent retrenchment in tobacco control efforts described in Chapter 3, one might worry whether that level of commitment can be achieved and sustained. Nevertheless, any major initiatives undertaken to reduce tobacco use, including those outlined in the blueprint described in this chapter, should be carefully evaluated both for their levels and integrity of delivery and for their effectiveness.

It is not literally true that the only way that the 10 percent smoking prevalence target can be reached in 2025 is by implementing this particular combination of actions. Any set of actions, whether they are produced by policy interventions or by exogenous events, that sufficiently reduces initiation or increases the rate of smoking cessation would enable the country to meet that 10 percent target. This point is illustrated in Figure 5-10, which was created by running the System Dynamics Model in reverse to determine the break-even changes in initiation and cessation that are needed to achieve

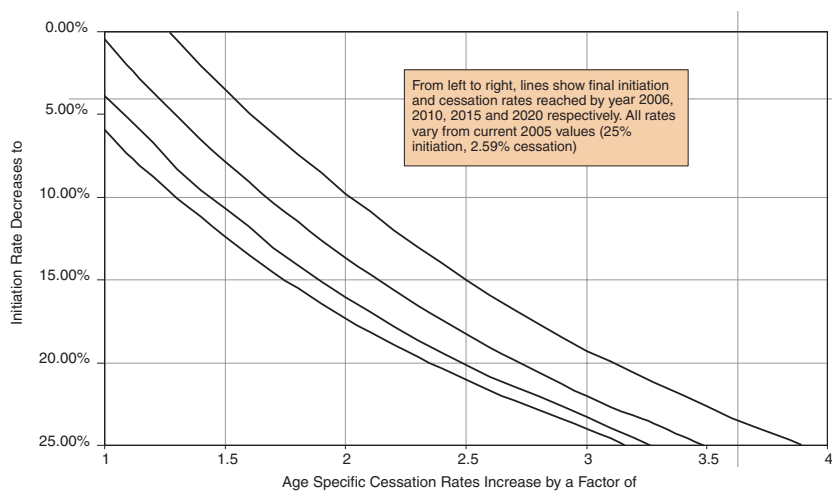


FIGURE 5-10 Combination of initiation and cessation rates required to reach a smoking prevalence of 10 percent by 2025.

a smoking prevalence of 10 percent by 2025. The figure shows four different break-even lines, each corresponding to different rates of change. The line farthest to the left shows the initiation and cessation that would be required if those changes took place more or less instantly. The line farthest to the right shows the changes that would be needed if such changes were phased in between now and 2020.

Figure 5-10 presents a lot of information into one display, so it is worth pausing to explain exactly how to read it. Note that the line farthest to the right essentially crosses the point (2, 10 percent) corresponding to a doubling in the cessation rate (horizontal axis) and a 10 percent rate of initiation (vertical axis). That means that if, between now and 2020 (2020 is used because this is the fourth line from the left), initiation rates fell from the current rates of 25 percent down to 10 percent, and cessation rates doubled over the same time period, then by 2025 those changes would be enough to drive the smoking prevalence to 10 percent by 2025. Any combination of changes to the lower left of that line would not be enough. Any combination of changes to the upper right, if effective by 2020, would be enough to drive the smoking prevalence below 10 percent by 2025.

Reductions in initiation and increases in cessation are complements, or alternative ways to reach the target (hence the lines slope from upper left to lower right). The general impression that the committee takes away from this chart is that the 10 percent smoking prevalence in 2025 target is attainable, but it will require rather potent actions sustained over a long period of time.

One way to achieve the goal would be full implementation of the actions described in this chapter. However, these proposals have been selected within two substantial constraints: they are known to be effective, and they can be implemented within the existing legal structure of tobacco control.

Chapter 6 describes proposals that relax these two constraints. The ideas presented go beyond implementation of the tried and trusted methods that have been subject to extensive experimentation and peer review. Rather, they are policy strategies that hold great potential but that are relatively untried and that therefore have been relatively unexamined empirically. One overall lesson that can be taken from the modeling exercises is this: if the country is serious about attaining 10 percent smoking prevalence by 2025, then unless the country has great confidence that the plan outlined in this chapter will be rapidly, faithfully, and continuously implemented in its entirety, other approaches should be considered.

Realistically, the committee is doubtful that the prevalence of smoking among adults will drop significantly below 15 percent, or that the rate of smoking initiation will permanently fall below 15 percent if the basic legal structure of the tobacco market, and the tobacco control community's responses to that market, remain unchanged. Although achieving these levels

would be a major improvement, they are not satisfactory from a public health standpoint, simply because of the large numbers of premature deaths and other serious harmful consequences that would inevitably follow. The steps outlined in this chapter are surely necessary in the short run, but we should be prepared to do more over the long run.

REFERENCES

- AAP (American Academy of Pediatrics). 1986. Involuntary smoking: a hazard to children. *Pediatrics* 77:755-757.
- Abrams DB, Niaura R, Brown RA, Emmons KM, Goldstein MG, Monti PM. 2003. *The Tobacco Dependence Treatment Handbook: A Guide to Best Practices*. New York: The Guilford Press.
- Abrams DB, Orleans CT, Niaura RS, Goldstein MG, Prochaska JO, Velcer W. 1996. Integrating individual and public health perspectives for treatment of tobacco dependence under managed health care: a combined stepped-care and matching model. *Annals of Behavioral Medicine* 18(4):290-303.
- ACHA (American College Health Association). 2005. *Position Statement on Tobacco on College and University Campuses*. Web Page. Available at: http://www.acha.org/info_resources/tobacco_statement.pdf; accessed June 12, 2007.
- AHA (American Heart Association), American Cancer Society, Campaign for Tobacco-Free Kids, and American Lung Association. 2005. *A Broken Promise to Our Children: The 1998 State Tobacco Settlement Seven Years Later*. Web Page. Available at: <http://www.tobaccofreekids.org/reports/settlements/2006/fullreport.pdf>; accessed May 30, 2006.
- AHIP (America's Health Insurance Plans). 2004. *Making the Business Case for Smoking Cessation*. Web Page. Available at: <http://www.businesscaseroi.org/roi/default.aspx>; accessed July 26, 2006.
- Aligne CA, Stoddard JJ. 1997. Tobacco and children: an economic evaluation of the medical effects of parental smoking. *Archives of Pediatric and Adolescent Medicine* 151(7):648-653.
- Andersen MR, Leroux BG, Bricker JB, Rajan KB, Peterson AV Jr. 2004. Antismoking parenting practices are associated with reduced rates of adolescent smoking. *Archives of Pediatric and Adolescent Medicine* 158(4):348-352.
- ANR (Americans for Nonsmokers' Rights). 2005. *Health Effects of Secondhand Smoke on Children*. Web Page. Available at: <http://www.no-smoke.org/document.php?id=212>; accessed July 11, 2006.
- ANRF (American Nonsmokers' Rights Foundation). 2006. *Municipalities with Local 100% Smokefree Laws*. Web Page. Available at: <http://www.no-smoke.org/pdf/100ordlisttabs.pdf>; accessed August 11, 2006.
- ANRF. 2007. *Colleges and Universities with Smokefree Air Policies*. Web Page. Available at: <http://www.no-smoke.org/pdf/smokefreecollegesuniversities.pdf>; accessed June 12, 2007.
- Arkin RM, Roemhild HF, Johnson CA, Luepker RV, Murray DM. 1981. The Minnesota smoking prevention program: a seventh-grade health curriculum supplement. *Journal of School Health* 51(9):611-616.
- Baezconde-Garbanati L, Garbanati JA. 2000. Tailoring tobacco control messages for Hispanic populations. *Tobacco Control* 9(Suppl 1):i51.
- Bal DG. 1998. Designing an effective statewide tobacco control program—California. *Cancer* 83(12 Suppl Robert):2717-2721.

- Banthin C. 2004. Cheap smokes: state and federal responses to tobacco tax evasion over the internet. *Health Matrix* 14:325-356.
- Banzhaf JF. 2005. *17th State Bans Smoking in Home to Protect Children*. Web Page. Available at: <http://www.no-smoking.org/august05/08-05-05-1.html>; accessed July 14, 2006.
- Bauer UE, Johnson TM, Hopkins RS, Brooks RG. 2000. Changes in youth cigarette use and intentions following implementation of a tobacco control program: findings from the Florida Youth Tobacco Survey, 1998–2000. *Journal of the American Medical Association* 284(6):723-728.
- Bayer R, Colgrove J. 2002. Science, politics, and ideology in the campaign against environmental tobacco smoke. *American Journal of Public Health* 92(6):949-954.
- Behan DF, Eriksen MP, Lin Y. 2005. *Economic Effects of Environmental Tobacco Smoke*. Schaumburg, IL: Society of Actuaries.
- Belluck P. 2007, January 19. Maine city bans smoking in cars with children. *The New York Times*.
- Bergman J. 2003. *Smoking Policies in Long-Term Care and Residential Facilities Serving Older Persons*. Web Page. Available at: www.tcsg.org/powerpoint7/index.htm; accessed February 23, 2005.
- Bernstein E, Bernstein J, Levenson S. 1997. Project ASSERT: an ED-based intervention to increase access to primary care, preventative services, and the substance abuse treatment system. *Annals of Emergency Medicine* 30(2):181-189.
- Bernstein SL, Boudreaux ED, Cydulka RK, Rhodes KV, Lettman NA, Almeida SL, McCullough LB, Mizouni S, Kellermann AL. 2006. Tobacco control interventions in the emergency department: a joint statement of emergency medicine organizations. *Annals Emergency Medicine* 48(4):e417-e426.
- Bernstein SL, Cannata M. 2006. Nicotine dependence, motivation to quit, and diagnosis in emergency department patients who smoke. *Addictive Behavior* 31(2):288-297.
- Biener L. 2000. Adult and youth response to the Massachusetts anti-tobacco television campaign. *Journal of Public Health Management and Practice* 6(3):40-44.
- Biener L. 2002. Anti-tobacco advertisements by Massachusetts and Philip Morris: what teenagers think. *Tobacco Control* 11 (Suppl 2):ii43-ii46.
- Biener L, Harris JE, Hamilton W. 2000a. Impact of the Massachusetts tobacco control programme: population based trend analysis. *British Medical Journal* 321(7257):351-354.
- Biener L, McCallum-Keeler G, Nyman AL. 2000b. Adults' response to Massachusetts anti-tobacco television advertisements: impact of viewer and advertisement characteristics. *Tobacco Control* 9(4):401-417.
- BJS (Bureau of Justice Statistics). 2005. *Summary Findings: Prisons*. Web Page. Available at: <http://www.ojp.usdoj.gov/bjs/prisons.htm>; accessed May 11, 2007.
- Blecher EH, van Walbeek CP. 2004. An international analysis of cigarette affordability. *Tobacco Control* 13(4):339-346.
- Bloch M, Shopland DR. 2000. Outdoor smoking bans: more than meets the eye. *Tobacco Control* 9(1):99.
- Blumberg DL. 2005, June 22. Even home isn't haven for smokers. *Christian Science Monitor*. P. 16.
- Bonnie RJ. 2001. Tobacco and public health policy: A youth centered approach. Slovic PE, Ed. *Smoking: Risk, Perception, and Policy*. Thousand Oaks, CA: Sage Publications.
- Borders TE, K Tom Xu, Bacchi D, Cohen L, SoRelle-Miner D. 2005. College campus smoking policies and programs and students' smoking behaviors. *BioMed Center Public Health* 5(74).
- Borland R, Yong HH, Cummings KM, Hyland A, Anderson S, Fong GT. 2006. Determinants and consequences of smoke-free homes: findings from the International Tobacco Control (ITC) Four Country Survey. *Tobacco Control* 15(Suppl 3):iii42-iii50.

- Botvin GJ. 2000. Preventing drug abuse in schools: social and competence enhancement approaches targeting individual-level etiologic factors. *Addictive Behavior* 25(6):887-897.
- Botvin GJ, Baker E, Dusenbury L, Botvin EM, Diaz T. 1995. Long-term follow-up results of a randomized drug abuse prevention trial in a white middle-class population. *Journal of the American Medical Association* 273(14):1106-1112.
- Botvin GJ, Baker E, Dusenbury L, Tortu S, Botvin EM. 1990. Preventing adolescent drug abuse through a multimodal cognitive-behavioral approach: results of a 3-year study. *Journal of Consulting and Clinical Psychology* 58(4):437-446.
- Botvin GJ, Eng A. 1982. The efficacy of a multicomponent approach to the prevention of cigarette smoking. *Preventative Medicine* 11(2):199-211.
- Botvin GJ, Griffin KW. 2002. Life skills training as a primary prevention approach for adolescent drug abuse and other problem behaviors. *The International Journal of Emergency Mental Health* 4(1):41-47.
- Boudreaux ED, Kim S, Hohrmann JL, Clark S, Camargo CA. 2005. Interest in smoking cessation among emergency department patients. *Health Psychology* 24(2):220-224.
- Bray RM, Hourani LL, Rae Olmsted KL, Witt M, Brown JM, Pemberton MR, Marsden ME, Marriott, Scheffler, Vandermaas-Peeler R, Weimer B, Calvin S, Bradshaw M, Close K, Hayden D. 2006. 2005 *Department of Defense Survey of Health Related Behaviors Among Active Duty Military Personnel*. Washington, DC: Department of Defense/RTI International.
- Cady B. 1998. History of successful ballot initiatives—Massachusetts. *Cancer* 83(12 Suppl Robert):2685-2689.
- Campaign for Tobacco-Free Kids. 2003. *State of Washington V. Dirtcheapcig.Com, Inc.* Web Page. Available at: <http://tobaccofreekids.org/reports/internet/WARuling.pdf>; accessed May 29, 2007.
- Capehart T. 2005. *Tobacco Outlook: Leaf Production Plummets with End of Program*. Washington, DC: Economic Research Service, U.S. Department of Agriculture.
- Cawley J, Markowitz S, Tauras J. 2004. Lighting up and slimming down: the effects of body weight and cigarette prices on adolescent smoking initiation. *Journal of Health Economics* 23(2):293-311.
- CDC (Centers for Disease Control and Prevention). 1996. Cigarette smoking before and after an excise tax increase and an antismoking campaign—Massachusetts, 1990–1996. *MMWR (Morbidity and Mortality Weekly Report)* 45(44):966-970.
- CDC. 1999a. Decline in cigarette consumption following implementation of a comprehensive tobacco prevention and education program—Oregon, 1996–1998. *MMWR (Morbidity and Mortality Weekly Report)* 48(7):140-143.
- CDC. 1999b. Ten great public health achievements—United States, 1900–1999. *MMWR (Morbidity and Mortality Weekly Report)* 48(12):241-243.
- CDC. 1999c. *Best Practices for Comprehensive Tobacco Control Programs—August 1999*. Atlanta, GA: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health.
- CDC. 2001. Tobacco use among adults—Arizona, 1996 and 1999. *MMWR (Morbidity and Mortality Weekly Report)* 50(20):402-406.
- CDC. 2002. Annual smoking-attributable mortality, years of potential life lost, and economic costs—United States, 1995–1999. *MMWR (Morbidity and Mortality Weekly Report)* 51(14):300-303.
- CDC. 2003. *Chronic Disease. Grants and Funding: Consolidating and Streamlining Program Announcements*. Web Page. Available at: http://www.cdc.gov/nccdphp/grants_funding/consolidating.htm; accessed August 15, 2006.

- CDC. 2004a. Prevalence of cigarette use among 14 racial/ethnic populations—United States, 1999–2001. *MMWR (Morbidity and Mortality Weekly Report)* 53(3):49-52.
- CDC. 2004b. Impact of a smoking ban on restaurant and bar revenues—El Paso, Texas, 2002. *MMWR (Morbidity and Mortality Weekly Report)* 53(7):150-152.
- CDC. 2005a. CDC Wonder: DATA 2010 . . . *The Healthy People 2010 Database*. Web Page. Available at: <http://wonder.cdc.gov/data2010/focus.htm>; accessed July 10, 2006.
- CDC. 2005b. *Key Outcome Indicators for Evaluating Comprehensive Tobacco Control Programs*. Atlanta, GA.
- CDC. 2005c. *State Tobacco Activities Tracking and Evaluation (STATE) System*. Web Page. Available at: <http://apps.nccd.cdc.gov/statesystem/>; accessed June 8, 2007.
- CDC. 2005d. Annual smoking-attributable mortality, years of potential life lost, and productivity losses—United States, 1997–2001. *MMWR (Morbidity and Mortality Weekly Report)* 54(25):625-628.
- CDC. 2005e. State smoking restrictions for private-sector worksites, restaurants, and bars—United States, 1998 and 2004. *MMWR (Morbidity and Mortality Weekly Report)* 54(26):649-653.
- CDC. 2005f. Estimated exposure of adolescents to state-funded anti-tobacco television advertisements—37 states and the District of Columbia, 1999–2003. *MMWR (Morbidity and Mortality Weekly Report)* 54(42):1077-1080.
- CDC. 2005g. Cigarette smoking among adults—United States, 2004. *MMWR (Morbidity and Mortality Weekly Report)* 54(44):1121-1124.
- CDC. 2006a. *Behavioral Risk Factor Surveillance System*. Web Page. Available at: <http://www.cdc.gov/brfss/>; accessed July 19, 2006.
- CDC. 2006b. *YRBSS: Youth Risk Behavior Surveillance System*. Web Page. Available at: <http://www.cdc.gov/HealthyYouth/yrbs/index.htm>; accessed July 19, 2006.
- CDHS (California Department of Health Services). 1998. *A Model for Change: The California Experience in Tobacco Control*. Sacramento, CA: California Department of Health Services.
- CDHS. 2002. *California Tobacco Control Update*. Web Page. Available at: <http://www.dhs.ca.gov/tobacco/documents/pubs/TCSupdate.pdf>; accessed February 1, 2006.
- CDHS. 2005. *Prevalence: Youth Smoking*. Sacramento, CA.
- Celebucki C, Biener L, Koh HK. 1998. Evaluation: methods and strategy for evaluation—Massachusetts. *Cancer* 83(12 Suppl Robert):2760-2765.
- Chaloupka FJ. 1999. Macro-social influences: the effects of prices and tobacco-control policies on the demand for tobacco products. *Nicotine and Tobacco Research* 1(Suppl 1):105-109 .
- Chaloupka FJ, Pacula RL. 1998. *An Examination of Gender and Race Differences in Youth Smoking Responsiveness to Price and Tobacco Control Policies, Working Paper 6541*. Web Page. Available at: <http://www.impactteen.org/fjc/PublishedPapers/w6541.pdf>; accessed June 8, 2007.
- Chaloupka FJ, Warner KE. 2000. The Economics of Smoking. *Handbook of Health Economics*. Vol. 1B. Pp. 1541-1612.
- Chapman S. 2000. Banning smoking outdoors is seldom ethically justifiable. *Tobacco Control* 9(1):95-97.
- Chapman S, Richardson J. 1990. Tobacco excise and declining tobacco consumption: the case of Papua New Guinea. *American Journal of Public Health* 80(5):537-540.
- Chassin L, Presson CC, Rose JS, Sherman SJ. 1996. The natural history of cigarette smoking from adolescence to adulthood: demographic predictors of continuity and change. *Health Psychology* 15(6):478-484.

- Chassin L, Presson CC, Rose J, Sherman SJ, Davis MJ, Gonzalez JL. 2005. Parenting style and smoking-specific parenting practices as predictors of adolescent smoking onset. *Journal of Pediatric Psychology* 30(4):333-344.
- Chinnock WF. 2003. No smoking around children: the family courts' mandatory duty to restrain parents and other persons from smoking around children. *Arizona Law Review* 453.
- Clark PI, Scarisbrick-Hausser A, Gautam SP, Wirk SJ. 1999. Anti-tobacco socialization in homes of African-American and white parents, and smoking and nonsmoking parents. *Journal of Adolescent Health* 24(5):329-339.
- Cohen DA, Richardson J, LaBree L. 1994. Parenting behaviors and the onset of smoking and alcohol use: a longitudinal study. *Pediatrics* 94(3):368-375.
- Connolly G, Robbins H. 1998. Designing an effective statewide tobacco control program—Massachusetts. *Cancer* 83(12 Suppl Robert):2722-2727.
- Cooper M. 2005, June 9. Bill would ban delivery of cigarettes in mail. *The New York Times*. B, p. 4.
- Cummings KM, Clarke H. 1998a. *The Use of Counter-Advertising as a Tobacco Use Deterrent*. Web Page. Available at: <http://www.advocacy.org/publications/mtc/counterads.htm>; accessed September 12, 2005.
- Cummings KM, Clarke H. 1998b. *Health Science Analysis Project—Policy Analysis No. 8*. Washington, DC: Advocacy Institute.
- DHHS (U.S. Department of Health and Human Services). 2000. *Reducing Tobacco Use: A Report of the Surgeon General*. Atlanta, GA: U.S. Department of Health and Human Services.
- DHHS. 2001. *Healthy People 2010, Volume II: 27 Tobacco Use*. Web Page. Available at: http://www.healthypeople.gov/Document/HTML/Volume2/27Tobacco.htm#_Toc489766224; accessed July 20, 2006.
- DHHS. 2004. *HHS Announces National Smoking Cessation Quitline Network*. Web Page. Available at: <http://www.hhs.gov/news/press/2004pres/20040203.html>; accessed July 17, 2006.
- DHHS. 2006. *The Health Consequences of Involuntary Exposure to Tobacco Smoke: A Report of the Surgeon General*. Atlanta, GA: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, Coordinating Center for Health Promotion, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health.
- DiFranza JR. 1999. Are the federal and state governments complying with the Synar Amendment? *Archives of Pediatric and Adolescent Medicine* 153(10):1089-1097.
- DiFranza JR, Dussault GF. 2005. The federal initiative to halt the sale of tobacco to children—the Synar Amendment, 1992-2000: lessons learned. *Tobacco Control* 14(2):93-98.
- DiFranza JR, Lew RA. 1996. Morbidity and mortality in children associated with the use of tobacco products by other people. *Pediatrics* 97(4):560-568.
- Ding A. 2003. Youth are more sensitive to price changes in cigarettes than adults. *Yale Journal of Biological Medicine* 76(3):115-124.
- Dorfman L, Wallack L. 1993. Advertising health: the case for counter-ads. *Public Health Reports* 108(6):716-726.
- Eckhardt L, Woodruff SI, Elder JP. 1997. Related effectiveness of continued, lapsed, and delayed smoking prevention intervention in senior high school students. *American Journal of Health Promotion* 11(6):418-421.
- Elder JP, Edwards CC, Conway TL, Kenney E, Johnson CA, Bennett ED. 1996. Independent evaluation of the California Tobacco Education Program. *Public Health Reports* 111(4):353-358.

- Elder JP, Wildey M, de Moor C, Sallis JF Jr, Eckhardt L, Edwards C, Erickson A, Golbeck A, Hovell M, Johnston D, et al. 1993. The long-term prevention of tobacco use among junior high school students: classroom and telephone interventions.[see comment]. *American Journal of Public Health* 83(9):1239-1244.
- Emery S, White MM, Pierce JP. 2001. Does cigarette price influence adolescent experimentation? *Journal of Health Economics* 20(2):261-270.
- Emont S, Choi W, Novotny T, Giovino G. 1992. Clean indoor air legislation, taxation, and smoking behaviour in the United States: an ecological analysis. *Tobacco Control* 2:13-17.
- Ennett ST, Tobler NS, Ringwalt CL, Flewelling RL. 1994. How effective is drug abuse resistance education? A meta-analysis of Project DARE outcome evaluations. *American Journal of Public Health* 84(9):1394-1401.
- EPA (Environmental Protection Agency). 1992. *Respiratory Health Effects of Passive Smoking: Lung Cancer and Other Disorders*. Washington, DC: Office of Health and Environmental Assessment, Office of Research and Development, U.S. Environmental Protection Agency.
- EPA. 2006. *Health Effects of Exposure to Secondhand Smoke*. Web Page. Available at: <http://www.epa.gov/smokefree/healtheffects.html>; accessed July 7, 2006.
- Etzel RA. 1997. Active and passive smoking: hazards for children. *Central European Journal of Public Health* 5(2):54-56.
- Fagan P, Brook JS, Rubenstone E, Zhang C. 2005. Parental occupation, education, and smoking as predictors of offspring tobacco use in adulthood: a longitudinal study. *Addictive Behavior* 30(3):517-529.
- Farkas AJ, Gilpin EA, White MM, Pierce JP. 2000. Association between household and workplace smoking restrictions and adolescent smoking. *Journal of the American Medical Association* 284(6):717-722.
- Farquhar JW, Maccoby N, Wood PD, Alexander JK, Breitrose H, Brown BW Jr, Haskell WL, McAlister AL, Meyer AJ, Nash JD, Stern MP. 1977. Community education for cardiovascular health. *Lancet* 1(8023):1192-1195.
- Farrelly MC, Chen J, Thomas KY, Heulton CJ. 2001. *Legacy First Look Report 6: Youth Exposure to Environmental Tobacco Smoke*. Washington, DC: American Legacy Foundation.
- Farrelly MC, Davis KC, Haviland ML, Messeri P, Heulton CG. 2005. Evidence of a dose—response relationship between “truth” antismoking ads and youth smoking prevalence. *American Journal of Public Health* 95(3):425-431.
- Farrelly MC, Heulton CG, Davis KC, Messeri P, Hersey JC, Haviland ML. 2002. Getting to the truth: evaluating national tobacco countermarketing campaigns.[erratum appears in *American Journal of Public Health* 2003 May;93(5):703]. *American Journal of Public Health* 92(6):901-907.
- Farrelly MC, Niederdeppe J, Yarsevich J. 2003. Youth tobacco prevention mass media campaigns: past, present, and future directions. *Tobacco Control* 12(Suppl 1):i35-i47.
- Farrelly MC, Nonnemaker JM, Chou R, Hyland A, Peterson KK, Bauer UE. 2005. Changes in hospitality workers’ exposure to secondhand smoke following the implementation of New York’s smoke-free law. *Tobacco Control* 14(4):236-241.
- Farrelly MC, Pechacek TF, Chaloupka FJ. 2003. The impact of tobacco control program expenditures on aggregate cigarette sales: 1981-2000. *Journal of Health Economics* 22(5):843-859.
- Fee E, Brown TM. 2004. Hospital smoking bans and their impact. *American Journal of Public Health* 94(2):185.

- Fichtenberg CM, Glantz SA. 2000. Association of the California Tobacco Control Program with declines in cigarette consumption and mortality from heart disease. *New England Journal of Medicine* 343(24):1772-1777.
- Fichtenberg CM, Glantz SA. 2002. Effect of smoke-free workplaces on smoking behaviour: systematic review. *BMJ* 325(7357):188.
- Fiore MC, Bailey WC, Cohen SJ. 2000. *Treating Tobacco Use and Dependence (Clinical Practice Guideline)*. Rockville, MD: U.S. Department of Health Human Services. Public Health Service.
- Fiore MC, Croyle RT, Curry SJ, Cutler CM, Davis RM, Gordon C, Heaton C, Koh HK, Orleans CT, Richling D, Satcher D, Seffrin J, Williams C, Williams LN, Keller PA, Baker TB. 2004. Preventing 3 million premature deaths and helping 5 million smokers quit: a national action plan for tobacco cessation. *American Journal of Public Health* 94(2):205-310.
- Flay BR. 2000. Approaches to substance use prevention utilizing school curriculum plus social environment change. *Addictive Behavior* 25(6):861-885.
- Flay BR, Hu FB, Richardson J. 1998. Psychosocial predictors of different stages of cigarette smoking among high school students. *Preventive Medicine* 27(5 Pt 3):9-18.
- Flynn BS, Worden JK, Secker-Walker RH, Badger GJ, Geller BM. 1995. Cigarette smoking prevention effects of mass media and school interventions targeted to gender and age groups. *Journal of Health Education* 26(2):S45-S51.
- Flynn BS, Worden JK, Secker-Walker RH, Badger GJ, Geller BM, Costanza MC. 1992. Prevention of cigarette smoking through mass media intervention and school programs. *American Journal of Public Health* 82(6):827-834.
- Flynn BS, Worden JK, Secker-Walker RH, Pirie PL, Badger GJ, Carpenter JH, Geller BM. 1994. Mass media and school interventions for cigarette smoking prevention: effects 2 years after completion. *American Journal of Public Health*. 84(7):1148-1150.
- Folsom D, Jeste DV. 2002. Schizophrenia in homeless persons: a systematic review of the literature. *Acta Psychiatrica Scandinavica* 105(6):404-413 .
- Fong GT, Hyland A, Borland R, Hammond D, Hastings G, McNeill A, Anderson S, Cummings KM, Allwright S, Mulcahy M, Howell F, Clancy L, Thompson ME, Connolly G, Driezen P. 2006. Reductions in tobacco smoke pollution and increases in support for smoke-free public places following the implementation of comprehensive smoke-free workplace legislation in the Republic of Ireland: findings from the ITC Ireland/UK Survey. *Tobacco Control* 15(Suppl 3):iii51-iii58.
- Fraguela J, Martin A, Trinanes E. 2003. Drug-abuse prevention in the school: four-year follow-up of a programme. *Psychology in Spain* 7(1):29-38.
- Frieden TR, Mostashari F, Kerker BD, Miller N, Hajat A, Frankel M. 2005. Adult tobacco use levels after intensive tobacco control measures: New York City, 2002–2003. *American Journal of Public Health* 95(6):1016-1023.
- Friend K, Levy DT. 2002. Reductions in smoking prevalence and cigarette consumption associated with mass-media campaigns. [Review] [63 refs]. *Health Education Research*. 17(1):85-98.
- Gallet CA, List JA. 2003. Cigarette demand: a meta-analysis of elasticities. *Health Economics* 12(10):821-835.
- GAO (General Accounting Office). 2002. *Internet Cigarette Sales: Giving ATF Investigative Authority May Improve Reporting and Enforcement*. Washington, DC: GAO.
- GAO. 2006. *Tobacco Settlement: States' Allocations of Fiscal Year 2005 and Expected Fiscal Year 2006 Payments*. Washington, DC: GAO.
- Gerlach KK, Larkin MA. 2005. *To Improve Health and Health Care, Vol. VIII*. San Francisco, CA: Jossey-Bass.

- Gilpin EA, Lee L, Pierce JP. 2005. How have smoking risk factors changed with recent declines in California adolescent smoking? *Addiction* 100(1):117-125.
- Gilpin E, Lee L, Pierce JP, Tang H, Lloyd J. 2004. Support for protection from second hand smoke: California 2002. *Tobacco Control* 13(1):96.
- Givel M, Glantz S. 2000. Failure to defend a successful state tobacco control program: policy lessons from Florida. *American Journal of Public Health* 90(5).
- Givel S, Dearlove J, Glantz S. 2001. *Tobacco Policy Making in California 1999-2001: Stalled and Adrift*. San Francisco, CA: Center for Tobacco Research and Education (University of California).
- Glantz S, Balbach E. 2000. *Tobacco War: Inside the California Battles*. Berkeley: University of California Press.
- Glasgow RE, Cummings KM, Hyland A. 1997. Relationship of worksite smoking policy to changes in employee tobacco use: findings from COMMIT. Community Intervention Trial for Smoking Cessation. *Tobacco Control* 6(Suppl 2):S44-S48.
- Glynn TJ. 1989. Essential elements of school-based smoking prevention programs. *Journal of School Health* 59(5):181-188.
- Gortmaker SL, Walker DK, Jacobs FH, Ruch-Ross H. 1982. Parental smoking and the risk of childhood asthma. *American Journal of Public Health* 72(6):574-579.
- Gross CP, Soffer B, Bach PB, Rajkumar R, Forman HP. 2002. State expenditures for tobacco-control programs and the tobacco settlement. *New England Journal of Medicine* 347(14):1080-1086.
- Gruber J. 2001. Tobacco at the crossroads: the past and future of smoking regulation in the United States. *The Journal of Economic Perspectives* 15(2):193-212.
- Halperin AC, Rigotti NA, Rothstein WG, Rajapaksa S. 2003. US public universities' compliance with recommended tobacco-control policies. *Journal of American College Health* 51(5):181.
- Hamilton VH, Levinton C, St-Pierre Y, Grimard F. 1997. The effect of tobacco tax cuts on cigarette smoking in Canada. *Canadian Medical Association Journal* 156(2):187-191.
- Hamilton W, Norton G, Weintraub J. 2002. *Independent Evaluation of the Massachusetts Tobacco Control Program, 7th Annual Report—January 1994 to June 2000*. Cambridge, MA: Abt Associates Inc.
- Hamilton WL, Biener L, Rodger CN. 2005. Who supports tobacco excise taxes? Factors associated with towns' and individuals' support in Massachusetts. *Journal of Public Health Management and Practice* 11(4):333-340.
- Hamilton WL, Rodger CN, Chen X, Njobe TK, Kling R, Norton G. 2003. *Independent Evaluation of the Massachusetts Tobacco Control Program, Eighth Annual Report: January 1994—June 2001*. Cambridge, MA: Abt Associates Inc.
- Hamlett-Berry K. 2004. Smoking cessation policy in the VA health care system: Where have we been and where are we going? In: Isaccs S, ed. *VA in the Vanguard: Building on Success in Smoking Cessation: Proceedings of a Conference Held September 21, 2004 in San Francisco, California*. Washington, DC: Department of Veterans Affairs. Pp. 7-40.
- Hammond D, McDonald PW, Fong GT, Borland R. 2004. Do smokers know how to quit? Knowledge and perceived effectiveness of cessation assistance as predictors of cessation behaviour. *Addiction* 99(8):1042-1048.
- Hammond SK, Emmons KM. 2005. Inmate exposure to secondhand smoke in correctional facilities and the impact of smoking restrictions. *Journal of Exposure Analysis and Environmental Epidemiology* 15(3):205-211.
- Hanewinkel R, Asshauer M. 2004. Fifteen-month follow-up results of a school-based life-skills approach to smoking prevention. *Health Education Research* 19(2):125-137.
- Hansen W. 1988. Theory and Implementation of the Social Influence Model of Primary Prevention. *Prevention Research Findings: 1988. OSAP Prevention Monograph-3*. Washington, DC: Office of Substance Abuse Prevention (U.S. HHS).

- Hansen WB, Malotte CK, Fielding JE. 1988. Evaluation of a tobacco and alcohol abuse prevention curriculum for adolescents. *Health Education Quarterly* 15(1):93-114.
- Harris JE, Chan SW. 1999. The continuum-of-addiction: cigarette smoking in relation to price among Americans aged 15-29. *Health Economics* 8(1):81-86.
- Hay JW. 1991. The Harm They Do to Others: A Primer on the External Costs of Drug Abuse. *Searching for Alternatives: Drug Control Policy in the United States*. Stanford, CA: Hoover Institution Press. Pp. 200-225.
- Hennrikus D, Pentel PR, Sandell SD. 2003. Preferences and practices among renters regarding smoking restrictions in apartment buildings. *Tobacco Control* 12(2):189-194.
- HEW (Department of Health, Education, and Welfare). 1964. *Smoking and Health: Report of the Advisory Committee to the Surgeon General of the Public Health Service*. Washington, DC: U.S. Department of Health, Education, and Welfare; Public Health Service.
- Hill KG, Hawkins JD, Catalano RF, Abbott RD, Guo J. 2005. Family influences on the risk of daily smoking initiation. *J Adolesc Health* 37(3):202-210.
- Hopkins DP, Briss PA, Ricard CJ, Husten CG, Carande-Kulis VG, Fielding JE, Alao MO, McKenna JW, Sharp DJ, Harris JR, Woollery TA, Harris KW. 2001. Reviews of evidence regarding interventions to reduce tobacco use and exposure to environmental tobacco smoke. *American Journal of Preventive Medicine* 20(2 Suppl):16-66.
- Hu TW, Ren QF, Keeler TE, Bartlett J. 1995a. The demand for cigarettes in California and behavioural risk factors. *Health Economics* 4(1):7-14.
- Hu TW, Sung HY, Keeler TE. 1995b. The state antismoking campaign and the industry response: the effects of advertising on cigarette consumption in California. *American Economic Review* 85(2):85-90.
- Hyland A, Higbee C, Li Q, Bauer JE, Giovino GA, Alford T, Cummings KM. 2005. Access to low-taxed cigarettes deters smoking cessation attempts. *American Journal of Public Health* 95(6):994-995.
- Hyland A, Li Q, Bauer JE, Giovino GA, Steger C, Cummings KM. 2004. Predictors of cessation in a cohort of current and former smokers followed over 13 years. *Nicotine and Tobacco Research* 6(Suppl 3):S363-S369.
- IARC (International Agency for Research on Cancer). 2002. *Volume 83 Tobacco Smoke and Involuntary Smoking*. Web Page. Available at: <http://monographs.iarc.fr/ENG/Monographs/vol83/volume83.pdf>; accessed June 8, 2007.
- Independent Evaluation Consortium. 2002. *Final Report. Independent Evaluation of the California Tobacco Control Prevention and Education Program: Waves 1, 2, and 3 (1996-2000)*. Rockville, MD: The Gallup Organization.
- IOM (Institute of Medicine). 1988. *The Future of Public Health*. Washington, DC: National Academy Press.
- IOM. 1994a. *Growing Up Tobacco Free: Preventing Nicotine Addiction in Children and Youth*. Washington, DC: National Academy Press.
- IOM. 1994b. *Growing Up Tobacco Free: Preventing Nicotine Addiction in Children and Youth*. Washington, DC: National Academy Press.
- IOM/NRC (National Research Council). 2004. *Reducing Underage Drinking: A Collective Responsibility*. Washington, DC: The National Academies Press.
- Jackson C, Henriksen L. 1997. Do as I say: parent smoking, antismoking socialization, and smoking onset among children. *Addictive Behavior* 22(1):107-114.
- Jemal A, Cokkinides VE, Shafey O, Thun MJ. 2003. Lung cancer trends in young adults: an early indicator of progress in tobacco control (United States). *Cancer Causes Control* 14(6):579-585.

- Johnson CA, Pentz MA, Weber MD, Dwyer JH, Baer N, MacKinnon DP, Hansen WB, Flay BR. 1990. Relative effectiveness of comprehensive community programming for drug abuse prevention with high-risk and low-risk adolescents. *Journal of Consulting and Clinical Psychology* 58(4):447-456.
- Jordaan ER, Ehrlich RI, Potter P. 1999. Environmental tobacco smoke exposure in children: household and community determinants. *Archives of Environmental Health* 54(5):319-327.
- Kandula NR, Kersey M, Lurie N. 2004. Assuring the health of immigrants: what the leading health indicators tell us. *Annual Review of Public Health* 25:357-376.
- Keeler TE, Hu TW, Barnett PG, Manning WG. 1993. Taxation, regulation, and addiction: a demand function for cigarettes based on time-series evidence. *Journal of Health Economics* 12(1):1-18.
- Kempner M. 2005, June 6. UPS reviews cigarette shipments. *The Atlanta Journal-Constitution*. Business.
- Kerr M, Stattin H. 2000. What parents know, how they know it, and several forms of adolescent adjustment: further support for a reinterpretation of monitoring. *Developmental Psychology* 36(3):366-380.
- Kesich GD. 2004, November 18. UPS, others sue over Maine tobacco law; the suit challenges the requirement that delivery driver verify age, identity of tobacco recipients. *Portland Press Herald*. Local & State.
- Klepp KI, Halper A, Perry CL. 1986. The efficacy of peer leaders in drug abuse prevention. *Journal of School Health* 56(9):407-411.
- Klevens RM, Giovino GA, Peddicord JP, Nelson DE, Mowery P, Grummer-Strawn L. 1995. The Association Between Veteran Status and Cigarette-Smoking Behaviors. *American Journal of Preventive Medicine* 11(4):245-250.
- Kuiper N, Nelson D, Schooley M. 2005. *Evidence of Effectiveness: A Summary of State Tobacco Control Program Evaluation Literature*. Atlanta, GA: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health.
- Kulig JW. 2005. Tobacco, alcohol, and other drugs: the role of the pediatrician in prevention, identification, and management of substance abuse. *Pediatrics* 115(3):816-821.
- Leverett M, Ashe M, Gerard S, Jenson J, Woollery T. 2002. Tobacco use: the impact of prices. *Journal of Law, Medicine and Ethics* 30(3 Suppl):88-95.
- Levinson A, Pérez-Stable E, Espinoza P, Flores E, Byers TE. 2004. Latinos report less use of pharmaceutical aids when trying to quit smoking. *American Journal of Preventive Medicine* 26(2):105-111.
- Levy DT, Romano E, Mumford E. 2005. The relationship of smoking cessation to sociodemographic characteristics, smoking intensity, and tobacco control policies. *Nicotine & Tobacco Research* 7(3):387-396.
- Levy DT, Romano E, Mumford EA. 2004. Recent trends in home and work smoking bans. *Tobacco Control* 13(3):258-263.
- Liang L, Chaloupka F, Nichter M, Clayton R. 2003. Prices, policies and youth smoking, May 2001. *Addiction* 98(Suppl 1):105-122.
- Loukas A, Garcia M, Gottlieb NH. 2006. Texas college students' opinions of no-smoking policies, secondhand smoke, and smoking in public places. *Journal of American College Health* 1(55):27-32.
- Lowenstein S, Tomlinson D, Koziol-McLain J, Prochazka A. 1995. Smoking habits of emergency department patients: an opportunity for disease prevention. *Academic Emergency Medicine* 2:165-171.

- Luepker RV, Murray DM, Jacobs DR Jr, Mittelmark MB, Bracht N, Carlaw R, Crow R, Elmer P, Finnegan J, Folsom AR, et al. 1994. Community education for cardiovascular disease prevention: risk factor changes in the Minnesota Heart Health Program. *American Journal of Public Health* 84(9):1383-1393.
- Ma GX, Tan Y, Toubbeh JI, Su X, Shive SE, Lan Y. 2004. Acculturation and smoking behavior in Asian-American populations. *Health Education Research* 19(6):615-625.
- Manning WG, Keeler EB, Newhouse JP, Sloss EM, Wasserman J. 1989. The taxes of sin: do smokers and drinkers pay their way? *Journal of the American Medical Association* 261(11):1604-1609.
- Mannino DM, Siegel M, Husten C, Rose D, Etzel R. 1996. Environmental tobacco smoke exposure and health effects in children: results from the 1991 National Health Interview Survey. *Tobacco Control* 5(1):13-18.
- McPhillips-Tangum C, Bocchino C, Carreon R, Erceg C, Rehm B. 2004. Addressing tobacco in managed care: results of the 2002 survey. *Preventing Chronic Disease* 1(4): 1-11.
- MDPH (Massachusetts Department of Public Health). 2002a. *MTCP Background*. Web Page. Available at: <http://www.mass.gov/dph/mtcp/background/background.htm>; accessed June 23, 2006.
- MDPH. 2002b. *MTCP Statewide Services*. Web Page. Available at: <http://www.mass.gov/dph/mtcp/programs/statewide.htm>; accessed July 20, 2006.
- MDPH. 2006, June 22. *Massachusetts Tobacco Control Program Accomplishments*. Web Page. Available at: <http://www.mass.gov/dph/mtcp/reports/accomplishments.pdf>; accessed June 22, 2006.
- Michel L. 2005, April 4. Internet cigarette sales take hit. *Buffalo News*. News.
- Miller A. 1998. Designing an effective counteradvertising campaign—Massachusetts. *Cancer* 83(12 Suppl Robert):2742-2745.
- Miller DR, Kalman D, Ren XS, Lee AF, Niu Z, Kazis LE. 2001. *Health Behaviors of Veterans in the VHA: Tobacco Use*. Washington, DC: U.S. Department of Veterans Affairs Veterans Health Administration Office of Quality and Performance and VHA Health Assessment Project Center for Health Quality, Outcomes, and Economic Research.
- Mittelmark MB, Luepker RV, Jacobs DR, Bracht NF, Carlaw RW, Crow RS, Finnegan J, Grimm RH, Jeffery RW, Kline FG, et al. 1986. Community-wide prevention of cardiovascular disease: education strategies of the Minnesota Heart Health Program. *Preventive Medicine* 15(1):1-17.
- The Monitor's View. 2005, July 7. Snuffing out tobacco in prisons. *Christian Science Monitor*. P. 8.
- Moskowitz JM, Lin Z, Hudes ES. 2000. The impact of workplace smoking ordinances in California on smoking cessation. *American Journal of Public Health* 90(5):757-761.
- Murray DM, Hannan PJ, Jacobs DR, McGovern PJ, Schmid L, Baker WL, Gray C. 1994. Assessing intervention effects in the Minnesota Heart Health Program. *American Journal of Epidemiology* 139(1):91-103.
- Najera AP. 1998. History of successful ballot initiatives—California. *Cancer* 83(12 Suppl Robert):2680-2684.
- National Journal Group. 2005, June 20. Efforts to regulate internet tobacco sales may be revived. *National Journal's Congress Daily*.
- NCI (National Cancer Institute). 2005. ASSIST: shaping the future of tobacco prevention and control. NCI. *Tobacco Control Monograph Series*. Vol. 8, No. NIH Publication Number 05-5645. Bethesda, MD: National Institutes of Health.
- Nicholl J. 1998. Tobacco tax initiatives to prevent tobacco use: a study of eight statewide campaigns. *Cancer* 83(12 Suppl Robert):2666-2679.

- Niederdeppe J, Farrelly MC, Haviland ML. 2004. Confirming “truth”: more evidence of a successful tobacco countermarketing campaign in Florida. *American Journal of Public Health* 94(2):255-257.
- NIH (National Institutes of Health). 2006a. *Final Statement: National Institutes of Health State-of-the-Science Conference Statement, Tobacco Use: Prevention, Cessation, and Control*. Web Page. Available at: <http://consensus.nih.gov/2006/TobaccoStatementFinal090506.pdf>; accessed January 18, 2007a.
- NIH. 2006b. *National Institutes of Health State-of-the-Science Conference Statement*. Web Page. Available at: <http://consensus.nih.gov/2006/2006TobaccoSOS029html.htm>; accessed July 26, 2006.
- O’Byrne KK, Haddock CK, Poston WS. 2002. Parenting style and adolescent smoking. *Journal of Adolescent Health* 30(6):418-425.
- Older Americans Report. 2005, August 5. City’s housing authority bans smoking in senior apartments. *Older Americans Report*.
- Orleans CT. 1993. Treating Nicotine Dependence in Medical Settings: A Stepped-Care Model. Orleans CT, Slade J, Editors. *Nicotine Addiction: Principles and Management*. New York: Oxford University Press. Pp. 145-161.
- Orleans CT, Fishman J. 2000. Tailored communications for smoking cessation. *Tobacco Control* 9(Suppl 1):i49.
- Osterwalder J, Beeman DE. 2005, April 13. Fresh air: officials to consider tougher rules; no vacancy for smokers; smoke-free housing debate forces leaders to pit personal rights vs. health concerns. *The Press Enterprise*. A. p. 1.
- OTRU (Ontario Tobacco Research Unit). 2006. *The Smoke-Free Ontario Act: Extend Protection to Children in Vehicles*. Web Page. Available at: http://www.otru.org/pdf/updates/update_aug2006.pdf; accessed January 19, 2007.
- Ozer EM, Adams SH, Gardner LR, Mailloux DE, Wibbelsman CJ, Irwin CE Jr. 2004. Provider self-efficacy and the screening of adolescents for risky health behaviors. *Journal of Adolescent Health* 35(2):101-107.
- Parmet WE, Banthin C. 2005. Public health protection and the commerce clause: controlling tobacco in the Internet Age. *New Mexico Law Review* 35:81-122.
- Patrick S, Marsh R. 2001. Current tobacco policies in U.S. adult male prisons. *The Social Science Journal* 38:27-37.
- Pechmann C, Reibling ET. 2000. Planning an effective anti-smoking mass media campaign targeting adolescents. *Journal of Public Health Management and Practice* 6(3):80-94.
- Pechmann C, Slater MD. 2005. Social Marketing Messages That May Motivate Irresponsible Behavior. Ratneshwar S. *Inside Consumption: Consumer Motives, Goals, and Desires*. New York: Routledge.
- Pentz MA, MacKinnon DP, Dwyer JH, Wang EY, Hansen WB, Flay BR, Johnson CA. 1989. Longitudinal effects of the midwestern prevention project on regular and experimental smoking in adolescents. *Preventive Medicine* 18(2):304-321.
- Perry C, Kelder S, Klepp K. 1994. Community-wide cardiovascular disease prevention in young people. *European Journal of Public Health* 4:188-194.
- Perry CL, Kelder K-I, Siller C. 1989. Community-wide strategies for cardiovascular health: the Minnesota heart health program youth program. *Health Education Research* 4: 87-101.
- Perry CL, Kelder SH, Murray DM, Klepp KI. 1992. Communitywide smoking prevention: long-term outcomes of the Minnesota Heart Health Program and the Class of 1989 Study. *American Journal of Public Health* 82(9):1210-1216.
- Peterson AV Jr, Kealey KA, Mann SL, Marek PM, Sarason IG. 2000. Hutchinson Smoking Prevention Project: long-term randomized trial in school-based tobacco use prevention—results on smoking. *Journal of the National Cancer Institute* 92(24):1979-1991.

- Pierce J, Gilpin E, Emery S, Farkas A, Zhu S, Choi W, Berry C, Distefan J, White M, Soroko S, Navarro A. 1998. *Tobacco Control in California: Who's Winning the War? An Evaluation of the Tobacco Control Program, 1989–1996*. La Jolla, CA: University of California, San Diego.
- Pierce JP, White MM, Gilpin EA. 2005. Adolescent smoking decline during California's tobacco control programme. *Tobacco Control* 14(3):207-212.
- Pinilla J. 2002. [Tobacco taxes, prices and demand for tobacco products: a comparative analysis]. *Gaceta Sanitaria* 16(5):425-435.
- Pizacani BA, Martin DP, Stark MJ, Koepsell TD, Thompson B, Diehr P. 2004. A prospective study of household smoking bans and subsequent cessation related behaviour: the role of stage of change. *Tobacco Control* 13(1):23-28.
- Popham WJ, Potter LD, Bal DG, Johnson MD, Duerr JM, Quinn V. 1993. Do anti-smoking media campaigns help smokers quit?. *Public Health Report*. 108(4):510-513.
- Popham WJ, Potter LD, Hetrick MA, Muthen LK, Duerr JM, Johnson MD. 1994a. Effectiveness of the California 1990-1991 Tobacco Education Media Campaign. *American Journal of Preventive Medicine* 10(6):319-326.
- Popham WJ, Potter LD, Hetrick MA, Muthen LK, Duerr JM, Johnson MD. 1994b. Effectiveness of the California 1990–1991 tobacco education media campaign. *American Journal of Preventive Medicine* 10(6):319-326.
- Powell LM, Tauras JA, Ross H. 2005. The importance of peer effects, cigarette prices and tobacco control policies for youth smoking behavior. *Journal of Health Economics* 24(5):950-968.
- Public Health Service. 2000. *Reducing Tobacco Use: A Report of the Surgeon General*. Public Health Service Pub.
- Repace J. 2000. Banning outdoor smoking is scientifically justifiable. *Tobacco Control* 9(1):98.
- Rigotti N. 2001. Chapter 6—reducing the supply of tobacco to youths. *Regulating Tobacco*. New York: Oxford University Press. Pp. 143-175.
- Ross H, Chaloupka FJ. 2003. The effect of cigarette prices on youth smoking. *Health Economics* 12(3):217-230.
- RTI International. 2004. *First Annual Independent Evaluation of New York's Tobacco Control Program*. Research Triangle Park, NC: RTI International.
- RTI International. 2005. *Second Annual Independent Evaluation of New York's Tobacco Control Program*. Research Triangle Park, NC: RTI International.
- Russell CM. 1998. Evaluation: methods and strategy for evaluation—California. *Cancer* 83(12 Suppl Robert):2755-2759.
- Schauffler HH, Barker DC, Orleans CT. 2001. Medicaid coverage for tobacco-dependence treatments. *Health Affairs (Millwood)* 20(1):298-303.
- Schoenmarklin S, Tobacco Control Legal Consortium. 2004. *Infiltration of Secondhand Smoke into Condominiums, Apartments and Other Multi-Unit Dwellings*. St. Paul, MN: Tobacco Control Legal Consortium.
- Schroeder SA. 2006. Should emergency physicians help smokers quit? *Annals of Emergency Medicine* 48(4):415-416.
- Scollo M, and Lal A. 2004. *Summary of Studies Assessing the Economic Effects of Smoke-Free Policies in the Hospitality Industry*. Web Page. Available at: <http://www.vctc.org.au/tc-res/Hospitalitysummary.pdf>; accessed February 23, 2005.
- Scollo M, Younie S, Wakefield M, Freeman J, Icasiano F. 2003. Impact of tobacco tax reforms on tobacco prices and tobacco use in Australia. *Tobacco Control* 12(Suppl 2): ii59-ii66.
- Siahpush M, Borland R, Scollo M. 2003. Factors associated with smoking cessation in a national sample of Australians. *Nicotine and Tobacco Research* 5(4):597-602.

- Siegel M. 2002. The effectiveness of state-level tobacco control interventions: a review of program implementation and behavioral outcomes. *Annual Review of Public Health* 23:45-71.
- Siegel M, Biener L. 2000. The impact of an antismoking media campaign on progression to established smoking: results of a longitudinal youth study. *American Journal of Public Health* 90(3):380-386.
- Siegel M, Mowery PD, Pechacek TP, Strauss WJ, Schooley MW, Merritt RK, Novotny TE, Giovino GA, Eriksen MP. 2000. Trends in adult cigarette smoking in California compared with the rest of the United States, 1978–1994. *American Journal of Public Health* 90(3):372-379.
- Simons-Morton B, Chen R, Abrams L, Haynie DL. 2004. Latent growth curve analyses of peer and parent influences on smoking progression among early adolescents. *Health Psychology* 23(6):612-621.
- Skara S, Sussman S. 2003. A review of 25 long-term adolescent tobacco and other drug use prevention program evaluations. *Preventive Medicine* 37(5):451-474.
- Sloan FA, Carlisle ES, Rattliff JR, Trogdon J. 2005. Determinants of states' allocations of the master settlement agreement payments. *Journal of Health and Political Policy Law* 30(4):643-86.
- Sloan FA, Mathews CA, Trogdon JG. 2004. Impacts of the Master Settlement Agreement on the tobacco industry. *Tobacco Control* 13(4):356-361.
- Sly DF, Heald GR, Ray S. 2001a. The Florida "truth" anti-tobacco media evaluation: design, first year results, and implications for planning future state media evaluations.[see comment]. *Tobacco Control* 10(1):9-15.
- Sly DF, Hopkins RS, Trapido E, Ray S. 2001b. Influence of a counteradvertising media campaign on initiation of smoking: the Florida "truth" campaign. *American Journal of Public Health* 91(2):233-238.
- Sly DF, Trapido E, Ray S. 2002. Evidence of the dose effects of an antitobacco counteradvertising campaign. *Preventive Medicine*. 35(5):511-518.
- Smith CM, Pristach CA, Cartagena M. 1999. Obligatory cessation of smoking by psychiatric inpatients. *Psychiatric Service*. 50(1):91-94.
- Smith E, Swisher J, Vicary J, et al. 2004. Evaluation of life skills training and infused-life skills training in a rural setting: outcomes at two years. *Journal of Alcohol and Drug Education* 48(1):51-70.
- Smokefree Apartment House Registry. 2004. *News Release: City Creates Non-Smoking Sections in New Affordable Housing*. Web Page. Available at: <http://www.smokefreeapartments.org/T.O.%20News%20Release.pdf>; accessed July 14, 2006.
- Snyder LB, Hamilton MA, Mitchell EW, Kiwanuka-Tondo J, Fleming-Milici F, Proctor D. 2004. A meta-analysis of the effect of mediated health communication campaigns on behavior change in the United States. *Journal of Health Communication* 9(Suppl 1):71-96.
- Soldz S, Clark TW, Stewart E, Celebucki C, Klein Walker D. 2002. Decreased youth tobacco use in Massachusetts 1996 to 1999: evidence of tobacco control effectiveness. *Tobacco Control* 11(Suppl 2):ii14-ii19.
- Spoth RL, Redmond C, Trudeau L, Shin C. 2002. Longitudinal substance initiation outcomes for a universal preventive intervention combining family and school programs. *Psychology of Addictive Behavior* 16(2):129-134.
- State of California. 2004. *Proposition 99 and the Legislative Mandate for the California Tobacco Control Program*. Web Page. Available at: <http://www.dhs.ca.gov/tobacco/html/about.htm>; accessed May 22, 2006.
- Stattin H, Kerr M. 2000. Parental monitoring: a reinterpretation. *Childhood Development* 71(4):1072-1085.

- Steinberg L, Fletcher A, Darling N. 1994. Parental monitoring and peer influences on adolescent substance use. *Pediatrics* 93(6 Pt 2):1060-1064.
- Stephens T, Pederson LL, Koval JJ, Kim C. 1997. The relationship of cigarette prices and no-smoking bylaws to the prevalence of smoking in Canada. *American Journal of Public Health* 87(9):1519-1521.
- Stephens T, Pederson LL, Koval JJ, Macnab J. 2001. Comprehensive tobacco control policies and the smoking behaviour of Canadian adults. *Tobacco Control* 10(4):317-322.
- Stevens C. 1998. Designing an effective counteradvertising campaign—California. *Cancer* 83(12 Suppl Robert):2736-2741.
- Stillman FA, Hartman AM, Graubard BI, Gilpin EA, Murray DM, Gibson JT. 2003. Evaluation of the American Stop Smoking Intervention Study (ASSIST): a report of outcomes. *Journal of the National Cancer Institute* 95(22):1681-1691.
- Tacoma-Pierce County Health Department. 2003. *Fresh Air Everywhere*. Web Page. Available at: <http://www.tpchd.org/files/library/fb76d4134077b3c4.pdf>; accessed July 11, 2006.
- Task Force on Community Preventive Services. 2001. Recommendations regarding interventions to reduce tobacco use and exposure to environmental tobacco smoke. *American Journal of Preventive Medicine* 20(2 Suppl):10-15.
- Task Force on Community Preventive Services. 2005. *The Guide to Community Preventive Services (Community Guide): What Works to Promote Health?* Oxford, England: Oxford University Press.
- Tauras JA. 2004a. Public policy and smoking cessation among young adults in the United States. *Health Policy* 68(3):321-332.
- Tauras JA. 2004b. Public policy and smoking cessation among young adults in the United States. *Health Policy* 68(3):321-332.
- Tauras JA, Chaloupka FJ, Farrelly MC, Giovino GA, Wakefield M, Johnston LD, O'Malley PM, Kloska DD, Pechacek TE. 2005. State tobacco control spending and youth smoking. *American Journal of Public Health* 95(2):338-344.
- Tedeschi B. 2005, April 4. Now That Credit Card Companies Won't Handle Online Tobacco Sales, Many Merchants Are Calling It Quits. *The New York Times*. C. p. 5.
- TEROC (Tobacco Education and Research Oversight Committee). 2000. *Toward a Tobacco-Free California: Strategies for the 21st Century, 2000-2003*. Web Page. Available at: <http://www.dhs.ca.gov/tobacco/documents/pubs/TEROCReport99.pdf>; accessed February 1, 2006.
- TEROC. 2003. *Toward a Tobacco-Free California, 2003-2005: The Myth of Victory*. Web Page. Available at: <http://www.dhs.ca.gov/tobacco/documents/pubs/TobaccoMasterPlan2003.pdf>; accessed February 1, 2006.
- Thomson CC, Fisher LB, Winickoff JP, Colditz GA, Camargo CA Jr, King C 3rd, Frazier AL. 2004. State tobacco excise taxes and adolescent smoking behaviors in the United States. *Journal of Public Health Management and Practice* 10(6):490-496.
- Tilson EC, McBride CM, Lipkus IM, Catalano RF. 2004. Testing the interaction between parent-child relationship factors and parent smoking to predict youth smoking. *Journal of Adolescent Health* 35(3):182-189.
- Times Wire Services. 2006, July 6. DHL to Restrict Cigarette Shipments. *Los Angeles Times*. Business. P. 3.
- TIPS (Tobacco Information and Prevention Source). 2006a. *Exposure to Environmental Tobacco Smoke and Nicotine Levels—Fact Sheet*. Web Page. Available at: http://www.cdc.gov/tobacco/research_data/environmental/factsheet_ets.htm; accessed July 14, 2006.
- TIPS. 2006b. *Secondhand Smoke: Fact Sheet*. Web Page. Available at: http://www.cdc.gov/tobacco/factsheets/secondhand_smoke_factsheet.htm; accessed July 10, 2006.

- Tobler NS. 1992. Drug prevention programs can work: research findings. *Journal of Addictive Disorders* 11(3):1-28.
- Trochim WM, Stillman FA, Clark PI, Schmitt CL. 2003. Development of a model of the tobacco industry's interference with tobacco control programmes. *Tobacco Control* 12(2):140-147.
- Trudeau L, Spoth R, Lillehoj C, Redmond C, Wickrama KA. 2003. Effects of a preventive intervention on adolescent substance use initiation, expectancies, and refusal intentions. *Prevention Science* 4(2):109-122.
- Tuttle R. 2006, July 6. DHL Agrees to Stop Shipping Cigarettes Sold Via Internet. *Newsday*.
- Ubelacker S. 2005, August 15. Kids' exposure to second-hand smoke may lead to smoking as teens: study. *Canadian Press NewsWire*. Web page. Available at: <http://www.nexis.com>; accessed July 11, 2006.
- UPS reviews cigarette shipments. 2005. *Atlanta Journal Constitution*. July 6, D3.
- U.S. Fed News. 2005, March 17. Attorneys General, ATF Announce Joint Initiative with Credit Card Companies to Prevent Illegal Cigarette Sales Over Internet. *U.S. Fed News*.
- Vartiainen E, Fallonen U, McAlister AL, Puska P. 1990. Eight-year follow-up results of an adolescent smoking prevention program: the North Karelia Youth Project. *American Journal of Public Health* 80(1):78-79.
- Vartiainen E, Paavola M, McAlister A, Puska P. 1998. Fifteen-year follow-up of smoking prevention effects in the North Karelia youth project. *American Journal of Public Health* 88(1):81-85.
- Vartiainen E, Pallonen U, McAlister A, Koskela K, Puska P. 1983. Effect of two years of educational intervention on adolescent smoking (the North Karelia Youth Project). *Bulletin of the World Health Organization* 61(3):529-532.
- Vartiainen E, Pallonen U, McAlister A, Koskela K, Puska P. 1986. Four-year follow-up results of the smoking prevention program in the North Karelia Youth Project. *Preventive Medicine* 15(6):692-698.
- Vokes NI, Bailey JM, Rhodes KV. 2006. "Should I give you my smoking lecture now or later?" Characterizing emergency physician smoking discussions and cessation counseling. *Annals of Emergency Medicine* 48(4):406-414, 414-417.
- Wakefield M, Chaloupka F. 2000. Effectiveness of comprehensive tobacco control programmes in reducing teenage smoking in the USA. *Tobacco Control* 9(2):177-186.
- Wakefield MA, Chaloupka FJ, Kaufman NJ, Orleans CT, Barker DC, Ruel EE. 2000. Effect of restrictions on smoking at home, at school, and in public places on teenage smoking: cross sectional study. *BMJ* 321(7257):333-337.
- Wallack L, Dorfman L, Jernigan D, Mekani T. 1993. *Media Advocacy and Public Health*. Newbury Park, CA: Sage Publications.
- Waller BJ, Cohen JE, Ferrence R, Bull S, Adlaf EM. 2003. The early 1990s cigarette price decrease and trends in youth smoking in Ontario. *Canadian Journal of Public Health* 94(1):31-35.
- Warner KE. 1977. The effects of the anti-smoking campaign on cigarette consumption. *American Journal of Public Health* 67(7):645-650.
- Warner K. 2000. The deed for, and value of, a multi-level approach to disease prevention: the case of tobacco control. IOM. *Promoting Health: Intervention Strategies From Social and Behavioral Research*. Washington, DC: National Academy Press. Pp. 417-449.
- Warner KE. 1979. Clearing the airwaves: the cigarette ad ban revisited. *Policy Analysis* 5:435-450.
- Warner KE. 1985. Cigarette advertising and media coverage of smoking and health. *New England Journal of Medicine* 312(6):384-388.

- Warner KE, Mendez D, Smith DG. 2004. The financial implications of coverage of smoking cessation treatment by managed care organizations. *Inquiry* 41(1):57-69.
- Washington State Department of Revenue. 2005. *Major Tribal Internet Cigarette Seller Agrees to Provider Customer Lists*. Web Page. Available at: http://dor.wa.gov/Docs/Pubs/News/2005/NR_Smokesignals_settles.pdf; accessed July 11, 2006.
- Wechsler H, Kelley K, Seibring M, Kuo M, Rigotti NA. 2001. College smoking policies and smoking cessation programs: results of a survey of college health center directors. *Journal of American College Health* 49(5):205-213.
- Weintraub JM, Hamilton WL. 2002. Trends in prevalence of current smoking, Massachusetts and states without tobacco control programmes, 1990 to 1999. *Tobacco Control* 11(Suppl 2):ii8-ii13.
- White J, Bero LA. 2004. Public health under attack: the American Stop Smoking Intervention Study (ASSIST) and the tobacco industry. *American Journal of Public Health* 94(2):240-250.
- Wiehe SE, Garrison MM, Christakis DA, Ebel BE, Rivara FP. 2005. A systematic review of school-based smoking prevention trials with long-term follow-up. *Journal of Adolescent Health* 36(3):162-169.
- Wilcox GJ. 2005, April 14. Apartment smoking bans may widen. *Daily News*.
- Worden JK, Flynn BS, Geller BM, Chen M, Shelton LG, Secker-Walker RH, Solomon DS, Solomon LJ, Couchey S, Costanza MC. 1988. Development of a smoking prevention mass media program using diagnostic and formative research. *Preventive Medicine*. 17(5):531-558.
- Yolton K, Dietrich K, Auinger P, Lanphear BP, Hornung R. 2005. Exposure to environmental tobacco smoke and cognitive abilities among U.S. children and adolescents. *Environmental Health Perspectives* 113(1):98-103.
- Yong HH, Borland R, Siahpush M. 2005. Quitting-related beliefs, intentions, and motivations of older smokers in four countries: findings from the International Tobacco Control Policy Evaluation Survey. *Addictive Behavior* 30(4):777-788.
- Yurekli AA, Zhang P. 2000. The impact of clean indoor-air laws and cigarette smuggling on demand for cigarettes: an empirical model. *Health Economics* 9(2):159-170.
- Zhu S, Melcer T, Sun J, Rosbrook B, Pierce JP. 2000. Smoking cessation with and without assistance: a population-based analysis. *American Journal of Preventive Medicine* 18(4):305-311.
- Zollinger TW, Saywell RM Jr, Muegge CM, Wooldridge JS, Cummings SF, Caine VA. 2003. Impact of the life skills training curriculum on middle school students tobacco use in Marion County, Indiana, 1997-2000. *Journal of School Health* 73(9):338-346.
- Zucker D, Hopkins RS, Sly DF, Urich J, Kershaw JM, Solari S. 2000. Florida's "truth" campaign: a counter-marketing, anti-tobacco media campaign. *Journal of Public Health Management and Practice* 6(3):1-6.

6

Changing the Regulatory Landscape

The first prong of the committee's blueprint for reducing tobacco use, set forth in Chapter 5, envisions strengthening traditional tobacco control measures. If the plan set forth in Chapter 5 is successfully implemented and sustained, it could have a significant impact on tobacco use; but even an optimistic projection leaves prevalence at 10 percent in 2025, and a more realistic projection might be 15 percent. The main argument presented in this chapter is that a more substantial long-term impact requires a change in the current legal framework of tobacco control to a new, innovative regulatory approach that takes into account the unique history and characteristics of tobacco.

Over the past two decades, tobacco control policy has developed incrementally as the nation has moved step-by-step from a laissez-faire legal system embedded in a smoking culture to a system with coherent antismoking policy grounded in public health. Incremental reforms, however, will not end the nation's tobacco problem. A more fundamental shift must occur. It is time for Congress and other policy makers to change the legal structure of tobacco policy, thereby laying the foundation for a strategic initiative to end the nation's tobacco problem, that is, reducing tobacco use to a level that is insignificant from a public health standpoint. In this chapter, the committee sets forth the blueprint for a new regulatory approach.

Currently (and under the interventions of the blueprint outlined in Chapter 5), the implicit model of tobacco control is demand reduction combined with reactive efforts to prevent the tobacco industry from impeding demand-reducing policies. This leaves in place the supply side (the product and its existing channels of distribution) as well as all the existing

incentives for attracting more consumers and selling more cigarettes. A more ambitious strategy would ask these questions: Can anything be done to substantially curtail the availability of tobacco products? Can anything be done to change tobacco products to make them less hazardous? Is it possible to bring the industry's incentives into closer alignment with the public health goals of tobacco control? No existing regulatory statute provides a model for tobacco products because there is no other lawful product for which the declared public goal is to suppress its use altogether. A new legal regime, new models, and new policy paradigms are needed.

The challenge, then, is to craft a policy framework that is aligned with the unique aim of tobacco control policy: to substantially reduce, if not eliminate, the use of this unusually damaging product without replicating the problems associated with the prohibition of alcohol in the 1920s and with the contemporary prohibitions of illegal drugs (e.g., widespread non-compliance, violent black markets, corruption, and high rates of arrest). In this chapter and Chapter 7, the committee offers several ideas for more fundamental change.

FEDERAL REGULATORY AUTHORITY IS NEEDED

It is clear that the U.S. Congress has the constitutional authority to enact national legislation bearing on all domains of tobacco control, including banning the distribution and use of tobacco products, analogous to the authority that it exercises over controlled substances such as peyote and marijuana. The pertinent policy questions are (1) whether Congress should exercise its constitutional authority (by prescribing national rules or by delegating the authority to do so to a federal agency, such as the Food and Drug Administration [FDA]), or, conversely, whether it should allow the states to exercise primary authority to regulate the production, distribution, marketing, and use of tobacco; and (2) if Congress does exercise federal regulatory authority in any of these domains, whether it should leave any room for supplemental state regulation and, if so, within what constraints. The committee believes that the time has come for Congress to exercise its acknowledged authority to regulate the production, marketing, and distribution of tobacco products while freeing the states to supplement federal action with their own measures that aim to suppress tobacco use and that are compatible with federal law.

Relationship Between Federal and State Tobacco Regulation

Setting aside the complexities of a complicated body of federal law, Congress has essentially three options: (1) state control, in which the federal government leaves regulation in a particular domain to the states (and,

depending on state law, to localities); (2) federal preemption, in which the federal government has complete regulatory control and precludes any state regulation in the area; and (3) complementary regulation, in which the federal government establishes regulations on a particular subject but does not exclude the states from also establishing regulations. Under the third approach, the federal action typically establishes minimum requirements for the whole country (the basic requirements) while allowing the states to adopt more stringent regulations. Familiar examples of these three approaches include the state regulation of the retail distribution of alcohol, federal preemption of the state regulation of employee benefit plans under the Employee Retirement and Income Security Act, and complementary regulation of controlled substances.

At present, tobacco regulation in the United States is characterized by plenary state control except in the federally preempted domain of information or warnings “based on smoking and health,” as defined in the 1969 Cigarette Labeling Act. The preemption language adopted by the Congress has been construed broadly by the U.S. Supreme Court to preempt “failure to warn” product liability suits under state tort law and direct state or local regulation of tobacco advertising, as well as the obviously preempted area of mandated warnings on packages or in advertisements (*Cipollone v. Liggett Group* 1992; 505 U.S. 504; *Lorillard Tobacco Company v. Reilly* 2001; 533 U.S. 525).

Whether federal regulation is needed and, if so, whether and to what extent the federal regulatory statute should preempt compatible state regulation are complex inquiries involving highly contextual judgments. However, the general contours of the analysis can be summarized succinctly. On the one hand, a decision to preempt state regulation in favor of exclusive federal authority may impose an overly rigid and inefficient uniform nationwide approach that is contrary to public preferences in many jurisdictions, especially when the benefits and costs from regulation vary considerably across jurisdictions. For example, a state with no tobacco farmers to protect may want to impose stricter regulations than a tobacco-growing state, or a state with a large Hispanic population might want to insist on labels in both English and Spanish. As another example, because the prevalence of smoking varies by as much as threefold among the states, the voters in a state with more smokers may find public smoking regulations more oppressive than the voters in another state with fewer smokers.

Nationwide rules can be especially inefficient when it comes to regulatory matters that fall almost exclusively within a state’s geographic boundaries. Thus the regulation of smoking in public places is primarily a local matter, with individual business establishments and local governments bearing the brunt of the compliance costs. The same might also be said for restrictions on point-of-sale advertising, including the in-store placement of

placards and the proximity of external store window signs to schoolyards. Consider in this respect a hypothetical national ban on certain activity (such as the sale of alcohol) within a certain radius of a school. What seems like a perfectly reasonable distance, say, 1,000 yards, would have a very different impact on lawful access to alcohol in a dense urban area, where the ban might cover an entire city, than it would in a less densely populated suburban or rural area. Finally, the imposition of a nationwide approach can increase the costs of a regulatory error, especially when there is uncertainty over the most appropriate form of regulation and when the scientific evidence and business environment are changing.

As these observations suggest, there are many reasons why regulation of retail distribution, marketing, and use of tobacco should presumptively be left to state regulation and, to the extent that federal regulation is adopted in these domains, that supplementary state regulation should be permitted as long as it is compatible with the federal regulatory objectives.

However, in some contexts, there are strong arguments for a national regulatory approach, and perhaps for national uniformity. One such context is the regulation of commercial products for which there is a national market and where the regulated products are easily transported across state lines. For example, if there are substantial differences in regulatory standards from one state to another, strong incentives would exist for people to purchase less heavily regulated products in one state and sell them in a state with more demanding regulatory requirements, thereby potentially undermining the latter state's regulatory objectives, creating a black market, and possibly attracting the participation of criminal syndicates. Another concern that sometimes arises in situations involving diverse state regulation of product characteristics is inefficiency attributable to the need for manufacturers to comply with 50 different requirements. A third consideration is the need for continuing oversight and research by experts, as is often the case in environmental protection.

Regulation of pharmaceutical products, where national standards have prevailed since adoption of the Pure Food and Drugs Act of 1906, is pertinent illustration of a strong national regulatory interest, potentially high costs to state-by-state variations, and need for ongoing regulatory oversight. Over time, the Congress has tended to both increase the scope of federal regulatory authority and precluded additional state regulation in areas in which the FDA has acted. Explicit statutory preemption has been adopted in connection with FDA regulation of medical devices, over-the-counter drugs, and cosmetics.

As will be explained below, the committee favors strong regulation of tobacco product characteristics, packaging, labeling, and promotion and distribution. The colossal failure of the tobacco market to produce accurate information regarding the health effects of tobacco products and

to produce adequate incentives for companies to develop less hazardous products, the national scope of the problem, and the need for creating and sustaining regulatory expertise argue strongly for national regulation. The residual question is whether supplemental, compatible state regulation should be permitted. In the committee's view, a uniform national approach preempting state regulation altogether makes the most sense in relation to regulations governing tobacco product design and labeling, as well as in relation to marketing through national media. A uniform national approach makes the least sense in relation to the retail distribution, local marketing, and consumption of tobacco. Federal regulation may not be needed in some of these areas at all, but even if federal regulations are adopted, the federal rules should set the floor, and supplemental state regulation should be permitted. In this latter respect, the current federal preemption provision unduly constrains the prerogatives of the states in regulating the local marketing of tobacco products.

Recommendation 23: Congress should repeal the existing statute preempting state tobacco regulation of advertising and promotion “based on smoking and health” and should enact a new provision that precludes all direct state regulation only in relation to tobacco product characteristics and packaging while allowing complementary state regulation in all other domains of tobacco regulation, including marketing and distribution. Under this approach, federal regulation sets a floor while allowing states to be more restrictive.

This approach was embodied in the proposed “Family Smoking Prevention and Tobacco Control Act” (S. 625 and HR 1008), introduced on February 15, 2007, by Senators Kennedy and Cornyn with 29 other Senators and Congressmen Waxman, Davis, and Palone. This will be referred to as the proposed Tobacco Control legislation in this report.

Any federal statute preempting direct state regulation of the product and its packaging should not preempt any private or public causes of action, in state or federal courts, based on a failure to warn consumers about any risks (of which the company was aware) not covered by the federally prescribed warnings or based on claims of fraud or conspiracy. Congress should make its intentions regarding the narrow scope of preemption clear in the legislative record.

EMPOWERING FDA TO REGULATE TOBACCO

In 1994, the Institute of Medicine (IOM) report *Growing Up Tobacco Free* urged Congress to adopt a regulatory framework for tobacco products and to empower a federal regulatory agency to implement it:

Congress should confer upon an administrative agency the authority to regulate the design and constituents of tobacco products whenever it determines that such regulation would reduce the prevalence of dependence or disease associated with use of the product or would otherwise promote the public health. The agency should be specifically authorized to prescribe ceilings on the yields of tar, nicotine, or any other harmful constituent of a tobacco product (IOM 1994, p. 246-247).

Soon after the IOM report was released, the FDA surprised many observers by claiming that Congress had already given the agency the authority to regulate cigarettes as nicotine delivery devices under the Food, Drug, and Cosmetic Act (FDCA) and by issuing a rule regulating the marketing and distribution of cigarettes to youth. Eventually, the U.S. Supreme Court rejected the FDA's position, ruling that the FDCA did not authorize the FDA to regulate tobacco products and striking down the 1996 FDA Tobacco Rule (*FDA v. Brown & Williamson Tobacco Corp.*, 529 U.S. 120, 2000).

Since the U.S. Supreme Court's decision, proposals have been pending in the Congress to authorize the FDA to regulate tobacco products. The version pending at the time of the final version of the committee's report is the proposed Tobacco Control legislation, which would give the FDA wide-ranging authority over the manufacture, distribution, and promotion of tobacco products with a few exceptions, which will be described below. The power granted to FDA in the proposed Tobacco Control legislation is even more extensive than that envisioned in Chapter 8 of *Growing Up Tobacco Free* (IOM 1994).

Under the proposed Tobacco Control legislation:

- The 1996 FDA Tobacco Rule relating to youth access and marketing to youth would be revived.
- FDA would have broad authority to promulgate tobacco product standards whenever such a standard is found to be "appropriate for protection of the public health," taking into consideration "the risks and benefits to the population as a whole, including users and non-users of tobacco products." (The bill embodies the principles relating to products purporting to reduce exposure to toxins and to reduce disease risk developed by the IOM in *Clearing the Smoke* [2001].)
- Legally required package warnings would be strengthened immediately and FDA would have the authority to revise these requirements upon finding "that such a change would promote greater public understanding of the risks associated with tobacco."

- FDA would have authority to “restrict . . . the sale and distribution of a tobacco product if the Secretary [of the U.S. Department of Health and Human Services] determines that such regulation would be appropriate for the protection of the public health.”
- FDA would be empowered to restrict the advertising and promotion of tobacco products “to the full extent permitted by the First Amendment” upon finding “that such regulation would be appropriate for the protection of the public health.”

Each of these topics is discussed below. Overall, however, the committee reiterates the view taken by two previous IOM committees (IOM 1994, 2001): broad federal regulatory authority over the manufacture, distribution, marketing, and use of tobacco products is an essential element of a comprehensive public health approach to tobacco control.¹ Congress does not have the institutional capacity to monitor and respond to ongoing innovations in product design (especially those purporting to reduce exposure to tobacco-related toxins), or to changes in marketing or patterns of consumption, whereas FDA personnel are well-positioned to gather the necessary information and to make evidence-based scientific judgments about the likely public health consequences of alternative regulatory approaches. Overall, the potential benefits of agency regulation in this context seem to far outweigh its potential costs. Specifically, the committee does not agree with the view expressed by some tobacco control advocates that empowering FDA to regulate the manufacture, distribution, promotion, and use of tobacco products necessarily “legitimizes” these products or that it will unavoidably lead to the “regulatory capture” of the agency by the tobacco industry. Other objections to the federal regulation and to particular features of the proposed Tobacco Control legislation are discussed below in the specific contexts in which they arise.

Recommendation 24: Congress should confer upon the FDA broad regulatory authority over the manufacture, distribution, marketing, and use of tobacco products.

A REGULATORY PHILOSOPHY

The ultimate regulatory goal is to reduce smoking-related mortality and morbidity to a level that is acceptable to a well-informed American public.

¹The committee assumes that the FDA will be the agency empowered to regulate tobacco products. If Congress decides to confer regulatory authority on another agency, recommendations addressed to FDA should be understood to refer to whatever agency has regulatory authority.

Under the present circumstances, given what is known about the health consequences of tobacco use, reducing the prevalence of smoking and the level of per-capita cigarette consumption are reasonable proxies for reducing harm. In the context of other health and safety regulations, the goal of reducing cigarette consumption to a socially acceptable level might mean reducing it to the lowest feasible level or the level at which the social costs of trying to reduce it further exceed the public health benefits of doing so. Either way, feasibility is a significant constraint on the regulatory measures that can sensibly be adopted. Most importantly, a total prohibition against tobacco manufacture and distribution is not a realistic option at present or for the foreseeable future.

The United States now has 44.5 million adult smokers (CDC 2005), the vast majority of whom are addicted to the nicotine in cigarette smoke. If it were possible to prevent smoking initiation altogether, it might be feasible to embrace a nicotine maintenance approach, under which tobacco products would be lawfully available only by prescription to people who are addicted to nicotine. However, the experience with marijuana and other illegal drugs demonstrates that prohibition does not eliminate initiation even when there is no lawful market for a psychoactive drug, and it is implausible to expect that tobacco products lawfully available to more than 40 million addicts would not spill over into a large “gray” market that would sustain ongoing initiation, especially by young people. Nor is it plausible that the billions of cigarettes produced for the international market would not find their way into the United States.²

The challenge, then, is to frame a policy for tobacco production and distribution within the context of a regulated market. What should be the aims of the regulatory agency over the short term? In the committee’s view, the following aims should guide tobacco policy for the foreseeable future:

- Undertake significant and sustained efforts to reduce the rate of initiation of smoking
- Maximize the options available to addicted smokers to help them quit or reduce their risk
- Prevent people from becoming addicted to tobacco products if they use them
- Reduce the risks of using tobacco products to the users and to others

²Although prohibition accompanied by prescription-only cigarettes for already addicted smokers might reduce smoking initiation, the committee anticipates that the costs of enforcing such an approach would be substantial and would exceed the potential public health gains. However, such an approach may be worthy of consideration at some future time, especially if it is combined with the nicotine reduction concept sketched in Chapter 7. Innovative strategies of this kind should be explored by the tobacco policy research office recommended in that chapter.

Policies designed to achieve these aims must be formulated and implemented on the basis of a careful consideration of their potential effectiveness and potential costs. A key factor is the need to avoid creating a substantial black market and its associated costs.

The remainder of this chapter sets forth several elements of the comprehensive regulatory strategy that should supplement the traditional tobacco control approaches described in Chapter 5. Specifically:

- Tobacco product characteristics should be regulated to protect the public health.
- Messages on tobacco packages should promote health.
- The retail environment for tobacco sales should be transformed to promote the public health.
- New models for regulating the retail market should be explored.
- The federal government should mandate industry payments for tobacco control and should support and coordinate state funding.
- Tobacco advertising should be further restricted.
- Targeting of youth by tobacco manufacturers for any purpose should be banned.
- Youth exposure to smoking in movies and other media should be reduced.
- Surveillance and evaluation should be enhanced.

TOBACCO PRODUCT CHARACTERISTICS SHOULD BE REGULATED

As noted above, the proposed Tobacco Control legislation would grant FDA the authority to regulate tobacco products. FDA was selected because it is the only existing regulatory agency with expertise both in scientific and health issues and in product regulation. The authority that would be conferred on FDA for tobacco regulation in the proposed Tobacco Control Legislation parallels in many ways current FDA authority for the regulation of drugs, although different regulatory criteria are needed. Requiring tobacco products to be “safe” is not an available option, of course, and prohibition of the existing products is not a feasible regulatory strategy. Overall, the regulatory standard should be to “protect the public health” by reducing initiation, promoting cessation, preventing relapse, reducing consumption, and reducing product hazards. This standard incorporates its own limitation because it will require the agency to evaluate the likely consumer responses to any proposed regulation, including the likelihood of product substitution and the creation of black markets that could nullify the anticipated public health benefits of the regulation.

FDA regulates many consumer products, including drugs and foods, and the agency has many tools at its disposal that can be deployed in tobacco regulation. FDA regulation serves to inform consumers about the constituents of the products that they consume and to enhance the safety of these products. FDA can require existing and new products to meet toxicant exposure standards and can promote new standards and make products less hazardous. FDA can also ensure that the claims made about products are truthful and are not misleading. If FDA is authorized to regulate tobacco products, the task should be undertaken in the context of a comprehensive framework that includes the regulation of novel tobacco products and other nicotine delivery products, the delivery of tobacco smoke constituents, and the regulation of medications used to treat tobacco addiction.

The need for a tobacco regulatory authority is illustrated by the history of the low yield cigarette, which has been described in detail in a recent IOM report and in National Cancer Institute (NCI) Monograph 13 (IOM 2001; NCI 2001). In brief, low-yield cigarettes were developed after scientific evidence indicated that cigarette tar contributed to cancer. Low-tar cigarettes were implicitly promoted by the tobacco industry as a way to reduce the health risks of smoking. A large majority of smokers believe that low-yield cigarettes were less harmful, and many have switched to low-yield cigarettes rather than quit smoking (Kozlowski et al. 1998). However, because of the engineering characteristics of the cigarettes and the tendency of the smokers to maintain their desired levels of nicotine in their bodies, smokers easily compensate for low-yield cigarettes by smoking more intensively and by smoking more cigarettes (NCI 2001). One strategy used to decrease cigarette tar delivery was to change tobacco blends. However the tobacco contained higher levels of nitrogenous chemicals that resulted in the generation of larger amounts of NNK, a tobacco-derived substance that is known to be a pulmonary carcinogen. The ultimate result of the shift to low-yield cigarettes was no reduction of toxic exposures and no impact on smoking-related disease risks. Unfortunately, however, low yield cigarettes were promoted for more than 30 years before it was publicly understood that they have no beneficial effect on smoking-related risk (NCI 2001).

Evidence introduced in the U.S. Department of Justice Racketeering Influenced and Corrupt Organization (RICO) suit against the tobacco manufacturers indicated that for many years company scientists and company officials had internal information indicating that “light” cigarettes might not deliver lower doses of toxicants and that such cigarettes delivered lower dosages to machines than they did to human smokers (NCI 2001). Moreover, tobacco company researchers had information that the tar from a “light” cigarette might be qualitatively more toxic on a milligram-per-milligram basis than the tar from a regular filtered cigarette. However, public health professionals and officials in other government agencies failed to appreciate

the seriousness of the problem for several reasons. First, lacking the information possessed by tobacco manufacturers, they mistakenly assumed that smoking machines could accurately gauge the relative toxicity of cigarettes. They underestimated the complexity of the cigarette product and the ability of manufacturers to change the product in ways not reflected in the machine-based measurements. Second, lacking complete information about smoker compensation possessed by tobacco manufacturers, they underestimated the behavioral inclination of smokers to maintain their desired levels of nicotine intake. As a result of industry deception, there was a massive regulatory failure, as nothing was done to control how these products were marketed.

The best way to prevent such a sequence of events from occurring again is to have a regulatory body that can systematically assess toxic exposures, make judgments about potential risks from tobacco products, regulate industry claims about the products to ensure that they are accurate and not misleading, set minimum standards, and provide relevant surveillance to determine actual human exposures and risks. This is particularly important because a number of tobacco companies are developing and marketing tobacco products that are intended to reduce the harm from smoking and presumably will be promoted as such.

Goals of Tobacco Product Regulation

The regulation of tobacco product characteristics can be seen as having two primary goals (IOM 2001). One is to reduce the harm from the continued use of tobacco products. This might be achieved by reducing the toxic emissions from cigarettes or the toxic constituents of smokeless tobacco. Reducing toxic exposures would potentially lower the risk and severity of disease in people who continue to smoke. It is essential, however, that the federal government assure that consumers are informed about what is and what is not known about the risks of using products that result in reduced toxic exposures (reduced exposure products). Moreover, regulators must take steps to reduce the likelihood that the availability of reduced-exposure products will increase initiation or reduce the number of users who quit. The danger that the marketing of reduced-exposure products could lead to an increase in smoking prevalence by altering risk perceptions about smoking is one of the greatest challenges that the FDA will need to address.

The second goal of regulating tobacco product characteristics is to reduce consumption. The most promising way of reducing consumption through product regulation would be to make cigarettes less addictive, thereby making quitting easier and preventing initiating smokers from becoming addicted. Another promising strategy is the development of new medications for the treatment of nicotine addiction. To the extent that harm

reduction policies are pursued, it would be desirable to bring modified tobacco products and medications for smoking cessation within a common regulatory framework.

Reducing Harm from Continued Use

The regulation of tobacco products could potentially reduce the harm of tobacco use in smokers who continue to use these products. The approaches to and the pitfalls associated with harm reduction have been reviewed extensively in a recent IOM report (IOM 2001). Some of the ways in which the harm of tobacco products might be reduced include (1) setting performance standards to reduce toxic emissions from cigarettes, (2) evaluating novel and potential reduced exposure products (PREPs), (3) educating users about the risks and benefits of novel products, and (4) encouraging the development of medication that can substantially reduce cigarette consumption (for example, maintaining abstinence through the use of medications). In addition, a national regulatory program would conduct ongoing surveillance of the use of novel and traditional tobacco products.

Making Tobacco Products Less Addictive

The manufacture of cigarettes allows for the control of the nicotine content of the tobacco. Nicotine can be extracted from tobacco and then added back to tobacco to achieve any desired level of nicotine. Although nicotine-free cigarettes were marketed in the past, they were not commercially successful.

For people addicted to controlled substances or alcohol, a common approach to reducing their drug use and minimizing withdrawal symptoms is to gradually taper the use of an addictive drug over time. Such gradual tapering allows a gradual reduction of the dose, a decrease in the level of tolerance, and minimization of the severity of withdrawal symptoms. This type of treatment has been used to treat heroin addicts by gradually increasing the doses of methadone that they receive and to treat alcohol and sedative drug addicts by using drugs such as phenobarbital and benzodiazepines.

An analogous approach could be the basis for a regulatory strategy to reduce the addictiveness of cigarettes (Benowitz and Henningfield 1994; Henningfield et al. 1998). The idea would be to reduce the nicotine content of cigarette tobacco gradually over time. This would result in a lowering of the level of nicotine intake and, presumably, a lowering of the level of nicotine dependence. As nicotine levels become very low, cigarettes would become much less addicting. As a consequence, fewer novice smokers would become regular lifelong smokers. For previously addicted smokers,

a reduction of nicotine dependence would be expected to facilitate quitting. This approach is discussed in more detail in Chapter 7.

Another proposed approach to making tobacco products less addictive includes removing flavorants and additives that enhance the sensory characteristics of cigarettes, as sensory characteristics are thought to contribute to the reinforcing qualities and the addictiveness of cigarettes.

Increasing Medicinal Nicotine Alternatives

Another way to deal with potential compensation would be to make medicinal nicotine more readily available. Currently, nicotine-containing medications are available both over the counter and by prescription, but they tend to be more expensive than cigarettes and are more difficult to obtain. With the ready availability of nicotine-containing medications, smokers could obtain supplemental nicotine to compensate for reduced nicotine intake from low-nicotine-content cigarettes (Henningfield et al. 1998). After complete smoking cessation, the nicotine dose in the medication could be tapered down over time to finally eliminate all dependence on the drug.

The Proposed Tobacco Control Legislation Provisions for FDA Product Regulation

The proposed Tobacco Control legislation would give the FDA authority to “restrict the sale and distribution of a tobacco product if the Secretary determines that such regulation would be appropriate for the protection of the public health.” This broad authority is limited only in the following ways: the FDA (1) may not prohibit the sale of tobacco products altogether, (2) may not require a prescription for tobacco products, (3) may not adopt a minimum purchase age higher than 18 years, and (4) may not ban any particular category of retail outlet from selling tobacco products. As general principles guiding FDA authority, decisions would be based on sound science; the goals would be both to reduce consumption and to reduce the mortality and morbidity caused by tobacco use, and the FDA efforts are expected to complement (and not replace) proven prevention and cessation efforts. The proposed Tobacco Control legislation provisions for FDA product regulation has the key elements described in the following sections.

Disclosure

The bill would require tobacco companies to disclose to the FDA all chemical compounds found in both their tobacco products and the products’ smoke, whether these compounds are added or occur naturally, by quantity. Tobacco companies would be required to disclose the content

and form a delivery based on standards established by the FDA, to disclose research on their product as well as behavioral aspects of its use, and to notify the FDA whenever there is a change in a product.

Testing

The bill would grant the FDA the authority to promulgate regulations on cigarette testing methods, including how the cigarettes are tested and which smoke constituents must be measured. The FDA would also determine what product test data are disclosed to the public to inform consumers, without misleading them, about the risks of tobacco-related disease.

Product Standards

The FDA would be given broad authority to promulgate tobacco product standards whenever such a standard is found to be “appropriate for protection of the public health,” taking into consideration the risks and benefits to the population as a whole, including users and nonusers of tobacco products. The FDA is specifically directed to take into account the increased or decreased likelihood that existing users of tobacco products would stop using such products and the increased or decreased likelihood that those that do not use tobacco products would start using such products. As indicated earlier, the proposed Tobacco Control legislation reflects a statutory formulation of the principles developed by the IOM in *Clearing the Smoke*. The FDA is specifically authorized to promulgate standards requiring “reduction of nicotine yields of the product” as long as it does not require that nicotine be reduced “to zero.” (The bill stipulates that only an act of Congress can require that nicotine yields be reduced to zero.) The agency is also empowered to promulgate standards “for reduction or elimination of other constituents, including smoke constituents or harmful components of the product.” In short, the FDA is empowered to embrace a harm reduction approach by reducing the toxicity of tobacco products.

Potential Reduced-Exposure Products

The bill would authorize the FDA to develop specific standards for evaluating novel products that companies intend to promote as reduced-exposure or reduced-risk products. Such products would be those, as indicated by the manufacturer explicitly or implicitly, that present a lower risk of tobacco-related diseases or that are less harmful than other commercially-marketed tobacco products; tobacco products or their smoke that contain a reduced level of a substance or whose use results in a reduced exposure to a substance; or tobacco products that, when smoked, do not contain or are

free of a particular substance. The FDA would be granted the authority to regulate reduced-exposure and reduced-risk health claims and to ensure that there is a scientific basis for the claims that are permitted.

Public Health Concerns Regarding Federal Tobacco Product Regulation

Proposed FDA regulation has received mixed support from the public health community and from the tobacco industry. Some public health groups, such as the Campaign for Tobacco-Free Kids, have worked with members of Congress in developing the proposed legislation and have been highly supportive of its content. Other public health groups have also endorsed the proposal (Tobacco Free Kids 2007a, 2007b). However, some tobacco control advocates have opposed the bill (AAPHP 2007). They have done so on two quite different grounds. Some opposed the product regulation features of the bill because adoption of a regulatory approach will, in some sense, legitimize a product that should be banned outright. For these opponents, the goal is prohibition, and the most likely political path to prohibition is state-by-state action. Others have argued that the proposed regulatory framework for PREPs, based on the recommendations in *Clearing the Smoke*, is too demanding and may impede the development of reduced-exposure products by stifling innovation and retarding competition with safer products, especially by small companies and new entrants into the market. For these opponents, the goal is harm reduction, and the federal government should be giving companies incentives to develop PREPs rather than putting regulatory obstacles in their paths.

A third line of objection to federal tobacco product regulation arises out of a deep-seated skepticism about the ultimate utility of federal tobacco regulation. Tobacco control advocates are mindful of the tobacco industry's past successes in using federal legislation to obstruct tobacco control efforts, and their concerns are reinforced by general skepticism about the natural history of regulation. Under this view, regulatory agencies rarely have as much information as the regulated companies and therefore are prone to regulatory mistakes. Eventually, regulatory agencies tend to be captured by the industry that they are regulating, performance standards tend to be set by the industry itself, and consumers are often worse off than they would have been without regulation.

For some of the critics who hold this perspective, the main problem with the tobacco industry is not under-regulation, but, rather, oligopolistic concentration, which tends to encourage collusion and suppress competition. These critics believe that the industry has engaged in collusive activity throughout the century—even since the political and legal tide turned against it—and there is no reason to think that this will change. As long as this is true, the argument continues, there is a need to be realistic about

the poor prognosis for getting positive results through federal regulation. Rather, ways should be found to break up the industry. From this perspective, competition, not regulation, is the answer.

Committee Response to Public Health Concerns

The committee has given careful consideration to the concerns raised by some public health advocates about the proposed Tobacco Control legislation's product regulation features. In the end, we think the fears are overstated and that federal tobacco product regulation is an essential element of a long-term strategy for achieving substantial reductions in tobacco use and in tobacco-related morbidity and mortality. One of the major reasons for this conclusion is that active federal monitoring and regulation of the tobacco market is needed to prevent, curtail, and counteract industry efforts to undermine tobacco control policies. A second reason is that the market for reduced-risk products is likely to replicate the "light" cigarette experience in the absence of aggressive regulation of claims about these products.

Reducing use and reducing harm Although harm reduction might be a useful adjunct to a comprehensive tobacco control strategy, it is not at the center of the committee's charge, which is to propose a blueprint for reducing tobacco use in the United States. Reduced-exposure cigarette products may not reduce the prevalence of tobacco use and may have little public health payoff in the short term; moreover, given the numerous uncertainties identified in *Clearing the Smoke*, even an optimist would have to be reserved about the long-term payoff. A recent simulation study by Tengs and colleagues reinforces the cautious perspective enunciated in *Clearing the Smoke* (Tengs et al. 2004). They conclude that even if the new products do reduce harm to smokers by as much as 20 percent, the long-term consequences are highly likely to be negative if the rate of cessation drops by 20 to 40 percent.

Whatever the long-term prospects for harm reduction as a tobacco control strategy, however, industry efforts to develop and market reduced-risk or reduced-exposure products must not be left unattended, because their promotion and use could interfere with efforts to reduce tobacco use. This was the sad lesson of so-called "light" cigarettes. From this standpoint, it is imperative that Congress empower the FDA to regulate the claims that may be made regarding PREPs. In this respect, the FDA's regulatory jurisdiction over PREPs is an essential component of the blueprint.

Risks and Benefits of Regulation

The general arguments against product regulation enunciated by opponents of the proposed Tobacco Control legislation strike the committee as

overstated in the specific context of tobacco regulation. First, the committee believes that the FDA, a public health agency, is unlikely to become allied with, much less captured by, the tobacco industry. Admittedly, the tobacco industry's successful efforts to fend off regulatory action in the 1970s and 1980s give one pause. For example, the NCI's harm reduction program (the Tobacco Working Group [TWG]), which operated from 1968 to 1977, failed because many of its key members were scientists with direct ties to tobacco manufacturers. The NCI did not assemble a working group of independent scientists in great part because there was insufficient expertise in cigarette design and evaluation outside the industry. As documents produced in litigation have revealed, industry scientists, notwithstanding their pronouncements that they were participating solely as individuals rather than as company representatives, repeatedly informed their companies' legal counsel of any contemplated action by the TWG that might threaten the industry's interests. Company scientists, acting on instructions from counsel, successfully blocked promising research projects that had been proposed to the TWG. Once the TWG was disbanded, the tobacco companies retained two of its government representatives as consultants. In particular, the director of NCI's program, Gio Gori, went on to represent the Brown and Williamson Corporation in various regulatory proceedings.

Likewise, the Federal Trade Commission (FTC) has been criticized for its failure to stand up to the tobacco manufacturers. As documents produced in litigation reveal, the FTC passively allowed the industry to obscure the fact that the machine-tested tar and nicotine testing bore little relationship to human exposure. The FTC had no independent knowledge of cigarette design, and the FTC did not regulate the amounts of tar and nicotine delivered. However, its perpetuation of the testing regime merely served as an instrument for disciplining firms that threatened the industry-wide agreement to stick to machine-measured tar and nicotine numbers and avoid any suggestion that the machines did not accurately gauge human exposure. Moreover, the fact that the Master Settlement Agreement (MSA) had to include a variety of restrictions on misleading and youth-oriented advertising provides evidence of regulatory default by the FTC. Finally, the fact that Judge Gladys Kessler, in her final judgment and order in the government's RICO suit, enjoined the major tobacco manufacturers from using such words as "low tar," "light," "ultra-light," "mild," and "natural" provides even further evidence that the FTC has failed to carry out its legislative mandate (Tobacco Free Kids 2006).

The committee acknowledges the regrettable history of federal regulatory default. However, the committee believes that the widespread condemnation of the tobacco industry's deceit during the 1970s and 1980s, most recently documented in Judge Kessler's opinion in the federal government's RICO suit, makes it less likely that any federal regulatory agency, especially

an agency charged with protecting the public health such as the FDA, will be captured by the tobacco industry. There is no doubt that the agency could still be misled, but the proposed Tobacco Control legislation's disclosure requirements are designed to reduce the informational disparity between the industry and the regulators, and the FDA scientists can be expected to be highly skeptical of the data and the interpretations of those data provided by the tobacco industry.

Aside from regulatory capture, the other major criticism of the proposed Tobacco Control legislation is that the agency might retard innovation in the development of PREPs by insisting on high standards of proof regarding the effects of reduced exposure to tobacco toxins. In the committee's view, however, even if the regulatory criteria for permitting reduced-exposure and reduced-risk claims might be applied too cautiously, the dangers of unregulated competition over safety are greater than the dangers of retarding safety innovation. The underlying question regarding harm reduction is whether it is better to err in one direction or the other. In the committee's view, the highest priority is to prevent another "light" cigarette disaster.

The committee concludes that product regulation by the FDA will advance tobacco control efforts in the United States and around the world. The proposed Tobacco Control legislation embodies the principles that should govern the regulation of tobacco products in the coming years. The disclosure and testing requirements are needed to correct massive information failures in the tobacco market. The IOM's approach to reduced-exposure products, which is embodied in the bill, strikes the right balance between encouraging innovation and protecting the public from misleading claims. Empowering FDA to reduce the nicotine content of tobacco products has great potential (see Chapter 7).

Recommendation 25: Congress should empower FDA to regulate the design and characteristics of tobacco products to promote the public health. Specific authority should be conferred

- to require tobacco manufacturers to disclose to the agency all chemical compounds found in both product and the product's smoke, whether added or occurring naturally, by quantity; to disclose to the public the amount of nicotine in the product and the amount delivered to the consumer based on standards established by the agency; to disclose to the public research on their product, as well as behavioral aspects of its use; and to notify the agency whenever there is a change in a product;
- to prescribe cigarette testing methods, including how the cigarettes are tested and which smoke constituents must be measured;
- to promulgate tobacco product standards, including reduction of

nicotine yields and reduction or elimination of other constituents, wherever such a standard is found to be appropriate for protection of the public health, taking into consideration the risks and benefits to the population as a whole, including users and non-users of tobacco products; and

- to develop specific standards for evaluating novel products that companies intend to promote as reduced-exposure or reduced-risk products, and to regulate reduced-exposure and reduced-risk health claims, assuring that there is a scientific basis for claims that are permitted.

These recommendations are generally compatible with Articles 9-11 of the WHO Framework Convention on Tobacco Control (WHO 2003).

MESSAGES ON TOBACCO PACKAGES SHOULD PROMOTE HEALTH

The tobacco industry has long used cigarette packaging to identify and market its products, and governments have long used cigarette packaging to convey messages about tobacco risk and exposure. As legal restrictions have increasingly reduced or eliminated media advertising, the importance of the package as a vehicle for promotion has increased (Slade 1997). The packages carried by smokers serve as mobile advertisements for particular products. Promotional displays of packages in retail outlets are also key marketing tools. In response to the increasing importance of the package in promotion, governments have begun to exert more control over packaging characteristics for the dual purposes of reducing this form of marketing and communicating directly with consumers.

Among the reasons for regulatory interest in tobacco packaging are

- communicating product information to consumers and potential consumers,
- warning consumers about hazards and thereby discouraging consumption,
- communicating other health information (e.g., cessation hotline numbers),
- preventing smuggling (by requiring documentation of excise tax payment),
- preventing misleading messages by tobacco companies and providing corrective information to counteract previous deceptions,
- preventing promotional messages by tobacco companies as other avenues of advertising are curtailed, and
- “denormalizing” tobacco products.

The use of packages to convey tobacco-related health risks has a number of potential advantages over other forms of communication. The frequency of exposure is high. The messages are delivered at the moment a smoker desires another cigarette. The messages on packages also communicate information to the public at large, and not merely the consumer.

Package Warnings Regarding Tobacco-Related Health Risks

Congress first required health warnings on cigarette packages in 1966 and in advertisements in 1972. By 1985, four rotating warnings were required on both packages and in advertisements. However, U.S. package warnings are still not prominent and are located on the side of the package in small print (see Figure 6-1). In 1994, a previous IOM committee made the following observation about this country's tobacco health warnings:

The adequacy of the current cigarette warnings has been repeatedly questioned by public health specialists. Moreover, in the committee's view federal cigarette labeling legislation has reflected an unsatisfactory compromise between the public's health and the tobacco industry's desire to avoid concurrent state regulation and to reduce its exposure to tort liability. Negotiations in the legislative process have tended to favor the industry. . . . The inadequacy of current labeling policy is clearly revealed in the declaration of congressional purpose in the Comprehensive Smoking Education Act of 1984: It is the purpose of this Act to provide a



FIGURE 6-1 An example of U.S. government's warning on cigarette packages.

new strategy of making Americans more aware of any adverse health effects of smoking, to assure the timely and widespread dissemination of research findings, and to enable individuals to make informed decisions about smoking. It is time to state unequivocally that the primary objective of tobacco regulation is not to promote informed choice but rather to discourage consumption of tobacco products, especially by children and youths, as a means of reducing tobacco-related death and disease. Even though tobacco products are legally available to adults, the paramount public health aim is to reduce the number of people who use and become addicted to these products, through a focus on children and youths. The warnings must be designed to promote this objective. In the committee's view, the current warnings are inadequate even when measured against an informed choice standard, but they are woefully deficient when evaluated in terms of proper public health criteria" (IOM 1994, p. 236-237).

This committee agrees. Although federal law has remained unchanged for more than 20 years, evidence regarding the ineffectiveness of the prescribed warnings has continued to accumulate. As Krugman and colleagues note, the U.S. package warnings have served the tobacco industry well by reducing their liability exposure while communicating ineffectively with smokers and potential smokers (Krugman et al. 1999). The basic problems with the U.S. warnings are that they are unnoticed and stale, and they fail to convey relevant information in an effective way. In contrast to the messages used in other countries, the United States requires one of four text messages in black and white that occupy only 50 percent of the side of a pack. These messages have not changed in 20 years. They therefore have little effect on decision making or behavior (see Ferrence, Appendix C).

In contrast to the experience with such warnings in the United States, the experiences with these warnings in Canada and other countries have been more promising.

The Canadian Experience

Voluntary health package warnings were introduced in Canada in 1972 but were first imposed by federal law in 1989. Initially, they included four text messages. Five years later, eight stronger messages were introduced, and these messages occupied the top 35 percent of the front and back panels of the pack. These messages clearly specified the diseases and conditions caused by smoking and confirmed that "cigarettes are addictive." These messages were soon adopted in Australia, Thailand, and Poland.

The most important innovation in package regulation is requiring companies to print graphic messages with pictorial content. Graphic warnings were first introduced in Canada in 2001. The manufacturers of cigarettes for sale in Canada are now required to print 1 of 16 health warnings on each pack of



FIGURE 6-2 Example of one of Health Canada’s 16 graphic warnings.
 SOURCE: (Health Canada 2005) http://www.bc-sc.gc.ca/abc-asc/media/photogall/label-etiquette/img0010_e.html. Licensed under Health Canada copyright.

cigarettes (see Figure 6-2 for an example of such a warning). The new warning system extends to carton wrappers, which now include a warning on each of their six surfaces. The top 50 percent of each main panel on the package (as opposed to the side panel) must be used for the outside warning. These warnings include a photograph or other illustration, a marker word “Warning,” a short summary statement of the warning, and a brief explanation. Inside each pack, there must be 1 of 16 other detailed messages that provide information about quitting or health damage. Warning labels also include information on damage to nonsmokers exposed to smoke from cigarettes. Other tobacco products have similar requirements for warning labels.

Other Countries

Since 2001, several other countries have adopted graphic package warnings including Brazil, Singapore, Thailand, Australia, and Venezuela. Members of the European Union are now permitted, but not required, to prescribe graphic warnings, and the European Union has also developed a standard set of pictorial warnings for consideration by its members. Several other countries (Bangladesh, Hong Kong, India, Malaysia, New Zealand, South Africa, and Taiwan) are currently considering graphic warnings. The World Health Organization Framework Convention for Tobacco Control (FCTC) requires that warnings cover 30 percent of the front and the back of the package and recommends package coverage of 50 percent or more. A series of messages must be rotated. Graphic warnings are permitted but are not required.

Package warning size and placement vary considerably by country. The front of the package is considered the most prominent location

(Cunningham 2005), and it is probably important to have some health message on all sides, since retailers may position packages to hide the warnings if all sides are not covered.

There are considerable variations in the types of graphics used and in potential emotional impacts of particular graphics. In Brazil, for example, the warnings are more colorful and more dramatic than the Canadian warnings, most showing smokers with obvious health conditions (see Figure 6-3).



FIGURE 6-3 Examples of Brazil's graphic warnings.

SOURCE: See www.anvisa.gov.br/eng/informs/news/281003.htm.

Evidence Regarding Effectiveness

Ferrence and colleagues (Appendix C) have reviewed the scientific evidence regarding the effectiveness of tobacco package warnings in getting the attention of consumers and potential consumers (salience), influencing their awareness of tobacco-related health risks (risk perception), and affecting their self-reported smoking intentions and behaviors. In general, the evidence shows that the salience of warnings is affected by their placement, sizes, and other design features, and that salient warnings affect the consumer's awareness of risks. Although few studies have been able to parse out the effects of warnings on smoking behavior, the available data suggest a beneficial effect on consumption and cessation.

For the committee's present purposes, the question of greatest importance is what is known about the effects of pictorial warnings. Given that Canada was the first country to introduce pictorial warnings, all of the available evidence derives from Canadian smokers. A study conducted with Canadian smokers in 2001 found that more than half reported that the pictorial warnings have made them more likely to think about the health risks of smoking (Hammond et al. 2004). National surveys conducted on behalf of Health Canada also indicate that approximately 95 percent of youth smokers and 75 percent of adult smokers report that the pictorial warnings have been effective in providing them with important health information (Health Canada 2005a; Health Canada 2005b).

The International Tobacco Control Policy Evaluation Survey—a cohort survey of a representative sample of more than 8,000 adult smokers from Canada, Australia, the United States, and the United Kingdom—also provides suggestive findings. When smokers were asked to cite the sources of smoking-related health information, approximately two-thirds of all smokers cited cigarette packages; this proportion was more than radio, print, and electronic sources, and cigarette packages were the second most common source after television (Hammond et al. 2005). However, the results varied substantially by country: respondents living in countries with more comprehensive warnings were more likely to cite packages as a source of health information. For example, 85 percent of Canadian respondents cited packages as a source of health information; in contrast, 47 percent of U.S. smokers cited packages as a source of health information. In addition, specific health warnings were associated with knowledge about specific diseases. For example, in Canada, where package warnings include information about the risks of impotence, smokers were more than twice as likely as smokers from the other three countries to agree that smoking causes impotence. Overall, the study found that warnings that are graphic, larger, and more comprehensive in content were associated with greater health knowledge.

Finally, there is evidence that smokers with less education are less likely to recall health information in text-based messages than people with more education (Millar 1996). Given the inverse association between smoking and educational status, pictorial warnings may be particularly important for communicating with those most at risk. Indeed, preliminary evidence suggests that countries with pictorial warnings demonstrate fewer disparities in health knowledge across educational levels (Siahpush et al. 2006). Pictorial warnings may also be particularly effective in educating people who are illiterate, and could have a significant population impact in developing countries with low literacy rates, as well as regions where numerous languages and dialects are used.

In a series of papers, Hammond and colleagues (2004) have examined the impact of Canadian graphic warning labels on smoking behavior. Smokers who had read, thought about, and discussed the new labels were more likely to have quit, tried to quit, or reduced their smoking at the 3-month follow-up, after adjustment for intention to quit and smoking status at baseline (Hammond et al. 2004). One-fifth of Canadian smokers said that they smoked less because of the labels, whereas only 1 percent said that they smoked more and one-third said that they were more likely to quit because of the warnings. In addition, former smokers identified the pictorial warnings as important factors in their quitting and in subsequently maintaining abstinence (Hammond et al. 2004). Results from the International Tobacco Control Policy Evaluation Survey are consistent with these findings: at least one quarter of respondents from Canada, Australia, the United Kingdom, and the United States reported that package warnings have made them more likely to quit, although Canadian smokers were significantly more likely to report cessation benefits from the warnings than smokers in the other three countries that have text-only warnings (Fong et al. 2004).

As recommended in *Growing Up Tobacco Free* (IOM 1994) the proposed Tobacco Control legislation would strengthen the required package warnings immediately and would confer authority on the FDA to revise these requirements upon finding “that such a change would promote greater public understanding of the risks associated with tobacco.” (The 1994 committee stated that the agency should also be authorized to modify the warnings upon finding that so doing would reduce consumption, such as by making the risks more salient or strengthening the resolve of smokers to quit, and this committee agrees.) The bill would specifically authorize the agency to increase the required label area up to 50 percent of the package and to require color graphics. On the basis of the evidence accumulated thus far, graphic warnings of the kind required in Canada, Brazil, and Thailand “would promote greater public understanding of the risks” of using tobacco and would help reduce consumption.

Recommendation 26: Congress should strengthen the federally mandated warning labels for tobacco products immediately and should delegate authority to the FDA to update and revise these warnings on a regular basis upon finding that doing so would promote greater public understanding of the risks of using tobacco products or reduce tobacco consumption. Congress should require or authorize the FDA to require rotating color graphic warnings covering 50 percent of the package equivalent to those required in Canada.

Using Packages to Convey Other Health Information

Aside from printed health warnings, regulatory authorities can use the tobacco package to convey health-related information in other ways. For example, so-called package onserts (printed matter that is affixed to the package, and that is equivalent to inserts in drug product packaging) provide an appropriate vehicle for supplementing the health warnings printed on the package with information on ingredients and details regarding specific health hazards. In addition, the package can be used creatively to promote smoking cessation by displaying a quitline number and by including coupons for nicotine replacement products (e.g., patches and gum).

Recommendation 27: Congress should empower the FDA to require manufacturers to include in or on tobacco packages information about the health effects of tobacco use and about products that can be used to help people quit.

Restricting Misleading Messages on Tobacco Packages

Tobacco manufacturers have traditionally used the words and trademarks on the package as a channel for conveying messages about product characteristics. Some of these messages are misleading and are not protected by the First Amendment, because they falsely imply that smoking a particular brand of cigarette is less harmful than smoking other brands.

As Wakefield and colleagues (Wakefield et al. 2004) have noted, package design can help to shape perceptions of a tobacco product's performance and its sensory attributes, even among experienced smokers. This phenomenon is best illustrated by the use of brand descriptors and colors to promote perceptions that the tobacco product is safer than other tobacco products. Tobacco manufacturers commonly pair brand descriptors such as "light" and "mild" with cigarettes that generate low tar yields under the machine testing protocols. Although the industry has argued that these terms refer only to the "taste" of a product, these descriptors help to promote these brands as "healthier" products (Pollay 2001; Pollay

and Dewhirst 2002). Indeed, surveys of smokers in the United States and Canada indicate that a substantial proportion of “light” cigarette smokers believe that their cigarettes are less hazardous (Kozlowski et al. 1998; Shiffman et al. 2001). Adolescents have also been found to have similar misconceptions that “light” cigarettes are less hazardous (Borland et al. 2004; Kropp and Halpern-Felsher 2004; see also Chapter 2).

Ashley and colleagues (2001) reported that in Ontario, Canada, in 1996, one in five smokers of “light” cigarettes incorrectly believed that smoking “light” and “mild” cigarettes lowered the risk of cancer and heart disease. In 2000, 27 percent of Ontario smokers said that they smoked “light” cigarettes to reduce health risks, 40 percent as a step toward quitting, and 41 percent said that they would be more likely to quit if they knew that “light” cigarettes provided the same amount of tar and nicotine as regular cigarettes (Ashley et al. 2001). In a study of smokers’ responses to advertisements for potentially reduced-exposure tobacco products, “light” cigarettes, and regular cigarettes, Hamilton and colleagues found that the respondents incorrectly perceived “light” cigarettes as having significantly lower health risks and carcinogen levels than regular cigarettes (Hamilton et al. 2004).

Article 11 of the FCTC calls for the removal of brand descriptors that “directly or indirectly create the false impression that a particular tobacco product is less harmful than other tobacco products,” including terms such as “low tar,” “light,” or “mild.” Several jurisdictions have already banned deceptive descriptors. For example, in September 2003, the European Union banned the use of a number of brand descriptors, such as “low-tar,” “light,” “ultra-light,” and “mild,” in accordance with Directive 2001/37/EC. Findings from the International Tobacco Control Policy Evaluation Survey suggest that this ban has been effective in reducing misconceptions about the health benefits of brands labeled “light” and “mild” (Fong 2005). However, as the experience in the United Kingdom has demonstrated, tobacco manufacturers have proven adept at substituting numbers and colors for the banned descriptors. For example, pale blue and the number “one” are now being used to indicate a “light” or “mild” cigarette. In Brazil and the United Kingdom, manufacturers openly provided translation guides for this substitution. Because the evidence clearly shows that terms such as “mild,” “light,” “ultra-light,” and similar words are interpreted by consumers to imply reduced risk, the use of these terms should be barred.

In her recent remedial order in the federal government’s RICO suit against the big U.S. tobacco manufacturers, Judge Kessler permanently enjoined the companies from “conveying any express or implied health message or health descriptor for any cigarette brand either in the brand name or on any packaging, advertising or other promotional, informational or other

material.” She specifically enjoined use of the words “low tar,” “light,” “ultra-light,” “mild,” “natural,” and “any other words which reasonably could be expected to result in a consumer believing that smoking the cigarette brand using that descriptor may result in a lower risk of disease or be less hazardous to health than smoking other brands of cigarettes.” Judge Kessler’s order is very important, but it has two limitations: it does not apply to all manufacturers and it will require continuing interpretation regarding its application to words and images other than the ones specifically banned in the order.

The committee believes that Congress should supplement Judge Kessler’s order with a statutory restriction banning the use of these specific terms and should empower the regulatory agency to ban any other descriptors, signals, or practices that the companies may subsequently use that have the purpose or effect of leading consumers to believe believing that smoking the cigarette brand with that descriptor may result in a lower risk of disease or may be less hazardous to their health than smoking other brands of cigarettes.

Recommendation 28: Congress should ban, or empower the FDA to ban, terms such as “mild,” “lights,” “ultra-lights,” and other misleading terms mistakenly interpreted by consumers to imply reduced risk, as well as other techniques, such as color codes, that have the purpose or effect of conveying false or misleading impressions about the relative harmfulness of the product.

Using Packages to Convey Corrective Communications

Judge Kessler’s remedial order in the RICO suit also requires the defendant manufacturers to make various “corrective communications” on their websites, at the point of sale and on package inserts (Tobacco Free Kids 2006). These messages would address the adverse health effects of smoking, the addictiveness of smoking and nicotine, the effects of so-called low-tar cigarettes, the adverse effects of exposure to secondhand smoke, and the impact of marketing on youth smoking. Some of these proposed messages would be substantially equivalent to the health warnings contained in the proposed Tobacco Control legislation, although they would sometimes be more lengthy than package warnings. Some of the messages embody admissions of past deception by the manufacturers.

Recommendation 29: Whenever a court or administrative agency has found that a tobacco company has made false or misleading communications regarding the effects of tobacco products, or has engaged in conduct promoting tobacco use among youth or discouraging cessation

by tobacco users of any age, the court or agency should consider using its remedial authority to require manufacturers to include corrective communications on or with the tobacco package as well as at the point of sale.

THE RETAIL ENVIRONMENT FOR TOBACCO SALES SHOULD BE TRANSFORMED TO PROMOTE THE PUBLIC HEALTH

At present, tobacco use is actively promoted in retail outlets, with little regard to the public interest in discouraging smoking initiation (aside from the occasional warning sign that sale to a minor is prohibited) or in helping people quit. In the committee's view, the retail environment for tobacco should be radically transformed. Effective measures of restricting the commercial distribution of tobacco products to youth are only a starting point. Tobacco is not an ordinary consumer product and should not be treated as such. Although the sale of tobacco products to adults is permitted, it is disfavored as a matter of public policy. The retail environment should be designed to effectuate the public health goals of discouraging tobacco use and reducing tobacco-related disease.

Current Retail Promotional Activities

With the adoption of the MSA in 1998, there was a dramatic shift in the tobacco industry's advertising and promotion budgets, and retail marketing became the dominant strategy (Pierce and Gilpin 2004). The categories of promotional expenditures by tobacco manufacturers since 1980, as reported to the FTC, are presented in Box 6-1 (see also Figure 6-4 and Table 6-1).

Point-of-Sale Advertising

In 2003, tobacco manufacturers spent \$165.6 million in payments for the purchase of point-of-sale advertising (FTC 2005). The main venues of such advertising are convenience stores, small grocery stores (often in tandem with the sale of gas), liquor stores, chain supermarkets, and chain pharmacies, with youth exposure especially concentrated at the first two of these locations. The amount spent on point-of-sale advertising in 2003 represents a 41.7 percent decline from that in 2001, when companies spent \$284.3 million on point-of-sale advertising, and a decline of 58.6 percent since their peak in 1993 at \$400.9 million (FTC 2005). The prime advertising space within most retail stores is the radius around the checkout counter. A study conducted in California found nearly 90 percent of tobacco marketing materials within 4 feet of store checkout counters (Feighery et

BOX 6-1 Domestic Cigarette Advertising and Promotional Expenditures for 2003 (Dollars in Thousands)

ALL MEDIA		2003
-Newspaper	\$8,251	(0.1%)
-Magazines	\$156,394	(1.0%)
-Outdoor	\$32,599	(0.2%)
-Transit	\$0	(0.0%)
-Point-of-Sale	\$165,573	(1.1%)
-Sponsorships	\$31,371	(0.2%)
-Endorsements & Testimonials	\$0	(0.0%)
-Direct Mail	\$92,978	(0.6%)
-Company Website	\$2,851	(0.0%)
-Internet—Other	\$0	(0.0%)
-Telephone	\$760	(0.0%)
 DISCOUNTS		
-Price Discounts	\$10,808,239	(71.4%)
-Promotional Allowances—Retailers	\$1,229,327	(8.1%)
-Promotional Allowances—Wholesalers	\$683,067	(4.5%)
-Promotional Allowances—Other	\$2,786	(4.5%)
-Speciality Item Distribution—Branded	\$9,195	(0.1%)
-Speciality Item Distribution—Non-Branded	\$254,956	(1.7%)
-Public Entertainment—Adult Only	\$150,889	(1.0%)
-Public Entertainment—General Audience	\$32,849	(0.2%)
 PROMOTIONS		
-Sampling Distribution	\$17,853	(0.1%)
-Coupons	\$650,653	(4.3%)
-Retail-Value-Added—Bonus Cigarettes	\$677,308	(4.5%)
-Retail-Value-Added—Non-Cigarette Bonus	\$20,535	(0.1%)
 OTHER		
-Other	\$117,563	(0.8%)
 TOTAL	 \$15,145,998	

NOTE: The twenty-four spending categories are listed as they appear in the Federal Trade Commission's Cigarette Report for 2003. The Committee designated the four main expenditure groups and which spending categories were included in each.

al. 2001). A similar study found that nearly 50 percent of the California retailers surveyed posted tobacco product advertisements 3 feet or lower in height, which is easy eye-level for young children.

Under current law, state restriction of tobacco advertising (“based on smoking and health”) at the point of sale is preempted by the 1969 Ciga-

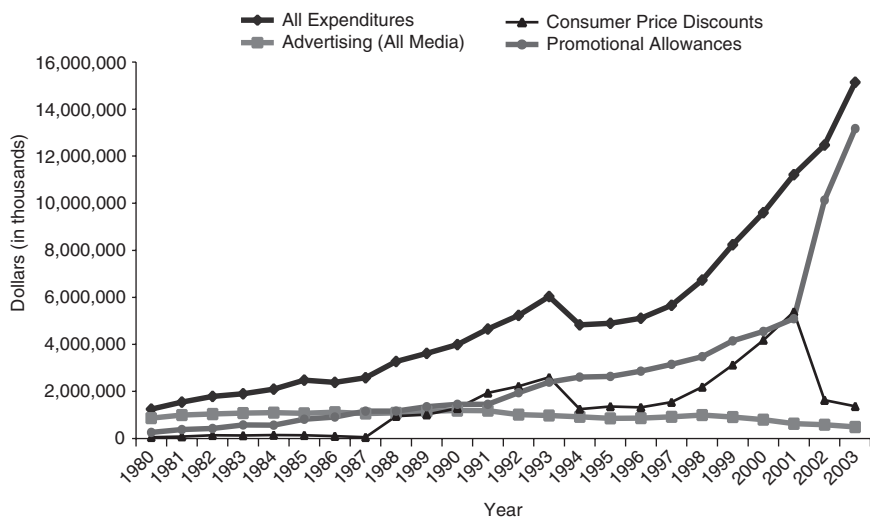


FIGURE 6-4 Domestic cigarette advertising and promotional expenditures for 1980–2003.

rette Labeling Act. However, the committee believes that the states should be free to regulate advertising at the point of sale as long as the regulation is no less restrictive than whatever federal regulation may have been adopted. In fact, this is the approach taken in the proposed Tobacco Control legislation, which would allow the states to ban point-of-sale advertising and other restrictions that would have been preempted under the Cigarette Labeling Act.

Retail Promotional Allowances

Promotional allowances paid to retailers now constitute the lion's share of manufacturers' marketing expenditures (see Figure 6-4 and Table 6-1). They are broadly defined by the FTC to include all payments or allowances to retailers "in order to facilitate the sale of any cigarette." So defined, they include so-called slotting fees, which are industry fees paid to retailers—in the form of discounts—linked to advantageous placement and promotion vis-à-vis competing brands. In addition to product placement itself, these merchandising strategies address an array of product accessories: signage (e.g., regarding discount deals), logos, banners, display racks, and window posters. Another type of retail allowance involves pricing policies. So-called buy-downs feature inventory clearance deals, which are time-constrained discounts. To participate in the buy-down, a retailer must agree to erect special product displays and other promotional signs. In addition to buy-

TABLE 6-1 Promotional Expenditures by Tobacco Manufacturers

Year	All Expenditures	Advertising (All Media)	Consumer Price Discounts	Promotional Allowances	Other
1980	1,242,289	869,880	50,459	265,256	56,694
1981	1,547,658	998,303	81,522	381,607	86,226
1982	1,793,814	1,040,140	141,178	430,683	181,813
1983	1,900,771	1,080,865	125,968	569,987	123,951
1984	2,095,231	1,097,454	148,031	563,666	286,035
1985	2,476,441	1,074,946	140,565	817,887	443,043
1986	2,382,357	1,119,318	98,866	911,603	252,570
1987	2,580,504	1,060,959	55,020	1,165,170	299,355
1988	3,274,853	1,090,125	948,638	1,157,778	78,366
1989	3,616,993	1,155,570	1,017,736	1,354,395	89,290
1990	3,992,008	1,190,923	1,284,691	1,453,558	62,917
1991	4,650,114	1,182,232	1,939,875	1,459,250	68,758
1992	5,231,917	1,021,859	2,224,688	1,943,762	41,608
1993	6,035,437	974,477	2,599,589	2,397,691	63,680
1994	4,833,532	918,971	1,255,870	2,611,019	47,672
1995	4,895,223	857,830	1,362,214	2,641,499	33,680
1996	5,107,700	869,993	1,324,653	2,866,360	46,696
1997	5,660,014	918,556	1,544,978	3,146,273	50,207
1998	6,733,157	994,255	2,194,026	3,483,290	61,584
1999	8,237,631	912,366	3,124,598	4,146,009	54,658
2000	9,592,627	796,732	4,181,075	4,551,433	63,395
2001	11,216,220	631,877	5,381,077	5,098,469	104,797
2002	12,466,358	584,669	1,636,054	10,132,755	112,879
2003	15,145,998	490,777	1,366,349	13,171,308	117,563

NOTE: Dollar amount given in thousands. The Committee designated the four main expenditure groups and which spending categories (24 spending categories are listed in the Federal Trade Commission's Cigarette Report for 2003 [FTC 2005]) were included in each.

downs, there is the most basic of pricing strategies: straight volume discounts for retailers.

Although these practices are common marketing practices for other retail goods, such as food and soft drinks, they are problematic from a tobacco control standpoint for two reasons. First, when the manufacturers purchase display space or other promotional services from the retailer, they are promoting smoking as well as the use of the particular brands displayed or advertised. As discussed below, the committee believes that, aside from properly restrained black-and-white-text only price advertising, all promotional displays should be prohibited, including so-called power walls (large displays of packages of a single brand).

Second, the purchase of space through the payment of slotting fees could reduce or even eliminate the space available for smaller manufactur-

ers who are producing PREPs and who cannot afford to pay the same fees or give similar discounts as the major manufacturers. Even if this practice does not amount to an antitrust violation, it certainly tends to reduce the available shelf space for brands with the smallest market share, such as PREPs introduced by new entrant firms. In the committee's view, the overall public health objective of reducing tobacco use justifies the more aggressive regulation of retail marketing and sales practices. Instead of allowing market forces to give prioritized access to ordinary tobacco products, society should direct retailers who choose to sell tobacco products to give prioritized display space to products that tend to reduce tobacco-related disease, including smoking cessation products and, as they are introduced, to tobacco products that have been found to have genuine potential for reducing tobacco-related disease.

Recommendation 30: Congress and state legislatures should enact legislation regulating the retail point of sale of tobacco products for the purpose of discouraging consumption of these products and encouraging cessation. Specifically:

- All retail outlets choosing to carry tobacco products should be licensed and monitored (see also youth access section in Chapter 5).
- Commercial displays or other activity promoting tobacco use by or in retail outlets should be banned, although text-only informational displays (e.g., price or health-related product characteristics) may be permitted within prescribed regulatory constraints.
- Retail outlets choosing to carry tobacco products should be required to display and distribute prescribed warnings about the health consequences of tobacco use, information regarding products and services for cessation, and corrective messages designed to offset misstatements or implied claims regarding the health effects of tobacco use (e.g., that “light” cigarettes are less harmful than other cigarettes).
- Retail outlets choosing to carry tobacco products should be required to allocate a proportionate amount of space to cessation aids and nicotine replacement products and, after regulatory clearance by the FDA or a designated state agency, to “qualifying” exposure-reduction products. (The FDA or a suitable state health agency should promulgate a list of “qualifying” exposure-reducing products.)

States are now preempted from implementing some aspects of these recommendations. However, as explained above, the committee believes that the federal preemption should be repealed. In addition, as explained below, the committee also believes that the proposed recommendation is compatible with the First Amendment.

Retail Sales on Indian Reservations

From a tobacco control standpoint, the main concern about retail cigarette outlets on Indian reservations is that the marketing and the distribution of tobacco products by tribes could impinge upon or undermine state efforts to increase the price (and collect its revenues) through excise taxes and to reduce the promotion and availability of tobacco.

Recommendation 31: Congress should explicitly and unmistakably include production, marketing, and distribution of tobacco products on Indian reservations by Indian tribes within the regulatory jurisdiction of FDA. Authority to investigate and enforce the Jenkins Act should be transferred to the Bureau of Alcohol, Tobacco, Firearms and Explosives. State restrictions on retail outlets should apply to all outlets on Indian reservations.

New Models for Regulating the Retail Market Should Be Explored

The recommendations just presented aim to inject public health into the existing retail market structure, which comprises a diverse array of privately owned businesses selling tobacco as one of many products in numerous locations. Two additional tools for transforming the retail environment for tobacco sales should also be explored. One is restricting the number and location of the retail outlets, and the other is shifting retail ownership to public control through direct public operation or through a chartered non-profit monopoly. Because state-level regulation of retail distribution of alcohol after repeal of the 19th Amendment provides the most analogous policy experience, the effects of the alternative models developed by states after Prohibition are briefly reviewed before tobacco outlets are addressed.

The Alcohol Experience

Following the passage of the 21st Amendment, which repealed Prohibition, 17 states adopted a public monopoly system for alcohol distribution. Monopoly methods applied primarily to the retail sales of distilled spirits, considered to be the “primary root of social abuse,” whereas wine and beer, thought to be “nonintoxicating,” were often excluded from monopoly control (Munshi 1997; Shipman 1940). In addition to retail sales, most state systems included wholesale businesses in distilled liquors, and Wyoming operated only a wholesale monopoly (Munshi 1997; Shipman 1940). The alternative to a monopoly system was a licensing system in which the state granted licenses for a fee to individuals or companies to dispense liquor under government supervision. Both systems were intended primarily to reduce organized crime and prevent the reemergence of the saloon; however,

another objective was to contain consumption and reduce its associated harms (Shankar 1999; Woeste 2004).

Proponents of the monopoly system advocated it in preference to the licensing system for its ability to remove the private profit motive, which, it was feared, “might defeat effective public control” (Munshi 1997; Shipman 1940). In short, a driving insight was to erase at the retail level the vested private interests that tend to increase consumption. Under the monopoly arrangements, “sales promotion is neither necessary nor socially desirable, the products sold are standardized and do not require diversified handling, and the strategy of customer appeal in store premises and equipment is unnecessary” (Shipman 1940). In addition, price controls would be easier to implement under a monopoly system, as most products would be under direct state control (Munshi 1997; Rutledge 1989). Finally, advocates of the monopoly approach believed that because the state would be more concerned with social welfare than with profit—in contrast to the interests of privately licensed bodies—the state would be better positioned to manage the appearance and location of its stores (Munshi 1997).

Although both the public monopoly and the licensing systems were initially intended to contain the number of liquor outlets and promote temperance, these objectives shifted over the course of the 20th century as states saw opportunities to leverage liquor distribution systems to boost state revenues (Spaeth 1991). Furthermore, as public opposition to heavily regulated liquor sales grew, state officials responded by advocating liberalization of stringent control systems. For example, in a debate regarding the future of Pennsylvania’s state liquor stores, a state senator cited “poor selection, inconvenience, and high prices” as justification for privatization of the state monopoly system (Munshi 1997). Expressing similar distaste with his state’s restrictive licensing scheme, Governor John Carlin of Kansas lobbied for reforming the state’s liquor laws out of concern that the state’s reputation for radical temperance was thwarting efforts to bring new business to the state (Swain 1996).

Although the recent trend of liberalizing retail access to alcohol, even in the states with monopolies on retail sales, has tended to obscure the differences between the two legal regimes, there is a body of research on the relationship between alcohol consumption and the type of regulation and the number of outlets. Several studies have found that privatization of wine sales and the elimination of a state monopoly on retail sales of distilled spirits led to an increase in overall consumption (Holder and Wagenaar 1990; Wagenaar and Holder 1995).

Reducing the convenience of retail alcohol accessibility typically increases the opportunity cost to the drinker, (i.e., the cost in time and money to actually obtain alcohol from retail sources). Specifically, the number and concentration of alcohol retail outlets affect the convenience of obtaining

alcohol, and the distance between outlets increases the cost of doing so. Gruenewald and colleagues (1993) conducted a time series cross-sectional analysis of alcohol consumption and the density of alcohol outlets over the 50 U.S. states. The results indicated that a 10 percent reduction in the density of alcohol outlets would reduce the consumption of spirits from 1 percent to 3 percent and the consumption of wine by 4 percent.

Licensing of alcohol outlets can be used to restrict the number or density of outlets in a given area, as well as the hours of sale, the types of beverages, and the size of beverage containers. Reducing the days and times of alcohol sales restricts the opportunities for alcohol purchasing and can reduce heavy consumption. Licensing is thus a common strategy for reducing drinking-related problems, although the trend in recent years has been to liberalize such restrictions in many countries (Drummond 2000). In general, it appears that changes in licensing provisions that substantially reduce hours of service can have a significant impact on drinking and drinking-related problems overall (Holder 2004).

Options for Restructuring Retail Tobacco Sales

A state retail monopoly for tobacco sales would have advantages and disadvantages. Although it would have the advantage of exerting direct and complete control over the retail environment, it could have the undesirable effect of giving the state a vested economic interest in increased tobacco sales, a concern that would be accentuated if tobacco sales were combined with liquor sales in states that retain retail monopolies over some aspect of alcohol sales. Because states have gradually liberalized (and even encouraged) alcohol sales in recent years, the inclusion of tobacco sales (which should be discouraged) in a consumption-promoting retail alcohol monopoly would send the wrong message altogether. A better option would be to establish a retail monopoly of tobacco-only outlets operated either by the state or by a state-chartered nonprofit corporation. The chartered-nonprofit approach would have the additional advantage of distancing the state from direct participation in tobacco sales. Under either approach, the legislated retail system would have to be carefully structured so that it would have no incentive to engage in marketing and promotional activities. It would be absolutely necessary for the legislature to declare that the sole statutory purpose of the retail outlets would be to facilitate smoking cessation.

Many public health experts will be skeptical about the likelihood that a publicly chartered retail monopoly for tobacco sales could be successfully operated to promote the public health. An alternative to a retail monopoly would be to license private outlets according to a population-based formula. Under this approach, it would be important to structure the system to enable the regulatory authority to reduce the number of outlets when it

determines that doing so would promote the public health. The key would be to restrict the license to a reasonably short term, say, 5 years, without any legal presumption of renewal. If it were commercially feasible, licensure could be restricted to outlets that sell only tobacco. Outlets that sell only tobacco would have the additional advantage of being able to facilitate the enforcement of youth-access restrictions.

Under any of the approaches (public monopoly, chartered non-profit monopoly, or a private licensing system), the decisions regarding number and location of outlets should be made by a public health agency, taking into account the potential benefits (in reducing tobacco use) and the possible costs, including the risk of stimulating a black market. Concerns about black-market supply can be reduced by narrowing the wide variation in state tobacco excise taxes. This problem is addressed below.

Recommendation 32: State governments should develop and, if feasible, implement and evaluate legal mechanisms for restructuring retail tobacco sales and restricting the number of tobacco outlets.

The Federal Role

The committee believes the states should take the lead in exploring innovation in tobacco retail regulation. However, the federal government should play a facilitative role in the near term and should be empowered to take a more directive role over the long term.

The proposed Tobacco Control legislation would permit state innovations in retail sale regulation while restricting FDA authority. Although the bill would give the FDA the authority to restrict “the sale and distribution of a tobacco product . . . if the Secretary determines that such regulation would be appropriate for the protection of the public health,” it would specifically deny FDA the authority to require a prescription for tobacco products or to ban any particular category of retail outlet from selling tobacco products. The latter limitation would effectively prevent the FDA from adopting a strategy of curtailing the sales of tobacco at retail outlets. However, under the preemption provision, the bill would explicitly leave the states free to adopt restrictions “in addition to or more stringent than” the federal requirements in connection with the sale and distribution of tobacco products. Accordingly, a state could prohibit tobacco products altogether or, more to the point for the present purposes, could require prescriptions or limit the number of retail outlets that sell tobacco.

Recommendation 33: Congress should empower FDA to restrict outlets in order to limit access and facilitate regulation of the retail environment, and thereby protect the public health.

FDA should have the authority to ban categories of retail outlets if it determines that doing so is necessary to implement the regulatory policy, and the proposed Tobacco Control legislation should be modified accordingly. However, the immediate implementation of a federal regulatory scheme would be premature. The first step is to enable and encourage state and local innovation.

THE FEDERAL GOVERNMENT SHOULD MANDATE INDUSTRY PAYMENTS FOR TOBACCO CONTROL AND SHOULD SUPPORT AND COORDINATE STATE FUNDING

This section addresses two distinct problems with current state tobacco control policies as described in Chapter 5: inadequate funding of tobacco control programs and substantial variations in the per-pack rate of state tobacco excise taxes. These problems could be corrected by the states themselves if they were to implement the policies proposed in Recommendations 1 and 2. This section presents a plan for solving both of these problems through federal coordination of state tobacco control policies if the states fail to do so on their own.

As discussed in Chapter 5, substantial state excise taxes on tobacco are an essential component of a comprehensive state tobacco control program, not only as a tool for raising the price and reducing consumption but also as a way of raising revenues that can be used to fund tobacco control programs. Most states allocate insufficient funding for tobacco control programs. Table 6-2 shows each state's proposed tobacco prevention spending for FY 2006, as well as the Centers for Disease Control and Prevention's (CDC) minimum spending targets for prevention programs. With the exception of Delaware, Maine, and Mississippi, the states do not spend up to the CDC minimum target for tobacco prevention programs. The District of Columbia, Michigan, Missouri, New Hampshire, South Carolina, and Tennessee did not allocate any state funds for tobacco control in FY 2006. When each state's actual spending on tobacco use prevention is expressed as a percentage of the CDC's minimum target, the median is 31.2 percent. Accordingly, Recommendation 1 emphasizes the need for states to fund tobacco control programs at the level recommended by the CDC, earmarking funds generated by state tobacco excises as a way of assuring continued funding if doing so is permissible under the state constitution. If this recommendation were fully implemented by the states, the federal role in tobacco control funding could be limited to those programs that are national in scope (such as the youth-oriented national media campaign proposed in Recommendation 15). However, the plan outlined in this section is designed to give states an additional incentive to fund tobacco control programs.

TABLE 6-2 Recommended and Proposed Tobacco Control Program Spending

State	CDC Minimum Prevention Spending Target (\$ in millions)	FY 2006 Tobacco Prevention Proposed Spending (\$ in millions)
Alabama	26.7	
Alaska	8.1	5.7
Arizona	27.8	23.1
Arkansas	17.9	17.7
California	165.1	79.7
Colorado	24.5	27
Connecticut	21.2	0.04
Delaware	8.6	9.2
District of Columbia	7.5	0
Florida	78.4	1
Georgia	42.6	3.1
Hawaii	10.8	5.8
Idaho	11	
Illinois	64.9	11
Indiana	34.8	10.8
Iowa	19.3	5.6
Kansas	18.1	1
Kentucky	25.1	2.7
Louisiana	27.1	8
Maine	11.2	14.2
Maryland	30.3	9.2
Massachusetts	35.2	4.3
Michigan	54.8	0
Minnesota	28.6	22.1
Mississippi	18.8	20
Missouri	32.8	0
Montana	9.4	6.8
Nebraska	13.3	3
Nevada	13.5	4.2
New Hampshire	10.9	0
New Jersey	45.1	11.5
New Mexico	13.7	6
New York	95.8	43.4
North Carolina	42.6	15
North Dakota	8.2	3.1
Ohio	61.7	47.2
Oklahoma	21.8	8.9
Oregon	21.1	3.5
Pennsylvania	65.6	32.9
Rhode Island	9.9	2.1
South Carolina	23.9	0
South Dakota	8.7	

continued

TABLE 6-2 continued

State	CDC Minimum Prevention Spending Target (\$ in millions)	FY 2006 Tobacco Prevention Proposed Spending (\$ in millions)
Tennessee	32.2	0
Texas	103.2	7
Utah	15.2	7.2
Vermont	7.9	4.9
Virginia	38.9	12.8
Washington	33.3	27.2
West Virginia	14.2	5.9
Wisconsin	31.2	10
Wyoming	7.4	5.9

NOTE: Federal Tax rate is \$0.39 per pack.

SOURCE: Adapted from Campaign for Tobacco Free Kids.

<http://www.tobaccofreekids.org/reports/settlements/2006/fullreport.pdf>.

A second problem identified in Chapter 5 is that the wide variation in tobacco excise tax rates among the states tends to encourage tax evasion and smuggling through interstate shipments. Table 6-3 shows state cigarette excise tax rates as of January 1, 2006, and reveals a wide disparity in tax rates, ranging from 7 cents to \$2.46 per pack, with a median tax of 80 cents per pack. The absolute wide range of state excise tax rates has been increasing over time. Figure 6-5 shows vertical box plots of state excise tax rates in 1998 and 2006.³ The plots show the extreme values as well as the quartile ranges. The median excise tax rate rose from 34 to 80 cents per pack over this period, while the spread between the 25th and the 75th percentiles rose from 40 cents in 1998 to 82.5 cents in 2006. In Recommendation 2, the committee urges the low-tax states to raise their excise taxes to what is now the upper quintile of state tax rates. If that recommendation were implemented by all the states, it would substantially decrease, if not eliminate, the incentive for cross-state smuggling. However, if the states do not deal successfully with this problem on their own, the increasing variation in state tobacco excise taxes should be addressed by the federal government.

In this section, the committee offers a new federal funding scheme (the National Tobacco Control Funding Plan, described below) as a back-up plan to support and coordinate state tobacco control programs, while giving the states with low tobacco excise taxes the incentive to raise them. The basic outline of such a scheme is as follows: the Congress would levy a supplementary remedial assessment on tobacco manufacturers through a per-pack fee, much like the current federal excise tax. The federal gov-

³The source of the excise tax data for 1998 is Tax Burden on Tobacco.

TABLE 6-3 State Cigarette Excise Tax Rates

State	State Cigarette Excise Tax Rates (in cents per pack)—Updated January 1, 2006	State	State Cigarette Excise Tax Rates (in cents per pack)—Updated January 1, 2006
Rhode Island	246	Kansas	79
New Jersey	240	Wisconsin	77
Washington	202.5	Utah	69.5
Maine	200	Nebraska	64
Michigan	200	Wyoming	60
Montana	170	Arkansas (2)	59
Alaska	160	Idaho	57
Connecticut	151	Indiana	55.5
Massachusetts	151	Delaware	55
New York (1)	150	West Virginia	55
Hawaii	140	South Dakota	53
Pennsylvania	135	North Dakota	44
Ohio	125	Alabama (1)	42.5
Minnesota (3)	123	Texas	41
Vermont	119	Georgia	37
Arizona	118	Iowa	36
Oregon	118	Louisiana	36
Oklahoma	103	North Carolina	35
District of Columbia	100	Florida	33.9
Maryland	100	Kentucky (2)	30
Illinois (1)	98	Virginia (1)	30
New Mexico	91	Tennessee (1,2)	20
California	87	Mississippi	18
Colorado	84	Missouri (1)	17
Nevada	80	South Carolina	7
New Hampshire	80		

NOTES: *Counties and cities may impose an additional tax on a pack of cigarettes in AL, 1¢ to 6¢; IL, 10¢ to 15¢; MO, 4¢ to 7¢; NYC \$1.50; TN, 1¢; and VA, 2¢ to 15¢.

*Dealers pay an additional enforcement and administrative fee of 0.1¢ per pack in KY and 0.05¢ in TN. In AR, a \$1.25/1,000 cigarette fee is imposed.

*Plus an additional 25.5 cent sales tax is added to the wholesale price of a tax stamp (total \$1.485).

SOURCE: Adapted from Federation of Tax Administration (<http://www.taxadmin.org/fta/rate/cigarette.html>)

ernment would use a portion of these funds to support national tobacco control programs (for example, a national media-based educational and prevention program and a national quitline and cessation services network, as recommended in Chapter 5). The remainder of the funds would be distributed to the states based on a formula that rewards states with high excise taxes or high levels of tobacco control spending. This would give states

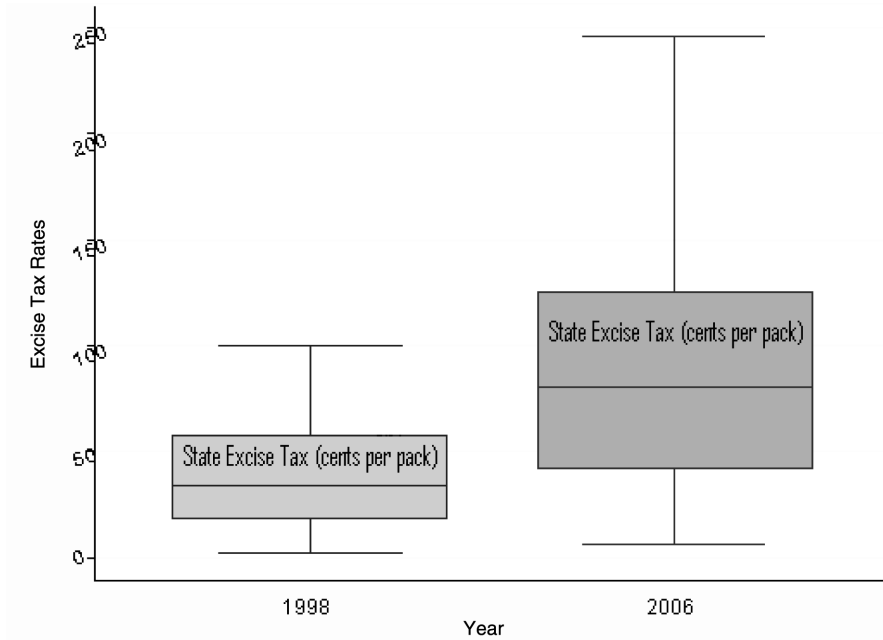


FIGURE 6-5 Box-whisker plots of state cigarette excise tax rates, 1998–2006.

an incentive to increase their spending on tobacco prevention and would give states with low excise taxes an incentive to raise them, thereby narrowing the current wide variation in excise tax rates among the states. The precise details of the formula would have to be based on further research, but the committee has developed an illustrative formula to demonstrate the principles that it has in mind.

Federal Remedial Assessment

Under the committee's proposed National Tobacco Control Funding Plan, the federal government would raise funds for tobacco control on a nationwide basis through a per-pack remedial assessment on cigarettes sold in the United States. These assessments would be based on congressional findings that cigarettes are unreasonably hazardous products, that most smokers are addicted to nicotine, that most addicted smokers began smoking as adolescents, that most adult smokers desire to quit, and that the promotional activities of the tobacco companies have created and sustained addiction to cigarettes.

The precise amount of the assessment would be selected by the Congress to yield a target amount of overall funding for tobacco control, whereas it would produce the optimal incentives for the states to raise tobacco excise taxes and spend state funds on tobacco control.

It will be recalled that the committee recommended a substantial increase in the federal tobacco excise tax rate in Chapter 5 (Recommendation 3). It would be compatible with the committee's recommendation to regard a portion of a new federal excise tax increase as the source of funds for the new tobacco control funding plan. However, the committee has conceptualized the levy as a "remedial assessment" rather than simply as an increase in the excise tax in order to provide a strong rationale for directing the proceeds to tobacco control funding. In addition, it is worth noting that, despite the impact of current federal and state taxes and the regular payments mandated by the MSA, the major U.S. cigarette manufacturers remain highly profitable and still have a substantial ability to help finance the prevention and cessation programs recommended in this report. Table 6-4 shows the pretax domestic operating profits of the three largest U.S.-based tobacco manufacturers for calendar year 2005, as derived from Forms 10-K submitted to the U.S. Securities and Exchange Commission. Their combined pretax operating profits from the sale of cigarettes within the United States exceeded \$7 billion in 2005.

An Illustrative Allocation Formula

An example of a formula that would determine the federal funds that would be distributed to the states and that would achieve the committee's basic objectives is $G = aS\sqrt{T}$, where G represents the annual grant to a particular state (in millions of dollars); a is a constant that depends on the total funds available for distribution nationwide; S is the state's annual spending on tobacco prevention (in millions of dollars); and T is the state's excise tax rate on cigarettes (in cents per pack), exclusive of sales taxes. The symbol \sqrt{T} refers to the square root of the excise tax rate.

The formula implies that the state will receive $a\sqrt{T}$ dollars in federal payments for each dollar spent on tobacco control activities. This means

TABLE 6-4 Pre-Tax Domestic Tobacco Operating Profits of the Three Largest U.S.-Based Cigarette Manufacturers, 2004–2005 (in \$millions)

Parent Company (Division)	2004	2005
Altria (Philip Morris USA)	4,405	4,581
Reynolds American (RJ Reynolds)	882	1,459
Loews (Lorillard)	1,040	1,151
Total	6,327	7,191

that states with high tobacco excise tax rates receive a higher federal matching rate for tobacco control spending. Moreover, the formula implies that each state would have an incentive to raise its cigarette excise tax, but states with low taxes have the greatest incentive. If a state with a baseline excise tax of 25 cents per pack raised its cigarette tax by 25 cents to 50 cents per pack, it would receive a 41.4 percent increase in federal payments. By contrast, if a state with a baseline excise tax of \$1 per pack raised its cigarette tax by 25 cents to \$1.25 per pack, it would receive an 11.8 percent increase in federal payments. There is precedent for the use of nonlinear formulas in the distribution of federal funds to the states. For example, the federal medical assistance percentage rates in the Medicaid program are based on the square of each state's per capita income (see Section 1905(b) of the Social Security Act).⁴

Table 6-5 shows how the formula would be used to distribute \$500 million (an arbitrarily designated amount), based on the values of *S* (in Table 6-3) and *T* (in Table 6-4). At current cigarette prices, an additional federal levy of about 2.75 cents per pack would be required to generate such revenue.⁵ The last column of Table 6-5 shows the effective federal matching rate per dollar of state tobacco prevention spending. Thus the state of Georgia has a relatively low tax rate of 37 cents per pack (Table 6-3) and will spend \$3.1 million on tobacco prevention in FY 2006. Under a federal incentive scheme that awards a total of \$500 million to the states, Georgia would receive a payment of \$0.56 per dollar of tobacco control spending, which comes to a grant of \$1.72 million for the year (Table 6-5). By contrast, the state of Minnesota has a relatively high tax rate of \$1.23 per pack (Table 6-3) and plans on spending \$22.1 million on tobacco prevention in FY 2006 (Table 6-5). Under the same federal scheme, Minnesota would receive a payment of \$1.01 per dollar of tobacco control spending, which comes to a grant of \$22.37 million for the year (Table 6-5). In effect, the federal grant would subsidize all of Minnesota's tobacco control spending. Finally, consider the state of Michigan, which has a much higher tax rate of \$2.00 per pack (Table 6-3), but will have made no expenditures on tobacco prevention in FY 2006 (Table 6-5). Under the same federal scheme, Michigan would be eligible to receive a payment of \$1.29 per dollar spent

⁴For the most recent rates, see Federal Register Vol. 70, No. 229, p. 71856, November 30, 2005.

⁵According to the USDA Tobacco Situation, total federal taxable removals for 2005 were an estimated 366.7 billion pieces or, equivalently, 18.335 billion packs. The estimated average retail price of a pack of cigarettes in 2005 was \$4.32. (See Campaign for Tobacco-Free Kids: <http://www.tobaccofreekids.org/research/factsheets/pdf/0207.pdf>.) If the short-run price elasticity of demand is -0.4, then a federal levy of about 2.75 cents per pack would generate an additional \$500 million in revenue.

TABLE 6-5 State Grants and Matching Payment Rates Under Proposed Federal Scheme^a

State	FY 2006 Tobacco Prevention Proposed Spending (in \$ millions)	State Grant Under Proposed Federal Plan (in \$ millions)	Matching Payment per Dollar of State Tobacco Control Spending (in \$)
Alabama	0.5	0.19	0.6
Alaska	5.7	6.58	1.15
Arizona	23.1	22.91	0.99
Arkansas	17.7	12.41	0.7
California	79.732	67.86	0.85
Colorado	27	22.59	0.84
Connecticut	0.04	0.04	1.12
Delaware	9.2	6.23	0.68
District of Columbia	0	0	0.91
Florida	1	0.53	0.53
Georgia	3.1	1.72	0.56
Hawaii	5.8	6.26	1.08
Idaho	0.544	0.37	0.69
Illinois	11	9.94	0.9
Indiana	10.8	7.34	0.68
Iowa	5.6	3.07	0.55
Kansas	1	0.81	0.81
Kentucky	2.7	1.35	0.5
Louisiana	8	4.38	0.55
Maine	14.2	18.33	1.29
Maryland	9.2	8.4	0.91
Massachusetts	4.3	4.82	1.12
Michigan	0	0	1.29
Minnesota	22.1	22.37	1.01
Mississippi	20	7.75	0.39
Missouri	0	0	0.38
Montana	6.8	8.09	1.19
Nebraska	3	2.19	0.73
Nevada	4.2	3.43	0.82
New Hampshire	0	0	0.82
New Jersey	11.5	16.26	1.41
New Mexico	6	5.22	0.87
New York	43.4	48.52	1.12
North Carolina	15	7.5	0.5
North Dakota	3.1	1.88	0.61
Ohio	47.2	48.17	1.02
Oklahoma	8.9	8.25	0.93
Oregon	3.5	3.47	0.99
Pennsylvania	32.9	34.9	1.06
Rhode Island	2.1	3.01	1.43
South Carolina	0	0	0.24

continued

TABLE 6-5 continued

State	FY 2006 Tobacco Prevention Proposed Spending (in \$ millions)	State Grant Under Proposed Federal Plan (in \$ millions)	Matching Payment per Dollar of State Tobacco Control Spending (in \$)
South Dakota	0.707	0.47	0.66
Tennessee	0	0	0.41
Texas	7	4.09	0.58
Utah	7.2	5.48	0.76
Vermont	4.9	4.88	1
Virginia	12.8	6.4	0.5
Washington	27.2	35.33	1.3
West Virginia	5.9	3.99	0.68
Wisconsin	10	8.01	0.8
Wyoming	5.9	4.17	0.71

^aBased on the grant formula $G = aS\sqrt{T}$, where $a = 0.09129$ is calculated so that total federal grants equal \$500 million.

on tobacco control activities, but because it has no current tobacco control spending, it would receive no federal grant.

To illustrate how this federal allocation program would work, we consider three separate cases: (1) Georgia raises its cigarette excise tax by 25 cents per pack, (2) Minnesota raises its cigarette excise tax by 25 cents per pack, and (3) Michigan raises its cigarette excise tax by 25 cents per pack and spends \$10 million on tobacco control activities.

If Georgia raised its cigarette tax by 25 cents to 62 cents per pack but did not increase its spending on tobacco control activities, its federal matching rate would still increase from \$.56 to \$.72 cents per dollar of tobacco prevention spending. As a result, Georgia's enactment of an increase in its cigarette excise tax would result in an increase in its federal grant from \$1.72 million to \$2.23 million. By contrast, if Minnesota raised its cigarette tax by 25 cents to \$1.48 per pack but did not increase its spending on tobacco control activities, its federal matching rate would still increase from \$1.01 to \$1.11 per dollar of tobacco prevention spending. As a result, Minnesota's enactment of an increase in its cigarette excise tax would result in an increase in its federal grant from \$22.37 million to \$24.54 million. In these two cases, Georgia receives an incentive bonus of approximately \$0.5 million for raising its excise tax by 25 cents, whereas Minnesota receives an incentive bonus of more than \$2 million for raising its excise tax by the same amount. The explanation is that states with high rates of spending on tobacco prevention get a greater reward for raising their cigarette excise taxes.

Finally, consider the consequences of Michigan's raising its excise tax by 25 cents and, at the same time, increasing its spending on tobacco control activities by \$10 million. As a consequence of the excise tax increase, its federal matching rate would increase from \$1.29 to \$1.37 per dollar of spending on tobacco prevention. Accordingly, the state's newly increased spending of \$10 million on tobacco prevention would result in a federal grant of \$13.7 million, a grant that entirely subsidizes its tobacco control spending and adds additional funds to the state's coffers. This example illustrates an important feature of the federal allocation formula, namely, that states with higher excise tax rates receive a greater reward for increasing their tobacco prevention spending.

Possible Criticisms of Proposed Allocation Formula

It is arguable that the proposed incentive scheme may not provide sufficient incentives for states with low excise taxes and low spending on tobacco prevention to alter their policies. Thus, consider a state such as South Carolina, which has a very low cigarette excise tax of 7 cents per pack (Table 6-3) and will spend no state funds on tobacco prevention in FY 2006 (Table 6-2). South Carolina would essentially receive a federal subsidy of 24 percent for each dollar that it devoted to tobacco prevention spending, which may not be enough to induce the state to allocate funds for tobacco prevention. However, the size of the effective federal matching rate depends on the amount of funds to be allocated. In a program that allocated \$2 billion in federal incentive funds, South Carolina would receive a 97 cent match for every dollar that it decided to invest in tobacco control. Its effective subsidy would be 97 percent for each new dollar of spending on tobacco control. That is, although South Carolina has no current tobacco use prevention program, the federal government would essentially be paying the state to establish a tobacco use prevention program.

Alternatively, one might argue that the incentive system outlined above provides too much reward for past good behavior and too little incentive for future increases in cigarette taxes or tobacco use prevention spending. This is a matter of equity. The grant formula could be modified so that only prospective changes in spending S or cigarette taxes T are rewarded. On the other hand, the formula could be modified to take into account a combination of past and prospective changes in taxes or spending on prevention.

Finally, it could be argued that the nonlinear square root formula does not offer sufficiently strong incentives to equalize tax rates. In that case, the formula could be modified to provide greater incentives to states with lower cigarette excise taxes. For example, if the formula were changed to $G = aS \sqrt{T}$, a scheme to allocate \$500 million would give Georgia a higher subsidy rate of 66 cents per dollar of tobacco control spending, whereas

Minnesota would receive a lower subsidy rate of 98 cents per dollar of tobacco control spending.

Recommendation 34: If most states fail to increase tobacco control funding and reduce variations in tobacco excise tax rates as proposed in Recommendations 1 and 2, Congress should enact a National Tobacco Control Funding Plan raising funds through a per-pack remedial assessment on cigarettes sold in the United States. Part of the proceeds should be used to support national tobacco control programs and the remainder of the funds should be distributed to the states to subsidize state tobacco control programs according to a formula based on the level of state tobacco control expenditures and state tobacco excise rates. The plan should be designed to give states an incentive not only to increase state spending on tobacco control, but also to raise cigarette taxes, especially in low-tax states. Congress should assure that any federal coordination mechanism affecting the coverage and collection of state tobacco excise taxes applies to Indian tribes.

Prevalence-Based Penalties

The committee's proposed National Tobacco Control Funding Plan is not the only approach that could be used to tap tobacco industry revenues for the purpose of funding tobacco control activities. For example, various financial formulas have been proposed as devices for penalizing tobacco manufacturers for failing to take steps to reduce the prevalence of smoking among youth. In the proposed final judgment in its RICO suit, the U.S. Department of Justice recommended that the court set specified targets for each defendant on the basis of the 2003 baseline rate of smoking their brands and to reduce the prevalence of smoking among youth by 6 percent each year for 7 years. Under the government's proposed judgment, a manufacturer failing to reach its target in any given year would be assessed \$3,000 (adjusted for inflation) for each young person by which the target was missed. According to the U.S. Department of Justice, these penalties would be justified by the specific finding that the companies intentionally marketed cigarettes to youth while denying that they were doing so. Eighty percent of the recommended assessments would have been used to support the National Cessation Quitline Network, which would have been established under the proposed order, and 20 percent would have been used to support prevention activities. Although Judge Kessler found the tobacco company defendants liable under the RICO Act, she declined to order these proposed remedies on the ground that they are precluded by an earlier ruling by the Court of Appeals for the District of Columbia.

In any case, the committee's proposed National Tobacco Control Funding Plan is not meant to be an alternative to other plans that are based on prevalence-based penalties; it is meant to stand on its own and can be used to complement a penalty-based approach if such an approach were to be ordered by a court or embraced by Congress. Accordingly, if the Court of Appeals for the District of Columbia were to take a broader view of the district court's remedial authority under the RICO Act, and the district court were to enter an order similar to that recommended by the federal government, Congress could use the funds raised under the committee's proposed plan to supplement these funds as needed to carry out the national cessation and prevention programs established by the court's order.

TOBACCO ADVERTISING SHOULD BE FURTHER RESTRICTED

The Cigarette Smoking Act of 1969 banned the advertising of cigarettes on television and radio. The FDA's 1996 Tobacco Rule would have limited magazine advertising to a black-and-white-text only format, restricted the use of the trade or brand name of certain tobacco products; prohibited the sale or distribution of promotional brand-identified non-tobacco items, such as hats and tee shirts; and prohibited the use of the brand name of a tobacco product when a tobacco company sponsors entries, teams, and sporting and other events. These restrictions never went into effect. Under the MSA, the participating manufacturers agreed to eliminate billboard advertising, significantly limit brand item advertising, and sharply restrict public advertising in entertainment forms. However, other types of advertising and promotion were not affected. Efforts by the states to restrict point-of-sale advertising have been found to be preempted by the 1969 Cigarette Labeling Act (*Lorillard Tobacco Company v. Reilly* 2001;533 U.S. 525).

As noted earlier, the proposed Tobacco Control legislation would revive the 1996 FDA Tobacco Rule and would empower the FDA to restrict the advertising and promotion of tobacco products "to the full extent permitted by the First Amendment" upon finding "that such regulation would be appropriate for the protection of the public health." The questions raised are whether restrictions on tobacco advertising and other forms of marketing would reduce the level of smoking in the population, thereby promoting the public health, and whether these restrictions would be constitutionally permissible.

