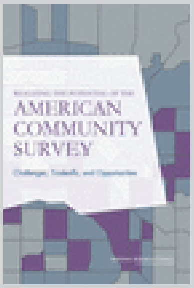

Realizing the Potential of the American Community Survey: Challenges, Tradeoffs, and Opportunities

ISBN
978-0-309-36678-6

240 pages
6 x 9
PAPERBACK (2015)

Panel on Addressing Priority Technical Issues for the Next Decade of the American Community Survey; Committee on National Statistics; Division of Behavioral and Social Sciences and Education; National Research Council

REALIZING THE POTENTIAL OF THE AMERICAN COMMUNITY SURVEY

Challenges, Tradeoffs, and Opportunities

Panel on Addressing Priority Technical Issues for the Next Decade of the American Community Survey

Committee on National Statistics

Division of Behavioral and Social Sciences and Education

NATIONAL RESEARCH COUNCIL
OF THE NATIONAL ACADEMIES

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

THE NATIONAL ACADEMIES PRESS 500 Fifth Street, NW 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 Contract No. YA 1323-11-CN-0032 between the National Academy of Sciences and the U.S. Census Bureau. Support for the work of the Committee on National Statistics is provided by a consortium of federal agencies through a grant from the National Science Foundation. Any opinions, findings, conclusions, or recommendations expressed in this publication are those of the author(s) and do not necessarily reflect the views of the organizations or agencies that provided support for the project.

International Standard Book Number-13: 978-0-309-36678-6
International Standard Book Number-10: 0-309-36678-X

Additional copies of this report are available from the National Academies Press, 500 Fifth Street, NW, Keck 360, Washington, DC 20001; (800) 624-6242 or (202) 334-3313; http://www.nap.edu.

Printed in the United States of America.

Suggested citation: *Realizing the Potential of the American Community Survey: Challenges, Tradeoffs, and Opportunities*. (2015). Panel on Addressing Priority Technical Issues for the Next Decade of the American Community Survey, Committee on National Statistics, Division of Behavioral and Social Sciences and Education. Washington, DC: The National Academies Press.

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. C. D. Mote, Jr., 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. Victor J. Dzau 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. C. D. Mote, Jr., are chair and vice chair, respectively, of the National Research Council.

www.national-academies.org

PANEL ON ADDRESSING PRIORITY TECHNICAL ISSUES FOR THE NEXT DECADE OF THE AMERICAN COMMUNITY SURVEY

ALAN M. ZASLAVSKY (*Chair*), Department of Health Care Policy, Harvard Medical School
MICHAEL DAVERN, NORC at the University of Chicago
JEFF HARDCASTLE, Nevada Small Business Development Center, University of Nevada, Reno
SCOTT H. HOLAN, Department of Statistics, University of Missouri
JAMES S. HOUSE, Survey Research Center, Institute for Social Research, University of Michigan
DAVID HUBBLE, Westat, Rockville, MD
LINDA A. JACOBSEN, Population Reference Bureau, Washington, DC
MICHAEL W. LINK, A.C. Nielsen, New York, NY
JENNIFER H. MADANS, National Center for Health Statistics, U.S. Department of Health and Human Services
DAVID A. PLANE, School of Geography and Development, University of Arizona
JEROME P. REITER, Department of Statistical Science, Duke University
JOSEPH J. SALVO, New York City Department of City Planning
ROBERT L. SANTOS, The Urban Institute, Washington, DC

KRISZTINA MARTON, *Study Director*
NANCY J. KIRKENDALL, *Senior Program Officer*
MICHAEL J. SIRI, *Program Associate*

COMMITTEE ON NATIONAL STATISTICS 2013-2014

LAWRENCE D. BROWN (*Chair*), Department of Statistics, Wharton School, University of Pennsylvania
JOHN M. ABOWD, School of Industrial and Labor Relations, Cornell University
MARY ELLEN BOCK, Department of Statistics, Purdue University
DAVID CARD, Department of Economics, University of California, Berkeley
ALICIA CARRIQUIRY, Department of Statistics, Iowa State University
MICHAEL E. CHERNEW, Department of Health Care Policy, Harvard Medical School
CONSTANTINE GATSONIS, Center for Statistical Sciences, Brown University
JAMES S. HOUSE, Survey Research Center, Institute for Social Research, University of Michigan
MICHAEL HOUT, Department of Sociology, New York University
SALLIE KELLER, Virginia Bioinformatics Institute at Virginia Tech, Arlington, VA
LISA LYNCH, Heller School for Social Policy and Management, Brandeis University
COLM O'MUIRCHEARTAIGH, Harris School of Public Policy Studies, University of Chicago
RUTH PETERSON, Criminal Justice Research Center, Ohio State University
EDWARD H. SHORTLIFFE, Department of Bioinformatics, Columbia University and Arizona State University
HAL STERN, Donald Bren School of Information and Computer Sciences, University of California, Irvine

CONSTANCE F. CITRO, *Director*

Acknowledgments

On behalf of the Panel on Addressing Priority Technical Issues for the Next Decade of the American Community Survey, we wish to thank everyone who contributed their time and expertise to assist the panel's work and the preparation of this report. The study was initiated by the Census Bureau, under the leadership of then-director Robert Groves, and has greatly benefited from the guidance and continued support of the Census Bureau's senior management. We are particularly grateful to James Treat, chief of the American Community Survey Office, and to Nancy Torrieri, who recently retired from the Census Bureau, for facilitating the work of the panel.

Census Bureau staff readily assisted the panel through presentations and responses to a large number of requests for background materials about the American Community Survey. We thank a long list of current and former staff: Mark Asiala, Wesley Basel, Michael Beaghen, William Bell, Scott Boggess, Tasha Boone, Grace Clemmons, Chandra Erdman, Alexandra Figueroa, Michael Freiman, Sirius Fuller, Debbie Griffin, Sam Hawala, Steven Hefter, Adriana Hernandez-Viver, Todd Hughes, David Johnson, John Jordan, Karen King, Robert Kominski, Amy Lauger, Jerry Maples, Peter Miller, Freddie Navarro, Sally Obenski, Brett O'Hara, Cody Pfau, David Raglin, Daniel Sommers, Michael Starsinic, Jennifer Tancreto, Anthony Tersine, Yves Thibaudeau, Michael Thieme, Victoria Velkoff, Frank Vitrano, Daniel Weinberg, Tommy Wright, and Laura Zayatz. The panel's work touched on many aspects of the American Community Survey, and we know that there were others who worked in the background and dedicated significant time to responding to the panel's requests for information.

The panel received substantial help with data analysis from Joel Alvarez of the New York City Department of City Planning. We are also grateful to Ned English and Becki Curtis from NORC, Jean D'Amico from the Population Reference Bureau, Rachel Flanigan and Alexis Irion from the University of Nevada, Reno, and Gary Christopherson from the University of Arizona for their contributions to the panel's work.

We thank the National Research Council (NRC) staff who contributed to this study. We are grateful for the guidance and support received from Constance Citro, director of the Committee on National Statistics (CNSTAT), for the input provided by CNSTAT senior program officers Nancy Kirkendall and Michael Cohen, and the contributions of former senior program officer Edward Spar. Kirsten Sampson Snyder expertly coordinated the review process, Eugenia Grohman provided thoughtful editorial help, and Yvonne Wise shepherded the report through production. We also thank program coordinator Michael Siri for able logistical support for the meetings.

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 NRC'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: Chet Bowie, NORC at the University of Chicago; Steven Heeringa, Institute for Survey Research, University of Michigan; Michael Hout, Department of Sociology, New York University; Linda Gage, State of California, retired; Graham Kalton, Westat; Andrew Reamer, George Washington Institute of Public Policy, George Washington University; Hal Stern, Donald Bren School of Information and Computer Sciences, University of California, Irvine; and Richard Valliant, Joint Program in Survey Methodology, Universities of Maryland and Michigan.

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 William Eddy, Department of Statistics, Carnegie Mellon University, and Kenneth

Wachter, Departments of Demography and Statistics, University of California at Berkeley. Appointed by the NRC, 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.

Alan Zaslavsky, *Chair*
Krisztina Marton, *Study Director*

Contents

Summary

Since the successful transition from the long-form sample of the decennial census, the continuous American Community Survey (ACS) has become an invaluable resource for many stakeholders, particularly for meeting data needs for the nation, states, and cities and counties with large populations. However, due to inadequate sample sizes, a major challenge for the survey is producing estimates with adequate statistical precision for small geographic areas and small population groups. This challenge is a concern because of the unique role fulfilled by the long-form sample, and now the ACS, of providing data with a granularity that no other federal survey provides. In addition to the primary challenge of the precision of ACS estimates, this is also a good time to assess other aspects of the survey in order to identify opportunities for refinement based on the experience of its first few years.

The U.S. Census Bureau asked the Committee on National Statistics of the National Research Council (NRC) to convene a panel to provide input on ways of improving the ACS, focusing on two priority areas: identifying methods that could improve the quality of the data available for small geographic areas and population groups and suggesting changes that would increase the survey's efficiency in responding to new data needs. As is frequently the case in the literature, the panel uses small area data to mean data for small domains, such as small geographic areas and small population groups.

The panel's deliberations led to the formulation of three guiding principles that provide a framework for the discussions and recommendations in this report:

- While comparisons to the decennial long-form survey provide a useful context for understanding the evolution of the ACS, the unique strength of the survey is not in replicating the long-form survey, but in meeting data needs that can best be addressed by a large national survey with the design characteristics of the ACS. The needs for small area data evolve and so do the methods and tools available for accomplishing the survey's objectives.
- How well the survey is meeting data needs for small administrative entities and population groups can only be truly assessed from the perspective of the broad range of stakeholders who use the data. In the design of a successful survey, there is no substitute for a thorough understanding of data users' needs.
- Tradeoffs will have to be made. Some of these tradeoffs are inevitable choices between competing survey design objectives (such as speed, accuracy, and level of detail). Other tradeoffs are imposed by resource limitations, particularly a sample size that is insufficient for producing adequately precise data for all small geographic areas and groups. Given the role of the ACS as a national resource, design decisions, such as the optimal allocation of sample among geographic areas in order to improve the precision of the estimates, are not simply statistical questions: they also involve policy decisions. The panel was not charged with assessing these matters from a policy perspective, but nonetheless emphasizes that a solid understanding of stakeholder needs is necessary for informed policy decisions.

Close collaboration with data users is essential to ensure that as refinements to the survey are considered going forward, the decisions are informed by stakeholder input. Although an ACS Data User Group (ACS DUG) was recently formed and has become an active platform for information exchange related to the data, the ACS DUG is not tasked with providing formal data user input to the Census Bureau. A standing group that is available to provide feedback on the survey and the data from a stakeholder perspective could provide highly valuable long-term benefits and at very little cost to the Census Bureau. The panel thus offers an overarching priority recommendation.

RECOMMENDATION 1: As a priority, the Census Bureau should establish a formal, institutionalized, standing group to provide ongoing data user input on decisions related to the American Community Survey, and this standing group should include representation of data user organizations.

SAMPLE DESIGN AND PRECISION OF ESTIMATES

Some degree of reduction in the precision of the estimates relative to the long-form sample has always been viewed as the tradeoff for the benefits provided by annual ACS updates. However, budget constraints have affected sample sizes so that the small area data are unusable from the perspective of many stakeholders at the local level. After exploring options to address this issue, the Census Bureau recently instituted a sample reallocation program that shifts the sample among census tracts to make the coefficients of variation (CVs) more nearly equal for tracts and for political and administrative areas.

Although it is understandable that the Census Bureau would want to reduce the largest tract-level CVs, it is not clear whether a consistent policy rationale guides this approach. Under current overall sample size constraints, the sample reallocation has limited ability to raise the precision to acceptable levels in small tracts, while it creates inefficiencies in the geographic aggregation of estimates, a strategy the Census Bureau has been recommending to users in order to deal with concerns about precision.

The Census Bureau has also recently increased the nonresponse sampling rate to 100 percent in selected areas, but without providing a clear rationale for this change. This change may cause the allocation of data collection resources in some of the smallest governmental units to be inefficient.

Although the panel does not recommend any immediate changes to the sample design, it is essential to integrate policy considerations into all research on the ACS design. This will help ensure that the needs of data users are being met and that the design of the survey is optimally cost efficient.

RECOMMENDATION 2: Future sample redesigns of the American Community Survey should consider whether there are explicit rationales based on identified data needs that justify deviations from proportional allocation of sample. Due regard should be given to the effects of reallocation on estimates for policy-relevant small geographic areas and nongeographically defined small groups.

RECOMMENDATION 3: Efforts to improve the precision of the American Community Survey estimates for specific small governmental units should be focused on increasing the initial designated sample size while maintaining the optimal nonresponse sampling rate instead of increasing the subsampling rate to 100 percent.

DATA COLLECTION METHODS

To maximize the efficiency of the data collection operations, the ACS uses four data collection modes: mail, Internet, telephone, and personal visit. The Census Bureau has also begun research on adaptive design techniques that could be incorporated into the data collection operations to increase efficiencies in fieldwork management. These efforts are promising, but they are greatly hindered by the lack of granularity in the way the Census Bureau tracks data collection costs, particularly by mode. What is needed is a system that can more precisely track costs to inform research and decisions on optimizing data collection operations, and the panel believes that implementing such a system is the most critical next step from a survey operations perspective. Although this step will undoubtedly involve some up-front costs due to changes or additions needed to the current survey management systems, the long-term payoff for a survey of the scale of the ACS is likely to be significant.

RECOMMENDATION 4: As a priority, the Census Bureau should develop systems for tracking American Community Survey data collection costs as precisely as possible, overall and by data collection mode.

Although the Census Bureau's resources for research projects are limited, continuous evaluation of data collection approaches is needed because technologies and methods that can increase efficiency, improve data quality, and reduce respondent burden are constantly evolving. In the panel's view, at least the initial stages of such evaluations are of relatively low cost and worthwhile investments that can translate into savings and improvements to the survey, for both respondents and data users, in the long run. The recommendations below fall into this category.

RECOMMENDATION 5: Taking into account cost and yield and their variation across areas, the Census Bureau should periodically evaluate the optimal subsampling rate for the American Community Survey, as well as the number of follow-ups in each mode.

RECOMMENDATION 6: The Census Bureau should evaluate the possibility of improving the American Community Survey's accuracy at a fixed cost by truncating nonresponse follow-up or using modeling techniques to replace some of the nonresponse follow-up, particularly for the more expensive data collection modes.

RECOMMENDATION 7: The Census Bureau should conduct research on potential ways of identifying cell phone numbers associated with

adult household members and instruct American Community Survey field interviewers in proper protocols for calling cell phone numbers, as needed.

RECOMMENDATION 8: The Census Bureau should continue to conduct research on how adaptive design techniques can benefit the American Community Survey.

RECOMMENDATION 9: The Census Bureau should continue to investigate the use of auxiliary data to develop nonresponse models for the American Community Survey.

RECOMMENDATION 10: The Census Bureau should conduct a thorough evaluation of potential mode effects on both data quality and nonresponse in the American Community Survey, focusing in particular on the newly introduced Internet mode.

RECOMMENDATION 11: The Census Bureau should conduct research to understand what types of devices are used by American Community Survey respondents to connect to the Internet and whether there are any associated data quality implications.

DATA PROCESSING AND ANALYSIS

The way data are processed can affect their quality and usefulness to users. Estimates produced based on the census long-form sample benefited from weights based on population controls available from the simultaneous census enumeration, but similarly high-quality weights are not available for the ACS at all levels of geography. Research is needed to improve population controls, especially when an area is affected by a major disaster, such as a hurricane. Such events can greatly increase local governments' need for up-to-date and accurate data in the aftermath of the event, while simultaneously making the Census Bureau's task of providing such data more difficult. Expanding collaborations with state, local, and tribal governments is not assumed to be cost neutral, but it could represent an important opportunity for the Census Bureau to demonstrate the survey's usefulness to existing and new stakeholders in critical situations.

RECOMMENDATION 12: The Census Bureau should conduct research on how the decennial census can be used for controls for the American Community Survey at a finer level of geographic resolution than the controls currently used on an annual basis.

RECOMMENDATION 13: The Census Bureau should conduct research on the benefits of developing procedures and standards for the creation of controls for the American Community Survey that can be put in place in times of disasters or other disruptive events. The benefits of closer collaborations with state, local, and tribal governments should be explored for the development of controls in general and for crisis situations in particular.

Currently, most of the data review steps happen after a year's worth of data are edited, imputed, and used to generate data products. Errors can be introduced during any stage of data preparation (such as weighting or imputation), and errors in fieldwork (such as the questionnaire being incorrectly administered by field representatives) are also unavoidable. Consequently, deferring review until a full year's worth of data are collected can lead to situations in which it is too late to correct the problem and some estimates have to be suppressed. The panel believes that from a data processing perspective, implementing ongoing quality control and editing processes is the most important next step, and one that could translate into significant cost savings in the long run if these checks successfully prevent potential major errors from affecting a full year's worth of data.

RECOMMENDATION 14: As a priority, the quality control and editing processes in the American Community Survey should be ongoing and as close to the data collection as possible, to ensure that problems are identified promptly and that their impact is minimized.

RECOMMENDATION 15: The Census Bureau should evaluate whether procedural changes might improve the efficiency of the American Community Survey quality control operations.

The use of administrative records is another area that could be explored to enhance data processing, and further research on small area and small domain estimation options is also needed. These research projects would require dedicated resources, but they have the potential of identifying approaches that could have long-term payoffs and enhance the survey's value to data users.

RECOMMENDATION 16: The Census Bureau should coordinate efforts across units on research related to the potential use of administrative records, and when possible, the American Community Survey Office should build on the research being conducted in other units. Promising topics include the use of administrative records for adaptive design, as

sources of data for items on the questionnaire, and to enhance estimation in the post data collection stages. (See also Recommendation 26.)

RECOMMENDATION 17: The Census Bureau should continue its program of small area estimation using American Community Survey data, maintaining a balance of methodological research and development of production applications directed to current user needs, methods for univariate and multivariate estimation, and intramural and extramural research.

RECOMMENDATION 18: The Census Bureau should negotiate agreements with potential federal sources of auxiliary variables for small area estimation, allowing sharing of data for multiple developmental and production uses, with suitable protections of confidentiality. In particular, the Census Bureau should endeavor to broaden its data-sharing agreement with the Internal Revenue Service to facilitate statistical uses beyond those directly related to the Small Area Income and Poverty Estimates Program.

DATA DISSEMINATION

The ACS data products include tables that involve rates or proportions, typically expressed as percentages, and are accompanied by margins of error (MoEs). This method works well for some estimates, but it can be confusing and uninformative in other cases, especially for small proportions. Research is needed to improve the presentation of measures of uncertainty to users. Implementing any changes would require testing and a minor redesign of some of the user interfaces, which would not be cost neutral, but improved presentation of measures of uncertainty would increase the clarity and value of the information presented to users.

RECOMMENDATION 19: The Census Bureau should continue research into alternative approaches for constructing and presenting measures of uncertainty for the American Community Survey that are suitable for data from complex survey designs and with small proportions or samples, with the objective of rapidly adopting new methods without the defects apparent in current practice.

RECOMMENDATION 20: The data disseminated from the American Community Survey should include both interval estimates (confidence or credible intervals) and approximately unbiased variance estimates, although the latter become less important if a suitable system for aggregation of estimates is introduced. (See also Recommendation 24.)

Despite the apparent abundance of data products, many of the actual estimates cannot be made available to data users because of the sample size limitations. In addition to data suppression to protect respondent confidentiality, the 1- and 3-year data are also subject to filtering due to concerns about precision. Under current procedures, more data are filtered out than is necessary. Changing the filtering rules would require some redesign of dissemination systems and processes, but making more data available would further increase the usefulness of the survey to data users.

RECOMMENDATION 21: The Census Bureau should revise the suppression practices for the American Community Survey: rather than suppressing data due to concerns about lack of precision, users should be provided with access to all data that pass confidentiality review. The Census Bureau will have to be proactive about user education and provide adequate information about the precision of the data to enable users to decide whether the data are suitable for use to meet their specific analytic needs.

RECOMMENDATION 22: The Census Bureau should evaluate whether the data release population thresholds of 65,000 or more for 1-year estimates and 20,000 or more for 3-year estimates are still optimal for the American Community Survey. This question should be revisited periodically.

The ACS data products were initially intentionally designed to facilitate comparison to the census long-form sample data products, but the annual release of a very large volume of 1-, 3-, and 5-year tables is very resource intensive, and it is unclear how useful many of the tables are to users. While many of the panel's recommended changes to dissemination methods are primarily targeted at enhancing user experience, there is an opportunity to scale back some forms of dissemination that may have become less useful over the years and direct the savings to providing other benefits to users.

RECOMMENDATION 23: The Census Bureau should evaluate whether the current range of tables produced provides optimal value to data users and whether the table production could be limited to a core set in order to allocate resources for other projects.

The MoEs associated with many of the estimates for small areas and groups can be very large, and data users are encouraged to aggregate estimates across geographic areas or population subgroups to improve precision. However, data users find performing these aggregations challenging, particularly because calculating the MoEs for the aggregated estimates is not always straightforward. Developing a tool that assists with these calculations would be an enhancement that would greatly improve data users' satisfaction with ACS data products and needs to be a priority.

In the long run, data users would also benefit from a query system that has more flexibility for performing analyses based on the underlying microdata. The panel acknowledges that the development of these tools would require a substantial investment of resources, but these types of features appear to be the most valuable to users. They might also have a long-term payoff for the Census Bureau in terms of stakeholder satisfaction and possibly increased use of the data, as well as substituting for the production of large numbers of prespecified tables.

RECOMMENDATION 24: As a priority, the Census Bureau should develop a tool that enables data users to aggregate geographies and collapse categories, as well as to calculate the standard errors for the new estimates. To support a greater range of analyses, a microdata access system with additional capabilities should also be considered. The American Community Survey (ACS) Office should take the lead in developing these tools, working in collaboration with other Census Bureau offices. The Census Bureau should also involve a working group of ACS data users, State Data Centers, and user interface experts from the early stages of the process.

MANAGING THE ACS CONTENT

The broad range of uses and nuances in data user needs raises difficult questions about how to prioritize demands for survey content without further increasing respondent burden. Managing the content is a balance between federally mandated functions and broader uses of the data, and it appears to be hindered by a lack of systematic, in-depth understanding of the range of uses. Although the Census Bureau has recently conducted a review of the ACS content based on federal uses of the data, to successfully manage the content of the survey it is important that the Census Bureau gain a solid understanding of the needs of the survey's stakeholders in a much broader sense. The panel considers this a priority in the context of content management. The recommended standing group to provide ongoing data user input (see Recommendation 1) can also provide guidance in accomplishing this task.

RECOMMENDATION 25: As a priority, the Census Bureau should conduct a comprehensive evaluation of the needs for the specific items on the American Community Survey, including nonfederal uses of the data. The evaluation should center on the level of disaggregation at

which the data are needed as the primary criterion, and the criteria and processes used for the evaluation should be documented.

Research on the potential use of administrative records to replace items on the questionnaire is not a priority area among the administrative records research projects currently being pursued by the Census Bureau, but if viable options could be found for obtaining some of the data from sources other than the interviews, this would reduce respondent burden and potentially enable the ACS to accommodate other data needs on the questionnaire.

RECOMMENDATION 26: The Census Bureau should continue research on the possible use of alternative sources and estimation methods to obtain content that is now collected on the American Community Survey. Once a comprehensive evaluation of the data needs has been completed, for each of the items, the Census Bureau should evaluate whether the survey represents the best source for those data or if data from other sources could be considered as a substitute. Research on the availability of alternative sources and estimation methods for the data should be ongoing.

Given the unique and valuable role of the ACS as part of the nation's statistical system, particularly in terms of its ability to produce small area data, the demand for new questions exceeds what the survey can reasonably accommodate. Consequently, implementing and following a systematic and transparent process for managing the survey's content is essential to ensure that the utility of the survey is maximized. These low-cost investments can have substantial payoffs in the long run.

RECOMMENDATION 27: The Census Bureau should clarify the criteria and aim to follow as closely as possible the guidelines and processes that have been established for the American Community Survey for adding new questions and dropping existing ones. Ad hoc, off-cycle changes should be the exception, rather than the rule, and new questions added this way should go through the full process during the next scheduled cycle of revisions. In all cases, it is important to maintain transparency about how the decisions are made.

RECOMMENDATION 28: The Census Bureau should evaluate whether the scope and size of the current field test required as part of the process of adding a new question to the American Community Survey is optimal or whether a smaller scale pretest (and separate

guidelines) may be adequate for minor questionnaire changes, allowing the survey to be more responsive to data user needs without sacrificing quality. Whatever the scope of the changes, the process should be systematic and transparent, with the goal of ensuring that their potential impact is fully assessed.

1

Vision for the American Community Survey

The American Community Survey (ACS) is the result of efforts—dating back to the first census in 1790—to collect data for public policy purposes through the decennial census process. Presidents and Congresses have regularly reaffirmed the value of the data collected through this platform by their use of the data and by requesting new questions to be added. The need for more frequent data collections, such as mid-decade censuses, has also been voiced repeatedly over the years.

The Census Bureau has met the challenges associated with growing needs for the data through innovative redesigns. For the past few decades, a long-form survey was used as part of the decennial census to collect detailed population and housing data from a sample of the U.S. population. This long-form survey became the main source of socioeconomic information for areas smaller than the whole nation.

The primary motivation for the change from the long-form decennial data collection to the ACS was to produce more frequent and more timely estimates, especially for small areas that may change significantly over the course of a decade. The data provided for small areas, such as counties, municipalities, and neighborhoods, are what made the long-form sample unique, and those data are what make the ACS unique today. Although there are other federal surveys that produce data on similar socioeconomic topics in greater content detail, their sample sizes are not large enough to be able to provide the same granularity as the ACS. The ACS is the primary source of data for anyone wishing to understand the characteristics and needs of small communities and administrative entities from a local perspective. The survey also provides data about small population groups that are not available from other sources.

THE ACS IN CONCEPT AND IMPLEMENTATION

The concept of the ACS was proposed in the 1990s, with the goal of moving from the decennial collection of the data to continuous measurement throughout each decade. The idea was based on Leslie Kish's earlier work on rolling sample design (Kish, 1981), and it entailed replacing the large decadal long-form sample with smaller monthly samples to collect data each month in all geographic areas covered by the survey. The Census Bureau hoped that the data from this design, collected over several years and pooled, would provide estimates of the population and housing characteristics that had previously been produced by the decennial long-form sample, with the same level of precision as the data from the long-form sample, even for small geographic areas.

In the mid-1990s, the Census Bureau began testing possible approaches to implementing the new continuous measurement survey. This testing was followed by a demonstration stage between 2000 and 2004, when data were produced at the national and state levels, as well as several large geographic areas. Full implementation began in 2005, with a sample of housing units, followed by a combined sample of housing units and group quarters in 2006.

While the data collected through the census long-form sample provided a snapshot every 10 years, with the ACS the Census Bureau publishes annual cumulated 1-year estimates for geographic entities with populations of at least 65,000, 3-year estimates for geographic entities with populations of at least 20,000, and 5-year estimates for all statistical, legal, and administrative entities, including areas as small as census block groups.

As part of the implementation of the ACS, the Census Bureau developed new data processing, estimation, data review, and data dissemination tools and methods to enable the release of the data before the end of the calendar year following the year in which they were collected. This means that the releases are not only more frequent, but data are also released more quickly after the data collection has been completed than was the case with the census long-form sample. This is particularly important for informing policy making in smaller, rapidly changing geographic areas, where once-a-decade measurements of social, economic, or housing characteristics could quickly become obsolete.

Another significant change that occurred with the transition from the decennial data collection to continuous measurement was a shift from relying on a large temporary workforce to highly trained, professional staff to carry out the various activities associated with the survey operations, including in-person follow-up visits to nonrespondents. This change led to lower rates of refusal to complete the questionnaire, as well as to an improvement in the quality of the information that is collected, primarily due to lower item nonresponse rates. In addition to data quality improvements, the change also led to increased operational efficiency. A further benefit to the Census Bureau was the reduction in the burden imposed on the other parts of the decennial census operations by the simultaneous collection of the long-form data.

Despite a highly successful implementation, a major challenge for the ACS is producing precise estimates for small geographic areas. The initial hope for the survey was to produce estimates with a similar level of precision to the data from the census long-form sample, by cumulating 5 years of data, with the estimates representing averages over the 5-year period.

For the 2000 census long-form sample, the overall sampling rate was 1 in 6, which translated to approximately 18 million housing units. Initially, sample sizes of 500,000 housing units monthly (or 6 million housing units annually) were proposed for the ACS (Alexander, 1993b), but it quickly became evident that a survey of that size would be prohibitively expensive. After additional research, the Census Bureau determined that a sample half that size, that is, 250,000 housing units monthly or 3 million housing units annually, would generate acceptable levels of precision (U.S. Census Bureau, 2009).

For the first few years of the ACS, the annual sample size was a little under 3 million housing units. Starting in June 2011, this was increased to approximately 3.5 million housing units annually, due largely to concerns voiced by data users about the precision of the estimates, particularly in smaller geographic areas. Table 1-1 shows the ACS sample sizes since its inception, including both housing units and group quarters. During the first 5 years of data collection (2005-2009), the average annual percentage of addresses in the sample was 2.2.

The 2011 increase brought the sample size over 5 years somewhat closer to the size of the long-form sample, but nonresponse follow-up is different. For the long-form sample, the Census Bureau followed up with all nonrespondents as part of the decennial operations; in the ACS nonrespondents are sampled for follow-up, which increases the design effect of the survey estimates and widens confidence intervals around the estimates. Unmailable addresses, which do not receive follow-up in the ACS, further reduce the number of completed interviews. Ultimately, the number of responding households is about two-thirds the size of the initial ACS sample. Furthermore, the annual sample sizes are not adjusted for a natural growth of the population in the sampling frame over time, so the effective rate of sampling is declining.

TABLE 1-1 Initial ACS Sample Sizes and Completed Responses, 2006-2012

	Housing Units		Group Quarters Residents		
Year	Initial Addresses Selected	Final Number of Responses	Initial Sample Selected	Final Number of Actual Responses	Final Synthetic Cases[a]
2012	3,539,552	2,375,715	208,551	154,182	137,086
2011	3,272,520	2,128,104	204,553	148,486	150,052
2010	2,899,676	1,917,799	197,045	144,948	N/A
2009	2,897,256	1,917,748	198,808	146,716	N/A
2008	2,894,711	1,931,955	186,862	145,974	N/A
2007	2,886,453	1,937,659	187,012	142,468	N/A
2006	2,885,384	1,968,362	189,641	145,311	N/A

[a]Final actual responses are the responses obtained from sampled group quarters residents. Synthetic interviews for group quarters residents were created by imputing the characteristics of interviewed group quarters persons into group quarters facilities that were not in the sample for that year or other time period.
SOURCE: Data from U.S. Census Bureau; available https://www.census.gov/acs/www/methodology/sample_size_and_data_quality/ [August 2014].

Overall, while sample sizes have proven adequate for larger geographic areas, the unique strength of the ACS design, as envisioned, was the survey's potential to produce population and housing estimates for the smallest of geographic areas (such as tracts, block groups, and school districts), as well as small demographic groups. This vision has not been achieved because for small areas the margins of error associated with the estimates can be very large.

PANEL CHARGE

Now that the ACS is nearly 10 years old, this is a good time to assess its evolution to date and consider how it can be enhanced going forward. The Census Bureau asked the Committee on National Statistics of the National Research Council to convene a panel and provide input on changes that the ACS office should consider over the course of the next few years in order to further improve the ACS data (see Box 1-1). In addition to the need for addressing the primary challenge associated with the precision of the estimates, the ACS is also at a stage in its natural evolution at which it is timely to evaluate other aspects of the survey and associated processes to identify opportunities for refinement based on the experience of the first

BOX 1-1
Statement of Task

An ad hoc panel will conduct a study to address priority technical issues for the American Community Survey (ACS) as the survey enters its next decade. The panel will consider how the Census Bureau could improve performance in several areas, which may ultimately lead to improved data products. The panel should conduct its work on the assumption that increases in ACS resources may not be possible.

- The panel will focus on methods and approaches to improve the accuracy of demographic, social, economic, and housing information produced from the ACS for the smallest geographic areas and population groups and will advise the Census Bureau on how to communicate the changes to data users in ways that facilitate effective use of the data.
- The panel will also consider data collection processes that can more efficiently meet national and local needs for new content in the broader context of the fundamental mission of the ACS.

few years. The panel was asked to focus on two priority areas: identifying methods that could improve the quality of the data available for small areas and suggesting changes that would increase the survey's efficiency in responding to new data needs.

PANEL APPROACH AND INITIAL ASSESSMENT

Since the survey was launched in 2005, many stakeholders have come to depend on the ACS data. Federal agencies use the ACS data to inform policy makers, assess programs, and distribute funds. A study found that in 2008, ACS data or data derived from the ACS were used by 184 federal domestic assistance programs to guide the geographic distribution of $416 billion in funds, representing 29 percent of all federal assistance (Reamer, 2010). State and local agencies use the ACS to evaluate the need for new services, such as roads, schools, and hospitals. Businesses use the ACS for information about potential markets, such as where people who might be interested in their services are concentrated. Other frequent users of the data include nongovernmental organizations, organizations serving American Indians and Alaska Natives, emergency planners, academic researchers, and journalists. The broad range of stakeholders demonstrates the survey's success, but it also represents a more complex challenge in terms of prioritizing decisions for how to meet the growing needs and expectations for ACS data, especially when operating with limited resources.

The panel's deliberations led to the formulation of three guiding principles that provide a framework for the discussions and recommendations in this report:

- While comparisons to the decennial long-form survey provide a useful context for understanding the evolution of the ACS, the unique strength of the survey is not in replicating the long-form survey, but in meeting data needs that can best be addressed by a large national survey with the design characteristics of the ACS. The needs for small area data evolve and so do the methods and tools available for accomplishing the survey's objectives.
- How well the survey is meeting data needs for small administrative entities and population groups can only be truly assessed from the perspective of the broad range of stakeholders who use the data. In the design of a successful survey, there is no substitute for a thorough understanding of data users' needs.
- Tradeoffs will have to be made. Some of these tradeoffs are inevitable choices between competing survey design objectives (such as speed, accuracy, and level of detail). Other tradeoffs are imposed by resource limitations, particularly a sample size that is insufficient for producing adequately precise data for all small geographic areas and groups. Given the role of the ACS as a national resource, design decisions, such as the optimal allocation of sample among geographic areas in order to improve the precision of the estimates, are not simply statistical questions: they also involve policy decisions. The panel was not charged with assessing these matters from a policy perspective, but nonetheless emphasizes that a solid understanding of stakeholder needs is necessary for informed policy decisions.

There have been several recent Census Bureau initiatives targeted at understanding data users' needs. A recently conducted content review was focused primarily on understanding federal agencies' uses of the questions on the ACS, although other data users were also encouraged to provide input. The ACS Data User Group (ACS DUG) was formed in 2013 with the goal of providing a platform for information exchange related to the data, and the Census Bureau also sponsored several data users' workshops over the past few years, with both federal and nonfederal data users. However, the ACS DUG is not tasked with providing formal data user input to the Census Bureau and is not set up in a way that could serve that function. Closer collaboration with data users is needed to ensure that, as refinements to the survey are considered going forward, the decisions are informed by stakeholder input. A standing group that is available to provide feedback on the survey and the data from stakeholders' perspectives can provide highly valuable long-term benefits, for very little cost to the Census Bureau. The panel thus offers an overarching, priority recommendation.

RECOMMENDATION 1: As a priority, the Census Bureau should establish a formal, institutionalized, standing group to provide ongoing data user input on decisions related to the American Community Survey, and this standing group should include representation of data user organizations.

CHALLENGES AND OPPORTUNITIES FOR ENHANCING THE ACS

This report discusses features of the ACS that can be improved or for which research should be conducted at this stage in the survey's evolution. Although the report is not intended to be a comprehensive review of all aspects of the ACS, it addresses a wide range of elements of the survey, including survey design, implementation, and data production and dissemination, because each of these affects the utility of the data. Although the most obvious solution to the frequently voiced concern of the low precision of the small area data would be to allocate more funding to increase the sample size, the focus of this report is on methodological changes that the panel believes could enhance the value of the survey for data users with current funding levels (as stated in our charge).