Current Advertising

As noted above, the tobacco industry's advertising and promotion budgets shifted dramatically after the MSA was executed in 1998. Retail

marketing became the dominant strategy (Pierce and Gilpin 2004), and traditional forms of advertising in mass media have declined. Magazine advertising has not been abandoned, however, and the industry still spends \$107 million per year to produce advertisements containing colorful, attractive, and prominently placed imagery that appeals to both youth and adult consumers (King and Siegel 2001). Expenditures for magazine advertisements have declined dramatically since their peak in 1984, however, when tobacco companies reported spending \$425.9 million on advertising in this medium, which then represented more than 20 percent of their marketing and promotion budgets. Magazine advertisements now represent a much smaller percentage of total spending: less than 1 percent, if retail consumer price discounting is included (FTC 2005).

The amount of cigarette advertising in magazines with high youth readership has declined since tobacco companies agreed to avoid targeting youth as a condition of the MSA (Hamilton et al. 2002). Researchers credit this trend to public pressure from advocacy groups and the popular press, as the proportion of advertising expenditures in magazines with at least 15 percent youth readership declined more after public pressure was applied than immediately following the execution of the MSA (Hamilton et al. 2002). Nevertheless, a recent court decision may make tobacco companies take greater care in adhering to the MSA advertising requirements; in 2004, a California court of appeals affirmed a trial court ruling that the R.J. Reynolds Company violated the agreement by placing cigarette advertisements in magazines with high youth readerships (*People of the State of California ex rel. Lockyer v. R.J. Reynolds Tobacco Company*, 116 CalAppAth 1253, 1291, 2004).

Notwithstanding the decline in industry expenditures on advertising in youth-oriented publications, however, youth exposure to cigarette advertisements remains high. One study found that magazine advertisements for brands of cigarettes preferred by youth (those smoked by more than 5 percent of the smokers in the 8th, 10th, and 12th grades) reached more than 80 percent of young people in the United States an average of 17 times each in 2000 (King and Siegel 2001). Moreover, studies have shown that the MSA itself had little, if any, effect on the exposure of young people to magazine advertisements in the years following the agreement (Hamilton et al. 2002; King and Siegel 2001; Krugman et al. 2005). Cigarette companies continue to promote their products in magazines that reach high percentages and numbers of youth readers (Krugman et al. 2005).

Like magazine advertising, point-of-sale advertising (advertisements at the retail location, excluding outdoor signs on retailer property) also represents a smaller percentage of the promotional spending for tobacco companies than it did in years past. In 2003, tobacco companies reported spending \$165.8 million on point-of-sale promotions. This amount rep-

resents a 41.7 percent decline from that in 2001, when companies spent \$284.3 million on point-of-sale advertising. Current expenditures on point-of-sale advertising have declined 58.6 percent since their peak in 1993 at \$400.9 million (FTC 2005).

In this section, the committee addresses advertising (in magazines and at the point of sale). The committee does not address price discounting to either consumers or retailers. The pricing of cigarettes is addressed in connection with cigarette excise taxes in Chapter 5.

Effects of Advertising and Other Promotional Exposures

No one doubts the government's powerful interest in preventing the initiation of tobacco use by youth. A core element of the tobacco control policy agenda for decades has been the elimination of youth exposure to tobacco advertising. However, the long-standing industry position has been that advertising does not create new demand but rather affects the market share among existing smokers. This general position has also long been accompanied by an industry-wide insistence that advertising did not "target" youth and that exposure to advertising by youth was the incidental consequence of a spillover effect of targeting young adult smokers.

In 1994, the IOM reached the following conclusions after reviewing the available scientific literature:

The images typically associated with advertising and promotion convey the message that tobacco use is a desirable, socially approved, safe and healthful, and widely practiced behavior among young adults, whom children and youths want to emulate. As a result, tobacco advertising and promotion undoubtedly contribute to the multiple and convergent psychosocial influences that lead children and youths to begin using these products and to become addicted to them (IOM 1994, p. 131).

Since 1994, the available literature has been augmented in two important ways. First, internal industry documents disclosed in the course of litigation have yielded substantial evidence that tobacco companies did, in fact, target youth, including teenagers, to create new demand. Second, scientific evidence documenting the relationship between advertising exposure and consumption has accumulated.

Econometric studies examining the link between advertising and demand for tobacco products have provided mixed results, with a majority finding that cigarette advertising is an insignificant determinant of demand and others concluding that cigarette advertising had a positive and significant impact on consumption (Chaloupka and Warner 1999; Tauras et al. 2005). However, a recent review of these studies by Saffer and Chaloupka

demonstrated that the study results depended on which of three alternative empirical measures of advertising was used (Saffer and Chaloupka 2000). Most of the studies finding that advertising was not an important predictor of cigarette demand used annual or quarterly national aggregate expenditure data. The investigators argue that these studies lacked statistical power and were thus likely to find insignificant results because national expenditures lose variance because of aggregation effects and measure advertising where the marginal effect of advertising is near zero. In contrast, studies using cross-sectional data (typically measured at the local level for periods of less than a year) have greater variation in the advertising data and greater statistical power and thus are more likely to identify a positive relationship between advertising and consumption. Finally, studies that measure advertising on the basis of advertising bans produced various results that depended on the scope of advertising restrictions, leading the investigators to conclude that comprehensive advertising bans can reduce tobacco consumption but that a limited set of advertising bans will have little or no effect.

Saffer and Chaloupka caution that attempts to restrict advertising must be sufficiently comprehensive to eliminate the possibility that tobacco companies will simply substitute the remaining legal forms of advertising and promotion (Saffer and Chaloupka 2000). Advertising bans achieve the greatest success when they eliminate a wide range of media outlets, which diminishes opportunities for substitution, and which defeats industry efforts to replace advertising in the banned media with advertising in alternative channels. For example, the ban on outdoor advertising required by the MSA may have little effect on consumption because other forms of promotion, including print advertising, point-of-sale advertising, sponsorships, and other forms of retail promotion, will not be prohibited.

From the standpoint of the initiation of smoking by youth, the most important feature of tobacco advertising is its noninformational characteristics. The most compelling data are those that link positive feelings toward smoking with exposure to tobacco advertising and to ownership of commodities with tobacco company logos and paraphernalia.

The very purpose of noninformational tobacco advertising is to associate smoking with positive attributes and consequences and to create a positive affect toward smoking and people who smoke. In addition, advertising in magazines and retail displays creates the impression that smoking is a widespread and normal social practice and that tobacco is a normal consumer product. The images used in tobacco marketing associate smoking with lifestyles and experiences that appeal to young people, and these positive associations tend to displace or override risk information in adolescent decision making. The evidence clearly shows that youth exposure to images that create a positive association with smoking is associated with a

higher likelihood of smoking. Although it is difficult to isolate the effect of any particular strand in the web of influences that encourage adolescents to smoke, prevailing scientific opinion regards the relationship between promotional exposures and smoking to be a causal one.

Cigarette advertising also affects demand by current and former smokers. Tobacco advertisements and promotional campaigns may reduce current smokers' willingness to quit smoking and may induce former smokers to resume their habit by reinforcing the attractions of smoking (Chaloupka and Warner 1999; Warner 1986). A review of tobacco industry documents confirmed that the companies have actively researched the determinants of cessation, and based upon their findings, they engaged in marketing efforts expressly designed to discourage current smokers from quitting and to encourage former smokers to relapse (Ling and Glantz 2004; Pollay and Dewhirst 2002). For example, upon discovering that health was the most frequently reported reason for quitting, the companies sought to address potential quitters' concerns by developing and promoting more socially acceptable products (Ling and Glantz 2004) and advertising filtered and low-tar cigarettes as alternatives to quitting (Pollay and Dewhirst 2002). The companies have also attempted to encourage former smokers to resume smoking by increasing the number of advertisements appearing in popular magazines during periods when former smokers may be particularly vulnerable. A review of studies on cigarette advertising revealed that since 1984, advertising for cigarettes is more prevalent in January and February than it is in other months (Basil et al. 2000). Researchers believe that this trend likely reflects an attempt to counter New Year's resolutions by targeting recent quitters when their withdrawal symptoms are peaking.

Tobacco Advertising Should Be Limited to Black-and-White-Text Only

A text-only regulatory approach to tobacco advertising, recommended by the IOM in 1994, is suitably tailored to promote the government's interests in reducing the initiation of smoking by youth, and in reducing the level of smoking in general while respecting the industry's interests in communicating product and price information. The government's compelling interest in preventing the initiation of smoking by youth justifies constraints on the use of promotional messages and images that have a unique appeal to youth (such as cartoon characters) and the placement of commercial messages depicting smoking in a positive light in venues attracting substantial numbers of youth. Under the FDA's 1996 Tobacco Rule, the ban applied to magazines with a youth readership of greater than 15 percent. However, in light of the overt purpose of all non-informational tobacco advertising to make smoking appear to be attractive to smokers and nonsmokers alike, including youngsters and former smokers, the committee believes that all

commercial messages promoting smoking should be limited to a black-and-white-text only format, even if the level of youth exposure is less than 15 percent.

Recommendation 35: Congress and state legislatures should enact legislation limiting visually displayed tobacco advertising in all venues, including mass media and at the point-of-sale, to a text-only, black-and-white format.

The proposed restriction on advertising in mass media would apply to magazines and broadcast media (if the current ban were invalidated) and to advertising over the Internet through third parties. However, the committee recognizes that direct communication with customers through the Internet cannot feasibly be restricted.

Is a Black-and-White-Text Only Restriction Constitutional?

It is by no means clear that restrictions on tobacco advertising of the kind recommended above would survive a constitutional challenge.⁶ However, the committee believes that the proposed restriction on non-informational advertising is justified not only by the government's powerful interest in suppressing the use of tobacco, an unreasonably dangerous product, but also by the unique history of deception and manipulation by the tobacco industry. Furthermore, allowing informational advertising in a black-and-white-text only format fully respects the genuine constitutional interests of tobacco companies and consumers. Accordingly, the committee believes that there is a reasonable prospect that the U.S. Supreme Court can be persuaded to uphold restrictions for tobacco advertising that would not be constitutionally permissible in other contexts.

The committee acknowledges that smokers have a legitimate interest in receiving accurate information from the manufacturers regarding the characteristics of their product and from the retailers regarding the prices of those products. In addition, the tobacco companies have a correlative interest in supplying such information, subject to appropriate regulation to prevent deception and unfair competition. Indeed, truthful, non-misleading information about tobacco products, including products that reduce exposure to harmful toxicants and purport to reduce the risks of smoking, can promote the public health. However, in the committee's view, the tobacco industry does not have a constitutionally protected interest in encouraging or promoting smoking, recruiting new smokers, or sustaining the demand

⁶Committee member Cass Sunstein has serious doubts about the constitutionality of the committee's proposal and does not endorse it.

of existing smokers. As the committee has previously noted, tobacco appears to be the only lawful consumer product for which the acknowledged governmental objective is to suppress all consumption. In this light, it would be constitutionally confusing if the tobacco companies' desire to promote smoking were held to have any constitutional value under the First Amendment in the context of a public policy aiming to suppress consumption.

Admittedly, individuals and companies have a First Amendment right to promote public policies that the government opposes, and to promote viewpoints that are strongly objectionable to their fellow citizens. Moreover, tobacco companies have the First Amendment right to express their opposition to laws and policies aiming to suppress tobacco use—in colorful images if they choose to do so. Spending money to promote political viewpoints on issues and candidates is constitutionally protected speech. However, in the committee's view, spending billions of dollars to promote the use of tobacco products should not be regarded as an exercise of political freedom or as its constitutional equivalent.

The federal and state governments have the constitutional authority to ban tobacco products altogether to protect the public health (see *Gonzales v. Raich*, 545 U.S. 1, 2005). However, no one believes that prohibition is a viable option in a country with 45 million addicted smokers. Under these circumstances, the federal and state governments have a compelling interest in reducing the prevalence of smoking by preventing smoking initiation and encouraging smoking cessation. The underlying issue, in a nutshell, is whether the U.S. constitutional system creates a fundamental contradiction—empowering the government to take aggressive measures to discourage smoking while simultaneously denying it the authority to restrict industry efforts to promote smoking. To put it another way, is the government barred by the First Amendment from restraining the marketing of an inherently harmful, although legal, product?

The U.S. Supreme Court has rejected the idea that the power to prohibit the sale of a product or service necessarily entails the lesser power to prohibit all commercial speech. If the product is lawful, the First Amendment provides some protection to commercial speech. The committee does not dispute that proposition. However, the question is what protection the First Amendment actually provides. On this point, the committee believes that the First Amendment protects the interests of sellers and buyers in conveying information about the product but does not protect the interest of sellers in promoting the use of a product that the government has a compelling interest in suppressing.

The explicit goal of tobacco policy is to reduce the use of this highly hazardous product in order to reduce tobacco-related mortality and morbidity. The powerful governmental interest in suppressing tobacco use should be sufficient to override whatever economic interest the tobacco

manufacturers and retailers have in encouraging people to smoke, an interest devoid of constitutional value. At the very least, the government's compelling interest in preventing youth from smoking justifies a black-and-white-text only restriction of tobacco advertising in any venue where substantial numbers of youth would be exposed to the advertising, defined quantitatively (as an absolute number such as 2 million) or as a percentage of the exposed audience (King and Siegel 2001).

The alternative understanding of the First Amendment would allow no distinctions to be drawn among lawful products with respect to commercial advertising by those who sell them. In effect, such a view would leave legislatures with only two choices: banning the product altogether, or allowing it to be aggressively marketed under the shield of the First Amendment. In the committee's opinion, this view is misguided, and tobacco is the test case.

In sum, the committee is drawing a crucial distinction between promoting tobacco use and informing consumers about tobacco use. Manufacturers and retailers do not have a constitutionally protected interest in promoting the use of their products, but they do have a protected interest in communicating truthful, non-misleading information about their products to consumers. Manufacturers and retailers also have a virtually absolute right to criticize the government's policies toward tobacco use. Neither of these interests is infringed by a black-and-white-text only restriction.

Admittedly, a picture can be worth a thousand words, and it is conceivable that a text-only restriction could suppress commercial expression with informational value and therefore be unconstitutional as it is applied to a specific advertisement. However, the committee regards this prospect as a marginal one. In the committee's opinion, few images in contemporary tobacco advertising convey truthful, non-misleading information about tobacco products. A good indication of the challenge that a tobacco company would have to overcome to support a claim that a visual advertisement is constitutionally protected would be to ask the company to describe the nonverbal message in words.

Diagrams depicting specific aspects of cigarette design to promote reduced-exposure products might convey important information to consumers. For example, Philip Morris and the R.J. Reynolds Company have test marketed cigarette-like products that purport to heat rather than burn tobacco. One might expect some advertisements for such products to show a diagram of the heating element, tobacco column, specialized lighter, and other aspects of design. There is a plausible claim for First Amendment protection here, but the constitutionality of the text-only restriction as applied to such an advertisement can be adjudicated on a case-by-case basis. Relevant considerations would include whether the necessary information can be conveyed effectively in words. Moreover, a regulatory agency charged with adopting rules to implement a text-only restriction might well decide

to make an exception for depictions of the product design as they relate to the health effects of smoking. Such an exception would be consistent with the committee's intent and could be written into the authorizing legislation (e.g., all advertising would have to be in black-and-white text except depictions of the product itself).

Under the committee's proposal, a company would not be entitled to show a color picture of a cigarette pack on the advertisement, even for the asserted purpose of informing consumers that its particular brand can be distinguished by a specific logo or color. The reason for holding the line on logos and colors is that these logos and colors are selected not only to convey information but also to affect the attitudes and behaviors of consumers toward the product. To allow such displays would threaten to unravel the constitutionally critical distinction between informational advertising and promotional advertising.

Targeting of Youth by Tobacco Manufacturers for Any Purpose Should Be Banned

For more than two decades, tobacco companies have promoted youth smoking education and prevention programs (Davidson 1998; Landman et al. 2002). Early efforts, introduced in the mid-1980s, were aimed at both children and parents; sample themes included "Talk to Your Kids," "Kids Don't Smoke," "Smoking Isn't Cool," and "Wait Until You're Older." The youth programs portrayed smoking as an adult activity that was inappropriate for teenagers, whereas the parent-oriented messages urged adults to be involved in their children's decision making regarding smoking.

Despite touting these programs as being designed to discourage teenagers from smoking, internal industry documents now reveal that, from their inception, these campaigns were developed largely to fend off increased regulation and to deflect public scrutiny of industry marketing practices. Industry representatives hoped that their youth prevention programs (which ignored the health effects of smoking) would displace the educational initiatives developed by public health groups, which frequently presented smoking as distasteful and unhealthy.

In the early 1990s, tobacco companies shifted their youth smoking prevention efforts to retailers, launching promotional efforts that included messages such as "It's the Law," "We Card," and "Support the Law." These campaigns implied that, in addition to age, upholding the law was an important reason not to smoke; moreover, the programs served to shift attention away from the industry's contributions to youth smoking. Through these youth smoking prevention programs, the industry was able to recruit a network of retailers to assist it in detecting and defeating local tobacco control legislation, such as youth-access measures, advertising restrictions,

and clear-indoor-air laws. The industry also used the presence of this retailer network to fight national legislation, arguing that FDA regulation of tobacco advertising was unnecessary because the We Card program was making a “measurable difference” (Landman et al. 2002).

By the late 1990s, the tobacco companies sought the assistance of third parties to disseminate youth smoking prevention messages. By building alliances with youth organizations such as 4-H and Boys and Girls Clubs, tobacco companies sought to gain credibility with the public and create an aura of legitimacy for their prevention efforts. Industry documents reveal that the companies expended very little (if any) effort to study the effect of their campaigns on reducing the rate of smoking among youth; yet, the industry carefully assessed the public relations outcomes associated with the third-party programs (Landman et al. 2002).

Industry documents also reveal that the youth smoking prevention campaigns also enabled the companies to obtain useful data about the teen market that was otherwise practically inaccessible to them through standard marketing surveys (Landman et al. 2002). For example, the Philip Morris company learned that a smoking prevention advertisement directed at young teens would likely receive little attention from older youth if the message were delivered by members of the younger age group. Thus the company chose not to target teens in the 15- to 18-year-old age group—those at the highest risk for smoking—with their prevention campaigns. The Lorillard company developed a similarly innovative approach, inviting teenagers to visit the company’s website to learn more about its youth smoking prevention campaign. When these individuals enter personal information to qualify for sweepstakes, the company also obtains potentially useful data about the youth market.

A company’s efforts to disseminate informational materials about its programs may constitute no more than veiled attempts to promote its corporate identity among children. The California Departments of Education and Justice confronted such an attempt by Philip Morris in 2000, when the company distributed book covers promoting its youth prevention campaign to schools in California (Landman et al. 2002). This fairly blatant commercial ploy aroused opposition among educators statewide who argued that Philip Morris could have supported existing programs proven to be effective if it had been sincerely interested in helping to reduce the rate of smoking among youth (Landman et al. 2002).

Within the last decade, tobacco companies have expanded youth smoking prevention programs worldwide and have increased their financial commitments to these programs. Philip Morris announced a \$100 million “Think. Don’t Smoke.” campaign in 1998 (Tobacco Free Kids 2005), and provided more than \$125 million in grants to schools and youth organizations to support youth smoking prevention, youth development, and youth

smoking cessation programs between 1999 and 2004 (Philip Morris USA 2006). Similarly, Lorillard has contributed more than \$80 million to youth smoking prevention programs since 1999 (Lorillard Tobacco Company 2007). As in the United States, international campaigns have frequently sent messages that have focused on decision making rather than on the negative health effects of smoking and that have presented smoking as an adult activity.

When these expenditures are viewed in terms most favorable to the companies, these expenditures are designed to demonstrate good corporate citizenship on the youth smoking issue and, perhaps, to weaken political support for stronger regulation. However, tobacco control advocates have a more skeptical view of the industry's motivation. According to tobacco control advocates, these "youth prevention" programs are not really designed to prevent youth smoking at all. Instead, they are designed to promote smoking by facilitating industry access to young people through marketing surveys, by counteracting the anti-industry message of tobacco control media efforts by portraying the industry as trustworthy, and finally, by beginning to establish brand identification for future smokers.

In the committee's view, it is not necessary to resolve this dispute regarding the industry's motivation. In light of the history of past industry practices, industry messages targeted at children and adolescents should be regarded as presumptively suspect. The only acceptable justification for an industry-sponsored youth-oriented program is to prevent youth smoking. However, there is no evidence that the industry's prevention programs actually do reduce youth smoking, and there is some evidence that they do not (Wakefield et al. 2006). If the tobacco manufacturers are genuinely interested in preventing youth from smoking, they should support programs known to be effective and should contract with an independent nonprofit organization with the necessary expertise to carry out the program (Warner 2002). To the extent that the companies have a legitimate interest in demonstrating good corporate citizenship, this interest can be served by requiring the recipients of company funding to acknowledge company support for its activities.

Recommendation 36: Congress and state legislatures should prohibit tobacco companies from targeting youth under 18 for any purpose, including dissemination of messages about smoking (whether ostensibly to promote or discourage it) or to survey youth opinions, attitudes and behaviors of any kind. If a tobacco company wishes to support youth prevention programs, the company should contribute funds to an independent non-profit organization with expertise in the prevention field. The independent organization should have exclusive responsibility for designing, executing and evaluating the program.

The constitutionality of the proposed restriction is not free from doubt, since it curtails the freedom of tobacco companies to communicate with young people for any purpose.⁷ However, the proposal does not ban all communication with minors, and the mere exposure of minors to advertising would not be a violation of the proposed ban. Instead, the restriction bans “targeting” of young people (conduct that is also banned by the MSA when it is explicitly promotional). The committee’s proposal extends the MSA ban to all targeting of youth, based on the presumption that any communications that target young people are highly likely to reflect a promotional motivation. Any legislation seeking to implement this restriction could certainly allow room for a company to prove that a specific communication had a legitimate purpose and did not have the purpose or effect of promoting tobacco use. On the basis of this analysis and on the unique history of tobacco company efforts to promote youth smoking, the committee believes that the proposed restriction would survive a constitutional challenge.

YOUTH EXPOSURE TO SMOKING IN MOVIES AND OTHER MEDIA SHOULD BE REDUCED

One of the biggest challenges of modern life for parents is to minimize the exposure of their children and impressionable teens to images and messages in the media that encourage or even glorify unhealthy and risky behaviors. Although the values of a free and open society preclude strong measures to cleanse the cultural environment of images and messages that are unfit for children, properly tailored legal restrictions on the time, place, and manner of display of such images and messages are permissible. The fact remains, however, that the authority of the state in this area is limited. These observations highlight the heavy responsibility borne by the entertainment media for formulating and enforcing industry regulations to facilitate parental efforts to protect their children from potentially harmful exposures to images and messages that tend to promote unhealthy (indeed, unlawful) behavior. A recent IOM/National Research Council report on underage drinking reviewed the evidence bearing on depictions and messages encouraging or glorifying drinking and urged stronger industry self-regulation backed up by monitoring of media content by the federal government (IOM/NRC 2004). This committee believes that a similar approach is needed regarding youth exposure to smoking in the entertainment media, especially in the movies.

The scientific literature on smoking in the movies is reviewed by Halpern-Felsher and Cornell in Appendix H, and the following material is drawn

⁷Committee member Cass Sunstein doubts the constitutionality of the proposed restriction and does not endorse it.

from that review. Depictions of smoking in the movies doubled in the 1990s, bringing exposure rates closer to those observed in the 1950s (Glantz et al. 2004). Although recent data suggest that depictions of smoking in the movies declined from 2000 to 2004 (Worth et al. 2006), youth exposure to smoking in the movies remains high. In addition to its inclusion in R-rated movies, smoking can readily be observed in many movies rated appropriate for youth, including movies rated G, PG, and PG-13 (Charlesworth and Glantz 2005). Studies that have used content analysis have documented that smoking was portrayed in approximately 87 percent of movies produced from 1988 to 1997 (Dalton et al. 2002), in 77 percent of movies in 2004 (Worth et al. 2006), and in more than 66 percent of children's animated movies released between 1937 and 1997 (Goldstein et al. 1999).

Healthcare professionals and tobacco control advocates are concerned that youth exposure to smoking in the movies will have an impact on adolescents' attitudes toward smoking as well as smoking behavior itself (Charlesworth and Glantz 2005; Sargent 2005; Worth et al. 2006). These concerns are consistent with social cognitive theory, which indicates that adolescents are especially vulnerable to social modeling influences on behavior, including risky behaviors such as the use of tobacco and other drugs (Akers and Lee 1996; Bandura 1986).

Research investigating the impact of youth exposure to smoking in movies has yielded three important findings:

- Exposure to depictions of smoking in movies is associated with more favorable attitudes toward smoking and characters who smoke, and these positive views are particularly prevalent among youth who themselves smoke. As the information in the previous section demonstrates, there is little doubt that youth are being exposed to smoking in the media, including movies, television, magazines, and newspapers, and that such exposures influence youth smoking-related perceptions.
- Exposure to smoking in movies increases the risk for smoking initiation. Cross-sectional and longitudinal studies provide clear support that youth report greater susceptibility and intentions to smoke and are more likely to actually try smoking following exposure to smoking in the movies and on television. Furthermore, even after controlling for other factors known to be associated with adolescent smoking intention and tobacco use, studies show a clear dose effect, whereby greater exposure to smoking in the movies is associated with a greater chance of smoking. Studies have not yet been conducted to determine whether such a relationship between viewing smoking in the movies and tobacco use continues after initial tobacco use (Sargent 2005).

- The increased risk for smoking initiation as a result of exposure to smoking in the movies can be reduced by antismoking advertisements and parental restriction of which movies their children watch.

On the basis of these findings, the committee encourages the entertainment industries to formulate and implement a set of strategies to limit and monitor youth exposure to smoking in the movies, television programming, and videos and to combat the effect of tobacco exposure on youth's smoking attitudes and behaviors. These strategies should both guide and educate the movie industry about the evidence linking smoking in the movies and adolescent tobacco use (Dalton et al. 2003; Sargent et al. 2005), as well as spark a cogent discussion within the movie industry and between the movie industry and policymakers.

A ratings board, which is appointed by the president of the Motion Picture Association of America (MPAA), decides on the ratings assigned to each movie. Currently, such ratings are based on the extent to which there is violence, language, nudity, sensuality, and drug abuse in the film. Tobacco use is not considered. Assigning films with tobacco use a mature (R) rating increases the likelihood that parents will restrict their children's access to such films, a strategy that has been shown to reduce the rate of smoking initiation (Dalton et al. 2002; Sargent et al. 2004, 2003).

The effects of youth viewing of smoking in the movies were found to be reduced among youth who first viewed an antismoking advertisement (Edwards et al. 2004; Pechmann and Shih 1999). Investigations of the effectiveness of antismoking advertisements with adolescents indicate strategies that are effective in reducing the influence of the viewing of smoking depictions in the media in general and that can be applied to smoking depictions in the movies as well. Goldman and Glantz (1998) showed that messages that are aggressive, delegitimize the tobacco industry, deglamorize smoking, and portray the negative effects of secondhand smoke were the most effective at changing perceptions about the normality of smoking and reducing cigarette consumption (Goldman and Glantz 1998). The results of a recent study of a specific antismoking advertising campaign (the truth[®] campaign) echoes those findings. That study found that this counter-industry media campaign was effective in increasing negative beliefs and attitudes about the tobacco industry and were associated with lower receptivity to pro-tobacco advertising and less progression of smoking intention and behavior (Hershey et al. 2005).

Recommendation 37: The Motion Picture Association of America (MPAA) should encourage and facilitate the showing of anti-smoking advertisements before any film in which smoking is depicted in more than an incidental manner. The film rating board of the MPAA

should consider the use of tobacco in the movies as a factor in assigning mature film ratings (e.g., an R-rating indicating Restricted: no one under age 17 admitted without parent or guardian) to films that depict tobacco use.

This recommendation urges the MPAA to take smoking into account “as a factor” in its rating system; it does not suggest, categorically, that all movies with smoking receive an R-rating. The objective is to encourage directors and producers to take into account the possible impact of displays of smoking on a teenage audience and give serious consideration whether depicting characters smoking contributes to the artistic aims of the film or is needed for historical or cultural accuracy.

Independent oversight of the industry’s standards and strategies is warranted. Such oversight of industry accountability should be facilitated through public monitoring and awareness of industry practices. Accordingly, the committee recommends that the U.S. Department of Health and Human Services be authorized and funded to monitor these media practices and report to Congress and the public. This approach echoes a similar recommendation made by the IOM Committee on Preventing and Reducing Underage Drinking in 2004 (IOM/NRC 2004).

Recommendation 38: Congress should appropriate the necessary funds to enable the U.S. Department of Health and Human Services to conduct a periodic review of a representative sample of movies, television programs, and videos that are offered at times or in venues in which there is likely to be a significant youth audience (e.g., 15 percent) in order to ascertain the nature and frequency of images portraying tobacco use. The results of these reviews should be reported to Congress and to the public.

SURVEILLANCE AND EVALUATION SHOULD BE ENHANCED

Central to successful tobacco control is surveillance for antismoking program design and outcomes. An in-depth discussion of the elements of surveillance for tobacco control is included in *Clearing the Smoke* (IOM 2001). CDC offers the following definition of surveillance: “Public health surveillance is the ongoing, systematic collection, analysis, and interpretation of health data essential to the planning, implementation, and evaluation of public health practice, closely integrated with the timely dissemination of these data to those who need to know” (Thacker and Berkelman 1988). The extent of tobacco control activity surveillance depends on the goals of the program, the breadth of control activities and methods, the size of the geographic area being evaluated, the availability and accuracy of data

elements being sought, and the amount of funding available to conduct surveillance procedures.

Surveillance for tobacco use takes several forms. Most frequently, surveillance is underpinned by assessing tobacco use through household surveys. Such surveys, usually conducted by telephone, often include cigarette smoking behaviors; the intensity, amount and patterns of smoking; the brands of cigarettes and other tobacco products consumed; the sources of tobacco purchase or other acquisition; smoking history; personal smoking cessation attempts and the source and methods of such attempts; indicators of tobacco dependence, tobacco-related consultations as part of interactions within the health care system; family and peer use of tobacco; exposure to formal tobacco education programs during schooling; and environmental exposures to tobacco smoke, including venues where smoking occurs and where it is banned. Survey information may be obtained from dedicated tobacco use surveys or at least in part through multipurpose surveys that may contain additional relevant health and behavioral information.

Household surveys have certain limitations, including less than full and possibly biased participation rates, a high respondent time burden, limited access to minors, the recurring need to demonstrate valid responses, and substantial costs. Validation studies are conducted periodically to determine the accuracy of personal reports and may be supplemented by the use of tests for biological markers of tobacco use. More critically, however, many elements of tobacco control programs cannot be comprehensively determined from household information, and information must be derived from other sources. School-based surveys may be required to monitor adolescent tobacco use. Internet-based surveys may also be valuable, as they reduce the time burden for respondents. Tobacco use among special populations, such as prisoners, patients with major mental illnesses, and homeless people, usually require special institutional surveys and sampling procedures and often require the collection of more detailed informed consent. Surveillance of healthcare professional practices pertaining to tobacco-related education and smoking cessation may best be ascertained through reviews of medical records or the presence of institutional clinical guidelines that are themselves periodically evaluated. Data on the commercial distribution and sales of tobacco and tobacco control products often provide considerable insight into control efforts and can also be used to validate population survey information. Monitoring of jurisdictional environmental regulations and compliance with those regulations, tobacco use in the media and countermarketing activities, seizures of illegal tobacco products smuggled into the United States, the delivery of school-based antismoking educational programs, the resources being spent on community-based tobacco control efforts (public and private), the enforcement of youth-access restrictions, and the activities and management of community-based tobacco control

programs themselves are all examples of important surveillance activities occurring outside of household surveys.

Yet another important element of a national control program is toxicological assessment of the contents of tobacco products, both in the distributed product and after the product is burned or other tobacco-containing products are used. Finally, although it may be a long-term endeavor, surveillance for tobacco-related disease outcomes is a critical component of evaluations of tobacco control programs. Such surveillance may take many forms, but most jurisdictions are able to conduct surveillance on the occurrence of smoking-related cancers. Nevertheless, a comprehensive discussion of surveillance elements and methods is beyond the scope of this document.

General guidance for constructing a local and state surveillance program can be found in materials prepared by CDC. The basic elements of existing tobacco control efforts, based on best-practice elements (CDC 1999), provide important guidance to the elements of tobacco control surveillance. However, many state and local control programs have surveillance programs in place and have tailored these programs to their special activities, such as surveillance in workplaces, eating, and drinking establishments, college campuses, urban public places and motor vehicles. Most importantly, surveillance programs allow assessment of the progress that tobacco control programs have made. In turn, surveillance findings are used to drive changes in program activities, direction, and intensity.

Recommendation 39: State tobacco control agencies should conduct surveillance of tobacco sales and use and the effects of tobacco control interventions, in order to assess local trends in usage patterns; identify special groups at high risk for tobacco use; determine compliance with state and local tobacco-related laws, policies, and ordinances; and evaluate overall programmatic success.

Recommendation 40: The Secretary of HHS, through FDA or other agencies, should establish a national comprehensive tobacco surveillance system to collect information on a broad range of elements needed to understand and track the population impact of all tobacco products and the effects of national interventions (such as attitudes, beliefs, product characteristics, product distribution and usage patterns, and marketing messages and exposures to them).

SUMMARY

This chapter recommends a fundamental change in the current legal framework of tobacco control: a new, innovative regulatory approach that

takes into account the unique history and characteristics of tobacco and its uses. Under the plan envisioned by the committee, the federal government would assume broad regulatory responsibility for tobacco control to augment the traditional state-centered tobacco control approaches described in Chapter 5. Because a total prohibition against the manufacture and distribution of tobacco products is not a realistic option for the foreseeable future, the new legal structure for tobacco control must be framed within the context of a regulated market. Accordingly, Congress should confer upon the FDA broad regulatory authority over the manufacture, distribution, marketing, and use of tobacco products. Such a broad federal regulatory authority would free the states to supplement federal action with their own measures that aim to suppress tobacco use and that are compatible with federal law.

Within this general framework, the committee recommends federal regulation of tobacco product characteristics and product packaging, aggressive state regulation of the retail environment to promote public health objectives, implementation of a federal tobacco control funding plan to coordinate state funding and reduce the wide range of state excise tax rates, and strong state and federal measures to reduce tobacco advertising and promotion and otherwise reduce initiation of tobacco use by youth.

REFERENCES

- AAPHP (American Association of Public Health Physicians). 2007. *American Association of Public Health Physicians*. Web Page. Available at: <http://www.aapghp.org/WebLinks/stakeholders.html>; accessed May 11, 2007.
- Akers RL, Lee G. 1996. A longitudinal test of social learning theory: adolescent smoking. *Journal of Drug Issues* 26(2):317-343.
- Ashley MJ, Cohen J, Ferrence R. 2001. "Light" and "mild" cigarettes: who smokes them? Are they being misled? *Canadian Journal of Public Health* 92(6):407-411.
- Bandura A. 1986. *Social Foundations for Thought and Action: A Social-Cognitive Model*. Englewood Cliffs, NJ: Prentice Hall.
- Basil MD, Basil DZ, Schooler C. 2000. Cigarette advertising to counter New Year's resolutions. *Journal of Health Communication* 5(2):161-174.
- Benowitz NL, Henningfield JE. 1994. Establishing a nicotine threshold for addiction. The implications for tobacco regulation. *New England Journal of Medicine* 331(2):123-125.
- Borland R, Yong HH, King B, Cummings KM, Fong GT, Elton-Marshall T, Hammond D, McNeill A. 2004. Use of and beliefs about light cigarettes in four countries: findings from the International Tobacco Control Policy Evaluation Survey. *Nicotine and Tobacco Research* 6(Suppl 3):S311-S321.
- CDC (Centers for Disease Control and Prevention). 1999. *Best Practices for Comprehensive Tobacco Control Programs—August 1999*. Atlanta, GA: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health.
- CDC. 2005. Cigarette smoking among adults—United States, 2004. *MMWR (Morbidity and Mortality Weekly Report)* 54(44):1121-1124.

- Chaloupka FJ and Warner KE. 1999. *The Economics of Smoking*. National Bureau of Economic Research, Working Paper No. W7047. Web Page. Available at: <http://www.nber.org/papers/w7047>; accessed September 13, 2006.
- Charlesworth A, Glantz SA. 2005. Smoking in the movies increases adolescent smoking: a review. *Pediatrics* 116(6):1516-1528.
- Cunningham R. 2005. *Package Warnings: Overview of International Developments*. Ottawa, Ontario: Canadian Cancer Society.
- Dalton MA, Ahrens MB, Sargent JD, Mott LA, Beach ML, Tickle JJ, Heatherton TF. 2002. Relation between parental restrictions on movies and adolescent use of tobacco and alcohol. *Effective Clinical Practice* 5(1):1-10.
- Dalton MA, Sargent JD, Beach ML, Titus-Ernstoff L, Gibson JJ, Ahrens MB, Tickle JJ, Heatherton TF. 2003. Effect of viewing smoking in movies on adolescent smoking initiation: a cohort study. *Lancet* 362(9380):281-285.
- Dalton MA, Tickle JJ, Sargent JD, Beach ML, Ahrens MB, Heatherton TF. 2002. The incidence and context of tobacco use in popular movies from 1988 to 1997. *Preventive Medicine* 34(5):516-523.
- Davidson PA. 1998. Tales from the tobacco wars: industry advertising targets teenage girls. *Wisconsin Women's Law Journal* 13(1).
- Drummond DC. 2000. UK government announces first major relaxation in the alcohol licensing laws for nearly a century: drinking in the UK goes 24-7. *Addiction* 95(7):997-998.
- Edwards CA, Harris WC, Cook DR, Bedford KF, Zuo Y. 2004. Out of the smokescreen: does an anti-smoking advertisement affect young women's perception of smoking in movies and their intention to smoke? *Tobacco Control* 13(3):277-282.
- Feighery EC, Ribisl KM, Schleicher N, Lee RE, Halvorson S. 2001. Cigarette advertising and promotional strategies in retail outlets: results of a statewide survey in California. *Tobacco Control* 10(2):184-188.
- Fong GT. 2005. *Evaluating the Effects of the September 2003 European Union Policy Banning "Light/Mild" Cigarette Brand Descriptors: Findings from the International Tobacco Control Policy Evaluation Survey*. Health Canada.
- Fong GT, Hammond D, Laux FL, Zanna MP, Cummings KM, Borland R, Ross H. 2004. The near-universal experience of regret among smokers in four countries: findings from the International Tobacco Control Policy Evaluation Survey. *Nicotine and Tobacco Research* 6(Suppl 3):S341-S351.
- FTC (Federal Trade Commission). 2005. *Cigarette Report for 2003*. Washington, DC: Federal Trade Commission.
- Glantz SA, Kacirk KW, McCulloch C. 2004. Back to the future: smoking in movies in 2002 compared with 1950 levels. *American Journal of Public Health* 94(2):261-263.
- Goldman LK, Glantz SA. 1998. Evaluation of antismoking advertising campaigns. *Journal of the American Medical Association* 279(10):772-777.
- Goldstein AO, Sobel RA, Newman GR. 1999. Tobacco and alcohol use in G-rated children's animated films. *Journal of the American Medical Association* 281(12):1131-1136.
- Gruenewald PJ, Ponicki WB, Holder HD. 1993. The relationship of outlet densities to alcohol consumption: a time series cross-sectional analysis. *Alcoholism: Clinical and Experimental Research* 17(1):38-47.
- Hamilton WL, Norton G, Ouellette TK, Rhodes WM, Kling R, Connolly GN. 2004. Smokers' responses to advertisements for regular and light cigarettes and potential reduced-exposure tobacco products. *Nicotine and Tobacco Research* 6(Suppl 3):S353-S362.
- Hamilton WL, Turner-Bowker DM, Celebucki CC, Connolly GN. 2002. Cigarette advertising in magazines: the tobacco industry response to the Master Settlement Agreement and to public pressure. *Tobacco Control* 11(Suppl 2):ii54-ii58.
- Hammond D, Fong GT, McDonald PW, Brown KS, Cameron R. 2004. Graphic Canadian ciga-

- rette warning labels and adverse outcomes: evidence from Canadian smokers. *American Journal of Public Health* 94(8):1442-1445.
- Hammond D, Fong GT, McNeill A, Borland R, Cummings KM. 2005. *Effectiveness of Cigarettes Warning Labels in Informing Smokers About the Risks of Smoking: Findings From the International Tobacco Control (ITC) Four Country Survey*. Web Page. Available at: http://tc.bmjournals.com/cgi/content/full/15/suppl_3/iii19; accessed June 21, 2006.
- Hammond D, McDonald PW, Fong GT, Brown KS, Cameron R. 2004. The impact of cigarette warning labels and smoke-free bylaws on smoking cessation: evidence from former smokers. *Canadian Journal of Public Health* 95(3):201-204.
- Health Canada. 2005a. *The Health Effects of Tobacco and Health Warning Messages on Cigarette Packages—Survey of Adults and Adult Smokers*. Web Page. Available at: http://www.hc-sc.gc.ca/hl-vs/tobac-tabac/research-recherche/por-rop/impact/2003_e.html; accessed June 23, 2007.
- Health Canada. 2005b. *The Health Effects of Tobacco and Health Warning Messages on Cigarette Packages—Survey of Youth*. Ottawa, Ontario: Health Canada.
- Henningfield JE, Benowitz NL, Slade J, Houston TP, Davis RM, Deitchman SD. 1998. Reducing the addictiveness of cigarettes. *Tobacco Control* 7(3):281-293.
- Hershey JC, Niederdeppe J, Evans WD, Nonnemaker J, Blahut S, Holden D, Messeri P, Haviland ML. 2005. The theory of “truth”: how counterindustry campaigns affect smoking behavior among teens. *Health Psychology* 24(1):22-31.
- Holder HD. 2004. Supply side approaches to reducing underage drinking: an assessment of the scientific evidence. *Reducing Underage Drinking: A Collective Responsibility*. Washington, DC: National Academy Press. Pp. 458-489.
- Holder HD, Wagenaar AC. 1990. Effects of the elimination of a state monopoly on distilled spirits’ retail sales: a time-series analysis of Iowa. *British Journal of Addiction* 85(12):1615-1625.
- IOM (Institute of Medicine). 1994. *Growing Up Tobacco Free: Preventing Nicotine Addiction in Children and Youth*. Washington, DC: National Academy Press.
- IOM. 2001. *Clearing the Smoke: Assessing the Science Base for Tobacco Harm Reduction*. Washington, DC: National Academy Press.
- IOM/NRC (National Research Council). 2004. *Reducing Underage Drinking: A Collective Responsibility*. Washington, DC: The National Academies Press.
- King C, Siegel M. 2001. The Master Settlement Agreement with the tobacco industry and cigarette advertising in magazines. *New England Journal of Medicine* 345(7):504-511.
- Kozlowski LT, Goldberg ME, Yost BA, White EL, Sweeney CT, Pillitteri JL. 1998. Smokers’ misperceptions of light and ultra-light cigarettes may keep them smoking. *American Journal of Preventive Medicine* 15(1):9-16.
- Kropp RY, Halpern-Felsher BL. 2004. Adolescents’ beliefs about the risks involved in smoking “light” cigarettes. *Pediatrics* 114(4):e445-e451.
- Krugman DM, Fox RJ, Fischer PM. 1999. Do cigarette warnings warn? Understanding what it will take to develop more effective warnings. *Journal of Health Communication* 4(2):95-104.
- Krugman DM, Quinn WH, Sung Y, Morrison M. 2005. Understanding the role of cigarette promotion and youth smoking in a changing marketing environment. *Journal of Health Communication* 10(3):261-278.
- Landman A, Ling PM, Glantz SA. 2002. Tobacco industry youth smoking prevention programs: protecting the industry and hurting tobacco control. *American Journal of Public Health* 92(6):917-930.
- Ling PM, Glantz SA. 2004. Tobacco industry research on smoking cessation. Recapturing young adults and other recent quitters. *Journal of General Internal Medicine* 19(5 Pt 1):419-426.
- Lorillard Tobacco Company. 2007. *Lorillard Tobacco Company: Youth Smoking Prevention*.

- Web Page. Available at: <http://www.lorillard.com/index.php?id=5>; accessed June 15, 2007.
- Millar WJ. 1996. Reaching smokers with lower educational attainment. *Health Reports* 8(2):11-19(Eng); 13-22(Fre).
- Munshi MA. 1997. Share the wine—liquor control in Pennsylvania: a time for reform. *University of Pittsburgh Law Review* 58(2):507-547.
- NCI (National Cancer Institute). 2001. *Risks Associated with Smoking Cigarettes with Low Machine-Measured Yields of Tar and Nicotine (Monograph 13)*. Bethesda, MD: National Institutes of Health.
- Pechmann C, Shih CF. 1999. Smoking scenes in movies and antismoking advertisements before movies: effects on youth. *Journal of Marketing* 63(1-13).
- Philip Morris USA. 2006. *Youth Smoking Prevention: Grant Programs*. Web Page. Available at: http://www.philipmorrisusa.com/en/our_initiatives/ysp/grant_programs.asp; accessed September 13, 2006.
- Pierce JP, Gilpin EA. 2004. How did the Master Settlement Agreement change tobacco industry expenditures for cigarette advertising and promotions? *Health Promotion Practice* 5(3 Suppl):84S-90S.
- Pollay RW. 2001. JTI-McDonald, Imperial Tobacco Canada Ltd and Rothmans, Bencon & Hedges InC v. Attorney General of Canada and Canadian Cancer Society. *The Role of Packaging Seen Through Industry Documents*. Supreme Court, Province of Quebec, District of Montreal.
- Pollay RW, Dewhirst T. 2002. The dark side of marketing seemingly “Light” cigarettes: successful images and failed fact. *Tob Control* 11 (Suppl 1):118-131.
- Rutledge TE. 1989. The questionable viability of the Des Moines warrant in light of Brown-Forman Corp v. New York. *Kentucky Law Journal* 78(1):209-235.
- Saffer H, Chaloupka F. 2000. The effect of tobacco advertising bans on tobacco consumption. *Journal of Health Economics* 19(6):1117-1137.
- Sargent JD. 2005. Smoking in movies: impact on adolescent smoking. *Adolescent Medicine Clinics* 16(2):345-370, ix.
- Sargent JD, Beach ML, Adachi-Mejia AM, Gibson JJ, Titus-Ernstoff LT, Carusi CP, Swain SD, Heatherton TF, Dalton MA. 2005. Exposure to movie smoking: its relation to smoking initiation among U.S. adolescents. *Pediatrics* 116(5):1183-1191.
- Sargent JD, Beach ML, Dalton MA, Ernstoff LT, Gibson JJ, Tickle JJ, Heatherton TF. 2004. Effect of parental R-rated movie restriction on adolescent smoking initiation: a prospective study. *Pediatrics* 114(1):149-156.
- Sargent JD, Dalton MA, Heatherton T, Beach M. 2003. Modifying exposure to smoking depicted in movies: a novel approach to preventing adolescent smoking. *Archives of Pediatric and Adolescent Medicine* 157(7):643-648.
- Shankar V. 1999. Alcohol direct shipment laws, the commerce clause, and the twenty-first amendment. *The Virginia Law Review* 85(2):353-383.
- Shiffman S, Pillitteri JL, Burton SL, Rohay JM, Gitchell JG. 2001. Smokers’ beliefs about “Light” and “Ultra Light” cigarettes. *Tobacco Control* 10(Suppl 1):i17-i23.
- Shipman GA. 1940. State administrative machinery for liquor control. *Law and Contemporary Problems* 7:600-620.
- Siahpush M, McNeill A, Hammond D, Fong GT. 2006. Socioeconomic and country variations in knowledge of health risks of tobacco smoking and toxic constituents of smoke: results from the 2002 International Tobacco Control (ITC) Four Country Survey. *Tobacco Control* 15:65-70.
- Slade J. 1997. The pack as advertisement. *Tobacco Control* 6(3):169-170.
- Spaeth SJ. 1991. The twenty-first amendment and state control over intoxicating liquor: accommodating the federal interest. *California Law Review* 79(1):161-204.

- Swain KW. 1996. Liquor by the book in Kansas: the ghost of temperance past. *Washburn Law Journal* 35(2):322-345.
- Tauras JA, Chaloupka FJ, Emery S. 2005. The impact of advertising on nicotine replacement therapy demand. *Social Science and Medicine* 60(10):2351-2358.
- Tengs TO, Ahmad S, Moore R, Gage E. 2004. Federal policy mandating safer cigarettes: a hypothetical simulation of the anticipated population health gains or losses. *Journal of Policy Analysis and Management* 23(4):857-872.
- Thacker SB, Berkelman RL. 1988. Public health surveillance in the United States. *Epidemiology Review* 10:164-190.
- Tobacco Free Kids. 2005. *A Long History of Empty Promises: The Cigarette Companies' Ineffective Youth Anti-Smoking Programs*. Web Page. Available at: <http://www.tobaccofreekids.org/research/factsheets/pdf/0010.pdf>; accessed September 13, 2006.
- Tobacco Free Kids. 2006. *Tobacco Free Kids Action Fund, American Cancer Society, American Heart Association, American Lung Association, Americans for Nonsmokers' Rights, and National African American Tobacco Prevention Network V. Philip Morris, Inc.* Web Page. Available at: <http://tobaccofreekids.org/reports/doj/JudgmentOrder.pdf>; accessed May 30, 2007.
- Tobacco Free Kids. 2007a. *Congress Has Historic Opportunity to Save Children and Save Lives by Granting FDA Authority Over Tobacco Products*. Web Page. Available at: <http://tobaccofreekids.org/Script/DisplayPressRelease.php3?Display=966>; accessed May 11, 2007.
- Tobacco Free Kids. 2007b. *Letter to Representative*. Web Page. Available at: <http://tobaccofreekids.org/organization/letters/092804.pdf>; accessed May 11, 2007b.
- Wagenaar AC, Holder HD. 1995. Changes in alcohol consumption resulting from the elimination of retail wine monopolies: Results from five U.S. states. *Journal of Studies on Alcohol* 56(5):566-572.
- Wakefield M, Kloska DD, O'Malley PM, Johnston LD, Chaloupka F, Pierce J, Giovino G, Ruel E, Flay BR. 2004. The role of smoking intentions in predicting future smoking among youth: findings from Monitoring the Future data. *Addiction* 99(7):914-922.
- Wakefield M, Terry-McElrath Y, Emery S, Saffer H, Chaloupka FJ, Szczypka G, Flay B, O'Malley PM, Johnston LD. 2006. Effect of televised, tobacco company-funded smoking prevention advertising on youth smoking-related beliefs, intentions, and behavior. *American Journal of Public Health* 96(12):2154-2160.
- Warner KE. 1986. *Selling Smoke: Cigarette Advertising and Public Health*. Washington, DC: American Public Health Association.
- Warner KE. 2002. What's a cigarette company to do? *American Journal of Public Health* 92(6):897-900.
- WHO (World Health Organization). 2003. *WHO Framework Convention on Tobacco Control*. Geneva, Switzerland: WHO.
- Woeste K. 2004. Reds, whites, and roses: the dormant commerce clause, the twenty-first amendment, and the direct shipment of wine. *University of Cincinnati Law Review* 72(4):1821-1848.
- Worth K, Tanski S, Sargent J. 2006. *Trends in Top Box Office Movie Tobacco Use, 1996-2004. First Look Report*. Washington, DC: American Legacy Foundation.

7

New Frontiers of Tobacco Control

Ending the tobacco problem will require creative policymaking. Effective use of the traditional tools of tobacco control, reviewed in Chapter 5, can move the nation closer to that goal, but is unlikely to take us all the way. The next big step forward will require a new legal foundation and a substantial federal presence. The plan outlined in Chapter 6 is designed to lay that foundation and to authorize new approaches to tobacco control, such as adopting pictorial warnings, regulating claims about products that purport to reduce exposures to toxicants, and restructuring the retail environment for tobacco products. However, these innovations require thorough analysis before being implemented and careful monitoring afterward. Such an analysis will require a robust capacity to conduct tobacco policy analysis, including state-of-the-art modeling of the effects of new industry initiatives and potential regulatory interventions.

This chapter has two objectives: first, it fleshes out the case for investing in tobacco policy analysis and development and highlights several new frontiers of tobacco control that merit investigation by the new policy development office. Second, it discusses in some detail the most promising of these ideas—gradually reducing the nicotine content of cigarettes. If this idea proves feasible, its implementation could provide the nation’s best hope for ending the tobacco problem.

TOBACCO POLICY ANALYSIS AND DEVELOPMENT

An investment in tobacco policy analysis and development is an essential component of a comprehensive federal effort to reduce the heavy

public health burden of tobacco use, especially when history so clearly documents the capacity of the tobacco industry to mount effective countermeasures against and to neutralize potentially effective innovations in tobacco control.

Recommendation 41: Congress should direct the Centers for Disease Control and Prevention to undertake a major program of tobacco control policy analysis and development and should provide sufficient funding to support the program. This program should develop the next generation of macro-level simulation models to project the likely effects of various policy innovations, taking into account the possible initiatives and responses of the tobacco industry as well as the impacts of the innovations on consumers.

The proposed tobacco policy development office might sensibly be located in the Food and Drug Administration (FDA) after Congress confers on FDA the necessary authority to regulate tobacco products.

Improving Policy Simulation Models

One of the policy office's first tasks should be to foster improvements in tobacco policy simulation models. The current generation of tobacco policy models has been valuable to the committee, and the committee is confident that the projections provided to the committee represent the best that can be produced with the currently available tools. However, the implications of tobacco policy decision making are of sufficient magnitude to warrant a greater investment to help policy analysts advance the state of the art. The current tobacco policy models could benefit from the following improvements.

Incorporate State-Dependent or Endogenous Transition Rates

Smoking initiation is influenced by peers, particularly peers' rates of smoking. More generally, individuals' decisions to start, stop, or restart smoking may be influenced by the smoking or nonsmoking of others. These feedbacks from current prevalence to various flow rates include personal interaction effects (e.g., when smoking teens encourage their friends to smoke), societal-level effects (e.g., if smoking is rare, it is more likely to be shunned, which might reduce relapse rates), and market-level effects (e.g., if there are fewer smokers, and hence less demand for tobacco, the market equilibrium price for cigarettes might be affected, which in turn can affect smoking rates).

Distinguish Between Different Intensities of Smoking

Policy simulation models of other forms of substance abuse differentiate between light and heavy users. The incorporation of such distinctions in tobacco-use models would be valuable, inasmuch as a nonnegligible proportion of current smokers are not daily smokers, various policy interventions (including tax increases) may affect the frequency of smoking as well as the overall smoking prevalence, and some health outcomes of interest may be state-dependent.

Recognize Behavioral Response on the Part of Industry

The tobacco industry may undertake new innovations in smoking or respond to changes in smoking prevalence, or it may respond to changes in smoking policies in various ways that are not reflected in current models. A simple example is the industry's response to a tax increase. Current tobacco policy models typically assume that excise tax increases are passed along to consumers in the form of dollar-for-dollar increases in the retail prices, but tobacco manufacturing is an oligopolistic industry, so other outcomes are possible, as are other forms of strategic behavior or product innovation. For example, declining sales might trigger the aggressive promotion of new products, such as flavored cigarettes, which might affect smoking initiation rates.

Model Black and Gray Market Behavior

Excise tax increases are a particularly important and appealing policy lever. Yet, various forms of retail tax evasion and other forms of illicit marketing already exist, and one would expect them to become more common as taxes increase further. Modeling of that behavior is essential to determining the best tax policies.

Track Vectors of Health Outcomes in Addition to Smoking Prevalence

Policy is ultimately more concerned with health outcomes than with smoking per se, so it would be useful if tobacco policy models translated smoking rates into various types of health consequences. Some models can do this to some degree, but in many cases the current state of the art is rather limited.

Beyond these structural changes, a range of more pedestrian measures can be taken to improve the modeling infrastructure and to better inform tobacco policy. These include calibration of the models to longer and more age-specific age series, the use of more detailed demographic modeling

(e.g., immigration), allowance for more multidimensional parametric sensitivity analysis and associated confidence interval calculation (e.g., through Monte Carlo simulation), and investigation of more scenarios (e.g., advances in lung cancer treatment and the introduction of low-nicotine cigarettes).

Policy Innovations Worthy of Study

Among the interesting ideas that should be studied by a tobacco policy development office are the ideas explored in the previous chapters, including restructuring the retail market and reducing the number of retail outlets (Chapter 6) and implementing a nicotine-reduction strategy (see below). Other suggestions presented in the tobacco policy literature include establishing a wholesale purchasing monopsony (Borland 2003) and creating policy mechanisms for changing the incentives of tobacco companies to align their goals with public health goals.

Tobacco Wholesale Purchasing Monopsony

Borland has proposed an innovative model of tobacco distribution designed to eliminate marketing and to spur competition for reduced-exposure products (Borland 2003). Under the proposal, a new agency, the Tobacco Products Agency (TPA), would be chartered to be the exclusive buyer and distributor of tobacco products. It would purchase the products from domestic manufacturers and importers and distribute them to retailers. The agency's goal would be to promote the public health by reducing tobacco consumption and otherwise reducing harm. It would negotiate with the manufacturers to purchase the least-harmful products, giving them an incentive to compete on the basis of safety and thereby serving a quasi-regulatory function. In turn, the TPA would distribute the products generically, thereby cutting the link between manufacturer and consumer and removing any marketing incentive. Similarly, the TPA would control the marketing at the retail level. The core idea is eliminating any entity with a vested interest in promoting smoking. Only a Borland model or something like it (a retail nonprofit monopoly) will be able to maintain high prices and eliminate the promotions that have been the most important marketing tools used by the companies (Chaloupka et al. 2002). Similarly, the TPA could be expected to use plain packaging, which would eliminate brand identity and the various devices that manufacturers use to signal reduced-harm messages without making explicit claims. The committee believes that the Borland proposal is worthy of serious study by the proposed policy development office.

Changing the Incentives of Tobacco Manufacturers

In the clear light of history, there can be no doubt that the promotion and marketing of cigarettes by tobacco companies have been the vectors of an enormous public health problem. The extent to which industry efforts to suppress the truth about tobacco's health effects contributed to and sustained the tobacco problem, and whether this conduct persists are factual inquiries that have recently been addressed by federal district Judge Gladys Kessler in the U.S. Justice Department's Racketeering Influenced and Corrupt Organization (RICO) suit, *United States v. Philip Morris* (2006). Judge Kessler noted in her opinion that she was doubtful that the industry's aims have changed:

As Defendants' senior executives took the witness stand at trial, one after another, it became exceedingly clear that these Defendants have not, as they claim, ceased their wrongdoing or, as they argued throughout the trial, undertaken fundamental or permanent institutional change (p. 1605). . . . [D]espite Defendants' claims that they have materially altered their management and are now "new" companies, the evidence demonstrates that they have not changed their policies or personnel in any meaningful way (p. 1609).

In the committee's view, even if the industry's misleading and deceptive conduct has ended, it is difficult to see how an industry whose aggressive marketing was the primary vector of a major public health problem and whose profits continue to be generated by selling cigarettes could possibly be an ally of public health efforts to discourage smoking and, eventually, to eliminate it. Indeed, evidence of industry efforts to defeat and curtail the tobacco control measures outlined in Chapter 6 is abundant, as are the industry's current promotional expenditures.

What conduct should now be expected of tobacco companies? Recent efforts by Philip Morris to align the company "with society's evolving expectations of a responsible tobacco company," including support for enactment of federal legislation that empowers the FDA to regulate tobacco products and support for cessation and prevention programs, are intriguing. However, unless public policies fundamentally transform a tobacco company's economic incentives, the committee knows of no model of corporate responsibility that can reconcile a tobacco company's responsibility to its shareholders with a business plan of discouraging smoking and promoting cessation, that is, with measures designed to put itself out of the tobacco business.

Admittedly, the cause of tobacco control is better off today than it was when the tobacco companies were uniformly denying that smoking was addictive or harmful and when smoking was aggressively promoted in every

mass medium and on much of the visual space on highways and in urban centers. However, the emergence of the truth about smoking and about the tobacco industry's efforts to suppress it has not ended the companies' interest in generating profits. Nor has it erased the interests of convenience stores and other retailers in selling as many cigarettes as possible. For this reason, the committee has repeatedly emphasized the need to remove or offset the influences that tend to promote tobacco use or that otherwise impede successful efforts to reduce it.

The only socially useful role for the tobacco industry is to satisfy the residual demand among current smokers for tobacco products while financing compulsory remedial measures to undo the damage caused by the companies' past conduct. To the extent that the tobacco companies want to shift into the "harm reduction" market, these initiatives need to be carefully policed to ensure that consumers are not misled and that the marketing of reduced-exposure products is not actually a disguised effort to deter smoking cessation and to preserve the demand by addicted smokers—and that it does not, in fact, have that effect.

The challenge for policy makers is to develop creative measures for aligning the companies' incentives as closely as possible with public health interests. Specifically, how might incentives be created to deter companies from stimulating new demand for smoking, especially among youth (defined as those younger than 21 years of age); to encourage them to reduce the harmfulness of tobacco products; and, ideally, to help addicted smokers quit?

In its RICO suit against the major domestic manufacturers, the U.S. Department of Justice unsuccessfully urged the district court to set goals for youth smoking and penalize the companies \$3,000 for every underage smoker exceeding the annual target (as had been proposed by the state attorneys general in 1997 during negotiations for a so-called global settlement of the state Medicaid reimbursement suits). Targets could also be set for reducing the prevalence of adult smokers based on a finding that smoking prevalence is substantially higher than it would have been in the absence of the manufacturers' illegal behavior.

The committee is not in a position to assess the economic plausibility of different incentive plans. However, responsible agencies of the federal government, including the policy development office, should evaluate the possible effects of different approaches to aligning the incentives of tobacco manufacturers more closely with public health objectives.

REDUCING THE NICOTINE CONTENT OF CIGARETTES

As discussed in Chapter 4, the ethical case for the forceful regulation of cigarettes and other tobacco products is squarely grounded in the ad-

dictive property of nicotine. Young people begin using tobacco products without genuinely appreciating the risk and meaning of addiction, and most addicted users experience deep regret and frustration about their inability to quit. One possible long-term strategy for reducing tobacco use and its associated harms is to reduce the addictiveness of tobacco products. For this reason, the committee believes that the responsible federal agencies, including the proposed tobacco policy development office, should give a high priority to exploring the feasibility of a long-term policy of gradually reducing the nicotine content of cigarettes. The goal of such a policy would be to reduce the addictiveness of cigarettes, thereby reducing the likelihood of progression from occasional to regular smoking by adolescents and young adults and making it easier for addicted smokers to quit by reducing their level of nicotine addiction (Benowitz and Henningfield 1994).

The committee acknowledges that the FDA's 1996 Tobacco Rule rejected a nicotine-reduction strategy in the short run. Similarly, recent reports on nicotine and on tobacco ingredients by the World Health Organization's Scientific Advisory Committee on Tobacco Product Regulation (SACTob) conclude that major scientific uncertainties and practical concerns preclude such a strategy, at least in the short term (SACTob 2003a, 2003b).

However, neither the FDA nor the WHO Scientific Advisory Committee has ruled out nicotine reduction as a long-term strategy—implemented over decades, perhaps—as its supporters have envisioned it (Benowitz and Henningfield 1994). In addition, to be implemented successfully, nicotine reduction would have to build on, and be integrated with, other components of the blueprint identified in Chapters 5 and 6, especially innovations in product regulation. Developing knowledge and experience with tobacco product regulation is a necessary precondition for implementing a nicotine-reduction strategy; however, regulation of tobacco product characteristics to make them less addictive could be a first step in the direction of the nicotine-reduction strategy (Henningfield et al. 2004).

With these caveats in mind, the committee elaborates below on the rationale for giving serious consideration to nicotine reduction as a long-term strategy.

Feasibility of a Reduced-Nicotine–Cigarette Strategy

The nicotine content of cigarettes could be lowered independently of changes to other constituents of cigarette tobacco, although the agency authorized to regulate tobacco products could also require manufacturers to reduce or eliminate specific toxic constituents of tobacco smoke, according to the perceived health risks and technical feasibility (see Chapter 6). However, it is unlikely that making cigarettes “safer” will ever be a satisfactory long-term strategy as long as tobacco use is addictive. Furthermore, on the

basis of the experience with other addictive drugs, a gradual reduction of the nicotine content of cigarettes is more sensible than an effort to eliminate cigarettes altogether, given the costs of enforcing prohibition. The exact decrements of nicotine content and the rate at which these decrements are mandated would depend both on scientific considerations and on the practicality of changing tobacco manufacturing procedures. For a nicotine reduction strategy to work, it must apply to all manufactured cigarettes, and the extent of nicotine reduction across cigarette brands must be uniform. If not, smokers will simply select higher-nicotine-content cigarettes to sustain their addiction. Most likely, a nicotine-reduction strategy would need to take place in decrements over 10 to 15 years, with decrements of 10 to 15 percent of nicotine content per step. Currently available research suggests that smokers will find a gradual reduction of nicotine content acceptable when the other characteristics of tobacco smoke remain the same (Benowitz et al. 2004).

The ultimate level of nicotine reduction would need to be determined by ongoing scientific research and by the results of surveillance of the smokers of reduced nicotine products over time. Currently, marketed cigarettes contain 10 to 15 milligrams of nicotine per cigarette. The smoker systemically absorbs only about 10 percent of the nicotine in the rod of tobacco (cigarette), so the machine-determined nicotine yields of current cigarettes are approximately 1 milligram. Benowitz and Henningfield estimated that a reduction of the total nicotine content of cigarettes to 0.5 milligrams per rod would be a good initial estimate of what would be necessary to minimize the addictiveness of cigarettes (Benowitz and Henningfield 1994). The estimate was based on a daily intake level of 5 milligrams per day (compared with the 20 milligrams per day currently taken in by the typical addicted smoker) and the possibility that a person smokes up to 30 cigarettes per day very intensively. The nicotine content of tobacco can be reduced either by extracting nicotine from the tobacco or by using tobacco that is genetically engineered to have a lower nicotine content. Both of these methods have been used in the manufacturing of low-nicotine-content cigarettes in the past (for the Next™ brand of cigarettes by extracting nicotine and for the Quest™ brand of cigarettes by using genetically engineered tobacco). The nicotine content of cigarette tobacco can be determined by straightforward and unambiguous chemical analytical methods. It would also be essential that cigarette manufacturers be prohibited from changing the design of cigarettes to make nicotine more bioavailable than it is at present. (Bioavailability could be assessed by smoking machine testing or human bioavailability studies by using biomarkers of nicotine exposure. The details of testing and enforcement would have to be worked out by the regulatory authority.)

One of the consequences of reducing the nicotine available from cigarettes might be that smokers would smoke cigarettes more intensively or smoke more cigarettes per day, thereby increasing their exposure to other toxic smoke constituents. This could produce short-term adverse health consequences. It is well known that when smokers switch from higher- to lower-yield commercial cigarettes, they adjust their smoking behavior to maintain the desired levels of nicotine intake (NCI 2001). Smokers take deeper and more frequent puffs, block ventilation holes, or smoke more cigarettes to sustain adequate levels of nicotine. It should be recognized, however, that currently available commercial low-yield cigarettes contain as much nicotine as high-yield cigarettes (NCI 2001). Therefore, it is quite easy for a person to adjust his or her smoking behavior to compensate for low yields. However, these are not the same types of low-nicotine cigarettes that would be part of a nicotine reduction regulatory strategy.

Recent research with low-nicotine-content cigarettes in which the nicotine content was gradually tapered down (by extracting the nicotine from the tobacco) suggests that smokers do not increase their toxic exposures, despite substantial reductions in their nicotine intakes. Benowitz and colleagues conducted a 6-week longitudinal study of 20 smokers who smoked their usual brand and who then smoked five different types of research cigarettes with progressively lower nicotine contents (ranging from 10 to 0.6 milligrams), each for 1 week (Benowitz et al. 2004). The intake of nicotine, as measured by determination of the smokers' plasma cotinine concentrations, declined progressively as the nicotine content of the cigarettes was reduced, with little evidence of compensation. The level of cigarette consumption and biomarkers of exposure to carbon monoxide and polycyclic aromatic hydrocarbons remained stable, whereas the level of urinary NNAL (tobacco-specific nitrosamine) excretion decreased. These data suggest that the availability of nicotine in tobacco can be lowered without increasing the level of exposure to the toxins of tobacco smoke.

The reasons for a lack of compensatory smoking are likely to include the difficulty in obtaining more nicotine (because less nicotine is available in the tobacco) and the satiating effects of the tar, the levels of which remained unchanged in these reduced-nicotine cigarettes. Smokers could smoke more cigarettes per day in the first phases of a gradual reduction strategy, but for most smokers, compensation for low-yield cigarettes is done primarily by puffing more intensively. Although there is strong evidence of titration of nicotine intake from cigarettes, sensory aspects such as the taste and harshness of cigarette smoke do provide some reinforcement and may lessen withdrawal symptoms compared with those experienced when both nicotine and tar deliveries are reduced in combination. Similar findings of little compensation from the smoking of reduced-nicotine, higher-tar ciga-

rettes have been reported by Rose and Behm (2004), using tobacco that was genetically engineered to be low in nicotine content, and by Benowitz and colleagues using manufactured cigarettes from which nicotine had been extracted (Benowitz, Peyton, and Herrera 2006).

A key element in any regulatory proposal must be careful surveillance of smokers over time. Surveillance would need to include measurement of cigarette consumption, measurement of the smokers' level of exposure to nicotine and tobacco toxins by determining the levels of various biomarkers, and assessment of smoking initiation rates and subsequent cigarette consumption by adolescents and young adults. Surveillance of biomarkers could entail cross-sectional or longitudinal studies of cohorts of smokers. The numbers and characteristics of smokers who would be selected and which biomarkers would be monitored would need to be determined by the regulatory authorities.

Some smokers may not get enough nicotine from reduced-nicotine cigarettes to sustain their addiction and may experience withdrawal symptoms. To deal with such smokers, nicotine-containing medications should be made readily and inexpensively available. Making nicotine-containing medication available could also be done as part of a tobacco regulatory strategy (NCI 2001). Although nicotine in itself is likely to have some intrinsic toxicity, such toxicity is minimal compared with the toxicity of cigarette smoking. Smokers who move from cigarettes to pure nicotine either could continue to take nicotine in pure form over time to sustain their addiction, or could gradually reduce their level of nicotine over time. In any case, the health risks associated with nicotine use is far less than those of continued smoking.

A nicotine-reduction strategy would require considerable education of the public about the goals of the program and the nature of the new cigarettes that will be introduced every year or two. The potential utility of nicotine replacement therapy to deal with insufficient nicotine intake would need to be explained, and resources would need to be available to help those smokers who do decide to quit as their level of addiction is reduced. Vehicles for public education might include media campaigns and information supplied in cigarette package "onserts." The details of the public information program would most logically be coordinated by a central regulatory authority working with local communities to ensure that various populations of smokers are reached.

One concern with a mandatory reduction in the nicotine content of cigarettes is the creation of a demand for contraband or other tobacco products that do not meet the requirements set by the agency of regulatory authority. Such products might include manufactured cigarettes with high levels of nicotine that are illegally imported or manufactured, or loose tobacco which could be rolled into cigarettes by the user. The regulatory

agency would need to monitor such activities and products and determine whether intervention is needed to protect the public health. If contraband use is relatively low and if contraband products are used by only a small percentage of smokers who are highly addicted and want to continue to be addicted, then the public health problem would not be great and enforcement may not become a major issue. However, if a substantial market for contraband products arises, the regulatory agency would have to consider alternative approaches, such as raising the authorized level of nicotine for all cigarettes or allowing a higher-level nicotine cigarette to be obtained with a prescription.

If the nicotine reduction approach were successfully implemented, it is anticipated that cigarettes containing very low levels of nicotine would eventually appeal to a very small number of consumers and would be smoked primarily in social situations. The decision to smoke or not to smoke would not be driven by drug addiction and could be exercised more rationally by the smoker. A marked reduction of cigarette consumption and the promotion of quitting by currently addicted smokers would have an enormous impact on the adverse health effects of tobacco use.

Impact of a Reduced-Nicotine-Cigarette Strategy

The committee is in no position to assess the feasibility of a nicotine reduction strategy or to predict the consequences of implementing it. However, the committee believes that this approach has great promise and should be seriously explored by the regulatory agency recommended in Chapter 6 or the tobacco policy research office recommended in this chapter. The potential impact of federally mandated nicotine-reduction strategy was recently examined by an exploratory computer simulation conducted by Tengs and colleagues (2005). They developed a mathematical model based on the U.S. population in 2003, which was divided into cohorts according to age, gender, and smoking status. The smoking behaviors that were modeled included smoking initiation, cessation, and relapse. The model outcome was quality-adjusted life years. In examining the effects of a reduced-nicotine-cigarette strategy, Tengs and colleagues assumed that the nicotine content of cigarettes would be reduced over 6 years and that the reduced addictiveness of the reduced-nicotine-content cigarette after completion of the mandated tapering would result in an 80 percent increase in cessation rates and an 80 percent decrease in relapse and initiation rates over the 6 years. The model also included a 10 percent increase in the annual probability of death among continued smokers because of compensation and the probability that 10 percent of smokers would seek high-nicotine cigarettes from the black market, with both probabilities increasing linearly over 10 years. The simulation projects that the prevalence of smoking among the adult population could decline

from 23 to 5 percent over 50 years, with a cumulative gain of 157,000,000 quality-adjusted life years. The investigators also performed a number of sensitivity analyses. All showed a similar gain in quality-adjusted life years. The investigators concluded that “policy makers would be hard-pressed to identify another domestic public health intervention, short of historical sanitation efforts, that has offered this magnitude of benefit to the population.” Although the computer simulation by Tengs and colleagues includes too many ungrounded assumptions to serve as a basis for estimating the consequences of a phased-in nicotine reduction strategy, the study does reinforce the committee’s view that this approach merits serious consideration by policy makers.

Other Regulatory Approaches to a Reduced-Nicotine–Cigarette Strategy

Although a regulatory strategy that would mandate changes in product characteristics by a central authority is likely to be the most effective in reducing the addictiveness of cigarettes, two other regulatory approaches that could be implemented should be mentioned. One approach would be to mandate warnings on packages describing the nicotine content of the cigarettes and the relative addictiveness of the products. Individuals could choose to smoke less addictive cigarettes if they desired. Reduced-nicotine–content cigarettes are being marketed as the brand Quest™, but their sales are quite low. On the basis of prior experience with cigarette labeling and the compulsion of addicted individuals to continue the use of their addictive drug, if it is available, as well as the lack of public uptake of Quest™ cigarettes, it is unlikely that such an approach would be successful.

Another approach would be the progressive taxation of cigarettes on the basis of their nicotine content. Although highly addicted smokers are likely to accept moderate increases in price, so that they may obtain their desired dose of nicotine, if the tax increases were very high, the high taxes might force some smokers to accept lower-nicotine–content cigarettes. Progressive tax escalation based on the higher nicotine contents of cigarette tobacco over a number of years might result in many smokers switching to less addictive cigarettes. However, a mandated approach for nicotine reduction that is uniform across all cigarette brands might have the biggest payoff at the population level. The advantages and disadvantages of these alternative regulatory approaches should be explored by the regulatory agency.

Recommendation 42: Upon being empowered to regulate tobacco products, the FDA should give priority to exploring the potential effectiveness of a long-term strategy for reducing the amount of nicotine in cigarettes and should commission the studies needed to assess the feasibility of implementing such an approach. If such a strategy ap-

pears to be feasible, the agency should develop a long-term plan for implementing the strategy as part of a comprehensive plan for reducing tobacco use.

CONCLUSION

The new tobacco policy development office should be charged with conducting the necessary research and analysis to advise policy makers on the likely effects of existing policies and of proposed new ones and of measures that can be taken to increase the prospects of the successful implementation of these policies. For example, the aggressive tobacco control measures recommended in Chapter 6 rest on emerging public understanding of the characteristics of tobacco products that warrant such measures, and successful implementation over the long term will entail ongoing educational efforts to reinforce and sustain public understanding. In addition, tobacco use is a worldwide problem, and many other countries have embraced aggressive measures of tobacco control. The policy development office should also study the effects of policies adopted in other countries as well as the effects of free trade policies on tobacco control efforts in the United States and abroad.

In short, even if the aggressive measures recommended in this report were speedily adopted and implemented, ending the tobacco problem will require decades of sustained and careful policymaking, accompanied by vigilant monitoring and flexible response. A robust capacity for policy analysis and development is an essential component of a strategic initiative to end the tobacco problem. The policy development office as well as the FDA should take a long-term view and should initiate serious study of approaches on the frontier of tobacco control.

REFERENCES

- Benowitz NL, Hall SM, Dempsey D, Allen F, Peng M, Jacob P. 2004. Safety of a nicotine reduction strategy. Paper presented at Society for Research on Nicotine and Tobacco Research annual meeting.
- Benowitz NL, Henningfield JE. 1994. Establishing a nicotine threshold for addiction. The implications for tobacco regulation. *New England Journal of Medicine* 331(2):123-125.
- Benowitz NL, Peyton J, Herrera B. 2006. Nicotine intake and dose response when smoking reduced-nicotine content cigarettes. *Clinical Pharmacology Therapy* 80:703-714.
- Borland R. 2003. A strategy for controlling the marketing of tobacco products: a regulated market model. *Tobacco Control* 12(4):374-382.
- Chaloupka FJ, Cummings KM, Morley CP, Horan JK. 2002. Tax, price and cigarette smoking: evidence from the tobacco documents and implications for tobacco company marketing strategies. *Tobacco Control* 11(Suppl 1): I62-I72.
- Henningfield JE, Benowitz NL, Connolly GN, Davis RM, Gray N, Myers ML, Zeller M. 2004. Reducing tobacco addiction through tobacco product regulation. *Tobacco Control* 13(2):132-135.

- NCI (National Cancer Institute). 2001. *Risks Associated with Smoking Cigarettes with Low Machine-Measured Yields of Tar and Nicotine (Monograph 13)*. Bethesda, MD: National Institutes of Health.
- Rose JE, Behm FM. 2004. Effects of low nicotine content cigarettes on smoke intake. *Nicotine and Tobacco Research* 6(2):309-319.
- SACTob (World Health Organization's Scientific Advisory Committee on Tobacco Product Regulation). 2003a. *Recommendation on Nicotine and the Regulation in Tobacco and Non-Tobacco Products*. Geneva, Switzerland: World Health Organization.
- SACTob. 2003b. *Recommendation on Tobacco Product Ingredients and Emissions*. Geneva, Switzerland: World Health Organization.
- Tengs TO, Ahmad S, Savage JM, Moore R, Gage E. 2005. The AMA proposal to mandate nicotine reduction in cigarettes: a simulation of the population health impacts. *Preventive Medicine* 40(2):170-180.

Index

A

Abt Associates Inc., 165, 169, 170

Access to tobacco products

adolescent perceptions of, 167

community mobilization, 205

Internet sales, 11-12, 20, 207-210

minimum age, 206

price and, 42

recommendations, 10-11, 20, 205, 210

youth restrictions, 118-119, 120, 159, 167, 203-206

Action on Smoking and Health, 110

Addictiveness of tobacco products. *See*

Nicotine

adolescents, 89, 118-119

atypical patterns of smoking and, 93, 95

and cessation, 5, 117

conditioning, 79, 80

deception by tobacco industry, 7, 33, 35, 114, 121-122, 125, 127, 146, 148

environmental and personal factors, 80, 81, 201

flavorants and additives and, 283

genetic factors, 79, 82, 86-87, 96-97

industry acknowledgment of, 125

and litigation, 119, 121-122

nature of, 77-82

and paternalism issue, 151-152

as “pediatric disease,” 119, 148

physiological effects of smoke, 79

public understanding of, 7-8, 33, 35, 89, 108, 147

risk perception, 90, 91, 93

sensorimotor factors, 81

and tobacco control movement, 111-112, 116-118, 119

warning labels, 298

Adolescent tobacco use

alcohol policy compared, 153

cessation programs, 21

effectiveness of programs on, 11, 68, 124-125, 201

exposure to advertising, 320, 322-323

glamorization of smoking in movies and, 330-333

household bans on smoking and, 201-202

illegal sales, 164, 203

initiation rates, 3, 4, 5, 6, 11, 31, 34, 35, 45-46, 49, 51, 56-57, 70, 98, 112, 147-148, 149, 150-151, 167, 200

invulnerability concept and, 88, 89

media glamorization of smoking and, 330-333

mental illness and, 95

motivation, 92-93, 98, 183
 paternalism issue and, 34, 150-151
 prevalence, 31, 46, 52-54, 124, 167-168, 169, 170-171
 prevention interventions, 8, 11, 123
 price of cigarettes as deterrent, 9, 183-184
 restricted access to tobacco and, 118-119, 120, 159, 167, 203-206
 risk perceptions and, 4, 5, 6, 8, 35, 88-93, 98, 149, 150-151, 187, 297
 and smoking career, 58, 98
 targeting by tobacco industry, 50, 112, 129, 148, 327-330
 Adult tobacco use. *See also* Young adult tobacco use
 cessation rates, 4, 5, 49, 57, 66-67
 ever smoked, 49
 never smoked, 45
 per capita consumption, 45, 54, 56, 168
 prevalence, 1, 4, 5, 13, 29, 32, 45, 48, 51-52, 62, 64, 65, 66, 124, 125, 146, 166, 168, 170-171, 231, 278
 risk perception and, 80, 90, 91, 151
 Advertising. *See* Marketing and advertising
 Advocacy. *See also* Antitobacco activism; Community mobilization
 grassroots, 119, 147, 189, 196, 241-243, 244
 African Americans, 60, 61, 62, 63, 64, 94, 161, 171, 185, 247
 Age. *See also* Adolescent; Adult; Young adult tobacco use
 and initiation of smoking, 81, 94-95
 minimum for tobacco purchases, 206
 and nondaily smoking, 94
 and prevalence of smoking, 52, 53, 58-59
 Alabama, 174, 309, 311, 315
 Alaska, 174, 309, 311, 315
 Alcohol
 excise taxes, 193
 policy changes, 153, 241, 242, 273, 304-306
 shipping restrictions, 210
 American Academy of Family Physicians, 21, 222
 American Academy of Pediatrics, 21, 222

American Cancer Society, 109, 110, 120, 179
 American College Health Association, 20, 198, 199
 American College of Emergency Physicians, 221
 American College of Physicians, 21, 222
 American Correctional Association, 19, 194-195, 196
 American Heart Association, 109, 179
 American Indian and Alaska Natives, 60, 62, 63, 64
 American Jail Association, 194-195
 American Legacy Foundation, 2, 123, 124, 129, 130, 133, 229-231, 243
 American Lung Association, 109, 179
 American Medical Association, 21, 109, 117, 120, 222
 American Nonsmokers' Rights Foundation, 198
 American Nursing Association, 21, 222
 American Psychiatric Association, 117
 American Stop Smoking Intervention Study (ASSIST), 120, 121, 159, 163, 172, 241-242, 243, 244, 246
 Annenberg Tobacco Survey, 89, 90
 Antidepressants, 87
 Antitobacco activism, early movements, 34, 107-108, 109-110, 115
 Arizona, 115, 119, 160, 172, 174, 309, 311, 315
 Arkansas, 66, 172, 309, 311, 315
 Asians, 60-61, 62, 63, 64, 94, 161, 247
 Attention-deficit/hyperactivity disorder, 96
 Australia, 83, 201, 291, 292, 295
 Austria, 213

B

Ballin, Scott, 117
 Bangladesh, 292
 Bans on smoking. *See* Restrictions on smoking
 Banzhaf, John F., 110
 Behavior Risk Factor Surveillance System (BRFSS), 46, 65, 93, 164, 165
 Botvin, Gil, 212
 Brain-derived neurotropic factor, 82
 Brandt, Allan, 107
 Brazil, 292, 293, 295, 297

- Bright Futures, 219
 Brown and Williamson Company, 43, 209, 287
 Bupropion treatment, 82, 87, 233
 Bureau of Alcohol, Tobacco, Firearms, and Explosives, 209, 304
 Bush Administration, 123
- C
- California
 adolescent smoking, 167
 Adult Tobacco Survey, 164
 bans on smoking, 192, 195, 196, 202-203, 214, 245
 cessation rates, 67, 136
 Department of Education, 161
 Department of Health Services, 161, 164
 effectiveness of programs, 166-168, 169, 184, 192, 226, 242-243
 evaluation of programs, 164, 165
 excise taxes, 160, 161, 177, 184, 311
 funding for tobacco control, 161-162, 166, 167, 175, 180, 315
 Healthy Kids Program, 161
 heart disease mortality, 166-167
 marketing violations by industry, 320, 328
 media campaigns, 120, 161, 184, 224-226, 227
 MSA allocations, 178, 180, 320
 nonsmokers' rights movement, 147
 per-capita cigarette consumption, 166, 167
 prevalence of smoking, 66, 67, 94, 136, 165, 166, 167-168, 169, 170, 171
 retail environment, 299-300
 revenues and expenditures for tobacco control, 174, 177, 178, 180, 309
 school-based interventions, 212, 214
 Smokers' Helpline, 161
 Student Tobacco Survey, 168
 Tobacco Control Program, 119, 120, 124-125, 157, 159, 160, 161-162, 163, 164, 165, 174
 Tobacco Survey, 94, 164
 youth access law, 208
 Youth Tobacco Survey, 164
 California Apartment Association, 196
- Carlin, John, 305
 Camel cigarettes, 43
 Campaign for Tobacco-Free Kids, 179, 285
 Canada
 bans on smoking, 202
 excise taxes, 183
 health warnings on tobacco products, 291-292, 295
 regretful smokers, 83
 risk perceptions, 297
 Cancer, 29, 30, 44, 89, 92, 108, 110, 115, 116, 125, 127, 191, 226, 247, 280, 297, 335, 337
 Cardiovascular disease, 29, 30, 95, 110, 166-167, 191, 215-216, 247
 Catechol-O-methyltransferase gene, 82
 Center for Tobacco Prevention and Control, 163
 Centers for Disease Control and Prevention, 21, 29, 128, 161, 192, 193, 224, 228, 238, 242, 244
 Best Practices for Comprehensive Tobacco Control Programs, 159, 175, 176, 242, 335
 BRFSS, 46, 65, 93, 164, 165
 goals for tobacco control, 249
 Guidelines for School Health Programs to Prevent Tobacco Use and Addiction, 109
 IMPACT program, 120, 159, 246
 Office on Smoking and Health, 22, 159, 172, 246
 recommended funding level for state programs, 9, 19, 172-173, 175-176, 181-182, 308, 309-310
 YRBSS, 46, 53, 171
 Centers for Medicare and Medicaid Services, 126
 Cessation attempt fatigue, 86
 Cessation of smoking
 abstinence defined, 85
 access to programs, 12-13, 21-22, 84, 126, 129, 185
 addictiveness of nicotine and, 5, 117
 adolescent programs, 21
 age trends, 58, 59
 airway sensory replacement and, 81
 behavioral and counseling interventions, 80, 87, 109, 126, 160, 161, 219, 220, 221, 222, 232, 233, 236, 240

challenges, 84, 235-236
 clinical practice guidelines, 87, 126, 129, 240
 community mobilization, 222, 234, 236-237, 238
 components of care management, 232
 cost-effectiveness to interventions, 239-241
 delivering services, 238-239
 demand for programs, 234, 235-236
 disseminating programs, 12, 13, 16, 17, 21, 22, 24, 87, 234, 235, 236-238, 303
 duration of quit attempts, 85, 86
 education about quitting process, 235-236
 effectiveness of programs, 6, 12, 13, 68, 87, 159, 232-234, 236, 239-231
 environment and, 16, 17, 24, 84, 86, 160, 192, 193, 201
 ethical context for policies, 14, 34, 149-150
 funding programs, 187, 240
 gender differences, 62
 genetic factors, 82, 97
 geographic differences, 64, 65, 66-67
 hardcore smokers, 6, 233, 234
 health improvements, 231
 industry discouragement of, 24, 323
 initiation age and, 59
 intensity of smoking and, 59, 85, 86-87, 97
 intensity of treatment and, 232-233, 234
 interventions, 6, 12, 21, 22, 120, 231-241
 "light" cigarettes and, 297
 limitations of programs, 234
 mental illness and, 68, 69
 motivation, 83, 109, 184, 221
 nicotine replacement therapies, 17, 82, 87, 117, 147, 185, 233, 234
 nondaily smoking and, 94
 paternalism issue and, 149-150
 pharmacotherapies, 82, 87, 109, 119, 126, 147, 233, 234, 240, 281-282
 physician participation in, 83-84, 129, 219-222

and prevalence of smoking, 232, 235, 249, 250, 251-252
 price of cigarettes and, 182-183, 184
 quitlines, 21, 84, 126, 133, 161, 221, 236, 237
 quitting attempts, 5-6, 65, 85-87, 97, 233, 234
 surveillance and monitoring, 239
 race/ethnicity and, 61
 rates, 4, 5, 12, 45, 49, 57, 58, 62, 66-67, 82-83, 193
 recommendations, 12, 21, 22, 236, 239
 reimbursement for treatment, 12, 13, 22, 84, 126, 234, 238, 239-241
 relapses, 86, 97, 193, 201, 233, 234
 and smokeless tobacco use, 2, 3
 socioeconomic status and, 63
 Stages of Change model, 84-85
 stepped-care approach, 232, 233, 234, 235, 239
 trends, 31, 57, 77
 warning labels on packages and, 295
 Children, exposure to secondhand smoke, 115, 192, 199, 200-201
 Chinese Americans, 61
 Cigar smoking, 30, 41, 43, 198
 Cigarette Labeling and Advertising Act, 110, 273, 300-301, 319
 Cigarette manufacturing, 41-42, 107, 152
 Cigarette Smoking Act of 1969, 110, 319
 Cipollone, Rose, 113
 Clinician's Handbook of Preventive Services, 219
 Clinton Administration, 119, 123
 Clonidine, 87
 Coalition for Tobacco-Free Colorado, 245
 Coalition on Smoking OR Health, 109, 117
 College, 20, 198, 199. *See also* Young adult tobacco use
 Colorado, 174, 243, 245, 309, 311, 315
 Community Intervention Trial for Smoking Cessation (COMMIT), 83, 87, 192
 Community mobilization
 action projects, 213-214
 alcohol policy compared, 241
 cessation programs, 222, 234, 236-237, 238
 education programs, 215-216, 230, 231
 effectiveness, 215, 242, 244, 246

- evaluation of programs, 242, 246
 - expenditures, 175
 - funding, 159, 163, 244, 246
 - grassroots advocacy, 119, 147, 189, 196, 241-243, 244
 - lobbying challenge from tobacco industry, 121, 241, 243-244
 - local health departments, 161, 163
 - maintaining momentum, 244-246
 - recommendations, 246
 - school programs combined with, 214, 215-217, 218, 231
 - smoking bans, 115, 119, 189, 196, 203, 244-246
 - state strategy, 120-121, 154, 241-242
 - youth access restriction, 205
 - Comprehensive Smoking Education Act of 1984, 110
 - Comprehensive state programs. *See also*
 - Excise tax rates; Restrictions on smoking; *individual states*
 - CDC best practices, 159, 175, 176, 242
 - community mobilization strategy, 22, 120-121, 154, 241-242, 246
 - description, 160-163
 - effectiveness, 67, 68, 120, 124-125, 136, 157-158, 159, 160, 161, 165-172
 - elements of, 120, 152, 160
 - evaluation of, 120, 159-160, 164-165, 171-172
 - expenditures, 30, 158, 163, 173-176, 226, 309-310, 315-316
 - funding, 120, 128, 157, 158-159, 172-182, 226-227, 308-319
 - intensity of, 160
 - interventions, 158, 159
 - media campaigns, 119, 120, 159, 160, 161, 162-163, 224-229
 - monitoring and surveillance, 164
 - MSA allocations, 128, 178-181
 - public health partnerships, 154
 - recommendations, 181-182
 - revenue sources, 158, 176-181
 - youth access restrictions, 120, 159
 - Conduct disorders, 95
 - Congress. *See also* Legislation
 - authority over states, 188 n.3
 - Cigarette Labeling and Advertising Act, 110, 273, 300-301, 319
 - Cigarette Smoking Act of 1969, 110, 319
 - Fair Housing Act, 197
 - Federal Smoking Prevention and Tobacco Control Act, 126, 206, 275
 - Food, Drug and Cosmetic Act, 117, 126, 152
 - proposed legislation, 275, 283-285, 307
 - Connecticut, 66, 67, 115, 125, 309, 311, 315
 - Consumer Product Safety Commission, 111
 - Consumer sovereignty issue, 7, 8, 32, 111, 114, 117, 145-146, 150-152. *See also* Paternalism issue
 - Controlled Substances Act, 112, 152
 - Correctional facilities. *See* Inmates
 - Council for Tobacco Research, 111, 123
 - Council of Emergency Medicine Residency Directors, 221
 - Crawford, Victor, 226
 - Current Population Survey Tobacco Use Supplement, 46, 64, 96
 - Current smokers/smoking
 - cessation attempts, 82
 - correlates of, 57-68
 - decline in, 45
 - defined, 47, 166 n.2
 - intensity of smoking, 55
 - prevalence, 48, 51
 - CYP2A6 gene, 82
 - CYP2B6 gene, 97
- ## D
- Daily smoking/smokers, 52-53, 54, 55, 65, 95, 217
 - Davis, Ronald, 109
 - Deaths, 1-2, 29, 30, 34, 89, 113, 116, 126, 130, 166-167, 226, 228, 231
 - Decarboxylase, 82
 - Decisional Balance Inventory, 92
 - Decline in smoking
 - health scares and, 44, 109
 - Healthy People 2010 goals, 124
 - industry response to, 44, 46-51
 - maintaining momentum, 6-7, 30-31
 - media campaigns and, 124, 160, 184, 217, 218, 223, 225-226, 227, 228, 229, 230-231

policy changes and, 130, 145
 smoking bans and, 10, 94, 125, 184, 185, 191-202
 trends, 4-5, 45-46, 70
 Delaware, 125, 128, 173, 174, 175, 176, 179, 245, 308, 309, 311, 315
 Denmark, 213
 DHL, 209
 Disabled individuals, 95
 Discount brands, 133
 Dopamine, 79, 80, 82, 97
 Drug Abuse Resistance Education, 211

E

Eclipse cigarette, 127
 Economic effects of tobacco use, 2, 30, 192, 195, 200, 239
 Educational attainment
 and nondaily smoking, 94
 and prevalence of smoking, 6, 62-64, 65, 67, 96, 187
 Educational initiatives, 109-110. *See also*
 Media campaigns; School-based interventions
 community mobilization, 215-216, 230, 231
 effectiveness, 70, 198
 Emergency Medicine Residents Association, 221
 Emergency Nurses Association, 221
 Employee Retirement and Income Security Act, 273
 Environmental tobacco smoke. *See*
 Secondhand smoke
 Epidemiology of tobacco use. *See also*
 Cessation of smoking; Decline in smoking; Initiation of smoking; Intensity of smoking; Prevalence of smoking
 atypical patterns of smoking, 94
 cessation rates, 82
 decline in use, 4-5, 45-51
 growth of problem, 4, 41-44
 recent trends, 51-68
 European Union, 292
 Excise tax rates
 and adolescent smoking, 183-184
 appropriate level of, 159, 181, 182, 185-187, 249

avoidance, 9, 177, 184, 185-186, 188, 207
 cessation services funded with, 187, 240
 and cigarette use, 182-184
 congressional authority over states, 188 n.3
 disparities among states, 9, 176-177, 182, 186, 188-189, 308, 310-311
 and expenditures for tobacco control, 178
 external costs of consumption and, 186-187
 federal, 10, 19, 50, 125, 185, 188, 189
 funding tobacco control with, 9, 19, 159, 160, 162, 176, 177-178, 181, 182, 188-189, 218, 224, 227, 314-317
 impacts of, 9, 170, 181, 182, 184, 185, 249, 250
 interaction with other antismoking measures, 184-185
 Internet retail shipments and, 185, 186, 207, 209, 210
 new measures, 36, 188-189
 recommendations, 9, 10, 17-18, 19, 25, 182, 189, 318
 regressivity concerns, 187
 revenues, 9, 174-175, 176, 177, 178
 state, 9, 19, 119-120, 125, 158, 159, 160, 162, 170, 176-178, 182-189, 310-311
 tax-exempt outlet sales and, 185, 207

F

Fair Housing Act, 197
 Fairness Doctrine, 110, 113-114, 223-224
 Family Smoking Prevention and Tobacco Control Act, 126, 206, 275
 FDA Tobacco Rule, 126
 Federal Acquisition Streamlining Act of 1994, 243
 Federal Bureau of Prisons, 195
 Federal Communications Commission, 110, 223
 Federal Express, 209

- Federal Food, Drug, and Cosmetic Act, 117, 126, 152
- Federal Trade Commission, 47, 110, 112, 113, 287, 299, 301
- Fetal growth retardation, 110
- Field Institute, 164
- Filtered cigarettes, 44, 70, 323
- Finland, 215
- Firearms policy, 153
- Florida
- bans on smoking, 245
 - effectiveness of programs, 171-172, 229
 - excise tax rates, 311
 - funding for programs, 227, 315
 - media campaigns, 120, 224, 227-229
 - Medicaid litigation, 122-123
 - revenues and expenditures for tobacco control, 174, 224, 309
 - tobacco control program, 125, 128, 160, 174, 227-228
 - Youth Tobacco Survey, 228
- Food and Drug Administration
- authority, 17, 25, 36, 117, 118, 119, 122, 123, 126-127, 154, 203, 272, 275-277, 283-285, 307-308
 - integrity, 287-288
 - Tobacco Rule, 203, 205, 206, 276, 319, 323, 347
 - youth-oriented policy, 148, 276
- Former smokers, 47, 57 n.7, 65
- Framework Convention for Tobacco Control, 3, 34, 289, 292
- Freedom of Information Act, 121, 243
- Funding tobacco control. *See also* Excise tax rates
- allocation formula, 311-312, 314-318
 - American Legacy Foundation, 129
 - budgetary constraints, 9, 128, 157, 160, 161-162, 165, 166, 167, 171, 172, 180, 224, 226-227
 - and effectiveness of state programs, 160
 - federal role, 22, 159, 246, 308-319
 - MSA allocations, 9, 128, 129, 158, 163, 173, 174, 178-181, 227-228, 308-319
 - philanthropic, 22, 120, 246
 - prevalence-based penalties, 318-319
 - recommended and proposed spending, 9, 17-18, 19, 25, 172-173, 175-176, 181-182, 308, 309-310
 - remedial assessment on cigarettes, 312-313
 - state programs, 120, 128, 157, 158-159, 172-182, 224, 226-227, 308-319
- ## G
- Gallup Organization, 164, 167
- Gamblers, 95
- Gamma-aminobutyric acid 2 gene, 82
- Gender differences. *See also* Women, as marketing target
- cessation of smoking, 62
 - initiation of smoking, 81
 - natural history of smoking, 58
 - motivation to smoke, 183
 - prevalence of smoking, 51, 58, 60-62
- Generic brands, 50
- Genetic vulnerability, 79, 82, 86-87, 96-97
- Georgia, 174, 309, 311, 314, 315, 316, 317
- Germany, 213
- Glamorization of smoking, 6, 42, 110, 330-333
- Gori, Gio, 287
- Grassroots activism, 119, 147, 189, 196, 241-243, 244. *See also* Antitobacco activism; Community mobilization
- Great Depression, 44
- Group Against Smokers' Pollution (GASP), 115
- Growing Up Today Study, 183
- Guide to Clinical Preventive Services, 219
- Guidelines for Adolescent Preventive Services, 219
- Guidelines for Health Supervision of Infants, Children, and Adolescents, 219
- ## H
- Hard-core smokers, 6, 8, 69, 96-97, 98
- Harm reduction policies, 282
- Hawaii, 174, 245, 309, 311, 315
- Health Belief Model, 88
- Health care expenditures, 2, 30

Health Supervision Guidelines, 219
 Healthy People 2010, 7, 13, 52, 124, 133,
 135, 136, 199, 250, 251
 Heavy smokers, 47, 54, 61, 68, 69, 95,
 96, 145
 Hispanics, 60, 61, 62, 63, 64, 94, 161, 247
 History of tobacco use, 107-108
 Home production of cigarettes, 185, 186
 Homeless individuals, 6, 95, 96, 248
 Hong Kong, 292
 Hutchinson Project, 211

I

Idaho, 174, 245, 309, 311, 315
 Illinois, 174, 309, 311, 315
 Impotence, 294
 Income
 expenditures on cigarettes, 51
 and prevalence of smoking, 6, 44, 62-
 64, 65, 67, 187
 Inconsistent preferences, 151
 India, 292
 Indian reservations, 24, 185, 207
 Indiana, 174, 213, 309, 311, 315
 Industry. *See* Tobacco industry
 Infant exposure to tobacco smoke, 29
 Infectious diseases, 29
 Initiation of smoking
 adolescents, 3, 4, 5, 6, 11, 31, 34, 35,
 45-46, 49, 51, 56-57, 70, 98,
 112, 147-148, 149, 150-151,
 167, 200
 age and, 81, 94-95
 defined, 56 n.6
 deterrents, 7, 12-13
 environment and, 200, 219
 gender differences, 81
 genetic influences, 81
 psychiatric and behavioral
 comorbidities, 95-97
 racial/ethnic differences, 69
 regret among smokers, 5, 83, 88, 93,
 97, 151
 risk perceptions and, 6, 88-93
 socioeconomic status and, 63
 trends in rates, 13, 31, 45, 46, 49,
 56-57, 77, 252
 young adults, 5, 6, 45-46, 49, 57, 69,
 70, 94-95, 167

Initiatives to Mobilize for the Prevention
 and Control of Tobacco
 (IMPACT) program, 120, 159,
 246
 Inmates, 6, 95, 96, 194-196
 Institute of Medicine, 118, 119, 125, 130,
 148
 Insurance coverage, 12, 13, 22, 84, 126,
 234, 238, 239-241
 Intensity of smoking
 age at initiation and, 98
 and cessation, 59, 85, 86-87, 97
 gender differences, 61-62
 genetic factors, 81
 per-capita consumption, 45, 54, 56,
 166, 168-169
 price of cigarettes and, 182, 183
 and risk perception, 90
 and smoking career, 59, 85, 98
 socioeconomic status and, 69
 trends, 5, 6, 45, 54-56
 Interagency Committee on Smoking and
 Health, 126, 129
 International Agency for Research on
 Cancer, 191
 International Tobacco Control Policy
 Evaluation Survey, 294, 295, 297
 International comparisons, 3, 34-35, 193,
 291-293, 329
 Interventions. *See* Cessation of smoking;
 Prevention interventions
 Iowa, 174, 213, 309, 311, 315
 Ireland, 193

J

Jenkins Act, 207, 304
 Joe Camel character, 50, 112
 Joint Commission on Accreditation of
 Healthcare Facilities, 194

K

Kansas, 174, 179, 216, 305, 309, 311, 315
 Kentucky, 65, 66, 94, 134, 135, 174, 176,
 309, 311, 315
 Kessler, David, 117, 118, 119, 122, 123,
 148
 Kessler, Gladys, 127-128, 287, 297-298,
 318, 345

Kluger, Richard, 107
 Kool cigarettes, 43
 Koop, C. Everett, 115, 122
 Korean Americans, 61, 247

L

Legacy Media Tracking Surveys, 229
 Legislation
 advertising restrictions, 110, 118
 bans on smoking, 36
 exemptions for tobacco industry, 111-112
 FDA empowerment, 126-127, 279-280, 283-285
 proposed, 122, 276, 279-280, 283-285, 286-287, 295, 301
 public health gains, 113
 state excise taxes, 119, 210
 warning labels, 110, 113, 126, 154, 273, 295
 youth access control, 118, 210
 Lethality of smoking, beliefs about, 89-90
 Leukoplakia, 30
 “Light” cigarettes, 89, 91-92, 112, 122, 123, 127, 280-281, 286, 287, 288, 296, 297-298, 303, 323, 325, 329
 Light smokers (chippers), 95
 Life Skills Training (LST), 211, 212-213
 Litigation, 33
 addictiveness of nicotine and, 119, 121-122
 antilobbying challenge by industry, 121, 241, 243
 class action suits, 121-122
 common-law lawsuits, 196, 197
 MSA, 50, 56, 122-123, 124, 125, 128, 129, 157, 178
 Medicaid-related, 7, 122-123, 148, 157, 178
 punitive damages, 128
 regulatory challenges by industry, 119, 209
 RICO, 123, 127-128, 157, 280-281, 287-288, 297-298, 318, 319, 345, 346
 smokeless tobacco products, 127
 tort claims, 113, 114, 121-122, 147, 197, 291

Lobbying
 advocacy groups falsely accused of, 121, 241, 243-244
 by tobacco industry, 111, 122, 157
 Lorillard, 329
 Louisiana, 174, 245, 309, 311, 315
 Low-nicotine cigarettes, 48, 346-353
 Low-tar cigarettes, 44, 48, 112, 117, 122, 280, 287, 296, 297, 298, 323
 Low-yield products, 48, 280, 349
 Lucky Strike cigarettes, 43
 Luxembourg, 213

M

Maine, 124, 125, 128, 160, 173, 174, 208-209, 245, 308, 309, 311, 315
 Malaysia, 292
 Marketing and advertising
 black-and-white text only, 302, 319, 323-327
 constitutionality issues, 324-327
 current practices, 48, 319-323
 deceptive health claims, 43, 44, 117, 123, 125, 296-298
 developing countries, 113
 discount prices/coupons, 48, 50-51, 61, 302
 effects of, 42, 43, 50-51, 61, 152, 321-323
 expenditures by industry, 47-48, 114, 129, 299, 300, 302, 319-320
 Fairness Doctrine, 110, 113-114, 223-224
 in magazines, 300, 320, 321, 322, 323, 324, 331
 point-of-sale, 16-17, 24, 114, 273-274, 299-301, 303, 319, 320-321, 322
 promotional activities, 20, 50-51, 114, 118, 119, 123, 126, 129, 154, 184, 199, 289, 299-300, 301-303, 322
 recommendations, 16-17, 18, 24, 25, 303, 324, 329
 restrictions, 16-17, 18, 20, 24, 25, 48, 50, 110, 113-114, 119, 120, 123, 129, 154, 158, 159, 198, 199, 223-224, 273-275, 277, 287, 289, 300-301, 303, 324, 319-330

- sponsorships, 322
 - targeting women, 43, 50, 112
 - targeting youth, 20, 50, 112, 129, 148, 198, 199, 226, 287, 320, 323-324, 327-330
 - warnings on advertisements, 113
- Marlboro Friday, 50
- Marlboro Man, 226
- Maryland, 174, 309, 311, 315
- Massachusetts
 - Adult Tobacco Survey, 184
 - bans on smoking, 197, 245
 - community mobilization, 242
 - Department of Public Health, 162
 - effectiveness of programs, 165, 166, 168-171, 184, 227, 242-243
 - evaluation of programs, 164-165
 - excise taxes, 160, 162, 170, 177, 184, 311
 - funding for tobacco control, 162, 163, 172, 177, 315
 - media campaigns, 120, 133, 162, 184, 224, 226-227
 - per-capita cigarette smoking, 168-169, 170
 - prevalence of smoking, 165, 166, 168-171, 172
 - Prevalence Study, 171
 - revenues and expenditures for tobacco control, 163, 174, 224, 309
 - Smoker's Quitline, 163
 - Tobacco Control Program, 119, 125, 128, 157, 160, 161, 162-163, 242-243
 - Tobacco Survey, 164
 - Try to Stop Resource Center, 163
- Master Settlement Agreement (MSA), 9, 50, 56, 122-123, 124, 125, 128, 129, 157, 158, 163, 173, 174, 175, 176, 178-180, 181, 185, 206, 243, 287, 299, 313, 319-320, 322, 330
- McCain, John, 122
- McClarren, Wayne, 226
- McHugh, John, 210
- Media campaigns
 - American Legacy Foundation's truth[®] Campaign, 124, 229-230, 332
 - effectiveness, 124, 160, 184, 217, 218, 223, 225-226, 227, 228, 229, 230-231, 249
 - elimination, 133, 223-224
 - evaluation, 225-226, 229, 231
 - expenditures, 226, 229, 230
 - exposure and receptivity, 227
 - Fairness Doctrine, 223-224, 229
 - funding, 11-12, 224, 225, 226-227, 238
 - goals, 225, 226
 - recommendations, 11-12, 20, 21, 218, 231, 238
 - school-based programs combined with, 11-12, 21, 215-218, 230-231
 - social marketing of cessation interventions, 237-238
 - state, 119, 120, 159, 160, 161, 162-163, 224-229, 241-242
 - youth-oriented, 11-12, 21, 57, 215-218, 224, 227, 228, 229
- Medicaid, 12, 22, 30, 122-123, 148, 178, 240, 314
- Medicare, 12, 22, 236, 240
- Mental illness
 - and cessation therapy, 233, 234, 247
 - and prevalence of smoking, 6, 68, 69, 70, 95-96, 98
- Menthol cigarettes, 43, 44, 48, 61
- Michigan, 173, 174, 176, 179, 196-197, 308, 309, 311, 314, 315, 316, 317
- Midwestern Prevention Project, 215, 216-217
- Military personnel, 95, 107-108, 248
- Minnesota, 93, 115, 122-123, 160, 174, 196, 309, 311, 314, 315, 316, 317-318
 - Class of 1989 project, 215-216
 - Smoking Prevention Program, 216
- Mississippi, 122-123, 128, 160, 174, 308, 309, 311, 315
- Missouri, 173, 174, 308, 309, 311, 315
- Models. *See* Policy simulations
- Monitoring the Future, 46, 52, 169
- Montana, 174, 175, 245, 309, 311, 315
- Moore, Michael, 122
- Motion Picture Association of America, 25-26, 332-333
- MSA. *See* Master Settlement Agreement

N

National Academy of Sciences, 115
 National Action Plan for Tobacco Cessation, 126
 National Association of State Attorneys General, 209-210
 National Cancer Institute, 21, 69, 238
 ASSIST program, 120, 121, 159, 163, 172, 241-242, 243, 244, 246
 Smoking and Tobacco Control Program, 109
 Tobacco Working Group, 287
 National Cancer Policy Board, 125
 National Committee for Quality Assurance, 239
 National Health Interview Survey, 46, 48, 49, 52, 53, 55, 59, 60, 62, 63, 82, 85, 94, 95, 199
 National Household Survey on Drug Abuse, 63
 National Institutes of Health, 34, 128, 182-184, 201-202, 204, 211, 230, 235, 240
 National Quitline Network, 21, 126, 221, 237, 318
 National Research Council, 115, 125
 National Survey on Drug Use and Health, 45, 46, 56, 58, 61, 63
 National Survey on Environmental Management of Asthma and Children's Exposure to Environmental Tobacco Smoke, 199
 National Youth Tobacco Survey, 199
 Natural history of smoking, 58-59
 Nebraska, 174, 309, 311, 315
 Nevada, 174, 179-180, 309, 311, 315
 New Hampshire, 173, 174, 308, 309, 311, 315
 New Jersey, 174, 176, 189, 245, 309, 311, 315
 New Mexico, 174, 309, 311, 315
 New York, 122, 125, 172, 174, 185, 181, 182, 193, 207, 209, 210, 213, 245, 309, 311, 315
 New Zealand, 292

Nicotine

addiction/addictiveness, 5, 77-82, 95, 97, 111-112, 116-118, 119, 121-122, 125, 146, 147, 148, 151-152
 drug classification, 152
 FDA regulation, 117-118, 119, 125
 filtered cigarettes, 44
 flue curing and, 42-43
 illegal drugs compared, 58, 153
 industry manipulation of levels, 118, 152
 "light" cigarettes, 92, 112
 low-level exposures, 95
 maintenance approach to policies, 278
 medicinal alternatives, 281-282, 283
 menthol cigarettes, 61
 neuroadaptation, 80
 priming effect on children of smokers, 201
 product differences, 43
 and quitting, 4, 5, 97
 reduction strategy, 154, 281, 282-283, 346-353
 replacement products, 17, 82, 87, 117, 147, 185, 233, 234
 and smoking career, 59, 97
 tolerance to, 82
 withdrawal, 80
 Nicotinic acetylcholine receptor alpha4 gene, 82
 NNK, 280
 Nondaily smoking, 93-95, 166
 North Carolina, 174, 176, 180, 309, 311, 315
 North Dakota, 174, 175, 245, 309, 311, 315
 North Karelia project, 215
 Nortriptyline, 87

O

Ohio, 66, 174, 200, 309, 311, 315
 Oklahoma, 66, 174, 309, 311, 315
 Oregon, 160, 172, 174, 177, 185, 201, 242, 309, 311, 315

P

- Packaging of tobacco products. *See also*
 Warning labels
 corrective communications, 24, 298-299
 misleading messages, 24, 289, 296-298
 other health information, 296
 promotional, 289
 recommendations, 16, 23, 24, 298
 regulation of, 24, 289, 296-298
- Parental smoking, 29, 110, 186-187, 200-201, 218, 219
- Paternalism issue, 7, 111, 149-152, 202.
See also Consumer sovereignty issue
- Pennsylvania, 174, 176, 213, 305, 309, 311, 315
- Philip Morris, Inc., 50, 112, 121, 122, 125, 126-127, 313, 326, 328, 345
- Physicians
 antismoking, 111
 prosmoking, 108
 screening, educating, and counseling smokers, 83-84, 129, 219-222
- Poland, 291
- Policy analysis and development. *See also*
 Policy simulations
 incentives for manufacturers, 345-346
 innovations worthy of study, 344-346
 nicotine content reduction, 154, 346-353
 recommendations, 26, 342
 wholesale purchasing monopsony, 344-346
- Policy framework. *See also* Regulation of tobacco; Restrictions on smoking; Tobacco control measures
 alcohol policy compared, 152
 blueprint outline, 3, 35-36, 154
 charge to committee, 31-35
 consumer sovereignty issue, 7, 8, 146-147, 150-152
 context for, 7-8, 146-148
 ethical context, 33-34, 148-150
 federal role, 154, 272-275
 firearm policy compared, 152
 goals, 32, 278-279
 horizon for projections, 32
 inherent dangers of tobacco and, 8, 152-153
 paternalism problem, 7, 33-34, 111, 146, 147, 149-152
 product safety problem, 8, 145-146
 slippery slope argument, 153
 state role, 154
 youth-oriented, 8, 147-148, 153
- Policy simulations
 black and gray market behavior, 343
 health outcomes tracking, 343-344
 industry response element, 343
 intensities of smoking in, 343
 models, 342-344
 reduced-nicotine cigarette, 154, 351-352
 SimSmoke model, 130-133, 134, 249-251
 state-dependent or endogenous transition rates, 342
 steady-state scenario, 4, 6-7, 131-133, 136, 249, 250
 strengthened policies (best-case), 4, 12-13, 137, 249-253
- System Dynamics Model, 130-133, 134, 135, 136, 251-252
- uncertainty in, 130-131, 133
 worst-case scenario, 4, 6-7, 133-137, 250
- Potential reduced-exposure products (PREPs), 15, 23, 282, 284-285, 286, 288, 289, 302-303, 344-346
- Pregnancy, smoking during, 29, 110, 187, 200, 234
- Prevalence of smoking. *See also* Decline in smoking
 adolescents, 31, 46, 52-54, 124, 167-168, 169, 170-171
 adults, 1, 4, 5, 13, 29, 32, 45, 48, 51-52, 62, 64, 65, 66, 124, 125, 146, 166, 168, 170-171, 231
 age and, 52, 53, 58-59, 278
 bans on smoking and, 192-193, 198, 201
 cessation rates and, 232, 234, 251-252
 defined, 97
 nondaily patterns, 93-94
 educational attainment and, 62-64, 65, 67, 96, 187

- gender and, 51, 52, 53, 61-62
 - geographic differences, 64-68, 134, 273
 - income and, 62-64, 65, 67, 187, 248
 - initiation rates and, 251-253
 - goals, 251
 - Master Settlement Agreement and, 56
 - media campaigns and, 160
 - mental illness and, 6, 68, 69, 70, 247
 - and motivation to quit, 85
 - penalties based on, 318-319
 - price of cigarettes and, 56, 170, 182-184
 - projections, 12-13, 231, 249-253, 271; *see also* Policy simulations
 - race/ethnicity and, 60-61, 62, 64, 247
 - trends, 6-7, 52-54
 - surveillance and monitoring, 333-335
 - young adults, 198
 - Prevention interventions. *See also* Media campaigns; School-based interventions
 - for adolescents, 8, 11, 123
 - applicable tobacco products, 32
 - cost-effectiveness, 149
 - delivery of services, 221-222
 - expenditures on, 2
 - health care-based, 20-21, 210, 219-222
 - implementation, 32, 214
 - parent- or family-based, 11, 210, 218-219, 222
 - recommendations, 20-21, 222
 - synergistic effects, 184-185
 - for vulnerable populations, 247-248
 - Price of cigarettes, 5, 7, 9, 10, 16, 24, 42, 44 n.1, 48, 50, 56, 94, 120, 125, 129, 132, 133, 136, 170, 182-185, 186, 187, 191, 226, 236, 300, 301, 302, 303, 304, 305, 311, 314, 320, 321, 323, 324. *See also* Excise tax rates
 - Project SHOUT, 211, 213-215
 - Project STAR, 216
 - Promotions. *See* Marketing and advertising
 - Public Health Cigarette Smoking Act, 110
 - Public health remedies
 - educational initiatives, 109-110
 - secondhand smoke campaign, 114-116
 - tobacco industry response, 110-114
 - Puerto Ricans, 61
 - Puerto Rico, 66, 94, 185
 - Pure Food and Drug Act of 1906, 149, 274
 - Put Prevention into Practice, 219
- Q
- Quitlines, 21, 84, 126, 133, 161, 221, 236, 237
 - Quitting. *See* Cessation of smoking
- R
- Rabin, Robert, 122
 - Race/ethnicity
 - and cessation of smoking, 61
 - and initiation age, 69
 - and intensity of smoking, 69
 - and mortality related to smoking, 61, 247
 - and nondaily smoking, 94
 - and prevalence of smoking, 60-61, 62, 63, 64, 247
 - Racketeer Influenced and Corrupt Organizations Act (RICO), 123, 127-128, 280-281
 - Reduced-nicotine cigarette strategy
 - feasibility, 347-351
 - impact, 351-352
 - nicotine content warnings, 352
 - recommendations, 26, 352-353
 - taxation based on nicotine content, 352-353
 - Regret, 5, 83, 88, 93, 97, 148, 149, 150, 151, 153, 187
 - Regulation of tobacco
 - alcohol experience compared, 304-306
 - cigarette testing methods, 15, 23, 281, 284, 287, 288, 296
 - content disclosure, 23, 283-284, 288
 - enforcement practices, 10, 203-205, 207
 - exemptions for tobacco industry, 111-112
 - FDA empowerment, 14-15, 22, 119, 275-277, 288-289
 - federal authority, 36, 111, 158, 272-275, 283-285, 307-308

- federal-state relationship, 158, 272-275
- goals of, 277-279, 281-283
- harm reduction from continued use, 278, 281-282, 286
- Internet sales and delivery, 207-210
- “legitimization” concerns, 277, 285
- nicotine content, 15, 119, 281-283, 284
- packaging characteristics, 276, 289-299
- potential reduced-exposure products, 15, 23, 282, 284-285, 286, 288, 289, 302-303
- product characteristics, 15, 23, 111, 279-289
- product standards, 15, 23, 276, 284, 288-289
- proposed legislation, 275, 283-285
- public health concerns, 277, 285-286
- recommendations, 14-18, 22-26, 275, 288-289
- retail environment, 10-11, 20, 203-210, 273, 277, 283, 299-308
- risks and benefits, 286-289
- state authority, 272, 273
- warning labels, 110, 113, 126, 154, 273, 276, 290-296
- Respiratory diseases and disorders, 29, 30, 108, 110, 181-182, 200, 220-221, 222
- Restrictions on smoking. *See also* Secondhand smoke
 - on airlines, 115, 116, 121-122
 - in child care facilities, 116, 190
 - and cigarette consumption by smokers, 192-193, 201
 - on college campuses, 198-199
 - in correctional facilities, 190, 194-196
 - constitutionality, 195
 - coverage of state laws, 189, 190
 - effects of, 10, 94, 125, 184, 185, 191-202
 - grassroots activism, 115, 119, 152, 189, 196, 244-246
 - in hospitals and health care facilities, 19, 190, 194
 - and initiation of smoking, 201-202
 - industry response to, 121
 - legislation, 36
 - in multiunit residential locations, 196-197
 - and nonsmoker health, 191-192
 - in outdoor spaces, 202-203
 - in privately owned vehicles, 20, 199-202, 222
 - in public buildings, 147, 184, 189-191, 193-194
 - on public transportation, 115, 116, 121-122, 189, 190
 - recommendations, 10, 19, 20, 194, 196, 197, 199, 202, 203
 - in residences, 20, 199-202, 219, 220, 222
 - in restaurants and bars, 115, 125, 190, 191, 193-194, 245
 - statewide, 125
 - in workplaces, 115, 147, 184, 189-194, 201, 245
- Retail environment
 - adult purchases for minors, 206
 - age verification, 207-209, 327, 328
 - alcohol experience compared, 304-306
 - buydowns, 301-302
 - on college campuses, 198
 - federal role, 307-308
 - on Indian reservations, 24, 304
 - Internet sales, 11-12, 20, 133, 185, 186, 207-210
 - licensing mechanisms, 10, 20, 204, 206, 304-305, 306-307
 - models for regulation, 304-307
 - monitoring compliance, 10, 203-205, 206
 - monopoly systems, 304-306
 - promotional activities, 289, 299-303, 322; *see also* Marketing and advertising
 - promotional allowances, 50-51, 301-303
 - point-of-sale advertising, 114, 299-301
 - recommendations, 10-12, 16-17, 20, 24, 205, 210, 303, 307
 - restructuring options, 306-307
 - self-service displays and vending machines, 10, 205, 206
 - slotting fees, 301, 302-303
- Rhode Island, 125, 174, 175, 176, 208, 245, 309, 311, 315

- Risk perceptions
 addiction and cessation, 90, 91, 93
 adolescents, 4, 5, 6, 8, 35, 88-93, 98,
 149, 150-151, 187, 297
 adults, 80, 90, 91, 151
 effects of smoking, 89-91
 level and stage of smoking and, 90,
 95
 “light” cigarettes, 91-92, 296-297
 media campaigns and, 160
 optimism bias, 89, 150, 151-152
 and paternalism issue, 150-151
 smokeless tobacco, 2, 31
 warning labels on cigarettes and, 293
- R.J. Reynolds Company, 43, 48, 50, 112,
 118, 127, 313, 320, 326
- Robert Wood Johnson Foundation, 120,
 159, 161, 164, 243, 244
- S
- Sackman, Janet, 226
- Safe and Drug-Free School Act, 11, 20, 218
- School-based interventions. *See also*
individual programs
 CDC guidelines, 109
 community mobilization component,
 214, 215-217, 218, 231
 effectiveness, 211-217, 249-250
 evaluation of, 212, 213, 216
 funding, 11, 218
 media campaign combined with, 215-
 218, 230-231
 recommendation, 11, 20, 21, 218-219
 school-only programs, 211-215
 social competence approach, 212-213
 social influences approach, 211-212,
 216, 217
- Schroeder, Steven, 120
- Secondhand smoke, 34. *See also*
 Restrictions on smoking
 campaign against, 35, 114-116, 147,
 159, 163, 226
 children exposed to, 115, 192, 199,
 200-201
 common-law lawsuits, 196, 197
 deaths, 1-2, 29, 88, 116
 economic costs, 30, 192, 195, 200
 effects of smoking bans, 125, 191-202
 and external costs of cigarettes,
 186-187
 harm reduction products, 127
 health hazards, 115, 147, 191, 192,
 200
 monitoring exposure, 165, 229
 and paternalism issue, 147, 149, 150,
 152
 tort litigation, 121-122, 147
 warning labels, 298
- Self-Regulation Theory, 88
- Serotonin, 79, 82, 97
- Singapore, 292
- Smokeless cigarette, 117, 325
- SmokeLess States program, 120, 159, 161,
 243-244, 246
- Smokeless tobacco, 2-3, 30, 31, 41, 127,
 281
- Smokers, defined, 47
- Smuggling and black markets, 3, 14, 34,
 177, 185, 186, 188, 189, 195,
 278, 279, 289, 350-351
- Social costs of smoking, 30, 33-34, 146,
 148-149, 152, 186-187
- Social norms
 antismoking, 5, 7-8, 115, 246
 prosmoking, 6, 98, 129
- Socioeconomic status. *See also* Educational
 attainment; Income
 and access to interventions, 247-248
- Some-day smokers, 65 n.11, 93-94
- South Africa, 292
- South Carolina, 173, 174, 176, 188 n.3,
 308, 309, 311, 315, 317
- South Dakota, 174, 175, 245, 309, 311,
 316
- Spain, 213
- Stanford University, 164, 167
- States. *See also* Comprehensive state
 programs; *individual states*
 early smoking bans, 152
 excise tax revenues by, 177
 MSA allocations by, 179
 nondaily smoking rates, 94
 prevalence of smoking by, 64-68
 tobacco control revenues and
 expenditures by, 174-175
 variation in policies among, 9, 176-
 177, 182, 186, 188-189, 273
- Sudden infant death syndrome, 29, 192,
 200

- Surgeon General's reports, 4, 35, 45, 70, 77, 78, 79, 88, 108, 109, 110, 111, 113, 115, 117, 118, 119, 122, 147, 148, 151, 158, 242
- Survey of Health-Related Behaviors Among Active Duty Military Personnel, 248
- Synar Amendment, 118, 203-204

T

- Taiwan, 292
- Tar, 92. *See also* Low-tar cigarettes
- Teen Tobacco Summit, 228
- Tennessee, 66, 173, 174, 308, 309, 310, 311, 316
- Terry, Luther, 113
- Texas, 122-123, 160, 174, 193, 310, 311, 316
- Thailand, 291, 292, 295
- Theory of Planned Behavior, 88
- Thompson, Tommy, 126
- Tobacco and Alcohol Prevention Project (TAPP), 211-212
- Tobacco control measures. *See also* Community mobilization; Comprehensive state programs; Excise tax rates; Funding tobacco control; Policy simulations; Regulation of tobacco
- campaign against secondhand smoke, 114-116
 - effectiveness, 5, 6, 7, 68, 94, 124-128
 - evaluation of, 6, 333-335
 - expenditures, 30, 128
 - future of, 4, 128-136
 - inherent danger of tobacco products and, 152-153
 - international, 3
 - legislation, 110, 111-112
 - litigation strategies, 113-114, 121-123
 - modern movement, 108, 109-116
 - nicotine as addictive drug and, 116-118
 - political momentum, 2, 124-128, 157
 - retail shipments, 207-210
 - smuggling as threat to, 3
 - special populations, 247-248

- state actions, 119-121; *see also* Comprehensive state programs
 - status of, 138-129
 - status-quo policies, 4, 6-7, 131-133
 - strengthened policies, 4, 8-12, 249-253
 - surveillance and monitoring, 26, 120, 333-335
 - weakened policies, 4, 6-7, 133-136
 - youth access restrictions, 118-119, 203-206
 - youth exposure restrictions, 330-333
- Tobacco industry. *See also* Litigation; Marketing and advertising
- cigarette mass production, 41-42, 107, 152, 327-330
 - deceptive practices, 7, 33, 35, 114, 121-122, 125, 127, 146, 148, 225, 226, 228, 274-275, 280-281, 285-286, 298, 345-346
 - discouraging cessation, 24
 - economic assistance to growers, 126, 180
 - mandatory payments for tobacco control, 308-319
 - motivating conduct changes, 345-346
 - new product development, 46, 48, 112, 127, 145
 - nicotine manipulation, 117
 - political and commercial power, 157
 - pricing strategies, 46, 48, 50-51
 - profits, 313
 - public relations and lobbying campaigns, 110-114, 121, 123
 - response to decline in product use, 44, 46-51
 - response to public policy advocacy, 121, 241, 243-244
 - transnational companies, 34, 113
 - youth education and prevention programs, 327-330
- Tobacco Institute, 111, 115, 123
- Tobacco Related Disease Research Program, 161
- Toxic Substances Control Act, 111, 152
- Transtheoretical Model of Change, 88

U

- U.S. Department of Defense, 248
- U.S. Department of Education, 11, 20, 218

- U.S. Department of Health and Human Services, 21, 203-204, 238, 333
 Clinical Practice Guideline for Treating Tobacco Use and Dependence, 87
 Healthy People 2010, 7, 13, 52, 124, 133, 135, 136, 199, 250, 251
 National Quitline Network, 126, 237
 U.S. Department of Justice, 280, 318, 346
 U.S. Environmental Protection Agency, 116, 147, 199
 U.S. Government Accountability Office, 180
 U.S. Postal Service, 209-210
 U.S. Public Health Service, 240
 U.S. Securities and Exchange Commission, 313
 United Kingdom, 83, 295, 297
 University of California, 161
 San Diego, 164
 University of Massachusetts Medical School, 163
 University of Southern California, 164, 167
 UPS, 209
 Utah, 67, 94, 125, 174, 177, 245, 310, 311, 316
- V
- Varenicline, 87, 233
 Venezuela, 292
 Vermont, 67, 125, 127, 175, 245, 310, 311, 316
 Mass Media Project, 215, 217
 Veterans Health Administration, 248
 Vietnamese Americans, 61, 247
 Virgin Islands, 66
 Virginia, 175, 180, 310, 311, 316
 Virginia Slims, 50, 112
 Vulnerable populations, 6, 22, 57, 69, 95-97, 98, 247-248, 334
- W
- Warnings labels. *See also* Packaging of tobacco products
 on advertisements, 113, 154, 290
 black-and-white text, 291, 295
 Canadian experience, 16, 23, 291-292, 295, 296
 on carton wrappers, 292
 current policy, 290-291
 effectiveness, 294-296
 graphic/pictorial, 15-16, 23, 291-293, 294, 295, 296
 health risks, 110, 113, 126, 154, 276, 290-293
 industry endorsement of, 126
 international comparisons, 291-293
 legislation, 110, 113, 273
 recommendations, 15-16, 23, 296
 size and placement, 292-293
 and tort claims, 291
 smuggling, 289
 Washington, D.C., 94, 115, 128, 159 n.1, 170, 173, 174, 175, 178, 179, 190, 191, 207, 224, 245, 308, 309, 311, 315, 318, 319
 Washington state, 125, 175, 196, 207, 245, 310, 311, 316
 We Card program, 327, 328
 West Virginia, 65, 94, 175, 310, 311, 316
 Winston cigarettes, 48
 Wisconsin, 175, 310, 311, 316
 Women, as marketing target, 43, 50, 112
 Women's liberation movement, 112
 World Health Organization, 3, 34, 113, 117, 289, 292, 347
 World War I, 43
 World War II, 44, 152
 Wyoming, 175, 304, 310, 311, 316
- Y
- Young adult tobacco use
 on college campuses, 198-199
 initiation of smoking, 5, 6, 45-46, 49, 57, 69, 70, 94-95, 98, 167
 prevalence, 46, 58, 70, 167
 prevention interventions, 11
 price of cigarettes as deterrent, 50, 183, 184
 targeting by industry, 50
 Youth. *See also* Adolescent tobacco use
 correctional facilities, 195
 Youth Behavior Risk Surveillance System (YRBSS), 46, 53, 171

A

Comprehensive Smoking Cessation Policy for All Smokers: Systems Integration to Save Lives and Money

David B. Abrams
Office of Behavioral and Social Sciences Research
National Institutes of Health

Abstract In terms of the end points for cessation policy, three outcomes will reduce overall smoking prevalence: (1) reach and motivate more current smokers to make more frequent quit attempts, especially reaching the underserved; (2) ensure quitters know about and use appropriate evidence-based programs; and (3) enact policy that guarantees continuity of delivery of effective services via a comprehensive system of care management for all smokers. Policies that achieve these three goals will save millions of smokers from premature death and the burden of disease and will also save billions of dollars in excess cost to our nation.

Research provides evidence that effective smoking cessation interventions exist, including behavioral and pharmacological programs able to reach smokers through many delivery channels. Using evidence-based programs significantly increases success, from almost double to as much as fourfold the cessation rate of quitting on one's own. Yet less than half of current smokers make serious quit attempts annually, and less than a quarter of those that do try will use proven interventions, and over 95 percent of self-quitters will relapse. Weak dissemination of unappealing cessation products relative to the tobacco industry's marketing, results in many smokers harboring misinformation about the safety and efficacy of treatments with smokers tending to simultaneously believe that new cigarette products may be less harmful.

Having effective cessation programs and services is necessary but not sufficient to reduce population prevalence. The last decade has disproved the adage "if you build it, they will come." Saving millions of lives and billions of dollars requires nothing short of aggressive, proactive, direct-to-consumer marketing of appealing cessation products. Strong political will is also critical; it is important to put into national policy what is known about effective ways to promote smoking cessation and to support the financial and other resources required to establish a unified delivery system of cessation care management for all smokers.

EXECUTIVE SUMMARY

For a smoker, it is long and arduous journey from starting to smoke to enjoying smoking in ones carefree youth to wanting to stop. For much of that journey, the smoker is not motivated to quit and does not make any quit attempts at all. Somewhere along the way the smoker may change, either suddenly or gradually over time. Smokers can move from being unmotivated and not making any quit attempts to wanting to quit (over 70 percent say they want to quit) and then

to making serious quit attempts (about 45 percent try seriously to quit each year). If at first a smoker is not successful at quitting (over 90 percent are not), the arduous journey continues with cycles of trying to quit but relapsing to trying again. Some smokers may give up and feel too exhausted or perhaps even a bit ashamed to keep trying or to risk admission of repeated failure to their family, friends, and relatives. All too often a smoker may use unproven treatments or will-power to quit (over 75 percent do that). There are other barriers that a smoker needs to overcome, such as the cost of formal treatment or a lack of ability to discern ineffective from evidence-based treatments. There is no Consumer Reports or Good Housekeeping Award to guide one's choice of cessation products and services. Perhaps a lucky smoker may eventually quit on his or her own or with the use of an effective cessation product or service. Finally, the journey ends when the smoker either quits for good or suffers and dies from a smoking related cause (about one third to one half of lifetime smokers will die of a smoking-related disease).

Now that research has helped us understand so much of this journey, the challenge is to put what we know into practice and policy, and there is not a moment to lose as over 430,000 of our friends and fellow U.S. citizens die prematurely each year from their smoking addiction (that equals three fully loaded jumbo jets crashing with no survivors every single day, including weekends and holidays).

There is substantial room to find more leverage points to improve the overall cessation outcome rate at every step of the way along a smoker's journey to freedom from their addiction. This opportunity can only be fully realized with strong political will to do the right thing by designing cessation policies that support a comprehensive, systems approach to cessation intervention. This approach should provide aggressive, direct-to-consumer marketing and education campaigns to improve smoker's health literacy about the dangers of smoking and the best tools for quitting. It should also cover the critical leverage points along the entire smokers' journey, from being a slave to smoking to eventual freedom from tobacco addiction, and should provide interventions tailored to the smoker's needs. This can be achieved through cessation policies that support a comprehensive care management network as well as cessation policies that ensure adequate resources and aligned financial incentives at federal, state, and local levels across both the delivery systems within the health care industry and across the broader public health system.

Effective cessation programs are available but greatly underutilized, despite the social climate that is making it more difficult to smoke (e.g., bans in worksites, higher taxes). Decades of research, clinical practice guidelines, and meta-analyses provide solid evidence of the efficacy and cost effectiveness of smoking cessation interventions. Interventions include behavioral and pharmacological options ranging in intensity and cost from minimal (e.g., self-help) to maximal (e.g., inpatient treatment).

Less than 50 percent of the over 45 million current U.S. smokers make a quit attempt each year. Of those that try to quit, over 75 percent do so on their own without evidence-based programs and, of those, over 95 percent relapse. Using even a minimal intensity/brief cessation program generally doubles the likelihood of success. There is also a dose-response relationship such that use of more intensive programs and use of combined pharmacological and behavioral programs can triple to quadruple the likelihood of success.

As indicated by the available scientific evidence and computer simulation modeling (see work of Levy, Appendix J, and Mendez, Appendix K), even a conservative increase in the reach (number or percentage of smokers out of all current smokers who make a quit attempt each year) and a modest improvement in effectiveness (percent of smokers who use evidence-based programs and thereby increase their chances of maintenance of cessation) can play a very significant

role in the mix of policy components that will reduce overall population prevalence. A more aggressive adoption and implementation of known best practices can make an even larger impact, using policies that reach those smokers who are not motivated to quit, those with the greatest health disparities, the highest smoking rates and those with comorbid complications that make treatment more difficult.

In terms of policy, an integrated approach is needed at individual and at systems levels that can capitalize on all the proven cessation components and provide a continuum of care that will address the following three goals:

(1) Proactively reach more smokers and create strong consumer knowledge, motivation and demand for cessation.

Having effective treatment programs is necessary but not sufficient to reduce population prevalence. The last decade has disproved the assumption “if you build it, they will come.” Different smokers’ knowledge and needs must be targeted using social marketing and other behavioral principles and financial incentives. Smokers have misperceptions and gaps in their health literacy about tobacco product safety and about the value, safety, and efficacy of using proven cessation methods. Innovations must be found to specifically target smokers who are hard to reach and hard to motivate (i.e., smokers at disproportionate risk because they are from lower Socioeconomic Status (SES) groups or minorities, are under- or uninsured, have comorbid psychiatric/substance abuse disorders, or are adolescent or young adult smokers). Bio-behavioral vulnerability, cognitive expectations, and emotional and socio-demographic characteristics at individual and aggregate (e.g., community) levels are some of the critical elements that must be considered to ensure more smokers become: (1.a) more health literate about why and how to quit, (1.b) more motivated to make more frequent quit attempts, and (1.c) more likely to use their knowledge to choose and use the appropriate evidence-based treatments when quitting.

(2) Make the full range of proven cessation treatments accessible and freely available in a coordinated, aligned delivery system of comprehensive care management.

It is essential to: (2.a) establish and enforce policies for universal financial coverage of evidence-based cessation treatments; and (2.b) ensure service capacity is flexible, accessible, and meets the diverse needs of different smokers to use the appropriate type, intensity, and mode of treatment. A comprehensive care management system means that each smoker will receive continuity of care based on screening and triage into a level and type of treatment that meets their needs to enable smokers to receive the appropriate treatment (e.g., a Stepped Care approach; see Abrams et al. 1993;1996;2003, for details). Treatments can range from minimal/brief intensity (e.g., over the counter nicotine replacement, self help, or Internet-based interventions), to medium intensity (e.g., proactive telephone/brief primary care/managed care-based interventions), to maximum intensity (e.g., outpatient and inpatient multi-session clinical care delivered by specialists trained to treat severe nicotine addiction and comorbid psychiatric/substance abuse disorders).

(3) Establish a coherent, unified national policy for the integration of all the effective components that enhance cessation into a comprehensive system of care management.

Systems integration is arguably the single most critical missing ingredient needed to maximize the as yet unrealized potential to significantly increase population cessation rates. Systems integration includes: (3.a) putting what is known into widespread practice and policy and overcoming the barriers to implementation at every level (national, state, and local) of organizational systems structure, (3.b.) achieving continuity of care delivery via the alignment of the organizational infrastructure and the financial incentives within which health care and public health services are delivered, and (3.c) using quality indicators to ensure fidelity in the adoption and implementation of best cessation practices and continuous quality improvement based on measurable indicators. Key indicators for improving the fidelity of care include: surveillance; program, process and outcomes tracking measures as well as use of public access “report cards” to enhance consumer choice and to improve accountability across providers and their health service delivery organizations.

Since smoking is an addiction (a chronic, refractory, relapsing condition), for many smokers effective intervention requires a proactive and coherent strategy of strong care management—the same kind of “chronic disease care management” model being adopted for other expensive life-threatening conditions like diabetes and hypertension. An integrated system of care management with appropriate and aligned financial incentives must become part of the fabric of health care, public health, and policy at local, state, and national levels. An adequately financed system of care must be put in place and must be sustained over decades to cumulatively accelerate the trajectory of smoking prevalence reduction in the entire population within our lifetime.

While much is known about each of the successful components that will increase cessation rates, what is lacking is the integration of all the components to support a continuum of care management services. In many respects the single most critical issue for increasing population cessation rates lies in a lack of full “systems integration” of cessation tools and services that are already well known to be effective. Systems integration implies using the integrated knowledge base that we already have to inform the establishment of an overarching policy or set of policies. These policies must, in turn, support a comprehensive, seamless system of intervention care management at every level of societal structure (i.e., governmental, private sector, state and local public health, health care stakeholders, and delivery systems).

A comprehensive system of care management will require policies that align incentives, resources and political will for the greater long range good of improving the nation’s health. Full implementation of a comprehensive, integrated “systems approach” to smoking cessation can significantly accelerate population prevalence reduction, saving lives and money. Policies are urgently needed that will result in increases in: (a) all smokers’ interest in and motivation to quit but particularly targeting the underserved and those with comorbid conditions; (b) smokers’ health literacy about the range of safe and effective treatments available and how best to use them; (c) smokers’ demand for and use of proven cessation interventions that are tailored and targeted to their specific profiles; (d) maintenance of cessation (reductions in relapse rates); and (e) access to affordable treatment by restructuring the health and health care delivery systems via aligned financial incentives and policies that support continuity of care as well as the screening and delivery of comprehensive services at federal, state, and local levels (a system of comprehensive care management).

The major components of cessation treatment products and services are based on solid scientific evidence. Saving millions of lives and billions of dollars requires nothing short of strong political will to put into national policy what is known about effective ways to promote smoking

cessation and to make the financial investment required to support a unified system of cessation care management for all smokers.

REVIEW OF EVIDENCE

This appendix is structured into five sections, which focus selectively on the following areas:

1. Overview and rationale for investing in smoking cessation.
2. Understanding of smoker characteristics to reach more smokers and increase demand for cessation.
3. Evidence for efficacy and effectiveness of cessation interventions.
4. Future directions in cessation research and implementation.
5. Systems integration to increase the cessation rate and the trajectory of reduced prevalence.

SECTION 1 OVERVIEW AND RATIONALE FOR INVESTING IN SMOKING CESSATION

There are still over 45 million smokers in the US, comprising about 23 percent of the population (CDC 2004b). It is estimated that as many as half the current smokers, over 20 million human beings, will die prematurely of a smoking caused disease (Camenga and Klein 2004). Among the possible investments in preventive or palliative health care services available and reimbursed (e.g., treatment for diabetes, hypertension, cancer), smoking cessation remains one of the most cost-effective interventions per quality-adjusted life year saved (Cromwell et al. 1997; Fiore et al. 2004). Tobacco related diseases are costing over \$150 billion each year (CDC 2002) and reduce life expectancy by about 14 years (CDC 2002).

While primary prevention of smoking initiation among future generations will have a long term societal benefit, for the immediate future an urgent, aggressive, and vigorous effort directed at helping all current smokers to achieve lifelong cessation will save many lives and much money. Levy and colleagues (2000b), using a simulation model, projected that even if 100 percent of smoking initiation by all youth under 18 years of age was prevented, it would still take decades to reduce smoking prevalence by 50 percent if cessation rates remained at current levels. In another simulation model, Mendez and colleagues (1998) reported that if adoption of smoking at age 18 years remained constant at rates of 20, 25, 30 or 35 percent, then overall population prevalence of smoking would reach a steady state by 2045 of 12.2 percent, 15 percent, 18.4 percent, and 21.5 percent respectively.

Another reason to increase cessation is that it will save millions from premature disability and save money. As already demonstrated in California, cancer rates, heart disease, and savings in health care expenditures can be achieved by reducing smoking prevalence (Fichtenberg and Glanz, 2000; Warner et al. 1995; 1999). Nationwide, the overall cancer death rate in the United States has begun to fall for the first time in recorded history, primarily because of reductions in incidence and prevalence of lung cancer. These reductions are a direct result of smoking rates having declined from over 45 percent in the 1960s to under 23 percent in 2003 (CDC 2004a; Cole and Rodu 1996). In fact, Thun and colleagues (2006) reported that about 40 percent of the contribution to overall cancer deaths comes from the dramatic reduction in smoking prevalence since the 1960s.

There are other direct and indirect benefits to increasing the cessation rate at the population level. The following benefits are briefly noted. Accelerating smoking cessation among adults

will, in turn, reduce the number of role models who smoke, the number of children at risk for taking up smoking, the damage to the unborn fetus from maternal smoking during pregnancy (Buka et al. 2003), the amount of second hand smoke exposure to nonsmokers of all ages but especially to children, the risks and damage caused by fires from cigarettes, losses in productivity and absenteeism at work, and other direct and indirect costs of smoking and of passive exposure in terms of health and well being.

SECTION 1 SUMMARY

Increasing cessation rates to dramatically reduce population prevalence of smoking is possible but challenging. If an aggressive and immediate investment is not made in cessation interventions and policy, the consequences are devastating in terms of lives lost prematurely, reduced quality of life, and hundreds of billions of dollars in unnecessary expenses. Thus much more must be done to increase cessation among current smokers if a dramatic reduction in population smoking prevalence is desired and if millions of current smokers' lives are to be saved. Failing to act now to implement a nationwide comprehensive smoking cessation system of care is an extraordinary opportunity lost, with devastating consequences.

SECTION 2

UNDERSTANDING OF SMOKER CHARACTERISTICS TO REACH MORE SMOKERS AND INCREASE DEMAND FOR CESSATION

As outlined above, from a systems perspective, full impact of cessation interventions on the intended target population is a product of the proportion of the population reached and the efficacy of the intervention delivered to them ($\text{Impact} = \text{Reach} \times \text{Efficacy}$; see Abrams et al. 1993; 1996; 2003 for details). There are several ways to improve reach and efficacy from both individual and systems levels of intervention. Glasgow and colleagues (1999; 2003; 2006a) have expanded the concept of impact in their RE-AIM (Reach, Efficacy, Adoption, Implementation, Maintenance) model to include the individual and systems level considerations that reflect the need to measure and improve the fidelity of adoption and implementation of interventions, using measures of key indicators of quality and integrity of program, process, and outcomes evaluation at both the individual level and the delivery system level (see Abrams et al. 1993; 1996; 2003; Dziewaltowski et al. 2004; Glasgow et al. 1999; 2003; 2006a for more details). This section is focused primarily on the issue of reaching diverse groups of smokers, designing programs and services that can anticipate their needs, and planning for the increased demand for resources assuming that we are able to reach more of them and increase their motivation to make quit attempts.

Individual Bio-Behavioral Vulnerabilities and Demographics

There are a number of important individual and aggregate (i.e., group or population level) smoker characteristics associated with differences in smoking prevalence, motivation to quit, and with some cessation outcomes. Some of these factors are important in considering how best to reach more smokers, motivate them to try to stop smoking—and encourage them to use the best interventions available to ensure success—such as to reduce the high rates of relapse after quit attempts. Selected factors are briefly reviewed here to support the major recommendations of this appendix. A comprehensive critical review is beyond the scope and space limitations of this report. Factors include gender, education, income, SES, racial and ethnic background, and age.

There are also differences among subgroups of smokers in bio-behavioral variables such as their susceptibility to and their level of dependence on nicotine; the pattern of smoking over the years that they smoked; their motivation to quit; and their knowledge about the risks and benefits of smoking, the value of using smoking cessation programs, as well as the types of treatments available and how best to use them.

Dependence is defined by the American Psychiatric Association's Diagnostic and Statistical Manual (DSM IV-R) (APA 1994) using a fixed set of symptoms. Depending on the number of symptoms used to define dependence (Piper et al. 2006) and the response bias in the population of smokers surveyed, the percentage of dependent smokers can be as high as 87 percent (Hale et al. 1993). Withdrawal symptoms are also related to severity of dependence, and these symptoms may increase temptations to smoke to alleviate the withdrawal, especially in the first 30 days after cessation. Although a "cut point" for dependent versus not dependent is useful for some purposes, it is widely accepted now that there is an underlying continuum of dependence, from mild to severe (Shiffman et al. 1998) among all smokers. Greater nicotine dependence is related to lower motivation to quit; increased difficulty in trying to quit smoking; failure to quit; increase in prevalence of psychiatric of substance abuse comorbidity (e.g., depression, alcoholism) and, in some studies, to better treatment outcome with nicotine replacement therapy (Hughes 1996; Shiffman et al. 1998). However, it is important to note that nicotine replacement, evidence-based behavioral treatments, and now other pharmacological aids (see later in this appendix) increase all smokers' chances of quitting, regardless of level of dependence. The PHS (public health service) guideline therefore recommends that all smokers be advised to use nicotine replacement therapy (NRT) and other evidence-based treatments when trying to quit, except when nicotine replacement is contraindicated, such as during pregnancy or immediately post myocardial infarction (Fiore et al. 2000).

A detailed review of gender and smoking is beyond the scope of this chapter. The U.S. Surgeon General (DHHS 2004b) reported that since 1980, 3 million women have died prematurely from smoking related disease. Women differ from men in their biological responses to nicotine (Perkins et al. 1999). Some studies support the hypothesis that women have more difficulty quitting than men while others do not (Killen et al. 2002; Wetter et al. 1999). Sex-specific variables such as concerns about weight gain, stress reduction, and the need for social support may also underlie differences between men and women smokers. Some research suggests physical activity may help women smokers quit (Marcus et al. 1999). A recent report calls for more research to clarify the differences between men and women to improve treatment of women smokers (DHHS 2004).

Differences in demographic characteristics are most evident in smoking rates among those at disproportionate risk due to comorbidity (e.g., psychiatric, alcohol/substance abuse), disparities in SES, and among some racial and ethnic minorities. Smoking is over four times more prevalent (43 percent) in adults with lower educational attainment such as a GED than in those with a graduate degree (8.9 percent). Smoking rates are 17.0 percent for Asian Pacific islanders versus 34.0 percent for Alaskan American natives; 11.6 percent for those with more than 16 years of education versus 35.4 percent for those who did not complete high school; 12 percent for those older than 65 versus 29 percent for those 44 years of age or younger (CDC 1998). Augustson and Marcus (2003) defined hardcore smokers as established smokers over age 25 years, smoking 15 or more cigarettes per day and reporting no recorded history of quit attempts. Hardcore smokers make up 17.6 percent of all smokers, are more likely to be male, unmarried, unemployed, and

have a lower level of education. This hardcore subgroup may be a significant public health challenge in terms of reaching and treating them (Augustson and Marcus 2003).

At the state level of aggregation, Utah has the lowest prevalence (12.7 percent) and Kentucky the highest (32.6 percent) an almost threefold difference. Smoking prevalence is also lower than the national average (23 percent) in those states with strong, visible, comprehensive, and sustained antismoking programs (e.g., 16.4 percent in California and 19 percent in Massachusetts) (CDC 2004a). One population-based study suggests that higher smoking prevalence within a state may be associated with lower motivational levels of readiness to quit, fewer quit attempts, and heavier smoking (Etter 2004).

Generally, over 80 percent of adult smokers become regular users before the age of 18 years (CDC 1998). There has been a 32 percent increase in youth adoption of smoking between 1991 and 1997 in the United States (CDC 1998) and a 28 percent increase among college students (Rigotti et al. 2000). A unique window of opportunity exists for early cessation intervention among youth and young adults. This younger cohort of smokers has not received attention. Young smokers are a target population that has “slipped through the cracks” between the prevention and the treatment models of intervention (see Appendix D by Flay and Appendixes by E through H by Halpern-Felsher).

The past decade has seen numerous studies document strong relationships between smoking and psychiatric comorbidities. Depression, alcohol and other substance abuse disorders, adult attention deficit/hyperactivity problems, psychotic disorders, and anxiety disorders are associated with increased prevalence of smoking (Hughes 1993). One recent population-based study estimated that 44 percent of persons suffering from current mental illness were smokers (Lasser et al. 2000). Smokers with a history of depression are more likely to be diagnosed as nicotine dependent and to progress to more severe levels of dependence than persons without a history, and are less likely to quit smoking (Glassman 1997; Patten et al. 1998). Smoking rates of over 85 percent are observed in alcoholics, opiate addicts, and poly-drug users (Fertig and Allen 1995).

More alcoholics die of tobacco-related causes than from their alcoholism (Hurt et al. 1994). Smokers with a history of alcoholism are more likely to be nicotine dependent. Moreover, psychiatric comorbidities, whether historical or current, appear to significantly impede efforts at smoking cessation (Hughes et al. 1995; 1996); conversely, quitting smoking may significantly increase risk of relapse to major depressive disorder, at least among those with such a prior history (Glassman et al. 2001). Studies have been conducted on some populations at disproportionate risk, including racial and ethnic minorities, women, older Americans and a limited number on adolescents and young adults (see Appendix P by Wallace).

Preventing relapse among smokers who currently make quit attempts will have a very important impact on reducing population prevalence, along with reaching more smokers and motivating them to try to quit. Those smokers with comorbid complications and bio-behavioral vulnerabilities, such as increased dependence, do tend to relapse more often whether they quit on their own or even in formal evidence-based treatment. Although use of evidence-based interventions improves cessation outcomes for all smokers across the board, smokers who do have comorbidity and smoke more heavily generally do not achieve cessation at the same rates as smokers without such additional risks. While there is little evidence in support of treatment “matching” of smoker characteristics to specific treatment components (e.g., depressed smokers do not generally benefit more from cognitive behavioral treatment for depression (Brown et al. 2001), smokers who are at higher risk due to certain bio-behavioral or socioeconomic vulnerabilities may in-

deed benefit from more intensive, longer, or specialized clinical interventions (see review below of treatment efficacy).

In summary, the full impact of cessation interventions on the intended target population is a product of the proportion of the population reached and the efficacy and fidelity of implementation of the intervention delivered (Impact = Reach x Efficacy; see Abrams et al. 1993; 1996; 2003; Glasgow et al. 2003; 2006a,b for details). Thus, in addition to trying to motivate more smokers to make quit attempts, there is an enormous opportunity to further increase cessation outcomes. The vast majority of smokers who do make quit attempts, as many as 85–98 percent in studies of brief and self-help interventions, will relapse. As reviewed below and in subsequent sections, few smokers know about treatment efficacy, few use any treatments at all, and those who do use an evidence-based program may not use or have access to the best programs to address their individual vulnerabilities. Consequently, overall cessation can be improved by increasing the interest and motivation of smokers to make more quit attempts and to use evidence-based interventions when quitting to improve the likelihood of cessation and to reduce the likelihood of relapse.

Increasing Demand for Cessation

One way to increase the overall impact of cessation at the population level is to increase the reach of current interventions using social marketing and other behavioral principles to enhance smokers' motivation and interest in cessation. The following material reviews some of the factors that, in concert with the socio-demographic and bio-behavioral characteristics of smokers presented above, might be considered in making a case for increasing consumer demand for smoking cessation products and services. Characteristics of smokers and patterns of smoking at individual and group levels need to be considered in any plan for marketing and communications strategies to reach more smokers and to increase their motivation to quit and their demand for use of evidence-based cessation.

There is an enormous opportunity for improvement in cessation outcomes by reaching and motivating many more smokers to make quit attempts each year, by encouraging the use of proven cessation programs when trying to quit, and by targeting those with disparities in smoking rates and comorbidities. Increasing smoker motivation to make more quit attempts requires a multi-pronged set of intervention strategies targeted at multiple levels: (1) at all nonsmoking individuals and at smokers (e.g., increasing their health literacy, correcting misperceptions about smoking, and disseminating the facts about the safety and efficacy of cessation programs); and (2) at multiple systems levels of social and environmental structures and policies that can make smoking behavior more difficult and quitting easier at the peer, neighborhood, community, state and national levels (e.g., homes, schools, workplace bans; mass media campaigns and free OTC-NRT [over-the-counter nicotine replacement therapy]; tax disincentives).

Individual Level

Social marketing principles include the tailoring and targeting of campaigns to specific audience characteristics. Social marketing approaches would conceptualize smoking cessation programs as an attractive line of “products” that must be appropriately priced, packaged, positioned, and promoted in a competitive marketplace. In addition to the socio-demographic and bio-behavioral characteristics of smokers reviewed above, a number of other considerations may be

useful to improve the marketing and the reach of existing smoking cessation programs and services.

Effective social marketing to increase consumer demand must be driven by solid and appropriate social marketing principles, theories, and evidence. The marketing approach includes a number of elements such as understanding of each target audience's needs, characteristics, and perceptions including, for example, the accuracies and inaccuracies in smokers' knowledge of tobacco use and cessation and various approaches to risk perception, motivational enhancement (see Emmons 2003), and economic incentives.

About 43 percent of smokers make a quit attempt per year (Hughes et al. 2003). Thus, although over 70 percent of smokers say they intend to quit, 57 percent do not do so in a given year. Of those that make a quit attempt, some studies report that less than 20 percent of quitters use proven treatments, and relapse after an unaided quit attempt is more than twice as high as when a proven treatment is used (Zhu et al. 2000). Moreover, of smokers motivated to quit, 78 percent believed they were just as likely to quit on their own as with cessation intervention assistance (Zhu et al. 2000). Those participants who did believe cessation methods were effective were more likely to intend to quit (OR 1.8), make a quit attempt (OR 1.8), and to use intervention assistance when quitting (OR 3.62). Zhu and colleagues (2000) also reported that smokers who used an intervention (self-help, counseling and/or NRT versus those who quit on their own were twice as likely to succeed (7 percent vs. 15.2 percent), abstinent at 12-month follow up) and that heavy smokers were more likely to use assistance than light smokers, women more than men, and older more than younger smokers. Thus, there is an enormous opportunity to increase population prevalence of smoking cessation by reaching and motivating the 57 percent of smokers who currently make no quit attempts per year. Among those who do make a quit attempt, their success rate could at least be doubled for those 80 percent who quit on their own if only they used an evidence-based intervention. Reaching and motivating more smokers to make quit attempts each year and having them use proven treatments when they do quit would dramatically increase population cessation rates nationwide.

Some smokers come into treatment due to pressure from others. Motivation is best when it is intrinsic (comes from the smoker him/herself) and is tied to a realistic evaluation of the benefits of stopping versus the benefits of continuing to smoke (Curry et al. 1991; Curry et al. 1997). When a smoker is not really ready to quit and lacks self-confidence to try, then it is neither surprising that he or she will fail to quit when asked to try nor that the treatment provider will become discouraged from advising him/her to quit again in the future. Both smokers and their providers often have unrealistic expectations (Abrams et al. 1991; 1993; 1996; 2003). The mismatch between smoker readiness (not ready) and provider enthusiasm (you should quit today) is most evident in settings that require a provider to proactively reach out to smokers who are not seeking treatment for their smoking. Such settings include non-volunteer populations such as all the smoking members of a managed care organization, a worksite, a hospital, or in a substance abuse rehabilitation program (Abrams and Biener 1992; Abrams et al. 1993; 1996; 2003).

The Stages of Change (SOC) model (Prochaska and Velicer 2004) lends itself to the development of interventions that are tailored to the smoker's motivational readiness to change. The SOC model also provide a useful roadmap for smokers in that it provides milestones (pre-contemplation, contemplation, preparation, action, maintenance) and guidelines for processes used at every phase of the journey from smoking initiation to various patterns of use to various efforts at cessation, relapse, and recycling to the ultimate success of permanent maintenance of cessation. Both smokers and the health delivery systems (public health and health care) can

therefore use metaphors such as the journey from smoking to cessation to develop interventions that take into account continuity of care and the need for a systematic and dynamic approach to management of the cessation process (chronic disease management model; see further in this appendix as well as Abrams et al. 2003). Population surveys show that only a small minority of current smokers (14–28 percent) is motivated to quit in the next 30 days (Abrams and Biener 1992; Velicer et al. 1995). Members of managed care groups such as Health Maintenance Organizations (HMOs) have higher levels of motivational readiness than the general population, with as many as 70 percent planning to quit within 6 months (Hollis et al. 1993).

Wewers and colleagues (2003) measured the distributions by readiness to change. Desire or intention to quit, using the Stages of Change measure, was examined from data collected in 3 Tobacco Use Surveys (1992–1993, 1995–1996, and 1998–1999). Results indicated a similar distribution across all three time points indicating very little movement in the stages of readiness to change in the U.S. population during the 1990s. The percent in each stage was 59.1 percent in pre-contemplation (not seriously thinking of stopping within the next 6 months), 33.2 percent in contemplation (planning to stop in the next 6 months but not in the next 30 days or planning to stop in the next 30 days but made no quit attempts in the past 12 months), and 7.7 percent in preparation (planning to stop in the next 30 days and made a quit attempt of at least 24 hours duration in the past 12 months) (Wewers et al. 2003). However, Etter (2004) reported that there was an association between smoking prevalence and stages of change in the United States across the 50 states, such that a higher prevalence of smoking was associated with lower motivation to quit, fewer quit attempts, and higher cigarette consumption.

Among youth 55 percent of middle school students and 61 percent of high school students said they wanted to stop smoking, and overall 59 percent of current smokers reported they had tried to stop smoking in the 12 months preceding a national Behavior Risk Factor Survey (CDC 2001). Among middle school students, 80 percent thought secondhand smoke was harmful to them while 89.8 percent of high school students thought secondhand smoke was harmful to them. Research also indicates that 24 percent of young girls aged 12–18 years believed that they could stop smoking whenever they wanted to even if they smoked regularly, and this myth was even more prevalent among girls who were already smokers (41 percent) (Portor Novelli Communication styles 2002).

The PHS clinical guide (Fiore et al. 2000) does recommend motivational enhancement interventions for individual smokers who are not motivated to quit (for more details on motivational factors see Emmons 2003). Moreover, the PHS guide (Fiore 2000) recommends that smoking status and then intervention (the five A's) be made a “vital sign” along with temperature and blood pressure in all encounters between patients and any aspect of the health care delivery system. Evidence is presented that such a system can increase identification of smokers from 38 percent to over 65 percent in a health care setting and that this, in turn, can also double the cessation rate among smokers from 3 to 6.4 percent. If these PHS guidelines were implemented nationwide by all health care providers and all health care organizations, it alone would dramatically increase the number of smokers reached and provide an opportunity to motivate them, educate them about the best ways to stop smoking, and provide them with evidence-based cessation interventions.

Smoking prevalence and patterns of uptake, use, and cessation are also strongly influenced by the advertising and targeted marketing of the tobacco industry. The tobacco industry in the United States spent over \$15.15 billion in 2003 on marketing its lethal products (FTC 2005). The tobacco industry continues to aggressively promote smoking with attractive new products, novel

incentives, and creative marketing strategies. Forces promoting smoking and future innovations in tobacco products include so-called “potentially reduced exposure products” (PREPs), discount prices, free samples, and desirable paraphernalia such as T-shirts and sports bags. The industry has been especially successful at targeting young adults and minority groups over the last decade. Media and marketing efforts to promote cessation or to increase demand and motivation for cessation programs pale in comparison to the myriad of forces used by the tobacco industry to encourage and sustain smoking behavior and their market share of specific brands and products. Recent concerns have been raised that tobacco industry-sponsored programs for prevention and cessation may be using interventions that either have not been evaluated or are relatively weak or ineffective, thereby competing with more effective programs and potentially diluting the impact of more powerful evidence-based programs in schools, communities, and on the Internet (Mandel et al. 2006).

Shiffman and colleagues (2001) examined the effects of counter-advertising messages on tobacco industry-created beliefs about the effects of “light” and “ultra light” on quitting beliefs and intent. Smokers of these cigarettes continue to believe they are less harmful than regular cigarettes, and debunking these myths may encourage cessation (Kozlowski et al. 2000). The study found that messages focused on the sensory perceptions that these cigarettes were less harsh resulted in the most positive changes in beliefs about safety, delivery, and intent to quit. The authors concluded that addressing sensory dimensions may be a promising strategy for changing smoker’s misperceptions about “light” and “ultra light” cigarettes and enhancing their intent to quit. In a follow up study, Shiffman and colleagues (2004) examined the effects of marketing PREPs on smoker beliefs. They concluded that reduced-risk tobacco product claims undermine adult cessation and youth prevention. PREPs appeal to smokers contemplating cessation and exposure to PREPs claims appears to undermine smokers’ readiness to quit, especially among young adults ages 18–25 years. Media campaigns that educate smokers about beliefs in the addictiveness of smoking, the dangers of secondhand smoke exposure, and the tobacco industries’ use of deceptive advertising are associated with smokers’ increased consideration of cessation, especially if there are children in the home (Netemeyer et al. 2005). A recent article outlined 12 common myths that undermine tobacco control methods. Some myths stem from misunderstanding, while others seem to be deliberately promulgated by the tobacco industry (Freiden and Blakeman 2005). Media counter-advertising to creative tobacco industry marketing is an important component in increasing smokers’ interest in cessation and neutralizing tobacco industry targeting of smokers and potential smokers to undermine their motivation to stop smoking or not start smoking.

McDonald (1999) reviewed the field of population-based recruitment to examine the use of potential communications strategies to encourage enrollment in smoking cessation. Recruitment (i.e., reach) was defined as the number of smokers who enrolled in a cessation program divided by the estimated total number of smokers in the target population. Over 30 studies reported the results of 40 recruitment campaigns and the median recruitment rate was 2 percent. Studies that used interactive recruitment methods (e.g., telephone, interpersonal communications) were 66.5 times more successful than those using passive recruitment (e.g., direct mailing). McDonald (1999) suggests more attention is paid in designing population-based recruitment strategies and the use of interpersonal channels of communication.

Hammond and colleagues (2004) examined smokers’ awareness and perceived effectiveness of cessation methods in a random digit dial survey of 616 smokers in Canada (76 percent response rate). 87 percent of respondents said they wanted additional information on where to get

help quitting, 86 percent wanted information about how to quit, 85 percent wanted information on the benefits of quitting, 70 percent wanted information about a toll free telephone quitline, and 68 percent wanted to see a website address. They reported poor recall of cessation intervention methods with recall percentages as follows: 11 percent cited counseling programs, 6 percent behavioral tools, 5 percent brief physician counseling, and only 43 percent OTC NRT, despite nicotine patch being so heavily advertised by the pharmaceutical industry.

Yong and colleagues (2005) reported that older smokers (>60 years of age) perceived themselves to be less vulnerable to the harmful effects of smoking (self-exempting beliefs), less concerned about the health effects of smoking, less confident about being able to quit (self-efficacy), and less willing to want to quit. However, price of cigarettes, health providers advice, cheap quitting medication, and health risk information were predictors of quitting intention, and cigarette price and cheap medication were also associated with more recent quit attempts. In an interesting study of the characteristics of smokers who want to quit but have not (dissonant smokers), Paretti-Watel (2003) reported five different profiles using a cluster analysis. The clusters included younger smokers who were not interested in cessation but were sensitive to price of cigarettes; two groups who were healthy, moderate smokers who had many failed quit attempts and who preferred cessation without any medical assistance and were not concerned about adverse health effects; and two groups who were highly addicted to nicotine and who preferred medical help with cessation—this group was in poorer health and afraid of smoking-related diseases. The study suggests that there are a variety of subtypes of smokers and that marketing strategies to reach, motivate, and help them with cessation efforts will need to be targeted and tailored to these characteristics. However, prospective controlled studies have not been done to show that such tailored strategies will significantly increase readiness to quit and use of proven interventions when quitting.

Cummings and colleagues (2004) investigated what smokers say about the impact of different population-based interventions to motivate them to think seriously about stopping smoking using a random digit dial cross-sectional telephone survey of adult current cigarette smokers. A total of 815 smokers were asked which of eight interventions would motivate them to think seriously about stopping smoking in the next 6 months. The offer of free nicotine patches or gum (53 percent) and cash incentives (49 percent) were the most frequently mentioned interventions that smokers said would get them to think seriously about stopping smoking. The degree of motivation to stop smoking was the most consistent and strongest predictor of how respondents answered the question about the influence of the various intervention options.

No two smokers are identical; smokers smoke and stop smoking for different reasons, and each smoker has a unique profile of genetic predisposition and environmental experiences individual difference characteristics. To accelerate movement along the journey from smokers who are not motivated to make quit attempts to those who successfully maintain cessation for the remainder of their lives requires intervention planners and policymakers to offer a wide array of interventions that are likely to appeal to different subgroups of smokers and individual smoker needs in order to have a population impact. A variety of targeted and tailored interventions need to be considered as well as the offering of incentives that reward smokers for making quit attempts and for maintenance of cessation.

Systems Level

There is an inexorable social movement across the developed nations to increase restrictions on smoking and to protect the general public from the harms of environmental tobacco smoke

(ETS) exposure. The typical sequence of implementation of restrictions in a nation includes first workplace bans (initially voluntary and later mandatory) then increasing restrictions in public places, on mass transport, in restaurants and in bars and clubs as well as recommending voluntary restrictions in private homes and cars.

About 69 percent of U.S. worksites are smoke-free (American Cancer Society 2003). Employees in workplaces with total smoking bans have higher rates of cessation and smoked fewer cigarettes (Longo et al. 2001). But meta-analyses suggest little direct impact of workplace restrictions on cessation (Moher et al. 2005). Workplace studies aimed at the workforce as a whole included 14 studies of smoking bans; meta-analyses supported the hypothesis that bans reduced consumption during the working day and possibly overall consumption and quit attempts but not overall cessation.

To study the effects of restrictions on smoking, Borland and colleagues (2004) and Hammond and colleagues (2006) surveyed smokers in four countries (Canada, United States, United Kingdom, and Australia). In general, results were similar across the four countries. For the United States results were as follows (weighted for age and sex and stratified for major geographic regions): 65.5 percent reported smoking was not permitted anywhere in their workplace; among those who went to a restaurant in the past 6 months, 19 percent reported total indoor bans and 11.9 percent said there were restrictions; 15 percent of smokers said they never allow smoking at home while 34 percent had some restrictions on smoking at home and 40 percent had no restrictions at home. Total bans in smokers' homes declined with age, cigarette consumption, and self-exempting beliefs and increased with education, income, reported bans in restaurants and bars, presence of a nonsmoker adult in the home, better reported health, and believing that ETS was harmful to others. Farkas and colleagues (2000) reported that adolescents ages 15 to 17 years who lived in homes with smoking restrictions were 74 percent as likely to be smokers as adolescents who lived in households without smoking restrictions. Likewise, adolescents who worked in smoke-free environments were 68 percent as likely to smoke as those in workplaces with no smoking restrictions.

Fong and colleagues (2006) reported on the impact of smoke-free workplace legislation on smokers in Ireland which, on March 29, 2004, became the first country in the world to implement comprehensive smoke-free legislation in all workplaces with few exemptions. Fong and colleagues (2006) used a quasi-experimental design and interviewed 1,000 randomly selected adult smokers from Ireland and 600 from the United Kingdom before the ban (December 2003–January 2004) and after the ban (December 2004–January 2005). As expected, reported smoking in bars and pubs dropped after the ban from 98 to 5 percent in Ireland and remained at near 98 percent in the United Kingdom. In restaurants, the smoking rate dropped from about 84 percent in both Ireland and the UK to 3 percent in Ireland and about 62 percent in the UK. In shopping malls the rate dropped from 30–40 percent in Ireland and United Kingdom to near zero in Ireland and 20 percent in United Kingdom. In worksites, the rate dropped from over 61 percent in Ireland and just under 40 percent in the United Kingdom to about 14 percent in Ireland and about 38 percent in the United Kingdom. Ninety-eight percent of Irish smokers reported there was less smoke in pubs than the prior year, while only 35 percent of UK smokers said there was less smoke in pubs than a year ago.

In general, a barrier to policy change is the perception that smokers would not support a smoke-free law. Fong and colleagues (2006) examined these perceptions before and after the ban in Ireland compared with the United Kingdom and noted that the odds ratio (OR) was 6.38 (4.37–9.32) for the increase in support among Irish smokers for a total ban in pubs compared to

UK smokers. During the one year interval between the surveys, support increased from about 2–7 percent in the United Kingdom and Ireland before the Irish ban to over 40 percent in Ireland and about 10 percent in the United Kingdom. Significant differences in the same direction were noted in restaurants (OR 3.91 [2.89–5.30]) and workplaces (OR 2.78 [2.08–3.72]), as well as at fast food outlets, shopping malls, train stations, and in trains. Overall, 81 percent of Irish smokers reported that the smoke-free law was a good or very good thing, and the proportion of Irish homes with smoking bans also increased. After implementation of the law, 62 percent of Irish smokers supported the total ban in pubs compared with 26 percent of UK smokers. Moreover, 79 percent of Irish smokers who reported quitting smoking after the ban said that the smoke free law made them more likely to quit, and 90 percent stated the law helped them to avoid relapse. 46 percent of Irish smokers who were still smoking after the ban said the law made them more likely to quit and 59 percent of Irish smokers said the law made them cut down on the number of cigarettes they smoked.

The Irish smoke-free workplace law has been a public health success with very high compliance. It resulted in a dramatic reduction in ETS smoke; a substantial increase in support for the law among smokers; reports from smokers that the law has helped them to quit, try to quit, or cut down on the amount they smoke; and there is no evidence of shifting smoking to private venues. The pre-implementation campaign may have helped achieve these results.

Frieden and colleagues (2005) reported on the effectiveness of a large-scale distribution of free NRT patches in New York City. After increases in cigarette taxes and the implementation of smoke-free workplace legislation, a large-scale distribution of free NRT was undertaken and evaluated at 6-month follow up. An estimated 5 percent of all eligible New York City smokers of 10 or more cigarettes per day (34,090 smokers) who called a toll-free quitline were given a 6-week course of NRT and brief follow-up counseling was also attempted. Most (64 percent) were non-white, foreign born, and/or resided in a low-income neighborhood. Using a conservative intent to treat analysis (all non-respondents were smoking at 6-month follow-up), the cessation rate was 20 percent. Those who received counseling were also more likely to quit than those who did not (38 vs. 27 percent). They estimated the cost per quit was \$464. Easy access to free NRT cessation medication in diverse populations can help large numbers of smokers to quit.

In a related report, Frieden and colleagues (2005) examined the impact of the comprehensive tobacco control measures of increased excise taxes, legal action for smoke-free workplaces, and increased cessation services—including the free NRT patch program, education, and evaluation. The authors reported that from 2002 to 2003 smoking prevalence in New York City decreased by 11 percent from 21.6 to 19.2 percent, equivalent to about 140,000 fewer smokers. During that time, cigarette purchases outside of New York City doubled, effectively reducing the effective price increase by 33 percent. They concluded that concerted action can have an impact on sharply reducing local smoking rates in a defined population (New York City) but that further effectiveness will require a comprehensive and coordinated national plan to reduce evasion of the local tax increase.

The task force on Community Preventive Services (Hopkins et al. 2001) reviewed the evidence for making an impact on quitting of 15 tobacco control strategies and strongly recommended multi-faceted media campaigns (i.e., media combined with other tobacco control interventions). Fiore and colleagues (2004), as part of their recommendations to encourage an additional 5 million smokers to quit, recommended funding a \$1 billion national media campaign out of a \$2.00 a pack earmarked tax as well as a national proactive telephone quitline at a cost of \$3.2 billion per year. Media campaigns can encourage and increase cessation attempts and cessa-

tion across a variety of populations and can be tailored to address high-risk groups and disparities (Boyd et al. 1998; Siegel 2002).

Sociodemographic and selected behavioral and social environmental factors are also associated with facilitating cessation. For example, Saihpush and colleagues (2003) reported that knowing ETS exposure is harmful and smoking onset before age 14 was associated with greater likelihood of cessation. In addition, the odds of quitting were 4.5 times as likely for smokers living in homes where smoking was banned and 3.2 times greater for smokers reporting that few or none of their friends smoked. Their study suggests that it is difficult to quit smoking if the proximal environment is filled with smokers and thus interventions need to take the social context into consideration in smoking cessation programs.

Mass media campaigns can be effective at increasing interest in and motivation to quit when they are part of integrated community interventions, such as the comprehensive programs, monetary and other incentives (e.g., free NRT, tax disincentives, workplace bans), and interventions illustrated in the New York City and other case study and research trial examples reviewed above.

SECTION 2 SUMMARY

Current effective cessation programs exist but are greatly underutilized, despite the social climate that is making it more difficult to smoke (e.g., bans in worksites, higher taxes). The percent of all the 45 million current U.S. smokers who make a quit attempt each year is less than 45 percent. Of those that try to quit, over 75 percent do so on their own and over 95 percent of them fail to sustain abstinence. Using even minimal intensity or brief evidence-based cessation programs and services generally doubles the likelihood of success (see review below), and furthermore, there is a dose–response relationship such that more intensive programs and combined pharmacological and behavioral coaching programs can quadruple the likelihood of success. There is substantial room to improve the overall cessation outcome rate at every step of the journey from being an unmotivated current smoker who does not even make a quit attempt to reducing or preventing relapse among any smoker who makes a quit attempt.

The tobacco industry-sponsored marketing activities have also been shown to change smokers risk perceptions and expectations about safe cigarettes and motivation to quit. In short, they create myths and misinformation and undermine motivation to quit. Many smokers are also not aware of the safety and proven efficacy of formal treatment programs; for example, some smokers (as many as 67 percent) believe NRT may be as dangerous to one's health as smoking. Thus, there is a strong need for more aggressive campaigns directed at smoking consumers that will improve their health literacy about tobacco products and about the value and safety of using evidence-based interventions. Many smokers have significant gaps in their health literacy, lacking specific knowledge of cessation methods, success rates, and how best to use cessation resources.

The weak marketing of cessation products and services relative to the tobacco industry's capability results in many smokers harboring misinformation about the safety and efficacy of treatment, such as the misperception that PREPs are indeed relatively "safe." The countervailing tobacco industry forces undermine smokers' motivation to quit and weakens their health literacy about the health damaging effects of tobacco products and the beneficial effects of proven cessation products and services (e.g., Cummings et al. 2002; Cummings et al. 2004a; Cummings et al. 2004b). Having effective and efficient proven programs and services is necessary but not suffi-

cient to reduce population prevalence. The last decade has disproved the assumption “if you build it, they will come.” This supply side strategy of “if you build it, they will come” has not generated enough successful quitters to make a significant impact on reducing overall population smoking prevalence; both supply and demand strategies are needed.

In sharp contrast to the ongoing massive tobacco industry marketing campaigns, the financing in support of cessation and the marketing and promotion of information about cessation is miniscule. Herein lies a vast, largely unrealized, and untapped potential. Research studies illustrate the potential power of using financial incentives, mass media, and other strategies to motivate and support cessation (e.g., giving free NRT and telephone counseling in New York City). There are a number of other contextual and systems level factors that may discourage smoking and motivate smokers to quit: smoke-free laws and their enforcement (e.g., the workplace bans in Ireland and elsewhere), free state-supported proactive telephone quit lines, free OTC NRT, and low cost Internet-based cessation and relapse prevention (available 24/7/365 worldwide via the World Wide Web). Recent movement in the direction of increasing financial support for cessation includes the decision by the very influential federal Centers for Medicare and Medicaid Services (CMS) to reimburse for some of the proven cessation treatment services in their Medicare program as of March 2005. New generations of improved pharmacotherapies, behavioral counseling programs, and other innovations will also become available (see later sections in this appendix).

There are also large disparities in smoking rates with much higher prevalence among lower SES groups, some racial and ethnic minorities, and those with comorbid psychiatric/substance abuse conditions (see Wallace, Appendix P). Few smokers are fully informed consumers. The majority of smokers are relatively unaware of the differences in quality, content, safety, and efficacy of the various proven and unproven cessation interventions that are marketed to them. They neither know how to choose a program that best suits their needs nor what to do if they have difficulty quitting with a program and need a more intensive cessation care plan.

SECTION 2 RECOMMENDATIONS

The current smoker’s journey towards successful cessation needs a clear roadmap and milestones. This roadmap must be widely disseminated to educate and guide smokers through the phases from not being motivated to quit to making as many quit attempts as is needed (relapse and recycling) and learning how best to use the specific types of evidence-based programs that suite their unique individual profiles of patterns and needs until they can permanently maintain cessation.

There is a pressing need to focus on increasing consumer demand for cessation among smokers using well-established, theory-driven methods from social marketing and behavioral, social, and economic sciences. Creating strong consumer demand for quality programs requires greater emphasis on social marketing principles to address factors such as: product, providers, price, placement, promotion, and policy. Smokers must be educated that smoking is a journey from adoption to addiction to cessation.

A substantial investment must be made in research and in practice to determine what different smokers need and want, to clearly educate and communicate to them what is available to meet their needs, how to use the tools available for quitting, and what it is they should be doing

to improve their cessation success. Cessation products and services need to be made more attractive, accessible, and convenient.

Moreover, mass media and other channels of communication must be coordinated, aligned, and sustained in comprehensive, coordinated policy plans over time to motivate and promote cessation using key messages persistently and in novel ways.

Special emphasis must be placed on those smokers who are hard to reach, hard to motivate, hard to treat, and hard to maintain contact with. Surveillance and other modern epidemiological and geographic coding tools must be used to identify subpopulations of smokers based on socio-demographics, disparities, comorbidities and other factors in order to identify and target pockets of high smoking prevalence—those with low motivation to quit; little knowledge of cessation programs; and those communities and neighborhoods that lack the resources, the access, and the finances needed to provide proven cessation programs and services.

It is recommended that the federal government and health care delivery systems develop policies that mandate and implement a substantial, sustained, and effective marketing strategy to reach all smokers, with emphasis on hard-to-reach groups and communities with high pockets of prevalence. The campaign should deploy novel, persistent cues to action; should be designed to increase consumer awareness of the range of best practices available for cessation; should increase consumer ability to identify which programs meet best-practice guidelines; should motivate and provide strong incentives (e.g., contingent reward) for smokers to make quit attempts using evidence-based programs and services; and should help smokers understand the journey from smoking to cessation and the phases in the process of trying to quit—cessation, relapse and recycling—until permanent cessation success is achieved.

Among the areas to consider:

- Develop a credible “consumer report” and certification to identify for consumers those cessation treatments and services that meet evidence-based quality standards.
- Use social marketing principles and novel, persistent, and compelling cues to action to mount substantial and sustained mass media, direct-to-consumer marketing and other communication strategies and channels to reach all smokers with targeted messages addressing ways to increase consumer demand for cessation and encourage use of evidence-based intervention programs when quitting.
- Focus special social marketing strategies on the hard-to-reach and hard-to-motivate groups, such as those with the highest levels of smoking prevalence, greatest comorbidity, and those at largest disproportionate risk. Target “pockets of high risk prevalence”; in other words, the hardest to reach, hardest to motivate, and hardest to treat smokers (this means the 57 percent who make no quit attempt in a given year, those with comorbid psychiatric or substance abuse disorders, the uninsured, the unemployed, and those of lower SES and educational backgrounds who have the highest smoking prevalence rates are the least likely to be able to afford the more intensive and effective treatments and have poor or no access to health care settings).
- Increase consumer awareness of the processes involved in cessation, the range of best practices available for cessation, and provide realistic expectations of the commitment required for success.

- Use specific incentives to motivate smokers to make serious quit attempts (e.g., free NRT, full reimbursement for treatment services, quit and win contests).
- Increase enforcement and use of policies that restrict smoking and protect nonsmokers from secondhand smoke exposure, motivating smokers to consider cessation and reducing the number of proximal cues in the environment (other smokers) that tempt smoking and precipitate relapse.
- Health plans, insurers and public agencies—individually or collaboratively—should use specific incentives to motivate smokers to make serious quit attempts using proven behavioral strategies including monetary incentives (e.g., free NRT, full insurance reimbursement for cessation treatment services and medications).

In terms of outcomes, goals, and objectives, it is recommended that a national adequately funded and effective multi-media campaign be implemented to:

- educate smokers about the types of evidence-based interventions available and how they can choose and use these programs more appropriately and dispel the myths smokers have about cessation methods;
- reach and motivate many more smokers to increase the percentage of smokers who make quit attempts per year, especially the 57 percent of smokers not interested in making quit attempts, those at high risk, minorities, young adults 18–30 years of age, the uninsured, and smokers with health disparities; and
- encourage the smokers who do make a quit attempt each year to always use evidence-based programs when they try to quit (less than 30 percent do now), including educating them about smoking as a journey and informing them that they have the option to keep trying different cessation methods if at first they do not succeed at quitting. Specifically, educate smokers about a Stepped Care approach to cessation so that they can try less intensive and easily accessible programs (e.g., national or state telephone quit-lines, evidence-based internet programs with or without OTC NRT), as well as to consider the more intensive programs involving face-to-face contact, formal clinics, multi-session cognitive-behavioral treatments, prescription medications, and specialized services, especially if they have tried and failed to quit using less intensive methods, have psychiatric or substance abuse comorbidities, and are more heavily addicted to smoking.

The following outcome targets are recommended:

Goal #1: Increase consumer demand for evidence-based cessation programs and services.

Objective #1: Double the proportion of smokers who make quit attempts each year from the current rate of 40–45 percent per year to 60–70 percent within five years and 80–90 percent within 10 years).

- Mount a substantial and sustained mass media/social marketing strategy to reach all smokers (especially the hard-to-reach groups at disproportionate risk).

- Debunk the myths and misinformation that smoking consumers have and increase consumer demand and awareness of the realistic processes and the range of evidence-based cessation programs and practices available and how best to use them.
- Use specific incentives to motivate smokers to make quit attempts using proven behavioral strategies including monetary incentives and disincentives (e.g., free NRT giveaways as in New York City; full reimbursement for all evidence-based treatment services, contests, and worksite incentives).
- Lower the barriers to cessation and make the bar to try to quit so low that many more smokers will be tempted to try to quit and to try again more quickly if they do not succeed.
- Increase environmental restrictions on smoking and reduce secondhand smoke exposures and encourage nonsmokers and ex-smokers to support smokers in their efforts at reducing the harm of smoking to the smokers themselves and to those around them as a step towards cessation.

SECTION 3: EFFICACY AND EFFECTIVENESS OF CESSATION INTERVENTIONS

Efficacy Trials

Generally, there is broad consensus supported by a wealth of evidence from randomized controlled trials (RCTs), meta-analyses, and critical reviews showing that proven smoking cessation interventions (either behavioral or pharmacological) will roughly double the quit rates of users versus controls (see PHS Clinical Guide by Fiore et al. 2000 as well as Hughes et al. 1996 and Raw et al. 1998). Combined behavioral and pharmacological treatments can result in as much as a three to fourfold increase in cessation outcomes. Given the evidence and excellent consensus reports that have been published to date, a comprehensive review of the evidence supporting the best practice recommendations of the PHS report will not be covered in detail here (Fiore et al. 2000).

Although the empirical evidence for efficacy of cessation interventions (Fiore et al. 2000) is based on over 6,000 studies, with over 300 Randomized Controlled Trials (RCTs) meeting stringent criteria for inclusion in intensive meta-analyses, the RCTs are limited in generalizability to the relatively small samples of smokers recruited and treated under ideal conditions. Participants generally are motivated to quit, aged in their 40s, and tend to be of higher SES. Participants are self-selected volunteers; in other words, samples of convenience not representative of the diversity of smokers in the population at large. Participants in clinical RCTs represent less than 5 percent of smokers: those who are ready to quit in the next 30 days (Biener and Abrams 1991; Prochaska and Velicer 2004; Velicer et al. 1995).

In general, greater intensity of treatment (duration and number of contacts, more modalities of intervention) improves cessation outcomes. Although the following classification is an oversimplification, for many purposes, intervention intensity can be classified into three categories: (1) none to minimal, (2) low to moderate, and (3) maximal. Abstinence at a minimum of 6-month follow-up is related to the intensity of the intervention in a dose-response fashion. Abstinence rates range from: (1) about 2–10 percent for smokers quitting on their own, using self-help materials or when they are in the control condition of RCTs; (2) 10–20 percent for brief, low-to-moderate intensity interventions; (3) 20 to over 30 percent for maximally intensive individual or

combined pharmacological and behavioral interventions (see PHS Clinical Guidelines by Fiore et al. 2000 for summaries).

Some evidence supports the concept that tailoring of interventions to individual smoker characteristics or targeting of intervention to group characteristics (e.g., race or ethnic background, gender, age) improves outcomes and that smokers with comorbidity (e.g., psychiatric disorders, alcohol or substance abuse) perform more poorly, especially without using a proven treatment (Niaura and Abrams 2003). As intervention strategies shift from treating individuals in clinical settings to intervening on defined populations in communities, factors such as cost, training of providers, and the pragmatics of coordinated systems of delivery become paramount (i.e., moving from clinical to dissemination to policy research evidence). Interventions of different types and of varying intensity and quality can also target different “defined” populations based on geographic (e.g., neighborhood and community), socio-demographic (e.g., age, gender, race, ethnic and cultural background), pockets of high risk prevalence (low SES groups, the uninsured, alcohol and substance abusers, those with psychiatric comorbidity) or other defining criteria.

In general, RCT interventions, when targeted and tailored to specific defined populations such as African Americans, women, older smokers, and other groups have reported similar or lower outcome efficacy compared with clinical trials interventions reported in the PHS Guide (Fiore et al. 2000). Research targeting smokers with medical comorbidity, such as cardiac patients, generally have higher rates of cessation and maintenance of cessation than other groups reported in the PHS guide when treated as part of their acute medical conditions such as after heart attack or cancer diagnosis (DHHS 2004).

Smokers with psychiatric comorbidities, depression, and alcohol or substance abuse disorders also appear, in some studies, to be able to quit at reasonable rates compared with smokers without comorbid complications (Prochaska et al. 2004), but other studies suggest smokers with comorbidities have more difficulty with cessation and may be less inclined to seek or receive appropriate levels of specialized treatment that their comorbidities may require for ultimate success.

In general, the range of effect sizes and cessation rates reported in the meta-analyses of the PHS Guide (Fiore et al. 2000) can be used to estimate the impact of cessation interventions in clinical RCTs conducted in different settings with different subgroups of smokers. Effects are in the range of about 5 to over 30 percent abstinence rates as a function of the dose–response relationship between intervention program intensity (unaided, low, moderate, high) and outcomes (Fiore et al. 2000). When attempting to calculate population-level impact, however, the results are limited in generalizability because of the types of participants and recruitment methods used in clinical RCTs and lack of information regarding the denominators of the population they were recruited from (Glasgow et al. 2006a;b)

There is a positive dose response relationship between amount and intensity of intervention and outcomes suggesting that some type of Stepped Care model for intervention may be warranted with smokers who either fail at lesser levels of care (e.g., brief treatment) or who have comorbid complications known to diminish outcome efficacy (see Abrams et al. 1993; 1996; 2003; Orleans and Slade 1993 for details). For example, smokers may be assigned to one or the other of a two-tier intervention, either standard care (e.g., brief behavioral counseling and/or OTC NRT), or more intensive specialized care in an outpatient clinic staffed with specialists in addiction treatment, psychiatric comorbidity, and ability to review and provide prescription medications.

Dissemination Trials

Interventions that are translated from clinical to community settings to proactively reach more smokers in a cost-effective manner reveal considerable variability in outcome effectiveness as a function of more heterogeneous users or target group characteristics, program, provider, delivery system and other contextual or setting factors. In general, effectiveness is less than that reported in RCTs and effect sizes are more difficult to calculate with confidence.

Channels of intervention delivery must also be factored in, such as health care organizations and medical settings from hospitals to private practice, worksites, schools, telephone quit lines, the Internet, and other print and electronic media. Systems-level models are needed to address the diversity of channels and of populations of users. Models become more relevant such as Stepped Care, the tailoring of interventions to motivational readiness to quit (e.g., SOC model, motivational interviewing), and the targeting of interventions to channels or to population groups. The dose–response relationship between intervention intensity and cessation outcomes supported by the PHS guide meta-analyses (Fiore et al. 2000), provides some empirical support for a Stepped Care Model (Abrams et al. 2003). The guide also provides evidence that behavioral problem solving and social support enhances outcomes for those who are ready to quit. However, the PHS Clinical Guidelines (Fiore et al. 2000) reported there was insufficient evidence to endorse Stepped Care interventions or the SOC model at that time.

Quitlines

Telephone quit lines have been studied for almost two decades and provide a model for translating research into public health applications (Ossip-Klein and McIntosh 2003). Quit lines operate in more than half the states in the United States and in many other countries. Overall, when implemented appropriately quit lines can be viewed as effective and efficient brief interventions on their own. Quit lines can also be used in combination with other interventions. Quit lines can play an important role in reaching and motivating smokers to quit, and in providing flexible, convenient and low or no cost evidence-based programs for smokers. Generally, well-advertised quit lines can reach 1.1–5.9 percent of the adult smokers in the targeted area over a one year period. One challenge is to maintain a balance between promotion and utilization. Sufficient funds are needed to maintain a sufficiently high level of promotion to justify use of the service and employment of the trained counselors while at the same time not stimulating excessive demand that overwhelms the capacity of the service (Ossip-Klein and McIntosh 2003). Multiple individual studies and several meta-analyses report odds ratios in the 1.20 to 1.34 range (Stead et al. 2003). This efficacy is found when quitlines are used as the primary intervention. When quitlines are combined with other interventions, results are mixed. Significant effects were reported when quitlines were used to augment hospital-initiated interventions for cardiac patients, and in some studies were effective when combined with stages of change materials and NRT (Prochaska et al. 2001; Solomon et al. 2000) but not others (Lando 1997; Ockene 1991; Prochaska et al. 1993). Several studies are evaluating quit lines for cessation among adolescent and young adult smokers but no data are available as yet.

A number of studies have been published that explicitly focus on interventions designed for dissemination including tailored print and computer “expert systems”, telephone quit lines, Internet programs, and brief counseling in primary care and other settings. Space does not permit a comprehensive review of these studies but some exemplars and general trends can be noted. Zhu and colleagues (2002) reported on callers to the California quit line, randomized to receive self-help materials plus up to 7 proactive telephone calls (n = 1973) or to self-help and reactive

telephone support (i.e., only if they called back). A mean of 3 calls were delivered to 72.1 percent of callers in the proactive arm and 31.6 percent of reactive callers. The rates of abstinence at 6 and 12 months follow up were 12.8 and 9.1 percent in the proactive call arm and 8.6 percent and 6.9 percent in the reactive call arm. However the true denominator of all smokers who could have been in the defined population who could have called in but did not do so is unknown.

Fiore and colleagues (2004), based on a careful review of the evidence and the extensive deliberations of an expert panel, recommend funding a national telephone quit line (cost \$3.2 billion per year) along with an associated aggressive mass media marketing campaign (\$1 billion per year) to promote its use as a means of achieving an additional 5 million quitters per year and saving 3 million lives. In a more comprehensive integrated system of care, combinations of such a quitline, along with OTC-NRT, 24/7/365 Internet support for cessation and relapse prevention, and a system for determining how to deliver stepped-up intensive care for those with comorbid complications that require more intensive treatment than a quitline can provide, could all be considered to further improve outcomes (see also Abrams et al. 2003; Cobb et al. 2005; Strecher et al. 2005).

Pharmacotherapy

The U.S. Food and Drug Administration (FDA) approved prescription only (Rx) NRT in the form of chewing gum (2 milligrams) in 1984, a transdermal patch in 1991 and a 4 milligram gum in 1992. Both provide a temporary alternative source of nicotine, relieving withdrawal symptoms and helping smokers quit. The gum and patch were reclassified as OTC products in 1996. Other products were introduced as well: nasal spray (1996, Rx), inhaler (1997, Rx), and lozenge (2003, OTC). The non-nicotine product, Zyban®, was introduced after 1996.

Using data from the National Cancer Institute's (NCI) tobacco use supplement (TUS) to the current population survey (CPS), Shiffman and colleagues (1997; 2004) reported that in 1999 about 40 percent of smokers attempted to quit in the last year compared with about 35 percent in 1996 and 38 percent in 1993. The data are correlational but do seem to track the introduction of NRT and its going OTC: producing a spike in use in 1993, then declined as use of prescription only NRT reached a steady state in 1996 and then another spike in 1999 after NRT went OTC. Shiffman and colleagues (1997) also reported that sales of NRT increased 152 percent after the NRT's went OTC and estimated that this resulted in an additional 114,000 to 304,000 new quitters annually (Shiffman et al. 1997). In a 2000 study report by CDC, it was found that the largest increase in NRT use coincided with the switch of nicotine gum and patch to OTC and that the introduction of two newer forms of pharmacotherapy (nasal spray and oral inhaler) had almost no impact on use (CDC 2000). Longitudinal data from COMMIT (Community Intervention Trial for Smoking Cessation) indicated that annual NRT use doubled from 1993–1995 to 1997–2000 (Cummings and Hyland 2005).

In the mid-1980s, over 90 percent of former smokers reported stopping without use of any formal treatment or pharmacotherapy (Fiore et al. 1990). Studies evaluating commercial NRTs consistently report quit rate increases of 1.5 to 2-fold that of placebo (Silagay et al. 2002).

Should pharmacologic treatments be seen as adjuncts to behavioral treatments or stand-alone therapies? At least for NRT, it appears that the two work additively (Hughes et al. 1999b), although formal tests of this proposition are lacking, especially for combinations of behavioral treatments with the patch and behavioral treatments with non-NRT compounds. It is important, therefore, to know what kind of behavioral treatment components work best with pharmacologic agents and what format and delivery systems are best suited to each product and situation. Is

there dose-related incremental efficacy when intensity of behavioral treatment (components and/or contact) is increased and overlaid, for example, on use of the patch? Stated more simply, how much more can behavioral treatment add to patch efficacy?

Hughes (1995) also posed several hypotheses concerning the mechanisms by which behavioral and pharmacologic treatments might combine to increase treatment efficacy: (1) behavioral treatments improve skills necessary to achieve and maintain abstinence, whereas pharmacologic treatment improves withdrawal; (2) pharmacologic treatment provides relief of withdrawal early on and provides the necessary bridge through the most difficult period, whereas behavioral treatment provides skills necessary to prevent relapse subsequently; (3) behavioral skills may be specifically helpful for a subset of smokers, whereas pharmacologic treatment helps another subset; and (4) one treatment may increase compliance with the other (Hughes 1995). There have been no systematic investigations of these or other proposed mechanisms whereby behavioral and pharmacologic treatments may potentiate one another.

The issue of combining pharmacotherapies deserves additional attention. There is mixed evidence that combinations of NRT products boost efficacy compared with use of individual products (Blondal et al. 1999; Bohandana et al. 1999; Sutherland 1999). However, combined use of the patch and gum appears to alleviate withdrawal symptoms more than either product alone (Fagerstrom 1994), and there is no evidence for increased toxicity (Kornitzer et al. 1995). The combination of bupropion and the patch was also found to be efficacious, at least in the short term, with no evidence of increased adverse events for the combination (Jorenby et al. 1999). So the question remains: for which smokers are combinations of particular products useful?

The PHS Guideline (Fiore et al. 2000) makes it clear that several forms of NRT are efficacious: nicotine gum, the transdermal nicotine patch, the nicotine inhaler, and nicotine nasal spray. Two non-nicotine pharmacologic treatments, bupropion hydrochloride—an atypical antidepressant with noradrenergic and dopaminergic activity—and clonidine—a centrally acting antihypertensive agent—have also demonstrated efficacy since the 1996 Guideline and are recommended treatment options (Fiore et al. 2000; Hurt et al. 1997). Bupropion has received FDA approval for smoking cessation, whereas clonidine has not. Table A-1 depicts the 6-month abstinence estimated ORs and 95 percent confidence intervals (CI) for the different treatments relative to placebo. Overlapping CIs indicate that the treatments have statistically non-distinguishable effects. A recent head-to-head comparison of the nicotine patch, gum, inhaler, and spray showed no differential efficacy (Hajek et al. 1999). Despite some evidence that high-nicotine-dependent smokers may benefit more from nicotine gum (especially the 4 milligram gum) and nasal spray (Herrera et al. 1995; Sutherland et al. 1992), the majority of the evidence suggests that smokers in general benefit from all forms of demonstrated efficacious pharmacotherapies. Therefore, the choice of treatment should depend to a large degree on factors such as patient and provider preference, affordability, and side effects.

It is also clear that NRT works with little or no adjunctive behavioral treatment. This is not to say, however, that behavioral treatment is not important. Rather, it appears that the amount of behavioral treatment sets the base rate for quitting and that adding NRT doubles this quit rate (Hughes 1995; Hughes et al. 1999).

The FDA granted approval for OTC sales of the gum in 1995 and the patch in 1996. This decision was based on extensive clinical and safety experience (Shiffman et al. 1997), trials demonstrating efficacy in OTC-like environments, and the desire to increase smokers' access to proven effective therapies and thereby increase the likelihood that motivated smokers would use NRT and quit (Hughes et al. 1999). Some studies have suggested that the public health benefit of

OTC has been considerable (Shiffman et al. 1998). However, the efficacy of the gum and patch in this environment is less than that observed in controlled clinical trials and probably depends to a significant degree on factors such as under-dosing, ceasing use prematurely, using inappropriately, and having an (un)availability of supplemental behavioral treatment. For example, use of a program consisting of telephone support and tailored cessation materials boosted quit rates significantly for those OTC patch and gum users who availed themselves of this resource compared with patch users who did not (Shiffman et al. 2000; Shiffman et al. 2001).

For light versus heavy smokers, trials of NRT with treatment consistently indicate similar success rates for light versus heavy smokers, but trials of NRT without treatment (e.g., OTC NRT) suggest that heavy smokers do worse than light smokers when using NRT.

Community Dissemination and Implementation Trials

In moving from clinical trials to large-scale community dissemination research, intervention strategies shift from “reactively” treating highly motivated individuals to “proactively” reaching the vast majority of unmotivated smokers in broader, defined populations such as entire communities. Factors such as fidelity of implementation, cost-effectiveness (and efficiency), training of non-specialist (i.e., generalist) providers, and the pragmatics of “coordinated systems of delivery” become paramount. Interventions of different types, modes, methods, and channels of delivery are used to reach and target “defined” populations based on geography, demography (e.g., age gender, race, ethnicity), setting, or other criteria (e.g., low SES groups, the uninsured, alcohol and substance abusers, those with psychiatric comorbidity, and prison populations). Interventions can also vary in the degree of targeting or tailoring of program content to the individual difference characteristics of the subpopulations of smokers they are designed to reach (for details see Wallace Appendix P).

There are an increasing number of well-conducted dissemination studies of effectiveness and cost-effectiveness delivered through different channels and modalities. Such “real world” interventions range in intensity, duration, content, quality, reach, and cost (e.g., telephone quit lines, OTC-NRT, Internet cessation, health care providers in hospitals, clinics, primary care practice, managed care organizations [MCO], worksites, alcohol and substance abuse programs) (Cobb et al. 2005; Keller et al. 2005; Frieden et al. 2005; Hughes et al. 2003; Metzger et al. 2005; Ossip-Klein and McIntosh 2003; Shiffman et al. 1997; Solomon et al. 2005; Stead et al. 2003; Taylor and Curry 2004; Zhu et al. 2002). Dissemination trials report more variability in fidelity of implementation of best practices and mixed or weaker cessation outcomes than the results reported in clinical RCTs delivered under “ideal” conditions.

National Trials: National Health Plan Study in Great Britain

In a recently published evaluation of a national smoking cessation intervention supported by the British National Health Service, (Raw et al. 2005) reported that 28 percent of British smokers attempted to quit, 18 percent of all smokers used treatment (64 percent of the quitters); 9 percent (32 percent of quitters) bought Nicotine Replacement Therapy Over the Counter (NRT-OTC); 6 percent used prescription only pharmacotherapy (21 percent of quitters); and 3 percent used a cessation clinic (11 percent of quitters) and 5 percent quit without help (36 percent of quitters). Assuming success rates of 10 percent for NRT-OTC; 10 percent for Pharmacotherapy; 20 percent for Clinic Treatment; and 5 percent for unaided cessation, the percent of smokers who

stopped smoking was 2.6 percent. This study demonstrated making a national impact on the population of smokers in Great Britain.

There are limitations to the implementation of the British experience (Raw et al. 2005) that suggest the overall impact of their program could have been much greater. First, on the “demand side,” the program was poorly advertised and weakly marketed (i.e., there was little “buzz” and an inadequate effort to stimulate consumer demand or to reach and motivate all smokers in Great Britain). Second, on the “supply side,” the program relied entirely on the existing infrastructure of the health care system, providers were inadequately trained and only weakly supportive. Moreover, only traditional clinic-based cessation was offered—a serious limitation to access and usage in light of the possible brief, minimal, and community-based programs that could have been offered.

The British study may be seen as a lower limit to estimating the effectiveness of the potential impact of a cessation treatment plan that is supported and reimbursed by third party payers and implemented nationwide. Dissemination studies do reach a more representative and less motivated subset of the smoking population. However, even dissemination/implementation/community participatory research studies are limited in generalizability to the defined population that was targeted for the study. Moreover, because such studies do not successfully recruit the entire defined population (and oftentimes do not report on or use the true denominator in their calculations of cessation rates) the effect sizes of interventions delivered on a large scale to so called “real world” populations are less reliable and more variable. Results may also be difficult to interpret because the traditional randomized controlled trial may not be the best method to evaluate these studies and the time frames for expecting population level outcomes may be too short as in the ASSIST and COMMIT studies funded by the NCI in the 1990s (Cummings 1999; COMMIT Research Group 1995).

Prochaska and Velicer (2004) summarized a number of dissemination trials using tailored print materials based on the trans-theoretical SOC model. In one random digit dial study that proactively recruited 80 percent of the defined population, 23 percent cessation was reported at 18-month follow-up (Prochaska et al. 2001) using three rounds of tailored intervention over 6 months. In a defined population of smokers in an HMO, 85 percent of 4,653 were proactively recruited and yielded 23.2 percent cessation at 18 month follow up for three rounds of tailored print communications delivered over 6 months.

In contrast to the lower bound estimate of population impact on cessation prevalence derived from the National Health Plan Study in Great Britain (Raw et al. 2005—reviewed above), the Prochaska and colleagues (2001) study suggests an upper bound of reaching 80 percent of the total smoking population and obtaining a 23 percent effect size on cessation at 18-month follow-up.

Relapse and Recycling

Interventions for smoking typically consist of discreet periods of treatment leading to abstinence or relapse. The vast majority of quit attempts lead to relapse. Relapse is all too common: depending on the population sample, treatment intensity and type and the definitions of cessation between 65 and 95 percent of quit attempts end in relapse (Pierce and Gilpin 2003) with the greatest proportion of relapse (44 percent) occurring within 14 days of a serious quit attempt (Garvey et al. 1992). The relapse rates for those making unaided quit attempts in the general population is difficult to estimate but is likely to be even higher than 95 percent. The relapse curves for nicotine are similar to heroin and alcohol addiction (Hunt and Bespalec 1974).

It is not clear that encouraging rapid recycling will improve long-term cessation. Some studies have noted differences between groups encouraged to recycle or not, overall results have been discouraging. Lando and colleagues (1996) reported that a telephone support intervention significantly increased recycling but not long term abstinence. Tonneson and colleagues (1993b; 1996) found that introducing nicotine replacement after one year did not appreciably increase abstinence (6 percent for nasal spray and 0 percent for patch). These studies rely on small sample sizes of smokers motivated for treatment using the typical clinic trials or individual level model. It may be that the potential is much greater for using rapid recycling to improve overall cessation rates at the population level, among the 43 percent of all smokers (almost 20 million smokers) who make a quit attempt each year, most of whom do so on their own without any evidence-based intervention.

Relapse prevention and recycling is a huge public health opportunity but the research base to inform effective and efficient recycling/relapse prevention intervention is sparse. Several recent studies provide some direction for future research and for public policy. Brandon and colleagues (2003) suggest relapse prevention interventions be offered as a free standing intervention offered to all persons who have recently quit regardless of whether they used a formal treatment or not. They mailed a series of relapse prevention booklets to recent quitters and, in an initial efficacy trial, reported significantly reducing relapse rates. Among subjects who were abstinent less than 3 months after baseline, 88 percent of those who received the mailed materials were still abstinent at 12 months follow up versus only 65 percent in the no mail group. The intervention was also of minimal intensity and highly cost effective: the cost of keeping a smoker from relapsing at any time during the 12 months following their quit was \$174. The cost effectiveness of cessation treatments recommended by the PHS clinical practice guidelines range from \$2,186 for group counseling without NRT to \$8,962 for NRT with brief counseling (Cromwell et al. 1997).

Relapse should be regarded as part of the learning experience along the pathway to cessation. Just like learning to ride a bicycle for the first time, persistent effort, practice, and openness to the correction of past mistakes will lead to eventual mastery and success (Bandura 1997). If one falls off the bicycle, one has to get back up and try again to become proficient at negotiating the curves and the bumps in the road. Thus, the idea of recycling smokers who have slipped back into smoking is included in the treatment planning process.

Population Impact of Cessation Interventions in the Real World

The full impact of cessation interventions is a product of the proportion of the intended population reached and the efficacy of the interventions delivered to that population (Impact = Reach x Efficacy; see Abrams et al. 1993; 1996; 2003). Impact can be calculated under ideal conditions based on clinical trials data. Then the impact equation can be “discounted” or adjusted for the real world, for example by using an estimate of the degree to which the larger target population (proactively recruited) is harder to reach, harder to motivate, less likely to receive treatments of optimal quality and fidelity, less likely to adhere to treatment, and harder to follow up than the participants in the clinical trials under ideal circumstances.

SECTION 3 SUMMARY

In general, the outcome effectiveness of trials that can be widely adopted and disseminated remains in the moderate to good range. Dissemination studies and a number of meta-analyses provide reasonable and reliable data as a basis for projecting the impact on a population-wide

basis of the efficient implementation of best practices. Outcomes in various controlled and quasi-controlled trials can range from 1–30 percent quit at 6–12-month follow-up, in general somewhat lower than, but also able to approach, those of the more well documented clinical trials. For example, quit lines increase abstinence by as much as 30–50 percent over control conditions (Fiore et al. 2000). In a review of OTC NRT studies, Hughes and colleagues (2003) reported quit rates of 8–11 percent at 6-month follow-up in five studies; rates of 1 percent–6 percent in two other studies; and, in a meta-analysis of 4 trials, the odds ratio for OTC NRT versus placebo was 2.5 (95 percent CI 1.8–3.6).

Based on the growing evidence from dissemination research trials and the extensive deliberations of an expert panel, Fiore and colleagues (2004), recommended funding a national telephone quitline as a means of reaching more smokers and achieving an additional 5 million quitters per year as well as saving 3 million lives over the next two decades.

It is more difficult to estimate the effects of multi-level and multi-dimensional systems components (e.g., mass media campaigns, tax disincentives, and enforcement of bans/restrictions) that interact with intervention types, modes, and channels and with different smoker characteristics to produce an overall “impact” on cessation rates. It is likely a combination of multiple strategies that will ultimately translate into the high population prevalence rate reductions that are desired. More complex combinations of policies, delivery systems, programs, and individual characteristics can be examined using computer simulation modeling (e.g., Friend and Levy 2001; Levy and Friend 2002a,b; Levy et al. 2005; Mendez et al. 1998).

The following outcomes goals and objectives are recommended:

Goal #2: Increase the long term (>1 year) cessation success rate of smokers who make a serious quit attempt by encouraging greater use of evidence-based treatments when smokers make a quit attempt.

Objective # 2: Double the proportion of smokers who use a proven intervention when they do make a quit attempt from less than 25 percent now to over 50 percent within 5 years and over 70 percent within 10 years). This should increase the population cessation effectiveness rates from an average of 5–10 percent per year to 10–20 percent per year within 10 years.

- Ensure that smokers ready to quit have full knowledge of how to quit and what to expect and that they also have access to the full range of evidence-based cessation options documented in the Clinical Guidelines (OTC and Prescription pharmacotherapy as well as brief and more intensive behavioral counseling delivered via diverse intervention modes such as telephone, brief face to face individual or group support, clinic services, internet and others for motivation, cessation and relapse prevention).
- Reduce the rate of relapse among quitters who achieve initial cessation by providing support for cessation and reducing the time lag between consecutive quit attempts for those who relapse. Develop and make available specific new programs and services directly targeted at recent quitters and designed to either prevent relapse or encourage rapid recycling back into another cessation attempt if they have recently slipped back into smoking after a quit attempt. The Internet is an especially promising tool here given both preliminary data (Cobb et al. 2005), its 24/7/365 availability and ability to provide a variety of expert and peer social support networking).

- Provide clear guidelines and access to specialized, intensive, and Stepped Care (or stepped up care) for smokers who have known comorbid complications; those at highest risk for medical, psychiatric, alcohol/substance abuse complications; and those who have tried and failed to quit on their own or with brief or minimal intervention efforts (such as OTC medications alone or brief counseling alone).

SUMMARY OF SECTIONS 1–3 ESTIMATING THE POPULATION IMPACT OF CESSATION INTERVENTION POLICY

The full impact of cessation interventions is a product of the proportion of the intended population reached and the efficacy of the interventions delivered to that population (Impact = Reach x Efficacy; see Abrams et al. 1996; 2003). Impact can be calculated under ideal conditions based on clinical trials data. Then the impact equation can be “discounted” or adjusted for the real world, for example by using an estimate of the degree to which the larger target population (proactively recruited) is harder to reach, harder to motivate, less likely to receive treatments of optimal quality and fidelity, less likely to adhere to treatment, and harder to follow up than the participants in the clinical trials under ideal circumstances (see Abrams et al. 1993; 1996; Dzewaltowski et al. 2004; Glasgow et al. 2006a,b). The parameters that need to be considered when adjusting an efficacy metric downwards to convert it to an effectiveness estimate are consistent with the reporting of criteria in the “RE-AIM” model recommended by Glasgow and colleagues (Dzewaltowski et al. 2004; Glasgow et al. 1999; Glasgow et al. 2003; Glasgow et al. 2006a,b).

The committee commissioned a series of simulation models to estimate cessation’s overall impact on smoking prevalence outcomes over 20 years (presented in detail elsewhere; see appendixes by Levy and by Mendez and the full report). The simulation models provided a heuristic guide for projecting the potential increases in population cessation rates that might be expected over the next 2 decades, given parametric input assumptions. The simulation model to project the impact of smoking cessation interventions on population prevalence employed the SimSmoke algorithms developed by Levy, Friend, and colleagues (Friend and Levy 2001; Levy and Friend 2002a,b; Levy et al. 2004)

Based on the evidence from the reviews, meta-analyses of clinical (efficacy) and dissemination (effectiveness) trials, and guided in part by the simulation modeling, two primary goals emerged for significantly accelerating cessation rates to make an impact at the population level. The first goal addresses the reach dimension (reviewed in Section 2 above) and recommended a doubling of the number of smokers who make a quit attempt each year over a 10-year period. The second goal involved the efficacy to effectiveness dimension of implementing and using evidence-based treatments (reviewed in Section 3 above). Goal #2 recommended we enhance cessation rates and reduce relapse rates by doubling over 10 years the number of smokers who use evidence-based cessation treatments when they do make a quit attempt.

It is important to note that in setting the parameters for the algorithms in the simulation modeling (see appendix by Levy and by Mendez and the full report) it was decided to use measures of reach and efficacy that were anchored by more conservative and consistent evidence-based estimates. Therefore, the simulation modeling projections of the impact of cessation interventions on overall smoking prevalence are also relatively conservative. The computer simulation algorithms were tied to the lower to middle bounds of the reviews of the evidence for reach and effectiveness in Sections 2 and 3 above, rather than the more ambitious upper bounds recom-

mended in Goals #1 and #2. Thus there is room for an even stronger contribution of cessation to reducing overall population prevalence if the impact can be enhanced to achieve the ambitious but not impossible levels that are recommended in the 5- and 10-year goals and objectives for Goal #1 (reach), and Goal #2 (effectiveness).

SECTION 4: FUTURE DIRECTIONS IN CESSATION RESEARCH AND IMPLEMENTATION

Lowering the Bar to Cessation: Harm Minimization and Programs for Smokers Not Currently Motivated to Quit

Shiffman and colleagues (1998) have outlined principles that should guide a harm reduction philosophy and approach to tobacco control. Among these principles are the assumptions that: (1) the purpose of reducing exposure to tobacco toxins is to reduce the death and disease caused by tobacco; (2) the long-range goal should be to leave smokers both tobacco and nicotine free and should not reduce the likelihood of eventual cessation; (3) any method used to reduce exposure, especially pharmacologic agents such as NRT products, should pose no added safety risks; (4) exposure reduction therapies should not worsen an individual's level of nicotine dependence and should not lead to increased population prevalence of nicotine dependence or expansion of use beyond the smoking population; and (5) pharmacologic means, if used to reduce tobacco toxin exposure, should not appeal to adolescents. The degree to which pharmacologic interventions, and in particular NRT products, can result in acceptable, safe, and verifiable reductions in toxin exposure will be the target of considerable research and intervention efforts for some time to come.

Some smokers may not quit for a long time, and it is estimated that as many as 50 percent of smokers will never quit (Hughes et al. 1999a; Hughes et al. 1999b). Many smokers repeatedly fail after trying the very best interventions available. Since smoking at any level is harmful, it is hoped that continued engagement in treatment will eventually lead to longer periods of abstinence rather than a reduced level of smoking. For a subgroup who will not quit even with the highest levels of care, the treatment emphasis may have to change from abstinence to harm minimization (Baer et al. 1993; Hughes et al. 1999a; Marlatt 1998; Shiffman et al. 1998; Warner et al. 1997).

The pharmaceutical, public health, and sociobehavioral science communities as well as the tobacco industry are all converging on the need for innovative new approaches to reducing the huge amount of devastating and preventable death disability, disease burden, and cost of smoking on individuals' families and society. The not too distant future may contain a variety of new approaches to smoking cessation and reducing the harm caused to current smokers who will not or cannot stop smoking.

Hughes and colleagues (2004) suggests that interventions to reduce harm may ultimately encourage cessation. Smokers not currently interested in quitting ($n = 616$) were randomized to receive telephone-based: (1) reduction counseling plus nicotine replacement therapy (NRT) plus brief advice to quit, (2) motivational advice plus brief advice, or (3) no treatment. More smokers in the reduction (43 percent) and motivational (51 percent) conditions made a 24-hr quit attempt over 6 months than smokers in the no-treatment condition (16 percent), but the 2 active conditions did not differ. Similarly, 18, 23, and 4 percent of each condition were abstinent (7-day point

prevalence) at 6 months. Results indicate smoking reduction using NRT does not undermine cessation but rather increases the likelihood of quitting to a degree similar to motivational advice

Although new cessation products and services as well as harm minimization strategies will continue to be introduced into the marketplace in the coming years (by the tobacco industry, the pharmaceutical industry, service providers, social, and behavioral scientists) and although these innovations may improve outcome efficacy and/or reduce toxic exposures to some extent, it is unlikely to dramatically improve outcome efficacy in the near to medium term time frame of the next 5 to 10 years. However, immediate and potentially dramatic increases in population cessation rates can accrue from improving the utilization and reach of the current proven interventions and by reducing the risk of relapse following initial cessation

The Internet

The Internet can reach millions of smokers cost-effectively. Many cessation websites exist, but few have been evaluated and, of over 300 websites, less than 10 met criteria for having content outlined as effective in the PHS guideline (Bock et al. 2004). As a result, the potential impact of the Internet on smoking prevalence remains unknown. A preliminary, uncontrolled, large-scale evaluation of a broadly disseminated smoking cessation website used worldwide (QuitNet®) was recently reported (Cobb et al. 2005). Consecutive registrants ($n = 1,501$) were surveyed 3 months after they registered on the web site to assess 7-day point prevalence abstinence. Results must be interpreted cautiously as this is an uncontrolled study with a 25.6 percent response rate. Approximately 30 percent of those surveyed indicated they had already quit smoking at registration and were using the website for relapse prevention. Excluding these participants, an intention to treat (ITT) analysis yielded a 7 percent point prevalence abstinence (for the responders only, abstinence was 30 percent).

In a European study, 3,501 purchasers of a nicotine patch who proactively logged on to use a free Internet program and then consented to participate in a research study (76 percent) were randomly assigned to a tailored versus an untailored program (Strecher et al. 2005). To be eligible, the participant's target quit date had to be within 7 days of enrollment. At 3-month follow-up, using ITT analysis of continuous abstinence for 10 weeks, the tailored condition (22.8 percent) outperformed the untailored condition (18.1 percent). Although this study was a large randomized trial, it is unclear the degree to which results generalize to the broad population of smokers who seek cessation information and treatment on the Internet. Participants were restricted to those who could afford and did purchase a specific brand of patch and to those who chose to utilize an online support program. Collectively, these studies are a promising start in evaluating Web-based smoking cessation programs. However, more studies are needed.

Medication Development

Two other issues deserve comment: (1) Continued development of pharmacologic approaches to smoking cessation (what's in the product-development pipeline) and (2) the potential for long-term use of pharmacologic treatments to sustain cessation. New forms of NRT continue to be developed and evaluated. The nicotine lozenge and sublingual tablet are approved for use in Europe (Britton et al. 2000) and will probably be introduced to the U.S. consumer as prescription products in the near future. It is unclear whether these products confer a significant advantage over other NRT products.

Pharmacotherapy is an important adjunct to smoking cessation treatment. Currently marketed pharmacotherapies include nicotine replacement products (gum, patch, nasal spray, inhaler,

and lozenge) and bupropion. In clinical trials, existing pharmacotherapies on average double cessation rates compared to placebo. Limitations of the available pharmacotherapies are that the effectiveness is only modest (cessation rates 10–20 percent depending on the population of smokers and concomitant behavioral therapies) and the fact that many dependent smokers have already tried and failed these therapies. Most studies of retreatment with the same medication find very low cessation rates.

Thus it is imperative that new medications be developed to aid smoking cessation. Such medications might be more effective than existing medications, which is particularly important for highly dependent smokers. Even if new medications are not more effective than currently available medications, new medications would provide an alternative to current medications and would encourage more smokers who failed cessation in the past to consider quitting another quit attempt.

At this time, several new medications are under development and others hold great promise. Research on drugs that act on nicotinic cholinergic receptors have led to the discovery of varenicline, a nicotine receptor partial agonist. A partial agonist is a drug that stimulates a receptor, but at the same time blocks the actions of other receptor agonists. In this case, varenicline produces some direct nicotine-like effects on receptors, but blocks the effects of nicotine from tobacco. The promise of such a medication is that it would block the satisfaction from smoking a cigarette while at the same time producing nicotine-like effects to prevent withdrawal symptoms.

Varenicline, a novel pharmacotherapy, was approved by the FDA as an aid to smoking cessation treatment in May 2006 (FDA 2006). Varenicline is an $\alpha 4\beta 2$ nicotinic receptor partial agonist that is believed to aid smoking cessation by moderately increasing the release of dopamine in the mesolimbic system, thereby reducing abstinence-related craving and withdrawal (Coe et al. 2005). Varenicline also appears to reduce the rewarding effects of nicotine during smoking via this same mechanism. (Coe et al. 2005) The efficacy of varenicline has been assessed in six controlled clinical trials, of which 3 have been published (as of July 6, 2006). In one randomized controlled study involving 1,027 subjects, 23 percent of participants in the varenicline group (1 milligram twice per day for 12 weeks, starting 1 week before quitting smoking) were continuously abstinent during weeks 9 through 52 compared with 10.3 percent in the placebo group (OR, 2.66; 95 percent CI, 1.72–4.11; $P < .001$) and 14.6 percent in the bupropion SR group (OR, 1.77; 95 percent CI, 1.19–2.63; $P = .004$) (Jorenby et al. 2006). In a second double-blind study involving a total of 1,025 patients, continuous abstinence rates during weeks 9 through 52 were 21.9 percent for varenicline vs 8.4 percent for placebo (OR, 3.09; 95 percent CI, 1.95–4.91; $P < .001$) and vs 16.1 percent for bupropion SR (OR, 1.46; 95 percent CI, 0.99–2.17; $P = .057$) (Gonzales 2006). A third published study assessed the effect of an additional 12 weeks of therapy with varenicline on the likelihood of long-term abstinence. Patients were treated with open-label varenicline for 12 weeks, and patients who had stopped smoking by week 12 ($n = 1236$) were then randomized to double-blind treatment with either varenicline or placebo for an additional 12 weeks and then followed for 28 weeks post-treatment. The continuous abstinence rate was significantly higher for the varenicline group than for the placebo group for weeks 13 to 24 (70.5 percent vs. 49.6 percent; OR, 2.48; 95 percent CI, 1.95–3.16; $P < .001$) as well as for weeks 13 to 52 (43.6 percent vs. 36.9 percent; OR, 1.34; 95 percent CI, 1.06–1.69; $P = .02$) (Tonstad et al. 2006). Nearly 30 percent of participants in these three trials reported nausea, a rate significantly higher than with either bupropion or placebo (Klesges et al. 2006). Abnormal dreams were also common and much more likely in the varenicline groups. However, overall side effect rates were similar across the varenicline and bupropion conditions (Klesges et al.

2006). Varenicline was combined with counseling in all 3 studies. In summary, varenicline is an efficacious pharmacologic treatment for tobacco dependence that offers clinicians and patients a new powerful option for tobacco dependence treatment, though more experience is needed with this agent in real-world settings before its place among nicotine dependence treatments is fully understood (Klesges et al. 2006; Niaura et al. 2006).

Another drug under development is rimonabant, a cannabinoid-1 receptor antagonist. The cannabinoid receptor is the site of action of THC, the active constituent of marijuana. Cannabinoid receptors seem to be involved in a variety of appetitive behaviors, including drug use and food consumption. Clinical trials suggest that rimonabant might both facilitate smoking cessation and prevent bodyweight gain, which usually occurs after one quits smoking.

Another promising line of drug development is research on nicotine vaccines. Vaccination generates antibodies to nicotine that could block the reinforcing effects of nicotine. Nicotine vaccination is intended to prevent relapse to smoking after cessation. The idea is that if one relapses, the smoker would not find the cigarette rewarding and would not continue to smoke.

These three medications are currently in clinical trials, and their ultimate contribution to smoking cessation therapy has not yet been established. However, these examples demonstrate the potential of developing novel medications for smoking cessation.

The development of new medications to aid cessation for smoking cessation is a high priority, particularly for the treatment of the most highly dependent smokers. Basic science research on nicotinic receptors as well as agonists and antagonists that act on these receptors, and research on other neurotransmitter and receptor systems involved in the actions of nicotine, is likely to be the key to new medication development. Of particular importance is developing medications that will be useful in treating smokers with psychiatric comorbidity. Such medications might both aid smoking cessation and for example treat depression or other mental health disorders for which smoking may be perceived as beneficial.

Adolescent and Young Adults: An Important Opportunity and an Important Priority for Research

Children are exposed to nicotine early in life—over 80 percent of adult smokers become regular users before the age of 18 years (CDC 1998). But there has been a 32 percent increase in youth adoption of smoking between 1991 and 1997 in the United States (CDC 1998) and a 28 percent increase among college students (Rigotti et al. 2000).

Little is known regarding the smoking habits of young adults, as well as the feasibility of implementing intervention strategies (Backinger and Leishow 2001; Sussman et al. 1999; Sussman 2001). Lloyd-Richardson and colleagues (2001a,b) investigated characteristics among young adults attending technical school. A random sample of 784 students (response rate 82.5 percent) attending a large technical school completed a survey. They were primarily male (70 percent) and white (85 percent), with an average age of 26 years. Thirty-three percent were current smokers, smoking an average of 16 cigarettes per day, and 91 percent of smokers had tried to quit an average of 3 times in the past year, 78 percent endorsed at least a moderate level of motivation to quit smoking (i.e., “often think of quitting, but no plans yet”), with 50 percent interested in use of the nicotine patch and 43 percent interested in use of bupropion hydrochloride (Zyban®). These data suggest prevalence of smoking among technical school students is higher than among traditional 4-year college students (28 percent) (Wechsler et al. 1998) as well as among the general population of the United States (median 23 percent) (CDC 2004b).

Sussman and colleagues (1999) reviewed 34 studies conducted on adolescent regular tobacco users but employing both cessation and prevention interventions (see Flay in Appendix D). Of the 17 cessation-focused studies, there was great variability in their research designs, cessation programs, measures, and outcomes. Target populations and settings varied as well but were generally in the age range 14 to 22 years. Follow-up period also varied from 1 month to 24 months and was not reported in some studies. Sussman and colleagues (1999) reported that background (some studies were uncontrolled) or control group quit rates for this age group over 6 months varied from 0 to 11 percent and the average of the intervention's quit rates at follow up were approximately 13 percent. Younger smokers are difficult to recruit and difficult to motivate to use smoking cessation programs. Many programs were adapted from adult programs and are not tailored to younger smokers. Colby and colleagues (1998; 2005) reported on a promising preliminary study using motivational interviewing adapted from adult interventions with alcohol abusers to encourage adolescent smokers to stop.

Killen and colleagues (2004) randomized 211 adolescent smokers to nicotine patch plus bupropion SR or nicotine patch plus placebo. All participants also received group behavioral skills training and relapse prevention training weekly. At weeks 10 and 26 of follow up abstinence rates for the combined treatment versus placebo arms were 23 and 8 percent versus 28 and 7 percent, respectively. Compared to non African American teens, African Americans reported a 1 year later onset of smoking onset and a slower uptake trajectory to regular smoking. Rabinus and colleagues (2004) reported that among 3,500 callers to the ACS quitline, 12 percent (420) were smokers aged 18 to 22 years. All smokers were randomized to either self-help booklets by mail or up to 5 sessions of telephone counseling. Using intent to treat analysis, Rabinus and colleagues (2004) found 3-month cessation rates of 20 versus 9 percent for these younger smokers compared with 15 and 10 percent cessation rates for older smokers.

Finally, we note that there have been efforts to treat adolescent smokers with NRT (e.g., Moolchan et al. 2005). Despite evidence of safety, tolerability, and decreased withdrawal symptoms among adolescents treated with the nicotine patch, efficacy has not been demonstrated (Hurt et al. 2000). However disappointing, we must recognize that treatment of the adolescent smoker is still in its infancy. The use of NRT with teens and young adults is understudied (Benowitz 1998). This clearly reflects the gap in our knowledge base and points to the need for more research. One area about which we are particularly ignorant is at what point in the youth uptake trajectory (from initial use, experimentation, to regular use and progression to dependence) might it be helpful to prescribe NRT. Initiation and early smoking among youth is characterized by irregular patterns of use and long periods without exposure to nicotine. Even more regular users typically cannot smoke wherever and whenever they want to. Since there is upregulation of nicotinic brain receptors (see Dani and Heinemann 1996 and later in this appendix), a constant infusion of nicotine as delivered by NRT may increase abuse liability and withdrawal sensitivity especially in irregular smokers. Such potential problems, combined with the ethics involved with possibly exposing naive youth to nicotine for research purposes, are likely reasons why data are not available.

SECTION 4 SUMMARY

This area is beginning to receive the attention it deserves in recent years with several trials underway. The youth tobacco cessation collaborative (YTCC) was formed in 2003 to bring funders of youth cessation studies together and a monograph was published to help focus the field, share information and standardize measures and methods. The YTCC recommended three goals:

1. Identify and advocate for policies and environments that support youth tobacco cessation.
2. Increase motivation in quitting and quitting attempts among young smokers and generate increased interest and participation in effective cessation programs
3. Increase advocacy and support for youth tobacco cessation among youth themselves and their peers, providers, decision makers, community gatekeepers, and the public.

Outcomes in adolescent cessation are disappointing. Smokers typically enter treatment in their 40s (based on trials). But quitting early multiplies benefits: risk accumulates with duration, even more than amount. More research is needed to improve the marketing to adolescents and motivation to use cessation interventions as well as to increase the utility, availability, tailoring, and effectiveness of adolescent smoking cessation interventions delivered in a variety of channels: high schools, work settings colleges, technical schools, pediatric and primary care practice and other locations where young adults are found.

This is a unique opportunity for early intervention and to bridge the gap between prevention (see Appendix D by Flay) and cessation treatment among those ages 10 to 30, a group that has “slipped through the cracks” between the prevention and the treatment research communities (Backinger and Leishow 2001; Moolchan et al. 2005; Sussman 2001).

SECTION 5 DELIVERY SYSTEMS AND INTEGRATION

A Coherent Unified Strategy for Care Management Based on the Chronic Disease Care Management Model

Ideally, delivery systems such as managed care organizations or mental health clinics should be designed to support and track the quality of care delivered over time and even by multiple providers (see Curry et al. 2005). For example, a managed health care organization may have a policy that requires all providers in all settings (e.g., emergency room, primary care, specialty care) to screen for smokers and develop, document, and implement an individualized treatment plan for each smoking member of the health plan. In medical, psychiatric, and substance abuse treatment settings, the Health Plan Employer Data and Information Set (HEDIS 3.0) report cards are designed to track the mandate of the National Committee for Quality Assurance (Davis 1998). Surveys that inform these report cards evaluate whether all providers are asking about tobacco abuse as a vital sign (along with taking temperature and blood pressure) at each and every contact with the health care system. A training and certification process is needed for treatment providers. A certification/license is awarded for qualified trained service providers at two levels: (1) counselors in smoking cessation and (2) specialists in treatment of nicotine addiction and comorbid conditions.

There is evidence of a substantial return of investment within 2–3 years for those institutions that invest in comprehensive smoking cessation (e.g., health care, worksites) (AHIP 2004). With direct and indirect costs of smoking estimated at over \$150 billion per year and with the aging “baby boomers” putting an enormous strain on the health care system in the coming two decades, a credible and convincing case can be made that the single biggest, fastest, and most cost-effective impact on reducing the escalating costs of health care and enhancing the overall health of Americans can come from helping more people quit smoking (Orleans and Alper 2000).

In recent years there has been significant improvement in third party, federal, and state insurance coverage for some components of evidence-based treatments recommended in the PHS clinical guidelines (Fiore et al. 2000). However, coverage remains spotty. If cessation treatment is covered, the programs typically invests in only the minimum recommended level of coverage, falling short of adopting the more effective, costly, and intensive components of the PHS Guide recommendations (Fiore et al. 2000).

In their role as employers, states purchase health insurance for over 5 million employees and retirees. A survey of state employees insurance plans was conducted in 2002–2003. Of the 45 states that responded to the survey, only 6 required cessation coverage that was fully consistent with the PHS Guideline recommendations for all employees (Fiore et al. 2000). These states required coverage for some form of group or individual counseling and one or more FDA approved medications for smoking cessation. 10 states required coverage for at least some employees and a total of 29 out of the 45 states required coverage for at least one PHS recommended treatment for at least some employees. The survey did not capture the degree to which costs were shared (copay/deductible). Insurance coverage remains variable and there is room for improvement.

A 2002 National survey (McPhillips-Tangum 2004) among managed care organizations (MCO's) found that 30 percent had no written policy on coverage and 42 percent provided no coverage for behavioral interventions. Of those that do provide behavioral coverage, it is often the least effective: 54 percent offered self help materials only and 51 percent offered brief telephone counseling. As part of their routine prescription benefits, 89 percent covered prescribed medication. Warner and colleagues (2004) suggest that these figures may underestimate the national availability of covered services.

Medicare announced as of March 2005 that it will cover up to two cessation attempts per year and each attempt may include four counseling sessions for a total of 8 sessions per year. They also plan to cover pharmacotherapy in the prescription benefit coverage. An estimated 9.3 percent of persons over age 65 smoke, and of the 440,000 smokers that die each year of smoking related causes, an estimated 300,000 of them are over age 65 (www.cms.hhs.gov/coverage).

In 1998, only half of the 5 million Medicaid recipients nationwide who were current smokers were covered for any type of smoking cessation treatment (Schauffler et al. 2001). Doescher and colleagues (2002) conducted a pilot study of enhanced tobacco cessation services for low income smokers. They included NRT and pharmacist delivered smoking cessation counseling as the benefit for low income managed Medicaid patients and a state insurance program. They concluded that such a program is feasible but there are significant implementation barriers, including low participation rates and rapid turnover of insured.

McMenamin (2004) examined physician and enrollee knowledge of Medicaid coverage for tobacco addiction treatment in two states with comprehensive coverage. Only 36 percent of enrolled smokers and 60 percent of physicians knew that their state program offered any cessation treatment coverage, and physicians were more than twice as likely to know about pharmacological coverage than coverage for counseling. Warner and colleagues (2004) simulated the financial impact and cost effectiveness of smoking cessation in a hypothetical managed care organization MCO using data from three large MCO's. Quitters gained an average of 7.1 years of life with a direct coverage cost of \$3,416 for each life year saved. The net cost to the MCO plan was \$0.41 per patient per month (PMPM).

Tobacco use cessation programs, including appropriate use of pharmacotherapy, should be covered by all insurance, managed care, and employee benefit plans, in-

cluding Medicaid and Medicare. This coverage should be a lifetime benefit. A specified percentage of revenues from tobacco excise taxes, or payments made by tobacco companies under court orders or litigation settlements, should be allocated specifically to a fund with the sole purpose of supporting marketing, dissemination and use of cessation programs for tobacco users. This fund should be managed and distributed by an independent private entity. First priority should be given to funding cessation services for persons not covered by insurance.

Fiore and colleagues (2004) point out that extending tobacco treatment to all individuals with federal coverage (including all Medicare and Medicaid recipients nationwide, department of defense beneficiaries, federal employees, and all federally supported clinics) will ensure that 100 million families will have comprehensive insurance coverage for cessation interventions and it will address health disparities in that it will support interventions for the socio-economically disadvantaged and those that suffer disproportionately such as veterans and Medicaid beneficiaries.

Health plans, insurers and public health agencies—individually and collaboratively—should implement a comprehensive, coordinated, and integrated system of care management for smoking cessation at the local, state, and national levels.

- **Delivery infrastructure and financial incentives should be aligned to enable and encourage service providers to provide—and smokers to receive—evidence-based assistance.**
- **All smokers should be identified and contacted, be motivated to quit, and receive appropriate levels of intervention or referral and Stepped Up care in intensity if needed.**
- **Services should be provided continuously rather than episodically and should support the smoker for as long as necessary to achieve sustained abstinence.**
- **A performance based surveillance, quality assurance, tracking, and report card system should be implemented to monitor key indicators of progress at the systems level to produce timely summaries of individual group and systems aggregate performance and to permit self correction and continuous quality improvement among those falling behind performance benchmarks and best practice criteria.**

Surveillance Report Cards

Thus, above and beyond the current surveillance programs in place to measure smoking patterns in largely cross-sectional national surveys (e.g., NHIS, CPS; YBRFS), more specific national, state, and local monitoring and surveillance systems must be put in place to track key indicators of progress being made in reaching and enabling increased cessation rates. Key indicators must include individual and aggregate or “systems” level measures (Glasgow’s RE-AIM model; see Dzewaltowski et al. 2004; Glasgow et al. 1999; 2003; 2006a for details) of intermediate and final outcomes. Performance standards and “report cards” must be developed (e.g., using enhanced JACHO and HEDIS guidelines) to track progress towards goals, identify laggards, and motivate improvements.

Goal # 3: Implement a comprehensive, coordinated, and seamlessly integrated system of care management for smoking cessation.

Intervention should be offered and delivered at every opportunity in which there is contact between a smoker and the health care, public health, and other organizational systems such as schools, worksites, and community organizations. The system of care management must embrace the concepts of: (1) identifying and tracking all smokers (smoking as a vital sign and proactive follow up once identified); (2) providing for continuity of care and tailored interventions as appropriate to the smokers level of motivation and needs) at every contact with the system (e.g., following the four A's for cessation and four R's for motivation to quit (i.e., proactive care management), and (3) using algorithms for targeted and tailored interventions and for Stepped Care as needed (smokers are stepped up to more specialized and intensive intervention programs if they have comorbid complications and/or a cessation history of failure to quit on their own or at lower levels of intensity of intervention. To do so will require that health systems:

- 3.a.) Align financial incentives at every level to contingently reinforce the recommendations of the evidence-based practice guidelines and enable the care management system to manage tobacco addiction as a chronic refractory, including eliminating out of pocket costs for smokers to quit when they use evidence-based cessation interventions.
- 3.b.) Provide a care management system to smokers and implement it in all managed care and other health service delivery systems nationwide. (e.g., through electronic medical records and an Internet-based system of access [confidential and secure for intervention providers and smokers]).
- 3.c) Register and track all smokers. The “smoker registry” is used as a confidential medical record to ensure all current smokers in the United States are properly cared for. Smokers will then have a delivery system in place to receive (1) timely health care checkups and specific screenings for early detection of the chronic conditions for which smoking produces excessively high risk (cancers, especially lung, cardiovascular disease, pulmonary diseases, and other conditions and comorbidities associated with smoking such as psychiatric, alcohol, and substance abuse disorders; (2) timely feedback on their health status at every checkup, coupled with either (for those not motivated to quit) (3) motivational enhancement counseling (motivational interviewing) to consider smoking cessation and education/information about smoking cessation interventions tailored to their needs and characteristics; or (4) (for smokers already motivated and ready to quit) a brief or a more intensive smoking cessation and relapse prevention intervention or direct referral to intervention resources with recommendations for the type, mode and level of treatment needed using evidence-based triage algorithms for Stepped Care and tailored treatment based on the past history and current status.

Objective # 3a: within 5 years, 100 percent of health services, public health programs, and third party insurers across the nation will implement a system that has aligned incentives and that supports at every level the ability for service providers to give and smokers to receive evidence-based care.

All smokers should be proactively contacted, be motivated to quit, and should receive appropriate levels of intervention or referral to smoking cessation counselors or to specialists in treating smokers with comorbidity complications; these interventions can be stepped-up in intensity

and complexity of interventions if previous interventions have been used and have not been successful. They must be supported for as long as is necessary to achieve sustained abstinence.

Objective # 3b: At every contact with the health care system, 90 percent of health care providers will identify and intervene with smokers providing the five R's (motivational enhancement) for those not ready to quit and the five A's to those ready to quit).

Objective # 3c. Implement a performance based surveillance, quality assurance, tracking, and report card system to monitor key indicators of progress at the systems level, to produce timely summaries of individual group and systems aggregate performance, and to permit self correction and continuous quality improvement among those falling behind performance benchmarks and best practice criteria. Expand and adapt the current JACHO and HEDIS required tracking systems.

The monitoring system can provide timely feedback and benchmark comparisons about goals and targets met as well as about normative group comparisons (e.g., report cards to individual providers indicating their performance on key indicators, such as the five A's, and the average performance of similar offices in the local, state, or national data base) to motivate and encourage continuous quality improvement towards best practice goals.

CONCLUSION

For a smoker, it is long and arduous journey from starting to smoke to enjoying smoking in ones carefree youth to wanting to stop. For much of that journey the smoker is not motivated to quit and does not make any quit attempts at all. Somewhere along the way the smoker may change, either suddenly or gradually over time. Smokers can move from being unmotivated and not making any quit attempts to wanting to quit (over 70 percent say they want to quit) and then to making serious quit attempts (about 45 percent try seriously to quit each year). If at first a smoker is not successful at quitting (over 90 percent are not), the arduous journey continues from cycles of trying to quit but relapsing to trying again. Some smokers may give up trying to quit and withdraw out of fear of failure, shame or embarrassment. Sometimes the smoker may use unproven treatments or will power to quit (over 75 percent do that) and perhaps the smoker may use an effective product or service. Finally, the journey ends when the smoker either quits for good or suffers and dies from a smoking related cause (about a third to a half of lifetime smokers will die of a smoking related disease). Now that research has helped us understand so much of this journey the challenge is to put what we know into practice and policy. And there is not a moment to lose as over 400,000 of our friends and fellow U.S citizens die prematurely each year from their smoking addiction (that equals three fully loaded jumbo jets crashing with no survivors every single day including weekends and holidays). There is substantial room to find more leverage points to improve the overall cessation outcome rate at every step of the way along our fellow smokers journey to freedom from their addiction. This opportunity can only be fully realized with strong political will to do the right thing and by designing cessation policies that support a comprehensive, systems approach to cessation intervention. An approach that provides aggressive, direct-to-consumer marketing and education campaigns to improve their health literacy about the dangers of smoking and the best tools for quitting. An approach that covers the en-

tire smoker's journey and provides interventions tailored to the smokers' needs. This can be achieved through cessation policies that support a comprehensive care management network with aligned financial incentives at federal state and local levels across both the health care industry and the public health system.

Table A-1 Odds Ratios (95 percent Confidence Intervals) for Efficacious Smoking Treatments Relative to Placebo

Gum	Patch	Spray	Inhaler	Bupropion	Clonidine
1.5 (1.3–1.8)	1.9 (1.7–2.2)	2.7 (1.8–4.1)	2.5 (1.7–3.6)	2.1 (1.5–3.0)	2.1 (1.4–3.2)

REFERENCES

- Abrams DB, Emmons KM, Niaura RD, Goldstein MG, Sherman CE. 1991. Tobacco dependence: integrating individual and public health perspectives. In *Annual Review of Addictions, Treatment and Research*. New York: Pergamon. Pp. 391-436.
- Abrams DB, Niaura R, Brown RA, Emmons KM, Goldstein MG, Monti PM. 2003. *The Tobacco Dependence Treatment Handbook*. New York: The Guilford Press.
- Abrams DB, Orleans CT, Niaura R, Goldstein M, Velicer W, Prochaska JO. 1993. Treatment issues: towards a stepped care model. *Tobacco Control* 2 (Suppl), S17-S37.
- Abrams DB, Orleans CT, Niaura RS, Goldstein MG, Prochaska JO, Velicer W. 1996. Integrating individual and public health perspectives for treatment of tobacco dependence under managed health care. A Combined stepped-care and matching model. *Annals of Behavioral Medicine* 18 (4), 290-304.
- Abrams DB, Biener L. 1992. Motivational characteristics of smokers at the workplace: a public health challenge. *Preventive Medicine* 21 (6), 679-87.
- AHIP (America's Health Insurance Plans). 2004. *Making the Business Case for Smoking Cessation Programs*. Webpage. Available at: <http://www.businesscaseroi.org/roi/apps/execsum.aspx>; accessed August 21, 2007.
- American Cancer Society. 2006. *Cancer Facts and Figures*. Website. Available at: <http://www.cancer.org/downloads/STT/CAFF2006PWSecured.pdf>; accessed August 20, 2007.
- APA (American Psychiatric Association). 1994. *Diagnostic and Statistical Manual of Mental Disorders (4th ed.)*. Washington DC: APA
- Auguston EM, Marcus SE. 2003. Use of the Population Survey to characterize subpopulations of continued smokers: A national perspective on the "hardcore" smoker phenomenon. *Nicotine and Tobacco Research* 6 (4), 621-629.
- Backinger C, Leischow S. 2001. Advancing the science of adolescent tobacco use cessation. *American Journal of Health Behavior* 25, 183-190.
- Baer JS, Marlatt GA, McMahon RJ. 1993. *Addictive Behaviors Across the Life Span: Prevention, Treatment, and Policy Issues*. Newbury Park, CA: Sage.
- Bandura A. 1997. *Self-Efficacy: The Exercise of Control*. New York: Freeman.
- Benowitz N. 1998. *Nicotine Safety and Toxicity*. New York: Oxford University Press.
- Biener L, Abrams DB. 1991. The Contemplation Ladder: validation of a measure of readiness to consider smoking cessation. *Health Psychology* 10 (5), 360-365.
- Blondal T, Gudmundsson LJ, Olafsdottir I, Gustavsson G, Westin A. 1999. Nicotine nasal spray with nicotine patch for smoking cessation: randomised trial with six year follow up. *British Medical Journal* 318 (7179), 285-288.
- Bock B, Graham A, Sciamanna C, Krishnamoorthy J, Whitely J, Carmona-Barros R, Niaura R, Abrams D. 2004. Smoking cessation treatment on the Internet: content, quality, and usability. *Nicotine and Tobacco Research* 6, 1-13.
- Bohandana A, Nilsson F, Martinet Y. 1999. Nicotine inhaler and nicotine patch: a combination therapy for smoking cessation. *Nicotine and Tobacco Research* 1, 189.
- Bohadana A, Nilsson F, Rasmussen T, Martinet Y. 2000. Nicotine inhaler and nicotine patch as a combination therapy for smoking cessation: a randomized, double-blind, placebo-controlled trial. *Archives of Internal Medicine* 160(20), 3128-3134.
- Borland R, Yong HH, King B, Cummings KM, Fong GT, Elton-Marshall T, Hammond D, McNeil A. 2004. Use and beliefs about light cigarettes in four countries: findings from the International Tobacco Control Policy Evaluation Survey. *Nicotine and Tobacco Research* 6 (Suppl. 3), S311-S321
- Boyd NR, Sutton C, Orleans CT, McClatchey MW, Bingler R, Fleisher L, Heller D, Baum S, Graves C, Ward JA. 1998. Quit Today! A targeted communications campaign to increase use of the cancer information service by African American smokers. *Preventive Medicine* 27 (5 Pt 2), S50-S60
- Brandon TH, Herzog TA, Webb MS. 2003. It ain't over till it's over: the case for offering relapse-prevention interventions to former smokers. *American Journal of Medical Science* 326 (4), 197-200.
- Britton J, Bates C, Channer K, Cuthbertson L, Godfrey C, Jarvis M, McNeill A. 2000. *Nicotine Addiction in Britain: A Report by the Tobacco Advisory Group of the Royal College of Physicians*. London: Royal College of Physicians of London.
- Brown RA, Kahler CW, Niaura R, Abrams DB, Sales SD, Ramsey SE, Goldstein MG, Burgess ES, Miller IW. 2001. Cognitive-behavioral treatment for depression in smoking cessation. *Journal of Consulting and Clinical Psychology* 69(3), 471-480.

- Brown RA, Herman KC, Ramsey SE, Stout RL. 1999. *Characteristics of Smoking Cessation Participants Who Lapse on Quit Date*. Paper presented at the international meeting of the Society for Research on Nicotine and Tobacco, Copenhagen, Denmark.
- Buka SL, Shenassa ED, Niaura R. 2003. Elevated risk of tobacco dependence among offspring of mothers who smoked during pregnancy: a 30-year prospective study. *American Journal of Psychiatry* 160 (11), 1978-1984.
- Camenga DR, Klein JD. 2004. Adolescent smoking cessation. *Current Opinion in Pediatrics* 16, 368-372
- CDC (Centers for Disease Control and Prevention). 2004. State-specific prevalence of current cigarette smoking among adults—United States, 2003. *Mortality and Morbidity Weekly Report* 53 (44), 1035-1037.
- CDC. 2004. Cigarette smoking among adults—United States, 2002. *Mortality and Morbidity Weekly Report* 53, 427-431.
- CDC. 2004. State medicaid coverage for tobacco-dependence treatments—United States, 1994–2002. *Morbidity and Mortality Weekly Report* 53 (3):54-57.
- CDC. 2002. *Mortality and Morbidity Weekly Report* 51, 300-303.
- CDC. 2001. Behavior Risk Factor Survey. *Mortality and Morbidity Weekly Report* 50, 1-84.
- CDC. 2000. Strategies for reducing exposure to environmental tobacco smoke, increasing tobacco-use cessation, and reducing initiation in communities and health care systems: a report on recommendations of the Task Force on Community Preventive Services. *Mortality and Morbidity Weekly Report* 49, 1-12.
- CDC. 1998. Tobacco use among high school students—United States, 1997. *Morbidity and Mortality Weekly Report* 47 (12), 229-233.
- Cobb NK, Graham AL, Bock BC, Papandonatos G, Abrams DB. 2005. Initial evaluation of a real-world Internet smoking cessation system. *Nicotine and Tobacco Research* 7, 207-216
- Cokkinides VE, Ward E, Jemal A, Thun MJ. 2005. Under-use of smoking cessation treatments: results from the National Health Interview Survey, 2000. *American Journal of Preventive Medicine* 28:119–122.
- Coe JW, Brooks PR, Vetelino MG, Wirtz, MC, Arnold EP, Huang J, Sands SB, Davis TI, Lebel LA, Fox CB, Shrikhande A, Heym JH, Schaeffer E, Rollema H, Lu Y, Mansbach RS, Chambers LK, Rovetti CC, Schulz DW, Tingley FD, O'Neill BT. 2005. Varenicline: an alpha4beta2 nicotinic receptor partial agonist for smoking cessation. *Journal of Medicinal Chemistry* 48(10), 3474-3477.
- Colby SM, Monti PM, Barnett NP, Rohsenow DJ, Weissman K, Spirito A, Woolard RH, Lewander WJ. 1998. Brief motivational interviewing in a hospital setting for adolescent smoking: a preliminary study. *Journal of Consulting and Clinical Psychology* 66 (3), 574-578.
- Colby SM, Monti PM, Tevyaw TOL, Barnett NP, Spirito A, Rohsenow DJ, Riggs S, Lewander W. 2005. Brief motivational intervention for adolescent smokers in medical settings. *Addictive Behaviors* 30 (5) 865-874.
- Cole P, Rodu B. 1996. Declining cancer mortality in the United States. *Cancer* 78 (10), 2045-2048.
- COMMIT Research Group. 1995. Community Intervention Trial for Smoking Cessation (COMMIT): I. Cohort results from a four-year community intervention. *American Journal of Public Health* 85, 183-192.
- Critchley J, Capewell S. 2003. *Smoking Cessation for the Secondary Prevention of Coronary Heart Disease*. In the Cochrane Collaboration. Cochrane Library, Issue 4. Oxford: Update Software.
- Cromwell J, Bartosch WJ, Fiore MC, Hasselblad V, Baker T. 1997. Cost-effectiveness of the clinical practice recommendations in the AHCPR guideline of smoking cessation. Agency for Health Care Policy and Research. *Journal of the American Medical Association* 278 (21), 1759-1766.
- Cummings KM. 1999. Community-wide interventions for tobacco control. *Nicotine and Tobacco Research* 1(Suppl 1):113-116.
- Cummings KM, Hyland A, Bansal MA, Giovino GA. 2004. What do Marlboro Lights smokers know about low-tar cigarettes? *Nicotine and Tobacco Research* 6 (Suppl. 3), S323–S332.
- Cummings KM, Hyland A, Giovino GA, Hastrup JL, Bauer JE, Bansal MA. 2004. Are smokers adequately informed about the health risks of smoking and medicinal nicotine? *Nicotine and Tobacco Research* 6 (Suppl. 3), S333–S340.
- Cummings KM, Hyland A. 2005. Impact of nicotine replacement therapy on smoking behavior. *Annual Review of Public Health* Volume 25. Annual Reviews Inc.
- Cummings KM, Morley CP, Hyland A. 2002. Failed promises of the cigarette industry and its effect on consumer misperceptions about the health risks of smoking. *Tobacco Control* 11 (Suppl. 1), I110–I116.
- Curry SJ, Orleans CT. 2005. Addressing tobacco treatment in managed care. *Nicotine and Tobacco Research* 7 (Suppl. 1), s5-s8.
- Curry SJ, Orleans CT, Keller P, Fiore M. 2006. Promoting smoking cessation in the healthcare environment 10 years later. *American Journal of Preventive Medicine* 31 (3), 269-272.

- Curry SJ, Grothaus LC, McAfee T, Pabiniak C. 1998. Use and cost effectiveness smoking-cessation services under four insurance plans in a health maintenance organization. *New England Journal of Medicine* 339, 673-679.
- Curry SJ, Grothaus L, McBride C. Reasons for quitting: extrinsic and intrinsic motivation for smoking cessation in a population-based sample of smokers. *Addictive Behavior* 22, 737-739.
- Curry SJ, McBride C, Grothaus LC, Louie D, Wagner EH. 1995. A randomized trial of self-help materials, personalized feedback, and telephone counseling with nonvolunteer smokers. *Journal of Consulting and Clinical Psychology* 63 (6), 1005-1014.
- Curry SJ, Wagner EH, Grothaus LC. 1991. Evaluation of intrinsic and extrinsic motivation interventions with a self-help smoking cessation program. *Journal of Consulting and Clinical Psychology* 59 (2), 318-324.
- Dani JA, Heinemann S. 1996. Molecular and cellular aspects of nicotine abuse. *Neuron* 16, 905-908.
- Davis, RM. 1998. An overview of tobacco measures. *Tobacco Control* 7 (Suppl), S36-S40.
- DHHS (U.S. Department of Health and Human Services). 1994. *Preventing Tobacco Use Among Young People: A Report of the Surgeon General*. Atlanta, GA: CDC
- DHHS. 1998. *Tobacco Use Among U.S. Racial/Ethnic Minority Groups: A Report of the Surgeon General*. Washington DC: Government Printing Office.
- DHHS. 2000. *Reducing Tobacco Use: A Report of the Surgeon General*. Atlanta, GA: CDC.
- DHHS. 2004a. *The Health Consequences of Smoking*. Atlanta, GA: CDC.
- DHHS. 2004b. *Women, Tobacco and Cancer: An Agenda for the 21st Century*. National Cancer Institute report, NIH Pub. # 04-5599.
- Doescher MP, Whinston MA, Goo A, Cummings D, Huntington J, Saver BG. 2002. Pilot study of enhanced tobacco-cessation services for low-income smokers. *Nicotine and Tobacco Research* 4 (Suppl 1), S19-S24.
- Dzewaltowski DA, Glasgow RE, Klesges LM, Estabrooks PA, Brock E. 2004. RE-AIM: Evidence-based standards and a web resource to improve translation of research into practice. *Annals of Behavioral Medicine* 28 (2), 75-80.
- Emmons. 2003. *Motivating Smokers to Quit. The Tobacco Dependence Treatment Handbook*. New York: The Guilford Press.
- Etter JF. 2004. Associations between smoking prevalence, stages of change, cigarette consumption and quit attempts across the United States. *Preventive Medicine* 38 (3), 369-373.
- Fagerstrom KO, Schneider NG. 1989. Measuring nicotine dependence: a review of the Fagerstrom Tolerance Questionnaire. *Journal of Behavioral Medicine* 12, 159-181.
- Fagerstrom KO. 1994. Combined use of nicotine replacement products. *Health Values* 18:15-20.
- Farkas AJ, Gilpin EA, White MM, Pierce JP. 2000. Association between household and workplace smoking restrictions and adolescent smoking. *Journal of the American Medical Association* 284 (6), 717-722.
- FDA (Food and Drug Administration). 2006. *Labelling Information for Varenicline*. Website. Available at: <http://www.fda.gov/cder/foi/label/2006/0219281bl.pdf>; accessed August 20, 2007.
- Fertig J, Allen JP. 1995. *Alcohol and Tobacco: From Basic Science to Policy*. National Institute on Alcohol Abuse and Alcoholism, Monograph 30.
- Fichtenberg CM, Glanz SA. 2000. Association of the California Tobacco Control Program with declines in cigarette consumption and mortality from heart disease. *New England Journal of Medicine* 343 (24), 1772-1777.
- Fiore MC, Bailey WC, Cohen SJ, Dorfman SF, Goldstein MG, Gritz ER, Heyman RB, Jaen CR, Kottke TE, Lando HA, Mecklenburg RE, Mullen PD, Nett LM, Robinson L, Stitzer ML, Tommasello AC, Villejo L, Wewers ME. 2000. *Treating Tobacco Use and Dependence: Clinical Practice Guideline*. Rockville, MD: DHHS.
- Fiore MC, Croyle RT, Curry SJ, Cutler CM, Davis RM, Gordon C, Heaton C, Koh HK, Orleans CT, Richling D, Satcher D, Seffrin J, Williams C, Williams LN, Keller PA, Baker TB. 2004. Preventing 3 million premature deaths and helping 5 million smokers quit: a national action plan for tobacco cessation. *American Journal of Public Health* 94 (2), 205-210.
- Fiore MC, Novotny TE, Pierce JP, Giovino GA, Hatziandreu EJ, Newcomb PA, Surawicz TS, Davis RM. 1990. Methods used to quit smoking in the United States. Do cessation programs help? *Journal of the American Medical Association* 263 (20), 2760-2765.
- Fong GT, Hyland A, Borland R, Hammond D, Hastings G, McNeill A, Anderson S, Allwright S, Mulcahy M, Howell F, Clancy L, Thompson ME, Connolly G, Driezen P. 2006. Changes in exposure to tobacco smoke pollution and support for smoke-free public places following the implementation of comprehensive smoke-free workplace legislation in the Republic of Ireland: Findings from the ITC Ireland/UK Survey. *Tobacco Control* 15 (Suppl. III), iii51-iii58
- Frieden TR, Blakeman DE. 2005. The dirty dozen: 12 myths that undermine tobacco control. *American Journal of Public Health* 95 (9), 1500-1505.

- Frieden TR, Mostashari F, Kerker BD, Miller N, Hajat A, Frankel M. 2005. Adult tobacco use levels after intensive tobacco control measures—New York City. *American Journal of Public Health* 95:1016-1023.
- Friend K, Levy D. 2001. Smoking cessation interventions and policies to promote their use: a critical review. *Nicotine and Tobacco Research* 2, 299-310.
- FTC (Federal Trade Commission). 2005. *Cigarette Report for 2003*. Washington DC: FTC.
- Garvey AJ, Bliss RE, Hitchcock JL, Heinold JW, Rosner B. 1992. Predictors of smoking relapse among self-quitters: a report from the Normative Aging Study. *Addictive Behaviors* 17 (4), 367-77.
- Giardina TD, Hyland A, Bauer UE, Cummings KM. 2004. Which population-based interventions would motivate smokers to think seriously about stopping smoking? *American Journal of Health Promotion* 18 (6), 405-408.
- Glassman AM. 1997. Cigarette smoking and its comorbidity. *NIDA Research Monograph* 172, 52-60.
- Glassman AH, Covey LS, Stetner F, Rivelli S. 2001. Smoking cessation and the course of major depression: a follow up study. *Lancet* 357 (9272), 1929-1932.
- Glasgow RE, Vogt T, Boles SM. 1999. Evaluating the public health impact of health promotion interventions: the RE-AIM framework. *American Journal of Public Health* 89, 1322-1327.
- Glasgow RE, Lichtenstein E, Marcus AC. 2003. Why don't we see more translation of health promotion research to practice? Rethinking the efficacy to effectiveness transition. *American Journal of Public Health* 93(8), 1261-1267.
- Glasgow RE, Klesges LM, Dzewaltowski DA, Estabrooks PA, Vogt TM. 2006. Evaluating the impact of health promotion programs: using the RE-AIM framework to form summary measures for decision making involving complex issues. *Health Education Research* Aug 31; [Epub ahead of print].
- Glasgow R, Green L, Klesges L, Abrams D, Fisher E, Goldstein M, Hayman LL, Ockene JK, Orleans CT. 2006. External validity: we need to do more. *Annals of Behavioral Medicine*, 31(2), 105-108.
- Gonzales D, Rennard SI, Nides M, Oncken C, Azoulay S, Billing CB, Watsky EJ, Gong J, Williams KE, Reeves KR. 2006. Varenicline, an alpha4beta2 nicotinic acetylcholine receptor partial agonist, vs sustained-release bupropion and placebo for smoking cessation: a randomized controlled trial. *Journal of the American Medical Association* 296(1), 47-55.
- Hajek P, Stead LF, West R, Jarvis M, Lancaster T. 2005. Relapse prevention interventions for smoking cessation. Cochrane Collaboration. *Cochrane Library, Issue 1*. Oxford: Update Software.
- Hale K, Hughes J, Oliverto A, Helzar JE, Higgins ST, Bickel WK, Cottler LB. 1993. *Nicotine Dependence in a Population-Based Sample: Problems of Drug Dependence*. NIDA Research Monograph, 132.
- Hammond D, McDonald PW, Fong GT, Borland R. 2004. Do smokers know how to quit? Knowledge and perceived effectiveness of cessation assistance as predictors of cessation behaviour. *Addiction* 99(8), 1042-1048.
- Hammond D, Fong GT, Zanna MP, Thrasher JF, Borland R. 2006. Tobacco denormalization and industry beliefs among smokers from four countries. *American Journal of Preventive Medicine* 31(3): 225-232
- Herrera N, Franco R, Herrera L, Partidas A, Rolando R, Fagerstrom KO. 1995. Nicotine gum, 2 and 4 mg, for nicotine dependence. A double-blind placebo-controlled trial within a behavior modification support program. *Chest* 108 (2), 447-451.
- Hey K, Perera R. 2005. Competitions and incentives for smoking cessation. Cochrane Collaboration. *Cochrane Library, Issue 2*. Oxford: Update Software.
- Hey K, Perera R. 2005. Quit and win contests for smoking cessation. Cochrane Collaboration. *Cochrane Library, Issue 2*. Oxford: Update Software.
- Hollis JF, Lichtenstein E, Vogt TM, Stevens VJ, Biglan A. 1993. Nurse-assisted counseling for smokers in primary care. *Annals of Internal Medicine* 118 (7), 521-525.
- Hopkins DP, Briss PA, Ricard CJ, Husten CG, Carande-Kulis VG, Fielding JE, Alao MO, McKenna JW, Sharp DJ, Harris JR, Woollery TA, Harris KW. 2001. Reviews of evidence regarding interventions to reduce tobacco use and exposure to environmental tobacco smoke. *American Journal of Preventive Medicine* 20 (Suppl.1):16-66.
- Hopkins DP, Husten CG, Fielding JE, Rosenquist JN, Westphal LL. 2001. Evidence reviews and recommendations on interventions to reduce tobacco use and exposure to environmental tobacco smoke: a summary of selected guidelines. *American Journal of Preventive Medicine* 20 (Suppl. 1): 67-87.
- Hughes JR, Stead LF, Lancaster T. 2000. Anxiolytics for smoking cessation. 2000. Cochrane Collaboration. *Cochrane Library, Issue 4*. Oxford: Update Software.
- Hughes JR. 1995. Clinical implications of the association between smoking and alcoholism. Fertig J, Fuller R. (Eds). *Alcohol and tobacco: From basic science to policy*, National Institute of Alcohol and Alcoholism Monograph 30, 171-181.

- Hughes JR. 1996. Pharmacotherapy of Nicotine Dependence. Schuster CR, Kuhar MJ (Eds). *Pharmacological aspects of drug dependence: Toward an integrative neurobehavioral approach*. pp. 599-626. New York: Springer-Verlag.
- Hughes JR, Shiffman S, Callas P, Zhang J. 1993. A meta-analysis of the efficacy of over-the-counter nicotine replacement. *Tobacco Control* 12 (1), 21-27.
- Hughes JR, Cummings KM, Hyland A. 1999. Ability of smokers to reduce their smoking and its association with future smoking cessation. *Addiction* 94 (1), 109-114.
- Hughes JR, Fiester S, Goldstein MG, Resnick MP, Rock N, Ziedonis D. 1996. American Psychiatric Association Practice Guideline for the treatment of patients with nicotine dependence. *American Journal of Psychiatry* 153, S1-S31.
- Hughes JR, Goldstein MG, Hurt RD, Shiffman S. 1999. Recent advances in the pharmacology of smoking cessation. *Journal of the American Medical Association* 281 (1), 72-76.
- Hughes JR, Shiffman S, Callas P, Zhang J. 2003. A meta-analysis of the efficacy of over-the-counter nicotine replacement. *Tobacco Control* 12, 21-27.
- Hughes JR. 1993. Pharmacotherapy for smoking cessation: unvalidated assumptions, anomalies, and suggestions for future research. *Journal of Consulting and Clinical Psychology* 61 (5), 751-760
- Hughes JR, Keely J, Naud S. 2004. Shape of the relapse curve and long-term abstinence among untreated smokers. *Addiction* 99, 29-39.
- Hunt WA, Bespalec DA. 1974. An evaluation of current methods of modifying smoking behavior. *Journal of Clinical Psychology* 30 (4), 431-438.
- Hurt RD, Sachs DP, Glover ED, Offord KP, Johnston JA, Dale LC, Khayrallah MA, Schroeder DR, Glover PN, Sullivan CR, Croghan IT, Sullivan PM. 1997. A comparison of sustained-release bupropion and placebo for smoking cessation. *New England Journal of Medicine* 337 (17), 1195-1202.
- Hurt RD, Eberman KM, Croghan IT, Offord KP, Davis LJ, Morse RM, Palmén MA, Bruce BK. 1994. Nicotine dependence treatment during inpatient treatment for other addictions: a prospective intervention trial. *Alcoholism: Clinical and Experimental Research* 18(4), 867-872.
- Hurt RD, Croghan GA, Beede SD, Wolter TD, Croghan IT, Patten CA. 2000. Nicotine patch therapy in 101 adolescent smokers: efficacy, withdrawal symptom relief, carbon monoxide and plasma cotinine levels. *Archives of Pediatric and Adolescent Medicine* 154:31-37.
- Hyland A, Levy DT, Rezaishiraz H, Hughes JR, Bauer JE, Giovino GA, Cummings KM. 2005. Reduction in amount smoked predicts future cessation. *Psychology of Addictive Behaviors* 19, 221-225.
- Jackson NW, Howes FS, Gupta S, Doyle JL, Waters E. 2005. Policy interventions implemented through sporting organizations for promoting healthy behavior change. Cochrane Collaboration. *Cochrane Library*, Issue 2. Oxford: Update Software.
- Jorenby DE, Hays JT, Rigotti NA, Azoulay S, Watsky EJ, Williams KE, Billing CB, Gong J, Reeves KR. 2006. Efficacy of varenicline, an alpha4beta2 nicotinic acetylcholine receptor partial agonist, vs placebo or sustained-release bupropion for smoking cessation: a randomized controlled trial. *Journal of the American Medical Association* 296 (1), 56-63.
- Jorensby DE, Leischow SJ, Nides MA, Rennard SI, Johnston JA, Hughes AR, Smith SS, Muramoto ML, Daughton DM, Doan K, Fiore MC, Baker TB. 1999. A controlled trial of sustained release bupropion, a nicotine patch, or both for smoking cessation. *New England Journal of Medicine* 340:685-691
- Keller PA, Fiore MC, Curry SJ, Orleans CT. 2005. Systems change to improve health and health care: lessons from addressing tobacco in managed care. *Nicotine and Tobacco Research* 7 (Suppl.1): s5-s8.
- Killen JD, Fortmann SP, Varady A, Kraemer HC. 2002. Do men outperform women in smoking cessation trials? Maybe, but not by much. *Experimental Clinical Psychopharmacology* 10 (3), 295-301.
- Killen JD, Robinson TN, Ammerman S, Hayward C, Rogers J, Stone C, Samuels D, Levin SK, Green S. 2004. Randomized clinical trial of the efficacy of bupropion combined with nicotine patch in the treatment of adolescent smokers. *Consulting and Clinical Psychology* 72 (4):729-735.
- Klesges RC, Johnson KC, Somes G. 2006. Varenicline for smoking cessation: definite promise, but no panacea. *Journal of the American Medical Association* 296(1), 94-95.
- Kornitzer M, Boutsen M, Dramaix M, Thijs J, Gustavsson G. 1995. Combined use of nicotine patch and gum in smoking cessation. *Preventive Medicine* 24:41-47.
- Kozlowski LT, Yost B, Stine MM, Celebucki C. 2000. Massachusetts' advertising against light cigarettes appears to change beliefs and behavior. *American Journal of Preventive Medicine* 18 (4), 339-342.
- Lancaster T, Stead LF. 2000. Self-help interventions for smoking cessation. Cochrane Collaboration. *Cochrane Library*, Issue 3. Oxford: Update Software.

- Lando HA, Rolnick S, Klevan D, Roski J, Cherney L, Lauger G. 1997. Telephone support as an adjunct to transdermal nicotine in smoking cessation. *American Journal of Public Health* 87 (10), 1670-1674.
- Lando HA, Pirie PL, Roski J, McGovern PG, Schmid LA. 1996. Promoting abstinence among relapsed chronic smokers. *American Journal of Public Health* 86, 1786-1790.
- Lasser K, Boyd JW, Woolhandler S, Himmelstein DU, McCormick D, Bor DH. 2000. Smoking and mental illness: a population-based prevalence study. *Journal of the American Medical Association* 284 (20), 2606-2610.
- Levy DT, Friend K. 2002a. Examining the effects of tobacco treatment policies on smoking rates and smoking related deaths using the SimSmoke computer simulation model. *Tobacco Control* 11, 47-54.
- Levy DT, Friend K. 2002b. A simulation model of policies directed at treating tobacco use and dependence. *Medical Decision Making* 22:6-17.
- Levy DT, Chaloupka F, Gitchell J, Mendez D, Warner KE. 2004. The use of simulation models for the surveillance, justification and understanding of tobacco control policies. *Health Care Management Science* 5 (2), 113-120.
- Levy GT, Chaloupka F, Gitchell J. 2005. The effects of tobacco control policies on smoking rates: a tobacco control scorecard. *Journal of Public Health Management and Practice* 10 (4): 338-353.
- Levy DT, Cummings KM, Hyland A. 2000. Increasing taxes as a strategy to reduce cigarette use and deaths: Results of a simulation model. *Preventive Medicine* 31 (3): 279-286.
- Levy DT, Cummings KM, Hyland A. 2000b. A simulation of the effects of youth initiation policies on overall cigarette use. *American Journal of Public Health* 90 (8): 1311-1314.
- Lloyd-Richardson EE, Niaura R, Brown R, Abrams D. 2001a. *Informed Development of Smoking Cessation Interventions: Addressing the Needs of College and Technical School Students*. Symposium conducted at the Society for Prevention Research, Developing Effective Tobacco Interventions: Transdisciplinary Research Informing Target, Policy, and Content Decisions, L. Dierker, chairperson, Washington, DC.
- Lloyd-Richardson EE, Niaura R, Abrams D. 2001b. *A survey of smoking among young adults in technical school*. Unpublished raw data.
- Longo DR, Johnson JC, Kruse RL, Brownson RC, Hewett JE. 2001. A prospective investigation of the impact of smoking bans on tobacco cessation and relapse. *Tobacco Control* 10 (3), 267-272.
- Lovato C, Linn G, Stead LF, Best A. 2003. Impact of tobacco advertising and promotion on increasing adolescent smoking behaviors. Cochrane Collaboration. *Cochrane Library*, Issue 3. Oxford: Software Update.
- Mandel L, Bialous A, Glantz S. 2006. Avoiding "truth": tobacco industry promotion of life skills training. *Journal of Adolescent Health* 39 (6), 868-879.
- Marcus BH, Albrecht AE, King TK, Parisi AF, Pinto BM, Roberts M, Niaura RS, Abrams DB. 1999. The efficacy of exercise as an aid for smoking cessation in women: a randomized controlled trial. *Archives of Internal Medicine* 159 (11), 1229-1234.
- Marlatt GA. 1998. *Harm Reduction: Pragmatic Strategies for Managing High-Risk Behaviors*. New York: Guilford Press.
- McDonald PW. 1999. Population-based recruitment for quit-smoking programs: an analytic review of communication variables. *Preventive Medicine* 28 (6), 545-557.
- McMenamin SB, Halpin HA, Ibrahim JK, Orleans CT. 2004. Physician and enrollee knowledge of Medicaid coverage for tobacco dependence treatments. *American Journal of Preventive Medicine* 26 (2), 99-104.
- McPhillips-Tangum C, Bocchino C, Carreon R, Erceg C, Rehm B. 2004.. Addressing tobacco in managed care: results of the 2002 Survey. *Preventing Chronic Disease* 1 (4):A04.
- Mendez D, Warner KE. 2000. Smoking prevalence in 2010: why the Healthy People goal is unattainable. *American Journal of Public Health* 90(3), 401-403.
- Mendez D, Warner KE, Courant PN. 1998. Has smoking cessation ceased? Expected trends in the prevalence of smoking in the United States. *American Journal of Epidemiology* 148:249-258.
- Metzger KB, Mostashari F, Kerker BD. 2005. Use of pharmacy data to evaluate smoking regulations' impact on sales of nicotine replacement therapies in New York City. *American Journal of Public Health* 95 (6), 1050-1055.
- Miller N, Frieden TR, Liu SY, Matte TD, Mostashari F, Deitcher DR, Cummings KM, Chang C, Bauer U, Bassett MT. 2005. Effectiveness of a large-scale distribution programme of free nicotine patches: a prospective evaluation. *Lancet* 365 (9474), 1849-1854.
- Moher M, Hey K, Lancaster T. 2005. Workplace interventions for smoking cessation. Cochrane Collaboration. *Cochrane Library*, Issue 4. Oxford: Update Software.
- Moller A, Villebro N, Pederson T. 2001. Interventions for preoperative smoking cessation. 2001. Cochrane Collaboration. *Cochrane Library*, Issue 4. Oxford: Update Software.

- Moolchan ET, Robinson ML, Ernst M, Cadet JL, Pickworth WB, Heishman SJ, Schroeder JR. 2005. Safety and efficacy of the nicotine patch and gum for the treatment of adolescent tobacco addiction. *Pediatrics* 115, 407-414.
- Netemeyer RG, Andrews JC, Burton S. 2005. Effects of antismoking advertising—based beliefs on adult smokers' consideration of quitting. *American Journal of Public Health* 95 (6), 1062-1066.
- Niaura R, Abrams DB. 2002. Smoking cessation: Progress, priorities, and prospectus. *Journal of Consulting and Clinical Psychology* 70(3), 494-509
- Niaura R, Abrams DB. 2003. Assessment of smokers. *The Tobacco Dependence Treatment Handbook*. New York: The Guilford Press.
- Niaura R, Jones C, Kirkpatrick P. 2006. Fresh from the pipeline: Varenicline. *Nature Reviews Drug Discovery* 5: 537-538.
- Ockene J, Kristeller J, Goldberg R, Amick TL, Pekow P, Hosmer D, Quirk M, Kalan K. 1991. Increasing the efficacy of physician-delivered smoking interventions: a randomized clinical trial. *Journal of General Internal Medicine* 6, 1-8.
- Orleans CT, Alper J. 2003. Helping Addicted Smokers Quit. Issacs S, Knickman J (Eds). *To Improve Health and Health Care Vol. VI*. New Jersey: Robert Wood Johnson Foundation.
- Orleans CT, Slade JE. 1993. *Nicotine Addiction: Principles and Management*. New York: Oxford University Press.
- Ossip-Klein DJ, McIntosh S. 2003. Quitlines in North America: evidence base and applications. *American Journal of Medical Science* 326 (4), 201-205.
- Paretti-Watel P. 2003. I will quit tomorrow—Statistical Portrayals of “dissonant smokers.” *Revue d'Épidémiologie et de Santé Publique* 51 (2), 215-226. French.
- Park EW, Schultz JK, Tudiver F, Campbell T, Becker L. 2004. Enhancing partner support to improve smoking cessation.. Cochrane Collaboration. *Cochrane Library*, Issue 3. Oxford: Update Software.
- Patten CA, Martin JE, Myers MG, Calfas KJ, Williams CD. 1998. Effectiveness of cognitive-behavioral therapy for smokers with histories of alcohol dependence and depression. *Journal of Studies of Alcohol* 59 (3), 327-335.
- Perkins KA, Donny E, Caggiula AR. 1999. Sex differences in nicotine effects and self-administrations: review of human and animal evidence. *Nicotine and Tobacco Research* 1 (4), 301-315.
- Pierce JP, Gilpin EA. 2003. A minimum 6-month prolonged abstinence should be required for evaluating smoking cessation trials. *Nicotine and Tobacco Research* 5(2), 151-153.
- Piper M, McCarthy D, Baker T. 2006. Assessing tobacco dependence: a guide to measure evaluation and selection *Nicotine and Tobacco Research* 8 (3) 339-351.
- Porter Novelli, Communication Styles. 2002. *Communications Data Base on Youth Behavior*, Washington DC.
- Prochaska JO, DiClemente CC, Velicer WF, Rossi JS. 1993. Standardized, individualized, interactive, and personalized self-help programs for smoking cessation. *Health Psychology* 12 (5):399-405.
- Prochaska JO, Velicer WF, Fava JL, Ruggiero L, Laforge RG, Rossi JS, Johnson SS, Lee PA. 2001. Counselor and stimulus control enhancements of a stage-matched expert system intervention for smokers in a managed care setting. *Preventive Medicine* 32 (1):23-32.
- Prochaska JO, Velicer WF. 2004. Integrating population smoking cessation policies and programs. *Public Health Reports* 119 (3), 244-252.
- Prochaska JJ, Rossi JS, Redding CA, Rosen AB, Tsoh JY, Humfleet GL, Eisendrath SJ, Meisner MR, Hall SM. 2004. Depressed smokers and stage of change: implications for treatment interventions. *Drug and Alcohol Dependence* 76 (2):143-151.
- Rabius V, McAlister AL, Geiger A, Huang P, Todd R. 2004. Telephone counseling increases cessation rates among young adult smokers. *Health Psychology* 23 (5), 539-541.
- Raw M, McNeill A, West R. 1998. Smoking cessation guidelines for health professionals: a guide to effective smoking cessation interventions for the health care system. *Thorax* 53 (Supple 5)1:S1-S19.
- Raw M, McNeill A, Coleman T. 2005. Lessons from the English smoking treatment services. *Addiction* 100 (Suppl. 2), 84–91.
- Rigotti NA, Lee JE, Wechsler H. 2000. U.S. College students' use of tobacco products: results of a national survey. *Journal of the American Medical Association* 284 (6), 699-705.
- Schauffler HH, Barker DC, Orleans CT. 2001. Medicaid coverage for tobacco-dependence treatments. *Health Affairs* 20(1), 298-303.
- Shiffman S. 1989. Trans-situational consistency in smoking relapse. *Health Psychology* 8 (4), 471-481
- Shiffman S, Paty JA, Rohay JM, DiMarino ME, Gitchell J. 2000. The efficacy of computer-tailored smoking cessation material as a supplement to nicotine polacrilex gum therapy. *Archives of Internal Medicine* 160, 1675-1681.

- Shiffman SA, Paty JA, Rohay JM, DiMarino ME, Gitchell JG. 2001. The efficacy of computer-tailored smoking cessation material as a supplement to nicotine patch therapy. *Drug and Alcohol Dependence* 64:35-46
- Shiffman S, Gitchell J, Pinney JM, Burton SL, Kemper KE, Lara EA. 1997. Public health benefit of over-the-counter nicotine medications. *Tobacco Control* 6 (4), 306-310.
- Shiffman S, Mason KM, Henningfield JE. 1998. Tobacco dependence treatments: review and prospectus. *Annual Reviews of Public Health* 19, 335-358.
- Shiffman S, Pillitteri JL, Burton SL, Rohay JM, Gitchell JG. 2001. Smokers' beliefs about "Light" and "Ultra Light" cigarettes. *Tobacco Control* (Suppl. 1), i17-i23
- Shiffman S, Pillitteri JL, Burton SL, Di Marino ME. 2004. Smoker and ex-smoker reactions to cigarettes claiming reduced risk. *Tobacco Control* 13 (1), 78-84.
- Shiffman S, Shumaker SA, Abrams DB, Cohen S, Garvey A, Grunberg NE, Swan GE. 1986. Models of smoking relapse. *Health Psychology* 5, 13-27.
- Siahpush M, Borland R, Scollo M. 2003. Factors associated with smoking cessation in a national sample of Australians. *Nicotine and Tobacco Research* 5(4), 597-602.
- Siegel M. 2002. The effectiveness of state-level tobacco control interventions: a review of program implementation and behavioral outcomes. *Annual Review of Public Health* 23:45-71.
- Silagay C, Lancaster T, Stead L, Mant D, Fowler G. 2002. Nicotine replacement therapy for smoking cessation. Cochrane Collaboration. *Cochrane Library*, Issue 2. Oxford: Update Software.
- Sinclair HK, Bond CM, Stead LF. 2004. Community pharmacy personnel interventions for smoking cessation. Cochrane Collaboration. *Cochrane Library*, Issue 1. Oxford: Update Software.
- Smith TA, House RFJ, Croghan IT, Gauvin TR, Colligan RC, Offord KP, Gomez-Dahl, LC, Hurt RD. 1996. Nicotine patch therapy in adolescent smokers. *Pediatrics* 984(4 (Pt 1)):659-667.
- Solomon LJ, Scharoun GM, Flynn BS, Secker-Walker RH, Sepinwall D. 2000. Free nicotine patches plus proactive telephone peer support to help low-income women stop smoking. *Preventive Medicine* 31(1), 68-74.
- Solomon LJ, Marcy TW, Howe KD, Skelly JM, Reinier K, Flynn B. 2005. Does extended proactive telephone support increase smoking cessation among low-income women using nicotine patches? *Preventive Medicine* 40(3), 306-313.
- Stead LF, Lancaster T, Perera R. 2003. Telephone counseling for smoking cessation. Cochrane Collaboration. *Cochrane Library*, Issue 1. Oxford: Update Software.
- Strecher VJ, Shiffman S, West R. 2005. Randomized controlled trial of a web-based computer-tailored smoking cessation program as a supplement to nicotine patch therapy. *Addiction* 100 (5), 682-688.
- Sussman S, Lichtman K, Ritt A, Pallonen U. 1999. Effects of thirty-four adolescent tobacco use and prevention trials on regular users of tobacco products. *Substance Use and Misuse* 34, 1469-1503.
- Sussman S. 2001. School-based Tobacco use prevention and cessation: where are we going? *American Journal of Health Behavior* 25 (3), 191-199.
- Sutherland G, Stapleton JA, Russell MA, Jarvis MJ, Hajek P, Belcher M, Feyerabend C. 1992. Randomized controlled trial of nasal nicotine spray in smoking cessation. *Lancet* 340 (8815), 324-329.
- Sutherland G. 1999. A placebo-controlled double-blind combination trial of nicotine patch and spray. *Nicotine and Tobacco Research* 1:186-187.
- Taylor CB, Curry SJ. 2004. Implementations of evidence-based tobacco use cessation guidelines in managed care organizations. *Annals of Behavioral Medicine* 27(1), 13-21.
- Thun M, Jemal A. 2006. How much of the decrease in cancer death rates in the United States is attributable to reductions in tobacco smoking? *Tobacco Control* 15:345-347.
- Tonneson P, Norregaard J, Mikkelsen K, Jorgenson S, Nilsson F. 1993. A double-blind trial of a nicotine inhaler for smoking cessation. *Journal of the American Medical Association* 269(10), 1268-1271.
- Tonneson P, Norregaard J, Sawe U, Simonsen K. 1993. Recycling with nicotine patches in smoking cessation. *Addiction* 88, 533-539.
- Tonneson P, Mikkelsen K, Norregaard J, Jorgenson S. 1996. Recycling hard core smokers with nicotine nasal spray. *European Respiratory Journal* 9, 1619-1623.
- Tonstad S, Tonnesen P, Hajek P, Williams KE, Billing CB, Reeves KR. 2006. Effect of maintenance therapy with varenicline on smoking cessation: a randomized controlled trial. *Journal of the American Medical Association* 296 (1), 64-71.
- U.S. Preventive Services Task Force. 2006. *Task Force on Community Preventive Services. Guide to Community Preventive Services: Tobacco*. Atlanta, GA: CDC.
- Usher M. 2005. Exercise interventions for smoking cessation. Cochrane Collaboration. *Cochrane Library*, Issue 1. Oxford: Update Software.

- Van der Meer RM, Wagena EJ, Ostelo RWJG, Jacobs JE, van Schayck CP. 2001. Smoking cessation for chronic obstructive pulmonary disease. Cochrane Collaboration. *Cochrane Library*, Issue 1. Oxford: Update Software.
- Velicer WF, DiClemente CC, Prochaska JO, Abrams DB, Emmons KM, Pierce JP. 1995. Distribution of smokers by stage in three representative samples. *Preventive Medicine* 24, 401-411.
- Wagner EH, Curry SJ, Grothaus L, Saunders KW, McBride CM. 1995. The impact of smoking and quitting on health care use. *Archives of Internal Medicine* 155, 1789-1795.
- Warner KE, Hodgson TA, Carroll CE. 1999. Medical Costs of smoking in the United States: estimates, their validity, and their implications. *Tobacco Control* 8 (3), 290-300.
- Warner KE, Slade J, Sweanor DT. 1997. The emerging market for long-term nicotine maintenance. *Journal of the American Medical Association* 278 (13), 1087-1092.
- Warner KE, Mendez D, Smith DG. 2004. The financial implications of coverage of smoking cessation treatment by managed care organizations. *Inquiry* 41 (1), 57-69.
- Wechsler H, Rigotti NA, Gledhill-Hoyt J, Lee H. 1998. Increased levels of cigarette use among college students. *Journal of the American Medical Association* 280 (19), 1673-1678.
- West R, McNeill A, Raw M. 2000. National smoking cessation guidelines for health professionals: an update. *Thorax* 55, 987-999.
- West R, DiMarino ME, Gitchell J, McNeill A. 2005. Impact of UK policy initiatives on use of medicines to aid smoking cessation. *Tobacco Control* 14 (3): 166-171.
- Wetter DW, Kenford SL, Smith SS, Fiore MC, Jorenby DE, Baker TB. 1999. Gender differences in smoking cessation. *Journal of Consulting and Clinical Psychology* 67 (4), 555-562.
- Wewers ME, Stillman FA, Hartman AM, Shopland, DR. 2003. Distribution of daily smokers by stage of change: current population survey results. *Preventive Medicine* 36 (6) 710-720.
- Yong HH, Borland R, Siahpush M. 2005. Quitting-related beliefs, intentions, and motivations of older smokers in four countries: finding from the International Tobacco Control Policy Evaluation Survey. *Addictive Behaviors* 30 (4), 777-788.
- Yudkin P, Hey K, Roberts S, Welch S, Murphy M, Walton R. 2003. Abstinence from smoking eight years after participation in randomised controlled trial of nicotine patch. *British Medical Journal* 327 (7405), 28-29
- Zhu SH, Melcer T, Sun J, Rosbrook B, Pierce JP. 2000. Smoking cessation with and without assistance: a population-based analysis. *American Journal of Preventive Medicine* 18 (4), 305-311.
- Zhu SH, Anderson CM, Tadeschi GJ, Rosbrook B, Johnson CE, Byrd M, Gutierrez-Terrell E. 2002. Evidence of real-world effectiveness of a telephone quitline for smokers. *New England Journal of Medicine* 347 (14), 1087-1093.

B

Clean Air Laws

Diana Bonta
Kaiser Permanente

INTRODUCTION

In 1992, the Environmental Protection Agency (EPA) released a report that concluded that secondhand smoke (also called environmental tobacco smoke [ETS]) causes lung cancer in adult nonsmokers and impairs the respiratory health of children (EPA 1992). Furthermore, this EPA report classified secondhand smoke as a Group A carcinogen. Secondhand smoke has been shown in studies to cause cancer at typical environmental levels.

For more than three decades, federal, state, and local regulations and ordinances have created an increasing number of smoke-free environments. Smoking has been eliminated or restricted at many worksites, restaurants and bars, childcare agencies, and other public places, as well as in airports, on airline flights, and in government offices. The movement toward creating smoke-free environments has been significantly motivated by substantial evidence of the harms of ETS to nonsmokers (NCI 1999). However, the implementation of smoking restrictions to eliminate secondhand smoke exposure not only reduces exposure to nonsmokers of environmental tobacco, but also has proven to be a powerful intervention to enhance cessation and to reduce consumption among smokers (IOM 1998).

This appendix examines evidence of the effectiveness of existing policies that restrict tobacco use on levels of exposure of nonsmokers to ETS and on smoking initiation, consumption, and cessation in the United States. The policy levers currently in use, their outcome measures, and what is known about the effectiveness of these policies are discussed. Additionally, a brief description of the implementation and enforcement of policies is presented. Finally, future trends in the implementation of smoking bans or restrictions are considered.

This section is important because tobacco-use regulations have had a significant impact on tobacco use by limiting the opportunities for smokers to smoke. Regulations have influenced the number of smokers who have quit and decreased the quantity of cigarettes smoked. Additionally, smoking bans have influenced social norms regarding tobacco use, thus influencing the number of individuals who initiate smoking. Finally, tobacco bans decrease the number of individuals involuntarily exposed to secondhand smoke.

CLEAN AIR LAWS

While federal regulations have limited exposure of nonsmokers to ETS by instituting smoking bans on airline flights, in federal buildings, the White House, and childcare facilities that receive federal funds (Brownson 1998), the majority of legislation restricting smoking has occurred at the local and state levels (a current listing of state laws restricting smoking can be accessed on the American Lung Association website at www.slati.lungusa.org). An early leader in tobacco control, Minnesota enacted its Clean Indoor Air Act in 1975, which required the creation of nonsmoking sections at both public and private worksites (Emont et al. 1992; Tsoukalas

and Glantz 2003). In the same year, 14 other states passed new or amended clean indoor air laws (Emont et al. 1992).

As of July 1, 2006, 17 states have laws in effect that require 100 percent smoke-free workplaces and/or restaurants and/or bars (ANRF 2005a). Overall, 6,845 municipalities are covered by state or local laws requiring workplaces and/or restaurants and/or bars, to be 100 percent smoke-free, protecting 44.5 percent of the United States population (ANRF 2005b). Notably, 140 municipalities in the United States require workplaces, restaurants, and bars to be 100 percent smoke-free (ANRF 2005a). Additionally, many sites have voluntarily become smoke-free (Jacobson and Wasserman 1997).

A review by Serra and colleagues (2004) of interventions that prevent tobacco smoking in public places found that carefully planned and resourced, multicomponent strategies to implement policies banning smoking effectively reduce smoking in public places (Serra et al. 2004). Not surprisingly, less comprehensive strategies, such as posted warnings and educational material, were less effective.

Furthermore, the Centers for Disease Control and Prevention (CDC) Task Force conducted a systematic review of tobacco intervention studies ($n = 10$) and concluded that smoking bans or limits on tobacco smoking in workplaces and public areas are strongly recommended to reduce exposure to ETS based on the following key findings (CDC 2000b): First, smoking bans and restrictions effectively reduce workplace exposure to ETS in several different settings and populations. Second, following the implementation of smoking bans, decreases in daily tobacco consumption among smokers and increased rates of cessation were identified.

More stringent clean indoor air laws are associated with decreased smoking prevalence and cigarette consumption and a higher proportion of quitters. For example, Emont and colleagues (1992) found that the average smoking prevalence was 28 percent in states without clean indoor air laws and 24 percent in states with extensive clean indoor air laws ($J^* = 3.33$, $p < .001$). Additionally, average cigarette consumption per head was about 119 packets in states without laws and 105 in states with laws ($J^* = 2.79$, $p < .005$). Finally, the average proportion of quitters in states without laws was 44 percent and in states with laws was 50 percent ($J^* = 3.96$, $p < .00005$) (Emont et al. 1992).

Comprehensive public clean air laws have the potential to reduce prevalence and consumption rates of the entire population (including nonworking and non-indoor-working smokers) by about 10 percent (Levy and Friend 2003). Additionally, clean air regulations may contribute to a changing social norm with regard to smoking by altering the perceived social acceptability of smoking (CDC 2000c). Because of changes in social attitudes and the need to smoke in less hospitable places, smokers may be induced to attempt to quit or not initiate (Levy and Friend 2001a).

Workplace

Workplace smoking restrictions are likely to have the greatest impact on both ETS and smoking habits because of the number of hours that workers are subject to these restrictions. Worksite bans may include a total prohibition of smoking onsite, less stringent bans that limit smoking to separate ventilated areas, or smoking in designated areas only. A 1994 report by the EPA estimated that the net benefit of a nationwide, comprehensive clean indoor air law would exceed the estimated costs by \$39 billion to \$72 billion (EPA 1994). Cost savings to employers include an estimate \$4 billion to \$8 billion annually in operational and maintenance costs of buildings (EPA 1994).

Research has verified that the institution of smoke-free workplaces effectively reduces non-smokers' exposure to ETS (CDC 2000c). Stillman and colleagues (1990) evaluated the effectiveness of efforts to institute a complete institutional ban on smoking in all areas of the Johns Hopkins Medical Institutions in Baltimore (about 8,700 employees) (Stillman et al. 1990). The implementation plan of the ban included health-oriented information campaigns, free screening and smoking cessation treatment, training for managers and supervisors, educational programs, and posted signs. Participants included employees and visitors to the medical institutions. This prospective study found significant reductions in nicotine vapor concentrations in all areas except restrooms. Additionally, the reported consumption of cigarettes by employees who continued to smoke and the total number of cigarettes smoked at work decreased by an average of 25 percent. Finally, significant reductions were noted in the level of smoking observed and the amount of cigarette remnants.

Many other studies have also demonstrated the effects of smoking bans on the prevalence and consumption of tobacco. Totally smoke-free workplaces had about twice the effect on consumption and prevalence as policies that allowed smoking in some areas (Farrelly et al. 1999; Fichtenberg and Glantz 2002; Glasgow et al. 1997).

Using data from two large, nationally representative samples, Evans and colleagues (1999) concluded that workplace bans reduce smoking prevalence by 5 percent and average daily consumption among smokers by 10 percent (Evans et al. 1999).

Farrelly and colleagues (1999) analyzed responses from a total of 97,882 indoor workers who completed supplemental tobacco questionnaires regarding their smoking behavior and the smoking policies at their place of work in a series of national surveys conducted between September 1992 and May 1993. Researchers found that a 100 percent smoke-free workplace reduced smoking prevalence by 5.7 percent and average daily cigarette consumption among smokers by 14 percent relative to workplaces with weak or no smoking restrictions. These results were found to be true for all demographic groups and nearly all industries (Farrelly et al. 1999).

A study by Evans and colleagues (1999) also investigated the effects of work area smoking bans on smoking behavior. Data from the 1991 and 1993 National Health Interview Surveys were used to obtain data for more than 18,000 workers. Researchers found that workplace smoking bans are associated with a 5 to 6 percent decline in smoking prevalence and an average reduction in cigarette consumption of 2.3 cigarettes per smoker per day (Evans et al. 1999).

Fichtenberg and Glantz (2002) investigated the effects of smoke-free workplaces on smoking prevalence and cigarette consumption. Twenty-six studies on workplaces in the United States, Australia, Canada, and Germany were subjected to a process of systematic review and meta-analysis. Entirely smoke-free workplaces were associated with a 3.8 percent reduction in smoking prevalence and 3.1 fewer cigarettes per day per smoker. The combined effects of reduced prevalence and lower consumption corresponded to a 29 percent relative reduction in tobacco use among all employees. Based on these findings, the authors concluded that if all workplaces became smoke-free, consumption per capita in the entire population would drop by 4.5 percent in the United States (Fichtenberg and Glantz 2002).

Levy and Friend (2003) also concluded that studies on private worksite regulations suggest that strong worksite restrictions have the potential to reduce the smoking prevalence rate of the entire population by about 6 percent over the long term and the quantity smoked by continuing smokers by 2 to 8 percent, depending on the length of time after the ban was implemented (Levy and Friend 2003). The authors indicate that the effects appear to erode over time, since those who

most reduce their quantity may quit and are no longer represented as smokers with reduced quantities smoked.

Further, Farkas and colleagues (2000) found that workplace smoking restrictions can significantly reduce smoking rates among young adults. Using data from the Current Population Surveys from 1992–1993 and 1995–1996, researchers surveyed 17,185 adolescents between the ages of 15 and 17. Adolescents who worked in a smoke-free workplace were found to be 68 percent as likely to smoke than adolescents who worked in a workplace with no smoking restrictions (Farkas et al. 2000).

Workplace smoking restrictions have demonstrated an effect on the quit rates of smokers as well. Findings from COMMIT, a population-based survey of 8,271 employed adult smokers who completed surveys in 1988 and 1993, found that employees who worked in a smoke-free worksite were over 25 percent more likely to make a serious quit attempt between 1988 and 1993, and over 25 percent more likely to achieve cessation than those who worked in a worksite that permitted smoking. Among continuing smokers, employees in smoke-free worksites consumed an average of 2.75 fewer cigarettes per day than those who worked in places with a nonrestrictive smoking policy (Glasgow et al. 1997).

Using data from the 1990 California Tobacco Survey—which collected information about 4,680 adult indoor smokers—Moskowitz and colleagues (2000) investigated the effects of local workplace smoking laws on smoking cessation. The results of the study revealed that smoke-free ordinances significantly increased the rate of smoking cessation and did so along a “dose-response” relationship—the stronger the ordinance, the higher the rate of cessation. While there was only a 19.1 percent cessation rate in areas with no ordinance, there was a 24.6 percent cessation rate in areas with weak ordinances, and a 26.4 percent cessation rate in areas with strong ordinances. Overall, researchers found that smokers who worked in communities with strong ordinances were 38 percent more likely to quit smoking than smokers in communities with no ordinances (Moskowitz et al. 2000).

Longo and colleagues (2001) conducted a prospective investigation of the impact of smoking bans on tobacco cessation and relapse. The researchers concluded that employees in workplaces with smoking bans have higher rates of smoking cessation than employees in workplaces where smoking is permitted (however, relapse rates were similar between these two groups). Quit rates were higher and the time it took to quit smoking was shorter among employees with smoking bans (Longo et al. 2001).

Hospitals, Medical Campuses, and Nursing Homes

In 1992, the Joint Commission on Accreditation of Healthcare Organizations mandated that hospitals must be smoke-free. Many studies have shown the benefit of smoking restrictions on employees (e.g., Stillman et al. 1990). Various studies have also considered the effects of a hospital-wide smoking ban on patients, particularly in the psychiatric unit of hospitals. Researchers consistently concluded that the smoking bans were implemented with minimal or no adverse effects (Rauter et al. 1997; Ryabik et al. 1994; Smith et al. 1999; Thorward and Birnbaum 1989). Additionally, smoking bans were found to have a significant impact on ETS exposure (Rauter et al. 1997).

In 1998, the Kaiser Permanente (KP) Northern California Region initiated the multifaceted Tobacco Dependence Program. A critical component of this program—whose goal was to reduce tobacco use among its members—was the establishment of smoke-free campuses. Before 1998, no KP campus was completely smoke-free, whereas 16 campuses had become smoke-free as of

August 2004. The remaining campuses also restricted smoking to minimal outdoor areas or to a single outdoor shelter. KP also implemented a policy mandating that all KP campuses opening in 2003 and thereafter be smoke-free (Goldstein et al. 2005).

According to Bergman (2003), most state laws allow nursing homes some discretion regarding smoking, but require some form of designated smoking area if smoking is permitted. Federal laws also allow smoking in nursing homes, although federal and most state laws permit nursing homes to be totally smoke-free. Bergman also found that, among current policies at nursing homes, 64 percent do not permit any smoking inside while the remaining 36 percent allowing smoking only in designated smoking areas (Bergman 2003).

Restaurants and Bars

As of July 1, 2006, 15 states had laws requiring 100 percent smoke-free restaurants and 11 states had laws eliminating smoking in bars. Two additional states and the Commonwealth of Puerto Rico have laws enacted, but not yet in effect, that eliminate smoking in restaurants, bars, or both. Additionally, there are 305 municipal ordinances mandating 100 percent smoke-free restaurants and 222 municipal ordinances creating smoke-free bars (ANRF 2005a). Restaurant and bar ordinances reduce exposure of nonsmokers to ETS. For smokers, although the actual number of hours spent in a restaurant or bar is small, eating, drinking, and smoking often are linked activities (Levy and Friend 2001b). Therefore, bans on smoking in restaurants and bars also have the potential to decrease tobacco use among smokers.

According to a study by Albers and colleagues (2004), strong local clean indoor air regulations are associated with lower levels of reported exposure to ETS in restaurants and bars. Researchers sampled 6,739 adults in Massachusetts households to examine the association of local restaurant and bar regulations with self-reported exposure to ETS among adults. Compared to adults from towns with no restaurant smoking restrictions, those from towns with strong regulations were more than twice as likely to report no exposure to ETS (Odds Ratio [OR] = 2.74; 95 percent Confidence Interval [CI] = 1.97, 3.80), and those from towns with some restrictions were 1.62 times as likely to report no exposure to ETS (OR = 1.62; 95 percent CI = 1.29, 2.02). Bar smoking bans had even greater effects on exposure (Albers et al. 2004).

Eliminating smoking in these environments has been controversial, and the tobacco industry as well as many restaurant and bar proprietors have argued that restrictions on smoking in such establishments would be detrimental to business. However, a review of the literature by Scollo and Lal (2004) concluded that there was “no negative economic impact from the introduction of smoke-free policies in restaurant and bars indicated by 21 studies where findings are based on an objective measure such as taxable sales receipts, where data points several years before and after the introduction of smoke-free policies were examined, where changes in economic conditions are appropriately controlled for, and where appropriate statistical tests are used to control for underlying trends and fluctuations in data” (Scollo and Lal 2004).

For example, Glantz and Smith (1997) compiled sales tax data for 15 cities with smoke-free restaurant ordinances as well as 5 cities and 2 counties with smoke-free bar ordinances, and matched comparison locations. Data were analyzed by multiple regression, including time and a dummy variable for the ordinance. The results indicated that the ordinances did not adversely affect either restaurant or bar sales (Glantz and Smith 1997).

Scollo and Lal (2004) further indicate that studies concluding a negative economic impact have based findings primarily on outcomes predicted before the introduction of policies. on subjective impression or estimates of changes rather than actual, objective, verified, or audited data

(Scollo and Lal 2004). Additionally, these studies were funded predominantly by the tobacco industry or organizations allied with the tobacco industry.

Schools, Colleges, and Commercial Day Care Centers

By 1993, all schools had classrooms bans through federal and state laws (Levy et al. 2001). Almost two-thirds of schools (62.8 percent) had smoke-free building policies in 1994, but fewer (36.5 percent) reported such policies that included the entire school environment (CDC 2000c). Wakefield and colleagues (2000) conducted a cross-sectional survey of 17,287 high school students to study the effects of restrictions on smoking—at home, at school, and in public places—on teenage smoking. Researchers found that the existence of a school ban was not associated with a reduction in smoking uptake (interestingly, it was associated with an increase in the likelihood of transition from an advanced experimenter to established smoker); however, enforced school bans were associated with 11 percent reductions in uptake of smoking across all stages of uptake ($p < .05$) (CDC 2000c; Wakefield et al. 2000).

As of July 1, 2006, 29 colleges and universities in the United States had smoke-free policies for the entire campus, both indoors and out (ANRF 2004). More than 225 additional colleges and universities had smoke-free policies for all residential housing. Using a nationally representative sample of approximately 15,699 respondents to the 1997 Harvard School of Public Health College Alcohol Study, Czart and colleagues (2001) found that complete smoking bans on college campuses are associated with decreased consumption among current smokers but have no significant impact on smoking prevalence (Czart et al. 2001).

As of December 31, 2005, 17 states had laws preventing smoking or requiring separate ventilation at commercial daycare centers, 13 states did not allow smoking when children are on premises, and 6 states required or allowed a designated smoking area. Thirteen states had no restrictions (CDC 2005).

Airlines and Airports

As early as 1970, the Federal Aviation Administration (FAA) initiated an in-depth study to determine to what extent tobacco smoke was harmful to nonsmokers. In May 1973, the Civil Aeronautics Board required airlines to provide separate sections for smokers and nonsmokers for reasons of consumer comfort and protection. In August 1986, the National Academy of Sciences issued a report on airliner cabin air quality and related safety issues, which recommended a smoking ban on all domestic commercial flights. The authors cited four major reasons for the recommendation: (1) to lessen discomfort of passengers and crew, (2) to reduce potential health hazards to cabin crewmembers from environmental tobacco smoke, (3) to eliminate possible fires, and (4) to align cabin air quality with standards for other closed environments. Effective April 23, 1988, the FAA placed a 2-year ban on smoking on all domestic scheduled airline flights of 2 hours or less, and on February 25, 1990, prohibition of smoking went into effect on virtually all scheduled U.S. domestic airline flights. In 2000, the U.S. Department of Transportation banned smoking on all U.S. international flights.

A cross-sectional telephone survey of personnel at primary commercial-service airports found that only 61.9 percent of airports reported being smoke-free in 2002 and that larger airports, which account for the majority of passenger boardings, were less likely than smaller airports to have a smoke-free policy. The researchers concluded that increased adoption and enforcement of smoke-free policies were needed to protect the health of workers and travelers at U.S. airports (CDC 2004).

Prison Restrictions

According to a 2002 survey conducted by the American Correctional Association, at least 38 of 50 state correctional departments reported that they either are smoke-free or have partial smoking bans. Recent additions to that list includes California, whose governor signed a bill to amend the state's penal code to bar tobacco products from prisons and youth correctional facilities, effective July 1, 2005. In addition, on July 15, 2004, the Federal Bureau of Prisons instituted a policy establishing a near-total ban on smoking for both employees and inmates at 105 prisons.

Other Public Places

A leader in tobacco control, California has the nation's longest running comprehensive anti-tobacco program, a significant element of which is workplace bans. In November 1988, Proposition 99, the landmark Tobacco Tax and Health Protection Act, was approved by California voters and instituted a 25-cent tax on cigarettes and earmarked 5 cents of every cigarette pack sold to fund the California Tobacco Control Program. California's smoke-free workplace law took effect in 1995.

A recent California Department of Health and Human Services report indicates that the state's smoke-free workplace law has had a major impact on smoking behavior and cessation efforts, and that the majority of Californians support the law. According to the 2004 Field Poll (CDHS 2005), 58 percent of smokers who quit in the past 10 years said that having smoke-free public places made it easier for them to quit smoking. 69 percent of current smokers who attempted to quit in the past 10 years said that smoke-free public places helped them reduce the number of cigarettes they smoke. Additionally 90 percent of Californians surveyed, including the majority of smokers, said they approve of the smoke-free workplace law. A study by Burns (2002) also indicates that California has higher rates of cessation activity and cessation success compared to other states (Burns 2002).

Perhaps reflective of the strong support for smoke-free environments, many local communities within the state have recently enacted strong restrictions on smoking. In November 2003, Solana Beach in California became the first municipality in the United States to institute a local ordinance banning cigarette smoking on the beach. Since this time, several additional California cities have also implemented bans. The impetus for these ordinances was not only to reduce the amount of ETS to which nonsmokers are exposed, but also to decrease litter and reduce chemical leaching from cigarette butts.

Effective January 1, 2004, Californians were further protected from ETS by Assembly Bill 846, which expanded smoke-free zones around public buildings. The bill prohibits smoking within 20 feet of main entrances, exits, and operable windows of all city, county, and state buildings as well as buildings on the campuses of the University of California system, California state universities, and community colleges (California Legislature 2004).

Legislators in San Francisco city voted to ban smoking in public parks on January 25, 2005. California state law currently prohibits smoking or disposing of any tobacco-related products within 25 feet of a playground or tot lot sandbox area. Eleven other cities in California had previously enacted additional restrictions on outdoor smoking. However, San Francisco's smoking ban is a "curb-to-curb" prohibition of smoking in city parks, plazas, piers, gardens, and recreational fields, making San Francisco the first county in the state with such an expansive ban (Van de Water 2004).

Household Bans

Established by at least one individual in a home, household smoking restrictions have repeatedly been found to be effective at influencing smoking levels of individuals. Using data from three current population surveys with a supplement on tobacco use, Farkas and colleagues (1999) considered the effects of household and workplace smoking restrictions on quitting behaviors. Smokers who lived or worked under a total smoking ban were more likely to report a quit attempt in the previous year. Among those who made an attempt, those who lived or worked under a total smoking ban were more likely to be in cessation for at least 6 months. Current daily smokers who lived or worked under a total smoking ban were more likely to be light smokers. Household bans are even more effective than workplace bans (Farkas et al. 1999).

Farkas and colleagues (2000) also found that household smoking restrictions were found to significantly reduce adolescent cigarette consumption. Adolescents who lived in households with smoking restrictions were 26 percent less likely to be smokers than adolescents who lived in households with no smoking restrictions. Household smoking restrictions also had positive effects on cessation rates—adolescents were 1.80 times more likely to be former smokers if they lived in smoke-free homes (95 percent CI, 1.23, 2.65) (Farkas et al. 2000). Smoke-free homes have a greater association with lower rates of smoking prevalence than smoke-free workplaces do and are associated with an increased likelihood of smoking cessation by adolescent smokers. Adoption of a smoke-free home policy sends a message to family members that smoking is not condoned, while the lack of such a policy may send the opposite message.

Wakefield and colleagues (2000) found that more restrictive arrangements on smoking at home were associated with a greater likelihood of being in an earlier stage of smoking uptake ($p < .05$) and a lower 30-day prevalence (OR = 0.79; 95 percent CI = 0.67, 0.91, $p < .001$) (Wakefield et al. 2000).

IMPLEMENTATION AND ENFORCEMENT

Compliance with both voluntary restrictions and regulations on smoking in public places varies substantially. Compliance is high where changes have occurred through a combination of legislation and changes in public attitudes. Success of bans and their effect on smoking is dependent on efforts to increase compliance. For effective implementation, strict bans may require publicity and enforcement in areas without strong antismoking norms. Secondhand smoke issues may mobilize political support for other programs, but there may likely be opposition from the tobacco industry and some other businesses (Levy et al. 2004).

The enforcement of smoking bans relates to potential sanctions included in state legislation or local ordinances, such as license removal, fines, or other penalties resulting from specific law enforcement activity. A review of implementation and enforcement of state clean indoor air laws concluded that the laws are typically self-enforcing and are not systematically enforced by state or local authorities (Jacobson and Wasserman 1997). People voluntarily comply with the law in the absence of proactive enforcement. Nevertheless, greater government enforcement and media publicity may increase compliance with the law (Levy and Friend 2001a).

SUMMARY

Clean air laws effectively reduce exposure to ETS. Additionally, the more stringent the policy, the greater the impact on decreasing smoking prevalence, decreasing consumption, and en-

hancing cessation. Furthermore, smoking restrictions may positively influence social norms by decreasing the number of people observed smoking and decreasing opportunities to smoke.

State and local governments continue to expand regulations limiting smoking. In 2006, both Arkansas and Louisiana enacted legislation that prohibits smoking in all motor vehicles in which a child is restrained in a child passenger safety seat (Arkansas Legislative Information 2006; Louisiana Legislative Information 2006). Similar legislation is being considered in both California and New York.

In March 2006, Calabasas, California, a small Los Angeles suburb, implemented a Comprehensive Secondhand Smoke Control Ordinance to limit public exposure to secondhand smoke in both indoor and outdoor public areas within the city. The law prohibits smoking in “all public places in the City of Calabasas where other persons can be exposed to second-hand smoke.” Places where smoking is prohibited include indoor and outdoor businesses, hotels, parks, apartment common areas, restaurants and bars where people can be “reasonably expected to congregate or meet”(City of Calabasas, California 2006).

Given the success of home smoking bans at decreasing smoking consumption and initiation, and increasing quit rates, an important area to consider for new public policy is the role of government in supporting the institution of home smoking bans. For example, some hospitals voluntarily distribute information to new parents on the health effects of secondhand smoke on children and the importance of establishing a smoke-free home. Perhaps a state or local government could approve legislation, requiring that all hospitals provide this information and ask parents to sign a pledge to establish a smoke-free home.

McMillen and colleagues (2003) found that the majority of adults, both smokers and non-smokers, support smoking bans in a wide variety of places (McMillen et al. 2003). Ultimately, most studies have concluded that even among smokers, support for smoking restrictions and smoke-free environments is high (CDC 2000a).

REFERENCES

- Albers AB, Siegel M, Cheng DM, Rigotti NA, Biener L. 2004. Effects of restaurant and bar smoking regulations on exposure to environmental tobacco smoke among Massachusetts adults. *American Journal of Public Health* 94(11):1959-1964.
- ANRF (American Nonsmokers' Rights Foundation). 2004. *Colleges and Universities with Total or Partial Smoke-free Indoor Air Policies*. Web Page. Available at: www.no-smoke.org (accessed February 22, 2005).
- ANRF. 2005a. *Overview List - How Many Smokefree Laws?* Web Page. Available at: www.no-smoke.org/pdf/mediaordlist.pdf (accessed February 25, 2005).
- ANRF. 2005b. *Summary of United States Population Protected by 100% Smokefree Laws*. Web Page. Available at: www.no-smoke.org/pdf/summaryuspoplist.pdf (accessed February 23, 2005).
- Arkansas Legislative Information. 2006. *Act 13 of the First Extraordinary Session*. Web Page. Available at: <http://www.arkleg.state.ar.us/> (accessed August 30, 2006).
- Bergman J. 2003. *Smoking Policies in Long-Term Care and Residential Facilities Serving Older Persons*. Web Page. Available at: www.tcsg.org/powerpoint7/index.htm (accessed February 23, 2005).
- Brownson R. 1998. *Environmental Tobacco Smoke-Making the Case: State Tobacco Control Briefing Papers*. Web Page. Available at: www.advocacy.org/publications/mtc/ets.htm (accessed February 23, 2005).
- Burns DM. 2002. Reducing tobacco use: what works in the population? *Journal of Dental Education* 66(9):1051-1060.
- California Legislature. 2003–2004 Regular Session. *California Legislative Information on Assembly Bill 2997*. Web Page. Available at: www.leginfo.ca.gov (accessed February 25, 2005).
- CDC (Centers for Disease Control and Prevention). 2000a. *Reducing Tobacco Use: A Report of the Surgeon General*. Atlanta, GA: CDC.
- CDC. 2000b. *Strategies for Reducing Exposure to Environmental Tobacco Smoke, Increasing Tobacco-Use Cessation, and Reducing Initiation in Communities and Health-Care Systems: a Report on Recommendations of the Task Force on Community Preventive Services*. Atlanta, GA: CDC.
- CDC. 2000c. Reducing tobacco use: a report of the Surgeon General—Executive Summary. *Morbidity and Mortality Weekly Report* 49(No. RR-16):1-27.
- CDC. 2004. Survey of airport smoking policies—United States 2002. *Morbidity and Mortality Weekly Report* 53(50):1175-1178.
- CDC. 2005. *State Tobacco Activities Tracking and Evaluation (STATE) System*. Web Page. Available at: <http://apps.nccd.cdc.gov/statesystem/> (accessed June 8, 2007).
- CDHS (California Department of Human Services). 2005. *Prevalence: Youth Smoking*. Sacramento, CA: CDHS.
- City of Calabasas California. 2006. *City of Calabasas, California Comprehensive Secondhand Smoke Ordinance Frequently Asked Questions*. Web Page. Available at: <http://www.cityofcalabasas.com/secondhandsmoke-faq.html> (accessed September 6, 2006).
- Czart C, Pacula RL, Chaloupka FJ, Weschler H. 2001. *Tobacco Control—Reports on Industry Activity*. Chicago: University of Illinois.
- Emont S, Choi W, Novotny T, Giovino G. 1992. Clean indoor air legislation, taxation, and smoking behaviour in the United States: an ecological analysis. *Tobacco Control* 2:13-17.
- EPA (Environmental Protection Agency). 1992. *Respiratory Health Effects of Passive Smoking: Lung Cancer and Other Disorders*. Washington, DC: EPA.
- EPA. 1994. *The Costs and Benefits of Smoking Restrictions: An Assessment of the Smoke-Free Environment Act of 1993 (H.R. 3434)*. Web Page. Available at: <http://tobaccodocuments.org/landman/89268337-8360.html> (accessed June 1, 2007).
- Evans WN, Farrelly MC, Montgomery E. 1999. Do workplace smoking bans reduce smoking? *The American Economic Review* 89(4):728-747.
- Farkas AJ, Gilpin EA, Distefan JM, Pierce JP. 1999. The effects of household and workplace smoking restrictions on quitting behaviours. *Tobacco Control* 8(3):261-265.
- Farkas AJ, Gilpin EA, White MM, Pierce JP. 2000. Association between household and workplace smoking restrictions and adolescent smoking. *Journal of the American Medical Association* 284(6):717-722.

- Farrelly MC, Evans WN, Sfekas AE. 1999. The impact of workplace smoking bans: results from a national survey. *Tobacco Control* 8(3):272-277.
- Fichtenberg CM, Glantz SA. 2002. Effect of smoke-free workplaces on smoking behaviour: systematic review. *British Medical Journal* 325(7357):188.
- Glantz SA, Smith LR. 1997. The effect of ordinances requiring smoke-free restaurants and bars on revenues: a follow-up. *American Journal of Public Health* 87(10):1687-1693.
- Glasgow RE, Cummings KM, Hyland A. 1997. Relationship of worksite smoking policy to changes in employee tobacco use: findings from COMMIT. Community Intervention Trial for Smoking Cessation. *Tobacco Control* 6 (Suppl 2):S44-S48.
- Goldstein A, Gee S, Mirkin R. 2005. Tobacco dependence program: a multifaceted systems approach to reducing tobacco use among Kaiser Permanente members in Northern California. *The Permanente Journal* 9(2):9-18.
- IOM (Institute of Medicine). 1998. *Taking Action to Reduce Tobacco Use*. Washington, DC: National Academy Press.
- Jacobson PD, Wasserman J. 1997. *Tobacco Control Laws: Implementation and Enforcement*. Santa Monica, CA: RAND.
- Levy DT, Friend K. 2001a. A framework for evaluating and improving clean indoor air laws. *Journal of Public Health Management and Practice* 7(5):87-96.
- Levy DT, Friend K. 2001b. A framework for evaluating and improving clean indoor air laws. *Journal of Public Health Management and Practice* 7(5):87-96.
- Levy DT, Friend K, Polishchuk E. 2001. Effect of clean indoor air laws on smokers: the clean air module of the SimSmoke computer simulation model. *Tobacco Control* 10(4):345-351.
- Levy DT, Friend KB. 2003. The effects of clean indoor air laws: what do we know and what do we need to know? *Health Education Research* 18(5):592-609.
- Levy DT, Chaloupka F, Gitchell J. 2004. The effects of tobacco control policies on smoking rates: a tobacco control scorecard. *Journal of Public Health Management and Practice* 10(4):338-353.
- Longo DR, Johnson JC, Kruse RL, Brownson RC, Hewett JE. 2001. A prospective investigation of the impact of smoking bans on tobacco cessation and relapse. *Tobacco Control* 10(3):267-272.
- Louisiana Legislative Information. 2006. *Act 838 of the Regular Session*. Web Page. Available at: <http://www.legis.state.la.us/> (accessed August 30, 2007).
- McMillen RC, Winickoff JP, Klein JD, Weitzman M. 2003. U.S. adult attitudes and practices regarding smoking restrictions and child exposure to environmental tobacco smoke: changes in the social climate from 2000–2001. *Pediatrics* 112(1 Pt 1):e55-e60.
- Moskowitz JM, Lin Z, Hudes ES. 2000. The impact of workplace smoking ordinances in California on smoking cessation. *American Journal of Public Health* 90(5):757-761.
- NCI (National Cancer Institute). 1999. *Health Effects of Exposure to Environmental Tobacco Smoke: The Real Report of the California Environmental Protection Agency (Monograph 10)*. Bethesda, MD: National Institutes of Health.
- Rauter UK, de Nesnera A, Grandfield S. 1997. Up in smoke? Linking patient assaults to a psychiatric hospital's smoking ban. *Journal of Psychosocial Nursing and Mental Health Services*. 35(6):35-40.
- Ryabik BM, Lippmann SB, Mount R. 1994. Implementation of a smoking ban on a locked psychiatric unit. *General Hospital Psychiatry*. 16(3):200-204.
- Scollo M and Lal A. 2004. *Summary of Studies Assessing the Economic Effects of Smoke-Free Policies in the Hospitality Industry*. Web Page. Available at: <http://www.vctc.org.au/tc-res/Hospitalitysummary.pdf> (accessed February 23, 2005).
- Serra C, cabezas C, Bonfill X, Pladevall-Villa M. 2004. Interventions for Preventing tobacco smoking in public places. *The Cochrane Database of Systematic Reviews* 3(4).
- Smith CM, Pristach CA, Cartagena M. 1999. Obligatory cessation of smoking by psychiatric inpatients. *Psychiatric Services* 50(1):91-94.
- Stillman FA, Becker DM, Swank RT, Hantula D, Moses H, Glantz S, Waranch HR. 1990. Ending smoking at the Johns Hopkins Medical Institutions. An evaluation of smoking prevalence and indoor air pollution. *Journal of the American Medical Association* 264(12):1565-1569.
- Thorward SR, Birnbaum S. 1989. Effects of a smoking ban on a general hospital psychiatric unit. *General Hospital Psychiatry*. 11(1):63-67.
- Tsoukalas T, Glantz SA. 2003. The Duluth clean indoor air ordinance: problems and success in fighting the tobacco industry at the local level in the 21st century. *American Journal of Public Health*. 93(8):1214-1221.

- Van de Water A. 2004. *Banning Smoking in Outdoor City Parks and Recreational Areas*. Web Page. Available at: www.sfgov.org/site/bdsupvrs_page.asp?id=27960 (accessed February 23, 2005).
- Wakefield MA, Chaloupka FJ, Kaufman NJ, Orleans CT, Barker DC, Ruel EE. 2000. Effect of restrictions on smoking at home, at school, and in public places on teenage smoking: cross sectional study. *British Medical Journal* 321(7257):333-337.

C

Warning Labels and Packaging

Roberta Ferrence
Ontario Tobacco Research Unit
University of Toronto and Centre for Addiction and Mental Health

David Hammond
Department of Health Studies
University of Waterloo

Geoffrey T. Fong
Department of Psychology
University of Waterloo

INTRODUCTION

Cigarette packages are an important medium for communicating with smokers, both for the tobacco industry and for governments seeking to convey the health risks of smoking. As restrictions have increasingly reduced or eliminated traditional forms of tobacco advertising, the importance of the package as a marketing vehicle has increased. At the same time, governments have begun to exert more control over tobacco labeling, including the introduction of more prominent health warning messages. This appendix reviews the effectiveness of tobacco labeling policies and health warnings on cigarette packages.

THE CIGARETTE PACKAGE AS A MARKETING TOOL

Packaging is an important component in the overall marketing strategy of consumer goods (Shapiro et al. 1999). Packaging helps to establish brand identity in competitive markets and serves as an effective form of promotion both at the point of purchase and while the product is being used (Slade 1997). Packaging is particularly important for consumer products such as cigarettes, which have a high degree of social visibility (Pollay 2001). Unlike many other consumer products, cigarette packages are displayed each time the product is used and are often left in public view between uses (Wakefield and Letcher 2002). As John Digianni, a former cigarette package designer noted: “A cigarette package is unique because the consumer carries it around with him all day . . . It’s a part of a smoker’s clothing, and when he saunters into a bar and plunks it down, he makes a statement about himself” (Koten 1980). As a result, the package serves as a “badge product” and an important form of advertising in its own right (Pollay 2001).

Cigarette packages also serve as an important link to other forms of tobacco advertising (Wakefield et al. 2002a). Package designs help to reinforce brand imagery that is communicated through other media and play a central role in point-of-purchase marketing, which now accounts for a majority of the industry’s promotional spending in Canada and the United States (Dewhirst 2004). Indeed, cigarette “power walls”—rows of cigarette packages prominently displayed be-

hind retail counters—have been shown to be an effective form of marketing, particularly among youth and young adults (Wakefield et al. 2002a). Moreover, marketing value of the cigarette package increases as other forms of marketing are restricted (Celebucki and Diskin 2002; Wakefield et al. 2002b). The following quote from a Phillip Morris executive highlights the importance of the package under increasingly restrictive advertising environments: “Our final communication vehicle with our smoker is the pack itself. In the absence of any other marketing messages, our packaging . . . is the sole communicator of our brand essence. Put another way—when you don’t have anything else—our packaging is our marketing” (Hulit 1994).¹ Internal documents from British American Tobacco also indicate that packages have been designed to compensate for restricted forms of advertising: “Given the consequences of a total ban on advertising, a pack should be designed to give the product visual impact as well as brand imagery . . . the pack itself can be designed so that it achieves more visual impact in the point of sale environment than its competitors” (Miller 1986).

Beyond the retail environment, packages also help to increase the reach of “below-the-line” marketing activities (Carter 2003). For example, cigarette packages in Malaysia contain specific references to the sponsorship of Formula 1 racing series, while packs in other countries carry images and information for concert and nightclub promotions. As Pollay (2001) noted, “The package is the last and most critical link in an integrated chain of promotional communications” (Pollay 2001). Overall, the cigarette package is the cornerstone of tobacco marketing strategy and an effective means of targeting key subgroups of smokers, including young adults and women (Carpenter et al. 2005; Chapman and Carter 2003; Chapman and Carter 2003; Cummings et al. 2002; Pollay 2001).

WARNING LABELS

Background

In addition to serving as a marketing vehicle for the tobacco industry, cigarette packages also provide governments with a direct means of communicating with smokers. Warning labels are primarily intended to communicate the health risks of smoking and to fulfill the government’s responsibility as regulators to warn consumers about these hazardous products. To date, warnings labels have been introduced on cigarette packages in virtually every jurisdiction; the size and general strength of these warnings, however, vary considerably (Aftab et al. 1999). In most countries, the first warnings to appear on packages were introduced by tobacco manufacturers in response to growing pressure from health authorities and in an attempt to avoid liability for their products (Chapman and Carter 2003). By 1974, government-mandated warnings were required on packages in several countries, including Canada, Costa Rica, Ecuador, Ireland, New Zealand, Japan, Panama, Peru, the United Kingdom, the United States, and some areas of Australia. In the United States, health warnings were first included on cigarette packages in 1966 and in advertisements in 1972. Since 1984, U.S. cigarette packages have carried one of four government-mandated text warnings on the side panels of packages.

The United States is one of the few countries in the developed world that has not updated its warnings in the past 20 years. In contrast, most countries have increased the size, number, and general prominence of package warning labels. Most notably, several countries have introduced pictorial warnings labels. Canada was the first country to require pictorial warnings when they

¹ Originally cited by (Alechnowicz and Chapman 2004).

were implemented in 2000. The top 50 percent of each main panel on the package features one of 16 warnings. Each includes a photograph or other illustration, a marker word (“Warning”) and a short summary statement. Inside each pack, one of 16 text messages provides additional information on the health risks of smoking, as well as cessation-related information.

Since 2000, Brazil, Singapore, Thailand, and Venezuela have also introduced pictorial warnings. Australia is set to do so in 2006, and the European Union (EU) has developed a standard set of pictorial warnings for EU member states to consider. Several other countries, including Bangladesh, India, Hong Kong, Malaysia, New Zealand, South Africa, and Taiwan are also considering implementing pictorial warnings on packages. Indeed, the coming years promise an unprecedented degree of change in labeling policies as countries prepare to meet the standards set out in the Framework Convention for Tobacco Control (FCTC). Article 11 of the FCTC requires that warnings: (1) be approved by the competent national authority; (2) be rotating; (3) be large, clear, visible, and legible; (4) should be 50 percent or more of the principal display areas and no less than 30 percent of the principal display areas; and (5) may be in the form of or include pictures or pictograms. Given that the FCTC recommends—but does not require—pictorial warnings, policy makers in a number of countries will be forced to choose between the minimal and the recommended standards. The following section reviews the evidence on the effectiveness of text and pictorial warning labels that should guide these policy decisions.

Evidence

Saliency of Package Warning Labels

Package warnings are unique among tobacco control interventions in that they are delivered at the time of smoking and have a high frequency of exposure that increases with the number of cigarettes per day. Nevertheless, warning labels must be noticed to be effective, and the extent to which smokers attend to warnings depends upon various content and design features. The saliency of warnings is enhanced when information is presented in a vivid manner that evokes an emotional reaction (Strahan et al. 2002). Specific, unambiguous warnings (e.g., “cigarettes cause lung cancer”) are also more likely to be noticed and less likely to be discounted than vague, equivocal warnings (e.g., “cigarettes are hazardous to your health”) (Linthwaite 1985; Loken and Howard-Pitney 1988; Wegrzyn 1992). Warnings that are attributed to a specific source (e.g., the Surgeon General) have also been shown to be more credible than unattributed warnings (Guttman and Peleg 2003; Wogalter et al. 1999). In addition, text-based warnings should also target an appropriate literacy level (CREATEC Market Studies 2003). The United States warnings, for example, require a college reading level and may be inappropriate for youth and Americans with poor reading abilities (Malouff et al. 1992). This is particularly important considering that, in most countries, smokers report lower levels of education than the general public.