One important advantage in considering changes to the ACS derives from the survey's design of continuous data collection that relies on smaller monthly samples, in contrast to the one-time-only census long-form sample. This feature enables the Census Bureau to develop and test improvements to the survey, including new statistical methods, new question wording, or new data collection methods that can then be implemented in relatively short time. The ACS can be more nimble than the long-form survey was, and innovative solutions are possible. One example is the recently implemented imputation methodology to improve the estimates of the group quarters population in small areas. However, year-to-year comparisons are an important use of the survey, and 5 years of consistent data are needed to create data products for small areas, so changes to the survey have to be introduced with great care.

As detailed below, the next four chapters of the report (Chapters 2 through 5) focus on the first part of the panel's charge, improving the accuracy and usefulness of the information produced from the ACS for small areas. The final chapter (Chapter 6) addresses the second part of the charge, processes to better meet national and local needs for new survey content.

Sample Design

The primary challenge for the ACS is that the sample sizes and design are inadequate for producing estimates with precision that approaches the precision of the data that users were accustomed to from the census long-form sample. While ACS data are an invaluable resource for meeting analytic needs associated with larger geographic areas, data users are concerned about the precision of the estimates for the smallest geographic areas and groups. Simply put, the low precision of some of the estimates, even with 5 years of aggregation, renders them unusable from the perspective of many data users at the local level. Further aggregation of tracts or categories improves the usability of the data in many cases, but it is not a suitable solution in all areas.

Chapter 2 describes the ACS sample size and design characteristics, which are the fundamental determinants of precision. The chapter also discusses the implications of the recent sample reallocation implemented by the Census Bureau to increase the sampling rates in the smallest geographic areas and the panel's recommendations for further refinements to the sampling approach, given current funding levels.

Data Collection Methods

The ACS covers many topics, some of them in considerable detail, although it is not any more burdensome for respondents than the census long-form survey was (the time required to answer the questions depends largely on the number of people in the household). Response to the ACS is required by law (Title 13, U.S. Code, Sections 141, 193, and 221), as was completing the long-form survey. The main difference in respondent burden between the two data collections is that the ACS is continuously in the field, so respondent complaints can arise at any time. Consequently, questions about justifications for the survey may arise more frequently in the media or in Congress than they did with the decennial long-form survey.

The Census Bureau takes the issue of respondent burden seriously and is researching ways of addressing it. The recently added Internet option is expected to make responding to the survey more convenient for respondents, as well as to increase its efficiency. The ACS has also been serving as the test survey for several adaptive design ideas that similarly have the potential of reducing respondent burden and increasing efficiency. Chapter 3 discusses the panel's findings and recommendations for further research and enhancements to the data collection methods, which are indirectly also expected to improve data quality.

Data Processing and Analytic Issues

Processing of collected data can affect data quality. Estimates from the census long-form sample benefited from weights available from the simultaneous census enumeration. By contrast, the weights used to align characteristics of the ACS sample with the overall population are based on control totals from the postcensal population estimates produced by the Census Bureau's Population Estimates Program. Consequently, controls are not available for all levels of geography, and any imprecision in the population estimates also affects the ACS estimates.

The magnitude of sampling error in published estimates is represented by a margin of error published with the estimates. This is informative for most estimates, but for estimates of small proportions it can be confusing and not particularly useful. Chapter 4 suggests improvements and further directions for research on these aspects, and others, of ACS data processing. The chapter also discusses the use of administrative records that can be considered for editing, for imputation, or to evaluate bias, as well as small area and domain estimation methodologies.

Data Dissemination Limitations

ACS data products are closely modeled on the census long-form data products. Although the availability of annual estimates is one of the major benefits of the ACS, production of a wide range of data products based on three different datasets (of 1, 3, and 5 years) is very resource intensive. The overlaps in production, review, and dissemination stress the system, increasing the risk of compromising data quality.

The volume of datasets and data products can also be overwhelming for users. Because of the large volume of available data, which can be accessed in many different ways, users sometimes find it difficult to figure out what is the most efficient way of obtaining the data, and some methods are challenging to use without training.

At the same time, for small areas and population groups, the volume of data can be misleading: because of the sample size limitations, many of the estimates cannot be made available to data users. To protect the identities of respondents, the Census Bureau's Disclosure Review Board prohibits release of some estimates. In addition, the 1- and 3-year data releases are filtered on the basis of data quality (precision) considerations. The filtering rates are particularly high for small geographic areas.

Due to the limitations of the small area data, an option for data users is to aggregate estimates across geographic areas or population subgroups, at least when the geographic and analytic needs lend themselves to such aggregation. Performing the aggregations, however, requires cumbersome margin-of-error calculations, which few data users have the expertise or resources to perform. The Census Bureau does not provide a tool to assist data users with the aggregation, only instructions for how to do it. The current range of dissemination methods is also limited in terms of the opportunities it provides for custom analyses. Chapter 5 discusses these issues and presents the panel's recommendations for improving data dissemination.

Survey Content

The current ACS content is largely based on the census long-form survey, but it is likely that some of the questions are no longer as useful or necessary as they once were. The Census Bureau also has to balance requests for new content with the need to limit the time required to complete the survey, in other words, with respondent burden. A benefit of continuous data collection is that new content can be added to the ACS more quickly than was possible in the decennial census cycle, but the process still takes many years. Chapter 6 of the report discusses how the Census Bureau can make the ACS responsive to users' needs with the highest value content.

2

Sample Design and Precision of Estimates

The American Community Survey (ACS) was envisioned as a replacement and improvement upon the census long-form sample. One of the most important aspects of this vision is the provision of small area data for the entire nation, which for the smallest areas is provided in the ACS as a series of 5-year aggregates. As discussed in Chapter 1, the ACS design has important benefits and was not intended to simply replicate the long-form survey. Nonetheless, data quality comparisons to the long-form survey provide useful context, particularly from the perspective of data users.

Some degree of reduced precision in any 5-year estimate relative to the corresponding long-form estimates has always been viewed as the tradeoff for the benefits provided by annual ACS updates. But over the years, from inception to demonstration periods to full implementation, the ACS has faced challenges in providing small area data because of budget constraints, as well as design and operational limitations. As a result, a series of compromises have made the small area estimates far more problematic than originally expected (Starsinic, 2005). In fact, the reduced utility of the ACS estimates for small areas undermines the serviceability of the ACS program in terms of its original objective.

A detailed discussion of the ACS sample design can be found in the *American Community Survey Design and Methodology Report* (U.S. Census Bureau, 2014a). The first section below compares the precision of the ACS estimates to those from the census long-form sample. The next section analyzes the usability of tract data from the ACS. The third section looks at recent Census Bureau efforts to improve the precision of the ACS estimates, including a sample reallocation program focused on tract-level precision equalization. The effects of the sample reallocation are examined in depth, using New York City as a case study. The panel's conclusions and recommendations related to sample design are presented in the last section of the chapter.

PRECISION OF THE ACS AND CENSUS LONG-FORM SAMPLES

Table 2-1 shows the design characteristics at the tract level for the 2000 census long-form sample and the 2007-2011 ACS. The comparison captures the contributions of several design features to the dramatic differences in precision between the two data collections. First, the sample size from the ACS 5-year aggregate is only 54 percent of the 2000 census long-form sample size, and the median tract sample size for the ACS (296 housing units) is only 49 percent of the corresponding 2000 census long-form value (605 housing units).[1] In addition, differences in sample design (e.g., nonresponse subsampling) and estimation (e.g., lack of direct subcounty population controls) contribute to larger design effects[2] for the

TABLE 2-1 Design Characteristics of the 2000 Census Long-Form Sample and 2007-2011 ACS Samples

Characteristics	2000 Census	2007-2011 American Community Survey
Total Sample Size	43,961,414	23,781,823
Number of Tracts	65,746	73,146
Median Tract Sample Size	605	296
Median Tract Design Effect	1.12	1.41
Median Tract Effective Sample Size	533	209

NOTES: There are sample size data for only 72,234 of the 73,146 tracts because a minimum of 50 unweighted sample cases for a subpopulation in a geographic area is required to release a data table. The design effect only takes into account heterogeneity in weights and is calculated as 1+ the coefficient of variation squared. This is a generalized design effect based on a model of weighting loss computed under the assumption that the weights bear no association to the variable of interest. The actual design effect for any given estimate will be affected by which cases are in the universe, clustering, and stratification, in addition to weight heterogeneity. The effective sample size is the sample size after taking into consideration the design effect.

[1]Some of the difference is due to an increase in the number of tracts in the ACS.

[2]The design effect is the extent to which the sampling error differs from the sampling error that can be expected under simple random sampling.

ACS (median, 1.41) in comparison with the 2000 census long-form sample (median, 1.12).

Across all the differences, the median net effective sample size for ACS (209) is only 39 percent of the comparable 2000 census long-form sample figure (533). In other words, if everything else is held constant, standard errors for the ACS are about 60 percent larger than for the 2000 census for median-sized tracts: this difference is much larger than had been anticipated during the original design phase of the ACS.

When analysis is restricted to smaller domains (e.g., adults 18-64 years of age, those in the labor force, or racial or ethnic subgroups), sample sizes can become very small at the tract level. As a result, the ACS data are even more unstable for these types of analyses. Variables subject to large coefficients of variation (such as income or travel time to work) can also produce erratic 5-year estimates due to low sample sizes.

The distributional properties of the summarized differences in Table 2-1 are presented in Figures 2-1 and 2-2. The unweighted tract-level sample sizes in Figure 2-1 illustrate just how different the sample size distributions are for the ACS and the 2000 census. These distributional differences are even more pronounced when comparing tract-level effective sample sizes, as shown in Figure 2-2. The figures illustrate that the precision levels for the vast majority of tracts for the ACS 5-year estimates are likely to be only at the lowest levels achieved for the 2000 census long-form sample.

USABILITY OF TRACT DATA FROM THE 2008-2012 ACS

The Census Bureau evaluates the quality of ACS estimates by examining the median value of the coefficients of variation (CVs) for 20 key variables, where CV = [(standard error/estimate) × 100 percent], or the ratio of the standard error (SE) to the point estimate expressed as a percentage (see Hernandez-Viver and Starsinic, 2013). If the tract-level CV for a key variable is less than or equal to 30 percent, then this variable is judged to be "reliable" and to meet the Census Bureau's quality standard.[3] While the median CV for all tracts provides useful summary information, it does not provide a complete picture of the utility of tract-level ACS data for various users. Tables 2-2 and 2-3 provide a more detailed overview of the precision and usability of five of the Census Bureau's key variables, using 2008-2012 ACS data.

Table 2-2 shows that the median tract-level CV for each of these five key variables meets the Census Bureau's quality threshold (less than or equal to 30 percent). However, the share of all census tracts whose CV

[3] A more common standard of precision is a CV of less than or equal to 10 percent (see National Research Council, 2007).

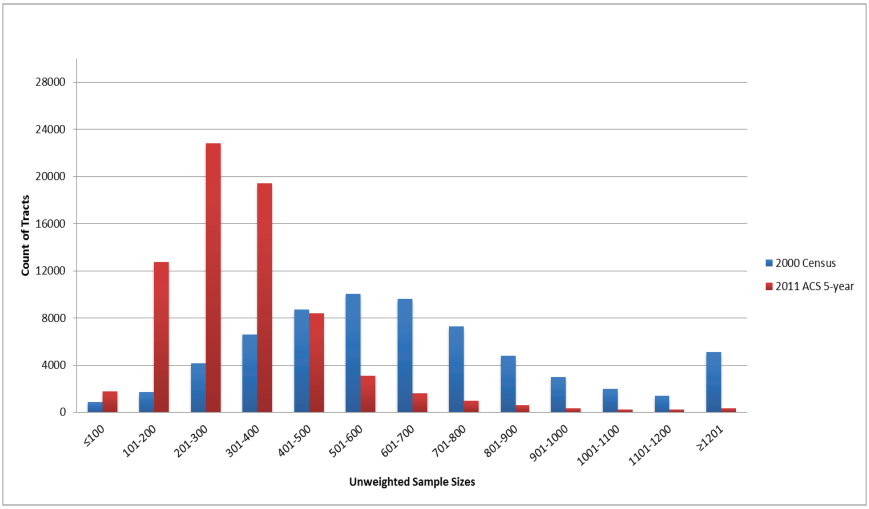

FIGURE 2-1 Unweighted sample counts in census tracts.
NOTE: Only tracts that have a minimum of 50 unweighted sample cases are included.

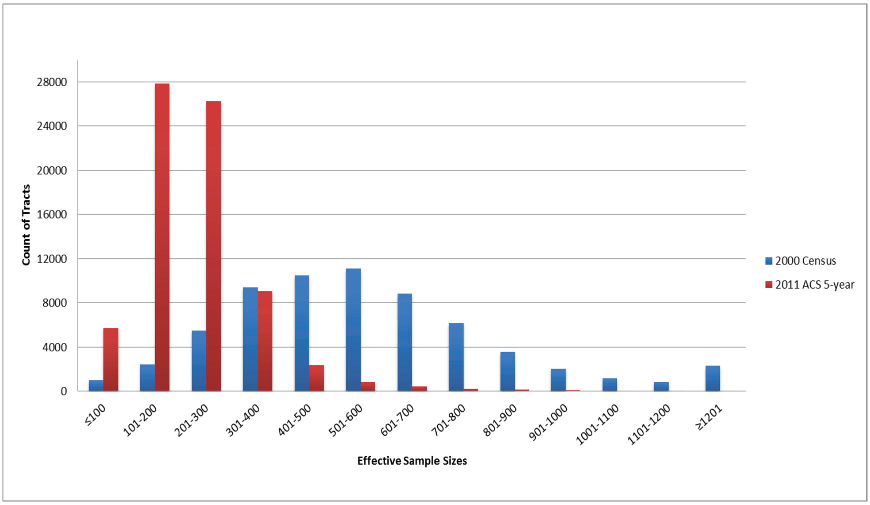

FIGURE 2-2 Effective sample sizes in census tracts.
NOTE: Only tracts that have a minimum of 50 unweighted sample cases are included.

meets this threshold varies from 50 percent for occupied housing units with persons who are foreign born to 88 percent for occupied housing units that are renter occupied. For data users trying to analyze the share of foreign-born population at the tract level, for example, only half of the tracts in the 2008-2012 ACS have CVs below the precision threshold.

The Census Bureau provides another measure of precision for each published ACS estimate, the margin of error (MoE), where MoE = SE × 1.645, which corresponds to a 90 percent confidence interval.[4] Many data users utilize the MoEs to calculate 90 percent confidence intervals around ACS estimates by adding and subtracting the MoE from the estimate to calculate the upper and lower bounds of the confidence interval. One commonly used standard of precision for percent estimates is that the width of confidence intervals is less than 10 percentage points, or equivalently the MoE is less than 5 percentage points. Table 2-2 shows that the share of tracts failing to meet this standard also varies widely across these five variables: from a low of 30 percent for the foreign-born population to a high of 80 percent for occupied housing units that are renter occupied. In other words, only 70 percent of estimates of the foreign-born population and 20 percent of estimates of the housing units that are renter occupied meet the standard.

An additional problem for data users using this simple method to construct confidence intervals is that the intervals may include logically impossible values. If the MoE is larger than the point estimate, then the confidence interval lower bound will fall below zero. Similarly, the upper bound might exceed 100 percent. Obviously, percentage estimates below zero or above 100 percent are both logical impossibilities. The share of tracts where the MoE exceeds the estimate, and therefore the lower bound of the confidence interval falls below zero, ranges from a low of 1 percent to a high of 16 percent: see Table 2-2. The share of tracts with a confidence interval whose upper bound exceeds 100 percent is much smaller. This problem and potential solutions are discussed in Chapter 5.

A meaningful CV for an ACS estimate cannot be calculated if the estimate is zero because it is not possible to divide by zero (given that CV = (standard error/estimate) × 100%). Furthermore, data users cannot calculate a meaningful standard error with the standard methods suggested by the Census Bureau if a published estimate is zero or if a derived percentage estimate is 100 percent because in those cases the conventional standard error estimate would be zero, suggesting an implausible degree of certainty

[4]Consistent with Census Bureau tradition, ACS estimates are published with 90 percent confidence levels, although ACS data users can convert the published MoEs to the MoEs for a higher confidence level, if needed. In the broader statistical community, 95 percent confidence levels are more commonly used.

TABLE 2-2 Usability Analysis: Tract-Level 2008-2012 ACS Data (in percentage)

Characteristics	Percentage of Persons Living in Poverty[a]	Percentage of Occupied Housing Units That Are Renter Occupied[b]	Percentage of Households Receiving SNAP Benefits in Past 12 Months[c]	Percentage of Persons Who Are Foreign Born	Percentage of Population Aged 25+ with a Graduate or Professional Degree[d]
National Estimate	14.9	34.5	11.4	12.9	10.6
National Margin of Error	±0.1	±0.2	±0.1	±0.1	±0.1
All Tracts[e]					
Tract range	0-100	0-100	0-100	0-100	0-100
Tract mean	16.0	35.2	12.5	12.2	10.3
Tract median	12.6	29.8	9.2	6.9	7.2
Tract median CV	28.3	14.7	29.5	29.7	26.0
Tract median MoE	5.8	6.7	4.6	3.4	3.2
CV ≤ 30%	56	88	51	50	61
CV > 30 and ≤ 50%	35	9	29	29	27
CV > 50%	9	2	20	21	12
Confidence interval ≥ 10 percentage points	59	80	45	30	17
MoE > estimate	4	1	16	15	8
Confidence interval lower bound < 0	4	1	16	15	8

Confidence interval upper bound > 100	0.17 (125 tracts)	1.4 (1034 tracts)	0.1 (89 tracts)	0.05 (37 tracts)	0.1 (64 tracts)
Confidence Interval Width ≥ 10 Percentage Points by CV Category, Excluding Tracts Where CV = 0					
CV ≤ 30%	73	84	69	48	24
CV > 30 and ≤ 50%	46	58	33	19	9
CV > 50%	30	32	11	8	6
Median CVs by Tract Total Population Size All Tracts					
< 1,000	31.3	18.7	27.2	43.6	37.6
1,000-2,999	29.0	16.0	29.6	38.6	31.4
3,000-4,999	28.1	14.3	29.3	29.6	25.9
5,000-6,999	28.2	14.1	29.8	25.2	23.5
7,000+	27.8	14.4	29.5	20.7	20.8

Continued

TABLE 2-2 Continued

Characteristics	Percentage of Persons Living in Poverty[a]	Percentage of Occupied Housing Units That Are Renter Occupied[b]	Percentage of Households Receiving SNAP Benefits in Past 12 Months[c]	Percentage of Persons Who Are Foreign Born	Percentage of Population Aged 25+ with a Graduate or Professional Degree[d]
Median CV by Tract Number of Housing Units					
All Tracts					
≤ 400	32.6	12.0	23.7	29.8	42.9
401-1,000	31.6	18.0	31.8	34.1	35.5
1,001-2,000	28.4	14.9	29.2	30.9	27.4
2,001-4,000	27.4	13.6	29.1	28.1	22.7
4,001-6,000	27.2	13.4	31.8	20.8	17.0
6,001+	26.4	13.7	40.4	16.0	14.2

[a]Tracts with no persons in the universe for which poverty rates are calculated were excluded from this analysis.
[b]Tracts with no households were excluded from this analysis.
[c]SNAP is the Supplemental Nutrition Assistance Program; tracts with no households were excluded from this analysis.
[d]Tracts with no persons aged 25 or older were excluded from this analysis.
[e]Tracts with zero population are excluded.

NOTES: For a more detailed version of this table, see Appendix A. MoE is margin of error; CV is coefficient of variation (see text).

SOURCE: Data from the 2008-2012 ACS Summary File, available at http://www.census.gov/acs/www/data_documentation/summary_file/ [September 2014].

that the population count or proportion in question is exactly zero or 100 percent. The MoEs for zero estimates displayed in published tables are identical for all zero estimates for a given geographic level, and therefore convey no useful information about the precision of those estimates.

Neither the CV nor the MoE alone summarizes the utility of the estimates for all users. In general, for a given tract sample size, the MoE will tend to be smaller for estimates of a rate or proportion closer to zero (0%) or one (100%). The CV will tend to be larger for small estimated values, due to the appearance of the estimate in the denominator of the CV. Furthermore, the CV will differ depending on whether the discussion is about a poverty rate of 5 percent or a 95 percent rate of those not in poverty. A large CV might or might not indicate that an estimate is not useful, depending on the inference being made. For example, if the poverty rate is estimated as 5 percent with a standard error also of 5 percentage points, then the CV is 100 percent and the MoE is 8.2 percentage points. The potential error is too large to accurately assess the number of potential clients for a hypothetical antipoverty program, yet the data are more than adequately accurate for determining that the area falls below a threshold of 25 percent that defines an area of concentrated poverty for the program.

Table 2-2 illustrates that criteria using these two measures may result in opposite conclusions about the precision of ACS estimates. For example, the share of tracts with a CV below or equal to 30 percent, but a confidence interval width that exceeds 10 percentage points, ranges from a low of 24 percent to a high of 84 percent for the five key variables in Table 2-2. Thus, there is no single criterion that data users can use to assess whether ACS estimates are precise enough for their applications.

Of course, the precision of ACS estimates varies by the population size and number of housing units in a tract. In general, both median CVs and the share of confidence interval widths exceeding 10 percentage points decrease as population size and the number of housing units increase, particularly if tracts with CVs equal to zero are excluded from the analysis: see Table 2-2. There is a similar pattern of decline in the share of tracts where the MoE exceeds the estimate. These results indicate that data users who are working with tracts with small population and housing unit counts face the greatest challenges in identifying ACS estimates that are sufficiently precise to serve as a replacement for data from the census long-form sample.

Table 2-3 shows the share of tracts with CVs that meet the 30 percent threshold for several categories of estimates of the prevalence rate of the characteristic in question. In tracts where this rate is very small, the majority of CVs exceed 30 percent, and in some cases even 50 percent. For rates over 10 percent, there is a substantial jump in the share of tracts meeting the 30 percent threshold. As shown in the last column in Table 2-3, a substantial number of tracts have prevalence levels below 10 percent for several

TABLE 2-3 Distribution of Tracts by Variable Categories and CV Categories: 2008-2012 ACS Data (in percentage)

People in Poverty	CV ≤ 30%	CV > 30% and ≤ 50%	CV > 50%	Percentage of Total
≤ 3%	1	43	56	8
> 3% and ≤ 10%	25	62	13	32
> 10% and < 20%	66	32	2	31
≥ 20% and < 30%	89	10	0.6	15
≥ 30% and < 97%	96	3	0.8	13
≥ 97%	0	0	0	0
Renter Occupied	CV ≤ 30%	CV > 30% and ≤ 50%	CV > 50%	Total
≤ 3%	0.2	17	83	1
> 3% and ≤ 10%	25	61	14	8
> 10% and < 20%	83	16	0.7	21
≥ 20% and < 30%	98	2	0.2	20
≥ 30% and < 97%	99	0.3	0.1	49
≥ 97%	100	0	0	0.5
Households Receiving SNAP Benefits	CV ≤ 30%	CV > 30% and ≤ 50%	CV > 50%	Total
≤ 3%	0.4	14	85	16
> 3% and ≤ 10%	21	62	18	35
> 10% and < 20%	77	22	1	28
≥ 20% and < 30%	97	3	0.2	12
≥ 30% and < 97%	99	0.7	0.3	9
≥ 97%	0	0	0	0

People Who Are Foreign Born	CV ≤ 30%	CV > 30% and ≤ 50%	CV > 50%	Total
≤ 3%	3	35	61	28
> 3% and ≤ 10%	37	51	12	32
> 10% and < 20%	81	17	2	19
≥ 20% and < 30%	96	3	0.4	9
≥ 30% and < 97%	99	0.6	0.2	12
≥ 97%	0	0	0	0
Population Aged 25+ with a Graduate or Professional Degree	**CV ≤ 30%**	**CV > 30% and ≤ 50%**	**CV > 50%**	**Total**
≤ 3%	4	38	58	17
> 3% and ≤ 10%	52	43	5	46
> 10% and < 20%	94	6	0.5	23
≥ 20% and < 30%	99	1	0.4	9
≥ 30% and < 97%	98	0.7	0.8	5
≥ 97%	100	0	0	0

NOTES: Table excludes tracts where CV = 0. CV is coefficient of variation.
SOURCE: Data from the 2008-2012 ACS Summary File, available at http://www.census.gov/acs/www/data_documentation/summary_file/ [September 2014].

of these key ACS variables. For example, 51 percent of tracts in 2008-2012 have fewer than 10 percent of households receiving Supplemental Nutrition Assistance Program (SNAP) benefits in the past 12 months, and in 60 percent of tracts, less than 10 percent of the population is foreign born. The smaller sample size of the ACS, compared with the census long-form sample, makes it more difficult to study certain population and household characteristics at the tract level due to these lower levels of precision.

EFFORTS TO IMPROVE PRECISION

Over the years, data users have been raising concerns about the limited precision of tract-level estimates described above, and the Census Bureau has been exploring ways to address the issue. For example, model-assisted estimation was studied as a mechanism for using administrative records information to improve the precision of ACS estimates at the subcounty level and for tracts in particular (Fay, 2006; Starsinic and Tersine, 2007). In fact, model-assisted estimation has been fully incorporated into the ACS weighting schema, and the ACS variances shown in Table 2-1 (above) incorporate its impact.

In addition, the Census Bureau has worked to secure additional funding to increase the overall sample size of the survey. In particular, the annual sample size was increased from 2.90 million to 3.54 million housing units starting in June 2011 (U.S. Census Bureau, 2014a). The first 5-year data release that is fully based on the increased sample size will result in a decrease in ACS standard errors from 60 percent to about 45 percent larger than those for the 2000 census long-form sample. Nonetheless, further changes are necessary to bring ACS standard errors closer to those for the census-based estimates. To reduce the ACS standard errors to be only about 25 percent larger than those from the census (an early ACS design goal discussed in Alexander, 1993a) by increasing the annual sample size, the sample size would have to be increased to about 4.8 million housing units.

Tract-Level Precision Equalization Effort: Overview

Tract sizes vary substantially. Table 2-4 shows the distribution of census tracts by population size and number of housing units for the ACS for 2008-2012. While the majority of tracts have at least 3,000 people, more than one-fourth (27.3%) have population sizes that are smaller, although this group comprises only 14 percent of the total U.S. population. Similarly, only about 13 percent of tracts have fewer than 1,000 housing units, and these comprise only 6 percent of housing units nationwide.

In 2011 the Census Bureau instituted a tract-level reallocation program to shift sample from geographic areas with larger populations to

TABLE 2-4 Distribution of Tracts by Population Size and Number of Housing Units: 2008-2012 ACS Data

Tract Total Population Size[a]	Number of Tracts	Percentage of Tracts[b]	Percentage of Population
1-999	757	1.0	0.1
1,000-2,999	18,967	26.2	13.8
3,000,4999	30,593	42.2	39.2
5,000,6999	16,274	22.5	30.7
7,000+	5,836	8.1	16.1
Total	72,427		
Tract Total Number of Housing Units			**Percentage of Housing Units**
≤ 400	812	1.1	0.1
401-1,000	8,651	11.9	5.2
1,001-2,000	37,170	51.3	42.6
2,001-4,000	24,842	34.3	48.5
4,001-6,000	824	1.1	2.9
6,001+	128	0.2	0.7
Total	72,427		

[a]Tracts with zero population were excluded from the analysis.
[b]Totals may not sum to 100 percent due to rounding.
SOURCE: Data from the 2008-2012 ACS Summary File, available at http://www.census.gov/acs/www/data_documentation/summary_file/ [September 2014].

areas with smaller populations (Sommers and Hefter, 2014; U.S. Census Bureau, 2014b). The goal of the reallocation was to make CVs more nearly equal for census tracts and for governmental, political, and administrative areas. The old and new sampling plans for census tracts are compared in Table 2-5. The samples reallocated to the smaller sized areas mostly come from large tracts with 4,000 or more housing units, which in general had smaller than average CVs before the reallocation.

Under the sample reallocation program, instead of two sampling ratios, the plan used six different rates, based on the number of housing units. The overall goal was to equalize the level of precision across all tracts by improving the precision in tracts with fewer than 2,000 housing units at the expense of larger tracts. Under the reallocation, sampling rates are 2.5

TABLE 2-5 Sampling Rates by Size of Tract, 2009 and 2013 ACS

Tract Measure of Size	2009 Average of Postreduction Sampling Rates	2013 Average of Postreduction Sampling Rates	Ratio of 2013 Sampling Rate to 2009 Sampling Rate
0 < TMOS < = 400	2.141	5.275	2.464
400 < TMOS < = 1,000	2.141	4.220	1.971
1,000 < TMOS < = 2,000	2.141	2.562	1.197
2,000 < TMOS < = 4,000	1.573	1.507	0.958
4,000 < TMOS < = 6,000	1.573	0.904	0.575
6,000 < TMOS	1.573	0.528	0.335

NOTES: Postreduction sampling rates refers to sample adjustment for blocks in tracts where the Census Bureau predicts a level of completed mail and computer-assisted telephone interviews (CATI) of at least 60 percent and where at least 75 percent will be mailable addresses (see U.S. Census Bureau, 2014a). TMOS is a tract measure of size.
SOURCE: Alvarez and Salvo (2014).

times higher for tracts with fewer than 400 housing units, almost twice as high for tracts with 400 to 1,000 units, and about 1.2 times higher for tracts with between 1,000 and 2,000 units.

There was an increase in the sample size for close to two-thirds of all census tracts in the nation, with the majority (51 percent) receiving a 20 percent increase: see Figure 2-3. Most of the remaining census tracts are in the category of 2,000-4,000 housing units, and for them the sample size was reduced by a little more than 4 percent. This category accounts for about one-third of all census tracts and contains a little less than one-half of the nation's housing units. The tracts that lost the most in the sampling change contain 4,000 or more housing units and constitute 1 percent of the nation's census tracts (and about 3 percent of the nation's housing stock).

Beyond these initial sampling rates varying by the measure of size of the sampling stratum (defined by tracts and other geographic units), weighting factors also vary by the level of subsampling prior to follow-up by a computer-assisted personal interview (CAPI) (depending on the level of household responses to mail or telephone at the tract level) and other factors (U.S. Census Bureau, 2014a). The combination of all these components contributes to large differences in the final weights computed for each responding household and person. In particular, differential sampling rates at the tract level imply that heterogeneity is introduced when tracts with different sampling rates are combined to create larger geographic areas for analysis. Relative to a sample design with proportional sampling (i.e., uniform sampling rates), this heterogeneity in final weights increases the sampling variance of estimates from the combined geographic areas. Greater

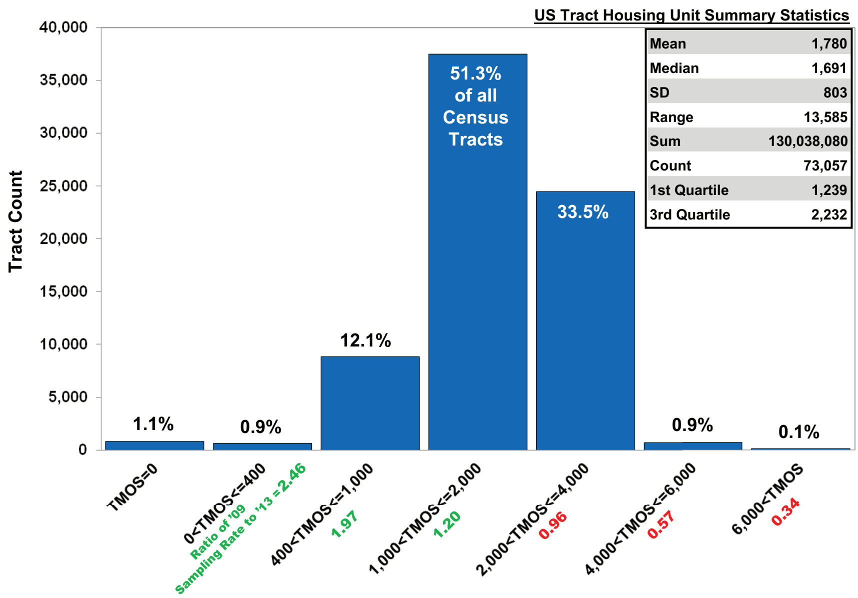

FIGURE 2-3 Tract measure of size strata tract counts, 2006-2010 ACS.
NOTE: TMOS is a tract measure of size.
SOURCE: Alvarez and Salvo (2014).

degrees of sampling rate heterogeneity (i.e., differential final weights) will result in greater increases to the sampling variance.

While it is understandable that the Census Bureau would want to reduce the largest tract-level CVs (in tracts with less than 1,000 housing units, especially those with less than 400 housing units), it is best to do so only when there is a good policy rationale. It could be argued that increasing the sample sizes associated with small governmental units to improve precision of their estimates does constitute such a rationale. However, the case for doing so for small tracts is much less clear, since tracts are only statistical areas for calculation and reporting of census results and have no necessary relationship to political or administrative units.

To assess this issue, we cross-tabulated the distribution of tract sizes by the sizes of their counties. We chose counties to represent governmental units because they are clearly defined in census data, they are commonly used in federal resource allocation and Census Bureau estimation programs, and counties with small populations are likely to contain small governmental units that also have small populations. Results by quintiles are presented in Table 2-6. The distribution of tract sizes within the varying sizes of

TABLE 2-6 Distribution of Tract Sizes Relative to the Size Distribution of Counties

		For Each County Quintile, the Percentage of Tracts Belonging to Each Tract Quintile					
		County Quintiles by Population Size					
		1st	2nd	3rd	4th	5th	
Tract Quintiles by Population Size		58-74,641	74,642-251,643	251,644-627,362	627,363-1,408,480	1,408,481-9,787,514	Total Number of Tracts
1st	1-2,645	23.1%	18.6%	20.9%	19.8%	17.6%	14,639
2nd	2,646-3,567	22.3%	18.9%	19.7%	20.4%	18.7%	14,645
3rd	3,568-4,463	20.9%	19.4%	19.1%	19.9%	20.7%	14,646
4th	4,464-5,673	18.3%	20.4%	19.7%	20.5%	21.1%	14,639
5th	5,674-36,880	15.4%	22.6%	20.7%	19.4%	22.0%	14,646
Total Number of Tracts		14,651	14,660	14,666	14,861	14,377	73,215

counties is remarkably uniform. (Results are similar for finer tabulations by deciles.) Given these results, it appears that changing the sample rates for low-population tracts is not likely to be an efficient method to improve precision for low-population small governmental units, offering very limited support for the potential benefits of tract equalization.

Thus, it can be argued that the increase in sample size for the small tracts likely cannot increase their precision to an acceptable level, while the reduction in sample size for some of the large tracts may lead to the loss of what was previously adequate precision. Broadly speaking, tract equalization only has the effect of moving the majority of tracts with the lowest level of precision (sample sizes of less than 100) and tracts with 301+ sample size into one of the two categories associated with sample sizes between 100 and 300. Furthermore, using counties as a proxy for potential benefit of tract equalization to small governmental units, Table 2-6 provides little support for such a position, given that tract sizes appear to be fairly uniformly distributed across various county sizes, including small counties.

Beyond the increased sampling rates, the lower CV outcome associated with the smallest governmental units (see Table 2-6) may be partly attributed to another design change, which increased the nonresponse sampling rate to 100 percent in selected areas. The justification for this change is unclear. A rule of thumb for the ACS survey design operations that is applied to other aspects of the ACS program calls for the nonresponse sampling rate to be roughly set to 1/square root (cost ratio), that is, the ratio of cost per nonresponse (CAPI) completed interview to the combined cost per completed interview by Internet, mail, or CATI (see Chapter 3 for details). Thus, the allocation of data collection resources in some of the smallest governmental units may not be optimal.

Table 2-7 compares sampling rates and CVs for 2010 and the 2011 reallocation by sampling stratum. The CVs are theoretical 5-year CVs calculated from Census Bureau simulations and theoretical 5-year CVs calculated from the weighted sample year rates. The table shows that initial production results under the reallocation program had the intended impact in smoothing out the median CV across various sized tracts. That is, tracts with 4,001-6,000 housing units and 6,001 or more housing units have CVs increasing from 20 and 15 percent to 29 and 28 percent, respectively, while CVs for tracts with 400-1,000 housing units decrease from 41 to 29 percent (Sommers and Hefter, 2014).