Several design features are also associated with greater saliency, including the size and position of the warning on the package (Fong 2005; Willemsen 2005). For example, smokers are more likely to recall larger warnings, as well as warnings that appear on the front of packages as opposed to on the sides (AGB Spectrum Research Ltd. 1987; Health Canada 2005b; Linthwaite 1985; Strahan et al. 2002; Wegrzyn 1992). Several studies indicate that the U.S. text warnings on the side of packages demonstrate low levels of saliency among smokers (Crawford et al. 2002; Fischer et al. 1989; Fox et al. 1994). In a comparative study of students in Canada and the United States carried out in 1995, at a time when Canadian packages carried text warnings on the front

of packages, 83 percent of Canadian students mentioned health warnings in a recall test of cigarette packages, compared to only 7 percent of U.S. students (Northrup and Pollard, 1995). A Phillip Morris document also highlights the importance of positioning on the front of packages: “Government required warnings placed on the largest packaging panel, often called the front and/or back, are the biggest marketing threat to all of us in Asia . . .” (Hulit 1994). Smokers have also been found to equate the size of the warning with the magnitude of the risk (Cragg Ross & Dawson Ltd. 1990). Support for these findings comes from a series of 56 focus groups, conducted across seven European countries, which explored reactions to more prominent warnings in the E.U. (Devlin et al. 2005).

Features that distinguish the warning messages from the package design have also been found to increase the salience and recall of warnings (Laugesen 1990). Messages with black lettering on a white background are the easiest to read, whereas the legibility of silver or gold text messages is comparatively poor (Nilsson 1991; Wegrzyn 1992). Warnings that include pictures or graphics are also more noticeable and more likely to be recalled than text messages (Health Canada 1999). This is consistent with research demonstrating that viewers perceive a greater likelihood of occurrence when presented with graphic depictions of disease (Laugesen 1990).

The salience of warnings labels is not constant over time. Rather, the effectiveness of health communications decreases with repeated exposures (Bornstein 1989; Henderson 2000), and the salience of tobacco warnings has been found to lessen as smokers become desensitized to the warnings over time (Health Canada 1999). For example, more than half of Canadians surveyed in 1999 agreed that warnings introduced in 1994 were “worn out” and had lost their effectiveness (Mahood 1999). It is important therefore to ensure that warnings are revised on a regular basis. Short of introducing new labels, any feature that enhances the vividness of the warnings should prolong their effectiveness (Strahan et al. 2002). In other words, color warnings, pictures, and increases in the number of rotating warnings should delay the wear-out of warnings. Indeed, approximately 4 years after their introduction, Canadian youth and adult smokers report only a moderate decrease in the frequency of reading the labels, with little or no decrease in reports of their effectiveness (Health Canada 2005a; Health Canada 2005b), and 95 percent of youth smokers reported that pictorial warning labels provided them with important information about the health effects of smoking. In addition, a comparative study of smokers in Canada and the United Kingdom found that the 4-year-old pictorial warnings in Canada were more likely to be rated as effective than the large text warnings that were introduced in the United Kingdom in 2003, only months prior to the survey (Fong et al. 2004).

Impact on Health Knowledge

Cigarette warning labels have been shown to have a significant impact on smokers’ understanding of the risks of tobacco use. Several studies have demonstrated that large text-based warnings are associated with increased perceptions of risk. Cross-sectional surveys conducted in Canada during the 1990s found that the majority of smokers reported that package warning labels are an important source of health information and have increased their awareness of the risks of smoking (Health Canada 2005a; Health Canada 2005b; Tandemar Research 1996). In Australia, Borland and Hill (1997) found that relative to nonsmokers, smokers demonstrated an increase in their knowledge of the main constituents of tobacco smoke and identified significantly more disease groups following the introduction of new Australian warning labels in 1995 (Borland and Hill 1997). At least two studies have evaluated the effects of the 2003 E.U. directive (2001/37/EC), which mandated that warnings in all E.U. countries meet size standards

equivalent to the FCTC minimal requirement. First, a study of Spanish university students concluded that text warnings based upon the E.U. directive significantly increased perceptions of risk (Portillo and Antonanzas 2002). These findings were consistent with results from the International Tobacco Control (ITC) Policy Evaluation Survey—a cohort survey of a representative sample of more than 8,000 adult smokers from Canada, Australia, the United States, and the United Kingdom. This quasi-experimental evaluation examined the changes in perceptions and reactions to warnings among adult smokers in the United Kingdom, compared to those in the other three countries, where no changes in warnings had occurred (Fong et al. 2004). The findings indicated that the enhancement in labels led to significant increases in the United Kingdom—relative to the other three countries—in: (1) salience and noticeability of the warnings, (2) thinking about the health risks of smoking, and (3) forgoing a cigarette due to the label.

There is also a growing evidence base on the effectiveness of pictorial warnings in communicating risk. Since Canada was the first country to introduce pictorial warnings, all of this evidence derives from Canadian smokers. A study conducted with Canadian smokers in 2001 found that more than half reported that the pictorial warnings have made them more likely to think about the health risks of smoking (Hammond et al. 2004). National surveys conducted on behalf of Health Canada also indicate that approximately 95 percent of youth smokers and 75 percent of adult smokers report that the pictorial warnings have been effective in providing them with important health information (Health Canada 2005a; Health Canada 2005b). Findings from the ITC Survey also provide evidence of the effectiveness of pictorial warnings. When asked to cite sources of health information, approximately two-thirds of all smokers cited cigarette packages—more than radio, print, and electronic sources—and the second most common source after television (Hammond et al. 2006). However, the results varied substantially by country: respondents living in countries with more comprehensive warnings were more likely to cite packages as a source of health information. For example, 85 percent of Canadian respondents cited packages as a source of health information, in contrast to only 47 percent of U.S. smokers. In addition, specific health warnings were associated with knowledge of specific diseases. In Canada, where package warnings include information about the risks of impotence, smokers were more than twice as likely to agree that smoking causes impotence compared to smokers from the other three countries (United States, United Kingdom, and Australia). Overall, the study found that warnings that are graphic, larger, and more comprehensive in content were associated with greater health knowledge.

There is also evidence that pictorial warnings may be effective in communicating health risks to nonsmokers. For example, approximately two-thirds of youth nonsmokers in Canada recently reported looking at the pictorial warnings at least once per week, and 95 percent agreed that the warnings have been effective in providing them with important information about the health effects of smoking (Health Canada 2005b).

Finally, there is evidence that smokers with less education are less likely to recall health information in text-based messages (Millar 1996). Given the inverse association between smoking and educational status, pictorial warnings may be particularly important for communicating with those most at risk. Indeed, there is preliminary evidence to suggest that countries with pictorial warnings demonstrate fewer disparities in health knowledge across educational levels (Yong et al. 2005). Pictorial warnings may also be particularly effective in developing countries with low literacy rates, as well as regions with numerous languages and dialects.

Impact on Behavior

Few studies have examined the impact of warning labels on smoking behavior; however, those that have suggest a beneficial effect on consumption and cessation. Borland and Hill (1997) found that new text warnings introduced in Australia encouraged some smokers to delay smoking or smoke less of a cigarette (Borland and Hill 1997). Willemsen (2005) looked at the impact of new text warnings on motivation to quit and smoking behavior using data from the Dutch Continuous Survey of Smoking Habits. Among smokers, 14 percent said they were less likely to buy cigarettes as a result of the new warnings, 32 percent said they preferred to buy packages without the warnings, 18 percent said the warnings made them more motivated to quit, and 10 percent said they smoked less because of the warnings. Those who intended to quit within 6 months were five to six times as likely to report smoking less due to the warnings than those who did not plan to quit. In fact, smokers not motivated to quit said their motivation decreased as a result of the warnings. However, since they were not planning to quit before the warnings came into effect, it is not clear that this response represented a meaningful decrease in intent (Willemsen 2005).

In a series of papers, Hammond and colleagues have examined the impact of Canadian graphic warning labels on smoking behavior. Smokers who had read, thought about, and discussed the new labels were more likely to have quit, tried to quit, or reduced their smoking at 3-month follow-up, after adjusting for intention to quit and smoking status at baseline (Hammond et al. 2004). One-fifth of Canadian smokers said they smoked less because of the labels, whereas only 1 percent said they smoked more, and one-third said they were more likely to quit because of the warnings. In addition, former smokers identified the pictorial warnings as important factors in their quitting and in subsequently maintaining abstinence (Hammond et al. 2004). Results from the ITC Policy Evaluation Survey are consistent with these findings: at least one-quarter of respondents from Canada, Australia, the United Kingdom, and the United States reported that package warnings have made them more likely to quit, although Canadian smokers were significantly more likely to report cessation benefits from the warnings than smokers in the other three countries that have text-only warnings (Fong et al. 2004).

Finally, internal documents from the tobacco industry also provide some indication of the effectiveness of pictorial warning labels. For example, research conducted by Rothmans Benson & Hedges in Canada on the pictorial warnings that were introduced in 2000 concluded that "the impact of the new warnings is colossal" (Pollay 2001).

Public Support and Credibility of Warning Labels

Tobacco labeling policies have received strong endorsement from both smokers and non-smokers. In a 1992 survey, 89 percent of Canadians expressed support for government-mandated warnings, while 83 percent were in favor of more detailed warnings than the text-based messages that were on packages at the time of the survey (Insight Canada 1992). Warning labels have also received strong public support in countries such as Australia (Borland and Hill 1997) and the United States (Jordan 1993). Graphic pictorial warnings have also received public backing. A 1999 national survey of Canadians found that 74 percent of the general public and 59 percent of daily smokers were in favor of regulations requiring warning messages to include pictures and to occupy 60 percent of the front and back of each pack (Environics 2000). High levels of support have also been found in subpopulations, such as young adults (Koval et al. 2005). Focus group testing of the current Canadian warnings found that all participants, regardless of age or smoking status, felt that stronger warnings are more effective in discouraging smoking (Health Canada

2000). A majority of smokers supported the pictorial warnings even after their introduction: in 2001, only 27 percent of smokers reported that the Canadian warnings contained “too much” health information, whereas 23 percent reported the warnings contain “about the right amount of information,” and 50 percent of smokers wanted to see even more health information on packages (Hammond et al. 2004).

Research also indicates that package warnings are perceived to be a credible source of health information. For example, 97 percent of Canadian youth reported that they “believed” the 1994 text-only labels (EnviroNics Research Group 1996), while 86 percent of adult Canadian smokers agreed that the 1994 labels were accurate (Health Canada, 2000). Findings from Australia and the United States also indicate that both smokers and nonsmokers perceive warning labels to be credible sources of information (Beltramini 1988; Cecil et al. 1996; Health Canada 2005b). Graphic pictorial warnings also enjoy high credibility ratings from smokers: in 2002, 87 percent of Canadian smokers reported that the graphic warnings accurately depicted the health risks of smoking (Hammond et al. 2004). A separate survey conducted with youth smokers found that 90 percent agreed that the messages communicated in the pictorial warnings are accurate (Health Canada 2005b).

Cessation-Related Information

In addition to warning about the risks of smoking, cigarette packages can also be used as a vehicle for communicating cessation-related information. In fact, research on public health communications indicates that health warnings are most effective when they are paired with efficacy-related information (Strahan et al. 2002; Witte and Allen 2000). In other words, cigarette warning labels that include information on the benefits of quitting and specific quit methods are most likely to result in behavior change. The Canadian warnings, which include general messages of support, as well as concrete information on ways to quit smoking, are consistent with this literature. The pictorial warnings that have been proposed by the EU include even stronger efficacy information on the outside of packs. Telephone quitline numbers appear to be a particularly important addition to recent warnings. Quitline information already appears on packs in several countries, including Holland, where calls to a national quitline increased dramatically after the number appeared on packages (Willemsen et al. 2002). Website addresses have also been printed on packages in countries such as Canada and represent another means of communicating cessation resources directly to smokers.

Labeling of Constituents

In many countries, tar, nicotine, and other mainstream smoke constituents are required by law to appear on cigarette packages. These cigarette “yields” are determined under the International Standards Organization (ISO) machine testing protocol, which is widely acknowledged to be seriously flawed. The ISO testing protocol is based upon unrealistic smoking parameters that lead to deceptively low yields and exaggerate differences between cigarette brands. Most importantly, ISO cigarette yields are not associated with individual exposure or with health risk (Shopland et al. 2001).

Nevertheless, in most countries, the ISO yields are the only source of constituent information printed on cigarette packages. Not surprisingly, a considerable proportion of smokers use the tar yields when choosing cigarette brands, under the mistaken belief that lower-tar cigarette reduce the risks of smoking (Cohen 1996; EnviroNics Research Group Limited 2003). As a consequence, there is a growing consensus that the ISO yields should be removed from all cigarette

packages, as will shortly be the case in Australia (WHO 2000). Although the ISO machine testing parameters used to generate the cigarette yields are currently under revision, there is no indication that the revised parameters will generate yields that are more closely associated with individual risk. Until there is persuasive evidence to indicate that the differences in cigarette yields, measured under the ISO protocol or any other protocol, reflect meaningful differences in health risk, there is no benefit to presenting them directly to consumers, who will inevitably interpret lower-yield products as less hazardous.

There is some evidence that nonnumerical constituent information may be more useful in communicating risk to consumers (Enviro-nics Research Group Limited 2003). For example, in the place of the cigarette yields, Brazil, Venezuela, and Australia have adopted more “descriptive” approaches to communicating constituents. This includes statements about the health effects of specific chemicals, as well as statements about the overall number of chemicals in tobacco smoke. Additional research is required to determine the most effective means of labeling constituent information on cigarette packages.

Brand Descriptors on Packages

One of the most important functions of packaging is to communicate sensory properties of a brand, such as its “taste” or “lightness.” As Wakefield and colleagues (2004) have noted, package design can help to shape perceptions of a product’s performance and its sensory attributes, even among experienced smokers (Wakefield et al. 2004). This phenomenon is best illustrated by the use of brand descriptors and colors to promote perceptions of a safer product. Tobacco manufacturers commonly pair brand descriptors such as “light” and “mild” with cigarettes that generate low ISO tar yields under the machine testing protocols. Although the industry has argued that these terms refer only to the “taste” of a product, these descriptors help to promote these brands as “healthier” products (Pollay 2001; Pollay and Dewhirst 2002). Indeed, surveys of smokers in the United States and Canada indicate that a substantial proportion of “light” smokers believe that their cigarettes are less hazardous (Elton-Marshall et al.; Kozlowski et al. 1998; Shiffman et al. 2001). Ashley et al. (2000) report that in Ontario in 1996, one in five smokers of “lights” believed that smoking “light” and “mild” cigarettes lowered the risk of cancer and heart disease (Ashley et al. 2000). In 2000, 27 percent of Ontario smokers said they smoked “lights” to reduce health risks, 40 percent said they used them as a step toward quitting, and 41 percent said they would be more likely to quit if they knew that “light” cigarettes provided the same amount of tar and nicotine as regular cigarettes (Ashley et al. 2001). In a study of smokers’ response to advertisements for potentially reduced-exposure tobacco products, “light” cigarettes, and regular cigarettes, Hamilton and colleagues (2004) found that respondents perceived “lights” as having significantly lower health risks and carcinogen levels than regular cigarettes. Adolescents have also been found to have similar misconceptions that “light” cigarettes are less hazardous.

Article 11 of the FCTC calls for the removal of any brand descriptor that “directly or indirectly creates the false impression that a particular tobacco product is less harmful than other tobacco products,” including terms such as “low-tar,” “light,” or “mild.” Several jurisdictions have already banned deceptive descriptors. For example, in September 2003, the European Union banned the use of a number of brand descriptors, such as “low-tar,” “light,” “ultra-light,” and “mild,” in accordance with Directive 2001/37/EC. Findings from the International Tobacco Control Policy Evaluation Survey suggest that this ban has been effective in reducing misconceptions about the health benefits of “light” and “mild” brands (Fong 2005). However, as the United Kingdom experience has demonstrated, tobacco manufacturers have proven adept at substituting

colors and numbers for the banned descriptors. For example, pale blue or the number “one” are used to indicate a “light” or “mild” cigarette. In Brazil and the United Kingdom, manufacturers openly provided translation guides for this substitution.

Plain Packaging

Plain packaging, devoid of brand logos and images, may be the only way of removing deceptive labeling from packages. Although plain packaging has yet to be mandated in any jurisdiction, it would effectively strip the industry of a critical marketing tool. Two separate studies also indicate that plain packaging would help to increase the salience of health warnings. Goldberg and colleagues (1999) found that plain packaging increased the recall of health warning messages in two of three cases (Goldberg et al. 1999). Short, simple messages appeared to be more effective on plain packages, whereas a longer technical message showed no improvement on a plain package. Beede and Lawson (1992) also found that presenting health warnings on plain packages without brand imagery resulted in a significantly greater recall rate (Beede and Lawson 1992).

Government Regulation and Industry Opposition

The tobacco industry has vigorously opposed comprehensive tobacco labeling policies, especially in the case of pictorial labels (Chapman and Carter 2003). For example, as Alechnowicz and Chapman (2004) have noted, in 1995, package warnings were identified by British American Tobacco (BAT) as one of the key issues facing the company. Protecting the pack design and “neutralizing” the controversy over pack warning labels were among the priorities listed in the document (BAT 1995). The same document goes on to state that “pictorial warnings, and those occupying a major pack face or faces (front and back) or a disproportionately large area of advertising space, should be restricted, as should moves to plain or generic packs. Every effort should be made to protect the integrity of the company's packs and trade marks” (Alechnowicz and Chapman 2004; BAT 1995).

In public, tobacco manufacturers have argued that large comprehensive warnings are not only unnecessary, but are less effective than more obscure text messages (Chapman and Carter 2003). For example, Martin Broughton, the former chairman of BAT, recently stated that “the growing use of graphic image health warnings . . . can offend and harass consumers—yet in fact give them no more information than print warnings” (Hearn 2004). Tobacco manufacturers have also argued that comprehensive warnings constitute an unreasonable and illegal expropriation of cigarette packaging (Pollay 2001).

To date, courts of law have disagreed. For example, in response to a legal challenge of the Canadian Tobacco Act, the court found that the tobacco companies’ right to advertise their products could not be given the same legitimacy as the federal government’s duty to protect public health (Pollay 2001). In short, the courts have ruled that even graphic warnings are warranted considering the societal costs of smoking.

RECOMMENDATIONS

The cigarette package is a key component of tobacco marketing strategy, particularly under increasing regulation of advertising and other forms of promotion. As a consequence, restrictions on package labeling are critical to reducing tobacco use and ensuring that smokers are adequately

informed about the risks of smoking. Indeed, prominent health warnings on packages are among the most cost-effective forms of public health education available.

To achieve these dual objectives, we recommend the following:

- Large graphic health warnings are now used or proposed in many countries and should be adopted for cigarettes in the United States.
- Misleading brand descriptors such as “light” and “mild” should be eliminated. Consideration should be given to limiting the use of colors and numbers that suggest “light” and “mild” attributes.
- Misleading constituent information, such as the ISO cigarette yields, should be eliminated from packaging.
- Information on the benefits of quitting, as well as concrete cessation advice and sources of support, should be provided on cigarette packages. In particular, telephone quitline numbers should be included on all packages. This information should be displayed on the outside panels of the package, although more detailed information can also be included on the inside of the package or on an insert.
- The regulation of cigarette package labeling requires a more formal regulatory structure.
- Specific package markings can be used to indicate that federal or provincial taxes have been paid. This is particularly useful for identifying packages of cigarettes that have not been taxed and may be sold illegally.

REFERENCES

- Aftab M, Kolben D, Lurie P. 1999. International cigarette labelling practices. *Tobacco Control* 8(4):368-372.
- AGB Spectrum Research Ltd. 1987. *Testing the Positions of Health Warnings on Cigarette Packages*. New Zealand.
- Alechnowicz K, Chapman S. 2004. The Philippine tobacco industry: “the strongest tobacco lobby in Asia.” *Tobacco Control* 13 (Suppl 2):ii71-ii78.
- Ashley MJ, Cohen J, Bull S, Ferrence R, Poland B, Pederson L, Gao J. 2000. Knowledge about tobacco and attitudes toward tobacco control: how different are smokers and nonsmokers? *Canadian Journal of Public Health* 91(5):376-380.
- Ashley MJ, Cohen J, Ferrence R. 2001. “Light” and “mild” cigarettes: who smokes them? Are they being misled? *Canadian Journal of Public Health* 92(6):407-411.
- BAT (British-American Tobacco Company). 1995. *1995 Key Area Paper: Corporate Affairs*. Web Page. Available at: <http://www.library.ucsf.edu/tobacco/batco/html/7200/7265/otherpages/allpages.html> (accessed May 10, 2006).
- Beede P, Lawson R. 1992. The effect of plain packages on the perception of cigarette health warnings. *Public Health* 106(4):315-322.
- Beltramini RF. 1988. Perceived believability of warning label information presented in cigarette advertising. *Journal of Advertising* 17:26-32.
- Borland R, Hill D. 1997. The path to Australia’s tobacco health warnings. *Addiction* 92(9):1151-1157.
- Bornstein RF. 1989. Exposure and affect: overview and meta-analysis of research, 1968–1987. *Psychological Bulletin* 106(2):265-289.
- Carpenter CM, Wayne GF, Connolly GN. 2005. Designing cigarettes for women: new findings from the tobacco industry documents. *Addiction* 100(6):837-851.
- Carter SM. 2003. Going below the line: creating transportable brands for Australia’s dark market. *Tobacco Control* 12 (Suppl 3):iii87-iii94.
- Cecil H, Evans RI, Stanley MA. 1996. Perceived believability among adolescents of health warning labels on cigarette packs. *Journal of Applied Social Psychology* 26(6):502-519.
- Celebucki CC, Diskin K. 2002. A longitudinal study of externally visible cigarette advertising on retail storefronts in Massachusetts before and after the Master Settlement Agreement. *Tobacco Control* 11 (Suppl 2):ii47-53.
- Chapman S, Carter SM. 2003. “Avoid health warnings on all tobacco products for just as long as we can”: a history of Australian tobacco industry efforts to avoid, delay and dilute health warnings on cigarettes. [Review]. *Tobacco Control* 12 (Suppl 3):iii13-22.
- Cohen JB. 1996. Consumer/smoker perceptions of Federal Trade Commission Tar Ratings. National Cancer Institute. *The FTC Cigarette Test Method for Determining Tar, Nicotine, and Carbon Monoxide Yields of U.S. Cigarettes (Smoking and Tobacco Control, Monograph 7)*. Bethesda, MD: NIH. 127-134.
- Cragg Ross & Dawson, Ltd. 1990. *Health Warnings on Cigarette and Tobacco Packs: Report on Research to Inform European Standardization*. London: Health Education Authority.
- Crawford MA, Balch GI, Mermelstein R. 2002. Responses to tobacco control policies among youth. *Tobacco Control* 11(1):14-19.
- CREATEC Market Studies. 2003. *Effectiveness of Health Warning Messages on Cigarette Packages in Informing Less-Literate Smokers*.
- Cummings KM, Morley CP, Horan JK, Steger C, Leavell NR. 2002. Marketing to America's youth: evidence from corporate documents. *Tobacco Control* 11 (Suppl 1):I5-I17.
- Devlin E, Anderson S, Hastings G, MacFayden L. 2005. Targeting smokers via tobacco product labeling: opportunities and challenges for Pan European health promotion. *Health Promotion International* 20:41-49.
- Dewhirst T. 2004. POP goes the power wall? Taking aim at tobacco promotional strategies utilised at retail. *Tobacco Control* 13(3):209-210.
- Elton-Marshall TE, Fong GT, Zanna MP. Do beliefs about “light” cigarettes influence adolescent smoking? Findings from the North American Student Smoking Survey. Paper presented at the Fourth Canadian National Conference on Tobacco or Health, Ottawa.
- Environics Research Group. 1996. *Youth Smoking Survey 1994, Technical Report*. Ottawa, ON: Health Canada.

- Environics Research Group. 2000. *Health Warnings on the Flip/Side and Inserts of Cigarette Packaging: A Survey of Smokers*. Ottawa, ON: Health Canada.
- Environics Research Group Limited. 2003. *Toxics Information on Cigarette Packaging: Results of a Survey of Smokers, Final Report*. Ottawa, ON: Health Canada
- Fischer PM, Richards JW Jr, Berman EJ, Krugman DM. 1989. Recall and eye tracking study of adolescents viewing tobacco advertisements. *Journal of the American Medical Association* 261(1):84-89.
- Fong GT, Hammond D, Laux FL, Zanna MP, Cummings KM, Borland R, Ross H. 2004a. The near-universal experience of regret among smokers in four countries: findings from the International Tobacco Control Policy Evaluation Survey. *Nicotine and Tobacco Research* 6 (Suppl 3):S341-S351.
- Fong GT, Hammond D, Borland R, Hastings G, Cummings M. 2004b. Quasi-experimental evaluation of the enhancement of warning labels in the United Kingdom: Initial findings from the International Tobacco Control Policy Evaluation Survey. In GT Fong (Chair), *Evaluating and Building an Evidence Base for the Framework Convention on Tobacco Control: Recent Findings from the International Tobacco Control Policy Evaluation Survey*. Symposium presented at the meeting of the Society for Research on Nicotine and Tobacco, Scottsdale, Arizona.
- Fong GT. 2005. *Evaluating the Effects of the September 2003 European Union Policy Banning "Light/Mild" Cigarette Brand Descriptors: Findings From the International Tobacco Control Policy Evaluation Survey*. Ottawa, Canada: Health Canada.
- Fox RJ, Krugman DM, Fletcher JE, Rojas TH. 1994. Adolescents' attention to beer and cigarette print ads and associated product warnings. *Journal of Advertising Research* 39-52.
- Goldberg ME, Liefeld J, Madill J, Vredenburg H. 1999. The effect of plain packaging on response to health warnings. *American Journal of Public Health*. 89(9):1434-1435.
- Guttman N, Peleg H. 2003. Public preferences for an attribution to government or to medical research versus unattributed messages in cigarette warning labels in Israel. *Health Communication* 15(1):1-25.
- Hamilton WL, diStefano Norton G, Ouellette TK, Rhodes WM, Kling R, Connolly G. 2004. Smokers' responses to advertisements for regular and light cigarettes and potential reduced-exposure products. *Nicotine and Tobacco Research* (Suppl 3):S353-S362.
- Hammond D, Fong GT, McDonald PW, Brown KS, Cameron R. 2004. Graphic Canadian cigarette warning labels and adverse outcomes: evidence from Canadian smokers. *American Journal of Public Health* 94(8):1442-1445.
- Hammond D, Fong GT, McNeill A, Borland R, Cummings KM. 2006. Effectiveness of cigarette warning labels in informing smokers about the risks of smoking: findings from the International Tobacco Control (ITC) Four Country Survey. *Tobacco Control* 15 (Suppl 3):iii19-iii25.
- Health Canada. 1999. Focus group research on new health warnings on tobacco packages. In *Health Warnings Testing: Final Report*. Prepared by Environics Research Group Informa Market Research. Ottawa, Canada: Health Canada
- Health Canada. 2000. *Building on Success: A Proposal for New Health-Related Information on Tobacco Product Labels*. Ottawa, Canada: Health Canada.
- Health Canada. 2005a. *The Health Effects of Tobacco and Health Warning Messages on Cigarette Packages - Survey of Adults and Adult Smokers*. Ottawa, Canada: Health Canada.
- Health Canada. 2005b. *The Health Effects of Tobacco and Health Warning Messages on Cigarette Packages - Survey of Youth*. Ottawa, Canada: Health Canada.
- Hearn J. 2004. Shippers dragged into tax battle over online sales of cigarettes. *The Hill*. June: 13.
- Henderson B. 2000. Wear out: an empirical investigation of advertising wear-in and wear-out. *Journal of Advertising Research* 6:95-100.
- Hulit M. 1994. *Presentation at the May 17, 1994 Corporate Affairs Conference, Manila: Marketing Issues*. Philip Morris. Bates No. 2504015017/5042.
- Insight Canada Research. 1992. *Smoking in Canada: Warnings, Report on the findings of a nation-wide survey conducted on behalf of The Canadian Cancer Society, The Heart and Stroke Foundation of Canada, and the Canadian Council on Smoking and Health*. Pp. 4-21.
- Jordan J. 1993. Health warnings and cigarette packaging: let the buyers beware. *World Smoking and Health*.
- Koten J. 1980. Tobacco Marketers' Success Formula: Make Cigaretts in Smoker's Own Image. *Wallstreet Journal*. February 29, 22.
- Kovar J, Aubur J, Pederson L, O'Hegarty M, Chan S. 2005. The potential effectiveness of warning labels on cigarette packages: the perceptions of young adult Canadians. *Canadian Journal of Public Health* 96:353-356.
- Kozlowski LT, Goldberg ME, Yost BA, White EL, Sweeney CT, Pillitteri JL. 1998. Smokers' misperceptions of light and ultra-light cigarettes may keep them smoking. *American Journal of Preventive Medicine* 15(1):9-16.

- Laugesen M. 1990. Optimal working and pack position for strong varied disease warnings on cigarette packs in New Zealand. *Proceedings of the Seventh World Conference in Tobacco or Health*.
- Linthwaite P. 1985. Health warnings. *Health Education Journal* 44:218-219.
- Loken B, Howard-Pitney B. 1988. Effectiveness of cigarette advertisements on women: an experimental study. *Journal of Applied Psychology* 73(3):378-382.
- Mahood G. 1999. Warnings that tell the truth: breaking new ground in Canada. *Tobacco Control* 8(4):356-361.
- Malouff J, Gabrilowitz D, Schutte N. 1992. Readability of health warnings on alcohol and tobacco products. *American Journal of Public Health* 82(3):464.
- Millar WJ. 1996. Reaching smokers with lower educational attainment. *Health Reports* 8(2):11-19(Eng); 13-22(Fre).
- Miller L. 1986. *Principles of Measurement of Visual Standout in Pack Design*. Report No. RD 2039 Restricted. Group Research & Development Centre, British American Tobacco Co Ltd. Bates No. 102699347-102699500
- Nilsson T. 1991. Legibility of Tobacco Health Messages With Respect to Distance. A report to the Tobacco Products Division of the Health Protection Branch of Health and Welfare Canada.
- Northrup, David, and Pollard, J. 1995. *Plain Packaging of Cigarettes, Event Marketing to Advertise Smoking and other Tobacco Issues: A Survey of Grade Seven and Grade Nine Ontario Students*. Toronto, Ontario: York University.
- Pollay RW. 2001. JTI-McDonald, Imperial Tobacco Canada Ltd and Rothmans, Bencon & Hedges InC v. Attorney General of Canada and Canadian Cancer Society. *The Role of Packaging Seen Through Industry Documents*. Supreme Court, Province of Quebec, District of Montreal.
- Pollay RW, Dewhirst T. 2002. The dark side of marketing seemingly “Light” cigarettes: successful images and failed fact. *Tobacco Control* 11 (Suppl 1):I18-I131.
- Portillo F, Antonanzas F. 2002. Information disclosure and smoking risk perceptions: potential short-term impact on Spanish students of the new European Union directive on tobacco products. *European Journal of Public Health* 12(4):295-301.
- Shiffman S, Pillitteri JL, Burton SL, Rohay JM, Gitchell JG. 2001. Smokers' beliefs about “light” and “ultra light” cigarettes. *Tobacco Control* 10 (Suppl 1): i17-i23.
- Shopland DR, Burns DM, Benowitz NL, Amacher RH. 2001. *NCI Smoking and Tobacco Control Monograph 13: Risks Associated with Smoking Cigarettes with Low Machine-Measured Yields of Tar and Nicotine*. Bethesda, MD: National Cancer Institute, Pp. 13-37.
- Slade J. 1997. The pack as advertisement. *Tobacco Control* 6(3):169-170.
- Strahan EJ, White K, Fong GT, Fabrigar LR, Zanna MP, Cameron R. 2002. Enhancing the effectiveness of tobacco package warning labels: a social psychological perspective. [Review]. *Tobacco Control* 11 (3):183-190.
- Tandemar Research Inc. 1996. *Cigarette Packaging Study: The Evaluation of New Health Warning Messages*. Toronto (ON): Tandemar Research Inc.
- Wakefield M, Letcher T. 2002. My pack is cuter than your pack. *Tobacco Control* 11(2):154-156.
- Wakefield M, Morley C, Horan JK, Cummings KM. 2002a. The cigarette pack as image: new evidence from tobacco industry documents. *Tobacco Control* 11 (Suppl 1):I73-I180.
- Wakefield MA, Ruel EE, Chaloupka FJ, Slater SJ, Kaufman NJ. 2002b. Association of point-of-purchase tobacco advertising and promotions with choice of usual brand among teenage smokers. *Journal of Health Communication* 7(2):113-121.
- Wakefield M, Kloska DD, O'Malley PM, Johnston LD, Chaloupka F, Pierce J, Giovino G, Ruel E, Flay BR. 2004. The role of smoking intentions in predicting future smoking among youth: findings from Monitoring the Future data. *Addiction* 99(7):914-922.
- Wegrzyn J. 1992. *Health Warnings and Contents Labeling on Tobacco Products*. Carlton Victoria, Australia: Centre for Behavioural Research in Cancer.
- WHO (World Health Organization). 2000. *Advancing Knowledge on Regulating Tobacco Products, Final Report*. Oslo, Norway: WHO
- Willemsen MC, Simons C, Zeeman G. 2002. Impact of the new EU health warnings on the Dutch quit line. *Tobacco Control* 11(4):381-382.
- Willemsen MC. 2005. The new EU cigarette health warnings benefit smokers who want to quit the habit: results from the Dutch Continuous Survey of Smoking Habits. *European Journal of Public Health* 15(4):389-392.
- Witte K, Allen M. 2000. A meta-analysis of fear appeals: implications for effective public health campaigns. *Health Education and Behavior* 27 (5):591-615.
- Wogalter MS, Kalsher MJ, Rashid R. 1999. Effect of signal word and source attribution on judgements of warning credibility and compliance likelihood. *International Journal of Industrial Ergonomics* 24(2):185-192.

Yong HH, Borland R, Siahpush M. 2005. Quitting-related beliefs, intentions, and motivations of older smokers in four countries: findings from the International Tobacco Control Policy Evaluation Survey. *Addictive Behaviors* 30(4):777-788.

D

The Long-Term Promise of Effective School-Based Smoking Prevention Programs

Brian R. Flay
Department of Public Health
Oregon State University

Researchers and others have developed many school-based tobacco prevention programs over the past 30 years. Several reviews (Best et al. 1988; Burns 1992; DHHS 2000; Flay 1985; Glasgow and McCaul 1985; Goldstein et al. 1997; IOM 1994; Lantz et al. 2000; Skara and Sussman 2003) and meta-analyses (Black et al. 1998; Bruvold 1993; Rooney and Murray 1996; Rundall and Bruvold 1988; Tingle et al. 2003; Tobler 1986; Tobler 1992; Tobler et al. 2000; Tobler and Stratton 1997) have established that some programs and strategies, particularly those based on the social influences approach (educating youth about social norms and influences and providing skills for resisting such influences) were effective, although for some programs effects were often limited or did not last (Ellickson and Bell 1990; Flay et al. 1989; Murray et al. 1989).

Meta-analyses of school-based prevention programs have used various criteria and so have varied in scope, from including 74 smoking prevention studies among 207 substance prevention studies (Tobler et al. 2000) to including only 8 studies with grade 12 (or age 18) outcome data (Wiehe et al. 2005). The result has been a confusing array of findings, ranging from precise effect sizes for some type of programs to a conclusion that most school-based prevention programs do not work (Glantz and Mandel 2005; Wiehe et al. 2005).

Several studies (Black et al. 1998; Tobler 1986; Tobler 1992; Tobler and Stratton 1997) suggest that programs that use interactive learning strategies and involve same- or similar-age peers as leaders or facilitators are most effective. Consistent with earlier meta-analyses, Tobler and colleagues (2000) found that smoking prevention programs produced an average effect size of 0.16, with “interactive” programs producing a significantly larger effect size than noninteractive programs (0.17 versus 0.05) (Tobler et al. 2000). Even after adjusting for intraclass correlations (which many earlier analyses had not done), Rooney and Murray (1996) found that social influence programs produced reductions in smoking of between 5 and 30 percent (Rooney and Murray 1996). Tobler and colleagues (2000) found that programs that address multiple substances were not significantly less effective at reducing tobacco use than programs that targeted only tobacco—and they had the added benefit of reducing alcohol and other substance use as well (Tobler et al. 2000). Tobler (1986) also found program effects to be larger in schools with predominantly special or high-risk populations (minorities, high levels of absenteeism or drop-outs, poor academic records) (Tobler 1986).

The purpose of this review is to determine what long-term (by age 25) effects the nation might expect if the best school-based smoking prevention programs were to be adopted nationwide. Recent findings have raised questions about the medium-term (high school) effects of school-based smoking prevention programs. Wiehe and colleagues (2005) conducted a meta-analysis of eight studies with results reported at grade 12 or age 18 (Wiehe et al. 2005). These included evaluations of programs of known ineffectiveness from prior studies and even from

multiple prior studies and a meta-analysis (e.g., Drug Awareness and Resistance Education), which are discussed further below.

The Hutchinson project (conducted at the Fred Hutchinson Cancer Center, University of Washington) was designed to be a multiyear (grades 3–10) social influences tobacco prevention program. A large randomized trial (20 school groups per condition) produced no significant effects at the end of grade 12 or 2 years later (Peterson et al. 2000). These findings are impossible to interpret, because the investigators have not reported what effects there were or were not at any other time, including prior to entering high school (when most other programs report short-term results) or at the end of the program (grade 10). Certainly, one cannot use these results to conclude that the social influences approach to smoking prevention is ineffective in the long-term deterrence of smoking among youth (Peterson et al. 2000). These results must be interpreted in the context of many other studies on the social influences approach in the literature (Botvin et al. 2001; Botvin et al. 2001; Sussman et al. 2001).

The DARE (Drug Awareness and Resistance Education) Program was developed by the Los Angeles Police Department (LAPD) and the Los Angeles Unified School District (LAUSD) in the early 1980s. They essentially took the two variants of Project SMART (Self Management and Resistance Training) that were being tested with 7th grade students in LAUSD schools at the time (Graham et al. 1990), combined them, and added a great deal of information about drugs for police officers to deliver to 5th and 6th grade students. The results of a randomized trial of the two SMART variants found that the resistance skills program was effective, albeit with small effects, and that the self-management program actually led to increased drug use relative to control group students (Graham et al. 1990; Hansen et al. 1988a). These results, combined with our knowledge that information does not often greatly influence behavior and that the police officers who used are not usually highly skilled teachers, make it no great surprise that DARE was not be effective. Although early nonrandomized studies suggested that DARE sometimes had small effects for elementary school students, multiple randomized trials have shown that DARE has little or no impact on drug use in the short term and no impact in the long term (Clayton et al. 1925; Dukes et al. 1996; Ennett et al. 1994a; Lynam et al. 1999; Rosenbaum et al. 1994; Rosenbaum and Hanson 1998). For a summary, see the meta-analysis by Ennett and colleagues (1994b). In response, DARE has developed programs for junior and senior high school students; the junior high program also has been shown not to be effective (Perry et al. 2003).

Another program that has been promoted as being an effective prevention program, but that has no medium-term effects on smoking is the Michigan Health Education Model. It consists of 30 lessons taught during grades 5–8, some of which include resistance skills training. Although it produced an 82 percent relative reduction (RR) in ever smoking at the end of the program (Shope et al. 1996), no significant effects on smoking behavior remained by the end of grade 12—indeed, boys became more likely to smoke (Shope et al. 1998). It seems that the prevention content of this program was not intensive or long enough to produce permanent effects, that additional programming might have been needed when the students were adolescents, or that some content may even have had a negative effect as some older informational programs did (Goodstadt 1978).

Other studies included in the Wiehe and colleagues (2005) meta-analysis were early studies of the social influences approach (Flay et al. 1989; Shean et al. 1994)¹ that, in retrospect, one should never have expected to have long-term—or even medium-term—effects (Wiehe et al.

¹ A similar study that reported 12th grade data, but was not included by Wiehe and colleagues (2005), was the early Minnesota smoking prevention program that many others were modeled after (Murray et al. 1989).

2005). These programs were initial small-scale experimental tests of the social influences approach that included only 5 to 10 sessions in one or two grades without any boosters or programming in high school. Another was Project ALERT, which consisted of only eight sessions in 7th grade and three booster sessions in 8th grade (Ellickson et al. 1993). Clearly, programs need to include more sessions, preferably with some in high school, in order to be effective in the long-term.

Of the studies reviewed by Wiehe and colleagues (2005), only the Life Skills Program, which is an interactive program of 15 sessions in 7th grade, 10 in 9th grade, and 5 in 10th grade that incorporates the social influences approach as well as other general personal and social skills, was effective at medium-term follow-up, concluded that “there is little evidence to suggest that existing programs produce medium-term decreases in smoking prevalence” (Wiehe et al. 2005, p. 168). In an editorial comment, Glantz and Mandel (2005) misleadingly stated that the Wiehe and colleagues (2005) review of medium-term trials “convincingly shows that they are not effective” (Glantz and Mandel 2005, p. 157). They then discount the Life Skills Program evaluation because of the use of one-tailed t-tests and the failure to take multiple comparisons into account. However, it is perfectly appropriate to use one-tailed t-tests when a clear hypothesis is stated, and adjusting for multiple comparisons would not have eliminated the significant effects. In addition, the short-term effects of Life Skills Training (LST) have been replicated in multiple studies (see below). Glantz and Mandel (2005) suggest that all aspects of smoking education should be integrated into regular core curriculum classes. However, this approach has not been shown to be effective. Furthermore, it is not likely to happen in the near future because of the current demands on schools, nor is it likely to be effective because one would expect much less adherence to the program components if the program was delivered by multiple teachers (Glantz and Mandel 2005).

Skara and Sussman (2003) reviewed medium-term studies (at least 24 months) of 25 tobacco and other drug prevention programs. They found that 18 of the 25 studies reported significant short-term effects and that 15 of the 25 reported significant medium-term effects. Of 17 studies with pretest and posttest data, 11 (65 percent) reported significant medium-term effects, with an average reduction in the percentage of baseline nonusers who initiated smoking in the program condition relative to control conditions of 11.4 percent (range 9 to 14.2 percent). Of the studies with significant short-term effects, 72 percent (13 of 18) were found to have significant medium-term effects. Results also indicated that program effects were less likely to decay for programs with extended programming or booster sessions (Skara and Sussman 2003).

In summary, findings from various reviews and meta-analyses suggest that school-based smoking prevention programs can have significant long-term effects if they: (1) are interactive social influences or social skills programs; (2) involve 15 or more sessions, including some up to at least ninth grade; (3) produce substantial short-term effects. These findings also suggest that many more programs that have reported short-term effects might also have medium- and long-term effects if they were evaluated. Unfortunately, long-term studies are relatively rare, mostly due to lack of funding.

METHODS

For the purposes of this report, the Institute of Medicine’s Committee on Reducing Tobacco Use: Strategies, Barriers, and Opportunities wanted to develop an estimate of the size of the effect that the best programs could produce if widely implemented. This required a focus on studies of programs that both were successful in reducing smoking in the short term and also in-

cluded follow-up data into high school (grades 10–12). Few studies have included follow-up beyond high school, but for those that did, the reported effects are of interest. Since the purpose was to determine the size of the effects that could be obtained by the best programs that have been tested, the decision was made, based on past reviews, to limit this review to programs that included 15 or more sessions (preferably including some in high school) and that had demonstrated effects at both short term and medium term. Only three school-based programs and four school-plus-community programs fulfilled these criteria.² For each of these programs, Table D-1 shows the research design, the number of sessions, the duration, the grade levels of the program, the grade of the last follow-up, and the short- and medium-term program effects. These two sets of studies are labeled Category I studies of school-based and school-plus-community or mass media programs, respectively.³

Given the small number of Category I studies, evaluations of other programs with the promise of medium- and long-term effectiveness are also reviewed. Category II studies consist of school-based and school-plus-community or mass media programs that had large effects and were of a large enough scope and sequence to suggest likely medium- and long-term effects. Four school-based programs and one school-plus-community program met these criteria.

Percent relative reduction (RR) is used as the indicator of effect size for two reasons. First, it is readily available for all programs, whereas the detailed statistics needed to calculate an effect size are sometimes incompletely reported. Second, RR is readily understood and utilized in cost and benefit calculations. For randomized trials, pretest levels of smoking should be the same in both program and control groups, and RR would be the difference between posttest control (C) and program (P) groups divided by the control group level [i.e., (C - P)/C]. However, pretest levels were not always the same, and these should be adjusted for; thus, in cases where pretest data were reported, RR is the posttest difference between groups minus the pretest difference between groups, divided by the control group posttest level, that is [(Post C - Post P) - (Pre C - Pre P)] / Post C, expressed as a percentage.

Another complication in determining effect sizes is that different studies report different levels of smoking as their outcome variable. For both short- and medium-term effects, the most commonly used outcomes were ever (lifetime) use, use in the past month, or use in the past week. When studies report more than one of these, all are reported. While relatively few studies reported more than one outcome measure, the RRs were remarkably consistent across outcomes when they were reported. On the assumption that investigators reporting only one outcome may have chosen to report the outcome with the largest effect size, the estimates are likely to be on the generous side.

REVIEW OF CATEGORY I STUDIES AND FINDINGS

Category I School-Based Programs

² This review is not limited to randomized trials.

³ All seven Category I programs were included in the 25 studies with at least 2 years of follow-up reviewed by Skara and Sussman (2003) (Skara and Sussman 2003). The other studies in their review did not meet one or more of the criteria for inclusion. For many, the last follow-up was earlier than grade 10 (and some of these are in my Category II). For some, there were no demonstrable short-term program effects (e.g., Peterson et al. 2003).

The Tobacco and Alcohol Prevention Project

The Tobacco and Alcohol Prevention Project (TAPP) (Hansen et al. 1988b) was a 15-session social influences-oriented program developed at the University of California, Los Angeles, in the early 1980s. The core components of the social influences approach have been employed in many evaluated programs, including those reviewed here. Hansen (1988) provides a good description of the theory and content of this approach. It has two main core elements: (1) resistance skills training to teach skills to resist the specific and general social pressures to smoke and (2) normative education to correct student misperceptions of prevalence and acceptability of use. Programs using this approach also often involve active learning or the use of the Socratic or dialectic teaching approaches, open discussion, the use of peers or older admired youth as instructors, and behavioral rehearsals to ensure that skills are learned well (Hansen 1988a). TAPP included the above core elements plus inoculation against mass media messages, information about parental influences, information about the consequences of use, and the making of a public commitment not to smoke. Peer opinion leaders were used to assist teachers with program delivery.

TAPP was evaluated in two cohorts of 7th grade classes in a nonrandomized study in Los Angeles County. Only cohort 1, conducted in two moderately-sized school districts, was followed into grade 10. Health education and social studies teachers received 2 days of training prior to delivering the program. As shown in Table D-1, by the end of 7th grade the RR in past-month smoking was 26.2 percent. By the end of 10th grade there was a 19.1 percent RR in past-month smoking and an 18.3 percent RR in ever smoking. In a secondary analysis of only those students present at all waves of the study, the RR in past-month smoking was 43 percent.

This was an early study of the social influences approach, and it demonstrated that the approach can be very effective. The use of peer leaders probably enhanced what program effects would have occurred with teacher-only delivery (Klepp et al. 1986; Tobler 1992). The whole-sample result is preferred as the initial estimate of program effects because it provides a more realistic assessment of what would happen under real-world conditions; however, note that the larger effect obtained for students present throughout the study could be obtained if all schools were to implement the program.

Life Skills Training

Life Skills Training (LST) is one of the most researched school-based smoking prevention or any other kind of substance use prevention program. Developed by Botvin and Eng (1982), originally at the American Health Foundation and then at Cornell University, LST consists of 30 classroom sessions with 15 delivered in 7th grade, 10 in 8th grade and 5 in 9th grade (usually the first year of high school)⁴ (Botvin and Eng 1982). The program was designed to teach students a wide array of personal and social skills. These include content similar to other smoking prevention programs that focus on social influences (Glynn 1989; Hansen 1988b), including learning and practicing refusal and other assertion skills, information about the short- and long-term consequences of smoking, correction of misperceptions of the prevalence of use by same-age peers, and information about the decreasing acceptability of smoking in society. Other generic program content addresses the development of communication skills and ways to develop personal relationships.

⁴ This is the number of lessons for the version tested in the studies reported here. Different versions of the program have different numbers of lessons per grade.

Multiple studies over 25 years have demonstrated the effectiveness of the program when delivered by different providers, in different kinds of schools, and for different kinds of students (see Botvin 2000 and Botvin and Griffin 2002 for reviews). Only one study has included medium-term follow-up through high school (Botvin et al. 1995). This was a follow-up of the largest single trial, conducted in 56 suburban and rural schools serving largely white students (91 percent) in three geographical regions of New York State (Botvin et al. 1990). Schools were assigned randomly to two experimental conditions (one day or video-taped teacher training) or a control condition. Level of implementation ranged from 27 to 97 percent by teacher reports, with about 75 percent of the students receiving 60 percent or more of the intervention. Six program schools and 18 percent of the students were excluded from the analysis of program effects because of poor implementation.

As shown in Table D-1, at the end of 9th grade the RR was a relatively small 8.9 percent (1.63 percent vs. 1.48 percent) for weekly smoking, reflecting the low prevalence of weekly smoking at this age. At the end of 12th grade, the RRs were 19.7 percent (33 percent versus 26.5 percent) and 20.4 percent (27 percent versus 22 percent) for monthly and weekly smoking, respectively.⁵ For the high-implementation group, the medium-term RRs were both 28 percent. However, the RRs for the (almost) complete sample provide the most appropriate estimate of what effects could be obtained under real-world conditions—indeed, they may still be an overestimate of the effects that might be obtained when the program developer is not involved—although larger effects might be obtained with full, high-quality implementation.

Independent evaluations of LST have found similar or larger short-term effects. In a nonrandomized trial in Spain, where the program was delivered by teachers to 9th grade students, a 21 percent RR in average monthly smoking at the end of grade 10 reduced to 11 percent by the end of grade 12 (Fraguela et al. 2003). Independent evaluations of LST in Midwestern states found a short-term RR of 22 percent in a randomized trial in rural Iowa (Spoth et al. 2002; Trudeau et al. 2003) and short-term RRs of 43 percent in current smoking and 9 percent in ever-use in Indianapolis (Zollinger et al. 2003). Another small-scale (three schools per condition) randomized evaluation in Pennsylvania found small immediate effects for girls only, and these had decayed by the end of grade 7 and were no longer apparent by the end of grades 8–10 (Smith et al. 2004). In a nonrandomized trial of a German adaptation of the life skills approach in 106 German-speaking elementary schools in Austria, Denmark, Luxembourg, and Germany, a 10 percent RR in ever smoking and less than 1 percent RR in past-month smoking were reported (Hanewinkel and Asshauer 2004).

Project SHOUT

Project SHOUT (Students Understanding Others Understand Tobacco) (Eckhardt et al. 1997; Elder et al. 1993) used trained college undergraduates to teach 18 sessions to 7th and 8th graders that included information on the health consequences of smoking, celebrity endorsements on nonuse, the antecedents and social consequences of tobacco use, decision making, resistance skills advocacy (writing letters to tobacco companies, magazines, and film producers; participating in community action projects designed to mobilize them as antitobacco activists), a public commitment to not use tobacco, and positive approaches to encouraging others to avoid tobacco or quit. In 9th grade, five newsletters were mailed to students and two to their parents, and each

⁵ Note that the RR of 21 percent [(33 - 27)/33] reported by Skara and Sussman was based on the method that used only posttest results. Our RR is based on the method that includes pretest results (Skara and Sussman 2003).

student received four phone calls from trained undergraduate counselors that were individually tailored to their tobacco use status at the end of 8th grade or the prior phone call. During 11th grade, approximately half of the students received two more newsletters that focused on tobacco company tactics to recruit new smokers; information on recent city, state, or national legislation regarding tobacco; cessation advice and information on second-hand smoke; and one phone call that focused on eliminating smoking in restaurants and other public places as well as information concerning the rights of customers and employees in those places affected by the potential ban.

The program was evaluated in 22 schools with ethnically diverse populations in the San Diego area, some suburban and some rural. Schools were assigned randomly to program and control conditions after matching on pretest levels of tobacco use. Effects observed at the end of 8th grade (14.6 percent versus 10.8 percent, RR = 22 percent) were not statistically significant. However, as shown in Table D-1, by the end of 9th grade the intervention produced a relative reduction in tobacco use in the past month of 30.3 percent (19.8 percent versus 13.2 percent). By the 11th grade, the average RR was 44.1 percent (12.6 percent versus 7 percent). For the group that did not receive the 11th grade intervention, the RR decayed to only 9.5 percent.

The pattern of effects observed for this study suggest that much of the medium-term effect was due to personal attention via newsletters and phone calls in grades 9 and 11. Indeed, one has to wonder if the personal attention set up a response bias among respondents such that those who received personalized newsletters and phone calls were motivated to tell the researchers what they wanted to hear. Lack of a differential response rate to the surveys by condition speaks against this, however, at least in part. Considerable research suggests that the power of similar-age peers and the power of college-age counselors for high school students should not be underestimated. Although the cost of the intervention as studied was kept down by the use of volunteer students, it is not clear how easily this model can be disseminated. The results also strongly suggest, however, that even a brief intervention during high school was enough to actually increase the effect observed at the end of grade 9.

Summary of Findings From Category I School-Based Programs

Results from three social influence and social competence programs with 15 or more sessions over 2–4 years, preferably with some content in high school, had significant medium-term effects (i.e., at grades 10–12): an average of a 27.6 percent (range 18.7–44.1) RR in smoking. The extraordinary effects of Project SHOUT may have been due to the added content on tobacco industry activities, the teaching and encouragement of advocacy skills, and the personal attention. These results need to be replicated. The medium-term effects suggest that a minimal personal contact intervention of this kind in high school could increase the effects of any other program delivered in middle school.

Category I School-Plus-Community Programs

The North Karelia Project

Vartiainen and colleagues (Vartiainen et al. 1983; Vartiainen et al. 1986; Vartiainen et al. 1990; Vartiainen et al. 1998) tested a 10-session social influences program delivered by trained health education teachers and peer leaders in the province of North Karelia, Finland. A community-wide heart disease prevention program and mass media campaign modeled on the Stanford three-cities project (Farquhar et al. 1977) was going on throughout North Karelia at the same

time. Two schools received the 10-session program from the project health educator and trained peer leaders and two schools received a 5-session version from regular teachers. Two schools from another province, where there was no prevention program, were used as controls. As shown in Table D-1, at the end of grade 9 the RR (average of lifetime, monthly, and weekly) was 44.6 percent for both program conditions, which decayed to 38.7 percent by grade 11. By 3 years beyond the end of high school, the RR had decayed to 22.9 percent in the health educator condition and 37.3 percent in the teacher condition. By 10 years beyond high school, the average RR was 20 percent with the two conditions not significantly different.

The results reported here can only be interpreted as the joint effects of the school-based smoking prevention program and the community-wide heart disease prevention campaign (which had a reduction of smoking as one of its targets). Thus, these results suggest effects that are larger than those of the school-based programs reviewed above. The larger effects obtained by regular teachers suggests that programs might be more effective when delivered by regular classroom teachers than when delivered by visitors to classrooms, possibly because of the ongoing relationships that teachers establish with students. However, the long-term effects were no different.

The Class of 1989 Study

This project was another in which a school-based prevention curriculum was tested in the context of a community-wide heart disease prevention program (Perry et al. 1989). The community program consisted of community education, including mass media and organization activities as well as screening, cessation clinics, and workplace education designed to reduce three cardiovascular risk factors: smoking, cholesterol levels, and blood pressure (Luepker et al. 1994; Mittelmark et al. 1986). The school-based smoking prevention program (Perry et al. 1992; Perry et al. 1994) was based on the Minnesota Smoking Prevention Program (Arkin et al. 1981; Murray et al. 1994), one of the early social influences programs, and included material on diet and exercise as well as tobacco. Seven sessions on smoking prevention were delivered by peer leaders assisted by teachers in 7th grade. In 8th and 9th grades an additional 10 sessions concerning tobacco use were delivered by teachers. The classroom components were supplemented by the development of health councils through which students participated in other cardiovascular risk reduction projects.

The smoking prevention program was evaluated with a design in which students in all of the schools in one community received both the community-wide cardiovascular intervention and the school-based smoking prevention program and students in all the schools in another community did not. All students in one cohort were surveyed every year from 6th to 12th grade. As in all school-based studies, attrition occurred continuously over the 6 years, and by 12th grade only 45 percent of the original participants were surveyed. There were no differences in smoking rates at 6th grade. By the end of 7th grade, after the core smoking prevention content had been delivered, weekly smoking prevalence was about 40 percent lower in the program condition, and this effect was maintained through 12th grade, 3 years after the end of direct smoking prevention instruction and a year after the end of general community education (Table D-1).

Like the North Karelia project, this study demonstrates that school-plus-community programming can have substantial effects that are maintained to a large extent through the end of high school.

Midwestern Prevention Project

The Midwestern Prevention Project (MPP; also known as Project STAR [Students Taught Awareness and Resistance]) tested a school-plus-community (and mass media) version of the social influences approach in eight communities in the Kansas City metropolitan area. The school-based component consisted of 10 sessions delivered by classroom teachers to 6th or 7th grade students (depending on the year of transition to middle school) and 5 sessions delivered the following year (when a parent involvement component was also implemented). Of these schools, 8 were assigned randomly to conditions, 24 other schools elected to deliver the program, and 18 others elected to wait till after the project. Mass media programming was available to all communities every year. Other community-based programming started in the third year and likewise was available in all communities.

At the 2-year follow-up, the RR was 37.5 percent (Table D-1) (Pentz et al. 1989). By grades 9–10, it was 18 percent (Table D-1) (Johnson et al. 1990). These results are difficult to interpret because all students were exposed to the mass media and community components. The mass media programming, in particular, would be expected to reduce the difference between groups because the control group would no longer be a real control and it might have reduced students' rate of onset relative to if they had not been exposed to the community program. This might explain the relatively fast decay.

Vermont Mass Media Project

The Vermont project tested the effectiveness of a mass media social influences smoking prevention program when delivered in the context of a school-based program. Worden and colleagues (1988) undertook a careful development process to develop television and radio spots that would discourage cigarette smoking by adolescents. They randomly assigned two communities to the program condition (mass media plus school) and two matched communities to a school-only condition. There was no true control group. In the program communities, they purchased the time for airing the spots (734 TV spots in year 1 decreasing to 348 by year 4, and 248 radio spots in year 1 increasing to 450 by year 4) and provided schools with the school-based program (four sessions in each of 5th through 8th grades and three sessions in both 9th and 10th grades—each student in the study cohort was exposed to 4 years of program during 5th through 8th grades, 6th through 9th grades, or 7th through 10th grades) and teacher training to deliver them. Neither schools nor students were told about the media programming, and the mass media programming never mentioned the school program. Thus, as far as students were concerned, there was no linkage between the two programs (Worden et al. 1988).

As shown in Table D-1, the RRs in weekly smoking among the school plus mass media program group compared to the school-only program group were 36.6 percent (14.8 percent versus 9.1 percent) at the end of the program (grades 9–11) and 28.8 percent 2 years later at grades 10–12 (Flynn et al. 1992; Flynn et al. 1994; Flynn et al. 1995). Larger effects were observed for daily smoking—44 percent RR at the end of the program and 36 percent a year later. It is difficult to estimate what the effects of the school-only program might have been and therefore it was difficult to estimate the relative contributions of the school and mass media programming. Nevertheless, this study demonstrates that well-designed media programming can produce large effects above those of the school-only program, about 80 percent of which are maintained for at least 2 years.

Summary of Findings from Category I School-Plus-Community Programs

The school-plus-community studies produced short-term RRs of about 40 percent, almost twice as good as the school-only programs. These effects decayed an average of 22 percent to about 31 percent. Because the effects of school-only programs tended to increase rather than decay over time, the medium-term effects of school-plus-community or mass media programs were only about 12 percent better than school-only programs. Note, however, that program effects were maintained at a higher level (almost 40 percent, or 31 percent better than school-only programs) for those programs that included a high school component (North Karelia and Class of 1989 Studies), reinforcing the conclusion above that high school programming reduces the decay of effects. Despite this latter result, we conclude conservatively that ongoing school plus mass media or community programs can produce a medium-term RR of between 31 and 40 percent.

The use of multiple delivery modalities increases effectiveness over those obtained from school-only programs (Flay 2000). This is consistent with theories about the influences on behavior existing across multiple domains of life (Bronfenbrenner 1979; Bronfenbrenner 1986; Flay and Petraitis 1994; Flay et al. 1995). It helps if students receive consistent messages across community contexts and over time.

CATEGORY II PROGRAMS

This section provides a brief review of several programs that show exceptional promise or provide other important insights to help estimate the potential and likely relative reduction in smoking onset if prevention programs were widely implemented. These programs are summarized in Table D-2.

Category II School-Only Programs*The Adolescent Alcohol Prevention Trial*

Hansen and Graham (1991) tested two variants of early social influences program (nine sessions delivered to 7th grade students) targeted to alcohol use (Hansen and Graham 1991). They contrasted information plus resistance skill training, information plus normative education alone, or both of these combined. Schools were assigned randomly to one of these three conditions or to a control. Although the program focused mostly on alcohol, it did produce effects on cigarette smoking. The normative education and combined programs produced the largest effects. As shown in Table D-2, the RRs at the end of the program were 21.4 percent for lifetime smoking and 26.2 percent for monthly smoking. At 11th grade follow-up, the RR in lifetime smoking was 13.9 percent (Taylor et al. 2000). Although this program focused mostly on alcohol, it also produced effects for cigarette smoking. These effects were not too different in magnitude from those reported earlier from TAPP (developed by the same principal investigator), although, as might be expected because the program was not focused on smoking, these effects were not maintained as well.

Towards No Tobacco

Sussman and colleagues (1993a; 1993b; 1996) developed the Towards No Tobacco (TNT) program as a more intensive approach to tobacco prevention that incorporated the social influ-

ences approach and new approaches to altering normative beliefs and social skills training. In a large randomized trial, they found RRs in ever smoking of 34 percent at the end of the program (grade 8) and 30 percent at grade 9, and RRs in weekly smoking of 64 percent at the end of the program and 56 percent at the end of grade 9. These effects are larger than those found in other programs, so one would expect that the medium-term effects might also be larger (Dent et al. 1995; Sussman et al. 1993a; Sussman et al. 1993b; Sussman et al. 1995).

Know Your Body

Investigators at the American Health Foundation developed the Know Your Body (KYB) program in the early 1980s as a comprehensive health education program that included social influences and competence prevention components. It consisted of 384 lessons delivered during 4th through 9th grades. In a randomized trial, Walter and colleagues (Walter et al. 1988; Walter and Wynder 1989) found an 11.5 percent RR in thiocyanate (a biological marker of smoking) at grade 8 and a 73.3 percent RR in lifetime smoking at the end of grade 9. This is an exceptionally large effect. Without long-term follow-up data we cannot be sure how well it would have been maintained, but this study shows that strong prevention effects can be obtained by comprehensive health education programs that also include proven approaches to prevention.

The Good Behavior Game

Kellam and Anthony (1998) applied the Good Behavior Game (GBG) (Barrish et al. 1969) to improving elementary student behavior in the expectation that it would prevent subsequent adolescent problem behavior (Kellam and Anthony 1998; Storr et al. 2002). In a trial where 1st grade students were assigned randomly to control classrooms and classrooms or teachers were assigned randomly to the GBG, another intervention, or control conditions, students received three 10-minute sessions per day at the beginning of 1st grade, increasing in frequency and duration during 1st through 2nd grades. Jalongo and colleagues (1999) found a 24 percent RR in problem behavior at the end of grade 2 (Jalongo et al. 1999) while Furr-Holden and colleagues (2004) reported a 26.3 percent RR in lifetime smoking 8th grade (Furr-Holden et al. 2004). These studies demonstrate that important changes in life course trajectories of behavior brought about early in life can lead to important changes in adolescent behavior, including smoking.

Other school-based programs that improve elementary school children's behavior also have this kind of potential, for example, the Fast Track (Conduct Problems Prevention Research Group 2002) and Positive Action programs (Flay et al. 2001; Flay and Allred 2003). Some non-school interventions that improve the behavioral trajectory of young children—for example, preschool maternal counseling (Cullen and Cullen 1996) and home nursing visitation (Olds 2002)—also have this potential.

Summary of Findings from Category II School-Based Programs

Although these programs are not strictly comparable, the average effect size of these four projects was 27.2 percent for short-term effects and 39.1 percent for medium-term effects (usually 8th or 9th grades), but with large variation (12 to 49 percent for short term and 26 to 73 percent for medium term). Given that Category I programs actually had increased effects over time, these results suggest that it may be possible to have medium-term effects considerably higher

than the estimates derived from Category I programs with more comprehensive or newer school-based programs.

The results of the GBG and other elementary school and preschool programs are particularly intriguing because they demonstrate the power of changing the trajectories of behavior early in life. A relatively nonintensive prevention program provided to these students in middle and high school might have much larger medium- and long-term effects on smoking and other health-related behaviors.

Category II School-Plus-Community Program

Project 16

Project 16 (Biglan and Ary 2000) was a randomized, multiple cross-sectional design to test the effects of a comprehensive community-based intervention designed to reduce smoking by 7th and 9th graders. Sixteen communities were assigned randomly to two conditions: a five-session social influences school-based program and the school plus the community program. The community program included media advocacy, youth antitobacco activities, family communications about tobacco use, and reduction of youth access to tobacco. At the end of 2 years of intervention, the covariate adjusted prevalence of smoking among 7th and 9th graders in the community program communities had increased 0.9 percent (from 10.7 percent to 11.6 percent) while prevalence had increased 3.3 percent (from 8.1 percent to 11.4 percent) in the school-based only communities—an RR of 21.1 percent (Table D-2). One year later, the parallel rates were 5.9 percent (from 7.9 percent to 13.8 percent) and 2.1 percent (from 10.3 to 12.4 percent), respectively, or a RR of 27.5 percent (Table D-2). The RRs obtained by this intervention suggest that well-designed community-based interventions can have effects that seem likely to be maintained at substantial levels. The lack of a true control group makes estimating the true effect difficult. However, the results of this study suggests that significant medium- and long-term effects can be expected from well-designed and implemented school-plus-community programs.

Summary of Category II Programs

The findings from both the school-only and the school-plus-community programs in this section suggest that programs can be developed and implemented that will be as effective or more so in the medium- or long-term as the Category I programs reviewed above.

Summary of Findings and Conclusions

School-Only Programs

This review suggests that interactive social influences or social competence smoking prevention programs that provide 15 or more lessons, start in upper elementary or middle school, and continue into high school can produce solid medium-term effects. Other conditions that appear to improve the effectiveness of school-only programs relate to content (social influences and general social competence are of critical importance), how well they are delivered (related to how well teachers are motivated and trained), and the involvement of older peers (see Tobler et al. 2000 for elaboration of the 13 components of effective programs).

Results from three social influence and social competence programs with 15 or more sessions over 2–4 years, preferably with some content in high school, had significant short-term effects of about 22 percent RR in monthly or weekly smoking that increased during high school in two of the studies to an estimated average of 28 percent RR. Some other programs (Category II) provided further evidence that: (1) the social influence approach can affect tobacco use even when alcohol use was the main focus; (2) comprehensive health education programs that include strong social influence content can be effective, possibly even more effective than stand-alone social influence programs; and (3) programs early in life can alter developmental pathways for the better, including less tobacco use in adolescence.

Based on an average of the medium-term effects of Category I studies and supported by the estimated medium-term effects of Category II studies, the possible medium-term effects of a national program of well-implemented, school-based smoking prevention programs of proven effectiveness are estimated to be 28 percent.

School-Plus-Community and/or Mass Media Programs

The four Category I school-plus-community studies produced short-term RRs of about 42 percent, decaying to medium-term effects of about 31 percent. Findings from one Category II community-based program implemented with a school-based program support this estimate of effect size. Thus, the possible medium-term effects of a national program of well-implemented school-plus-community and/or mass media smoking prevention programs of proven effectiveness are estimated to be 31 percent.

Expected Effects into Young Adulthood

Program effects are likely to decay beyond high school. Unfortunately, few studies are available to guide us in how large or small this decay might be. However, national U.S. data may allow for an estimate. A U.S. National Household survey on Drug Abuse data suggests that about 3.012 percent (average for 1989–1999, range = 2.63–3.46) of 18 year-olds who are not smoking daily become daily smokers by the time they are 25 (Giovino 2004). The Monitoring the Future 2003 data provide a national estimate of the percentage of 12th grade students that smoke daily at 15.8 percent, meaning that 84.2 percent of 12th graders were not smoking daily. For school-only programs, this would represent a 23.3 percent RR in daily smoking by age 25 (see Table D-3 for calculations) or a decay in RR of $(28 - 23.3)/28 = 17$ percent. The decay of school-only programs might be greater than this estimate, maybe 20 percent, and the decay of school plus ongoing community or mass media programs might be less, maybe 15 percent because the messages remain in the larger environment to influence or reinforce behavior.

Expected Effects Under Real-World Conditions

There are at least two other factors that could reduce the effects of even the best programs in real-world implementations: (1) rate of adoption by schools and communities and (2) level and quality of implementation or delivery.

Less-than-complete adoption clearly would reduce the expected national-level effect size. Getting effective prevention programs adopted by schools is not easy (DHHS 2000; Ennett et al. 2003; Ringwalt et al. 2002). Estimates of effects often come from efficacy trials where adoption is not as large an issue because only those schools or communities willing to adopt the program have been entered into the study, and also where implementation quantity and quality may not be

major issues because the implementers are trained and monitored by the researchers. Nevertheless, it would be helpful to have an estimate of the proportion of schools that would be willing to implement an effective tobacco prevention program; however, we know of few such estimates. The Conduct Problems Prevention Research Group (2002) reported that seven of eight school districts that were offered the fast track program accepted, and 52 of the 54 schools asked agreed to participate.

In actuality, not even all schools entered into studies always carry through with their willingness to implement the program. For example, Battistich and colleagues (2000) reported that only 5 of 12 schools recruited into the program arm of a nonrandomized project based on faculty interest and perceived likelihood of being able to implement the program actually implemented the program moderately well to very well during the 3-year study (Battistich et al. 2000).

In these days of high demands on schools, they are not going to address prevention unless they have to (or unless it can be shown to improve achievement) and they are not going to adopt a program unless they have the funding for it. Adoption probably would not be 100 percent even with a clear mandate and earmarked funding, although it might increase over time following the S-shaped adoption curve, as successes are publicized. A clear mandate to include tobacco prevention in the curriculum, together with earmarked funding and monitoring of adoption, should help obtain rates of adoption of evidence-based school-based programs of 75 percent or more.

Getting comprehensive programs implemented fully and with integrity, even when they are adopted with full information and commitments, is also no small task, and the level and quality of implementation are clearly related to program effectiveness (Kam et al. 2003). Factors believed to influence program implementation have been identified and they are related not only to the program itself (e.g., program complexity, provision of technical assistance, user-friendly materials) but also to the environment in which the program is implemented (i.e., district, school, teacher, and participant characteristics) (Durlak 1998).

For some programs with high levels of monitoring, levels of implementation might be high. For example, the Conduct Problems Prevention Research Group (2002) reported that participating teachers taught an average of 85 percent of the lessons in the first year of the program, 91 percent of parents participated in the program, and 79 percent of them attended at least 50 percent of the parent sessions.

Without ongoing monitoring, implementation might be much more uneven. Uneven implementation of a national program could reduce the effect size substantially—but by how much? The effect sizes reported for LST already took incomplete implementation into account. The authors reported that about 76 percent of the students received 60 percent or more of the program from trained teachers in schools who had signed onto the study (Botvin et al. 1995). The 20 percent medium-term RR reported was for the whole sample (for the high-fidelity sample, the medium-term RR was 28 percent). Independent evaluations of the LST program have reported a wide range of effects. None of these studies provided data on levels or integrity of implementation.

The tobacco industry has sponsored adoption, implementation, and evaluation of LST (Interactive Inc. 2000; Interactive Inc. 2001).⁶ During the first 2 years, teachers who provided implementation data (73 percent) taught 80 percent of the units, met 75 percent of the objectives, and covered at least 69 percent of the activities. If one assumes that the 27 percent who did not provide implementation reports did not teach LST, then the average implementation level would

⁶ Unfortunately, the design of this evaluation (unmatched control group, for which data are not reported) does not allow for any interpretation regarding program effectiveness.

be between 50 and 60 percent. Some teachers noted that the only reason they implemented LST at all, especially in year 2, was because it was being monitored or evaluated. Thus, one could conclude that under conditions of ongoing monitoring or evaluation a high level of implementation (60 percent or more) could be achieved.

There may be less compromise in the delivery of a mass media campaign than of school programs because they are of larger scale. As long as campaigns are well designed and fully funded (including purchase of time on television and radio), a 75 percent implementation might be a reasonable expectation.

DISCUSSION

There are a number of limitations to the studies that met the criteria for this review. First, the most appropriate design is the school-based randomized trial, where schools are assigned to conditions and data are analyzed taking into account the nesting of students in schools (Flay and Collins 2005; Murray 1998). Many prevention studies—including some of those reviewed here—did not use randomization, but instead used matched controls or other designs. Some so-called quasi-experimental designs (Shadish et al. 2002) may be acceptable under certain conditions (Flay et al. 2005; Flay et al. in press). Second, although more than one program has reported significant medium-term effects, none of the individual programs has more than one evaluation of medium-term effects. Thus, although we can conclude that comprehensive, interactive programs with 15 or more sessions, including in high school, can have medium-term effects, we do not yet know whether the medium-term effects of any one of the programs meeting these criteria can be replicated.

Third, there is a reliance on self-report measures of tobacco use. For many years, the validity of self-reports of sensitive behaviors was questioned. After a series of studies of the use of biochemical validation or the collection of biochemical samples for use in a “bogus pipeline” procedure (Aguinis et al. 1993; Presti et al. 1992; Roese and Jamieson 1993), methods for surveying adolescents that ensure confidentiality were developed that seem to ensure the validity of self-reports of sensitive behaviors (Graham et al. 1984; Murray and Perry 1987; Patrick et al. 1994; Stacy et al. 1990). Although multiple studies suggest that students do report their substance use honestly when asked under conditions of confidentiality, these studies were limited to middle school students, so it would be wise to have some studies use biochemical verification with high school students and young adults.

Fourth, the available long-term evaluations do not allow determination of the relative effectiveness of these programs for different populations. However, indications from meta-analyses that these types of programs have larger effects in schools with a predominantly special or high-risk (minority, high absenteeism or dropout, poor academic records) populations are promising.

Fifth, the last time of data collection in most of these studies was while youth were still in high schools (hence, “medium-term”). We need many more truly long-term studies of the ongoing effects of smoking prevention programs, preferably up to age 25.

Sixth, there is great variability in the way researchers and evaluators assess outcomes. Researchers have used ever smoking, smoking in the past month or week, and other indicators of youth smoking. Fortunately, there was reasonable consistency in estimates of prevention effectiveness across measures in most of the reviewed studies. Nevertheless, it would help future reviewers if researchers could settle on consistent measures. In addition, however, future research needs to include assessment of multiple short-term effects (or mediating variables) in addition to tobacco use. For example, programs are designed to improve knowledge of the influences on be-

havior (including tobacco industry promotions); knowledge of the physical, economic, environmental and social consequences of tobacco use; perceptions of risk; normative estimates or beliefs; decision-making, peer pressure resistance, and coping skills; and possibly student's activism against smoking in their environment. All of these need to be measured in future research, and their mediating effects on tobacco use behavior demonstrated.

Seventh, there was large variation across studies in program content, which affects the validity of some prior reviews of this literature. Conducting meta-analyses of these studies seems like comparing apples with oranges, or even with yams (instead of comparing multiple crops of Gala apples or even different breeds of apples). The variation makes it difficult to compare programs. In other disciplines, one would not conduct a meta-analysis or review of such different kinds of programs and draw a conclusion for all programs as a group. One would not, for example, conduct a meta-analysis of all treatments for breast cancer and conclude that breast cancer treatment does not work. Rather, one would attempt to determine which kinds of treatments work the best (and for whom and under what conditions), and then adopt the best treatment as the standard of practice. Unfortunately, some meta-analysts of various smoking prevention programs have treated them as a homogeneous group and concluded that they do not have medium- or long-term effects. It would be more appropriate to try to find which kinds of programs produce significant effects, or the largest effects (as well as for which kinds of people and under what conditions), as Tobler and colleagues as well as this author have attempted.

Finally, program developers were involved in all of the evaluations reported. It is quite probable that the effect sizes reported by program developers are larger than those that will be obtained under other conditions. The field is urgently in need of independent replications of the findings summarized in this paper (Flay et al. in press).

Despite, or maybe because of, the above limitations, there are multiple reasons to suspect that estimates of effect sizes derived from the small number of studies reviewed here might be conservative (underestimates). First, some of the effect sizes reported were derived from studies that already included less than optimal implementation. Second, if a program was implemented nationwide for multiple years, there might be increasing effects over time as new generations of students passed through the program. For example, as fewer young adults become smokers, there will be less social support for smoking and fewer adolescents will be tempted to try smoking. Third, the possibility of larger effect sizes were suggested by the larger short-term effects of the TNT and KYB projects, the promising effects of general behavior improvement programs such as the GBG and the Positive Action program, and the extraordinarily large effects of Project SHOUT with minimal high school boosters.

Summary Statements and Recommendations

The summary statements and recommendations derived from this review apply only to the specific programs reviewed and cannot be extended to other programs, even programs similar to those reviewed. The specific programs are those developed by Hansen (TAPP and AAPT), Botvin (Life Skills Training), and others who have demonstrated that their adaptation and/or extension of similar strategies was effective (Project SHOUT, TNT). Even the community or mass media programs reviewed here used adaptations of the social influences approach (North Karelia, Class of 1989 Studies, Midwestern Prevention Project, Vermont, Project 16). However, one cannot assume that every adaptation or extension of this approach will be effective. Examples of the ineffectiveness of the DARE and Hutchinson programs provide vivid examples of the danger of such extrapolation.

Summary Statement Regarding Effects of School-Based Programs

Based on the studies reviewed, decay post high-school will erode the medium-term effect sizes of school-based programs by about 20 percent relative to the literature's evaluations through the end of high school. Thus, with complete adoption and implementation, the nation's schools could produce a long-term (by age 25) reduction in smoking initiation of more than 22 percent [$0.28 \times (1 - 0.2)$]. However, scaled-up replication of model school-based prevention programs might yield effect sizes less than half as large (45 percent) as those reported in the research literature because of incomplete adoption (75 percent) and less than optimal fidelity (quantity and quality) of delivery (60 percent). Hence, a suggested effect size for realistic long-term effects of school-based programs might be about 10 percent [$0.28 \times (1 - 0.2) \times 0.75 \times 0.60$].

Summary Statement Regarding Effects of School-plus-Community and/or Mass Media Programs

Based on the studies reviewed, decay post-high school will erode the medium-term effect sizes of school-plus-community or media programs by about 15 percent. Thus, with full implementation, comprehensive school-plus-community and mass media programming might reduce smoking initiation by age 25 by as much as 26 percent [$0.31 \times (1 - 0.15)$]. However, scaled-up replication of model school-plus-community or mass media programs might yield effect sizes only about 75 percent as large as those reported in the literature. Hence, a suggested effect size for realistic long-term (by age 25) effects of school-plus-community and/or mass media programs is about 20 percent [$0.31 \times (1 - 0.15) \times 0.75$].

Given that school-based prevention could produce significant and practical reductions in youth and young adult smoking levels, the following recommendations seem appropriate.

Recommendation 1: Every middle and high school should implement an evidence-based smoking prevention program (or a similar substance abuse prevention program that has been shown to reduce smoking) at all grade levels. As a corollary, they should be discouraged from using programs for which there is evidence of ineffectiveness (e.g., DARE)

Effective prevention programs might cost up to \$50 per student for the first year and as much as \$10 per student thereafter for program materials and training. However, the savings due to the benefits of preventing significant numbers of students from starting to smoke and delaying the start date (and therefore the lifetime consumption) for others are significant. Caulkins and colleagues (2004), for example, estimate the social benefits of smoking prevention alone to be about \$300 per student and the social benefits of substance abuse prevention to be about \$840 per student (Caulkins et al. 2004). The social benefits of even broader behavior improvement programs could be considerably greater (Aos et al. 2004). Clearly, from a societal perspective, the costs of effective prevention are well worth it both to the individual students and to society as a whole.

We still lack consistency and continuity across developmental stages (preschool through college), and this clearly is an area where continued research is desirable. At the preschool and elementary school levels, implementation of more general and promising approaches such as the GBG or the Positive Action program should be used to prepare students to adopt tobacco-free lifestyles. Increasing evidence suggests that behavior improvement or positive youth development programs can have pervasive effects on behavior, including reducing tobacco use, and also can improve school performance. However, the lack of replicated findings regarding specific ef-

fects on tobacco use to date suggests that they should be accompanied by rigorous evaluations. Such evaluations will contribute to the knowledge base of prevention and positive youth development.

Recommendation 2: Governments, communities, or school districts should provide funding for evidence-based programs for every school in their jurisdiction.

The current environment, with such a high focus on student achievement, is not very conducive to implementation of this recommendation. However, there is increasing evidence that effective behavior improvement programs also improve student achievement. This likely occurs because better behaved classrooms give teachers more time to teach and well-behaved students are more likely to learn.

The current climate might be more supportive of general substance abuse prevention programs or more general behavior improvement programs than tobacco-specific programs. However, smoking prevention programs can also lead to lower levels of initiation of alcohol and other drugs. Accordingly, they are eligible for Safe and Drug Free Schools and Communities (SDFS) funding. Given the availability of evidence-based smoking and substance abuse prevention programs, SDFS funds should be maintained, or even increased, to support comprehensive school-based prevention programming.

Increasing evidence suggests that more general behavior improvement programs not only have more effects, but have larger effects on each of the behaviors and these effects are more likely to be maintained because they support each other. More general programs also are more likely to include elements that change the climate of entire schools (or other locations in which they are implemented), thus providing more generalized support for the positive behaviors encouraged by the programs (Catalano et al. 2004; Eccles and Gootman 2002; Flay 2002).

Recommendation 3: Governments, communities, or schools also should provide funding to develop and deliver comprehensive community or mass media programs that complement school-based programs.

School-plus-community or mass media programs have been shown to have effects that are 10–20 percent larger than school-only programs. Conversely, school-based programs can provide the normative change that is needed to support community programs or policy changes regarding smoking in public places or the pricing of tobacco in the community.

Recommendation 4: Schools and communities must take steps to ensure that adopted programs are implemented with high fidelity.

Programs implemented with higher fidelity produce larger effects, and larger effects are more likely to be maintained through high school and into adulthood. Schools will need to provide the resources and support for every teacher and staff person to be trained in proper implementation. This also requires ongoing monitoring of implementation as well as ultimate effects on student behavior.

Recommendation 5: Prevention programs must be sustained over time.

It is not sufficient to deliver a prevention program, whether school only, community only, mass media only, or school plus mass media or community, for only a few years. Any program must be sustained for a meaningful length of time (a generation) to be effective at the population

level in the long term. Sustained programs may have greater effects in the long term; however, effects over an extended period are hard to estimate. Rather than just reducing young adult smoking by 10–20 percent for the first cohort, a sustained program could potentially cut the population prevalence of smoking in half in about two decades.

Recommendation 6: The nation should find the funding to make the above recommendations a reality.

SDFS funds are one source of funding (\$437 million in 2005). Others might include excise taxes on tobacco, extension of the Master Settlement Agreement, and penalizing the tobacco industry for every new smoker under the age of 21. The maximum costs of the above recommendations would be \$2.5 billion for the first year of implementation (based on approximately 50 million pre-K through 12th grade students [NCES 2003] at \$50 per student). This represents about 13.2 cents per pack of cigarettes sold in the United States (more than 19 billion packs in 2001 [FTC 2003]). Subsequent years would cost as little as one-fifth of these amounts, about \$500 million, only a little more than current SDFS funding, or about 2.6 cents per pack of cigarettes sold. An alternative approach might be to amortize the costs over 5–10 years at about \$600 million per year.

CONCLUSION

It is time for the nation to face up to the fact that preventing as many children and youth as possible from starting to smoke cigarettes is feasible and worthwhile, both economically for the nation and in terms of improved health of the population.

Table D-1 Short- and Medium-Term Effects of Seven Selected Social Influence Programs with Follow-up into High School

Investigator	Project Name	Design ^a	Number of Classes	Time (years)	Modality ^b	Grade(s)	Grade at Last Follow-up	Short-Term Effect Size (%) ^c				Medium-Term Effect Size (%) ^c			
								Ever	Month	Week	Average ES	Ever	Month	Week	Average ES
School-only programs															
Hansen ^d	TAPP (Cohort 1)	NR-S	15	1	S	7	10	26.2		26.2		18.3	19.1		18.7
Botvin ^e	Life Skills Training	R-S	30	3	S	7–9	12		8.9	8.9		19.7	20.4		20.0
Elder ^f	Project SHOUT	R-S	18+	3	S+	7–9+	11	30.3		30.3		44.1			44.1
MEANS for school programs									28.2	8.9	21.8	18.3	27.6	20.4	27.6
School-plus-community or mass media programs															
Vartiainen ^g	North Karelia	NR-C	10+	2 yrs	S+C	7–8	12	44.8	43.7	45.3	44.6	40.3	39.2	36.7	38.7
Perry	Minnesota Class of 89	NR-C	17+		S+C	6–10	12		40.0	40.0			39.4	39.4	
Pentz Flynn ^h	MPP Vermont Mass Media	PR-S R-C	15+ 22+	2 yrs 3 yrs	S+C S+M	6–7/7–8 5–8, 6–9 or 7–10	9–10 10–12	40.9	34.1	37.5		18.0		28.8	28.8
MEANS for School + Community or Media Programs								44.8	42.3	39.0	39.7	40.3	28.6	35.0	31.2
OVERALL MEANS for all programs								44.8	35.3	33.0	32.0	29.3	28.0	31.3	29.7

MPP = The Midwestern Prevention Project

SHOUT = Project SHOUT (Students Understanding Others Understand Tobacco)

TAPP = The Tobacco and Alcohol Prevention Project

^a R = random, NR = nonrandom, PR = partial random, S = school, C = community.

^b S = school only, S+ = school plus small media or family outreach, M = mass media, C = community.

^c As either $(\% \text{ change in C} - \% \text{ change in P})/\% \text{ C}$ or $(\% \text{ C} - \% \text{ P})/\% \text{ C}$, where P = program condition and C = control. Short-term effects are generally at the end of grade 8 or 9.

^d The medium-term effect for smoking in the past month is larger (42.9%) for students present at all waves of the study.

^e Randomization was originally complete, but six program schools were dropped from the analysis because of low implementation. The RR for high-implementation students at grade 12 was 37%.

^f Reported effect is with half the high school students receiving a high school booster (two newsletters and one phone call during grade 1); effect size decreases to 9.5% when no students receive the booster.

^g At 3 years post-high school the effect was 23% for the health educator (HE) condition and 37% for the teacher condition; at 10 years post-high school the effect was 20% for both the HE and the teacher conditions.

^h This study tested the difference between school plus mass media and school-only (there was no control group).

Table D-2 Short- and Medium-Term Effects of Seven Category II Programs

Investigator	Project Name	Design ^a	N classes	Time (years)	Modality ^b	Grade(s)	Grade at Last Follow-up	Short-Term Effect Size (%) ^c				Medium-Term Effect Size (%) ^c		
								Life	Month	Week	Average ES	Life	Week	Average ES
School-only programs														
Graham and Hansen ^d	AAPT	NR-S	9		S	7	11	21.4	26.2		23.8	13.9	13.9	
Sussman ^e	TNT	R-S	12	2	S	7-8	9	34.4		64.3	49.3	30.4	55.5	43.0
Walter ^f	KYB	R-S	384	6	S+	4-9	9				11.5	73.3		73.3
Kellam ^g	GBG	R-K	120a	2	S	1-2	8				24.4	26.3		26.3
MEANS for school programs								27.9	26.2	64.3	27.2	36.0	55.6	39.1
School- plus-community programs														
Biglan ^h	Project 16	R-C	5+	2 yrs	S+C	7-9	7-9	21.1			21.1	27.5		27.5
OVERALL MEANS								25.6	26.2	64.3	26.0	34.3	55.6	36.8

^a R = random, NR = nonrandom, PR = partial random, S = school, C = community.

^b S = school only, S+ = school plus small media or family outreach, M = mass media, C = community.

^c As either (% change in C - % change in P)/%C or (%C - %P)/%C, where P = program condition and C = control. Short-term effects are generally at the end of grade 8 or 9.

^d Adolescent Alcohol Prevention Trial.

^e Towards No Tobacco Use.

^f Know Your Body Included parent communications. Short-term effects are for thiocyanate, an biological indicator of tobacco use.

^g Good Behavior Game Initially three 10-minute classes per week in grade 1, increasing in duration and frequency during grades 1 and 2. Short-term effects are for "problem behavior" at the end of grade 2.

^h Multiple cross-sectional design, where successive cohorts of seventh and ninth grade students were surveyed.

TABLE D-3 Calculation of Decay in Prevention Effects by Age 25

Type	Decay (%)
Average school-only RR	28.00
Average school + community or media RR	31.00
Without the prevention	
Average proportion not smoking in high school who will start by age 25 (SAMHSA Household Survey 1989-99)	3.12
Average high school daily smoking without intervention (Monitoring the Future)	15.80
Therefore, proportion of new smokers by age 25	2.63
Therefore, total proportion smoking by age 25	18.43
With school-based prevention	
Proportion smoking after school-based prevention	11.38
Therefore, proportion not smoking	88.62
Therefore, proportion new smokers by age 25	2.77
Therefore, total proportion smoking by age 25	14.14
Therefore, new RR	23.62
Decay in RR	16.93
With school + community or media prevention	
Proportion smoking after school-based prevention	10.90
Therefore, proportion not smoking	89.10
Therefore, proportion new smokers by age 25	2.78
Therefore, total proportion smoking by age 25	13.68
Therefore, new RR	25.75
Decay in RR	16.93

REFERENCES

- Aguinis H, Pierce CA, Quigley BM. 1993. Conditions under which a bogus pipeline procedure enhances the validity of self-reported cigarette smoking: A meta-analytic review. *Journal of Applied Social Psychology* 23(5):352-373.
- Aos S, Lieb R, Mayfield J, Miller M, Pennucci A. 2004. *Benefits and Cost of Prevention and Early Intervention Programs for Youth*. Web Page. Available at <http://www.wsipp.ws.gov/rptfiles/04-07-3901.pdf> (accessed July 25, 2006).
- Arkin RM, Roemhild HF, Johnson CA, Luepker RV, Murray DM. 1981. The Minnesota smoking prevention program: a seventh-grade health curriculum supplement. *Journal of School Health* 51(9):611-616.
- Barrish HH, Saunders M, Wolf MM. 1969. Good behavior game: effects of individual contingencies for group consequences on disruptive behavior in a classroom. *Journal of Applied Behavior Analysis* (2):119-124.
- Battistich V, Schaps E, Watson M, Solomon D, Lewis C. 2000. Effects of the child development project on students' drug use and other problem behaviors. *The Journal of Primary Prevention* 21(1):75-99.
- Best JA, Thomson SJ, Santi SM, Smith EA, Brown KS. 1988. Preventing cigarette smoking among school children. *Annual Review of Public Health* 9:161-201.
- Biglan A, Ary D, Smolkowski K, Duncan T, Black C. 2000. A randomised controlled trial of a community intervention to prevent adolescent tobacco use. *Tobacco Control* (9):24-32.
- Black DR, Tobler NS, Sciaccia JP. 1998. Peer helping/involvement: an efficacious way to meet the challenge of reducing alcohol, tobacco, and other drug use among youth? *Journal of School Health* 68(3):87-93.
- Botvin GJ. 2000. Preventing drug abuse in schools: social and competence enhancement approaches targeting individual-level etiologic factors. *Addictive Behaviors* 25(6):887-897.
- Botvin GJ, Baker E, Dusenbury L, Botvin EM, Diaz T. 1995. Long-term follow-up results of a randomized drug abuse prevention trial in a white middle-class population. *Journal of the American Medical Association* 273(14):1106-1112.
- Botvin GJ, Baker E, Dusenbury L, Tortu S, Botvin EM. 1990. Preventing adolescent drug abuse through a multimodal cognitive-behavioral approach: results of a 3-year study. *Journal of Consulting and Clinical Psychology* 58(4):437-446.
- Botvin GJ, Eng A. 1982. The efficacy of a multicomponent approach to the prevention of cigarette smoking. *Preventive Medicine* 11(2):199-211.
- Botvin GJ, Griffin KW. 2002. Life skills training as a primary prevention approach for adolescent drug abuse and other problem behaviors. *International Journal of Emergency Mental Health* 4(1):41-47.
- Botvin GJ, Sussman S, Biglan A. 2001. The Hutchinson Smoking Prevention Project: a lesson on inaccurate media coverage and the importance of prevention advocacy. [Review]. *Prevention Science*. 2(2):67-70.
- Bronfenbrenner U. 1979. *The Ecology of Human Development*. Cambridge, MA: Harvard University.
- Bronfenbrenner U. 1986. Ecology of the family as a context for human development: research perspectives. *Developmental Psychology* 22(6):723-742.
- Bruvold WH. 1993. A meta-analysis of adolescent smoking prevention programs. *American Journal of Public Health* 83(6):872-880.
- Burns DM. 1992. Positive evidence on effectiveness of selected smoking prevention programs in the United States. *Journal of the National Cancer Institute* (Monograph 12):17-20.
- Catalano R, Berglund L, Ryan J, Lonczak H, Hawkins D. 2004. Positive youth development in the United States: Research findings on evaluations of positive youth development programs. *Annals of the American Academy of Political and Social Science* 591:98-124.
- Caulkins JP, Pacula RL, Paddock S, Chiesa J. 2004. What we can—and cannot—expect from school-based drug prevention. *Drug and Alcohol Review* 23:79-87.
- Clayton RR, Cattarello AM, Johnstone BM. 1995. The effectiveness of drug abuse resistance education (Project DARE): 5-year follow-up results. *Preventive Medicine* :307-318.
- Conduct Problems Prevention Research Group. 2002. Evaluation of the first 3 years of the Fast Track prevention trial with children at high risk for adolescent conduct problems. *Journal of Abnormal Child Psychology* 30:19-36.

- Cullen KJ, Cullen AM. 1996. Long-term follow-up of the Busselton six-year controlled trial of prevention of children's behavior disorders. *Journal of Pediatrics* 129(1):136-139.
- Dent CW, Sussman S, Stacy AW, Craig S, Burton D, Flay BR. 1995. Two-year behavior outcomes of Project Towards No Tobacco Use. *Journal of Consulting and Clinical Psychology* 63(4):676-677.
- DHHS. 1994. *Preventing Tobacco Use Among Young People: A report of the Surgeon General*, S/N 017-001-00491-0. Public Health Service, Centers for Disease Control and Prevention, Office on Smoking and Health, Atlanta.
- DHHS (Department of Health and Human Services). 2000. *Reducing Tobacco Use: A Report of the Surgeon General*. Washington, DC: U. S. Government Printing Office.
- Dukes RL, Ullman JB, Stein JA. 1996. Three-year follow-up of Drug Abuse Resistance Education (D.A.R.E.). *Evaluation Review* 20(1):49-66.
- Durlak JA. 1998. Why program implementation is important. *Journal of Prevention and Intervention in the Community* 17(2):5-18.
- Eccles J, Gootman JA. 2002. *Community Programs to Promote Youth Development*. Washington, DC: National Research Council.
- Eckhardt L, Woodruff SI, Elder JP. 1997. Related effectiveness of continued, lapsed, and delayed smoking prevention intervention in senior high school students. *American Journal of Health Promotion* 11(6):418-421.
- Elder JP, Wildey M, de Moor C, Sallis JF Jr, Eckhardt L, Edwards C, Erickson A, Golbeck A, Hovell M, Johnston D. 1993. The long-term prevention of tobacco use among junior high school students: classroom and telephone interventions. *American Journal of Public Health*. 83(9):1239-1244.
- Ellickson PL, Bell RM. 1990. Drug prevention in junior high: a multi-site longitudinal test. *Science* 247(4948):1299-1305.
- Ellickson PL, Bell RM, McGuigan K. 1993. Preventing adolescent drug use: long-term results of a junior high program. *American Journal of Public Health* 83(6):856-861.
- Ennett ST, Ringwalt CL, Thorne J, Rohrbach LA, Vincus A, Simons-Rudolph A, Jones S. 2003. A comparison of current practice in school-based substance use prevention programs with meta-analysis findings. *Prevention Science* 4(1):1-14.
- Ennett ST, Rosenbaum DP, Flewelling RL, Bieler GS, Ringwalt CL, Bailey SL. 1994a. Long-term evaluation of drug abuse resistance education. *Addictive Behaviors* 19(2):113-125.
- Ennett ST, Tobler NS, Ringwalt CL, Flewelling RL. 1994b. How effective is drug abuse resistance education? A meta-analysis of Project DARE outcome evaluations. *American Journal of Public Health* 84(9):1394-1401.
- Farquhar JW, Maccoby N, Wood PD, Alexander JK, Breirose H, Brown BW Jr, Haskell WL, McAlister AL, Meyer AJ, Nash JD, Stern MP. 1977. Community education for cardiovascular health. *Lancet* 1(8023):1192-1195.
- Flay BR. 2000. Approaches to substance use prevention utilizing school curriculum plus social environment change. *Addictive Behaviors* 25(6):861-885.
- Flay BR. 2002. Positive youth development requires comprehensive health promotion programs. *American Journal of Health Behavior* 26:407-424.
- Flay BR, Allred CG. 2003. Long-term effects of the Positive Action program. *American Journal of Health Behavior* 27 (Suppl 1):S6-S21.
- Flay BR, Allred CG, Ordway N. 2001. Effects of the Positive Action program on achievement and discipline: two matched-control comparisons. *Prevention Science* 2(2):71-89.
- Flay BR, Biglan A, Boruch RF, Castro FG, Gottfredson D, Kellam S, Moscicki EK, Schinke S, Valentine J, and Ji P. 2005. *Standards of Evidence: Criteria for Efficacy, Effectiveness and Dissemination*. Web Page. Available at: <http://preventionresearch.org/sofetext.php> (accessed May 17, 2005).
- Flay BR, Biglan A, Boruch RF, Castro FG, Gottfredson D, Kellam S, Moscicki EK, Schinke S, Valentine J, Ji P. in press. Standards of evidence: criteria for efficacy, effectiveness, and dissemination. *Prevention Science*
- Flay BR, Collins LM. 2005. Historical review of school-based randomized trials for evaluating problem behavior prevention programs. *Annals of the American Academy of Political and Social Science* 599:115-146.
- Flay BR, Koepke D, Thomson SJ, Santi S, Best JA, Brown KS. 1989. Six-year follow-up of the first Waterloo school smoking prevention trial. *American Journal of Public Health* 79(10):1371-1376.
- Flay BR, Miller TQ, Hedeker D, Siddiqui O, Britton CF, Brannon BR, Johnson CA, Hansen WB, Sussman S, Dent C. 1995. The television, school, and family smoking prevention and cessation project. VIII. Student outcomes and mediating variables. *Preventive Medicine* 24(1):29-40.
- Flay BR. 1985. Psychosocial approaches to smoking prevention: a review of findings. *Health Psychology* 4(5):449-488.

- Flay BR, Petraitis J. 1994. *The Theory of Triadic Influence: A New Theory of Health Behavior with Implications for Preventive Interventions*. Greenwich, CT: JAI Press. Pp. 19-44.
- Flynn BS, Worden JK, Secker-Walker RH, Badger GJ, Geller BM, Costanza MC. 1992. Prevention of cigarette smoking through mass media intervention and school programs. *American Journal of Public Health* 82(6):827-834.
- Flynn BS, Worden JK, Secker-Walker RH, Pirie PL, Badger GJ, Carpenter JH, Geller BM. 1994. Mass media and school interventions for cigarette smoking prevention: effects 2 years after completion. *American Journal of Public Health*. 84(7):1148-1150.
- Flynn BS, Worden JK, Secker-Walker RH, Badger GJ, Geller BM. 1995. Cigarette smoking prevention effects of mass media and school interventions targeted to gender and age groups. *Journal of Health Education* 26(2):S45-S51.
- Fraguela J, Martin A, Trinanés E. 2003. Drug-abuse prevention in the school: four-year follow-up of a programme. *Psychology in Spain* 7(1):29-38.
- FTC . 2003. *Federal Trade Commission Cigarette Report for 2001*. Web Page. Available at: <http://www.ftc.gov/opa/2003/06/2001cigrpt.htm> (accessed June 30, 2005).
- Furr-Holden CD, Ialongo NS, Anthony JC, Petras H, Kellam SG. 2004. Developmentally inspired drug prevention: middle school outcomes in a school-based randomized prevention trial. *Drug Alcohol Dependency* 73(2):149-158.
- Giovino G. 2004. 1999 and 2000 National Household Survey on Drug Abuse by SAMHSA Office of Applied Studies. PowerPoint Presentation presented to the Institute of Medicine's Committee on Reducing Tobacco Use.
- Glantz SA, Mandel LL. 2005. Since school-based tobacco prevention programs do not work, what should we do? *J Adolescent Health* 36(3):157-159.
- Glasgow RE , McCaul KD. 1985. Social and personal skills training programs for smoking prevention: critique and directions for future research. *NIDA Research Monograph* 63:50-66.
- Glynn TJ. 1989. Essential elements of school-based smoking prevention programs. *Journal of School Health* 59(5):181-188.
- Goldstein M, Niaura R, Willey-Lessne C, Depue J, Eaton C, Rakowski W, Dube C. 1997. Physicians counseling smokers: a population based survey of patients' perceptions of health care provider-delivered smoking cessation interventions. *Archives of Internal Medicine* 157(12):1313-1319.
- Goodstadt MS. 1978. Alcohol and drug education: models and outcomes. *Health Education Monograph* 6(3):263-279.
- Graham JW, Flay BR, Johnson CA, Hansen WB, Grossman L, Sobel JL. 1984. Reliability of self-report measures of drug use in prevention research: evaluation of the Project SMART questionnaire via the test-retest reliability matrix. *Journal of Drug Education* 14(2):175-193.
- Graham JW, Johnson CA, Hansen WB, Flay BR, Gee M. 1990. Drug use prevention programs, gender, and ethnicity: evaluation of three seventh-grade Project SMART cohorts. *Preventive Medicine* 19(3):305-313.
- Hanewinkel R , Asshauer M. 2004. Fifteen-month follow-up results of a school-based life-skills approach to smoking prevention. *Health Education Research* 19(2):125-137.
- Hansen WB , Graham JW. 1991. Preventing alcohol, marijuana, and cigarette use among adolescents: peer pressure resistance training versus establishing conservative norms. *Preventive Medicine* 20(3):414-430.
- Hansen WB, Johnson CA, Flay BR, Graham JW, Sobel J. 1988a. Affective and social influences approaches to the prevention of multiple substance abuse among seventh grade students: results from project SMART. *Preventive Medicine* 17(2):135-154.
- Hansen WB, Malotte CK, Fielding JE. 1988b. Evaluation of a tobacco and alcohol abuse prevention curriculum for adolescents. *Health Education Quarterly* 15(1):93-114.
- Hansen W. 1988. Theory and implementation of the social influence model of primary prevention. *Prevention Research Findings: 1988. OSAP Prevention Monograph-3*. Washington, DC: Office of Substance Abuse Prevention (U.S. HHS).
- Ialongo NS, Werthamer L, Kellam SG, Brown CH, Wang S, Lin Y. 1999. Proximal impact of two first-grade preventive interventions on the early risk behaviors for later substance abuse, depression, and antisocial behavior. *American Journal of Community Psychology* 27(5):599-641.
- Interactive Inc. 2000. *Evaluation of the Life Skills Training Program: Year 1 (Prepared for Philip Morris, USA and Brown & Williamson)*. Web Page. Available at: <http://legacy.library.ucsf.edu/tid/acb29c00> (accessed May 5, 2005).

- Interactive Inc. 2001. *Evaluation of the Life Skills Training Program: Year 2 Report (Prepared for Philip Morris, USA and Brown & Williamson)*. Web Page. Available at: <http://legacy.library.ucsf.edu/tid/sch75c00> (accessed May 5, 2005).
- IOM (Institute of Medicine). 1994. Toward a youth-centered prevention policy. Lynch BJ, Bonnie RJ, Eds. *Growing Up Tobacco Free*. Washington, DC: National Academy Press. Pp. 3-25.
- Johnson CA, Pentz MA, Weber MD, Dwyer JH, Baer N, MacKinnon DP, Hansen WB, Flay BR. 1990. Relative effectiveness of comprehensive community programming for drug abuse prevention with high-risk and low-risk adolescents. *Journal of Consulting and Clinical Psychology* 58(4):447-456.
- Kam CM, Greenberg MT, Walls CT. 2003. Examining the role of implementation quality in school-based prevention using the PATHS curriculum. Promoting Alternative THinking Skills Curriculum. *Prevention Science* 4(1):55-63.
- Kellam SG, Anthony JC. 1998. Targeting early antecedents to prevent tobacco smoking: findings from an epidemiologically based randomized field trial. *American Journal of Public Health* 88(10):1490-1495.
- Klepp KI, Halper A, Perry CL. 1986. The efficacy of peer leaders in drug abuse prevention. *Journal of School Health* 56(9):407-411.
- Lantz PM, Jacobson PD, Warner KE, Wasserman J, Pollack HA, Berson J, Ahlstrom A. 2000. Investing in youth tobacco control: a review of smoking prevention and control strategies. *Tobacco Control* 9(1):47-63.
- Luepker RV, Murray DM, Jacobs DR Jr, Mittelmarm MB, Bracht N, Carlaw R, Crow R, Elmer P, Finnegan J, Folsom AR, et al. 1994. Community education for cardiovascular disease prevention: risk factor changes in the Minnesota Heart Health Program. *American Journal of Public Health* 84(9):1383-1393.
- Lynam DR, Milich R, Zimmerman R, Novak SP, Logan TK, Martin C, Leukefeld C, Clayton R. 1999. Project DARE: no effects at 10-year follow-up. *Journal of Consulting and Clinical Psychology* 67(4):590-593.
- Mittelmarm MB, Luepker RV, Jacobs DR, Bracht NF, Carlaw RW, Crow RS, Finnegan J, Grimm RH, Jeffery RW, Kline FG, et al. 1986. Community-wide prevention of cardiovascular disease: education strategies of the Minnesota Heart Health Program. *Preventive Medicine* 15(1):1-17.
- Murray DM. 1998. *Design and Analysis of Group-Randomized Trials*. New York: Oxford University.
- Murray DM, Hannan PJ, Jacobs DR, McGovern PJ, Schmid L, Baker WL, Gray C. 1994. Assessing intervention effects in the Minnesota Heart Health Program. *American Journal of Epidemiology* 139(1):91-103.
- Murray DM, Perry CL. 1987. The measurement of substance use among adolescents: when is the “bogus pipeline” method needed? *Addictive Behaviors* 12(3):225-33.
- Murray DM, Pirie P, Leupker RV, Pallonen U. 1989. Five- and six-year follow-up results from four seventh-grade smoking prevention strategies. *Journal of Behavioral Medicine* 12(2):207-218.
- NCES. 2003. *Digest of Education Statistics, 2003*. Web Page. Available at: <http://nces.edu.gov/programs/digest/d03> (accessed June 30, 2005).
- Olds DL. 2002. Prenatal and infancy home visiting by nurses: from randomized trials to community replication. *Prevention Science* 3(3):153-172.
- Patrick DL, Cheadle A, Thompson DC, Diehr P, Koepsell T, Kinne S. 1994. The validity of self-reported smoking: a review and meta-analysis. *American Journal of Public Health* 84(7):1086-1093.
- Pentz MA, MacKinnon DP, Dwyer JH, Wang EY, Hansen WB, Flay BR, Johnson CA. 1989. Longitudinal effects of the midwestern prevention project on regular and experimental smoking in adolescents. *Preventive Medicine* 18(2):304-321.
- Perry CL, Kelder KI, Siller C. 1989. Community-wide strategies for cardiovascular health: the Minnesota heart health program youth program. *Health Education Research* 4:87-101.
- Perry CL, Kelder SH, Murray DM, Klepp KI. 1992. Communitywide smoking prevention: long-term outcomes of the Minnesota Heart Health Program and the Class of 1989 Study. *American Journal of Public Health* 82(9):1210-1216.
- Perry C, Kelder S, Klepp K. 1994. Community-wide cardiovascular disease prevention in young people. *European Journal of Public Health* 4:188-194.
- Perry C, Komro K, Veblen-Mortenson S, Bosma L, Farbaksh K, Muson K, Stigler M, Lytle L. 2003. A randomized controlled trial of the middle and junior high school D.A.R.E. and D.A.R.E. plus programs. *Archives of Pediatric and Adolescent Medicine* 157:178-184
- Peterson AV Jr, Kealey KA, Mann SL, Marek PM, Sarason IG. 2000. Hutchinson Smoking Prevention Project: long-term randomized trial in school-based tobacco use prevention—results on smoking. *Journal of the National Cancer Institute* 92(24):1979-1991.
- Presti DE, Ary DV, Lichtenstein E. 1992. The Context of smoking initiation and maintenance: Findings from interviews with youths. *Journal of Substance Use* 4:35-45.

- Ringwalt CL, Ennett S, Vincus A, Thorne J, Rohrbach LA, Simons-Rudolph A. 2002. The prevalence of effective substance use prevention curricula in U.S. middle schools. *Prevention Science* 3(4):257-265.
- Roose NJ, Jamieson DW. 1993. Twenty years of bogus pipeline research: A critical review and meta-analysis. *Psychological Bulletin* 114:363-375.
- Rooney BL, Murray DM. 1996. A meta-analysis of smoking prevention programs after adjustment for errors in the unit of analysis. *Health Education Quarterly* 23(1):48-64.
- Rosenbaum DP, Flewelling RL, Bailey SL, Ringwalt CL, Wilkinson DL. 1994. Cops in the classroom: a longitudinal evaluation of drug abuse resistance education (DARE). *Journal of Research in Crime and Delinquency* 31(1):3-31.
- Rosenbaum DP, Hanson GS. 1998. Assessing the effects of school-based drug education: a six-year multilevel analysis of Project D.A.R.E. *Journal of Research in Crime and Delinquency* 35(4):381-412.
- Rundall TG, Bruvold WH. 1988. A meta-analysis of school-based smoking and alcohol use prevention programs. *Health and Education Quarterly* 15(3):317-334.
- Shadish WR, Cook TD, Campbell DT. 2002. *Experimental and Quasi-Experimental Designs for Generalized Causal Inference*. New York: Houghton Mifflin Company.
- Shean RE, de Klerk NH, Armstrong BK, Walker NR. 1994. Seven-year follow-up of a smoking-prevention program for children. *Australian Journal of Public Health* 18(2):205-208.
- Shope JT, Copeland LA, Kamp ME, Lang SW. 1998. Twelfth grade follow-up of the effectiveness of a middle school-based substance abuse prevention program. *Journal of Drug Education* 28(3):185-197.
- Shope JT, Copeland LA, Marcoux BC, Kamp ME. 1996. Effectiveness of a school-based substance abuse prevention program. *Journal of Drug Education* 26(4):323-337.
- Skara S, Sussman S. 2003. A review of 25 long-term adolescent tobacco and other drug use prevention program evaluations. *Preventive Medicine* 37(5):451-474.
- Smith E, Swisher J, Vicary J, et al. 2004. Evaluation of life skills training and infused-life skills training in a rural setting: outcomes at two years. *Journal of Alcohol and Drug Education* 48(1):51-70.
- Spoth RL, Redmond C, Trudeau L, Shin C. 2002. Longitudinal substance initiation outcomes for a universal preventive intervention combining family and school programs. *Psychology of Addictive Behaviors* 16(2):129-134.
- Stacy AW, Flay BR, Sussman S, Brown KS, Santi S, Best JA. 1990. Validity of alternative self-report indices of smoking among adolescents. *Psychological Assessment: A Journal of Consulting and Clinical Psychology* 2(4):442-446.
- Storr CL, Jalongo NS, Kellam SG, Anthony JC. 2002. A randomized controlled trial of two primary school intervention strategies to prevent early onset tobacco smoking. *Drug and Alcohol Dependency* 66(1):51-60.
- Sussman S, Dent CW, Burton D, Stacy AW, Flay BR. 1995. *Developing School-Based Tobacco Use Prevention and Cessation Programs*. Thousand Oaks, CA: Sage Publications.
- Sussman S, Dent CW, Stacy AW, Hodgson CS, Burton D, Flay BR. 1993a. Project Towards No Tobacco Use: implementation, process and post-test knowledge evaluation. *Health Education Research* 8(1):109-123.
- Sussman S, Dent CW, Stacy AW, Sun P, Craig S, Simon TR, Burton D, Flay BR. 1993b. Project towards no tobacco use: 1-year behavior outcomes. *American Journal of Public Health* 83(9):1245-1250.
- Sussman S, Hansen WB, Flay BR, Botvin GJ. 2001. Re: Hutchinson Smoking Prevention Project: long-term randomized trial in school-based tobacco use prevention—results on smoking. *Journal of the National Cancer Institute* 93(16):1267; author reply 1269-1271.
- Taylor BJ, Graham JW, Cumsille P, Hansen WB. 2000. Modeling prevention program effects on growth in substance use: analysis of five years of data from the Adolescent Alcohol Prevention Trial. *Prevention Science* 1(4):183-97.
- Tingle LR, DeSimone M, Covington B. 2003. A meta-evaluation of 11 school-based smoking prevention programs. *Journal of School Health* 73(2):64-67.
- Tobler NS. 1992. Drug prevention programs can work: research findings. *Journal of Addictive Diseases* 11(3):1-28.
- Tobler NS. 1986. Meta-analysis of 143 adolescent drug prevention programs: quantitative outcome results of program participants compared to a control or comparison group. *Journal of Drug Issues* 16(4):537-567.
- Tobler NS, Roona MR, Ochshorn P, Marshall DG, Streke AV, Stackpole KM. 2000. School-based adolescent drug prevention programs: 1998 meta-analysis. *Journal of Primary Prevention* 20(4):275-336.
- Tobler NS, Stratton HH. 1997. Effectiveness of school-based drug prevention programs: a meta-analysis of the research. *Journal of Primary Prevention* 18(1):71-128.
- Trudeau L, Spoth R, Lillehoj C, Redmond C, Wickrama KA. 2003. Effects of a preventive intervention on adolescent substance use initiation, expectancies, and refusal intentions. *Prevention Science* 4(2):109-122.

- Vartiainen E, Fallonen U, McAlister AL, Puska P. 1990. Eight-year follow-up results of an adolescent smoking prevention program: the North Karelia Youth Project. *American Journal of Public Health* 80(1):78-79.
- Vartiainen E, Paavola M, McAlister A, Puska P. 1998. Fifteen-year follow-up of smoking prevention effects in the North Karelia youth project. *American Journal of Public Health* 88(1):81-85.
- Vartiainen E, Pallonen U, McAlister A, Koskela K, Puska P. 1983. Effect of two years of educational intervention on adolescent smoking (the North Karelia Youth Project). *Bulletin of the World Health Organization* 61(3):529-532.
- Vartiainen E, Pallonen U, McAlister A, Koskela K, Puska P. 1986. Four-year follow-up results of the smoking prevention program in the North Karelia Youth Project. *Preventive Medicine* 15(6):692-698.
- Walter HJ, Hofman A, Vaughan RD, Wynder EL. 1988. Modification of risk factors for coronary heart disease. Five-year results of a school-based intervention trial. *New England Journal of Medicine* 318(17):1093-1100.
- Walter HJ, Wynder EL. 1989. The development, implementation, evaluation, and future directions of a chronic disease prevention program for children: the "Know Your Body" studies. *Preventive Medicine* 18(1):59-71.
- Wiehe SE, Garrison MM, Christakis DA, Ebel BE, Rivara FP. 2005. A systematic review of school-based smoking prevention trials with long-term follow-up. *Journal of Adolescent Health* 36(3):162-169.
- Worden JK, Flynn BS, Geller BM, Chen M, Shelton LG, Secker-Walker RH, Solomon DS, Solomon LJ, Couchey S, Costanza MC. 1988. Development of a smoking prevention mass media program using diagnostic and formative research. *Preventive Medicine*. 17(5):531-558.
- Zollinger TW, Saywell RM Jr, Muegge CM, Wooldridge JS, Cummings SF, Caine VA. 2003. Impact of the life skills training curriculum on middle school students tobacco use in Marion County, Indiana, 1997–2000. *Journal of School Health* 73(9):338-346.

E

Adolescents' and Young Adults' Perceptions of Tobacco Use: A Review and Critique of the Current Literature

Bonnie L. Halpern-Felsher
Department of Pediatrics
University of California, San Francisco

Malena E. Ramos
Department of Pediatrics
University of California, San Francisco

Jodi L. Cornell
Department of Pediatrics
University of California, San Francisco¹

INTRODUCTION

Explanations of individuals' engagement in risk behavior, including tobacco use, often make reference to one's inability to judge risk and belief in one's invulnerability to harm. Judgments about risk are viewed as a fundamental element of most theoretical models of health behavior, including Social Cognitive Theory (Bandura 1994), the Health Belief Model (Rosenstock 1974), the Theory of Reasoned Action (Fishbein and Ajzen 1975), the Theory of Planned Behavior (Ajzen 1985), Self-Regulation Theory (Kanfer 1970), and Subjective Culture and Interpersonal Relations Theory (Triandis 1977). These theories posit individuals' perceptions about the consequences of their actions, and perceptions of vulnerability to those consequences play a key role in behavior.

The relationship between risk perceptions and risk behavior has been applied particularly to adolescents, as descriptions of adolescent risk taking almost invariably make reference to adolescents' beliefs in their own invulnerability to harm. The theoretical basis for the assertion of adolescent invulnerability can be traced to Elkind (Elkind 1967; Elkind 1978), who argued that when young adolescents first enter into formal operations, they become cognitively egocentric. Due to this egocentrism, the adolescent is hypothesized to hold an exaggerated sense of uniqueness and to believe in a "personal fable"—that one is special and in some way immune to the natural laws that pertain to others. The belief in this personal fable is thought to be the origin of adolescents' tendencies to view themselves as invulnerable to harm, and therefore to engage in behaviors considered risky by others.

¹ This research was supported in part by grants awarded to Dr. Halpern-Felsher from the Tobacco-Related Disease Research Program, Office of the President, University of California (#9K-0072 and #14RT-0010).

The concept of adolescent “invulnerability” remains pervasive in both scientific and lay circles, is used to explain adolescents’ decisions to engage in potentially harmful behavior, and is incorporated into many tobacco-related prevention and intervention programs (Weinstein 1983; Weisenberg et al. 1980; see also Reyna and Farley 2006). We turn to a review and critique of the empirical literature on the relationship between risk judgments and adolescent tobacco use.

EMPIRICAL TESTS OF THE RISK PERCEPTION AND TOBACCO USE LINK

The majority of studies testing the relationship between perceptions of risk and tobacco use have compared perceptions of tobacco-related risks between those who have and have not smoked. Although some studies find that adolescents who have smoked perceive greater smoking-related risks than those who have not smoked, others found that smokers perceive less risk. For example, Halpern-Felsher and colleagues (2004) found that adolescent smokers and those who intend to smoke estimated their chance of experiencing a smoking-related negative outcome as less likely than did nonsmokers and non-intenders. A study by Johnson and colleagues (2002) also revealed that for both high school (aged 16–18 years) and college students (aged 18–22 years), smokers saw their outcome risk as higher than that of nonsmokers.

Similar findings in a study conducted by Weinstein and colleagues (2005) concluded that adult smokers underestimated their relative risk compared to other smokers and to nonsmokers. A national survey of 6,369 people (1,245 current smokers) examined beliefs about the risks of smoking. Key questions separated samples of smokers who were asked either about their own risk or about the risk of the average smoker. More than half of current smokers thought that their own risk was only twice as high or less as that of nonsmokers. The data clearly indicate that smokers underestimate the extent to which smoking elevates lung cancer risk above that of nonsmokers (Weinstein et al. 2005). Arnett (2000) found greater optimistic bias among smokers than among nonsmokers for both adolescents and adults. Another set of studies has found that smokers, both adolescents and adults, believe that the health risks of smoking are lower for themselves than for other, same-age smokers (Weinstein 1998; Hansen and Malotte 1986; McCoy et al. 1992), but higher compared to nonsmokers (Arnett 2000).

There are six salient problems with the literature base on the relationship between risk perceptions and tobacco use. First, Slovic and colleagues (2001; 2004) have argued that studies on tobacco-related risk perception fail to consider the affective components that surround decision making (e.g., Slovic 2001; Slovic et al. 2004). In brief, the affect heuristic is thought to play a role in decisions in part through its influence on perceptions of risks and benefits. For example, if one feels good about engaging in a particular behavior, one might judge risks to be lower and in turn be more inclined toward engagement. With regard to cigarette smoking, Slovic (2004) extends this argument by stating that adolescents might not be weighing the risks and benefits in their decisions to smoke, but instead are driven by affective impulses such as enjoying the new experience or having fun with friends (Slovic et al. 2004). We discuss more about the affect heuristic later in this appendix.

A second problem with the literature base is the lack of consideration of whether smokers have or have not experienced a related positive or negative outcome. Studies focusing on the role of outcome experience in risk judgments have shown that individuals who have personally experienced a negative outcome linked to an event or risk behavior perceive the same or similar outcome as more likely to happen than do individuals without such outcome experience (e.g., Gochman 1997; Greening et al. 1996; Roe-Berning and Straker 1997; Vaughan 1993; Weinstein

1989). Evidence also suggests that early experiences with tobacco, especially physical responses to nicotine, may be precursors of later regular cigarette smoking and nicotine dependence (Eissenberg and Balster 2000; Pomerleau et al. 1998). Pomerleau and colleagues' (1998) work on early experiences with tobacco use reveals that physical reactions to nicotine predict adult smoking status and that people who become highly dependent on cigarettes appear to have more pleasurable sensations, such as a pleasurable rush or buzz and relaxation, at their initial exposure to tobacco than those who do not become regular smokers (Pomerleau et al. 1998). Unpleasant reactions to the first cigarette such as nausea and cough do not seem to protect against subsequent smoking (Pomerleau et al. 1998). Thus, when examining the role of behavioral experience in risk judgments, it is important to also examine the effects of outcome experience either statistically or by limiting the samples to those with or without such outcome experience. It is also critical to understand the extent to which such outcome experiences lead to increased or decreased cigarette use among older adolescents and young adults.

Third, most studies have elicited general judgments about the likelihood of a given outcome occurring (e.g., what is the chance that you will get lung cancer?) without making the judgment conditional on a behavioral antecedent. It is not surprising that studies using these unconditional risk assessments yield a positive relationship between risk perception and behavior since individuals who are engaging in a risk behavior are truly more likely to experience a negative outcome than are non-engagers. Similarly, non-engagers rate their risk of experiencing the negative outcome as lower than do engagers because they are not engaging in the risk behavior. Instead, one must use conditional risk assessments in which the behavior or event linked to the outcome is specified (e.g., what is the chance that you will get lung cancer if you smoke?) (Halpern-Felsher et al. 2001; Ronis 1992; Van der Velde and Hooykaas 1996). Conditional risk assessments are more closely related to factors incorporated in models of health behavior and have been better predictors of behavior than unconditional risk assessments (Ronis 1992; Van der Velde and Hooykaas 1996).

Fourth, although studies have identified factors associated with tobacco use among multiethnic youth (e.g., Gritz et al. 2003), few studies on adolescent risk perception have included demographic variables such as gender, race or ethnicity, or socioeconomic status, and no study has explored whether these variables moderate the risk perception–tobacco use link. It is possible that the level of perceived risk (and benefit) may differ across groups of individuals, possibly as a factor of culture, socioeconomic status, or differences in exposure to behavior-related outcomes, for example. Alternatively, groups of adolescents or young adults might perceive the same level of risk, but these perceptions might have different implications for their smoking, in part due to differences in perceived control, risk-reducing strategies used, or the value placed on the negative outcome (e.g., bad breath or trouble breathing) compared to the value placed on the benefit (e.g., looking cool) of smoking.

Fifth, the majority of studies assessing the link between risk perceptions and tobacco use have employed a cross-sectional design. Therefore, the direction of influence between behavioral experiences and risk perceptions is not discernible. Although perceptions of risk are theorized to motivate behavior, it is plausible to suggest that risk perceptions are reflective of behavioral experiences (e.g., Gerrard et al. 1996; Halpern-Felsher et al. 2001). Further, the nature of the relationship is likely to change over time, depending on factors such as experience, which are known to bias judgment (Weinstein and Nicolich 1993).

Finally, many studies examining the relationship between risk perceptions and tobacco use have focused on the onset of tobacco use and have thus included younger adolescent samples.

Few studies have examined the relationship between risk perceptions and behavior in older adolescence or adulthood, nor have studies determined whether such a relationship is predictive of changes in tobacco use over time. A notable exception is the study by Chassin and colleagues (2000), in which less positive beliefs about smoking were found for adolescent abstainers and later onsetters, as well as among adults who never became established regular smokers. Tucker and colleagues (2003) found no relationship between risk perceptions and tobacco use over time.

ADOLESCENTS' UNDERSTANDING OF THE INHERENT RISKS OF TOBACCO USE

In addition to examining the extent to which risk perceptions play an important role in one's decisions to smoke, a number of studies have examined adolescents' understanding of tobacco-related risks, including an understanding of actual risks, long- versus short-term risks, health versus social consequences, perceived risk for different types of cigarettes, and cumulative risk of tobacco use over time. These studies are reviewed next.

Understanding of Actual Tobacco-Related Risks

A number of studies have examined whether adolescents and adults understand the actual risk of tobacco use, compared to epidemiological data. Some studies show that smokers either overestimate or underestimate (e.g., Borland 1997; Halpern-Felsher et al. 2004; Kristiansen et al. 1983; Schoenbrun 1997; Viscusi 1990; 1991; 1992; Viscusi et al. 2000; see also Slovic 2001) the risks of smoking. Jamieson and Romer (2001) found that 14–22 year olds vary in their sensitivity to risk associated with smoking mortality compared to other risk behaviors. Their results noted that 70 percent of smokers and 79 percent of nonsmokers overestimated the risk of lung cancer. Although their beliefs about the likelihood of dying from a smoking-related cause were more accurate (34 percent of smokers and 41 percent of nonsmokers overestimated the death rate from smoking), 41 percent of smokers and 27 percent of nonsmokers either underestimated or did not know this rate. Many study participants (26 percent of nonsmokers and 21 percent of smokers) also underestimated years of life lost due to smoking and inaccurately perceived more deaths caused by gunshots, car accidents, alcohol, and other drug use than by smoking cigarettes.

Perceived Short- Versus Long-Term Tobacco-Related Risks

Historically, studies have focused primarily on long-term health risks such as heart attack and lung cancer. More recently, there has been an emphasis on short-term risks that are more salient to adolescents, such as the smell of cigarettes, the yellowing of teeth, and the possibility of getting into trouble (Gritz et al. 2003; Halpern-Felsher et al. 2004; Prokhorov et al. 2002). There is also good evidence to suggest that there are other aspects of tobacco risks not fully understood by adolescents and young adults. Slovic (e.g. Slovic 1998; 2001; Arnett 2000; Leventhal et al. 1987) argued that although adolescents in general might be aware of the health and long-term risks of smoking, they are much less aware of the addictive nature of smoking. In fact, studies suggest that adolescent smokers might be less worried about the long-term risks of smoking in part because they believe that they can quit smoking easily and at any time (Arnett 2000; Halpern-Felsher et al. 2004; Slovic 1998). We discuss adolescents' perceptions of addiction in greater depth later in this appendix.

Perceived Risk Varies by Type of Cigarettes Smoked

Despite evidence that “light” cigarettes are not a safe alternative to smoking, adults harbor misperceptions about the health risks associated with smoking light and ultralight cigarettes, with a large proportion of adult smokers believing that such cigarettes deliver less tar and nicotine, produce milder sensations, reduce the health risks associated with smoking, and assist with smoking cessation. Some smokers have switched to “low-yield” cigarettes in an attempt to reduce the health consequences of smoking (Slovic 2001). When smoking lower-yield cigarettes, smokers puff more frequently or more intensely than when smoking higher-yield cigarettes, presumably to obtain their usual specific level of nicotine from each cigarette. In switching from high-yield to low-yield cigarettes, smokers consume more nicotine from a low-yield cigarette than predicted from high-yield cigarettes (Slovic 2001).

A study by Shiffman and colleagues (2001) presented results of a survey of more than 2,120 adults aged 18 or over who were daily smokers. Most smokers in the study believed that lights and ultralights were less harsh and delivered less tar and nicotine compared to regular cigarettes. In fact, all three types of smokers (i.e., of regulars, lights, and ultralights) believed that ultralight cigarettes were less hazardous than lights. Although most smokers thought that smoking lights or ultralights was closer in risk to smoking regular cigarettes than to not smoking at all, 8.7 percent thought that light cigarettes were closer in risk to not smoking, while 20.9 percent believed that the risk of ultralight cigarettes was closer to that of not smoking. Among smokers of ultralights, 27.1 percent believed the risk of smoking ultralights was closer to that of not smoking at all than that of smoking regulars; this was also true of 22.1 percent of the smokers of light cigarettes.

Data presented by Etter and colleagues (2003) support the findings by Shiffman and colleagues (2001) that the risk of lung cancer was perceived to be lower in smokers of light cigarettes than in smokers of regular cigarettes. In a sample that included 2,000 people aged 18–70 years, 27 percent of participants answered that the risk of lung cancer was lower in smokers of light cigarettes than in smokers of regular cigarettes; 60 percent said that the risk was the same, and 7 percent said that the risk was higher. For ultralight cigarettes, the corresponding figures were 32, 55, and 6 percent, respectively (Etter et al. 2003). In addition, participants thought that one would have to smoke two light cigarettes or four ultralight cigarettes in order to inhale the same amount of nicotine as that from one regular cigarette. Many smokers choose light cigarettes because they think that such cigarettes are safer or less addictive (Etter et al. 2003).

A study conducted by Cummings and colleagues (2004) examined the extent to which smokers of Marlboro Lights perceived lower health risks associated with using a low-tar cigarettes and the extent to which they were aware of filter vents in their cigarettes. In a large-sized sample of adult current cigarette smokers ($n = 1,046$), 68 percent of Marlboro Lights smokers were unaware that the filters on their cigarettes were ventilated. Many Marlboro Lights smokers also expressed the belief that low-tar and filtered cigarettes are safer than full-flavored cigarettes (Cummings et al. 2004). In addition, a substantial minority of participants (one in four) answered that smokers of light cigarettes were at lower risk of developing lung cancer than smokers of regular cigarettes (Cummings et al. 2004).

Fewer studies on perceptions of light cigarettes have been conducted with adolescent samples. A notable exception is a study conducted by Kropp and Halpern-Felsher (2004) in which participants perceived that they would be significantly less likely to get lung cancer, have a heart attack, die from a smoking-related disease, get a bad cough, have trouble breathing, and get wrinkles from smoking light cigarettes than from smoking regular cigarettes for the rest of their lives. Furthermore, when participants were asked how long it would take to become addicted to

the two cigarette types, they thought it would take significantly longer to become addicted to light versus regular cigarettes. In addition, participants also thought that their chances of being able to quit smoking were higher with light cigarettes than with regular cigarettes. They also agreed or strongly agreed that regular cigarettes deliver more tar than light cigarettes and that light cigarettes deliver less nicotine than regular cigarettes. Although some of the adolescents in this study were aware of the health risks and addictive properties associated with light cigarettes, the data clearly showed that 22 percent of the adolescents were uncertain regarding the differences between regular and light cigarettes and between 25 percent and 35 percent of the adolescents thought that health risks were more likely with regular cigarettes use than with light cigarettes.

These studies confirm that adults and adolescents, as well as smokers and nonsmokers, harbor misconceptions about so-called light cigarettes. Such perceptions are likely the result, in part, of the tobacco industry's marketing of light cigarettes as the healthier smoking choice, a safer alternative to cessation, and a first step toward quitting smoking altogether.

Understanding of Cumulative Risk

Another small set of studies has examined whether adolescents recognize and acknowledge another aspect of tobacco risk: cumulative risk. Cumulative risk is exposure to a hazard occurring repeatedly over time. A study conducted by Slovic (2000) showed that young smokers, as cumulative risk takers, believe they can get away with some amount of smoking before the risks take hold. Many young smokers tend to believe that smoking the "very next cigarette" poses little or no risk to their health or that smoking for only a few years poses negligible risk (Slovic 2000). Denial about the short-term risks of smoking is higher among adolescent smokers compared to nonsmokers (Slovic 2000).

Among adults, the light—that is, the occasional smoker—is in general less addicted than are daily smokers of more than five cigarettes per day (Shiffman 1989). The use of tobacco in response to withdrawal symptoms is less of a factor in such tobacco users. Among adults, light or occasional smokers are relatively uncommon (less than 10 percent of adult smokers); they have greater success in smoking cessation than do heavier smokers, although not all light smokers are able to quit (Benowitz 2001). In contrast, many more adolescents than adults are light or occasional smokers. However, light smoking by adolescents is often not a stable pattern; rather, it represents a state in escalation to daily smoking (Benowitz 2001).

Successful smoking cessation may also be affected by the motives for smoking behavior (Rose et al. 1996). For example, Pomerleau and colleagues (1978) reported that those who smoked for affect regulation reasons were less likely to quit, and this may also be true for those who report higher levels of perceived addiction as motivating their smoking behavior.

Data collected from two surveys (Robert Wood Johnson, [RWJ], and Annenberg School of Communication, [ANN]) found that 69 percent of RWJ and 45 percent of ANN participants rated their own difficulty of quitting as lower than that of other smokers' (Weinstein et al. 2004). Figures were lower among the adult cohort from these two surveys.

ADOLESCENTS AND NICOTINE ADDICTION

Understanding adolescents' perspectives of nicotine addiction is important since more than 90 percent of addicted smokers began smoking during adolescence (Bottorff et al. 2004; Benowitz 2001; Colby et al. 2000; Epstein et al. 2000), making tobacco use and addiction one of

the greatest public health concerns in the United States and worldwide (Quintero and Davis 2002; Rugkasa et al. 2001). Nicotine dependence (ND) is defined as the compulsive use of cigarettes to achieve pleasurable and other effects and to avoid withdrawal symptoms (Fagerstrom and Schneider 1989; Rojas et al. 1998). This type of dependence consists of both nicotine seeking (compulsive use for positive reinforcement) and avoidance of nicotine withdrawal symptoms (compulsive use for negative reinforcement), such as a strong compulsion to smoke, irritability, and restlessness (Prokhorov et al. 1996). DiFranza, Savageau, Rigotti and colleagues (2002) showed that approximately 20 percent of adolescents ($n = 679$) reported nicotine dependence symptoms within a month of initiating monthly smoking. Many smokers report that smoking enhances performance and mood (Benowitz 2001). However, the extent to which the enhanced performance and mood after smoking are due to the relief of symptoms of abstinence or to an intrinsic enhancement effect on the brain is unclear (Benowitz 2001). Thus, nicotine dependence has origins that are both psychologic and biologic, both of which are intimately related.

Adolescents' Perceptions of Addiction

There are few studies conducted specifically on the topic of children's, adolescents', and young adults' perceptions of nicotine addiction. In a quantitative study of almost 400 adolescents, Halpern-Felsher and colleagues (2004) showed that adolescents who have smoked believe that they are significantly less likely to become addicted than are adolescents who reported no smoking experience. Similar results were found between adolescents who intend to smoke in the near future and adolescents with no intentions to smoke.

Rubinstein and colleagues (2003) examined whether and how adolescents discriminate among categories of smokers and how these discriminations engender different smoking-related perceptions. Five hundred fifty 9th graders who reported never smoking tobacco completed a self-administered survey concerning smoking attitudes and beliefs. The results indicated that adolescents discriminated significantly among nonsmokers, casual smokers, smokers, and addicted smokers, based on both frequency of smoking and the number of cigarettes smoked. Addicted smokers were perceived as having the greatest chance of experiencing negative outcomes, followed by smokers, casual smokers, and last, nonsmokers. Finally, adolescents ascribed a far greater chance of quitting smoking to casual smokers than they did to either regular or addicted smokers.

Other studies' use of both structured and unstructured interviews has motivated our need for further understanding of nicotine dependence among this population. Although a wide range of reasons to smoke were cited among various studies, some of the most common values to emerge included mood management, peer influences, addiction, and image maintenance (Bottorff et al. 2004; Moffat and Johnson 2001; Quintero and Davis 2002). For example, a multi-phase qualitative study conducted by Johnson and colleagues (2003) found that social, pleasure, emotional, and empowerment aspects all played a role in adolescents' perspectives on the need to smoke. Study participants gave explanations such as "needing to smoke" or being "controlled by cigarettes," while others described using cigarettes to "feel calm" and the need "to connect" with their peers (Johnson et al. 2003).

Another qualitative study conducted among children also had emergent themes similar to those found in studies among young adults. Rugkasa and colleagues (2001) conducted 85 focused interviews among children 10–11 years of age. The study data implied that children's conceptualizations of nicotine addiction are linked to the notion that tobacco consumption is something that symbolically belongs to the world of adults (Porcellato et al. 1999). Whereas adult

smokers are perceived as dependent on nicotine, child smokers are perceived in terms of social relations, such as “young people smoke to appear ‘cool,’ ‘hard,’ and ‘grown up’” (Rugkasa et al. 2001). Young children’s ideas of addiction were frequently conflated with “getting used to it” or even simply being able to “handle it” as well as “liking” or “enjoying the taste of cigarettes” when referring to experienced child smoking (Rugkasa et al. 2001; Wang et al. 2004).

Johnson and colleagues (2003) found that dependence for adolescents extends beyond nicotine and can be defined by tobacco fulfilling emotional needs (i.e., avoiding unpleasant feelings), social needs (i.e. connecting with others), pleasure-seeking needs, and individuality development. Rugaska and colleagues (2001) concluded that youth perceive dependence risks to be associated only with adult smoking because of their view of adults smoking to cope with everyday life while youth thought their smoking for social reasons was safe. Physical responses to first smoking experience, such as relaxation and dizziness, are associated with the development of nicotine dependence (DiFranza et al. 2004).

A narrative inquiry conducted by Moffat and Johnson (2001) found three narratives that emerged among adolescent female participants: invincibility, giving, and unanticipated addiction. Two subnarratives that came about were needing to quit and repeating history (Moffat and Johnson 2001). The authors concluded that semantics and identity issues were key to understanding adolescents’ perceptions. Further studies of both qualitative and quantitative design are needed to add to our understanding of children’s and young adults’ perception of nicotine dependence in order to better inform future intervention programs.

Adolescents’ Perceptions of Ability to Quit Smoking

Belief in the short-term safety of smoking may combine insidiously with a tendency of young smokers to underestimate or be uninformed about the difficulty of stopping smoking (Slovic 1998). A longitudinal survey conducted as part of the University of Michigan’s Monitoring the Future Study found that 85 percent of high school seniors predicted that they probably or definitely would not be smoking in 5 years, as did 32 percent of those who smoked one or more packs of cigarettes per day. In a follow-up study conducted 5 to 6 years later, of those who had smoked at least one pack per day as seniors, only 13 percent had quit and 72 percent still smoked one pack or more per day (Slovic 1998).

A study conducted by Weinstein and colleagues (2004) explored what smokers believe about the difficulty of quitting smoking and the nature of addiction. With data collected in two nationwide surveys ($n = 361$ and $n = 788$), an overwhelming proportion (96 percent) of both youth and adult smokers agreed with the statement, “The longer you smoke, the harder it is to quit.” Most also agreed that signs of addiction appear very quickly if a teenager starts smoking half a pack of cigarettes a day: 80 percent of youth and 79 percent of adults said that signs appeared in a few months or less. Although respondents did not appear to be reluctant to say that they were addicted, many smokers, especially youth, tended to claim they were less addicted than the average smoker (Weinstein et al. 2004).

Jamieson and Romer (2001) found smokers to hold relatively optimistic beliefs about the meaning of tobacco addiction. Although 82 percent agreed that “a chemical in cigarettes makes smoking addictive,” nearly 60 percent of these smokers still said that they believed quitting is either very easy or possible for most people if they really try (Jamieson and Romer 2001). Similar findings were shown by Weinstein and colleagues (2004) when both youth and adult smokers who want to quit greatly overestimate the likelihood that they will succeed in the coming year.

When asked about their perceptions of the ease of quitting smoking, adolescents with smoking experience believed that they were more likely to quit smoking and would find it easier to quit smoking than did adolescents with no smoking experience (Halpern-Felsher et al. 2004). Quitting intention has been shown to be modestly related to beliefs about the use of “light” and “ultralight” cigarettes (Etter et al. 2003). Smokers of light cigarettes had the greatest interest in quitting, significantly greater than that of ultralight smokers, while regular smokers achieved only an intermediate quit index score that was significantly different from that of light smokers. Light and ultralight smokers who believed their cigarettes were safer, milder, or delivered less tar and nicotine were currently less interested in quitting, but only very slightly so. Interest in quitting was lowest among those who either denied or strongly endorsed the belief that light and ultralight cigarettes were less harsh (Shiffman et al. 2001a). Kropp and Halpern-Felsher (2004) reported that adolescents believed it would be easier to quit smoking light compared to regular cigarettes.

Arnett (2000) assessed the optimistic bias in relation to smoking among both adolescents (aged 12–17 years) and adults (aged 30–50 years). A questionnaire about smoking behavior, attitudes, and smoking risk perceptions was completed to address whether the optimistic bias related to smoking risks was greater for adolescents than for adults. Nearly 60 percent of adolescents and 48 percent of adults believed that “I could smoke for a few years and then quit if I want to,” which shows that many adolescent smokers hold an optimistic bias that the addictiveness of smoking that applies to “most people” does not apply to themselves (Arnett 2000).

Weinstein and colleagues (2005) found that people who planned to quit judged their absolute risk of lung cancer as higher than did people who did not plan to quit. People who planned to quit also judged their relative risk of lung cancer higher, and among those not planning to quit, 57.3 percent said that their risk was “the same” as or “a little higher” than nonsmokers. People who did not plan to quit were also more likely to believe that genes primarily determine lung cancer.

Perceptions of Secondhand Smoke

Despite numerous studies on adolescents’ recognition of the medical risks of primary smoke, and conclusive evidence and public health messages concerning the risks of secondhand smoke, there have been surprisingly few investigations of how adolescents perceive the risks associated with exposure to secondhand smoke. Glantz and Jamieson (2000) asked adolescents whether “thousands of nonsmokers die from breathing other people’s smoke” and found that nonsmoking youth endorsed this statement more than youth who have smoked. They also showed that awareness of the effects of secondhand smoke was related to adolescents’ plans to quit smoking. Romer and Jamieson (2001) found that knowledge of the dangers of secondhand smoke was indirectly related to intentions to quit, through its relationship with perceived risk of smoking overall. In their study of elementary, middle, and high school African American students, Kurtz and colleagues (1996) showed that students with smoking experience had less knowledge about and less negative attitudes toward secondhand smoke and they made fewer efforts to prevent exposure to secondhand smoke than did students without smoking experience.

Halpern-Felsher and Rubinstein (2005) explored adolescents’ perceptions of secondhand smoke. Recent literature has suggested that adolescents’ perceptions of the effects of secondhand smoke might serve to deter them from smoking. To address this issue, Halpern-Felsher and Rubinstein (2005) examined: (1) how adolescents perceive the risks associated with primary tobacco exposure compared to secondary exposure, (2) whether adolescents’ perceptions of the

risks from secondhand smoke vary by whether the adolescent has smoked or not, and (3) whether adolescents' perceived risks of secondhand smoke varies based on who is producing the secondhand smoke. They found that while adolescents perceived the risk from primary smoke to be greater than that from secondhand smoke, they were still aware of the serious risks posed by exposure to secondhand smoke. Adolescents who have smoked were more likely to perceive the risks from exposure to secondhand smoke as lower than did adolescents who had never smoked. According to adolescents, the greatest risks from secondhand smoke are those from exposure to parental smoking, then from exposure to an officemate's smoke, and then from smoke from a similar-aged friend. The finding that adolescents are acutely aware of the risks from secondhand smoke may provide another method of approaching smoking prevention and cessation among both teens and their parents. In particular, it may be prudent to include the risks from secondhand smoke exposure in antismoking messages as a further means of discouraging smoking.

Perceptions of Tobacco-Related Benefits

In order to understand how perceived benefits motivate individuals to smoke, compared with how perceived risks deter smoking, one must integrate these lines of research into one coherent theoretical model, which necessitates examining both sets of perceptions. The Decisional Balance Inventory, a construct of the Transtheoretical Model (Prochaska et al. 1992; Prochaska and Velicer 1992), incorporates a weighing of both the benefits (pros) and the risks (cons) in predicting behavior and behavior change. Applied to smoking, the model encompasses three factors: social pros (e.g., kids who smoke have more friends), coping pros (e.g., smoking relieves tension), and cons (e.g., smoking smells). This construct includes a number of social and short-term outcomes rather than relying solely on long-term health outcomes that are less salient to adolescents and young adults. Tobacco use among adolescents may hinge on their perceptions not only of risks (Slovic 2000), but of benefits as well. Using this inventory, Prokhorov and colleagues (2002) found that scores on the smoking pros scale increased and con scores decreased as adolescents' susceptibility to smoking increased. Similarly, Pallonen and colleagues (1998) showed a positive relationship between perceived smoking benefits and nonsmokers' likelihood of tobacco onset, whereas the cons of smoking were less predictive of smoking acquisition.

Pallonen and colleagues (1998) found that adolescent nonsmokers were more likely to start smoking or to try smoking if they believe smoking is useful in helping one cope. Halpern-Felsher and colleagues (2004) and Goldberg and colleagues (2002) found that participants who have smoked perceived benefits to be more likely to occur, and risks less likely to occur, than did adolescents who have not smoked.

The competence enhancement approach has been used in many smoking prevention programs. Epstein and colleagues (2000) conducted a study in which a sample of 1,459 middle and junior high school students self-reported to test whether a deficiency in competence (poor decision-making skills, low personal efficacy) is linked to acquiring beliefs in the perceived benefits of smoking and whether these perceived benefits are then related to subsequent smoking. The authors of the study found that adolescents with deficiencies in personal competence were more likely to believe that smoking offers social benefits such as looking cool, having more friends, and being better liked. Consequently, adolescents holding these beliefs in the 1-year follow-up were more likely to engage in the 2-year follow-up assessment (Epstein et al. 2000).

Gender Differences in Perceived Benefits

Previous studies have found limited gender-specific differences among smokers with regards to perceived benefits of smoking. Although the research is currently limited to adult cohorts, these findings may point to possible gender differences in adolescents as well. Pirie and colleagues (1991) reported that women were more likely than men to be concerned about post-cessation weight gain. Swan and colleagues (1993) found that women identified weight gain as the cause for relapse to smoking and women who were more concerned about post-cessation weight gain were less likely to be motivated to quit smoking (Weekley et al. 1992). Females reported more ND symptoms than males, even though levels of cigarette consumption were similar (O’Loughlin et al. 2003). McKee and colleagues (2005) conducted a study with 93 adult participants and found that females indicated greater likelihood ratings of perceived risk and benefits than males, although the magnitude of these differences was small. Perceived benefits were positively associated with motivation for men and women, although the authors did not find any gender-specific effects for this relationship. There was also no significant interaction between perceived benefits and gender, predicting pretreatment motivation. Women are less likely to acknowledge the health benefits of smoking cessation (Sorensen and Pachacek 1987) and less likely to be motivated to quit to gain health benefits than men (Curry et al. 1997). Similar studies conducted among the adolescent cohort would be valuable in understanding why females have poorer smoking cessation outcomes compared to males (Perkins 2001). Further studies are needed with adolescents to determine if these gender differences exist in younger cohorts.

Adolescents’ Reasons for Smoking

Qualitative studies have used methodology such as focus groups or one-on-one interviewing to understand the motivations for teen smoking. Vuckovic and colleagues (2003) found that reasons for smoking included to relieve stress and boredom, because parents smoke, to fit in with peers, to decrease appetite, and to increase the high from alcohol and drugs. Similar reasons for teen smoking were cited in Nichter and colleagues (1997) study with female adolescents. Other studies suggest that adolescents form perceptions of smoking images, such as nonsmokers being more mature (Lloyd et al. 1997), and adolescents recognize that different types of smoking identities beyond the usual categories of nonsmokers, experimenters, and smokers exist for adolescents (Johnson et al. 2003).

Smoking initiation or first-time use of tobacco has specifically been addressed in qualitative studies. Curiosity as a reason to try smoking is a prominent theme in several qualitative studies (Kegler et al. 2000; Plano et al. 2002; Dunn and Johnson 2001), as well as peer influences as wanting to fit in (Gittelshon et al. 2001).

Other studies have identified peer and social influences as main reasons that teens continue to smoke after initiation. Kegler and colleagues (2001) discovered that the adolescents’ most recent smoking events were for more social reasons such as peer inclusion and to alleviate boredom. Qualitative studies comment on peers as reinforcers of smoking behavior by expecting smoking within the peer group (Plano et al. 2002; Gittelsohn et al. 2001; Kegler et al. 2000).

The Affect Heuristic

Risk perception is typically conceptualized as a cognitive construct—that is, an estimate of the likelihood of a negative event happening—rather than as an affective construct (Gerrard et al. 2003). Although it has been found in many studies that the relationships between these percep-

tions and intentions are more analytical, thoughtful, and planned (Gerrard et al. 2003), it has been argued that the vast majority of risk decisions are motivated by affect rather than by analysis of quantitative statistical facts (Slovic 2003). This is especially relevant to adolescents. Risk feelings are instinctive reactions in which one evaluates risk. Affect is defined as a subtle form of emotion typically defined by positive (like) or negative (dislike) evaluative feelings toward an external stimulus (Slovic 2003). The reliance on affect and emotion that is thought to happen automatically and reactively is called “experiential thinking.” This type of risk analysis is characterized as the affect heuristic and is argued to guide information-processing and judgment (Slovic et al. 2004). The reliance of experiential thinking comes from the act of doing something of habit and allows the performance of activities to happen quickly without the need to think through each step. The fields of marketing and advertising have exploited this type of thinking in order to promote positive imagery and affect toward smoking. Affective cues emanating from the social environment are also powerful influences on smoking behavior (Slovic 2003). Examples of this include healthy and beautiful people smoking and enjoying cigarettes among the company of friends. Unfortunately, experiential thinking does not appreciate the cumulative risk of smoking and nicotine addiction (Slovic 2003). It does, however, play a role in how risks and benefits are perceived and evaluated. This, in turn, has an effect on decision-making abilities, especially with regard to smoking.

The importance of affect evaluation is considered to be a part of the overall decision-making process. Since adolescence is a pivotal developmental period in which difficult decisions are made that can have lasting consequences, it is imperative to consider risk feelings as they pertain to overall decision-making abilities. An inverse relationship between perceived risk and perceived benefit of an activity was linked to the strength of positive or negative affect associated with that activity (Alhakami and Slovic 1994; Slovic et al. 2004). In the model of affect heuristic as described in Slovic and colleagues (2004), people base their judgments of an activity or a technology not only on what they think about it but also on how they feel about it. If their feelings toward an activity are favorable, they are moved toward judging the risks as low and the benefits as high. In contrast, if their feelings toward it are unfavorable, they tend to judge the opposite—high risk and low benefit (Slovic et al. 2004). Thus, under this model, affect comes prior to, and directs, judgments of risk and benefit (Slovic et al. 2004). Affective thinking is one mode of thinking; the other is the “rational” or analytic. While both need to be considered in the decision-making process, the affective or “experiential” mode is thought to play an active role in motivating risk behaviors. Thus, in Slovic’s (2004) view, affect contributes to the perception of benefits that promotes smoking behavior.

SUMMARY

Studies have indicated that, in general, adolescents understand that there are risks associated with smoking (Leventhal et al. 1987; Viscusi 1992; Jamieson and Romer 2001; Arnett 2000). However, there has been debate about how adolescents understand the nature of smoking risks and to what extent their understanding or knowledge about these risks either hinders or promotes their decision to smoke. One viewpoint is that smokers are “informed consumers” making rational choices, and not only are people well aware of the risks associated with smoking, including the risks of getting lung cancer and the mortality and life expectancy rates associated with smoking, but smokers are overestimating these risks (Viscusi 1992). This view includes adolescents within a rational learning model as consumers who respond appropriately to information and make trade-offs between the costs and benefits of smoking. Another viewpoint argues that

such analyses fail to consider vital aspects of risk such as the influence of optimistic bias, cumulative risk, and youth misperception of addiction (Benowitz 2001; Slovic 2001). Thus, it is important to take into account to what extent adolescents are truly aware of the full extent to which smoking is harmful, including the relative risks of smoking versus other risks, their misperceptions of addiction, and how this judgment process motivates their decision-making behavior. The review provided in this appendix suggests that adolescents and young adults are aware of some of the risks involved in tobacco use, especially those consequences most stressed by public health campaigns. That is, they are aware that smoking involves a significant risk of lung cancer, heart attack, and other health outcomes. However, adolescents are not aware of the full extent to which smoking is harmful, including the relative risk of smoking versus other risks such as alcohol use, getting hit by a car, and so on. In addition, they are not as aware of the cumulative risk of tobacco use or the years of life lost due to tobacco use. Importantly, adolescents are less aware and have less of an understanding of the addictive nature of tobacco use. That is in part because they simply do not understand the risks of addiction and the cumulative nature of tobacco risks, and in part because they believe they can quit at any time and therefore avoid addiction. This is particularly important because adolescents believe that they can negate the risks of smoking by altering the amount they smoke, when they smoke (e.g., only on weekends, only every few days), or what they smoke (e.g., “light” versus regular cigarettes). Similarly, they are less likely to believe that the risk of addiction and related health consequences apply to them because they believe they have control over their tobacco use and its consequences. The literature also strongly suggests that adolescents’ decisions to smoke are not just based on a consideration of long-term health risks. Clearly, social risks (e.g., getting into trouble, smelling bad) play an important role in their behavioral decision making. Additionally, perceived benefits are weighed heavily among adolescents, because they are very much aware that smoking can reduce stress and increase concentration. These findings suggest that efforts to prevent or reduce tobacco use among adolescents might be more effective if they not only focus on long-term health risks but address all of adolescents’ perceptions, and misperceptions, about tobacco use, including the social consequences, benefits, cumulative risk, and addiction.

REFERENCES

- Alhakami AS, Slovic P. 1994. A psychological study of the inverse relationship between perceived risk and perceived benefit. *Risk Analysis* 14(6): 1085-1096.
- Ajzen I. 1985. From Intentions to Actions. *Action Control from Cognition to Behavior*. New York: Springer-Verlag.
- Arnett JJ. 2000. Optimistic bias in adolescent and adult smokers and nonsmokers. *Addictive Behaviors* 25(4):625-632.
- Bandura A. 1994. DiClemente RJ, Peterson, JL (Eds). Social cognitive theory and exercise of control over HIV infection. *Preventing AIDS: Theories and methods of behavioral interventions*. New York: Plenum Press. 25-29
- Benowitz N. 2001. Slovic P, Editor. The nature of nicotine addiction. *Smoking: Risk, Perception and Policy*. Thousand Oaks, CA: Sage Publications, Inc. Pp. 159-187.
- Borland R. 1997. Tobacco health warnings and smoking-related cognitions and behaviours. *Addiction* 92(11): 1427-1435.
- Bottorff JL, Johnson JL, Moffat B, Grewal J, Ratner PA, Kalaw C. 2004. Adolescent constructions of nicotine addiction. *Canadian Journal of Nursing Research* 36(1):22-39.
- Chassin L, Presson CC, Pitts SC, Sherman SJ. 2000. The natural history of cigarette smoking from adolescence to adulthood in a midwestern community sample: Multiple trajectories and their psychosocial correlates. *Health Psychology* 19(3): 223-231.
- Colby SM, Tiffany ST, Shiffman S, Niaura RS. 2000. Are adolescent smokers dependent on nicotine? A review of the evidence. *Drug and Alcohol Dependence* 1 (59): 83-95.
- Cummings KM, Hyland A, Bansal MA, Giovino GA. 2004. What do Marlboro Lights smokers know about low-tar cigarettes? *Nicotine Tobacco Research* 6 (3): 323-332.
- Curry SJ, Grothaus L, McBride C. 1997. Reasons for quitting: intrinsic and extrinsic motivation for smoking cessation in a population-based sample of smokers. *Addictive Behaviors* 22(6):727-739.
- DiFranza JR, Savageau JA, Rigotti NA, Ockene JK, McNeill AD, Coleman M, Wood C. 2004. Trait anxiety and nicotine dependence in adolescents: a report from the DANDY study. *Addictive Behavior* 29(5): 911-919.
- DiFranza JR, Savageau JA, Rigotti NA, Fletcher K, Ockene JK, McNeill AD, Coleman M, Wood C. 2002. Development of symptoms of tobacco dependence in youths: 30 month follow up data from the DANDY study. *Tobacco Control* 11(3): 228-235.
- Dunn DA, Johnson JL. 2001. Choosing to remain smoke-free: the experiences of adolescent girls. *Journal of Adolescent Health* 29(4):289-97.
- Eissenberg T, Balster RL. 2000. Initial tobacco use episodes in children and adolescents: current knowledge, future directions. *Drug and Alcohol Dependence* 59 (Suppl 1):41-60.
- Elkind D. 1967. Egocentrism in adolescence. *Child Development* 38(4):1025-1034.
- Elkind D. 1978. Understanding the young adolescent. *Adolescence* 13:127-134.
- Epstein JA, Griffin KW, Botvin GJ. 2000. A model of smoking among inner-city adolescents: the role of personal competence and perceived social benefits of smoking. *Preventive Medicine* 31(2 Pt 1):107-114.
- Etter JF, Kozlowski LT, Perneger TV. 2003. What smokers believe about light and ultralight cigarettes. *Preventive Medicine* 36(1):92-98.
- Fagerstrom KO, Schneider NG. 1989. Measuring nicotine dependence: a review of the Fagerstrom Tolerance Questionnaire. *Journal of Behavioral Medicine* 12(2):159-182.
- Fishbein M, Ajzen I. 1975. *Belief, Attitude, Intention, and Behavior: An Introduction to Theory and Research*. Reading, MA: Addison-Wesley.
- Gerrard M, Gibbons FX, Benthin AC, Hessling, RM. 1996. A longitudinal study of the reciprocal nature of risk behaviors and cognitions in adolescents: what you do shapes what you think and vice versa. *Health Psychology* 15, 344-354.
- Gerrard M, Gibbons FX, Gano M. 2003. Romer D, Editor. Adolescents' risk perceptions and behavioral willingness: implications for intervention. *Reducing Adolescent Risk: Toward an Integrated Approach*. Newbury, CA: Sage Publications. Pp. 75-81.

- Gittelsohn J, Roche KM, Alexander CS, Tassler P. 2001. The social context of smoking among African-American and white adolescents in Baltimore City. *Ethnic Health* 6(3-4):211-225.
- Glantz SA, Jamieson P. 2000. Attitudes toward secondhand smoke, smoking, and quitting among young people. *Pediatrics* 106(6).
- Gochman DS. 1997. Traumatic encounters, self-concept, and perceived vulnerability to dental problems. *Journal of Public Health Dentistry* 37(2):95-98.
- Goldberg JH, Halpern-Felsher BL, Millstein SG. 2002. Beyond vulnerability: the importance of benefits in adolescents' decision to drink alcohol. *Health Psychology* 21(5):477-484.
- Greening LD, Dollinger S, Pitz G (1996). Adolescents perceived risk and personal experience with natural disasters: An evaluation of cognitive heuristics. *Acta Psychologica* 91:27-38.
- Gritz ER, Prokhovrov AV, Hudmon KS, Mullin Jones M, Rosenblum C, Chang CC, Chamberlain RM, Taylor WC, Johnston D, de Moor C. 2003. Predictors of susceptibility to smoking and ever smoking: a longitudinal study in a triethnic sample of adolescents *Nicotine and Tobacco Research* 5:493-503.
- Halpern-Felsher BL, Biehl M, Kropp RY, Rubinstein ML. 2004. Perceived risks and benefits of smoking: differences among adolescents with different smoking experiences and intentions. *Preventive Medicine* 39 (3):559-567.
- Halpern-Felsher BL, Millstein SG, Ellen J, Adler N, Tschann J, Biehl M. 2001. The role of behavioral experience in judging risks. *Health Psychology* 20:120-126.
- Halpern-Felsher, BL, Rubinstein, ML. 2005. Clear the air: adolescents' perceptions of the risks associated with secondhand smoke. *Preventive Medicine* 41(1):16-22.
- Hansen WB, Malotte CK. 1986. Perceived personal immunity: The development of beliefs about susceptibility to the consequences of smoking. *Preventive Medicine* 15(4):363-372.
- Jamieson P, Romer D. 2001. Slovic P, Editor. A profile of smokers and smoking. *Smoking: Risk, Decision, and Policy*. Thousand Oaks, CA: Sage. Pp. 29-47
- Johnson JL, Bottorff JL, Moffat B, Ratner PA, Shoveller JA, Lovato CY. 2003. Tobacco dependence: adolescents' perspectives on the need to smoke. *Social Science Medicine* 56(7):1481-1492.
- Johnson RJ, McCaul KD, Klein WM. 2002. Risk involvement and risk perception among adolescents and young adults. *Journal of Behavioral Medicine* 25(1):67-82.
- Kanfer FH. 1970. *Self Regulation: Research, Issues and Speculations*. New York: Appleton-Century-Crofts.
- Kegler M, Cleaver V, Kingsley B. 2000. The social context of experimenting with cigarettes: American Indian "start stories". *American Journal of Health Promotion* 15(2):89-92.
- Kristiansen CM, Harding CM, Eiser JR. 1983. Beliefs about the relationship between smoking and causes of death. *Basic and Applied Social Psychology* 4:253-261.
- Kropp RY, Halpern-Felsher BL. 2004. Adolescents' beliefs about the risks involved in smoking "light" cigarettes. *Pediatrics* 114 (4): 445-451.
- Kurtz ME, Kurtz JC, Johnson SM, Beverly EE. 1996. Exposure to environmental tobacco smoke: perceptions of African American children and adolescents *Preventive Medicine* 25:286-292.
- Leventhal H, Glynn K, Fleming R. 1987. Is the smoking decision an "informed choice"? Effect of smoking risk factors on smoking beliefs. *Journal of the American Medical Association* 257(4):3373-3376.
- Lloyd B, Lucas K, Fernbach M. 1997. Adolescent girls' constructions of smoking identities: implications for health promotion. *Journal of Adolescence* 20(1):43-56.
- McCoy SB, Gibbons FX, Reis TJ, Gerrard M, Luus CAE, Sufka AVW. 1992. Perceptions of smoking risk as a function of smoking status. *Journal of Behavioral Medicine* 15:469-488.
- McKee SA, O'Malley SS, Salovey P, Krishnan-Sarin S, Mazure CM. 2005. Perceived risks and benefits of smoking cessation: Gender-specific predictors of motivation and treatment outcome. *Addictive Behaviors* 30(3):423-435.
- Moffat BM, Johnson JL. 2001. Through the haze of cigarettes: teenage girls' stories about cigarette addiction. *Quality Health Research* 11(5):668-681.
- Nichter M, Nichter M, Vuckovic N, Quintero G, Ritenbaugh C. 1997. Smoking experimentation and initiation among adolescent girls: qualitative and quantitative findings. *Tobacco Control* 6(4):285-295.
- O'Loughlin J, DiFranza J, Tyndale RF, Meshedjian G, McMillan-Davey E, Clarke PB, Hanley J, Paradis G. 2003. Nicotine-dependence symptoms are associated with smoking frequency in adolescents. *American Journal of Preventive Medicine* 25(3):219-225.
- Pallonen UE, Prochaska JO, Velicer WF, Prokhorov AV, Smith NF. 1998. Stages of acquisition and cessation for adolescent smoking: an empirical integration. *Addictive Behaviors* 23(3):303-324.
- Perkins KA. 2001. Smoking cessation in women: special considerations. *CNS Drugs* 15:391-411.

- Pirie PL, Murray DM, Luepker RV. 1991. Gender differences in cigarette smoking and quitting in a cohort of young adults. *American Journal of Public Health* 81(3):324-327.
- Plano Clark VL, Miller DL, Creswell JW, McVea K, McEntarffer R, Harter LM, Mickelson WT. 2002. In conversation: high school students talk to students about tobacco use and prevention strategies. *Qualitative Health Research* 12(9):1264-1283.
- Pomerleau O, Adkins D, Pertschuk M. 1978. Predictors of outcome and recidivism in smoking cessation treatment. *Addictive Behaviors* 3(2):65-70.
- Pomerleau OF, Pomerleau CS, Namenek RJ. 1998. Early experiences with tobacco among women smokers, ex-smokers, and never-smokers. *Addiction* 93(4):595-599.
- Porcellato L, Dugdill L, Springlett J, Sanerson F. 1999. Primary school children's perceptions of smoking: Implications for health education. *Health Education Research* 14: 71-83.
- Prochaska JO, DiClemente CC, Norcross JC. (1992a). In search of how people change: applications to addictive behavior. *American Psychologist* 47:1102-1114.
- Prochaska JO, Velicer WF. (1992b). The transtheoretical model of health behavior change. *American Journal of Health Promotion* 12: 38-48.
- Prokhorov AV, Pallonen UE, Fava JL, Ding L, Niaura R. 1996. Measuring nicotine dependence among high-risk adolescent smokers. *Addictive Behaviors* 21(1):117-127.
- Prokhorov AV, de Moor CA, Hudmon KS, Hu S, Kelder SH, Gritz ER. 2002. Predicting initiation of smoking in adolescents: evidence for integrating the stages of change and susceptibility to smoking constructs. *Addictive Behaviors* 27(5):697-712.
- Quintero G, Davis S. 2002. Why do teens smoke? American Indian and Hispanic adolescents' perspectives on functional values and addiction. *Medical Anthropology Quarterly* 16(4):439-457.
- Reyna VF, Farley F. 2006. Risk and rationality in adolescent decision-making. *Psychological Science in the Public Interest* 7(1):1-44.
- Roe-Berning S, Straker G. 1997. The association between illusions of invulnerability and exposure to trauma. *Journal of Trauma and Stress* 10(2):319-327.
- Rojas NL, Killen JD, Haydel KF, Robinson TN. 1998. Nicotine dependence among adolescent smokers. *Archives of Pediatric and Adolescent Medicine* 152(2):151-156.
- Romer D, Jamieson P. 2001. Do adolescents appreciate the risks of smoking? Evidence from a national survey. *Journal of Adolescent Health* 29 (1):12-21.
- Ronis DL. 1992. Conditional health threats: health beliefs, decisions, and behaviors among adults. *Health Psychology* 11(2):127-134.
- Rose JS, Chassin L, Presson CC, Sherman SJ. 1996. Prospective predictors of quit attempts and smoking cessation in young adults. *Health Psychology* 15(4):261-268.
- Rosenstock IM. 1974. Historical origins of the health benefit model. *The Health Belief Model and Personal Health Behavior*. Thorofare, NJ: Charles B. Sc Slack. Pp. 1-8.
- Rubinstein ML, Halpern-Felsher BL, Thompson PJ, Millstein SG. 2003. Adolescents discriminate between types of smokers and related risks: evidence from nonsmokers. *Journal of Adolescent Research* 18(6):651-663.
- Rugkasa J, Knox B, Sittlington J, Kennedy O, Treacy MP, Abaunza PS. 2001. Anxious adults vs. cool children: children's views on smoking and addiction. *Social Science and Medicine* 53(5):593-602.
- Schoenbrun M. (1997). Do smokers understand the mortality effect of smoking? Evidence from the Health and Retirement Survey. *American Journal of Public Health* 87, 755-759.
- Shiffman S. 1989. Tobacco "chippers": individual differences in tobacco dependence. *Psychopharmacology* 97(4): 539-547.
- Shiffman S, Pillitteri JL, Burton SL, Rohay JM, Gitchell JG. 2001. Effects of health messages about "Light" and "Ultra Light" cigarettes on beliefs and quitting intent. *Tobacco Control* 10(1):24-32.
- Shiffman S, Pillitteri JL, Burton SL, Rohay JM, Gitchell JG. 2001. Smokers' beliefs about "Light" and "Ultra Light" cigarettes. *Tobacco Control* 10(1):17-32.
- Slovic P. 1998. Do adolescent smokers know the risks? *Duke Law Journal* 47(6):1133-1141.
- Slovic P. 2000. What does it mean to know a cumulative risk? Adolescents' perceptions of short-term and long-term consequences of smoking. *Journal of Behavioral Decision Making* 13:259-266.
- Slovic P. 2001. *Smoking: Risk, Perception and Policy*. Thousand Oaks, CA: Sage Publications, Inc.
- Slovic P. 2003. Romer D, Editor. Affect, analysis, adolescence, and risk. *Reducing Adolescent Risk: Toward an Integrated Approach*. Thousand Oaks, CA: Sage Publications, Inc.
- Slovic P, Finucane ML, Peters E, MacGregor DG. 2004. Risk as analysis and risk as feelings: some thoughts about affect, reason, risk, and rationality. *Risk Analysis* 24(2):311-322.

- Sorensen G, Pechacek TF. 1987. Attitudes toward smoking cessation among men and women. *Journal of Behavioral Medicine* 10(2):129-137.
- Swan GE, Ward MM, Carmelli D, Jack LM. 1993. Differential rates of relapse in subgroups of male and female smokers. *Journal of Clinical Epidemiology* 46(9):1041-1053.
- Tucker J, Ellickson P, Klein D. 2003. Predictors of the transition to regular smoking during adolescence and young adulthood. *Journal of Adolescent Health* 32:314-324
- Triandis HC. 1977. *Interpersonal Behavior*. Monterey, CA: Brooks/Cole.
- Van Der Velde FW, Hooykaas C. 1996. Conditional versus unconditional risk estimates in models of aids-related behaviour. *Psychology and Health* 12:87-100.
- Vaughan E. 1993. Chronic exposure to an environmental hazard: risk perceptions and self-protective behavior. *Health Psychology* 1:74-85.
- Viscusi WK. 1990. Do smokers underestimate risks? *Journal of Political Economy* 98:1253-1269.
- Viscusi WK. 1991. Age variations in risk perceptions and smoking decisions. *Review of Economics and Statistics* 73, 577-588.
- Viscusi WK. 1992. *Smoking: Making the Risky Decision*. Oxford, UK: Oxford University Press.
- Viscusi WK, Carvalho I, Antonanzas F, Rovira J, Brana FJ, Portillo F. 2000. Smoking risks in Spain: Part III—determinants of smoking behavior. *Journal of Risk and Uncertainty* 21:213-234.
- Vuckovic N, Polen MR, Hollis JF. 2003. The problem is getting us to stop. What teens say about smoking cessation. *Preventative Medicine* 37(3):209-218.
- Wang C, Henley N, Donovan RJ. 2004. Exploring children's conceptions of smoking addiction. *Health Education Research* 19(6):626-634.
- Weekley CK, Klesges RC, Reylea G. 1992. Smoking as a weight-control strategy and its relationship to smoking status. *Addictive Behaviors* 17(3):259-271.
- Weinstein ND. 1983. Reducing unrealistic optimism about illness susceptibility. *Health Psychology* 2(1):11-20.
- Weinstein ND. 1989. Optimistic biases about personal risks. *Science* 246:1232-1233.
- Weinstein ND, Nicolich M. 1993. Correct and incorrect interpretations of correlations between risk perceptions and risk behaviors. *Health Psychology* 12(3):235-245.
- Weinstein ND. 1998. Accuracy of smokers' risk perceptions. *Annals of Behavioral Medicine* 20:135-140.
- Weinstein ND, Slovic P, Gibson G. 2004. Accuracy and optimism in smokers' belief about quitting. *Nicotine Tobacco Research* 6 (3):375-380.
- Weinstein ND, Marcus SE, Moser RP. 2005. Smokers' unrealistic optimism about their risk. *Tobacco Control* 14(1):55-59.
- Weisenberg M, Kegeles SS, Lund AK. 1980. Children's health beliefs and acceptance of a dental preventive activity. *Journal of Health and Social Behavior* 21:59-74.

F

Interventions for Children and Youth in the Health Care Setting

Bonnie L. Halpern-Felsher
Department of Pediatrics
University of California, San Francisco

INTRODUCTION

In addition to providing primary health care for children and adolescents, an annual health care visit provides a potentially pivotal opportunity for physicians to provide clinical preventive services that can prevent and reduce children's and adolescents' engagement in health risk behaviors, including tobacco use. As such, a number of national guidelines concerning physicians' provision of preventive services have been developed (e.g., DHHS 1998; Elster and Kuznets 1994; Green and Palfrey 2002; Levenberg and Elster 1995; Stein 1997; U.S. Preventive Services Task Force 2004). In general, these guidelines recommend that all children and adolescents have an annual health care visit during which time all patients should receive confidential preventive services, including being screened, educated, and counseled on a number of biomedical, emotional, and sociobehavioral areas including health risk behaviors such as alcohol and tobacco use, sexual behavior, violence, and safety. Furthermore, guidelines, including those outlined by the American Academy of Pediatrics, recommend that pediatricians discuss substance use as part of routine health care for the prenatal visit, as a home assessment, and for youth (Kulig 2005). With regard to tobacco use, guidelines suggest that in addition to inquiring about tobacco use in general, physicians should specifically query youth about the extent to which tobacco is used, the settings in which tobacco is used, and whether tobacco use has had a negative impact on social, educational or vocational activities (Kulig 2005). Further, physicians need to inquire about tobacco use in the child's home, including use by parents, siblings, and other family members (Kulig 2005). Health care providers need to encourage smoke-free homes, and provide guidance and assistance to parents and youth on means to smoking cessation, including counseling and use of pharmacological agents.

Despite these guidelines, research shows that physicians' rates of screening, educating, and counseling around tobacco use are less than optimal. In this paper, we briefly review the literature describing rates of delivery of clinical preventive services to youth. We also describe physicians' reported barriers to the provision of preventive services and review interventions aiming to increase clinical services, including effects of training healthcare providers to screen, educate, and counsel youth as well as the effects of such training on youth outcomes. We also review the limited literature on providers' use of pharmacological agents to assist adolescents in tobacco cessation. We conclude with a set of recommendations to improve tobacco-related clinical preventive services for youth.

Provision of Clinical Preventive Services to Youth

Low rates of delivery of preventive services have been found among physicians in private practice, community-based practices, and managed care settings. For example, studies have shown that fewer than 60 percent of adolescents are provided guidance about smoking (Marks et al. 1990), and only 1 percent of adolescent office visits included advice about smoking cessation (Igra and Millstein 1993). Halpern-Felsher and colleagues (2000) showed that 77 percent of adolescents in a managed care setting were screened for tobacco use (Halpern-Felsher et al. 2000). Among those who reported tobacco use, more than three-quarters were screened further about the amount they smoked, and 84 percent were educated about the risks of smoking. Halpern-Felsher and colleagues (2002) also found that 43 percent of the adolescent patients' parents were told about the need to monitor their adolescents' behaviors for risk behaviors, including substance use. In a study of almost 1,000 pediatricians randomly selected from a national sample, Galuska and colleagues (2002) reported that 29 percent of the pediatricians reported always counseling younger children (age 6–12) about tobacco use, and 69 percent always counseled about tobacco use among 13–18 year old patients. However, fewer than half of the pediatricians counseled about tobacco use by others in the home. In a large survey of family practitioners, pediatricians, internists, and obstetricians/gynecologists, Ewing and colleagues (1999) found that fewer than half of the providers routinely inquired about smoking. In another survey of pediatricians and family physicians, Klein and colleagues (2001a) showed that providers reported asking over 90 percent of their adolescent patients about smoking, and discussed tobacco-related health risks with more than 75 percent of their patients (Klein et al. 2001a). Inquiries about parental smoking, peer smoking, and use of smokeless tobacco were lower, ranging from 54 to 32 percent. While greater than 80 percent of the providers promoted smoking abstinence among their nonsmoking patients and assessed cessation motivation among smoking patients, fewer than half of the providers followed up with cessation materials or referrals.

Rates of screening adolescents for tobacco use and other risk behaviors vary by physician characteristics, including age, gender, year of graduation, practice setting, and subspecialty. For example, Galuska and colleagues (2002) (see also Klein et al. 2001a) found that rates of counseling for tobacco use and other preventive services was greater among female providers and pediatricians who were able to spend more time with their patients. Ewing and colleagues (1999) showed that younger providers were more likely to provide tobacco-related clinical preventive services. Blum and colleagues (1996) showed that provision of clinical services was lowest among non-teen-focused practice settings, net of patient age or gender. Halpern-Felsher and colleagues (2000) showed greater provision of services among female physicians, recent graduates from medical school, and providers with a greater number of older adolescent patients (Halpern-Felsher et al. 2000).

Provision of Pharmacological Agents

Given that adolescent smokers who are trying to quit experience similar withdrawal symptoms to adults, it has been suggested that adolescents might benefit from the use of pharmacological agents (i.e., nicotine replacement therapy [NRT]) to aid in cessation. Despite evidence that nicotine replacement therapy, coupled with counseling, has been effective with adults, few health care providers have used NRTs with their adolescent patients and even fewer controlled clinical trials have been published. A study conducted by Hurt and colleagues (Hurt et al. 2000) examined the efficacy of NRT in adolescent smokers. The intervention consisted of 6 weeks of nicotine patch therapy plus a minimal behavioral intervention. Despite adolescent participants' moti-

vation to quit, the authors reported only a 5 percent smoking abstinence rate over the 6-month study period, which is a rate no greater than abstinence rates among adolescents quitting on their own. More recently, Killen and colleagues (2004) published their results of a study on the efficacy of smoking cessation treatment for adolescents that combined nicotine patch treatment with bupropion, an aminoketone antidepressant that has been successful in aiding adults to quit smoking. Adolescents were randomized into two groups for a 26-week assessment period: nicotine patch plus bupropion or nicotine patch plus placebo. Both groups also received group-based skills training. Results indicated that the addition of bupropion was not an added benefit to the use of nicotine replacement alone on smoking abstinence. After 10 weeks of assessment, adolescents' rates of smoking abstinence were 23 percent and 28 percent for the patch plus bupropion and the patch plus placebo, respectively. After 26 weeks, these rates fell to 8 percent and 7 percent, respectively. Although bupropion did not provide added value, it was clear that the use of nicotine replacement plus the skills training was at least partly effective, suggesting that further research on the use of NRT in adolescents is encouraging.

Barriers to Provision of Clinical Preventive Services to Youth

Physicians cite a number of barriers to their provision of clinical preventive services, including: (1) a large number of patients which results in time constraints per patient, (2) inadequate reimbursement relative to the time and effort required to provide such services, (3) fear of alienating patients and families, (4) insufficient education and training, (5) lack of dissemination to physicians of research supporting positive treatment outcomes and negative effects of failure to intervene, and (6) lack of information about how to access referral and treatment resources (Kulig 2005; Cheng et al. 1999). Research also suggests that physicians' self-efficacy to screen adolescents about tobacco use is related to their delivery of preventive services (Cheng et al. 1999; Ozer et al. 2004).

Clinical Preventive Services: Effects on Youth Smoking

Physicians' role in preventing or reducing tobacco use among children and adolescents may be either direct or indirect. Directly, physicians can screen and educate youth about tobacco use and refer youth who do smoke to cessation programs. Indirectly, physicians can encourage parents to monitor their children's behavior and set firm expectations about not smoking. Unfortunately, little research exists to determine whether increased rates of screening, counseling, and education by physicians actually result in lower rates of tobacco use and higher rates of cessation, nor have studies determined mechanisms by which physician interventions might be most effective (Christakis et al. 2003). One study did investigate whether implementing an office systems approach would prevent or delay adolescents' drinking and smoking behaviors (Stevens et al. 2002). The idea of the office systems approach is that not only does the primary care physician provide anticipatory guidance and screening, but also the entire office staff endorses the prevention messages and prevention materials are provided in the office. Stevens and colleagues (2002) found that, despite evidence that their intervention was implemented successfully, it had no significant impact on adolescents' tobacco use. The authors suggested that their program might have been ineffective in part because it focused on increasing parent-child communication rather than targeting the adolescents' behaviors per se. More recently, Ozer and colleagues (2004) presented preliminary results that compared to adolescents in comparison sites, adolescents participating in clinical preventive services in managed care settings were less likely to increase their tobacco use over a one-year period (Ozer et al. 2004). However, the effects on to-

bacco use initiation were not reported. Three other studies, using randomized controlled trials of smoking prevention interventions in medical settings, found that preventive services had no effect on youth smoking (Kentala et al. 1999). Fidler and Lambert (2001) found a small but significant difference in smoking rates between youth in the intervention and control group (Fidler and Lambert 2001). Curry and colleagues (2003) implemented and evaluated a randomized trial of a family-based smoking prevention program in a managed care setting (Curry et al. 2003). The intervention included a smoking prevention kit mailed to parents, parent newsletters, follow-up telephone calls by health educators, materials for the children, and information placed in medical records and charts as reminders to the physician to deliver prevention messages. Despite their careful design and implementation of the intervention, evaluation results showed no program effects. Although the intervention had small but significant effects on increasing parent-child communication about tobacco, no differences between the intervention and control groups were found in rates of susceptibility to smoking, experimentation with smoking, or monthly smoking rates.

INTERVENTIONS AIMED AT INCREASING CLINICAL PREVENTIVE SERVICES

A number of different types of interventions (e.g., physician training, charting forms, and electronic prompts) have been developed and tested to improve the preventive services of primary care physicians, yielding small to moderate effects on clinical service provision. These various interventions are reviewed next.

Physician Training

Training sessions to increase physicians' screening and counseling during routine medical visits have been implemented and evaluated, with mixed results depending on the type and intensity of training. Overall, however, the research shows that physicians' rates of screening and educating about tobacco use can be increased through training in which physicians are provided with knowledge, attitudes, and skills that are necessary for behavior change (Lustig et al. 2001; Ozer et al. 2005). For example, Lustig and colleagues (2001) showed that the average percentage of adolescents screened for tobacco use went from 64 percent pre-training to 76 percent post-training (Lustig et al. 2001). Similarly, the average percentage of adolescent patients who received brief counseling concerning tobacco use also increased, from 60 to 69 percent. Physicians were also more likely to discuss confidentiality with adolescent patients following skills-based training (Lustig et al. 2001). This later finding is important given research indicating that adolescents are more likely to disclose their engagement in risk behaviors if they believe their discussions with their physicians will be kept confidential (Ford et al. 1997). This adolescent concern emphasizes the need to query youth about their tobacco use and other risk behaviors in a private office space with parents and other authority figures not proximal to these conversations (Kulig 2005). Klein and colleagues (2001b) conducted in-depth training of the American Medical Association Guidelines for Adolescent Preventive Services (GAPS) guidelines in 5 community health centers (Klein et al. 2001b). Their evaluation showed significant increases in the process of delivery of care, with a greater number of adolescents receiving comprehensive screening and counseling and more health education materials that were in accord with the GAPS guidelines.

Charting Tools and Reminders

Even with successful skills-based training, research suggests that physicians need charting tools and reminders in order to continue their preventive services. Further, physicians' screening and counseling rates for tobacco use can be improved through training, introduction of charting forms concerning screening and counseling, and with the addition of an on-site health educator (e.g., Klein et al. 2001b). The addition of screening tools as well as the addition of resources from a health educator in the clinic also significantly increase the likelihood that an adolescent will be screened and counseled about their alcohol use (Ozer et al. 2001; see also Sims et al. 2004). Similarly, Gadowski and colleagues showed that integrating the GAPS questionnaire into routine medical care significantly increased the documentation of risk behaviors, although no changes in referral rates of follow-up visits were noted (Gadowski et al. 2003).

Use of Electronic Prompts and Electronic Patient Records

The use of Electronic Medical Records (EMRs) is an additional tool used to improve rates and quality of preventive care to youth. EMRs can improve access to patient data, provide more efficient means of documenting services, provide prompts to healthcare professionals, and provide key data and instructional information for patients (Adams et al. 2003). Despite recent development and implementation of EMRs, their use in a pediatric setting is not widespread; and few studies have examined their effectiveness at increasing provision of preventive services. Adams and colleagues (2003) conducted one of the only studies on the use of comprehensive EMRs by pediatricians and nurse practitioners (Adams et al. 2003). The authors developed a pediatric EMR that resembled traditional paper-and-pencil forms but provided healthcare professionals with prompts and areas of inquiry as to whether the service was provided. Computers containing these EMRs were located in each examination room and, through the clinic, allowed for documentation of each patient visit. Using a pre-post intervention design, the authors found that the delivery of primary care was enhanced with the implementation of the EMRs over the more traditional paper-and-pencil documentation forms in all areas, and especially for the area of risk assessment, including asking about smoking in the home. In addition to providing the pediatrician prompts for assessment areas, the computers allowed for enhanced anticipatory guidance and the provision of educational materials that could be easily printed, in multiple languages, for the patient and their family. Finally, the study showed that healthcare providers and their patients were positive about the use of the EMRs, reporting that quality of care and guidance was improved. However, the providers noted that direct eye contact with patients was reduced through the use of the EMRs. Nevertheless, all providers recommended continued use of the EMRs.

In a pilot study, Toth-Pal and colleagues (2004) developed, implemented, and evaluated the use of a computer-generated on-screen reminder for physicians caring for elderly patients (Toth-Pal et al. 2004). Their pilot data indicated that both laboratory and manual screening tests, as well as emergence of new diagnoses and treatment, increased among general practitioners in the computer-generated prompt group, compared to control.

Schellhase and colleagues (2003) conducted a survey of 51 primary care providers—including providers in family medicine, internal medicine, and pediatrics—to discern providers' use of and attitudes toward reminder systems embedded within EMRs (Schellhase et al. 2003). The authors found that 75 percent of the clinicians liked or loved the EMR system, nearly half felt that the automatic reminders improved care, and the majority of respondents did not feel that the reminder system was intrusive on their decision-making autonomy. Despite these favorable attitudes, the health maintenance reminder system was under-utilized, with the overwhelming

majority of clinicians reporting that they never or seldom looked for the reminder alert and that they typically ignored the alert when they did notice it. EMRs also provide opportunities to assess quality of preventive care, improving upon assessment methods utilizing surveys or chart reviews (Vogt et al. 2004).

Studies have suggested that computer-based and computer-generated clinical reminders are an efficient and effective strategy for increasing provision of clinical services (see Shea et al. 1996 and Austin et al. 1994 for a review and meta-analysis; see also Morris et al. 2004 and Schellhase et al. 2003). Nevertheless, adherence to recommendations for clinical preventive service remains even in clinics utilizing such reminder prompts (Schellhase et al. 2003).

SUMMARY AND RECOMMENDATIONS

Given that most adolescents attend an annual health care visit, physicians have the opportunity to provide adolescents with confidential screening, education, and counseling concerning their engagement in risk behaviors, including tobacco use. Despite national guidelines, research clearly shows that physicians' rates of screening, educating, and counseling their adolescent patients about tobacco use and cessation are far below recommended levels. While such delivery of preventive services has been below levels suggested by national guidelines, research clearly shows that rates of screening and anticipatory guidance can increase through skills-based training, inclusion of screening and charting tools, and resources such as health educators in the clinic. Unfortunately, there is a dearth of literature examining whether the successful implementation of preventive services actually reduces adolescent tobacco use. However, preliminary studies suggest a positive relationship between training and delivery of preventive services around tobacco use. Further, we lack information on the mechanisms by which physician screening and education effects tobacco use. Such information is critical if we are to be able to provide specific recommendations concerning the implementation of clinical preventive services as a successful route to tobacco use prevention or intervention. Thus, additional research on the implementation and evaluation of preventive services are needed to determine whether and how physician training leads to increased services and reduced tobacco use.

Given the literature and promising results thus far, we recommend that every youth coming to any health care provider (including annual visits, urgent care, and ER visits as well as sports physicals and camp physicals) should be screened and counseled about tobacco use. This screening and education should include regular cigarettes, light cigarettes, bidis, loose tobacco, and so on. Youth who screen positive for tobacco use should be referred to cessation programs.

REFERENCES

- Adams WG, Mann AM, Bauchner H. 2003. Use of an electronic medical record improves the quality of urban pediatric primary care. *Pediatrics* 111(3):626-632.
- Austin SM, Balas EA, Mitchell JA, Ewigman BG. 1994. Effect of physician reminders on preventive care: meta-analysis of randomized clinical trials. *Proceedings of the Annual Symposium on Computer Applications in Medical Care* 121-124.
- Blum RW, Beuhring T, Wunderlich M, Resnick, MD. 1996. Don't ask, they won't tell: the quality of adolescent health screening in five practice settings. *American Journal of Public Health* 86:1767-1772.
- Cheng TL, DeWitt TG, Savageau JA, O'Connor KG. 1999. Determinants of counseling in primary care pediatric practice: Physician attitudes about time, money, and health issues. *Archives of Pediatric and Adolescent Medicine* 153:629-635.
- Christakis DA, Garrison MM, Ebel BE, Wiehe SE, Rivara FP. 2003. Pediatric smoking prevention interventions delivered by care providers: a systematic review. *American Journal of Preventive Medicine* 25(4):358-362.
- Curry SJ, Hollis J, Bush T, Polen M, Ludman EJ, Grothaus L, McAfee T. 2003. A randomized trial of a family-based smoking prevention intervention in managed care. *Preventive Medicine* 37(6):617-626.
- DHHS. 1998. *Clinician's Handbook of Preventive Services: Put Prevention into Practice (2nd ed)*. McLean, VA: International Medical Publishing.
- Elster AB, Kuznets NJ. 1994. *AMA Guidelines for Adolescent Preventive Services (GAPS): Recommendations and Rationale*. Baltimore, MD: Williams & Wilkins.
- Ewing GB, Selassie AW, Lopez CH, McCutcheon EP. 1999. Self-report of delivery of clinical preventive services by U.S. physicians: comparing specialty, gender, age, setting of practice, and area of practice. *American Journal of Preventive Medicine* 17:62-72.
- Fidler W, Lambert TW. 2001. A prescription for health: a primary care based intervention to maintain the non-smoking status of young people. *Tobacco Control* 10(1):23-26.
- Ford CA, Millstein SG, Halpern-Felsher BL, Irwin CE Jr. 1997. Influence of physician confidentiality assurances on adolescents' willingness to disclose information and seek future health care. A randomized controlled trial. *Journal of the American Medical Association* 278(12):1029-1034.
- Gadamski A, Bennett S, Young M, Wissow LS. 2003. Guidelines for adolescent preventive services: The GAPS in practice. *Archives of Pediatric and Adolescent Medicine* 157:426-432.
- Galuska DA, Fulton JE, Powell KE, Burgeson CR, Pratt M, Elster A, Griesemer BA. 2002. Pediatrician counseling about preventive health topics: results from the Physicians' Practices Survey, 1998-1999. *Pediatrics* 109: e83
- Green M, Palfrey JS. 2000. *Bright Futures: Guidelines for Health Supervision of Infants, Children and Adolescents (2nd ed)*. Arlington, VA: National Center for Education in Maternal and Child Health.
- Green M, Palfrey JS. 2002. *Bright Futures: Guidelines for Health Supervision of Infants, Children, and Adolescents (3rd ed)*. Arlington, VA: National Center for Education in Maternal and Child Health.
- Halpern-Felsher BL, Ozer EM, Millstein SG, Wibbelsman CJ, Fuster CD, Elster AB, Irwin CE Jr. 2000. Preventive services in a health maintenance organization: how well do pediatricians screen and educate adolescent patients? *Archives of Pediatric and Adolescent Medicine* 154(2):173-179.
- Hurt RD, Croghan GA, Beede SD, Wolter RD, Croghan IT, Patten CA. 2000. Nicotine patch therapy in 101 adolescent smokers: efficacy, withdrawal symptom relief, and carbon monoxide and plasma cotinine levels. *Archives of Pediatric and Adolescent Medicine* 154:31-37.
- Igra V, Millstein SG. 1993. Current status and approaches to improving preventive services for adolescents. *Journal of the American Medical Association* 269(11):1408-1412.
- Kentala J, Utriainen P, Pahkala K, Mattila K. 1999. Can brief intervention through community dental care have an effect on adolescent smoking? *Preventive Medicine* 29(2):107-111.
- Killen JD, Robinson TN, Ammerman S, Hayward C, Rogers J, Stone C, Samuels D, Levin SK, Green S, Schatzberg AF. 2004. Randomized clinical trial of the efficacy of bupropion combined with nicotine patch in the treatment of adolescent smokers. *Journal of Consulting and Clinical Psychology* 72:729-735.
- Klein JD. Incorporating effective smoking prevention and cessation counseling into practice. 1995. *Pediatric Annals* 24:646-652.

- Klein JD, Allan MJ, Elster AB, Stevens D, Cox C, Hedberg VA, Goodman RA. 2001a. Improving adolescent preventive care in community health centers. *Pediatrics* 107:318-327.
- Klein JD, Levine LJ, Allan MJ. 2001b. Delivery of smoking prevention and cessation services to adolescents. *Archives of Pediatric and Adolescent Medicine* 155(5):597-602.
- Kulig JW. 2005. Tobacco, alcohol, and other drugs: the role of the pediatrician in prevention, identification, and management of substance abuse. *Pediatrics* 115(3):816-821.
- Levenberg PB, Elster AB. 1995. *Guidelines for Adolescent Preventive Services (GAPS): Implementation and Resource Manual*. Chicago, IL: AMA.
- Lustig JL, Ozer EM, Adams SH, Wibbelsman CJ, Fuster CD, Bonar RW, Irwin CE Jr. 2001. Improving the delivery of adolescent clinical preventive services through skills-based training. *Pediatrics* 107(5):1100-1107.
- Marks A, Fisher M, Lasker S. 1990. Adolescent medicine in pediatric practice. *Journal of Adolescent Health Care* 11(2):149-153.
- Morris CJ, Rodgers S, Hammersley VS, Avery AJ, Cantrill JA. 2004. Indicators for preventable drug related morbidity: application in primary care. *Quality and Safety in Health Care* 13(3):181-185.
- Ozer EM, Adams SH, Gardner LR, Mailloux DE, Wibbelsman CJ, Irwin CE Jr. 2004. Provider self-efficacy and the screening of adolescents for risky health behaviors. *Journal of Adolescent Health* 35(2):101-107.
- Ozer EM, Adams SH, Lustig JL, Gee S, Garber AK, Gardner LR, Rehbein M, Addison L, Irwin CE Jr. 2005. Increasing the screening and counseling of adolescents for risky health behaviors: a primary care intervention. *Pediatrics* 115(4):960-968.
- Ozer EM, Adams SH, Lustig JL, Millstein SG, Camfield K, El-Diwany S, Volpe S, Irwin CE Jr. 2001. Can it be done? Implementing adolescent clinical preventive services. *Health Services Research* 36(6 Pt 2):150-165.
- Schellhase KG, Koepsell TD, Norris TE. 2003. Providers' reactions to an automated health maintenance reminder system incorporated into the patient's electronic medical record. *Journal of the American Board of Family Practice* 16(4):312-317.
- Shea S, DuMouchel W, Bahamonde L. 1996. A meta-analysis of 16 randomized controlled trials to evaluate computer-based clinical reminder systems for preventive care in the ambulatory setting. *Journal of the American Medical Informatics Association* 3(6):399-409.
- Sims TH, Maurer JR, Sims M, Layde PM. 2004. Factors associated with physician interventions to address adolescent smoking. *Health Services Research* 39:571-585.
- Stein M. 1997. *Guidelines for Health Supervision (3rd ed)*. Elk Grove, IL: American Academy of Pediatrics.
- Stevens MM, Olson AL, Gaffney CA, Tosteson TD, Mott LA, Starr P. 2002. A pediatric, practice-based, randomized trial of drinking and smoking prevention and bicycle helmet, gun, and seatbelt safety promotion. *Pediatrics* 109(3):490-497.
- Toth-Pal E, Nilsson GH, Furhoff AK. 2004. Clinical effect of computer generated physician reminders in health screening in primary health care—a controlled clinical trial of preventive services among the elderly. *International Journal of Medical Informatics* 73(9-10):695-703.
- U.S. Preventive Services Task Force. 1996. *Guide to Clinical Preventive Services (2nd ed)*. Alexandria, VA: International Medical Publishing.
- U.S. Preventive Services Task Force. 2004. *Guide to Clinical Preventive Services: Report of the U.S. Preventive Services Task Force*. Washington DC: U.S. Dept. of Health and Human Services
- Vogt TM, Aickin M, Ahmed F, Schmidt M. 2004. The Prevention Index: using technology to improve quality assessment. *Health Services Research* 39(3):511-530.

G

Reducing and Preventing Tobacco Use Among Pregnant Women, Parents, and Families

Bonnie L. Halpern-Felsher
Department of Pediatrics
University of California, San Francisco

Joan K. Orrell-Valente
Department of Pediatrics
University of California, San Francisco

REDUCING AND PREVENTING TOBACCO USE AMONG PREGNANT WOMEN, PARENTS, AND FAMILIES

Parent smoking poses health risks to children in utero and beyond. This risk may actually increase over time when one considers the cumulative effects of risk to the fetus from maternal smoking during pregnancy, exposure to household environmental smoke, and the fact that parent smoking predicts child smoking. Parents rightly represent a prime target for tobacco cessation interventions.

In this appendix, we provide an overview of the risks to children of maternal smoking during pregnancy, of exposure to household environmental smoke, and of becoming a smoker if parents and/or siblings smoke. We also identify factors associated with parent smoking versus parent cessation. An understanding of these factors can be useful in guiding the design and implementation of more effective interventions. Throughout, we provide a review of intervention efforts aimed at preventing or reducing tobacco use. We conclude with a set of recommendations for future prevention and intervention efforts.

SMOKING DURING PREGNANCY

Despite known risk factors, rates of smoking among pregnant women remain alarmingly high. Data from the United States Vital Statistics shows that approximately 13 percent of women smoke during pregnancy (Ventura et al. 2000). Analysis of data from the Centers for Disease Control and Prevention's Pregnancy Risk Assessment Monitoring System (PRAMS) for 1993 through 1999 showed that rates of smoking among pregnant women declined from 15.8 percent in 1993 to 12.3 percent in 1999 (Colman and Joyce 2003). The data also indicated that, on average, 26 percent of women smoked 3 months prior to pregnancy during the 1993–1999 period of data collection. Data from the 1998 National Health Interview Survey (NHIS) indicated that 19 percent of the women reported smoking at the beginning of their last pregnancy, and almost 12 percent smoked at some point during their pregnancy (Yu et al. 2002).

Rates of tobacco use during pregnancy vary by women's age, ethnicity, socioeconomic status (SES), and region of residence (Pickett et al. 2003; Ventura et al. 2000; Yu et al. 2002). Most tobacco use among pregnant women occurs in white women, women of low SES and/or educa-

tional level, and women who initiated smoking during their adolescent years (DiClemente et al. 2000; Goldenberg et al. 2000; Pickett et al. 2003; Yu et al. 2002). Tobacco use among pregnant women also occurs at greater rates among women who engage in other harmful health behaviors, are most heavily addicted to tobacco, and have the fewest psychosocial resources to overcome the addictive behavior (e.g., DiClemente et al. 2000; Goldenberg et al. 2000). It is perhaps important to recognize that these women represent a population subgroup that may be most resistant to cessation efforts given that they appear to have opted to smoke despite prevailing anti-smoking social norms and messages concerning the harm of smoking in general and during pregnancy (DiClemente et al. 2000).

Maternal smoking remains the single most important modifiable cause of poor pregnancy outcome in the United States, accounting for a significant proportion of babies with low birth weight, pre-term births, and perinatal deaths such as sudden infant death syndrome (SIDS) (Orleans et al. 2000). Such negative effects have been shown to occur even at moderate levels of smoking (e.g., less than eight cigarettes per day). Further, studies have shown that maternal smoking during pregnancy contributes to a range of health and developmental complications for children, including changes in fetal brain and nervous system development, respiratory illnesses, ear infections, language delays, higher activity, increased tantrums, and lower social competence (e.g., Anderson and Cook 1997; Ashmead 2003; DiFranza and Lew 1995; Faden et al. 2000; Slotkin 1998; Wisborg et al. 1999). These risks related to maternal smoking prompted the *Healthy People 2010* objective to reduce smoking rates among pregnant women to no more than 2 percent (DHHS 2000).

Smoking Cessation During Pregnancy

Many women quit smoking at some point during their pregnancy, with most cessation attempts occurring upon first learning about their pregnancy status (e.g., Pickett et al. 2003). Cessation efforts may be permanent, limited to the duration of their pregnancy, or sporadic during pregnancy, while other women simply reduce their amount of smoking. Data from the PRAMS study showed that an average of 42.5 percent of the women quit smoking at some point during their pregnancy, with quit rates increasing from 1993 through 1999 (Colman and Joyce 2003). Data from the NHIS 1991 Pregnancy and Smoking Supplement showed that while almost 40 percent of the pregnant women quit smoking for at least 1 week, almost half of these women resumed smoking at some point during their pregnancy (Pickett et al. 2003; see also Yu et al. 2002). Quit attempts were most prevalent in the first trimester, although attempts at smoking cessation occurred throughout the pregnancy.

Quit rates among pregnant women vary by demographic factors, with cessation more likely among adolescents, older women, women at first pregnancy, more educated women, Hispanic women, women with lower nicotine dependence, and women who smoke fewer than 10 cigarettes per day (Colman and Joyce 2003; Pickett et al. 2003; Yu et al. 2002). Low SES also appears to be a primary characteristic that distinguishes women who quit from women who continue smoking during pregnancy (e.g., Panjari et al. 1997; Quinn et al. 1991). Importantly, these women are subject to the cumulative stress of the range of physical and psychosocial conditions that are associated with lower SES. They are known to have more emotional problems, less social support, fewer financial resources, and residential instability (Paarlberg et al. 1999; Panjari et al. 1997). Too often, the pregnancy may have been unplanned, possibly resulting in the woman viewing her pregnancy as an additional stressor. Tobacco use may represent, in effect, a way of coping with stress.

Unfortunately, there are few intervention efforts aimed at getting pregnant women to stop smoking. Most of these efforts are brief, office-based interventions incorporated into prenatal care visits and have been shown to have minimal effect (Orleans et al. 2000). Despite guidelines emphasizing the need for clinicians to treat tobacco use during pregnancy through repeated screening, counseling, and treatment, few clinicians even inquire as to whether a pregnant woman is smoking, and inquiries are generally limited to the first visit, with follow-up inquiries rarely occurring (e.g., Pickett et al. 2003; Orleans et al. 2000). Studies show, at best, moderate rates of provider delivery of tobacco screening and counseling services, with services declining dramatically over the course of pregnancy and postpartum. Orleans and colleagues' (2000) review showed that less than one-half of medical providers routinely screened and advised their patients about smoking, and less than one-third discussed smoking cessation with their patients who smoked (Orleans et al. 2000). Pbert and colleagues (2004) found that whereas 52 percent of patients reported that their obstetric clinician intervened at the baseline prenatal visit, only 19 percent reported intervention at the 9-month prenatal visit, while 13 and 15 percent, respectively, reported intervention by their pediatric clinician at the 3-month and 6-month postpartum visits. Given very high postpartum relapse rates (Carmichael and Ahluwalia 2000; Fingerhut et al. 1990; see more information below), it is clearly not enough to intervene only once and only early during pregnancy. Even when clinical providers do inquire about smoking, a significant proportion of pregnant smokers do not accurately disclose their smoking status to their obstetric providers, so no intervention is ever attempted. Estimates go as high as 15 to 20 percent, prompting calls to include cotinine screening as part of routine prenatal screening procedures (Walsh et al. 1996; see also Owen and McNeill 2001). Even when the best clinical practices are implemented, studies indicate that fewer than 20 percent of addicted smokers succeed in quitting (Orleans et al. 2000).

One recent intervention study found that for the most at-risk population of low income pregnant and postpartum women, a relatively low level of social support from a nonsmoking friend or acquaintance identified by the women and modest financial incentives donated by local health care organizations were effective in smoking cessation (Donatelle et al. 2000). Thus, interventions that work in the context of these women's lives to reduce stress appear to be of benefit. It is further suggested that these women may benefit from learning more adaptive ways of coping and receiving interventions that focus also on the development of a sense of self-efficacy, which is likely to be necessary for smoking cessation.

Quit Together was a randomized controlled trial of a smoking cessation intervention aimed at getting low-income pregnant women to quit smoking during pregnancy and to maintain smoking cessation postpartum (Ma et al. 2005; see also Pbert et al. 2004). In the intervention, health care providers were trained to implement national clinical preventive service guidelines based on the pregnant woman's readiness for change. Services included routine screening; reminders to providers to provide services; distribution of materials to the patients; follow-ups; and coordination among providers in obstetrics, pediatrics, and the Women, Infants, and Children (WIC) program (Ma et al. 2005). Controlling for demographic characteristics related to smoking cessation (e.g., age, ethnicity), women in the intervention group were more likely to quit smoking during pregnancy and to be abstinent at time of delivery than were women receiving usual care.

Tobacco cessation efforts have also been found to be subpar at the institutional level. An evaluation of 76 federally funded programs to reduce infant mortality rates among high-risk women shows that these programs fail to identify tobacco cessation activities as a high priority,

are poorly funded, have inadequately trained staff, and have few intervention materials (Klerman et al. 2000).

Taken together, the high rates of smoking among pregnant women as well as the low rates of sustained smoking cessation during pregnancy, along with the lack of effective interventions, present an important call to action. These findings speak to the need for the development of more clinical preventive guidelines for the continual screening, education, and treatment of tobacco use among pregnant women throughout the entire pregnancy. Moreover, the results strongly suggest the need for clinician training and education in implementing the clinical guidelines. Finally, it is clear that in addition to health professionals providing clinical preventive services, cessation tools should be made readily available to the pregnant woman directly.

Rates of Smoking Relapse Postpartum

For women who quit smoking during pregnancy, postpartum relapse rates are alarmingly high. It is estimated that up to 70 percent of women resume smoking within 6 months of giving birth. Data from the PRAMS study indicated that more than half of the women who quit smoking during pregnancy went on to smoke again between 2 and 6 months postpartum (Colman and Joyce 2003). Relapse rates were highest among adolescents, less educated women, women who smoked more than 10 cigarettes prior to pregnancy, and low-SES women (Mullen et al. 1997). Concern over such high rates of postpartum relapse stem not only from the continued harm to the mother, but from the effect of secondhand smoke on the child and the entire family (see below).

Probable explanations for such rates of postpartum relapse are based in the transtheoretical Stages of Change Model (Prochaska and DiClemente 1992) and in the theory of extrinsic versus intrinsic motivation and behavior (DiClemente 1999). There is evidence to suggest that the primary motivation for spontaneously quitting smoking during pregnancy is centered on the health and well-being of the fetus, and not necessarily the health of the mother or the improvement in the overall household environment (e.g., McBride and Pirie 1990). Similarly, one primary thrust of tobacco cessation efforts aimed at expectant mothers is the reduction of fetal risk. The birth of the baby essentially obviates this extrinsic motivating factor, and the mother (who is adjusting to the stress of a new baby) can rationalize both smoking resumption and protection of her child by not smoking in the presence of the baby, (e.g., going outdoors). Of note also is that pregnant women who spontaneously quit smoking during pregnancy exhibit process-of-change characteristics that suggest that they are not deciding to quit smoking but to suspend smoking temporarily. These women appear more akin to nonpregnant women in the contemplation or preparation stages of change than they are to nonpregnant women who are in the action stage of quitting smoking. It would appear that a focus on the range of benefits that accrue from quitting, which include intrinsic benefits to the mothers, may be more effective in relapse prevention.

Interestingly, although the Quit Together intervention described above, in which the specific delivery of the intervention was based on the patients' age and level of addiction, did have success in terms of the cessation rates during pregnancy and at time of delivery, participants in the intervention group were no more likely than patients receiving usual care to maintain smoking abstinence postpartum (Ma et al. 2005). Results from their process evaluation suggested that the lack of intervention effect on postpartum smoking rates was due largely to lack of continued intervention as well as limited focus on postpartum support to continue smoking cessation. Their results strongly suggest the need to create a system of continued support and clinical guidelines for smoking cessation postpartum.

A potent influence on smoking during pregnancy and risk for relapse after pregnancy is having a partner who smokes. Expectant mothers whose partners are smokers report less support to quit and less likelihood of quitting than expectant mothers whose partners were nonsmokers (e.g., Ko and Schulken 1998; McBride et al. 1998). Evidently, partners must be included within the purview of tobacco cessation efforts. In fact, Project PANDA, an intervention consisting of videos and newsletters mailed to women during the final weeks of pregnancy and the first 6 weeks postpartum, included such a component, also mailing intervention materials geared to the male perspective. This intervention showed significant success with the women through the 12-month follow-up. Compared to controls, men were significantly more likely to be abstinent at the 3-month follow-up, though not at later follow-up (Mullen et al. 2000).

REDUCING EXPOSURE TO SECONDHAND SMOKE

Not surprisingly, the most important source of environmental tobacco smoke exposure of young children is parental smoking (Jordaan et al. 1999). National data indicate that almost 40 percent of U.S. children under the age of 5 live with at least one parent or guardian who smokes. Children who are regularly exposed to environmental tobacco smoke are at greater risk for a variety of respiratory ailments including asthma, bronchitis, and pneumonia (AAP 1986; Di Franza and Lew 1996; Etzel 1997; Gortmaker et al. 1982; Mannino et al. 1996). These children also miss more days of school due to illness than children of nonsmokers (Mannino et al. 1996).

To date, there have been few attempts to reduce children's passive smoke exposure. In fact, Emmons and colleagues (2001) identified only four such interventions. These interventions tended to target new mothers, were delivered by pediatric clinicians, and consisted of self-help written materials. They were not effective. Objective measures of children's exposure to tobacco smoke showed that the interventions had no significant outcomes. More success was observed with Project KISS (Keeping Infants Safe from Smoke). This project compared a motivational intervention with a self-help intervention. The motivation intervention targeted parents of children younger than 3 years old, was delivered to parents in the home by a health educator, and consisted of a 30 to 45-minute motivational interviewing session and four follow-up telephone counseling calls. The self-help intervention consisted of a mailed smoking cessation manual, tip-sheet, and resource guide (Emmons et al. 2001). Nicotine levels were significantly lower at 3- and 6-month follow-up for parents participating in the motivational intervention. No decrease in nicotine levels was observed in the parents in the self-help condition.

Despite the lack of formal interventions aimed at increasing smoke-free homes, studies have examined the extent to which parents are placing restrictions on smoking in their homes. Across studies, findings indicate fewer than 40 percent of the homes studied were smoke-free. Household smoking bans were more likely to occur in houses in which there were children and when at least one parent was a nonsmoker (Ashley et al. 1998; Okah et al. 2002; Pizacani et al. 2002). Clearly, more work is needed through public health messages as well as through health care providers to educate adults and children about the effects of secondhand smoke and to encourage smoking bans in all households.

PARENT SMOKING AND PARENTING BEHAVIOR AS A PREDICTOR OF YOUTH SMOKING

Despite theories in the lay and scientific arenas suggesting that peers wield the greatest influence on children's and adolescents' behavior, the scientific evidence indicates that parents in fact

remain a very important influence on adolescent development and behavior (e.g., Collins et al. 2000; Kerr et al. 1999). This may be the case in part because friendship groups change over time whereas parents generally remain a stable entity and force in adolescents' lives.

Studies have consistently demonstrated an association between parent smoking and adolescent smoking (e.g., Chassin et al. 1996; Flay et al. 1998; Fagan et al. 2005; Jackson and Henriksen 1997; Simons-Morton et al. 2004; Tilson et al. 2004). Chassin and colleagues (2005) have found that general parenting style with regard to parental behavioral control and acceptance prospectively and uniquely predicts adolescent smoking. Specifically, engaged parents relative to disengaged parents were less likely to initiate smoking. Interestingly, this effect was not explained by parents' smoking-specific practices (Chassin et al. 2005). As these researchers point out, the results suggest that parenting interventions may be more effective if broadened beyond a focus on smoking-specific practices.

The primary parenting mechanisms that have emerged as related to adolescent smoking are parent role modeling and parent monitoring. The thrust of both parent modeling and monitoring is centered in parents' explicit and implicit communication of antismoking socialization of their children. Moreover, Bauman and colleagues (1990) found that parent lifetime smoking is actually more strongly related to adolescent smoking than parent current smoking, suggesting that the association cannot be explained simply as the child imitating the parents (Bauman et al. 1990). As Bandura (1986) has noted, however, ". . . modeling (is) one of the most powerful means of transmitting values, attitudes, and patterns of thought and behavior" (Bandura 1986, p. 47). Indeed, parents with a history of smoking tend to hold and communicate weaker antismoking beliefs to their offspring, to be less likely to have household smoking rules (Kodl and Mermelstein, 2004), to see themselves as less influential in their children's decision to smoke, and to be more likely to see adolescent tobacco use as inevitable (Clark et al. 1999). In addition, it is important to note that the risk rates for children of former smokers are similar to the risk rates for children of current smokers, suggesting that parent modeling effects may be resistant to parents' quitting smoking. As pointed out by Jackson and Henriksen (1997), this may be the case either because parent's behavior change is not accompanied by similar change in their fundamental smoking beliefs or because parents do not use their behavior change as an opportunity to convey strong antismoking messages to their children. An extremely relevant finding is that children are less likely to smoke when parents engage in antismoking socialization even when parents are current smokers (Jackson and Henriksen 1997).

Parental monitoring, as recently reconceptualized and illuminated by Kerr and Stattin (2000) and Kerr and colleagues (2000), is based squarely within the domain of quality of the parent-adolescent relationship and parent-adolescent communication. It encompasses a range of knowledge about the adolescent that necessarily comes from the adolescent him- or herself through either voluntary sharing of information; active parent solicitation of information concerning his or her experiences, activities, and whereabouts; or knowing the adolescent's friends and peers. Clearly, the extent of mutual warmth and trust is directly related to the quality of parent-adolescent communication, particularly as it pertains to risk behaviors (Kerr et al. 1999; Kerr and Stattin 2000). Part of this process includes parental setting of expectations that are clear and age-appropriate with consequences that are fair, affirming, and useful (Connell et al. 1995; Connell and Halpern-Felsher 1995; Halpern-Felsher et al. 1997; Lee and Halpern-Felsher 2001; Kerr and Stattin 2000; Simons-Morton et al. 2004; Stattin and Kerr 2000). Parental monitoring also serves to prevent or reduce adolescents' health-compromising behaviors through the setting of curfews, awareness of and participation in afterschool and weekend activities, and prevention of adoles-

cents' association with risk-taking peers (Cohen et al. 1994; Kerr and Stattin 2000; Stattin and Kerr 2000; Steinberg et al. 1994). Research on parental monitoring has consistently and convincingly shown that it is a critical protective factor with regard to children's and adolescents' tobacco use (e.g., Andersen et al. 2004; Clark et al. 1999; O'Byrne et al. 2002).

Sibling Effects on Adolescent Tobacco Use

Siblings as a source of influence on adolescent tobacco use have received far less empirical attention than other potential interpersonal sources of influence, such as parents and peers. Notably, however, the available research points to the possibility that older sibling smoking may actually exert a greater influence on adolescent smoking than parent smoking does (e.g., Avenevoli and Merikangas 2003; Boyle et al. 2001), with older siblings influencing not only the level of younger sibling smoking but also their rate of use over time (Duncan and Aber 1997). Even more remarkably, classic twin studies have consistently suggested that initiation and rate of tobacco use may be influenced more strongly by shared environmental factors—social factors that promote sibling similarity—than by genetic factors (e.g., Li et al. 2003). Most recently, Slomkowski and colleagues (2005) utilized the Add Health sample of sibling pairs, representing the range of genetic relatedness, to disentangle genetic from nongenetic effects and to elucidate the sibling relationship dynamics that underlie any social processes (Slomkowski 2005). Both genetic and shared environment were found to contribute independently to adolescent smoking, with social connectedness between siblings moderating the effects of the shared environmental factors. Thus, sibling influence must be recognized as a social risk factor. Prevention and intervention programs aimed at reducing adolescent tobacco use would benefit from research to provide detail on the mechanisms that underlie the sibling effects on adolescent smoking.

Parent- and Family-Focused Interventions to Reduce Adolescent Tobacco Use

Despite compelling evidence showing associations between parent smoking and adolescent smoking, few adolescent tobacco cessation interventions include a parental component. Even less common is research to evaluate the effects of these interventions. Moreover, the intervention studies that have been conducted have serious methodological limitations, including small sample sizes, already-motivated parents, little likelihood of faithful replicability, and assessment of only short-term outcomes.

Focus on Kids (FOK) is a risk reduction intervention that focuses on “naturally occurring” peer groups rather than groups determined by the intervention or investigators. Although this intervention showed some positive short-term effects, its impact decreased over time. The addition of a parental-monitoring component to the intervention, Informed Parents and Children Together (ImPACT), was shown to increase parent–youth communication and adolescent perceptions of parental monitoring; however, ImPACT itself did not have a significant, unique effect on adolescent engagement in risk behavior.

In an extension of this intervention, Stanton and colleagues (2004) conducted a randomized, longitudinal trial in which one group of adolescents received FOK and their parents received a control training, while another group received FOK and parents received ImPACT, and the third group received FOK, ImPACT, and boosters. Results showed that adolescents who received FOK and whose parents received ImPACT were significantly less likely to smoke cigarettes than adolescents exposed only to FOK, indicating that teaching parents to communicate with their

teens and to provide more supervision of adolescents' behaviors can have a positive effect on adolescent behaviors.

Perry and colleagues (1990) were successful at encouraging parents to conduct antitobacco activities with their children in grades 4 through 6, but the effect of these activities on tobacco use was not evaluated (Perry et al. 1990). Biglan and colleagues (1996) examined the influence of two components of a community intervention on tobacco use. One component involved mobilizing peers, and the other mobilizing parents (Biglan et al. 1996). Results showed positive effects of communication activities geared toward increasing knowledge about and more negative attitudes toward tobacco use. Youth exposed to the antitobacco information were more knowledgeable about tobacco and had more negative attitudes toward tobacco use, reporting lower intentions to use tobacco. The effects on long-term intentions and actual tobacco use were not assessed.

Bauman and colleagues (2000; 2001) evaluated the effect of the Family Matters Program, an adolescent tobacco and alcohol prevention program in which four mailings of booklets were made to families, with each mailing followed by a telephone discussion with a health educator. The program evaluation consisted of telephone interviews at 3 and 12 months post-intervention. Results showed a 25 percent reduction in smoking onset for non-Hispanic white adolescents, with no statistically significant effects for the other ethnic groups. In a subsequent study, Bauman and colleagues (2002) showed that the Family Matters Program had a significant effect on reducing the prevalence rates of adolescent smoking, with effect sizes of 0.19 and 0.17 sizes at the 3-month and 12-month follow-up (Bauman et al. 2000; 2001).

Cohen and Rice (1995) found that asking parents to control risk factors, such as limiting adolescents' associations with peers who were smokers, had no significant effects on adolescent substance use. This research suggested that relative to risk factors, a focus on protective factors (e.g., parent monitoring of adolescents' whereabouts, a respectful parent-adolescent relationship with good rapport) might be most beneficial (Cohen and Rice 1995).

Curry and colleagues (2003) implemented and evaluated a randomized trial of a family-based smoking prevention program in a managed care setting. The intervention targeted parents and children aged 10–12 years. In this intervention, a smoking prevention kit was mailed to parents, followed by parent newsletters, telephone calls by health educators, materials for the children, and information placed in medical records and charts as reminders to the physician to deliver prevention messages (Curry et al. 2003). Children were 11 to 14 years old at follow-up. Despite their careful design and implementation of the intervention, evaluation results showed no program effects. Although the intervention had small but significant effects on increasing parent-child communication about tobacco, no differences between the intervention and control groups were found in susceptibility to smoking, experimentation with smoking, or monthly smoking rates. As Curry and colleagues (2003) point out, families in this study were of relatively low risk, and almost all of the parents indicated at baseline that they had talked to their children about smoking. They also admitted that their attempt to engage providers was minimal and, according to patient reports, may largely have failed to follow up. This study suggests that interventions may need to be more intensive to be effective.

SUMMARY AND RECOMMENDATIONS

Reducing tobacco use among pregnant women, parents, and within the family environment will yield dramatic social, physical, and economic benefits. Maternal smoking during pregnancy has been directly linked to low birth weight babies, preterm births, perinatal deaths including

SIDS, and changes in the development of the fetal brain and nervous system. Continued smoking within the home environment also has grave consequences to children as well as adults, including asthma, infections and illness to the ear and lung, and respiratory functioning (see Orleans et al. 2000 for a review).

Recommendations for Prepartum and Postpartum Interventions

Prior to and during pregnancy provides a potentially optimal period for smoking intervention. Not only are women often willing to quit smoking, at least for the sake of their unborn child, but women are also most likely to be encouraged and supported by their family, peers, and medical providers to quit smoking. Unfortunately, current interventions targeting smoking cessation among pregnant women are not optimal, in part due to: (1) the lack of well-developed, effective programs that are ready for mass dissemination; (2) limited adherence to clinical preventive service guidelines; (3) pregnant women not disclosing their smoking status during medical exams; and (4) inadequate programs to address postpartum relapse (Orleans et al. 2000).

Based on the evidence reviewed above, it is clear that early primary prevention of smoking among young women represents our best effort. As such, female smokers should be the target of cessation intervention efforts before, at the beginning of, and throughout pregnancy, as well as postpartum. Not only should obstetric clinicians provide such prevention or intervention services, but pediatric providers should also be mobilized in the delivery of preventive and intervention services. Importantly, cessation programs and services must be sustained even after delivery so as to reduce the likelihood of postpartum relapse. Finally, the expectant mother's close social support network, especially her partner, should be recruited into the cessation efforts. As such, we recommend the development of more clinical preventive guidelines for the continual screening, education, and treatment of tobacco use among pregnant women throughout the entire pregnancy. In addition, every pregnant woman should be told about the harms of smoking while pregnant and screened for tobacco use. Pregnant women who smoked should be referred to a smoking cessation program, and continual follow-ups concerning maternal smoking status should occur.

Recommendations for Reducing Household Environmental Tobacco Smoke Exposure

There is clear evidence that secondhand smoke is harmful and that many children and youth are at great risk of exposure to secondhand smoke in the home. As such, efforts to eliminate or at the very least reduce such home exposure should be made, with an eye toward making all homes smoke-free. Pediatric providers can and should play an important role in the lives of young children who have no control over their exposure to household environmental smoke. At every medical visit, providers should screen, counsel, and educate parents and children about the harmful effects of secondhand smoke and should discuss with parents the importance of keeping a smoke-free home.

Recommendations for Parenting Behaviors

Research shows a direct link between parenting behaviors and children and youth smoking in two critical ways. First, extensive evidence shows that youth reared in homes in which parents have authoritative parenting styles, including warmth and involvement coupled with clear and firm boundaries, as well as active monitoring of their behavior, are less likely to engage in health risk behaviors, including tobacco use. Second, research shows that youth are more likely to

smoke if their parents or others in the household smoke. These two sets of literature suggest that intervention efforts aimed at reducing youth smoking should contain a parent component in which parents are encouraged: (1) not to smoke, (2) to communicate with their children about tobacco use and convey strong antismoking message to them, and (3) to closely monitor their child's behavior. Further, pediatricians, obstetricians, and other health care providers should discuss with parents the importance of discussing tobacco use with their children, including conveying expectations that the child will not smoke and the importance of monitoring their children with regards to tobacco use.

REFERENCES

- AAP (American Academy of Pediatrics). 1986. Involuntary smoking—a hazard to children. *Pediatrics* 77:755-757.
- Andersen MR, Leroux BG, Bricker JB, Rajan KB, Peterson AV. 2004. Antismoking parenting practices are associated with reduced rates of adolescent smoking. *Archives of Pediatric and Adolescent Medicine* 158:348-352.
- Anderson H, Cook D. 1997. Passive smoking and sudden infant death syndrome: review of the epidemiological evidence. *Thorax* 52:1003-1009.
- Ashley MJ, Cohen J., Ferrence R, Bull S, Bondy S, Poland B, Pederson L. 1998. Smoking in the home: changing attitudes and current practices. *American Journal of Public Health* 88:797-800.
- Ashmead GG. 2003. Smoking and pregnancy. *Journal of Maternal-Fetal and Neonatal Medicine*. 14:297-304.
- Avenevoli S, Merikangas KR. 2003. Familial influences on adolescent smoking. *Addiction* 98 (Suppl 1):1-20.
- Bandura A. 1986. *Social Foundations for Thought and Action: A Social-Cognitive Model*. Englewood Cliffs, NJ: Prentice Hall.
- Bauman KE, Ennett ST, Foshee VA, Pemberton M, King TS, Koch GG. 2000. Influence of a family-directed program on adolescent cigarette and alcohol cessation. *Prevention Science* 1:227-237.
- Bauman KE, Ennett ST, Foshee VA, Pemberton M, Hicks K. 2001. Correlates of participation in a family-directed tobacco and alcohol prevention program for adolescents. *Health Education and Behavior* 28:440-461.
- Bauman KE, Ennett, ST, Foshee VA, Pemberton M, King TS, Koch GG. 2002. Influence of a family program on adolescent smoking and drinking prevalence. *Prevention Science* 35-42.
- Bauman KE, Foshee VA, Linzer MA, Koch GG. 1990. Effect of parental smoking classification on the association between parental and adolescent smoking. *Addictive Behaviors* 15:413-422.
- Biglan A, Ary D, Yudelson H, Duncan TE, Hood D, James L, Koehn V, Wright Z, Black C, Levings D, Smith S, Gaiser E. 1996. Experimental evaluation of a modular approach to mobilizing antitobacco influences of peers and parents. *American Journal of Community Psychology* 24:311-339.
- Boyle MH, Sanford M, Sztatman P, Merikangas K, Offord DR. 2001. Familial influences of substance use by adolescents and young adults. *Canadian Journal of Public Health* 92:206-209.
- Carmichael SL, Ahluwalia IB. 2000. Correlates of postpartum smoking relapse. Results from the pregnancy risk assessment monitoring system. *American Journal of Preventive Medicine* 19:193-196.
- Chassin L, Presson CC, Rose JS, Sherman SJ. 1996. The natural history of cigarette smoking from adolescence to adulthood: demographic predictors of continuity and change. *Health Psychology* 15:478-484.
- Chassin L, Presson CC, Rose JS, Sherman SJ, Davis MJ, Gonzalez JL. 2005. Parenting style and smoking-specific parenting practices as predictors of adolescent smoking onset. *Journal of Pediatric Psychology* 30:333-344.
- Clark PI, Scarisbrick-Hauser A, Gautam SP, Wirk SJ. 1999. Anti-tobacco socialization in homes of African-American and white parents, and smoking and nonsmoking parents. *Journal of Adolescent Health* 24:329-339.
- Cohen DA, Rice JC. 1995. A parent-targeted intervention for adolescent substance use prevention. *Evaluation Review* 19:159-180.
- Cohen DA, Richardson J, LaBree L. 1994. Parenting behaviors and the onset of smoking and alcohol use: a longitudinal study. *Pediatrics* 94:368-375.
- Collins WA, Maccoby EE, Steinberg L, Hetherington EM, Bornstein MH. 2002. Contemporary research on parenting. The case for nature and nurture. *American Psychology* 55:218-232.
- Colman GJ, Joyce T. 2003. Trends in smoking before, during, and after pregnancy in ten states. *American Journal of Preventive Medicine* 24:29-35.
- Connell JP, Halpern-Felsher BL, Clifford E, Crichlow W, Usinger P. 1995. Hanging in there: behavioral, psychological, and contextual factors affecting whether African-American adolescents stay in high school. *Journal of Adolescent Research* 10:41-63.
- Connell JP, Halpern-Felsher BL. 2003. How neighborhoods affect educational outcomes in middle childhood and adolescence: conceptual issues and an empirical example: a randomized trial of a family-based smoking prevention intervention in managed care. *Preventive Medicine* 37:617-626.
- DHHS (U.S. Department of Health and Human Services). 2000. *Healthy People 2010: Understanding and Improving Health*. 2nd ed. Washington DC: U.S. Government Printing Office.
- DiClemente CC, Dolan-Mullen P, Windsor RA. The process of pregnancy smoking cessation: implications for interventions. *Tobacco Control* 9:16-21.

- DiClemente CC. 1999. Motivation for change: implications for substance abuse treatment. *Psychological Science* 10:209-213.
- DiFranza JR, Lew RA. 1996. Morbidity and mortality in children associated with the use of tobacco products by other people. *Pediatrics* 97:560-568.
- DiFranza JR, Lew RA. 1995. Effect of maternal cigarette smoking on pregnancy complication and sudden infant death syndrome. *Journal of Family Practice* 40:385-394.
- Donatelle RJ, Prows SL, Champeau D, Hudson D. 2000. Randomised controlled trial using social support and financial incentives for high risk pregnant smokers: Significant Other Supporter (SOS) program. *Tobacco Control* 9:67-69.
- Duncan G, Aber JL. 1997. *Neighborhood Poverty, Vol. I: Context and Consequences for Children*. New York: Russell Sage Foundation. Pp. 174-199.
- Emmons KM, Wong M, Hammond SK, Velicer WF, Fava JL, Monroe AD, Evans JL. 2001b. Intervention and policy issues related to children's exposure to environmental tobacco smoke. *Preventive Medicine* 32:321-331.
- Etzel RA. 1997. Active and passive smoking: hazards for children. *Central European Journal of Public Health* 5:54-56.
- Faden VB, Graubard BI. 2000. Maternal substance use during pregnancy and developmental outcome at age three. *Journal of Substance Abuse* 12:329-340.
- Fagan P, Brook JS, Rubenstone E, Zhang C. 2005. Parental occupation, education, and smoking as predictors of offspring tobacco use in adulthood: a longitudinal study. *Addictive Behaviors* 30:517-529.
- Fingerhut LA, Kleinman JC, Kendrick JS. 1990. Smoking before, during, and after pregnancy. *American Journal of Public Health* 80:541-544.
- Flay BR, Phil D, Hu FB, Richardson J. 1998. Psychosocial predictors of different stages of cigarette smoking among high school students. *Preventive Medicine* 27(Suppl 1):A9-A18.
- Goldenberg RL, Klerman LV, Windsor RA, Whiteside HP. 2000. Smoking in pregnancy: final thoughts. *Tobacco Control* 9:85-86.
- Gortmaker SL, Kelin Walker D, Jacobs FH, Ruch-Ross H. 1982. Parental smoking and the risk of childhood asthma. *American Journal of Public Health* 72:574-579.
- Halpern-Felsher BL, Connell JP, Spencer MB, Aber JL, Duncan GP, Clifford E, Crichlow WE, Usinger P, Cole SP, Allen L, Seidman E. 1997. Neighborhood and family factors predicting educational risk and attainment in African American and white children and adolescents. *Neighborhood Poverty, Vol. I: Context and Consequences for Children*. New York: Russell Sage Foundation. Pp.146-173.
- Jackson C, Henriksen L. 1997. Do as I say: parent smoking, antismoking socialization, and smoking onset among children. *Addictive Behaviors* 22:107-114.
- Jordaan ER, Ehrlich RI, Potter P. 1999. Environmental tobacco smoke exposure in children: household and community determinants. *Archives of Environmental Health* 54:319-327.
- Kerr M, Stattin H, Trost K. 1999. To know you is to trust you: parents' trust is rooted in child disclosure of information. *Journal of Adolescence* 22:737-752.
- Kerr M, Stattin H. 2000. What parents know, how they know it, and several forms of adolescent adjustment: further support for a reinterpretation of monitoring. *Developmental Psychology* 36:366-380.
- Klerman LV, Spivey C, Raykovich KT. 2000. Smoking reduction activities in a federal program to reduce infant mortality among high risk women. *Tobacco Control* 9:51-55.
- Ko M, Schulken ED. 1998. Factors related to smoking cessation and relapse among pregnant smokers. *American Journal of Health Behavior* 22:83-89.
- Kodl MM, Mermelstein R. 2004. Beyond modeling: parenting practices, parental smoking history, and adolescent cigarette smoking. *Addictive Behaviors* 29:17-32.
- Lee CY, Halpern-Felsher BL. 2001. Parenting of adolescents. In *Parenthood in America: An Encyclopedia, Volume I: A-M*. Santa Barbara, CA: ABC-CLIO. Pp. 14-17.
- Li MD, Cheng R, Ma JZ, Swan GE. 2003. A meta-analysis of estimated genetic and environmental effects on smoking behavior in male and female adult twins. *Addiction* 98:23-31.
- Ma Y, Goins KV, Pbert L, Ockene JK. 2005. Predictors of smoking cessation in pregnancy and maintenance postpartum in low-income women. *Maternal and Child Health Journal* 9:1-10.
- Mannino D, Siegel M, Husten C, Rose D, Etzel R. 1996. Environmental tobacco smoke exposure and health effects in children: results from the 1991 National Health Survey. *Tobacco Control* 5:13-18.
- McBride CM, Curry SJ, Grothaus LC, Nelson JC, Lando H, Pirie PL. 1998. Partner smoking status and pregnant smoker's perceptions of support for and likelihood of smoking cessation. *Health Psychology* 17:63-69.
- McBride CM, Pirie PL. 1990. Postpartum smoking relapse. *Addictive Behaviors* 15:165-168.

- Mullen, PD, DiClemente, CC, Bartholomew, LK. 2000. Theory and context and Project PANDA: A program to help postpartum women stay off cigarettes. *Designing Theory and Evidence-Based Health Promotion Programs*. Mountain View, CA:Mayfield Publishers. Pp. 453-477.
- Mullen PD, Richardson MA, Quinn VP, Ershoff DH. 1997. Post-partum return to smoking: who is at risk and when. *American Journal of Health Promotion* 11:323-330.
- O'Byrne KK, Haddock CK, Poston WSC, Mid America Heart Institute. 2002. Parenting style and adolescent smoking. *Journal of Adolescent Health* 30:418-425.
- Okah FA, Choi WS, Okuyemi KS, Ahluwalia JS. 2002. Effect of children on home smoking restriction by inner-city smokers. *Pediatrics* 109:244-249.
- Orleans CT, Barker DC, Kaufman NJ, Marx JF. Helping pregnant smokers quit: meeting the challenge in the next decade. *Tobacco Control* 9:6-11.
- Owen L, McNeill A. 2001. Saliva cotinine as indicator of cigarette smoking in pregnant women. *Addiction* 96:1001-1006.
- Paarlberg KM, Vingerhoets JJM, Passchier J, Heinen AGJJ, Dekker GA, Van Geijn HP. 1999. Smoking status in pregnancy is associated with daily stressors and low well-being. *Psychology Health* 14:87-96.
- Panjari M, Bell RJ, Astbury J, Bishop SM, Dalais F, Rice GE. 1997. Women who spontaneously quit smoking in early pregnancy. *Australian and New Zealand Journal of Obstetrics and Gynaecology* 37:271-278.
- Pbert L, Ockene JK, Zapka J, Ma Y, Goins KV, Oncken C, Stoddard AM. 2004. A community health center smoking-cessation intervention for pregnant and postpartum women. *American Journal of Preventive Medicine* 26:377-385.
- Perry CL, Pirie P, Holder W, Halper A, Dudovitz B. 1990. Parent involvement in cigarette smoking prevention: two pilot evaluations of the "Unpuffables Program." *Journal of School Health* 60:443-447.
- Pickett KE, Wakschlag LS, Dai L, Leventhal BL. 2003. Fluctuations of maternal smoking during pregnancy. *Obstetrics and Gynecology* 101:140-147.
- Pizacani BA, Martin DP, Stark MJ, Koepsell TD, Thompson B, Diehr, P. 2002. Household smoking bans: which households have them and do they work? *Preventive Medicine* 36:99-107.
- Prochaska JA, DiClemente CC, Norcross JC. 1992. In search of how people change: applications to addictive behaviors. *American Psychologist* 47:1102-1114.
- Quinn VP, Mullen, PD, Ershoff DH. 1991. Women who stop smoking spontaneously prior to prenatal care and predictors of relapse before delivery. *Addictive Behaviors* 6:153-160.
- Simons-Morton B, Chen R, Abrams L, Haynie DL. 2004. Latent growth curve analyses of peer and parent influences on smoking progression among early adolescents. *Health Psychology* 23:612-621.
- Slotkin TA. The impact of fetal nicotine exposure on nervous system development and its role in sudden infant death syndrome. *Nicotine Safety and Toxicity*. New York: Oxford University Press. Pp. 89-97.
- Slomkowski C, Rende R, Novak S, Lloyd-Richardson E, Niaura R. 2005. Sibling effects on smoking in adolescence: evidence for social influence from a genetically informative design. *Addiction* 100:430-438.
- Stanton B, Cole M, Galbraith J, Li X, Pendleton S, Cottrel L, Marshall S, Wu Y, Kaljee L. Randomized trial of a parent intervention: parents can make a difference in long-term adolescent risk behaviors, perceptions, and knowledge. *Archives of Pediatric and Adolescent Medicine* 158:947-955.
- Stattin H, Kerr M. 2000. Parental monitoring: a reinterpretation. *Child Development* 71:1072-1085.
- Steinberg L, Fletcher A, Darling N. 1994. Parental monitoring and peer influences on adolescent substance use. *Pediatrics* 93:1060-1064.
- Tilson EC, McBride CM, Lipkus IM, Catalano RF. 2004. Testing the interaction between parent-child relationship factors and parent smoking to predict youth smoking. *Journal of Adolescent Health* 35:182-189.
- Ventura, SJ, Martin, JA, Curtin, SC, Mathews, TJ, Park, MM. 2000. Births: Final data for 1998. *National Vital Statistics Reports, Vol 48, No 3*. Hyattsville, MD: National Center for Health Statistics.
- Walsh RA, Redman S, Adamson L. 1996. The accuracy of self-report of smoking status in pregnant women. *Addictive Behaviors* 21:675-679.
- Wisborg K, Henriksen TB, Obel C, Skajaa E. 1999. Smoking during pregnancy and hospitalization of the child. *Pediatrics* 104:e46.
- Yu SM, Park CH, Schwalberg RH. 2002. Factors associated with smoking cessation among U.S. pregnant women. *Maternal and Child Health Journal* 6:89-97.

H

Smoking in the Movies: Its Impact on Youth and Youth Smoking

Bonnie L. Halpern-Felsher
Department of Pediatrics
University of California, San Francisco

Jodi L. Cornell
Department of Pediatrics
University of California, San Francisco¹

INTRODUCTION

Smoking in the movies doubled in the 1990s, bringing exposure rates closer to those observed in the 1950s (Glantz et al. 2004). While recent data suggest that depictions of smoking in the movies have declined from 2000–2004 (Worth et al. 2006), youth exposure to smoking in the movies remains high. In addition to its inclusion in R-rated movies, smoking can be observed readily in many youth-rated movies, including movies rated G, PG, and PG-13 (Charlesworth and Glantz 2005). Studies employing content analysis have documented that smoking is portrayed in approximately 87 percent of movies produced from 1988 to 1997 (Dalton et al. 2002b), in 77 percent of movies in 2004 (Worth et al. 2006) and in more than 66 percent of children’s animated movies released between 1937 and 1997 (Goldstein et al. 1999). Health professionals and tobacco control advocates are concerned that youth exposure to smoking in the movies will have an impact on adolescents’ attitudes toward smoking as well as smoking behavior itself (Charlesworth and Glantz 2005; Sargent 2005; Worth et al. 2006). These concerns are consistent with social cognitive theory indicating that adolescents are especially vulnerable to social modeling influences on behavior, including risky behavior such as tobacco and other drug use (Akers and Lee 1996; Bandura 1986).

It has been shown that the tobacco industry has done extensive research to determine how and when to best influence older adolescents’ and young adults’ initiation and continuation of tobacco use (Ling and Glantz 2002). Clearly, there is a strong relationship between exposure to pro-tobacco campaigns and tobacco advertising and adolescent uptake of smoking and age of initiation of smoking (Biener and Siegel 2000; Biener and Siegel 2001; Pierce et al. 1998; Pierce et al. 1999; Pierce et al. 2002). Pierce and colleagues (1998) found that adolescents in California who were able to describe a favorite tobacco advertisement were twice as likely to start smoking, and adolescents who used a tobacco-promotional product were three times as likely to begin. Sargent and colleagues (2000) also found that smoking uptake is more likely among adolescents who possess tobacco-promotional items, such as a T-shirt (Sargent et al. 2000; see also Pierce et al. 1999). Longitudinal research indicates that approximately 34 percent of all new tobacco ex-

¹ This research was supported in part by grants awarded to Dr. Halpern-Felsher from the Tobacco-Related Disease Research Program, Office of the President, University of California (#9K-0072 and #14RT-0010)

perimentation occurs as a result of tobacco advertising and promotions (Pierce et al. 1999). Emery and colleagues (1999) estimated that each year, tobacco-marketing efforts generate approximately 193,000 additional adult smokers who began smoking as adolescents because of such marketing (Emery et al. 1999). The influence of these pro-tobacco campaigns has been shown to be stronger than the presence of antismoking messages (Straub et al. 2003).

The body of research linking pro-tobacco campaigns to the initiation of youth smoking is alarming, especially given studies indicating that approximately one-third of adolescents who initiate smoking progress into addicted smoking (Anthony et al. 1994; Choi et al. 1997). It is thus important to explore whether and to what extent exposure to smoking in movies has a similar influence on adolescent tobacco use and whether such influence varies by age, gender, and parental influences. In this appendix, we provide a comprehensive review of empirical research investigating the relationship between exposure to smoking depictions in movies, adolescent smoking-related attitudes, and adolescent smoking behavior. We begin with some theoretical bases underlying the links between exposure to tobacco use in the movies and youth behavior.

THEORIES OF MOVIES AS SOCIAL MODELING INFLUENCES ON ADOLESCENT TOBACCO USE

The theoretical basis for the important role of social constructs in shaping smoking behaviors stems largely from Social Cognitive Theory (e.g., Akers and Lee 1996; Bandura 1986), Social Norms Theory, and Social Marketing Theory, which are also the basis for much of the health research investigating the relationship between exposure to smoking in movies and adolescent smoking behavior. These theories posit that social modeling (observing others perform a behavior and reaping the rewards of that behavior [Bandura 1986]) and social norms (believing that a given behavior is normative and frequent [Wakefield et al. 2003]) are powerful influences on teaching adolescents about behavior in social contexts and are strongly related to adolescents' behavior. Applied to smoking, depictions of smoking in the movies often serve to influence or change youth's attitudes about smoking, in part by glamorizing smoking and the smoker him or herself. Often the smoker is portrayed positively—attractive, slim, wealthy, and sexy. Smokers are often shown reaping smoking-related benefits (e.g., coping, relaxation), yet rarely are they seen experiencing any harm or negative stigma from smoking. Depictions of smoking in the movies are also expected to increase the perception that smoking is normative.

Current opinion about adolescent smoking largely considers social factors to be the main set of variables influencing experimental smoking (Lynch and Bonnie 1994; Sargent 2005), including peers and family, which are also key influences on the development of social norms. Adolescents are particularly cued into the social context around them, including media influences on depictions of various behaviors and related positive and negative outcomes. Parallel with physical and cognitive maturation, important social changes take place in adolescence that shift the focus of affiliation gradually from parents to peers and from group relations to intimate relations with individuals outside the family. These expanding social relationships from adolescence through young adulthood broaden adolescents' sense of extrafamilial reality and reinforce their increasing sense of individuality and need for autonomy. Adolescents' newly acquired ability to think abstractly and to take a third person's perspective is an important prerequisite for successful socialization and is tied to new responsibilities and freedom, including trying new and risky behavior such as drinking alcohol, having sex, and smoking cigarettes (e.g., Steinberg and Cauffman 1996). This sets the stage for a variety of social factors to influence adolescents' attitudes and beliefs for numerous behaviors, including movies and television depictions of behav-

ior, and since adolescents have increased power over their own choices about what media and movies they expose themselves to, the extent to which these media influence their socialization is worthy of attention (Arnett 1995).

RESEARCH ON SMOKING IN THE MOVIES AND YOUTH PERCEPTIONS AND BEHAVIOR

Research investigating the impact of youth exposure to smoking in movies has yielded three important findings: (1) exposure to smoking depictions in movies influences perceptions of smoking, (2) exposure to smoking in movies increases the risk for smoking initiation, and (3) the increased risk for smoking initiation from exposure to smoking in movies can be reduced by antismoking advertisements and parental restriction of movies. A review of the scientific evidence for these three findings is summarized next (see also Tables H-1, H-2, and H-3). The current review includes only published scientific research articles specifically investigating the relationship between smoking in the movies and adolescent attitudes and tobacco use (see also Charlesworth and Glantz 2005; Worth et al. 2006).

Exposure to Smoking Depictions in Movies Influences Adolescent Perceptions of Smoking

A small set of literature has addressed the extent to which youth are exposed to smoking in the movies and whether such exposure has an effect on youth perceptions of smoking images (Table H-1). Sargent and colleagues (2003) provided evidence for a dose effect between access to movies and increased exposure to smoking in movies (Sargent et al. 2003). Access to cable movie channels and videotapes and number of movie outings per month were strongly associated with adolescents' increased exposure to smoking in the movies ($F = 63.4$, adjusted $R^2 = .34$). Exposure to smoking increased by 10 percent (150 occurrences) for each additional movie channel and video watched per week. Movie theater outings more than once a month were associated with a 20 percent (300 occurrences) increase in movie smoking exposure.

A qualitative study conducted by Watson and colleagues (2003) sheds light on the content of media attended to by adolescents. This study examined perceptions of smoking images in television, movies, newspapers, and magazines to gauge the extent to which adolescents notice smoking in the media and how they interpret social acceptability of smoking through visual cues. Their findings showed that 78 percent of their sample noticed and commented on the smoking images unprompted by the facilitator and 64 percent of responses were positive for social acceptability, especially the social benefits of smoking. Negative physical health responses were 46 percent, and positive ratings were 33 percent, but there was rarely sufficient information to rate the media item on physical health effects. Alarming, 65 percent of mood ratings were positive, especially issues of stress relief and emotional control, 39 percent of ratings were positive and 44 percent were negative for appearance effects. Most positive ratings were from depictions of physically attractive persons. Finally, 52 percent of the sample rated smoking as a good thing to do, whereas 48 percent rated it as a bad thing (Watson et al. 2003). Clearly adolescents are aware of the conflicting messages conveyed through the media; alarmingly, these results indicate that the social desirability effects are also functioning. Unfortunately, these results were not linked to behavior or intentions to smoke.

McCool and colleagues (2004) have conducted a number of studies examining adolescent perceptions and smoking depictions in film. McCool and colleagues (2004) also found support

that image concerns influence adolescent perceptions of smoking in films and that these perceptions differed by gender (McCool et al. 2004). Further, “sexy” and “stylish” were stereotypes significantly associated with smoking susceptibility ($p < .01$) for both female and male smokers in films. However, a serious limitation of this study was that the measure of stereotypes was linguistically trait-based with matching from a generalized question rather than based on specific actors or viewed images. Thus, although these results point to general adolescent perceptions of male and female smokers on film, they do not capture information about the specific actors that are viewed most favorably by adolescents themselves and thus might have a more profound impact on adolescents’ attitudes and perceptions of smoking.

In their 2001 and 2003 studies utilizing focus groups, McCool and colleagues (2001; 2003) examined how smoking depictions are related to adolescent smoking perceptions. McCool and colleagues (2001) showed that young adolescents from New Zealand perceived smoking depictions in movies as very prevalent and recognizable and they regarded these depictions as a reflection of reality. The adolescents had nonchalant attitudes toward inclusion of smoking depictions in movies, and these attitudes were linked to the perception that smoking prevalence is high among peers and adults (McCool et al. 2001). The authors suggest that smoking imagery in film may reinforce perceptions of smoking as a way to reduce stress and to develop self-image, and to serve as a marker of adult independence. In their study with older adolescents, McCool and colleagues (2003) showed that adolescents were receptive to smoking depictions when used in a credible way to portray an emotional state, subculture affiliation, and life-style. Experience as a smoker appeared to inflate credibility of depictions of smoking, particularly in gritty realism or drama. Stereotypical images were readily recalled and appeared to support misconceptions of smoking, and recall of images was associated with stress, anxiety, drug use, and seduction (McCool et al. 2003). The results suggest that pervasive and credible smoking scenes may offer support and reassurance to smokers or teens who are ambivalent about smoking.

Taken together, these studies demonstrate that youth are exposed to a vast amount of smoking in the movies and that such depictions are associated with more favorable attitudes toward smoking and smoking characters. These positive views are particularly prevalent among youth who themselves smoke.

Exposure to Smoking Depictions in Movies Increases Risk for Smoking Initiation

As the above section demonstrates, there is little doubt that youth are being exposed to smoking in the media—including through movies, television, magazines, and newspapers—and that such exposure influences smoking-related perceptions. The question then becomes whether such exposure creates a heightened risk for youth’s own smoking. A number of studies employing different methodology have addressed this concern (see Table H-2). These studies, reviewed next, suggest a relationship between exposure to smoking in the movies and smoking initiation. However, studies have not yet been conducted to determine whether such a relationship between viewing smoking in the movies and tobacco use continues after initial tobacco use.

Favorite Movie Stars’ Use of Tobacco in Movies

Several studies have examined whether and to what extent viewing movies in which popular or favorite movie stars smoke on-screen has an effect on youth smoking. After controlling for other variables associated with adolescent smoking (e.g., parent and friend smoking, receptivity to tobacco ads; see Table H-2). Distefan and colleagues (1999) showed that adolescent never-

smokers who shared favorite stars with adolescent ever-smokers were more likely to be susceptible to smoking than adolescent never smokers who did not share stars with adolescent ever-smokers (OR = 1.35, 95 percent confidence interval 1.12–1.62; $p < .01$) (Distefan et al. 1999).

Similarly, Tickle and colleagues (2001) provided some support that smoking by movie stars is associated with greater risk of smoking initiation among adolescents. For youth with smoking experience, after controlling for possible confounds, the odds of having a higher smoking status (ranging from nonsusceptible never-smoker to smoker, see Table H-2) increased with their favorite stars' on-screen smoking. For adolescents whose star smoked in one film, the odds of being higher in smoking status were 0.78 (0.53–1.15, 95 percent confidence interval [CI]). For adolescents whose stars smoked in two films, odds increased to 1.53 (1.01–2.32, 95 percent CI), and whose stars smoked in three or more films, the odds of being higher in smoking status increased to 3.1 (1.34–7.12, 95 percent CI). The same pattern was found for never-smokers, that is susceptibility to smoking increased as their favorite stars' smoking increased. Specifically, for adolescents whose star smoked in one film, the odds of being higher in smoking status were 2.16 (0.86–5.45, 95 percent CI). For those whose stars smoked in two films, 4.78 (95 percent CI, 1.60–14.23), and for those whose stars smoked in three or more films, the risk increased to 16.18 (95 percent CI, 2.33–112.61). However, no effects were found for adolescents in other stages of smoking initiation or for current smokers. Thus, the direction of influence between exposure to smoking in movies and adolescent smoking status was not determined (Tickle et al. 2001).

Unfortunately, since both the Distefan and colleagues (1999) and the Tickle and colleagues (2001) studies used a cross-sectional design, it is impossible to determine whether adolescents who were more susceptible to smoking paid more attention to smoking in films or whether they were truly influenced by smoking images (Distefan et al. 1999; Tickle et al. 2001). Using a longitudinal design, Distefan and colleagues (2004) shed further light on the relationship between exposure to favorite movie stars' smoking on-screen and tobacco use among adolescents. They showed that adolescents with a favorite star who smoked on-screen were more likely to have smoked at follow-up 3 years later (odds ratio [OR] = 1.36; 95 percent CI 1.02–1.82). For adolescent females, the corresponding values were strong (OR = 1.86; 95 percent CI 1.26–2.73) when all other variables were controlled (including receptivity to tobacco advertising). For adolescent males, smoking initiation at follow-up was associated only with receptivity to tobacco advertising and promotions but not with having a favorite star smoke on-screen (Distefan et al. 2004).

Finally, using a controlled experimental design in which adolescents were exposed to a film clip depicting either smoking or nonsmoking by popular male and female actresses, adolescents were asked to rate character attractiveness and similarity to themselves (Hines and Saris 2000). Adolescents who viewed the smoking clips reported a greater likelihood of smoking (mean = 2.5, standard deviation [SD] = 1.6) than participants who viewed the nonsmoking clips (mean = 2.2, SD = 1.5; $F(1,135) = 7.44$, $p = .007$). This effect accounted for 5.2 percent of the variance. Adolescents' current smoking status also had a significant relationship with adolescents' report of their likelihood to smoke in the future ($F(2,135) = 446.75$, $p < .001$), with regular smokers (mean = 4.7, SD = 0.5) more likely to smoke than occasional smokers (mean = 3.3, SD = 1), who in turn were more likely to smoke than nonsmokers (mean = 1.3, SD = 0.4). This effect accounted for 86.7 percent of the variance. Thus, these results indicate that smoking status has a much stronger effect on likelihood of smoking than viewing smoking depictions in film clips.

Although these studies were modest in size and scope, they do provide evidence that adolescents are more susceptible to initiating tobacco use if they have observed their favorite movie

star smoke on-screen. However, given the limited experimental and longitudinal data available to date, caution must be exercised in interpreting these findings.

Exposure to Smoking Depictions in Movies and Television

A number of studies have questioned whether exposure to smoking in the movies more generally, not just by one's favorite actor or actress, has an influence on youth smoking. The majority of the research on movie smoking exposure and adolescent smoking initiation has been conducted by Sargent and colleagues (2001) and has employed both cross-sectional and longitudinal designs. Using quartiles of smoking exposure in movies in a cross-sectional study, Sargent and colleagues (2001) showed that increased exposure to smoking in movies was associated with greater risk of trying smoking (Sargent et al. 2001). Further, this relationship was demonstrated among a nationally representative sample including adolescents from broad geographic regions of the United States and among different racial and ethnic groups (Sargent et al. 2005). Sargent and colleagues (2005) estimated that exposure to smoking in movies is an independent, primary risk factor for smoking initiation among 38 percent of the adolescents who tried smoking in the study sample (0.10 ever tried smoking prevalence in overall study sample of 6,522) (Sargent et al. 2005). It was also shown that higher exposure to smoking in movies and increased smoking susceptibility (OR = 1.60; 95 percent CI, 1.24–2.07), more normative views of adult smoking (OR = 1.37; 95 percent CI 1.09–1.71), and more positive expectations from smoking (OR = 1.38; 95 percent CI 1.13–1.70) were related to adolescent smoking initiation (Sargent et al. 2002).

These results also showed that exposure to 50 occurrences of smoking in movies (about five R-rated movies) has a moderate effect on smoking attitudes similar to other social influences, such as having family members or friends who smoke (Sargent et al. 2002). No association was found between more exposure to smoking in movies and peer norms of smoking when controlling for sociodemographics, social influences, and personality factors.

Using a longitudinal design, Dalton and colleagues (2003) provided support for a clear dose effect between movie exposure and initiation, with greater exposure to smoking in the movies associated with a greater likelihood of tobacco initiation, particularly in participants with non-smoking parents. The dose effect size ranged from 2.0 to 2.7, even when controlling for a number of covariates including demographics; school achievement; parent, sibling, and friend smoking; receptivity to tobacco promotions; parental education; parenting styles; and perception of parental disapproval of smoking. However, only a small proportion of the sample (10 percent) initiated smoking, and a positive relationship was found between exposure and personal characteristics of adolescents such as sensation seeking, rebelliousness, or a negative association with school performance and parenting styles, suggesting that these results may reflect only a particular subset of adolescents (Dalton et al. 2003). An alternate view of these data is that a small subset of adolescents who already have many variables that contribute to a higher likelihood of smoking initiation, such as personality traits and parenting factors, could pay more attention to depictions of smoking than adolescents in general. Dalton and colleagues (2003) acknowledged that some aspects of R-rated movies other than smoking could conceivably contribute to smoking initiation and that further research is needed to determine other possible aspects.

Two studies examined whether there is a similar relationship between television and smoking behavior. Gutschoven and Van den Bulck (2004) examined the relationship between television viewing and the amount of cigarettes smoked by adolescent smokers per unit time of television. Smoking volume was correlated with self-assessed health, even when controlling for level of education and age ($r = -0.11$, $p = .03$), with heavier smokers feeling less healthy. Television

viewing was a significant predictor of smoking volume, with smokers who watch 5 or more hours a day reporting smoking between 60 and 147 more cigarettes per week than those who watch an hour or less a day. Television viewing explained an additional 3 percent of the variance ($F(8,399) = 30.975$, model $R^2 = .383$, $p < .0001$) when gender, educational level, parental and peer smoking, and frequency of going out were accounted for in the model. Using longitudinal data from the National Longitudinal Survey of Youth, Gidwani and colleagues (2002) examined whether youth with greater exposure to television exhibited higher rates of smoking initiation. They found a dose–response relation between amount of TV viewing and smoking initiation when taking control variables into account; specifically, adolescents who watched more than 5 hours of TV per day were 5.99 times more likely to initiate smoking than adolescents who watched 0–2 hours a day ($p = .02$; 95 percent CI 1.39–25.71) (Gidwani et al. 2002). Similarly, adolescents who watched more than 4 to 5 hours per day were 5.24 times more likely to initiate smoking than adolescents who watched 0–2 hours per day ($p = .03$; 95 percent CI 1.19–23.10) (Gutschoven and Van den Bulck 2004).

These cross-sectional and longitudinal studies provide clear support that youth report greater susceptibility and intentions to smoke and are more likely to actually try smoking following exposure to smoking in the movies and on television. Further, even after controlling for other factors known to be associated with adolescent tobacco intention and use, studies show a clear dose effect, whereby greater exposure to smoking in the movies is associated with a greater chance of smoking. Studies have not yet been conducted to determine whether such a relationship between viewing smoking in the movies and tobacco use continues after initial tobacco use (Sargent 2005).

The Effects of Smoking in Movies Can Be Reduced by Antismoking Advertisements and Parental Restriction of R-Rated Movies

As shown in Table H-3, a small number of studies have investigated whether antismoking advertisements can ameliorate the influence that exposure to smoking in the movies has on youth tobacco use. Pechmann and Shih (1999) conducted the first experimental study addressing this question, with results yielding significant interactions between viewing or not viewing an antismoking advertisement on the level of positive arousal ($F[1227] = 6.91$, $p < .01$), perceptions of a smoker’s stature ($F[1228] = 4.82$, $p < .05$), smoker’s perception of their own stature ($F[1228] = 4.88$, $p < .05$), and participants’ intent to smoke ($F[1203] = 4.88$, $p < .05$). Further, when viewing an antismoking advertisement, more negative thoughts were generated about the lead characters when the character was a smoker as compared to not being a smoker (2.37 vs. 1.31, $t = 2.70$, $p < .01$). This effect was not found if an antismoking ad was not viewed ($F[1188] = 6.98$, $p < .01$). A limitation of this study is that the outcome measure was not related to actual smoking behavior of adolescents. Nevertheless, the study provides evidence that antismoking advertisements may help to combat the positive associations that smoking in movies may foster (Pechmann and Shih 1999).

Edwards and colleagues (2004) attempted to replicate and expand on Pechmann and Shih’s results by using the “real-world” environment of actual movie theaters to evaluate the effect of antismoking advertisement on women’s perceptions of smoking in movies and their intentions to smoke. Nonsmokers who saw the ad were more likely to perceive smoking as “not ok” (48.2 percent) compared to nonsmokers who did not view the ad (25.2 percent, $X^2=83.11$, $df = 3$, $p = .0001$). This difference was maintained when age and movie exposure differences were adjusted (Wald $X^2 = 75.784$, $df = 1$, $p = .0001$). However, no effect was found for smokers, even when

age and movie were accounted for, and no overall effect was found for the antismoking ad on intentions to smoke. When smokers and nonsmokers were analyzed separately, smokers were more likely to have lower intentions to smoke (31.9 percent versus 47.8 percent; $X^2 = 9.03$, $df = 2$, $p = .01$), and when age and movie were accounted for the group of smokers who saw the ad continued to have lower intentions to smoke (Wald $X^2 = 4.59$, $df = 1$, $p = .03$). No effect was found for nonsmokers ($X^2 = .97$, $df = 2$, $p = .62$), even when age and movie were accounted for (Wald $X^2 = 1.25$, $df = 1$, $p = .263$). These results may indicate that antismoking advertisements may have only a small effect upon intention to smoke and that other factors may play a role in adolescents' intentions to smoke (Edwards et al. 2004).

Dixon and colleagues (2001) also found similar results in their quasi-experimental study investigating the effects of viewing a movie with anti-tobacco content. Theater patrons were surveyed before and after viewing the film *The Insider*, with results indicating that their perceptions of the business conduct of the tobacco industry were more negative than perceptions held by theater patrons who saw a control movie without anti-tobacco content. Further, viewing the anti-tobacco industry content also appeared to promote a short-term reduction in intentions to smoke (Dixon et al. 2001).

In a study examining the effect of parental restriction of R-rated movies on adolescent smoking initiation, Sargent and colleagues (2004) found that decreased parental restriction was associated with higher risk of smoking initiation. They also found a reverse effect, where increased parental restriction was associated with decreased risk, compared to adolescents reporting no change (Sargent et al. 2004). This pattern was even more pronounced for adolescents from non-smoking families compared to adolescents from families that smoke. Similarly, Dalton and colleagues (2002a) found higher levels of trying smoking and drinking alcohol among adolescents with no parental restriction of R-rated movies compared to adolescents whose parents did not allow them to view any R-rated movies (Dalton et al. 2002a).

Although limited in scope and methodology, the results from this set of studies provide evidence that viewing antismoking advertising and parental restrictions limiting youth exposure to R-rated movies can ameliorate the effect that smoking in the movies has on youth.

SUMMARY AND RECOMMENDATIONS

Portrayals of smoking in the movies, especially images that put smoking in a positive or sexy vein, are likely to alter perceived norms about smoking, resulting in smoking being viewed as more normative, positive and socially acceptable. Indeed, the convergence of study results provides persuasive evidence of a relationship between exposure to smoking in the movies and adolescent perceptions of tobacco, as well as actual tobacco use, and that the effects are at least comparable to those of pro-tobacco advertisements. It is clear that youth's exposure to smoking in movies, including but not limited to tobacco use among the more popular youth film stars, has an effect on youth initiation. Research provides evidence for a relationship between smoking exposure in movies and adolescent smoking behavior, but it also indicates avenues by which this risk of smoking initiation from exposure to smoking in movies can be reduced.

Given the serious public health concern, action to closely monitor and limit adolescent exposure to smoking in the movies is warranted. A number of recommendations can guide engaging the movie industry in a discussion and educating the many decision makers in the industry about the issue of smoking in the movies and adolescent tobacco use.

We recommend two strategies that the movie industry should consider to reduce smoking in the movies and combat the effect tobacco exposure has on youth.

Recommendation 1: First and foremost, we encourage the entertainment industries to create a set of self-regulatory strategies that closely limit and monitor youth exposure to smoking in the movies, television programming, and videos that combat the effect tobacco exposure has on youth's smoking attitudes and behavior. These strategies should both guide and educate the movie industry about the evidence linking smoking in the movies and adolescent tobacco use (e.g., Dalton et al. 2003; Sargent et al. 2005), as well as spark a cogent discussion within the industry and between the industry and policy makers.

We recommend a number of strategies and a range of options that the entertainment industries, and in particular the Motion Picture Association of America (MPAA), should adopt to reduce smoking in the movies. The industries' self-regulation should include but not be limited to the following possible options:

Recommendation 1a: The film rating board of the MPAA should consider the use of tobacco in the movies as a criterion in assigning mature film ratings (e.g., an R-rating indicating Restricted: no one under age 17 admitted without parent or guardian) to films that depict tobacco use.

A Ratings Board, which is appointed by the president of the MPAA, decides on ratings assigned to each movie. Currently, such ratings are based on the extent to which there is violence, language, nudity, sensuality, and drug abuse in the film. Tobacco use is not a criterion by which ratings are assigned. Assigning films with tobacco use a mature rating (R-rating) increases the likelihood that parents will restrict youth access to such films, a strategy that has been shown to reduce smoking initiation (Dalton et al. 2002a; Sargent et al. 2003; Sargent et al. 2004).

Recommendation 1b: The MPAA should encourage the use of antismoking advertisements before the film. As reviewed above, the effects of youth viewing smoking in the movies is reduced among youth who first viewed an antismoking advertisement (e.g., Edwards et al. 2004; Pechmann and Shih 1999).

Investigations of the effectiveness of antismoking advertisements with adolescents indicate strategies that are effective in reducing the influence of viewing smoking depictions in the media in general and can be applied to smoking depictions in the movies as well. Goldman and Glantz (1998) showed that messages that are aggressive, delegitimize the tobacco industry, deglamorize smoking, and portray the negative effects of secondhand smoke were the most effective messages for changing perceptions about the normality of smoking and reducing cigarette consumption (Goldman and Glantz 1998). A recent study of a specific antismoking advertising campaign (the Truth campaign) echoes the same results and found this counter-industry media campaign to be effective in increasing negative beliefs and attitudes about the tobacco industry and associated with lower receptivity to pro-tobacco advertising and less progression of smoking intention and behavior (Hershey et al. 2005).

Recommendation 1c: The MPAA should regulate smoking on all movie and television sets so as to minimize exposure to smoke among actors and crewmembers. Emphasis should also be given to banning smoking on all sets in which children, including child actors, are present.

Findings from the Environmental Protection Agency (EPA) and other studies showing the adverse health effects of secondhand smoke led the EPA to classify secondhand smoke as a human carcinogen (DHHS 2002a). The findings also led several states and municipalities to create laws restricting smoking in workplaces and other public places. Further, the *Healthy People 2010* objectives included a goal to reduce the percentage of nonsmokers exposed to secondhand smoke by 45 percent (DHHS 2000; DHHS 2002b). Reducing one's exposure to secondhand smoke should be applied to all individuals, but especially to infants, children, and youth for whom secondhand smoke has been shown to cause sudden infant death syndrome, low birth weight, chronic middle ear infections, and respiratory illnesses including asthma, bronchitis, and pneumonia (DHHS 1999). Many of these adverse health effects linked to secondhand smoke are expected to continue into adulthood, including increasing one's chance of developing lung cancer (Janerich et al. 1990).

Given that movie sets are workplaces, they should fall under similar regulations that restrict exposure to secondhand smoke among employees in other work settings. Further, the evidence summarized in this report strongly suggest that the MPAA, film directors, and other film producers should create extensive strategies to ensure that youth have limited exposure to tobacco smoke while on the movie and television sets. Such strategies adopted by the MPAA should include restricting the use of tobacco on the set unless absolutely necessary, reducing the number of times a scene that includes smoking is filmed, and creating as many outdoor scenes as possible.

Recommendation 2: Congress should appropriate the necessary funds to enable the U.S. Department of Health and Human Services to conduct a periodic review of a representative sample of movies, television programs, and videos that are offered at times or in venues in which there is likely to be a significant youth audience (e.g., 15 percent) in order to ascertain the nature and frequency of images portraying tobacco use. The results of these reviews should be reported to Congress and to the public.

Despite our overall recommendation that strategies to reduce youth exposure to the portrayal of tobacco use in movies, television, and videos should be implemented on a voluntary basis by the relevant entertainment industry and related trade associations, some independent oversight of these standards and strategies is warranted. Such oversight of industry accountability should be facilitated through public monitoring and awareness of industry practices. Accordingly, we recommend that the U.S. Department of Health and Human Services be authorized and funded to monitor these media practices and report to Congress and the public.

Recommendation 3: Finally, we encourage additional research on the effects of smoking in the movies on adolescent tobacco use. The research on how and the extent to which exposure to smoking in the movies influences adolescent tobacco use is still nascent and thus should be replicated and expanded. Current studies are a key step in the right direction, but there are questions that still must be addressed. For example, Dalton and colleagues' (2003) longitudinal study provided the most persuasive evidence that smoking depictions in movies influence adolescent smoking initiation (Dalton et al. 2003). However, the sample was predominately comprised of white, rural, nonsmoking youth and therefore should be replicated with a more diverse sample. Further, it is not clear how to measure cumulative effects of repeated exposure to smoking depictions from not only movies but also the combination of various media outlets. Sargent and colleagues' (2005) study provided the most comprehensive study

of a large, diverse group of adolescents and includes an impressive list of control variables, but the study's cross-sectional design still leaves unanswered questions (Sargent et al. 2005).

Measures of adolescent smoking in current research are also limited, with most studies focusing on smoking initiation (Dalton et al. 2003; Distefan et al. 2004; Sargent et al. 2004; Sargent et al. 2001; Sargent et al. 2002) or other factors such as intentions to smoke, susceptibility to smoking (Edwards et al. 2004; Hines and Saris 2000; McCool et al. 2004) or perceptions of smoking (Pechmann and Shih 1999; Watson et al. 2003). No information is available to date that indicates effects of smoking depictions in movies on long-term or addicted smoking. Another related issue is the lack of information about possible effects of exposure to smoking in movies depending upon different smoking status and experience of the adolescent. For example, results from Hines and Saris (2000) indicate that smoking status has a much stronger effect on likelihood of smoking than viewing smoking depictions in film clips. Additional prospective research is needed with nonsmokers to establish predictive relationships.

Another limitation of current research is determining whether adolescents with an interest in tobacco or with greater intentions to try cigarettes are more likely to attend to or notice smoking in movies. Adolescents who are more susceptible to smoking may pay more attention to smoking in films or admire stars who smoke more than less susceptible adolescents; the direction of this relationship is yet to be clearly answered. Although the Dalton and colleagues (2003) study provided evidence that movie exposure is predictive of initiation, the limitations of the study prevent definitive conclusions about causal relationships. Finally, finer-tuned measures of smoking exposure in movies are needed (Dalton et al. 2003). The specific factors of smoking depictions in movies that influence behavior must be identified, including possible genre-specific smoking depictions, smoking by actors with different character traits, and smoking in contexts with different situational and affective variables, and the way the gender and ethnicity of both actors and viewers influence interpretation of depictions, must be determined.

We thus recommend that further research be conducted in a number of areas. One question that remains to be answered by research is how the movies influence actual smoking behavior and whether viewing smoking depictions in the movies and other media has a lasting effect on continued smoking, since the crucial health issue of concern is adolescent smoking that results in health problems. Further, research on identifying the cumulative effect of advertising and other media depictions of smoking and movies is needed in order to gauge appropriate public health measures to address smoking in the movies. Finally, effects of exposure to smoking in the movies and other media must be considered within the entire context of variables that influences adolescent smoking, including parents, peers, and individual-level variables.

ENDING THE TOBACCO PROBLEM

Table H-1 Exposure to Smoking Depictions in Movies Influences Adolescent Perceptions of Smoking (Sargent et al. 2003)

Authors and Research Question	Methods	Sample	Measures	Findings	Limitations
Sargent et al., 2003 Describe adolescents' exposure to smoking and examines how access to movies, parenting, and characteristics of the adolescent are associated with exposure to movie smoking	Cross sectional School based survey List of specific movies with smoking occurrences measured for each	Adolescents aged 9-15 years in grades 5-8 at 14 schools in New England, USA Mainly white rural population N=4919	<u>Exposure to smoking in films:</u> Ratio of total number of smoking occurrences viewed by total possible number of smoking occurrences in a subset of 50 movies (median=436; interquartile range=387-492) <u>Exposure to smoking in popular contemporary movies:</u> the ratio of individual participant exposure multiplied by total possible occurrences on the entire sample of 601 movies shown in box offices from years 1988-99 <u>Movie access:</u> cable movie channels at home, videotapes viewed in a week, and movie theater outings in a month <u>Parenting factors:</u> Restriction of R-rated movies, TV restriction, authoritative parenting measure <u>Characteristics of Adolescent:</u> age, sex, school performance, sensation seeking, rebelliousness, and self esteem	Participants had seen 30% of the movie sample (interquartile range=20-44%) which contained 1160 (640-1970) occurrences of movie smoking All movie access factors were strongly associated with exposure to adolescent exposure to movie smoking ($F=63.4$, adjusted $R^2=0.34$). Exposure increased by 10% (150 occurrences) for each additional movie channel and video watched per week. Movie theater outings more than once a month were associated with a 20% (300 occurrences) increase in movie smoking exposure. Adolescents who reported no parental restriction of R-rated movies had seen about 50% (650) more smoking occurrences, and those with partial restriction saw 260 additional occurrences, than adolescents with full restriction of R-rated movies. An effect was not found for parenting style on exposure to movie smoking. Lower exposure to movie smoking mediated the effect of little or no R-rated movie restriction on risk of trying smoking which dropped from OR 8.8 (5.6-13.9) to 5.4 (3.3-8.7), 95% CI when exposure was included in the logistic regression model. Adolescents with no TV restrictions saw 140 more occurrences of smoking than those with full TV restriction. Participants who rated above the median for sensation seeking and rebelliousness had seen respectively 200 and 120 more occurrences of smoking in movies.	Finer tuned measures of smoking exposure in movies is needed, including measuring the effects of lifetime exposure, and of different depictions of smoking that include different character traits and contextual variables.

ENDING THE TOBACCO PROBLEM

Table H-1. Exposure to Smoking Depictions in Movies Influences Adolescent Perceptions of Smoking (Watson et al. 2003)

Authors and Research Question	Methods	Sample	Measures	Findings	Limitations
<p>Watson et al., 2003</p> <p>Examined perceptions of smoking images in TV, movies, newspapers, and magazines to gauge the extent that adolescents notice smoking in the media, and how adolescents interpret social acceptability of smoking through visual cues</p>	<p>Focus groups</p> <p>Metropolitan high school based focus groups, 4 groups of each age: 13,14, 15, and 16</p> <p>Participant pool divided into smoker and non-smoker groups and then randomly Selected</p> <p>Media clips shown to the groups, each was rated and then discussed</p> <p>Preliminary focus groups used to develop semantic scales used in subsequent groups to rate the media items</p>	<p>High school students aged 13-16 years old from schools selected for a range of socio-economic backgrounds</p> <p>N=117</p>	<p><u>Media items:</u> a media placement company provided movie and TV segments, magazine photos, newspaper articles, and cartoons for popularity among 13-16 year olds that all depicted smoking by people ranging in physical characteristics such as age, sex, appearance, and clothing</p> <p><u>Questionnaires to guide group discussion:</u></p> <p><u>Semantic scales:</u> Social acceptability (cool, normal, rewarding), physical health effects (addictive, unhealthy), mental health effects (relaxing, exciting, happy), cosmetic/body image effects (attractive, classy)</p> <p><u>Indicate overall if the clip represented smoking as a good or bad thing to do</u></p>	<p>78% of the sample noticed and commented on the smoking images unprompted by facilitator</p> <p>64% of responses were positive for social acceptability, especially the social benefits of smoking</p> <p>negative physical health responses were 46%, and positive ratings were 33%, rarely sufficient information to rate the media item on physical health effects</p> <p>65% of mood ratings were positive, especially issues of stress relief and emotional control</p> <p>39% of ratings were positive and 44% were negative for appearance effects, most positive ratings were from depictions of physically attractive persons</p> <p>52% of the sample rated smoking as a good thing to do, 48% rated it as a bad thing</p>	<p>Not linked to behavior or intentions to smoke</p>

ENDING THE TOBACCO PROBLEM

Table H-1. Exposure to Smoking Depictions in Movies Influences Adolescent Perceptions of Smoking (McCool et al . 2004)

Authors and Research Question	Methods	Sample	Measures	Findings	Limitations
<p>McCool et al., 2004</p> <p>To assess the effects of age, sex, smoking susceptibility, and ethnicity on smoking stereotypes, and the influence of emotional and image of smoking stereotypes on smoking susceptibility in adolescents</p>	<p>Cross sectional</p> <p>School-based survey</p> <p>List of possible image and emotional traits of general female and male smokers presented and rated</p>	<p>2 samples of adolescents from schools in Auckland, New Zealand</p> <p>N=3041</p> <p>Young adolescents: Mean age 12 yrs, 52.7% male, 55.5% European, 12.9% Maori, 13.5% Pacific island, 17% Asian, 5.7% other</p> <p>Older adolescents: mean age 18 yrs, 57.6% male, 53.9% European, 10.2% Maori, 19.5% Pacific Island, 19.3% Asian, 6% other</p>	<p><u>Smoking Susceptibility</u>: How likely to try a cigarette in the next year, how likely to be a smoker in the future on five point likert scale, all non-smokers who responded “probably” or “definitely” for both questions were defined as susceptible smokers</p> <p><u>Smoker Stereotypes</u>: “In general, do you think female (male) smokers in films tend to be...” range of actor traits presented on dichotomous yes/no scale, Stereotype data presented by category: <u>Emotional sensitivity stereotype</u>: depressed, bored, stressed, weak, angry and <u>Image stereotype</u>: stylish, tough smart, sexy, hard, healthy, intelligent</p>	<p><u>Age</u>: <u>Female smokers in film</u>: Younger adolescents were less likely than older adolescents to report female smokers as healthy and stressed but more likely to report female smokers in film to be angry <u>Male smokers in film</u>: Younger adolescents more likely than older adolescents to perceive male smokers as angry and depressed</p> <p><u>Gender</u>: <u>Female smokers in film</u>: Males more likely than females to perceive female smokers as sexy, intelligent, and healthy. Females more likely than males to perceive female smokers as stressed, bored, angry and depressed <u>Male smokers in film</u>: Females more likely than males to perceive male smokers as sexy, stressed, bored, angry, and depressed. Males more likely than females to perceive male smokers as stylish, intelligent, and healthy.</p> <p><u>Ethnicity</u>: <u>Female smokers in film</u>: Pacific more likely than European group to perceive female smokers as sexy, stylish, and intelligent. <u>Male smokers in film</u>: Pacific more likely to perceive male smokers as sexy, stylish, intelligent, bored, and depressed. Asian adolescents more likely to perceive male smokers as stylish and intelligent compared to other ethnic groups.</p> <p><u>Smoking Susceptibility</u>: Sexy and stylish were significantly associated with smoking susceptibility ($p's < .01$) for both female and male smokers in film.</p>	<p>Stereotypes measure based on linguistic trait matching from a generalized question rather than based on specific actors or viewed images</p>

ENDING THE TOBACCO PROBLEM

Table H-1. Exposure to Smoking Depictions in Movies Influences Adolescent Perceptions of Smoking (McCool et al. 2001)

Authors and Research Question	Methods	Sample	Measures	Findings	Limitations
<p>McCool et al., 2001</p> <p>To explore how adolescents interpret smoking depictions in movies, whether they were aware of media tactics, and how smoking depictions relate to their surrounding culture</p>	<p>Qualitative focus groups conducted at school</p> <p>Grounded theory analysis of same gendered focus group discussions</p>	<p>Adolescents from schools in Auckland, New Zealand</p> <p>N=76</p> <p>Young adolescents: Age 12 & 13 yrs, 50% male, 615% European, 14% Maori, 9% Pacific island, 11% Asian, 5% other</p>	<p>List of themes to discuss: centered around experiences and attitudes of media imagery, desired images, self-image, recall of smoking images, images of smokers, perceptions of smoking among peers and adults, weight and stress factors in smoking</p>	<p>Participants perceived smoking depictions in movies as very prevalent and recognizable and regarded smoking depictions as a reflection of reality</p> <p>Nonchalant attitude towards inclusion of smoking depictions in movies and linked to the perception that smoking prevalence is high among peers and adults</p> <p>Smoking imagery in film may reinforce perceptions of smoking as stress relief, development of self-image, and a marker of adult independence</p>	<p>Relatively young adolescents and no systematic measure of smoking status of participants</p>

ENDING THE TOBACCO PROBLEM

Table H-1. Exposure to Smoking Depictions in Movies Influences Adolescent Perceptions of Smoking (McCool et al. 2003)

Authors and Research Question	Methods	Sample	Measures	Findings	Limitations
<p>McCool et al., 2003</p> <p>To explore how older adolescents respond to smoking imagery in film and meanings and relevance to their beliefs about smoking</p>	<p>Qualitative focus groups conducted at school</p> <p>Grounded theory analysis of same gendered focus group discussions</p>	<p>Adolescents from schools in Auckland, New Zealand</p> <p>N=88</p> <p>Young adolescents: Average age 16 yrs, 46.6% male, 41% European, 29% Maori, 19% Pacific island, 8% Asian, 3% other</p>	<p>List of themes to discuss: centered around self-image, ideal images in popular culture, sub-culture affiliation and awareness, awareness and interpretation of smoking depiction in movies, symbolic significance of smoking images, media analysis skills, attitudes toward inclusion of smoking in media, media ‘immunity’ and perceived prevalence of smoking in reality</p>	<p>Participants were receptive to smoking depictions when used in a credible way to portray an emotional state, sub-culture affiliation, and lifestyle</p> <p>Experience as a smoker appeared to inflate credibility of depictions of smoking, particularly in gritty realism or drama</p> <p>Stereotypical images were readily recalled and appeared to support misconceptions of smoking, recall of images were associated with stress, anxiety, drug use, and seduction</p> <p>Smoking depictions in specific contexts hold specific meanings, realistic images were seen as salient representations of reality</p> <p>Pervasive and credible smoking scenes may offer support and reassurance to smokers or teens who are ambivalent about smoking</p> <p>Most responses were nonchalant about smoking depictions in film, indicating the pervasiveness of smoking</p> <p>Older teens tended to draw upon their own experience with tobacco use when interpreting smoking depictions in film</p>	<p>Unclear how the views expressed are shared among a larger sample of adolescents and how these influence smoking behavior</p>

Table H-2. Exposure To Smoking Depictions In Movies Increases Risk For Smoking Initiation (Distefan et al. 1999)

Authors and Research Question	Methods	Sample	Measures	Findings	Limitations
Distefan et al., 1999 Examine the relationship between adolescents' favorite movie stars and smoking status while controlling for variables associated with smoking initiation	Cross-sectional Telephone surveys in English and Spanish Favorite actors elicited from participants and then ranked into the top ten mentioned, differences between non-smoker and smoker adolescents in their nominations examined	Adolescents aged 12-17 years from a random digit-dialing telephone survey of households in California N=6252 (71.2% of original sample of 8778) 51.% male, 54.8% Caucasian, 25.2% Hispanic, 9.3% Asian, 7% African American, 3.4% other	<u>Smoking status of favorite star:</u> Participants at baseline were asked to list their 2 favorite male and female movie stars. The top 10 stars listed by gender of participant determined and 50 films in the 3 years before the study (1994-96) were viewed to rate whether or not the star smoked on-screen in at least 2 of these films; smoking status of star in real life determined by print media coverage <u>Smoking status of adolescent:</u> Positive responses to both, "Have you ever smoked a cigarette?" and "Have you ever tried or experimented with cigarette smoking, even a few puffs?" <u>Control variables:</u> Exposure to parental and friend smoking, perceived safety of experimenting with cigarettes, rebelliousness, and receptivity to tobacco advertising and promotions	5 of the 6 favorite stars of adolescent smokers smoked in real life, compared to 1 of the 4 stars preferred by never smokers After controlling for other variables associated with adolescent smoking, adolescent never smokers who shared favorite stars with adolescent ever smokers were more likely to be susceptible to smoking than those who did not share stars with adolescent ever smokers (OR=1.35, 95% CI 1.12, 1.62; p<.01)	No link to actual smoking behavior

ENDING THE TOBACCO PROBLEM

Table H-2. Exposure To Smoking Depictions In Movies Increases Risk For Smoking Initiation (Tickle et al. 2001)

Authors and Research Question	Methods	Sample	Measures	Findings	Limitations
Tickle et al., 2001 Assess relation between adolescents' favorite movie stars smoking on screen and adolescent smoking status	Cross sectional School based survey Open-ended question elicited adolescents' favorite movie stars, list condensed to 43 film stars whose films between 1994-96 were evaluated for the star's smoking	Adolescents aged 10-19 years in grades 6-12 at 5 schools in New England, USA Mainly white rural population N=632 who had selected one of the 43 film stars identified for analysis Out of 1236 responses to open ended question to name favorite movie/film star, 228 stars named and analysis restricted to 43 stars who were named by at least 5 adolescents that had appeared in films within 3 precious years of study (1994-96)	<u>Smoking status:</u> "Have you ever tried smoking cigarettes, even a few puffs?" and How many cigarettes have you smoked in your whole life?" Never: answered "no" and "none" to both q Experimental: smoked fewer than 100 cigarettes, and whether they had smoked in the last 30 days Smokers: smoked 100 or more cigarettes (Bogus pipeline procedure using saliva sample to increase validity of smoking reports) <u>Smoking status index:</u> non-susceptible never smokers, susceptible never smokers, non-current experimenters, current experimenters, smokers <u>Star tobacco use index:</u> Number of movies in sampling frame in which star smoked more than 2 times <u>Control variables:</u> Family and friend smoking, receptivity to tobacco promotions, grade, sex, school performance	53% of adolescents selected stars who did not smoke on-screen After controlling for possible confounds, the odds of having a higher smoking status increased with higher number of incidence of on screen star smoking, for adolescents whose star smoked in 1 film, the odds of being higher in smoking status was 0.78 (95%CI, 0.53-1.15), for stars who smoked in 2 films, 1.53 (95%CI, 1.01-2.32), for stars who smoked in 3 or more films, 3.1 (95%CI 1.34-7.12) For never smokers, the same pattern was found in susceptibility to smoking, for adolescents whose star smoked in 1 film, the odds of being higher in smoking status was 2.16 (95%CI, 0.86-5.45), for stars who smoked in 2 films, 4.78 (95%CI, 1.60-14.23), for stars who smoked in 3 or more films, 16.18 (95%CI 2.33-112.61)	Cross sectional nature of study cannot determine whether adolescents who are more susceptible to smoking may pay more attention to smoking in films or admire stars who smoke more than less susceptible adolescents

ENDING THE TOBACCO PROBLEM

Table H-2. Exposure To Smoking Depictions In Movies Increases Risk For Smoking Initiation (Distefan et al. 2004)

Authors and Research Question	Methods	Sample	Measures	Findings	Limitations
Distefan et al., 2004 Adolescents whose favorite movie stars smoke on-screen have a higher risk of smoking	Longitudinal Baseline telephone surveys in 1996 with follow up telephone surveys in 1999 Male and female actors elicited from participants, their on-screen smoking rated and then compared to other variables related to adolescent smoking	Adolescents aged 12-15 years from a random digit-dialing telephone survey of households in California N=2084 (67% of original sample of 3104) Never smokers from baseline sample used Non-participants more likely to be non-White, report average or below average school performance, and to have family members who were smokers	<u>Smoking status of favorite star:</u> Participants at baseline were asked to list their 2 favorite male and female movie stars. The top 10 stars listed by gender of participant determined and 50 films in the 3 years before the study (1994-96) were viewed to rate whether or not the star smoked on-screen in at least 2 of these films <u>Smoking status by follow up survey:</u> Positive responses to both, "Have you ever smoked a cigarette?" and "Have you ever tried or experimented with cigarette smoking, even a few puffs?" <u>Control variables: Receptivity to tobacco advertising and promotions:</u> "Have you ever bought or received for free any product which promotes a tobacco brand or distributed by a company?" and "Do you think you would ever use a tobacco industry promotional item, such as a t-shirt?" yes to either has high receptivity, low receptivity was unable to recall unaided a tobacco advertising brand or not having a favorite advertisement but able to name a brand most advertised, intermediate receptivity measured by having a favorite advertisement Exposure to parental and friend smoking, parental disapproval of smoking, school performance	34.5% of participants had favorite stars that smoked on-screen and the participants with smoking stars were more likely to be female (39.2% vs. 29.9%) and aged 14-15 years (40.7% vs. 29.5% aged 12-13 years at baseline) Adolescents with a favorite star who smoked on-screen were more likely to have smoked at follow up (OR=1.36; 95% CI=1.02-1.82) For adolescent females, having a favorite star who smoked on-screen increased the risk of smoking at follow up (OR=1.86;95% CI=1.26-2.73) when all other variables were controlled. When receptivity to tobacco advertising and gender was taken into account, an effect was found for adolescent females: 20% initiated smoking if at baseline they were minimally receptive and their favorite star did not smoke on-screen, compared to more than 50% of females who initiated smoking when at baseline they were highly receptive to advertising and had a favorite star who did smoke on-screen. For adolescent males, smoking initiation at follow up was only associated with receptivity to tobacco advertising and promotions but not to having a favorite star smoke on-screen	Only measures smoking initiation, no indication of continued or addicted smoking Further research needed to determine possible genre specific smoking depictions and how gender influences interpretation of depictions

ENDING THE TOBACCO PROBLEM

Table H-2. Exposure To Smoking Depictions In Movies Increases Risk For Smoking Initiation (Hines et al. 2000)

Authors and Research Question	Methods	Sample	Measures	Findings	Limitations
Hines et al., 2000 To determine the effect of exposure to smoking in the movies on attractiveness of the character, urge to smoke, and likelihood of smoking in certain situations by smoking status and gender.	Controlled Experiments School based surveys and film showings during class Film clips depicting both smoking and non smoking by popular male and female actresses Ratings of character attractiveness and similarity elicited after each clip	College students at a Midwestern university in the United States as part of general psychology course requirement N=151 64 females, 84 males aged 17-41 years (x=20.08), 87% Caucasian, 9% African American, 2% Asian American, 1% Hispanic	<u>Exposure to smoking in the movies:</u> Film actors who were attractive and popular to 160 General psychology students. Eight 3-minute film segments depicting 4 male and 4 female actors smoking (experimental condition) and not smoking (control condition). Distractor clips depicting different actors not smoking were also included. <u>Rating of character attractiveness:</u> physically attractive, sexy, in shape, sophisticated, wise, adventurous, cool, sociable, popular, desirable for a date, feminine, and masculine (5-point Likert scale) <u>Rating of perceived similarity to character:</u> how much the character is “like me”. <u>Smoking status:</u> smoking history and current smoking status elicited and participants categorized as regular (smoking every day and at least 100 cigarettes in lifetime), some-day (some days of the week and at least 100 cigarettes in lifetime), or nonsmokers (participants who did not meet above criteria) <u>Desire to smoke:</u> 7-point Likert scale <u>Smoking scenarios:</u> 18 scenarios of 3 different levels of cigarette availability (cigarette must be purchased or requested, cigarette is offered or pack is available, cigarette is being pushed by friends) rated likelihood of smoking on a 5-point Likert scale.	n.s. main effects and interactions found for ratings of the male actor attractiveness by the experimental condition and participant smoking status The effect of the experimental condition accounted for 9.3% of the variance in ratings of attractiveness, the interaction between the experimental condition and smoking status accounted for an additional 4.5% of the variance The experimental condition by gender by smoking status interaction for desire to smoke was significant $F(2, 143)=3.46$, $p=.03$ and accounted for 5% of the variance The main effect of experimental condition on likelihood of smoking was significant ($F(1,135)=7.44$, $p=.007$), with those who viewed the smoking clips ($x=2.5$, $SD=1.6$) reporting a greater likelihood of smoking than participants who viewed the nonsmoking clips ($x=2.2$, $SD=1.5$). This effect accounted for 5.2% of the variance The main effect of smoking status of participant on likelihood of smoking was also significant ($F(2,135)=446.75$, $p<.001$) with regular smokers ($x=4.7$, $SD=.5$) more likely to smoke than occasional smokers ($x=3.3$, $SD=1$) who were more likely to smoke than nonsmokers ($x=1.3$, $SD=.4$). This effect accounted for 86.7% of the variance	The results indicate that smoking status has a much stronger effect on likelihood of smoking than viewing smoking depictions in film clips. Further prospective research is needed with non-smokers to establish predictive relationships

Table H-2. Exposure To Smoking Depictions In Movies Increases Risk For Smoking Initiation (Sargent et al. 2005)

Authors and Research Question	Methods	Sample	Measures	Findings	Limitations
Sargent, et al., 2005 Measure exposure to movie smoking in a nationally representative sample and determine whether exposure is associated with smoking initiation in adolescents	Cross-sectional Telephone based survey List of specific movies with smoking occurrences measured for each	Adolescents aged 10-14 years randomly selected across the USA Broad geographic regions across USA and different ethnic and racial groups N=6522	<u>Exposure to smoking in movies:</u> Total number of smoking occurrences viewed in a random subset of 50 movies selected from 500 movies from 1998-2002 and 32 movies during 2003; categorized into quartiles based on median number of smoking occurrences (46, interquartile range 19,88) for analysis. <u>Smoking Initiation:</u> Any lifetime cigarette smoking by answering yes to the question, "Have you ever tried smoking a cigarette, even just a puff?" <u>Controlled variables:</u> age, sex, parent education, self-reported school performance, sensation seeking, rebelliousness, self esteem, parent, sibling, friend smoking, parenting style, weekly spendable income, access to cigarettes in the home, extracurricular activities, weekday TV watching, weekday videogame use, self regulation, parental oversight of smoking behavior, and parent report of household income.	Exposure to smoking in movies was an average of 61 occurrences (mean number of 13 (SE:0.11) movies seen by participants from the randomized list of 50). Exposure was higher among Hispanic (65 occurrences; SE: 2.1) and black (74 occurrences; SE: 2.7) adolescents compared to white adolescents (57 occurrences; SE: 0.9; p<.001) The proportion of adolescents who tried smoking increased with each quartile of exposure to smoking in movies: quartile 1= 0.02, quartile 2= 0.06, quartile 3= 0.11 & quartile 4= 0.22, consistent across racial/ethnic groups and no difference between region of the country In addition, when controlling for all possible confounding variables, adolescents with higher exposure to smoking in movies had significantly higher odds of trying smoking when compared to quartile 1: quartile 2= OR 1.7 (1.1-2.7) CI 95%; quartile 3= OR 2.0 (1.2-3.1); and quartile 4= OR 2.7 (1.7-4.2). Attributable risk, determined by setting movie smoking to quartile 1 for adolescents in higher quartiles and holding other risk factors constant, was 0.38 (0.20-0.56) CI 95%. Thus, exposure to smoking depictions in movies is an independent, primary risk factor for smoking initiation in 38% of adolescents in the sample who tried smoking.	Not longitudinal and therefore cannot assess temporal sequence or causation

ENDING THE TOBACCO PROBLEM

Table H-2. Exposure To Smoking Depictions In Movies Increases Risk For Smoking Initiation (Sargent et al. 2001)

Authors and Research Question	Methods	Sample	Measures	Findings	Limitations
Sargent et al., 2001 Exposure to movie smoking associated with smoking initiation in adolescents	Cross-sectional School based survey List of specific movies with smoking instances measured for each	Adolescents aged 9-15 years in grades 5-8 at 14 schools in New England, USA Mainly white rural population N=4919	<u>Exposure to smoking in movies:</u> Total number of smoking occurrences viewed in a random subset of 50 movies selected from 601 movies from 1988-99, categorized into 4 groups for analysis 0-50 (26.4% of sample), 51-100 (28.7%), 101-150 (19.5%), and >150 (25.4%). <u>Smoking Initiation:</u> Any lifetime cigarette smoking <u>Controlled variables:</u> age, sex, school, parent education, self-reported school performance, sensation seeking, rebelliousness, self esteem, receptivity to tobacco advertising, authoritative parenting, parental disapproval of smoking, and parent, sibling, friend smoking	Exposure to smoking in movies increased with age, lower school performance, and higher levels of sensation seeking and rebelliousness More males than females had exposure to smoking in movies (mean=126 SD: 88 vs. mean= 95 SD: 72, p<.0001) The proportion of adolescents who tried smoking increased with more exposure to smoking in movies as follows, 0-50 occurrences 4.9% (64) tried smoking, 51-100 occurrences 13.7% (194), 101-150 occurrences 22.1% (212), >150 31.3% (391), independent of age p<.0001 In addition, when controlling for possible confounding variables, adolescents with higher exposure to smoking in movies had significantly higher odds of trying smoking: 51-100 occurrences OR 1.9 (1.3-2.7) CI 95%, 101-150 occurrences OR 2.6 (1.8-3.7), >150 occurrences OR 2.5 (1.7-3.5)	Sample mainly white rural population of non-smokers Smoking occurrence is so prevalent in R-rated films, may not be able to determine independent effect of exposure to smoking from other R-rated movie content

Table H-2. Exposure To Smoking Depictions In Movies Increases Risk For Smoking Initiation (Sargent et al. 2002)

Authors and Research Question	Methods	Sample	Measures	Findings	Limitations
Sargent et al., 2002 Higher exposure to smoking in movies among never smokers will be associated with more favorable attitudes toward smoking initiation	Cross sectional School based survey List of specific movies with smoking occurrences measured for each	Adolescents aged 9-15 years in grades 5-8 at 14 schools in New England, USA Mainly white rural population N=3702 Only participants who reported no lifetime smoking experience were eligible Non-participants were more likely to be in 5 th and 6 th grade, to have parents, siblings, and friends who smoke; and have lower school performance compared with participants. No differences in attitudes toward smoking were found, except more likely to view adult smoking as normative than participants	<u>Exposure to smoking in movies:</u> Total number of smoking occurrences viewed in a random subset of 50 movies selected from 601 movies from 1988-99, categorized into 4 groups for analysis: 0-50 (30% of sample), 51-100 (30%), 101-150 (19%), and >150 (21%). <u>Smoking susceptibility:</u> intentions: “Do you think you will smoke a cigarette in the next 6 months?” and resistance to peer smoking: “Would you smoke a cigarette if your best friend offered you one?” <u>Normative peer smoking:</u> “I think most kids in my school smoke” <u>Normative adult smoking:</u> “I think most adults smoke” <u>Positive expectations of smoking:</u> enjoyment, something to do when bored, deal with problems or stress, stay thin, feel more comfortable at parties, relaxing, look older dichotomized y/n and then summed into an index ranging from 0 to 7 <u>Controlled variables:</u> grade, school, self-reported school performance, sensation seeking, rebelliousness, self esteem, receptivity to tobacco advertising, parent education, authoritative parenting, and parent, sibling, friend smoking	Exposure to smoking in movies increased with higher grade in school, lower school performance, higher levels of sensation seeking and rebelliousness, and lower levels of self esteem. More males than females had exposure to smoking in movies (mean=115, SD: 84 vs. mean= 87, SD: 68) Positive attitudes increased with more exposure to smoking in movies: 14% of never smokers in lowest quartile of exposure were susceptible to smoking vs. 36% who were in the highest quartile (p<.001) 14% in the lowest category of exposure endorsed >2 positive expectations compared to 31% in the highest category of exposure (p<.0001) Associations were found between higher exposure to smoking in movies and smoking susceptibility (OR 1.60, 95% CI 1.24-2.07), normative adult smoking (OR 1.37, 95% CI 1.09-1.71), and positive expectations from smoking (OR 1.38, 95% CI 1.13-1.70) Exposure to 50 occurrences of smoking in movies (about 5 R-rated movies) has a moderate effect on attitudes, similar to other social influences such as having family members or friends who smoke (OR 1.16 (.97-1.39) 95% CI) for 0-50 occurrences vs. (OR 1.31 (1.05-1.62) 95% CI) for 51-100 occurrences No association was found between higher exposure to smoking in movies and peer norms of smoking when controlling for sociodemographics, social influences, and personality factors	Sample mainly white rural population of non-smokers Cannot determine if positive smoking attitudes are due to another unknown variable which in turn leads adolescents to seek out movies with smoking or other adult behaviors

ENDING THE TOBACCO PROBLEM

Table H-2. Exposure To Smoking Depictions In Movies Increases Risk For Smoking Initiation (Dalton et al. 2003)

Authors and Research Question	Methods	Sample	Measures	Findings	Limitations
Dalton et al., 2003 Exposure to movie smoking predicts smoking initiation in adolescents	Longitudinal Baseline school-based surveys and follow up phone interviews 13-26 months later List of specific movies with smoking occurrences measured for each	Adolescents aged 10-14 years in grades 5-8 at 14 schools in New England, USA N=2603 Only participants who reported no lifetime smoking experience on baseline were eligible for follow up interviews Non-participants comparable to participants in age, sex, grade, and exposure to movie smoking but were more susceptible to smoking at baseline; were more likely to have parents, siblings, and friends who smoke; and were more likely to have lower school performance	<u>Exposure to smoking in movies:</u> Ratio of total number of smoking occurrences viewed by total possible number of smoking occurrences in a subset of 50 movies selected from 601 movies from 1988-99, classified into quartiles (0-531, 532-960, 961-1664, 1665-5308) <u>Child characteristics:</u> sex, age, school, self-reported school performance, sensation seeking, rebelliousness, self esteem <u>Social influences on smoking initiation:</u> Parent, sibling, friend smoking, receptivity to tobacco advertising <u>Parenting characteristics:</u> parent education, authoritative parenting, and adolescent perceptions of parental disapproval of smoking <u>Smoking Initiation:</u> Any lifetime cigarette smoking reported on follow up survey	Participants saw 32% (n=16) of the 50 movies on the survey for a total mean of 98.5 (SD=75.1) smoking occurrences Females saw a mean of 14.6 (SD=7.4) movies with a mean of 85.1 (SD=66.4) occurrences vs. Males saw a mean of 17.1 (SD=8.2) movies and a mean of 113.5 (SD=81.2) smoking occurrences Smoking in movie exposure was positively associated with sensation seeking and rebelliousness and negatively associated with school performance and measures of authoritative parenting 10% (259) of participants initiated smoking and of those 208 reported “just a few puffs” and 6 reported more than 100 cigarettes After controlling for age, sex, and school adolescents with the highest exposure to smoking in the movies were 2.71 (95%, CI 1.73-4.25) times more likely to initiate smoking compared to adolescents with the lowest exposure The effect of exposure to smoking in movies was stronger for adolescents whose parents did not smoke than for adolescents whose parents smoked 52.2% of smoking initiation was attributed to smoking in movies exposure	Sample mainly white rural population of non-smokers Did not control for age, as increase in age also increase in exposure to smoking, how to measure the cumulative exposure? Unable to separate out effects of R-rating and smoking content of movies since many R-rated movies contain smoking thus another aspect of R-rated movies may influence smoking initiation

Table H-2. Exposure To Smoking Depictions In Movies Increases Risk For Smoking Initiation (Gutschoven and Van den Bulck 2004)

Authors and Re-search Question	Methods	Sample	Measures	Findings	Limitations
<p>Gutschoven & Van den Bulck, 2004</p> <p>Examining the relationship between television viewing and the amount of cigarettes smoked by adolescent smokers per time unit</p>	<p>Cross-sectional</p> <p>School bases survey conducted in assembly setting</p>	<p>Adolescents average age 16.51 (SD=.81) in schools in Flanders, Belgium</p> <p>N=421</p> <p>Only participants who reported smoking at least one cigarette in the past year were used for analysis</p>	<p><u>Television viewing time:</u> total television viewing in hours per week</p> <p><u>Cigarette smoking:</u> variable calculated into number of cigarettes smoked per week</p> <p><u>Self-assessed health:</u> How healthy you feel and how many days in the past year unable to attend school because of sickness</p> <p><u>Control variables:</u> sex, educational level (general, technical, and vocational), peer smoking, frequency of going out to taverns, pubs, bars, discos, parties, etc., parental smoking</p>	<p>Smokers watched an average of 3.04 hours a day of television</p> <p>Males (3.14, SD=1.44) watched more TV than females (2.48, SD=1.35; $t=2.648$, $df=415$, $p=.0008$)</p> <p>Smokers of the highest (general) educational level (2.32m SD=1.17) watched significantly less TV than smokers in the technical (3.09,SD=1.42) and vocational levels (3.32, SD=1.52; $F(2416)=64.821$, $p=.0001$)</p> <p>Smoking volume was correlated with self-assessed health, even when controlling for level of education and age ($r = -0.11$, $p=.03$) with heavier smokers feeling less healthy and this was also found between volume and days off sick ($r = .28$, $p<.0001$).</p> <p>Television viewing was a significant predictor of smoking volume, with smokers who watch 5 or more hours a day smoke between 60 and 147 more cigarettes per week than those who watch 1 hour or less a day. Television viewing explained an additional 3% of the variance ($F(8399)= 30.975$, Model $R^2 = .383$, $p<.0001$) when gender, educational level, parental and peer smoking, and frequency of going out was accounted for in the model.</p>	<p>Definition of smokers for sample inclusion was unclear, not well defined</p> <p>Unable to separate out direction of the relationship, smokers may watch more TV due to an unmeasured variable.</p> <p>School performance was not measured</p>

ENDING THE TOBACCO PROBLEM

Table H-2. Exposure To Smoking Depictions In Movies Increases Risk For Smoking Initiation (Gidwani et al. 2002)

Authors and Research Question	Methods	Sample	Measures	Findings	Limitations
Gidwani et al., 2002 Determine whether youth with greater exposure to television exhibit higher rates of smoking initiation	Longitudinal Annual interviews from the National Longitudinal Survey of Youth (NLSY) compared between 1990-1992	Adolescents from 10 to 15 years old mean age 11.5 years from the NLSY nationally representative sample of youth which was over sampled for African American, Hispanic American, and poor non-Hispanic white populations N=592 Only participants who had completed reports of television viewing and no smoking before 1990	<u>Television viewing time:</u> average television viewing in hours per day categorized into 0-2, >2-3, >3-4, >4-5, and >5 hours per day <u>Initiation of smoking:</u> self-reported smoking in the last 3 months <u>Control variables:</u> ethnicity, household poverty, marital status, number of children in household, maternal education, intelligence, employment, gender, baseline aptitude scores	Smoking increased from 4.8% in 1990 to 12.3% in 1992 Average hours of television viewing was 4.8 hours in 1990, of the participants who initiated smoking in 1992, 42% viewed >5 hours of television per day Dose-response relation was found between amount of TV viewing and smoking initiation when taking control variables into account: adolescents who watch >5 hours of TV per day were 5.99 times more likely to initiate smoking (P=.02; 95%CI:1.39-25.71) than adolescents who watched 0-2 hours a day. Similarly, adolescents who watched >4-5 hours per day were 5.24 times more likely to initiate smoking than adolescents who watched 0-2 hours per day (P=.03; 95% CI: 1.19-23.10)	Content of TV viewing, peer smoking, and exposure to other media were not measured

Table H-2. Exposure To Smoking Depictions In Movies Increases Risk For Smoking Initiation (McCool et al. 2005)

Authors and Research Question	Methods	Sample	Measures	Findings	Limitations
<p>McCool et al., 2005</p> <p>To assess the media interpretation model of adolescents' exposure to smoking in film, perceptions of smoking imagery in film, and smoking intentions</p>	<p>Cross-sectional</p> <p>School based surveys during required class or after-school assembly</p>	<p>Two samples of adolescents median age 12 and median age 16 years from schools in Auckland, New Zealand</p> <p>N=3041</p> <p>Ever smoker 12 yrs cohort: 28.8% and 16 yrs cohort: 66.4%</p>	<p><u>Film experiences:</u> film exposure, perception of smoking depiction frequency, nonchalant attitudes toward smoking in movies, positive stereotypes of smokers in movies</p> <p><u>Smoking beliefs and intentions:</u> perceptions of smoking prevalence, attitudes towards smokers, intentions to smoke</p>	<p>Film exposure predicted higher levels of perceived smoking frequency and nonchalant attitudes about smoking imagery</p> <p>24% of the variance of smoking intentions was accounted for by the media interpretation model</p> <p>Perceptions of smoking were prevalent, non-judgmental attitudes toward smoking and positive smoker stereotypes independently accounted for variance within smoking intentions</p>	<p>Direction of influence of noticing smoking depictions and perceptions of smoking frequency is unclear</p> <p>Smoking experience was not taken into account</p>

ENDING THE TOBACCO PROBLEM

Table H-2. Exposure To Smoking Depictions In Movies Increases Risk For Smoking Initiation (Goldberg 2003)

Authors and Research Question	Methods	Sample	Measures	Findings	Limitations
<p>Goldberg, 2003</p> <p>Examine the relationship between level of exposure to American movies and videos, exposure to American cigarette advertising and access to promotional products for cigarettes, and smoking behavior including exploratory puffing, cigarettes smoked in the last week, and intentions to smoke in the future</p>	<p>Cross-sectional</p> <p>School based surveys during free class time</p>	<p>Adolescents aged between 14 and 16 years from schools in Hong Kong</p> <p>N=3041</p> <p>Ever smoker 12 yrs cohort: 28.8% and 16 yrs cohort: 66.4%</p>	<p><u>Film exposure:</u> Number of American movies and videos seen over the past 2 months</p> <p><u>Smoking behavior and intentions:</u> ever puffed a cigarette, smoked in the last 7 days, expectations of smoking cigarettes one year from now</p> <p><u>Brand of cigarette smoked and brand of cigarette advertising recalled</u></p> <p><u>Number of cigarette promotional products owned</u></p>	<p>Adolescents had seen an average of 1.4 American movies and 1.2 American videos</p> <p>Significant differences in smoking experience and intentions found between adolescents who saw 0-1 movies vs. 4 or more movies (34% vs. 47% and 21% vs. 30%, $p < .01$, Chi square values not reported)</p> <p>Significant differences in smoking experience, current smoking, and intentions to smoke found between adolescents who reported seeing 0-5 cigarette advertising products vs. 9 or more products (28% vs. 50%; 13% vs. 27%; 16% vs. 34%, $p < .001$)</p> <p>Significant differences in smoking experience, current smoking, and intentions to smoke found between adolescents who reported owing no vs. 2 or more cigarette promotional products (34% v.71%, 16% vs. 44%, 22% vs.58%; $p < .001$)</p>	<p>Depictions of smoking in movies not measured</p> <p>Direction of influence not discernable</p> <p>No other variables controlled for or measured</p>

Table H-3. The Effects of Smoking in Movies Can Be Reduced by Anti-Smoking Advertisements and Parental Restriction of R-Rated Movies (Pechmann and Shih, 1999)

Authors and Research Question	Methods	Sample	Measures	Findings	Limitations
<p>Pechmann and Shih, 1999</p> <p>Experimental design to test rival theses about the effects of smoking in movies on adolescents and whether these effects can be nullified with antismoking advertising</p>	<p>Controlled Experiments</p> <p>School based surveys and film showings during class</p> <p>Study 1: Clips of 2 films with smoking either present or professionally edited out</p> <p>Study 2: Entire feature length film with smoking present or edited out</p> <p>Ratings of arousal and smoking perceptions elicited after each scene in both studies</p>	<p>9th graders aged 14-15 years from southern California</p> <p>Non smokers, half female</p> <p>Study 1: N= 607; 75% Caucasian</p> <p>Study 2: N= 232; 50% Caucasian, screened out if already seen stimulus movie</p>	<p><u>Study 1:</u> <u>Smoking in Movies:</u> 14 scenes from 2 feature films (16 minutes of total footage) that included high and low positive arousal scenes with a female and a male star who either originally smoke in the scene or the smoking is professionally edited out of the scene</p> <p><u>Positive arousal:</u> Each scene rated sad vs. happy and boring vs. exciting</p> <p><u>Perceptions of Smokers:</u> “How does a teenager who smokes cigarettes look to you?” (1-9, 9= most favorable), rating teenage smokers on 4 factors: stature (intelligent, smart, rich, successful), vitality (healthy, well, fit, athletic, clean, good-smelling), popularity (well-liked, fun to be with, desirable to date, sexy, cute, good-looking), and poise (confident, comfortable around others, own person, free to make own decisions, contented, relaxed), and “If you were to smoke a cigarette, how do you think it would make you feel?”, rating on same 4 factors</p> <p><u>Study 2:</u> <u>Smoking in Movies:</u> original version of feature film <i>Reality Bites</i>, 12 (30%) out of 40 scenes depicted smoking, a total of 99 minutes of footage, and version of same film with smoking, cigarettes, ash trays,</p>	<p><u>Study 1:</u> The smoking vs. nonsmoking scenes elicited more positive arousal ($x=3.42$ vs. 3.19; $F(1596)=10.06$, $p<.01$); more positive perceptions of how smokers are perceived by others in stature (3.58 vs. 3.13, $F(1601)=7.49$, $p<.01$) and vitality (3.16 vs. 2.76, $F(1601)=4.86$, $p<.01$); and more positive perceptions about how a smoker perceives their own stature (3.63 vs. 3.27, $F(1601)=5.85$, $p<.01$)</p> <p><u>Study 2:</u> In control ad condition, the smoking vs. nonsmoking scenes elicited more positive arousal ($x=4.35$ vs. 4.03, $t=2.19$, $p<.05$); more positive perceptions of how smokers are perceived by others in stature (3.91 vs. 3.13, $t=2.33$, $p<.05$); more positive perceptions of smoker self-perception of stature (3.80 vs. 2.96, $t= 2.32$, $p<.05$); and more intentions to smoke (1.91 vs. 1.59, $t=1.88$, $p<.05$). In the antismoking ad condition, the smoking scenes did not differ from the other scenes ($p<.05$)</p> <p>Significant interactions were found between the ad conditions and smoking depictions with the level of positive arousal ($F(1227)=6.91$, $p<.01$); other’s perceptions of a smoker’s stature ($F(1228)=4.82$, $p<.05$); smoker’s perception of their own stature ($F(1228)=4.88$, $p<.05$); and participants’ intent to smoke ($F(1203)=4.88$, $p<.05$)</p> <p>In the antismoking ad, more negative thoughts were generated when the lead characters were smokers vs. nonsmokers (2.37 vs.1.31, $t=2.70$,</p>	<p>Outcome measure was not actual smoking behavior</p> <p>Reactions were measured after each scene which could have influenced results</p> <p>Smoking depictions limited to one movie, further research is needed with more smoking depictions in movies</p>
Pechmann and Shih,					

ENDING THE TOBACCO PROBLEM

Table H-3. The Effects of Smoking in Movies Can Be Reduced by Anti-Smoking Advertisements and Parental Restriction of R-Rated Movies (Pechmann and Shih, 1999)

Authors and Research Question	Methods	Sample	Measures	Findings	Limitations
1999 (Cont)			<p>and secondhand smoke professionally edited out</p> <p><u>Positive arousal and Perceptions of Smokers:</u> Same as above</p> <p><u>Anti-Smoking Advertisement:</u> 30-second television spot of negative caricatures of a smoker vs. control advertisement on AIDS with same length and format of caricatures</p> <p><u>Intentions to Smoke:</u> “Do you think that you will smoke at any time during the next year? and Would you smoke if your best friend dared you?” (1=definitely not, 4=definitely yes)</p> <p>Ad-induced increases in negative smoker-related thoughts (positive, negative, or neutral)</p> <p>Extensive manipulation and suspicion checks also included</p>	<p>p<.01), this was not found in the control ad condition. Significant interaction between the ad conditions and smoking depictions with the number of negative thoughts about the lead characters (F(1188)=6.98, p<.01)</p>	

Table H-3. The Effects of Smoking in Movies Can Be Reduced by Anti-Smoking Advertisements and Parental Restriction of R-Rated Movies (Edwards et al. 2004)

Authors and Research Question	Methods	Sample	Measures	Findings	Limitations
Edwards, et al., 2004 Evaluate the effect of anti-smoking advertisement on women's perceptions of smoking in movies and their intentions to smoke	Quasi-experimental Surveys administered after viewing movies in movie theater to patrons who looked between 12 and 17 years old Five movies with various amounts of smoking viewed in 'real-world' movie theaters Control condition: no ad was shown before the movie (week 1) Experimental condition: Anti-smoking advertisement shown before the movie (week 2)	Female movie theater patrons aged 12-17 years in Sydney, Australia N=2038 Mean age=13.9 years (SD=1.58) Age not evenly distributed for 16 and 17 year olds 9.2% reported smoking cigarettes in the previous 4 weeks	<u>Movie exposure to smoking:</u> 5 movies on "Screenit", an internet film review site were identified for varying levels of smoking depiction <u>Perceptions of smoking in movies:</u> whether smoking was present in the movie seen and which characters smoked, answer to question: "was it ok the characters were smoking?" 5-point Likert scale responses <u>Smoking history and intentions:</u> "have you smoked cigarettes in the last 4 weeks?" and "do you think you will be smoking cigarettes this time next year?" 7-point Likert scale <u>Anti-smoking advertisement:</u> A national anti-tobacco campaign's ad was modified with an anti-smoking voice-over by a popular female teen star was shown before the movie	Nonsmokers who saw the ad were more likely to see smoking as "not ok" (48.2%) vs. nonsmokers who did not see the ad (25.2%, $X^2=83.11$, $df=3$, $p=.0001$); this difference was maintained when age and movie exposure differences were adjusted for (Wald $X^2=75.784$, $df=1$, $p=.0001$). No effect was found for smokers ($X^2=2.52$, $df=2$, $p=.28$), even when age and movie were accounted for (Wald $X^2=1.37$, $df=1$, $p=.242$). No overall effect was found for the intervention on intentions to smoke ($X^2=3.26$, $df=2$, $p=.196$). When smokers and nonsmokers were analyzed separately, smokers were more likely to not intend to smoke (31.9% vs. 47.8%; $X^2=9.03$, $df=2$, $p=.01$), and when age and movie were accounted for the intervention group of smokers continued to have lower intentions to smoke (Wald $X^2=4.59$, $df=1$, $p=.03$). No effect was found for nonsmokers ($X^2=.97$, $df=2$, $p=.62$), even when age and movie were accounted for (Wald $X^2=1.25$, $df=1$, $p=.263$). .	No baseline information about perceptions of smoking or intentions to smoke. Sampling strategy open to researcher bias and may not be representative.

ENDING THE TOBACCO PROBLEM

Table H-3. The Effects of Smoking in Movies Can Be Reduced by Anti-Smoking Advertisements and Parental Restriction of R-Rated Movies (Dixon 2001)

Authors and Research Question	Methods	Sample	Measures	Findings	Limitations
Dixon, 2001 Assess public perceptions of the tobacco industry and tobacco use intentions after watching the movie <i>The Insider</i>	Quasi-experimental Surveys administered before and 2 weeks after viewing movies in a movie theater for a free movie pass Control movie: <i>Erin Brockovich</i>	Commercial theater patrons between ages 15-60+ years (majority between 20-39 years) in Melbourne, Australia N=322, <i>Insider</i> viewers =182 <i>Brokovich</i> viewers=141 Only participants who had not seen either movie were included in the sample Both sets of viewers had comparable smoking status (majority non-smoker) and education.	<u>Film conditions:</u> both rated “M15+” which means viewers 15 year or under not admitted unless with a parent or adult guardian <i>The Insider</i> was a tale of a whistleblower of the tobacco industry cover up of the harmful health effects of their products. <i>Erin Brokovich</i> which had an analogous plot but without the tobacco industry content. <u>Perceptions of different professions:</u> List of professions were presented and rating on “ethics and honest” and “power” elicited. Statements of agreement presented about business conduct of tobacco industry and other industries. <u>Intentions to smoke:</u> “Do you think you will be smoking cigarettes this time next year?” <u>Perception of smoking prevalence:</u> in real life and in movies compared to real life	Patrons who viewed <i>The Insider</i> held more negative views of the tobacco industry business conduct than those who saw the control movie, even when pre-existing attitudes were controlled for (pre-film means = 1.68 vs. 1.78, post-film means = 1.63 vs. 1.90, F(1, 242)= 3.09, p=.0004) Viewing <i>The Insider</i> was also associated with short term reductions in intentions to smoke (pre-film mean = 1.97 (SD: 1.57) vs. post-film mean = 1.76 (SD: 1.44) F(4,188)=114.97, p<.001).	No baseline information about perceptions of smoking or intentions to smoke. Self-selection bias of viewing <i>The Insider</i> and non-equivalent control movie make the intentions finding difficult to interpret.

ENDING THE TOBACCO PROBLEM

Table H-3. The Effects of Smoking in Movies Can Be Reduced by Anti-Smoking Advertisements and Parental Restriction of R-Rated Movies (Sargent et al. 2004)

Authors and Research Question	Methods	Sample	Measures	Findings	Limitations
Sargent, et al., 2004 Examine the effect of parental R-rated movie restriction on adolescent smoking initiation	Longitudinal School-based surveys at baseline and follow up phone interviews 13-26 months later List of specific R-rated movies with smoking occurrences measured for each	Adolescents aged 10-14 years at 14 schools in New England, USA N=2596 Only participants who reported no lifetime smoking experience on baseline were eligible for follow up interviews Non-participants comparable to participants in age, sex, grade, and parental R-rated movie restriction but were more slightly more susceptible to smoking at baseline; were more likely to have parents, and friends who smoke; have parents who did not complete high school and were more likely to have lower school performance	<u>Exposure to smoking in R-rated movies:</u> Ratio of total number of smoking occurrences viewed by total possible number of smoking occurrences in a subset of 50 movies selected from 601 movies from 1988-99, adolescents classified into 3 categories of R-rated movie exposure: no exposure (n=594), low (n=1109, exposure to 1-499 occurrences of R-rated movie smoking), and high (n=893, exposure to 500-3376 occurrences) <u>Parental Restriction of R-rated movies:</u> "How often do your parents let you watch movies or videos that are rated R?" responses ranged from "never" to "all the time" and then coded into 3 categories: greater strictness (score moved to more restrictive category during follow up), greater leniency (score moved to a less restrictive category), or no change <u>Confound variables:</u> sex, age, school, self-reported school performance, sensation seeking, rebelliousness, self esteem; Parent, sibling, friend smoking, receptivity to tobacco advertising; parent education, authoritative parenting, and adolescent perceptions of parental disapproval of smoking <u>Smoking Initiation:</u> Any lifetime cigarette smoking reported on follow up survey	Exposure to R-rated movie smoking decreased significantly ($p < .001$) with increasing parental restriction, adolescents who were "never" allowed to view R-rated movies had low exposure to R-rated movie smoking (4.9%), compared to 20% for adolescents allowed to watch them "once in while", and 54% for adolescent allowed to "sometimes/all the time" After controlling for confound variables, risk of smoking initiation increased with decreased parental restriction from viewing R-rated movies RR 1.8(95% CI 1.1-3.1) for "once in a while" vs. RR 2.8 (95% CI 1.6-4.7) for "sometimes" or "all the time" This pattern was even more pronounced for adolescents from non-smoking families (RR 4.3 (95% CI, 1.4-13) when "once in while" vs. "sometimes, all the time" RR 10 (95% CI 3.6-31) compared to adolescents from families that smoke (RR 12 (4.1-37) for "once in a while" vs. "sometimes, all the time" RR 13 (4.4-38) Decreased parental restriction was associated with higher risk of smoking initiation and increased restriction with decreased risk, compared with adolescents reporting no change.	Only measures smoking initiation, no indication of continued or addicted smoking

ENDING THE TOBACCO PROBLEM

Table H-3. The Effects of Smoking in Movies Can Be Reduced by Anti-Smoking Advertisements and Parental Restriction of R-Rated Movies (Dalton et al. 2002)

Authors and Research Question	Methods	Sample	Measures	Findings	Limitations
Dalton et al., 2002 Examine the effect of parental R-rated movie restriction on adolescent smoking and alcohol use	Cross-sectional School-based surveys List of specific R-rated movies elicited whether student had seen or not	Primarily White (93%) adolescents average age 12 years at 30 schools in New England, USA N=4544	<u>Exposure to smoking in R-rated movies:</u> List of a subset of 50 movies selected from 603 movies from 1988-99 rated on whether participant saw movie or not <u>Parental Restriction of R-rated movies:</u> "How often do your parents let you watch movies or videos that are rated R?" responses ranged from "never" to "all the time" <u>Confound variables:</u> sex, school, grade, school performance, sensation seeking, rebelliousness, self esteem; parent education, parental disapproval of smoking, maternal supervision and responsiveness <u>Whether participant ever tried smoking or alcohol:</u> "How many cigarettes have you smoked in your life?" any answer of "just a few puffs" or more coded as tried smoking. "Have you ever had beer, wine, or other drink with alcohol that your parents didn't know about?" yes or no.	Trying smoking prevalence was 35% for no restriction of R-rated movies, 12% for partial restrictions, and 2% with complete restrictions. Trying alcohol prevalence was 46% for no restrictions, 16% for partial restriction, and 4% with complete restriction. When R-rated movies were completely restricted, adolescents were less likely to smoke (Relative Risk 0.29, 95% CI, 0.19-0.45) and drink alcohol (Relative Risk 0.30, CI, 0.21- 0.42) compared with no restrictions of R-rated movies, even after controlling for confound variables.	Not a clear measure of smoking depiction exposure Only measures trying behavior, not continued use Not clear that other variables associated with smoking and drinking behavior, e.g. peer behaviors, account for findings

REFERENCES

- Akers RL, Lee G. 1996. A longitudinal test of social learning theory: adolescent smoking. *Journal of Drug Issues* 26(2):317-343.
- Anthony JC, Warner LA, Kessler RC. 1994. Comparative epidemiology of dependence on tobacco, alcohol, controlled substances, and inhalants: basic findings from the national comorbidity survey. *Experimental and Clinical Psychology* 2:244-268.
- Arnett JJ. 1995. Adolescents' uses of the media for self-socialization. *Journal of Youth and Adolescence* 24(5):519-533.
- Bandura A. 1986. *Social Foundations for Thought and Action: A Social-Cognitive Model*. Englewood Cliffs, NJ: Prentice Hall.
- Biener L, Siegel M. 2000. Tobacco marketing and adolescent smoking: more support for a causal inference. *American Journal of Public Health* 90(3):407-411.
- Biener L, Siegel M. 2001. *The Role of Tobacco Advertising and Promotion in Smoking Initiation*. Bethesda, MD: Charlesworth A, Glantz SA. 2005. Smoking in the movies increases adolescent smoking: a review. *Pediatrics* 116(6):1516-1528.
- Choi WS, Pierce JP, Gilpin EA, Farkas AJ, Berry CC. 1997. Which adolescent experimenters progress to established smoking in the United States. *American Journal of Preventive Medicine* 13(5):385-391.
- Dalton MA, Ahrens MB, Sargent JD, Mott LA, Beach ML, Tickle JJ, Heatherton TF. 2002a. Relation between parental restrictions on movies and adolescent use of tobacco and alcohol. *Effective Clinical Practice* 5(1):1-10.
- Dalton MA, Tickle JJ, Sargent JD, Beach ML, Ahrens MB, Heatherton TF. 2002b. The incidence and context of tobacco use in popular movies from 1988 to 1997. *Preventive Medicine*. 34(5):516-523.
- Dalton MA, Sargent JD, Beach ML, Titus-Ernstoff L, Gibson JJ, Ahrens MB, Tickle JJ, Heatherton TF. 2003. Effect of viewing smoking in movies on adolescent smoking initiation: a cohort study. *Lancet* 362(9380):281-285.
- DHHS (U.S. Department of Health and Human Services). 1999. *The Health Consequences of Involuntary Exposure to Tobacco Smoke: A Report of the Surgeon General*. Atlanta, GA:DHHS.
- DHHS. 2000. *Healthy People 2010 (2nd Ed). With Understanding and Improving Health and Objectives for Improving Health*. Washington DC: U.S. Government Printing Office.
- DHHS. 2002a. *Report on Carcinogens (10 ed)*. Public Health Service, National Toxicology Program.
- DHHS. 2002b. *Healthy People 2010: Understanding and Improving Health*. Washington, DC: U.S. Government Printing Office.
- Distefan JM, Gilpin EA, Sargent JD, Pierce JP. 1999. Do movie stars encourage adolescents to start smoking? Evidence from California. *Preventive Medicine* 28(1):1-11.
- Distefan JM, Pierce JP, Gilpin EA. 2004. Do favorite movie stars influence adolescent smoking initiation? *American Journal of Public Health* 94(7):1239-1244.
- Dixon HG, Hill DJ, Borland R, Paxton SJ. 2001. Public reaction to the portrayal of the tobacco industry in the film *The Insider*. *Tobacco Control* 10(3):285-291.
- Edwards CA, Harris WC, Cook DR, Bedford KF, Zuo Y. 2004. Out of the smokescreen: does an anti-smoking advertisement affect young women's perception of smoking in movies and their intention to smoke? *Tobacco Control* 13(3):277-282.
- Emery S, Choi WS, Pierce JP. 1999. The social costs of tobacco advertising and promotions. *Nicotine and Tobacco Research* 1 (Suppl 2):S83-91.
- Gidwani PP, Sobol A, DeJong W, Perrin JM, Gortmaker SL. 2002. Television viewing and initiation of smoking among youth. *Pediatrics* 110:505-508.
- Glantz SA, Kacirk KW, McCulloch C. 2004. Back to the future: smoking in movies in 2002 compared with 1950 levels. *American Journal of Public Health*. 94(2):261-263.
- Goldman LK, Glantz SA. 1998. Evaluation of antismoking advertising campaigns. *Journal of the American Medical Association* 279(10):772-777.
- Goldstein AO, Sobel RA, Newman GR. 1999. Tobacco and alcohol use in G-rated children's animated films. *Journal of the American Medical Association*. 281 (12):1131-1136.
- Gutschoven K, Van den Bulck J. 2004. Television viewing and smoking volume in adolescent smokers: a cross-sectional study. *Preventive Medicine* 39(6):1093-1098.