While the CV equalization effort appears to have had the intended impact of smoothing median CVs across tracts sizes, the policy justifications are not evident, given the increased inefficiencies in the sample design (due to increased differential weights) in the case of estimates for governmental units associated with larger geographic areas or populations. Furthermore, any statistical inefficiency associated with this program could have unan-

TABLE 2-7 Comparison of Results from 2011 and 2010 Production Data (in percentage)

	2011		2010	
New Stratum	Sampling Rate	CV	Sampling Rate	CV
0 < GUMOS ≤ 200	15.00	22	10.00	40
200 < GUMOS ≤ 400	10.00	22	6.67	26
400 < GUMOS ≤ 800	7.00	23	6.67	26
800 < GUMOS ≤ 1,200	3.84	26	3.33	28
0 < TMOS ≤ 400	4.77	41	2.18	65
1,000 < TMOS ≤ 2,000	4.37	44	2.00	69
400 < TMOS ≤ 1,000 H.R.	3.83	29	2.20	41
400 < TMOS ≤ 1,000	3.53	30	2.03	41
0 < TMOS ≤ 400 H.R.	2.33	28	2.20	29
1,000 < TMOS ≤ 2,000 H.R.	2.14	29	2.03	30
2,000 < TMOS ≤ 4,000	1.36	28	1.62	26
4,000 < TMOS ≤ 6,000 H.R.	1.26	29	1.49	27
6,000 < TMOS	0.82	28	1.61	19
4,000 < TMOS ≤ 6,000	0.76	29	1.49	20
2,000 < TMOS ≤ 4,000 H.R.	0.48	28	1.60	15
6,000 < TMOS H.R.	0.44	28	1.48	15

NOTES: GUMOS is a governmental unit or tract measure of size that is assigned to every block. TMOS is a tract measure of size. H.R. is a high response strata.
SOURCE: Sommers and Hefter (2014, p. 7).

ticipated adverse consequences for estimates concerning small populations that are not defined by geography, such as small ethnic populations. Also, as noted above, equalization of CVs does not imply equalization of other statistics that summarize precision, such as the margin of error, that might better reflect data quality for some uses.

Given this, the panel concludes that there has been little benefit from tract equalization. That is, tracts still need to be combined in some fashion to produce sufficiently precise estimates because of small sample sizes, but the increases in variances associated with larger geographies from this tract CV smoothing effort is potentially counterproductive and not dealing with the real challenges being faced by ACS data users. The next section presents a case study to illustrate these CV equalization sample design issues and implications.

Tract-Level Precision Equalization Effort: New York City Case Study

Figure 2-4 illustrates the general lack of precision at the tract level in New York City. Making reasonably precise comparisons between areas within the city requires "neighborhoods" to be defined as groups of adjacent census tracts. The effect of aggregation on the precision of estimates, where its 2,168 census tracts were aggregated into 188 neighborhood tabulation areas,[5] can be seen in the substantially reduced median CVs for three example variables: people who are foreign born; people with incomes below the poverty line; and households with high rent burden (defined as households for which rent is more than 35 percent of household income). Based on data from the 2008-2012 ACS, the median CV for all three variables is just one-third of the level for neighborhood tabulation areas compared with census tracts. Thus, in exchange for a loss of geographic specificity, there is a large gain in the precision of ACS estimates.

Continuing the New York City illustration, the impact of the increase in the degree of differential sampling was assessed in a simulation using the city's neighborhood tabulation areas as a case study. In addition, the degree to which changes in sample size as a result of the new scheme affected variance in the estimates was examined. Data for the 2006-2010 ACS 5-year estimates were used because these were not subject to the new sampling scheme. This choice allowed for a comparison between the now obsolete sampling plan and the new plan adopted in 2011. The number of married-couple families was selected as a test variable.

The impact of differential sampling was present under the old sampling plan as well as the new plan, but it was expected that the new plan would further exacerbate the impact because of the increased number of sampling strata and the degree of differential sampling rates (see Table 2-7, above). Under the sampling plan used prior to 2011, there were just two initial sampling rates in place for census tracts (see Table 2-5, above), and the ratio of the rates was only 1.36. The evaluation of New York City's 188 neighborhood tabulation areas indicates only a small marginal increase in sampling variance associated with the aggregation of tracts with differential final weights under the old design. The median CV increase for married-couple families was only 0.8 percent, with a maximum of about 2.1 percent. This result is a reflection of the fact that under the old design the sampling rates and resulting final weights of combined tracts were not different enough

[5]Neighborhood tabulation areas were created as aggregates of whole census tracts, with a minimum population requirement of 15,000. The median population size of an area is 34,000 (2008-2012). Because of large developments in New York City, the high population density of some neighborhoods, and physical boundary features, a small number of neighborhoods have populations of more than 50,000 people.

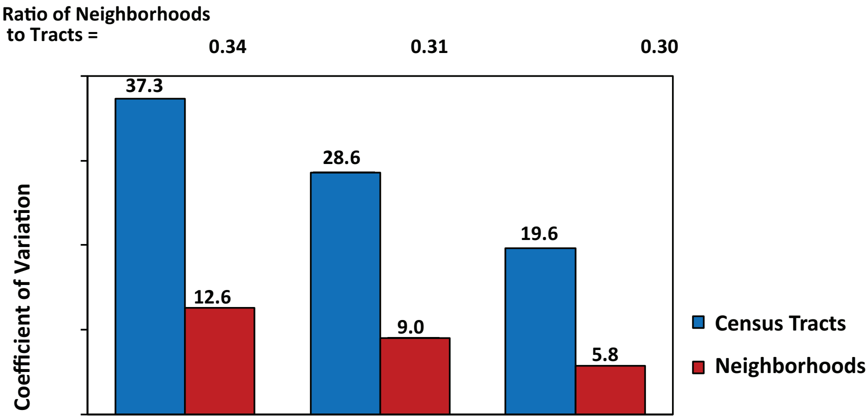

FIGURE 2-4 Median coefficients of variation (CVs) for selected variables, New York City census tracts and neighborhoods, 2008-2012.
NOTES: CVs for tract estimates of zero were omitted. For neighborhood tabulation area aggregations, margins of error associated with tract estimates of zero were converted to zero.
SOURCE: Alvarez and Salvo (2014).

to inflate the variance to any large degree among neighborhood tabulation areas in New York City.

Under the new plan, the effect of differential sampling is estimated to raise the median CV by 3.9 percent. While this median effect is somewhat limited, it is not insignificant. At the 75th and 90th percentiles, the estimated increases to the CVs are 6.5 and 9.1 percent, respectively. Furthermore, there are several neighborhood tabulation areas where the differential sampling rates associated with the new design will result in CVs that are larger by 12 percent or more than they would have been under the old design: see Figure 2-5.

In addition to the effect of a greater differential sampling rate, there is the effect of the sample size itself, which rose or declined with the new sample plan (for a more detailed discussion of this, see Salvo, 2014). When combined with the effect of differential sampling, a picture of changes related to the new sampling plan emerges as a result of the sample reallocation. An interesting observation was that New York City actually received more ACS sample under the new plan than under the old plan, which resulted in a net overall reduction in the CVs. This occurred mostly because more than twice as many census tracts in New York City relative to the nation were in the category of 400-1,000 housing units—28 percent compared with 12 percent nationally. As shown above, the sample for these

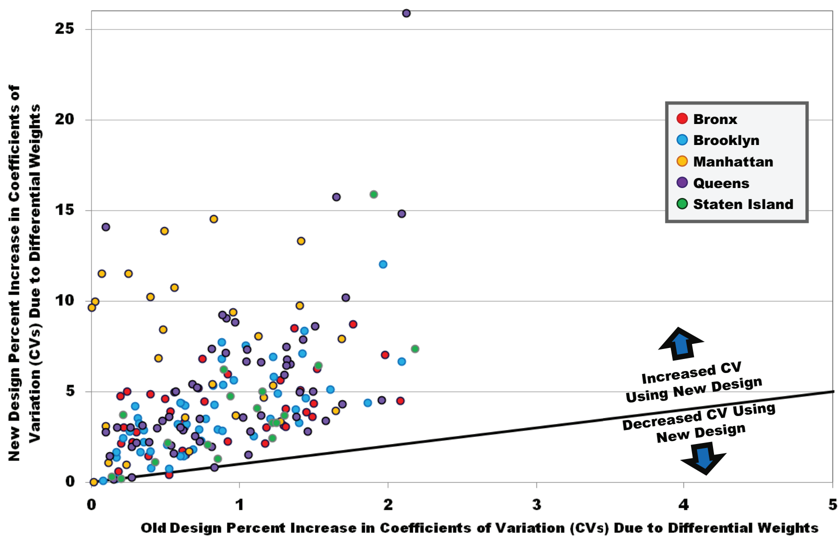

FIGURE 2-5 Incremental design effects for disproportionate sampling of tracts within neighborhood tabulation areas, comparing pre-2011 ACS design to revised (2011) design.
NOTES: Plotted quantities represent the percent increase in CV due to disproportionate sampling relative to the CV for proportional sampling for estimates of number of married-couple families in New York City neighborhood tabulation areas. Each of the designs is applied to the population distribution of ACS 2006-2010 data. In this analysis tract margins of error for estimates of zero were adjusted to zero. Tracts in parks, airports, and the Rikers Island neighborhood tabulation areas were excluded.
SOURCE: Alvarez and Salvo (2014) based on the ACS 2006-2010 Summary File.

tracts under the new plan was almost twice what it had been under the old plan. This outcome may have something to do with the nature of the census tract review process over the decades. Emphasis has always been placed on maintaining boundaries of census tracts over time for comparability purposes.

The overall picture by neighborhood tabulation areas in New York City shows that in most areas of the city there was a net gain in the precision of estimates due to increases in sample size, but there are a number of notable exceptions that point to the risks inherent in summary statistics. In Manhattan and a small number of census tracts in the other boroughs, a diminution in sample size occurred because the neighborhood tabulation areas were created using large and dense component census tracts that took substantial sample cuts under the new plan. These areas are very dense as a result of large buildings (large parts of Manhattan) or because of large and concentrated housing developments that have distinct physical features (Co-op City in the Bronx) that do not permit subdivision into smaller areas. Thus, in addition to tracts of different size being aggregated, there was also a loss of sample in neighborhood tabulation areas characterized by very large tracts, especially in Manhattan, and this played an important role in the increases in CVs. As shown in Figure 2-6, while most neighborhood tabulation areas in the city outside of Manhattan gained as a result of the new sample allocation plan, none of the Manhattan neighborhood tabulation areas were improved. However, the level of precision is high enough in comparisons with other neighborhood tabulation areas, and thus suitable for policy development and program planning and implementation.

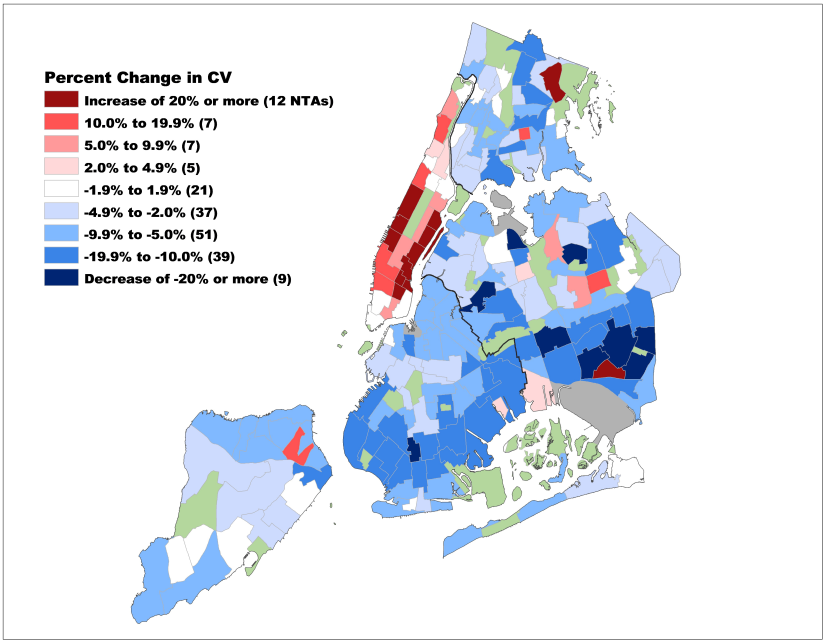

FIGURE 2-6 Effects of differential sampling rates and sample size on CVs for number of married-couple families, New York City neighborhood tabulation areas, ACS 2006-2010.
NOTES: In this analysis, tract margins of error for estimates of zero were adjusted to zero. Tracts in parks, airports, and the Rikers Island neighborhood tabulation areas were excluded.
SOURCE: Alvarez and Salvo (2014).

CONCLUSIONS AND RECOMMENDATIONS

Under the current overall sample size limitations, sample reallocation to ensure CV equalization at the tract level achieves little benefit to precision, and it creates inefficiencies in the geographic aggregation of estimates. The latter is of concern because aggregation is a strategy the Census Bureau has been recommending to users in order to counteract challenges associated with low precision at the tract level.

The allocation of data collection resources expended in some of the smallest governmental units under the revised sample design may also be inefficient because of the increase in the nonresponse follow-up sampling rate to 100 percent in selected areas. The availability of additional funds to improve the precision of estimates would be better used to increase the initial designated sample size, rather than to increase the nonresponse sampling rate.

The panel does not recommend any immediate changes to the sample design, but it is essential to integrate policy considerations in all further research on sample design. This will help ensure that the ACS is responsive to data user needs and that the design of the survey is optimally cost efficient.

RECOMMENDATION 2: Future sample redesigns of the American Community Survey should consider whether there are explicit rationales based on identified data needs that justify deviations from proportional allocation of sample. Due regard should be given to the effects of reallocation on estimates for policy-relevant small geographic areas and nongeographically defined small groups.

RECOMMENDATION 3: Efforts to improve the precision of the American Community Survey estimates for specific small governmental units should be focused on increasing the initial designated sample size while maintaining the optimal nonresponse sampling rate instead of increasing the subsampling rate to 100 percent.

3

Data Collection Methods

Beginning in 2013, when an Internet data collection mode was added, American Community Survey (ACS) data have been collected using four modes: mail, Internet, telephone, and personal visit. The first phase in the data collection process involves a request sent by postal mail urging sample members to respond by Internet. The next step is another mailing that includes a paper questionnaire and provides the option of responding by Internet or mail. If no response has been received to these requests, then a telephone follow-up is attempted, which is then followed by an in-person visit for a subset of the respondents. Table 3-1 shows the sequence of the overlapping follow-up steps for each monthly sample panel.

The goal of the Census Bureau's multimode data collection strategy is to maximize response rates in a cost-effective manner. Prior to the implementation of the Internet option, in 2012, the weighted distribution of the responses by mode was as follows: close to half (48 percent) of the eligible sample addresses completed the survey by mail self-response, 7 percent by computer-assisted telephone interview (CATI), and a little under half (42 percent) by computer-assisted personal interview (CAPI) (U.S. Census Bureau, 2014a).

Although the 2013 data are not yet available, results from the first half of 2013 (January-June panels) found that a little over half of the surveys completed via self-response were received by Internet and the rest by mail These early results also suggested that the availability of the Internet mode could provide a slight boost to the overall self-response rate (Baumgardner et al., 2014).

The first section below details the four ACS data collection modes. The

TABLE 3-1 Sequence of Data Collection Steps for the ACS

ACS Sample Panel	Month of Data Collection					
	January	February	March	April	May	June
January	Mail/ Internet	Telephone	In-person visit			
February		Mail/ Internet	Telephone	In-person visit		
March			Mail/ Internet	Telephone	In-person visit	
April				Mail/ Internet	Telephone	In-person visit
May					Mail/ Internet	Telephone
June						Mail/ Internet

SOURCE: U.S. Census Bureau (2009c).

following three sections cover nonresponse follow-up, adaptive design, and mode effects and data quality; the panel's recommendations on these topics are at the end of each section.

DATA COLLECTION MODES

Mail and Internet

The first mailing is an advance letter that alerts sample members to the survey and encourages participation. It is followed by a mail package, which includes instructions for how to respond through the Internet. A reminder postcard is sent a few days after the mail package. Sample members who do not respond after the reminder postcard are sent a replacement mail package, which includes a paper version of the questionnaire and a postage-paid envelope for a mail response. Instructions for responding by the Internet are also included. The package is followed by another postcard reminder. Sample members who do not have a telephone number that can be used for telephone follow-up receive an additional postcard, alerting them that a field representative will be contacting them in person if they do not respond by mail or Internet.

Telephone Follow-Up

The Census Bureau uses sample members' mailing addresses to attempt to identify a telephone number for follow-up (with the help of vendors that do address matching). The panel's understanding is that this effort is currently limited to locating landline numbers and does not include cell phones.

Telephone follow-up begins about 5 weeks after the first mailing. The number of follow-up calls made to a household depends on the disposition of prior calls. For example, if the household refuses to participate by telephone, then one additional refusal conversion attempt is made in this mode. The Census Bureau has been conducting research on the optimum number of follow-up calls based on historical data about call outcomes (Zelenak, 2013).

In-Person Visit

After the mail, Internet, and telephone follow-ups are completed, the cases that have not yet been completed are subsampled for in-person follow-up. Mailable addresses are sampled at a 1 in 2, 2 in 5, or 1 in 3 rate, depending on the response rate expected at the census tract level. Unmailable addresses are sampled at a 2 in 3 rate.[1] The in-person follow-up operation typically begins approximately 2 months after the first mailing.

Each case is assigned to a field representative, who will first attempt to complete the interview by telephone, except in cases where the household already refused by telephone or if the address was deemed unmailable, because in those cases the field representative would need to visit the location to determine whether the housing unit exists and to determine the occupancy status. For most cases, an actual in-person visit is only attempted after three to five calls are made during different times of the day. This is typically needed for approximately 80 percent of the cases assigned to the field. Although CATI refusals are slightly more likely to also end as a refusal in CAPI, field representatives are generally very successful at obtaining an interview, with an over 95 percent completion rate (Zelenak, 2013).

Group Quarters Data Collection

As defined by the Census Bureau, group quarters are places where people live or stay in a group living arrangement and receive housing and services from an organization or other entity. This definition encompasses

[1]All eligible addresses within designated Hawaiian homelands, Alaska native village statistical areas, and some American Indian areas are included in the personal visit follow-ups without subsampling.

such facilities as college dormitories, nursing homes, and correctional facilities. As did the census long-form sample, the ACS aims to be as comprehensive as possible in representing the entire U.S. population and therefore includes people living in nearly all forms of group quarters.

The group quarters sample is separate from the housing unit sample, and the data collection process is also different to address the unique challenges associated with interviewing in the context of such facilities. All group quarters cases are assigned to a field representative, who visits the facility after an initial mailing that introduces the survey has been sent. During the visit, the field representative obtains a roster of the residents, which is then used to generate a sample of individuals to interview. Up to 15 residents are interviewed at each facility included in the survey. An earlier report (National Research Council, 2012) examined the effect of the group quarters on the American Community Survey estimates and recommended changes to the survey design and operations.

NONRESPONSE FOLLOW-UP

As described above, cases that cannot be completed through CATI are subsampled for CAPI follow-up. Efficient design of a multimode survey depends on good information about the costs and contribution to survey accuracy of each phase of the survey. The subsampling rates (1 in 2, 2 in 5, or 1 in 3, noted above) are determined by taking into account the costs of CAPI relative to other data collection modes.

However, the Census Bureau's approach to tracking costs is not well adapted to monitoring costs per completed interview by mode, much less distinguishing costs of early respondents from those requiring multiple contact attempts before an interview is obtained. A high-level analysis (Griffin and Hughes, 2012) estimated that completed telephone interviews are about three times as expensive as questionnaires returned by mail and in-person interviews (including those conducted over the telephone by field representatives) cost six times as much as questionnaires completed by mail, taking into account the costs of unsuccessful follow-up attempts for nonrespondents. These cost estimates are very rough and cannot be separated into interview-related costs and costs not related to interviews, or marginal and fixed costs, with reasonable precision. It is possible that more precise estimates would reveal an even larger gap between the cost of mail interviews and the cost of in-person interviews, especially in-person interviews that require multiple contact attempts, which in the experience of panel members is frequent.

Census Bureau staff have indicated that in the future they intend to refine the way they track cost data to better understand the costs associated with each interview. Such operational cost modeling is essential if the

Census Bureau is to optimize the distribution of effort across the different survey modes, including subsampling rates for the CAPI nonresponse follow-up (and perhaps for telephone follow-up as well) and number of callbacks for telephone and in-person operations. It would be particularly useful to have analyses of the costs and yield for each data collection mode by geographic area (e.g., by tract characteristics), as well as the marginal costs associated with changing the number of follow-up attempts.

It is important to note that the nonresponse follow-up subsampling rates were developed before the full implementation of the ACS and before the implementation of the Internet response option, which might affect response rates in other modes. On the basis of testing conducted before the Internet response was introduced, the Census Bureau anticipated that in addition to generating savings in areas such as printing, mailing, and data capture, the availability of the Internet response option might also lead to a slight overall increase in self-response. Thus, it is possible that since the time when the ACS was first launched, the optimal rates for subsampling have shifted considerably.

In addition to cost factors, several other considerations are relevant to follow-up design. Reaching sample households by telephone to complete a survey is becoming increasingly difficult as more households are dropping landlines in favor of cell phones and are relying on such technologies as voicemail, caller ID, call blocking, and privacy managers to screen unwanted calls. Inefficiencies associated with a high number of unproductive calls can be especially challenging in the case of surveys that do not include cell phone numbers, as is the case with the ACS follow-up calls.

At the same time, even if telephone calls are less likely to result in a successful interview, a large number of calls to a household can contribute to the perceived burden of the survey. To address concerns of respondent burden associated with follow-up efforts, the Census Bureau has been conducting research on ways of adjusting the specifications for the number of follow-up attempts in both the telephone and in-person modes to reduce the overall number of contact attempts without an adverse effect on costs and data quality. One study found that moving cases from CATI to CAPI after fewer call attempts could increase efficiency (Griffin, 2013).

In addition to the respondent burden considerations, an important question concerns the extent to which the follow-up improves the representativeness of the sample. Because follow-up cases are typically more expensive than responses from initial contact modes or contact attempts, they are an inefficient use of resources unless they reach a part of the population that differs from those reached in earlier, less expensive operations. It is possible that in some geographic areas or for some demographic groups, higher response rates due to more extensive follow-up do not substantially change the estimates. In some cases, efforts made to increase the response rate by a few percentage points (such as through additional CATI attempts) can lead to interviews completed disproportionately among specific subgroups, which could possibly even adversely affect the representativeness of the overall sample. As shown in Table 3-2, there are demographic differences in the likelihood of responding at each stage of the follow-up process. As a consequence, it is possible that reducing follow-up effort and thereby attaining lower response rates would not necessarily lead to substantially different estimates, once the data were weighted for differential nonresponse, if the follow-up were to be reduced based on careful analysis.

Using existing data and paradata (data on survey operations), the Cen-

TABLE 3-2 Demographic Representation Among Completed Interviews After Each Follow-Up Mode (in percentage)

	Percentage of Population Represented by Weighted Data			Weighted Percentage of Responses from Each Mode		
Demographic Group	After Mail	After Mail and Telephone	After Mail, Telephone, and In-Person Visit	Mail	Telephone	In Person
Total Population	50	62	91	55	13	32
Male	49	61	90	54	13	32
Female	51	63	92	55	13	32
Hispanic	26	40	87	30	16	54
White Alone	52	62	87	60	11	29
Black or African American Alone	27	40	82	33	16	51
American Indian or Alaska Native Alone	29	39	75	39	13	48
Asian Alone	51	60	89	57	10	33
Under Age 5	41	52	88	47	13	41
Age 18 and Over	52	64	91	57	13	30
Age 65 and Over	70	80	96	73	10	17

SOURCE: Data from 2003 ACS. For columns 1-3, Griffin and Raglin (2011); for columns 4-6, panel calculations.

sus Bureau could simulate the effect of truncating nonresponse follow-up in areas with various characteristics, combined with various methods of adjusting for nonresponse, such as nonresponse weighting of respondents. If such a study were to find that the effect of truncation on estimates is minimal in identifiable areas, then resources could be redirected from follow-up to increasing overall sample size in the same or other areas. The optimal subsampling rate for the in-person follow-up could also be assessed in terms of marginal variance reduction.

An alternative, but related, approach of applying small area estimation methods would begin by modeling associations between estimates for the CAPI population and those for the self-response population by small geographical area (tract or block group). If the latter are highly predictive of the former, then it might be possible to reduce CAPI sample sizes and use model-based predictions to maintain the precision of estimates for the population of households who would respond only by CAPI (O'Malley and Zaslavsky, 2007). Alternatively, further subsampling could be imposed on extended CAPI follow-up, if the cost per additional interview is found to be highest in later phases. Savings could then be used to increase initial sample sizes, especially in areas with low mail and Internet response rates. The large annual sample of the ACS and its repetition over time are important features for efficient estimation of such models (see discussion of small area estimation in Chapter 4). Simple truncation of data collection assumes equivalence of early and late respondents conditional on covariates used in weighting. Modeling can make less restrictive, more flexible assumptions that account for observed differences between early and late respondents conditional on covariates used in weighting.

From a survey operations perspective, the most critical next step is to implement a much more precise system for tracking data collection costs than currently exists. Although this will involve some up-front costs due to changes or additions needed to the current survey management systems, the precise tracking of all aspects of the data collection costs is essential to inform the ongoing work to optimize the allocation of resources. A system that closely tracks data collection costs will clearly have significant long-term payoff for a survey of the scale of the ACS.

Two of the panel's recommendations below for specific research projects are related to data collection methods that would need to be informed, in part, by cost analyses. Although the Census Bureau's resources for research projects is limited, the panel considers at least the initial stages of this type of evaluation to be relatively low-cost investments that could identify options for increased efficiency and opportunities to free up resources that could be re-invested in changes that would ultimately improve overall data quality.

RECOMMENDATION 4: As a priority, the Census Bureau should develop systems for tracking American Community Survey data collection costs as precisely as possible, overall and by data collection mode.

RECOMMENDATION 5: Taking into account cost and yield and their variation across areas, the Census Bureau should periodically evaluate the optimal subsampling rate for the American Community Survey, as well as the number of follow-ups in each mode.

RECOMMENDATION 6: The Census Bureau should evaluate the possibility of improving the American Community Survey's accuracy at a fixed cost by truncating nonresponse follow-up or using modeling techniques to replace some of the nonresponse follow-up, particularly for the more expensive data collection modes.

ADAPTIVE DESIGN

As discussed above, recent research indicates that the relationship between response rates and data quality is complex, and higher response rates do not always necessarily lead to better data quality (Groves, 2006; Groves and Peytcheva, 2008). Moreover, aiming for the highest response rate possible can be costly and can increase respondent burden. Adaptive design, rooted in the total survey error perspective (Weisberg, 2005), increases efficiencies in fieldwork management by aiming for an optimal balance between data quality considerations and costs. An important aspect of this is the ability to closely monitor quality and cost indicators and to be able to make timely adjustments.

Specifically, adaptive survey design strategies

- pre-identify a set of survey design features potentially affecting costs and errors of survey estimates;
- identify a set of indicators of the cost and error properties of those features and monitor those indicators in the initial phases of data collection; and
- alter the features of the survey in subsequent phases, as needed, based on cost-error tradeoff decision rules.

Although the Census Bureau's efforts in this area are likely hindered by a lack of cost information at sufficient granularity, the ACS already incorporates several design features that are essentially characteristics of adaptive design. Some examples include sending an additional postcard to addresses that do not have telephone numbers for CATI follow-up; relying on call history information to determine the next call attempt in CATI; and subsampling for CAPI follow-up based on expected response rates at the tract level.

The ACS offers an especially attractive vehicle for adaptive design research because of the continuous data collection in all four modes, and the research could benefit many of the other surveys at the Census Bureau. The research to date has focused primarily on analyzing information from contact attempts and outcomes to tailor subsequent attempts to contact the household, for example, by switching between data collection modes based on paradata or modeling.

Currently, the Census Bureau's centralized telephone operations only conduct interviews on telephone landlines. Although there are some special considerations when including cell phone numbers in a survey (e.g., the numbers cannot be autodialed), conducting research on the possibility of integrating cell phones into the follow-up operations would be worthwhile given the rapid increase in the proportion of households that rely on cell phones and do not have landlines. As noted above, field interviewers complete approximately 20 percent of their workload by telephone rather than through an in-person visit, and presumably these were limited primarily to landlines. If an actual in-person visit is needed, then field representatives could also collect cell phone numbers at that stage if additional contact with the household is likely to be needed (e.g., if the interview cannot be completed at that time and the field representative is likely to want to call back). The optimal approach for switching between landlines and cell phones could also be investigated as part of an adaptive design strategy during the field follow-up.

RECOMMENDATION 7: The Census Bureau should conduct research on potential ways of identifying cell phone numbers associated with adult household members and instruct American Community Survey field interviewers in proper protocols for calling cell phone numbers, as needed.

The Census Bureau has several ongoing research projects to identify ways in which adaptive design can be further incorporated into the survey. One study augmented the sample frame data from the 2011 ACS Internet test with administrative records data and developed a discrete time-logistic model to predict household-level daily Internet propensities and optimize mode switch strategies, focusing on switching Internet nonrespondents to mail (Chestnut, 2013). Table 3-3 shows the percentage of administrative records data that were linked and that the records from most databases were linked with a high success rate except for the Internal Revenue Service database. The study found that timeliness could be increased by switching

TABLE 3-3 Administrative Records Data Sources Used in the Mode Switch Study

Administrative Record Data Source	Variables	ACS Internet Test Sample Linked by Master Address File Identification Number (%)
2010 Census—Housing Unit Response Data File	Self-administered questionnaire, language of interview or questionnaire, proxy respondent	96
2010 Census—Edited Household Data File 2	Householder—age, race, and Hispanic origin; tenure; large household	96
2010 Census—Edited Person Data File	No spouse, not related	87
2010 Census—Unedited Operation Data File	Mail enumeration area, response check-in-date	99
Master Address File	Urban or rural	100
Info USA	Do not call flag, high-tech household	85
U.S. Postal Service—National Change of Address Database	Change of address flag	100
National Telecommunications and Information Administration	Broadband flag	96
Internal Revenue Service	Total income reported for 2010 (form 1040)	66
2010 Census—Advertising	Targeted stratum	100

SOURCE: Chestnut (2013, p. 4).

some cases that are not likely to respond by Internet to other follow-up modes sooner, or even prior to data collection.

These efforts are promising investigations into ways of increasing efficiencies in data collection. Models could be developed to include a variety of administrative records, paradata, and design characteristics. In particular, use of adaptive design strategies might necessitate concomitant modification of estimation procedures.

RECOMMENDATION 8: The Census Bureau should continue to conduct research on how adaptive design techniques can benefit the American Community Survey.

RECOMMENDATION 9: The Census Bureau should continue to investigate the use of auxiliary data to develop nonresponse models for the American Community Survey.

MODE EFFECTS AND DATA QUALITY

As noted above, the Census Bureau began offering an Internet response option in January 2013. Early estimates of the Internet response rates indicate that over half of the self-responses (mail or Internet) were being completed using the Internet option. To date, relatively little research has been published evaluating the Internet mode since its implementation, and the Census Bureau has not yet conducted formal studies of mode bias, but tests conducted prior to the implementation found few significant differences in response error between the Internet and mail modes and very low response error rates across most estimates examined (Horwitz et al., 2012).

An initial look at item nonresponse, using the raw (unedited) data from the 2013 January panel, compared item nonresponse rates between the mail and Internet modes and found that Internet nonresponse was lower than mail nonresponse for most of the survey items in the study (Clark, 2014). In the case of the basic demographic questions, item nonresponse rates were about 1-6 percentage points lower in the Internet mode than the mail mode. Internet nonresponse rates were also lower than mail nonresponse rates for all of the questions in the housing section.

Some housing items that require respondents to provide a dollar amount had particularly high nonresponse rate in the mail mode but produced much more complete data in the Internet mode. For example, the nonresponse rate for the question on gas costs was 14 percent in the mail mode and 4 percent in the Internet mode. The nonresponse rate for the question on fuel costs was 19 percent in the mail mode and 3 percent in the Internet mode. These questions are structured differently in the two modes, with the Internet instrument taking advantage of the easier integration of skip patterns and screening questions to facilitate responding.

Internet nonresponse rates were also lower than the mail rates for most of the population questions, including large differences for the income questions. For example, the nonresponse rate for the total income question was 23 percent in the mail mode and 13 percent in the Internet mode. However, there were a few population questions for which the Internet nonresponse rate was somewhat higher than the mail rate, including place of birth, citizenship, language other than English, health insurance, hearing difficulty, and vision difficulty. These differences were generally smaller (3 percentage points or less) than most of the item nonresponse differences that were favorable to the Internet mode.

The reasons for the differences that were not favorable to the Internet mode could again be associated with the differences between the way the questions are asked in the two modes. If additional research can shed further light on the potential cause of these differences, then the flexibility of the Internet mode might enable the Census Bureau to bring the Internet nonresponse rates below the mail nonresponse rates for these items as well. The evaluation of the 2013 January panel (Clark, 2014) revealed that some of the item nonresponse in the Internet mode was associated with breakoffs (survey responses that were started but not completed). Breakoffs tend to be higher in the Internet mode than the mail mode, partly because the Census Bureau can track breakoffs that happen on the Internet, but does not have information about mail questionnaires that someone started to fill out but did not complete and did not return. Further analysis of the breakoff patterns would also be useful.

Some of the research conducted as part of the Internet test provides an indication of the many ways the unique features of the Internet mode can be used to improve not only the Internet instrument but also the survey itself. For example, one study analyzed paradata from the help link provided to respondents and found that the help link was requested at least once by approximately 40 percent of respondents and that 14 percent of all requests for help involved the ancestry question (Horwitz et al., 2013). These rates are surprisingly high in comparison with prior research that seems to suggest that help links are not frequently used by survey respondents (Conrad et al., 2006). The finding indicates that this feature of the Internet mode may be providing very useful assistance to respondents that the mail mode lacks. Indeed, the research revealed that in over half of the cases (54.8 percent) when the help link was accessed, the information appears to have been used to generate an answer when no response option had previously been selected, and that, in a small number of cases (5.1 percent), the help requests resulted in a changed answer. However, the high reliance on the help link raises some questions about the degree of difficulty associated with many of the questions overall, regardless of the mode of administration: this issue, too, would benefit from further research attention.

RECOMMENDATION 10: The Census Bureau should conduct a thorough evaluation of potential mode effects on both data quality and nonresponse in the American Community Survey, focusing in particular on the newly introduced Internet mode.

During the 2011 Internet test, less than 3 percent of the respondents used a device other than a personal computer (such as a tablet computer or cell phone) to access the web-based survey instrument (Horwitz et al., 2013). Because a version customized for such uses was not available, it is difficult to know whether more people would have tried to complete the survey on a mobile device if an option tailored to these devices was made available. Since the use of mobile devices for functions that were previously performed on a personal computer is quickly growing, continuing to monitor this trend and beginning to plan for the development of a survey instrument that works well on the majority of mobile devices is important. Work in this area could also serve as a test vehicle for the 2020 census.

RECOMMENDATION 11: The Census Bureau should conduct research to understand what types of devices are used by American Community Survey respondents to connect to the Internet and whether there are any associated data quality implications.

4

Data Processing and Analytic Issues

Several aspects of data processing can affect the quality and usefulness of the data to users. This chapter covers four topics: the effects of the population controls, the effects of data review, the role of administrative records, and the role of small area estimation in the production of American Community Survey (ACS) estimates.

POPULATION CONTROLS

One of the major differences between the ACS and the decennial census long-form survey is the type of estimates available to serve as population controls as part of the weighting methodology. Since the long-form survey was administered as part of the decennial census enumeration, controls from the full count were used as a basis for controlling long-form estimates for small geographic areas, such as census tracts. In contrast, the ACS uses controls from the Census Bureau's population estimates program at the county level by age, sex, race, and Hispanic origin, and at the subcounty level for the total population of incorporated cities and minor civil divisions (for those states that have those jurisdictions).

Challenges Associated with the Current Population Controls

The controls for the ACS are created using the decennial census as a base, with components of change derived from vital statistics, other administrative records, and survey data. The Census Bureau's Population Division works with Federal State Cooperative for Population Estimates (FSCPE) agencies in each state to produce subnational population estimates. FSCPE agencies supply vital statistics and information about group quarters. They also review and comment on the estimates produced by the Census Bureau.

Changes of address on tax returns are used to create domestic migration rates, vital statistics are used to calculate the balance of births and deaths (natural increase), and the ACS is used to determine international migration. For the population aged 65 years and older, Medicare records are used to determine migration of that population. The Census Bureau's controls for housing units are created with data on new construction and, for most areas, a demolition model based on data from the American Housing Survey. In both cases—for population and housing—the base for controls is the decennial census. The areas for which housing and population controls are created by this method include larger counties and groups of smaller counties.