- Hershey JC, Niederdeppe J, Evans WD, Nonnemaker J, Blahut S, Holden D, Messeri P, Haviland ML. 2005. The theory of "truth": how counterindustry campaigns affect smoking behavior among teens. *Health Psychology* 24(1):22-31.
- Hines D, Saris RN. 2000. Cigarette smoking in popular films: does it increase viewers' likelihood to smoke? *Journal of Applied Social Psychology* 30(11):2246-2269.
- Janerich DT, Thompson WD, Varela LR, Greenwald P, Chorost S, Tucci C, Zaman MB, Melamed MR, Kiely M, McKneally MF. 1990. Lung cancer and exposure to tobacco smoke in the household. *New England Journal of Medicine* 323(10):632-636.
- Ling PM, Glantz SA. 2002. Why and how the tobacco industry sells cigarettes to young adults: evidence from industry documents. *American Journal of Public Health* 92(6):908-916.
- Lynch BS, Bonnie RJ. 1994. *Growing Up Tobacco Free: Preventing Nicotine Addiction in Children and Youths*. Washington DC: The National Academies Press.
- McCool JP, Cameron L, Petrie K. 2004. Stereotyping the smoker: adolescents' appraisals of smokers in film. *Tobacco Control* 13(3):308-314.
- McCool JP, Cameron LD, Petrie KJ. 2001. Adolescent perceptions of smoking imagery in film. *Social Science and Medicine* 52(10):1577-1587.
- McCool JP, Cameron LD, Petrie KJ. 2003. Interpretations of smoking in film by older teenagers. *Social Science and Medicine*. 56(5):1023-1032.
- Pechmann C, Shih CF. 1999. Smoking scenes in movies and antismoking advertisements before movies: effects on youth. *Journal of Marketing* 63:1-13.
- Pierce JP, Choi WS, Gilpin EA, Farkas AJ, Berry CC. 1998. Tobacco industry promotion of cigarettes and adolescent smoking. *Journal of the American Medical Association* 279(7):511-515.
- Pierce JP, Distefan JM, Jackson C, White MM, Gilpin EA. 2002. Does tobacco marketing undermine the influence of recommended parenting in discouraging adolescents from smoking? *American Journal of Preventive Medicine* 23(2):73-81.
- Pierce JP, Gilpin EA, Choi WS. 1999. Sharing the blame: smoking experimentation and future smoking-attributable mortality due to Joe Camel and Marlboro advertising and promotions. *Tobacco Control* 8(1):37-44.
- Sargent JD. 2005. Smoking in movies: impact on adolescent smoking. *Adolescent Medicine Clinics* 16(2):345-370.
- Sargent JD, Beach ML, Adachi-Mejia AM, Gibson JJ, Titus-Ernstoff LT, Carusi CP, Swain SD, Heatherton TF, Dalton MA. 2005. Exposure to movie smoking: its relation to smoking initiation among US adolescents. *Pediatrics* 116(5):1183-1191.
- Sargent JD, Beach ML, Dalton MA, Ernstoff LT, Gibson JJ, Tickle JJ, Heatherton TF. 2004. Effect of parental R-rated movie restriction on adolescent smoking initiation: a prospective study. *Pediatrics* 114(1):149-156.
- Sargent JD, Beach ML, Dalton MA, Mott LA, Tickle JJ, Ahrens MB, Heatherton TF. 2001. Effect of seeing tobacco use in films on trying smoking among adolescents: cross sectional study. *British Medical Journal* 323(7326):1394-1397.
- Sargent JD, Dalton M, Beach M, Bernhardt A, Heatherton T, Stevens M. 2000. Effect of cigarette promotions on smoking uptake among adolescents. *Preventive Medicine* 30(4):320-327.
- Sargent JD, Dalton MA, Beach ML, Mott LA, Tickle JJ, Ahrens MB, Heatherton TF. 2002. Viewing tobacco use in movies: does it shape attitudes that mediate adolescent smoking? *American Journal of Preventive Medicine*. 22(3):137-145.
- Sargent JD, Dalton MA, Heatherton T, Beach M. 2003. Modifying exposure to smoking depicted in movies: a novel approach to preventing adolescent smoking. *Archives of Pediatric and Adolescent Medicine* 157(7):643-648.
- Steinberg L, Cauffman E. 1996. Maturity of judgment in adolescence: psychosocial factors in adolescent decision making. *Law and Human Behavior* 20:249-272.
- Straub DM, Hills NK, Thompson PJ, Moscicki AB. 2003. Effects of pro- and anti-tobacco advertising on nonsmoking adolescents' intentions to smoke. *Journal of Adolescent Health* 32(1):36-43.
- Tickle JJ, Sargent JD, Dalton MA, Beach ML, Heatherton TF. 2001. Favourite movie stars, their tobacco use in contemporary movies, and its association with adolescent smoking. *Tobacco Control* 10(1):16-22.
- Wakefield M, Flay B, Nichter M, Giovino G. 2003. Role of the media in influencing trajectories of youth smoking. *Addiction* 98 (Suppl 1):79-103.
- Watson NA, Clarkson JP, Donovan RJ, Giles-Corti B. 2003. Filthy or fashionable? Young people's perceptions of smoking in the media. *Health Education Research* 18(5):554-567.
- Worth K, Tanski S, Sargent J. 2006. *Trends in Top Box Office Movie Tobacco Use, 1996-2004. First Look Report*. Washington, DC: American Legacy Foundation.

I

State Statutes Governing Direct Shipment of Alcoholic Beverages to Consumers: Precedents for Regulating Tobacco Retail Shipments

Lisa F. Kinney
University of Virginia
School of Law

An important issue in contemporary tobacco control is the regulation of the conditions under which it is permissible for internet retailers or mail-order companies to ship tobacco directly to consumers. Given the difficulty of policing Internet tobacco transactions and constitutional barriers to additional, state-imposed delivery requirements, the only practical way to effectively regulate online tobacco retailers is through legislation prohibiting both online tobacco sales and direct shipment of tobacco products to consumers. Statutes restricting direct shipment of alcoholic beverages provide a precedent for such legislation because most states either explicitly prohibit direct shipment to consumers or do so practically by requiring that all transactions for alcoholic beverages take place within the state's licensed distribution system. Under a similar legislative scheme, shipment of tobacco products would be restricted to licensed wholesale or retail outlets, and consumers would only be permitted to purchase these products only in face-to-face transactions in licensed retail settings. Such legislation would be effective at a state level, as the New York statute banning direct shipment has demonstrated (*Brown & Williamson Tobacco Corp. v. Pataki*, 2003), or at a federal level, enforceable by the Bureau of Alcohol, Tobacco, Firearms, and Explosives.

To facilitate a better understanding of the range of mechanisms available for the regulation of online and mail-order tobacco purchases, the following pages review state statutes regulating shipments of alcoholic beverages. Of the states that ban alcohol shipment directly to consumers, most have enacted such prohibitions with respect to all alcoholic beverages, including wine, beer, and liquor. State statutes restricting direct shipment to consumers typically require that individuals importing alcoholic beverages from outside the state hold a commercial wholesaler's or importer's license.¹ Under tiered distribution systems, manufacturers may sell alcoholic beverages to licensed wholesale distributors, who may sell to retailers, who, in turn, make the products available to consumers. By requiring that all direct shipments take place within this system,

¹ Ark. Code Ann. § 3-7-106 (2005); Cal. Bus. & Prof. Code § 23661 et seq. (2005); Colo. Rev. Stat. § 12-47-901 (2004); Del. Code Ann. tit. 4, §§ 501, 526 (2005); Fla. Stat. Ann. § 561.545 (2005); Ga. Code Ann. § 3-3-32 (2004); Idaho Code §§ 23-102, 23-1055 (2005); 235 Ill. Comp. Stat. 5/6-29.1 (2005); Ind. Code Ann. § 7.1-5-11-1.5 (2004); Iowa Code § 123.22 (2004); Kan. Stat. Ann. §§ 41-104, 41-306 (2005); Ky. Rev. Stat. Ann. § 244.165 (2004); La. Rev. Stat. Ann. § 26:359 (2005); Me. Rev. Stat. Ann. tit. 28, § 2077-B (2004); Md. Code Ann., art. 2B, § 16-506.1 (2004); Mass. Ann. Laws ch. 138, § 18 (2005); Mich. Comp. Laws Ann. § 436.1203 (2005); Minn. Stat. § 340A.3021 (2004); Miss. Code Ann. § 97-31-47 (2005); Mont. Code Ann. § 16-3-101 (2004); N.J. Stat. Ann. § 33:1-2 (2005); N.M. Stat. Ann. §§ 60-7A-3, 60-7A-4 (2004); N.Y. Alco. Bev. Cont. Law § 102 (2005); N.C. Gen. Stat. §§ 18B-102, 18B-102.1, 18B-109 (2004); Ohio Rev. Code Ann. § 4301.19 (2005); Okla. Stat. Ann. tit. 37, § 505 (2004); Or. Rev. Stat. § 471.405 (2003); Pa. Stat. Ann. tit. 47, § 4-491 (2004); R.I. Gen. Laws § 3-4-8 (2005); S.C. Code Ann. § 61-2-175 (2004); S.D. Codified Laws § 35-4-66 (2004); Tenn. Code Ann. § 57-3-402 (2004); Tex. Alco. Bev. Code Ann. § 107.07 (2004); Utah Code Ann. § 32A-12-504 (2005); Va. Code Ann. § 4.1-310 (2005); Wash. Rev. Code Ann. § 66.12.030 (2005); Wash. Admin. Code §§ 314-36-020, 314-68-050 (2005); W. Va. Code Ann. §§ 60-1-4, 60-1-5 (2005); Wis. Stat. §§ 125.30, 125.58 (2004); Wyo. Stat. Ann. § 12-2-204 (2004).

states effectively prevent out-of-state manufacturers, wholesalers, and retailers from selling directly to state residents.² Through either outright prohibitions against direct shipment or tiered distribution systems, states are able to closely regulate commerce in alcoholic beverages and limit opportunities for minors to purchase these products.

States that permit direct shipment of alcohol to consumers employ approaches that vary widely. Alaska and Missouri are alone in imposing no restrictions on the direct shipment of alcoholic beverages to consumers.³ Connecticut, Nevada, North Dakota, and the District of Columbia permit the direct shipment of liquor and beer to consumers, but strictly limit the quantity of alcoholic beverages that may be imported across their borders.⁴ Arizona, Nebraska, and New Hampshire permit direct shipment to consumers provided that the out-of-state seller holds a direct shipment license or permit authorizing shipments to state residents.⁵ Texas and Wyoming allow importation from licensed direct shippers for wine, alone, while Virginia permits licensed direct shipment for both wine and beer.⁶

In contrast, a few other states require the in-state consumer to receive either the express permission of the state's alcohol control board or a license authorizing importation from outside of the state. Hawaii permits residents to import up to 5 gallons of alcoholic beverages into the state provided they obtain a prior approval in the form of a single-shipment permit issued by the state's alcohol control board. Ohio allows importation upon completion of an application to the state liquor control board, but limits direct shipment under these conditions to beer and wine.⁷ Montana permits importation by residents who hold connoisseur's licenses, but also limits shipments to beer and wine.⁸ Vermont allows individuals to import liquor, beer, or wine into the state if they hold a permit issued by the liquor control board; otherwise, the state grants exclusive authority to import alcoholic beverages to the control board.⁹

Notwithstanding the restrictions described above, most states have created statutory exceptions to their direct shipment laws to allow for private importation of wine. The 2002 Department of Justice Appropriations Authorization Act requires that all states permit direct shipment of wine to state residents provided that: (1) the wine was purchased while the purchaser was physically present at the winery, (2) the purchaser of the wine provided the winery verification of legal age to purchase alcohol, (3) the shipping container in which the wine is shipped is marked to require an adult's signature upon delivery, (4) the wine is for personal use only and not for resale, and (5) the purchaser could have carried the wine lawfully into the state (or the District of Columbia) to which the wine is shipped.¹⁰ A number of states—including Arizona, Georgia, Louisiana, Nebraska, Nevada, New Hampshire, North Carolina, North Dakota, Rhode Island, South Carolina, Texas, Wyoming, and the District of Columbia—permit additional limited direct shipment of wine from out-of-state sellers, even beyond the conditions imposed by the federal

² Ala. Admin. Code r. § 20-X-8-.03 (2005); Del. Code Ann. tit. 4, §§ 501, 526 (2005); Pa. Stat. Ann. tit. 47, § 4-491 (2004).

³ Alaska Alcoholic Beverage Control Board, *Trade Practices*, available at <http://www.dps.state.ak.us/abc/trade.asp> [last visited July 12, 2005]; Mo. Rev. Stat. § 311.010 et seq. (2005); *State ex rel. Nixon v. Beer Nuts, Ltd.*, 29 S.W.3d 828, 838 (Mo. Ct. App. 2000); S.B. 102, 90th Gen. Assem. (Mo. 1998).

⁴ Conn. Gen. Stat. § 12-436 (2004); D.C. Code Ann. § 25-772 (2005); Nev. Rev. Stat. Ann. § 369.490 (2004); N.D. Cent. Code § 5-01-16 (2005).

⁵ Ariz. Rev. Stat. § 4-203.04 (2004); Neb. Rev. Stat. Ann. § 53-123.15 (2005); N.H. Rev. Stat. Ann. § 178:27 (2004).

⁶ S.B. 877, 2005 Leg. 79th Sess. (Tex. 2005); Va. Code Ann. § 4.1-112.1 (2005); Wyo. Stat. Ann. § 12-2-204 (2004).

⁷ Haw. Rev. Stat. Ann. § 281-33.1 (2004); Ohio Department of Commerce Division of Liquor Control, *Direct Shipment of Beer & Wine to Ohio Residents*, available at <http://www.liquorcontrol.ohio.gov/1516pdf> [last visited July 13, 2005].

⁸ Mont. Code Ann. § 16-4-903 (2004).

⁹ Vt. Stat. Ann. tit. 7, § 63 (2004).

¹⁰ H.R. 2215, 107th Cong. (2002).

legislation.¹¹ Other states—including California, Colorado, Hawaii, Idaho, Illinois, Iowa, Minnesota, Missouri, New Mexico, Oregon, Washington, West Virginia, and Wisconsin—all permit limited direct shipment from states that authorize reciprocal shipping privileges.¹² In addition, a few states—including Delaware, Montana, Ohio, and Virginia—have also established statutory-limited direct shipment exceptions for beer.¹³

Many of the states that allow direct shipment exceptions for wine have followed the Wine Industry Model Direct Shipping Bill developed by the National Conference of State Legislatures.¹⁴ The Model Bill limits the quantity of shipments to two cases per month, requires that packages bear a label indicating that a signature of a person 21 years of age or older is necessary for delivery, and requires that sellers report all shipments to state authorities annually.¹⁵ Many states also require that recipients of alcoholic beverages present a valid form of identification so that common carriers may verify their age. For example, North Carolina, Texas, and Virginia all require that common carriers obtain proof of identification prior to delivery of direct shipments of alcoholic beverages to confirm that recipients are 21 years of age or older.¹⁶

A recent Supreme Court decision invalidated restrictions on the direct shipment of wine that distinguished between in-state and out-of-state retailers, but left intact legal justifications for nondiscriminatory direct shipment laws (*Granholm v. Heald*, 544 U.S. 460 [U.S. 2005]). While the Court rejected the states' arguments that banning interstate shipments was necessary to curb underage drinking, the majority's consideration of the facts indicated that the Court would permit narrow restrictions on beverages that are more popular with underage drinkers, such as beer,

¹¹ Wine Institute, *State Shipping Laws*, available at <http://www.wineinstitute.org/shipwine/> [last visited July 13, 2005].

¹² *Id.*

¹³ Del. Code Ann. tit. 4, § 526 (2005); Mont. Code Ann. § 16-4-903 (2004); Ohio Department of Commerce Division of Liquor Control, *Direct Shipment of Beer & Wine to Ohio Residents*, available at <http://www.liquorcontrol.ohio.gov/1516pdf> [last visited July 13, 2005]; Va. Code Ann. §§ 4.1-112.1, 4.1-310 (2005).

¹⁴ *Model Direct Shipping Bill*, National Conference of State Legislatures Task Force on the Wine Industry, available at <http://www.freethegrapes.org/wineries.html#model> [last visited July 12, 2005].

¹⁵ Wine Institute, *Answers to Frequently Asked Questions*, available at <http://www.wineinstitute.org/shipwine/> [last visited July 13, 2005]; *Model Direct Shipping Bill*, National Conference of State Legislatures Task Force on the Wine Industry, available at <http://www.freethegrapes.org/wineries.html#model> [last visited July 12, 2005]; Ariz. Rev. Stat. § 4-203.04 (2004); Cal. Bus. & Prof. Code § 23661.2 (2005); Colo. Rev. Stat. § 12-47-104 (2004); Conn. Gen. Stat. § 30-93a (2004); Del. Code Ann. tit. 4, § 526 (2005); Idaho Code § 23-1309A (2005); 235 Ill. Comp. Stat. 5/6-29 (2005); La. Rev. State. Ann § 26:359 (2005); Minn. Stat. § 340A.417 (2004); Mo. Rev. Stat. § 311.462 (2005); N.H. Rev. Stat. Ann. § 178:27 (2004); N.M. Stat. Ann § 60-7A-3 (2004); N.C. Gen. Stat. § 18B-1001.1 (2004); N.D. Cent. Code § 5-01-16 (2005); Or. Rev. Stat. § 471.229 (2003); R.I. Gen. Laws § 3-4-8 (2005); S.C. Code Ann. § 61-4-747 (2004); S.B. 877, 2005 Leg. 79th Sess. (Tx. 2005); Va. Code Ann. § 4.1-112.1 (2005); Wash. Rev. Code Ann. § 66.12.200 (2005); W. Va. Code Ann. § 60-8-6 (2005); Wyo. Stat. Ann. § 12-2-204 (2004).

¹⁶ N.C. Gen. Stat. § 18B-1001.1 (2004); S.B. 877, 2005 Leg. 79th Sess. (Tx. 2005); Va. Code Ann. § 4.1-112.1 (2005).

wine coolers, and liquors. The Court also explicitly encouraged less restrictive measures to minimize the risk of direct shipment of alcohol to minors, recommending that states enact provisions such as those provided in the Model Direct Shipping Bill. The Court was clear, however, that states will bear the burden of proof to demonstrate the need for any difference in treatment between in-state and out-of-state producers.

ENDING THE TOBACCO PROBLEM

TABLE I-1

State	Statutory and/or Regulatory Authority	Direct Shipment Permitted (subject to restrictions)	Direct Shipment to Non-licensed Individuals Prohibited	Description of State Regulation	Labeling and Delivery Requirements for Direct Shipments	Exception for wine? ^a	Shipment, Labeling, and Delivery Regulations for Direct Shipment of Wine
Alabama	Ala. Admin. Code r. § 20-X-8-.03 (2005); Ala. Code § 28-3A-9 (2005)	X		Direct shipment permitted only with prior approval from the state Beverage Control Board; shipments must be delivered through tiered system and may only be consigned to the care of an ABC store	Shipments must be consigned to the care of an ABC store	No	N/A
Alaska	Alaska Alcoholic Beverage Control Board, Trade Practices, available at http://www.dps.state.ak.us/abc/trade.asp [last visited July 12, 2005]	X		Direct shipment permitted by the state, but subject to local bans on importation (some of which make it a felony to ship alcoholic beverages to their communities)	N/A (but may be imposed at local level)	No	N/A

ENDING THE TOBACCO PROBLEM

Arizona	Ariz. Rev. Stat. § 4-203.04 (2004)	X	Direct shipment permitted only by out-of-state retailers holding a direct shipment license	The licensed retailer may deliver the liquor directly to the consumer, but must ensure that (1) the person making the delivery is 21 or older, (2) the delivery occurs only during the hours that liquor may be lawfully served, (3) delivery is not made to a person who appears intoxicated, and (4) the person accepting the delivery is 21 years of age or older. The retailer must also make a record of the delivery, including the name, age, and signature of the person accepting the delivery, along with the type and serial number of the written identification presented by the person accepting delivery	Yes—limited direct shipment	Wine may be shipped from out of state as long as: (1) the wine was purchased while the purchaser was physically present at the winery, (2) the purchaser of the wine provided the winery verification of legal age to purchase alcohol, (3) the wine is for personal use only and not for resale, (4) the winery ships to a residential address, (5) the purchaser could have carried the wine lawfully into this state, and (6) the winery ships not more than two cases of wine to the purchaser per calendar year. Also, the shipping container must be marked to require an adult's signature on delivery and delivery confirmation
Arkansas	Ark. Code Ann. § 3-7-106 (2005); S.B. 762, 85th Gen. Assem., Reg. Sess. (Ark. 2005)	X	Direct shipment prohibited to individuals who do not hold state-issued licenses	N/A	No	N/A
California	Cal. Bus. & Prof. Code § 23661 et seq., 23661.2 (2005)	X	Direct shipment prohibited to individuals who do not hold a state-issued importer's license	N/A	Yes—reciprocity	Out-of-state parties may ship no more than two cases of wine per month to any adult resident in this state. Delivery is not considered a sale in the state. The shipping container must be clearly labeled to indicate that the package cannot be delivered to a mi-

						nor or to an intoxicated person
Colorado	Colo. Rev. Stat. §§ 12-47-104, 12-47-901 (2004)	X	Direct shipment prohibited to individuals who do not hold a state-issued importer's license	N/A	Yes—reciprocity	Out-of-state parties may ship no more than two cases of wine to any adult resident in the state. Delivery is not considered a sale in this state. Any order must be made in person at the licensed premises of the alcoholic beverage licensee from whom the product is purchased. Any person authorized to ship wine must obtain a wine shipment permit from the state licensing authority. The shipping container must be clearly labeled to indicate that that package cannot be delivered to a minor or intoxicated person
Connecticut	Conn. Gen. Stat. §§ 12-436, 30-77, 30-93a (2004)	X	Direct shipment permitted; individuals may import into the state up to 5 gallons of alcoholic beverages within a 60-day period	The contents of such package or carton must be clearly marked on the outside of such package or carton, and the delivery person must obtain the signature of an individual who is at least 21 years of age or legally authorized to receive such alcoholic liquor	No	N/A

ENDING THE TOBACCO PROBLEM

Delaware	Del. Code Ann. tit. 4, §§ 501, 526 (2005)	X	Direct shipment prohibited to individuals who do not hold a state-issued importer's or manufacturer's license; although the states permits residents to purchase wine or beer from manufacturers domiciled outside of the state, the beverages must be delivered to a state wholesaler who may deliver it to a retailer, who may, finally, deliver the wine or beer to the resident	When the retail licensee delivers wine or beer to a resident that was originally purchased from an out-of-state wholesaler or retailer, the package must be prominently labeled as containing alcoholic beverages and must be received by a person 21 or older	No	N/A
District of Columbia	D.C. Code Ann. § 25-772 (2005)	X	Limited direct shipment permitted; common carriers may transport up to one quart of alcoholic beverages to an individual per calendar month	N/A	No	N/A
Florida	Fla. Stat. Ann. § 561.545 (2005)	X	Direct shipment prohibited to individuals who do not hold a state-issued manufacturer's or wholesaler's license or an exporter's registration	N/A	Yes—limited direct shipment	Florida residents visiting on-site at a winery may have up to one gallon of wine shipped back to the state

APPENDIX I

I-9

Georgia	Ga. Code Ann. § 3-3-32 (2004)	X	Direct shipment prohibited to individuals who do not hold a state-issued manufacturer's, importer's, broker's, or wholesaler's license	N/A	Yes— limited direct shipment	An out-of-state winery is permitted to ship wine directly to consumers in this state for personal use under the following circumstances: (1) the consumer must purchase the wine while physically present at the winery, (2) the winery must verify that the consumer purchasing the wine is 21, and (3) no winery shall ship in excess of five cases to any one consumer or any one address in this state in any calendar year
Hawaii	Haw. Rev. Stat. Ann. §§ 281-33.1, 281-33.5 (2004)	X	Limited direct shipment permitted; unlicensed adults may apply to the liquor commission to receive a single shipment permit to receive up to 5 gallons of liquor from outside of the state for personal use	N/A	Yes— reciprocity	Out-of-state parties may ship up three cases per year to a resident over 21 years of age. Delivery does not constitute a sale in the state. Shipment only by a licensed wine manufacturer wine from another state that affords holders of a license to manufacture wine under section 281-31 an equal reciprocal shipping privilege

ENDING THE TOBACCO PROBLEM

Idaho	Idaho Code §§ 23-102, 23- 1055, 23- 1309A (2005)	X	Direct shipment prohib- ited; the state liquor dis- pensary has the exclu- sive authority to import and sell liquor, and it is unlawful for any beer brewer located outside the state to sell beer in the state except to li- censed dealers and wholesalers	N/A	Yes— reciprocity	Out-of-state parties may ship not more than two cases of wine per month for personal use from another state with- out payment of state tax, fees, or charges if shipped from a reciprocity state. The shipping container must be labeled to indicate that it con- tains alcoholic beverages and cannot be delivered to a per- son who is not at least 21 years of age. The delivery person must have the recipi- ent sign for receipt of wine shipments, not deliver to a minor or one that is visibly intoxicated, and must retain the signature for one year
Illinois	235 Ill. Comp. Stat. 5/6-29, 5/6-29.1 (2005)	X	Direct shipment prohib- ited to individuals who do not hold a state- issued license	N/A	Yes— reciprocity	Out-of-state wineries may ship not more than two cases of wine per year to an adult resident. No broker shall so- licit consumers to engage in interstate reciprocal wine shipments. The shipping con- tainer of any wine sent into or out of the state shall be clearly labeled to indicate that the package cannot be delivered to a person under the age of 21 years
Indiana	Ind. Code Ann. § 7.1-5-11-1.5 (2004)	X	Direct shipment prohib- ited to individuals who do not hold a state- issued wholesaler's per- mit; statute specifically	N/A	No	N/A

			prohibits the ordering and selling of alcohol over a computer network			
Iowa	Iowa Code §§ 123.22, 123.187 (2004)	X	Direct shipment prohib- ited; the state liquor di- vision holds the exclu- sive authority to import all forms of alcoholic liquor into the state	N/A	Yes— reciprocity	Out-of-state parties may ship not more than two cases per month for personal use to a person 21 years of age or older. Such wine shall not be resold
Kansas	Kan. Stat. Ann. §§ 41-104, 41- 306 (2005)	X	Direct shipment prohib- ited to individuals who do not hold a state- issued license	N/A	No	N/A
Kentucky	Ky. Rev. Stat. Ann. § 244.165 (2004)	X	Direct shipment prohib- ited to individuals who do not hold a state- issued wholesaler's or distributor's license	N/A	Yes— limited direct shipment	A Kentucky resident visiting another state or country may purchase and ship alcoholic beverages to his or her resi- dence, business, or mailing address in Kentucky

ENDING THE TOBACCO PROBLEM

Louisiana	La. Rev. State. Ann § 26:359 (2005)	X	Direct shipment prohibited to individuals who do not hold a state-issued wholesaler's permit	N/A	Yes— limited direct shipment	Wine may be sold and shipped directly to a consumer in Louisiana by the manufacturer or retailer of such beverage domiciled outside of the state provided both that all taxes have been paid in full and that (1) the consumer is 21 years of age or older, (2) the wine is for the consumer's personal consumption, (3) the total amount of wine shipped does not exceed 48 bottles per calendar year per household, (4) the manufacturer or retailer engaging in such direct sales holds a valid manufacturer's or retailer's license issued by the state of its domicile, and (5) the winery does not have wholesaler representation in the state. The package must be prominently labeled as containing alcohol and must be received by a person 21 years of age or older
Maine	Me. Rev. Stat. Ann. tit. 28, § 2077-B (2004)	X	Direct shipment prohibited; statute specifically prohibits individuals from selling, furnishing, delivering, or purchasing liquor from an out-of-state company by mail order	N/A	No	N/A

APPENDIX I

I-13

Maryland	Md. Code Ann., art. 2B, §§ 7.5-104, 16-506.1 (2004)	X	Direct shipment prohibited to individuals who do not hold the required state-issued permit	N/A	Yes—limited direct shipment	Out-of-state wineries may obtain a wine seller's permit which enables them to ship only wines that are not already available (and have not been in the last two years) in Maryland through a distributor. The shipper may not sell more than 900 liters of wine total per year or not more than 108 liters of wine to a single consumer in a calendar year. The consumer must designate a wholesaler in Maryland through which the transaction will be facilitated via a licensed retailer to the consumer
Massachusetts	Mass. Ann. Laws ch. 138, § 18 (2005)	X	Direct shipment prohibited to individuals who do not hold a state-issued wholesaler's or importer's license		No	
Michigan	Mich. Comp. Laws Ann. § 436.1203 (2005)	X	Direct shipment prohibited to individuals who do not hold a state-issued wholesaler's or importer's license, who are not agent's of the state liquor commission, and who do not have prior written permission from the commission	N/A	No	N/A

ENDING THE TOBACCO PROBLEM

Minnesota	Minn. Stat. §§ 340A.417, 340A.3021 (2004)	X	Direct shipment prohibited to individuals who do not hold a state-issued wholesaler's license; alcoholic beverages may only be consigned, shipped, and delivered to a licensed wholesaler's warehouse if they were manufactured outside of the state	N/A	Yes— reciprocity	Wineries with equal reciprocal shipping privilege may ship, for personal use and not for resale, not more than two cases in any calendar year to any resident of Minnesota age 21 or over. Delivery does not constitute a sale in the state. The law prohibits advertising or soliciting shipments and specifically prohibits accepting orders via the Internet. The shipping container of any wine sent under this section must be clearly marked "Alcoholic Beverages: adult signature (over 21 years of age) required"
Mississippi	Miss. Code Ann. § 97-31- 47 (2005)	X	Direct shipment prohibited; it is unlawful to transport intoxicating liquors into the state or to transport such liquors from one place to another within the state or from one point within the state to a point outside the state	N/A	No	N/A

APPENDIX I

I-15

Missouri	Mo. Rev. Stat. §§ 311.010 et seq., 311.462 (2005); State ex rel. Nixon v. Beer Nuts, Ltd., 29 S.W.3d 828, 838 (Mo. Ct. App. 2000); S.B. 102, 90th Gen. Assem. (Mo. 1998)	X	Direct shipment permitted; the code does not ban direct shipment of alcoholic beverages into the state, and a proposal to do so was not passed into law; however, a court has interpreted the liquor statute to hold that although direct shipment of alcoholic beverages is permitted, out-of-state distributors must comply with the state liquor code in order to transact business in the state	N/A	Yes— reciprocity	Out-of-state parties may ship not more than two cases per year to an adult resident from wineries in a state affording equal reciprocal shipping privileges. Brokers are prohibited from soliciting consumers to engage in interstate reciprocal wine shipments. In addition, no shipper located outside of Missouri may advertise interstate shipments. The shipping container of any wine sent into or out of this state under this section shall be clearly labeled to indicate that the package cannot be delivered to a person under the age of 21 years or to an intoxicated person
Montana	Mont. Code Ann. §§ 16-3-101, 16-4-903 (2004)	X	Direct shipment prohibited to individuals who do not hold a state-issued wholesaler's or connoisseur's license, and the statute specifically extends the prohibition to alcoholic beverages ordered or purchased by phone and computer; however holders of a connoisseur's license may import up to 12 cases of beer or wine annually (and may do so via phone or computer)	The holder of a connoisseur's license must forward to the out-of-state brewery or winery a distinctive address label, provided by the State of Montana, clearly identifying any package that is shipped as a legal direct shipment package to the holder of a connoisseur's license	No	N/A

ENDING THE TOBACCO PROBLEM

Nebraska	Neb. Rev. Stat. Ann. § 53-123.15 (2005)	X	Direct shipment to consumers permitted only if the seller holds a permit issued by the commission (of the state into which the beverage is shipped)	N/A	No	N/A
Nevada	Nev. Rev. Stat. Ann. § 369.490 (2004)		Limited direct shipment permitted; a state resident may import one gallon or less of alcoholic beverage per month or 12 cases of wine per year for personal use	N/A	No	N/A
New Hampshire	N.H. Rev. Stat. Ann. § 178:27 (2004)	X	Direct shipment to consumers permitted only if the seller holds a permit issued by the commission (of the state into which the beverage is shipped); the state limits shipment of 60 containers of not more than one liter each of liquor and wine per address per calendar year	Packages must be marked "Alcoholic Beverages, adult signature (over 21 years of age) required." All shipments shall be made by a licensed carrier and such carriers are required to obtain an adult signature	No	N/A
New Jersey	N.J. Stat. Ann. § 33:1-2 (2005)	X	Direct shipment prohibited from out-of-state retailer to an in-state consumer	N/A	No	N/A

APPENDIX I

I-17

New Mexico	N.M. Stat. Ann §§ 60-7A-3, 60-7A-4 (2004)	X	Direct shipment prohibited to individuals who do not hold a state-issued wholesaler's or manufacturer's license	N/A	Yes— reciprocity	Out-of-state parties may ship no more than two cases for personal use per month to an individual not a minor. Delivery does not constitute a sale in this state and nothing in the Liquor Control Act limits or applies to such shipments. The shipping container of any wine sent into or out of this state under this subsection shall be labeled clearly to indicate that the package cannot be delivered to a minor or to an intoxicated person
New York	N.Y. Alco. Bev. Cont. Law § 102 (2005)	X	Direct shipment prohibited to individuals who do not hold a state-issued license to traffic in alcoholic beverages	N/A	No	N/A
North Carolina	N.C. Gen. Stat. §§ 18B-102, 18B-102.1, 18B-109, 18B-1001.1 (2004)	X	Direct shipment prohibited from out-of-state retailer or wholesaler to individuals who do not hold a state-issued wholesaler's license	N/A	Yes— limited direct shipment	Holders of Wine Shippers Permits are authorized to ship not more than two cases of wine per month to any one individual purchaser for personal use. All shipments must be made through an approved common carrier. Each common carrier must (1) require the recipient to demonstrate that s/he is at least 21 years of age by providing appropriate identification, (2) require the recipient to sign an electronic or paper form acknowledging receipt,

ENDING THE TOBACCO PROBLEM

						and (3) refuse delivery when the proposed recipient appears to be under the age of 21 years and refuses to present valid identification
North Dakota	N.D. Cent. Code § 5-01-16 (2005)	X	Limited direct shipment permitted; individuals may import 9 liters or less of liquor, or 288 fluid ounces or less of beer, per month for personal use from a person holding a valid manufacturer's or retailer's license issued by the state of its domicile	Every package shipped directly to an individual in this state must be labeled with conspicuous words "SIGNATURE OF PERSON AGE 21 OR OLDER REQUIRED FOR DELIVERY." A shipper shall obtain the signature of an individual 21 years of age or older before delivering any alcoholic beverages shipped directly to an individual in this state	No	N/A
Ohio	Ohio Rev. Code Ann. § 4301.19 (2005); Ohio Department of Commerce Division of Liquor Control, Direct Shipment of Beer & Wine to Ohio Residents, available at http://www.liqu	X	Limited direct shipment permitted; state liquor dispensary has the exclusive right to sell liquor in the state; however, Ohio residents may import beer or wine, provided that they fill out a "personal consent" form requiring that (1) the beer or wine is for personal use and not for resale, (2) the resident is	N/A	No	N/A

	orcon-trol.ohio.gov/1516pdf [last visited July 13, 2005]		21 years of age or older, (3) the laws of the United States allow the shipment of the beer or wine into the United States, (4) all taxes due the State of Ohio shall be paid prior to the importation, or within 30 days of the receipt, of beer or wine			
Oklahoma	Okla. Stat. Ann. tit. 37, § 505 (2004)	X	Direct shipment prohibited by manufacturers, wholesalers, and retailers located outside of the state	N/A	No	N/A
Oregon	Or. Rev. Stat. §§ 471.229, 471.405 (2003)	X	Direct shipment prohibited; state liquor control commission holds the exclusive right to procure alcoholic beverages in the state	N/A	Yes— reciprocity	Out-of-state parties may ship not more than two cases of wine per month to individuals 21 years of age or older for personal use. Receipt of a shipment does not constitute a sale in the state. Out-of-state wine or cider suppliers must obtain a license from the Oregon Liquor Control Commission before selling or soliciting sales of wine or cider in Oregon. The shipping container of any wine or cider sent into or out of this state under this section must be clearly labeled to indicate that the container contains alcoholic beverages and cannot be delivered to a person who is not at least 21 years of

ENDING THE TOBACCO PROBLEM

						age or to a person who is visibly intoxicated
Pennsylvania	Pa. Stat. Ann tit. 47, § 4-491 (2004)	X	Direct shipment prohibited; all commerce in alcoholic beverages must occur within the state-run system	N/A	Yes—limited direct shipment	Internet ordering and direct shipments of out-of-state wine are permitted, provided that (1) the wine must be purchased from a licensed Direct Wine Shipper, (2) only wines which are not available in Pennsylvania wine & spirits stores may be purchased through this mechanism, (3) consumers may not purchase more than 9 liters per month from a single Direct Wine Shipper, (4) the Direct Wine Shipper will have a shipping charge and must add a handling fee, and that state's liquor and sales taxes, and (5) the wine will be shipped to a Pennsylvania Wine and Spirits Store for the consumer to pick up
Rhode Island	R.I. Gen. Laws § 3-4-8 (2005)	X	Direct shipment prohibited to individuals who do not hold a state-issued wholesaler's license	N/A	Yes—limited direct shipment	Individuals may place an order for intoxicating beverages personally at the manufacturer's premises, for shipment to an address in Rhode Island for personal use. Shipments must display the language: "Contains Alcohol, Adult Signature (over 21) Required for Delivery"

APPENDIX I

I-21

South Carolina	S.C. Code Ann. §§ 61-2-175, 61-4-747 (2004)	X	Direct shipment prohibited to individuals who do not hold a state-issued wholesaler's, manufacturer's, or producer's license	N/A	Yes—limited direct shipment	Holders of wine shipper's licenses may sell and ship not more than 24 bottles of wine per month to any person in South Carolina to whom alcoholic beverages may be lawfully sold. Any shipment must be labeled conspicuously with the words "CONTAINS ALCOHOL: SIGNATURE OF PERSON AGE 21 OR OLDER REQUIRED FOR DELIVERY"
South Dakota	S.D. Codified Laws §§ 35-12A-1, 35-4-66 (2004)	X	Direct shipment prohibited to any individual not licensed by the state to traffic in alcoholic beverages	N/A	Yes—reciprocity	Any person who is at least 21 years of age may purchase wine from another state if the wine is not in distribution in this state and the wine comes from a winery that is located in a state that affords South Dakota wineries an equal reciprocal shipping privilege or a winery located in South Dakota. The person must place an order with a licensee, who may order the wine through a wholesaler who shall, in turn, ship the wine to the licensee
Tennessee	Tenn. Code Ann. § 57-3-402 (2004)	X	Direct shipment prohibited to individuals who do not hold a state-issued manufacturer's or wholesaler's license	N/A	No	N/A

ENDING THE TOBACCO PROBLEM

Texas	Tex. Alco. Bev. Code Ann. § 107.07 (2004); S.B. 877, 2005 Leg. 79th Sess. (Tex. 2005)	X	Direct shipment prohibited to state residents from persons located outside of the state	N/A	Yes—limited direct shipment	All in-state and out-of-state wineries are able to sell and ship their product directly to adult Texas consumers located anywhere in the state, provided they hold a permit to do so. Wine shipped by the holder of a winery permit may not be delivered to any person other than (1) the person who purchased the wine, (2) a recipient designated in advance by such purchaser, or (3) a person at the delivery address who is age 21 or over. Wine may be delivered only to a person who is age 21 or over after the person accepting the package (1) presents proof of identity and age and (2) personally signs a receipt acknowledging delivery of the package
Utah	Utah Code Ann. § 32A-12-504 (2005)	X	Direct shipment prohibited; alcoholic beverages may not be shipped into the state or from one point to another within the state	N/A	No	N/A
Vermont	Vt. Stat. Ann. tit. 7, § 63 (2004)	X	Limited direct shipment permitted; individuals may import liquor, beer, or wine into the state if they hold a permit issued by the liquor control board; otherwise, the liquor control board	N/A	No	N/A

			holds the exclusive authority to import and transport liquors into the state			
Virginia	Va. Code Ann. §§ 4.1-112.1, 4.1-310 (2005)	X	Limited direct shipment permitted; the state liquor control board holds the exclusive authority to import alcoholic beverages into the state; however, holders of wine shippers' licenses and beer shippers' licenses issued by the commonwealth may sell and ship not more than two cases of wine per month or more than two cases of beer per month to any person in Virginia to whom alcoholic beverages may be lawfully sold for personal use	The recipient must demonstrate that he is at least 21 and must sign an acknowledgement of receipt. The Board-approved common carrier shall refuse delivery when the recipient appears to be under 21 and refuses to present valid identification. All shipments must include a notice in 16-point type or larger on the outside of each package in a conspicuous location stating: "CONTAINS ALCOHOLIC BEVERAGES; SIGNATURE OF PERSON AGED 21 YEARS OR OLDER REQUIRED FOR DELIVERY"	No	N/A
Washington	Wash. Rev. Code Ann. §§ 66.12.030, 66.12.200 (2005); Wash. Admin. Code §§ 314-36-020, 314-68-050 (2005)	X	Direct shipment prohibited; no liquor may be imported into the state unless it is consigned to the state liquor control board or to a licenseholder and delivered to an authorized public warehouse	N/A	Yes—reciprocity	Out-of-state parties may ship not more than two cases of wine of their own manufacture per year from wineries in states affording the same reciprocal privilege. Out-of-state wineries must obtain a private wine shipper's license from the Washington State Liquor Control Board. The shipping container of any wine sent into or out of this state under this law shall be clearly labeled to indicate

ENDING THE TOBACCO PROBLEM

						that the package cannot be delivered to a person under 21 years of age or to an intoxicated person
West Virginia	W. Va. Code Ann. §§ 60-1-4, 60-1-5, 60-8-6 (2005)	X	Direct shipment prohibited; state-run alcoholic beverage control agency holds the exclusive right to sell alcoholic beverages within the state	N/A	Yes— reciprocity	Out-of-state parties may ship not more than two cases per month for personal use from an out-of state winery or retailer in states affording the same reciprocal privileges. Delivery does not constitute sale in the state. No adult resident or duly licensed retailer or distributor may advertise the availability of wines by shipment to residents of this state. The shipping container of any wine sent into or out of this state under this subsection shall be clearly labeled to indicate that the package cannot be delivered to any person under the age of 21 or to an intoxicated person

Wisconsin	Wis. Stat. §§ 125.30, 125.58 (2004)	X	Direct shipment prohibited to individuals who do not hold a state-issued permit	N/A	Yes— with re- porting require- ment	A winery located outside of this state may ship wine into this state provided that (1) the winery is located in a state that has a reciprocal agreement with this state, (2) the winery holds a valid business tax registration certificate, (3) the winery submits a copy of its current license from the state from which it will ship wine into this state, and (4) the winery submits a detailed report to the department about the shipments
Wyoming	Wyo. Stat. Ann. § 12-2- 204 (2004)	X	Direct shipment of liquor and malt beverages prohibited to state residents from persons located outside of the state	N/A	Yes— limited direct shipment	Any person currently licensed in its state of domicile as an alcoholic liquor or malt beverage manufacturer, importer, wholesaler, or retailer who obtains an out-of-state shipper's license by from the state of Wyoming may ship no more than a total of 18 liters of manufactured wine directly to any household in this state in any 12-month period for personal use. The recipient must be at least 21, and out-of-state shippers must ensure that all containers of wine shipped pursuant to this section are conspicuously labeled with the words: "CONTAINS ALCOHOLIC BEVERAGES. ADULT (OVER 21) SIGNATURE REQUIRED FOR

DELIVERY"

^a Where states have created exceptions for both wine and beer, they have been classified as permitting direct shipment, subject to limitations.

J

The Role of Public Policies in Reducing Smoking Prevalence: Results from the SimSmoke Tobacco Policy Simulation Model

David T. Levy
Senior Scientist
Pacific Institute for Research and Evaluation
Professor, University of Baltimore

INTRODUCTION

The computer simulation model, known as SimSmoke, is a model that has been developed to examine the effect of tobacco control policies for the United States (Levy et al. 2002; Levy et al. 2000a). SimSmoke projects smoking prevalence over time and estimates the effect of tobacco control policies on those rates. The purpose of this appendix is to describe and to provide predictions from that model.

The development of the model and results from it have been published in a series of papers examining different types of policies (Levy et al. 2000a; Levy et al. 2000b; Levy and Friend 2001; Levy and Friend 2002a; Levy and Friend 2002b; Levy et al. 2001a; Levy et al. 2001b). Other papers have considered the future impact of the policies (Levy et al. 2003; Levy et al. 2005b). In addition, a group of papers has validated the model. Levy and colleagues (2004a; 2004c; 2004d) found that the model predicted smoking prevalence rates well for the United States over the time period 1993–2003, with most of the changes over that period due to prices changes. These studies also show that models for the states of California and Arizona predicts smoking prevalence relatively well after comprehensive programs were developed, and that an important part of the changes was explained by the media campaigns or comprehensive programs implemented in the states (Levy et al. 2004a; Levy et al. 2004c; Levy et al. 2004d).

This appendix considers the effects of individual policies and a combination of different policies on smoking prevalence as explained by the model and using effect sizes developed in conjunction with the Institute of Medicine's (IOM) Committee on Reducing Tobacco Use. Specifically, we estimate how much smoking rates may be changed by additional policies, including tax changes, clean air laws, media or comprehensive campaigns, school education programs, cessation treatment policies, and youth access enforcement. We also consider the effect of abandoning some of the policies currently in place as well as the effect of policies on smoking rates in total and by age groups.

METHODOLOGY

Basic Model

The SimSmoke simulation model begins with the number of smokers, never-smokers, and ex-smokers by age and gender for the United States in the baseline year. In developing the model, we chose a best year for which there were data to develop the necessary smoking meas-

ures. We chose the year 2002 as our baseline year, which also had the advantage that there were no large changes in policies in recent years (since the large 1998–1999 price changes).

The basic SimSmoke model involves a population model, a smoking model, and policy modules. Following a discrete first-order Markov process, the entire population evolves through birth and death rates, and the number of smokers, never-smokers, and ex-smokers evolves through initiation, cessation, and relapse rates. Tobacco control policies change initiation and cessation rates through individual policy modules. Consequently, smoking rates over time depend on tobacco control policies and prior smoking patterns.

The version of the model used in this report is built on an Excel platform. This section presents a brief description of that model and a discussion of future policy scenarios. The data sources are summarized in Table J-1. A mathematical formulation and further description of the model can be found at http://cisnet.flexkb.net/mp/pub/cisnet_lung_pire_profile.pdf and referenced papers.

Population Model

SimSmoke is built first on a demographic model. The population, distinguished by age, starts in the year 2002. The population evolves over time with fertility (leading to births) and some portion of the population dying at each age. We do not consider immigration or changes in racial or ethnic composition for the purposes of this model.

Mathematically, the total population (Pop) is distinguished by time period (T) and age (A) (and is further distinguished in the model by gender and racial ethnic group). Mortality rates (MR) are distinguished by age and gender. The number of newborns depends on first-year death rates and fertility rates (Fert) of females by age, with equal birth rates for males and females. Births through the first year (age 0) for each gender are:

$$\text{Pop}_{T,0} = 0.5 * (1 - \text{MR}_0) * \sum_A (\text{Pop}_{T,A,1} * \text{Fert}_A), \text{ where } T = 1 \dots 20; A = 14 \dots 49$$

After the first year, the population evolves as:

$$\text{Pop}_{T,A} = \text{Pop}_{T-1,A-1} * (1 - \text{MortRate}_A)$$

Population data are obtained from the 2000 Census of Population, and projected forward to 2002. Fertility rates are from the U.S. Census Vital Rate Inputs Tables for the year 2002. Mortality rates are from the 2001 Multiple Cause-of-Death File compiled from death certificates, by the National Center for Health Statistics (NCHSU; www.nchs.gov). The file includes information on all deaths in the United States in 2001.

Smoking Model

SimSmoke next divides the population in the base year into: (1) never-smokers, (2) smokers and (3) 16 categories of ex-smokers ($n = 1 \dots 16+$), corresponding to years since last smoking. After the base year, individuals are classified as never-smokers (designated by NS) from birth until they initiate smoking or die, according to:

$$\text{Neversmokers}_{T,A} = \text{Neversmokers}_{T-1,A-1} * (1 - \text{MortRate}_{A,NS}) * (1 - \text{Initiation Rate}_A)$$

Through age 24, the number of smokers (designated by S) is tracked as:

$$\text{Smokers}_{T,A} = \text{Smokers}_{T-1,A-1} * (1 - \text{MortRate}_{A,S}) + \text{NeverSmokers}_{T-1,A-1} * (1 - \text{MortRate}_{A,ns}) * \text{Initiation Rate}_A$$

Once a smoker, individuals continue in that category until they quit, die, or reenter the group through relapse. After age 24, smokers are tracked as:

$$\text{Smokers}_{T,A} = \text{Smokers}_{T-1,A-1} * (1 - \text{MortRate}_{T,A,S}) * (1 - \text{Cessation Rate}_A) + \Sigma_{16}^N = 1 \text{ Ex-smokers}_{T-1,A-1,N} * (1 - \text{MortRate}_{T,A,N}) * (\text{Relapse Rate}_{A,N})$$

First year ex-smokers are determined by the first-year cessation rate applied to surviving smokers in the previous year. Individuals who have been ex-smokers for $n = 2 \dots 15$ years, are defined as:

$$\text{Ex-smokers}_{T,A,N} = \text{Ex-smokers}_{T-1,A-1,N-1} * (1 - \text{MortRate}_{A,N}) * (1 - \text{Relapse Rate}_{A,N-1})$$

For those who have ceased smoking for more than 15 years, we add to the above equation the ex-smokers from the previous year who have quit for more than 15 years and did not die or relapse in the previous year.

In the model, smokers are defined as individuals who are currently smoking (either daily or on some days) and have smoked more than 100 cigarettes in their lifetime. Due to empirical challenges in measuring initiation and quitting and to ensure the stability and internal consistency of the model, initiation rates at each age are a measured net of quitting. Specifically, net initiation is measured as the difference between the smoking rate at a given age and that same rate at the previous age. Because the duration of smoking is not considered, we do not track the specific year when individuals initiate in this population-level model. Since smoking rates typically level off by age 24 (DHHS 1994), initiation in the model occurs until age 24.

Cessation is tracked from age 24, since the relative risks of mortality from smoking are not discernible for those who quit smoking before that age (DHHS 1990; DHHS 2004). Cessation rates in the first year are distinguished by age, but relapse rates in later years are only distinguished by years since quitting. Ex-smokers are defined as those over the age of 24 who were not smoking at the time of the survey. In SimSmoke, ex-smokers are broken down into six categories, categorized by year since quitting through 15 years and then aggregated at >15 years. Never-smokers are those who have not smoked 100 cigarettes in their lifetime or have smoked 100 cigarettes in their lifetime, but are less than the age of 24 and are not currently smoking.

The primary source of baseline data on smoking habits by age and gender is the Tobacco Use Supplement (TUS) of the Current Population Survey (CPS), a sample of approximately 475,000 respondents conducted in September 2001, January 2002, and May 2002. Data are obtained by single age from ages 15 to 24 years, and then by 10 year age groups through age 90. Smoking rates are multiplied by the relevant 2002 population to determine the number of smokers and ex-smokers by demographic group.

In the model, we assign the value for the age bracket to the midpoint age of the bracket, and interpolate between that bracket and the midpoint value in the previous age bracket. Smoking may begin before age 15, but the TUS only asks individuals age 15 and older about their smoking status. For those below age 15, we use data from the 1993 TAPS (Teenage Attitudes and

Practices) survey. To maintain comparability, we scaled those data by the ratio of the TAPS 15–17-year-old smoking rate divided by the U.S. 15–17-year-old smoking rate.

Policy Modules

In separate policy modules, we examine the effect of tax changes, clean indoor air laws, mass media policies, school education policies, cessation treatment policies, and strategies to reduce youth access to cigarettes. The original policy parameters in the model used to generate the predicted effects are based on thorough reviews of the literature and the advice of an expert panel. These parameters have been reviewed by the IOM committee and are either accepted or modified, as described below. In the case of cessation treatment and school education policies, significant changes have been made in the structure of the original SimSmoke policy modules.

The effects of policies are calculated in percentage terms relative to the initial rates [$PR = (\text{Post-policy Rate} - \text{Initial Rate})/\text{Initial Rate}$], where $PR < 0$. For most policies, the greatest effect is generally in the first few years in which the policy is in effect. These are modeled as a permanent additive effect on smoking prevalence, that is, $\text{Smokers}_{T,A} * (1 + PR_{I,T,A})$ for policy (I) at time period (T) that may vary by age (A). While the effect may be spread over several years, we model the effects as occurring in the first year that the policy is in effect.

If the policy is maintained, the effects of the policy are maintained through modification of the initiation rates. The percentage reduction is applied throughout the years (T) during which the policy is in effect to the initiation rate [as $\text{Initiation Rate}_A * (1 + PR)$]. The percentage effects of the policy are also enhanced over time through increases in the first year cessation rate [as $\text{Cessation Rate}_A * (1 - PR)$]. First-year quit rates continue to be elevated for each of the policies (except youth access policies), because policies reduce the quantity smoked per smoker and quitting is more likely among those who smoke less (Hughes 2000; Hymowitz et al. 1991; Hymowitz et al. 1997). We assume that relapse rates are unaffected by the policy, except insofar as the amount of relapse increases in proportion to any added cessation.

Unless otherwise indicated, the same proportionate effect of a policy is applied to the prevalence, initiation, and cessation rates when a new policy is implemented and maintained. When a long-standing policy is reversed, it is assumed that only initiation and cessation rates are affected (i.e., the effects of a policy are asymmetric in terms of implementation of a proactive policy and the scaling back of that policy). We expect that those who have quit and maintained cessation over a reasonable period of time are unlikely to relapse when the policy is abandoned, although future initiation rates will be higher and cessation rates will be lower. Policy effects may also vary by age. For example, some policies are directed at and are expected primarily to affect youth.

When more than one policy is in effect, the percentage reductions are multiplicatively applied, that is, $(1 + PCI) * (1 + PCI)$ for policies (I), which implies that the relative effect is independent of other policies but the absolute effect is smaller when another policy is in effect. Some specific synergies are built into the model as described below.

We track the effects of policies from the year 2006 forward. Because the model begins in the year 2002, we track the effect of policies through 2005. Since the CPS and TUS data are collected between September of the preceding year and May of the current year, we consider the estimates as representing smoking rates in the midpoint month (January), and policy data are matched to their levels on January 1 of the particular year.

Taxes

In the tax module (Levy et al. 2000b), price increases are modeled as age-specific, constant proportional, effects on prevalence, initiation, and cessation rates (Levy et al. 2000b). Based on economic theory, cigarette use is determined by changes in the retail price relative to the prices of other goods, as measured by the participation (i.e., prevalence) and demand elasticity (i.e., the percentage change in consumption from a 1 percent increase in price). Based on the studies that distinguish by age, the simulation model assigns a price elasticity of -0.6 for individuals below age 18, -0.3 for those ages 18 to 24, -0.2 for those ages 25 to 34, and -0.1 for those age 35 and above. Based on recent evidence (Farrelly and Bray 1998), these elasticity estimates have been lowered since our earlier work (Levy et al. 2000b). These parameters have been accepted by the IOM panel.

For the period 2002–2005, prices are averaged over states with weights based on tobacco sales and are adjusted for inflation using the Bureau of Labor Statistics (BLS) Consumer Price Index. Data on retail prices and taxes were obtained for 2002 and 2003 from (Orzechowski and Walker 2003) and for 2004 and 2005 from www.tobaccofreekids.org/research/factsheets/pdf/0212.pdf. The retail price is measured by a price index that includes generic cigarettes weighted by their proportionate sales. Inflation-adjusted prices increased slightly from \$3.75 to \$4.20 between 2002 and 2005, and the average state tax in 2005 was \$1.23.

From 2005, we assume that cigarette prices relative to inflation stay constant (i.e., we assume that taxes adjust upward to reflect general price inflation). To model the effect of additional tax changes, prices change by the amount of change in the average state plus the federal tax on cigarettes, based on studies reported in Jha and Chaloupka (2000).

Clean Air Laws

The clean air policy module examines the effect of three types of laws: work site, restaurant, and other public places (Levy et al. 2001b). The module predicts an 11 percent reduction in prevalence rates with all policies fully implemented and with strong enforcement and media publicity. Work site laws have the largest effect, 7 percent, with restaurant and bars laws producing a 2 percent effect, and laws covering other places a 1 percent effect. Work site bans without high compliance have two-thirds of the effect of a total ban with high compliance, and partial work site and restaurant bans have one-third the effect of total bans. Media publicity and enforcement yield an added 0.5 percent effect each for work sites and restaurants. Based on differences in labor participation rates and on the effect on workers who smoke, females experience 80 percent of the effect compared to males, and effects increase between ages 26 to 39 but decrease at older ages. These parameters have been accepted by the IOM panel.

The effects of newly implemented clean air laws depend on the extent of clean air laws already in place and the extent of private work site restrictions already implemented. By January 2005, 11 states had adopted smoke-free restaurant laws (California, Connecticut, Delaware, Florida, Idaho, Maine, Massachusetts, New York, Rhode Island, Utah, and Vermont) and 10 states (California, Delaware, Florida, Massachusetts, Maryland, New York, Oregon, Rhode Island, South Dakota, and Washington) had adopted stricter work laws that required smoke-free or separately ventilated areas for smoking. We also consider the effect of partial bans and the percentage of firms that currently have strict bans.

In addition to taking into account the extent of policies already in effect, the model considers changes over the tracking period (2002–2005). We estimate that 72 percent of work sites already had strict bans by 2005 (up from 67 percent in 2002) and that 36 percent of restaurants and 31

percent of other public places were covered in 2005. We estimate that enforcement and publicity were at half the maximum level from 2002 to 2005.

Mass Media

The mass media policy module is based on a model of the effect of media campaign expenditures on smoking prevalence (Levy and Friend 2001). Media expenditures must be high enough for messages to reach potential smokers and quitters a sufficient number of times, but after a threshold, additional expenditures show diminishing returns. The effects of media campaigns also depend on other policies that are currently in place. In particular, many states have comprehensive programs as well as local programs and cessation treatment programs. These can also be accompanied by tax increases. These other programs create added publicity, which reinforces the messages of the media campaign, thus having more potential to change attitudes toward smoking. The model distinguishes policies aimed at the entire population and those aimed primarily at youth.

The early California, Massachusetts, and Arizona (after the first year) campaigns directed their efforts to all ages. In Massachusetts, where price stayed constant, there was a 6 percent reduction in prevalence with no price change and similar effects are implied for California after netting out prices (CDC 1996; Farrelly et al. 2003; Friend and Levy 2002). It is estimated that across states and over time, tobacco control expenditures at high levels (including an intensive media campaign) would reduce per capita tobacco consumption (which includes prevalence and quantity smoked per smoker changes) by 8 percent, and a recent meta-analysis (Snyder et al. 2004) found that media campaigns (most of which were generally part of a more comprehensive tobacco program) yielded a 5 percent reduction in smoking prevalence. Studies generally have not been able to distinguish the effect of media campaigns from other aspects of comprehensive programs.

Using the formal model presented by Levy and colleagues (2001a) that provides the relationship between per capita expenditures and reductions in smoking prevalence, SimSmoke predicts that a highly publicized mass media campaign (publicized heavily on television and other media) directed at all smokers yields a 6 percent reduction in smoking prevalence, which increases over time to as much as 7 percent (Levy et al. 2001a). A low-publicity campaign (publicized only sporadically) has 20 percent the effect of a highly publicized campaign. In the absence of other policies, the effects are halved. These parameters have been accepted by the IOM panel.

Media and comprehensive campaigns in Florida and Arizona in the first year and the American Legacy Foundation campaign since 2000 have been directed at youth. A recent study (Tauras et al. 2005) obtained results for youth that were broadly consistent with those found for the effect of adult campaigns, and a recent study (Farrelly et al. 2005) indicated a 7 percent reduction in smoking prevalence associated with the American Legacy Foundation campaign (22 percent of the overall 36 percent decline in youth smoking prevalence). We estimate that youth-oriented campaigns lead to a 6 percent reduction in youth prevalence. We do not consider the effect on smokers ages 18–24 and on those age 25 and above, due to the lack of studies.

To incorporate the effect of past media campaigns, state per capita expenditures in 2002 were used to calculate the implied annual reductions in smoking rates by state. The annual reductions were then weighted by the number of smokers in a state, with separate estimates for campaigns directed at youth and all ages. Between 1993 and 1999, Massachusetts—followed by Utah, Arizona, Florida, and Oregon—implemented campaigns. California had a media campaign prior to 1993. Since 1999, Alaska, Maine, Idaho, Indiana, Maryland, Minnesota, Mississippi, New York,

New Jersey, and Vermont have added campaigns, but many were directed primarily at youth, and some were conducted at a low level. Since January 2002, Arkansas, Hawaii, and Delaware have implemented campaigns, but many states (including California, Colorado, Massachusetts, Minnesota, New Jersey, and Oregon) reduced campaign expenditures due to fiscal constraints (www.Tobaccofreekids.org/reports/settlements/2004/trends.pdf and www.slati.lungusa.org/reports/SLATI2004MidTermReport.pdf). Due to difficulties in obtaining measures in recent years, media campaigns are considered only for 2002, but media expenditures since then have decreased in some states. Using our mass media model, which relates per capita expenditures to reductions in smoking rates (Levy and Friend 2001), we estimate a 1.5 percent reduction from campaigns implemented in 2002.

For youth campaigns, we include the American Legacy Foundation national truth® campaign directed at youth. We estimate that current youth campaigns reduced smoking prevalence by 5 percent for the years 2002 through 2005.

School Education Programs

School education policies are added to the model for this report. They consist of well-tested programs applied through middle and high school. These programs have been shown to be more effective when accompanied by sustained media campaigns directed at youth. The effect sizes are based primarily on studies using the 30-day prevalence measure of smoking, which are assumed to ultimately lead to reductions in established smoking.

Since the model is in terms of established smokers, the effect of school-based programs has been developed in terms of their ultimate effect on initiation rates into established smoking. Based on the review in this report of school programs (Flay, Appendix D), it is estimated that sustained school programs alone reduce smoking rates by 10 percent and by 20 percent if accompanied by a sustained media campaign. The 10 percent incremental effect of media campaigns reflects the synergies from implementing the campaign in conjunction with the educational programs and is thus higher than the effect of a youth campaign alone (as described above). These effects are modeled as across-the-board reductions in initiation rates at all ages through age 24 applied to males and females. Because there is a lag between the programs and their ultimate effect on initiation, we assume that the program affects initiation rates of youth through age 15 in the first year that the program is in effect, through age 16 the second year that the program is in effect, and one additional age each for each year of implementation through age 24, the last age of initiation.

Because current educational programs are generally not implemented in a consistent manner (in other words, using well-tested formats continuously applied throughout middle and high school), it is assumed that they have no measurable effect. There have, however, been youth campaigns in effect, through the American Legacy Foundation campaign and various state campaigns, as described above. The education policy would, therefore, have the entire effect described above, but a concurrent media campaign effect would only reflect the difference between the current campaigns and the additional effects from having the campaigns in conjunction with the educational campaign.

Cessation Treatment Policies

In a previously published version of the cessation treatment policy module, SimSmoke considers the effects of mandated brief interventions delivered by health care providers to encourage patients to quit smoking, and complete financial coverage of cessation treatments with the

smoker having the flexibility to choose from the array of treatment options (Levy and Friend 2002a; Levy and Friend 2002b). Physicians receive training, their practices are monitored, and the financial coverage is well publicized. In that version, cessation policies only affect first-year quit rates. They increased the quit rate by 28 percent, which translates into a 1.4 percent decrease in smoking prevalence in the first 2 years and a 5 percent decreasing after 20 years.

The cessation treatment module has been revised for the purposes of this report to consider a more all-inclusive policy. In particular, the module considers the effect of quitlines that are well publicized (e.g., through a media campaign) and that encourage follow-up with multiple sessions. In addition, the quitline is accompanied by a “free NRT” (nicotine replacement therapy) program that enables quitline callers to obtain NRT for a specified period of time. The module has also been modified to allow for a direct prevalence effect as well a continuous effect on the future first-year quit rate as long as the program is in operation. The effect on future one-year quit rates is halved to reflect the greater use of treatments and effectiveness of interventions in the first year of the program.

Parameters in the new module have been developed in cooperation with the IOM committee. In the revised module, we set the quit success rate of those who complete a quit attempt at 6 percent, which is consistent with an overall quit rate of 4 percent with about 45 percent of smokers making a quit attempt. We continue to assume that behavioral or pharmacotherapy use doubles quit rates, and their combined use quadruples quit rates (Fiore et al. 2000). Proactive quitlines with follow-up double the quit success rate of those making a quit attempt (Zhu et al. 2002). We estimate that quitlines alone with high media publicity attract 1 percent of smokers and, when free NRT is added, attract 6 percent of smokers (Metzger et al. 2005; Miller et al. 2005; West et al. 2005), of whom 30 percent are new quit attempts. Through the complete coverage of effective cessation treatments, an additional 4 percent of smokers use cessation treatment alone, 2 percent use behavioral treatment alone, and 3 percent use combined pharmacotherapy and behavioral treatment. We estimate that 50 percent of those who use treatments as a result of the policy would not otherwise have made a quit attempt. In addition, brief interventions increase quit attempts by 20 percent and further increase new treatment use (through quitlines and other financial access) by 10 percent. With the combined policies, quit attempts in the first year increase by 40 percent (from 45 to 63 percent of smokers) and average quit success (per quit attempt) increases by 28 percent (from 8.9 to 11.4 percent). As a result of all the policies, the prevalence of smokers is reduced by 3.4 percent in the first-year, and future first-year quit rates increase by about 20 percent.

From 2002 forward, the module takes into account the level of treatment coverage and health care involvement. By 2003, 36 Medicaid programs covered some counseling or medication for all Medicaid recipients, but only New Jersey and Oregon offered comprehensive coverage and Medicare did not provide coverage (CDC 2004). Measures of insurance coverage by private payers are more limited (Levy and Friend 2002b). A study of managed care organizations (McPhillips-Tangum et al. 2002) found that 59 percent of plans had some type of pharmacotherapy coverage and 86 percent had some kind of behavioral coverage, but a study of employer coverage (www.cdc.gov/tobacco/educational_materials/cessation/page1.html) found that only 24 percent of employers provided any type of cessation treatment coverage. In 2002, 14.6 percent of adults were not covered at any time in last year, 71 percent were covered by private insurance, 11 percent by Medicaid, and 13.5 percent by Medicare (www.ferrer.bls.census.gov/macro/032002/health/h02_001.htm). We estimate that less than 20 percent of the population is covered for pharmacotherapy and for behavioral therapy, and these

benefits are not well publicized. We estimate that about 40 states have quitlines—but these quitlines are generally not widely publicized and do not provide free pharmacotherapy (www.cdc.gov/tobacco/quit/Quitlines/Appendix.pdf)—and that about 50 percent of smokers were receiving brief interventions.

Youth Access

The youth access module considers the effect of self-service and vending machine bans, and three components of retail compliance (compliance checks, penalties, and merchant awareness or community mobilization). The module also takes into account that, as retail sales to youth are reduced, youth switch to non-retail sources such as theft, older peers, and parents.

The model considers three levels of enforcement: (1) strongly enforced and publicized (compliance checks are conducted four times per year per outlet, penalties are potent and enforced, and there is heavy publicity and community involvement); (2) well enforced (compliance checks are conducted regularly, penalties are potent, and publicity and merchant training are included, but there is little community support); and (3) weakly enforced (compliance checks are conducted sporadically, penalties are weak, and there is little merchant awareness along with minimal community participation). With a strongly enforced and well-publicized program, we estimate a 20 percent reduction in youth smoking prevalence and future initiation for 16–17 year olds when all policies are in full force, with a 30 percent reduction for those ages 10–15 years (Levy et al. 2001a; Levy and Friend 2000). The well-enforced and weakly enforced policies, respectively, yield 50 percent and 10 percent of the effect. These policies work through the prevalence and initiation rate, but do not affect cessation. These parameters have been accepted by the IOM panel.

Data from the Substance Abuse and Mental Health Administration website (<http://prevention.samhsa.gov/tobacco/01synartable.asp>) indicate that noncompliance is about 15 percent, but these figures may be overstated because they affect future funding. Based on current compliance rates and programs in effect across states, we estimate that states on average have a low enforcement policy.

Prediction of Status Quo Trends and the Effect of Tobacco Control Policies

The model provides a prediction of smoking prevalence from the year 2002 through 2005, taking into account changes in policies during that time period. The model will be used to project smoking rates in future years beginning in the year 2006. We will consider the smoking prevalence rate over a 20-year time horizon ending in 2025. We examine rates for the adult population (ages 18 and above), as well as breakdowns by age.

First, we present a status quo scenario. This scenario incorporates policies in the year 2002 and changes in policy between 2002 and 2005, and then holds policies constant at their 2005 levels to project changes in smoking prevalence in the absence of any policy changes. We then consider the effect of policy changes on smoking rates in future years. Policy changes are made in the year 2006 and maintained in all future years. Their incremental effect will depend on the level of policies in effect in 2005. The effects of policies are presented relative to the status quo level in the same year, that is $(\text{Policy Rate}_T - \text{Status Quo Rate}_T) / \text{Status Quo Rate}_T$.

Worst Case Scenario

Since 1998, large price increases, new clean air laws, and other tobacco control policies have been associated with a reduction in smoking prevalence of about 20 percent (Levy et al. 2005a).

However, this reduction might be reversed if policy changes are not maintained. We consider a reverse in some of the more prominent policies, especially those relating to the settlement funds (including those to the American Legacy Foundation), which we call a worst-case scenario. This scenario typifies the possibilities if tobacco control regresses, as it has done in some states.

While states are not expected to reduce taxes, cigarette manufacturers might be expected to reduce price to gain back some of the customers that they have lost in recent years due to price increases (Levy et al. 2005a), especially if public pressure is reduced. For example, after the settlement, average cigarette prices increased about \$0.80 net of tax increases. That price increase might be reversed once the settlement is no longer an issue, since there would no longer be an incentive to raise prices to reduce youth consumption, and thereby, reduce the size of settlement payouts. With the settlement abandoned, prices might be expected to decrease. We separately consider price reductions of \$0.40 and \$0.80. As part of the worst-case scenario, we also assume that current taxes do not adjust to future inflation, suggesting a slight erosion of taxes over time.

Clean air laws are not expected to revert, but compliance with those laws might be lower as less attention is focused on tobacco control, especially if media campaigns are abandoned. We consider the effect of reduced publicity and enforcement surrounding the laws.

In recent years, media campaigns have been abandoned in some states, such as Massachusetts, and faced large cutbacks in others, such as California. The American Legacy Foundation campaign may also be abandoned. We consider the effect of reductions in those campaigns from their current level to no funding, both for youth and for adults.

Education policies are currently at levels where they are of minimal effectiveness. Consequently, no change is expected under the worst-case scenario. In addition, no change is expected for youth access policies. These policies are not currently conducted at levels that are expected to have large effects on smoking prevalence, especially adult prevalence, and large cutbacks are not expected.

For cessation, we consider only the elimination of the quitlines. It is not expected that Medicaid or other coverage is likely to revert.

We then consider the reversion of all policies: a reduction in price of \$0.80, a reduction in enforcement and clean air laws, a reduction in adult media campaigns, a reduction in youth media campaigns, and a reduction in cessation treatment programs.

Future Policies

Finally, we consider the effect of strengthening current policies to what might be viewed as the desired set of policies recommended by the IOM committee. We consider changes in the following policies, individually and in combination:

We consider tax increases of \$1.00, \$2.00, and \$3.00. We assume that these taxes are indexed to inflation, so that their value is maintained over time.

We consider a clean air policy that bans smoking at all work sites—which includes bars, restaurants, and grocery stores—plus increased compliance through publicity from other policies (especially media policies regarding secondhand smoke).

We consider an intensive media campaign as part of a more comprehensive strategy (at levels recommended by the Centers for Disease Control and Prevention), directed at adults and youth in all states.

We will consider a comprehensive cessation treatment policy with all of the policies described above (full coverage of pharmacotherapy and behavioral therapy, training and mandated

tobacco brief interventions, and multi-session quitlines with free NRT). We further assume that the policies are well-publicized.

School education policies consist of well-tested programs applied through middle and high school. We include a media campaign as part of the policy.

The youth access policy is assumed to be conducted at a high enforcement level, with high penalties, and be well-publicized. The policy is part of the comprehensive campaign, implying a high degree of community mobilization.

RESULTS

We present the effect of varying levels of tobacco control policies in isolation and together through a comprehensive tobacco control strategy. The estimates of smoking prevalence under the status quo and varying policy scenarios are shown for the adult population (18 years of age and above) in Tables J-2 and J-3.

The Status Quo Scenario

The model begins in 2002 with policy levels and changes in policy inputted into the model through 2005. The smoking prevalence is estimated as 21.7 percent in 2002, falling to 20.6 percent in 2004. Part of this decline is due to long-run trends, including policies implemented before 2002, and part is due to policies implemented between January 2002 and January 2005. The average price increased about 14 percent, and several states implemented clean air laws.

New policies are implemented and maintained from 2006 through 2025. Their effect on smoking prevalence is presented relative to the status quo, in which tobacco control policies remain unchanged from their 2005 levels. In the status quo scenario, adult smoking prevalence is projected to decline from the 2005 level of 20.6 percent to the 2010 level of 19.3 percent. This absolute reduction of 1.3 percentage points represents a 6.3 percent decline relative to the 2005 level. Kept at 2005 policy levels, smoking rates are projected to fall to 15.5 percent by 2025. This drop represents a 24.7 percent decrease relative to the 2005 level. At least some of the reduction in smoking prevalence is explained by stricter public policies implemented prior to 2005, including the increase in prices since 1998, more stringent smoking restrictions in work and public places, and better information about the effects of smoking (DHHS 2000). The largest reductions are among the 35–64-year-old age groups, due to higher cessation rates among those groups and reduced initiation at earlier ages.

Worst-Case Scenario

In the worst-case scenario, we first look at the effect of decreasing the average tax rate. A \$0.40 decrease without taxes indexed to inflation will lead to a projected 1.6 percent relative increase in adult smoking prevalence within 5 years compared to the status quo, and by the year 2025 it will lead to a 5 percent relative increase. A \$0.80 decrease in average tax price is projected to have an even greater effect, causing a 3 percent relative increase within 5 years compared to the status quo, rising steadily to a 7.6 percent relative increase in adult smoking prevalence by the year 2025.

Taking away enforcement and publicity of clean air laws has a smaller effect than a tax decrease. This reduction in clean air laws is projected to cause a 0.2 percent relative rise in smoking prevalence compared to status quo within 5 years, and a 0.5 percent relative rise after 20 years. Reductions in media coverage lead to slightly larger increases in smoking prevalence

compared to the reduction in clean air laws. Abandoning adult media campaigns is projected to cause a 0.3 percent relative rise in smoking prevalence compared to status quo within 5 years and an 0.8 percent relative rise after 20 years. Abandoning youth media campaigns is projected to cause a 0.1 percent relative rise in smoking prevalence compared to status quo within 5 years and a 0.3 percent relative rise after 20 years. Reductions in cessation treatment policies rise 0.2 percent after 5 years and have a 2.0 percent relative rise after 20 years.

Finally, we consider the elimination of all policies: a reduction in price of \$0.80, a reduction in enforcement and clean air laws, a reduction adult media campaigns, and a reduction in cessation treatment programs. After 5 years, these reductions are projected to lead to a 3.5 percent increase in smoking prevalence relative to the status quo. The smoking prevalence is projected to increase steadily relative to the status quo. After 20 years, smoking prevalence is projected to be 17.1 percent compared to 15.5 percent under the status quo, or a 10.4 percent relative increase. Relative to the status quo, most of the increases are among the younger age groups due to the greater effect of price increases on those age groups (especially below age 35).

Taxes

Of the tobacco control policies, SimSmoke attributes the most pronounced effect on smoking prevalence trends between 1993 and 2003 to taxes (Levy et al. 2004e). However, the same absolute increase in taxes or price has a smaller percentage effect at the higher prices found in 2005 than in earlier years, since prices are now at a higher rate and the changes represent smaller relative increases. An increase in the average tax rate of \$0.50 from the 2005 level is projected to result in an absolute decline of 0.5 percent in adult smoking prevalence compared to the status quo between 2005 and 2010, which represents a 2.4 percent relative drop. This decrease is projected to continue steadily, reaching a 0.7 percent decline compared to the status quo by the year 2025, which represents a 4.4 percent relative drop. An increase in the average tax rate of \$1.00 is projected to result in a 0.9 percent absolute (a 4.4 percent relative) reduction compared to status quo within the first 5 years, rising to a 1 percent reduction (6.8 percent relative to status quo) by 2025. An increase in the average tax rate of \$2.00 is projected to result in a 1.5 percent reduction (7.7 percent relative) compared to status quo by the year 2010 and a decrease of 1.8 percent (11.8 percent relative) by 2025. Finally, a \$3.00 average tax increase is projected to result in a 2.0 percent reduction in adult smoking prevalence compared to status quo in the first 5 years, which represents a 10.3 percent relative reduction. The smoking prevalence is projected to have a 2.4 percent absolute (15.8 percent relative) decline compared to the status quo by the year 2025.

The largest effects of the price increases are on those at younger ages, particularly those below age 18. Consequently, the growth in effect over time is primarily because youth are more responsive to price increases than adults. We also assume that taxes increase with the rate of inflation over time, but some of the effect on smoking prevalence dissipates over time if the per-unit taxes are not indexed to inflation (Levy et al. 2000b).

Clean Air Policies

Clean air policies have a similar, although smaller, effect on smoking prevalence compared to tax policies. The model predicts the effects derived from implementing a total smoking ban in workplaces, restaurants, and public places supported by both publicity and enforcement of the ban. By 2010, these policies lead to a 3.4 percent relative drop in the smoking rate compared to the status quo. By 2025, the model predicts a 4.2 percent drop compared to the status quo, the increased effect due primarily to higher cessation rates. The largest effects are among those in

the 25–64-year-old age groups, particularly 35–44-year-old groups, due to the more pronounced effect of work site laws on this group (particularly among males).

Mass Media

We examine a media campaign directed at all smokers implemented at a high intensity, used in conjunction with other programs, and maintained over time. The decline of 1.1 percent in adult smoking after 5 years compared to status quo translates to a 5.9 percent relative decrease. The effect increases steadily to a 7.3 percent reduction relative to the status quo by 2025. Media campaigns initially have a greater effect on younger smokers, but have greater effects on older smokers in later years.

School Education Policies

We look at the effects of a sustained school program combined with a media campaign directed at youth. There is a very small projected decline in adult smoking prevalence after 5 years, which is to be expected considering this policy is directed at youth. After 10 years, this policy is projected to result in an absolute decline in adult smoking prevalence of 0.5 percent compared to status quo, which is a relative decline of 2.9 percent. By the year 2025 there will be a projected 0.9 percent absolute or 5.9 percent relative drop in smoking prevalence compared to the status quo. These programs only directly affect youth, but their effects spread to lower prevalence rates at older ages over time.

Cessation Policies

A policy of mandated brief interventions delivered by health care providers, along with full financial coverage of cessation treatments and well-publicized quitlines with free NRT, have smaller effects in the earlier years of the projection, but their impact grows over time through increased cessation rates, which affect those greater than age 24 (Levy and Friend 2002b). The combined cessation policies are projected to reduce adult smoking prevalence by an absolute value of 1.1 percent by 2010 or, in other words, a 5.8 percent relative improvement over the status quo scenario. This effect grows to an 11.2 percent reduction relative to the status quo by 2025.

Youth Access Policies

We look at a policy of strict control of youth access (bans on access to self-service and vending machines in addition to strict retail compliance checks, penalties for noncompliance, and a high level of publicity). Initially, smoking rates of youth are reduced by about 25 percent. Not surprisingly, adult smoking rates (of which youth are included only in later years) decline by a small amount (1.1 percent) relative to the status quo by 2010, with a greater relative decline of 5.1 percent by 2025 as a large portion of youth affected by the policies become older, replacing those cohort with higher initiation rates.

Best-Case Scenario: A Comprehensive Set of Policies

The final cases consider a combination of policies representing a tax increase of \$1.00, \$2.00, and \$3.00, along with work site, restaurant, and public place smoking bans with publicity and enforcement; a high-intensity media campaign; comprehensive cessation policies; and strict youth access policies. With a \$1.00 tax and the other policies, the smoking rate is projected to

fall by 19.7 percent below the status quo level by 2005. Maintaining this policy is projected to reduce the smoking rate 34.0 percent relative to the status quo by 2025. With a \$2.00 tax and the other policies, the smoking rate is projected to fall to 14.9 percent by 2010, which is 22.5 percent below the status quo level of 19.3 percent in relative terms. Maintaining this policy is projected to reduce the smoking rate to 9.7 percent compared to a status quo level of 15.5 percent by 2025, which is 37.6 percent lower relative to the status quo. With a \$3.00 tax and the other policies, the smoking rate is projected to fall to 14.5 percent by 2010, which is 24.7 percent below the status quo level in relative terms. Maintaining this policy is projected to reduce the smoking rate to 9.3 percent by 2025, which is a 40.3 percent reduction relative to the status quo.

Of the policies in the comprehensive package, media campaigns, clean air laws, and taxes have the greatest effect in 2010, but cessation treatment, education, and youth access policies play a greater role by 2025. Some policies have a greater impact on adult smoking prevalence and others on youth prevalence. Overall, the largest effects are on youth through the effects of price, youth access policies, and education programs. The effects of a comprehensive policy strategy are shown as the SimSmoke screen in Figure J-1.

CONCLUSIONS

From the current smoking prevalence of about 20.6 percent, the SimSmoke model projects a reduction in smoking rates to 19.3 percent by 2010, if policies are maintained at their 2005 levels. The decline occurs due to the aging of older cohorts and the impetus from policies in years through 2005. This rate is substantially above the *Healthy People 2010* target of 12 percent. By the year 2025, the smoking rate is projected to fall to 15.5 percent in the absence of policy change. However, if policies regress (the worst-case scenario), the model predicts that the smoking rate would be at 17.1 percent, about 10 percent higher than the status quo scenario.

We considered a package of policies as suggested in this report. With a cumulative set of policies (with taxes increased \$2.00), we predict that smoking prevalence will fall to about 15 percent by 2010, which is 23 percent below the status quo level of 19 percent in relative terms, and to about 10 percent by 2025, or a 40 percent decrease relative to the status quo. The cumulative impact of the comprehensive set of policies over a 20-year period provides strong encouragement for implementing the policy objectives set out in this report.

In summary, the SimSmoke model suggests that policies can have a large impact on smoking rates. With the implementation of strong policies, we project a smoking rate of about 15 percent in 2010. Evidence from California, which has had policies in line with these goals, suggests that this projection is attainable (Gilpin et al. 2003). Maintaining policies at high levels could reduce the smoking prevalence in the United States to about 10 percent by 2025. Although later, these levels are in line with *Healthy People 2010* targets.

TABLE J-1 Data Used in SimSmoke

Variable	Source	Specifications
I. Population model		
A. Population	2002 Current Population Survey (CPS)	Breakdowns by age and gender
B. Fertility rates	U.S. Census Vital Rate Inputs Tables, 2000	Breakdowns by age
C. Mortality rates	2001 Multiple Cause-of-Death File, NCHS	Breakdowns by age and gender: total deaths
II. Smoking model		
A. Baseline prevalence rates for current and ex-smokers	Tobacco Use Supplement of the CPS (1992–93) for age 15+, and 1993 Teen-age Attitudes and Practices Survey (TAPS) for <age 15	Based on 100+ cigarettes lifetime and distinction between current and previous smokers. Breakdowns by smoking experience (<1, 1–2, 3–5, 6–10, 11–14, 15+ years), by age and gender
B. Initiation rates	Change in smoking rates between contiguous age groups	Breakdowns by age and gender
C. First-year quit rates	Calculated from cessation module with adjusters for demographic group based on the CPS	Breakdowns by age and gender
D. Relapse rates	(DHHS 1989) McWhorter et al. 1990; U.S. DHHS 1990; Gilpin et al. 1997), COMMIT data	Breakdowns by age
E. Relative death risks of smokers and ex-smokers	Cancer Prevention Study II (see Thun et al. 2001)	Breakdowns by age and gender
III. Policy modules		
A. Taxes	Tobacco Institute, Tobaccofreekids.org , www.bls.gov/cpi/home.htm	Prices and taxes for 2002–05
B. Clean air laws	www2.cdc.gov/nccdphp/osh/state/report_index.asp and slati.lungusa.org/search-form.asp (National Cancer Institute 2000)	Different types of laws and their stringency
C. Media and other educational campaigns	CDC and various state websites: (Farrelly Matthew C et al. 2003; Wakefield and Chaloupka 2000)	Expenditures per capita and audience

D. Youth access	CDC, SAMHSA, (Levy et al. 2001a)	Enforcement checks, penalties, community campaigns, self-service, and vending machine bans
-----------------	----------------------------------	--

NOTE: CDC = Centers for Disease Control and Prevention; NCHS = National Center for Health Statistics; SAMHSA = Substance Abuse and Mental Health Administration.

TABLE J-2 Projected Adult Smoking Prevalence (%) from 2003 to 2008, with Projection Through 2025 under Status Quo and Worst-Case Policy Scenarios^a

YEAR	2002	2005	2006	2010	2015	2020	2025
Prevalence (%)							
Status quo	21.7	20.6	20.3	19.3	18.1	16.9	15.5
\$0.40 price reduction	21.7	20.6	20.4	19.6	18.6	17.6	16.3
\$0.80 price reduction	21.7	20.6	20.6	19.9	18.9	18.0	16.7
Clean air reduction	21.7	20.6	20.3	19.3	18.1	17.0	15.6
Media reduction	21.7	20.6	20.3	19.4	18.2	17.0	15.7
Youth media reduction	21.7	20.6	20.3	19.3	18.3	17.2	15.8
Cessation reduction	21.7	20.6	20.3	19.3	18.1	17.0	15.6
	21.7	20.6	20.6	20.0	19.2	18.4	17.1
% Change in Prevalence from Status Quo ^b							
Status quo							
\$0.40 price reduction			0.7	1.6	2.8	4.0	5.0
\$0.80 price reduction			1.4	3.0	4.8	6.4	7.6
Clean air reduction			0.1	0.2	0.3	0.4	0.5
Media reduction			0.2	0.3	0.5	0.7	0.8
Youth media reduction			0.0	0.1	0.2	0.3	0.3
Cessation reduction			0.0	0.2	1.0	1.6	2.0
			1.6	3.8	6.4	8.8	10.4

SOURCE: SimSmoke model.

^a Policies are implemented and maintained from year 2005 forward.^b Percent changes calculated relative to the status quo rate at (Policy Rate - Status Quo Rate)/Status Quo Rate.

TABLE J-3 Projected Adult Smoking Prevalence (%) from 2003 to 2005, with Projections Through 2025 Under Status Quo and Best-Case Policy Scenarios^a

YEAR	2002	2005	2006	2010	2015	2020	2025
Prevalence (%)							
Status quo	21.7	20.6	20.3	19.3	18.1	16.9	15.5
\$0.50 tax increase	21.7	20.6	19.9	18.8	17.6	16.4	14.9
\$1.00 tax increase	21.7	20.6	19.6	18.4	17.1	15.9	14.5
\$2.00 tax increase	21.7	20.6	19.1	17.8	16.4	15.1	13.7
\$3.00 tax increase	21.7	20.6	18.6	17.3	15.8	14.5	13.1
Clean air laws	21.7	20.6	19.7	18.6	17.4	16.3	14.9
Media campaign	21.7	20.6	19.2	18.1	16.9	15.8	14.4
Cessation treatment	21.7	20.6	19.7	18.2	16.7	15.3	13.8
Education programs	21.7	20.6	20.3	19.2	17.6	16.1	14.6
Youth access policies	21.7	20.6	20.3	19.1	17.6	16.2	14.7
All policies with \$1.00 tax	21.7	20.6	17.4	15.5	13.4	11.8	10.2
All policies with \$2.00 tax	21.7	20.6	16.9	14.9	12.9	11.2	9.7
All policies with \$3.00 tax	21.7	20.6	16.5	14.5	12.4	10.8	9.3
% Change in Prevalence from Status Quo ^b							
Status quo							
\$0.50 tax increase			-1.8	-2.4	-2.9	-3.3	-3.7
\$1.00 tax increase			-3.4	-4.4	-5.3	-6.2	-6.8
\$2.00 tax increase			-6.1	-7.7	-9.3	-10.7	-11.8
\$3.00 tax increase			-8.2	-10.3	-12.4	-14.2	-15.6
Clean air laws			-3.1	-3.4	-3.7	-3.9	-4.2
Media campaign			-5.5	-6.0	-6.5	-6.9	-7.4
Cessation treatment			-3.1	-5.8	-7.8	-9.4	-11.2
Education programs			0.0	-0.7	-2.9	-4.8	-5.9
Youth access policies			0.0	-1.1	-2.8	-4.3	-5.1
All policies with \$1.00 tax			0.0	-19.7	-25.7	-30.5	-34.0
All policies with \$2.00 tax			-14.3	-22.5	-28.9	-33.8	-37.6
All policies with \$3.00 tax			-16.7	-24.7	-31.3	-36.4	-40.3

SOURCE: SimSmoke model.

^a Policies are implemented and maintained from year 2005 forward.^b Percent changes calculated relative to the status quo rate at (Policy Rate - Status Quo Rate)/Status Quo rate.

REFERENCES

- CDC (Centers for Disease Control and Prevention). 1996. Cigarette smoking before and after an excise tax increase and an antismoking campaign--Massachusetts, 1990-1996. *Morbidity and Mortality Weekly Report* 45(44):966-970.
- CDC (2004). State medicaid coverage for tobacco-dependence treatments—United States, 1994-2002. *Morbidity and Mortality Weekly Report* 53(3):54-57.
- DHHS (Department of Health and Human Services). 1989. *Reducing the Health Consequences of Smoking: 25 Years of Progress: A Report of the Surgeon General*. Rockville, MD: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health.
- DHHS. 1990. *The Health Benefits of Smoking Cessation: A Report of the Surgeon General*. Atlanta, Georgia: U.S. Department of Health and Human Services, Public Health Service, Centers for Disease Control, Office on Smoking and Health.
- DHHS. 1994. *Preventing Tobacco Use Among Young People (A Report of the Surgeon General)*. Rockville, MD: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, Center for Health Promotion and Education, Office on Smoking and Health.
- DHHS. 2000. *Reducing Tobacco Use: A Report of the Surgeon General*. Atlanta, GA: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health.
- DHHS. 2004. *The Health Consequences of Smoking: A Report of the Surgeon General*. Atlanta, GA: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health.
- Farrelly MC, Davis KC, Haviland ML, Messeri P, Heaton CG. 2005. Evidence of a Dose—Response Relationship Between “truth” Antismoking Ads and Youth Smoking Prevalence. *American Journal of Public Health* 95(3):425-431.
- Farrelly MC, Pechacek TF, Chaloupka FJ. 2003. The impact of tobacco control program expenditures on aggregate cigarette sales: 1981-2000. *Journal of Health Economics* 22(5):843-859.
- Farrelly Matthew C, Pechacek Terry F, Chaloupka Frank J. 2003. The impact of tobacco control expenditures on aggregate cigarette sales: 1981-2000. *Journal of Health Economics* 22:843-859.
- Fiore MC, Bailey WC, Cohen SJ. 2000. *Treating Tobacco Use and Dependence (Clinical Practice Guideline)*. Rockville, MD: U.S. Department of Health Human Services. Public Health Service.
- Friend K, Levy DT. 2002. Reductions in smoking prevalence and cigarette consumption associated with mass-media campaigns. [Review]. *Health Education Research* 17(1):85-98.
- Gilpin EA, Emery SL, Farkas AJ, Zhu SF, et al. (2003). *Tobacco Control Successes in California: A Focus on the Young People, Results from the California Tobacco Control Surveys, 1990-2002*. La Jolla, CA: University of California, San Diego.
- Gilpin EA, Pierce JP, Farkas AJ. 1997. Duration of smoking abstinence and success in quitting. *Journal of the National Cancer Institute* 89(8):572-576.
- Hughes JR. 2000. Reduced smoking: an introduction and review of the evidence. *Addiction* 95 (Suppl 1):S3-S7.
- Hymowitz N, Sexton M, Ockene J, Grandits G. 1991. Baseline factors associated with smoking cessation and relapse. MRFIT Research Group. *Preventive Medicine* 20(5):590-601.
- Hymowitz N, Cummings KM, Hyland A, Lynn WR, Pechacek TF, Hartwell TD. 1997. Predictors of smoking cessation in a cohort of adult smokers followed for five years. *Tobacco Control* 6 (Suppl 2):S57-S62.
- Jha P, Chaloupka FJ. 2000. The economics of global tobacco control. *British Medical Journal* 321:358-361.
- Levy DT, Bauer J, Ross H, Powell L, Nikolayev N. 2004a. The Role of Public Policies in Reducing Smoking Prevalence and Deaths Caused by Smoking in Arizona: *Results from the Arizona Tobacco Policy Simulation Model*. Calverton, MD.
- Levy DT, Chaloupka F, Gitchell J, Mendez D, Warner KE. 2002. The use of simulation models for the surveillance, justification and understanding of tobacco control policies. *Health Care Management Science* 5(2):113-120.
- Levy DT, Cummings KM, Hyland A. 2000a. A simulation of the effects of youth initiation policies on overall cigarette use. *American Journal of Public Health* 90(8):1311-1314.

- Levy DT, Cummings KM, Hyland A. 2000b. Increasing taxes as a strategy to reduce cigarette use and deaths: results of a simulation model. *Preventive Medicine* 31(3):279-286.
- Levy DT, Friend KB. 2000. A simulation model of tobacco youth access policies. *Journal of Health Politics, Policy and Law* 25(6):1023-1050.
- Levy DT, Friend K. 2001. A computer simulation model of mass media interventions directed at tobacco use. *Preventive Medicine* 32(3):284-294.
- Levy DT, Friend K. 2002a. A simulation model of policies directed at treating tobacco use and dependence. *Medical Decision Making* 22(1):6-17 .
- Levy DT, Friend K. 2002b. Examining the effects of tobacco treatment policies on smoking rates and smoking related deaths using the SimSmoke computer simulation model. *Tobacco Control* 11(1):47-54.
- Levy DT, Friend K, Holder H, Carmona M. 2001a. Effect of policies directed at youth access to smoking: results from the SimSmoke computer simulation model. *Tobacco Control* 10(2):108-116.
- Levy DT, Friend K, Polishchuk E. 2001b. Effect of clean indoor air laws on smokers: the clean air module of the SimSmoke computer simulation model. *Tobacco Control* 10(4):345-351.
- Levy DT, Mumford E, Pesin B. 2003. Tobacco control policies and reductions in smoking rates and smoking-related deaths: Results from the SimSmoke Model. *Expert Review of Pharmacoeconomics and Outcomes Research* 3(4): 457-468.
- Levy DT, Nikolayev N, Mumford EA Compton C. 2004b. The Healthy People 2010 smoking prevalence and tobacco control objectives: results from the SimSmoke Tobacco Control Policy Simulation Model. *Cancer Causes and Control* 16(4):359-371.
- Levy DT, Nikolayev N, Mumford EA. 2004c. The Role of Public Policies in Reducing Smoking Prevalence and Deaths Caused by Smoking in California:Results from the California Tobacco Policy Simulation Model. Calverton, Maryland: Pacific Institute.
- Levy DT, Nikolayev N, Mumford EA. 2004e. A validation of the SimSmoke simulation model: The role of tobacco control policies in recent years. PIRE Working Paper. Calverton, MD.
- Levy DT, Nikolayev L, Mumford E. 2005a. Recent trends in smoking and the role of public policies: results from the SimSmoke tobacco control policy simulation model. *Addiction* 100(10):1526-1536.
- Levy DT, Nikolayev L, Mumford E, Compton C. 2005b. The Healthy People 2010 smoking prevalence and tobacco control objectives: results from the SimSmoke tobacco control policy simulation model (United States). *Cancer Causes Control* 16(4):359-371.
- McPhillips-Tangum C, Cahill A, Bocchino C, Cutler CM. 2002. Addressing tobacco in managed care: Results from the 2000 survey. *Preventive Medicine in Managed Care* 3(3):85-95.
- McWhorter WP, Boyd GM, Mattson ME. 1990. Predictors of quitting smoking: the NHANES I followup experience. *Journal of Clinical Epidemiology* 43(12):1399-1405.
- Metzger KB, Mostashari F., Kerker BD. 2005. Use of pharmacy data to evaluate smoking regulations' impact on sales of nicotine replacement therapies in New York City. *American Journal of Public Health* 95(6):1050-1055.
- Miller N, Frieden TR, Liu SY, Matte T, Mostashari F, Deitcher D, Cummings K, Chang C, Bauer U, Bassett M. 2005. Effectiveness of a large-scale distribution programme of free nicotine patches: a prospective evaluation. *Lancet* 365(9474):1849-1854.
- NCI (National Cancer Institute). 2000. *State and Local Legislative Action to Reduce Tobacco Use*. Bethesda MD: U.S. DHHS, National Institutes of Health, National Cancer Institute.
- Orzechowski W, Walker RC. 2003. *The Tax Burden on Tobacco: Historical Compilation, Vol. 37, 2002*. Arlington, VA: The Tobacco Institute
- Snyder LB, Hamilton MA, Mitchell EW, Kiwanuka-Tondo J, Fleming-Milici F, Proctor D. 2004. A meta-analysis of the effect of mediated health communication campaigns on behavior change in the United States. *Journal of Health Communication* 9 (Suppl 1):71-96.
- Tauras JA, Chaloupka FJ, Farrelly MC, Giovino GA, Wakefield M, Johnston LD, O'Malley PM, Kloska DD, Pechacek TF. 2005. State tobacco control spending and youth smoking. *American Journal of Public Health* 95(2):338-344.
- Thun MJ, Henley SJ, Miracle-McMahill HL. 2001. Health consequences of tobacco use: total mortality. In *Women and Smoking: A Report of the Surgeon General*. Atlanta, GA: DHHS.
- Wakefield M, Chaloupka F. 2000. Effectiveness of comprehensive tobacco control programmes in reducing teenage smoking in the USA. *Tobacco Control* 9(2):177-186.
- West R, DiMarino ME, Gitchell J, McNeill A. 2005. Impact of UK policy initiatives on use of medicines to aid smoking cessation. *Tobacco Control* 14(3): 166-171.

Zhu SH, Anderson CM, Tedeschi GJ, Rosbrook, B, Johnson CE, Byrd M, Gutierrez-Terrell E. 2002. Evidence of real-world effectiveness of a telephone quitline for smokers. *New England Journal of Medicine* 347(14):1087-1093.

K

Commissioned Simulation Modeling of Smoking Prevalence as an Outcome of Selected Tobacco Control Measures

David Mendez
University of Michigan
School of Public Health

Kenneth E. Warner
University of Michigan
School of Public Health

The statement of work requested by the committee can be divided into three tasks:

1. An analysis of future U.S. smoking prevalence under “status quo,” “best-case” and “worst-case” scenarios. The best-case scenario was defined by the committee as the United States achieving the State of California’s current smoking initiation and cessation rates. The worst case scenario was defined by the committee as the United States achieving the State of Kentucky’s current initiation and cessation rates.
2. An analysis of different combinations of initiation and cessation rates that would achieve an adult smoking prevalence of 10 percent by the year 2025.
3. An analysis of the impact on smoking prevalence of increases in specific age group cessation rates.

For all three analysis tasks, the committee requested reports of current, former, and never-smokers’ prevalence by age group and year. Current smokers are defined as individuals who have smoked more than 100 cigarettes during their entire lives and who smoke now every day or some days.

To carry out the analysis we used the model of U.S. smoking prevalence that we developed, which has been described elsewhere (Mendez et al. 1998). We introduced the following modifications to the model:

1. Age-specific population figures were updated using the 2000 U.S. Census.
2. Death rates were updated with year 2000 figures (from the Statistical Abstract of the United States).
3. Overall adult prevalence for the year 2005 was fixed at 20.6 percent. This figure is a projection, because the year 2005 smoking prevalence figure is not known yet. For reference, the Center for Disease Control and Prevention’s (CDC) preliminary estimate (from National Health Interview Survey [NHIS] data) of the adult smoking prevalence in 2004 is 20.9 percent.
4. Output was modified to conform to the committee’s specification.

DESCRIPTION OF ANALYSES

Pages 1 through 11 in the Results section show the outcomes from the model when subject to status quo as well as California and Kentucky's initiation and cessation rates.

Status quo initiation rate was taken to be 25 percent, consistent with the prevalence for the 18–24 age group observed in 2003 (CDC 2005). Cessation rates for the status quo scenario were taken to be the ones estimated by Mendez and colleagues (1998): 0.21 percent for the 18–30 age group; 2.15 percent for the 31–50 age group; and 5.97 percent for individuals aged 51 and older. By using these age group-specific cessation rates we obtained an estimated 2.59 percent overall cessation rate in 2005 for the United States.

California and Kentucky rates were estimated with data from the Behavioral Risk Factor Surveillance System (BRFSS) from recent years (2000–2003). California's initiation rate was estimated to be 20 percent, an average of the 18–24 age group prevalence from 2000 to 2003. Kentucky's smoking initiation rate was estimated to be 39 percent.

Cessation rates for California and Kentucky were estimated in the following way: first, we obtained from BRFSS adult smoking prevalence by age group for each state from 2000 to 2003. We also obtained, from the Statistical Abstract of the United States, population size by age for each of the two states for the year 2000. We aged the population from 2000 to 2003 according to age-specific death rates and, for every year, computed the adult smoking prevalence assuming a single cessation rate for the population. We estimated the single cessation rate as the value that matched the calculated overall adult smoking prevalence with the prevalence reported from BRFSS for a specific year. These years, 2001 for Kentucky and 2002 for California, were chosen to highlight the high cessation in California and the low cessation in Kentucky. This procedure yielded an estimated cessation rate of 3.33 percent for California and 1.00 percent for Kentucky. We should note that this is a crude estimation procedure that ignores the effect of migration into and out of the states. The procedure is aimed to produce a rough estimate of the cessation rates in the states.

To obtain national age-specific cessation rates consistent with the aggregate quit rates obtained for California and Kentucky, we multiplied the status quo age-specific cessation rates by the ratio of the estimated cessation rates for California and Kentucky to the overall U.S. cessation rate: that is, $3.33/2.59$ for California and $1.00/2.59$ for Kentucky.

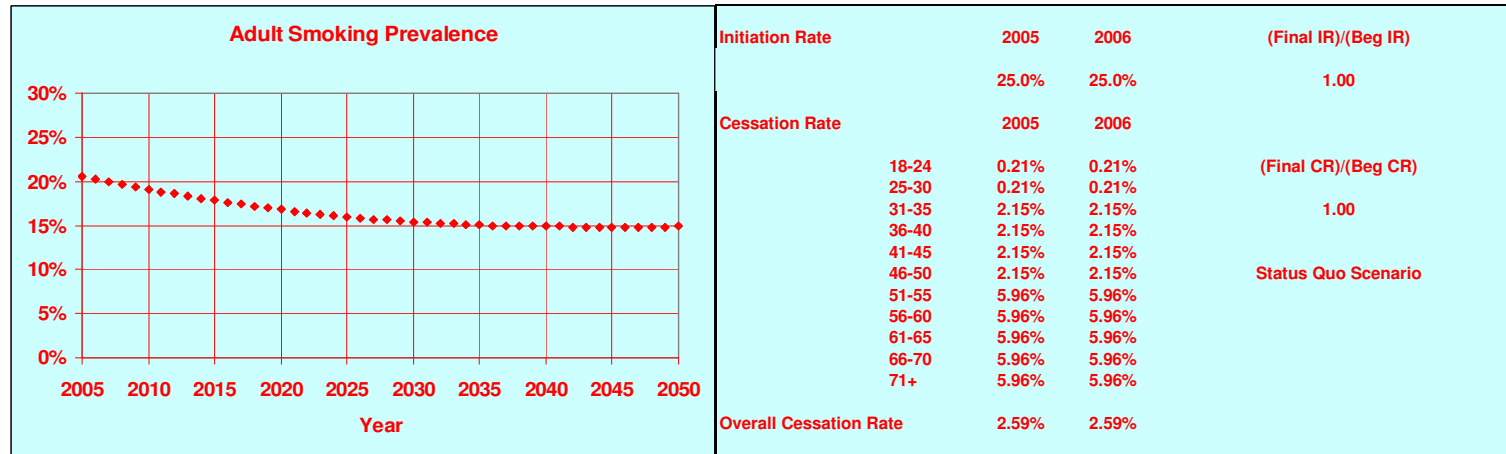
Page 1 in Results presents the status quo scenario. Pages 2 through 11 show scenarios in which the United States attains California and Kentucky rates at different times: almost instantaneously (in 2006) and gradually (linearly), by 2010, 2015, and 2020.

Pages 12 through 26 in Results describe different scenarios in which the country will move from a current adult smoking prevalence of 20.6 percent in 2005 to a 10 percent adult smoking prevalence in 2025. These scenarios describe necessary changes in initiation and/or cessation rates to achieve the 2025 10 percent target prevalence. These changes in initiation and cessation rates are assumed to happen instantaneously by 2006 or gradually (linearly) by 2010, 2015, and 2020. Once target cessation and initiation rates are reached, they are kept constant at the target levels for the remainder of the analysis period.

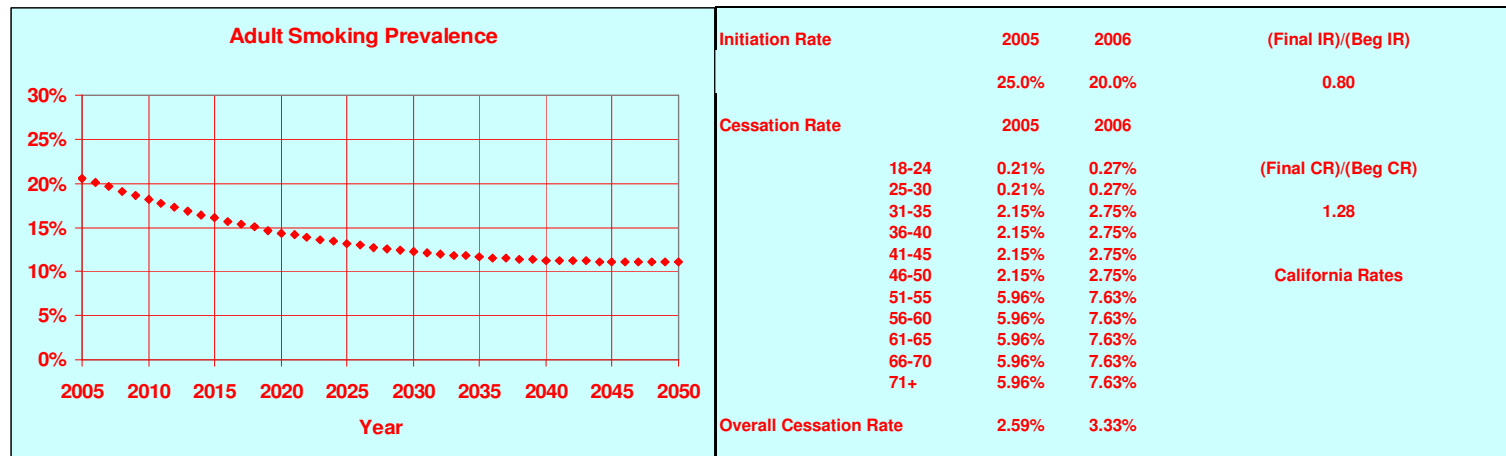
Finally, pages 27 through 38 present the percentage decrease in adult smoking prevalence (from the status quo) due to a 10 percent increase in cessation for each of the age groups reported in the analysis.

Page	Description
4	Status Quo Scenario
5	Country moves from Status Quo rates to California rates – California rates are reached by 2006
6	California rates are reached by 2010
7	California rates are reached by 2015
8	California rates are reached by 2020
9	Country moves from Base Case rates to Kentucky rates – Kentucky rates are reached by 2006
10	Kentucky rates are reached by 2010
11	Kentucky rates are reached by 2015
12	Kentucky rates are reached by 2020
13	Smoking prevalence under California, Kentucky and Base Case rates – Rates are reached by 2006
14	Smoking prevalence under California, Kentucky and Base Case rates – Rates are reached by 2010
15	If initiation drops to 5.9% by 2006, prevalence will drop to 10% by 2025
16	If initiation drops to 4.1% by 2010, prevalence will drop to 10% by 2025
17	If initiation drops to 0.5% by 2015, prevalence will drop to 10% by 2025
18	If initiation is fixed at 30% in 2006 and cessation increases 4.39-fold by 2006, prevalence will drop to 10% by 2025
19	If initiation is fixed at 30% in 2006 and cessation increases 4.54-fold by 2010, prevalence will drop to 10% by 2025
20	If initiation is fixed at 30% in 2006 and cessation increases 4.79-fold by 2015, prevalence will drop to 10% by 2025
21	If initiation is fixed at 30% in 2006 and cessation increases 5.23-fold by 2020, prevalence will drop to 10% by 2025
22	If initiation is fixed at 25% in 2006 and cessation increases 3.21-fold by 2006, prevalence will drop to 10% by 2025
23	If initiation is fixed at 25% in 2006 and cessation increases 3.24-fold by 2010, prevalence will drop to 10% by 2025
24	If initiation is fixed at 25% in 2006 and cessation increases 3.48-fold by 2015, prevalence will drop to 10% by 2025
25	If initiation is fixed at 25% in 2006 and cessation increases 3.81-fold by 2020, prevalence will drop to 10% by 2025
26	If initiation is fixed at 20% in 2006 and cessation increases 2.36-fold by 2006, prevalence will drop to 10% by 2025
27	If initiation is fixed at 20% in 2006 and cessation increases 2.38-fold by 2010, prevalence will drop to 10% by 2025
28	If initiation is fixed at 20% in 2006 and cessation increases 2.55-fold by 2015, prevalence will drop to 10% by 2025
29	If initiation is fixed at 20% in 2006 and cessation increases 2.78-fold by 2020, prevalence will drop to 10% by 2025
30	Combinations of initiation and cessation rates to reach 10% prevalence by 2025
31	Sensitivity analysis – 10% increase in cessation rate for the 18-24 group in 2005
32	Sensitivity analysis – 10% increase in cessation rate for the 25-30 group in 2005
33	Sensitivity analysis – 10% increase in cessation rate for the 31-35 group in 2005
34	Sensitivity analysis – 10% increase in cessation rate for the 36-40 group in 2005
35	Sensitivity analysis – 10% increase in cessation rate for the 41-45 group in 2005
36	Sensitivity analysis – 10% increase in cessation rate for the 46-50 group in 2005
37	Sensitivity analysis – 10% increase in cessation rate for the 51-55 group in 2005
38	Sensitivity analysis – 10% increase in cessation rate for the 56-60 group in 2005
39	Sensitivity analysis – 10% increase in cessation rate for the 61-65 group in 2005
40	Sensitivity analysis – 10% increase in cessation rate for the 66-70 group in 2005
41	Sensitivity analysis – 10% increase in cessation rate for the 71+ group in 2005

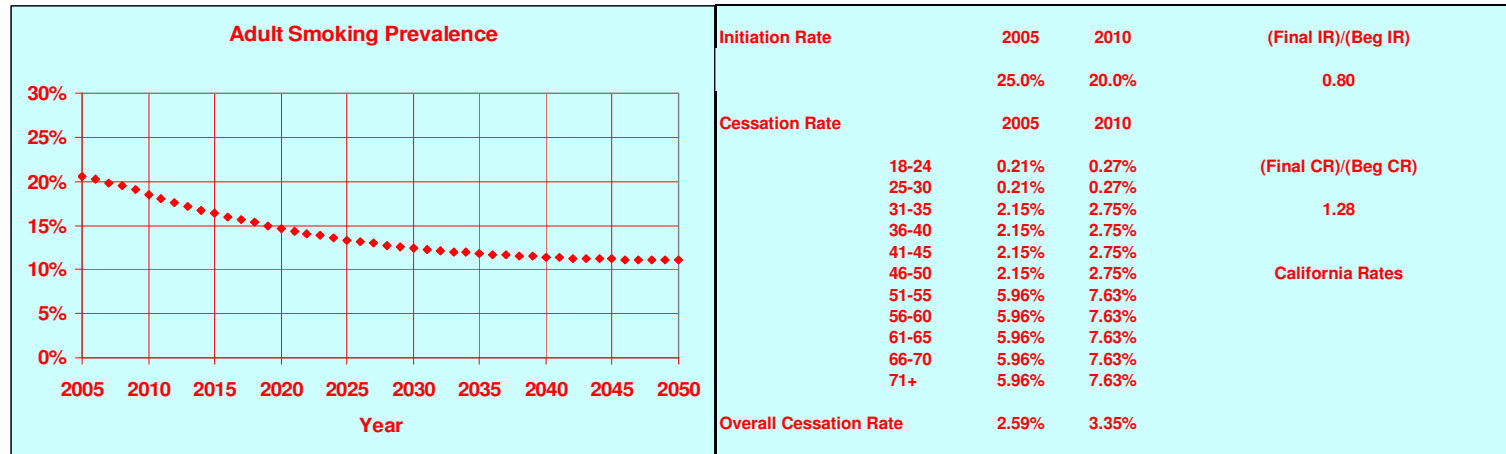
Prevalence	Current Smokers					Former Smokers					Population					
	Age Group	Year					Year					Year				
		2005	2010	2015	2020	2025	2005	2010	2015	2020	2025	2005	2010	2015	2020	2025
18-24	0.247	0.247	0.248	0.248	0.248	0.030	0.002	0.002	0.002	0.002	28,170,884	28,809,290	28,119,208	26,494,277	26,229,137	
25-30	0.258	0.247	0.242	0.245	0.245	0.098	0.051	0.007	0.005	0.005	22,594,835	24,040,328	24,257,599	24,506,737	22,790,690	
31-35	0.249	0.246	0.236	0.229	0.233	0.165	0.113	0.071	0.019	0.017	19,812,168	18,459,108	19,940,806	19,910,835	20,466,081	
36-40	0.235	0.224	0.221	0.212	0.206	0.179	0.190	0.138	0.095	0.043	20,580,855	19,663,179	18,321,136	19,791,536	19,761,982	
41-45	0.235	0.211	0.201	0.198	0.190	0.179	0.203	0.213	0.161	0.117	22,663,512	20,365,985	19,457,459	18,130,901	19,585,647	
46-50	0.230	0.211	0.190	0.180	0.178	0.208	0.203	0.224	0.234	0.181	21,738,585	22,320,148	20,056,554	19,161,164	17,857,034	
51-55	0.194	0.192	0.175	0.157	0.149	0.345	0.247	0.239	0.257	0.265	19,122,955	21,252,801	21,819,662	19,605,490	18,729,237	
56-60	0.172	0.143	0.141	0.129	0.116	0.367	0.396	0.297	0.285	0.298	16,061,197	18,465,213	20,520,682	21,065,052	18,925,138	
61-65	0.172	0.126	0.105	0.104	0.095	0.367	0.413	0.434	0.334	0.319	12,239,416	15,196,090	17,461,534	19,403,599	19,914,024	
66-70	0.152	0.126	0.093	0.077	0.076	0.377	0.413	0.446	0.462	0.361	9,710,302	11,304,880	14,036,814	16,125,198	17,917,525	
70-89	0.069	0.072	0.071	0.063	0.053	0.417	0.429	0.447	0.469	0.486	23,814,098	24,701,480	26,325,510	30,082,950	35,126,973	
18-89	0.206	0.191	0.178	0.168	0.160	0.227	0.222	0.216	0.209	0.200	216,508,806	224,578,501	230,316,966	234,277,740	237,303,467	



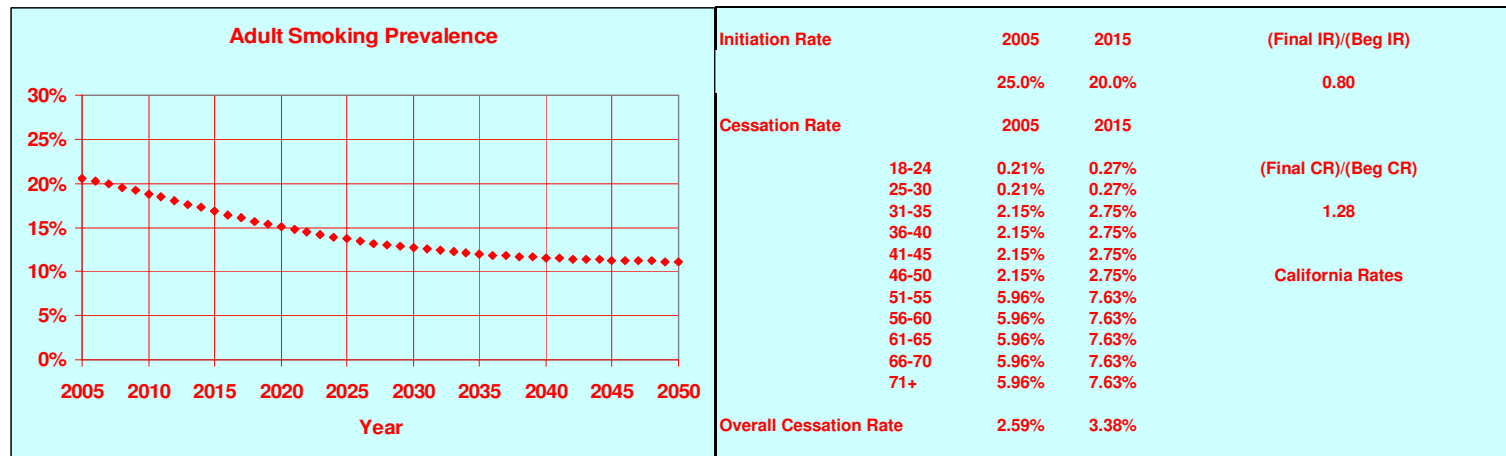
Age Group	Current Smokers					Former Smokers					Population				
	Year					Year					Year				
	2005	2010	2015	2020	2025	2005	2010	2015	2020	2025	2005	2010	2015	2020	2025
18-24	0.247	0.210	0.198	0.198	0.198	0.030	0.003	0.002	0.002	0.002	28,170,884	28,809,290	28,119,208	26,494,277	26,229,137
25-30	0.258	0.247	0.216	0.195	0.195	0.098	0.051	0.008	0.005	0.005	22,594,835	24,040,328	24,257,599	24,506,737	22,790,690
31-35	0.249	0.243	0.233	0.206	0.183	0.165	0.116	0.075	0.023	0.017	19,812,168	18,459,108	19,940,806	19,910,835	20,466,081
36-40	0.235	0.218	0.211	0.202	0.179	0.179	0.196	0.148	0.105	0.049	20,580,855	19,663,179	18,321,136	19,791,536	19,761,982
41-45	0.235	0.206	0.190	0.184	0.176	0.179	0.208	0.224	0.175	0.131	22,663,512	20,365,985	19,457,459	18,130,901	19,585,647
46-50	0.230	0.206	0.179	0.165	0.160	0.208	0.208	0.235	0.249	0.199	21,738,585	22,320,148	20,056,554	19,161,164	17,857,034
51-55	0.194	0.183	0.162	0.141	0.130	0.345	0.255	0.252	0.273	0.284	19,122,955	21,252,801	21,819,662	19,605,490	18,729,237
56-60	0.172	0.133	0.123	0.109	0.095	0.367	0.406	0.315	0.305	0.319	16,061,197	18,465,213	20,520,682	21,065,052	18,925,138
61-65	0.172	0.117	0.089	0.083	0.073	0.367	0.422	0.450	0.355	0.341	12,239,416	15,196,090	17,461,534	19,403,599	19,914,024
66-70	0.152	0.117	0.079	0.060	0.056	0.377	0.422	0.460	0.479	0.382	9,710,302	11,304,880	14,036,814	16,125,198	17,917,525
70-89	0.069	0.067	0.061	0.049	0.038	0.417	0.434	0.458	0.483	0.501	23,814,098	24,701,480	26,325,510	30,082,950	35,126,973
18-89	0.206	0.181	0.160	0.144	0.132	0.227	0.227	0.225	0.220	0.212	216,508,806	224,578,501	230,316,966	234,277,740	237,303,467



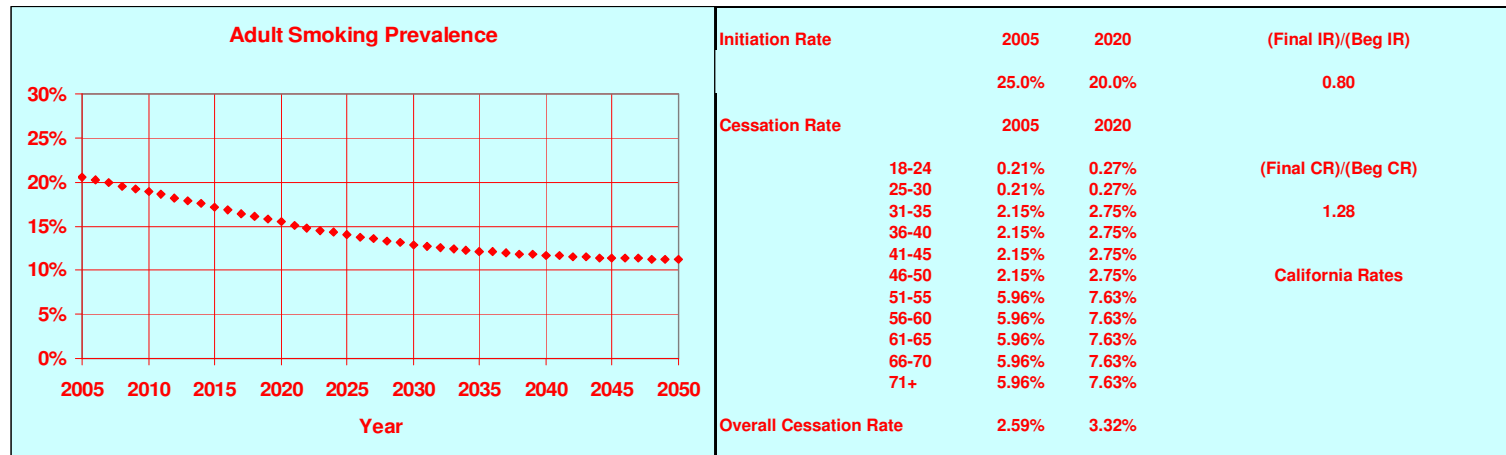
Prevalence	Current Smokers					Former Smokers					Population					
	Age Group	Year					Year					Year				
		2005	2010	2015	2020	2025	2005	2010	2015	2020	2025	2005	2010	2015	2020	2025
18-24	0.247	0.225	0.200	0.198	0.198	0.030	0.003	0.002	0.002	0.002	28,170,884	28,809,290	28,119,208	26,494,277	26,229,137	
25-30	0.258	0.247	0.231	0.200	0.195	0.098	0.051	0.008	0.005	0.005	22,594,835	24,040,328	24,257,599	24,506,737	22,790,690	
31-35	0.249	0.244	0.233	0.219	0.188	0.165	0.115	0.075	0.023	0.018	19,812,168	18,459,108	19,940,806	19,910,835	20,466,081	
36-40	0.235	0.221	0.212	0.203	0.191	0.179	0.193	0.147	0.105	0.052	20,580,855	19,663,179	18,321,136	19,791,536	19,761,982	
41-45	0.235	0.209	0.192	0.185	0.176	0.179	0.205	0.222	0.174	0.131	22,663,512	20,365,985	19,457,459	18,130,901	19,585,647	
46-50	0.230	0.209	0.182	0.167	0.161	0.208	0.205	0.232	0.247	0.198	21,738,585	22,320,148	20,056,554	19,161,164	17,857,034	
51-55	0.194	0.187	0.164	0.142	0.131	0.345	0.252	0.250	0.272	0.283	19,122,955	21,252,801	21,819,662	19,605,490	18,729,237	
56-60	0.172	0.138	0.126	0.110	0.096	0.367	0.401	0.312	0.304	0.318	16,061,197	18,465,213	20,520,682	21,065,052	18,925,138	
61-65	0.172	0.122	0.093	0.085	0.074	0.367	0.417	0.446	0.353	0.340	12,239,416	15,196,090	17,461,534	19,403,599	19,914,024	
66-70	0.152	0.122	0.082	0.062	0.057	0.377	0.417	0.457	0.477	0.381	9,710,302	11,304,880	14,036,814	16,125,198	17,917,525	
70-89	0.069	0.070	0.063	0.050	0.039	0.417	0.431	0.455	0.481	0.500	23,814,098	24,701,480	26,325,510	30,082,950	35,126,973	
18-89	0.206	0.185	0.164	0.147	0.134	0.227	0.225	0.223	0.219	0.211	216,508,806	224,578,501	230,316,966	234,277,740	237,303,467	



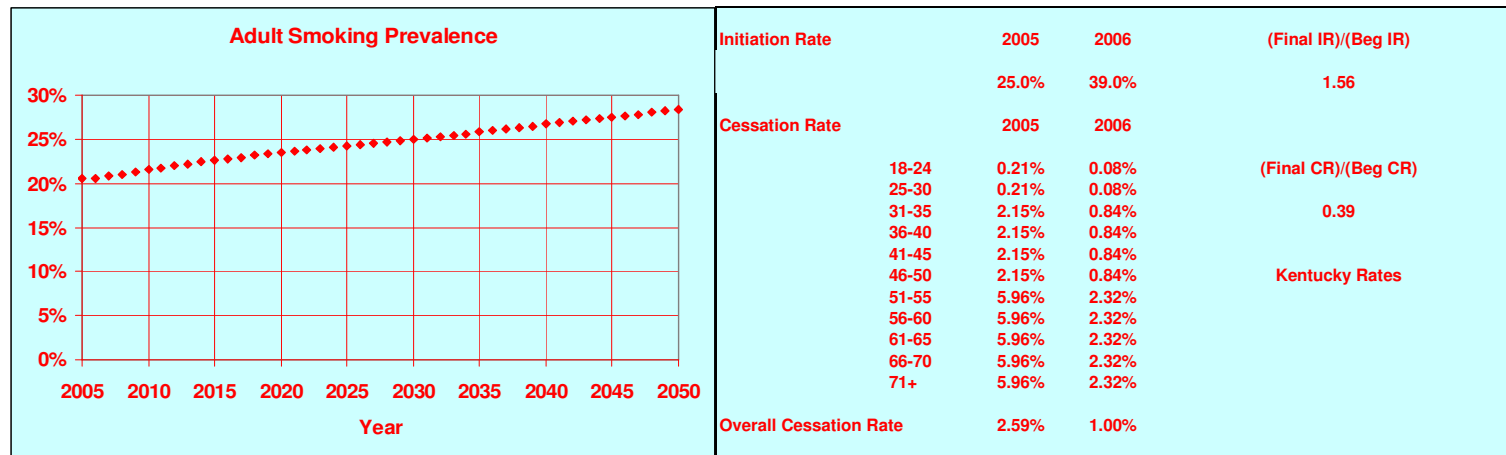
Age Group	Current Smokers					Former Smokers					Population				
	Year					Year					Year				
	2005	2010	2015	2020	2025	2005	2010	2015	2020	2025	2005	2010	2015	2020	2025
18-24	0.247	0.236	0.214	0.199	0.198	0.030	0.003	0.002	0.002	0.002	28,170,884	28,809,290	28,119,208	26,494,277	26,229,137
25-30	0.258	0.247	0.236	0.217	0.197	0.098	0.051	0.008	0.005	0.005	22,594,835	24,040,328	24,257,599	24,506,737	22,790,690
31-35	0.249	0.245	0.234	0.223	0.206	0.165	0.114	0.074	0.023	0.020	19,812,168	18,459,108	19,940,806	19,910,835	20,466,081
36-40	0.235	0.222	0.215	0.203	0.194	0.179	0.192	0.144	0.104	0.052	20,580,855	19,663,179	18,321,136	19,791,536	19,761,982
41-45	0.235	0.210	0.195	0.187	0.177	0.179	0.204	0.219	0.172	0.130	22,663,512	20,365,985	19,457,459	18,130,901	19,585,647
46-50	0.230	0.210	0.184	0.170	0.163	0.208	0.204	0.230	0.244	0.196	21,738,585	22,320,148	20,056,554	19,161,164	17,857,034
51-55	0.194	0.189	0.167	0.145	0.133	0.345	0.249	0.247	0.269	0.281	19,122,955	21,252,801	21,819,662	19,605,490	18,729,237
56-60	0.172	0.140	0.131	0.113	0.097	0.367	0.399	0.307	0.301	0.317	16,061,197	18,465,213	20,520,682	21,065,052	18,925,138
61-65	0.172	0.124	0.097	0.088	0.076	0.367	0.415	0.442	0.350	0.338	12,239,416	15,196,090	17,461,534	19,403,599	19,914,024
66-70	0.152	0.124	0.086	0.065	0.059	0.377	0.415	0.453	0.474	0.379	9,710,302	11,304,880	14,036,814	16,125,198	17,917,525
70-89	0.069	0.071	0.066	0.053	0.041	0.417	0.430	0.453	0.479	0.498	23,814,098	24,701,480	26,325,510	30,082,950	35,126,973
18-89	0.206	0.188	0.168	0.151	0.137	0.227	0.223	0.221	0.217	0.210	216,508,806	224,578,501	230,316,966	234,277,740	237,303,467



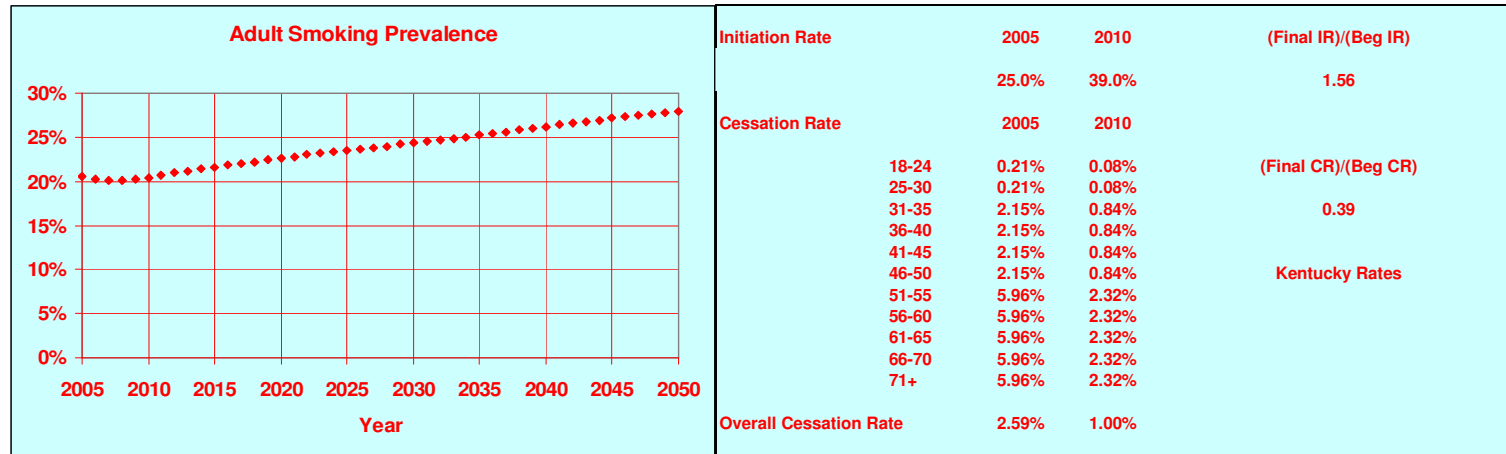
Prevalence	Current Smokers					Former Smokers					Population					
	Age Group	Year					Year					Year				
		2005	2010	2015	2020	2025	2005	2010	2015	2020	2025	2005	2010	2015	2020	2025
18-24	0.247	0.239	0.225	0.208	0.199	0.030	0.003	0.002	0.002	0.002	28,170,884	28,809,290	28,119,208	26,494,277	26,229,137	
25-30	0.258	0.247	0.238	0.226	0.210	0.098	0.051	0.007	0.005	0.005	22,594,835	24,040,328	24,257,599	24,506,737	22,790,690	
31-35	0.249	0.245	0.235	0.224	0.214	0.165	0.114	0.073	0.022	0.020	19,812,168	18,459,108	19,940,806	19,910,835	20,466,081	
36-40	0.235	0.223	0.217	0.205	0.195	0.179	0.191	0.142	0.102	0.051	20,580,855	19,663,179	18,321,136	19,791,536	19,761,982	
41-45	0.235	0.210	0.197	0.190	0.179	0.179	0.204	0.217	0.169	0.129	22,663,512	20,365,985	19,457,459	18,130,901	19,585,647	
46-50	0.230	0.210	0.186	0.173	0.165	0.208	0.204	0.228	0.241	0.194	21,738,585	22,320,148	20,056,554	19,161,164	17,857,034	
51-55	0.194	0.190	0.170	0.147	0.135	0.345	0.248	0.244	0.267	0.279	19,122,955	21,252,801	21,819,662	19,605,490	18,729,237	
56-60	0.172	0.141	0.134	0.116	0.099	0.367	0.398	0.304	0.298	0.315	16,061,197	18,465,213	20,520,682	21,065,052	18,925,138	
61-65	0.172	0.125	0.100	0.092	0.078	0.367	0.414	0.439	0.346	0.336	12,239,416	15,196,090	17,461,534	19,403,599	19,914,024	
66-70	0.152	0.125	0.088	0.068	0.062	0.377	0.414	0.451	0.471	0.376	9,710,302	11,304,880	14,036,814	16,125,198	17,917,525	
70-89	0.069	0.072	0.068	0.055	0.043	0.417	0.430	0.451	0.476	0.496	23,814,098	24,701,480	26,325,510	30,082,950	35,126,973	
18-89	0.206	0.189	0.172	0.155	0.140	0.227	0.223	0.219	0.215	0.209	216,508,806	224,578,501	230,316,966	234,277,740	237,303,467	



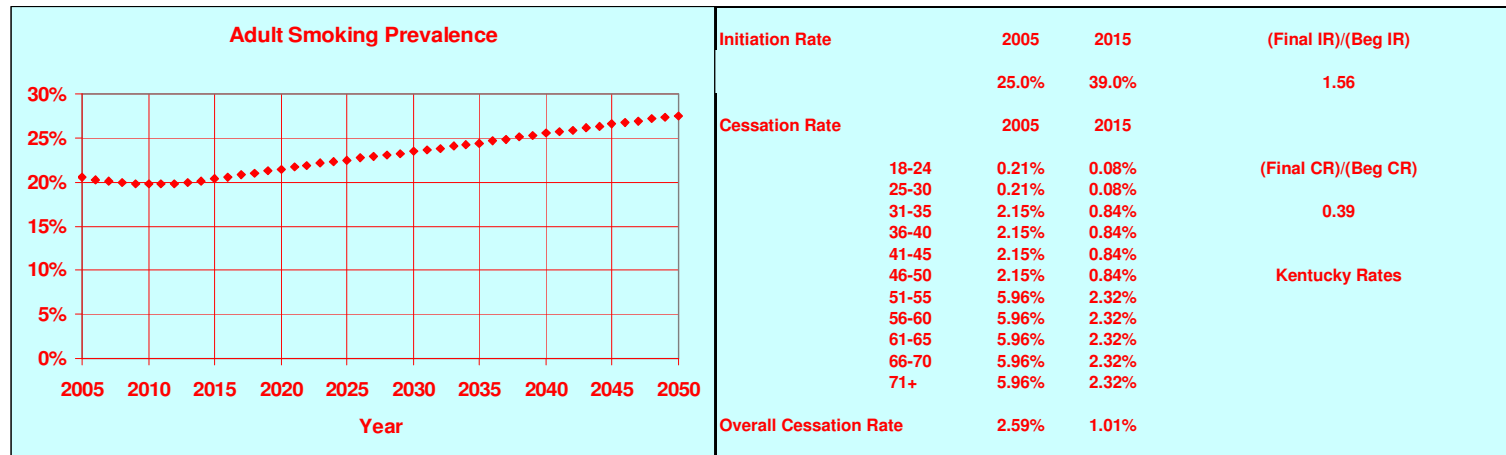
Age Group	Current Smokers					Former Smokers					Population				
	Year					Year					Year				
	2005	2010	2015	2020	2025	2005	2010	2015	2020	2025	2005	2010	2015	2020	2025
18-24	0.247	0.348	0.389	0.389	0.389	0.030	0.002	0.001	0.001	0.001	28,170,884	28,809,290	28,119,208	26,494,277	26,229,137
25-30	0.258	0.248	0.315	0.387	0.387	0.098	0.049	0.005	0.003	0.003	22,594,835	24,040,328	24,257,599	24,506,737	22,790,690
31-35	0.249	0.253	0.245	0.295	0.379	0.165	0.106	0.062	0.011	0.011	19,812,168	18,459,108	19,940,806	19,910,835	20,466,081
36-40	0.235	0.236	0.243	0.235	0.283	0.179	0.178	0.116	0.072	0.023	20,580,855	19,663,179	18,321,136	19,791,536	19,761,982
41-45	0.235	0.223	0.226	0.233	0.225	0.179	0.191	0.188	0.126	0.082	22,663,512	20,365,985	19,457,459	18,130,901	19,585,647
46-50	0.230	0.223	0.214	0.217	0.223	0.208	0.191	0.200	0.197	0.136	21,738,585	22,320,148	20,056,554	19,161,164	17,857,034
51-55	0.194	0.212	0.207	0.199	0.202	0.345	0.227	0.207	0.215	0.212	19,122,955	21,252,801	21,819,662	19,605,490	18,729,237
56-60	0.172	0.166	0.188	0.184	0.177	0.367	0.373	0.250	0.230	0.237	16,061,197	18,465,213	20,520,682	21,065,052	18,925,138
61-65	0.172	0.147	0.148	0.167	0.164	0.367	0.392	0.391	0.271	0.250	12,239,416	15,196,090	17,461,534	19,403,599	19,914,024
66-70	0.152	0.147	0.131	0.131	0.149	0.377	0.392	0.408	0.408	0.289	9,710,302	11,304,880	14,036,814	16,125,198	17,917,525
70-89	0.069	0.084	0.100	0.106	0.109	0.417	0.417	0.418	0.425	0.430	23,814,098	24,701,480	26,325,510	30,082,950	35,126,973
18-89	0.206	0.215	0.226	0.235	0.243	0.227	0.210	0.193	0.177	0.162	216,508,806	224,578,501	230,316,966	234,277,740	237,303,467



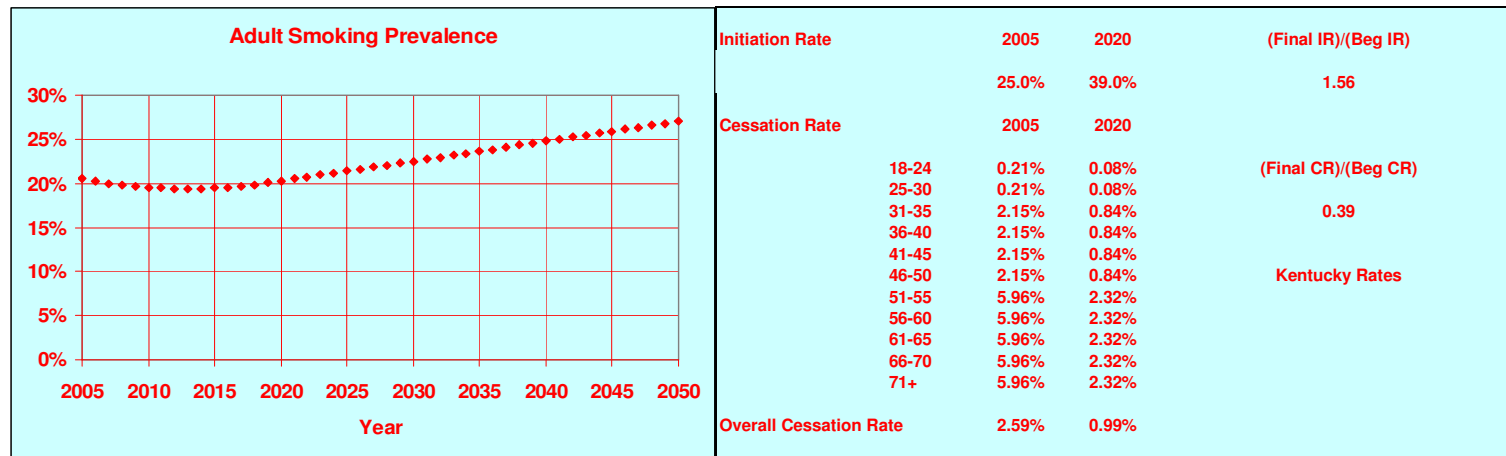
Prevalence	Current Smokers					Former Smokers					Population					
	Age Group	Year					Year					Year				
		2005	2010	2015	2020	2025	2005	2010	2015	2020	2025	2005	2010	2015	2020	2025
18-24	0.247	0.308	0.385	0.389	0.389	0.030	0.002	0.001	0.001	0.001	28,170,884	28,809,290	28,119,208	26,494,277	26,229,137	
25-30	0.258	0.248	0.272	0.373	0.387	0.098	0.050	0.005	0.003	0.003	22,594,835	24,040,328	24,257,599	24,506,737	22,790,690	
31-35	0.249	0.250	0.244	0.255	0.363	0.165	0.109	0.063	0.011	0.010	19,812,168	18,459,108	19,940,806	19,910,835	20,466,081	
36-40	0.235	0.230	0.240	0.234	0.245	0.179	0.184	0.119	0.073	0.021	20,580,855	19,663,179	18,321,136	19,791,536	19,761,982	
41-45	0.235	0.217	0.220	0.230	0.225	0.179	0.197	0.194	0.129	0.083	22,663,512	20,365,985	19,457,459	18,130,901	19,585,647	
46-50	0.230	0.217	0.208	0.211	0.220	0.208	0.197	0.206	0.203	0.138	21,738,585	22,320,148	20,056,554	19,161,164	17,857,034	
51-55	0.194	0.203	0.202	0.193	0.196	0.345	0.236	0.212	0.221	0.218	19,122,955	21,252,801	21,819,662	19,605,490	18,729,237	
56-60	0.172	0.154	0.180	0.179	0.172	0.367	0.385	0.258	0.235	0.242	16,061,197	18,465,213	20,520,682	21,065,052	18,925,138	
61-65	0.172	0.136	0.137	0.160	0.160	0.367	0.403	0.402	0.278	0.254	12,239,416	15,196,090	17,461,534	19,403,599	19,914,024	
66-70	0.152	0.136	0.121	0.122	0.143	0.377	0.403	0.418	0.417	0.295	9,710,302	11,304,880	14,036,814	16,125,198	17,917,525	
70-89	0.069	0.078	0.093	0.099	0.101	0.417	0.423	0.425	0.433	0.438	23,814,098	24,701,480	26,325,510	30,082,950	35,126,973	
18-89	0.206	0.204	0.216	0.226	0.235	0.227	0.216	0.198	0.181	0.165	216,508,806	224,578,501	230,316,966	234,277,740	237,303,467	



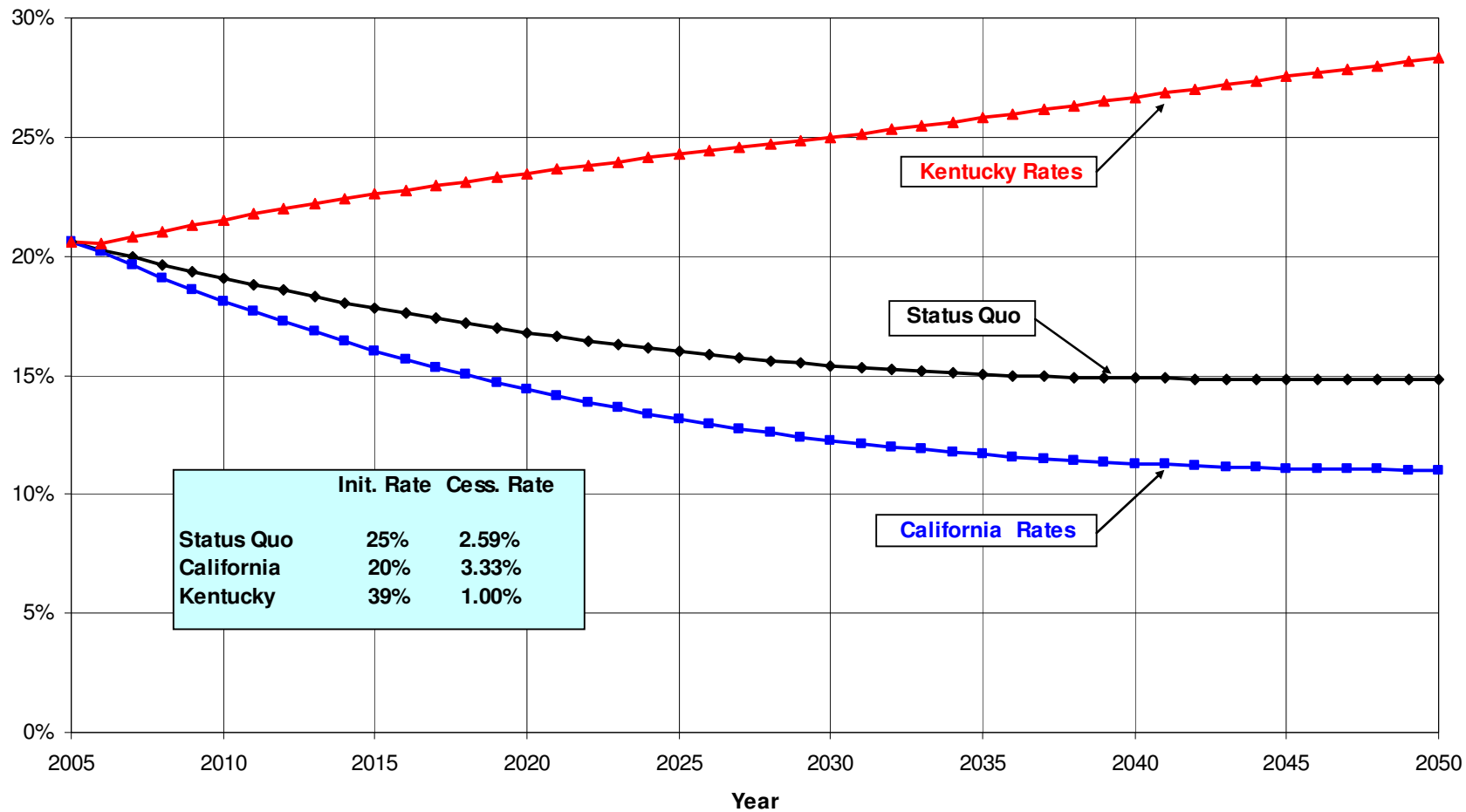
Age Group	Current Smokers					Former Smokers					Population				
	Year					Year					Year				
	2005	2010	2015	2020	2025	2005	2010	2015	2020	2025	2005	2010	2015	2020	2025
18-24	0.247	0.277	0.346	0.387	0.389	0.030	0.002	0.001	0.001	0.001	28,170,884	28,809,290	28,119,208	26,494,277	26,229,137
25-30	0.258	0.247	0.257	0.323	0.380	0.098	0.050	0.006	0.003	0.003	22,594,835	24,040,328	24,257,599	24,506,737	22,790,690
31-35	0.249	0.248	0.242	0.246	0.311	0.165	0.111	0.065	0.011	0.009	19,812,168	18,459,108	19,940,806	19,910,835	20,466,081
36-40	0.235	0.227	0.233	0.232	0.236	0.179	0.187	0.126	0.075	0.021	20,580,855	19,663,179	18,321,136	19,791,536	19,761,982
41-45	0.235	0.214	0.213	0.223	0.223	0.179	0.200	0.201	0.135	0.084	22,663,512	20,365,985	19,457,459	18,130,901	19,585,647
46-50	0.230	0.214	0.201	0.204	0.214	0.208	0.200	0.213	0.210	0.145	21,738,585	22,320,148	20,056,554	19,161,164	17,857,034
51-55	0.194	0.197	0.193	0.187	0.190	0.345	0.241	0.221	0.227	0.224	19,122,955	21,252,801	21,819,662	19,605,490	18,729,237
56-60	0.172	0.148	0.166	0.172	0.166	0.367	0.391	0.273	0.242	0.248	16,061,197	18,465,213	20,520,682	21,065,052	18,925,138
61-65	0.172	0.131	0.125	0.147	0.153	0.367	0.408	0.414	0.291	0.261	12,239,416	15,196,090	17,461,534	19,403,599	19,914,024
66-70	0.152	0.131	0.110	0.111	0.131	0.377	0.408	0.429	0.428	0.307	9,710,302	11,304,880	14,036,814	16,125,198	17,917,525
70-89	0.069	0.075	0.085	0.090	0.092	0.417	0.426	0.434	0.442	0.447	23,814,098	24,701,480	26,325,510	30,082,950	35,126,973
18-89	0.206	0.198	0.203	0.215	0.225	0.227	0.219	0.204	0.186	0.169	216,508,806	224,578,501	230,316,966	234,277,740	237,303,467



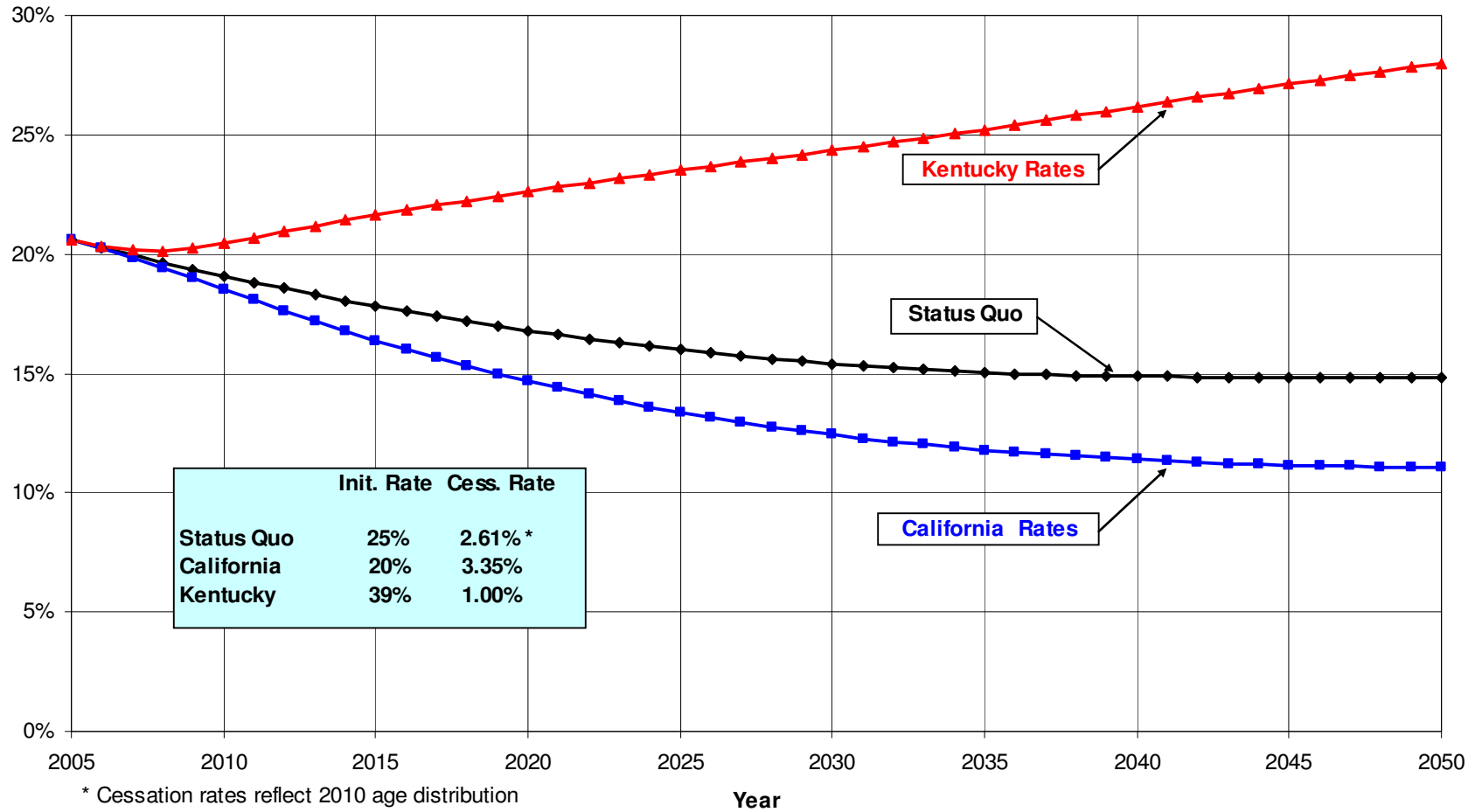
Prevalence	Current Smokers					Former Smokers					Population					
	Age Group	Year					Year					Year				
		2005	2010	2015	2020	2025	2005	2010	2015	2020	2025	2005	2010	2015	2020	2025
18-24	0.247	0.267	0.313	0.361	0.388	0.030	0.002	0.001	0.001	0.001	28,170,884	28,809,290	28,119,208	26,494,277	26,229,137	
25-30	0.258	0.247	0.252	0.297	0.345	0.098	0.051	0.006	0.004	0.003	22,594,835	24,040,328	24,257,599	24,506,737	22,790,690	
31-35	0.249	0.247	0.240	0.242	0.287	0.165	0.112	0.067	0.013	0.009	19,812,168	18,459,108	19,940,806	19,910,835	20,466,081	
36-40	0.235	0.226	0.229	0.228	0.232	0.179	0.188	0.130	0.080	0.023	20,580,855	19,663,179	18,321,136	19,791,536	19,761,982	
41-45	0.235	0.213	0.209	0.217	0.218	0.179	0.201	0.205	0.142	0.089	22,663,512	20,365,985	19,457,459	18,130,901	19,585,647	
46-50	0.230	0.213	0.197	0.198	0.208	0.208	0.201	0.217	0.216	0.151	21,738,585	22,320,148	20,056,554	19,161,164	17,857,034	
51-55	0.194	0.195	0.187	0.180	0.184	0.345	0.243	0.227	0.234	0.230	19,122,955	21,252,801	21,819,662	19,605,490	18,729,237	
56-60	0.172	0.146	0.157	0.160	0.160	0.367	0.393	0.281	0.254	0.254	16,061,197	18,465,213	20,520,682	21,065,052	18,925,138	
61-65	0.172	0.129	0.118	0.135	0.143	0.367	0.410	0.421	0.303	0.271	12,239,416	15,196,090	17,461,534	19,403,599	19,914,024	
66-70	0.152	0.129	0.104	0.101	0.120	0.377	0.410	0.435	0.438	0.318	9,710,302	11,304,880	14,036,814	16,125,198	17,917,525	
70-89	0.069	0.074	0.080	0.082	0.084	0.417	0.427	0.438	0.450	0.455	23,814,098	24,701,480	26,325,510	30,082,950	35,126,973	
18-89	0.206	0.195	0.195	0.203	0.214	0.227	0.220	0.208	0.192	0.174	216,508,806	224,578,501	230,316,966	234,277,740	237,303,467	



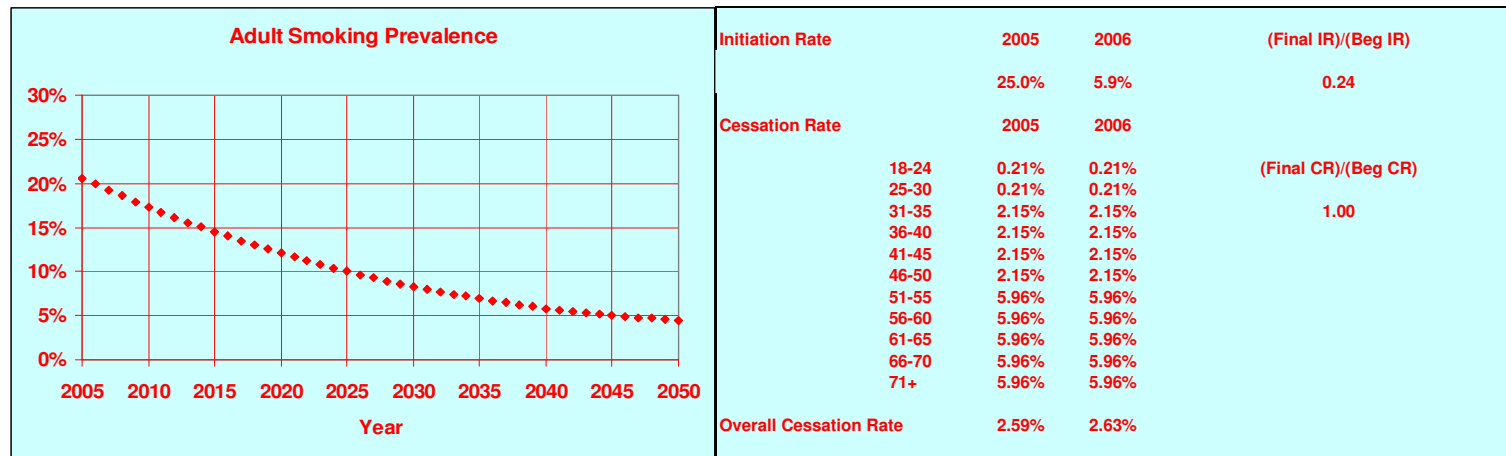
Projections of U.S. Adult Smoking Prevalence under Status Quo, California and Kentucky Smoking Initiation and Cessation Rates (California and Kentucky rates are reached instantaneously in 2006)



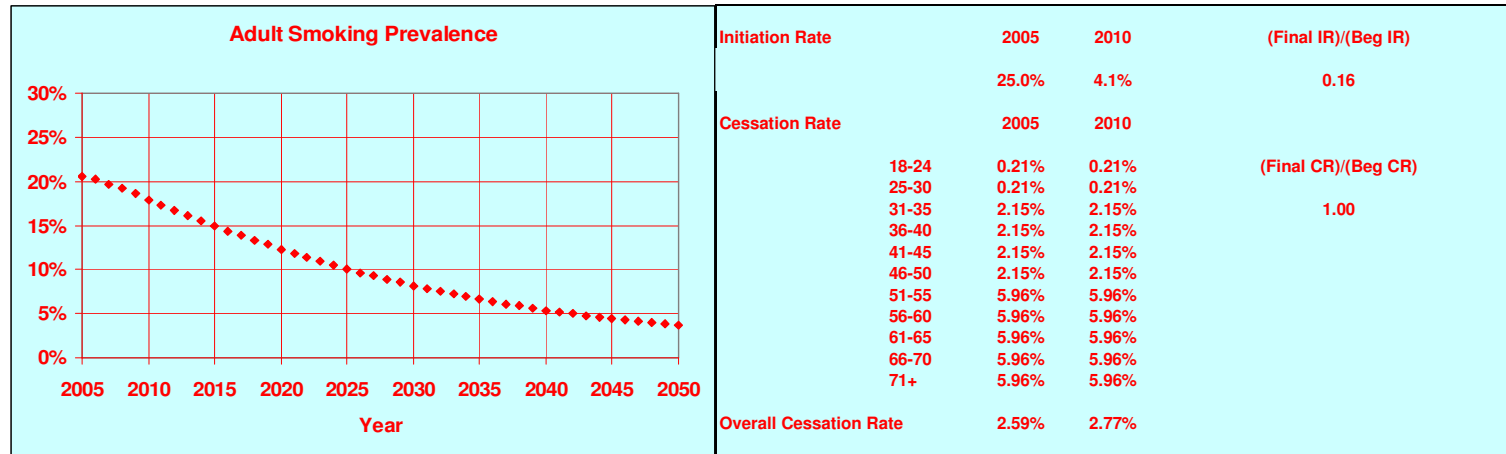
Projections of U.S. Adult Smoking Prevalence under Status Quo, California and Kentucky Smoking Initiation and Cessation Rates (California and Kentucky rates are reached gradually by 2010)



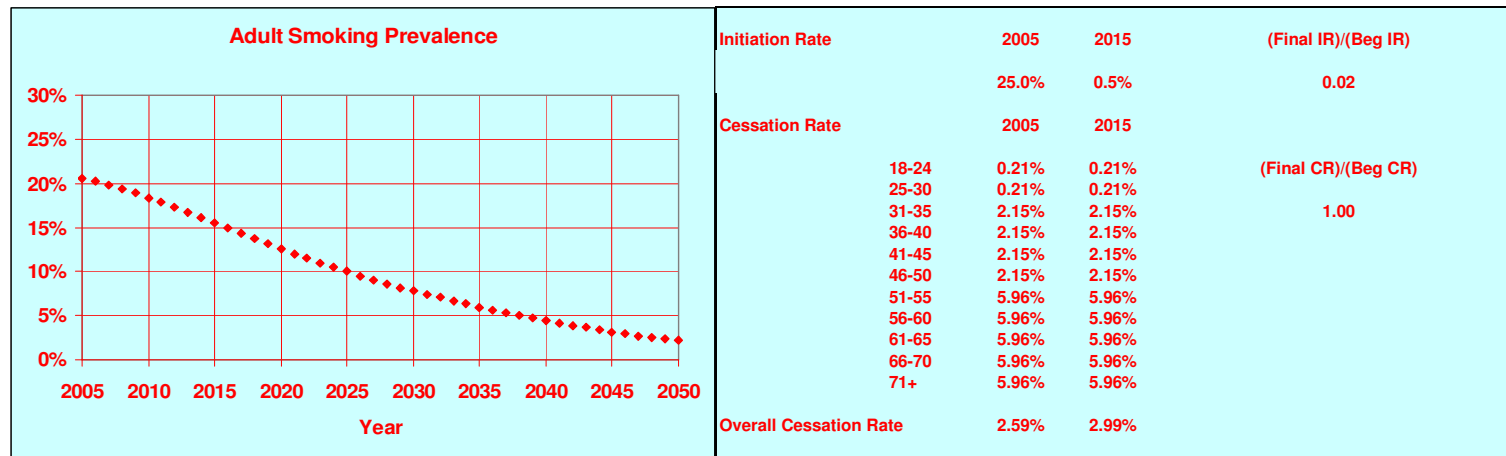
Age Group	Current Smokers					Former Smokers					Population				
	Year					Year					Year				
	2005	2010	2015	2020	2025	2005	2010	2015	2020	2025	2005	2010	2015	2020	2025
18-24	0.247	0.109	0.059	0.059	0.059	0.030	0.002	0.000	0.000	0.000	28,170,884	28,809,290	28,119,208	26,494,277	26,229,137
25-30	0.258	0.247	0.146	0.058	0.058	0.098	0.051	0.006	0.001	0.001	22,594,835	24,040,328	24,257,599	24,506,737	22,790,690
31-35	0.249	0.246	0.236	0.155	0.055	0.165	0.113	0.071	0.016	0.004	19,812,168	18,459,108	19,940,806	19,910,835	20,466,081
36-40	0.235	0.224	0.221	0.212	0.139	0.179	0.190	0.138	0.095	0.032	20,580,855	19,663,179	18,321,136	19,791,536	19,761,982
41-45	0.235	0.211	0.201	0.198	0.190	0.179	0.203	0.213	0.161	0.117	22,663,512	20,365,985	19,457,459	18,130,901	19,585,647
46-50	0.230	0.211	0.190	0.180	0.178	0.208	0.203	0.224	0.234	0.181	21,738,585	22,320,148	20,056,554	19,161,164	17,857,034
51-55	0.194	0.192	0.175	0.157	0.149	0.345	0.247	0.239	0.257	0.265	19,122,955	21,252,801	21,819,662	19,605,490	18,729,237
56-60	0.172	0.143	0.141	0.129	0.116	0.367	0.396	0.297	0.285	0.298	16,061,197	18,465,213	20,520,682	21,065,052	18,925,138
61-65	0.172	0.126	0.105	0.104	0.095	0.367	0.413	0.434	0.334	0.319	12,239,416	15,196,090	17,461,534	19,403,599	19,914,024
66-70	0.152	0.126	0.093	0.077	0.076	0.377	0.413	0.446	0.462	0.361	9,710,302	11,304,880	14,036,814	16,125,198	17,917,525
70-89	0.069	0.072	0.071	0.063	0.053	0.417	0.429	0.447	0.469	0.486	23,814,098	24,701,480	26,325,510	30,082,950	35,126,973
18-89	0.206	0.173	0.145	0.121	0.100	0.227	0.222	0.216	0.208	0.197	216,508,806	224,578,501	230,316,966	234,277,740	237,303,467



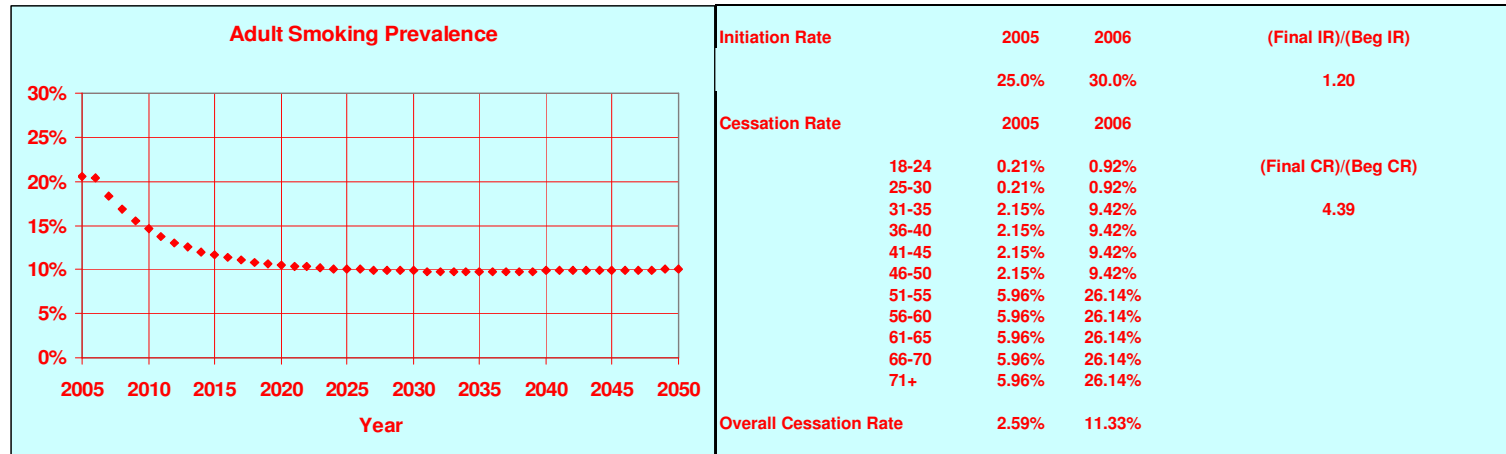
Prevalence	Current Smokers					Former Smokers					Population					
	Age Group	Year					Year					Year				
		2005	2010	2015	2020	2025	2005	2010	2015	2020	2025	2005	2010	2015	2020	2025
18-24	0.247	0.156	0.047	0.041	0.041	0.030	0.002	0.000	0.000	0.000	28,170,884	28,809,290	28,119,208	26,494,277	26,229,137	
25-30	0.258	0.247	0.200	0.061	0.040	0.098	0.051	0.006	0.001	0.001	22,594,835	24,040,328	24,257,599	24,506,737	22,790,690	
31-35	0.249	0.246	0.236	0.205	0.061	0.165	0.113	0.071	0.018	0.005	19,812,168	18,459,108	19,940,806	19,910,835	20,466,081	
36-40	0.235	0.224	0.221	0.212	0.184	0.179	0.190	0.138	0.095	0.039	20,580,855	19,663,179	18,321,136	19,791,536	19,761,982	
41-45	0.235	0.211	0.201	0.198	0.190	0.179	0.203	0.213	0.161	0.117	22,663,512	20,365,985	19,457,459	18,130,901	19,585,647	
46-50	0.230	0.211	0.190	0.180	0.178	0.208	0.203	0.224	0.234	0.181	21,738,585	22,320,148	20,056,554	19,161,164	17,857,034	
51-55	0.194	0.192	0.175	0.157	0.149	0.345	0.247	0.239	0.257	0.265	19,122,955	21,252,801	21,819,662	19,605,490	18,729,237	
56-60	0.172	0.143	0.141	0.129	0.116	0.367	0.396	0.297	0.285	0.298	16,061,197	18,465,213	20,520,682	21,065,052	18,925,138	
61-65	0.172	0.126	0.105	0.104	0.095	0.367	0.413	0.434	0.334	0.319	12,239,416	15,196,090	17,461,534	19,403,599	19,914,024	
66-70	0.152	0.126	0.093	0.077	0.076	0.377	0.413	0.446	0.462	0.361	9,710,302	11,304,880	14,036,814	16,125,198	17,917,525	
70-89	0.069	0.072	0.071	0.063	0.053	0.417	0.429	0.447	0.469	0.486	23,814,098	24,701,480	26,325,510	30,082,950	35,126,973	
18-89	0.206	0.179	0.149	0.123	0.101	0.227	0.222	0.216	0.208	0.198	216,508,806	224,578,501	230,316,966	234,277,740	237,303,467	



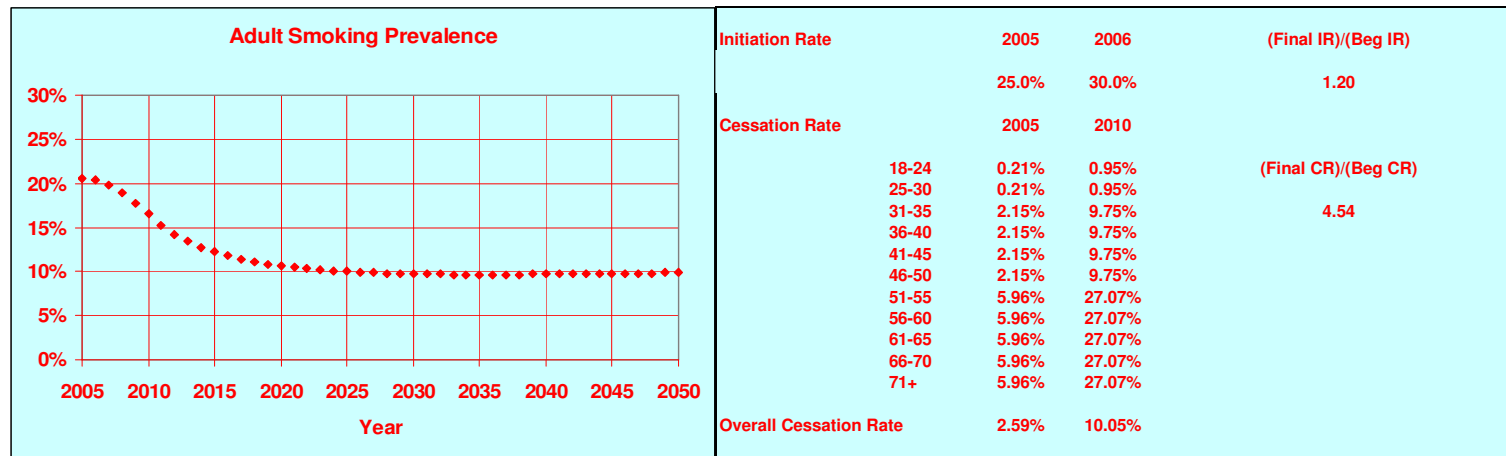
Age Group	Current Smokers					Former Smokers					Population				
	Year					Year					Year				
	2005	2010	2015	2020	2025	2005	2010	2015	2020	2025	2005	2010	2015	2020	2025
18-24	0.247	0.193	0.079	0.008	0.005	0.030	0.002	0.001	0.000	0.000	28,170,884	28,809,290	28,119,208	26,494,277	26,229,137
25-30	0.258	0.247	0.217	0.114	0.017	0.098	0.051	0.007	0.002	0.000	22,594,835	24,040,328	24,257,599	24,506,737	22,790,690
31-35	0.249	0.246	0.236	0.215	0.118	0.165	0.113	0.071	0.019	0.010	19,812,168	18,459,108	19,940,806	19,910,835	20,466,081
36-40	0.235	0.224	0.221	0.212	0.193	0.179	0.190	0.138	0.095	0.041	20,580,855	19,663,179	18,321,136	19,791,536	19,761,982
41-45	0.235	0.211	0.201	0.198	0.190	0.179	0.203	0.213	0.161	0.117	22,663,512	20,365,985	19,457,459	18,130,901	19,585,647
46-50	0.230	0.211	0.190	0.180	0.178	0.208	0.203	0.224	0.234	0.181	21,738,585	22,320,148	20,056,554	19,161,164	17,857,034
51-55	0.194	0.192	0.175	0.157	0.149	0.345	0.247	0.239	0.257	0.265	19,122,955	21,252,801	21,819,662	19,605,490	18,729,237
56-60	0.172	0.143	0.141	0.129	0.116	0.367	0.396	0.297	0.285	0.298	16,061,197	18,465,213	20,520,682	21,065,052	18,925,138
61-65	0.172	0.126	0.105	0.104	0.095	0.367	0.413	0.434	0.334	0.319	12,239,416	15,196,090	17,461,534	19,403,599	19,914,024
66-70	0.152	0.126	0.093	0.077	0.076	0.377	0.413	0.446	0.462	0.361	9,710,302	11,304,880	14,036,814	16,125,198	17,917,525
70-89	0.069	0.072	0.071	0.063	0.053	0.417	0.429	0.447	0.469	0.486	23,814,098	24,701,480	26,325,510	30,082,950	35,126,973
18-89	0.206	0.184	0.155	0.126	0.100	0.227	0.222	0.216	0.208	0.198	216,508,806	224,578,501	230,316,966	234,277,740	237,303,467



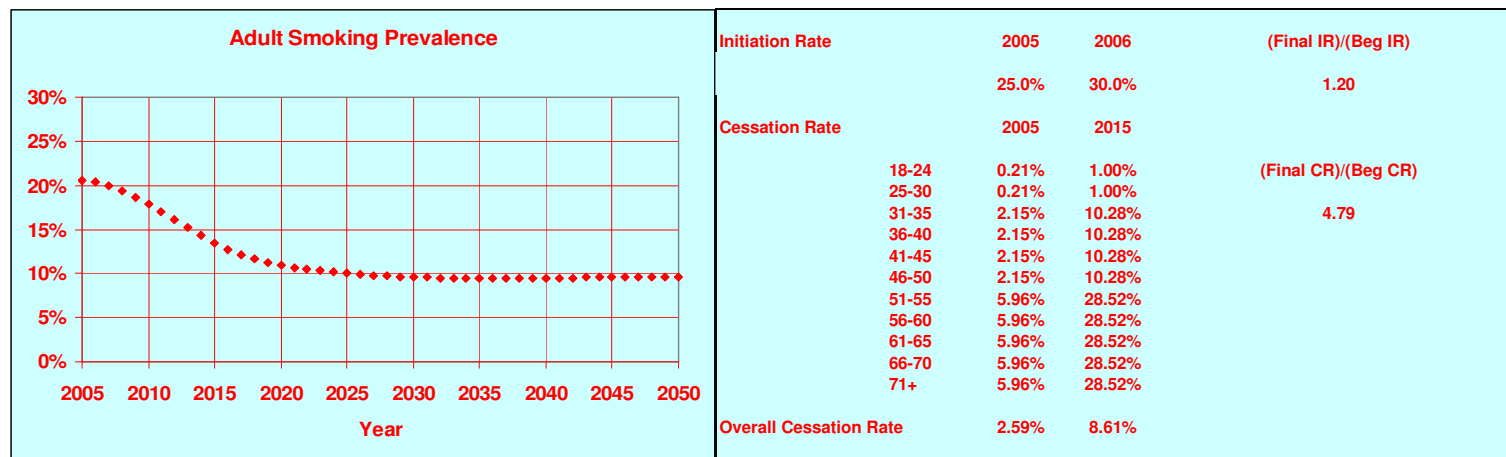
Prevalence	Current Smokers					Former Smokers					Population					
	Age Group	Year					Year					Year				
		2005	2010	2015	2020	2025	2005	2010	2015	2020	2025	2005	2010	2015	2020	2025
18-24	0.247	0.278	0.292	0.292	0.292	0.030	0.008	0.008	0.008	0.008	28,170,884	28,809,290	28,119,208	26,494,277	26,229,137	
25-30	0.258	0.240	0.251	0.275	0.275	0.098	0.058	0.023	0.025	0.025	22,594,835	24,040,328	24,257,599	24,506,737	22,790,690	
31-35	0.249	0.209	0.194	0.200	0.220	0.165	0.149	0.114	0.069	0.080	19,812,168	18,459,108	19,940,806	19,910,835	20,466,081	
36-40	0.235	0.164	0.128	0.118	0.122	0.179	0.250	0.231	0.189	0.147	20,580,855	19,663,179	18,321,136	19,791,536	19,761,982	
41-45	0.235	0.155	0.100	0.078	0.072	0.179	0.259	0.314	0.281	0.235	22,663,512	20,365,985	19,457,459	18,130,901	19,585,647	
46-50	0.230	0.155	0.095	0.061	0.048	0.208	0.259	0.319	0.353	0.311	21,738,585	22,320,148	20,056,554	19,161,164	17,857,034	
51-55	0.194	0.107	0.065	0.040	0.026	0.345	0.332	0.349	0.374	0.388	19,122,955	21,252,801	21,819,662	19,605,490	18,729,237	
56-60	0.172	0.054	0.023	0.014	0.009	0.367	0.485	0.415	0.400	0.405	16,061,197	18,465,213	20,520,682	21,065,052	18,925,138	
61-65	0.172	0.048	0.012	0.005	0.003	0.367	0.491	0.527	0.433	0.411	12,239,416	15,196,090	17,461,534	19,403,599	19,914,024	
66-70	0.152	0.048	0.011	0.003	0.001	0.377	0.491	0.528	0.536	0.437	9,710,302	11,304,880	14,036,814	16,125,198	17,917,525	
70-89	0.069	0.028	0.008	0.002	0.001	0.417	0.474	0.510	0.529	0.538	23,814,098	24,701,480	26,325,510	30,082,950	35,126,973	
18-89	0.206	0.146	0.116	0.105	0.100	0.227	0.272	0.286	0.284	0.275	216,508,806	224,578,501	230,316,966	234,277,740	237,303,467	



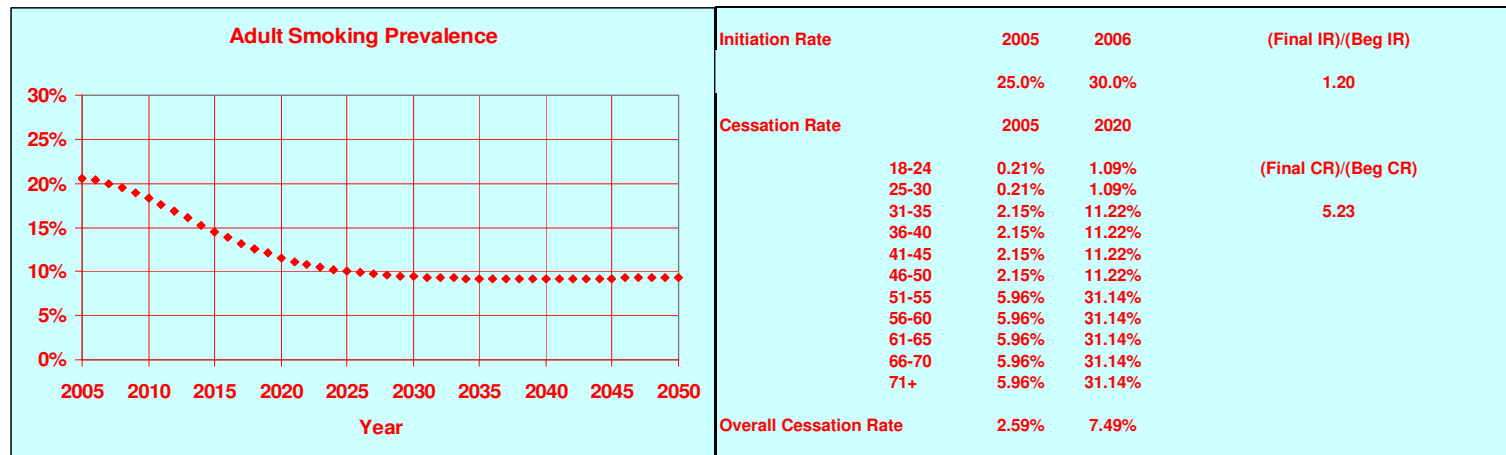
Age Group	Current Smokers					Former Smokers					Population				
	Year					Year					Year				
	2005	2010	2015	2020	2025	2005	2010	2015	2020	2025	2005	2010	2015	2020	2025
18-24	0.247	0.280	0.291	0.292	0.292	0.030	0.006	0.009	0.008	0.008	28,170,884	28,809,290	28,119,208	26,494,277	26,229,137
25-30	0.258	0.243	0.253	0.274	0.274	0.098	0.054	0.021	0.026	0.026	22,594,835	24,040,328	24,257,599	24,506,737	22,790,690
31-35	0.249	0.223	0.195	0.200	0.218	0.165	0.136	0.113	0.069	0.082	19,812,168	18,459,108	19,940,806	19,910,835	20,466,081
36-40	0.235	0.191	0.133	0.117	0.120	0.179	0.223	0.225	0.191	0.149	20,580,855	19,663,179	18,321,136	19,791,536	19,761,982
41-45	0.235	0.180	0.114	0.080	0.070	0.179	0.234	0.300	0.279	0.238	22,663,512	20,365,985	19,457,459	18,130,901	19,585,647
46-50	0.230	0.180	0.108	0.068	0.048	0.208	0.234	0.306	0.346	0.311	21,738,585	22,320,148	20,056,554	19,161,164	17,857,034
51-55	0.194	0.137	0.073	0.044	0.028	0.345	0.302	0.341	0.370	0.386	19,122,955	21,252,801	21,819,662	19,605,490	18,729,237
56-60	0.172	0.088	0.028	0.015	0.009	0.367	0.451	0.410	0.399	0.405	16,061,197	18,465,213	20,520,682	21,065,052	18,925,138
61-65	0.172	0.078	0.018	0.006	0.003	0.367	0.461	0.521	0.432	0.411	12,239,416	15,196,090	17,461,534	19,403,599	19,914,024
66-70	0.152	0.078	0.016	0.004	0.001	0.377	0.461	0.523	0.535	0.437	9,710,302	11,304,880	14,036,814	16,125,198	17,917,525
70-89	0.069	0.045	0.012	0.003	0.001	0.417	0.456	0.506	0.528	0.538	23,814,098	24,701,480	26,325,510	30,082,950	35,126,973
18-89	0.206	0.166	0.122	0.106	0.100	0.227	0.252	0.281	0.283	0.276	216,508,806	224,578,501	230,316,966	234,277,740	237,303,467



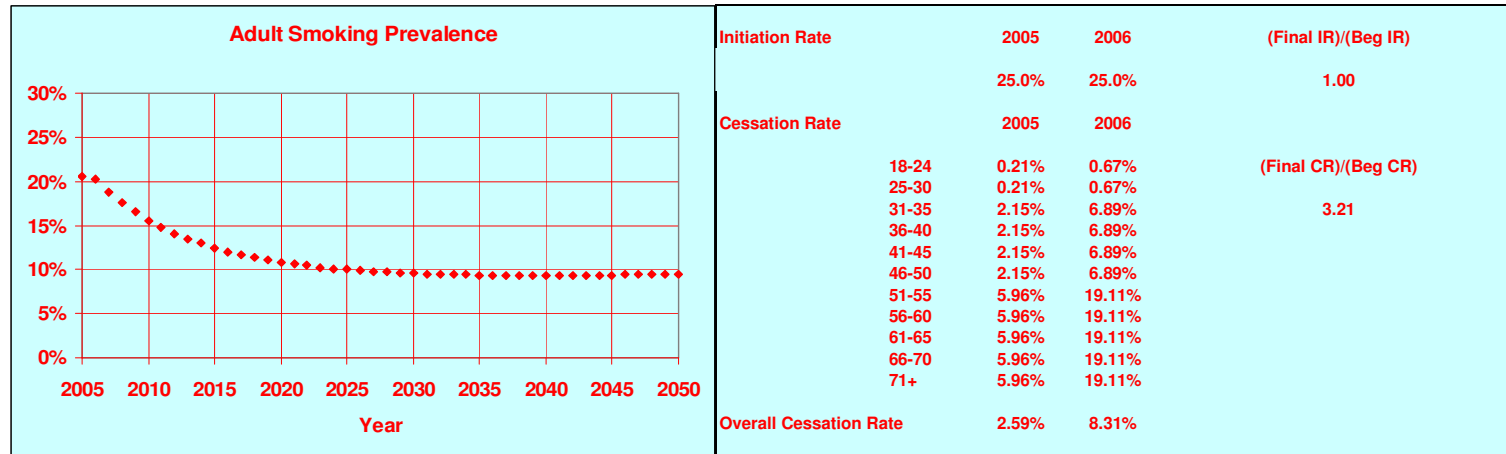
Prevalence	Current Smokers					Former Smokers					Population					
	Age Group	Year					Year					Year				
		2005	2010	2015	2020	2025	2005	2010	2015	2020	2025	2005	2010	2015	2020	2025
18-24	0.247	0.281	0.293	0.291	0.291	0.030	0.004	0.007	0.009	0.009	28,170,884	28,809,290	28,119,208	26,494,277	26,229,137	
25-30	0.258	0.245	0.258	0.276	0.273	0.098	0.053	0.017	0.024	0.027	22,594,835	24,040,328	24,257,599	24,506,737	22,790,690	
31-35	0.249	0.233	0.202	0.201	0.216	0.165	0.126	0.105	0.068	0.084	19,812,168	18,459,108	19,940,806	19,910,835	20,466,081	
36-40	0.235	0.206	0.155	0.117	0.117	0.179	0.208	0.204	0.190	0.152	20,580,855	19,663,179	18,321,136	19,791,536	19,761,982	
41-45	0.235	0.194	0.137	0.090	0.068	0.179	0.220	0.277	0.269	0.239	22,663,512	20,365,985	19,457,459	18,130,901	19,585,647	
46-50	0.230	0.194	0.129	0.080	0.052	0.208	0.220	0.285	0.334	0.306	21,738,585	22,320,148	20,056,554	19,161,164	17,857,034	
51-55	0.194	0.161	0.092	0.050	0.031	0.345	0.278	0.322	0.364	0.383	19,122,955	21,252,801	21,819,662	19,605,490	18,729,237	
56-60	0.172	0.111	0.047	0.017	0.009	0.367	0.428	0.391	0.397	0.405	16,061,197	18,465,213	20,520,682	21,065,052	18,925,138	
61-65	0.172	0.098	0.033	0.009	0.003	0.367	0.441	0.506	0.429	0.411	12,239,416	15,196,090	17,461,534	19,403,599	19,914,024	
66-70	0.152	0.098	0.029	0.006	0.002	0.377	0.441	0.510	0.533	0.436	9,710,302	11,304,880	14,036,814	16,125,198	17,917,525	
70-89	0.069	0.057	0.022	0.005	0.001	0.417	0.445	0.496	0.527	0.538	23,814,098	24,701,480	26,325,510	30,082,950	35,126,973	
18-89	0.206	0.179	0.135	0.110	0.100	0.227	0.239	0.268	0.280	0.276	216,508,806	224,578,501	230,316,966	234,277,740	237,303,467	



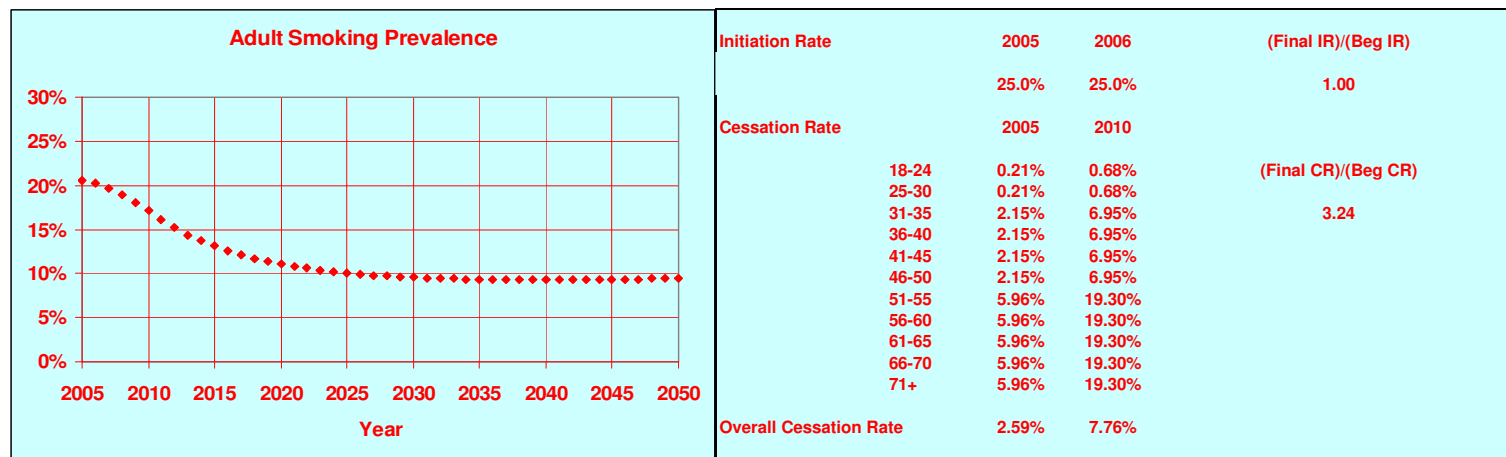
Age Group	Current Smokers					Former Smokers					Population				
	Year					Year					Year				
	2005	2010	2015	2020	2025	2005	2010	2015	2020	2025	2005	2010	2015	2020	2025
18-24	0.247	0.281	0.294	0.292	0.290	0.030	0.004	0.006	0.008	0.010	28,170,884	28,809,290	28,119,208	26,494,277	26,229,137
25-30	0.258	0.246	0.260	0.279	0.272	0.098	0.052	0.014	0.021	0.028	22,594,835	24,040,328	24,257,599	24,506,737	22,790,690
31-35	0.249	0.236	0.210	0.205	0.214	0.165	0.122	0.097	0.064	0.086	19,812,168	18,459,108	19,940,806	19,910,835	20,466,081
36-40	0.235	0.210	0.170	0.128	0.113	0.179	0.204	0.189	0.179	0.156	20,580,855	19,663,179	18,321,136	19,791,536	19,761,982
41-45	0.235	0.198	0.151	0.104	0.071	0.179	0.216	0.263	0.255	0.237	22,663,512	20,365,985	19,457,459	18,130,901	19,585,647
46-50	0.230	0.198	0.143	0.092	0.057	0.208	0.216	0.271	0.322	0.302	21,738,585	22,320,148	20,056,554	19,161,164	17,857,034
51-55	0.194	0.168	0.109	0.058	0.032	0.345	0.270	0.305	0.356	0.382	19,122,955	21,252,801	21,819,662	19,605,490	18,729,237
56-60	0.172	0.119	0.063	0.024	0.009	0.367	0.420	0.375	0.390	0.405	16,061,197	18,465,213	20,520,682	21,065,052	18,925,138
61-65	0.172	0.105	0.045	0.014	0.004	0.367	0.434	0.494	0.424	0.410	12,239,416	15,196,090	17,461,534	19,403,599	19,914,024
66-70	0.152	0.105	0.040	0.010	0.002	0.377	0.434	0.499	0.529	0.436	9,710,302	11,304,880	14,036,814	16,125,198	17,917,525
70-89	0.069	0.060	0.030	0.008	0.001	0.417	0.441	0.488	0.524	0.538	23,814,098	24,701,480	26,325,510	30,082,950	35,126,973
18-89	0.206	0.183	0.145	0.116	0.100	0.227	0.235	0.257	0.273	0.276	216,508,806	224,578,501	230,316,966	234,277,740	237,303,467



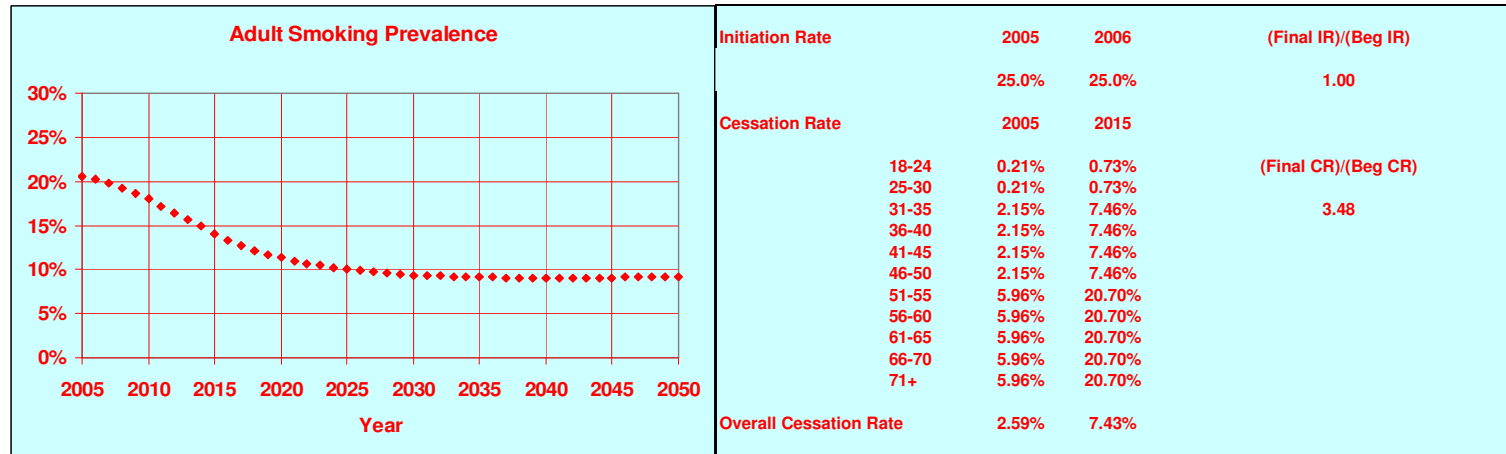
Age Group	Current Smokers					Former Smokers					Population				
	Year					Year					Year				
	2005	2010	2015	2020	2025	2005	2010	2015	2020	2025	2005	2010	2015	2020	2025
18-24	0.247	0.244	0.245	0.245	0.245	0.030	0.005	0.005	0.005	0.005	28,170,884	28,809,290	28,119,208	26,494,277	26,229,137
25-30	0.258	0.243	0.232	0.234	0.234	0.098	0.055	0.016	0.016	0.016	22,594,835	24,040,328	24,257,599	24,506,737	22,790,690
31-35	0.249	0.222	0.208	0.198	0.199	0.165	0.137	0.100	0.051	0.051	19,812,168	18,459,108	19,940,806	19,910,835	20,466,081
36-40	0.235	0.183	0.155	0.145	0.138	0.179	0.231	0.204	0.162	0.110	20,580,855	19,663,179	18,321,136	19,791,536	19,761,982
41-45	0.235	0.173	0.128	0.109	0.102	0.179	0.241	0.286	0.250	0.206	22,663,512	20,365,985	19,457,459	18,130,901	19,585,647
46-50	0.230	0.173	0.121	0.090	0.076	0.208	0.241	0.293	0.324	0.283	21,738,585	22,320,148	20,056,554	19,161,164	17,857,034
51-55	0.194	0.132	0.093	0.065	0.048	0.345	0.307	0.321	0.349	0.366	19,122,955	21,252,801	21,819,662	19,605,490	18,729,237
56-60	0.172	0.078	0.046	0.032	0.023	0.367	0.461	0.393	0.382	0.391	16,061,197	18,465,213	20,520,682	21,065,052	18,925,138
61-65	0.172	0.069	0.027	0.016	0.011	0.367	0.470	0.512	0.422	0.403	12,239,416	15,196,090	17,461,534	19,403,599	19,914,024
66-70	0.152	0.069	0.024	0.009	0.005	0.377	0.470	0.515	0.530	0.432	9,710,302	11,304,880	14,036,814	16,125,198	17,917,525
70-89	0.069	0.040	0.018	0.008	0.003	0.417	0.461	0.500	0.524	0.536	23,814,098	24,701,480	26,325,510	30,082,950	35,126,973
18-89	0.206	0.156	0.125	0.108	0.100	0.227	0.257	0.270	0.268	0.260	216,508,806	224,578,501	230,316,966	234,277,740	237,303,467



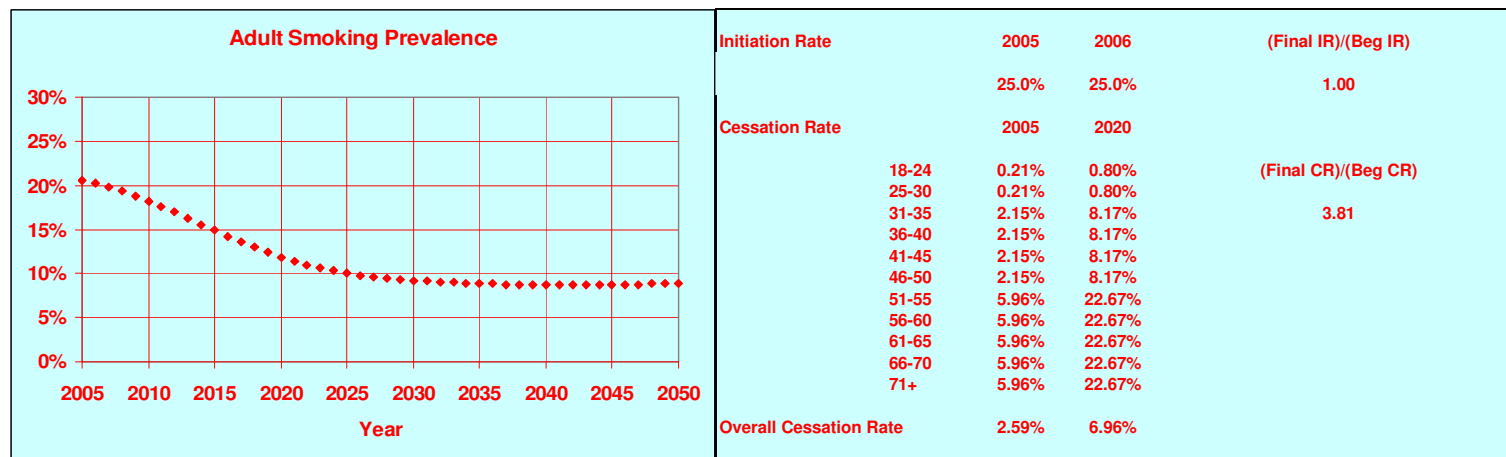
Age Group	Current Smokers					Former Smokers					Population				
	Year					Year					Year				
	2005	2010	2015	2020	2025	2005	2010	2015	2020	2025	2005	2010	2015	2020	2025
18-24	0.247	0.245	0.245	0.245	0.245	0.030	0.004	0.005	0.005	0.005	28,170,884	28,809,290	28,119,208	26,494,277	26,229,137
25-30	0.258	0.245	0.234	0.234	0.234	0.098	0.053	0.015	0.016	0.016	22,594,835	24,040,328	24,257,599	24,506,737	22,790,690
31-35	0.249	0.231	0.209	0.199	0.199	0.165	0.128	0.098	0.050	0.051	19,812,168	18,459,108	19,940,806	19,910,835	20,466,081
36-40	0.235	0.203	0.161	0.146	0.139	0.179	0.211	0.198	0.161	0.110	20,580,855	19,663,179	18,321,136	19,791,536	19,761,982
41-45	0.235	0.191	0.141	0.112	0.102	0.179	0.223	0.273	0.246	0.206	22,663,512	20,365,985	19,457,459	18,130,901	19,585,647
46-50	0.230	0.191	0.133	0.099	0.078	0.208	0.223	0.281	0.315	0.280	21,738,585	22,320,148	20,056,554	19,161,164	17,857,034
51-55	0.194	0.156	0.102	0.071	0.052	0.345	0.283	0.312	0.343	0.362	19,122,955	21,252,801	21,819,662	19,605,490	18,729,237
56-60	0.172	0.106	0.053	0.035	0.024	0.367	0.433	0.385	0.379	0.390	16,061,197	18,465,213	20,520,682	21,065,052	18,925,138
61-65	0.172	0.094	0.036	0.018	0.012	0.367	0.445	0.503	0.420	0.402	12,239,416	15,196,090	17,461,534	19,403,599	19,914,024
66-70	0.152	0.094	0.032	0.012	0.006	0.377	0.445	0.507	0.527	0.432	9,710,302	11,304,880	14,036,814	16,125,198	17,917,525
70-89	0.069	0.054	0.025	0.010	0.004	0.417	0.447	0.494	0.521	0.535	23,814,098	24,701,480	26,325,510	30,082,950	35,126,973
18-89	0.206	0.171	0.131	0.111	0.101	0.227	0.242	0.263	0.266	0.259	216,508,806	224,578,501	230,316,966	234,277,740	237,303,467



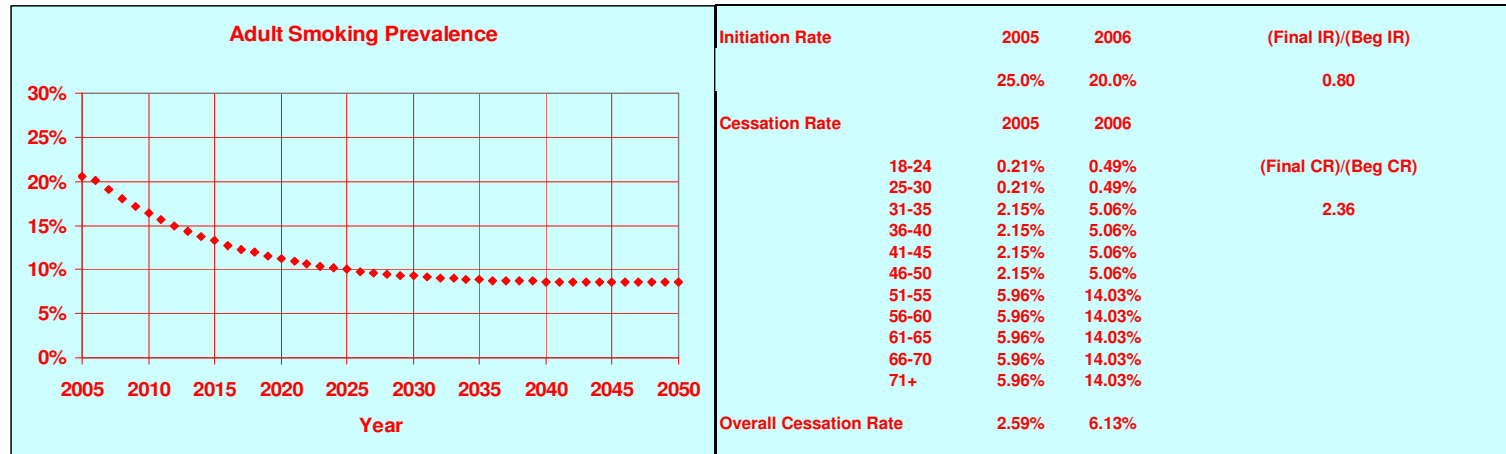
Prevalence	Current Smokers					Former Smokers					Population					
	Age Group	Year					Year					Year				
		2005	2010	2015	2020	2025	2005	2010	2015	2020	2025	2005	2010	2015	2020	2025
18-24	0.247	0.246	0.246	0.245	0.245	0.030	0.003	0.004	0.005	0.005	28,170,884	28,809,290	28,119,208	26,494,277	26,229,137	
25-30	0.258	0.246	0.236	0.235	0.233	0.098	0.052	0.013	0.015	0.017	22,594,835	24,040,328	24,257,599	24,506,737	22,790,690	
31-35	0.249	0.238	0.213	0.199	0.197	0.165	0.121	0.094	0.050	0.053	19,812,168	18,459,108	19,940,806	19,910,835	20,466,081	
36-40	0.235	0.212	0.176	0.145	0.135	0.179	0.202	0.183	0.163	0.114	20,580,855	19,663,179	18,321,136	19,791,536	19,761,982	
41-45	0.235	0.200	0.157	0.119	0.098	0.179	0.214	0.257	0.240	0.209	22,663,512	20,365,985	19,457,459	18,130,901	19,585,647	
46-50	0.230	0.200	0.148	0.106	0.081	0.208	0.214	0.266	0.308	0.278	21,738,585	22,320,148	20,056,554	19,161,164	17,857,034	
51-55	0.194	0.171	0.116	0.075	0.054	0.345	0.267	0.298	0.339	0.360	19,122,955	21,252,801	21,819,662	19,605,490	18,729,237	
56-60	0.172	0.122	0.070	0.036	0.023	0.367	0.417	0.368	0.378	0.391	16,061,197	18,465,213	20,520,682	21,065,052	18,925,138	
61-65	0.172	0.107	0.050	0.022	0.011	0.367	0.432	0.489	0.416	0.403	12,239,416	15,196,090	17,461,534	19,403,599	19,914,024	
66-70	0.152	0.107	0.044	0.016	0.007	0.377	0.432	0.495	0.523	0.431	9,710,302	11,304,880	14,036,814	16,125,198	17,917,525	
70-89	0.069	0.062	0.034	0.013	0.005	0.417	0.439	0.485	0.519	0.534	23,814,098	24,701,480	26,325,510	30,082,950	35,126,973	
18-89	0.206	0.180	0.141	0.113	0.100	0.227	0.233	0.253	0.263	0.259	216,508,806	224,578,501	230,316,966	234,277,740	237,303,467	



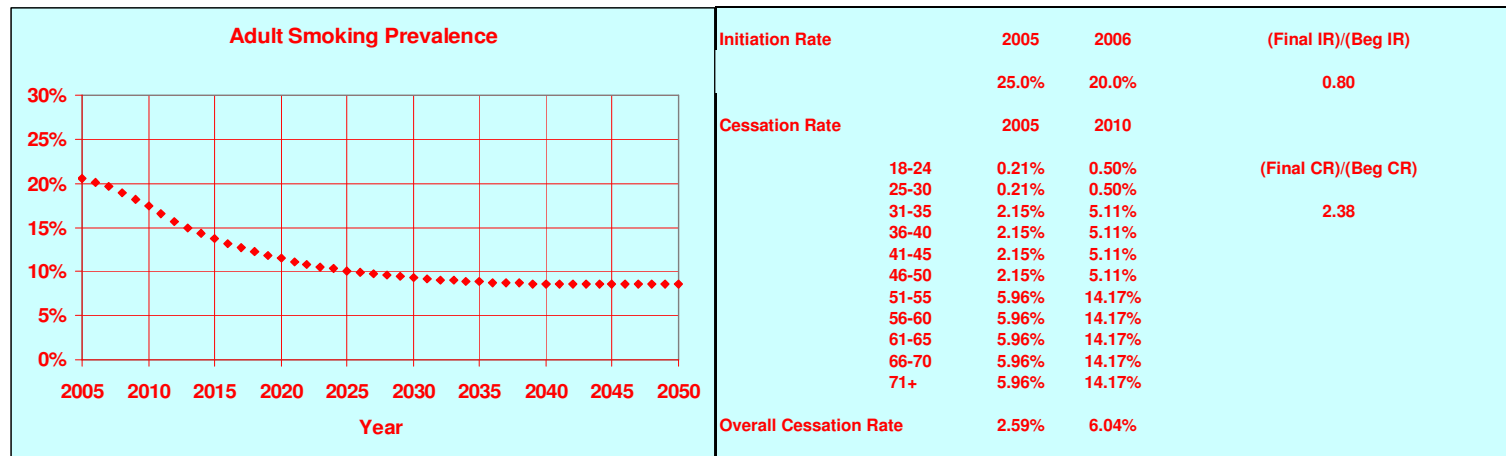
Prevalence	Current Smokers										Former Smokers					Population				
	Age Group	Year					Year					Year								
		2005	2010	2015	2020	2025	2005	2010	2015	2020	2025	2005	2010	2015	2020	2025				
18-24	0.247	0.246	0.246	0.245	0.244	0.030	0.003	0.004	0.005	0.006	28,170,884	28,809,290	28,119,208	26,494,277	26,229,137					
25-30	0.258	0.246	0.238	0.236	0.233	0.098	0.052	0.011	0.014	0.017	22,594,835	24,040,328	24,257,599	24,506,737	22,790,690					
31-35	0.249	0.240	0.219	0.200	0.195	0.165	0.119	0.089	0.048	0.055	19,812,168	18,459,108	19,940,806	19,910,835	20,466,081					
36-40	0.235	0.215	0.186	0.152	0.131	0.179	0.199	0.173	0.155	0.118	20,580,855	19,663,179	18,321,136	19,791,536	19,761,982					
41-45	0.235	0.203	0.166	0.129	0.100	0.179	0.211	0.248	0.229	0.208	22,663,512	20,365,985	19,457,459	18,130,901	19,585,647					
46-50	0.230	0.203	0.157	0.116	0.085	0.208	0.211	0.257	0.298	0.274	21,738,585	22,320,148	20,056,554	19,161,164	17,857,034					
51-55	0.194	0.176	0.128	0.082	0.055	0.345	0.262	0.286	0.332	0.359	19,122,955	21,252,801	21,819,662	19,605,490	18,729,237					
56-60	0.172	0.126	0.084	0.044	0.023	0.367	0.413	0.354	0.370	0.391	16,061,197	18,465,213	20,520,682	21,065,052	18,925,138					
61-65	0.172	0.112	0.060	0.029	0.012	0.367	0.427	0.479	0.409	0.402	12,239,416	15,196,090	17,461,534	19,403,599	19,914,024					
66-70	0.152	0.112	0.053	0.021	0.008	0.377	0.427	0.486	0.518	0.430	9,710,302	11,304,880	14,036,814	16,125,198	17,917,525					
70-89	0.069	0.064	0.041	0.017	0.005	0.417	0.437	0.477	0.515	0.534	23,814,098	24,701,480	26,325,510	30,082,950	35,126,973					
18-89	0.206	0.182	0.149	0.119	0.100	0.227	0.231	0.245	0.258	0.259	216,508,806	224,578,501	230,316,966	234,277,740	237,303,467					



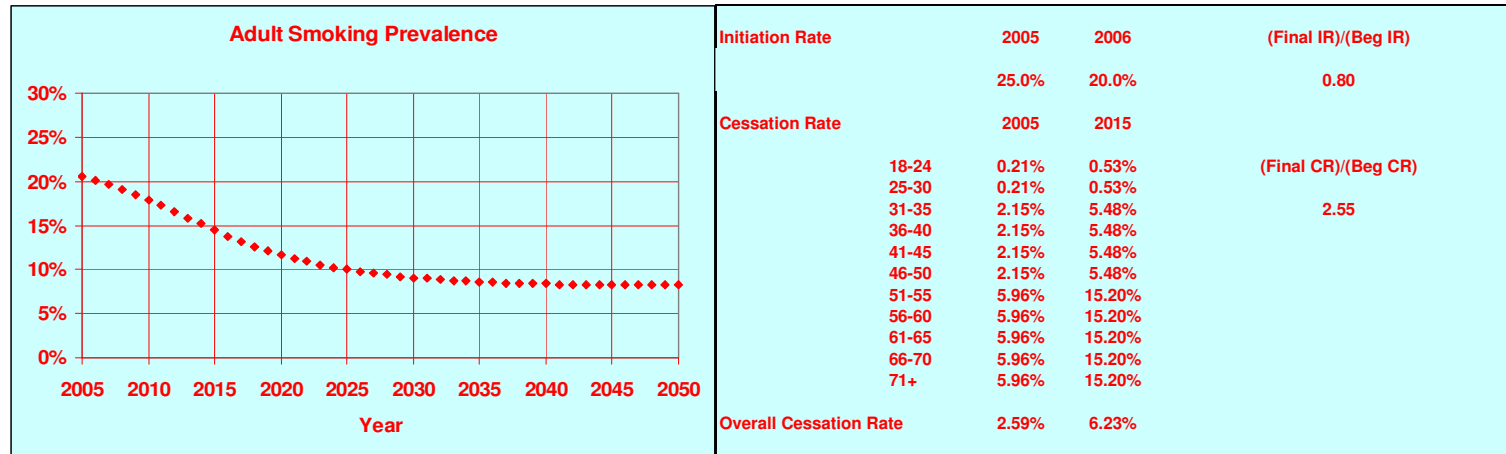
Prevalence	Current Smokers					Former Smokers					Population					
	Age Group	Year					Year					Year				
		2005	2010	2015	2020	2025	2005	2010	2015	2020	2025	2005	2010	2015	2020	2025
18-24	0.247	0.209	0.197	0.197	0.197	0.030	0.004	0.003	0.003	0.003	28,170,884	28,809,290	28,119,208	26,494,277	26,229,137	
25-30	0.258	0.244	0.212	0.191	0.191	0.098	0.054	0.012	0.009	0.009	22,594,835	24,040,328	24,257,599	24,506,737	22,790,690	
31-35	0.249	0.231	0.218	0.191	0.169	0.165	0.128	0.089	0.038	0.031	19,812,168	18,459,108	19,940,806	19,910,835	20,466,081	
36-40	0.235	0.198	0.178	0.168	0.147	0.179	0.216	0.181	0.139	0.081	20,580,855	19,663,179	18,321,136	19,791,536	19,761,982	
41-45	0.235	0.187	0.153	0.137	0.130	0.179	0.227	0.261	0.222	0.177	22,663,512	20,365,985	19,457,459	18,130,901	19,585,647	
46-50	0.230	0.187	0.144	0.118	0.106	0.208	0.227	0.270	0.296	0.253	21,738,585	22,320,148	20,056,554	19,161,164	17,857,034	
51-55	0.194	0.153	0.119	0.092	0.075	0.345	0.286	0.295	0.322	0.339	19,122,955	21,252,801	21,819,662	19,605,490	18,729,237	
56-60	0.172	0.100	0.072	0.056	0.043	0.367	0.439	0.367	0.358	0.371	16,061,197	18,465,213	20,520,682	21,065,052	18,925,138	
61-65	0.172	0.088	0.047	0.034	0.026	0.367	0.451	0.492	0.404	0.388	12,239,416	15,196,090	17,461,534	19,403,599	19,914,024	
66-70	0.152	0.088	0.041	0.022	0.016	0.377	0.451	0.498	0.517	0.422	9,710,302	11,304,880	14,036,814	16,125,198	17,917,525	
70-89	0.069	0.051	0.032	0.018	0.010	0.417	0.451	0.487	0.514	0.529	23,814,098	24,701,480	26,325,510	30,082,950	35,126,973	
18-89	0.206	0.163	0.132	0.112	0.100	0.227	0.245	0.253	0.252	0.243	216,508,806	224,578,501	230,316,966	234,277,740	237,303,467	



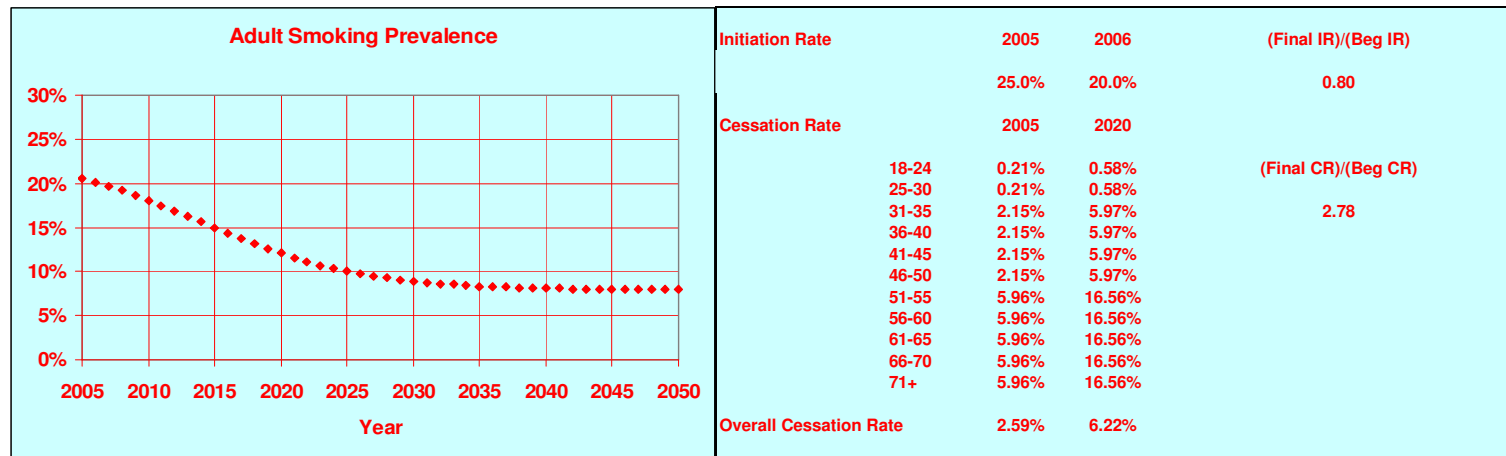
Age Group	Current Smokers					Former Smokers					Population				
	Year					Year					Year				
	2005	2010	2015	2020	2025	2005	2010	2015	2020	2025	2005	2010	2015	2020	2025
18-24	0.247	0.210	0.197	0.197	0.197	0.030	0.003	0.003	0.003	0.003	28,170,884	28,809,290	28,119,208	26,494,277	26,229,137
25-30	0.258	0.246	0.212	0.191	0.191	0.098	0.052	0.011	0.009	0.009	22,594,835	24,040,328	24,257,599	24,506,737	22,790,690
31-35	0.249	0.237	0.219	0.192	0.169	0.165	0.122	0.088	0.037	0.031	19,812,168	18,459,108	19,940,806	19,910,835	20,466,081
36-40	0.235	0.210	0.182	0.169	0.147	0.179	0.204	0.177	0.139	0.081	20,580,855	19,663,179	18,321,136	19,791,536	19,761,982
41-45	0.235	0.199	0.162	0.140	0.130	0.179	0.215	0.252	0.219	0.177	22,663,512	20,365,985	19,457,459	18,130,901	19,585,647
46-50	0.230	0.199	0.153	0.125	0.108	0.208	0.215	0.261	0.289	0.251	21,738,585	22,320,148	20,056,554	19,161,164	17,857,034
51-55	0.194	0.169	0.126	0.097	0.079	0.345	0.270	0.288	0.317	0.335	19,122,955	21,252,801	21,819,662	19,605,490	18,729,237
56-60	0.172	0.119	0.079	0.059	0.045	0.367	0.420	0.360	0.355	0.369	16,061,197	18,465,213	20,520,682	21,065,052	18,925,138
61-65	0.172	0.105	0.056	0.037	0.027	0.367	0.434	0.483	0.401	0.387	12,239,416	15,196,090	17,461,534	19,403,599	19,914,024
66-70	0.152	0.105	0.049	0.026	0.017	0.377	0.434	0.490	0.513	0.421	9,710,302	11,304,880	14,036,814	16,125,198	17,917,525
70-89	0.069	0.061	0.038	0.021	0.011	0.417	0.441	0.481	0.511	0.528	23,814,098	24,701,480	26,325,510	30,082,950	35,126,973
18-89	0.206	0.174	0.137	0.115	0.101	0.227	0.234	0.248	0.249	0.242	216,508,806	224,578,501	230,316,966	234,277,740	237,303,467



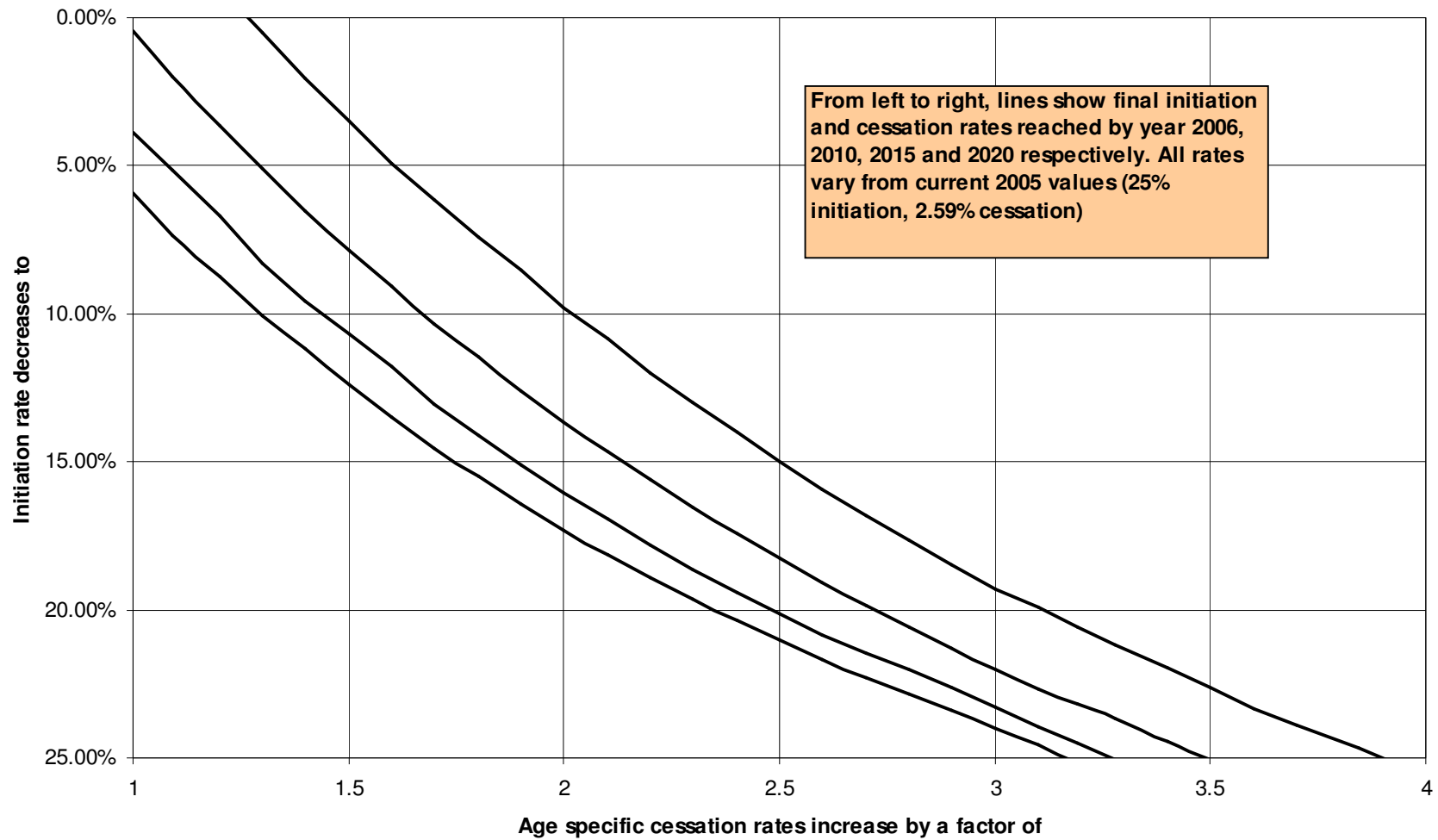
Prevalence	Current Smokers					Former Smokers					Population					
	Age Group	Year					Year					Year				
		2005	2010	2015	2020	2025	2005	2010	2015	2020	2025	2005	2010	2015	2020	2025
18-24	0.247	0.210	0.197	0.197	0.197	0.030	0.003	0.003	0.003	0.003	28,170,884	28,809,290	28,119,208	26,494,277	26,229,137	
25-30	0.258	0.246	0.214	0.191	0.190	0.098	0.052	0.010	0.009	0.010	22,594,835	24,040,328	24,257,599	24,506,737	22,790,690	
31-35	0.249	0.241	0.222	0.191	0.168	0.165	0.118	0.086	0.037	0.032	19,812,168	18,459,108	19,940,806	19,910,835	20,466,081	
36-40	0.235	0.216	0.191	0.167	0.144	0.179	0.198	0.167	0.140	0.084	20,580,855	19,663,179	18,321,136	19,791,536	19,761,982	
41-45	0.235	0.204	0.172	0.144	0.126	0.179	0.210	0.242	0.214	0.181	22,663,512	20,365,985	19,457,459	18,130,901	19,585,647	
46-50	0.230	0.204	0.162	0.130	0.109	0.208	0.210	0.252	0.284	0.250	21,738,585	22,320,148	20,056,554	19,161,164	17,857,034	
51-55	0.194	0.179	0.135	0.099	0.079	0.345	0.260	0.279	0.315	0.335	19,122,955	21,252,801	21,819,662	19,605,490	18,729,237	
56-60	0.172	0.129	0.092	0.059	0.044	0.367	0.410	0.346	0.355	0.370	16,061,197	18,465,213	20,520,682	21,065,052	18,925,138	
61-65	0.172	0.114	0.067	0.040	0.026	0.367	0.425	0.472	0.398	0.388	12,239,416	15,196,090	17,461,534	19,403,599	19,914,024	
66-70	0.152	0.114	0.059	0.029	0.018	0.377	0.425	0.480	0.510	0.420	9,710,302	11,304,880	14,036,814	16,125,198	17,917,525	
70-89	0.069	0.066	0.045	0.024	0.012	0.417	0.436	0.473	0.508	0.527	23,814,098	24,701,480	26,325,510	30,082,950	35,126,973	
18-89	0.206	0.179	0.144	0.116	0.100	0.227	0.229	0.241	0.248	0.243	216,508,806	224,578,501	230,316,966	234,277,740	237,303,467	



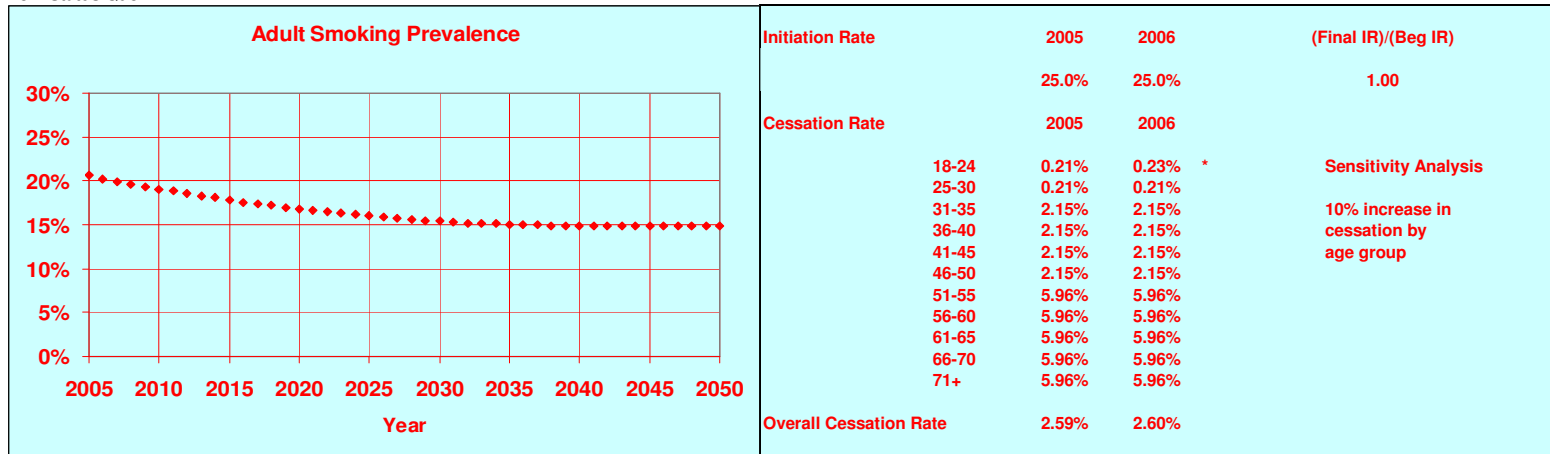
Age Group	Current Smokers					Former Smokers					Population				
	Year					Year					Year				
	2005	2010	2015	2020	2025	2005	2010	2015	2020	2025	2005	2010	2015	2020	2025
18-24	0.247	0.210	0.198	0.197	0.197	0.030	0.003	0.002	0.003	0.003	28,170,884	28,809,290	28,119,208	26,494,277	26,229,137
25-30	0.258	0.246	0.214	0.192	0.190	0.098	0.051	0.009	0.008	0.010	22,594,835	24,040,328	24,257,599	24,506,737	22,790,690
31-35	0.249	0.242	0.225	0.192	0.167	0.165	0.117	0.082	0.036	0.033	19,812,168	18,459,108	19,940,806	19,910,835	20,466,081
36-40	0.235	0.218	0.198	0.172	0.141	0.179	0.196	0.161	0.135	0.087	20,580,855	19,663,179	18,321,136	19,791,536	19,761,982
41-45	0.235	0.206	0.178	0.152	0.127	0.179	0.208	0.236	0.207	0.181	22,663,512	20,365,985	19,457,459	18,130,901	19,585,647
46-50	0.230	0.206	0.168	0.137	0.111	0.208	0.208	0.246	0.277	0.247	21,738,585	22,320,148	20,056,554	19,161,164	17,857,034
51-55	0.194	0.182	0.144	0.105	0.080	0.345	0.257	0.270	0.309	0.334	19,122,955	21,252,801	21,819,662	19,605,490	18,729,237
56-60	0.172	0.132	0.102	0.066	0.042	0.367	0.407	0.336	0.348	0.372	16,061,197	18,465,213	20,520,682	21,065,052	18,925,138
61-65	0.172	0.117	0.074	0.047	0.027	0.367	0.422	0.465	0.391	0.387	12,239,416	15,196,090	17,461,534	19,403,599	19,914,024
66-70	0.152	0.117	0.066	0.034	0.019	0.377	0.422	0.473	0.505	0.419	9,710,302	11,304,880	14,036,814	16,125,198	17,917,525
70-89	0.069	0.067	0.050	0.028	0.013	0.417	0.434	0.468	0.504	0.526	23,814,098	24,701,480	26,325,510	30,082,950	35,126,973
18-89	0.206	0.181	0.150	0.121	0.100	0.227	0.227	0.236	0.244	0.243	216,508,806	224,578,501	230,316,966	234,277,740	237,303,467



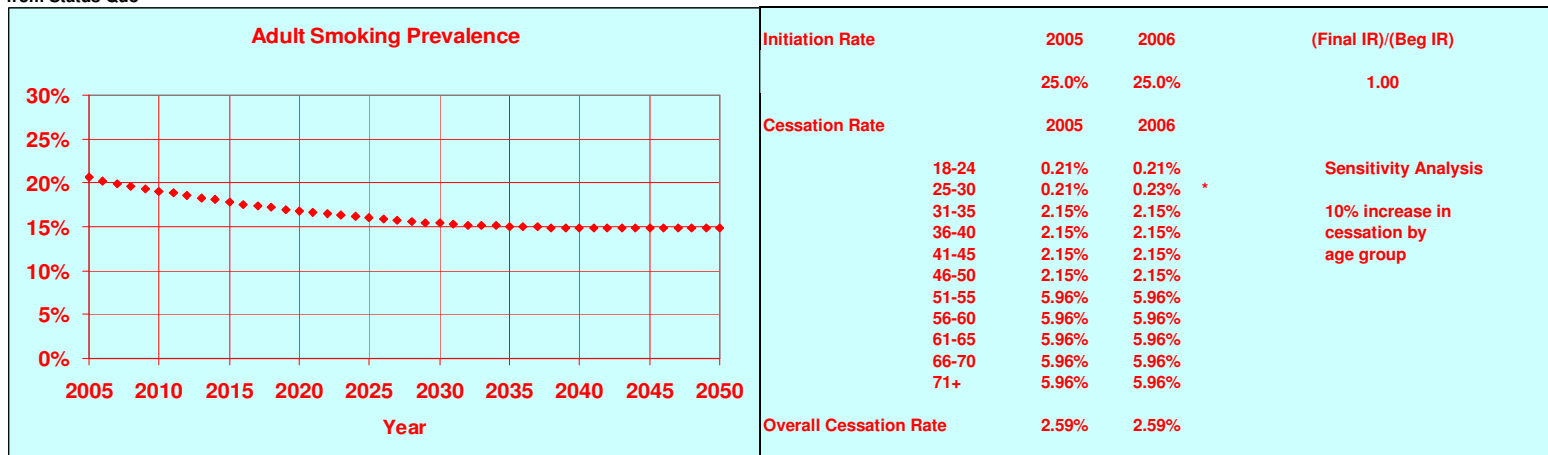
Combinations of Initiation and Cessation Rates to Reach a Smoking Prevalence of 10% by Year 2025



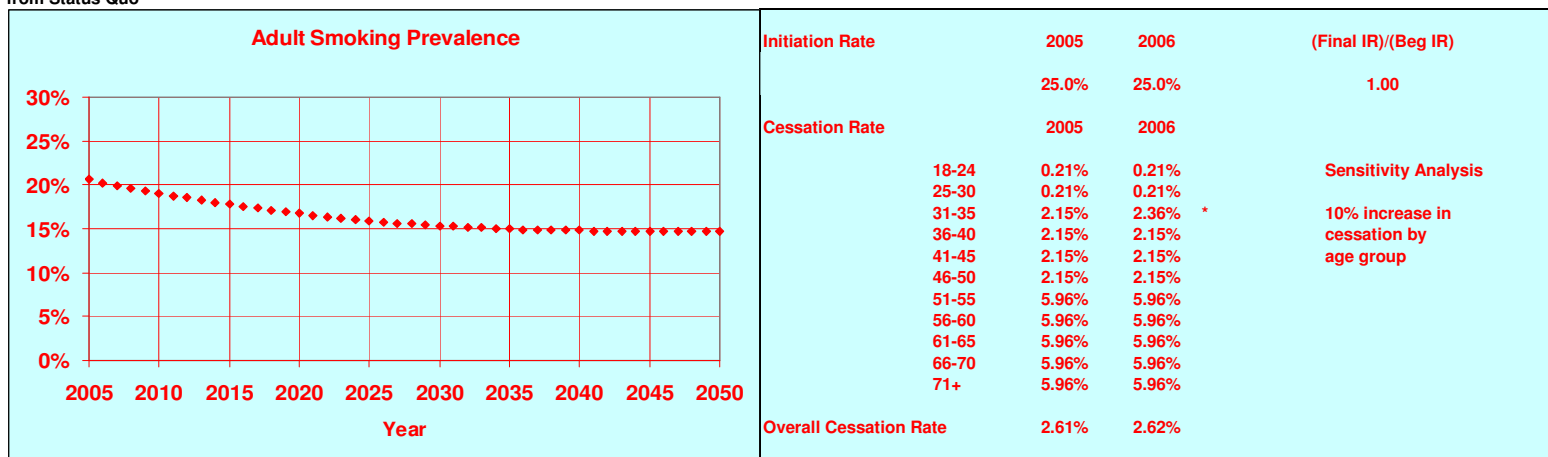
Age Group	Current Smokers					Former Smokers					Population				
	2005	Year				2005	Year				2005	Year			
		2010	2015	2020	2025		2010	2015	2020	2025		2010	2015	2020	2025
18-24	0.247	0.246	0.248	0.248	0.248	0.030	0.003	0.002	0.002	0.002	28,170,884	28,809,290	28,119,208	26,494,277	26,229,137
25-30	0.258	0.247	0.241	0.245	0.245	0.098	0.051	0.007	0.005	0.005	22,594,835	24,040,328	24,257,599	24,506,737	22,790,690
31-35	0.249	0.246	0.236	0.229	0.233	0.165	0.113	0.071	0.020	0.017	19,812,168	18,459,108	19,940,806	19,910,835	20,466,081
36-40	0.235	0.224	0.221	0.212	0.205	0.179	0.190	0.138	0.095	0.043	20,580,855	19,663,179	18,321,136	19,791,536	19,761,982
41-45	0.235	0.211	0.201	0.198	0.190	0.179	0.203	0.213	0.161	0.117	22,663,512	20,365,985	19,457,459	18,130,901	19,585,647
46-50	0.230	0.211	0.190	0.180	0.178	0.208	0.203	0.224	0.234	0.181	21,738,585	22,320,148	20,056,554	19,161,164	17,857,034
51-55	0.194	0.192	0.175	0.157	0.149	0.345	0.247	0.239	0.257	0.265	19,122,955	21,252,801	21,819,662	19,605,490	18,729,237
56-60	0.172	0.143	0.141	0.129	0.116	0.367	0.396	0.297	0.285	0.298	16,061,197	18,465,213	20,520,682	21,065,052	18,925,138
61-65	0.172	0.126	0.105	0.104	0.095	0.367	0.413	0.434	0.334	0.319	12,239,416	15,196,090	17,461,534	19,403,599	19,914,024
66-70	0.152	0.126	0.093	0.077	0.076	0.377	0.413	0.446	0.462	0.361	9,710,302	11,304,880	14,036,814	16,125,198	17,917,525
70-89	0.069	0.072	0.071	0.063	0.053	0.417	0.429	0.447	0.469	0.486	23,814,098	24,701,480	26,325,510	30,082,950	35,126,973
18-89	0.206	0.191	0.178	0.168	0.160	0.227	0.222	0.216	0.209	0.200	216,508,806	224,578,501	230,316,966	234,277,740	237,303,467
% Decrease in Prevalence from Status Quo	0.00%	0.02%	0.04%	0.05%	0.07%										



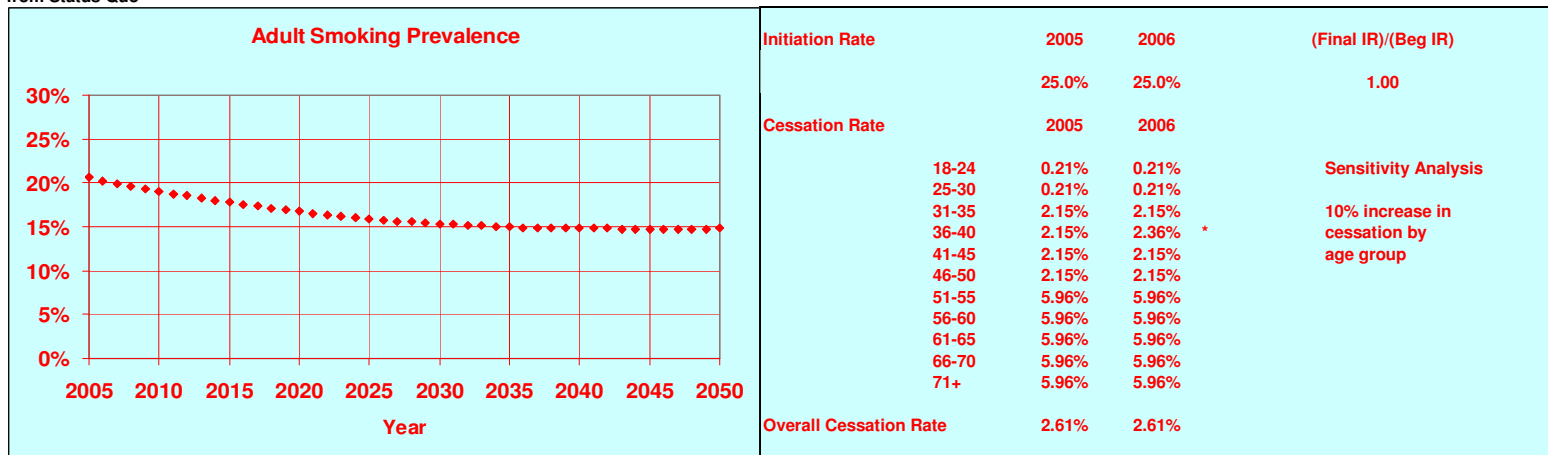
Age Group	Current Smokers					Former Smokers					Population				
	Year					Year					Year				
	2005	2010	2015	2020	2025	2005	2010	2015	2020	2025	2005	2010	2015	2020	2025
18-24	0.247	0.247	0.248	0.248	0.248	0.030	0.002	0.002	0.002	0.002	28,170,884	28,809,290	28,119,208	26,494,277	26,229,137
25-30	0.258	0.247	0.242	0.245	0.245	0.098	0.051	0.007	0.005	0.005	22,594,835	24,040,328	24,257,599	24,506,737	22,790,690
31-35	0.249	0.246	0.236	0.229	0.233	0.165	0.113	0.071	0.020	0.017	19,812,168	18,459,108	19,940,806	19,910,835	20,466,081
36-40	0.235	0.224	0.220	0.212	0.206	0.179	0.190	0.138	0.095	0.043	20,580,855	19,663,179	18,321,136	19,791,536	19,761,982
41-45	0.235	0.211	0.201	0.198	0.190	0.179	0.203	0.213	0.161	0.117	22,663,512	20,365,985	19,457,459	18,130,901	19,585,647
46-50	0.230	0.211	0.190	0.180	0.177	0.208	0.203	0.224	0.234	0.181	21,738,585	22,320,148	20,056,554	19,161,164	17,857,034
51-55	0.194	0.192	0.175	0.157	0.149	0.345	0.247	0.239	0.257	0.265	19,122,955	21,252,801	21,819,662	19,605,490	18,729,237
56-60	0.172	0.143	0.141	0.129	0.116	0.367	0.396	0.297	0.285	0.298	16,061,197	18,465,213	20,520,682	21,065,052	18,925,138
61-65	0.172	0.126	0.105	0.104	0.095	0.367	0.413	0.434	0.334	0.319	12,239,416	15,196,090	17,461,534	19,403,599	19,914,024
66-70	0.152	0.126	0.093	0.077	0.076	0.377	0.413	0.446	0.462	0.361	9,710,302	11,304,880	14,036,814	16,125,198	17,917,525
70-89	0.069	0.072	0.071	0.063	0.053	0.417	0.429	0.447	0.469	0.486	23,814,098	24,701,480	26,325,510	30,082,950	35,126,973
18-89	0.206	0.191	0.178	0.168	0.160	0.227	0.222	0.216	0.209	0.200	216,508,806	224,578,501	230,316,966	234,277,740	237,303,467
% Decrease in Prevalence from Status Quo	0.00%	0.01%	0.03%	0.04%	0.05%										



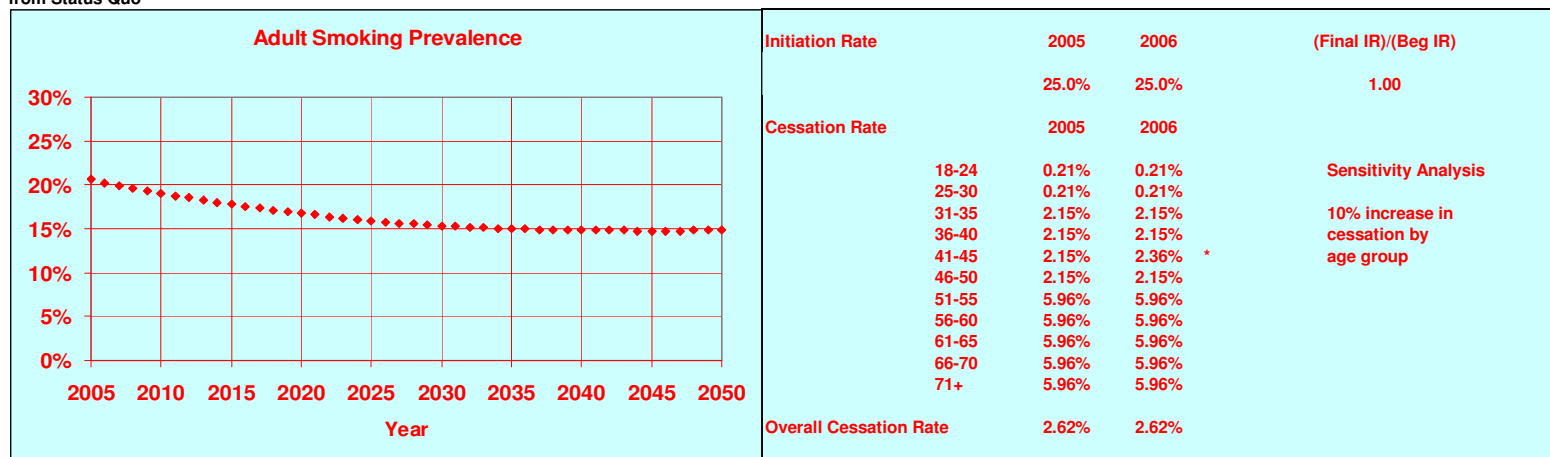
Age Group	Current Smokers					Former Smokers					Population				
	Year					Year					Year				
	2005	2010	2015	2020	2025	2005	2010	2015	2020	2025	2005	2010	2015	2020	2025
18-24	0.247	0.247	0.248	0.248	0.248	0.030	0.002	0.002	0.002	0.002	28,170,884	28,809,290	28,119,208	26,494,277	26,229,137
25-30	0.258	0.247	0.242	0.245	0.245	0.098	0.051	0.007	0.005	0.005	22,594,835	24,040,328	24,257,599	24,506,737	22,790,690
31-35	0.249	0.245	0.235	0.228	0.232	0.165	0.114	0.072	0.020	0.018	19,812,168	18,459,108	19,940,806	19,910,835	20,466,081
36-40	0.235	0.222	0.218	0.210	0.204	0.179	0.192	0.141	0.098	0.045	20,580,855	19,663,179	18,321,136	19,791,536	19,761,982
41-45	0.235	0.211	0.199	0.196	0.188	0.179	0.203	0.215	0.163	0.119	22,663,512	20,365,985	19,457,459	18,130,901	19,585,647
46-50	0.230	0.211	0.190	0.179	0.176	0.208	0.203	0.224	0.235	0.183	21,738,585	22,320,148	20,056,554	19,161,164	17,857,034
51-55	0.194	0.192	0.175	0.157	0.148	0.345	0.247	0.239	0.257	0.266	19,122,955	21,252,801	21,819,662	19,605,490	18,729,237
56-60	0.172	0.143	0.141	0.129	0.116	0.367	0.396	0.297	0.285	0.298	16,061,197	18,465,213	20,520,682	21,065,052	18,925,138
61-65	0.172	0.126	0.105	0.104	0.095	0.367	0.413	0.434	0.334	0.319	12,239,416	15,196,090	17,461,534	19,403,599	19,914,024
66-70	0.152	0.126	0.093	0.077	0.076	0.377	0.413	0.446	0.462	0.361	9,710,302	11,304,880	14,036,814	16,125,198	17,917,525
70-89	0.069	0.072	0.071	0.063	0.053	0.417	0.429	0.447	0.469	0.486	23,814,098	24,701,480	26,325,510	30,082,950	35,126,973
18-89	0.206	0.191	0.178	0.167	0.159	0.227	0.222	0.216	0.209	0.200	216,508,806	224,578,501	230,316,966	234,277,740	237,303,467
% Decrease in Prevalence from Status Quo	0.00%	0.11%	0.22%	0.32%	0.42%										



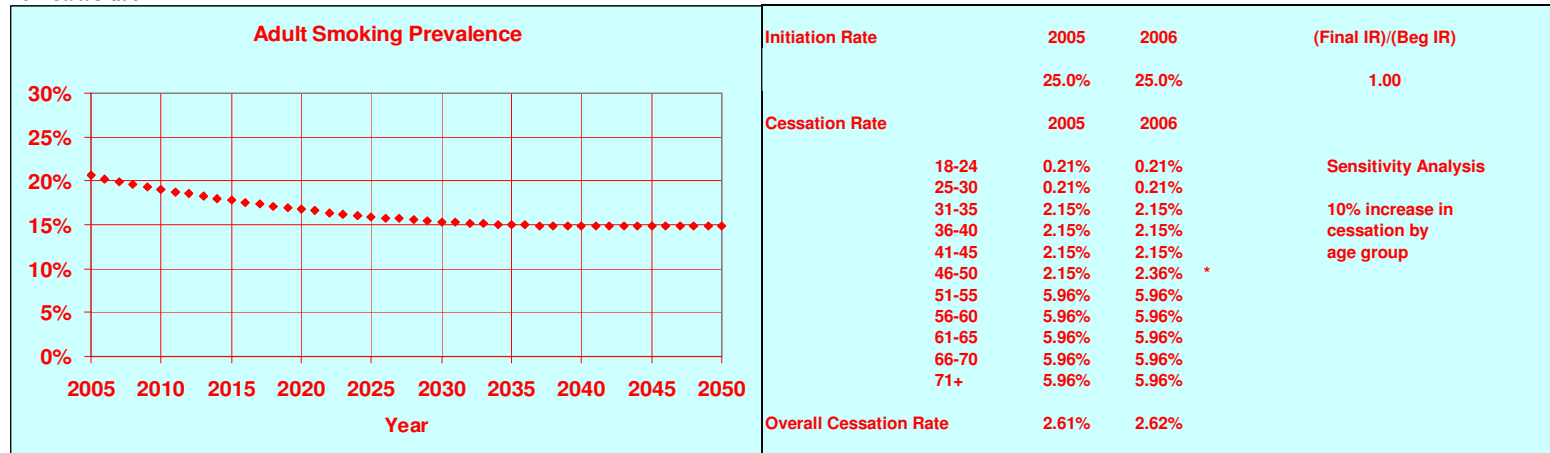
Age Group	Current Smokers					Former Smokers					Population				
	Year					Year					Year				
	2005	2010	2015	2020	2025	2005	2010	2015	2020	2025	2005	2010	2015	2020	2025
18-24	0.247	0.247	0.248	0.248	0.248	0.030	0.002	0.002	0.002	0.002	28,170,884	28,809,290	28,119,208	26,494,277	26,229,137
25-30	0.258	0.247	0.242	0.245	0.245	0.098	0.051	0.007	0.005	0.005	22,594,835	24,040,328	24,257,599	24,506,737	22,790,690
31-35	0.249	0.246	0.236	0.229	0.233	0.165	0.113	0.071	0.019	0.017	19,812,168	18,459,108	19,940,806	19,910,835	20,466,081
36-40	0.235	0.223	0.220	0.211	0.205	0.179	0.191	0.139	0.096	0.044	20,580,855	19,663,179	18,321,136	19,791,536	19,761,982
41-45	0.235	0.210	0.199	0.196	0.188	0.179	0.204	0.215	0.163	0.119	22,663,512	20,365,985	19,457,459	18,130,901	19,585,647
46-50	0.230	0.211	0.188	0.178	0.176	0.208	0.203	0.226	0.236	0.183	21,738,585	22,320,148	20,056,554	19,161,164	17,857,034
51-55	0.194	0.192	0.175	0.156	0.148	0.345	0.247	0.239	0.258	0.266	19,122,955	21,252,801	21,819,662	19,605,490	18,729,237
56-60	0.172	0.143	0.141	0.129	0.115	0.367	0.396	0.297	0.285	0.299	16,061,197	18,465,213	20,520,682	21,065,052	18,925,138
61-65	0.172	0.126	0.105	0.104	0.095	0.367	0.413	0.434	0.334	0.319	12,239,416	15,196,090	17,461,534	19,403,599	19,914,024
66-70	0.152	0.126	0.093	0.077	0.076	0.377	0.413	0.446	0.462	0.361	9,710,302	11,304,880	14,036,814	16,125,198	17,917,525
70-89	0.069	0.072	0.071	0.063	0.053	0.417	0.429	0.447	0.469	0.486	23,814,098	24,701,480	26,325,510	30,082,950	35,126,973
18-89	0.206	0.191	0.178	0.167	0.159	0.227	0.222	0.216	0.209	0.200	216,508,806	224,578,501	230,316,966	234,277,740	237,303,467
% Decrease in Prevalence from Status Quo	0.00%	0.11%	0.21%	0.29%	0.36%										



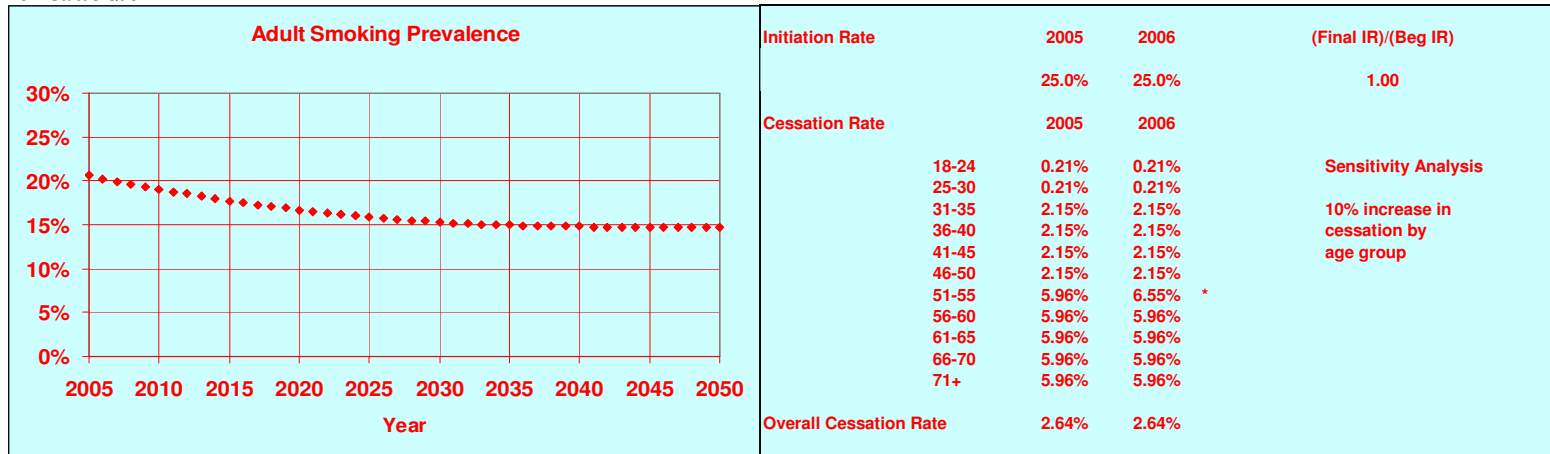
Age Group	Current Smokers					Former Smokers					Population				
	2005	Year				2005	Year				2005	Year			
		2010	2015	2020	2025		2010	2015	2020	2025		2010	2015	2020	2025
18-24	0.247	0.247	0.248	0.248	0.248	0.030	0.002	0.002	0.002	0.002	28,170,884	28,809,290	28,119,208	26,494,277	26,229,137
25-30	0.258	0.247	0.242	0.245	0.245	0.098	0.051	0.007	0.005	0.005	22,594,835	24,040,328	24,257,599	24,506,737	22,790,690
31-35	0.249	0.246	0.236	0.229	0.233	0.165	0.113	0.071	0.019	0.017	19,812,168	18,459,108	19,940,806	19,910,835	20,466,081
36-40	0.235	0.224	0.221	0.212	0.206	0.179	0.190	0.138	0.095	0.043	20,580,855	19,663,179	18,321,136	19,791,536	19,761,982
41-45	0.235	0.210	0.200	0.197	0.189	0.179	0.204	0.214	0.162	0.118	22,663,512	20,365,985	19,457,459	18,130,901	19,585,647
46-50	0.230	0.210	0.187	0.178	0.176	0.208	0.204	0.227	0.236	0.183	21,738,585	22,320,148	20,056,554	19,161,164	17,857,034
51-55	0.194	0.192	0.174	0.155	0.148	0.345	0.247	0.240	0.259	0.266	19,122,955	21,252,801	21,819,662	19,605,490	18,729,237
56-60	0.172	0.143	0.141	0.128	0.114	0.367	0.396	0.297	0.286	0.300	16,061,197	18,465,213	20,520,682	21,065,052	18,925,138
61-65	0.172	0.126	0.105	0.104	0.094	0.367	0.413	0.434	0.334	0.320	12,239,416	15,196,090	17,461,534	19,403,599	19,914,024
66-70	0.152	0.126	0.093	0.077	0.076	0.377	0.413	0.446	0.462	0.361	9,710,302	11,304,880	14,036,814	16,125,198	17,917,525
70-89	0.069	0.072	0.071	0.063	0.053	0.417	0.429	0.447	0.469	0.486	23,814,098	24,701,480	26,325,510	30,082,950	35,126,973
18-89	0.206	0.191	0.178	0.167	0.159	0.227	0.222	0.216	0.209	0.200	216,508,806	224,578,501	230,316,966	234,277,740	237,303,467
% Decrease in Prevalence from Status Quo	0.00%	0.12%	0.21%	0.27%	0.31%										



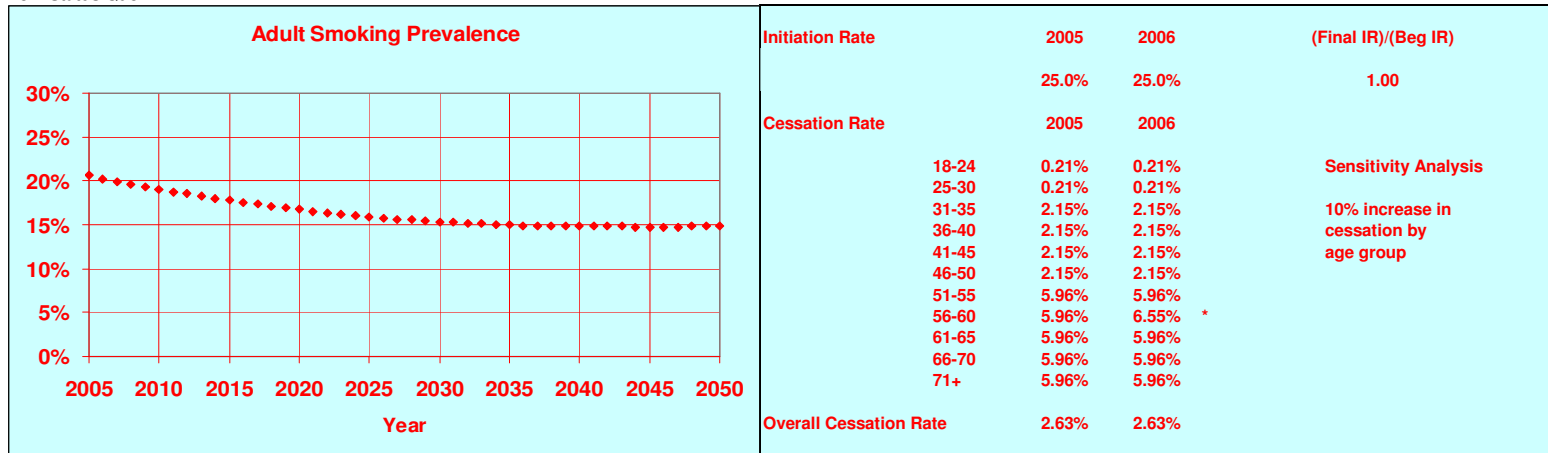
Age Group	Current Smokers					Former Smokers					Population				
	Year					Year					Year				
	2005	2010	2015	2020	2025	2005	2010	2015	2020	2025	2005	2010	2015	2020	2025
18-24	0.247	0.247	0.248	0.248	0.248	0.030	0.002	0.002	0.002	0.002	28,170,884	28,809,290	28,119,208	26,494,277	26,229,137
25-30	0.258	0.247	0.242	0.245	0.245	0.098	0.051	0.007	0.005	0.005	22,594,835	24,040,328	24,257,599	24,506,737	22,790,690
31-35	0.249	0.246	0.236	0.229	0.233	0.165	0.113	0.071	0.019	0.017	19,812,168	18,459,108	19,940,806	19,910,835	20,466,081
36-40	0.235	0.224	0.221	0.212	0.206	0.179	0.190	0.138	0.095	0.043	20,580,855	19,663,179	18,321,136	19,791,536	19,761,982
41-45	0.235	0.211	0.201	0.198	0.190	0.179	0.203	0.213	0.161	0.117	22,663,512	20,365,985	19,457,459	18,130,901	19,585,647
46-50	0.230	0.210	0.189	0.179	0.177	0.208	0.204	0.225	0.235	0.182	21,738,585	22,320,148	20,056,554	19,161,164	17,857,034
51-55	0.194	0.190	0.173	0.155	0.148	0.345	0.248	0.241	0.259	0.266	19,122,955	21,252,801	21,819,662	19,605,490	18,729,237
56-60	0.172	0.143	0.140	0.128	0.114	0.367	0.396	0.298	0.286	0.300	16,061,197	18,465,213	20,520,682	21,065,052	18,925,138
61-65	0.172	0.126	0.105	0.103	0.094	0.367	0.413	0.434	0.335	0.320	12,239,416	15,196,090	17,461,534	19,403,599	19,914,024
66-70	0.152	0.126	0.093	0.077	0.076	0.377	0.413	0.446	0.462	0.362	9,710,302	11,304,880	14,036,814	16,125,198	17,917,525
70-89	0.069	0.072	0.071	0.063	0.053	0.417	0.429	0.447	0.469	0.486	23,814,098	24,701,480	26,325,510	30,082,950	35,126,973
18-89	0.206	0.191	0.178	0.167	0.159	0.227	0.222	0.216	0.209	0.200	216,508,806	224,578,501	230,316,966	234,277,740	237,303,467
% Decrease in Prevalence from Status Quo	0.00%	0.11%	0.19%	0.24%	0.26%										



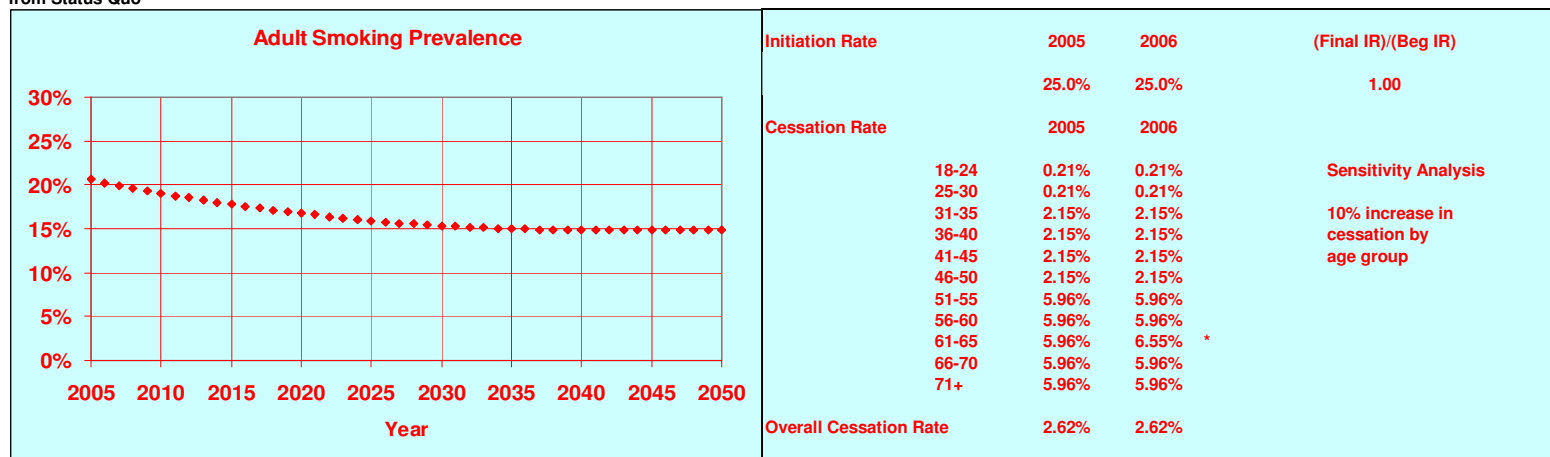
Age Group	Current Smokers					Former Smokers					Population				
	2005	Year				2005	Year				2005	Year			
		2010	2015	2020	2025		2010	2015	2020	2025		2010	2015	2020	2025
18-24	0.247	0.247	0.248	0.248	0.248	0.030	0.002	0.002	0.002	0.002	28,170,884	28,809,290	28,119,208	26,494,277	26,229,137
25-30	0.258	0.247	0.242	0.245	0.245	0.098	0.051	0.007	0.005	0.005	22,594,835	24,040,328	24,257,599	24,506,737	22,790,690
31-35	0.249	0.246	0.236	0.229	0.233	0.165	0.113	0.071	0.019	0.017	19,812,168	18,459,108	19,940,806	19,910,835	20,466,081
36-40	0.235	0.224	0.221	0.212	0.206	0.179	0.190	0.138	0.095	0.043	20,580,855	19,663,179	18,321,136	19,791,536	19,761,982
41-45	0.235	0.211	0.201	0.198	0.190	0.179	0.203	0.213	0.161	0.117	22,663,512	20,365,985	19,457,459	18,130,901	19,585,647
46-50	0.230	0.211	0.190	0.180	0.178	0.208	0.203	0.224	0.234	0.181	21,738,585	22,320,148	20,056,554	19,161,164	17,857,034
51-55	0.194	0.189	0.173	0.155	0.147	0.345	0.249	0.241	0.259	0.267	19,122,955	21,252,801	21,819,662	19,605,490	18,729,237
56-60	0.172	0.140	0.137	0.125	0.112	0.367	0.399	0.302	0.289	0.302	16,061,197	18,465,213	20,520,682	21,065,052	18,925,138
61-65	0.172	0.126	0.103	0.101	0.092	0.367	0.413	0.436	0.337	0.322	12,239,416	15,196,090	17,461,534	19,403,599	19,914,024
66-70	0.152	0.126	0.093	0.076	0.074	0.377	0.413	0.446	0.463	0.364	9,710,302	11,304,880	14,036,814	16,125,198	17,917,525
70-89	0.069	0.072	0.071	0.063	0.052	0.417	0.429	0.447	0.469	0.487	23,814,098	24,701,480	26,325,510	30,082,950	35,126,973
18-89	0.206	0.190	0.177	0.167	0.159	0.227	0.222	0.217	0.210	0.201	216,508,806	224,578,501	230,316,966	234,277,740	237,303,467
% Decrease in Prevalence from Status Quo	0.00%	0.23%	0.42%	0.54%	0.58%										



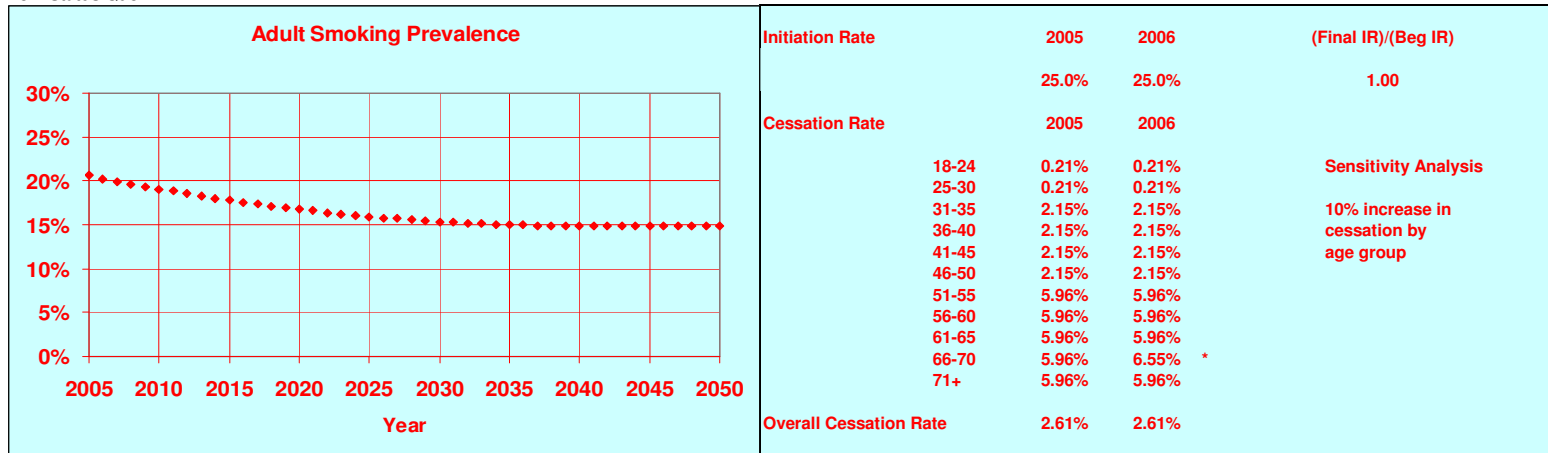
Age Group	Current Smokers					Former Smokers					Population				
	Year					Year					Year				
	2005	2010	2015	2020	2025	2005	2010	2015	2020	2025	2005	2010	2015	2020	2025
18-24	0.247	0.247	0.248	0.248	0.248	0.030	0.002	0.002	0.002	0.002	28,170,884	28,809,290	28,119,208	26,494,277	26,229,137
25-30	0.258	0.247	0.242	0.245	0.245	0.098	0.051	0.007	0.005	0.005	22,594,835	24,040,328	24,257,599	24,506,737	22,790,690
31-35	0.249	0.246	0.236	0.229	0.233	0.165	0.113	0.071	0.019	0.017	19,812,168	18,459,108	19,940,806	19,910,835	20,466,081
36-40	0.235	0.224	0.221	0.212	0.206	0.179	0.190	0.138	0.095	0.043	20,580,855	19,663,179	18,321,136	19,791,536	19,761,982
41-45	0.235	0.211	0.201	0.198	0.190	0.179	0.203	0.213	0.161	0.117	22,663,512	20,365,985	19,457,459	18,130,901	19,585,647
46-50	0.230	0.211	0.190	0.180	0.178	0.208	0.203	0.224	0.234	0.181	21,738,585	22,320,148	20,056,554	19,161,164	17,857,034
51-55	0.194	0.192	0.175	0.157	0.149	0.345	0.247	0.239	0.257	0.265	19,122,955	21,252,801	21,819,662	19,605,490	18,729,237
56-60	0.172	0.141	0.139	0.127	0.114	0.367	0.398	0.299	0.287	0.300	16,061,197	18,465,213	20,520,682	21,065,052	18,925,138
61-65	0.172	0.124	0.102	0.101	0.092	0.367	0.415	0.437	0.337	0.322	12,239,416	15,196,090	17,461,534	19,403,599	19,914,024
66-70	0.152	0.126	0.091	0.075	0.074	0.377	0.413	0.448	0.464	0.364	9,710,302	11,304,880	14,036,814	16,125,198	17,917,525
70-89	0.069	0.072	0.071	0.062	0.052	0.417	0.429	0.447	0.470	0.487	23,814,098	24,701,480	26,325,510	30,082,950	35,126,973
18-89	0.206	0.190	0.178	0.167	0.159	0.227	0.222	0.216	0.209	0.200	216,508,806	224,578,501	230,316,966	234,277,740	237,303,467
% Decrease in Prevalence from Status Quo	0.00%	0.16%	0.28%	0.39%	0.44%										



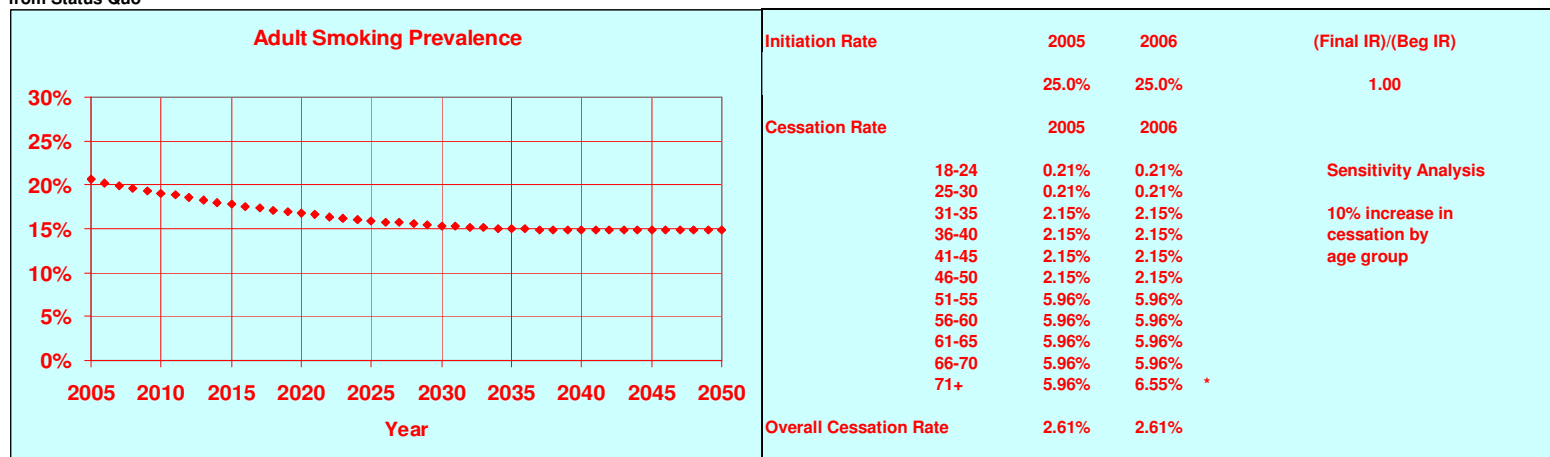
Age Group	Current Smokers					Former Smokers					Population				
	Year					Year					Year				
	2005	2010	2015	2020	2025	2005	2010	2015	2020	2025	2005	2010	2015	2020	2025
18-24	0.247	0.247	0.248	0.248	0.248	0.030	0.002	0.002	0.002	0.002	28,170,884	28,809,290	28,119,208	26,494,277	26,229,137
25-30	0.258	0.247	0.242	0.245	0.245	0.098	0.051	0.007	0.005	0.005	22,594,835	24,040,328	24,257,599	24,506,737	22,790,690
31-35	0.249	0.246	0.236	0.229	0.233	0.165	0.113	0.071	0.019	0.017	19,812,168	18,459,108	19,940,806	19,910,835	20,466,081
36-40	0.235	0.224	0.221	0.212	0.206	0.179	0.190	0.138	0.095	0.043	20,580,855	19,663,179	18,321,136	19,791,536	19,761,982
41-45	0.235	0.211	0.201	0.198	0.190	0.179	0.203	0.213	0.161	0.117	22,663,512	20,365,985	19,457,459	18,130,901	19,585,647
46-50	0.230	0.211	0.190	0.180	0.178	0.208	0.203	0.224	0.234	0.181	21,738,585	22,320,148	20,056,554	19,161,164	17,857,034
51-55	0.194	0.192	0.175	0.157	0.149	0.345	0.247	0.239	0.257	0.265	19,122,955	21,252,801	21,819,662	19,605,490	18,729,237
56-60	0.172	0.143	0.141	0.129	0.116	0.367	0.396	0.297	0.285	0.298	16,061,197	18,465,213	20,520,682	21,065,052	18,925,138
61-65	0.172	0.125	0.104	0.103	0.094	0.367	0.414	0.435	0.335	0.320	12,239,416	15,196,090	17,461,534	19,403,599	19,914,024
66-70	0.152	0.124	0.090	0.075	0.074	0.377	0.415	0.449	0.464	0.364	9,710,302	11,304,880	14,036,814	16,125,198	17,917,525
70-89	0.069	0.072	0.071	0.061	0.052	0.417	0.429	0.448	0.470	0.487	23,814,098	24,701,480	26,325,510	30,082,950	35,126,973
18-89	0.206	0.191	0.178	0.167	0.159	0.227	0.222	0.216	0.209	0.200	216,508,806	224,578,501	230,316,966	234,277,740	237,303,467
% Decrease in Prevalence from Status Quo	0.00%	0.12%	0.20%	0.26%	0.30%										



Age Group	Current Smokers					Former Smokers					Population				
	Year					Year					Year				
	2005	2010	2015	2020	2025	2005	2010	2015	2020	2025	2005	2010	2015	2020	2025
18-24	0.247	0.247	0.248	0.248	0.248	0.030	0.002	0.002	0.002	0.002	28,170,884	28,809,290	28,119,208	26,494,277	26,229,137
25-30	0.258	0.247	0.242	0.245	0.245	0.098	0.051	0.007	0.005	0.005	22,594,835	24,040,328	24,257,599	24,506,737	22,790,690
31-35	0.249	0.246	0.236	0.229	0.233	0.165	0.113	0.071	0.019	0.017	19,812,168	18,459,108	19,940,806	19,910,835	20,466,081
36-40	0.235	0.224	0.221	0.212	0.206	0.179	0.190	0.138	0.095	0.043	20,580,855	19,663,179	18,321,136	19,791,536	19,761,982
41-45	0.235	0.211	0.201	0.198	0.190	0.179	0.203	0.213	0.161	0.117	22,663,512	20,365,985	19,457,459	18,130,901	19,585,647
46-50	0.230	0.211	0.190	0.180	0.178	0.208	0.203	0.224	0.234	0.181	21,738,585	22,320,148	20,056,554	19,161,164	17,857,034
51-55	0.194	0.192	0.175	0.157	0.149	0.345	0.247	0.239	0.257	0.265	19,122,955	21,252,801	21,819,662	19,605,490	18,729,237
56-60	0.172	0.143	0.141	0.129	0.116	0.367	0.396	0.297	0.285	0.298	16,061,197	18,465,213	20,520,682	21,065,052	18,925,138
61-65	0.172	0.126	0.105	0.104	0.095	0.367	0.413	0.434	0.334	0.319	12,239,416	15,196,090	17,461,534	19,403,599	19,914,024
66-70	0.152	0.125	0.092	0.076	0.076	0.377	0.414	0.447	0.463	0.362	9,710,302	11,304,880	14,036,814	16,125,198	17,917,525
70-89	0.069	0.072	0.070	0.061	0.051	0.417	0.429	0.449	0.471	0.488	23,814,098	24,701,480	26,325,510	30,082,950	35,126,973
18-89	0.206	0.191	0.178	0.168	0.160	0.227	0.222	0.216	0.209	0.200	216,508,806	224,578,501	230,316,966	234,277,740	237,303,467
% Decrease in Prevalence from Status Quo	0.00%	0.09%	0.14%	0.17%	0.19%										



Age Group	Prevalence										Population				
	Current Smokers					Former Smokers									
	2005	2010	2015	2020	2025	2005	2010	2015	2020	2025	2005	2010	2015	2020	2025
18-24	0.247	0.247	0.248	0.248	0.248	0.030	0.002	0.002	0.002	0.002	28,170,884	28,809,290	28,119,208	26,494,277	26,229,137
25-30	0.258	0.247	0.242	0.245	0.245	0.098	0.051	0.007	0.005	0.005	22,594,835	24,040,328	24,257,599	24,506,737	22,790,690
31-35	0.249	0.246	0.236	0.229	0.233	0.165	0.113	0.071	0.019	0.017	19,812,168	18,459,108	19,940,806	19,910,835	20,466,081
36-40	0.235	0.224	0.221	0.212	0.206	0.179	0.190	0.138	0.095	0.043	20,580,855	19,663,179	18,321,136	19,791,536	19,761,982
41-45	0.235	0.211	0.201	0.198	0.190	0.179	0.203	0.213	0.161	0.117	22,663,512	20,365,985	19,457,459	18,130,901	19,585,647
46-50	0.230	0.211	0.190	0.180	0.178	0.208	0.203	0.224	0.234	0.181	21,738,585	22,320,148	20,056,554	19,161,164	17,857,034
51-55	0.194	0.192	0.175	0.157	0.149	0.345	0.247	0.239	0.257	0.265	19,122,955	21,252,801	21,819,662	19,605,490	18,729,237
56-60	0.172	0.143	0.141	0.129	0.116	0.367	0.396	0.297	0.285	0.298	16,061,197	18,465,213	20,520,682	21,065,052	18,925,138
61-65	0.172	0.126	0.105	0.104	0.095	0.367	0.413	0.434	0.334	0.319	12,239,416	15,196,090	17,461,534	19,403,599	19,914,024
66-70	0.152	0.126	0.093	0.077	0.076	0.377	0.413	0.446	0.462	0.361	9,710,302	11,304,880	14,036,814	16,125,198	17,917,525
70-89	0.069	0.071	0.069	0.060	0.051	0.417	0.430	0.449	0.471	0.488	23,814,098	24,701,480	26,325,510	30,082,950	35,126,973
18-89	0.206	0.191	0.178	0.168	0.160	0.227	0.222	0.216	0.209	0.200	216,508,806	224,578,501	230,316,966	234,277,740	237,303,467
% Decrease in Prevalence from Status Quo	0.00%	0.08%	0.14%	0.17%	0.19%										



REFERENCES

- CDC (Centers for Disease Control and Prevention). 2005. Cigarette smoking among adults—United States, 2003. *Morbidity and Mortality Weekly Report* 54(20):509-528.
- Mendez D, Warner KE, Courant PN. 1998. Has smoking cessation ceased? Expected trends in the prevalence of smoking in the United States. *American Journal of Epidemiology* 148(3):249-258.

L

Controlling the Retail Sales Environment: Access, Advertising, and Promotional Activities

Robert L. Rabin
Stanford University
School Law

RESTRICTIONS ON YOUTH ACCESS

Introduction

In the 1990s, the attention of the public health community came to focus, among other concerns, on youth access to tobacco products. In part, this attentiveness reflected the persisting high number of underage smokers and the continuing indications in the trend data that no significant inroads were being made in reducing the initiation and prevalence of youth smoking (Johnston et al. 2004b). But the emerging public health concern for supply-side strategies also indicated a sense of disenchantment with the efficacy of information-based, demand-side smoking reduction strategies, such as in-school programs. In addition, at that time, counter-advertising strategies aimed at reformulating youth attitudes towards tobacco use—once again, a demand-side set of initiatives—had yet to provide any indication of success. To the contrary, taking into account the broader vantage point of advertising and promotion engaged in by the tobacco industry to encourage youth smoking, it appeared quite clear that the industry had the upper hand (DiFranza et al. 1991).

The case for the legitimacy of the state’s engaging in youth access protection activity was firmly grounded: The rationale of a state’s undertaking child protection activity rests on long-standing tradition. Reflecting this tradition, tobacco sales to minors were illegal in every state (in most cases, with an age limitation of 18 years). Hence, proactive enforcement of youth access restrictions simply reflected implementation of sanctions on illegal conduct. As a policy choice, however, in contrast to a question of legal authority, the case is not quite so clear-cut. Glantz (1996), among others, has argued that vigorous enforcement of youth access restrictions is a highly problematic public health strategy on the grounds that it is likely to make smoking—as a “forbidden fruit” and one proscribed by “authority”—more attractive to youth, rather than less so (Glantz 1996). Whatever the merits of this argument, clearly the dominant strand in 1990s thinking was that supply-side restriction, in the form of more effective youth access limitations, was a strategy worth pursuing.

Youth Access: 1990–2001

In 1992, Congress enacted the Synar Amendment, aimed at addressing the continuing illegal sales of tobacco to minors (Section 1926, Public Health Service Act [42 USC 300x-26] 2004). This legislation required that all states enact and enforce youth access laws, with the sanction of

loss of federal block grant substance abuse and treatment funding for noncomplying states. Under subsequently adopted Department of Health and Human Services (DHHS) regulations, states were required to reduce the rate of retailer violations of youth access laws to 20 percent or less by 2003 (DHHS 1996).

In a complementary mode, the Federal Drug Administration (FDA) adopted a comprehensive set of youth regulations in 1996 that included a major compliance check program under the auspices of the agency. The regulations had a short shelf-life, however: The FDA program was invalidated by the U.S. Supreme Court in 2000 on the grounds that tobacco regulation was outside the scope of the agency's authority (*FDA v. Brown & Williamson*, 2000).

As mentioned above, every state has baseline legislation prohibiting sales to minors. Both the Synar Amendment and the failed FDA effort reflect the fact that in the 1990s, when attention came to focus on youth access, there was a widespread perception that states and localities were simply not enforcing these provisions with any vigor. Rigotti (2001) documents a considerable number of studies, beginning in 1987 and extending well into the 1990s, revealing widespread merchant indifference to the laws and a like indifference on the part of enforcement authorities (Rigotti 2001).

Indifference is, of course, quite a different matter from disagreement in principle, and Rigotti (2001) asserts that in fact there is widespread agreement among tobacco control activists and public health experts on the provisions that would be incorporated in a model access restriction law. In summary, the principal guideposts Rigotti (2001) mentions are: (1) establish a minimum age of at least 18, (2) require that retailers establish proof of age through checking identification, (3) create a tobacco sales licensing scheme, (4) require periodic tests of retailers' compliance, (5) establish administrative or civil law penalties for illegal sales, and (6) prohibit self-service displays of tobacco products (IOM 1994).

The existing state and local laws on the books, as might be expected, incorporate many of these provisions. However, there were almost no data on ongoing enforcement levels, so it was impossible to conclude with any confidence whether enforcement practices had changed in any meaningful way from the rather dismal record of the period immediately before the Synar Amendment was enacted. Moreover, in a considerable number of instances, local ordinances that appeared strong, at least as written, were diluted by weaker state laws preempting inconsistent local provisions.

In 1996, once the Synar Amendment came into effect, the logical inquiry was whether it would exert an independent positive influence on state and local enforcement practices. In the early years, this appears not to have been the case. In an analysis of 1997 substance abuse block grant applications from all states, DiFranza (1999) concluded that "states and DHHS are violating the statutory requirements of the Synar Amendment rendering it ineffective" (DiFranza 1999). In a subsequent study of state Synar compliance through 2000, however, DiFranza and Dussault (2005) find a more positive state of affairs (DiFranza and Dussault 2005). Despite some leniency in holding states to established targets, as DHHS pressured some states to move from educational to compliance-testing strategies, states made considerable progress in achieving maximum 20 percent noncompliance goals.

In the late 1990s, a number of studies were conducted of communities that engaged in proactive enforcement, aimed at assessing the efficacy of these efforts. Initially, these studies generally took reduction in access as an outcome measure (i.e., merchant compliance rates, as measured by failed efforts by minors to successfully purchase tobacco products), rather than reduction in smoking initiation or prevalence. These earlier studies were generally uncontrolled, rather than

matched with non-proactive communities sharing like demographic characteristics. Later studies made an effort to measure effects on smoking activity through self-reports from sample youth populations in the communities and also were designed as controlled studies. Rigotti (2001) analyzes the studies in detail through 2001 and concludes that the results, in terms of efficacy, are mixed at best.

The first wave of studies to examine the impact of tobacco sales laws assessed intermediate endpoints (merchant compliance laws) and clearly demonstrated that enforcing the laws changed retailer behavior. Enforcement must continue to be done regularly to remain effective. The relative effectiveness of different penalties as deterrents to selling tobacco to minors has not been systematically studied (Stead and Lancaster 2000).

The second wave of studies uses youth access to tobacco and tobacco use as outcomes. These studies have yet to provide conclusive evidence that interventions using retailer education or law enforcement alone can change the ease with which young people obtain tobacco products. Because interventions have not been able to interrupt the supply of tobacco to minors, it is not surprising that they have not been clearly shown to reduce youth tobacco use (DiFranzia 2000; Rigotti 1999; Stead and Lancaster 2000). Existing studies have not been able to provide a rigorous test of the supply reduction hypothesis because it has proved difficult to mount interventions that substantially reduce the supply of tobacco to minors (Rigotti 2001).

Another variable that warrants further exploration—both in future efficacy studies and as a more general policy matter—is the nature of the sanctions attached to violation of youth access laws. Existing laws have ordinarily relied on fines and penalties assessed against errant merchants; a stronger sanction obviously would be the threat of loss of license to sell tobacco products (Fichtenberg and Glantz 2002).¹ But penalizing merchants does not exhaust the field. Another approach, either complementary or independently, would be to criminalize either purchase or possession. In other words, relying from a deterrence perspective on the threat of criminal sanction against the purchasing minor (demand side) as well as the vendor of the product. In tandem, these sanctions might prove more efficacious than relying exclusively on punishing the seller.

However, these alternative sanctioning approaches nonetheless fail to address, in themselves, two critical dimensions of the problem in reducing tobacco use by minors. At the threshold, there is the temporal concern—that is, the very real prospect that a short-term commitment to vigorous enforcement will yield only short-term effects—that staying power has yet to be demonstrated. The still more complicated factor is the presence of noncommercial sources of tobacco—friends and family—as alternative sources, which appear to play a more significant role when commercial sources are perceived to be less available.

Recent Analyses: Post-2001

Once again, it is critical to keep in mind three distinct possible outcome measures: (1) changes in merchant compliance (ordinarily measured by “stings,” i.e., test purchasing), (2) changes in ease of access (ordinarily measured by studies of youth perceptions of availability), and (3) changes in youth smoking behavior (ordinarily measured by trends in smoking initiation or prevalence).

In a recent study of perceived ease of access, based on *Monitoring the Future* data, 1997–2002, Johnston and colleagues (2004a) find that perceived ease of access is linked to smoking

¹ It should be noted, however, that a majority of states already have licensing statutes on the books, and this datum has had no discernable deterrent effect in restricting youth access.

consumption: current regular smokers are significantly more likely to report easy access than never-smokers or past smokers (Johnston et al. 2004a). Moreover, a strikingly high percentage of current smokers (65 percent) report obtaining cigarettes from noncommercial sources (friends, relatives) within the past 30 days.

Gilpin and colleagues (2004) provide confirmatory findings, based on analysis of population data from the California Tobacco Surveys, in a study of two cohorts of adolescent smokers in California, 1993–1996 and 1996–1999 (Gilpin et al. 2004). In the earlier cohort, without significant change throughout the period in level of enforcement activity, there was no noticeable difference in transitioning into the current smokers category between those who perceived cigarettes as difficult to obtain and those who perceived this as an easy matter. In the later period, when there was considerably higher enforcement activity, there was a significantly higher transition to current smoking among those who perceived access as easy at the beginning of the period compared to those who perceived it as difficult. After controlling for changes in other regulatory control variables, the authors conclude that higher levels of enforcement had a protective effect, reinforcing the propensity of never-smokers to avoid initiation.

The Johnston and colleagues (2004b) study also confirms the finding across numerous studies that social sources of cigarettes undercut the benefits achieved from reducing availability from commercial sources. At the same time, however, Johnston and colleagues (2004b), along with the confirmatory findings in Gilpin and colleagues (2004), suggest a more subtle corollary: even if confirmed smokers do find alternative sources of tobacco—“friendly” commercial establishments or social sources and if commercial access generally is constrained, never-smokers or past-smokers may well be dissuaded from commencing or recommencing smoking by perceptions of difficulty in obtaining tobacco products.

But there is conflicting evidence on virtually every dimension of the youth access problem. Dent and Biglan (2004) draw on Oregon Healthy Teens data to survey 8th and 11th grade students from 75 communities in the state regarding the relationship between illegal sales activities and prevalence of tobacco use (Dent and Biglan 2004). Although the findings do indicate a weak relationship between illegal sales rates and smoking prevalence among 11th graders, the dominant finding in the study is the extent to which adolescents adjust their tobacco sources to the available outlets—in particular, the pronounced effect of youths’ shifting to social sources when commercial sources become more problematic.

Fichtenberg and Glantz (2002) stake out an even stronger position in a review essay on the eight studies they were able to identify, conducted between 1985 and 2001, in which an effort was made to conduct cohort studies of the association between youth access merchant compliance programs (featuring sting operations) and smoking prevalence (Fichtenberg and Glantz 2002). The authors concluded that no positive association has been established between these youth access interventions and prevalence of youth smoking. Once again, they speculate that the lack of association is largely determined by the availability of noncommercial sources.

Finally, on the independent issue of youth perceptions of availability, as distinguished from smoking behavior, Thomson and colleagues (2004) examine a database of all town-level access ordinances in Massachusetts, and in a cross-sectional analysis finds no significant association between communities with high-level restrictions and adolescent perceptions of availability, apart from those communities that had banned free-standing displays of tobacco products (where a positive association was present) (Thomson et al. 2004).

Summary

While the efficacy of proactive enforcement has yet to be firmly established, it can be argued that continued efforts at supply-side access restrictions are warranted, not as the endpoint of an effective tobacco control policy, but as a complementary component of a comprehensive package of control initiatives, if for no other reason than the symbolic value of demonstrating that the public commitment to reducing tobacco use in the critical early years of smoking initiation is not simply a matter of lip-service. In their recent analysis of state compliance with the Synar Amendment, 1992–2000, DiFranzia and Dussault (2005) cautiously suggest:

It is certainly plausible that Synar has contributed to this salubrious trend [a 30 percent decrease in youth smoking rates since Synar went into effect] as one component of a multifaceted public health effort that has included price hikes, education, anti-smoking media campaigns, limited restrictions on tobacco marketing, and restrictions on public smoking. It would therefore seem wise to maintain this policy while its impact is carefully evaluated (DiFranzia 2005, *supra* note 11 at 98).

Beyond this, on the basis of presently available data, it cannot be predicted with any degree of confidence that positive outcome determinations in smoking prevalence will result from investing resources in proactive merchant compliance activities.

POINT-OF-PURCHASE PROMOTIONS AND ADVERTISING

Introduction

With the adoption of the Master Settlement Agreement (MSA) in 1998, billboard advertising was prohibited, brand item advertising was limited, and the public entertainment forum advertising was sharply restricted. As a consequence, there was a dramatic shift in the tobacco industry's advertising and promotion budgets. Pierce and Gilpin (2004) report that by 2001, more than 80 percent of the total advertising and promotion expenditures by the industry were targeted at incentives to merchants and retail value-added offers; in short, retail marketing became the dominant strategy (Pierce and Gilpin 2004).

The main venues of such advertising are convenience stores, small grocery stores (often in tandem with the sale of gas), liquor stores, chain supermarkets, and chain pharmacies, with youth access especially concentrated at the first two of these sources. Concomitantly, it appears that a notably disproportionate share of the industry's advertising and promotion budget, as detailed below, is channeled to those outlets where underage youths tend to hang out or make purchases, raising serious questions as to the efficacy of the MSA advertising limitations in addressing the problem of underage smoking.

Indeed, contractual arrangements regarding placement and promotional initiatives are highly site-specific. In the case of independent stores, manufacturers' representatives generally make site visits to discuss these matters while arrangements with chains are more commonly conducted through dealings with the central retailing office.

What are the principal strategies used in the retail environment? For analytical purposes, it is possible to identify a set of promotional policies and a set of pricing strategies. The former would include product placement initiatives, such as self-service displays. As indicated in the preceding section on youth access, self-service readily lends itself to shoplifting, as well as providing a particularly prominent enticement to an on-the-spot purchase attempt. Apparently, however, self-service is on the decline as a voluntary matter: Retailers don't like it, precisely because

of the pilferage problem, and at least one of the tobacco manufacturers—Philip Morris, in fact—has come down against the practice, most likely as part of its effort to present a better image.

Closely related to self-service as a strategy is a broader set of height and visibility display considerations, which are in fact the subject of detailed specification in the manufacturer–retailer contract, indicating the importance of these marketing considerations to the tobacco companies. Related to these specifications are the so-called slotting fees, which are industry fees paid to retailers in the form of discounts linked to advantageous placement and promotion vis-à-vis competing brands. In addition to product placement itself, these merchandising strategies address an array of product accessories: signage (e.g., discount deals), logos, banners, display racks, and window posters.

The second set of strategies involves pricing policies. So-called “buy-downs” feature inventory clearance deals, which are time-constrained discounts. Then, there is the most basic of pricing strategies: straight volume discounts. Finally, there are an array of other stratagems, ranging from “buy one, get one free” to coupon-related inducements. In tandem with the promotional strategies, these initiatives constitute the industry’s current effort to shift directions, post-MSA, from the traditional mass medium advertising to a frame of reference that is much closer to the potential buyer’s immediate impulse for gratification.

Retail Environment: Magnitude of the Concern

In 2000, tobacco manufacturers spent \$4.26 billion on point-of-sale advertising and promotional programs and \$3.52 billion on retail value-added items (e.g., free gifts, multipack discounts). Such expenditures totaled 81.2 percent of cigarette manufacturers’ marketing budgets for the year. In the same year, a study by Wakefield and colleagues (2000) found that 80 percent of retail outlets surveyed had interior tobacco advertising displays, 60 percent had exterior advertising, and 70 percent used tobacco product-endorsed functional items (e.g., floormats, clocks) within the store (Wakefield et al. 2000). A study of California retail outlets found that 94 percent of stores displayed tobacco advertisements (Feighery et al. 2001). A 42-state survey conducted in 1999 found that 92 percent of stores contained point-of-purchase advertising for tobacco products (Feighery et al. 2003).

The prime advertising space within most stores is the radius around the checkout counter. A study conducted in California found close to 90 percent of tobacco marketing materials within 4 feet of store checkout counters. A similar study found that nearly 50 percent of surveyed California retailers posted tobacco product advertisements at 3 feet or lower in height, easy eyelevel for young children. Additionally, 23 percent of stores had cigarette product displays in close proximity to candy, another high value to volume item that is attractive to youth (Feighery et al. 2001).

Store advertising may vary with the store size, store type, and demographics of the neighborhood in which the shop is located. A study of neighborhoods in Boston revealed that the number of stores in an area selling tobacco products was related to the neighborhood’s economic status. In a region with a recorded per capita income in 1989 of \$7,620, 19.4 percent of stores sold tobacco products. By contrast, in an affluent neighborhood with a \$46,490 per capita income, only 3.7 percent of stores sold tobacco. The study also found that lower-income and minority neighborhood stores were more likely than their affluent counterparts to advertise mentholated cigarettes and to post a greater number of tobacco advertisements on the exterior of the store (Laws et al. 2002).

Retail Environment: Marketing Strategies

Point-of-purchase marketing efforts by tobacco manufacturers take several main forms. Feighery and colleagues (2003) conducted in-depth interviews with 29 tobacco retailers in the United States to determine the type and extent of relationships between tobacco manufacturers and retailers (Feighery et al. 2003). In addition to the production and distribution of marketing materials (i.e., posters, packaging), tobacco manufacturers cultivate direct relationships with retailers in order to achieve the desired placement of their products and materials within stores. Along with slotting fees—direct payments to retailers for prime product placements—manufacturers also offer trade promotions and special offers to retailers as provisions in the retail sales agreement. In the Feighery and colleagues (2003) study, most of the retailers surveyed reported having contracts with tobacco companies at some point. Contract provisions include volume discount offers for stores fulfilling minimum sales volume levels. Such promotional offers, however, tend to be accompanied by requirements that the retailer conform to specifications about product placement within the store.

Buy-downs are another prominent promotional incentive offered by manufacturers to retailers. Buy-downs are used to place a store's existing inventory on sale. Manufacturers will approve a certain reduction in the sale price of their products. The retailer sells its inventory at that reduced price and collects a reimbursement from the manufacturer at a later date. To participate in the buy-down, a retailer must agree to erect special product displays and other promotional signs. One retailer interviewed in the Feighery and colleagues (2003) study reported that manufacturers have reduced their use of "give-aways," such as T-shirts, cameras, hats, and other promotional products that would be offered free with purchase of tobacco products in the wake of the increased tobacco lawsuits. Instead, the companies have increased their use of techniques such as buy-downs.

As noted, a proviso of the manufacturer's promotional offers is that participating retailers comply with product placement specifications. Placement requirements may differ between firms in the industry and among the specific contracts that each company maintains. However, some trends are worthy of note. Tobacco manufacturers vie for the space closest to the cashier area and for eye-level placement within that space. One retailer told Feighery that manufacturers now want to keep their cigarette products behind the service counter and not in self-service displays because of legislative compliance concerns.

Placement of signage is also largely controlled by manufacturers. Companies produce diagrams to show where their advertisements and posters should be placed within the store. Again, line of vision and proximity to the checkout area are the prime considerations.

Relationships with tobacco manufacturers can prove exceptionally lucrative for tobacco retailers. Convenience store owners reported annual benefits worth up to \$20,000 for fully complying with the marketing programs of tobacco companies (Bloom 2001).

PUBLIC POLICY OPTIONS

As suggested above, there seems to be a consensus among researchers in attributing the rise in slotting fee and trade promotion expenditures—indeed, in the entire array of retail marketing incentives—to the tobacco industry's attempt to offset the impact of the ban on billboard advertising and related measures in the MSA. Along parallel lines, Slater and colleagues (2001) found that Philip Morris was significantly more likely to offer a gift-with-purchase promotion for Marlboros in states with comprehensive tobacco control programs than in states without such controls

(Slater et al. 2001). Regulations aimed at retail outlet advertising and/or promotion may be deemed necessary to close this major loophole in the MSA. Bloom (2001), in his survey of slotting fees and product promotions, discusses an array of options that policy makers might consider by way of limiting the recent shift in industry strategy (Bloom 2001).

First, Bloom (2001) suggests that government entities could impose a full ban on slotting fees and trade promotions by tobacco companies. He cites similar action taken by the Bureau of Alcohol, Tobacco and Firearms in 1995 in an attempt to protect small wineries and breweries from being ousted from retail shelves due to high product placement fees paid to large retailers by the major alcohol producers. An outright ban could serve to alleviate the economic pressure felt by retailers to court the big tobacco manufacturers and thereby become their political allies on issues related to teen smoking. Bloom (2001) notes, however, that such a ban could have unwanted effects. As noted above, tobacco companies spend exorbitant amounts of money every year on such promotional fees, money that would remain in the pockets of the industry if such payments were banned. Bloom (2001) suggests that tobacco companies might use these savings to facilitate reductions in product price, an effect that might actually increase youth access to tobacco products.

Another option might be to regulate retail prices as a means of preventing retailers from passing on manufacturer-created price breaks to customers. Bloom (2001) refers to a New York regulatory scheme that prohibits retailers from selling tobacco products below cost (plus a statutorily required markup). He contends that by limiting the degree to which manufacturers' special offers can actually affect the market price, states can diminish the stimulation of demand through trade promotions. On this score, however, in a comparative study of states with and without retail minimum price controls—half of the states fall into each category—Feighery and colleagues (2005) found no conclusive evidence that states with controls had lower prices or lower retailer participation rates in these promotional programs (note, however, that these programs, with the exception of New York's, do not exclude promotional programs from their minimum price formulas) (Feighery et al. 2005).

Still other regulatory options, such as elimination of self-service displays and restrictions on signage—or requirements for antismoking warning signage—would take direct aim at the retailing environment. The likely efficacy of these measures varies. One can question whether more prominent warning signage at the point of sale would add much, if anything, as a deterrent to consumption decisions by minors intent on making illegal purchases. Self-service display bans, by contrast, may very well have a salutary effect, as discussed above. But this practice appears to be on the way out in any event. When one turns to more restrictive controls on advertising and promotion in the retail setting, constitutional considerations, discussed briefly in the following section, become a matter of considerable salience.

It would be possible to address controls on the retail sales environment from a distinctly different perspective—namely, placing limits on the number of retail outlets in a particular community. As discussed in Holder (2004), this strategy has been employed, at times, in the context of retail sales of alcoholic beverages (Holder 2004). Licensing schemes and public monopoly systems are two methods states have used to limit alcohol retailers in their jurisdictions. Under a licensing scheme, the state requires retailers to obtain a license in order to sell alcohol products. Licenses are issued for a limited period and require reapplication for renewal. Retailer density can be controlled directly by the licensing body either by limiting the total number of licenses distributed or by limiting the density of licenses within geographic areas. Imposing prohibitive application fees can also serve as an indirect limit on the number of retailers in an area. A public

monopoly system prohibits the sale of a certain product by private retailers and establishes the state (or local government) as the sole distributor of the good.

The rationale for these measures is that reducing the number and density of outlets makes access to the product less convenient and increases the opportunity cost of using the product (i.e., the time and resources expended on search costs) (Shipman 1940). While either of these approaches may succeed in limiting the supply and availability of tobacco products, it should be noted that neither approach is targeted directly at youth access. Rather, the strategies would impact all consumers of tobacco.

It would probably be hard to justify outlet restriction as a primary strategy for reducing youth access to tobacco—it would be regarded as overkill because of spillover effects to adults if this were the principal justification. In the Holder (2004) study just cited, reduction in youth access is regarded as a salutary secondary consequence of policy reasons for reducing the number of outlets for the purchase of liquor across the board.

Then the question becomes whether the “inconvenience effects” (search costs) of outlet restriction can serve as a direct justification, or strategy, for reducing tobacco consumption across the board (i.e., not just for youth). Interestingly, the present array of strategies that impose inconvenience effects do so as a secondary consequence of achieving other goals. In particular, second-hand smoke zoning-type restrictions on smoking in public accommodations, which are justified on the grounds of either health effects or public nuisance effects on nonsmokers (with inconvenience to smokers and consequent reduction in smoking serving as a collateral benefit). These considerations, along with the obvious opposition of current tobacco sales outlets, suggest the formidable political barriers that would confront an outlet restriction strategy.

CAVEAT: THE LORILLARD CASE AND THE FIRST AMENDMENT

In *Lorillard Tobacco Company v. Reilly* (533 U.S. 525 [2001]), the U.S. Supreme Court invalidated Massachusetts regulations and adopted as a more stringent supplement to the restrictions on advertising in the MSA that prohibited outdoor advertising within 1,000 feet of schools (including, in particular, billboard advertising) and proscribed certain retail sales practices, such as displaying tobacco product advertising lower than 5 feet from the floor of the establishment. The Supreme Court left only the narrowest of the regulations in place—a ban on self-service displays—on the tailored rationale that the self-service proscription was not aimed at advertising but at product placement per se (with ease of underage access the immediate basis for the prohibition).

The case has been read by many antitobacco activists as sounding a virtual death knell for regulation of advertising at point of purchase, and not without some basis in fact. *Lorillard v. Reilly* stands on a two-pronged foundation: First, the commercial speech doctrine as enunciated in *Central Hudson Gas & Elec. Corp. v. Public Service Commission of New York* (447 U.S. 557 [1980]), and broadly applied in *Liquormart, Inc. v. Rhode Island* (517 U.S. 484 [1996]), and second, the statutory preemption provision in the Federal Cigarette Labeling and Advertising Act of 1966 which, as interpreted in *Cipollone v. Liggett Group, Inc.* (505 U.S. 504 [1992]) establishes immunity from tort suits based on claims of failure to adequately warn to tobacco advertisements complying with the labeling requirements of the statute.

The broad reach of the latter provision is evident in the Supreme Court’s assertion that “a distinction between state regulation of the location as opposed to the content of cigarette advertising has no foundation in the text of the pre-emption provision.” Most of the constraints on product placement and advertising content in the retail setting are put in jeopardy by one or the other

prong of *Lorillard v. Reilly*, just as the 5-feet-or-lower proviso is explicitly struck down. At the same time, however, *Lorillard v. Reilly* would seem to have no bearing on measures aimed at outlet limitations or other price-related discount restrictions.

REFERENCES

- Bloom PN. 2001. Role of slotting fees and trade promotions in shaping how tobacco is marketed in retail stores. *Tobacco Control* 10(4):340-344.
- Dent C , Biglan A. 2004. Relation between access to tobacco and adolescent smoking. *Tobacco Control* 13(4):334-338.
- DHHS (Department of Health and Human Services). 1996. *45 CFR Part 96, Tobacco Regulation for Substance Abuse Prevention and Treatment Block Grants; Final Rule*. Federal Register: 1492-1509.
- DiFranza JR. 1999. Are the federal and state governments complying with the Synar Amendment? *Archives of Pediatric and Adolescent Medicine* 153(10):1089-1097.
- DiFranza JR. 2000. Youth access: the baby and the bath water. *Tobacco Control* 9:120-121.
- DiFranza JR , Dussault GF. 2005. The federal initiative to halt the sale of tobacco to children—the Synar Amendment, 1992-2000: lessons learned. *Tobacco Control* 14(2):93-98.
- DiFranza JR, Richards JW, Paulman PM, Wolf-Gillespie N, Fletcher C, Jaffe RD, Murray D. 1991. RJR Nabisco's cartoon camel promotes camel cigarettes to children. *Journal of the American Medical Association* 266(22):3149-3153.
- FDA v. Brown & Williamson C2000; 529 U.S. 120.
- Feighery EC, Ribisl KM, Clark PI, Haladjian HH. 2003. How tobacco companies ensure prime placement of their advertising and products in stores: interviews with retailers about tobacco company incentive programmes. *Tobacco Control* 12(2):184-188.
- Feighery EC, Ribisl KM, Schleicher N, Lee RE, Halvorson S. 2001. Cigarette advertising and promotional strategies in retail outlets: results of a statewide survey in California. *Tobacco Control* 10(2):184-188.
- Feighery EC, Ribisl KM, Schleicher NC, Zellers L, Wellington N. 2005. How do minimum cigarette price laws affect cigarette prices at the retail level? *Tobacco Control* 14(2):80-85.
- Fichtenberg CM, Glantz SA. 2002. Youth access interventions do not affect youth smoking. *Pediatrics* 109(6):1088-1092.
- FTC (Federal Trade Commission). 2001. *Federal Trade Commission Cigarette Report for 1999*.
- Gilpin EA, Lee L, Pierce JP. 2004. Does adolescent perception of difficulty in getting cigarettes deter experimentation? *Journal of Preventive Medicine* 38(4):485-491.
- Glantz SA. 1996. Preventing tobacco use—the youth access trap. *American Journal of Public Health* 86(2):156-158.
- Holder HD. 2004. Supply side approaches to reducing underage drinking: an assessment of the scientific evidence. *Reducing Underage Drinking: A Collective Responsibility*. Washington DC: The National Academies Press. Pp. 458-489.
- IOM (Institute of Medicine). 1994. *Growing Up Tobacco Free: Preventing Nicotine Addiction in Children and Youth*. Washington DC: National Academy Press.
- Johnston LD, O'Malley PM, Terry-McElrath YM. 2004a. Methods, locations, and ease of cigarette access for American youth, 1997-2002. *American Journal of Preventive Medicine* 27(4):267-276.
- Johnston L, O'Malley P, Bachman J, and Schulenberg J. 2004b. *Cigarette Smoking Among American Teens Continues to Decline, but More Slowly Than in the Past*. Web Page. Available at: http://www.monitoringthefuture.org/pressreleases/04cigpr_complete.pdf (accessed April 6, 2006).
- Laws MB, Whitman J, Bowser DM, Krech L. 2002. Tobacco availability and point of sale marketing in demographically contrasting districts of Massachusetts. *Tobacco Control* 11 (Suppl 2):ii71-ii73.
- Pierce JP, Gilpin EA. 2004. How did the Master Settlement Agreement change tobacco industry expenditures for cigarette advertising and promotions? *Health Promotion Practice* 5(3 Suppl):84S-90S.
- Rigotti NA. 1999. Youth access to tobacco. *Nicotine and Tobacco Research* 1(Suppl 2):S93-S97.
- Rigotti N. 2001. Chapter 6—Reducing the Supply of Tobacco to Youths. *Regulating Tobacco*. New York: Oxford University Press. Pp. 143-175.
- Shipman GA. 1940. State administrative machinery for liquor control. *Law and Contemporary Problems* 7:600-620.
- Slater S, Chaloupka FJ, Wakefield M. 2001. State variation in retail promotions and advertising for Marlboro cigarettes. *Tobacco Control* 10(4):337-9.
- Stead LF, Lancaster T. 2000. A systematic review of interventions for preventing tobacco sales to minors. *Tobacco Control* 9:169-176.

- Thomson CC, Gokhale M, Biener L, Siegel MB, Rigotti NA. 2004. Statewide evaluation of youth access ordinances in practice: effects of the implementation of community-level regulations in Massachusetts. *Journal of Public Health Management Practice* 10(6):481-489.
- Wakefield M, Terry YM, Chaloupka F, Barker DC, Slater S, Clark PI/Giovino GA. 2000. *Changes at the Point-of-Sale for Tobacco Following the 1999 Tobacco Billboard Ban*. Chicago: University of Illinois at Chicago.

M

Sales and Marketing of Cigarettes on the Internet: Emerging Threats to Tobacco Control and Promising Policy Solutions

Kurt M. Ribisl

University of North Carolina - Chapel Hill
School of Public Health

Annice E. Kim

University of North Carolina - Chapel Hill
School of Public Health

Rebecca S. Williams¹

University of North Carolina - Chapel Hill
School of Public Health

INTRODUCTION

An editorial in *Tobacco Control* by Connolly (2001) expressed concern about the tobacco industry embracing a relatively unregulated Internet because “many of the public health interventions that we have developed to curb real world lung cancer could go up in a puff of cyber smoke (Connolly 2001). Taxes, ad bans, and youth access laws are easily eroded online.” There is great potential for the sales and marketing of tobacco products on the Internet to undermine the progress that has been made in tobacco control. Experts at the Centers for Disease Control and Prevention (CDC) selected the “recognition of tobacco use as a health hazard and subsequent public health antismoking campaigns” as one of the 10 greatest public health achievements of the twentieth century (CDC 1999). Recent evidence-based reviews (Task Force on Community Preventive Services 2005) and reports by the U.S. Surgeon General (DHHS 2001) have concluded that tobacco control policies and programs account for much of this progress. One of the most potent strategies for reducing tobacco use involves increasing tobacco prices, which is typically accomplished through increasing state and federal excise taxes on tobacco products. When tax-free cigarettes are sold on the Internet, this reduces their price and can undermine the public health benefits of increased cigarette prices. Restricting tobacco product advertising and marketing has

¹ Acknowledgments: Support for this research and the preparation of this appendix was provided by a grant from the Robert Wood Johnson Foundation to the School of Public Health at the University of North Carolina at Chapel Hill (“Examining the Sales Practices of Internet Cigarette Vendors: Implications for Policy Development, Implementation, and Enforcement”—Kurt M. Ribisl, principal investigator). Additional support in the form of dissertation research awards were provided to Annice Kim and Rebecca Williams by the Association of Schools of Public Health (ASPH) with funding by the American Legacy Foundation (Legacy) as part of their Scholarship, Training, and Education Program for Tobacco Use Prevention (“STEP UP”). This appendix does not necessarily represent the views of ASPH, Legacy, Legacy Foundation staff, Legacy’s Board of Directors, the Robert Wood Johnson Foundation, or its Board of Directors.

also reduced consumption, with complete advertising bans having the greatest impact. Since 1971, advertising for tobacco products has been banned on all broadcast media in the United States. Under the 1998 Master Settlement Agreement, Joe Camel and other cartoon characters were banned from appearing in cigarette advertisements, sponsorships were restricted, and cigarette advertisements were banned on billboards and buses. Outside of the United States, many countries have implemented complete bans on all forms of tobacco advertising. The landmark Framework Convention on Tobacco Control, a worldwide public health treaty sponsored by the World Health Organization in 2003 (Shibuya et al. 2003; Taylor and Bettcher 2000), urges all ratifying countries to ban all tobacco advertising (if their constitution permits it), including cigarette advertising on the Internet. The impact of advertising bans and restrictions at home and abroad will be diluted if the tobacco industry aggressively markets its products online and if bans, such as those included in the Framework Convention, are not adequately implemented and enforced.

This appendix addresses two fundamental questions: (1) What are the major threats to tobacco control posed by the sales and marketing of cigarettes on the Internet and (2) what current policies and practices and promising new ones can counteract these threats? The first section provides background on the scope and magnitude of Internet cigarette sales. The next section examines the three major threats to tobacco control efforts: online sales of cheap “tax-free” cigarettes, online marketing and promotional efforts by Internet cigarette vendors and tobacco companies, and online cigarette sales to minors. In the final section we review policies designed to regulate these practices and conclude with a proposed framework for regulating Internet cigarette sales.

BACKGROUND ON INTERNET CIGARETTE SALES

Trends in the Number of Internet Cigarette Vendors

Over the past 6 years, there has been a substantial increase in the number of Internet cigarette vendors. Although there is no national licensing system for Internet vendors that would precisely enumerate the number, researchers have relied on comprehensive web searching strategies to estimate the number of Internet vendors. Ribisl and colleagues (2001) used a standardized searching protocol whereby data collectors manually entered several search strings (e.g., discount cigarettes, tax-free cigarettes) into multiple search engines (Ribisl et al. 2001). This approach identified 88 unique domestic Internet cigarette vendors in January 2000. Unpublished follow-up studies using a similar protocol identified 195 domestic vendors in January 2002 and 338 domestic and international vendors in January 2003. Of the 338 sites found in 2003, 266 (78.7 percent) were domestic, 34 (10.1 percent) were outside the United States, and the location could not be determined for 38 (11.2 percent). In January 2004, 775 Internet cigarette vendors were identified, of which 323 (41.7 percent) were domestic, 347 (44.8 percent) were outside the United States, and the location could not be determined for 105 (13.5 percent). In January 2005, 664 Internet cigarette vendors were identified. Of those vendors, 306 (46.1 percent) were domestic, 300 (45.2 percent) were outside of the United States, and the location could not be determined for 58 (8.7 percent). Although a small number of international vendors were identified in January 2000 and 2002, they were excluded from the sample because the original study focused on domestic vendors and policies that were unique to the United States (e.g., presence of a U.S. Surgeon General’s warning on the site). However, in 2003 and subsequent years, the eligibility criteria were

expanded to include international vendors after a pilot study revealed that their numbers were growing.

The growth in the number of Internet cigarette vendors from 2000 to 2005 could be a true increase or it could simply reflect improvements in the sampling protocol. At each wave of data collection, several sources of information (such as shopping portals and search directories) were used in addition to keyword searching to identify new vendor websites. Starting in 2004, however, keyword searching was replaced with new automated searching strategies developed by Cyveillance, a private sector online risk monitoring and management firm. They entailed deploying specially developed algorithms and intelligent web spiders that reviewed more than 40 million websites, as well as postings to nearly 100,000 message boards and newsgroups and 1 million spam email messages to identify websites that were likely to be Internet cigarette vendors, which were then reviewed by trained research assistants for inclusion in the study.

A small change was also made to the protocol for removing “duplicate” sites. In the first three waves from 2000 to 2003, when two sites appeared to be nearly identical based on visual inspection of the site and the contact information, only one site was coded. However, starting in 2004, each site with a domain name (i.e., website address) was counted as an individual website because they are listed separately on search engines and are rated separately by organizations that collect data on visitor traffic to the site. This minor change in protocol would have a small effect on increasing the number of sites compared to prior waves of data collection. The extent to which the growth in the number of Internet cigarette vendors represents a true increase versus better detection or the revised protocol is currently being explored in an ancillary study. However, it is likely that the increase in the number of vendors identified represents both true growth and better detection methods. It is important to realize that the number of websites identified by these rigorous search strategies is still a lower-bound estimate of the true number of Internet cigarette vendors. First, these studies have only examined sites written in English, and there would be more Internet cigarette vendors if foreign language sites were included. Second, the World Wide Web contains billions of web pages and even the most comprehensive search strategy will miss some sites. Given the dynamic changing nature of the Internet, the searching protocol was modified and improved at each wave with the goal of identifying the highest number of Internet cigarette vendors at each given period.

Location of Internet Cigarette Vendors

Many Internet cigarette vendors are located on tribal lands and countries outside the United States, which presents regulatory and enforcement challenges. In January 2005, among domestic vendors, 63.4 percent appeared to have a Native American affiliation. Sites were coded as having a Native American affiliation if they explicitly mentioned being located on sovereign land or an Indian reservation, or if they featured Native American wording or imagery, such as descriptions of tax-related treaties or pictures of an Indian chief or Native American artwork. In January 2005, the Seneca Indians located on two reservations near Buffalo, New York comprised 77.7 percent of Native American sites. In fact, 98.1 percent of sites in the State of New York were Native American, which explains why New York State has consistently led the nation in the number of websites selling cigarettes. Background information on the Seneca and their retail, mail order, and Internet tobacco operations is provided elsewhere (Ribisl et al. 2001; Tedeschi 2005). Figure M-1 shows the growth and location of Internet cigarette vendors from 2000 to 2004.

Outside of New York, the next greatest concentration of Internet cigarette vendors occurs in southern tobacco-producing states, such as Kentucky, North Carolina, and Virginia. Historically, these states have had low cigarette excise taxes. As of March 18, 2005, the mean excise tax in tobacco-producing states was 19.8 cents per pack compared to 93.1 cents per pack for other states (McMahon 2005). Why would proximity to low cigarette excise taxes be important to Internet cigarette vendors? A newspaper article described how one unemployed North Carolina resident set up *www.CutRateSmokes.com* and operated his small online business out of his home. The owner mentioned selling a carton of Marlboro cigarettes for \$26.50 a carton (plus a flat fee of \$6.00 for shipping), which was a bargain for smokers paying approximately \$70.00 a carton in New York City. Although his source of cigarettes was not identified in the article, presumably he was purchasing them from a North Carolina warehouse club for approximately \$19.99, which would still allow him to resell them online for a small profit. This example illustrates how web vendors located in low-tax states can profitably sell cigarettes to smokers residing in high-tax states. Although the cigarette excise taxes are paid for in the “source” state, they are not being collected and remitted to the revenue department in the “destination” state. Similar to tax-free cigarette sales from Indian reservations, they also constitute a source of tax avoidance because it is very rare for recipients of the cigarettes to pay the back taxes that are owed in their own state.

Another trend is the emergence and growth of Internet cigarette vendors located outside the United States. This may reflect a growth in international vendors or, alternatively, a trend of U.S. Internet cigarette vendors relocating their businesses offshore in order to escape U.S. regulations. Determining the true location of Internet cigarette vendors has become increasingly difficult. Over time, the number of vendors not listing a location for their operations has been increasing. Nevertheless, many vendors make claims that they are selling from “outside of the United States,” “Europe,” or “a duty-free zone.” Table M-1 describes the claimed location of 664 Internet vendors identified in January 2005. The United States led all other countries in the number of English language websites selling cigarettes, followed by Switzerland (22.9 percent), the United Kingdom (1.2 percent), Spain (1.1 percent), and Indonesia (1.1 percent). There were also 34 “international” sites (5.1 percent) and 55 “European” sites (8.3 percent); these regional locations were inferred based on information provided on the site. Neither country nor regional location could be determined for 58 (8.7 percent) sites. Among the 606 sites with country-specific or regional location information, 306 (50.5 percent) were based in the United States and 300 (49.5 percent) were based outside of the United States.

Manufacturers Selling Directly to Consumers

Cigarette manufacturers have traditionally sold their cigarettes to wholesalers or distributors who then sell to the retailers. The retailer then sells the cigarettes to the smoker. Recently, there have been changes in the distribution channel whereby some small manufacturers are now selling their brands directly to consumers via the Internet. Also, some large manufacturers are selling selected brands online. For example, the upscale manufacturer of premium cigarettes, Nat Sherman, sells its own brand on its website (*www.natsherman.com*). Philip Morris, the market leader in the United States, does not sell its cigarette brands online, but R.J. Reynolds sells its supposedly reduced-exposure product, Eclipse (*www.eclipse.rjrt.com*), and provides coupons and other special offers for its generic brand Doral (*www.smokerswelcome.com*) online. The promotional aspects of the Smokers Welcome site and others like it are described in the marketing and promotion section of this chapter. In 2000, the Brown & Williamson Tobacco Company announced that it was going to sell its less popular cigarette brands directly to consumers via

mail order, telephone, and eventually, the Internet. The company established a subsidiary, BWT Direct LLC, because it claimed that scarce shelf space at U.S. retailers forced retailers to stock only the most popular cigarette brands (Fairclough 2000). The company appears to have discontinued its direct sales of cigarettes to consumers. In general, relatively little is known about the market share of direct sales of cigarettes from manufacturers and the implications of this new delivery channel for tobacco control efforts.

Estimated Sales of Cigarettes Online

Two approaches have been put forth to estimate the extent of Internet cigarette sales: (1) industry report projections and (2) assessing smokers' Internet cigarette purchasing behavior over time. Several industry reports have attempted to estimate the market size and share of Internet cigarette sales. In 2001, the private firm Forrester Research estimated that by the end of 2005, online tobacco sales would exceed \$5 billion and comprise 14 percent of all U.S. tobacco sales (Rubin et al. 2001). A 2002 report by Prudential Securities (Campagnino 2002) projected that Internet cigarette sales would account for 5.9 percent of industry volume in 2005, but these figures should be interpreted with caution because most are outdated and based on proprietary assumptions and methodologies that were not adequately described or peer-reviewed. The U.S. Department of Commerce conducts a Census of Retail Trade that estimates annual revenue and the number of establishments selling various product categories, including tobacco products. In the nonstore retailer category, "electronic shopping and mail order" houses were estimated in 1997 to have sold \$127,801,000 in "cigars, cigarettes, tobacco, and smokers' accessories (excluding sales from vending machines operated by others)" (U.S. Department of Commerce 2001). This is a small fraction of the total \$36.8 billion sales for the category. Aside from being outdated, another shortcoming in the methodology of this economic census is that it covers only the subset of establishments with a payroll, which tend to be the larger establishments. An upcoming Census of Retail Trade might provide a more useful estimate of the magnitude of Internet and mail order tobacco sales. Both of the private industry projections seem to be overestimates given recent studies described below that have examined sources of cigarettes for smokers, which have generally concluded that a relatively small proportion of smokers purchase their cigarettes via the Internet.

A study of 5,215 adult smokers from the 1999 California Tobacco Survey found that 70 percent of respondents regularly purchased cigarettes from traditional retail markets, such as convenience stores and gas stations, compared to only 5.1 percent who purchased from lower or non-taxed sources such as out-of-state outlets, military bases, or the Internet (Emery et al. 2002). Only 0.3 percent of smokers in California regularly purchased their cigarettes from the Internet in 1999. A subsequent survey in 2002 found a small increase whereby 1.1 percent of California smokers reported purchasing cigarettes on the Internet. A study of 3,602 smokers who were originally in the Community Intervention Trial for Smoking Cessation (COMMIT) study were asked in 2001 about their cigarette purchasing patterns, including purchasing cigarettes on the Internet (Hyland et al. 2005). Overall, 59 percent of smokers reported engaging in a high price avoidance strategy, such as purchasing at a reservation or switching to discount cigarettes. The rate of regularly purchasing cigarettes from the Internet was 2.0 percent overall, with a range of 0 percent in Greensboro, North Carolina, where the state excise tax was 5 cents per pack to 9 percent in Yonkers, New York, where the state excise tax was \$1.11 at the time. The rate of purchasing online was higher in communities with higher state excise taxes, unless the community was in close proximity (<40 miles) to an Indian reservation.

Most recently, the 2003 International Tobacco Control (ITC) Four Country Survey of 6,682 smokers in the United States, the United Kingdom, Canada, and Australia found that 6.1 percent of U.S. smokers, 19.7 percent of UK smokers, 3.7 percent of Canadian smokers, and 1.1 percent of Australian smokers reported a low or untaxed source for their last cigarette purchase. American smokers reported buying cigarettes online more than the other three countries in the survey, with 1.3 percent of American smokers reporting the Internet as the source for their last cigarette purchase. Canada, the United Kingdom, and Australia had very low percentages of smokers reporting buying their cigarettes online, with 0 percent, 0.1 percent, and 0.1 percent respectively. In each country, except Canada, these estimates represented an increase over the percentage of smokers purchasing their cigarettes online during a wave of data collected 7 months earlier, when 0.6 percent of U.S. and 0.0 percent of UK and Australian smokers reported the Internet as the source of their most recent cigarette purchase (Hyland et al. 2006).

Studies have also been conducted in states with high state excise taxes. A telephone survey of 3,447 current adult smokers in New Jersey found that 0.8 percent usually purchased their cigarettes on the Internet in 2000, which rose to 3.1 percent in 2002 after the state increased its cigarette excise tax (Hrywna et al. 2004). In New Jersey, the rate of ever purchasing cigarettes on the Internet rose from 1.1 percent in 2000 to 6.7 percent in 2002. Smokers who bought cigarettes online were more likely to be white, to be older, and to report fewer quit attempts in the past year. Similarly, after New York City levied an additional excise tax of \$1.50 on top of the state excise tax of \$1.50 per pack of cigarettes, there was a tenfold increase in tax receipts and an 89 percent increase in cigarettes purchased outside of the city, 18.1 percent of which were purchased over the Internet (Frieden et al. 2005). A recent economic study examined patterns over time for state cigarette excise taxes, tax-paid cigarette sales, and cigarette consumption (Stehr 2005). The analysis suggested that the decline in tax-paid sales (i.e., elasticity of tax-paid sales) in response to tax increases is significantly greater than the decline observed in consumption (i.e., elasticity of consumption) measured by population surveys. In other words, when cigarette prices increase because of a tax hike, the percentage decline in tax-paid sales is greater than the decline in actual smoking rates. The fact that both do not decline equally suggests that some smokers are simply avoiding the taxes. The author estimated that from 1985 to 2001, 9.6 percent of cigarettes were purchased without payment of state taxes. Similar findings were observed in another econometric study that found that the rise of the Internet, and the associated ability of consumers to purchase tax-free cigarettes, has altered the elasticity of tax-paid cigarette sales and suggests that states now have a reduced ability to raise revenue by increasing cigarette taxes (Goolsbee and Slemrod 2004).

In summary, the number of Internet cigarette vendors appears to have increased substantially over the past half-decade, with a growing proportion of sites coming from outside the United States. Longitudinal studies in selected states and countries suggest that the proportion of adults purchasing online may be rising, especially in states with higher excise taxes. However, few smokers appear to be purchasing cigarettes online if they have ready access to cheaper cigarettes from nearby Indian reservations or if they reside in a state with a low excise tax. The issue of tax avoidance is described in greater detail in the following section.

THREATS

Threat 1: The Internet as a Source of Cheap Cigarettes from Tax Avoidance

The public health benefits of raising cigarette prices to reduce consumption are undermined by sales of low-tax or tax-free cigarettes online. Up to 78 percent of Internet cigarette vendors advertise selling cigarettes tax-free (GAO 2002a), which is attractive to price-sensitive smokers residing in states with high excise taxes. Internet vendors can sell cigarettes more cheaply than brick-and-mortar retail outlets because they are generally selling low-tax or untaxed products from tobacco-producing states, foreign countries, or American Indian reservations. Their customers are generally smokers residing in high-tax areas. Figure M-2 is a scatterplot based on one Internet vendor's shipping records that shows the relationship between a state's cigarette excise tax rate and the number of shipments to that state per 100,000 smokers (based on state-level rates of current smoking for adults). There are very few shipments to states where the excise taxes are fairly low, and the highest rate of shipment occur in the six states with the highest excise taxes. The shipment rate was only moderately related to other possible predictors, such as state-level rates of Internet access (Frieden et al. 2005).

The availability of low-cost cigarettes online may have a negative impact on public health because price-sensitive smokers who might have considered quitting or reducing their consumption after a tax hike can continue to smoke by purchasing cheaper cigarettes online. In the COMMIT study, 59 percent of smokers reported trying to avoid high cigarette prices when taxes increased (Hyland et al. 2005). Hyland and colleagues (2005) found that when cigarette prices increased, price-sensitive smokers who are not motivated to quit most commonly seek out lower-priced or tax-free cigarettes, rather than switch to generic brands or use coupons, especially when lower-priced tax-free sources are readily available. Given that the Internet is accessible to approximately 66 percent of the U.S. population (Pew Internet and American Life Project 2005), price-sensitive smokers may seek out cheaper cigarettes online when cigarette taxes increase. A small-scale study of New York and New Jersey smokers found that smokers who purchased cigarettes online were motivated primarily by lower prices (Kim et al. 2006). Additionally, smokers who purchased cheaper cigarettes from the Internet and other lower-taxed sources significantly increased their consumption over time, compared to smokers who reported paying full-price at traditional brick-and-mortar retail stores. This result is consistent with findings from a prior longitudinal study of New York smokers that 68.4 percent of smokers who paid full price at retail outlets attempted to quit, compared to only 44.4 percent of smokers who paid lower-tax prices from American Indian reservations (Hyland et al. 2005). Among those who paid full price, 20 percent successfully quit smoking at follow-up, compared to only 10.2 percent who purchased cigarettes from Indian reservations. These studies suggest that easy access to low-tax cigarettes online may influence price-sensitive smokers to continue smoking when retail prices increase, thereby undermining the public health benefits of increased cigarette excise taxes.

Despite concerns that Internet cigarette sales may undermine the efforts of raising cigarette taxes, recent data suggest that increasing taxes still confers tax revenue benefits on states. In 2002, New York City raised its city's cigarette excise tax from \$0.08 to \$1.50, which occurred in addition to the New York State excise tax of \$1.50. After the New York City tax increase, tax receipts increased tenfold even though the proportion of cigarettes reportedly purchased by smokers outside of New York City increased 89 percent (Frieden et al. 2005). Of cigarettes purchased elsewhere, 29.0 percent were bought in New York State outside of New York City, 21.7 percent were bought in a different state, 18.1 percent were bought over the Internet, 12.4 percent

were bought from another person, and 7.8 percent were bought from an American Indian reservation.