For legal or political areas at the subcounty level, such as incorporated cities and towns and minor civil divisions, the Census Bureau estimates population using an allocation based on housing units. It is important to recognize that many large jurisdictions, such as New York City's five counties or Clark County, Nevada, do not have legal-political geographic entities smaller than the county level that are recognized by the Census Bureau for much, if not all, of their populations. Thus, in these jurisdictions, controls for the ACS are set at the county level—both housing unit controls and controls for population by age, sex, race, and Hispanic origin.

The panel did not have the resources to conduct a comprehensive analysis of the accuracy of population controls below the county level, but it did examine the magnitude of discrepancies between decennial census and ACS counts for age-sex strata in a systematic selection of communities. For the ACS 3- and 5-year estimates, the controls are simple averages of the most recent population estimates. In particular, for the 2012 5-year ACS, these estimates include the intercensal estimates for 2008, 2009, and 2010 and the postcensal estimates for 2011 and 2012. Thus, the population estimates all make use of data from the 2010 census and therefore are not subject to the known deterioration of accuracy of county-level population estimates in years that are increasingly further from the last census (Albright, 2011; Yovell and Devine, 2013). Although it seems reasonable to expect that the average of these estimates would approximate the April 1, 2010, census estimate, as would the distribution of characteristics by age, sex, race, and Hispanic origin, comparisons for the selected communities, ranging from the size of an average census tract to cities with populations exceeding 100,000, show large differences in many age-sex cells: see specific examples in Appendix B. In some cases, there were discrepancies by factors as large as two.

These discrepancies between the census base and the 2008-2012 ACS estimates for variables used as controls are an important point of concern. The ACS relies on these controls as a means of "grounding" the ACS estimates, using the census as the "gold standard," in order to compensate for differences in coverage of groups, a critical factor in many places.

It would be beneficial to have a subcounty population estimation methodology that more closely reflects and builds on decennial census estimates for small geographic areas not covered by the present program, taking into account the time since the last census. Such an approach could be applied to both postcensal and intercensal controls.

RECOMMENDATION 12: The Census Bureau should conduct research on how the decennial census can be used for controls for the American Community Survey at a finer level of geographic resolution than the controls currently used on an annual basis.

Traumatic Events

If census controls are problematic during normal times, then the challenges become even greater when conditions in a local area are affected by catastrophic events. The usefulness of the ACS data in such situations is undermined unless the population estimates that serve as controls reflect the actual conditions and rest on a solid empirical foundation.

The terrorist attacks of September 11, 2001, rendered the decennial census data for a sizable portion of Manhattan obsolete. After the attacks, through a special arrangement with the Census Bureau, a data file from the 2005 ACS was acquired for a customized set of geographic areas in Manhattan. This file provided data based on the only representative sample available of the population post-9/11. Most important, New York City engaged the Census Bureau in the years that followed 9/11 by offering a housing unit–based population estimate for Manhattan as part of the population estimates challenge program. This helped maintain the integrity of the population controls as the ACS entered full implementation.

After the fall of 2005, when Hurricane Katrina hit the Gulf Coast, the Census Bureau, in cooperation with local authorities, made an effort to provide information on population and housing. Since the administrative data sources that the Census Bureau relies on to generate population estimates under normal circumstances (birth and death records, filings with the Internal Revenue Service [IRS], Medicare records, and state counts of group quarters populations) were either incomplete or too lagged in time to reflect post-disaster population conditions in 2006, special strategies to estimate the population were adopted. The Census Bureau used U.S. Postal Service national change-of-address records to track the movements of individual households and develop special January 2006 population estimates for affected counties.

In the cases of 9/11 and Katrina, the Census Bureau successfully took on challenges in concert with local governments in an effort to provide a better picture of population and housing conditions on the ground. In October of 2012, yet another traumatic event occurred when superstorm Sandy hit the East Coast of the United States. It is clear that there is a new and very challenging environment for the application of controls to estimates in the ACS. Thus, it is important to ask whether going forward, the population and housing unit controls used in the ACS will adequately reflect the actual population and housing stock in local communities in the face of traumatic events.

The 12 months of data collection in 2013 (which will be available in fall 2014) should yield valuable information for the areas affected by Sandy, both for public-use microdata areas and smaller geographic areas. The problem is that the controls for July of 2013 may not reflect the true population of the affected areas in New York and New Jersey. The most serious issue is likely to be the time lag for changes of addresses on income tax returns from the previous year; these data may be problematic for the creation of accurate domestic migration rates. Even without the time lag, many displaced residents may keep their original addresses when filing returns, leading to the erroneous conclusion that conditions have not changed. Moreover, the Bureau has not developed controls for housing that adequately reflect the role of housing demise—demolitions and the like—since a model from the American Housing Survey is currently used in most places to gauge demolitions, not actual permit data.

Confusion over the number of demolitions caused by superstorm Sandy, especially in communities on the New Jersey shore, may have caused the number to be understated, perhaps partly due to uncertainty over the status of housing units in situations where units may be standing but uninhabitable. Units awaiting repairs or demolition or just in abeyance because of requirements from the Federal Emergency Management Agency or flood insurance regulations add to the uncertainty. Further, re-occupancy of previously existing housing may not occur for a significant period of time or may not occur at all. New federal flood insurance requirements may make re-occupancy too costly for many homeowners. Thus, some communities may have a sizable number of homes in flux regarding their condition or occupancy status. This situation will be a challenge, not only for ACS follow-up operations, but also for estimation and weighting of housing units, particularly because the identification and estimation of vacant housing units in the ACS has been especially problematic, even under more normal circumstances (see, e.g., Albright, 2011; Cresce, 2012; Yovell and Devine, 2013).

When the ACS was conceived, environmental issues were a subject of discussion, but few could anticipate how these would grow in importance, with a series of weather events that brought the problem of climate change into daily news reports. Current expectations are that these weather events will become more frequent, with several "100-year storms" each decade. Establishing mechanisms in concert with local governments so that the estimates used as controls for the years following a traumatic event adequately reflect changing conditions might not be cost neutral, but there is an opportunity here for the Census Bureau to demonstrate the usefulness of the ACS by maximizing its potential to measure "current" conditions in communities across the nation. Again, the controls need to be accurate so that any remedial action can be based on accurate estimates of an event's impact.

RECOMMENDATION 13: The Census Bureau should conduct research on the benefits of developing procedures and standards for the creation of controls for the American Community Survey that can be put in place in times of disasters or other disruptive events. The benefits of closer collaborations with state, local, and tribal governments should be explored for the development of controls in general and for crisis situations in particular.

DATA REVIEW

Most of the ACS data review is carried out after 1 year's worth of data are edited and imputed and the data products (including those based on the multiyear datasets) are generated. This final review before the estimates are released is performed by subject-matter analysts, with the goals to verify that the data edits have been correctly specified, the microdata seem reasonable, the data products have been correctly specified and rendered, and the supporting documentation does not include any errors.

The data review has four steps: (1) review of supporting documentation; (2) edit review; (3) data review, including a process for the 1-year data and a process for multiyear data; and (4) data product review, again including a process for the 1-year data and a process for multiyear data. Examples of specific actions for steps (2)-(4) are summarized in Box 4-1.

The review relies on a number of automated tools, but it is a massive and very resource-intensive operation. Furthermore, although many of the checks are automated, issues that are flagged as part of the automated process generally require manual review. Typically, the review of 1 year's worth of 1-year data tables takes a large number of analysts more than a month. As would be expected, most of the errors identified during the review are associated with changes, such as new questions or products introduced since the previous year's review. Because the ACS is still fairly

BOX 4-1
Examples of Data Review Steps

Edit Review

- Verify edit specifications.
- Verify variable universes.
- Review tallies.
- Review matrix counts.
- Review consistency among variables.
- Review unweighted imputation rates.
- Examine edited frequency distributions by allocation flag values.
- Compare unweighted unallocated and allocated relative frequency distributions.
- Compare unweighted current-year and prior-year relative frequency distributions.

1-Year Data Review

- Compare current-year and prior-year summary distributions.
- Compare current-year and prior-year derived measures.
- Compare ACS estimates with other Census Bureau estimates.
- Review weighted imputation rates.
- Compare weighted unallocated and allocated relative frequency distributions.
- Verify data product specifications.
- Verify the programming of any new or modified data products.
- Verify any new or modified table shells.

Multiyear Data Review

- Review variable crosswalking and inflation adjustment on the unweighted multiyear microdata, done by the Census Bureau's Population (POP) and Social, Economic, and Housing Statistics Divisions (SEHSD).
- Review variable crosswalks and inflation adjustment on the unweighted multiyear microdata.
- Review the multiyear core measures and report the results to branches in POP and SEHSD.
- Review the coordination staff materials and decide whether to clear or perform additional review, done by POP and SEHSD.
- Review the disclosure avoidance performed on the multiyear microdata, done by selected POP and SEHSD branches.

new, there are still a relatively high number of changes from year to year. Further revisions of survey content and products are likely to occur in coming years (albeit limited by the need for continuity of measurement in order to estimate trends). Thus the ACS staff may continue to be stressed by the burden imposed on the current quality control system.

Although some of the errors are introduced during the various stages of data preparation (such as weighting or imputation), it appears that a small number of errors are associated with problems during the fieldwork (such as field representatives not administering the questionnaire correctly). Although challenges during the fieldwork are to some degree unavoidable, the fact that the review does not commence until a full year's worth of data are collected leads to situations in which it is too late to correct the problem, and some of the estimates have to be suppressed. This time lag can affect not only the 1-year data from the previous year but also other datasets that include the 1-year data. The Census Bureau has developed a system for ongoing monitoring of the data, but it has not been implemented, perhaps because full implementation would require changes to a large and complicated operation. However, for a survey of the scale of the ACS, it is particularly critical to ensure that problems are identified while they can still be corrected and while the consequences can be minimized. From the perspective of data processing, implementing ongoing quality control and editing processes is the most important next step. Once implemented, in the long run these changes could result in significant cost savings if they prevent potential major errors from affecting a full year's worth of data. Some of the new systems being implemented as part of the shift to adaptive design could also facilitate this process.

RECOMMENDATION 14: As a priority, the quality control and editing processes in the American Community Survey should be ongoing and as close to the data collection as possible, to ensure that problems are identified promptly and that their impact is minimized.

RECOMMENDATION 15: The Census Bureau should evaluate whether procedural changes might improve the efficiency of the American Community Survey quality control operations.

USING ADMINISTRATIVE RECORDS

The Census Bureau has several ongoing research projects on the potential use of administrative records, many housed in its Center for Administrative Records Research and Applications, which is a new interdisciplinary group within the Research and Methodology Directorate. These projects tend to be focused on the crucial step of evaluating the scope and quality of available administrative records databases, and the immediate interest is in the possible use of administrative records for modeling missing data or increasing operational efficiencies for the ACS.

For example, the 2010 ACS Match Study (Luque and Bhaskar, 2013), a continuation of the work on the 2010 Census Match Study, evaluated administrative records coverage of 2010 ACS addresses, persons, and person-address pairs at different levels of geography as well as by demographic characteristics and response mode. The study looked at the coverage of records in several data sources, including:

- Individual Income Tax Returns (IRS Form 1040)
- Information Returns (IRS Forms 1099 and W2)
- U.S. Department of Housing and Urban Development (HUD) Public and Indian Housing Information Center
- HUD Tenant Rental Assistance Certification System
- HUD Computerized Homes Underwriting Management System
- Social Security Administration Supplemental Security Income records
- Selective Service System Registration File
- Centers for Medicare & Medicaid Services Medicare enrollee data
- Indian Health Service Patient Registration File
- U.S. Postal Service National Change of Address File
- Temporary Assistance for Needy Families

In addition, the Census Bureau evaluated data from five commercial vendors: Experian, Targus, Veteran Service Group of Illinois, InfoUSA, and Melissa Data Base Source. These datasets tend to contain basic demographic information.

The ACS Match Study concluded that administrative records provided more than 90 percent coverage for addresses and persons in the 2010 ACS and around 75 percent coverage for person-address pairs. Coverage was lower for some groups, including young children, some ethnic minorities, and group quarters residents.

Another study (Bond et al., 2014) evaluated the potential for systematic biases in the Census Bureau's ability to assign each record a unique identifier, called a protected identification key (PIK). That study found that the ability to successfully assign a PIK for person records in the ACS is lower for young children, minorities, residents of group quarters, immigrants, recent movers, low-income individuals, and unemployed individuals than others. This result probably reflects either that the identifying information was insufficient or that the information did not uniquely match any of the administrative records used in the person validation process. However, between 2009 and 2010 (the 2 years examined in the study), changes introduced to the Census Bureau's Person Identification Validation System greatly reduced these biases.

Other sections of this report discuss the potential use of administrative records to improve data collection operations (Chapter 3), in small area estimation (below), or as substitutes for items on the questionnaire (Chapter 6). There are a number of ways in which administrative records could also be useful in various stages of the data processing. Some of these options are discussed in this section.

Editing and Imputation

Administrative records could be used to replace misreported or missing items in the ACS directly or through modeling. Some examples of data that are available from administrative records that have been considered for this type of use include age, sex, race, Hispanic origin, earned income, welfare program participation, and food security program participation. The direct use of administrative records would involve matching individual-level ACS records to corresponding individual-level administrative records and using the information from the administrative records about the person or household to replace data that are inaccurate or missing in the ACS survey responses.

Administrative records could also be used for model-based imputation to improve the accuracy of imputed values. Indeed, the Census Bureau considers modeling missing data to be one of the more promising potential future uses of administrative records. Although direct imputation has the advantage of increased accuracy, it can be more resource intensive. Moreover, relevant records for the appropriate time period would have to be available at the time when the ACS data are being processed to ensure that delays are not introduced in the ACS data release. The confidentiality considerations can also be more complex in the case of direct uses of administrative data than in the case of their use for model-based applications.

Reducing Bias

Administrative records can be used to evaluate data accuracy, including bias resulting from sampling or survey nonresponse. This evaluation can be accomplished by comparing the individual-level characteristics of the survey respondents to matched person-level information from administrative records or by comparing aggregate survey responses to aggregate administrative records. Again, individual-level comparisons are resource intensive, but they can provide more insight into the problems identified with the data. To a limited extent, administrative records, particularly other Census Bureau records, are already used to evaluate survey data once the data collection and processing are complete. Income, assisted renters, public health insurance, receipt of benefits from the Supplemental Nutrition Assistance Program (SNAP), and residence 1 year ago have been among the administrative data considered for uses of this type.

Administrative records can also be used to improve the weights applied to the data. One challenge for the ACS is that subcounty-level controls are not available from a full enumeration of the population conducted in parallel with the survey, as was the case with the census long-form sample. To reduce the level of variance in the subcounty estimates, the ACS Office uses administrative records from other federal agencies as part of a model-based estimation step in the weighting process for the multiyear data. The possibility of expanding this type of use of administrative records would be worth evaluating.

Evaluating Post-Collection Uses of Administrative Records

The research currently conducted by the Census Bureau on potential ways of integrating administrative records into the ACS is focused on the appropriate first steps in assessing feasibility, including understanding the coverage of the data in both federal and commercial databases and the extent to which the records can be matched to sample cases in the ACS. This provides an important basis for additional research projects.

Further research will be needed on the quality of the administrative records, especially in the context of comparisons to the quality of ACS data. In the case of administrative records beyond basic demographic characteristics, the extent to which the information available represents the same underlying concepts as those that the ACS is intended to measure will have to be evaluated. The reference period for which data are available and how that relates to the ACS data collection period is also an important consideration. Time is also a factor in terms of whether administrative records can be obtained on a schedule that does not adversely impact the ACS data release schedule. Finally, what types of permissions, if any, may be necessary from the individuals whose records are integrated into the ACS is important to assess for different potential uses, along with whether there are any new confidentiality concerns that could emerge.

RECOMMENDATION 16: The Census Bureau should coordinate efforts across units on research related to the potential use of administrative records, and when possible, the American Community Survey Office should build on the research being conducted in other units. Promising topics include the use of administrative records for adaptive design, as sources of data for items on the questionnaire, and to enhance estimation in the post data collection stages. (See also Recommendation 26.)

SMALL AREA ESTIMATION

Previous chapters describe the effects of the reduced sample size of the ACS relative to the decennial census long-form sample on the precision of estimates for tracts and small governmental units. Domains defined by combinations of geography with demographic or other characteristics (such as "Iranian immigrants over 65 years old in New Jersey") suffer a similar loss of precision for direct ACS estimates. (Direct estimates refer to those based solely on data from the same primary information source in the same domain.) Estimates for areas or other domains for which direct estimates are not acceptably precise are commonly referred to as small area estimates or small domain estimates. (The latter term is technically more general but the former is more common; we use them interchangeably.)

Small area estimation generally involves introducing supplementary information beyond that included in direct estimation in each domain. Statistical models or procedures based on hypothesized relationships among the data sources are then used to obtain improved "indirect estimates." Small area estimation is successful when at least on the average (although not necessarily for every small area) indirect estimates are closer than direct estimates to the target estimands, the quantities that would have been obtained if the primary information source had been available for the entire domain population.

Supplementary information used in small area estimation may take several forms. One form is information from the primary information source extended over time (e.g., using data from previous years of the same survey to improve estimates for the current year), over space (e.g., using data from a larger surrounding area to improve estimates for a small area), over domain definition (e.g., using data from two- and four-person families to improve estimates of small area median income for three-person families), or over survey mode or method (e.g., using mail responses to predict potential in-person interview responses, as suggested in Chapter 3). Another form is information from distinct information sources that contain "auxiliary variables" related to the variables of interest in the primary information source. Typically, these auxiliary variables are measured with better precision than the primary variables because of larger sample sizes in the auxiliary data, but conceptual differences or nonsampling errors make it unacceptable to simply substitute the auxiliary variable for the primary source (e.g., income and family composition data from tax returns as an auxiliary to ACS estimates of poverty rates, data from the previous decennial census as a source for population and housing characteristics when estimates are desired for a more recent year).

Given the diversity of characteristics of primary sources (sample sizes and design, scales of measurement and distributional characteristics of variables, patterns of variation across various dimensions, units of measurement, etc.) and auxiliary data (the same characteristics and relationships to the variables of primary interest), as well as differing definitions and requirements of accuracy, a large literature of small area estimation methods has developed (for reviews of this literature, see Ghosh and Rao, 1994; Rao, 2003; Jiang and Lahiri, 2006; Pfeffermann, 2002, 2013). Despite this development of principles and methods, small area estimation is still not an "off-the-shelf" methodology: in fact, a concerted effort is typically required to develop a major new small area estimation product. Nonetheless, small area estimation methods may be the only practical alternative when it is infeasible to expand data collection to the scale required to obtain needed information through direct estimation.

The rest of this section discusses several approaches to small area estimation: current Census Bureau activities, spatial and temporal modeling, synthetic data, and general issues and principles with respect to the ACS.

Current Small Area Estimation Implementation and Development Projects Involving ACS Data

As the nation's largest timely household survey, the ACS plays a key role in current small area estimation efforts at the Census Bureau, and is likely to continue to do so. Current and potential uses of the ACS in this work broadly fall into two categories. In the first, the ACS itself is the primary information source and contains the target variables; in the other, the ACS provides auxiliary variables for estimation of a measure on another survey. Broadly, one might think of the first of these as filling the gap left by the smaller samples of the ACS relative to the decennial census while maintaining the improved currency of the ACS, and of the second as uses of the ACS to extend the level of detail of population surveys that typically are much smaller than the ACS. A similar perspective emerged in discussions with the Census Bureau staff about their plans for small area estimation.

The first kind of use is represented by two ongoing Census Bureau series, the Small Area Income and Poverty Estimates (SAIPE) and Small Area Health Insurance Estimates (SAHIE) Programs. SAIPE was originally developed with support from the Department of Education to generate up-to-date state and county estimates of numbers and rates of children in poverty, which were required to calculate timely allocations of local school aid under Title I of the Elementary and Secondary Education Act. (The original SAIPE development program was extensively evaluated by the National Research Council [2000a, 2000b]).

The SAIPE Program produces poverty counts and rates for four age groups and estimates of median income for states and counties. Previously, the census long-form sample had been the only source for estimates at this level of detail, which could result in allocations that were based on data as much as 12 years old. Initial SAIPE releases relied on the Annual Social and Economic Supplement (March Supplement) to the Current Population Survey (CPS), a survey of approximately 60,000 households, for income data.

CPS data (averaged over 3 years) were the source of the dependent variable in a model that predicted poverty rates and population counts using auxiliary predictor variables from income tax and information returns, SNAP, and the preceding decennial census. Direct CPS estimates were combined with predictions from the model, weighted by their relative precisions. In many counties most of the weight was placed on the model, because most counties had few or no residents in the CPS sample.

Since 2005, the target variables are drawn from single-year ACS data (Bell et al., 2007). The much larger ACS sample supports direct estimates much more precise than those from the CPS, although there are nonsampling differences between the CPS and ACS income measurements. Hence, since introduction of the ACS, more weight has been placed on direct estimates, especially in the larger states and counties, improving precision and reducing any possible biases due to error in the auxiliary-variable regression model. Furthermore, the ACS sample includes people in every county, and these data contribute to county estimates even for counties that fall below the population threshold for public reporting of 1-year data. The transition from relying primarily on direct estimates to relying primarily on the model is seamless, in the sense that their relative weights vary continuously as a function of the precision of each.

The SAHIE Program produces estimates of health insurance coverage by state and county, using data inputs and methods broadly similar to those of SAIPE. An interesting feature of SAHIE is that it provides a joint distribution of insurance status and income (within age-sex-race and ethnicity demographic cells by state). Proportions for five income groups are estimated first under a normal model for logit-transformed proportions, and then with insurance rates within income-by-demography cells using a similar model. This differs from the age-stratified SAIPE estimates, for which the age distribution is estimated from the census or intercensal population estimates rather than a model. By providing estimates of a bivariate outcome, the SAHIE Program illustrates both the importance and challenges of multivariate small area estimation (Bauder et al., 2011).

Another Census Bureau small area application falling into the same general class but using a very different modeling strategy concerns estimation of the numbers of potential voters speaking a language other than English whose limited English proficiency may impede their ability to participate in elections (Joyce et al., 2014). Under the Voting Rights Act, political jurisdictions meeting criteria of rates or absolute numbers for any linguistic group are required to provide assistive materials in that group's language. Although language group by age by detailed geography is drawn from the census, the measures of English-language proficiency are only available from the ACS. Because the areas (covered jurisdictions) may be small and the number of languages is large, the estimation problem is challenging and not suited to the type of regression model used in SAIPE and SAIHE. The strategy adopted was to form classes of areas with similar predicted rates of limited English proficiency in a language group based on ACS variables and then to use a beta-binomial model to "shrink" estimates for each area toward the mean for the class. This generic methodology supports "mass production" of the large number of estimates required.

The reduced sample size of the ACS relative to the census long-form sample affects the precision of estimates for all of the variables in the ACS. This fact suggests that it might be beneficial to adopt a more generic approach to small area estimation from ACS data so the full range of data products could be released for domains whose 1- or 3-year estimates are now suppressed. Nugent and Hawala (2012) investigated an approach proposed by Schirm and Zaslavsky (2002) based on reweighting of survey data for relatively large domains to controls estimated for smaller domains, possibly using auxiliary data and/or regression estimation methods. The product of this methodology is a weighted microdata file of households, all of which are based on actual data, although some or all of the cases are "donated" from other areas. Once this file is created, all desired tabulations and other statistics can be calculated without requiring separate modeling efforts for each: the admixture of households from within and outside the small area provides some protection against inadvertent disclosure of confidential data.

An effort to apply this methodology to generate estimates for school districts, some of which are very small, was unsuccessful but informative (Nugent and Hawala, 2012). An important problem was the inconsistency between the geographical boundaries of many school districts and standard census geographies. An additional technical obstacle was the very large variation in weights in the ACS files, which contributed to problems with convergence of the algorithms. Another line of research aimed at providing generic methods for small area estimates of ACS variables used beta models as a general modeling strategy, extending the methods used in the Voting Rights Act analysis described above. One extension to this model accommodates areas in which the prevalence of a certain characteristic is either 0 percent or 100 percent (Wieczorek et al., 2012), which cannot be predicted under a standard beta model.

There are fewer examples currently for the second role of the ACS in small area estimation, in which the ACS provides auxiliary data for small area estimates of a variable appearing in another, smaller survey. This category is represented by a developmental project on state-level small area estimates for disability (Maples and Brault, 2013). Detailed information on disability is collected by the Survey of Income and Program Participation (SIPP) for a sample of about 37,000 households annually; however, the SIPP sample size and design are not capable of supporting state-level estimates.

The ACS (since 2008) contains six items about broad types of disability; the same items are asked on the SIPP (although on a separate wave of the survey than the more detailed scales). An individual-level regression model was fitted to the SIPP data predicting the SIPP disability items from age, sex, race and ethnicity, and the six ACS disability items appearing on the SIPP. Predictions from this model were calculated for state ACS samples to estimate state rates of disability on the detailed SIPP measures (the regression projection method of Kim and Rao, 2012).

Spatial and Temporal Modeling

Continuous measurement and geographical detail make the ACS a natural candidate for application of spatial, time-series, and spatio-temporal modeling to improve small area estimates, which is currently a topic of research. Spatial methodology has been shown to improve the precision of the ACS small area estimates. In the univariate case, Porter et al. (2014b) demonstrated the advantages of using intrinsic conditional autoregressive models in addition to auxiliary functional covariates (e.g., Google Trends data), rather than models having no spatial dependence. In contrast, Porter et al. (2014a) proposed two multivariate models: the first model had a separable outcome-by-space dependence structure, whereas the second model accounted for cross-dependence using a generalized multivariate conditional autoregressive (GMCAR) structure. In a state-level example, the GMCAR model yielded smaller mean square prediction errors relative to both the separable model and a multivariate model with unstructured dependence between outcomes and no spatial dependence. This approach is well suited to producing several estimates simultaneously rather than a series of separate estimates for different variables.

To aggregate data to user-defined geographies, areal data spatial models could be constructed using change-of-support methodology in which demographic variables are defined on new spatial supports. Bradley et al. (2014) developed an approach that models count-valued survey data using a Poisson distribution by interpreting Poisson count-valued data in small areas as an aggregation of events from a spatial point process. This approach enables ACS data users to consider spatial supports other than those released for publication.

In principle, spatio-temporal small area estimation models might be considered for the ACS. Indeed, 3- and 5-year estimates could be regarded as a crude form of temporal modeling. To date, the ACS annual time series are too short for some of the more complex temporal models, but this will change as more years of data are collected.

Synthetic Data

Typical applications of small area estimation generate estimates and standard errors for specific domains. Depending on the nature of the sampling design, it can be somewhat difficult to aggregate (or disaggregate) these estimates into other domains. Doing so may require knowledge of covariances of estimates across the original domains, which often are not available in published material. One approach to this problem is to generate and release synthetic populations in which every geographic area (at the finest level of aggregation deemed of statistical use) has a complete roster of simulated households and individuals, each having all ACS variables imputed.

Synthetic populations could simplify secondary analyses of the ACS enormously. In particular, analysts can estimate any finite population quantity of interest in any geographic region by simple unweighted tabulations. Furthermore, if the Census Bureau releases multiple copies of the simulated populations, as in multiple imputation (Rubin, 1987; Raghunathan et al., 2003), then analysts can compute the variance of any estimate as the variance of the corresponding population quantities. These simple computations apply regardless of how an analyst aggregates the data.

To illustrate the outline for a fully model-based approach to synthesis, the data synthesizer might start with a list of housing units with some characteristics from the sampling frame or from the decennial census. The next step would be to estimate models for unknown household characteristics given known housing unit characteristics based on ACS sample data. To borrow strength across geographic units, the models might include random effects for blocks or tracts (possibly with spatial correlation). The synthesizer would then impute unknown household characteristics by sampling from the estimated models. Having generated a synthetic roster of households, the Census Bureau would next populate them with individuals by drawing from a model for person characteristics given household characteristics, generating a complete synthetic roster from which any desired tabulations or other statistics could be prepared.

The success of a synthetic ACS approach would depend on the quality of the models used for synthesis (Reiter, 2005). Constructing these models is a substantial challenge and might require new methodological developments. Nonetheless, there are precedents for synthesis of such complex datasets, such as the synthetic SIPP (Abowd et al., 2006) and the synthetic Longitudinal Business Database (Kinney et al., 2011). It may also be possible to reduce modeling effort and sensitivity to model specification by imputing or weighting into an area the actual households with the desired characteristics but from a different area, so only summary characteristics need to be modeled rather than every detail of household relationships and personal characteristics (see Zaslavsky, 2004).

General Issues and Principles for Small Area Estimation with the ACS

The examples described above illustrate the feasibility and usefulness of small area estimation as a contributor to the production of small area statistical products and the central role of the ACS in such efforts. Because of the diversity and complexity of small area estimation methodology, as well as the diversity of data needs that might be addressed through small area estimation, the panel did not consider it to be within our scope to make specific recommendations about priorities for new programs or methodologies. Instead, we note several general principles and issues, some of which are illustrated by the above examples.

A number of methodological issues and potential solutions call for attention to realize the potential for small area estimation. First, a methodology that generates small area estimates for many variables at once would have advantages relative to a series of separate estimation projects for different variables, since interactions or cross-tabulated cells might serve analytic needs that are not met by tables for single variables. The multivariate spatial models, reweighted microdata, and data synthesis approaches described above are three possible approaches to this objective.

Second, small area estimation models in many cases generate model-based intervals with good properties as well as point estimates. Thus, a by-product of small area estimation of ACS variables may be a solution to the problem of implausible intervals (discussed further in Chapter 5).

Third, ACS data are useful as an auxiliary data source for the small area estimation of variables from other population surveys (the second type of use defined above) when the ACS includes variables predictive of the key outcomes of the other survey. This use can be a consideration in content definition for the ACS (which is discussed in Chapter 6). Because the ACS is so much larger than other population surveys, there could be considerable benefits to estimation even if such variables were included in the ACS only on a sampled basis.

Finally, the Census Bureau has a long and impressive history of protecting confidentiality of individuals' data, and the ACS is no exception. The panel recognizes that the Census Bureau has controls in place to reduce risks of unintended disclosures and encourages the Census Bureau to continue to be vigilant in safeguarding confidentiality while preserving as much data quality as possible. One option is to offer tiered access to ACS data for different categories of researchers (see National Research Council, 2005). In this context, there is intermediate ground between tabular data and geographically nonspecific microdata released for public use, and block-level microdata accessible only in a Research Data Center. For example, virtual data enclaves like those developed by NORC and in use in Europe could be allowed for approved researchers (in academia, government, and industry), to improve access to ACS data with acceptable risks to confidentiality.

The Census Bureau will also need to be cognizant of the potential for additional disclosure risks due to use of sensitive or potentially identifying auxiliary data in small area estimates. For example, if the Census Bureau synthesizes populations by substituting values from administrative records that are also in an external database, then unusual values could result in identification. However, the information in auxiliary variables is typically aggregated and modified through complex models, reducing the risk of disclosure relative to other potential Census Bureau uses of administrative data, such as substitution for nonresponse or supplementing frame creation.

A number of organizational issues affect the prospects for a small area estimation program. First, an important limiting step for expansion of small area estimation products is the availability and quality of auxiliary data sources. Some of the most valuable administrative sources, notably IRS databases of tax and information return, are only made available to the Census Bureau for a few applications. Such restrictions on sharing of data across agencies have limited the ability of the Census Bureau to make the best use of federal data for small area estimation, although recent encouragement from the U.S. Office of Management and Budget (2014) for increased administrative data sharing could increase collaborations. Second, administrative restrictions are exacerbated by the major effort needed to prepare administrative datasets for statistical use, including geocoding to the appropriate levels of census geography. Optimally, this effort would be spread over the maximum number of uses of the data, so preparation of data could be made a priority for administrative records staff.

Third, small area estimation involves a combination of general methodologies and survey- and subject-matter-specific expertise. The Census Bureau does have a small expert staff devoted to small area estimation methodology, and it also has staff working on small area estimation in a number of program areas, including the ACS. A cross-cutting organizational structure could connect staff working on small area estimation projects on different subject-matter topics and using different data sources, by encouraging sharing of methodology and rotation of staff across methodologically related projects and to avoid duplication of effort. Given the importance of small area estimation to ACS objectives and of the ACS to other small area estimation initiatives, the issue of ongoing staffing in the ACS is important, because it would be important to maintain staffing for this work on a continuing basis. Establishing and preserving links with small area estimation practitioners in other agencies would also be productive.

Finally, the Census Bureau could encourage the user and research communities to develop methodologies for small area estimation using ACS data, both on Census Bureau designated and user-initiated topics. Mechanisms could include support through the National Science Foundation-Census Bureau Research Network and small-scale contracts, access to the Research Data Centers, challenge competitions, and a repository and search engine for small area estimation techniques and applications to which researchers could contribute.

RECOMMENDATION 17: The Census Bureau should continue its program of small area estimation using American Community Survey data, maintaining a balance of methodological research and development of production applications directed to current user needs, methods for univariate and multivariate estimation, and intramural and extramural research.

RECOMMENDATION 18: The Census Bureau should negotiate agreements with potential federal sources of auxiliary variables for small area estimation, allowing sharing of data for multiple developmental and production uses, with suitable protections of confidentiality. In particular, the Census Bureau should endeavor to broaden its data-sharing agreement with the Internal Revenue Service to facilitate statistical uses beyond those directly related to the Small Area Income and Poverty Estimates Program.

5

Data Dissemination

This chapter looks at several aspects of the dissemination of American Community Survey (ACS) data. The first section describes the ACS data products and dissemination methods. The second section looks in depth at the dissemination challenges facing the ACS and includes the panel's recommendations.

ACS DATA PRODUCTS AND DISSEMINATION METHODS

Based on the ACS, the Census Bureau publishes annual 1-year ACS estimates for geographic entities with populations of at least 65,000, 3-year estimates for geographic entities with populations of at least 20,000, and 5-year estimates for all statistical and legal entities, including areas as small as census block groups. Table 5-1 provides an overview of the data that have been released between 2006 and 2013 by type of estimate and population threshold.

After the data are edited and any necessary imputation and weighting procedures are completed, they are reviewed by the Census Bureau's Disclosure Review Board (DRB) to ensure that any data products released will maintain the confidentiality of individual responses. The DRB reviews the data product specifications of what characteristics will be included at what level of geography: it may require revisions to the specifications if the sample size or population size in a geographic area is small and could lead to the disclosure of individual respondents' identities. The 1- and 3-year data are also reviewed for precision, and tables are only produced if the sample size is sufficiently large to support statistically precise estimates.

TABLE 5-1 ACS Data Availability by Type of Estimate

Data Product	Population Threshold	Year of Release 2006	2007	2008	2009	2010	2011	2012	2013
1-Year Estimates	65,000+	2005	2006	2007	2008	2009	2010	2011	2012
3-Year Estimates	20,000+			2005-2007	2006-2008	2007-2009	2008-2010	2009-2011	2010-2012
5-Year Estimates	All areas					2005-2009	2006-2010	2007-2011	2008-2012

SOURCE: American Community Survey Design and Methodology Report; available at https://www.census.gov/acs/www/methodology/methodology_main/ [September 2014].

Estimates based on the 5-year data are released for all geographic areas, regardless of sample size, as long as they pass the DRB review with regard to confidentiality disclosure.

The variety of geographic areas for which data products are available are defined with the goal to meet the most important data user needs. The geographic areas include legal, administrative, and statistical areas, such as states, American Indian and Alaska Native areas, counties, minor civil divisions, incorporated places, congressional districts, block groups, census tracts, and census designated places. The Census Bureau works with state and local governments to define the boundaries of geographic areas. The Census Bureau's Geography Division updates the boundaries of legal areas (e.g., incorporated places) to reflect such changes as annexations, detachments, or mergers with other areas. The annual ACS estimates are produced on the basis of the geographic boundaries as of January 1 of the sample year, while the multiyear estimates reflect the boundaries as of January 1 of the final year of data collection.

The initial ACS data products were designed to be comparable to the census long-form data products, and they have undergone only relatively minor revisions based on feedback provided by data users. In recent years, as part of a comprehensive program review, the Census Bureau sponsored several data user workshops, with both federal and nonfederal data users, including a workshop of nonfederal data users (National Research Council, 2013). In 2013 a new, externally managed ACS Data User Group (ACS DUG) was formed with the goal of providing a platform for information exchange related to the data. The ACS DUG also held a data user workshop in 2014, and it is expected to provide further input to the Census Bureau on data user needs. These efforts have already enriched understanding of the many uses of the survey and pinpointed a few areas for improvement. However, a systematic evaluation of the use of the various data products has never been conducted.

Main Data Products

A large volume of data products are available based on the ACS, ranging from tables targeted at users who just need to find a quick estimate for a geographic area to the Public Use Microdata Sample (PUMS) files for more advanced users who want to create their own estimates. The range of products is modeled primarily on what was available from the decennial census long-form survey. It is important to note that not all releases include all of these products. For example, the 5-year data release does not include comparison profiles, state ranking tables, or selected population profiles.

Some of the key products are summarized in Table 5-2 and described below.

TABLE 5-2 Key American Community Survey (ACS) Data Products

Data Product	Description
Data Profiles	Broad social, economic, housing, and demographic profiles
Narrative Profiles	Summary of the information in the data profiles using concise, nontechnical text
Selected Population Profiles	Broad social, economic, and housing profiles for a large number of race, ethnic, ancestry, and country or region of birth groups
Ranking Tables	State rankings of estimates across 86 key variables
Subject Tables	Similar to data profiles (above) but include more detailed ACS data, classified by subject
Detailed Tables	The most detailed tabular ACS data and cross-tabulations of ACS variables
Geographic Comparison Tables	Comparison of geographic areas other than states (e.g., counties or congressional districts) for key variables
Thematic Maps	Interactive, online maps that can be used to display ACS data
Custom Tables	Rows of data from the ACS detailed tables that can be specified and extracted by users
Summary Files	Detailed tables that are accessed through a series of comma-delimited text files on the Census Bureau's file transfer protocol site
Public Use Microdata Sample Files	ACS microdata that can be accessed by data users with SAS and SPSS software experience

SOURCE: U.S. Census Bureau Data Product Descriptions, available at http://www.census.gov/acs/www/data_documentation/product_descriptions/ [September 2014].

- Data profiles are high-level reports of demographic, social, economic, and housing characteristics for a given geographic area. The Census Bureau publishes a comparison profile that compares the sample year's estimates with estimates from the 4 previous years. The profiles also include the margins of error of the estimates.
- Narrative profiles are descriptive reports based on the data profiles. They summarize information using nontechnical language and graphics on 15 topics for a geographic area.
- Selected population profiles provide some of the characteristics from the data profiles for specific population groups. These products are provided for 1- and 3-year estimates.
- Ranking tables provide state rankings for approximately 90 estimates. These tables are produced based only on the 1-year data.

- Subject tables are similar to data profiles, but they include more detailed information on frequently requested topics, such as education attainment by race and age. Approximately 70 subject tables are produced each year.
- Detailed tables provide distributions and cross-tabulations of demographic, social, economic, and housing characteristics, and they are the foundation for other data products. The tables display the estimates, along with the associated margins of error. There are more than 1,470 detailed tables based on the 2012 1-year data alone.
- Geographic comparison tables contain the same estimates as the ranking tables, as well as an additional 100 demographic measures, for states and some substate geographies. These tables are produced based on both the 1-year and the multiyear datasets.
- Thematic maps show mapped values for geographic areas.
- Custom tables are tables produced by the Census Bureau on a cost-reimbursable basis, to meet data user needs that are not met with the existing products.
- Summary files are comma-delimited text files that provide access to all detailed tables based on 1-, 3-, and 5-year estimates. These can be viewed using a spreadsheet or statistical software.
- PUMS files contain samples of individual records, with identifying information removed.

Microdata Access

Microdata access to individual records is provided through the PUMS files. PUMS files are extracts from the microdata file, which have undergone disclosure avoidance review and enable researchers to create custom tables that are not otherwise available. The extracts contain all characteristics data available in the full microdata file, but the only geographic information is region, division, state, and Public Use Microdata Area (PUMA). PUMAs are nonoverlapping areas that partition a state and contain populations of 100,000 or more. PUMS files are available based on each of the 1-, 3-, and 5-year datasets: the multiyear PUMS files consist of the combined annual PUMS files. The main limitation of PUMS files is that the level of geographic detail is not refined enough for many data applications. Moreover, PUMAs often do not coincide with geographies of interest for many data users.

Data Dissemination Methods

The primary dissemination mechanism for tables and maps is the American FactFinder (AFF). Summary files and PUMS files are available through the Census Bureau's File Transfer Protocol (FTP) site, which allows users

TABLE 5-3 Current Data Dissemination Methods

Methods	Description	Data Products Available
American FactFinder	Web access tool for American Community Survey data products	Detailed tables, data profiles, selected population profiles, subject tables, geographic comparison tables, 1-year ranking tables, 1-year comparison profiles
Summary Files and Public Use Microdata Sample (PUMS) Files	Web links for direct access to data files	Summary files and PUMS files
DataFerrett	Data analysis and extraction tool with recoding capabilities	Summary files and PUMS files
File Transfer Protocol Site	Site that allows users to download data for analysis	Summary files and PUMS files
Application Programming Interface	Interface that lets developers create custom web and mobile apps	5-year summary files, 1-year data profiles for congressional districts
Easy Stats	Interactive tool that lets users search for select statistics by geography	5-year summary files, 1-year data profiles for congressional districts
QuickFacts	Summary profiles showing frequently requested data items for the nation, states, counties, and places	5-year data profiles
Dwellr	Mobile application that allows users to find places based on preferences they specify	5-year summary files
POP Quiz	App that tests statistical literacy	5-year summary files

to download data as Excel, PDF, or text files, and DataFerrett, which is an analysis tool that also offers recoding capabilities. In recent years, the Census Bureau has added a series of new dissemination methods, focused on new technologies. They include the Application Programming Interface (API), which allows web users and developers to design new ways to access and present data. The Easy Stats is one such app based on the API.[1]

Table 5-3 shows the data products available through the main current dissemination methods. Block-group level data are available from the FTP site, DataFerrett, and API. Tract-level data are available from AFF, the FTP site, DataFerrett, and API.

[1]A list of additional APIs is available at http://www.census.gov/data/developers/data-sets.html.

DATA PRODUCT AND DISSEMINATION CHALLENGES

Rates with Zeros and Small Numbers

As outlined above, a major portion of ACS data releases take the form of tables of rates or proportions, typically expressed as percentages. Because these rates are based on samples, they are subject to sampling error, whose likely magnitude is represented by a published margin of error, which represents the half-width of a 90 percent confidence interval. This method works well for some estimates, but for many others, especially those with small proportions, it results in a confusing and uninformative presentation. In this section, we describe this problem and suggest some directions for solutions.

Computing standard errors and confidence intervals for a rate or proportion, p, is one of the oldest problems in statistics and has been a subject of ongoing research (for a review, see Brown et al., 2001). Unfortunately, no one solution handles every case of this complex problem. In particular, the coverage properties differ depending on the sample size n and whether p is near to or far from the boundary values of 0 or 1. Approaches for the ACS are further complicated because the sample under consideration does not constitute a simple random sample.

In the context of a simple random sample, the standard (maximum likelihood and unbiased) estimate for a binomial proportion p is $\hat{p} = X / n$, where X denotes the total number of successes, and n is the sample size (i.e., the sample proportion of successes). The standard error (SE) for $\hat{p}$ is estimated by $\sqrt{n^{-1}\hat{p}(1-\hat{p})}$, and its square is an unbiased estimator of variance (ignoring finite population corrections). For large sample sizes, a symmetric $100(1 - \alpha)$ percent confidence interval can be expressed as

$$\hat{p} \pm z_{\alpha/2}\sqrt{n^{-1}\hat{p}(1-\hat{p})},$$

where $z_{\alpha/2}$ denotes the $100(1 - \alpha/2)$ percentile of the standard normal distribution. This interval is typically justified by the normal approximation (central limit theorem) to the binomial distribution.

This estimated SE for $\hat{p}$ under simple random sampling is not directly applicable to ACS estimates, as the ACS sample is collected under a complex design and further adjusted with calibration weights. Instead, the direct variance estimates are computed using the successive difference replication method (Wolter, 1984; Judkins, 1990; Fay and Train, 1995), as described and summarized in U.S. Census Bureau (2009). To obtain intervals with coverage close to the nominal level, adjustments are needed to reflect the design-based variance estimates. One such adjustment adapts the standard intervals under simple random sampling by replacing the observed sample size n with the effective sample size, say n^* (Gilary et al., 2012). Using n^* in place of n attempts to account for the design effect, deff, where deff is defined to be the ratio of the variance of $\hat{p}$ under the complex sampling design to that under simple random sampling, and $n^* = n/\text{deff}$.

Current Practices and Deficiencies

Confidence intervals for the ACS are currently reported using symmetric intervals as described above, characterized by their half-widths or margins of error as described by the U.S. Census Bureau (2009, Ch. 12). This approach of relying on normal or Wald approximations is problematic for constructing confidence intervals for small or large proportions (those close to 0 or 1), for two reasons. (The cases of $p \approx 0$ and $p \approx 1$ are essentially equivalent since one can replace a characteristic such as poverty with its complement, nonpoverty.)

The most obvious problem is that these intervals may include values that are outside "logical" boundaries (negative values or values that exceed 100%). Although the U.S. Census Bureau (2009, Ch. 12) cautions users to consider logical boundaries when creating confidence intervals, the crude approach of truncating the interval at 0 or 1 is also unsatisfactory as these intervals may include zero as a "plausible" value for a proportion even though respondents with the characteristic of interest were found in that area. A second, more subtle, problem is that due to the discreteness of rate estimates, which are ratios of counts, the coverage of these intervals is a discontinuous function of the population proportion. Brown et al. (2001) note this property for a variety of interval estimators with simple binomial data and suggest that approximating nominal levels for coverage averaged over a range of population proportions is a suitable criterion: however, this issue has not yet been well studied for data from complex survey designs.

In the extreme case where there are zero sample (observed) rates or counts, these standard approaches for constructing confidence intervals clearly break down. In such cases, computation of estimated SEs using $\sqrt{n^{-1}\hat{p}(1-\hat{p})}$ will result in an estimated SE of zero—even if n^* is used in place of n. Furthermore, any symmetric interval around $\hat{p} = 0$ will include negative values. Aside from estimated counts of zero, the approach currently used by the ACS makes use of only one form of the SE estimate, which is only valid for large samples and proportions close to 0.5. In the case of estimated counts of zero, ACS uses a model-based approach (see U.S. Census Bureau, 2009, pp. 12-4, 12-5).

Another issue arises in the case of zero rates of counts from the current ACS practice of assigning a coefficient of variation (CV) of 100 percent to any $\hat{p}$ estimated to be zero. If the median CV is greater than 61 percent for the estimates in a given table, then that table is not released (U.S. Census Bureau, 2009, Ch. 13). This rule ignores the fact that some zeros are more informative than others. An estimate of zero successes when the sample denominator is large might provide powerful evidence that the rate in question is small, although it cannot establish that it is exactly zero. Conversely, a sampling zero with a small sample denominator might be consistent with a wide range of population proportions. Nevertheless, in both cases $\hat{p} = 0$ and the same CV is assumed. The practice of filtering tables based on this rule removes information that is potentially useful for data users.

Presentation of Uncertainty

The measures of error now included in ACS data products are actually used in two distinct ways. First, they are used to provide interval estimates of the form (point estimate) ± margin of error (MoE). As discussed above, these symmetrical intervals have poor properties for proportions that are close to zero or one. The MoE has another purpose for which it is more suited, however, namely, providing information for use in aggregation across areas. The squared MoE is proportional to an approximately unbiased estimate of variance. The variance of the estimated rate for an aggregation of independently sampled areas (such as a nonstandard combination of tracts of interest to local users) is a weighted combination of the variances of estimates for the individual areas. That combination might be estimated with adequate precision even if the estimates are not very accurate for some of the component areas with small counts. Therefore, as long as users are creating their own aggregations, they need access to estimates of sampling variances. Alternatively, the ACS could make available an online analysis system that can calculate point and interval estimates for the desired aggregates.

Many or perhaps most users of tables, however, are interested in the accuracy of the individual estimates in the tables. For this purpose, a number of methods are available to generate sensible intervals, although more research is needed before they can be applied to ACS data. Brown et al. (2001) describe several methods for calculating confidence intervals for a rate (proportion) under simple random sampling, with desirable properties, including approximately nominal coverage, lying entirely within the logical range from 0 to 1, and including zero if and only if the observed sample rate is zero. Among the alternatives that are reasonably simple to implement are the score interval, believed to have been proposed by Wilson (1927), the interval of Agresti and Coull (1998), and the equal-tailed interval under a noninformative Jeffreys prior for a binomial proportion. For $n \leq 40$, Brown et al. (2001) recommend using either the Wilson or Jeffreys interval: they indicate that the two intervals are similar in terms of absolute error. They recommend the Agresti-Coull interval for $n \geq 40$ as the easiest to present. Liu and Kott (2009) compare several alternative methods for constructing such intervals.

An alternative to these generic methods is to tailor the interval calculation to incorporate information from neighboring areas, previous time periods, or both. For example, a prior distribution might be defined for each tract reflecting the distribution of the rate in question over some collection of nearby or otherwise a priori similar tracts; the posterior credible intervals given the tract's data could be reported and would possess the desirable properties listed above. This approach is essentially an application of small area estimation (see further discussion above). Importantly, further gains may be possible by leveraging strength through spatial, time series, and spatio-temporal models that incorporate exogenous information from multiple data sources, including administrative records. Gilary et al. (2012) compare the performance of some intervals constructed in this way to those constructed without a small area estimation component. However, the methods compared do not consider formal spatial or spatio-temporal models.

Constructing confidence intervals for proportions when the data arise from a complex survey is another area of ongoing research. For example, Slud (2012) examines methods for creating upper confidence bounds from several small area estimation models. Janicki and Malec (2013) consider a design-adjusted approach, which incorporates a probability model for the finite population along with information regarding the survey design.

Implementing any changes to the way measures of uncertainty are presented to data users would require testing and a minor redesign of some of the user interfaces; consequently, it is not cost neutral. However, exploring options for these types of improvements would be worthwhile because they would increase the clarity and value of the information presented to users.

RECOMMENDATION 19: The Census Bureau should continue research into alternative approaches for constructing and presenting measures of uncertainty for the American Community Survey that are suitable for data from complex survey designs and with small proportions or samples, with the objective of rapidly adopting new methods without the defects apparent in current practice.

RECOMMENDATION 20: The data disseminated from the American Community Survey should include both interval estimates (confidence or credible intervals) and approximately unbiased variance estimates, although the latter become less important if a suitable system for aggregation of estimates is introduced. (See also Recommendation 24.)

Volume of Data Products and Access Options

Although the frequency of the data releases is one of the main benefits of the ACS, the volume of data products based on the three datasets (1-year, 3-year, and 5-year estimates) can be overwhelming to users who are not very familiar with the range of products. In addition, most of the data products can be accessed through a variety of different means, and in navigating the Census Bureau's website it is not always obvious which method is the most efficient to use for a particular purpose, further increasing confusion. Some of the dissemination methods (such as the DataFerrett and API) are primarily targeted at advanced users and are challenging to use without training. More importantly, as discussed below, the production of a large volume and wide range of products places significant burden on the ACS staff.

Data Suppression

Despite the apparent abundance of data products from the ACS, many of the actual estimates cannot be made available to data users due to the sample size limitations. As noted in Chapter 1, the 1- and 3-year ACS data releases are subject to population thresholds: 1-year estimates are only released for areas with populations of at least 65,000, and 3-year estimates are only released for areas with populations of at least 20,000. (There is no minimum population threshold for the 5-year estimates.) These thresholds were developed in the early ACS design stages, based on the assumptions available at the time about potential future sample sizes, and they have not been reexamined since then.

The population sizes used to apply the thresholds are determined based on the Population Estimates Program. This means that some areas could receive data based on the 1-year or 3-year threshold in a given year and not receive the same data products the next year. However, if data for an area were reported for a given year, then data are also published the following year, even if the population dropped below the threshold, as long as the drop was not more than 5 percent over the course of the 1 year.

Data Quality Filtering

In addition to the population thresholds, the 1- and 3-year estimates are also subject to data quality filtering. The data-quality filtering process identifies data products with the highest concentration of estimates that have low precision and prevents their publication. In the case of detailed tables, filtering is applied by calculating the median CV of all detailed lines in a table, excluding total and subtotal lines: a table is filtered out if the median CV is greater than 0.61. In a given table, only estimates at the lowest level of detail are included in the calculation of the median CV. A cell with an estimate of zero is considered to have a CV of 1. In many cases, if a detailed table does not meet the data quality criteria, then a collapsed version of the same table may be available.

The impact of the filtering that is applied to the detailed tables is carried over to the products based on these tables. Ratio tables are filtered out if the numerator or denominator estimates are filtered out. Cells in data profiles, subject tables, ranking tables, and geographic comparison tables are filtered out if the data used as the source of the cells are filtered out, although tables with means can have some lines filtered out and some not filtered out. Subject tables featuring specific population groups (available above certain population thresholds) and "iterated" selected population profiles (population profiles reproduced for selected population groups), which are generated directly from microdata, are filtered the same way as detailed tables, except that filtering is applied to the subpopulation groups rather than the whole table. However, if half or more of the lines are filtered out in a selected population profile, then the whole table is filtered out. For derived measures, such as medians, aggregates, ratios, and rates, if the standard error is zero, then the cell is suppressed if the estimated weighted total of the universe is less than 3,000. A table containing multiple derived measures may be made available in part.

Table 5-4 shows the filtering rates by population size for the 2012 1-year data. Overall, 29 percent of the tables and 39 percent of the estimates were filtered out. A higher proportion of tables are filtered out for smaller geographic areas than larger geographic areas: the smallest areas that received 1-year data had 52 percent of their estimates filtered out; the rate was 9 percent for the largest areas.

Table 5-5 shows the filtering rates by population size for the 2010-2012 3-year data. The average filtering rate across all geographies that receive data is similar to the filtering rate for the 1-year data (29 percent of the tables and 38 percent of the associated estimates were filtered out). Again, the filtering rates decrease as population sizes increase. As one would expect, areas that are large enough to also receive (heavily filtered) 1-year data are somewhat less affected by filtering in the 3-year release, although the filtering rates are still high for most areas, and they are particularly high for the smallest areas.

Appendixes C and D contain further detail about the filtering rates in the 1-year data for 2012 and the 3-year data for 2010-2012. In both the 1-year and 3-year data, the estimate types that are most likely to be filtered out are population and household counts. In the 1-year data, the topics that are most affected by filtering include ancestry (77 percent), earnings (59 percent), citizenship (57 percent), occupation/industry (54 percent), income (53 percent), Hispanic origin (53 percent), and grandparents as

TABLE 5-4 Filtering Rates by Population Size, 1-Year Data for 2012

Population Size (thousands)	Total Tables	Tables Published	Tables Filtered (%)	Total Estimates	Estimates Published	Estimates Filtered (%)
65-100	1,751,234	1,067,379	39.0	39,909,829	19,291,764	51.7
100-125	1,966,257	1,287,854	34.5	44,809,734	24,043,292	46.3
125-150	1,208,010	825,828	31.6	27,530,081	15,719,855	42.9
150-200	1,152,557	824,418	28.5	26,266,161	16,039,225	38.9
200-250	375,531	279,605	25.5	8,558,133	5,578,457	34.8
250-500	621,152	496,951	20.0	14,155,726	10,318,896	27.1
500-1,000	889,384	763,853	14.1	20,267,929	16,472,240	18.7
1,000+	372,576	345,598	7.2	8,491,263	7,734,926	8.9
Total	8,336,701	5,891,486	29.3	189,988,856	115,198,655	39.4

SOURCE: Table prepared by the Census Bureau at the panel's request.

TABLE 5-5 Filtering Results by Population Size, 3-Year Data for 2010-2012

Population Size (thousands)	Total Tables	Tables Published	Tables Filtered (%)	Total Estimates	Estimates Published	Estimates Filtered (%)
20-25	2,292,125	1,270,957	44.6	52,258,481	22,483,960	57.0
25-30	1,629,040	956,564	41.3	37,140,976	17,350,205	53.3
30-25	1,136,568	691,950	39.1	25,912,856	12,783,515	50.7
25-40	932,920	591,489	36.6	21,269,888	11,062,808	48.0
40-45	774,237	502,187	35.1	17,652,173	9,492,242	46.2
45-50	614,451	409,548	33.3	14,009,021	7,834,622	44.1
50-55	532,773	361,871	32.1	12,146,781	6,946,337	42.8
55-60	449,893	309,545	31.2	10,257,201	5,997,933	41.5
60-65	409,664	289,336	29.4	9,339,924	5,671,709	39.3
65-100	1,695,308	1,245,080	26.6	38,651,948	24,918,062	35.5
100-125	2,036,363	1,569,758	22.9	46,427,431	32,423,184	30.2
125-150	1,177,927	932,211	20.9	26,856,089	19,559,930	27.2
150-200	1,148,381	933,777	18.7	26,182,277	19,800,966	24.4
200-250	367,013	307,743	16.1	8,367,621	6,585,390	21.3
250-500	619,178	541,800	12.5	14,116,824	11,765,706	16.7
500-1,000	892,792	814,946	8.7	20,353,956	18,087,234	11.1
1,000+	367,318	351,181	4.4	8,373,107	7,947,806	5.1
Total	17,075,951	12,079,943	29.3	389,316,554	240,711,609	38.2

SOURCE: Table prepared by the Census Bureau at the panel's request.

caregivers (52 percent). In the 3-year data, the topics most often filtered out are ancestry (75 percent), race (74 percent), earnings (58 percent), citizenship (57 percent), income (52 percent), and Hispanic origin (52 percent).

Estimates in tables by race and Hispanic origin ("iterated" tables) are more than twice as likely to be filtered out as estimates in tables for the full population. Filtering rates are extremely high for rate iteration groups with the smallest populations, such as American Indian and Alaska Native and Native Hawaiian and Other Pacific Islander, with nearly all iterated count table estimates filtered out in both the 1- and the 3-year data.

For many of the tables, the Census Bureau produces "collapsed" versions that contain fewer details and therefore are less likely to be filtered out. The filtering affects approximately one in five of the uncollapsed tables for which no collapsed table exists, close to one-half of the uncollapsed tables for which a collapsed table exists, and a little over one in four of the collapsed tables.

Suppression for Confidentiality Reasons

In addition to data quality filtering, some of the ACS data are suppressed because of confidentiality rules. The Census Bureau's DRB reviews the data to ensure that the identity of an individual respondent could not be ascertained on the basis of the responses. The main DRB rules for the ACS data products are summarized below (U.S. Census Bureau, 2013):

- For selected population profiles, there must be at least 50 cases in the geographic area. If not, the DRB requires complementary suppression on the other columns: in other words, the suppression of data in other columns to prevent users from deriving sensitive data from the nonsensitive data that would otherwise not be suppressed. In practice the ACS Office suppresses whole tables instead of performing complementary suppression.
- Tables involving geographic areas other than current residence crossed with characteristics other than current residence must have at least 40 cases in the geographic area.
- For means and aggregates, the estimate must be based on either zero cases or three or more cases in a geographic area. Again, the DRB requires complementary suppression if this requirement is not met, but in practice the ACS Office suppresses the whole table.
- Tables with more than 100 independent lines cannot be released for block groups. In addition, some tables with sensitive topics cannot be released for block groups, even if they contain fewer than 100 lines (e.g., tables containing characteristics of people living in group quarters).

The filtering rules are applied at the table level, rather than at the cell level, so either the whole table is published for a geographic area or the whole table is filtered out. This means that more data are filtered out than is necessary on the basis of either data quality or confidentiality reasons. This practice simplifies the production process. It is also possible that the ACS Office assumes that the outcome is more convenient for users who might otherwise encounter suppressed cells scattered across many of the tables they are attempting to use. However, a systematic evaluation of how the data products are used has not been conducted, so it is unclear whether such an assumption is true for all users or even the majority of users.

It is likely that the current suppression practices that are due to concerns about the precision of the estimates are unduly limiting the analyses that can be conducted and therefore limiting the usefulness of the data. Although the precision concerns are certainly valid, if users could be provided with adequate information about data quality, then they could decide for themselves whether the data are suitable for their specific analytic needs. Indeed, as discussed above, in many cases the coefficient of variation is a poor yardstick for the usefulness of the estimates. Even if in many cases the answer is still "no" for data that would have been otherwise suppressed, there are likely to be situations where these data would be useful. In addition, access to currently suppressed data may enable and encourage users to develop new methodologies that result in more accurate 1- and 3-year estimates, for example, by iterating estimates from these files with information from other data sources. Although making additional data available to users would require a small redesign of some of the dissemination systems and processes, the change would increase the usefulness of the survey to data users.

RECOMMENDATION 21: The Census Bureau should revise the suppression practices for the American Community Survey: rather than suppressing data due to concerns about lack of precision, users should be provided with access to all data that pass confidentiality review. The Census Bureau will have to be proactive about user education and provide adequate information about the precision of the data to enable users to decide whether the data are suitable for use to meet their specific analytic needs.

As discussed above, the data releases are also subject to population thresholds that were developed when the ACS was first conceptualized (65,000 or more for 1-year estimates and 20,000 or more for 3-year estimates). Reexamining these thresholds with current sample sizes and data needs could also point to potential ways of increasing the usefulness and reach of the data.

RECOMMENDATION 22: The Census Bureau should evaluate whether the data release population thresholds of 65,000 or more for 1-year estimates and 20,000 or more for 3-year estimates are still optimal for the American Community Survey. This question should be revisited periodically.

Production Burden

It is important to note that although the range of data products, access, and analysis options do not necessarily meet all data user needs, the production of the literally billions of "cells" is a very large undertaking. As detailed above, the ACS data products were initially designed to facilitate comparison with data products from the census long-form survey. After the first 1-year release, the products for the 3- and 5-year releases were added based on the same general model. With each new dataset, the volume of data products and the associated resource-intensive production activities grew.

Table 5-6 shows the timeline of the main production and dissemination activities over the course of a typical year. The overlaps are naturally

TABLE 5-6 Data Production Timeline and Activities

September	October	November	December	January
Release 1-year data	Release 3-year data	Prepare 5-year data release	Release 5-year data	Release 5-year PUMS files
Conduct 3-year data AFF-UAT	Release 1-year PUMS files	Produce 5-year PUMS files and start verification	Release 3-year PUMS files	Release 1-, 3-, and 5-year PRCS in Spanish
Prepare 3-year data release	Conduct 5-year AFF-UAT		Submit product changes for next data year	
Conduct reasonableness review for 5-year data products				
Produce 3-year PUMS files and start verification				

NOTES: AFF-UAT, American Fact Finder User Acceptance Testing; PRCS, Puerto Rico Community Survey; PUMS, Public Use Microdata Sample.

stretching the Census Bureau's capacity, which raises concerns about the potential for errors to be introduced.

Because a thorough evaluation of how the data products are used has never been conducted, there is little information about which products are most useful and which may not be used at all. It is possible that the approach of publishing a very large number of tables for all possible combinations of variables that could be of interest is becoming increasingly obsolete for many users. Now that all of the ACS data products have been published for at least a few consecutive years, a formal evaluation of how the data products are used would provide information about which products are most useful, what might be missing, and whether there are any that could be dropped in order to reallocate resources to meet unfulfilled data user needs.

A mechanism for ongoing feedback from a data user group and subject-matter specialists is essential because what is useful could change as the ACS evolves and as policy needs change. Information about usage patterns on the Census Bureau's website and download statistics could also be useful in determining whether there are tables that are rarely used. Secondary distributors of the data (such as the Inter-university Consortium for Political and Social Research, the Population Reference Bureau, and the Minnesota Population Center) can also provide insight into what products are used most frequently.

RECOMMENDATION 23: The Census Bureau should evaluate whether the current range of tables produced provides optimal value to data users and whether the table production could be limited to a core set in order to allocate resources for other projects.

User-Defined Estimates

As discussed in Chapter 4, the MoEs associated with many of the estimates for small areas and groups can be very large, which often makes the data unusable at the local level, even after 5 years of aggregation. The Census Bureau's general guidance on this matter is to combine estimates across geographic areas or population subgroups to improve precision. However, the Census Bureau does not provide a tool to facilitate data aggregation, and even experienced data users struggle with calculating the MoEs for the aggregated estimates. While the instructions made available for performing the calculations are useful (U.S. Census Bureau, 2009), they are not always straightforward to implement, and the process is tedious and prone to error.

On the basis of information from data users, a web-based tool is needed to facilitate the construction of ACS tables for specified nonstandard combinations of geographic areas, possibly collapsing levels of variables in nonstandard ways, and, most importantly, to facilitate the calculation of the standard errors for the new estimates. Enabling data users to perform geographic aggregations or collapse categories on the 5-year data quickly and efficiently would greatly improve the ability of the ACS to meet the small area data needs of many users.

One option the Census Bureau could pursue for implementing this type of system would be to use the existing 5-year disclosure-reviewed tables as building blocks and perhaps integrate them with the existing dissemination modes, such as American FactFinder. Another option would be to design a more advanced system that relies on the microdata. Given that a replication method is used for variance estimation, the system would have to work with data that preserved replicate information to make the variance estimation possible.

As noted above, currently microdata access is available primarily in the form of PUMS files, which allows researchers to conduct custom analysis, but only for predefined PUMAs with populations of at least 100,000 or for larger geographic areas, such as states or the nation. In recent years, a small group of researchers in the Census Bureau has been working on developing a new dissemination tool to provide data users with the ability to conduct analyses on the microdata without access to the underlying data files. This Microdata Analysis System (MAS) is in its early design stages, but the basic features are based on the Advanced Query System (AQS), which was part of the American FactFinder for a limited time after the 2000 census. The AQS was not widely advertised because of concerns that it would overload the Census Bureau's servers at the time. When a Census Bureau contract with IBM ended, the AQS was also terminated.

According to the current plans, the MAS would be integrated with the existing DataFerrett tool. The first iteration would enable users to generate special tabulations for nonstandard geographies or for phenomena that occur with low frequencies, possibly at the subcounty level, as long as the data have passed confidentiality disclosure review. The second iteration of MAS would be for Census Bureau staff, to run statistical models. The third iteration of the MAS could enable external users to run some statistical models as well. It is unclear what the parameters for this type of analysis would be, but it appears that as currently envisioned, the plans are fairly modest because it is assumed that researchers might still need to apply for access to a Research Data Center[2] after perhaps testing their models using the MAS.

[2]Research Data Centers are secure Census Bureau facilities where qualified researchers with approved projects receive restricted access to selected nonpublic Census Bureau data files.

The development of a robust query tool for nonstandard user-defined analysis deserves serious consideration as part of the Census Bureau's approach to data dissemination. Enabling data users to perform geographic aggregations or to collapse categories on the 5-year data would greatly improve the utility of the ACS, and it is a priority from a data user perspective. A next step would be to investigate the possibility of integrating the 1- and 3-year data into a MAS-type system.

As discussed, the current approach to data products generates an astounding volume of tables, yet for the 1- and 3-year data, approximately 30 percent of these tables and close to 40 percent of the estimates are suppressed. This approach to dissemination does not seem particularly efficient from the Census Bureau perspective or satisfying from a user perspective. If the Census Bureau did not suppress data due to precision concerns (see Recommendation 21, in Chapter 4), then one option for making all of the data that passed confidentiality review available to users would be through a query system.

In the long run, data users would benefit most from a query system that had more flexibility for performing analyses based on the underlying continuous data. One option for increasing the flexibility of the aggregations would be to examine the possibility of adding new, higher-level geographies, which could be larger than tracts but smaller than PUMAs, to address the need for generating estimates with higher levels of precision for reasonably small geographic areas. The Census Bureau could also consider adding additional features to a robust microdata analysis tool, such as regression analysis capability.

Data user needs would have to be systematically evaluated, but it appears that those who have limited experience with ACS products have difficulty navigating the many options to determine which data products best meet their needs, while more advanced users feel constrained by the limited flexibility and features associated with the current tables. The overarching goal of the query system would be to make typical computations with ACS data easy for users, whether these analyses are aggregated counts or regression models. A long-term strategy could involve limiting the production of tables to a core set of the most useful tables (see Recommendation 23, above) and relying on the query system to meet the needs of more sophisticated users.

The Census Bureau's current efforts to develop MAS are being spearheaded by the Center for Disclosure Avoidance Research and Data Web and Applications staff. To maximize that value of such a system to ACS data users, the ACS staff would need to take the lead in developing the query system, working in collaboration with other Census Bureau offices, including subject-matter experts. The active involvement of a data users' working group, State Data Centers,[3] and experts in user interface would also be essential in the development of the specifications for the system.

The panel acknowledges that the development of these tools would require a substantial investment of resources, but for data users, these types of features appear to be the most valuable. These dissemination tools can also have long-term payoff for the Census Bureau, not only in terms of stakeholder satisfaction, but possibly also in the form of increased use of the data.

RECOMMENDATION 24: As a priority, the Census Bureau should develop a tool that enables data users to aggregate geographies and collapse categories, as well as to calculate the standard errors for the new estimates. To support a greater range of analyses, a microdata access system with additional capabilities should also be considered. The American Community Survey (ACS) Office should take the lead in developing these tools, working in collaboration with other Census Bureau offices. The Census Bureau should also involve a working group of ACS data users, State Data Centers, and user interface experts from the early stages of the process.

[3]State Data Centers are partnerships between states and the Census Bureau created with the goal to make data available locally to the public through a network of state agencies, universities, libraries, and regional and local governments.

6

Survey Content

The American Community Survey (ACS) replaced the census long-form sample, and the current content of the survey is largely based on the questions that had been part of the long-form survey. Now that the ACS has been in place for several years, it is the right time to consider how the content of the ACS meets small area needs.

Since the ACS was launched, a very large and diverse array of stakeholders have come to depend on the data. The survey is used by federal agencies to inform policy makers, assess programs, and distribute funds; by state and local agencies to evaluate the need for new services, such as roads, schools, and hospitals; and by businesses to understand potential markets, such as a concentration of people who might be interested in their services. Nongovernmental organizations, emergency planners, organizations serving American Indians and Alaska Natives, academic researchers, and journalists are also frequent users of ACS data. Many examples of important uses of the data are well documented (see, e.g., National Research Council, 2013) and are a reflection of the survey's vital importance to the nation as a whole.

The broad range of uses and nuances in data user needs also raises difficult questions about how to set priorities among the demands for survey content, without further increasing respondent burden. The Paperwork Reduction Act of 1995 (44 U.S.C. 3501) requires federal agencies to obtain approval from the Office of Management and Budget (OMB) prior to collecting information from the public. As part of the decennial census, the ACS is mandatory, and OMB's role also includes ensuring that only questions that are "necessary" are asked on the ACS. This assessment, however, is a challenging task, given that the history of the census long-form survey created a tangle of obligations in terms of the items on the ACS. Some of the questions have been included since the first census, while others were added over the years, primarily driven by legislative requirements.

For the 2000 census, the general guideline was that a question could be included on the long-form survey if it met one of three criteria (U.S. Census Bureau, 2014d):

- a current federal law that explicitly called for the use of the decennial census data for a particular federal program;
- a federal law or implementing regulation that required the use of specific data, and the decennial census was the historical or only source of the data; or
- an operational need by the Census Bureau.

After the ACS was implemented, to further refine the criteria, the following additional considerations were added by OMB for evaluating whether the survey is the right vehicle for a question (U.S. Census Bureau, 2014d):

- whether the data were needed with the frequency of the ACS,
- whether the data were needed at a small area level, and
- whether any other source of data is available to meet the need.

Managing the ACS content is a constant balance between federally mandated functions and broader uses of the data, and it appears to be hindered by a lack of systematic, in-depth understanding of the range of uses. Although, as described below, outreach activities are currently under way to document the uses of the data, particularly at the federal level, content management is one of the areas for which close collaboration with the broader community of data users and a continuous feedback loop about how the questions are meeting data needs are essential in order to ensure that the potential benefits of the survey are maximized (see Recommendation 1, in Chapter 1).

CURRENT CONTENT AND USES

Box 6-1 shows the topics currently covered in the survey. The mail version of the 2014 questionnaire is included in Appendix E, and Appendix F shows when each of the questions was added and which agency requested it. Due to the large number and variety of requests, the Census Bureau does

BOX 6-1
Topics Included in the 2014 ACS

Basic Demographics
- Age
- Sex
- Hispanic origin
- Race
- Relationship

Housing Characteristics, Physical
- Acreage
- Agricultural sales
- Bedrooms
- Computer and Internet use
- House heating fuel
- Kitchen facilities
- Plumbing facilities
- Telephone service available
- Rooms
- Units in structure
- Vehicles available
- Year moved into unit
- Year structure built

Economic Questions
- Class of worker
- Food stamps benefit
- Health insurance coverage
- Income
- Vehicles available
- Work status last year
- Industry
- Journey to work
- Occupation
- Place of work
- Labor force status

Population Questions
- Ancestry
- Citizenship status
- Disability
- Educational attainment
- Fertility
- Grandparents as caregivers
- Language spoken at home
- Marital history
- Marital status
- Period of military service
- Place of birth
- School enrollment
- Residence 1 year ago
- Undergraduate field of degree
- Veteran status
- Veterans Administration service-connected disability rating
- Year of entry

Housing Characteristics, Financial
- Business or medical office on property
- Cost of utilities
- Condominium fee
- Insurance
- Mobile home costs
- Mortgage
- Real estate taxes
- Rent
- Tenure
- Value of property

Questions Used to Administer the Survey
- Date
- Name
- Contact information
- Number of people at address

not have systematic documentation of questions that were requested over the years but not added.