Tax evasion from online sales also deprives governments and tobacco control or public health programs of much needed revenue. Forrester Research estimated that states would lose more than \$1.4 billion in 2005 due to the sale of untaxed cigarettes on the Internet (Rubin et al. 2001). It is likely that the actual amount of lost revenue to states is lower, but still quite significant. When Congress held the first ever hearings about problems posed by Internet tobacco sales,² economist Patrick Fleenor presented estimates of state and local revenue losses under three scenarios. The first scenario assumed Internet retailers would capture a 2 percent market share in 2003, and this yielded \$552.4 million in lost state and local government revenue. The second scenario assumed Internet retailers would capture a 6 percent market share in 2005, and this yielded \$1.7 billion in lost state and local government revenue. The final scenario assumed a 14 percent market share in 2005, which yielded nearly \$4 billion in lost revenue. As mentioned earlier, there are no firm national estimates of Internet tobacco sales, so the exact revenue losses cannot be calculated at this time, but it is likely that the 2005 market share was considerably lower than the 14 percent estimate and probably lower than the 6 percent estimate. Given that the 2003 International Tobacco Control Four Country Survey showed that 1.3 percent of adult smokers made their last cigarette purchase online (Hyland et al. 2006), the 2 percent market share estimate is probably the most accurate estimate, yielding more than half a billion dollars in lost revenue to state and local governments.

Although there are no federal laws that require Internet vendors to collect and remit cigarette taxes to taxation authorities, under state law consumers who purchase cigarettes on the Internet are liable for their own state's cigarette excise tax and, in some instances, for sales and/or use taxes (GAO 2002b). One of the ways to prevent lost revenue from cigarette excise taxes is by having policies that require vendors to register with states and share their customer lists. The Jenkins Act (Title 15, Chapter 10A, Sections 375–378) is a federal law from 1949 that regulates interstate commerce of cigarettes and has the potential to reduce tax evasion on the Internet (Banthin 2004; GAO 2002b). The Jenkins Act requires that tobacco vendors selling out-of-state must “first file with the tobacco tax administrator of the state into which such shipment is made.” The vendors must also report all cigarette sales to state taxation authorities by the tenth day of each calendar month. These reports must include “the name and address of the person to whom the shipment was made, the brand, and the quantity thereof.” Thus, if a smoker from New York City purchases three cartons from an Internet vendor in Virginia, the Virginia Internet vendor is obligated to report to the New York tobacco tax administrator the name and address of the buyer and the brand and quantity of cigarettes purchased. The penalties for violation are a misdemeanor with a fine of not more than \$1,000 or imprisonment of 6 months, or both.

An investigation conducted by the U.S. General Accounting Office (GAO) concluded that most websites openly stated that they violate the Jenkins Act and that there have been no successful prosecutions of noncompliant Internet cigarette vendors (GAO 2002b). The GAO concluded that the Jenkins Act is violated, in part, because it is a misdemeanor and not a felony. In addition, there has been little enforcement because the U.S. Federal Bureau of Investigation has jurisdiction, and this has been a low priority for them because of their new challenges and priori-

²HR 1839 (May 1, 2003): Youth Smoking Prevention and State Revenue Enforcement Act: Hearing before the Subcommittee on Courts, the Internet, and Intellectual Property of the Committee on the Judiciary, House of Representatives, 108th Congress. Serial No.19. Washington DC.

ties related to the threat of terrorism. The GAO recommended that the penalties for noncompliance be elevated to a felony and jurisdiction be given to the Bureau of Alcohol, Tobacco, Firearms and Explosives. Finally, although many tribal websites claim that they are not subject to the Jenkins Act provisions because they reside on sovereign lands, the GAO concluded that they are obligated to comply and the U.S. Supreme Court has ruled that the federal government can regulate interstate commerce including tribal commerce that occurs across state lines.

The GAO report was based on the advertised sales practices of websites. Our research team conducted a purchase survey to assess the actual rate of compliance with the Jenkins Act, which we believed would be very low based on reviewing website content and anecdotal reports in the media. The study is currently being prepared for publication. One buyer in California purchased cigarettes from 101 Internet vendors, all of which should have filed a Jenkins Act report for California. Research staff then asked the state's taxation authority, the California Bureau of Equalization, what proportion of the 101 vendors filed reports. None of the 101 vendors filed a Jenkins Act report.

Several states have identified individuals who have purchased cigarettes online because a small number of Internet vendors have filed Jenkins Act reports in the past and because some Internet vendors have turned over their customer lists to taxation authorities as a condition of legal settlements. In addition, the Massachusetts Revenue Department has identified Massachusetts residents who received deliveries of cigarettes from out-of-state Internet vendors by requiring shippers, such as United Parcel Service (UPS), to hand over their records (Mohl 2003; 2004). The GAO report (GAO 2002b) profiled the efforts of six states to promote Jenkins Act compliance by notifying Internet vendors of their duty to comply with the act. Relatively few Internet vendors complied. For instance, only 13 of 262 Internet vendors in Massachusetts responded to the notification with reports of their customers. However, in cases where the states received customer names and addresses, state revenue authorities then notified individual smokers to collect back taxes. In California, approximately 23,500 were identified from 20 Internet vendors. Approximately 13,500 of the 23,500 notified responded and the state recovered approximately \$1.4 million in back taxes, penalties, and interest. More recent news reports (Copeland 2005) have described how other cities and states, such as New York City, Pennsylvania, and Ohio, have sent thousands of letters to smokers who purchased their cigarettes on the Internet.

In summary, the Internet offers cheap so-called tax-free cigarettes for smokers concerned about high retail cigarette prices in their area. The availability of low-cost cigarettes from low-taxed sources, including the Internet, appears to be related to decreased quit attempts, thereby undermining the public health benefit of higher cigarette prices. Of the three threats to tobacco control posed by the Internet, tax avoidance is probably the most significant. Concern over revenue losses caused by Internet cigarette sales, however, should not deter states from increasing cigarette excise taxes. Despite some losses due to Internet sales and other tax evasion activities, states still experience a net increase in their tax revenue when increasing their cigarette taxes (Farrelly et al. 2003). An important topic for future study, according to Farrelly and colleagues (2003), is to better understand the effectiveness and the cost-effectiveness of controlling tax evasion and Internet sales.

Threat 2: Marketing and Promotional Efforts

The Internet provides unprecedented opportunities to market and promote tobacco products in a largely unregulated medium. A Surgeon General's report on smoking noted that "the future of tobacco advertising and promotion may lie in cyberspace" because "the Internet offers endless

possibilities for promoting tobacco use and marketing tobacco products” (DHHS 2001, p.16). These advertising and promotional messages are available 24 hours a day, 7 days a week to smokers who are online. The Internet has the potential to be a more potent medium than static print advertising in magazines because of its ability to individually tailor marketing strategies and to engage in these activities relatively unnoticed in the vast World Wide Web. As a result, this medium presents new challenges for the monitoring and regulation of tobacco marketing and promotions. In this section, we examine the range of marketing and promotional strategies that Internet cigarette vendors use based on findings from our ongoing longitudinal study of Internet cigarette vendors. We also present results from a small study on cigarette spam e-mails, explore how the major tobacco companies are using the Internet to build relationships with their customers, and conclude with a discussion of several policies that have been proposed to regulate online tobacco marketing practices.

Wide Variety of Cigarette Brands and Tobacco Products

Internet cigarette vendors sell a wide variety of cigarette brands and tobacco products online. In 2005, we found that all these sites sold some type of cigarettes (Table M-2). Approximately 30 percent advertised selling duty-free cigarettes, which are manufactured for export only and are illegal to sell in the United States because they violate the Imported Cigarette Compliance Act of 2000. Another 22.7 percent sold clove cigarettes, while about 5 percent sold bidis or herbal cigarettes. Internet cigarette vendors sold an average of 39.3 (standard deviation [SD] 21.52, range = 1 to 98) unique cigarette brands, with 45 percent of sites selling 40 or more brands. Internet cigarette vendors also sold cigars (42.2 percent), smokeless tobacco such as Skoal (28.0 percent), loose tobacco for pipes and roll-your-own cigarettes (23.0 percent), and tobacco paraphernalia such as lighters, ashtrays, and cigar cutters (19.3 percent). Approximately 10 percent of sites sold other tobacco-related products such as candles and air fresheners designed specifically for smokers, and roughly 15 percent of sites also sold non-tobacco products such as coffee, moccasins, jewelry, or condoms. These results suggest that Internet cigarette vendors advertise and carry a wide range of tobacco and non-tobacco products for virtually every type of customer. Whereas traditional brick-and-mortar retail vendors are restricted in the number of tobacco products they can sell because of limited physical storage and shelving space, Internet cigarette vendors can carry a much larger inventory of items and offer greater brand and product selection that might be appealing to a wider customer base. This may become increasingly important if more smokers switch cigarette brands and alter their purchasing and consumption patterns in response to rising cigarette excise taxes. One report suggested that Internet cigarette vendors aggressively promote cheaper, deep-discount brands because they yield more than four times the profit for vendors than premium brands and because many smokers who buy online are very cost conscious (Campagnino 2002).

Price-Related Promotions

Internet cigarette vendors also offer price-related promotions that reduce the actual cost of cigarettes or add value to their purchase. In 2005, 31.8 percent of Internet cigarette vendors offered reduced-price specials (Table M-2) such as discounts on specific brands, monthly or weekly price specials, and coupons. Approximately 40 percent of sites advertised that they sold cigarettes tax-free; this was explicitly stated on their website or incorporated into their business name or website URL (Figure M-3). By advertising that their cigarettes are tax-free, Internet

cigarette vendors are targeting smokers who reside in high-excise-tax states and currently pay high cigarette prices at retail stores. Few sites offered gifts, multipack specials, or contests, but those doing so gave away items such as free cigarettes or enter-to-win vacation contests.

Peer-to-Peer Promotions

One of the advantages of selling products on the Internet is using features of email and website technology to facilitate word-of-mouth communication among peer social networks (Hoffman and Novak 1997). In our study, we found that Internet cigarette vendors use several peer-to-peer strategies to attract more customers to their site. Approximately a third of the sites offered mechanisms to refer friends to the site (30.1 percent) and ways to link to their site (16.7 percent), while a few offered wish lists to their customers (3.9 percent). Wish lists enable customers to create lists of cigarette and tobacco products they desire that they can make available to friends who might purchase the products for them. The “link-to-us” function enables customers to create a bookmark or link on their own personal website so that interested friends can click on the link, which takes them directly to the Internet cigarette vendor site. Once new customers are at the website, Internet cigarette vendors also use strategies such as “customer testimonials” and “top-selling brands” as a way to share information about other customers’ purchasing patterns and experiences. In 2005, 11.6 percent of Internet cigarette vendors utilized customer testimonials and 28.3 percent advertised “top-selling brands.” The ease of sharing information via the Internet allows Internet cigarette vendors to utilize strategies that encourage word-of-mouth promotions among peer networks. Direct peer-to-peer marketing becomes more important in the electronic marketplace because online businesses only have a virtual presence among billions of other web pages, making it difficult for customers to find Internet cigarette vendors unless they actively search for the sites or are referred to them by friends.

Customized Services

The interactive capabilities of the Internet allow Internet vendors to communicate directly with their customers via email, to tailor these communications precisely to individual customers’ needs, and to obtain relevant information from customers so that vendors can customize their services and serve their customers more effectively in the future (Hoffman et al. 1995). In 2005, approximately 45 percent of Internet cigarette vendors provided register or create-an-account capabilities, which allow vendors to collect information about their customers’ product and ordering preferences and to store this in their databases so that future interactions with the customer can be personalized (Figure M-4). Approximately 40 percent of Internet cigarette vendors also offered mailing lists, which are emailed newsletters announcing upcoming sales or promotions that can be tailored to individual consumers’ product preferences. Approximately 20 percent of Internet cigarette vendors also offer automated shipping programs that enable customers to designate how many cigarettes they want delivered on a regular time schedule. All of these features ease the ordering process for customers and help vendors to build personalized relationships with their customers, which might translate into customer loyalty and retention over time.

Use of Spam Email to Attract Customers to Internet Cigarette Vendor Websites

Internet cigarette vendors can also attract new customers to their site by sending out unsolicited email messages (spam) to a wide range of recipients. This is a relatively inexpensive strategy

since vendors can purchase lists of tens of thousands of email addresses for only hundreds of dollars. A pilot study analyzing cigarette spam emails found that lower prices (99 percent) and tax evasion (43 percent) were most emphasized in the subject line or body of the email message (Potts 2004). Commonly used messages for conveying low cost or tax evasion included phrases such as:

“Stop wasting your money on high priced cigarettes, get your cigarettes at a huge discount!”

or

“I have some very exciting news for you. No longer will you be taxed to death. You can buy premium brand cartons of cigarettes for only \$13.95 a carton. That is \$1.39 a pack for all the top brands.”

Results from this study suggest that Internet cigarette vendors are marketing lower tax-free prices as the main incentive to purchase cigarettes from their sites. Kim and colleagues (2006) found that 46 percent of smokers in their sample reported seeing ads about Internet cigarette sales from mass media sources such as local newspapers or magazines (20.9 percent), spam emails (16.0 percent), banners or pop-up ads (11.2 percent), and Val-U-Pak coupon mailers (11.2 percent) (Kim et al. 2006). Because many of these channels are direct-to-consumer (e.g., spam e-mail, Val-U-Pak coupon mailer), these marketing strategies occur under the public radar and should be monitored. Future studies need to examine the extent of these marketing strategies and how they influence smokers' decisions to purchase cigarettes online.

Extent of Marketing Online by Tobacco Companies

Relative to their aggressive promotions in other venues such as retail outlets, direct mail, and magazines, most of the major U.S. tobacco companies appear to have a fairly restrained approach to utilizing the Internet for promoting or selling their brands. In 2002, the tobacco industry claimed that it spent only \$940,000 on company website-related expenses, which was less than 0.01 percent of its annual \$12.5 billion advertising and promotional expenditures (FTC 2004). Tobacco company websites tend to be neutral in tone and provide factual information about their companies (Figure M-5). For example, the R.J. Reynolds official website has the latest information about its stock prices, whereas the Phillip Morris USA website has detailed information on health issues, responsible marketing, and its policies, including a section on Internet cigarette sales. The industry did not report spending any additional funds on other Internet advertising such as banner ads or direct email marketing in 2002. Tobacco companies appear to have varying levels of involvement in and support for Internet tobacco sales and marketing. Philip Morris appears to be the most critical of Internet sales and has actually filed federal lawsuits against Internet vendors for violating its trademarks (e.g., the Marlboro logo) and illegally selling Marlboros manufactured for export (Beirne 2002). Philip Morris has also lobbied for legislation that would restrict Internet tobacco sales. One reason that it may want to discourage Internet tobacco sales is related to the fact that buyers are very cost conscious and would begin to purchase deep-discount brands, which takes business away from costlier premium brands such as Marlboro (Beirne 2002). Other tobacco companies, however, appear to have a more favorable attitude toward the Internet than the market leader.

In 2004, when Brown & Williamson (B&W) launched its KOOL Mixx hip hop ad campaign, it also included a web component. The House of Menthol website (www.houseofmenthol.com) featured information about the national DJ battle, free software demos, history of hip hop, and lists of retail stores where smokers could purchase the special edition KOOL Mixx cigarette packs (Figure M-6). The website was just one element of the marketing campaign, but as the House of Menthol website illustrates, tobacco companies can use the web to provide more promotional offers and to aggressively build the brand image with content that is engaging and interactive. B&W voluntarily pulled the ad campaign including the website after receiving pressure from attorneys general who threatened to sue claiming that the campaign violated the Master Settlement Agreement because it targeted youth and because it featured merchandise (e.g., a radio) with a cigarette brand name.

Some tobacco companies are using the web to advertise certain brands and to establish a database of smokers. R.J. Reynolds sells Doral cigarettes, a generic brand, on the web at www.smokerswelcome.com (Figure M-7). This site is advertised as “an online community for smokers by smokers” and offers attractive gifts for redeeming Doral pack seals and services such as online bulletin boards that help to engender a sense of community among Doral smokers. Philip Morris operates a similar website, www.smokersignup.com, where smokers can sign up to receive coupons and other promotional offers via postal mail (Figure M-8). As more smokers participate in these direct-marketing programs (Lewis et al. 2004), tobacco control advocates will have to monitor these practices both offline and online and examine how they influence smokers’ attitudes and behaviors. Data from the National Youth Tobacco Survey conducted by the CDC in 2004 showed that 34.1 percent of middle school students and 39.2 percent of high school students reported seeing advertisements for tobacco products on the Internet (CDC 2005). Although Cohen and colleagues (2001) have called for studies to determine the effects of web-based tobacco advertising on the tobacco-related knowledge, attitudes, and behaviors of viewers, to our knowledge there are no published studies on this topic (Cohen et al. 2001).

Threat 3: Youth Access to Cigarettes Via the Web

Will Internet Cigarette Vendors Sell to Underage Youth?

Several recent studies suggest that most Internet cigarette vendors sell to buyers without verifying age. In 2001, Ribisl and colleagues (2003) conducted a purchase survey in which four youth, aged 11–15, purchased cigarettes from 55 Internet cigarette vendors in 12 states. The vendors sold to minors in 76 out of 83 purchase attempts (92 percent overall sales rate). Very little was done to verify the age of the buyers in this purchase survey. Out of 83 money order and credit card purchase attempts, in only nine cases (11 percent) did the vendor request that the buyer submit a copy of a photo ID, the prevailing standard for age verification at retail outlets (Ribisl et al. 2003). Proof of age was not provided for any vendors, but only four of those nine purchases were refused due to lack of ID. Furthermore, although six (10.7 percent) vendors stated on their websites that they verify age at delivery (Ribisl et al. 2002), only one package arrived marked “Adult signature required for delivery.” The package was delivered to a parent while the youth buyer was at school, so there is no way to know whether the delivery person would have verified the age of the recipient if the youth buyer had received the package. More than 85 percent of the deliveries in the study were left at the door without any interaction with

the recipient. Altogether, youth in this study received 1,650 packs of cigarettes from Internet vendors.

A similar study asked college students to attempt to buy cigarettes from 32 Internet cigarette vendors without providing proof of age (Bryant et al. 2002). Of the 28 orders received by the vendor, 20 (71 percent) were filled and 4 orders (14 percent) were rejected because no proof of age was provided. Four orders were never received by the vendors, and four orders remained unfilled for other reasons.

Jensen and colleagues (2004) conducted a youth purchase survey where 30 youths, aged 15 to 16, were instructed to find an Internet cigarette vendor website on their own and to purchase one carton of cigarettes with their parent's credit card (Jensen et al. 2004). This study showed that the youths were able to find Internet cigarette vendors on their own without being provided a list of vendors as our previous studies had done (Ribisl et al. 2003). Of the 30 youth, 29 (96.7 percent) were able to find a tobacco vendor and place an order, usually in under 20 minutes, and 23 (76.7 percent) successfully received their orders, with 91 percent of the packages delivered without requests for proof of age. Most recently, a purchase survey assessing compliance with California's law designed to prevent youth access to cigarettes from Internet vendors found that none of the 101 vendors in the sample verified the age of the buyer in accordance with California law (Williams et al. In press). The results of these purchase surveys suggest that most Internet cigarette vendors do a poor job of preventing cigarette sales to minors.

Are Underage Youth Buying Cigarettes Online?

Several studies have assessed whether youth purchase cigarettes online. In the 2001 National Household Survey on Drug Abuse, 3.3 percent of adolescent smokers aged 12–17 reported buying cigarettes from the Internet in the past 30 days (Office of Applied Studies 2002). A study conducted in 1999–2000 found that, among current smokers under 18 years of age ($n = 1,689$), 2.2 percent reported attempting to purchase cigarettes online (Unger et al. 2001). Those who attempted purchases were younger, smoked more frequently, and reported greater perceived difficulty in obtaining cigarettes from commercial and social sources.

In 2001, 1,323 9th grade smokers in three western New York counties were asked about purchasing cigarettes online: 2.3 percent reported ever having purchased cigarettes online, and 1.7 percent reported buying online in the past 30 days (Abrams et al. 2003). Nearly 9 percent intended to purchase cigarettes online during the next year. Youth who had been refused cigarette sales at retail outlets in the previous month were more than three times as likely to purchase cigarettes online than youth who had successfully purchased cigarettes at a retail outlet in the past month. A follow-up survey in 2005 found that 6.5 percent of 9th grade smokers reported ever having purchased cigarettes online, with 5.2 percent having purchased online in the past 30 days. Youth smokers were 2.6 times more likely to report having purchased cigarettes online in the past 30 days in 2005 than in 2001 (Fix et al. 2006).

Although these results suggest that few teens are currently buying cigarettes on the Internet, the small proportion of youth who do purchase online reported greater difficulty in obtaining cigarettes from retail outlets, suggesting that if retail access becomes sufficiently restricted, more youth might turn to the Internet to obtain cigarettes.

How Can Internet Cigarette Vendors Discourage Youth Buyers?

There are four potential strategies for reducing sales to minors that can be used by Internet cigarette vendors: the posting of minimum age-of-sale warnings, the posting of health warnings, use of parental control filter information, and age verification.

Minimum age-of-sale warnings were featured on the home page of 83.4 percent of Internet cigarette vendor websites in 2005. Most state laws in the United States on youth access to cigarettes in retail stores require that vendors post the minimum age of sale. This same standard should be applied to online vendors, and age warnings should be prominent and immediately visible when the page is accessed. While 83.4 percent of vendors feature age warnings on their home pages, only 26.2 percent of vendors feature them at the top section of a web page that is immediately visible without scrolling when the page is accessed (note: this is when viewed on a monitor with 800 x 600 screen resolution, the prevailing standard for web designers).

Parental control filters (PCFs) are software programs that allow parents to restrict their children's access to inappropriate material on the Internet, such as pornography and violence. Most PCFs automatically filter out sites in which tobacco is the primary focus, but this method is not comprehensive because PCFs rely heavily on website owners to register with them. Prior studies (Center for Media Education 1999; Reagan et al. 2002) have found that PCFs are ineffective at blocking pro-tobacco websites, with the most effective programs blocking 70 percent, and the least effective failing to block any. Regan and colleagues (2002) also noted that PCF programs disagreed on which sites to block, with the highest level of agreement between programs only blocking 21.4 percent of the same sites. Because PCFs are ineffective at blocking access to pro-tobacco websites they should not be relied upon as an effective measure to block youth access to Internet cigarette vendors. They do provide some protection, but are not a stand-alone solution, since most Internet cigarette vendors (97.9 percent) do not register with PCFs and youth might be able to disable PCFs on their own.

Age verification is the most effective strategy for Internet cigarette vendors to reduce sales to minors. There are two main points at which age can and should be verified by vendors to ensure their customers are adults. Age should be verified both at the point of order and at the point of delivery. In retail stores, the point of order and delivery are one and the same, leaving only one point in time for age verification, the standard for which is a face-to-face matching of the customer to a valid driver's license. In online transactions, age should be verified with photo ID before a sale is made, but should also be verified at the point of delivery, since matching the customer to the photo on a driver's license is impractical in online transactions. Unfortunately, few Internet cigarette vendors (11 percent) request that their buyers submit a copy of their photo ID before making a sale, and often those that do will fulfill orders submitted without the requested ID (Ribisl et al. 2003).

While rigorous age verification methods, such as requiring photo ID submission, are uncommon among Internet cigarette vendors, self-age verification methods are more common, such as typing in a birth date (23.3 percent) or stating that by simply submitting an order, the customer is certifying that he or she is of legal age to purchase cigarettes (35.2 percent). These ineffective self-age verification methods (see Figure M-9) are not likely to deter youth buyers, and vendors should be discouraged from relying upon them.

Some vendors (15.2 percent) claim that by only accepting credit cards for payment, they are ensuring their buyers are adults, which assumes that only adults can obtain valid credit cards. However, it is plausible for teens to own their credit cards since vendors such as VisaBuxx market prepaid debit cards specifically for teens to use online. While accepting only credit card pay-

ments may deter most youth who don't have access to a credit card, it should not be relied upon as a method of age verification.

Age verification at delivery is potentially the most effective strategy available to Internet cigarette vendors to reduce sales to minors, since it is the sole face-to-face opportunity for the customer to be matched to a photo ID. Currently, few Internet cigarette vendors verify the age of their customers at delivery. In our youth purchase survey (Ribisl et al. 2003), the age of the youth buyers was not verified at delivery by any vendors. There are several barriers to widespread adoption of age verification at delivery by Internet cigarette vendors, the most significant of which is that currently the only shipping carrier legitimately available to Internet cigarette vendors is the U.S. Postal Service, which does not offer an age verification at delivery service. UPS is the only delivery company in the United States with an age verification at delivery service. In October 2005, however, UPS announced that, like FedEx and DHL, it would no longer ship cigarettes to consumers (Gormley 2005), leaving no age verification at delivery options for Internet cigarette vendors.

Self-Regulation of Internet Cigarette Vendors

The Online Tobacco Retailers Association (OLTRA) is an organization of Internet Cigarette Vendors formed, ostensibly, to "bring a standard of service to the online tobacco industry" (www.oltra.com). OLTRA claims to be a self-regulating organization and state that in addition to providing member benefits such as group purchasing benefits, legal representation, and an "OLTRA Certified Website Seal," all OLTRA member websites adhere to certain business standards, including only accepting customers aged 21 and over, requiring customers to submit a copy of their driver's license prior to order fulfillment, and exclusively using the "UPS adult signature required" shipping method to ensure that tobacco products are not delivered to minors.

OLTRA's claims about its members' self-regulation were tested in a separate compliance survey (Williams 2005). During this purchase survey, which was designed to assess the extent of vendor compliance with California Business and Professions Code § 22963, California's law regulating what Internet cigarette vendors must do to prevent sales to minors, 11 of the 20 member vendors listed on OLTRA's website were included in the randomly selected study sample. Compliance with OLTRA's standards among these member vendors was low. Of the vendors included in the study, only three required that their buyers be 21 and over, two required buyers to submit a copy of their driver's license, and none used UPS age verification at delivery. These results suggest that OLTRA's attempts at self-regulation are ineffective.

POLICY SOLUTIONS AND RECOMMENDATIONS

This final section examines some of the state-level policies in place to address the challenges posed by Internet cigarette sales and concludes with a recommended framework for addressing Internet cigarette sales. An analysis of laws governing Internet and mail order sales of cigarettes in the 50 U.S. states and the District of Columbia identified 33 state laws (Chriqui et al. Under Review). Data were collected as part of the National Cancer Institute's State Cancer Legislative Database system, and this represents the first comprehensive analysis of state laws to prevent tax evasion and youth access from Internet cigarettes sales. Details of the laws are provided in Table M-3. Highlights of this analysis are that 31 states have provisions designed to reduce youth access, 32 states have tax evasion provisions, and 2 states totally ban all Internet and mail order tobacco sales. Details on the number and percentage of states with specific provisions within

these categories are listed in the table and not described here. The two rightmost columns denote whether these specific provisions are recommended in model legislation from the Campaign for Tobacco Free Kids (Lindblom 2005a; Lindblom 2005b; Lindblom 2005c) and Philip Morris.

Effectively regulating Internet cigarette sales is difficult for many reasons (Ribisl 2003), including its supergeographical reach, complexities related to regulation of interstate commerce, tribal sovereignty and overseas vendors, and the fact that case law is still being formed (Banthin 2004). Given these challenges, we propose a framework (see Figure M-10) with multiple strategies that may effectively regulate Internet cigarette sales. The main goal of the Q.U.I.T. (Quarantine of Unhealthy Internet Trade) Framework is to go beyond simply regulating the vendor, and to involve other members of the supply chain starting at the beginning of the distribution process where Internet cigarette vendors (ICVs) first acquire their cigarettes to the final culmination of the sale when consumers receive their cigarette deliveries. In this model, we propose several regulatory strategies that intervene along the sales and delivery process in order to “quarantine” online vendors who are not compliant with existing tobacco tax collection and age verification laws. The vendors are essentially quarantined by disrupting the distribution process, which prevents Internet cigarette vendors from selling their product to consumers. The approach can be applied to other potentially harmful products sold over the Internet, such as firearms, illicit drugs, or child pornography.

One strategy would be to block or regulate the supply of cigarettes to Internet cigarette vendors from tobacco manufacturers, distributors, or retailers (Step 1, Figure M-10). For example, suppliers could be required to sell only to Internet cigarette vendors who are compliant with existing youth access and taxation laws. This strategy requires that tobacco manufacturers, distributors, and retailers keep detailed documentation of their inventories of tobacco products, which shows the route from manufacturer to distributor and retailer. Although some Native American Internet vendors manufacture their own brands of cigarettes, most carry other brands made by the major cigarette manufacturers and thus depend on an outside distributor. Native American cigarette vendors file paperwork when buying cigarettes that allows them to purchase cigarettes without payment of state excise taxes, as long as the cigarettes are for sale to other tribal members. Many tribal vendors claim that their sovereignty rights permit them to sell to anyone from their reservation (where their website is located). New York State has been planning efforts to cut off the supply of tax-free cigarettes to the Seneca nation and other tribes by requiring suppliers to sell cigarettes only where all state taxes are paid. This approach tends to work better when the supplier is based in the United States and may not work as well for cigarettes being shipped from overseas from a vendor that also acquires them overseas.

A second strategy is to block a vendor from hosting its website by seizing the domain name and shutting down the online storefronts of noncompliant Internet vendors (Step 2, Figure M-10). This strategy was employed by UK customs authorities who seized the URLs of websites such as www.cigarettesfromeurope.com for not charging appropriate cigarette taxes to UK customers. Although the reasons were for trademark infringement and other violations, Philip Morris successfully seized the domain name www.yesmoke.com, which now redirects to its corporate website (Dunai 2004). Although Yesmoke migrated its online business to another website address (www.yesmoke.ch), the domain name seizure likely caused significant difficulties for the vendor and some customers may not know of the new website address. Although there are many complexities in the field of domain name law (Moringiello 2004), states have several legal rationales that would allow them to seize the domain name of Internet vendors and perhaps replace the website content with a message of their choosing (Burstein In press).

A third strategy would be to prevent the major payment-processing companies such as Visa, MasterCard, American Express, Diners Club, Discover, or PayPal from approving transactions for Internet cigarette sales (Step 3, Figure M-10). In March 2005, all of the companies listed above reached a landmark voluntary agreement with state attorneys general and the Bureau of Alcohol, Tobacco, Firearms and Explosives to stop processing credit card payment of Internet cigarette orders because Internet vendors were conducting illegal business by not charging appropriate state cigarette excise taxes and not verifying the age of buyers (AP 2005; Tedeschi 2005). The negotiations were led by attorneys general from California, New York, and Oregon, and several other attorneys general also participated.

Restricting credit card payment does not entirely prevent all Internet cigarette sales because vendors can still utilize alternative payment methods such as money orders or personal checks, but nevertheless, according to media reports this policy has already caused scores of Internet vendors to lose business or shut down their operations (Tedeschi 2005). Credit cards are the most commonly used payment method offered by Internet cigarette vendors (Ribisl et al. 2001). The agreement applies to virtually all credit cards and affects websites based in the United States and abroad that sell to U.S. customers. Internet vendors that can document that they comply with all relevant laws will be allowed to accept credit cards under conditions of the agreement.

A fourth strategy would be to regulate delivery services such as the UPS or a postal service such as the U.S. Postal Service. For example, the vendor could be required to ship using a service that verified the age and identity of the buyer at the point of delivery. Moreover, cigarettes could be declared non-mailable matter, and delivery services could be banned from picking up packages of cigarettes from Internet cigarette vendors that appear on a "Do Not Ship" list comprised of vendors that do not comply with existing tax collection or youth access laws (Lindblom 2005c) (Step 4, Figure M-10). These provisions have been proposed as part of two federal legislative bills, the Green-Meehan Internet Tobacco Sales Enforcement Act (H.R. 2824) and the Prevent All Contraband Tobacco Act (PACT ACT, S. 1177), but neither bill has made it to the floor of the U.S. Congress. A spokesperson for UPS opposed any regulation that would require it to refuse packages from Internet tobacco vendors that violated tobacco tax laws (Campaign for Tobacco Free Kids 2005). However, in October 2005, UPS joined shipping carriers DHL and Federal Express involuntarily agreeing to cease shipping cigarettes to consumers (Gormley 2005), leaving the U.S. Postal Service as the only viable shipping option available to Internet cigarette vendors.

The final step in the distribution process would be to educate consumers about their requirement to pay taxes on cigarettes purchased from out-of-state Internet vendors (Step 5, Figure M-10). Although educational efforts might deter some customers from buying cigarettes online, this strategy is onerous because of the difficulty in reaching the nearly 50 million smokers in the United States. Instead, intervening upstream in the distribution process with several major manufacturers, distributors, Internet service providers, payment processing companies, or delivery companies can probably have greater impact than individually focused educational efforts.

In conclusion, the goal of the Q.U.I.T. framework is to disrupt one or more steps in the distribution channel that occur between the time cigarettes are manufactured and when they are delivered to the door of the smoker. The idea is that regulating vendors is not enough—so far, the overwhelming majority of Internet vendors have violated one or more laws designed to require tax reporting, prevent cigarette sales to minors, or ban the sale of imported duty-free cigarettes. Therefore, the focus is upon entities that do business with the Internet vendor. The goal is to prevent the noncompliant vendor from hosting a website, receiving payment from credit card com-

panies, and shipping its product to customers. There are weaknesses in any one approach; however, it is likely that the combination of strategies will be effective. Addressing the problems posed by Internet cigarette sales will require a collaborative effort among public health researchers, tobacco control advocates, state departments of revenue, attorneys general, policy makers, and legislators. Policies are needed that require Internet cigarette vendors to comply with the same provisions as brick-and-mortar retail vendors by charging appropriate state and local cigarette excise taxes and verifying the age of buyers. Until such policies are in place, online cigarette sales will undermine the public health benefit of raising cigarette prices.

FINAL RECOMMENDATION

For all Internet, mail order, and delivery tobacco sales, federal legislation is needed to ensure that customer ages and identities are verified at both the point of ordering and the point of delivery and that appropriate local, state, and federal taxes are collected. This legislation should include strong federal penalties for noncompliance while permitting state governments to have enforcement authority and the ability to pass stricter laws. The legislation should be written to effectively regulate the sales practices of tobacco vendors shipping to U.S. customers regardless of their physical location (i.e., vendors located on tribal lands or outside the United States). Moreover, all Internet and mail order vendors should be licensed at the federal level by an organization such as the Bureau of Alcohol, Tobacco, Firearms and Explosives. Vendors that violate youth access and tax laws should be placed on a do-not-ship list, and delivery services should not be allowed to transport their products.

TABLE M-1 Country and Region Locations of Internet Cigarette Vendor Websites, January 2005

Country	N=775 <i>Number (%)</i>
United States	323 (41.7)
Switzerland	118 (15.2)
International (outside the U.S., country not specified)	86 (11.1)
Europe (country not specified)	59 (7.6)
Spain	17 (2.2)
Panama	16 (2.1)
Indonesia	11 (1.4)
United Kingdom	6 (0.8)
Gibraltar	5 (0.7)
Asia	4 (0.5)
South Africa	4 (0.5)
Virgin Islands	3 (0.4)
Andorra	2 (0.3)
Canada	2 (0.3)
Russia	2 (0.3)
Other*	12 (1.5)
Location could not be determined	105 (13.5)

*Other category includes one vendor located in each of the following countries: Belize, Bulgaria, Dominican Republic, Germany, Mauritius, Malaysia, Netherlands, New Zealand, Romania, and Zimbabwe.

APPENDIX M

TABLE M-2 Sales and Marketing Practices of Internet Cigarette Vendor Websites, January 2005

N=664	
Number (%)	
Types of tobacco products sold	
Cigarettes	
Premium/value/discount brands	770 (99.3)
Duty-free	189 (28.5)
Clove	151 (22.7)
Bidis	10 (1.5)
Herbal	21 (3.2)
Cigars	280 (42.2)
Smokeless tobacco	186 (28.0)
Loose tobacco	153 (23.0)
Tobacco paraphernalia	128 (19.3)
Other tobacco-related products	49 (7.4)
Number of cigarette brands sold*	
1-20	158 (23.8)
21-40	217 (32.7)
41-60	145 (21.8)
61+	144 (21.7)
Non-tobacco products	82 (12.3)
Price-related promotions	
Reduced price special	211 (31.8)
Tax-free prices advertised	253 (38.1)
Gift with purchase	15 (2.3)
Multi-pack special	58 (8.7)
Special contest	26 (3.9)
Peer-to-peer promotions	
Refer-a-friend	200 (30.1)
Add to favorites/link to us	111 (16.7)
Wish list	26 (3.9)
Customer testimonials	77 (11.6)
List of most popular/top selling cigarettes	188 (28.3)
Customized services	
Register/create an account	295 (44.4)
Mailing list	269 (40.5)
Automated shipping program	121 (18.2)
Other promotions [^]	47 (7.1)

* Number of cigarette brands ranged from 1 to 107.

[^] Examples of other promotions include: free samples of cigarettes and continuity programs.

TABLE M-3 Summary of the Components of State Cigarette Delivery Sales Laws^a by Area of Emphasis (as of December 31, 2005)

Component Description	Number of States	% states with laws (N=33)	% all states ^b (N=51)	PM ^c Model Provision	CTFK ^d Model Provision
Preventing Youth Access to Cigarettes	25	76	49	Yes	Yes
Age/ID verification of purchaser	25	76	49	Yes	Yes
Required one time/first purchase only	11	33	22	Yes	No
Required at all times/every sale	13	39	26	No	Yes
Types of Age/ID Verification	22	67	43	Yes	Yes
Requires customer attestation only	4	12	8	No	No
Requires any 2: customer attestation, check govt. ID, or check age and/or ID against commercial database of government ID's	16	49	31	Yes	No
Requires all 3: customer attestation, check govt. ID, and check age/ID against commercial database of government ID's	4	12	8	No	Yes
Vendor required to use carrier that will:	19	58	37	Yes	Yes
Verify purchaser ID at delivery time	18	55	35	Yes	Yes
Obtain adult signature	16	49	31	Yes	Yes
Delivery only to address on ID	6	18	12	No	Yes
Preventing Tax Evasion	30	91	59	Yes	Yes
Requires delivery sales vendors to be licensed ^e	23	70	45	Yes	Yes
Sale considered delivery sale regardless of seller location (i.e., outside/inside state or tribal)	17	52	33	Yes	Yes
Registration and reporting requirements and/or Jenkins Act (15 U.S.C. 326) compliance	22	67	43	Yes	Yes
Tax collection and remittance requirements	21	64	41	Yes	Yes
Preventing Youth Access and Tax	31	94	61	Yes	Yes

^a For this analysis, "laws" was defined to include statutes, administrative rules and regulations, and case law, as appropriate.

^b "All states" includes the 50 states and the District of Columbia.

^c PM=Philip Morris model law provision (Rubin et al. 2001).

^d CTFK=Campaign for Tobacco-Free Kids model law provisions (Lindblom 2005a; Lindblom 2005b; Philip Morris USA 2003).

^e Vendor licensure provisions were captured if specifically referenced in the delivery sales statutes. In other words, a state received credit for requiring delivery sales vendors to be licensed if they explicitly stated this requirement in the delivery sales law OR indicated that delivery sales vendors must comply with existing licensure provisions.

Component Description	Number of States	% states with laws (N=33)	% all states ^b (N=51)	PM ^c Model Provision	CTFK ^d Model Provision
Evasion					
Ban shipping/delivery of cigarettes directly to consumers	4	12	8	No	Yes
Requires adherence to do not ship to list	4	12	8	No	Yes
Requires customer prior notification/disclosure	15	46	29	No	Yes
Payment Issues					
Required Payment Types	19	58	37	Yes	Yes
Credit card, debit card, OR check	11	33	22	Yes	No
Credit or debit card	4	12	8	No	Yes
Check or credit card	4	12	8	No	No
Payment type (credit card, debit card, or check) must be in buyer's name	15	46	29	Yes	Yes
Credit/debit card billing address must match shipping address/government identification, and/or database address	2	6	4	No	No
"Tobacco product" language to be printed on credit card statement	1	3	2	No	Yes
Vendor to provide carrier with evidence of compliance with:	11	33	22	Yes	Yes
Licensure requirements	2	6	4	No	Yes
Tax collection/remittance provisions	10	30	20	Yes	No
Shipping document and/or packaging requirements	28	85	55	Yes	Yes
Specify tobacco product content	27	82	53	Yes	Yes
Specify minimum age of sale language	18	55	35	Yes	Yes
Specify tax collection/remittance obligation	18	55	35	Yes	Yes
Product quantity order/shipping restrictions	4	12	8	No	Yes
Specifies minimum amount	1	3	2	No	No
Specifies maximum amount	3	9	6	No	Yes
Penalties and Enforcement					
Penalty Provisions	31	94	61	Yes	Yes
Penalties to Vendor	31	94	61	Yes	Yes
Penalties to Carrier	11	33	22	No	Yes
Penalties to Purchaser	13	39	26	Yes	Yes
Enforcement provisions and authority	24	73	47	Yes	Yes

REFERENCES

- Abrams SM, Hyland A, Cummings KM. 2003. Internet cigarette purchasing among ninth-grade students in Western New York. *Preventive Medicine* 36:731-733.
- Associated Press. 2000. Michigan cracks down on on-line cigarette sales. *Globe and Mail*. September 28, 2000:T2.
- Banthin C. 2004. Cheap smokes: state and federal responses to tobacco tax evasion over the internet." *Health Matrix Cleveland* 14(2):325-356.
- Beirne M. 2002. News analysis: Some see Web sales butting into PM profits. *Brandweek*. November 25, 2005.
- Bryant JA, Cody MJ, Murphy ST. 2002. Online sales: profit without question. *Tobacco Control* 11(3): 226-227.
- Burstein A. In press. Stopping Internet-based tobacco sales. *Health Matrix: Journal of Law-Medicine*.
- Campagnino RT. 2002. Buying cigarettes over the Internet. *Prudential Financial Research* September 24, 2002 .
- Campaign for Tobacco Free Kids. 2005. *Letter to UPS*. Website. Available at: <http://tobaccofreekids.org/reports/internet/UPSLetter.pdf>; accessed August 3, 2005.
- CDC (Centers for Disease Control and Prevention). 1999. Achievements in public health, 1900–1999: tobacco use—United States, 1900–1999. *Morbidity and Mortality Weekly Report* 48(43):986-993.
- CDC. 2005. Tobacco use, access, and exposure to tobacco in media among middle and high school students—United States, 2004. *Morbidity and Mortality Weekly Report* 54(12):297-301.
- Center for Media Education. 1999. *Youth Access to Alcohol and Tobacco Web Marketing: The Filtering and Rating Debate*. Washington DC: Center for Media Education.
- Chriqui J, Ribisl KM, et al. 2005. *A Review of State Laws Governing Delivery Sales of Cigarettes in the U.S.A.: Analysis of Provisions to Prevent Youth Access and Tax Evasion*. Web page. Available at: <http://2006.confex.com/uicc/wctoh/techprogram/P5196.HTM>; accessed August 21, 2006.
- Cohen JE, Sarabia V, Ashley M. 2001. Tobacco commerce on the internet: a threat to comprehensive tobacco control. *Tobacco Control* 10(4):364-367.
- Connolly GN. 2001. Smokes and cyberspace: a public health disaster in the making. *Tobacco Control* 10(4): 299.
- Copeland L. 2005. Online Tax Bill Due for Smokers. *USA Today*. March 8, 2005:3A.
- DHHS (Department of Health and Human Services, Public Health Service). 2001. *Monograph 14: Changing Adolescent Smoking Prevalence: Where It Is and Why*. Atlanta, GA: DHHS.
- Dunai M. 2004. Philip Morris blocks Yesmoke from sale of cigarettes in U.S. *Wall Street Journal*. August 25, 2004:B2.
- Emery S, White MM, Gilpin EA, Pierce JP. 2002. Was there significant tax evasion after the 1999 50 cent per pack cigarette tax increase in California? *Tobacco Control* 11(2):130-134.
- Fairclough G. 2000. BAT division will start taking phone, fax orders for cigarettes. *The Wall Street Journal Interactive Edition*. New York, 2000.
- Farrelly MC, Nimsch CT, James J. 2003. State cigarette excise taxes: implications for revenue and tax evasion. *RTI International*.
- Fix BV, Zambon M, Higbee C, Cummings KM, Alford T, Hyland A. 2006. Internet cigarette purchasing among 9th grade students in western New York: 2000–2001 vs. 2004–2005. *Preventive Medicine* 43(3):191-195
- Frieden TR, Mostashari F, Kerker BD, Miller N, Hajat A, Frankel M. 2005. Adult tobacco use levels after intensive tobacco control measures: New York City, 2002–2003. *American Journal of Public Health* 95(6):1016-1023.
- FTC (Federal Trade Commission). 2004. *Report to Congress for 2002: Pursuant to the Federal Cigarette Labelling and Advertising Act*. Washington DC: FTC.
- GAO (General Accounting Office). 2002a. *Internet Cigarette Sales: Limited Compliance and Enforcement of the Jenkins Act Result in Loss of State Tax Revenue*. Washington DCL GAO 18.
- GAO. 2002b. *Internet cigarette sales: Giving ATF investigative authority may improve reporting and enforcement*. Washington DC: GAO
- Goolsbee A, Slemrod J. 2004. Playing with Fire: Cigarettes, Taxes, and Competition from the Internet. Website. Available at <http://www.chicagogsb.edu/research/workshops/AppliedEcon/archive/WebArchive20032004/goolsbee.pdf>; accessed August 21, 2005.
- Gormley M. 2005. *UPS Agrees to End Cigarette Deliveries*. Associated Press. October 25, 2005. Albany, NY.
- Hoffman D, Novak T. 1997. A new marketing paradigm for electronic commerce. *Information Society* 13: 43-54.
- Hoffman D, Novak T, Chatterjee P. 1995. Commercial scenarios for the Web: opportunities and challenges. *Journal of Computer-Mediated Communication* 1(3):1-21.
- Hrywna M, Delnevo CD, Staniewska D. 2004. Prevalence and correlates of internet cigarette purchasing among adult smokers in New Jersey. *Tobacco Control* 13:296-300.

- Hyland A, Bauer JE, Li Q, Abrams SM, Higbee C, Peppone L, Cummings K. 2005. Higher cigarette prices influence cigarette purchase patterns. *Tobacco Control* 14(2):86-92.
- Hyland A, Higbee C, Li Q, Bauer JE, Giovino GA, Alford T, Cummings M. 2005. Access to low-taxed cigarettes deters smoking cessation attempts. *American Journal of Public Health* 95(6):994-995.
- Hyland A, Laux FL, Higbee C, Hastings G, Ross H, Chaloupka FJ, Fong GT, Cummings KT. 2006. Cigarette purchase patterns in four countries and the relationship with cessation: findings from the International Tobacco Control (ITC) Four Country Survey. *Tobacco Control* 15 (Suppl 3):iii59-iii64.
- Jensen JA, Hickman NJ, Landrine H, Klonoff EA. 2004. Availability of tobacco to youth via the Internet. *Journal of the American Medical Association* 291(15):1837.
- Kim AE, Ribisl KM, Delnevo CD, Hrywna M. 2006. Smokers' beliefs and attitudes about purchasing cigarettes on the Internet. *Public Health Reports* 121(5):594-602.
- Lewis MJ, Yulis SG, Delnevo C, Hrywna M. 2004. Tobacco industry direct marketing after the Master Settlement Agreement. *Health Promotion Practice* 5(3 Suppl):75S-83S.
- Lindblom E. 2005a. *Model State Legislation to Prohibit All Internet or Mail Order Sales of Tobacco Products*. Web Page. Available at <http://tobaccofreekids.org/research/factsheets/pdf/0229.pdf>. (accessed June 2, 2005).
- Lindblom E. 2005b. *Model State Legislation to Restrict Internet and Mail Order Tobacco Product Sales*. Web Page. Available at <http://tobaccofreekids.org/research/factsheets/pdf/0230.pdf> (accessed June 2, 2005).
- Lindblom E. 2005c. *The Critical Importance of a Delivery-List Enforcement Provision in State Internet Tobacco Sales Legislation*. Web Page. Available at <http://tobaccofreekids.org/research/factsheets/pdf/0259.pdf> (accessed August 3, 2005).
- McMahon K. 2005. *State Cigarette Taxes and Projected Benefits from Increasing Them*. Campaign for Tobacco-Free Kids. Website. Available at: <http://tobaccofreekids.org/research/factsheets/pdf/0148.pdf>; accessed March 21, 2005.
- Mohl B. 2003. UPS eyed as source for names: Firm may have given customer data to state in cigarette tax probe. *Boston Globe*. October 23, 2003:D1.
- Mohl B. 2004. Internet cigarette retailers targeted state to sue for list of tax-evading clients. *Boston Globe*. February 17, 2004:C1.
- Moringiello JM. 2004. Grasping intangibles, domain names and creditors' rights. *Journal of Internet Law* 8(3): 3-5.
- Office of Applied Studies. 2002. *How Youths Get Cigarettes: The NHSDA Report*. Rockville, MD: Substance Abuse and Mental Health Services Administration.
- Pew Internet and American Life Project. 2005. *Latest Trends: Demographics of Internet Users*. Web Page. Available at http://www.pewinternet.org/trends/User_Demo_03.07.05.htm (accessed April 10, 2005).
- Philip Morris USA. 2003. *Proposed Cigarette Delivery Sales Bill*. Web Page. Available at <http://www.tobaccofreekids.org/research/factsheets/pdf/0224.pdf> (accessed June 2, 2005).
- Potts C. 2004. Smoky spam: a content analysis of unsolicited electronic messages sent by Internet cigarette vendors. *Health Behavior and Health Education*. Chapel Hill, University of North Carolina School of Public Health: 47.
- Reagan KA, Hong T, Cohen EL, Cody MJ. 2002. Blocking access to online tobacco sales sites. *Tobacco Control* 11(2):164-165.
- Ribisl KM, Kim AE, Williams RS. 2001. Web sites selling cigarettes: How many are there in the USA and what are their sales practices? *Tobacco Control* 10:352-359.
- Ribisl KM, Kim AE, Williams RS. 2002. Are the sales practices of Internet cigarette vendors good enough to prevent sales to minors? *American Journal of Public Health* 92:940-941.
- Ribisl KM. 2003. The potential of the internet as a medium to encourage and discourage youth tobacco use. *Tobacco Control* 12(Suppl 1):i48-i59.
- Ribisl KM, Williams RS, Kim AE. 2003. Internet cigarette sales to minors. *Journal of the American Medical Association* 290:1356-1359.
- Rubin R, Charron C, Dorsey M. 2001. *Online Tobacco Sales Grow, States Lose*. Ottawa, ON: Forrester Research, Inc.
- Shibuya K, Ciecierski C, Guindon E, Bettcher DW, Evans DB, Murray CJL. 2003. WHO Framework Convention on Tobacco Control: development of an evidence based global public health treaty. *British Medical Journal* 327(7407):154-157.
- Stehr M. 2005. Cigarette tax avoidance and evasion. *Journal of Health Economics* 24(2):277-297.
- Task Force on Community Preventive Services (2005). *Tobacco. The Guide to Community Preventive Services: What Works to Promote Health?* Zaza S, Briss PA, Editors. New York: Oxford University Press. Pp. 1-79.
- Taylor AL, Bettcher DW. 2000. WHO Framework Convention on Tobacco Control: a global "good" for public health. *Bulletin of the World Health Organization* 78(7):920-929.

- Tedeschi B. 2005. Trouble for Online Vendors of Cigarettes. *New York Times*. April 3, 2005:A1.
- U.S. Department of Commerce. 2001. *Merchandise Line Sales: 1997 Economic Census Retail Trade Subject Series*. Washington DC: Economics and Statistics Administration and the National Telecommunications and Information Administration, U.S. Census Bureau.
- Unger JB, Rohrbach LA, Ribisl KM. 2001. Are adolescents attempting to buy cigarettes on the internet? *Tobacco Control* 10(4):360-363.
- Williams RS. 2005. Youth access to cigarettes online: advertised and actual sales practices of Internet cigarette vendors. *Health Behavior and Health Education*. University of North Carolina at Chapel Hill.
- Williams RS, Ribisl KM, Feighery EC. 2006. Internet cigarette vendors' lack of compliance with a California state law designed to prevent tobacco sales to minors. *Archives of Pediatrics and Adolescent Medicine* 160:988-989.

N

Media Campaigns and Tobacco Control

Michael D. Slater
Ohio State University
School of Communication

OVERVIEW

Media-based efforts to promote non-use of tobacco products have become an increasingly prominent feature of the tobacco control landscape over the past decade, with aggressive and well-funded efforts having taken place under the auspices of the American Legacy Foundation as well as in California, Massachusetts, and Florida, among other states. These campaigns typically make considerable use of highly visible and dramatic advertising in television and other media. They are sometimes referred to as “counter-advertising,” because such campaigns are seen in the public health community as efforts to provide even a modest counterweight to the very extensive marketing efforts of tobacco companies in the United States, which spent \$8.24 billion on advertising and promotion in 1999 (FTC 2001). It should be noted that, like tobacco company marketing efforts, such campaigns often are not confined to the use of advertising, but also involve a wide range of educational, promotional, and social marketing activities in a comprehensive program.

In this appendix, we briefly review highlights of laboratory and field research concerning effects of media and advertising efforts to influence tobacco-related attitudes and behavior (see Agostinelli and Grube 2002; Friend and Levy 2002; and Wakefield et al. 2003b for more detailed reviews). We focus in particular on evaluations of the recent major efforts by Massachusetts, Florida, and California (because these states had the most ambitious and the best-evaluated media efforts), and on the national efforts of the American Legacy Foundation. Based on such evaluations and on meta-analytic work previously published, we suggest effect size ranges that might be anticipated from appropriate national campaign efforts, as well as noting the particular concerns and obstacles associated with successful implementation of such efforts. Issues regarding media campaigns and smoking cessation are addressed briefly at the end of this section.

It should be noted that the different authorities cited report effect sizes in one of two ways: as absolute percent change or as relative percent change. For example, a change from 20 percent youth smoking prevalence to 18 percent prevalence would be described as a 2 percent change effect size. Others would instead report this effect size as a 10 percent reduction in prevalence. This is referred to as relative percent change.

EVALUATIONS OF RECENT MAJOR MEDIA-BASED EFFORTS

California

In 1988, California passed a citizen-supported initiative to raise cigarette taxes and use funds to support a comprehensive tobacco control initiative. Funds for the program fluctuated between

\$54 million and \$140.7 million over the next 10 years depending largely on the extent of political support from the governor and the legislature (Independent Evaluation Consortium 2001; Pierce et al. 1998b). An ambitious media campaign began in 1990 that addressed secondhand smoke issues, youth prevention (largely through ads critical of the tobacco industry), and smoking cessation (Independent Evaluation Consortium 2001); only a minority of media expenditures were directed at youth.

Evaluations of the California effort suggested that the campaign had an impact on smoking prevalence in the first 3 years of the effort. Adult smoking prevalence dropped from 22.7 percent to 18 percent from 1989 to 1993, a rate of decline that was about double that of the United States as a whole (Pierce et al. 1998b). According to Friend and Levy (Friend and Levy 2002), similar effect estimates were based on analyses by the Centers for Disease Control and Prevention (CDC 1996). Subsequently, prevalence rates flattened, with no evidence of declines, suggesting that the effects occurred in the first 4 years of the campaign or that the effects were dampened due to reductions in expenditures by California.

Complicating the overall picture, based on self-reported exposure to the campaign, several studies did not find clear evidence for reductions in prevalence associated with campaign exposure (Pierce et al. 1998a; Popham et al. 1994), although another study suggested that the media campaign influenced decisions to quit smoking in California (Popham et al. 1993). It also should be noted that this California campaign was not primarily youth-focused, in contrast to the Massachusetts and Florida efforts (see below).

Massachusetts

Massachusetts has been engaged in an ambitious tobacco control program since January 1993, which includes increased taxes that have been used to fund an extensive paid media campaign. Amounts available for these efforts were as high as \$43 million in 1995, but have declined since. Strong population-based evidence exists for the effectiveness of this comprehensive effort in reducing adult smoking prevalence (Biener et al. 2000). Media efforts included television, radio, and billboard antismoking advertising, directed primarily at youth. The effectiveness of the media component of this effort was evaluated based on a 4-year longitudinal panel survey of 592 youth (ages 12–15 years at baseline), conducted from 1993 to 1997. Campaign impact was assessed by measuring recall of campaign advertising and comparing progression to established smoking among nonsmoking youth who recalled campaign advertisements to those who did not. A variety of control variables were applied, including parental smoking at home, hours of television watched, and so forth. Results suggested that younger adolescents (ages 12–13 years) reporting exposure to television advertisements at baseline were only about half as likely to progress to regular smoking as were the unexposed (odds ratio [OR] = .49, $p < .05$). No such differences were found for older adolescents (OR = .94) and no effects of radio or billboard exposure were found for either group (Biener and Siegel 2000).

Limitations of this study include the limited control over possible variables that might be confounded with exposure at baseline. Moreover, measures of campaign message recall or recognition are inherently subject to problems of endogeneity, in which propensity to attend to and recall such messages may be related—positively or negatively—to a possible interest in smoking (Slater 2004). However, the prospective design, lack of consistency of results for older versus younger adolescents, and lack of evidence for effects due to susceptibility differences or differential attrition argue against attributing results to confounding relationships. It should also be noted that the effects of the campaign on adults, as opposed to youth only, are not assessed in

this analysis. Friend and Levy (2002) also reexamined these data, adjusting for price effects, and estimated a 6 percent (relative percent) change effect size attributable to this campaign (Friend and Levy 2002).

Further evidence for the impact of antismoking advertising in Massachusetts is provided in a quasi-experimental evaluation of advertisements directed against light cigarettes (Kozlowski et al. 2000). Randomly sampled respondents in Massachusetts ($n = 500$) were less likely than respondents from elsewhere in the United States ($n = 501$) to believe that “light” cigarettes might reduce the risks of health problems (32 percent versus 49 percent, $p < .05$). Within Massachusetts, smokers who reported having seen the ads were less likely to believe that “light” cigarettes decreased health risks (26 percent for exposed versus 44 percent for unexposed smokers, $p < .05$). The advertising also appeared effective in increasing knowledge concerning filter vents. Behavioral or sales data are not reported.

Florida

Florida initiated its \$25 million “truth” campaign in 1998, a campaign that, at first, focused on attacking the tobacco industry but was later obliged to refocus message strategies (Zucker et al. 2000). It should be emphasized that the “truth” campaign not only was an industry attack effort, but also can be understood as a campaign that endeavored to provide youth with a distinctive attitude of independence and control with respect to smoking and tobacco products. The so-called “truth” brand is designed to appeal to “edgy,” trend-setting youth who are influential with their peers and who also may be at risk for smoking (Farrelly et al. 2002). Smoking rates after the first year dropped from 18.5 percent to 15 percent among middle school youth, and from 27.4 percent to 25.2 percent among high school students, based on independently-collected data from Monitoring the Future (Friend and Levy 2002). Friend and Levy (2002) calculate the overall decline in youth prevalence to be a 5 percent (relative percent) change (Friend and Levy 2002).

Evidence also supports dose–response effects as estimated from advertisement recognition self-reports ($n = 1820$) (Sly et al. 2001a; Sly et al. 2001b). It appears that smoking rates remained lower among Florida youth than among youth nationally in the 2001–2002 school year (excluding youth from states with similar comprehensive tobacco control efforts), and that abstention from smoking was well predicted by awareness of the “truth” campaign whereas these rates were comparable prior to the campaign effort (Niederdeppe et al. 2004). It does not appear that possible confounding effects of tax and price changes in states under study were controlled in analyses of results, however, somewhat decreasing confidence in the precision of these results. Evaluators argue that the sizes of the Florida prevalence declines were too great to be attributable to the price increase, especially in 1998, the first year of the campaign (Farrelly et al. 2002).

National truth® Campaign

The American Legacy Foundation launched a national antismoking advertising effort, an extension of the “truth” campaign described above, in February 2002. An initial evaluation was conducted using nationally representative samples of adolescents, with a baseline pretest survey ($n = 6,897$) and a follow-up survey ($n = 10,692$) 10 months into the campaign (Farrelly et al. 2002). Results suggested statistically significant shifts in attitudes opposed to smoking and decreases in attention to smoke. Dose–response analyses indicated that greater self-reported recognition of truth® campaign advertising was associated with greater agreement with critical statements about cigarette companies, with an interest in taking a stand against smoking, and with the statement that not smoking was a way to express independence. Recognition of the so-called

truth advertisements was negatively related to agreement that smoking helped young people look cool or fit in (all $p < .05$ or better). Dose–response effects on intentions to smoke were in the predicted direction but were only marginally significant ($p < .10$).

This study also examined the impact of Phillip Morris USA’s “Think. Don’t Smoke” campaign, which began in 1998. Unsurprisingly, this campaign did not negatively impact perceptions of the tobacco industry and in some cases improved such perceptions. Exposure to the “Think. Don’t Smoke” advertisements was associated with agreement that not smoking was a way to express independence. However, the greater the self-reported exposure to the “Think. Don’t Smoke” campaign, the greater was the intention to smoke in the next year ($p < .02$). From a methodological perspective, using the same method (self-reported recognition of television anti-smoking advertising) and finding opposite results with two campaigns reduce concerns that such self-reporting might be confounded with preexisting attitudes or behavior about tobacco use.

A subsequent study provides more compelling evidence of the impact of the national truth® campaign on youth smoking (Farrelly et al. 2005). Unlike evaluation studies described above, this study examines actual variability in exposure to the ads that can occur in each major media market. Variability is substantial because the truth® campaign places its ads on cable channels. Cable penetration, or the number of households in which cable is viewed, varies substantially between markets in the United States. To the extent that variables that might influence both cable penetration and youth smoking prevalence can be controlled, differences in youth smoking prevalence by market that can be associated with market-level exposure differences can be especially persuasive. Such estimates are an excellent complement to other study designs because they are not dependent on self-reported exposure and thus they are not subject to possible confounding due to propensity to pay attention to and recall antismoking advertising because of existing attitudes and smoking-related behavior.

Results, utilizing multilevel modeling and national data ($n = 50,000$) from the Monitoring the Future study of adolescent substance use, indicated a significant relationship at the media market level, in which media markets receiving greater doses of the truth® campaign had at aggregate levels less smoking prevalence than markets receiving smaller doses of the campaign. Additional analyses were conducted to estimate effect size on youth smoking prevalence after accounting for other influences such as price on changes in prevalence. These estimates suggested that, of the 7.8 percent change in youth smoking prevalence between 2000 and 2002 (from 25.8 percent to 18 percent), an absolute percent change of 1.64 percent (or a relative percent of about 6 percent) could be attributed to the national truth® campaign. It is also likely that this analysis produced a conservative effect size estimate, because individual variability in exposure to campaign messages was ignored in this design in favor of market-level variability in advertising intensity.

One possible concern with the Farrelly and colleagues (2005) evaluation is the close relationship of the evaluators to the truth® campaign (Farrelly et al. 2005). Another regards limitations on the assessment of exogenous factors and other issues affecting the nature of the relationship between market-level exposure differences and effects. These limitations have been in many respects addressed in recent evaluations of state-sponsored anti-tobacco advertising efforts (Emery et al. 2005). This research used a similar multi-level approach, examining market-level differences in expected exposure to anti-tobacco advertising rather than individual self-reports of exposure, and associating this with *Monitoring the Future* data. An innovative element of this research was the inclusion of controls for expected exposure to tobacco-related advertising as well as other tobacco control policies. Significant effects for exposure to state-sponsored anti-tobacco ads were found on probability of being a smoker (OR = .74, 95 percent confidence interval [CI]

= .63–.88). Wakefield and colleagues (2003a) used this same approach to analyzing effects of industry-sponsored youth antismoking ads (Wakefield et al. 2003a). Consistent with the results discussed earlier, this research found no evidence for the impact of these ads in reducing youth smoking or related variables, and there was evidence among 10th–12th graders for increased likelihood of smoking and smoking intentions as well as and reduced perceived harm as a function of exposure to industry-sponsored antismoking ads.

Possible Additional Beneficial Effects of Media Campaigns for Tobacco Control Efforts

This effect size estimate focuses on effects of a campaign on youth uptake. These, in some respects, may underestimate the utility of such campaigns for tobacco control efforts. For example, impact on uptake among young adults typically is not measured. There is also evidence that such campaigns may encourage cessation attempts among adult smokers (Netemeyer et al. 2005). Such effects are not incorporated in these estimates.

In addition, the visibility of such campaigns is likely to maintain or increase the salience of tobacco control as a public priority—a phenomenon known as agenda setting (McLeod et al. 1991). Such salience is typically a necessary prerequisite for the willingness of public officials to pursue tobacco control policies in legislation, regulation, and enforcement. The possible impact of media campaigns on the public opinion climate for tobacco control policy has largely been unresearched and is not accounted for in the estimates made here.

EFFECTS OF ALTERNATIVE MESSAGE AND DELIVERY STRATEGIES: EVIDENCE FROM CONTROLLED EXPERIMENTS AND FIELD STUDIES

Message Strategies

Several studies have examined the effectiveness of alternative message strategies for anti-smoking efforts (see Agostinelli and Grube 2003; Kelder et al. 2002; Pechmann and Reibling 2000 for reviews, including discussion of possible psychological mechanisms for the effects of antismoking advertisements). For example, a field study using panel data ($n = 618$) from Massachusetts found evidence supporting the use of strong negative emotion over normative influence or humor messages (Biener et al. 2004). In a controlled lab study ($n = 1,667$) conducted in secondary schools in California, results indicated that message themes associated with endangering others, the negative life circumstances of smokers, and refusal skills outperformed control messages with respect to post-test smoking intentions. Messages about health consequences of smoking, about the tobacco industry's marketing tactics and how it profits from a product that causes disease and death, and about the cosmetic effects of smoking were not significantly different from controls, although all tended in the desired direction (Pechmann and Reibling 2006). Another study by the same group conducted in California ($n = 2,194$) found that ads of the type used by the Massachusetts campaign that focused on true stories of the negative impact of smoking reduced intent to smoke 35 percent. Effects of advertisements that focused on criticism of the tobacco industry did not have a statistically significant effect on intention to smoke (Pechmann and Reibling 2006). The authors attributed their findings to possible wear out of the industry criticism strategy among California youth in the study, as well as the novelty and effectiveness of the ads portraying true stories of negative impacts.

Such experiments that compare strategy effectiveness should be interpreted with caution. While in principle they test strategies against one another, in practice they must test selected examples of those strategies. Differences in executional quality may substantially influence results. Moreover, controlled experimental tests, while relatively rigorous, also exclude the social influence processes of discussion among youth that might have a substantial impact on reception of advertisements. In any case, given the above findings and the professional wisdom in the advertising community concerning wear out of a given advertising strategy, it is likely that ongoing campaign efforts would be well advised to explore at least several strategies. A given strategy may lose its novelty and effectiveness over time and need to be replaced, perhaps to be returned to in somewhat different ways in a few years.

There is also some evidence regarding ineffective strategies. As Green and colleagues (2002) point out, portraying tobacco use as attractive but not permitted (known in psychology as a “forbidden fruit” strategy) may be likely to make smoking seem more rather than less desirable (Cummings and Clarke 1998; Green et al. 2002; Malone et al. 2002). Green and colleagues (2002) suggest this might be an explanation for boomerang effects found by Farrelly and colleagues (2002) in the Philip Morris “Think. Don’t Smoke” campaign, and might be anticipated as a consequence of Lorillard’s “Tobacco Is Whacko If You Are a Teen” campaign (Farrelly et al. 2002).

It is encouraging that several strategies appear to have shown effectiveness, given that advertisements critical of the industry have come under considerable legal and political pressure (Healton 2001). However, there is no guarantee that any antismoking campaign will show comparable effects. Each of the major strategies reported above was developed after extensive formative research and message testing. Moreover, there are antismoking campaigns in the literature that show no evidence of impact, although often these involve rather brief or low-intensity efforts. As noted above, findings by Farrelly and Colleagues (2002) suggest that a high production quality, nationally-distributed, paid campaign (produced by Phillip Morris) failed to show any evidence of positive effects and indeed appeared to have increased intentions to smoke, underscoring the dependence of campaigns on well-conceived, well-executed, and well-tested strategies (Farrelly et al. 2002). Any assumptions about positive effects of such initiatives must assume comparable care and skill in development and implementation. Uncertainties about successful implementation include effects of political and legal pressures constraining advertising content, such as pressures that have precluded the use of ads critical of the tobacco industry in several campaigns or that, as in Arizona, have limited expenditures on the campaign (Bialous and Glantz 1997).

Delivery in Conjunction with School-Based Prevention Efforts

The foregoing discussion has focused on the independent effects of media campaigns, particularly using television advertising. Many of these efforts have taken place in conjunction with various school- and community-based intervention activities, including school prevention curricula. Several studies have provided evidence suggesting that there can be a synergistic effect of school-based media and media advertising or other media messaging (Flynn et al. 1992; Flynn et al. 1994; Perry et al. 1992); there is also evidence suggesting that such effects can be additive at least in the cases of alcohol and marijuana, with school and local community media efforts influencing prevalence above and beyond the effects of school prevention curricula (Slater 2004). Such strategies remain options for states and communities in conjunction with state or national media efforts.

ESTIMATING EFFECT SIZES IN THE ABSENCE OF RANDOMIZED, CONTROLLED TRIALS

Randomly controlled trials (RCTs) are generally not feasible in these national and regional efforts. It is more costly to buy advertising for individual markets in random assignment than to do a national media buy; therefore, the costs of a fully deployed RCT would be comparable to a national media effort. Moreover, such an RCT would demonstrate in principle the effectiveness of antismoking advertising but would not necessarily result in a campaign that then can be rolled out to a full national population. By the time the RCT is completed, it would be necessary to revise ads anyway given changes in youth culture (clothes, music, visual style, etc.). An RCT is highly desirable to demonstrate the effectiveness of an intervention strategy in the absence of strong evidence of effectiveness. In the presence of such evidence, it may be hard to justify the costs of an RCT and the delay in providing intervention approaches with good evidence of impact.

Strengths of the evidence in favor of the effectiveness of these media campaigns involve triangulated results—the consistency of results across different analytic and evaluation design strategies, different advertising executions and strategies, and implementation in multiple locations. As cited above, there are a variety of quasi-experimental studies comparing behavioral outcomes, dose–response studies looking at the relationship between self-reported exposure to the campaign and behavior or behavioral intent, and market-level studies associating media markets that give greater exposure to antismoking campaigns but lower levels to smoking among youth. One type of study that is feasible, but has not yet been conducted, which would further reinforce such triangulation, would be a controlled quasi-experimental test in only a few markets, using a crossover design rather than a large number of community replicates to control for community differences (Palmgreen et al. 2001).

Many field studies have been conducted, several state-wide and others on a community-wide or regional basis, in addition to the major campaigns discussed above. Most of those on which adequate evaluation data are available have been incorporated in a major meta-analysis of media behavior change campaign effects by Snyder and colleagues (2004). This meta-analysis incorporates a total of 17 studies relative to smoking with a total (n) of almost 80,000; 13 of the studies, with a total (n) of more than 75,000, include change data (Snyder et al. 2004).

The Snyder and colleagues (2004) estimate of 6 percent absolute change effect size for prevention campaigns (4 percent for smoking cessation campaigns) is somewhat higher than the major studies described above (only California data, from the campaigns described above, were included in this meta-analysis, representing one of the studies and less than 15 percent of the total (n) (Snyder et al. 2004). As with any meta-analysis, this effect size may be inflated due to ineffective campaigns that remain unpublished. Moreover, these data also include smaller, controlled trials that are likely to be relatively more intensive, less subject to measurement error, and to show larger effect sizes than one finds in field evaluations. These effect sizes are for the duration of a campaign and are not annualized.

Friend and Levy (2002) estimate a 6 percent relative effect for a major, highly publicized youth prevention media effort, consistent with findings for the American Legacy Foundation truth® campaign (Farrelly et al. 2005) and with several of the regional studies mentioned above (Friend and Levy 2002). It would seem therefore that such an effect size estimate for continuing national campaigns that adapt proven strategies, utilize appropriate development and testing strategies for youth tobacco use prevention (Pechmann and Reibling 2000), and are funded well

enough to provide substantial levels of exposure (e.g., equivalent to or greater than that achieved by the recent national truth campaign effort) is reasonable.

However, effects over an extended period are hard to estimate. Campaigns gain increased awareness and penetration over time, but the youth most prone to influence may be reached early. Youth may also habituate to messages, and the effectiveness of given strategies may wane unless they are skillfully revised and updated. Impact on the most receptive youth in a cohort and campaign novelty may mean that effects tend to be stronger in the first year or two. However, the usual target ages of 12–16 years means that the cohort is replaced every 5 years, reducing the impact of habituation and an increasingly resistant core of smoking-susceptible youth. Perhaps a cycle of reduced effect in years 3 to 5 of an effort, followed by a return to greater effectiveness with a new cohort of younger teens might be a reasonable hypothesis, but few or no hard data exist with respect to this issue. It also may be that what continued media efforts do is sustain reductions after the initial impact of a campaign, slight, continued increments may be possible, but the primary effect of continuing is preventing movement of prevalence back to original levels. (Levy and Friend 2002).

In projecting the effects of continued media efforts, a 6 percent relative effect would decrease youth prevalence from 18 percent presently to about 17 percent. Conversely, the removal of national and major statewide media efforts would likely negate within a few years the approximately 2 percent absolute prevalence decrease that appears reasonably and conservatively attributable to the antismoking media efforts conducted to date. Clearly, use of evaluation designs that track effects in more detail over time, involving strategies such as rolling cross-sections and time-series analyses, would help inform such estimates (Hornik 2002; Palmgreen et al. 2001; Slater 2004). In the absence of such data, it seems both reasonable and conservative to assume a difference in youth prevalence in absolute numbers of at least 3 percent (17 percent to 20 percent). It is also quite possible that the absence of major media efforts, given the continued relative visibility of tobacco marketing efforts, might lead over time to continued erosion of recent tobacco control gains among youth. Such effects, however, are difficult to quantify with confidence. Finally, these assessments do not include effects of the campaigns on adult uptake or on encouraging adult cessation (either directly through campaign efforts targeting cessation, or indirectly as a result of exposure to prevention-oriented messages).

Media campaign effect sizes are modest. At the same time, it should be recalled that these interventions are assessed against an entire population and that these effects are found not merely in controlled test studies, but also in state-wide and national implementations. Therefore, such interventions may be quite cost-effective. In state campaigns described above, per capita costs per year varied from \$0.50 to about \$2.00 (Friend and Levy 2002). Costs per capita for the truth® campaign ranged from \$1.54 to \$2.92, depending on the year (information provided by the American Legacy Foundation). Moreover, if, as these estimates suggest, the absence of ongoing national or statewide media campaigns would mean about a 3 percent absolute difference in youth prevalence relative to continuing such efforts, then that would represent almost an 18 percent relative increase in youth prevalence relative to what would be anticipated with continuing media efforts.

At the same time, it must be emphasized again that a media campaign is not a vaccine. Campaign effectiveness, as discussed above, is highly dependent on conceptualization, testing, and execution as well as adequate funding to achieve necessary levels of audience exposure (Hornik 2002). Effects of a national effort may be considerably better or worse than our estimates depending on these factors, and boomerang effects of such campaigns are possible (Hornik et al.

2001; Pechmann and Slater 2005). Uncertainties would be minimized if the effort is directed by organizations and associated advertising agencies, with an empirical record of successful impact on youth smoking behavior via media efforts and with a policy commitment toward appropriate development, testing, support for adequate levels of exposure, and careful evaluation.

MEDIA AND SMOKING CESSATION

With the exception of the California campaign, the recent major media-based tobacco control efforts have not focused on encouraging smoking cessation efforts. As noted above, there was some evidence for the impact of the California smoking cessation campaign (Popham et al. 1993). Snyder and colleagues (2004) found an absolute effect size of 4 percent for such campaign. Again, the Snyder and colleagues (2004) meta-analysis included controlled studies that may have increased effect sizes relative to what might be found in large-scale field evaluations (Snyder et al. 2004). The outcome measures for what constituted cessation or cessation attempts also varied between studies. Nonetheless, these are encouraging findings, especially given the point made elsewhere in this report regarding the potential of smoking cessation programs and the importance of increasing quit attempts in order to realize this potential, especially if cessation programs are made less expensive and more widely available.

Given that the available data on smoking cessation media campaigns are less complete than those for youth prevention efforts, it may be premature to recommend a national, large-scale media campaign. The Snyder and colleagues (2004) meta-analysis suggested that cessation campaign effects were about two-thirds the size of prevention campaign effects on uptake (Snyder et al. 2004). However, many of the studies included in this meta-analysis were conducted prior to the availability of more recently developed cessation technologies and generally did not also increase access to these technologies. The combination of increased access and increased marketing has substantial potential, as noted in the appendix on smoking cessation. The potential is such that large-scale trials, supported either by states or by the National Institutes of Health, would be worthwhile as the basis for such a recommendation for national cessation media and social marketing efforts in the not-too-distant future.

REFERENCES

- Agostinelli G, Grube JW. 2002. Alcohol counter-advertising and the media. A review of recent research. [Review]. *Alcohol Research and Health*. 26(1):15-21.
- Agostinelli G, Grube JW. 2003. Tobacco counter-advertising: a review of the literature and a conceptual model for understanding effects. [Review]. *Journal of Health Communication*. 8(2):107-127.
- Bialous SA, Glantz SA. 1997. *Tobacco Control in Arizona, 1973–1997*. Center for Tobacco Control Research and Education.
- Biener L, Harris JE, Hamilton W. 2000. Impact of the Massachusetts tobacco control programme: population based trend analysis. *British Medical Journal* 321(7257):351-354.
- Biener L, Ji M, Gilpin EA, Albers AB. 2004. The impact of emotional tone, message, and broadcast parameters in youth anti-smoking advertisements. *Journal of Health Communication* 9(3):259-274.
- Biener L, Siegel M. 2000. Tobacco marketing and adolescent smoking: more support for a causal inference. *American Journal of Public Health* 90(3):407-411.
- CDC (Centers for Disease Control and Prevention). 1996. State Specific Prevalence of Cigarette Smoking—United States. *Morbidity and Mortality Weekly Report* 45(44).
- Cummings KM, Clarke H. 1998. *Health Science Analysis Project—Policy Analysis No. 8*. Washington, DC: Advocacy Institute.
- Emery S, Wakefield MA, Terry-McElrath Y, Saffer H, Szczypka G, O'Malley PM, Johnston LD, Chaloupka FJ, Flay B. 2005. Televised state-sponsored antitobacco advertising and youth smoking beliefs and behavior in the United States, 1999–2000. *Archives of Pediatric and Adolescent Medicine* 159(7):639-645.
- Farrelly MC, Davis KC, Haviland ML, Messeri P, Heaton CG. 2005. Evidence of a dose–response relationship between “truth” antismoking ads and youth smoking prevalence. *American Journal of Public Health* 95(3):425-431.
- Farrelly MC, Heaton CG, Davis KC, Messeri P, Hersey JC, Haviland ML. 2002. Getting to the truth: evaluating national tobacco countermarketing campaigns.[erratum appears in American Journal of Public Health. 2003 May;93(5):703]. *American Journal of Public Health*. 92(6):901-907.
- Flynn BS, Worden JK, Secker-Walker RH, Badger GJ, Geller BM, Costanza MC. 1992. Prevention of cigarette smoking through mass media intervention and school programs. *American Journal of Public Health* 82(6):827-834.
- Flynn BS, Worden JK, Secker-Walker RH, Pirie PL, Badger GJ, Carpenter JH, Geller BM. 1994. Mass media and school interventions for cigarette smoking prevention: effects 2 years after completion. *American Journal of Public Health* 84(7):1148-1150.
- Friend K, Levy DT. 2002. Reductions in smoking prevalence and cigarette consumption associated with mass-media campaigns. [Review]. *Health Education Research* 17(1):85-98.
- FTC (Federal Trade Commission). 2001. *Federal Trade Commission Cigarette Report for 1999*.
- Green LW, Murphy RL, McKenna JW. 2002. New insights into how mass media works for and against tobacco. *Journal of Health Communication*. 7(3):245-248.
- Heaton C. 2001. Who's afraid of the truth? *American Journal of Public Health* 91(4):554-558.
- Hornik R, Maklan D, Orwin R, Cadell D, Judkins D, Barmada C, Yanovitzky I, Moser M, Zador P, Southwell B, Baskin R, Morin C, Jacobsohn L, Prado A, Steele D. 2001. *Evaluation of the National Youth Anti-Drug Campaign: Third Semi-Annual Report of Findings*. Rockville, MD: Westat; Annenberg School for Communication, University of Pennsylvania.
- Hornik RC. 2002. Exposure: theory and evidence about all the ways it matters. *Social Marketing Quarterly* 8(3):30-37.
- Independent Evaluation Consortium. 2001. *Interim Report: Independent Evaluation of the California Tobacco Control Prevention & Education Program: Wave 2 Data, 1998; Wave 1 & Wave 2 Data Comparisons, 1996–1998*. Rockville, MD: The Gallup Organization.
- Kelder SH, Pechmann C, Slater MD, Worden JK, Levitt A. 2002. The National Youth Anti-Drug media campaign. *American Journal of Public Health* 92(8):1211-1212.
- Kozlowski LT, Yost B, Stine MM, Celebucki C. 2000. Massachusetts's advertising against light cigarettes appears to change beliefs and behavior. *American Journal of Preventive Medicine* 18(4):339-342.
- Levy DT, Friend K. 2002. Examining the effects of tobacco treatment policies on smoking rates and smoking related deaths using the SimSmoke computer simulation model. *Tobacco Control* 11(1):47-54.

- Malone R, Wenger L, Bero L. 2002. High school journalists' perspectives on tobacco. *Journal of Health Communication* 7:139-156.
- McLeod J, Becker LB, Byrnes JE. 1991. Protes DL, McCombs, eds. Another Look at the Agenda-Setting Function of the press. In *Agenda Setting: Readings on Media, Public Opinion, and Policymaking*. Hillsdale, NJ: Lawrence Erlbaum Associates. Pp. 47-60.
- Netemeyer RG, Andrews JC, Burton S. 2005. Effects of antismoking advertising-based beliefs on adult smokers' consideration of quitting. *American Journal of Public Health* 95:1062-1066.
- Niederdeppe J, Farrelly MC, Haviland ML. 2004. Confirming "truth": more evidence of a successful tobacco countermarketing campaign in Florida. *American Journal of Public Health* 94(2):255-257.
- Palmgreen P, Donohew L, Lorch EP, Hoyle RH, Stephenson MT. 2001. Television campaigns and adolescent marijuana use: tests of sensation seeking targeting. *American Journal of Public Health* 91(2):292-296.
- Pechmann C, Reibling ET. 2000. Planning an effective anti-smoking mass media campaign targeting adolescents. *Journal of Public Health Management Practice* 6(3):80-94.
- Pechmann C, Reibling ET. 2006. Antismoking advertisements for youths: an independent evaluation of health, counter-industry, and industry approaches. *American Journal of Public Health* 96(5):906-913.
- Pechmann C, Slater MD. 2005. Social marketing messages that may motivate irresponsible behavior. In Ratneshwar S. *Inside Consumption: Consumer Motives, Goals, and Desires*. New York: Routledge.
- Perry CL, Kelder SH, Murray DM, Klepp KI. 1992. Communitywide smoking prevention: long-term outcomes of the Minnesota Heart Health Program and the Class of 1989 Study. *American Journal of Public Health* 82(9):1210-1216.
- Pierce JP, Choi WS, Gilpin EA, Farkas AJ, Berry CC. 1998a. Tobacco industry promotion of cigarettes and adolescent smoking. *Journal of the American Medical Association* 279(7):511-515.
- Pierce JP, Gilpin EA, Emery SL, White MM, Rosbrook B, Berry CC, Farkas AJ. 1998b. Has the California tobacco control program reduced smoking? *Journal of the American Medical Association* 280(10):893-899.
- Popham WJ, Potter LD, Bal DG, Johnson MD, Duerr JM, Quinn V. 1993. Do anti-smoking media campaigns help smokers quit? *Public Health Reports* 108(4):510-513.
- Popham WJ, Potter LD, Hetrick MA, Muthen LK, Duerr JM, Johnson MD. 1994. Effectiveness of the California 1990-1991 tobacco education media campaign. *American Journal of Preventive Medicine* 10(6):319-326.
- Slater MD. 2004. Operationalizing and analyzing exposure: the foundation of media effects research. *Journalism and Mass Communication Quarterly* 81(1):168-183.
- Sly DF, Heald GR, Ray S. 2001a. The Florida "truth" anti-tobacco media evaluation: design, first year results, and implications for planning future state media evaluations. *Tobacco Control*. 10(1):9-15.
- Sly DF, Hopkins RS, Trapido E, Ray S. 2001b. Influence of a counteradvertising media campaign on initiation of smoking: the Florida "truth" campaign. *American Journal of Public Health* 91(2):233-238.
- Snyder LB, Hamilton MA, Mitchell EW, Kiwanuka-Tondo J, Fleming-Milici F, Proctor D. 2004. A meta-analysis of the effect of mediated health communication campaigns on behavior change in the United States. *Journal of Health Communication* 9 (Suppl 1):71-96.
- Wakefield M, Flay B, Nichter M, Giovino G. 2003a. Role of the media in influencing trajectories of youth smoking. *Addiction* 98 (Suppl 1):79-103.
- Wakefield M, Flay B, Nichter M, Giovino G. 2003b. Effects of anti-smoking advertising on youth smoking: a review. *Journal of Health Communication* 8(3):229-247.
- Zucker D, Hopkins RS, Sly DF, Urich J, Kershaw JM, Solari S. 2000. Florida's "truth" campaign: a counter-marketing, anti-tobacco media campaign. *Journal of Public Health Management Practice* 6(3):1-6.

O

Advocacy as a Tobacco Control Strategy

Caroline H. Sparks

Associate Professor, School of Public Health and Health Services
The George Washington University

Public advocacy for a tobacco-free society has been a national tobacco control strategy in the United States for the past 15 years. This appendix discusses the rise of advocacy as a public health intervention strategy to reduce tobacco use and assesses the evidence that may indicate whether advocacy should be considered a best practice for tobacco control. This review is not a formal meta-evaluation, for there are too few studies that directly link advocacy to decreases in tobacco-related morbidity or mortality or tobacco use prevalence. It is, instead, an attempt to guarantee that when we review the formal evidence that links various tobacco control policies that are now considered “best practices” to changes in prevalence and consumption, we recognize that such policy changes were achieved only through advocacy by state tobacco control coalitions and the thousands of citizens that made those policy changes possible.

RISE OF COMMUNITY LEVEL INTERVENTIONS TO CONTROL TOBACCO

During the early days of tobacco use prevention, after the publication of the 1964 Surgeon General’s Report linking smoking to health problems (Public Health Service 1964), many state health departments relied on funds in state budgets for tobacco control and treatment. Interventions tended to be targeted toward smoking cessation for individuals. However, by the late 1980s, beginning with California and then expanding to all states, funding for comprehensive state tobacco control programs increased. With this funding came a shift from individual tobacco control interventions toward population-based interventions to alter the social and environmental conditions that contribute to tobacco use (Stillman et al. 1999). From the beginning, policy advocacy was an integral part of these comprehensive tobacco control programs, and as state programs matured, it became an increasingly important focus of state tobacco control efforts. Community-level interventions may seem the norm to many tobacco control veterans today but they were not the norm just 15 years ago and the effort to support them in many state and federal programs today is still a difficult task. The complexity of interactions within communities, the political realities, and the resource demands of such programs make them costly to support.

EVOLUTION OF COMPREHENSIVE STATE TOBACCO CONTROL PROGRAMS

California launched the first statewide comprehensive tobacco control program in 1988 using funds from Proposition 99, the law that devoted 20 percent of an increase in state tobacco taxes to tobacco control programs (Bal 1998; Glantz and Balbach 2000). At that time, the National Cancer Institute (NCI) was already preparing to launch the 7 year national American Stop Smok-

ing Intervention Study (ASSIST). In 1991, the ASSIST program funded community-level interventions to prevent tobacco use in 17 states.

By the mid-1990s, every state in the United States had some funding for comprehensive tobacco control either from ASSIST or from the Centers for Disease Control and Prevention (CDC) Office of Smoking and Health's (OSH) Initiatives to Mobilize for the Prevention and Control of Tobacco Use (IMPACT) program. Additional funding for tobacco control was available for some states, from 1994 to 2000, from the Robert Wood Johnson Foundation's (RWJF) SmokeLess States (SSI) program (Gerlach and Larkin 2005; Tauras et al. 2005). In addition to educational and cessation programs, the funds from all three of these national programs—ASSIST, IMPACT and the SmokeLess States program—supported statewide coalitions of individuals and organizations that pursued action strategies toward strengthening tobacco control policies. The ASSIST program funded state health departments' work with coalitions (NCI 1991). The IMPACT program required state health departments to establish state-level tobacco control coalitions and to build capacity for comprehensive tobacco control programs in the 33 state health departments that participated in this cooperative agreement (Federal Register 1993). SmokeLess States was the only program that funded state coalitions whose lead agencies were outside of state health departments (RWJF 1993).

The state tobacco control coalitions focused from the beginning on public policy advocacy as an important strategy. Their plans reflected the shift away from interventions aimed at individuals toward interventions to change social norms and environmental conditions. By the late 1980s, NCI staff were aware that most intervention research showed that individual approaches to tobacco use prevention were not effective in reducing smoking prevalence and were ready to sponsor social and environmental approaches (NCI 1991). The planners of the ASSIST program recognized that promoting changes in public policy was consistent with a population-based solution to a population-wide epidemic of tobacco use (NCI 2005). The shift in focus enabled tobacco control advocates to pursue population-based solutions to the tobacco epidemic on a national scale for the first time in U.S. history. It was a bold initiative on the part of two federal agencies, a private foundation, state health departments, and nonprofit health organizations that deserves recognition and analysis in any effort to formulate future initiatives.

The ASSIST program promoted three types of interventions: (1) program services, (2) policy, and (3) mass media. However, ASSIST guidelines stated that "efforts to achieve priority public policy objectives should take precedence over efforts to support service delivery" (NCI 2005). Mass media initiatives were intended to support those policy changes, which meant that media advocacy that engaged the news media in support of prevention policies was the focus of media initiatives rather than social marketing. The four ASSIST priority policy areas were: (1) eliminating environmental tobacco smoke, (2) higher tobacco taxes, (3) limits on tobacco advertising and promotion, and (4) reducing youth access to tobacco (NCI 2005).

Evaluation of Comprehensive State Programs

The evidence that the ASSIST, CDC, and SSI programs were effective must be based on whether change occurred in the priority policy areas listed above. The CDC OSH released a summary in 2005 of the literature on the evidence of the effectiveness of state tobacco control programs (Kuiper et al. 2005). Organized by major reviews and five outcome indicators (tobacco-related mortality, prevalence, consumption, cessation, and smoke-free legislation and policy), the results are presented generally by state. The evidence provided can be considered a guide for state health departments to measure the success of their comprehensive tobacco control

programs. Of the five indicators of success, one is a health outcome—tobacco-related mortality—and three are markers that lead to improved health outcomes—decreases in prevalence, decreases in consumption of tobacco products, and smoking cessation.

The fifth indicator, smoke-free legislation and policy, is an intermediate outcome that alters the environment that supports tobacco use. This outcome should be considered the endpoint for the intervention strategy of policy advocacy. In the ASSIST evaluation, changes in policy were, in fact, considered part of an Initial Outcome Index that represented initial outcomes of advocacy efforts (Gilpin et al. 2000). While we can link smoke-free policies, such as high tobacco excise taxes, to changes in prevalence, consumption, and cessation, it is more difficult to link advocacy action directly to these intermediate outcomes or to the long-range health outcome. This may be a reason why discussions of best practices generally list a range of smoke-free policies while ignoring or obscuring advocacy as a best practice in tobacco control. If we are not alert, policies can be treated as strategies instead of endpoints, without acknowledging that policy change in most cases cannot occur without public advocacy campaigns. The best practice must be considered an active, effective tobacco coalition with a focus on policy change.

As an example of the lack of attention to the importance of an advocacy strategy, the Task Force on Community Preventive Services (2001) did not list community advocacy or media advocacy in its 14 recommendations for interventions to reduce tobacco use and exposure to environmental tobacco smoke (Task Force on Community Preventive Services 2001). Yet, the advocacy work of tobacco control coalitions has been critical to the success of tobacco control policies.

To what extent does a comprehensive tobacco control program make a difference in a state? To what extent does a state coalition's policy advocacy work make a difference within a comprehensive tobacco control program? The first question seems easier to answer than the second. A number of authors have tried to assess the contribution of state comprehensive programs to policy change and/or reductions in smoking (Elder et al. 1996; Public Health Service 2000; Siegel 2002; Stillman et al. 2003; Tauras et al. 2005; Wakefield and Chaloupka 2000; Warner 2000). There is evidence that states with the most money for comprehensive programs have lower prevalence and consumption rates (Tauras et al. 2005).

The CDC concluded, on the basis of analyses of the excise tax-funded state programs in California, Massachusetts, Oregon, and Maine as well as on the agency's experience in providing assistance to four other states (Florida, Minnesota, Mississippi, and Texas), that the evidence was sufficiently compelling to encourage all states to pursue comprehensive programs. After the end of the ASSIST program in 1999, when the responsibility for tobacco prevention shifted from NCI to the CDC OSH, the OSH implemented a tobacco control program to sustain state comprehensive programs. Under that program each state can receive approximately \$1 million per year for comprehensive tobacco control (CDC 2003). On the basis of the evidence, the agency issued guidance for states in 1999 in a document titled *Best Practices for Comprehensive Tobacco Control Programs* (CDC 1999a). The guidance lists nine areas of activity that should be included as best practices because the complexity of changing the social environment "must be addressed by multiple program elements working together in a comprehensive approach" (CDC 1999a). Suggested levels of funding per capita are included to assist states in allocating funds from various sources.

The first area of best practice—community programs—includes promoting government and voluntary policies to promote clean indoor air, restrict access to tobacco products, and achieve other policy objectives. As evidence for this as a best practice, the document cites the success of

the California, Massachusetts, and Oregon coalitions in achieving policy and program objectives (CDC 1999a;b). Statewide programs that promote media advocacy and counter-marketing campaigns are also cited among the best practices, based on the CDC's review of core documents from the California and Massachusetts campaigns.

There have been few efforts to analyze the contribution of the state tobacco control coalitions within comprehensive state programs, especially their advocacy initiatives. Most of the authors cited above acknowledge that state coalitions have played a key role in the achievement of policy changes that reduce tobacco consumption while at the same time commenting on the difficulty of measuring the extent to which coalition activities at the state or local level were responsible for either policy change or health outcomes. For example, in an article about the connection between total tobacco control spending in the states and reduced tobacco consumption, Tauras and colleagues (2005) acknowledged that no data were available that would allow them to analyze which specific programs in the states are responsible for reduced consumption (Tauras et al. 2005). Elder and colleagues' (1996) evaluation of the California comprehensive program noted the shift from individually focused programs to community coalition and advocacy work, but they had no means of quantitatively documenting the contribution of those programs to the decline in smoking prevalence in the state. According to Nelson, one of the authors of the Kuipers and colleagues (2005) literature review from the OSH (Kuiper et al. 2005), the greatest research need is a multistate evaluation study of the impact of state programs (Personal Communication, Nelson, June 2005). If the CDC would fund a new initiative based on the ASSIST model, such a study could extend our understanding of statewide comprehensive tobacco control programs, refine evaluation measures, and help clarify the impact of such programs on changes in smoking prevalence.

WEAKNESS IN PUBLIC HEALTH METHODS FOR MEASURING PRIMARY PREVENTION STRATEGIES

One reason that the link between community action and reductions in tobacco use is difficult to document is that public health methodology is not as well developed for measuring complex community- and population-based social and policy change as it is for individual and small group change. This difficulty in public health methods has been noted by McKinley and Marceau (2000) in a critique of the current research paradigm in public health and their call for the development of multi-level research methods (McKinley and Marceau 2000). The ASSIST planners noted a lack of developed methods for evaluating large-scale, multisite demonstration projects (NCI 2005). The difficulty was also noted in a report of a workshop on tobacco control interventions sponsored by the Johns Hopkins Bloomberg School of Public Health (Johns Hopkins 2002). Public health experts in attendance noted that the complexity of comprehensive tobacco control programs and the contributions of specific programs cannot be evaluated using conventional experimental designs. They unanimously concurred that the current state of evaluation research has to be improved in order to evaluate higher-level public health initiatives, such as comprehensive tobacco control programs.

It is easier to track the direct influence of a policy change than to track the influence of advocates in achieving that policy. For example, an economist can track declines in cigarette purchases in the years following an increase in the tobacco tax in a state, so the excise tax may then be considered a best practice. It is more difficult for a public health researcher to show that a state coalition's activities are responsible for a change in the social climate that led to increased support for the higher tax. Most people in the tobacco control field know that a tax increase does

not occur without decision makers considering whether there is public support for such a measure. However, the link between tobacco coalition activities and the tax increase is hard to prove. As a result, even after years of citizen advocacy for tobacco control, we have a lot of anecdotal evidence but slim quantitative evidence that such coalition advocacy is essential to the process of change.

A search for evidence that would meet rigorous experimental or quasi-experimental standards for cross-study comparisons cannot yet yield enough studies for a meta-evaluation of the impact of advocacy initiatives. While many members of tobacco control coalitions can point to achievements in which their coalitions participated in educating the public or in supporting strong tobacco control policies, these achievements are documented in coalition reports and case studies that do not meet conventional standards for causality. Most of these case studies have not been able, or have not attempted, to parse out or compute the contribution of coalition advocacy action to tobacco control efforts so that we can generate effect sizes for such interventions. An evaluation of the impact of California's Proposition 99 program covering the period 1990–1994, for example, was primarily a process evaluation (Elder et al. 1996). The researchers noted their frustration at not being able to relate specific program efforts to local impact on tobacco use, even though it was clear that overall from 1988 to 1994, smoking declined by 28 percent in California. A team of researchers did attempt to measure a link between program exposure among adults and youth to the California Tobacco Control Program and reductions in smoking prevalence in counties from 1996 to 1998 (Rohrbach et al. 2002). The program design included cross-sectional surveys of random telephone samples of adults and youth at two points in time. Program exposure included community programs, community and media programs, and community and school programs. The evaluators found that 80 percent of adults reported exposure to community programs and that counties with the highest multicomponent exposure rates had the greatest reductions in adult smoking prevalence, the largest increases in home smoking bans, and the greatest reductions in workplace no-smoking policy violations. None of the changes in youth outcomes were associated with multicomponent exposure.

The single national study to date that reports an attempt to document a link between state-wide coalition efforts and decreasing prevalence of smoking is an evaluation of the ASSIST program (Stillman et al. 2003). For this study, the evaluators constructed an index of change in adult smoking prevalence and per capita cigarette consumption as outcome variables and compared the outcomes to tobacco control policies in the 17 ASSIST states and 33 non-ASSIST states and the District of Columbia (Gilpin et al. 2000). They computed a "strength of tobacco control index" (SOTC) for every state based on earlier concept mapping work (Trochim et al. 2003) as a means of computing tobacco control scores by state (Stillman et al. 1999). The evaluators found a small but statistically significant difference in reduction of adult smoking prevalence (-0.63 percent, $p = .049$), but not in per capita cigarette consumption, in ASSIST states compared to non-ASSIST states. However, per capita consumption was affected by the SOTC in the states. As the authors reported, "states with larger changes in IOI [initial outcomes index] score over time were associated with lower per capita cigarette consumption than states with smaller changes in IOI (-0.32, $p < .001$). For a state, per capita consumption decreased by .57 packs per person per month as the IOI values increased from the 25th to the 75th percentile over the intervention period" (Stillman et al. 2003). This decrease in consumption was largely due to the component of IOI that represented cigarette price. The authors estimated that if all 50 states had implemented ASSIST, the decrease in adult smoking would have been 1,213,000 smokers. They concluded that investing in state-level tobacco control capacity and promoting tobacco control policies are effective strate-

gies. The authors discuss the limitations of the study, especially their inability to develop an overall measure for the strength of the tobacco industry's opposition in the states. They acknowledged that the complex political and socioeconomic variability among states that probably affected implementation of the ASSIST program was beyond the control of the ASSIST intervention (NCI 2006).

The Tobacco Control Branch of the NCI published a monograph in 2005 that documents the history of the ASSIST program (NCI 2005). The authors discuss lessons learned and describe in detail the extent to which policy advocacy was a core feature of the innovative ASSIST program. The NCI's ASSIST evaluation, not yet available but to be published in late 2006, may add to public understanding of the impact of ASSIST on tobacco policy outcomes.

If we consider documented changes in tobacco control policy to be the initial endpoint of coalition advocacy initiatives, then we do have evidence of the effectiveness of citizen advocacy. Even without data that directly link citizen advocacy to reductions in tobacco use, the evidence of the effectiveness of advocacy as a strategy, for now, rests in the large number of documented changes in law and policy that have occurred in the states. For example, members of statewide coalitions were often the primary movers in countering the marketing techniques of the tobacco industry and in developing counter campaigns that reframed the positive spin on smoking of the tobacco companies. Much of this report focuses on the impact of tobacco policy changes on smoking rates. It is important to remember that strong tobacco control policies are an outcome of hundreds of local and state citizen campaigns. While we must hone our ability to measure the contribution of advocacy initiatives, we must be careful not to obscure the importance of continued advocacy work as a public health strategy.

In discussing the SmokeLess States program, Gerlach and Larkin (2005) link citizen campaigns to policy change, although they do not document it quantitatively (Gerlach and Larkin 2005). These authors discuss the success of the SmokeLess States program in terms of the policy changes that states adopted over the 10 years of the program. Even without quantitative studies of the efficacy of advocacy, most people in the tobacco control community make a reasonable assumption, based on their experiences, that without citizen advocacy it is doubtful that the changes in tobacco taxes, smoke-free workplace laws, restrictions on smoking in public accommodations, and restrictions on sales to youth would have occurred. This assumption is reasonable because decision makers do not decide to strengthen tobacco control policies unless an active citizenry, working through state and national tobacco control coalitions to create tobacco-free environments, demands such policies. In 2002, by the end of the decade of coalition advocacy, the Surgeon General's report, *Reducing Tobacco Use in 2000*, called the emergence of statewide coalitions the most important advance in comprehensive programs and concluded that comprehensive state programs, such as those in California and Massachusetts, provide evidence that such programs reduce smoking (Public Health Service 2000).

TOBACCO INDUSTRY ATTACKS ON PUBLIC POLICY ADVOCACY

Certainly, even without proof that coalition advocacy could change tobacco use, the potential power of an advocacy strategy by state coalitions was immediately recognized by the tobacco industry. The industry attacked the ASSIST program from its inception (NCI 2005; Trochim et al. 2003; White and Bero 2004) in order to reduce the threat of citizen action. In an industry document from 1995, a Phillip Morris consultant, objecting to the activities in the Community Environment Channel of ASSIST, wrote that "the most effective way of reaching low-educated

populations will be through policy and media advocacy” (National Institute of Health Publication 2005).

An analysis of tobacco industry internal documents indicates that the tobacco industry deliberately pursued a campaign to derail ASSIST by equating citizen advocacy efforts with illegal lobbying. The tobacco industry successfully pressured the federal legislature to add prohibitions on such efforts at the state and local levels (NCI 2005; White and Bero 2004). For the first time in U.S. history, it became illegal for anyone receiving federal funds to lobby state and local governments (Federal Acquisition Regulation 2005). A Tobacco Institute document of December 15, 1994, stated: “This Fall we were able to attach an amendment to the Federal Acquisition Streamlining Act legislation . . . which—for the first time—would prohibit federal funds from being used to lobby a local legislative body” (National Institute of Health Publication 2005).

The tobacco industry used the Freedom of Information Act to divert state health department resources and threatened lawsuits against state health departments and individual state employees as a scare tactic (NCI 2005). The industry continued its opposition to advocacy by ensuring that the national tobacco settlement included language that prohibited the national foundation that was created from engaging in any political activities or lobbying (National Association of Attorneys General 1998). The industry’s attack equates advocacy with lobbying and cites Internal Revenue Service regulations that forbid public agencies from using public money for lobbying (White and Bero 2004).

The Impact of Obscuring the Distinction Between Policy Advocacy and Lobbying

Federal agencies and many state health departments, for political reasons or for caution, reacted to tobacco industry attacks by severely limiting advocacy activities that were, and still are, perfectly legal. Within the public health field, advocacy is a much broader concept and set of activities than lobbying (Gerlach and Larkin 2005; Wallack et al. 1993). The definitional issue is important if advocacy strategies are to survive as important interventions. The simplest dictionary definition of advocacy is to act to persuade others to support a cause (Merriam Webster 1995). In his book on media advocacy as a public health strategy, Wallack and colleagues (1993) use a definition of advocacy as organized social action to improve social conditions (Wallack et al. 1993). They draw this definition from a 1988 Institute of Medicine report that defines the mission of public health as “fulfilling society’s interest in assuring conditions in which people can be healthy” and assumes that improving social conditions is the route to success (IOM 1988). Wallack and colleagues (1993) refer further to advocacy as a term that represents a set of skills used to create a shift in public opinion and mobilizes resources and forces to support an issue, policy, or constituency (Wallack et al. 1993). Others define advocacy specifically in terms of social change related to tobacco. Most state coalitions adopted names incorporating the words “tobacco free.” The school-based Kids Act to Control Tobacco program uses the definition of advocacy as “to act to support a tobacco free environment” (NEA HIN 2000). Gerlach and Larkin (2005), in their article on the SmokeLess States program, refer to advocacy as the process of educating policy makers and members of the community about issues and measures that can be taken to address them (Gerlach and Larkin 2005). They emphasize the importance of advocacy to change tobacco control policies and discuss how the RWJF considered such work the key to success as the SmokeLess States program matured.

Gerlach and Larkin (2005) point out that as early as the first year of the SmokeLess States program, RWJF’s support of the Coalition for Tobacco-Free Colorado was challenged as lobby-

ing by the tobacco industry (Gerlach and Larkin 2005). As a response, RWJF was careful to make a distinction between lobbying, which the SmokeLess States program would not fund, and advocacy. The foundation defined lobbying as direct communication to a legislator on specific legislation or grassroots communication to the general public urging them to take action on specific legislation. While RWJF would not fund coalitions to conduct lobbying, coalitions were free to use their own funds for such activity. Indeed, the foundation encouraged and finally insisted that coalitions find such funds. Both RWJF and the NCI ASSIST program held training workshops for state coalitions on policy advocacy. As the ASSIST report from NCI makes clear (NCI 2005, p. 352), policy advocacy and lobbying are not the same thing.

The fierce opposition of the tobacco industry to advocacy is a good indication of how important such initiatives should be in any blueprint for future tobacco control. Already, the industry attacks have weakened federal and state willingness to fund advocacy programs or, at least, have led them to obfuscate the language of advocacy while continuing to promote policy changes. The potential for future gains through this strategy is endangered if state health departments and coalitions become hesitant to openly acknowledge how critical citizen advocacy is for successful policy change. The restrictions on state and local lobbying added to the 1994 Federal Acquisitions Streamlining Act are still part of federal acquisition regulations (Federal Acquisition Regulation 2005). Unless these restrictions are rolled back, the hesitancy to engage in activities that could be confused with lobbying on the part of federal agencies and state health departments will remain.

The original funding that promoted coalition advocacy work ended in the late 1990s. It is important that new funding initiatives not equate advocacy with lobbying and not obscure the purposes of comprehensive programs and state coalitions. NCI's ASSIST program ended in 1999. The IMPACT program ended in 1998, and the CDC OSH assumed responsibility for continued funding of state health departments through the National Tobacco Control Program. While the focus is still on comprehensive tobacco programs, advocacy per se is not mentioned (Public Health Service 2000). From the ASSIST emphasis on policy advocacy as primary, the best practices recommendations have expanded to nine areas, with the potential for diluting funds for advocacy action. RWJF's SmokeLess States program funding for advocacy initiatives ended in 2004, after an investment of \$99 million over 10 years. While the foundation continues to fund tobacco use initiatives, the focus on advocacy as a strategy has diminished (Gerlach and Larkin 2005). Without further funding for state coalition advocacy initiatives and the development of evaluation methods that can measure the contribution of statewide coalitions, the potential for continued policy change may be further weakened.

THE FUTURE OF ADVOCACY EFFORTS

Although federal dollars for advocacy may be somewhat obscured by language about comprehensive state programs and although funding has decreased, promotion of tobacco control advocacy is alive and well among state and local workers in the field of tobacco control. For example, at the National Conference on Tobacco or Health held in Chicago, May 4–6, 2005, the focus on advocacy and social change was everywhere, from the keynote speakers to workshop presenters to people's discussions about action in their states (National Conference of Tobacco or Health 2005). Speakers at the conference made it clear that advocacy, even as a means to maintain funding for comprehensive state tobacco control programs, is essential for success. The advocacy focus included media and community advocacy. State health department policies toward advocacy have an influence on the extent to which these types of programs survive. Faced with

declining funds for a media campaign, one young man, who did not want to be identified as a state worker, referred to recent youth action in his home state as “guerilla advocacy,” meaning that when the state health department refused to support advocacy, the youth took advocacy out into the streets by staging events that spoke directly to community members (Personal communication, Anonymous, May 2005). He mentioned that when banned from handing out educational materials in a local mall, each member of the group wore a T-shirt with one letter so that when the members lined up the shirts spelled out “T-O-B-A-C-C-O F-R-E-E!” Such actions are cheap but effective ways of involving youth in creating anti-tobacco messages.

Training youth to become advocates was one theme at the conference. While evaluation studies of advocacy training programs are often still more qualitative than quantitative, several speakers presented results of youth training in advocacy skills at the tobacco conference. The National Education Association Health Information Network’s Kids Act to Control Tobacco (Kids ACT!) program’s outcome evaluation, conducted over 4 years by Sparks and Simmens (2005) is the first large, group-randomized trial of a school-based youth advocacy program in the United States. Based on a four-step advocacy model, the analysis of this 3-year program showed that the program produced small to moderate differences between intervention and control groups at three points in time. It should be noted that the primary outcome of this advocacy program was advocacy action rather than smoking behavior (Sparks et al. 2005). The Smokebusters advocacy training program in Missouri involves youth in 8th through 10th grades in a 3-year advocacy program. The program monitors youth participation and has data that can be used in an outcome evaluation if funds were available (Lara 2005). The Campaign for Tobacco Free Kids sponsors an action program and awards for youth advocates (Campaign for Tobacco-Free Kids 2006) and the American Legacy Foundation’s truth® campaign involves youth in a media advocacy program (American Legacy Foundation 2004). These advocacy efforts indicate that adults in tobacco control believe that training the next generation of advocates is important, not just as a smoking reduction strategy, but as a strategy for future social and policy change.

Many state activities for policy change are clearly based on increasing public support for tobacco-free environments. Even though funding for advocacy has decreased since the three national programs mentioned earlier ended, coalition action in the states has centered on grassroots advocacy for smoke-free environments in workplaces, restaurants, and bars. Americans for Non-smokers’ Rights (ANR) and other national organizations have worked with grassroots citizen coalitions to support smoke-free laws and policies. These efforts have been funded by national voluntary organizations such as the American Cancer Society, the American Heart Association, and the American Lung Association as well as by RWJF (Personal Communication, Frick, ANR, March 13, 2006). These coalition activities have had a tremendous success in decreasing environmental tobacco smoke. By April 2006, 461 municipalities in 33 states and the District of Columbia had passed smoke-free laws in workplaces, restaurants, or bars. One hundred and thirty-five of these had laws covering all three types of sites, while the others had laws covering one or more of these sites (ANR 2006). By January 2006, 11 states had passed smoke-free workplace legislation (Cherner 2006). An initiative to promote fire-safe cigarette laws has also emerged and self-extinguishing cigarettes are now required in five states—New York, California, Vermont, Illinois, and New Hampshire (Coalition for Fire Safe Cigarettes 2006). In January 2006, the California Environmental Protection Agency announced that environmental tobacco smoke is a Toxic Air Contaminant subject to state assessment for health effects (CEPA 2006).

RECOMMENDATIONS FOR FUTURE TOBACCO CONTROL

The adoption of the types of smoke-free policies mentioned above by cities and towns across America provides the most important evidence for the impact of citizen policy advocacy as a public health strategy in the first 6 years of the twenty-first century. Even as funding for coalitions has become less secure, these policy successes continue to roll forward with a momentum that was unanticipated in the late 1990s. The success of smoke-free policy change in the past 6 years illustrates the importance of continued federal and state support for community-level strategies for tobacco control and broad demonstration programs. As mentioned earlier, the CDC OSH currently offers only approximately \$1 million per state to continue comprehensive tobacco control efforts (CDC 1999b). Although the CDC recommends funding levels for each state based on smoking prevalence, state governments are not funding such efforts at the levels recommended for best practices by the CDC (Tauras et al. 2005). The Master Settlement Agreement money has been siphoned off by state governments to programs other than tobacco control. The NCI currently funds only small research projects and has no plans for funding broad community, multilevel programs such as ASSIST. Even though smoking rates are dropping, tobacco use remains the greatest preventable cause of death, continuing to kill more than 400,000 Americans every year (CDC 2004). If we expect to reduce significantly the burden of tobacco use on the health of people, we need the vision of the early planners and activists that brought ASSIST, IMPACT, and SmokeLess States into existence.

The evidence reviewed above indicates that the comprehensive approach of the 1990s, including policy advocacy, has resulted in many policy changes for tobacco control that, in turn, have had an effect on the prevalence of tobacco use. There are two main reasons to continue a comprehensive approach that focuses on policy advocacy. The first, specific to tobacco control, is that if we count all the state and local policies for tobacco control adopted in the last 15 years, the public advocacy approach has had the most effect in altering the environment that supports tobacco use. State health departments have broadened the scope of tobacco control activities and can document changes in social norms that support tobacco-free environments and public support for tobacco control and can list changes in public policy that limit tobacco use. A cadre of public health advocates was trained intensively through the ASSIST, IMPACT, and SmokeLess States coalition initiatives. Not only should this cadre be maintained, but funding and resources should be available so that they may provide training for the younger tobacco control workers in the 50 states so that the momentum of public advocacy is not lost.

The second and even more crucial reason is that continuing to implement and evaluate comprehensive social and environmental interventions is critical to the continued development of effective public health promotion. Our understanding of how to implement such interventions as well as how to develop methods for evaluating the effectiveness of such interventions cannot advance if the Federal government, state governments, and national nonprofit foundations will not take the lead in advancing public health through such initiatives. Involvement in broad initiatives is critical to the training of future public health professionals who need practice in population-based solutions to public health problems. Such initiatives, with their national focus, are so costly that they require federal coordination and support. As an example of the kind of advances the field needs, the recent OSH release of Key Outcome Indicators for Evaluating Comprehensive Tobacco Control Programs (Starr et al. 2005) illustrates how to enhance program evaluation of complex initiatives. The OSH tobacco control program requires states that receive tobacco control money to develop action plans based on logic models in which community mobilization and policy and regulatory action are interventions that lead to defined short-, intermediate-, and

long-term outcomes for tobacco control. Detailed outcome indicators then make it possible to quantitatively measure success. This approach is an example of how to train future tobacco control advocates to implement and evaluate community-level interventions.

RECOMMENDATIONS FOR FUTURE ACTION

As the ASSIST project was closing down in the late 1990s, a number of committees and task groups made recommendations for future comprehensive tobacco control programs that would continue innovative strategies and continue advocacy activities (NCI 2005). Many of those recommendations have yet to be acted upon. The 2005 Tobacco or Health Conference adopted recommendations for the future. At the World Tobacco Conference in July 2006, participants also adopted resolutions for future tobacco control. Even as citizen action continues, in this decade a lack of political will at the state and federal levels has resulted in lost time, missed opportunities, and gaps in training and continued development of advocacy research and expertise. The following recommendations, based on this review, incorporate some of the recommendations from various sources that should be part of a blueprint to advance tobacco control and public health intervention methods:

1. Federal funds disbursed to states and local communities for tobacco control activities should not be restricted from use for lobbying/advocacy efforts at the state or local level (ASSIST 1997). The government should immediately repeal language that implies that state and local citizen advocacy is illegal for recipients of federal health funding. A federal policy promoting citizen participation in the policy arena should be publicized and the distinction between legitimate citizen advocacy and professional lobbying should be made clear. A distinction can be made between corporate lobbying and citizen action.
2. The Federal government should continue to fund initiatives, such as ASSIST, in which multilevel, community-wide programs can be tested and evaluated. ASSIST should be considered only the beginning of a population approach to the national health threat of tobacco use. Similar recommendations were made by the ASSIST Coordinating Committee (ASSIST 1995).
3. State health departments should continue to position tobacco prevention as a priority in the media and through policy advocacy initiatives (ASSIST 1995). State health departments and tobacco control advocates should publicize the difference between advocacy for social change and lobbying. Comprehensive tobacco programs should encourage residents to demand their rights in a democracy to advocate for health policies that benefit the general public rather than the tobacco industry.
4. Federal and state agencies should increase funding to strengthen the ability of public health researchers to develop better methods to evaluate population strategies (Johns Hopkins 2002).
5. Far higher levels of public funding must be made available by federal and state governments to tobacco control coalitions to continue advocacy activities in their broadest sense.
6. Training grants to schools of public health should be made available to train graduate students in social and environmental approaches to public health problems.
7. The NCI and CDC should catalog advocacy training materials used in the ASSIST and IMPACT programs and make them widely available to professionals in the public health field so that training of advocates can continue.

REFERENCES

- American Legacy Foundation. 2004. *About the American Legacy Foundation*. Web Page. Available at: http://www.americanlegacy.org/americanlegacy/skins/alf/display.aspx?Action=display_page&mode=User&ModuleID=8cde2e88-3052-448c-893d-d0b4b14b31c4&ObjectID=e203e4bd-d5ac-4d5b-90ce-cfbaf0e3db8; accessed July 21, 2006.
- ANR (Americans for Nonsmokers' Rights Foundation). 2006. *Municipalities with Local 100% Smokefree Laws*. Web Page. Available at: <http://www.no-smoke.org/pdf/100ordlisttabs.pdf> (accessed May 31, 2006).
- ASSIST (American Stop Smoking Intervention Study). 1995. *Executive Summary from "Planning for a Durable Tobacco Prevention Movement: Sustaining Tobacco Prevention Beyond the American Stop Smoking Intervention Study"*. Rockville, MD.
- ASSIST. 1997. *Realizing America's Vision for Healthy People: Advancing a Federal Commitment to Fund Effective Tobacco Control*. Monograph 16: ASSIST—Shaping the Future of Tobacco Prevention and Control.
- Bal DG. 1998. Designing an effective statewide tobacco control program—California. *Cancer* 83 12 (Suppl Robert):2717-2721.
- Campaign for Tobacco-Free Kids. 2006. *Progressive Youth Advocacy Tactics to Fight Big Tobacco—Make Your Voice Heard*. Web Page. Available at: <http://www.tobaccofreekids.org/youthaction/display.php?DocID=1> (accessed August 7, 2006).
- CDC (Centers for Disease Control and Prevention). 1999. *Best Practices for Comprehensive Tobacco Control Programs—August 1999*. Atlanta, GA: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health.
- CDC. 2003. *Chronic Disease. Grants and Funding: Consolidating and Streamlining Program Announcements*. Web Page. Available at: http://www.cdc.gov/nccdphp/grants_funding/consolidating.htm (accessed August 15, 2006).
- CDC. 2004. *The Health Consequences of Smoking: A Report of the Surgeon General*. Web Page. Available at: http://www.cdc.gov/tobacco/data_statistics/sgr/sgr_2004/index.htm (accessed May 25, 2007).
- CDC. 2005. *Key Outcome Indicators for Evaluating Comprehensive Tobacco Control Programs*. Atlanta, GA: CDC
- CDHS (California Department of Health Services). 1998. *A Model for Change: The California Experience in Tobacco Control*. Sacramento, CA: CDHS.
- CEPA (California Environmental Protection Agency). 2006. *California Identifies Second-Hand Smoke As a "Toxic Air Contaminant"*, News Release 1/26/06. Web Page. Available at: <http://www.arb.ca.gov/newsrel/nr012606.htm> (accessed June 7, 2006).
- Cherner J. 2006. *New Jersey to Become 11th U.S. Smokefree Workplace State*. Web Page. Available at: <http://smokefree.net> (accessed June 3 2006)
- Coalition for Fire Safe Cigarettes. 2006. *New Hampshire to Require Fire Safe Cigarettes*, News Release 05/31/06. Web Page. Available at: <http://www.nfpa.org/newsReleaseDetails.asp?categoryid=488&itemId=28559> (accessed December 3, 2006)
- Elder JP, Edwards CC, Conway TL, Kenney E, Johnson CA, Bennett ED. 1996. Independent evaluation of the California Tobacco Education Program. *Public Health Reports* 111(4):353-358.
- Federal Acquisition Regulation. 2005. *Vol. 1, Part 31.205-22 Lobbying and Political Activity Costs*. Web Page. Available at: <http://www.arnet.gov/far/reissue/FARvol1ForPaperOnly.pdf> (accessed September 16, 2006).
- Federal Register. 1993. *Capacity Building for Core Components of Tobacco Prevention and Control Programs*. CDC Program Announcement #332 58(128): 36413-36416.
- Gerlach KK, Larkin MA. 2005. *To Improve Health and Health Care, Vol. VIII*. San Francisco, CA: Jossey-Bass.
- Gilpin E, Stillman FA et al. 2000. Index for US State Tobacco Control Initial Outcomes. *American Journal of Epidemiology* 152(8):727-738.
- Glantz S, Balbach E. 2000. *Tobacco War: Inside the California Battles*. Berkeley: University of California Press.
- IOM (Institute of Medicine). 1988. *The Future of Public Health*. Washington DC: National Academy Press.
- Johns Hopkins, Bloomberg School of Public Health. 2002. Evaluating comprehensive tobacco control interventions: challenges and recommendations for future action. Report of a workshop convened by the Institute for Global Tobacco Control, Johns Hopkins Bloomberg School of Public Health. *Tobacco Control* 11(2):140-145.

- Kuiper N, Nelson D, Schooley M. 2005. *Evidence of Effectiveness: A Summary of State Tobacco Control Program Evaluation Literature*. Atlanta, GA: Department of Health and Human Services.
- Lara J. 2005. *Smokebusters: Educating and Empowering Youth to Be Advocates for Policy Change*. Web Page. Available at: <http://ncth.confex.com/ncth/viewHandout.epl?uploadid=741> (accessed May 4, 2005).
- McKinley JB, Marceau LD. 2000. To boldly go (public health matters). *American Journal of Public Health* 90(1):25-33.
- Merriam-Webster. 1995. *Collegiate Dictionary (10 ed)*. Springfield, MA: Merriam-Webster Inc.
- National Association of Attorneys General. 1998. *Master Settlement Agreement*. Web Page. Available at: http://www.naag.org/upload/1109185724_1032468605_cigmsa.pdf (accessed August 2, 2005).
- National Conference on Tobacco or Health. 2005. *Conference Program: Turning Point: Challenges and Opportunities in Tobacco Control in the Next Decade*. Chicago, IL.
- National Institute of Health Publication. 2005. *The ASSIST Program*. Web Page. Available at: <http://legacy.library.ucsf.edu/tid/gfk86d00> (accessed May 4, 2005).
- NCI (National Cancer Institute). 1991. *Strategies to Control Tobacco Use in the United States: A Blueprint for Public Health Action in the 1990s (Monograph 1)*. Bethesda, MD: NIH.
- NCI. 2005. *ASSIST: Shaping the Future of Tobacco Prevention and Control (Monograph 16)*. Bethesda, MD: National Institutes of Health.
- NCI. 2006. *Evaluating ASSIST: A Blueprint for Understanding State-level Tobacco Control*. Tobacco Control Monograph No. 17. Bethesda, MD: U.S. Department of Health and Human Services. NIH Pub. No. 06-6058.
- NEA HIN (National Education Association Health Information Network). 2000. *Kids Act to Control Tobacco (Kids ACT!) Teacher's Manual*. Washington DC: NEA
- Public Health Service. 1964. *Smoking and Health: Report of the Advisory Committee of the Surgeon General of the Public Health Service*. Public Health Service Publication.
- Public Health Service. 2000. *Reducing Tobacco Use: A Report of the Surgeon General*. Public Health Service Publication.
- Rohrbach LA, Howard-Pitney B, Unger JB, Dent CW, Howard KA, Cruz TB, Ribisl KM, Norman GJ, Fishbein H, Johnson CA. 2002. Independent evaluation of the California Tobacco Control Program: relationships between program exposure and outcomes, 1996–1998. *American Journal of Public Health* 92(6):975-983.
- RWJF (Robert Wood Johnson Foundation). 1993. *Call for Proposals: SmokeLess States: Statewide Tobacco Prevention and Control Initiatives*. Princeton, NJ: RWJF.
- Siegel M. 2002. The effectiveness of state-level tobacco control interventions: a review of program implementation and behavioral outcomes. *Annual Review of Public Health* 23:45-71.
- Sparks C, Simmens S. 2005. *An Outcome Study of the Kids Act to Control Tobacco (Kids ACT!) Program*, Final Narrative Report submitted to the Robert Wood Johnson Foundation under Grant #038897.
- Sparks C, Simmens S, Klouj A, Jones K, Pearson E, Fraser J. 2005. *Evaluation of Kids Act to Control Tobacco (Kids ACT!)*.
- Starr G, Rogers T, Schooley M, Porter S, Wiesen E, Jamison N. 2005. *Key Outcome Indicators for Evaluating Comprehensive Tobacco Control Programs*. Atlanta, GA: CDC.
- Stillman F, Hartman A, Graubard B, Gilpin E, Chavis D, Garcia J, Wun LM, Lynn L, Manley M. 1999. The American Stop Smoking Intervention Study. Conceptual framework and evaluation design. *Evaluation Review* 23(3):259-280.
- Stillman FA, Hartman AM, Graubard BI, Gilpin EA, Murray DM, Gibson JT. 2003. Evaluation of the American Stop Smoking Intervention Study (ASSIST): a report of outcomes. *Journal of the National Cancer Institute* 95(22):1681-1691.
- Task Force on Community Preventive Services. 2001. Recommendations regarding interventions to reduce tobacco use and exposure to environmental tobacco smoke. *American Journal of Preventive Medicine* 20(2S):10-15.
- Taurus JA, Chaloupka FJ, Farrelly MC, Giovino GA, Wakefield M, Johnston LD, O'Malley PM, Kloska DD, Pechacek TF. 2005. State tobacco control spending and youth smoking. *American Journal of Public Health* 95(2):338-344.
- Tobacco Institute. 1994. *The ASSIST Program—Bates no. T113850309-0310*. Web Page. Available at: <http://legacy.library.ucsf.edu/tid/gfk86d00>. (accessed December 15).
- Trochim WM, Stillman FA, Clark PI, Schmitt CL. 2003. Development of a model of the tobacco industry's interference with tobacco control programmes. *Tobacco Control* 12(2):140-147.
- Wakefield M, Chaloupka F. 2000. Effectiveness of comprehensive tobacco control programmes in reducing teenage smoking in the USA. *Tobacco Control* 9(2):177-186.

Wallack L, Dorfman L, Jernigan D, Mekani T. 1993. *Media Advocacy and Public Health*. Newbury Park, CA: Sage Publications.

Warner K. 2000. The need for, and value of, a multi-level approach to disease prevention: the case of tobacco control. In IOM (Institute of Medicine). *Promoting Health: Intervention Strategies From Social and Behavioral Research*. Washington DC: The National Academies Press. Pp. 417-449.

White J, Bero LA. 2004. Public health under attack: the American Stop Smoking Intervention Study (ASSIST) and the tobacco industry. *American Journal of Public Health* 94(2):240-250.

P

Special Populations with Higher Rates of Cigarette Smoking: Identification and Implications for Tobacco Control

Robert B. Wallace
Department of Epidemiology
College of Public Health
University of Iowa

While the overall national prevalence of cigarette smoking among American adults is about 20–22 percent (CDC 2004b), several population groups have been identified with higher than average rates. It is axiomatic in public health that attention to populations with higher levels of unhealthy exposures such as tobacco should lead to improved and more efficient population outcomes. With regard to community tobacco control programs, it is apparent that high-risk populations have received less than full attention. For example, tobacco taxation policies, elementary school education programs, and youth access regulation—three important cornerstones of community-based tobacco control—are not particularly targeted to those at special risk or exposure other than attention to one specific demographic group (youth).

The purpose of this chapter is to identify populations that either have greater than average cigarette smoking rates or are at higher risk for acquiring smoking behaviors, and to derive some implications for community tobacco control efforts. Specifically, this chapter:

- Identifies a substantial number of population groups with higher than average levels of tobacco use and attempts to assess the quality of evidence that these groups indeed possess such smoking rates;
- Addresses the overlapping nature of risk factors for higher smoking rates among these potential target populations; and
- Discusses the implications of these high-utilization or high-risk groups for tobacco control policies in the United States.

THE BASIC PREMISE: SPECIAL BEHAVIORS AND INCREASED TOBACCO USE

The basic approach to this chapter is to identify individual and group characteristics and behaviors that are empirically associated with demonstrably higher use rates for tobacco products, particularly cigarette smoking, by using a targeted but not exhaustive literature review. As discussed below, some of these groups are defined by one or more demographic features. Other groups have characteristics and “behaviors” that are regarded as psychiatric symptomatology or frank psychiatric Axis I or II disorders, with widely accepted manifestations and a clear nosologic presence (Joseph et al. 2004). Some groups with high smoking prevalence rates have been recognized for decades, such as patients with schizophrenia, who have high cigarette consumption rates (Masterson and O’Shea 1984).

However, in addition to the mental conditions that have been associated with higher smoking levels, many other “special” behaviors and behavioral characteristics not directly comprising

mental illness have been suggested to be associated with increased tobacco use, leading to research into personality traits among smokers. An example is the reported association between a personality trait, such as sensation seeking, and tobacco use among college students (Zuckerman and Kuhlman 2000). The empirical focus on particular individual behaviors is extremely important and avoids the issue of whether such behaviors necessarily represent diseases or behavioral deviations in need of clinical management per se, a potential problem with the biomedical model of health and disease (Brandt and Gardner 2000). Of course, our understanding of the genesis of these traits is often incomplete, as are the biological explanations for tobacco use rates and risks in general.

DEMOGRAPHIC CHARACTERISTICS AND SMOKING HABITS

Cigarette smoking rates differ across broad demographic groups in the United States. Rates are higher in men than in women and among younger persons than older persons. African American and Hispanic adults have similar smoking prevalence rates to whites, whereas Asians overall have somewhat lower rates than whites and American Indians/Alaska Natives have somewhat higher rates than whites (CDC 2004b). Of particular interest, smoking rates are also higher among lower-socioeconomic groups (CDC 2004a). These socioeconomic disparities in tobacco exposure have been the subject of research with respect to explaining variation in tobacco use and resulting health status (King et al. 2004). It has also been suggested that young, “working class” adults have been important targets for commercial tobacco marketing (Barbeau et al. 2004).

The themes of poverty, lower socioeconomic status (SES), and health and social disparities pervade many of the high risk groups for tobacco use. However, the relation between lower SES and higher tobacco use rates is complex and multifactorial and requires substantial further inquiry. While some tobacco control programs have attempted intervention based on SES or broad demographic characteristics per se, many high-risk populations enriched with lower-SES individuals are identified largely by their intersection with various social institutions, such as the health care system, prisons, school counseling programs, and homeless shelters.

TOBACCO USE AND PSYCHIATRIC DISORDERS

Patients and survey respondents with clinical or research diagnoses of many important major mental illnesses have been reported to have higher rates of cigarette smoking and nicotine dependence. These include schizophrenia, major depressive disorder, any alcohol use disorder, any substance abuse disorder, anxiety disorders, mania, and personality disorders (Breslau 1995; Breslau et al. 1991; Breslau et al. 1993; Breslau et al. 1994; Fagerstrom et al. 1996; Grant et al. 2004; Hughes et al. 1986; Lasser et al. 2000). Some studies find higher smoking rates with increasing severity of the psychiatric condition, and these findings have been observed in both white and non-white populations (de Leon et al. 2002). In addition, other psychiatric conditions less frequently studied have been associated with a higher prevalence of smoking, including social phobia, agoraphobia, panic disorder, panic attacks, dysthymia, antisocial behavior and conduct disorders, and post-traumatic stress disorder (Lasser et al. 2000).

Studies on the association of mental illness and smoking have varied designs, inclusion criteria, and other methods. Some are clinic-based, while others are in geographically defined populations. Participation rates vary and, in some of the clinical studies, are unspecified. Patient diagnoses in clinical studies are usually based on individual practitioner designations, without

specific attention to diagnostic criteria, while those in population studies are often based on structured, standardized instruments adopted for epidemiological study. Most studies record actual cigarette or other tobacco use, while a few focus only on defined “tobacco use disorders” or the severity of nicotine dependence (Fagerstrom et al. 1996). Studies also differ in representation of various age, gender, and racial or ethnic groups. Patients in studies comprising clinical series, while of substantial value, may vary in terms of their mental illness severity, persistence, and age at onset. Often, the relation of age at onset of the psychiatric disorder vis-à-vis age at smoking initiation is not specified, but this temporal relationship may have important implications for identifying adolescents at high risk for smoking based on emerging manifestations of psychiatric disorders.

However, despite methodological variation in studies of these mental disorders and smoking, these associations appear to be robust, reproducible, and of an important magnitude. Indeed, Grant and colleagues (2004) calculated that while nicotine-dependent adults make up only 12.8 percent of the American adult population, they consume 57.5 percent of the cigarettes sold (Grant et al. 2004). Their study also suggests that adult Americans with psychiatric morbidity or comorbidity account for 70 percent of national cigarette sales. Thus, patients with mental illness should be an important part of community tobacco control programs, for both prevention and cessation efforts.

Since psychiatric comorbidity is common among smokers, a concerted effort to apply smoking cessation programs to these individuals has been recognized. A 1996 American Psychiatric Association guideline recommended routine treatment of smoking among patients with psychiatric disorders (APA 1996). However, for both resource and other reasons, determining the optimal interventions and ultimate effectiveness of such programs and motivating health professionals to invoke cessation programs are challenging. In the National Ambulatory Medical Care Survey, a medical record-based representative survey of primary care physicians in the United States, physicians were more likely to identify smoking status among patients with psychiatric disorders than among those without (Thorndike et al. 2001), but patients with mental illness were only modestly more likely to be counseled on smoking cessation (23 versus 18 percent of visits, respectively). Smokers with psychiatric comorbidity appear to be genuinely interested in smoking cessation programs. Among 120 smoking patients in four diverse mental health treatment settings, Lucksted and colleagues (2004) reported that 82 percent desired to stop or cut down on cigarette use (Lucksted et al. 2004). Saxon and colleagues (2003) reported that in a Department of Veterans Affairs psychiatric outpatient program, many were interested in smoking cessation but the programs were only minimally successful (Saxon et al. 2003). Whether psychopathology affects the response to cessation programs is not fully studied. Cinciripini and colleagues (2003) reported that post-cessation depression was associated with increased recidivism (Cinciripini et al. 2003), while Gariti and colleagues (2000) found no association between having an Axis I or II diagnosis and smoking cessation treatment success (Gariti et al. 2000). Clearly, more research is needed to explore the methods and effectiveness of smoking cessation treatment among persons with psychiatric comorbidity.

SMOKING-RELATED BEHAVIORAL AND MENTAL HEALTH ISSUES AMONG CHILDREN AND ADOLESCENTS

Elsewhere in this volume, Flay (Appendix D) discusses the techniques and success rates for prevention of smoking initiation with general, school-based intervention programs, both free-standing and in concert with other community-based interventions. He concludes that several

middle and high school programs can lead to a significant reduction in smoking prevalence, although there is decay through the later high school years, with little evidence for continued effectiveness at the 12th grade or beyond. In general, these programs are intended for delivery to general school populations for the target age ranges. Over the past few decades it has become clear that some children and adolescents are at identifiably greater risk of initiating and maintaining smoking. Some of these groups are identified below. The following sections are devoted to the behaviors and conditions among adolescents that are associated with the risk of cigarette smoking onset and maintenance.

Attention-Deficit/Hyperactivity Disorder and Smoking

One particularly important behavioral syndrome among children is Attention-Deficit / Hyperactivity Disorder (ADHD), an important public health problem thought to occur in 3–10 percent of child populations (Daley 2004). Children with this syndrome have a higher risk of cigarette use initiation and smoking maintenance, as well as abuse of other substances, than there are in non-ADHD contrast groups (Daley 2004; Lambert and Hartsough 1998; Wilens et al. 1997), although this association may in part be due to concomitant psychiatric comorbidity (Wilens 2004). Because ADHD risk has been reported to be increased among children whose mothers smoked during pregnancy (Thapar et al. 2003), both familial and environmental causes have been invoked to explain this association. Conversely, ADHD has been reported to be more common among those with substance abuse disorders and has also been associated with antisocial behaviors and conduct disorder (Flory and Lyman 2003; Schubiner et al. 2000). The presence of these conditions in themselves has obvious and important implications for delivering successful tobacco education programs.

The ADHD syndrome extends into adulthood, and the disorder tends to impair academic, social, and occupational function, as well as frequently being associated with substance abuse (including smoking) and other psychiatric comorbidity (Wilens and Dodson 2004). Among adults with ADHD, substance abuse, including nicotine dependence, occurred more frequently than expected by chance, raising the prospect that pharmacological treatment of ADHD may reduce the risk of substance abuse in these individuals (Wilens 2004).

Childhood Behaviors, Behavioral Exposures, and the Risk of Smoking Initiation

Certain types of childhood behaviors have been associated with increased general substance use, and cigarette smoking in particular. For example, there is growing evidence that smoking rates, along with other psychiatric comorbidity, are higher among girls and women with a history of sexual abuse earlier in life (De Von Figueroa-Moseley et al. 2004; Nichols and Harlow 2004). There is also an emerging literature exploring a host of adverse experiences extending beyond direct physical or sexual abuse that are associated with substantially increased risks of smoking initiation, such as the presence of depressed affect, suicide attempts, sexually transmitted disease, and an impoverished, dysfunctional household environment (Dube et al. 2003; Mcnutt et al. 2002).

In keeping with findings of strong associations between psychiatric conditions and an increased prevalence of smoking, various behavioral syndromes and mental disorders that are associated with increased smoking rates, in addition to ADHD, have been identified in children and adolescents. In a review of the literature through 2001, these included disruptive behaviors (e.g., oppositional defiant disorder and conduct disorder), anxiety disorders, major depression, and

drug and alcohol use disorders (Upadhyaya et al. 2002). In addition, increased smoking rates have been reported among children and adolescents with depressive symptoms or major depression; as noted above, some of these individuals had also been victims of early physical and sexual abuse (Diaz et al. 2002; Glied and Pine 2002). Eating disorders and concerns about body weight, particularly among adolescent females, also have been associated with increased smoking rates (Potter et al. 2004). In a study evaluating substance abuse screening instruments in adolescents, adolescent cigarette smoking was associated with a wide range of mental health symptoms (Chang et al. 2005). It has been observed that with the exception of ADHD, conduct disorder, and anxiety disorders, the onset of cigarette smoking generally precedes the onset of the diagnosed psychiatric disorder (Dierker et al. 2002). Thus, identifying children who smoke may have a role in the prevention or amelioration of future psychiatric morbidity.

With respect to the school environment and other social and institutional settings, the problem of conduct disorder is particularly relevant. Hyperactivity (also part of the ADHD syndrome) and socially disruptive behaviors are often identified early in school children. Conduct disorder, along with a history of parental smoking, predicts higher rates of daily adolescent smoking (Clark and Cornelius 2004; Rohde et al. 2004). Among children and adolescents with in-patient psychiatric admissions, the odds of smoking were increased thirteenfold among those with conduct disorder (Upadhyaya et al. 2003). Conduct disorder has also been associated with alcohol and other substance abuse as well as heavy smoking (Cornelius et al. 2001). Conduct disorder and antisocial personality among adolescents are associated with increased risk of substance abuse and violent crime as adults (Moffitt et al. 2002), which along with problems in cognitive development may explain in part the high rates of smoking among persons in prisons and jails (see below) (Feinstein and Bynner 2004).

DEFINED ADULT POPULATIONS WITH HIGH RATES OF CIGARETTE SMOKING

There are important and sometimes large adult populations that have been recognized to have higher than average prevalence rates for cigarette consumption; some of these groups have been approached by community-based tobacco control programs. Several of these groups have higher rates of impoverishment or at least lower SES, and some have substantial prevalence rates for psychiatric comorbidity. As noted above, both of these characteristics are associated with higher smoking rates, and the groups below are defined by their intersection with social institutions where they can be identified and potentially receive smoking cessation and other appropriate treatments.

Smoking Among Inmates in Correctional Institutions

Cigarette smoking rates are generally believed to be extremely high in correctional institutions. While there have been relatively few exhaustive quantitative surveys of smoking rates in jails and prisons, such smoking rates and concerns about health consequences among inmates have been described (Voglewede and Noel 2004). Lightfoot and Hodgins (1988) reported a 77 percent smoking rate in the past 6 months among inmates in a male penitentiary (Lightfoot and Hodgins 1988). Hughes and Boland (1992) reported a current smoking rate among American penitentiary inmates of 79 percent (Hughes and Boland 1992). Durrah and Rosenberg (2004) reported a current smoking prevalence of 71 percent among women arrested in New York City (Durrah and Rosenberg 2004). High rates of smoking among prisoners are not surprising given

the rates of incarceration for substance abuse, the generally lower SES of inmates, and the high rates of psychiatric comorbidity (Andersen 2004). The peer-reviewed literature on smoking cessation programs among prisoners is extremely limited. However, there is a report of the impact of a total smoking ban in a maximum security psychiatric hospital (Hempel et al. 2002). Ultimately, the ban was accepted by both patients and staff, and there was a post-ban decline in sick call, disruptive behavior, and verbal aggression rates among patients.

Smoking Among Military Recruits

Higher than expected rates of tobacco consumption have been reported among incoming recruits and active duty military personnel in the United States. Chisick and colleagues (1998) reported the highest rates among white males on active duty: 43 percent cigarette smoking and 24 percent smokeless tobacco use (Chisick et al. 1998). Ward and colleagues (2003) reported a smoking rate of over 24 percent among Air Force recruits (Ward et al. 2003). Among Naval recruits, Ames and colleagues (2002) reported that about half used tobacco in the year prior to enlistment (Ames et al. 2002). Shahar and Carol (1991) reported that smoking rates in one cohort actually increased during basic training (Shahar and Carol 1991). Since military recruit populations tend to be overrepresented with persons of lower educational attainment and lower SES in general, they are likely to be at greater risk for smoking.

Smoking Among Homeless Persons

It is very difficult to conduct representative surveys of homeless persons, and thus it is difficult to determine population health characteristics. In one study from Pittsburgh, comprising homeless persons receiving medical or social services at nine sites, 69 percent of the homeless clients were current smokers (Connor et al. 2002). Reports of tobacco use prevalence rates among homeless persons internationally have ranged from 75 to 85 percent, and are consistent with the high rate of mental illness and substance abuse seen among homeless patients in the United States and elsewhere (Folsom and Jeste 2002; Martens 2001). In the United States, tobacco industry documents uncovered as part of the Master Settlement Agreement (MSA) revealed a marketing program aimed in part at homeless persons (Stevens et al. 2004). No peer-reviewed reports on smoking cessation programs among the homeless were identified. However, some homeless smokers in a series from an urban academic medical center did express an interest in quitting and smoking cessation counseling (Arnsten et al. 2004).

Smoking Among Lesbian, Gay, Bisexual, or Transgender Populations

While the literature is limited, and small-area population surveys are not necessarily representative of large geographic regions, there is evidence that cigarette smoking is more common among Lesbian, Gay, Bisexual, or Transgender (LGBT) communities than among the general population (Greenwood et al. 2005; Ryan et al. 2001; Stevens et al. 2004; Tang et al. 2004). As in homeless persons, documents uncovered as part of the MSA revealed an industrial tobacco marketing program to the urban gay and lesbian community (Stevens et al. 2004). There is also an emerging and relevant literature suggesting that mental health problems may be higher among LGBTs than the general population (Cochran et al. 2003; Diamant and Wold 2003; Mays and Cochran 2001). However, no large-scale, robust, population-based surveys of this issue have been identified; most studies were conducted on clinical, network, or small-scale population samples.

Smoking and Gambling

Substantial clinical observation and a few surveys have suggested a strong positive association between smoking and gambling disorders and gambling behavior. For example, 43 percent of those calling a gambling helpline reported daily tobacco use (Potenza et al. 2004) and daily smoking was present in about two-thirds of persons seeking psychiatric treatment for gambling (Petry and Oncken 2002). In an Australian household survey, persons among households containing smokers were more likely to engage in gambling behaviors (Siahpush et al. 2004). It may be reasonable to consider screening persons for gambling behaviors or disorders within primary care or other clinical and psychiatric settings, in order to identify smokers and those with other psychiatric comorbidity, and then invoke appropriate smoking cessation programs. Of note, it has been reported that ordinances banning smoking in charitable public gaming settings had no adverse effect on the level of monetary profits (Glantz and Wilson-Loots 2003).

Smoking Among Disabled Populations

The term disability is used in several contexts, but generally refers to dysfunction, difficulty, or dependence in executing defined tasks that are associated with daily living in the community. As thus defined, having a disability may be associated with mental illness, and smoking prevalence rates are higher than among comparable populations without disabilities. Smoking rates may also be elevated among those with common chronic disabling conditions to which smoking is etiologically related, such as cardiopulmonary disease, stroke, lung disease, cancer, and intermittent claudication (Kuhn et al. 2005; Regensteiner 2004; Twardella et al. 2004). Even in the presence of overt disease and during the rehabilitation process, there are opportunities for conducting smoking cessation programs.

However, few population or geographic surveys of smoking rates among those with physical disabilities have been conducted. A survey of adults with disabilities in Massachusetts found somewhat higher smoking rates among those with disabilities related to orthopedic conditions (Brawarsky et al. 2002), but not affective or sensory conditions. In a survey of persons with major disabilities living in six independent living facilities, changes in smoking were associated with concomitant changes in health-related quality of life scores (Mitra et al. 2004). Persons with disabilities are not spared the adverse health outcomes of smoking. In addition to major chronic illnesses, for example, McGeary and colleagues (2004) found that smoking interfered with the rehabilitation of patients after spinal injuries and surgery (McGeary et al. 2004). Populations with disabilities use a substantial amount of health care, a situation that may offer an important opportunity for smoking prevention and cessation interventions.

IMPLICATIONS OF SPECIAL HIGH-RISK OR HIGH TOBACCO-CONSUMPTION GROUPS FOR TOBACCO CONTROL EFFORTS

Cigarette consumption is not distributed randomly across the American adult population. Rather, consumption rates are clearly overrepresented among those of lower SES and those with mental illness and related behavioral symptoms and behaviors. Further, adolescents evincing mental health symptoms or conditions, behavioral disruptions, or learning disorders are at greater risk of becoming regular smokers. These findings have important implications for tobacco control, although none contradicts the historically and scientifically proven general population approaches to tobacco control, such as taxation policy, indoor and outdoor smoking bans, and enhanced tobacco product labeling. Nor does this overrepresentation deny the important role of

physiological nicotine addiction as a major cause of cigarette smoking maintenance. However, it does suggest that additional approaches to tobacco control are needed as part of an effective control program, despite the existing challenges.

Since it appears that many current and future smokers have elements of impoverishment or lower SES, mental illness or abnormal behavioral symptoms, and higher rates of learning disorders or school dropout, conventional educational and advertising programs, whatever their basic efficacy, may not have the level of impact desired. Many persons in these higher-risk groups will intersect with various social and health systems and care institutions, where opportunities for more intensive tobacco prevention and treatment programs are possible, even if the fundamental missions of these institutions lie elsewhere. Most importantly, these findings suggest that community tobacco control programs must target these high-risk, high-prevalence populations in order to improve general control effectiveness beyond current achievements.

Thus, given these considerations, a number of high-priority tobacco control measures are suggested:

1. There appears to be adequate evidence that many children at high risk of later cigarette smoking can be identified through their school performance and problem behaviors. While the evidence is scant that targeted educational and social interventions directed at children with manifestations such as learning disorders, abnormal mental symptoms, overt mental illness, or conduct disorder are effective, such programs need to be investigated to determine if they can complement existing general educational activities. It is appreciated that this may require substantial resources at a time when school and child health funds are limited.

2. Efforts should be made to enhance receipt of clinical smoking cessation wherever mental health clinical treatments are undertaken. There is evidence that most patients with mental conditions are willing to accept antismoking treatments, but are not often offered such regimens. Several strategies in applying smoking cessation treatments could result in enhancing treatment effectiveness for nicotine dependence:

- Promoting clinical guideline development and enforcement within mental health settings, such as those promulgated by the American Psychiatric Association (APA 1996).
- Implementing health care institutional programs for surveillance of smokers, as contained in standards promulgated by the Joint Commission for Accreditation of Healthcare Organizations. This should specifically include psychiatric facilities.
- Training mental health professionals to attain skills in the prevention and treatment of nicotine dependence.
- Extending and enforcing policies of smoke-free psychiatric in-patient facilities. It has been noted that it is difficult to motivate patients to stop smoking unless the facility itself is smoke-free (APA 1996). Other community settings with high concentrations of smokers and those with mental illness, such as homeless shelters, should also consider smoke-free policies.
- Extending smoking cessation research to include persons with mental health diagnoses.

3. Offer smoking cessation treatments within the justice systems where institutional practices will allow it. Particularly, the maintenance of smoke-free prisons and jails, in concert with provision of resources to treat smoking behaviors, may facilitate smoking cessation in a very

hard-to-reach group. Environmental antismoking provisions should apply to staff as well as to inmates.

4. Assure that antismoking treatments are available as part of the benefit package for all state- and federally funded general health insurance or care delivery programs.

5. State and local tobacco control programs should monitor for attempts to market tobacco products to high-risk populations.

REFERENCES

- Ames GM, Cunradi CB, Moore RS. 2002. Alcohol, tobacco, and drug use among young adults prior to entering the military. *Prevention Science* 3(2):135-144.
- Andersen HS. 2004. Mental health in prison populations. A review—with special emphasis on a study of Danish prisoners on remand. *Acta psychiatrica Scandinavica Supplementum* (424):5-59.
- APA (American Psychiatric Association). 1996. *American Psychiatric Association Practice Guidelines*. Washington DC: APA.
- Arnsten JH, Reid K, Bierer M, Rigotti N. 2004. Smoking behavior and interest in quitting among homeless smokers. *Addictive Behavior* 29(6):1155-1161.
- Barbeau EM, Leavy-Sperounis A, Balbach ED. 2004. Smoking, social class, and gender: what can public health learn from the tobacco industry about disparities in smoking? *Tobacco Control* 13(2):115-120.
- Brandt AM, Gardner M. 2000. Antagonism and accommodation: interpreting the relationship between public health and medicine in the United States during the 20th century. *American Journal of Public Health* 90(5):707-715.
- Brawarsky P, Brooks DR, Wilber N, Gertz RE Jr, Klein Walker D. 2002. Tobacco use among adults with disabilities in Massachusetts. *Tobacco Control* 11 (Suppl 2):ii29-ii33.
- Breslau N. 1995. Psychiatric comorbidity of smoking and nicotine dependence. *Behavior Genetics* 25(2):95-101.
- Breslau N, Andreski P, Kilbey MM. 1991. Nicotine dependence in an urban population of young adults: prevalence and co-morbidity with depression, anxiety and other substance dependencies. *NIDA Research Monograph* 105:458-459.
- Breslau N, Kilbey MM, Andreski P. 1993. Nicotine dependence and major depression. New evidence from a prospective investigation. *Archives of General Psychiatry* 50(1):31-35.
- Breslau N, Kilbey MM, Andreski P. 1994. DSM-III-R nicotine dependence in young adults: prevalence, correlates and associated psychiatric disorders. *Addiction* 89(6):743-754.
- CDC (Centers for Disease Control and Prevention). 2004a. Prevalence of cigarette use among 14 racial/ethnic populations—United States, 1999–2001. *Morbidity and Mortality Weekly Report* 53(3):49-52.
- CDC. 2004b. Cigarette smoking among adults—United States, 2002. *Journal of the American Osteopathy Association* 104(8):324-327.
- Chang G, Sherritt L, Knight JR. 2005. Adolescent cigarette smoking and mental health symptoms. *Journal of Adolescent Health* 36(6):517-522.
- Chisick MC, Poindexter FR, York AK. 1998. Comparing tobacco use among incoming recruits and military personnel on active duty in the United States. *Tobacco Control* 7(3):236-240.
- Cinciripini PM, Wetter DW, Fouladi RT, Blalock JA, Carter BL, Cinciripini LG, Baile WF. 2003. The effects of depressed mood on smoking cessation: mediation by postcessation self-efficacy. *Journal of Consulting and Clinical Psychology* 71(2):292-301.
- Clark DB, Cornelius J. 2004. Childhood psychopathology and adolescent cigarette smoking: a prospective survival analysis in children at high risk for substance use disorders. *Addictive Behavior* 29(4):837-841.
- Cochran SD, Mays VM, Sullivan JG. 2003. Prevalence of mental disorders, psychological distress, and mental health services use among lesbian, gay, and bisexual adults in the United States. *Journal of Consulting and Clinical Psychology* 71(1):53-61.
- Connor SE, Herbert MI, Neal SM, Williams JT. 2002. Smoking cessation in homeless populations: there is a will, but is there a way? *General Internal Medicine* 17(5):369-372.
- Cornelius JR, Lynch K, Martin CS, Cornelius MD, Clark DB. 2001. Clinical correlates of heavy tobacco use among adolescents. *Addictive Behavior* 26(2):273-7.
- Daley KC. 2004. Update on attention-deficit/hyperactivity disorder. *Current Opinion in Pediatrics* 16(2):217-226.
- de Leon J, Becona E, Gurpegui M, Gonzalez-Pinto A, Diaz FJ. 2002. The association between high nicotine dependence and severe mental illness may be consistent across countries. *Journal of Clinical Psychiatry* 63(9):812-816.
- De Von Figueroa-Moseley C, Landrine H, Klonoff EA. 2004. Sexual abuse and smoking among college student women. *Addictive Behaviors* 29(2):245-251.
- Diaz A, Simantov E, Rickert VI. 2002. Effect of abuse on health: results of a national survey. *Archives of Pediatric and Adolescent Medicine* 156(8):811-817.
- Diamant AL, Wold C. 2003. Sexual Orientation and Variation in Physical and Mental Health Status among Women. *Journal of Women's Health* 12(1):41-49.

- Dierker LC, Avenevoli S, Stolar M, Merikangas KR. 2002. Smoking and depression: an examination of mechanisms of comorbidity. *American Journal of Psychiatry* 159(6):947-953.
- Dube SR, Felitti VJ, Dong M, Giles WH, Anda RF. 2003. The impact of adverse childhood experiences on health problems: evidence from four birth cohorts dating back to 1900. *Preventive Medicine* 37(3):268-277.
- Durrah TL, Rosenberg TJ. 2004. Smoking among female arrestees: prevalence of daily smoking and smoking cessation efforts. *Addictive Behavior* 29(5):1015-1019.
- Fagerstrom KO, Kunze M, Schoberberger R, Breslau N, Hughes JR, Hurt RD, Puska P, Ramstrom L, Zatonski W. 1996. Nicotine dependence versus smoking prevalence: comparisons among countries and categories of smokers. *Tobacco Control* 5(1):52-56.
- Feinstein L, Bynner J. 2004. The importance of cognitive development in middle childhood for adulthood socioeconomic status, mental health, and problem behavior. *Child Development* 75(5):1329-1339.
- Flory K, Lyman DR. 2003. The relation between Attention Deficit Hyperactivity Disorder and substance abuse: what role does conduct disorder play? *Clinical Child and Family Psychology Review* 6:6-16.
- Folsom D, Jeste DV. 2002. Schizophrenia in homeless persons: A systematic review of the literature. *Acta Psychiatrica Scandinavica* 105: 404-413.
- Gariti P, Alterman AI, Mulvaney FD, Epperson L. 2000. The relationship between psychopathology and smoking cessation treatment response. *Drug and Alcohol Dependence* 60(3):267-273.
- Glantz SA, Wilson-Loots R. 2003. No association of smoke-free ordinances with profits from bingo and charitable games in Massachusetts. *Tobacco Control* 12(4):411-443.
- Glied S, Pine DS. 2002. Consequences and correlates of adolescent depression. *Archives of Pediatric and Adolescent Medicine* 156(10):1009-1014.
- Grant BF, Hasin DS, Chou SP, Stinson FS, Dawson DA. 2004. Nicotine dependence and psychiatric disorders in the United States: results from the national epidemiologic survey on alcohol and related conditions. *Archives of General Psychiatry* 61(11):1107-1115.
- Hempel AG, Kownacki R, Malin DH, Ozone SJ, Cormack TS, Sandoval BG 3rd, Leinbach AE. 2002. Effect of a total smoking ban in a maximum security psychiatric hospital. *Behavior Science and Law* 20(5):507-22.
- Hughes GV, Boland FJ. 1992. The effects of caffeine and nicotine consumption on mood and somatic variables in a penitentiary inmate population. *Addictive Behavior* 17(5):447-457.
- Hughes JR, Hatsukami DK, Mitchell JE, Dahlgren LA. 1986. Prevalence of smoking among psychiatric outpatients. *American Journal of Psychiatry* 143(8):993-997.
- Joseph A, Lexau B, Willenbring M, Nugent S, Nelson D. 2004. Factors associated with readiness to stop smoking among patients in treatment for alcohol use disorder. *American Journal of Addiction* 13(4):405-417.
- King G, Polednak A, Bendel RB, Vilsaint MC, Nahata SB. 2004. Disparities in smoking cessation between African Americans and Whites: 1990-2000. *American Journal of Public Health* 94(11):1965-1971.
- Kuhn KG, Boesen E, Ross L, Johansen C. 2005. Evaluation and outcome of behavioural changes in the rehabilitation of cancer patients: a review. *European Journal of Cancer* 41(2):216-224.
- Lambert NM, Hartsough CS. 1998. Prospective study of tobacco smoking and substance dependencies among samples of ADHD and non-ADHD participants. *Journal of Learning Disabilities* 31(6):533-544.
- Lasser K, Boyd JW, Woolhandler S, Himmelstein DU, McCormick D, Bor DH. 2000. Smoking and mental illness: a population-based prevalence study. *Journal of the American Medical Association* 284(20):2606-2610.
- Lightfoot LO, Hodgins D. 1988. A survey of alcohol and drug problems in incarcerated offenders. *International Journal of Addiction* 23(7):687-706.
- Lucksted A, McGuire C, Postrado L, Kreyenbuhl J, Dixon LB. 2004. Specifying cigarette smoking and quitting among people with serious mental illness. *American Journal of Addiction* 13(2):128-138.
- Martens WH. 2001. A review of physical and mental health in homeless persons. *Public Health Review* 29(1):13-33.
- Masterson E, O'Shea B. 1984. Smoking and malignancy in schizophrenia. *British Journal of Psychiatry* 145:429-432.
- Mays VM, Cochran SD. 2001. Mental health correlates of perceived discrimination among lesbian, gay, and bisexual adults in the United States. *American Journal of Public Health* 91(11):1869-1876.
- McGeary DD, Mayer TG, Gatchel RJ, Anagnostis C. 2004. Smoking status and psychosocioeconomic outcomes of functional restoration in patients with chronic spinal disability. *Spine Journal* 4(2):170-175.
- McNutt LA, Carlson BE, Persaud M, Postmus J. 2002. Cumulative abuse experiences, physical health and health behaviors. *Annals of Epidemiology* 12(2):123-130.
- Mitra M, Chung MC, Wilber N, Klein Walker D. 2004. Smoking status and quality of life: a longitudinal study among adults with disabilities. *American Journal of Preventive Medicine* 27(3):258-260.

- Moffitt TE, Caspi A, Harrington H, Milne BJ. 2002. Males on the life-course-persistent and adolescence-limited antisocial pathways: follow-up at age 26 years. *Developmental Psychopathology* 14(1):179-207.
- Nichols HB, Harlow BL. 2004. Childhood abuse and risk of smoking onset. *Journal of Epidemiology and Community Health* 58(5):402-406.
- Petry NM, Oncken C. 2002. Cigarette smoking is associated with increased severity of gambling problems in treatment-seeking gamblers. *Addiction* 97(6):745-753.
- Potenza MN, Steinberg MA, McLaughlin SD, Wu R, Rounsaville BJ, Krishnan-Sarin S, George TP, O'Malley SS. 2004. Characteristics of tobacco-smoking problem gamblers calling a gambling helpline. *American Journal of Addiction* 13(5):471-493.
- Potter BK, Pederson LL, Chan SS, Aubut JA, Koval JJ. 2004. Does a relationship exist between body weight, concerns about weight, and smoking among adolescents? An integration of the literature with an emphasis on gender. *Nicotine and Tobacco Research* 6(3):397-425.
- Regensteiner JG. 2004. Exercise rehabilitation for the patient with intermittent claudication: a highly effective yet underutilized treatment. *Current Drug Targets: Cardiovascular and Haematological Disorders* 4(3):233-239.
- Rhode P, Kahler CW, Lewinsohn PM, Brown RA. 2004. Psychiatric Disorders, familial factors, and cigarette smoking, II: association with progression to daily smoking. *Nicotine and Tobacco Research* 6:119-132.
- Ryan H, Wortley PM, Easton A, Pederson L, Greenwood G. 2001. Smoking among lesbians, gays, and bisexuals: a review of the literature. *American Journal of Preventive Medicine* 21(2):142-149.
- Saxon AJ, Baer JS, Davis TM, Sloan KL, Malte CA, Fitzgibbons K, Kivlahan DR. 2003. Smoking cessation treatment among dually diagnosed individuals: preliminary evaluation of different pharmacotherapies. *Nicotine and Tobacco Research* 5(4):589-596.
- Schubiner H, Tzelepis A, Milberger S, Lockhart N, Kruger M, Kelley BJ, Schoener EP. 2000. Prevalence of attention-deficit/hyperactivity disorder and conduct disorder among substance abusers. *Journal of Clinical Psychiatry* 61(4):244-251.
- Shahar Y, Carel RS. 1991. Changes in smoking patterns in young military recruits in relationship to psychosocial characteristics. *Military Medicine* 156(9):455-461.
- Siahpush M, Borland R, Scollo M. 2004. Is household smoking status associated with expenditure on food at restaurants, alcohol, gambling and insurance? Results from the 1998-99 Household Expenditure Survey, Australia. *Tobacco Control* 13(4):409-414.
- Stevens P, Carlson LM, Hinman JM. 2004. An analysis of tobacco industry marketing to lesbian, gay, bisexual, and transgender (LGBT) populations: strategies for mainstream tobacco control and prevention. *Health Promotion Practice* 5(3 Suppl):129S-134S.
- Tang H, Greenwood GL, Cowling DW, Lloyd JC, Roeseler AG, Bal DG. 2004. Cigarette smoking among lesbians, gays, and bisexuals: how serious a problem? (United States). *Cancer Causes and Control* 15(8):797-803.
- Thapar A, Fowler T, Rice F, Scourfield J, van den Bree M, Thomas H, Harold G, Hay D. 2003. Maternal smoking during pregnancy and attention deficit hyperactivity disorder symptoms in offspring. *American Journal of Psychiatry* 160(11):1985-1989.
- Thorndike AN, Stafford RS, Rigotti NA. 2001. US physicians' treatment of smoking in outpatients with psychiatric diagnoses. *Nicotine and Tobacco Research* 3(1):85-91.
- Twardella D, Kupper-Nybelen J, Rothenbacher D, Hahmann H, Wusten B, Brenner H. 2004. Short-term benefit of smoking cessation in patients with coronary heart disease: estimates based on self-reported smoking data and serum cotinine measurements. *European Heart Journal* 25(23):2101-2108.
- Upadhyaya HP, Brady KT, Wharton M, Liao J. 2003. Psychiatric disorders and cigarette smoking among child and adolescent psychiatry inpatients. *American Journal of Addiction* 12(2):144-152.
- Upadhyaya HP, Deas D, Brady KT, Kruesi M. 2002. Cigarette smoking and psychiatric comorbidity in children and adolescents. *Journal of the American Academy of Child and Adolescent Psychiatry* 41(11):1294-1305.
- Voglewede JP, Noel NE. 2004. Predictors of current need to smoke in inmates of a smoke-free jail. *Addictive Behavior* 29(2):343-348.
- Ward KD, Vander Weg MW, Klesges RC, Kovach KW, Elrod MC, DeBon M, Haddock CK, Talcott GW, Lando HA. 2003. Characteristics of highly physically active smokers in a population of young adult military recruits. *Addictive Behavior* 28(8):1405-1418.
- Wilens TE. 2004. Attention-deficit/hyperactivity disorder and the substance use disorders: the nature of the relationship, subtypes at risk, and treatment issues. *Psychiatry Clinic of North America* 27(2):283-301.
- Wilens TE, Biederman J, Mick E, Faraone SV, Spencer T. 1997. Attention deficit hyperactivity disorder (ADHD) is associated with early onset substance use disorders. *Journal of Nervous and Mental Disorders* 185(8):475-482.

- Wilens TE , Dodson W. 2004. A clinical perspective of attention-deficit/hyperactivity disorder into adulthood. *Journal of Clinical Psychiatry* 65(10):1301-1313.
- Zuckerman M , Kuhlman DM. 2000. Personality and risk-taking: common biosocial factors. *Journal of Personality* 68(6):999-1029.