The questionnaire collects basic demographic information and additional population and economic characteristics about residents in the housing unit selected into the sample ("living or staying at [the] address for more than 2 months"). The full set of questions are asked of up to five residents, and if there are more than five people living at the address, the name, sex, and age if collected for up to an additional seven people. The questionnaire also includes questions about the physical characteristics of the property and the financial characteristics of the household. Contact information for the person completing the questionnaire is collected for administrative purposes.

Some examples of the intent and main uses of the questions are briefly described below. As discussed in subsequent sections of this chapter, the Census Bureau recently completed a review of the items on the survey to more extensively document the purpose of each of the questions.

Basic Demographic Questions

Basic demographic questions, such as age, sex, and race, are used to inform programs that are targeted at specific groups. For example, age data are used to allocate funds for services to children, working-age adults, and the elderly. Under the Voting Rights Act, an estimate of the population of voting age is required for legislative redistricting. Various programs, such as those targeted at women, require information on sex. Race data are used to promote equal employment opportunity and to assess racial disparities in access to programs and services. The ACS questionnaire also asks about the relationships among those living in the household. This information is used to understand living arrangements and family characteristics, such as the number of people living alone or the number of children living with one parent, which informs the planning of federal programs, such as nutrition and education programs.

Population Questions

In addition to the basic demographic questions, the ACS includes questions aimed at understanding broader social and population characteristics and trends. For example, the citizenship questions are used to understand how immigrant groups are assimilated. The place of birth question not only helps understand immigration patterns, but also provides information on migration among states. The question about a person's residence 1 year ago sheds further light on population mobility and its effects on various geographic areas.

Ancestry data are required to enforce provisions under the Civil Rights Acts of 1964 and 1968, which prohibit discrimination, and are used to develop services that accommodate cultural differences. The education questions provide further useful socioeconomic data and are also used for program planning and funding allocation. Information on undergraduate field of degree in the case of college graduates provides data for assessing the qualifications of the U.S. workforce and local economic development efforts. Questions about disability are used to inform programs aimed at assisting people with disabilities. The veteran status questions are used to measure the presence and needs of veterans and to evaluate the effects of programs aimed at veterans. The number of children born in the past 12 months is used to project the future size of the population. Questions about marital history and grandparents who have primary responsibility for the care of their grandchildren are used to understand family structure and develop and evaluate programs and services.

Economic Questions

The ACS's economic questions include labor force status and occupation questions, which are used to understand employment and unemployment patterns, the availability of workers, and to formulate policy. Employment data also factor into defining metropolitan areas, calculating state per capita incomes, and assessing the impact of immigration on the economy and job markets. Income questions are used to measure economic well-being and determine poverty levels, as well as the need for economic assistance. Health insurance questions are used to understand state and local health insurance needs. Questions about commuting patterns are used by planning organizations to identify areas that need transit services, design programs that ease traffic problems, and plan for emergency services.

Housing Questions

The ACS's housing questions cover both the physical and financial characteristics of the home. This information is used to understand the characteristics of the housing inventory, determine fair market rents, and manage a variety of programs, such as the Low-Income Home Energy Assistance Program. For example, the question about the volume of agricultural sales helps determine whether the property is a farm and factors into estimates of the size of the farm population, which in turn is used to allocate funds to states. The question about the existence of a business on the premises helps understand property values in context. In addition to helping determine fair market rents, questions about plumbing and kitchen facilities are used to identify areas eligible for public assistance programs and rehabilitation loans. The question about heating fuel provides additional information about the adequacy of housing, as well as data about energy supply and consumption. Questions about Internet access are used to understand the availability of broadband technology and for programs that are aimed at expanding public access. The question about the number of vehicles is used in transportation planning. Financial questions related to housing, such as mortgage, insurance, taxes, and the cost of utilities, are used to measure the cost of home ownership and determine the need for housing assistance programs in different areas.

ACS CONTENT REVIEW

Based on a review of data from the U.S. General Services Administration's Catalog of Federal Domestic Assistance and the Census Bureau's Consolidated Federal Funds Report, Reamer (2010) estimated that 184 federal assistance programs relied directly or indirectly on ACS data to help guide the distribution of $416 billion, or 29 percent of all federal assistance, while federal grant funding informed by the ACS accounted for $389.2 billion, or 69 percent of all federal grant funding. The ACS facilitates the distribution of federal funds primarily by providing data that contribute to or complement several other datasets, such as the Bureau of Economic Analysis' per capita income series and the Census Bureau's own population estimates.

While overviews such as the Reamer report present a compelling case that information obtained on the ACS is essential for the functioning of a variety of programs, there is no up-to-date inventory of the ways each of the questions are used, even by other federal agencies. To address this gap, the Census Bureau recently conducted a comprehensive review of all of the questions on the ACS to better understand how federal agencies use the data. One aspect of this effort is the updating of the list of laws, statutes, and regulations that underlie the collection of each of the data items and determining at what level of geography are the data needed. Although federal uses represent only a small fraction of the many uses of the ACS data, this is an important first step towards documenting the Census Bureau's obligations and understanding how much flexibility there is for content changes.

Because responding to the ACS is mandatory for those who are selected into the sample, minimizing respondent burden is particularly important. In addition to the need to limit the time required to complete the survey, the Census Bureau is also concerned about the possibility that the burden placed on respondents by questions that are perceived to be particularly burdensome or sensitive could adversely impact overall data quality, either by increasing nonresponse rates or by decreasing the quality of the responses provided.

Cost-Benefit Analysis

In an effort to develop a framework that would facilitate an evaluation of the questions on the survey in the context of both their usefulness and the difficulty of obtaining quality information, the Census Bureau planned to conduct a cost-benefit analysis. For this analysis, it developed 19 decision criteria, 13 that measure each question's utility and ability to produce high-quality data and 6 that measure the difficulty of obtaining the information: see Box 6-2. Based on these criteria, a composite score was developed for each question. Because the development of this framework was still in the early stages at the time of writing this report, the panel did not have enough information to assess how well it would function. As emphasized through-

BOX 6-2
Criteria Developed by the Census Bureau for Assessing the Utility and Difficulty of the Questions on the ACS

Utility
- Statutory uses
  - Block group/tract level
  - Place/county/MSA level
  - State/national level
- Required uses
  - Block group/tract level
  - Place/county/MSA level
  - State/national level
- Programmatic uses
  - Block group/tract level
  - Place/county/MSA level
  - State/national level
- County-level interquartile range in values
- Used to select frame for a federal survey
- Availability of other data sources
- Median county-level coefficients of variation

Difficulty
- Cognitive burden
- Sensitivity
- Overall difficulty
- Number of complaints
- Seconds to answer
- Median item response rate at county level

NOTE: MSA is metropolitan statistical area.

out the report, however, data user input and transparency regarding this process are particularly important.[1]

As a first step in the evaluation, federal agencies were asked to provide information for about one-third of the decision criteria, including how the data are used and at what level of geography. The Census Bureau relied on its own records for such information as the time required to complete the survey (available based on the computer-assisted telephone interviews and web paradata) and item nonresponse rates. Questions and complaints received on the Census Bureau's respondent helpline were also factored in, as well as feedback from field representatives, who were asked to share their perspectives on the difficulties associated with administering the questions.

The Census Bureau's plan was to first apply the cost-benefit analysis to several data items that are considered particularly difficult to collect, and then proceed to look at all of the items on the questionnaire. The items that are considered particularly difficult to collect on the basis of anecdotal information, primarily because they are perceived as sensitive or burdensome by the public, include plumbing facilities, journey to work, income, and disability. All of these items involve multipart questions on the ACS. Based on prior inventories of the way the questions are used, many of these are also heavily used questions, although the purpose of the content review was to understand how the relative value of these items may have changed over the years. For example, data about plumbing facilities are used as an indicator of housing quality and to identify areas eligible for public assistance programs and rehabilitation loans. The questions are also used to locate areas in danger of ground water contamination and waterborne diseases, especially in rural areas. However, the condition of the housing stock has improved dramatically since questions about plumbing were first introduced in the 1940 census, and the availability of alternative data sources that capture this information, such as administrative records, may have also become more widespread.

Broader Data User Input

The Census Bureau content review was focused on obtaining information from federal agencies about their uses of the data, primarily because the applicable statutes are also at the federal level. The Census Bureau also provided an opportunity to other data users and the general public

[1]The Census Bureau issued the results of its first-round cost-benefit analysis of the ACS content in a request for comment on October 31, 2014 (https://www.federalregister.gov/articles/2014/10/31/2014-25912/proposed-information-collection-comment-request-the-american-community-survey-content-review-results). The next steps in the process are for the Census Bureau to review the comments provided and then send a proposal to OMB with the revisions proposed to the ACS content.

to provide feedback using an online form, but this effort was not intended to be as systematic or comprehensive as the review of the federal uses of the data. Because the use of the ACS data at the subnational level often involves the distribution of funds that are part of federal programs, federal agencies were also asked to indicate if other entities use the data for the purposes listed as justifications by the agency (e.g., if the data are used for the allocation of assistance to states, then states might be the other users of the data). However, the information provided by federal agencies about other data users is likely to be fairly limited and can by no means provide a comprehensive view of the variety of ways the data are used outside of programs associated with the federal government.

To understand how the ACS is meeting its goal of being a useful source of information for small geographic areas and populations, much broader outreach is needed to data users beyond the federal level. This is a priority in the context of content management. The establishment of a standing group to provide ongoing data user input (see Recommendation 1, in Chapter 1) can also help with guidance in accomplishing this task, and the resources invested into broader outreach can lead to the support needed to manage the content of the ACS. As emphasized throughout the report, although national- and state-level ACS data have many important uses, the panel believes that the ability of the ACS to provide data with levels of disaggregation not available from other surveys is what makes the survey unique and argues that this is an important consideration when evaluating the survey's content.

RECOMMENDATION 25: As a priority, the Census Bureau should conduct a comprehensive evaluation of the needs for the specific items on the American Community Survey, including nonfederal uses of the data. The evaluation should center on the level of disaggregation at which the data are needed as the primary criterion, and the criteria and processes used for the evaluation should be documented.

POSSIBILITIES FOR MODIFICATION

The content review is expected to yield useful information on the uses and justifications for the ACS data, at least in the context of federal programs. The information gathered about the geographic levels at which the data are used will be particularly helpful in understanding how well the ACS is able to meet these needs. As discussed above, it is essential to supplement this research with a solid understanding of other uses of the data, particularly at the small area level. That research can serve as a guide for decisions about possible future revisions or modifications to the questionnaire, including

- dropping questions that are no longer needed,
- adding new questions,
- evaluating the possibility of obtaining some of the data from other sources (e.g., administrative records), and
- redesigning the survey based on what is learned about the importance and geographic needs for the questions.

Dropping Questions

The content review could reveal that some of the questions have become obsolete, are no longer needed for other reasons, or are of relatively little value, while at the same time increasing the burden on the respondents. The challenge for the Census Bureau is that even if the circumstances that led to the initial justification of the questions have changed over the years, it is likely that most of the data that are made available through the ACS are used by some stakeholders for a variety of planning, research, or other purposes, and that these stakeholders would lament the loss of the data. Assembling as much information as possible about the uses and quality of the data, as well as about the difficulties (or lack thereof) associated with collecting those data, is important for deciding which questions can be dropped, in order to ensure that once the decisions are made, they can be implemented without significant unanticipated objections from stakeholders.

Adding New Questions

Under the Paperwork Reduction Act, the practical utility of all federal data collections has to be demonstrated, and respondent burden has to be kept to a minimum. Because participation in the ACS is required by law for those selected into the sample, additional guidelines exist to ensure that only questions that are well justified are included in the survey. The Census Bureau's current estimate is that it takes approximately 40 minutes for an average household to complete the ACS, and OMB has indicated that the goal is to keep the time required to respond to the survey fixed. In other words, new questions are very unlikely to be added without other questions being dropped.

Due to the long history of the survey—with its roots in the decennial census—the guidelines and practices for adding new questions have evolved over the years. As noted above, historically, questions have generally only been added to the ACS if there was a legislatively based requirement to do so. The frequency and level of geography needed for the data collection, as well as what is known about whether alternative sources exist for the data, are currently also taken into consideration. The criterion of whether the data are required at the small area level is especially important, given the objective of the ACS to meet small area needs. The evolution of the guidelines appears to have contributed to some confusion, in particular around the meaning of the term "programmatic" data need. For the long-form survey content, this was defined as data necessary for Census Bureau operations (U.S. Census Bureau, 2006). However, "programmatic" in the context of the ACS has sometimes been used to refer to data needs for program planning, implementation, or evaluation by other agencies that are not otherwise classified as mandatory or required needs. For example, the content review asked agencies to describe these types of programmatic needs for ACS data.

Regardless, the Census Bureau's content review was an effort to ensure that the ACS remains the appropriate vehicle for the collection of the data already on the survey and it was not intended to provide insights into the possible need for new questions. Naturally, the potential need and wishes for additional questions far exceed the ability of the survey to accommodate new content, which underscores the importance of having clear guidelines for what can be added and a consistent and transparent process for accommodating the needs that emerge (see below).

Obtaining Data from Other Sources

An important question is whether new data sources, such as administrative records, that may have become available over the years, could provide an alternative to collecting the data from respondents to the ACS. As part of the content review, federal agency representatives were asked to describe how they would address their need for the ACS data they use if the data were not available through the survey. It is unclear, however, to what extent agencies were able to provide substantive responses, especially those without an existing research program actively exploring such alternatives.

The Census Bureau's current research on coverage rates (see Chapter 4) represents the foundations for evaluating whether administrative records could also be used to replace some items on the questionnaire or possibly enhance the ACS content in other ways. Another important step is to evaluate the accuracy of the data available from administrative records and whether there are systematic differences between these records and the responses provided by respondents to the survey. To date, few Census Bureau studies on administrative records have examined these issues. One interesting exception is an exploratory study comparing self-reported housing values to housing values available from the CoreLogic tax roll database (Kingkade, 2013). The researchers were able to match 80 percent of the single-family owned homes from the 2009 ACS to the records in the CoreLogic database. Their preliminary analysis indicated differences between the home values in the two databases, systematically related to the characteristics of the householder, the household, and the local area in which the property was located.

Conducting research on the potential use of administrative records to replace items on the questionnaire is not a priority area among the administrative records research projects currently being pursued by the Census Bureau. However, some of the items that have been considered as suitable candidates for investigation based on the data sources available include other housing items, such as real estate taxes, year built, and number of rooms, as well as veteran status, place of birth, public health insurance coverage, and income. The content review could shed further light on whether there might be promising research projects to pursue.

RECOMMENDATION 26: The Census Bureau should continue research on the possible use of alternative sources and estimation methods to obtain content that is now collected on the American Community Survey. Once a comprehensive evaluation of the data needs has been completed, for each of the items, the Census Bureau should evaluate whether the survey represents the best source for those data or if data from other sources could be considered as a substitute. Research on the availability of alternative sources and estimation methods for the data should be ongoing.

Survey Redesign

If the content review indicates that only a subset of the current ACS questions are heavily used at the smallest geographic levels, then it may be possible to reconceptualize the survey as a set of "core questions" that are administered using the current schedule and sample size and other questions that could be administered less often or to only a portion of the overall ACS sample. Approaches such as subsampling, matrix sampling, or special modules combined with a set of core questions administered to the full sample could provide a mechanism for increasing content while at the same time reducing respondent burden.

A change such as this would unavoidably increase the complexity of an already complex survey, both in terms of survey operations and the analysis of the data. However, if for some of the questions a much smaller sample is sufficient, then this approach could greatly improve the ability of the ACS to satisfy a larger number of stakeholders and possibly address concerns related to respondent burden. The impact on the availability of data for not only small geographic areas, but also small populations, would have to be carefully considered on the basis of what is learned about how the data are used. In addition to relying on a thorough understanding of how the data are used, considering what the ACS would look like in terms of content if it was being developed today would also help in informing the assessment of whether a redesign of this nature might be worthwhile.

A possible framework for a reconceptualization of the way the ACS content is collected could focus on the following priorities: (1) which questions are most needed, (2) what level of disaggregation is needed for the data, and (3) what is the optimal survey design to meet these requirements. To determine the best way of collecting data, it will be important to consider not only the full ACS sample, subsamples, and supplements, but other sources as well, such as administrative records and other surveys.

THE ACS CONTENT CHANGE PROCESS

As noted at the beginning of this chapter, OMB plays a major role in determining the content of the ACS. To advise the OMB on policies and practices for the ACS, in 2012 the Interagency Council of Statistical Policy Subcommittee for the ACS (ICSP-SACS) was formed. According to the charter of the ICSP-SACS, the unique scope of the ACS makes it "a national resource for which the Federal statistical system is a steward" (Interagency Council of Statistical Policy Subcommittee for the American Community Survey, 2012, p. 1). The ICSP-SACS is cochaired by OMB's chief statistician and the Census Bureau director, and membership includes three heads of federal statistical agencies on a rotating basis.

Other groups assisting in the management of ACS content include the ACS Content Council at the Census Bureau and the OMB Interagency Committee for the ACS. The ACS Content Council is an internal Census Bureau group that reviews proposed content changes and provides input on their impact. The OMB Interagency Committee for the ACS is composed of representatives of federal agencies that have an interest in ACS data and is the primary source of requests for content changes, as well as a vehicle for communicating proposed changes to federal stakeholders.

The ICSP-SACS charter for the ACS includes guidelines for content changes (Interagency Council of Statistical Policy Subcommittee for the American Community Survey, 2012):

- Federal agencies consult with the Census Bureau's ACS Office and the Statistical and Science Policy Office at OMB and then submit a request for change to the ICSP-SACS.
- ICSP-SACS makes a recommendation to OMB regarding the requested changes.
- If OMB approves the changes, then an interagency committee is formed to draft new questions or revise existing questions.

- The Census Bureau conducts cognitive testing in English and Spanish, followed by field testing in all modes of data collection.
- The results of the testing are submitted along with a formal request and justification from the agency to make the change.
- The ICSP-SACS reviews the request and makes a recommendation to the OMB chief statistician and the Census Bureau director.
- A formal submission is made to OMB, in accordance with requirements of the Paperwork Reduction Act, including a *Federal Register* notice and public comment period.

According to a timetable provided to the panel, the typical content change process can take 5-1/2 years from the time of the agency's initial submission for the proposed changes to the time the Census Bureau begins collecting data using the new questions. To introduce some predictability in the process, the Census Bureau has historically scheduled content tests on a 5-year cycle, and the testing itself takes close to a year. Moreover, funding cuts have further extended this extremely lengthy schedule.

In terms of dropping questions, the charter of the ICSP-SACS states that this should be considered if questions are no longer needed because of a legal, regulatory, or administrative change or because there is not enough evidence of "regular use of estimates at small areas by any Federal Government program or by other users" (Interagency Council of Statistical Policy Subcommittee for the American Community Survey, 2012, p. 4). The guidelines do not provide quite as much detail on the process for dropping questions as they do on adding questions.

The Census Bureau does not have systematic records on the details of how each of the questions was added to the ACS over the years and how decisions were made about questions that were dropped. However, based on the experience of the past few years and discussions with stakeholders, it appears that stated processes are not always followed. When new questions have been added in the past, there were often special circumstances that resulted in exceptions and a need to deviate from the prescribed process. The process for dropping questions can be especially difficult because pressures from data users and other stakeholders can be significant. To a great extent, this reflects the challenges associated with the task of managing a survey that has a complex role in the statistical system and a wide range of stakeholders.

However, despite the difficulties, following a clearly defined, systematic, and transparent process is the best way to maximize the utility of the survey to the greatest number of users and reduce the risk of controversies. These low-cost investments can have substantial payoffs in the long run. Some exceptions to a predefined process for content modifications are unavoidable, especially if the process cannot be shortened, but they need to be exceptions, not the norm. There may also be ways of shortening the entire process or customizing it, depending on whether the changes can be described as minor (such as small wording changes) or major (such as adding new questions). For example, separate guidelines could be developed for pretesting with a much shorter process, for minor changes.

RECOMMENDATION 27: The Census Bureau should clarify the criteria and aim to follow as closely as possible the guidelines and processes that have been established for the American Community Survey for adding new questions and dropping existing ones. Ad hoc, off-cycle changes should be the exception, rather than the rule, and new questions added this way should go through the full process during the next scheduled cycle of revisions. In all cases, it is important to maintain transparency about how the decisions are made.

RECOMMENDATION 28: The Census Bureau should evaluate whether the scope and size of the current field test required as part of the process of adding a new question to the American Community Survey is optimal or whether a smaller scale pretest (and separate guidelines) may be adequate for minor questionnaire changes, allowing the survey to be more responsive to data user needs without sacrificing quality. Whatever the scope of the changes, the process should be systematic and transparent, with the goal of ensuring that their potential impact is fully assessed.

References

Abowd, J., Stinson, M., and Benedetto, G. (2006). *Final Report to the Social Security Administration on the SIPP/SSA/IRS Public Use File Project*. U.S. Census Bureau Longitudinal Employer-Household Dynamics Program. Washington, DC: U.S. Department of Commerce. Available: http://www.census.gov/sipp/synth_data.html [September 2014].

Agresti, A., and Coull, B.A. (1998). Approximate is better than exact for interval estimation of binomial proportions. *The American Statistician, 52*(2), 119-126.

Albright, K.A. (2011). *Using Subcounty Population Estimates as Controls in Weighting for the American Community Survey*. Washington, DC: U.S. Department of Commerce. Available: http://www.census.gov/acs/www/Downloads/library/2011/2011_Albright_01.pdf [September 2011].

Alexander, C.H. (1993a). *A Continuous Measurement Alternative for the U.S. Census*. Washington, DC: U.S. Department of Commerce. Available: https://www.amstat.org/sections/srms/Proceedings/papers/1993_079.pdf [September 2014].

Alexander, C.H. (1993b). *Three General Prototypes for a Continuous Measurement System*. Internal Census Bureau Reports CM-1. Washington, DC: U.S. Department of Commerce.

Alvarez, J.A., and Salvo, J. (2014). *Navigating Reliability of Small Area Data Lessons from New York City*. Presented at the American Community Survey Data User Group Conference, May 29-30, Washington, DC.

Bauder, M., Luery, D., and Szelepka, S. (2011). *Small Area Estimation of Health Insurance Coverage in 2010 and 2011*. Washington, DC: U.S. Department of Commerce. Available: http://www.census.gov/did/www/sahie/methods/files/sahie_tech_2011.pdf [September 2014].

Baumgardner, S.K., Griffin, D.H., and Raglin, D.A. (2014). *The Effects of Adding an Internet Response Option to the American Community Survey*. Washington, DC: U.S. Department of Commerce. Available: http://www.census.gov/acs/www/Downloads/library/2014/2014_Baumgardner_04.pdf [September 2014].

Bell, W., Basel, W., Cruse, C., Dalzell, L., Maples, J., O'Hara, B., and Powers, D. (2007). *Use of ACS Data to Produce SAIPE Model-Based Estimates of Poverty for Counties.* Washington, DC: U.S. Department of Commerce. Available: https://www.census.gov/did/www/saipe/publications/files/report.pdf [September 2014].

Bond, B., Brown, J.D., Luque, A., and O'Hara, A. (2014). *The Nature of the Bias When Studying Only Linkable Person Records: Evidence from the American Community Survey.* Washington, DC: U.S. Department of Commerce. Available: http://www.census.gov/srd/carra/The_Nature_of_the_Bias_When_Studying_Only_Linkable_Person_Records.pdf [September 2014].

Bradley, J.R., Wikle, C.K., and Holan, S.H. (2014). (Submitted). *Bayesian Spatial Change of Support for Count—Valued Survey Data.* ArXiv preprint:1405.7227.

Brown, L.D., Cai, T.T., and DasGupta, A. (2001). Interval estimation for a binomial proportion. *Statistical Science, 16*(2), 101-117.

Chestnut, J. (2013). *Model-Based Mode of Data Collection Switching from Internet to Mail in the American Community Survey,* Washington, DC: U.S. Department of Commerce. Available: https://www.census.gov/acs/www/Downloads/library/2013/2013_Chesnut_01.pdf [September 2014].

Clark, S.L. (2014). *American Community Survey Item Nonresponse Rates: Mail versus Internet.* Washington, DC: U.S. Department of Commerce. Available: http://www.census.gov/acs/www/Downloads/library/2014/2014_Clark_01.pdf [September 2014].

Conrad, F., Couper, M., Tourangeau, R., and Peytchev, A. (2006). Use and non-use of clarification features in web surveys. *Journal of Official Statistics, 22*(2), 245-269.

Cresce, A.R. (2012). *Evaluation of Gross Vacancy Rates from the 2010 Census versus Current Surveys: Early Findings from Comparisons with the 2010 Census and the 2010 ACS 1-Year Estimates.* Paper presented at the meeting of the Federal Committee on Statistical Methodology, January 10-12, Washington, DC. SEHSD Working Paper Number 2012-07. Available: http://www.census.gov/housing/files/FCSM%20paper.pdf [September 2014].

Fay, R.E. (2006). Using administrative records with model-assisted estimation for the American Community Survey. *Proceedings of the 2006 Joint Statistical Meetings on CD-ROM, American Statistical Association* (pp. 2995-3001).

Fay, R.E., and Train, G. (1995). Aspects of survey and model-based postcensal estimation of income and poverty characteristics for states and counties. *Proceedings of the Section on Government Statistics, American Statistical Association* (pp. 154-159).

Ghosh, M., and Rao, J.N.K. (1994). Small area estimation: An appraisal. *Statistical Science, 9*(1), 55-76.

Gilary, A., Maples, J., and Slud, E.V. (2012). Small area confidence bounds on small cell proportions in survey populations. *Proceedings of the Survey Research Methods Section, American Statistical Association* (pp. 3541-3555).

Griffin, D.H. (2013). *Effect of Changing Call Parameters in the American Community Survey's Computer-Assisted Telephone Interviewing Operation.* Washington, DC: U.S. Department of Commerce. Available: http://www.census.gov/acs/www/Downloads/library/2013/2013_Griffin_03.pdf [September 2014].

Griffin, D.H., and Hughes, T. (2012). *Projected 2013 Costs of a Voluntary American Community Survey.* Washington, DC: U.S. Department of Commerce. Available: http://www.census.gov/acs/www/Downloads/library/2012/2012_Griffin_03.pdf [September 2014].

Griffin, D.H., and Raglin, D. (2011). *Quality Measures Associated with a Voluntary American Community Survey.* Available: http://www.census.gov/acs/www/Downloads/library/2011/2011_Griffin_02.pdf [September 2014].

Groves, R. (2006). Nonresponse rates and nonresponse bias in household surveys. *Public Opinion Quarterly, 70*(5), 646-675.

Groves, R.M., and Peytcheva, E. (2008). The impact of nonresponse rates on nonresponse bias. *Public Opinion Quarterly*, 72, 167-189.

Hernandez-Viver, A., and Starsinic, M. (2013). *Assessing ACS Data Products: Meeting the Census Bureau's Statistical Quality Standards*. Presentation prepared for the Panel on Addressing Priority Technical Issues for the Next Decade of the American Community Survey, January 17, Washington, DC.

Horwitz, R., Tancreto, J.G., Zelenak, M.F., and Davis, M.C. (2012). *Data Quality Assessment of the American Community Survey Internet Response Data*. Washington, DC: U.S. Department of Commerce. Available: http://www.census.gov/acs/www/Downloads/library/2012/2012_Horwitz_02.pdf [September 2014].

Horwitz, R., Tancreto, J.G., Zelenak, M.F., and Davis, M.C. (2013). *Use of Paradata to Assess the Quality and Functionality of the American Community Survey Internet Instrument*. Washington, DC: U.S. Department of Commerce. Available: http://www.census.gov/acs/www/Downloads/library/2013/2013_Horwitz_01.pdf [September 2014].

Interagency Council on Statistical Policy Subcommittee for the American Community Survey. (2012). *Charter of the Interagency Council on Statistical Policy Subcommittee on the American Community Survey*. Washington, DC: U.S. Department of Commerce. Available: https://www.census.gov/acs/www/Downloads/operations_admin/ICSP_Charter.pdf [September 2014].

Janicki, R., and Malec, D. (2013). *A Small Sample Evaluation of Design-Adjusted Likelihoods Using Bernoulli Outcomes*. Washington, DC: U.S. Department of Commerce. Available: http://www.census.gov/srd/papers/pdf/rrs2014-05.pdf [September 2014].

Jiang, J., and Lahiri, P. (2006). Mixed model prediction and small area estimation. *Test, 15*(1), 1-96.

Joyce, P.M., Malec, D., Little, R.J.A., Gilary, A., Navarro, A., and Asiala, M.E. (2014). Statistical modeling methodology for the Voting Rights Act section 203 language assistance determinations. *Journal of the American Statistical Association, 109*(505), 36-47.

Judkins, D.R. (1990). Fay's method for variance estimation. *Journal of Official Statistics, 6*(3), 223-239.

Kim, J.K., and Rao, J.N.K. (2012). Combining data from two independent surveys: A model-assisted approach. *Biometrika, 99,* 85-100.

Kingkade, W. (2013). *Self-Assessed Housing Values in the American Community Survey: An Exploratory Evaluation Using Linked Real Estate Records*. Paper presented at the 2013 Joint Statistical Meetings, Montreal, Canada.

Kinney, S.K., Reiter, J.P., Reznek, A.P., Miranda, J., Jarmin, R.S., and Abowd, J.M. (2011). Towards unrestricted public use business microdata: The synthetic longitudinal business database. *International Statistical Review, 79*(3), 362-384.

Kish, L. (1981). *Using Cumulated Rolling Samples to Integrate Census and Survey Operations of the Census Bureau: An Analysis, Review, and Response*. Washington, DC: U.S. Government Printing Office.

Liu, Y., and Kott, P. (2009). Evaluating alternative one-sided coverage intervals for a proportion. *Journal of Official Statistics, 25,* 569-588.

Luque, A., and Bhaskar, R. (2013). *2010 American Community Survey Match Study.* Washington, DC: U.S. Department of Commerce. Available: http://www.census.gov/srd/carra/2010_American_Community_Survey_Match_Study.pdf [September 2014].

Maples, J.J., and Brault, M. (2013). Improving small area estimates of disability: Combining the American Community Survey with the Survey of Income and Program Participation. *Proceedings of the Joint Statistical Meetings, American Statistical Association* (pp. 2076-2086).

National Research Council. (2000a). *Small-Area Estimates of School-Age Children in Poverty: Evaluation of Current Methodology.* Panel on Estimates of Poverty for Small Geographic Areas. C.F. Citro and G. Kalton (Eds.). Committee on National Statistics, Commission on Behavioral and Social Sciences and Education. Washington, DC: National Academy Press.

National Research Council. (2000b). *Small-Area Income and Poverty Estimates: Priorities for 2000 and Beyond*. Panel on Estimates of Poverty for Small Geographic Areas. C.F. Citro and G. Kalton (Eds.). Committee on National Statistics, Commission on Behavioral and Social Sciences and Education. Washington, DC: National Academy Press.

National Research Council. (2005). *Expanding Access to Research Data: Reconciling Risks and Opportunities*. Panel on Data Access for Research Purposes. Committee on National Statistics, Division of Behavioral and Social Sciences and Education. Washington, DC: The National Academies Press.

National Research Council. (2007). *Using the American Community Survey: Benefits and Challenges*. C.F. Citro and G. Kalton (Eds.). Committee on National Statistics, Division of Behavioral and Social Sciences and Education. Washington, DC: The National Academies Press.

National Research Council. (2012). *Small Populations, Large Effects: Improving the Measurement of the Group Quarters Population in the American Community Survey.* P.R. Voss and K. Marton (Eds.). Panel on Measuring the Group Quarters Population in the American Community Survey. Committee on National Statistics, Division of Behavioral and Social Sciences and Education. Washington, DC: The National Academies Press.

National Research Council. (2013). *Benefits, Burdens, and Prospects of the American Community Survey: Summary of a Workshop*. D.L. Cork, Rapporteur. Committee on National Statistics, Division of Behavioral and Social Sciences and Education. Washington, DC: The National Academies Press.

Nugent, C., and Hawala, S. (2012). *Research and Development for Methods of Estimating Poverty for School-Age Children*. Washington, DC: U.S. Department of Commerce. Available: https://www.census.gov/did/www/saipe/publications/files/nugent hawalajsm2012.pdf [September 2014].

O'Malley, A.J., and Zaslavsky, A. (2007). Optimal survey design when nonrespondents are subsampled for followup. *ASA Proceedings of the Joint Statistical Meetings* (pp. 3268-3274).

Pfeffermann, D. (2002). Small area estimation—New developments and directions. *International Statistical Review, 70*(1), 125-143.

Pfeffermann, D. (2013). New important developments in small area estimation. *Statistical Science, 28*(1), 40-68.

Porter, A.T., Wikle, C.K., and Holan, S.H. (2014a). Small area estimation via multivariate Fay-Herriot models with latent spatial dependence. *Australian and New Zealand Journal of Statistics.*

Porter, A.T., Holan, S.H., Wikle, C.K., and Cressie, N. (2014b). Spatial Fay-Herriot models for small area estimation with functional covariates. *Spatial Statistics, 10*, 27-42.

Raghunathan, T.E., Reiter, J.P., and Rubin, D.B. (2003). Multiple imputation for statistical disclosure limitation. *Journal of Official Statistics, 19*, 1-16.

Rao, J.N.K. (2003). *Small Area Estimation*. Hoboken, NJ: John Wiley & Sons.

Reamer, A. (2010). *Surveying for Dollars: The Role of the American Community Survey in the Geographic Distribution of Federal Funds.* Washington, DC: The Brookings Institution. Available: http://www.brookings.edu/~/media/Files/rc/reports/2010/0726_acs_reamer/0726_acs_reamer.pdf [September 2014].

Reiter, J.P. (2005). Releasing multiply-imputed, synthetic public use microdata: An illustration and empirical study. *Journal of the Royal Statistical Society, Series A*(168), 185-205.

Rubin, D.B. (1987). *Multiple Imputation for Nonresponse in Surveys*. Hoboken, NJ: John Wiley & Sons.

Salvo, J. (2014). *Using Small Area Data from the ACS: Overcoming Reliability Issues.* Presented at the Annual Meeting of the Population Association of America, May 1-3, Boston, MA.

Schirm, A., and Zaslavsky, A. (2002). Reweighting a national database to improve the accuracy of state estimates. *Proceedings of the Joint Statistical Meetings, American Statistical Association* (pp. 3101-3106).

Slud, E. (2012). Assessment of zeroes in survey-estimated tables via small-area confidence bounds. *Journal of the Indian Society of Agricultural Statistics, 66*(2), 157-169.

Sommers, D., and Hefter, S. (2014). *Evaluating the Impact of the 2011 Sample Reallocation for the American Community Survey.* Washington, DC: U.S. Department of Commerce. Available: http://www.census.gov/acs/www/Downloads/library/2014/2014_Sommers_01.pdf [September 2014].

Starsinic, M. (2005). American Community Survey: Improving reliability for small area estimates. *Proceedings of the 2005 Joint Statistical Meetings on CD-ROM, American Statistical Association* (pp. 3592-3599).

Starsinic, M., and Tersine, A., Jr. (2007). *Analysis of Variance Estimates from American Community Survey Estimates*. Prepared for presentation at the Joint Statistical Meetings, July 29-August 2, Salt Lake City, UT.

U.S. Census Bureau. (2006). *U.S. Census Bureau Policy on New Content*. Washington, DC: U.S. Department of Commerce. Available: http://www.census.gov/acs/www/Downloads/operations_admin/ACS_Content_Policy.pdf [September 2014].

U.S. Census Bureau. (2009). *A Compass for Understanding and Using American Community Survey Data: What Researchers Need to Know.* Washington, DC: U.S. Government Printing Office.

U.S. Census Bureau. (2013). *American Community Survey Data Suppression*. Washington, DC: U.S. Department of Commerce. Available: http://www.census.gov/acs/www/Downloads/data_documentation/data_suppression/ACSO_Data_Suppression.pdf [September 2014].

U.S. Census Bureau. (2014a). *American Community Survey Design and Methodology.* Washington, DC: U.S. Department of Commerce. Available: http://www.census.gov/acs/www/methodology/methodology_main/ [September 2014].

U.S. Census Bureau. (2014b). *American Community Survey Multiyear Accuracy of the Data (3-Year 2010-2012 and 5-Year 2008-2012).* Washington, DC: U.S. Department of Commerce. Available: http://www.census.gov/acs/www/Downloads/data_documentation/Accuracy/MultiyearACSAccuracyofData2012.pdf [September 2014].

U.S. Census Bureau. (2014c). *Evaluating the Impact of the 2011 Sample Reallocation for the American Community Survey.* Washington, DC: U.S. Department of Commerce.

U.S. Census Bureau. (2014d). *Overview of the American Community Survey (ACS) Content Review.* Washington, DC: U.S. Department of Commerce. Available: http://www.census.gov/acs/www/Downloads/operations_admin/2014_content_review/ACS_Content_Review_Overview.pdf [September 2014].

U.S. Office of Management and Budget. (2014). *Guidance for Providing and Using Administrative Data for Statistical Purposes*. Washington, DC: Executive Office of the President. Available: http://www.whitehouse.gov/sites/default/files/omb/memoranda/2014/m-14-06.pdf [September 2014].

Weisberg, H.F. (2005). *The Total Survey Error Approach*. Chicago, IL: University of Chicago Press.

Wieczorek, J., Nugent, C., and Hawala, S. (2012). A Bayesian zero-one inflated beta model for small area shrinkage estimation. *Proceedings of the Joint Statistical Meeting, American Statistical Association* (pp. 3896-3910).

Wilson, E. (1927). Probable inference, the law of the succession, and statistical inference. *Journal of the American Statistical Association, 22*(158), 209-212.

Wolter, K.M. (1984). An investigation of some estimators of variance for systematic sampling. *Journal of the American Statistical Association, 79*(388), 781-790.

Yovell, T., and Devine, J. (2013). *Evaluating Current and Alternative Methods to Produce 2010 County Population Estimates*. Washington, DC: Executive Office of the President. Available: https://www.census.gov/content/dam/Census/library/working-papers/2013/demo/POP-twps0100.pdf [September 2014].

Zaslavsky, A.M. (2004). Representing the census undercount by multiple imputation of households. In A. Gelman and X.L. Meng (Eds.), *Applied Bayesian Modeling and Causal Inference from Incomplete-Data Perspectives* (pp. 129-140). Hoboken, NJ: John Wiley & Sons.

Zelenak, M.F. (2013). *Impact of Multiple Contacts by Computer-Assisted Telephone Interview and Computer-Assisted Personal Interview on Final Interview Outcome in the American Community Survey*. Washington, DC: U.S. Department of Commerce. Available: http://www.census.gov/acs/www/Downloads/library/2013/2013_Zelenak_01.pdf [September 2014].

Appendix A

Usability Analysis: Tract-Level 2008-2012 ACS Data

This appendix presents an expanded version of Table 2-2 (in Chapter 2), providing a detailed overview of the precision and usability of five key American Community Survey variables: (1) persons living in poverty, (2) occupied housing units that are renter occupied, (3) households receiving benefits from the Supplemental Nutrition Assistance Program (SNAP) in the past 12 months, (4) persons who are foreign born, and (5) the population aged 25 and older with a graduate or professional degree.

TABLE A-1 Usability Analysis: Tract-Level 2008-2012 ACS Data (in percentage)

Characteristics	Percentage of Persons Living in Poverty[a]	Percentage of Occupied Housing Units That Are Renter Occupied[b]	Percentage of Households Receiving SNAP Benefits in Past 12 Months[c]	Percentage of Persons Who Are Foreign Born	Percentage of Population Aged 25+ with a Graduate or Professional Degree[d]
National Estimate	14.9	34.5	11.4	12.9	10.6
National Margin of Error	±0.1	±0.2	±0.1	±0.1	±0.1
All Tracts[e]					
Tract range	0-100	0-100	0-100	0-100	0-100
Tract mean	16.0	35.2	12.5	12.2	10.3
Tract median	12.6	29.8	9.2	6.9	7.2
Tract median CV	28.3	14.7	29.5	29.7	26.0
Tract median MoE	5.8	6.7	4.6	3.4	3.2
CV ≤ 30%	56	88	51	50	61
CV > 30 and ≤ 50%	35	9	29	29	27
CV > 50%	9	2	20	21	12
Confidence interval ≥ 10 percentage points	59	80	45	30	17
MoE > estimate	4	1	16	15	8
Confidence interval lower bound < 0	4	1	16	15	8
Confidence interval upper bound > 100	0.17 (125 tracts)	1.4 (1034 tracts)	0.1 (89 tracts)	0.05 (37 tracts)	0.1 (64 tracts)

Excluding Tracts Where CV = 0	Percentage of Persons Living in Poverty[f]	Percentage of Occupied Housing Units That Are Renter Occupied[g]	Percentage of Households Receiving SNAP Benefits in Past 12 Months[h]	Percentage of Persons Who Are Foreign Born[i]	Percentage of Population Aged 25+ with a Graduate or Professional Degree[j]
Tract range	0.02-96.3	0.14-99.8	0.04-94.2	0.02-95.0	0.02-97.4
Tract mean	16.0	34.9	12.9	12.5	10.4
Tract median	12.6	29.7	9.7	7.2	7.3
Tract median CV	28.4	14.8	30.3	30.4	26.2
Tract median MoE	5.8	6.7	4.8	3.5	3.2
CV ≤ 30%	55	88	49	49	60
CV > 30 and ≤ 50%	35	9	30	30	27
CV > 50%	9	2	20	21	13
Confidence interval ≥ 10 percentage points	59	80	46	31	17
MoE > estimate	4	1	13	13	7
Confidence interval lower bound < 0	4	1	13	13	7
Confidence interval upper bound > 100	0.11 (78 tracts)	0.8 (541 tracts)	0.01 (10 tracts)	0.02 (11 tracts)	.03 (19 tracts)

Continued

TABLE A-1 Continued

Characteristics	Percentage of Persons Living in Poverty[a]	Percentage of Occupied Housing Units That Are Renter Occupied[b]	Percentage of Households Receiving SNAP Benefits in Past 12 Months[c]	Percentage of Persons Who Are Foreign Born	Percentage of Population Aged 25+ with a Graduate or Professional Degree[d]
Confidence Interval Width ≥ 10 Percentage Points by CV Category, Excluding Tracts Where CV = 0					
CV ≤ 30%	73	84	69	48	24
CV > 30 and ≤ 50%	46	58	33	19	9
CV > 50%	30	32	11	8	6
Median CVs by Tract Total Population Size					
All Tracts					
< 1,000	31.3	18.7	27.2	43.6	37.6
1,000-2,999	29.0	16.0	29.6	38.6	31.4
3,000-4,999	28.1	14.3	29.3	29.6	25.9
5,000-6,999	28.2	14.1	29.8	25.2	23.5
7,000+	27.8	14.4	29.5	20.7	20.8
Excluding Tracts Where CV = 0					
< 1,000	37.2	24.6	40.7	54.7	49.4

1,000-2,999	29.1	16.2	30.6	40.2	31.9
3,000-4,999	28.1	14.4	30.0	30.1	26.0
5,000-6,999	28.2	14.1	30.4	25.3	23.6
7,000+	27.8	14.4	29.9	20.8	20.8
Median CV by Tract Number of Housing Units					
All Tracts					
≤ 400	32.6	12.0	23.7	29.8	42.9
401-1,000	31.6	18.0	31.8	34.1	35.5
1,001-2,000	28.4	14.9	29.2	30.9	27.4
2,001-4,000	27.4	13.6	29.1	28.1	22.7
4,001-6,000	27.2	13.4	31.8	20.8	17.0
6,001+	26.4	13.7	40.4	16.0	14.2
Excluding Tracts Where CV = 0					
≤ 400	48.6	28.9	63.1	35.6	58.5
401-1,000	31.7	18.3	33.2	36.2	36.5
1,001-2,000	28.4	15.0	29.9	31.5	27.5
2,001-4,000	27.4	13.6	29.6	28.3	22.7
4,001-6,000	27.2	13.4	32.4	20.8	17.0
6,001+	26.4	13.7	40.7	16.0	14.2

Continued

TABLE A-1 Continued

Characteristics	Percentage of Persons Living in Poverty[a]	Percentage of Occupied Housing Units That Are Renter Occupied[b]	Percentage of Households Receiving SNAP Benefits in Past 12 Months[c]	Percentage of Persons Who Are Foreign Born	Percentage of Population Aged 25+ with a Graduate or Professional Degree[d]
Confidence Interval ≥ 10 Percentage Points by Tract Population Size, Excluding Tracts Where CV = 0					
< 1,000	83	93	79	58	61
1,000-2,999	68	86	60	34	28
3,000-4,999	59	80	46	32	16
5,000-6,999	54	77	38	28	11
7,000+	46	67	29	23	6
Confidence Interval ≥ 10 Percentage Points by Tract Number of Housing Units, Excluding Tracts Where CV = 0					
≤ 400	88	95	85	45	56
401-1,000	72	88	66	43	30
1,001-2,000	61	81	49	32	17
2,001-4,000	53	77	36	25	13

4,001-6,000	38	63	16	17	14
6,001+	25	54	10	15	16
MoE > Estimate by Tract Population Size, Excluding Tracts Where CV = 0					
< 1,000	25	14	34	43	39
1,000-2,999	6	2	14	22	13
3,000-4,999	4	1	12	11	6
5,000-6,999	3	0.5	12	7	3
7,000+	2	0.4	10	3	2
MoE > Estimate by Tract Number of Housing Units, Excluding Tracts Where CV = 0					
≤ 400	36	20	52	22	47
401-1,000	9	3	17	22	19
1,001-2,000	4	1	13	14	7
2,001-4,000	2	0.3	11	8	2
4,001-6,000	1	0	12	1	0.2

Continued

TABLE A-1 Continued

Characteristics	Percentage of Persons Living in Poverty[a]	Percentage of Occupied Housing Units That Are Renter Occupied[b]	Percentage of Households Receiving SNAP Benefits in Past 12 Months[c]	Percentage of Persons Who Are Foreign Born	Percentage of Population Aged 25+ with a Graduate or Professional Degree[d]
6,001+	1	0	13	2	0

[a]Tracts with no persons in the universe for which poverty rates are calculated were excluded from this analysis.

[b]Tracts with no households were excluded from this analysis.

[c]SNAP is Supplemental Nutrition Assistance Program; tracts with no households were excluded from this analysis.

[d]Tracts with no persons aged 25 and older were excluded from this analysis.

[e]Tracts with zero population are excluded.

[f]There are 265 tracts excluded because the estimated poverty rate equals zero. When the poverty rate is zero, the CV cannot be calculated and is set to zero.

[g]There are 596 tracts excluded because either the standard error of the percentage of renter-occupied households equals zero or the percentage of renter-occupied households equals zero. When the percentage renter occupied is zero, the CV cannot be calculated and is set to zero.

[h]There are 2,754 tracts excluded because either the standard error of the percentage with SNAP benefits equals zero or the percentage with SNAP benefits equals zero. When the percentage with SNAP benefits is zero, the CV cannot be calculated and is set to zero.

[i]There are 1,806 tracts excluded because either the standard error of the percentage of the foreign-born population equals zero or the percentage of the foreign–born population equals zero. When the percentage population is zero, the CV cannot be calculated and is set to zero.

[j]There are 940 tracts excluded because either the standard error of the percentage of persons with a professional degree equals zero or the percentage of persons with a professional degree equals zero. When the percentage with a professional degree is zero, the CV cannot be calculated and is set to zero.

NOTE: MoE is margin of error; CV is coefficient of variation.

SOURCE: Panel analysis of data from the 2008-2012 ACS Summary File, available at http://www.census.gov/acs/www/data_documentation/summary_file/ [September 2014].

Appendix B

Examples of Differences Between Census Counts and ACS Population Estimates

This appendix examines the magnitude of discrepancies between the 2010 census and 2008-2010 American Community Survey (ACS) counts for age-sex strata in a systematic selection of communities: Fort Wayne, Indiana; Sterling Heights, Michigan; San Clemente, California; Valparaiso, Indiana; Sunnyside, Washington; Rayne, Louisiana; and Ely, Nevada. Table B-1 shows the raw differences and Table B-2 shows the percentage differences. Many of the communities examined are the size of an average census tract. In many instances, the 2008-2012 ACS 5-year period estimates do not approximate the 2010 census results when 5-year age groups by sex are compared, and some comparisons include differences by factors as large as two.

For example, in Ely, Nevada (population 4,255), the ACS reported 201 females aged 30-34 while the census reported 103, a 95 percent difference. For males aged 15-19 years, the ACS reported 263 residents while the census reported 168, a 57 percent difference. For Rayne, Louisiana (population 7,953), the female population aged 35-39 years was reported in the ACS as 437 and in the census as 258; for all people aged 40-44, the ACS reported 153, and the census reported 257. Though not included in the table, similar differences appear in a sample of census tracts for the Bronx as well.

These problems are not confined to very small areas. For San Clemente, California (population 63,522), the number of females aged 85 and older in the ACS was 564, compared with 777 in the census, a 27 percent difference. For Fort Wayne, Indiana (population 253,691), the ACS reported

2,206 males aged 80-84, and the census reported 1,862, a 19 percent difference. The ACS also reported 1,253 males aged 85 and older, and the census reported 1,450, a 14 percent difference. That is, the differences are found for both tract and city estimates for geographic areas that are smaller than the county level. Even with the difference in reference periods (point-in-time census estimates and 2008-2012 ACS estimates), differences of this magnitude in 5-year age groups are larger than what one would reasonably expect.

TABLE B-1 Differences Between 2010 Census Counts and ACS 2008-2012 Population Estimates, by Sex and 5-Year Cohorts: Seven Cities

Population, by Sex and Age Cohorts	Fort Wayne, Indiana	Sterling Heights, Michigan	San Clemente, California	Valparaiso, Indiana	Sunnyside, Washington	Rayne, Louisiana	Ely, Nevada
Census Total Population	253,691	129,699	63,522	31,730	15,858	7,953	4,255
Male	666	–812	1,036	–147	86	–25	96
Under 5 years	–33	–355	1	95	–177	212	3
5 to 9 years	347	–359	–448	62	368	–118	41
10 to 14 years	–169	174	368	–96	94	–43	55
15 to 19 years	–205	18	295	45	–153	–32	–95
20 to 24 years	95	–18	252	187	–147	–71	42
25 to 29 years	161	–321	330	90	78	58	37
30 to 34 years	98	182	258	105	248	–26	43
35 to 39 years	499	347	–325	–16	–141	–71	–24
40 to 44 years	–193	–455	114	81	34	–410	–9
45 to 49 years	458	–49	218	44	104	22	9
50 to 54 years	–82	114	155	–174	–43	–32	–12
55 to 59 years	243	–150	83	–11	–40	–22	8
60 to 64 years	–460	–16	34	–27	–93	57	6
65 to 69 years	143	16	–54	84	–90	38	12
70 to 74 years	–41	65	–155	–165	33	–16	–5
75 to 79 years	–48	27	–82	17	58	50	36
80 to 84 years	–344	–144	25	12	22	–10	–33
85 years and older	197	112	–33	197	–69	20	–18

Continued

TABLE B-1 Continued

Population, by Sex and Age Cohorts	Fort Wayne, Indiana	Sterling Heights, Michigan	San Clemente, California	Valparaiso, Indiana	Sunnyside, Washington	Rayne, Louisiana	Ely, Nevada
Female	–592	624	–701	106	–3	6	–77
Under 5 years	–203	539	–175	–69	157	65	9
5 to 9 years	245	–252	–171	21	73	88	34
10 to 14 years	–214	343	–398	–103	9	91	–24
15 to 19 years	305	86	436	321	–11	–47	–83
20 to 24 years	89	–165	–70	–49	–188	–49	60
25 to 29 years	–318	–142	288	–169	185	41	39
30 to 34 years	–27	–288	–147	105	8	14	–98
35 to 39 years	93	–54	–415	46	123	–179	35
40 to 44 years	130	131	–289	120	–37	104	–98
45 to 49 years	65	203	510	–150	–198	9	26
50 to 54 years	–171	119	–207	55	70	–32	–15
55 to 59 years	–2	–95	–159	–10	–24	–7	7
60 to 64 years	–82	224	–117	–81	–85	18	7
65 to 69 years	–59	76	–89	–11	1	–16	16
70 to 74 years	–134	–88	–54	–65	–42	–42	39
75 to 79 years	–56	–73	155	44	–74	2	20
80 to 84 years	–114	–4	–12	86	–36	26	–48
85 years and older	–139	64	213	0	66	–80	–3

Summary of 5-Year Cohorts							
Maximum	499	539	510	321	368	212	60
Minimum	–460	–455	–448	–174	–198	–179	–98
Percentage of county population	71.4	15.4	2.1	19.3	6.5	12.9	42.4
Sampling rate	7.8	7.5	6.3	7.2	4.9	6.3	9.8
Unweighted sample size of population	19,764	9,748	3,981	2,276	775	499	415

TABLE B-2 Percentage Differences Between 2010 Census Counts and ACS 2008-2012 Population Estimates, by Sex and 5-Year Cohorts: Seven Cities

Population, by Sex and Age Cohorts	Fort Wayne, Indiana	Sterling Heights, Michigan	San Clemente, California	Valparaiso, Indiana	Sunnyside, Washington	Rayne, Louisiana	Ely, Nevada
Total Population	0.0	–0.1	0.5	1.2	0.5	–0.2	4.4
Male	0.5	–1.3	3.2	1.2	1.1	–0.7	2.1
Under 5 years	–0.3	–9.7	0.0	–15.2	–16.9	72.9	35.0
5 to 9 years	3.7	–9.2	–19.5	9.5	42.2	–35.8	43.0
10 to 14 years	–1.8	4.1	17.0	6.5	11.9	–15.0	–56.5
15 to 19 years	–2.2	0.4	13.6	–7.5	–20.1	–10.7	34.4
20 to 24 years	1.1	–0.4	13.1	2.5	–22.2	–27.5	27.4
25 to 29 years	1.8	–8.0	16.7	13.6	13.1	25.7	38.7
30 to 34 years	1.1	4.6	15.3	8.1	43.2	–13.3	–22.4
35 to 39 years	6.2	8.3	–15.3	10.3	–29.6	–37.0	–7.7
40 to 44 years	–2.5	–10.5	4.7	–1.8	8.1	–17.2	5.5
45 to 49 years	5.5	–1.0	8.5	8.7	25.9	7.9	–6.9
50 to 54 years	–1.0	2.4	6.0	4.7	–13.0	–11.6	4.2
55 to 59 years	3.2	–3.5	3.9	–19.9	–14.7	–9.9	4.2
60 to 64 years	–7.7	–0.4	1.9	–1.5	–45.4	26.9	11.4
65 to 69 years	3.6	0.5	–4.2	–6.2	–55.2	25.9	–5.8
70 to 74 years	–1.5	3.2	–17.2	25.5	28.7	–13.8	50.7
75 to 79 years	–2.1	1.9	–12.1	–54.6	61.7	50.5	–70.2
80 to 84 years	–18.5	–13.7	4.7	6.5	28.9	–16.4	–51.4
85 years and older	13.6	12.5	–7.0	4.7	–78.4	44.4	–3.7

Female	–0.5	0.9	–2.2	1.2	0.0	0.1	6.2
Under 5 years	–2.1	15.5	–9.1	11.6	16.4	23.1	27.6
5 to 9 years	2.7	–6.9	–8.0	–7.7	9.0	31.4	–18.2
10 to 14 years	–2.4	8.8	–18.8	2.3	1.2	33.3	–64.3
15 to 19 years	3.3	2.1	22.0	–8.6	–1.6	–17.2	47.6
20 to 24 years	0.9	–4.1	–4.4	16.9	–31.2	–21.0	35.1
25 to 29 years	–3.4	–3.4	16.6	–4.0	29.3	14.8	–95.1
30 to 34 years	–0.3	–7.2	–8.3	–16.7	1.4	6.5	37.2
35 to 39 years	1.1	–1.3	–18.5	10.7	25.9	–69.4	–77.8
40 to 44 years	1.7	2.9	–11.5	5.1	–8.4	40.5	16.9
45 to 49 years	0.8	4.0	19.6	12.6	–52.4	3.0	–8.5
50 to 54 years	–1.9	2.3	–8.5	–14.2	20.8	–10.7	4.5
55 to 59 years	0.0	–2.0	–7.4	5.8	–8.7	–2.7	5.4
60 to 64 years	–1.2	5.3	–6.4	–1.2	–38.6	7.3	15.1
65 to 69 years	–1.2	2.3	–7.1	–14.9	0.5	–7.9	44.3
70 to 74 years	–3.7	–3.7	–5.3	–2.1	–24.3	–25.1	29.0
75 to 79 years	–1.7	–3.9	19.4	–15.1	–64.3	1.5	–92.3
80 to 84 years	–3.8	–0.2	–1.7	9.0	–28.3	23.4	–4.2
85 years and older	–4.1	3.0	27.4	14.0	36.9	–78.4	0.0

Continued

TABLE B-2 Continued

Population, by Sex and Age Cohorts	Fort Wayne, Indiana	Sterling Heights, Michigan	San Clemente, California	Valparaiso, Indiana	Sunnyside, Washington	Rayne, Louisiana	Ely, Nevada
Summary of 5-Year Cohorts							
Maximum	13.6	15.5	27.4	25.5	61.7	72.9	50.7
Minimum	–18.5	–13.7	–19.5	–54.6	–78.4	–78.4	–95.1
Mean absolute difference	3.1	4.7	10.9	10.3	25.9	23.8	30.0

Appendix C

Data Quality Filtering Rates, 1-Year ACS Data, 2012

The ACS data quality filtering process identifies data products with the highest concentration of estimates that have low precision and prevents their publication: see discussion in Chapter 5. This appendix shows the filtering rates for the 2012 1-year ACS data.

- Table C-1 shows filtering rates by population for noniterated tables.
- Table C-2 shows filtering rates by population for iterated tables.
- Table C-3 shows filtering rates by estimate type.
- Table C-4 shows filtering rates by collapsing type and estimate type.
- Table C-5 shows filtering rates by state and estimate type.
- Table C-6 shows filtering rates by iteration group for iterated count tables.
- Table C-7 shows filtering rates by topic.
- Table C-8 shows an alternate (to Table C-5) for filtering rates by state and estimate type.

TABLE C-1 Filtering Results by Population, Noniterated Tables Only, 1-Year Data, 2012

Population Size Range (thousands)	Total Tables	Tables Published	Tables Filtered, Percentage	Total Estimates	Estimates Published	Estimates Filtered, Percentage
65-100	977,108	762,431	22.0	26,135,725	15,591,386	40.3
100-125	1,097,127	908,414	17.2	29,345,214	19,302,207	34.2
125-150	674,004	576,150	14.5	18,028,457	12,559,738	30.3
150-200	643,085	566,737	11.9	17,201,073	12,724,754	26.0
200-250	209,535	189,334	9.6	5,604,549	4,411,617	21.3
250-500	346,580	324,102	6.5	9,270,238	7,999,989	13.7
500-1,000	496,318	478,932	3.5	13,274,065	12,417,657	6.5
1,000+	208,137	204,182	1.9	5,565,525	5,452,975	2.0
Total	4,651,894	4,010,282	13.8	124,424,846	90,460,323	27.3

SOURCE: Table prepared by the Census Bureau at the panel's request.

TABLE C-2 Filtering Results by Population, Iterated Tables Only, 1-Year Data, 2012

Population Size Range (thousands)	Total Tables	Tables Published	Tables Filtered, Percentage	Total Estimates	Estimates Published	Estimates Filtered, Percentage
65-100	774,126	304,948	60.6	13,774,104	3,700,378	73.1
100-125	869,130	379,440	56.3	15,464,520	4,741,085	69.3
125-150	534,006	249,678	53.2	9,501,624	3,160,117	66.7
150-200	509,472	257,681	49.4	9,065,088	3,314,471	63.4
200-250	165,996	90,271	45.6	2,953,584	1,166,840	60.5
250-500	274,572	172,849	37.0	4,885,488	2,318,907	52.5
500-1,000	393,066	284,921	27.5	6,993,864	4,054,583	42.0
1,000+	164,439	141,416	14.0	2,925,738	2,281,951	22.0
Total	3,684,807	1,881,204	48.9	65,564,010	24,738,332	62.3

SOURCE: Table prepared by the Census Bureau at the panel's request.

TABLE C-3 Filtering Results by Estimate Type, 1-Year Data, 2012

Estimate Type	Total Tables	Tables Published	Tables Filtered, Percentage	Total Estimates	Estimates Published	Estimates Filtered, Percentage
Aggregate	536,484	458,398	14.6	2,188,290	1,655,873	24.3
Household Count	1,277,732	836,499	34.5	27,572,613	15,428,703	44.0
Housing Unit Count	966,551	720,278	25.5	17,176,058	11,535,665	32.8
Population Count	4,673,441	3,054,231	34.6	137,211,923	80,863,295	41.1
Gini Coefficient	28,236	28,236	0.0	127,062	127,062	0.0
Median Age of First Marriage	62	62	0.0	124	124	0.0
Median	769,487	727,960	5.4	5,599,842	5,494,131	1.9
Ratio	84,708	65,822	22.3	112,944	93,802	16.9
Total	8,336,701	5,891,486	29.3	189,988,856	115,198,655	39.4

NOTE: The Gini coefficient is a measure of statistical dispersion.
SOURCE: Table prepared by the Census Bureau at the panel's request.

TABLE C-4 Filtering Results by Collapsed Category and Estimate Type, 1-Year Data, 2012

Estimate Type	Collapsed Category	Total Tables	Tables Published	Tables Filtered, Percentage	Total Estimates	Estimates Published	Estimates Filtered, Percentage
Aggregate	B tables where no C table exists	395,304	353,885	10.5	1,164,735	912,669	21.6
Household Count	B tables where no C table exists	261,236	236,394	9.5	2,534,340	2,428,067	4.2
Housing Unit Count	B tables where no C table exists	430,371	357,527	16.9	6,662,708	5,050,305	24.2
Population Count	B tables where no C table exists	1,002,981	707,298	29.5	14,283,307	11,653,151	18.4
Gini Coefficient	B tables where no C table exists	28,236	28,236	0.0	127,062	127,062	0.0
Median Age of First Marriage	B tables where no C table exists	62	62	0.0	124	124	0.0
Median	B tables where no C table exists	769,487	727,960	5.4	5,599,842	5,494,131	1.9
Ratio	B tables where no C table exists	84,708	65,822	22.3	112,944	93,802	16.9
Total	B tables where no C table exists	2,972,385	2,477,184	16.7	30,485,062	25,759,311	15.5
Aggregate	B tables where a C table does exist	70,590	43,343	38.6	635,310	402,867	36.6

Continued

TABLE C-4 Continued

Estimate Type	Collapsed Category	Total Tables	Tables Published	Tables Filtered, Percentage	Total Estimates	Estimates Published	Estimates Filtered, Percentage
Household Count	B tables where a C table does exist	508,248	275,433	45.8	16,115,697	7,910,274	50.9
Housing Unit Count	B tables where a C table does exist	268,090	150,921	43.7	7,359,649	3,816,910	48.1
Population Count	B tables where a C table does exist	1,821,154	1,022,720	43.8	86,743,118	42,588,522	50.9
Total	B tables where a C table does exist	2,668,082	1,492,417	44.1	110,853,774	54,718,573	50.6
Aggregate	C tables	70,590	61,170	13.3	388,245	340,337	12.3
Household Count	C tables	508,248	324,672	36.1	8,922,576	5,090,362	42.9
Housing Unit Count	C tables	268,090	211,830	21.0	3,153,701	2,668,450	15.4
Population Count	C tables	1,849,306	1,324,213	28.4	36,185,498	26,621,622	26.4
Total	C tables	2,696,234	1,921,885	28.7	48,650,020	34,720,771	28.6

NOTE: The Gini coefficient is a measure of statistical dispersion.
SOURCE: Table prepared by the Census Bureau at the panel's request.

TABLE C-5 Filtering Results by State and Estimate Type, 1-Year Data, 2012

State	Estimate Type	Total Tables	Tables Published	Tables Filtered, Percentage	Total Estimates	Estimates Published	Estimates Filtered, Percentage
Geographies Crossing States	Aggregate	14,440	13,372	7.4	58,900	52,326	11.2
Geographies Crossing States	Household count	34,391	25,956	24.5	742,143	511,233	31.1
Geographies Crossing States	Housing unit count	26,030	22,275	14.4	462,460	391,975	15.2
Geographies Crossing States	Population count	125,795	96,151	23.6	3,694,966	2,727,594	26.2
Geographies Crossing States	Gini coefficient	760	760	0.0	3,420	3,420	0.0
Geographies Crossing States	Median age of first marriage	10	10	0.0	20	20	0.0
Geographies Crossing States	Median	20,714	19,891	4.0	152,257	150,156	1.4
Geographies Crossing States	Ratio	2,280	1,948	14.6	3,040	2,708	10.9
Geographies Crossing States	Total	224,420	180,363	19.6	5,117,206	3,839,432	25.0
Alabama	Aggregate	9,424	7,971	15.4	38,440	29,065	24.4
Alabama	Household count	22,445	14,273	36.4	484,347	274,527	43.3
Alabama	Housing unit count	16,988	12,514	26.3	301,816	207,599	31.2
Alabama	Population count	82,098	49,753	39.4	2,410,415	1,331,410	44.8

Continued

TABLE C-5 Continued

State	Estimate Type	Total Tables	Tables Published	Tables Filtered, Percentage	Total Estimates	Estimates Published	Estimates Filtered, Percentage
Alabama	Gini coefficient	496	496	0.0	2,232	2,232	0.0
Alabama	Median age of first marriage	1	1	0.0	2	2	0.0
Alabama	Median	13,517	12,576	7.0	98,341	95,897	2.5
Alabama	Ratio	1,488	1,020	31.5	1,984	1,512	23.8
Alabama	Total	146,457	98,604	32.7	3,337,577	1,942,244	41.8
Alaska	Aggregate	1,672	1,493	10.7	6,820	5,353	21.5
Alaska	Household count	3,983	2,786	30.1	85,935	50,328	41.4
Alaska	Housing unit count	3,014	2,547	15.5	53,548	40,637	24.1
Alaska	Population count	14,574	10,674	26.8	427,841	279,446	34.7
Alaska	Gini coefficient	88	88	0.0	396	396	0.0
Alaska	Median age of first marriage	1	1	0.0	2	2	0.0
Alaska	Median	2,399	2,286	4.7	17,455	17,240	1.2
Alaska	Ratio	264	240	9.1	352	328	6.8
Alaska	Total	25,995	20,115	22.6	592,349	393,730	33.5
Arizona	Aggregate	11,096	9,504	14.3	45,260	32,974	27.1
Arizona	Household count	26,427	17,946	32.1	570,279	326,326	42.8
Arizona	Housing unit count	20,002	15,060	24.7	355,364	232,827	34.5
Arizona	Population count	96,662	65,782	31.9	2,838,029	1,702,830	40.0

Arizona	Gini coefficient	584	584	0.0	2,628	2,628	0.0
Arizona	Median age of first marriage	1	1	0.0	2	2	0.0
Arizona	Median	15,915	15,220	4.4	115,787	113,981	1.6
Arizona	Ratio	1,752	1,555	11.2	2,336	2,127	8.9
Arizona	Total	172,439	125,652	27.1	3,929,685	2,413,695	38.6
Arkansas	Aggregate	5,016	4,251	15.3	20,460	15,527	24.1
Arkansas	Household count	11,947	7,480	37.4	257,799	138,443	46.3
Arkansas	Housing unit count	9,042	6,540	27.7	160,644	103,861	35.3
Arkansas	Population count	43,702	26,096	40.3	1,283,069	677,517	47.2
Arkansas	Gini coefficient	264	264	0.0	1,188	1,188	0.0
Arkansas	Median age of first marriage	1	1	0.0	2	2	0.0
Arkansas	Median	7,195	6,783	5.7	52,347	51,251	2.1
Arkansas	Ratio	792	558	29.5	1,056	822	22.2
Arkansas	Total	77,959	51,973	33.3	1,776,565	988,611	44.4
California	Aggregate	65,360	56,407	13.7	266,600	198,648	25.5
California	Household count	155,661	108,265	30.4	3,359,163	1,954,829	41.8
California	Housing unit count	117,820	89,828	23.8	2,093,240	1,370,369	34.5
California	Population count	569,330	403,227	29.2	16,716,047	10,400,463	37.8
California	Gini coefficient	3,440	3,440	0.0	15,480	15,480	0.0
California	Median age of first marriage	1	1	0.0	2	2	0.0
California	Median	93,741	89,201	4.8	681,989	670,777	1.6

Continued

TABLE C-5 Continued

State	Estimate Type	Total Tables	Tables Published	Tables Filtered, Percentage	Total Estimates	Estimates Published	Estimates Filtered, Percentage
California	Ratio	10,320	9,226	10.6	13,760	12,646	8.1
California	Total	1,015,673	759,595	25.2	23,146,281	14,623,214	36.8
Colorado	Aggregate	9,196	7,958	13.5	37,510	28,243	24.7
Colorado	Household count	21,902	14,555	33.5	472,629	265,763	43.8
Colorado	Housing unit count	16,577	12,583	24.1	294,514	202,257	31.3
Colorado	Population count	80,112	54,609	31.8	2,352,104	1,466,073	37.7
Colorado	Gini coefficient	484	484	0.0	2,178	2,178	0.0
Colorado	Median age of first marriage	1	1	0.0	2	2	0.0
Colorado	Median	13,190	12,474	5.4	95,962	94,068	2.0
Colorado	Ratio	1,452	1,260	13.2	1,936	1,744	9.9
Colorado	Total	142,914	103,924	27.3	3,256,835	2,060,328	36.7
Connecticut	Aggregate	7,144	6,291	11.9	29,140	23,298	20.0
Connecticut	Household count	17,015	11,718	31.1	367,167	214,546	41.6
Connecticut	Housing unit count	12,878	10,183	20.9	228,796	162,762	28.9
Connecticut	Population count	62,238	43,873	29.5	1,827,305	1,166,644	36.2
Connecticut	Gini coefficient	376	376	0.0	1,692	1,692	0.0
Connecticut	Median age of first marriage	1	1	0.0	2	2	0.0
Connecticut	Median	10,247	9,796	4.4	74,551	73,374	1.6

Connecticut	Ratio	1,128	915	18.9	1,504	1,291	14.2
Connecticut	Total	111,027	83,153	25.1	2,530,157	1,643,609	35.0
Delaware	Aggregate	1,596	1,382	13.4	6,510	4,912	24.5
Delaware	Household count	3,802	2,530	33.5	82,029	46,285	43.6
Delaware	Housing unit count	2,877	2,168	24.6	51,114	34,374	32.8
Delaware	Population count	13,912	9,400	32.4	408,404	246,216	39.7
Delaware	Gini coefficient	84	84	0.0	378	378	0.0
Delaware	Median age of first marriage	1	1	0.0	2	2	0.0
Delaware	Median	2,290	2,190	4.4	16,662	16,418	1.5
Delaware	Ratio	252	207	17.9	336	291	13.4
Delaware	Total	24,814	17,962	27.6	565,435	348,876	38.3
District of Columbia	Aggregate	836	752	10.0	3,410	2,889	15.3
District of Columbia	Household count	1,992	1,405	29.5	42,969	25,684	40.2
District of Columbia	Housing unit count	1,507	1,288	14.5	26,774	21,759	18.7
District of Columbia	Population count	7,292	5,381	26.2	214,034	148,735	30.5
District of Columbia	Gini coefficient	44	44	0.0	198	198	0.0
District of Columbia	Median age of first marriage	1	1	0.0	2	2	0.0

Continued

TABLE C-5 Continued

State	Estimate Type	Total Tables	Tables Published	Tables Filtered, Percentage	Total Estimates	Estimates Published	Estimates Filtered, Percentage
District of Columbia	Median	1,200	1,159	3.4	8,732	8,657	0.9
District of Columbia	Ratio	132	116	12.1	176	160	9.1
District of Columbia	Total	13,004	10,146	22.0	296,295	208,084	29.8
Florida	Aggregate	29,336	24,837	15.3	119,660	89,076	25.6
Florida	Household count	69,867	45,736	34.5	1,507,719	841,970	44.2
Florida	Housing unit count	52,882	39,398	25.5	939,524	643,628	31.5
Florida	Population count	255,542	167,299	34.5	7,502,909	4,416,525	41.1
Florida	Gini coefficient	1,544	1,544	0.0	6,948	6,948	0.0
Florida	Median age of first marriage	1	1	0.0	2	2	0.0
Florida	Median	42,075	39,888	5.2	306,107	300,578	1.8
Florida	Ratio	4,632	3,557	23.2	6,176	5,061	18.1
Florida	Total	455,879	322,260	29.3	10,389,045	6,303,788	39.3
Georgia	Aggregate	15,352	12,701	17.3	62,620	45,079	28.0
Georgia	Household count	36,563	23,073	36.9	789,015	424,202	46.2
Georgia	Housing unit count	27,674	19,453	29.7	491,668	301,679	38.6
Georgia	Population count	133,734	82,501	38.3	3,926,501	2,144,638	45.4

Georgia	Gini coefficient	808	808	0.0	3,636	3,636	0.0
Georgia	Median age of first marriage	1	1	0.0	2	2	0.0
Georgia	Median	22,019	20,752	5.8	160,195	156,909	2.1
Georgia	Ratio	2,424	1,700	29.9	3,232	2,486	23.1
Georgia	Total	238,575	160,989	32.5	5,436,869	3,078,631	43.4
Hawaii	Aggregate	1,976	1,805	8.7	8,060	6,820	15.4
Hawaii	Household count	4,707	3,539	24.8	101,559	64,806	36.2
Hawaii	Housing unit count	3,562	2,963	16.8	63,284	47,577	24.8
Hawaii	Population count	17,222	13,353	22.5	505,589	355,001	29.8
Hawaii	Gini coefficient	104	104	0.0	468	468	0.0
Hawaii	Median age of first marriage	1	1	0.0	2	2	0.0
Hawaii	Median	2,835	2,725	3.9	20,627	20,385	1.2
Hawaii	Ratio	312	301	3.5	416	405	2.6
Hawaii	Total	30,719	24,791	19.3	700,005	495,464	29.2
Idaho	Aggregate	3,344	2,817	15.8	13,640	10,102	25.9
Idaho	Household count	7,965	4,751	40.4	171,867	87,564	49.1
Idaho	Housing unit count	6,028	4,146	31.2	107,096	64,787	39.5
Idaho	Population count	29,138	17,078	41.4	855,455	454,505	46.9
Idaho	Gini coefficient	176	176	0.0	792	792	0.0
Idaho	Median age of first marriage	1	1	0.0	2	2	0.0
Idaho	Median	4,797	4,484	6.5	34,901	33,950	2.7

Continued

TABLE C-5 Continued

State	Estimate Type	Total Tables	Tables Published	Tables Filtered, Percentage	Total Estimates	Estimates Published	Estimates Filtered, Percentage
Idaho	Ratio	528	373	29.4	704	547	22.3
Idaho	Total	51,977	33,826	34.9	1,184,457	652,249	44.9
Illinois	Aggregate	21,508	18,051	16.1	87,730	64,452	26.5
Illinois	Household count	51,224	32,291	37.0	1,105,401	580,983	47.4
Illinois	Housing unit count	38,771	27,842	28.2	688,822	438,059	36.4
Illinois	Population count	187,356	118,539	36.7	5,500,898	3,121,243	43.3
Illinois	Gini coefficient	1,132	1,132	0.0	5,094	5,094	0.0
Illinois	Median age of first marriage	1	1	0.0	2	2	0.0
Illinois	Median	30,848	29,161	5.5	224,428	220,157	1.9
Illinois	Ratio	3,396	2,452	27.8	4,528	3,580	20.9
Illinois	Total	334,236	229,469	31.3	7,616,903	4,433,570	41.8
Indiana	Aggregate	13,072	10,858	16.9	53,320	39,138	26.6
Indiana	Household count	31,133	19,161	38.5	671,835	356,557	46.9
Indiana	Housing unit count	23,564	16,720	29.0	418,648	267,202	36.2
Indiana	Population count	113,874	67,944	40.3	3,343,391	1,787,932	46.5
Indiana	Gini coefficient	688	688	0.0	3,096	3,096	0.0
Indiana	Median age of first marriage	1	1	0.0	2	2	0.0

Indiana	Median	18,749	17,608	6.1	136,405	133,424	2.2
Indiana	Ratio	2,064	1,405	31.9	2,752	2,087	24.2
Indiana	Total	203,145	134,385	33.8	4,629,449	2,589,438	44.1
Iowa	Aggregate	5,244	4,570	12.9	21,390	16,947	20.8
Iowa	Household count	12,490	7,693	38.4	269,517	142,475	47.1
Iowa	Housing unit count	9,453	6,993	26.0	167,946	114,658	31.7
Iowa	Population count	45,688	28,524	37.6	1,341,380	773,427	42.3
Iowa	Gini coefficient	276	276	0.0	1,242	1,242	0.0
Iowa	Median age of first marriage	1	1	0.0	2	2	0.0
Iowa	Median	7,522	7,077	5.9	54,726	53,531	2.2
Iowa	Ratio	828	596	28.0	1,104	872	21.0
Iowa	Total	81,502	55,730	31.6	1,857,307	1,103,154	40.6
Kansas	Aggregate	5,168	4,506	12.8	21,080	16,418	22.1
Kansas	Household count	12,309	8,072	34.4	265,611	147,426	44.5
Kansas	Housing unit count	9,316	7,073	24.1	165,512	113,513	31.4
Kansas	Population count	45,026	30,206	32.9	1,321,943	799,610	39.5
Kansas	Gini coefficient	272	272	0.0	1,224	1,224	0.0
Kansas	Median age of first marriage	1	1	0.0	2	2	0.0
Kansas	Median	7,413	7,061	4.7	53,933	53,087	1.6
Kansas	Ratio	816	684	16.2	1,088	956	12.1
Kansas	Total	80,321	57,875	27.9	1,830,393	1,132,236	38.1

Continued

TABLE C-5 Continued

State	Estimate Type	Total Tables	Tables Published	Tables Filtered, Percentage	Total Estimates	Estimates Published	Estimates Filtered, Percentage
Kentucky	Aggregate	6,004	5,039	16.1	24,490	18,833	23.1
Kentucky	Household count	14,300	8,895	37.8	308,577	168,716	45.3
Kentucky	Housing unit count	10,823	7,806	27.9	192,286	128,276	33.3
Kentucky	Population count	52,308	31,056	40.6	1,535,750	835,745	45.6
Kentucky	Gini coefficient	316	316	0.0	1,422	1,422	0.0
Kentucky	Median age of first marriage	1	1	0.0	2	2	0.0
Kentucky	Median	8,612	8,075	6.2	62,656	61,313	2.1
Kentucky	Ratio	948	625	34.1	1,264	941	25.6
Kentucky	Total	93,312	61,813	33.8	2,126,447	1,215,248	42.9
Louisiana	Aggregate	8,968	7,734	13.8	36,580	28,391	22.4
Louisiana	Household count	21,359	13,939	34.7	460,911	263,041	42.9
Louisiana	Housing unit count	16,166	12,025	25.6	287,212	197,787	31.1
Louisiana	Population count	78,126	49,442	36.7	2,293,793	1,310,440	42.9
Louisiana	Gini coefficient	472	472	0.0	2,124	2,124	0.0
Louisiana	Median age of first marriage	1	1	0.0	2	2	0.0
Louisiana	Median	12,863	12,058	6.3	93,583	91,512	2.2
Louisiana	Ratio	1,416	1,042	26.4	1,888	1,504	20.3
Louisiana	Total	139,371	96,713	30.6	3,176,093	1,894,801	40.3

Maine	Aggregate	2,812	2,374	15.6	11,470	8,692	24.2
Maine	Household count	6,698	4,010	40.1	144,525	76,075	47.4
Maine	Housing unit count	5,069	3,770	25.6	90,058	64,550	28.3
Maine	Population count	24,504	14,584	40.5	719,396	405,410	43.6
Maine	Gini coefficient	148	148	0.0	666	666	0.0
Maine	Median age of first marriage	1	1	0.0	2	2	0.0
Maine	Median	4,034	3,747	7.1	29,350	28,551	2.7
Maine	Ratio	444	297	33.1	592	445	24.8
Maine	Total	43,710	28,931	33.8	996,059	584,391	41.3
Maryland	Aggregate	7,904	6,797	14.0	32,240	24,956	22.6
Maryland	Household count	18,825	12,231	35.0	406,227	221,184	45.6
Maryland	Housing unit count	14,248	10,392	27.1	253,136	162,424	35.8
Maryland	Population count	68,858	46,366	32.7	2,021,675	1,242,416	38.5
Maryland	Gini coefficient	416	416	0.0	1,872	1,872	0.0
Maryland	Median age of first marriage	1	1	0.0	2	2	0.0
Maryland	Median	11,337	10,823	4.5	82,481	81,056	1.7
Maryland	Ratio	1,248	963	22.8	1,664	1,379	17.1
Maryland	Total	122,837	87,989	28.4	2,799,297	1,735,289	38.0
Massachusetts	Aggregate	11,020	9,527	13.5	44,950	35,038	22.1
Massachusetts	Household count	26,246	17,077	34.9	566,373	308,374	45.6
Massachusetts	Housing unit count	19,865	14,983	24.6	352,930	241,111	31.7

Continued

TABLE C-5 Continued

State	Estimate Type	Total Tables	Tables Published	Tables Filtered, Percentage	Total Estimates	Estimates Published	Estimates Filtered, Percentage
Massachusetts	Population count	96,000	63,608	33.7	2,818,592	1,687,943	40.1
Massachusetts	Gini coefficient	580	580	0.0	2,610	2,610	0.0
Massachusetts	Median age of first marriage	1	1	0.0	2	2	0.0
Massachusetts	Median	15,806	14,998	5.1	114,994	113,123	1.6
Massachusetts	Ratio	1,740	1,373	21.1	2,320	1,953	15.8
Massachusetts	Total	171,258	122,147	28.7	3,902,771	2,390,154	38.8
Michigan	Aggregate	17,480	15,000	14.2	71,300	54,965	22.9
Michigan	Household count	41,631	26,867	35.5	898,383	506,083	43.7
Michigan	Housing unit count	31,510	23,532	25.3	559,820	390,133	30.3
Michigan	Population count	152,270	96,399	36.7	4,470,737	2,580,043	42.3
Michigan	Gini coefficient	920	920	0.0	4,140	4,140	0.0
Michigan	Median age of first marriage	1	1	0.0	2	2	0.0
Michigan	Median	25,071	23,599	5.9	182,399	178,325	2.2
Michigan	Ratio	2,760	2,082	24.6	3,680	3,002	18.4
Michigan	Total	271,643	188,400	30.6	6,190,461	3,716,693	40.0
Minnesota	Aggregate	8,284	7,089	14.4	33,790	25,736	23.8
Minnesota	Household count	19,730	12,246	37.9	425,757	225,158	47.1
Minnesota	Housing unit count	14,933	10,980	26.5	265,306	180,121	32.1

Minnesota	Population count	72,168	46,018	36.2	2,118,860	1,265,798	40.3
Minnesota	Gini coefficient	436	436	0.0	1,962	1,962	0.0
Minnesota	Median age of first marriage	1	1	0.0	2	2	0.0
Minnesota	Median	11,882	11,139	6.3	86,446	84,617	2.1
Minnesota	Ratio	1,308	986	24.6	1,744	1,422	18.5
Minnesota	Total	128,742	88,895	31.0	2,933,867	1,784,816	39.2
Mississippi	Aggregate	4,408	3,597	18.4	17,980	13,097	27.2
Mississippi	Household count	10,499	6,551	37.6	226,551	126,095	44.3
Mississippi	Housing unit count	7,946	5,670	28.6	141,172	92,877	34.2
Mississippi	Population count	38,406	22,295	41.9	1,127,573	585,246	48.1
Mississippi	Gini coefficient	232	232	0.0	1,044	1,044	0.0
Mississippi	Median age of first marriage	1	1	0.0	2	2	0.0
Mississippi	Median	6,323	5,981	5.4	46,003	45,067	2.0
Mississippi	Ratio	696	410	41.1	928	638	31.3
Mississippi	Total	68,511	44,737	34.7	1,561,253	864,066	44.7
Missouri	Aggregate	9,652	8,048	16.6	39,370	29,107	26.1
Missouri	Household count	22,988	13,877	39.6	496,065	256,839	48.2
Missouri	Housing unit count	17,399	12,222	29.8	309,118	197,982	36.0
Missouri	Population count	84,084	49,470	41.2	2,468,726	1,324,291	46.4
Missouri	Gini coefficient	508	508	0.0	2,286	2,286	0.0
Missouri	Median age of first marriage	1	1	0.0	2	2	0.0

Continued

TABLE C-5 Continued

State	Estimate Type	Total Tables	Tables Published	Tables Filtered, Percentage	Total Estimates	Estimates Published	Estimates Filtered, Percentage
Missouri	Median	13,844	12,998	6.1	100,720	98,634	2.1
Missouri	Ratio	1,524	1,076	29.4	2,032	1,584	22.0
Missouri	Total	150,000	98,200	34.5	3,418,319	1,910,725	44.1
Montana	Aggregate	2,508	2,117	15.6	10,230	7,623	25.5
Montana	Household count	5,974	3,474	41.8	128,901	63,310	50.9
Montana	Housing unit count	4,521	3,253	28.0	80,322	52,596	34.5
Montana	Population count	21,856	12,338	43.5	641,648	337,085	47.5
Montana	Gini coefficient	132	132	0.0	594	594	0.0
Montana	Median age of first marriage	1	1	0.0	2	2	0.0
Montana	Median	3,598	3,290	8.6	26,178	25,289	3.4
Montana	Ratio	396	272	31.3	528	404	23.5
Montana	Total	38,986	24,877	36.2	888,403	486,903	45.2
Nebraska	Aggregate	2,508	2,242	10.6	10,230	8,135	20.5
Nebraska	Household count	5,974	4,057	32.1	128,901	76,946	40.3
Nebraska	Housing unit count	4,521	3,621	19.9	80,322	61,640	23.3
Nebraska	Population count	21,856	15,409	29.5	641,648	425,761	33.6
Nebraska	Gini coefficient	132	132	0.0	594	594	0.0
Nebraska	Median age of first marriage	1	1	0.0	2	2	0.0

Nebraska	Median	3,598	3,433	4.6	26,178	25,731	1.7
Nebraska	Ratio	396	326	17.7	528	458	13.3
Nebraska	Total	38,986	29,221	25.0	888,403	599,267	32.5
Nevada	Aggregate	3,496	3,134	10.4	14,260	11,150	21.8
Nevada	Household count	8,327	6,355	23.7	179,679	119,650	33.4
Nevada	Housing unit count	6,302	5,273	16.3	111,964	85,762	23.4
Nevada	Population count	30,462	23,747	22.0	894,329	630,346	29.5
Nevada	Gini coefficient	184	184	0.0	828	828	0.0
Nevada	Median age of first marriage	1	1	0.0	2	2	0.0
Nevada	Median	5,015	4,860	3.1	36,487	36,144	0.9
Nevada	Ratio	552	541	2.0	736	725	1.5
Nevada	Total	54,339	44,095	18.9	1,238,285	884,607	28.6
New Hampshire	Aggregate	2,660	2,247	15.5	10,850	8,365	22.9
New Hampshire	Household count	6,336	3,679	41.9	136,713	68,601	49.8
New Hampshire	Housing unit count	4,795	3,490	27.2	85,190	58,006	31.9
New Hampshire	Population count	23,180	13,815	40.4	680,522	377,595	44.5
New Hampshire	Gini coefficient	140	140	0.0	630	630	0.0
New Hampshire	Median age of first marriage	1	1	0.0	2	2	0.0
New Hampshire	Median	3,816	3,552	6.9	27,764	27,076	2.5
New Hampshire	Ratio	420	267	36.4	560	407	27.3
New Hampshire	Total	41,348	27,191	34.2	942,231	540,682	42.6

Continued

TABLE C-5 Continued

State	Estimate Type	Total Tables	Tables Published	Tables Filtered, Percentage	Total Estimates	Estimates Published	Estimates Filtered, Percentage
New Jersey	Aggregate	13,148	11,035	16.1	53,630	39,585	26.2
New Jersey	Household count	31,314	20,259	35.3	675,741	360,767	46.6
New Jersey	Housing unit count	23,701	17,066	28.0	421,082	262,014	37.8
New Jersey	Population count	114,536	75,514	34.1	3,362,828	1,973,991	41.3
New Jersey	Gini coefficient	692	692	0.0	3,114	3,114	0.0
New Jersey	Median age of first marriage	1	1	0.0	2	2	0.0
New Jersey	Median	18,858	17,948	4.8	137,198	134,833	1.7
New Jersey	Ratio	2,076	1,600	22.9	2,768	2,286	17.4
New Jersey	Total	204,326	144,115	29.5	4,656,363	2,776,592	40.4
New Mexico	Aggregate	4,332	3,712	14.3	17,670	13,171	25.5
New Mexico	Household count	10,318	7,166	30.5	222,645	132,992	40.3
New Mexico	Housing unit count	7,809	5,892	24.5	138,738	92,440	33.4
New Mexico	Population count	37,744	25,399	32.7	1,108,136	650,835	41.3
New Mexico	Gini coefficient	228	228	0.0	1,026	1,026	0.0
New Mexico	Median age of first marriage	1	1	0.0	2	2	0.0
New Mexico	Median	6,214	5,854	5.8	45,210	44,271	2.1
New Mexico	Ratio	684	594	13.2	912	818	10.3
New Mexico	Total	67,330	48,846	27.5	1,534,339	935,555	39.0

New York	Aggregate	23,484	20,258	13.7	95,790	74,490	22.2
New York	Household count	55,930	37,317	33.3	1,206,957	691,071	42.7
New York	Housing unit count	42,333	32,183	24.0	752,106	527,292	29.9
New York	Population count	204,568	138,929	32.1	6,006,260	3,736,551	37.8
New York	Gini coefficient	1,236	1,236	0.0	5,562	5,562	0.0
New York	Median age of first marriage	1	1	0.0	2	2	0.0
New York	Median	33,682	31,948	5.1	245,046	240,756	1.8
New York	Ratio	3,708	2,938	20.8	4,944	4,172	15.6
New York	Total	364,942	264,810	27.4	8,316,667	5,279,896	36.5
North Carolina	Aggregate	18,772	16,012	14.7	76,570	57,594	24.8
North Carolina	Household count	44,708	29,172	34.7	964,785	543,182	43.7
North Carolina	Housing unit count	33,839	25,352	25.1	601,198	404,144	32.8
North Carolina	Population count	163,524	103,981	36.4	4,801,166	2,720,976	43.3
North Carolina	Gini coefficient	988	988	0.0	4,446	4,446	0.0
North Carolina	Median age of first marriage	1	1	0.0	2	2	0.0
North Carolina	Median	26,924	25,524	5.2	195,880	192,463	1.7
North Carolina	Ratio	2,964	2,183	26.3	3,952	3,171	19.8
North Carolina	Total	291,720	203,213	30.3	6,647,999	3,925,978	40.9
North Dakota	Aggregate	1,444	1,211	16.1	5,890	4,492	23.7
North Dakota	Household count	3,440	1,901	44.7	74,217	33,923	54.3
North Dakota	Housing unit count	2,603	1,845	29.1	46,246	30,765	33.5

Continued

TABLE C-5 Continued

State	Estimate Type	Total Tables	Tables Published	Tables Filtered, Percentage	Total Estimates	Estimates Published	Estimates Filtered, Percentage
North Dakota	Population count	12,588	7,219	42.7	369,530	199,067	46.1
North Dakota	Gini coefficient	76	76	0.0	342	342	0.0
North Dakota	Median age of first marriage	1	1	0.0	2	2	0.0
North Dakota	Median	2,072	1,931	6.8	15,076	14,721	2.4
North Dakota	Ratio	228	163	28.5	304	239	21.4
North Dakota	Total	22,452	14,347	36.1	511,607	283,551	44.6
Ohio	Aggregate	17,556	14,837	15.5	71,610	55,039	23.1
Ohio	Household count	41,812	26,370	36.9	902,289	501,839	44.4
Ohio	Housing unit count	31,647	23,170	26.8	562,254	385,934	31.4
Ohio	Population count	152,932	92,910	39.2	4,490,174	2,515,496	44.0
Ohio	Gini coefficient	924	924	0.0	4,158	4,158	0.0
Ohio	Median age of first marriage	1	1	0.0	2	2	0.0
Ohio	Median	25,180	23,532	6.5	183,192	178,913	2.3
Ohio	Ratio	2,772	1,893	31.7	3,696	2,817	23.8
Ohio	Total	272,824	183,637	32.7	6,217,375	3,644,198	41.4
Oklahoma	Aggregate	6,384	5,734	10.2	26,040	20,864	19.9
Oklahoma	Household count	15,205	11,231	26.1	328,107	213,010	35.1
Oklahoma	Housing unit count	11,508	9,473	17.7	204,456	154,523	24.4

Oklahoma	Population count	55,618	40,971	26.3	1,632,935	1,079,637	33.9
Oklahoma	Gini coefficient	336	336	0.0	1,512	1,512	0.0
Oklahoma	Median age of first marriage	1	1	0.0	2	2	0.0
Oklahoma	Median	9,157	8,922	2.6	66,621	66,076	0.8
Oklahoma	Ratio	1,008	913	9.4	1,344	1,249	7.1
Oklahoma	Total	99,217	77,581	21.8	2,261,017	1,536,873	32.0
Oregon	Aggregate	7,448	6,420	13.8	30,380	22,800	25.0
Oregon	Household count	17,739	11,136	37.2	382,791	203,003	47.0
Oregon	Housing unit count	13,426	9,957	25.8	238,532	156,028	34.6
Oregon	Population count	64,886	41,188	36.5	1,905,053	1,090,264	42.8
Oregon	Gini coefficient	392	392	0.0	1,764	1,764	0.0
Oregon	Median age of first marriage	1	1	0.0	2	2	0.0
Oregon	Median	10,683	9,941	6.9	77,723	75,769	2.5
Oregon	Ratio	1,176	992	15.6	1,568	1,384	11.7
Oregon	Total	115,751	80,027	30.9	2,637,813	1,551,014	41.2
Pennsylvania	Aggregate	18,088	15,616	13.7	73,780	58,501	20.7
Pennsylvania	Household count	43,079	27,468	36.2	929,631	520,635	44.0
Pennsylvania	Housing unit count	32,606	24,479	24.9	579,292	411,318	29.0
Pennsylvania	Population count	157,566	100,750	36.1	4,626,233	2,754,888	40.5
Pennsylvania	Gini coefficient	952	952	0.0	4,284	4,284	0.0
Pennsylvania	Median age of first marriage	1	1	0.0	2	2	0.0

Continued

TABLE C-5 Continued

State	Estimate Type	Total Tables	Tables Published	Tables Filtered, Percentage	Total Estimates	Estimates Published	Estimates Filtered, Percentage
Pennsylvania	Median	25,943	24,464	5.7	188,743	184,990	2.0
Pennsylvania	Ratio	2,856	2,093	26.7	3,808	3,043	20.1
Pennsylvania	Total	281,091	195,823	30.3	6,405,773	3,937,661	38.5
Rhode Island	Aggregate	2,432	2,072	14.8	9,920	7,300	26.4
Rhode Island	Household count	5,793	3,715	35.9	124,995	67,028	46.4
Rhode Island	Housing unit count	4,384	3,302	24.7	77,888	52,338	32.8
Rhode Island	Population count	21,194	13,785	35.0	622,211	361,675	41.9
Rhode Island	Gini coefficient	128	128	0.0	576	576	0.0
Rhode Island	Median age of first marriage	1	1	0.0	2	2	0.0
Rhode Island	Median	3,489	3,299	5.4	25,385	24,995	1.5
Rhode Island	Ratio	384	309	19.5	512	437	14.6
Rhode Island	Total	37,805	26,611	29.6	861,489	514,351	40.3
South Carolina	Aggregate	8,664	7,367	15.0	35,340	26,937	23.8
South Carolina	Household count	20,635	13,245	35.8	445,287	252,350	43.3
South Carolina	Housing unit count	15,618	11,542	26.1	277,476	189,812	31.6
South Carolina	Population count	75,478	46,917	37.8	2,216,045	1,241,993	44.0
South Carolina	Gini coefficient	456	456	0.0	2,052	2,052	0.0
South Carolina	Median age of first marriage	1	1	0.0	2	2	0.0

South Carolina	Median	12,427	11,756	5.4	90,411	88,801	1.8
South Carolina	Ratio	1,368	926	32.3	1,824	1,376	24.6
South Carolina	Total	134,647	92,210	31.5	3,068,437	1,803,323	41.2
South Dakota	Aggregate	1,672	1,497	10.5	6,820	5,546	18.7
South Dakota	Household count	3,983	2,450	38.5	85,935	46,020	46.4
South Dakota	Housing unit count	3,014	2,327	22.8	53,548	38,149	28.8
South Dakota	Population count	14,574	8,938	38.7	427,841	241,324	43.6
South Dakota	Gini coefficient	88	88	0.0	396	396	0.0
South Dakota	Median age of first marriage	1	1	0.0	2	2	0.0
South Dakota	Median	2,399	2,229	7.1	17,455	17,029	2.4
South Dakota	Ratio	264	199	24.6	352	287	18.5
South Dakota	Total	25,995	17,729	31.8	592,349	348,753	41.1
Tennessee	Aggregate	10,184	8,492	16.6	41,540	30,878	25.7
Tennessee	Household count	24,255	15,169	37.5	523,407	283,352	45.9
Tennessee	Housing unit count	18,358	13,125	28.5	326,156	213,011	34.7
Tennessee	Population count	88,718	53,525	39.7	2,604,785	1,423,336	45.4
Tennessee	Gini coefficient	536	536	0.0	2,412	2,412	0.0
Tennessee	Median age of first marriage	1	1	0.0	2	2	0.0
Tennessee	Median	14,607	13,730	6.0	106,271	104,124	2.0
Tennessee	Ratio	1,608	1,034	35.7	2,144	1,570	26.8
Tennessee	Total	158,267	105,612	33.3	3,606,717	2,058,685	42.9

Continued

TABLE C-5 Continued

State	Estimate Type	Total Tables	Tables Published	Tables Filtered, Percentage	Total Estimates	Estimates Published	Estimates Filtered, Percentage
Texas	Aggregate	41,648	34,649	16.8	169,880	120,752	28.9
Texas	Household count	99,189	65,668	33.8	2,140,491	1,182,320	44.8
Texas	Housing unit count	75,076	54,714	27.1	1,333,832	840,486	37.0
Texas	Population count	362,786	237,324	34.6	10,651,703	6,093,975	42.8
Texas	Gini coefficient	2,192	2,192	0.0	9,864	9,864	0.0
Texas	Median age of first marriage	1	1	0.0	2	2	0.0
Texas	Median	59,733	56,826	4.9	434,573	427,055	1.7
Texas	Ratio	6,576	5,130	22.0	8,768	7,274	17.0
Texas	Total	647,201	456,504	29.5	14,749,113	8,681,728	41.1
Utah	Aggregate	5,320	4,589	13.7	21,700	16,213	25.3
Utah	Household count	12,671	8,131	35.8	273,423	149,091	45.5
Utah	Housing unit count	9,590	6,998	27.0	170,380	109,776	35.6
Utah	Population count	46,350	30,801	33.5	1,360,817	825,757	39.3
Utah	Gini coefficient	280	280	0.0	1,260	1,260	0.0
Utah	Median age of first marriage	1	1	0.0	2	2	0.0
Utah	Median	7,631	7,109	6.8	55,519	54,172	2.4
Utah	Ratio	840	742	11.7	1,120	1,022	8.8
Utah	Total	82,683	58,651	29.1	1,884,221	1,157,293	38.6

Vermont	Aggregate	760	685	9.9	3,100	2,552	17.7
Vermont	Household count	1,811	1,130	37.6	39,063	21,838	44.1
Vermont	Housing unit count	1,370	1,067	22.1	24,340	19,070	21.7
Vermont	Population count	6,630	4,373	34.0	194,597	125,793	35.4
Vermont	Gini coefficient	40	40	0.0	180	180	0.0
Vermont	Median age of first marriage	1	1	0.0	2	2	0.0
Vermont	Median	1,091	1,019	6.6	7,939	7,769	2.1
Vermont	Ratio	120	99	17.5	160	139	13.1
Vermont	Total	11,823	8,414	28.8	269,381	177,343	34.2
Virginia	Aggregate	12,996	10,983	15.5	53,010	39,248	26.0
Virginia	Household count	30,952	19,576	36.8	667,929	352,806	47.2
Virginia	Housing unit count	23,427	16,795	28.3	416,214	260,900	37.3
Virginia	Population count	113,212	73,638	35.0	3,323,954	1,956,590	41.1
Virginia	Gini coefficient	684	684	0.0	3,078	3,078	0.0
Virginia	Median age of first marriage	1	1	0.0	2	2	0.0
Virginia	Median	18,640	17,614	5.5	135,612	133,123	1.8
Virginia	Ratio	2,052	1,558	24.1	2,736	2,238	18.2
Virginia	Total	201,964	140,849	30.3	4,602,535	2,747,985	40.3
Washington	Aggregate	13,148	11,465	12.8	53,630	40,519	24.4
Washington	Household count	31,314	20,414	34.8	675,741	365,823	45.9
Washington	Housing unit count	23,701	17,911	24.4	421,082	279,216	33.7

Continued

TABLE C-5 Continued

State	Estimate Type	Total Tables	Tables Published	Tables Filtered, Percentage	Total Estimates	Estimates Published	Estimates Filtered, Percentage
Washington	Population count	114,536	76,291	33.4	3,362,828	1,995,416	40.7
Washington	Gini coefficient	692	692	0.0	3,114	3,114	0.0
Washington	Median age of first marriage	1	1	0.0	2	2	0.0
Washington	Median	18,858	17,720	6.0	137,198	134,380	2.1
Washington	Ratio	2,076	1,819	12.4	2,768	2,507	9.4
Washington	Total	204,326	146,313	28.4	4,656,363	2,820,977	39.4
West Virginia	Aggregate	2,964	2,444	17.5	12,090	9,133	24.5
West Virginia	Household count	7,060	4,157	41.1	152,337	80,043	47.5
West Virginia	Housing unit count	5,343	3,723	30.3	94,926	62,353	34.3
West Virginia	Population count	25,828	14,144	45.2	758,270	384,330	49.3
West Virginia	Gini coefficient	156	156	0.0	702	702	0.0
West Virginia	Median age of first marriage	1	1	0.0	2	2	0.0
West Virginia	Median	4,252	3,915	7.9	30,936	30,047	2.9
West Virginia	Ratio	468	274	41.5	624	430	31.1
West Virginia	Total	46,072	28,814	37.5	1,049,887	567,040	46.0
Wisconsin	Aggregate	10,640	9,269	12.9	43,400	34,708	20.0
Wisconsin	Household count	25,341	15,830	37.5	546,843	300,254	45.1
Wisconsin	Housing unit count	19,180	14,288	25.5	340,760	236,790	30.5

Wisconsin	Population count	92,690	58,410	37.0	2,721,407	1,607,326	40.9
Wisconsin	Gini coefficient	560	560	0.0	2,520	2,520	0.0
Wisconsin	Median age of first marriage	1	1	0.0	2	2	0.0
Wisconsin	Median	15,261	14,339	6.0	111,029	108,574	2.2
Wisconsin	Ratio	1,680	1,286	23.5	2,240	1,846	17.6
Wisconsin	Total	165,353	113,983	31.1	3,768,201	2,292,020	39.2
Wyoming	Aggregate	1,140	944	17.2	4,650	3,374	27.4
Wyoming	Household count	2,716	1,559	42.6	58,593	27,446	53.2
Wyoming	Housing unit count	2,055	1,442	29.8	36,510	22,824	37.5
Wyoming	Population count	9,940	5,777	41.9	291,782	153,483	47.4
Wyoming	Gini coefficient	60	60	0.0	270	270	0.0
Wyoming	Median age of first marriage	1	1	0.0	2	2	0.0
Wyoming	Median	1,636	1,539	5.9	11,904	11,609	2.5
Wyoming	Ratio	180	138	23.3	240	198	17.5
Wyoming	Total	17,728	11,460	35.4	403,951	219,206	45.7
Puerto Rico	Aggregate	5,776	4,636	19.7	23,560	16,822	28.6
Puerto Rico	Household count	13,757	8,947	35.0	296,859	165,891	44.1
Puerto Rico	Housing unit count	9,880	7,036	28.8	179,436	113,694	36.6
Puerto Rico	Population count	50,170	28,510	43.2	1,469,839	722,664	50.8
Puerto Rico	Gini coefficient	304	304	0.0	1,368	1,368	0.0

Continued

TABLE C-5 Continued

State	Estimate Type	Total Tables	Tables Published	Tables Filtered, Percentage	Total Estimates	Estimates Published	Estimates Filtered, Percentage
Puerto Rico	Median age of first marriage	1	1	0.0	2	2	0.0
Puerto Rico	Median	8,285	7,916	4.5	60,277	59,383	1.5
Puerto Rico	Ratio	912	566	37.9	1,216	814	33.1
Puerto Rico	Total	89,085	57,916	35.0	2,032,557	1,080,638	46.8

NOTE: The Gini coefficient is a measure of statistical dispersion.
SOURCE: Table prepared by the Census Bureau at the panel's request.

TABLE C-6 Filtering Results by Iteration Group, Iterated Count Tables Only, 1-Year Data, 2012

Iteration Label	Total Tables	Tables Published	Tables Filtered, Percentage	Total Estimates	Estimates Published	Estimates Filtered, Percentage
White Alone	352,950	344,448	2.4	7,171,944	6,854,501	4.4
Black or African American Alone	352,950	188,252	46.7	7,171,944	2,789,363	61.1
American Indian and Alaska Native	352,950	34,241	90.3	7,171,944	383,081	94.7
Asian Alone	352,950	125,114	64.6	7,171,944	1,599,278	77.7
Native Hawaiian and Other Pacific Islander Alone	352,950	6,293	98.2	7,171,944	69,574	99.0
Some Other Race Alone	352,950	105,106	70.2	7,171,944	1,328,947	81.5
Two or More Races	352,950	104,962	70.3	7,171,944	1,195,953	83.3
White Alone, Not Hispanic or Latino	352,950	331,622	6.0	7,171,944	6,465,142	9.9
Hispanic or Latino	352,950	216,368	38.7	7,171,944	3,178,132	55.7
Total	3,176,550	1,456,406	54.2	64,547,496	23,863,971	63.0

NOTE: Only count estimate tables—persons, households, and housing units—are included.
SOURCE: Table prepared by the Census Bureau at the panel's request.

TABLE C-7 Filtering Results by Topic, 1-Year Data, 2012

Topic	Total Tables	Tables Published	Tables Filtered, Percentage	Total Estimates	Estimates Published	Estimates Filtered, Percentage
Sex and Age	211,770	154,203	27.2	3,105,960	1,879,037	39.5
Race	77,968	53,299	31.6	412,027	244,200	40.7
Hispanic	35,295	23,194	34.3	543,543	254,983	53.1
Ancestry	98,826	50,016	49.4	6,014,268	1,388,964	76.9
Citizenship	282,284	180,166	36.2	7,515,850	3,241,549	56.9
Place of Birth	155,374	132,823	14.5	2,918,331	2,769,559	5.1
Migration	204,560	129,243	36.8	4,113,937	2,863,082	30.4
Journey to Work	592,956	412,921	30.4	14,774,487	9,666,669	34.6
Relationship	70,590	68,764	2.6	1,129,440	1,102,850	2.4
Grandparents	169,416	83,110	50.9	1,503,567	727,299	51.6
Household Type	395,357	278,834	29.5	3,564,954	2,627,191	26.3
Marital Status	162,684	100,342	38.3	3,687,837	2,285,193	38.0
Fertility	134,121	96,925	27.7	1,531,803	1,248,473	18.5
School Enrollment	204,711	133,623	34.7	3,811,860	2,674,613	29.8

Educational Aattainment	261,183	161,422	38.2	4,461,288	3,262,116	26.9
Language	197,652	123,746	37.4	4,948,359	2,601,700	47.4
Poverty	712,959	465,479	34.7	18,706,350	11,019,795	41.1
Disability	247,065	217,578	11.9	5,830,734	5,514,655	5.4
Income	1,150,617	816,770	29.0	15,868,632	7,398,179	53.4
Earnings	240,006	143,512	40.2	10,454,379	4,270,769	59.1
Veteran Status	197,652	113,494	42.6	4,616,586	2,603,452	43.6
Food Stamps	127,062	102,603	19.2	1,129,440	996,507	11.8
Employment Status	275,301	182,693	33.6	12,282,660	7,041,915	42.7
Occupation/Industry	338,838	215,839	36.3	23,382,564	10,743,908	54.1
Housing	1,383,032	1,103,498	20.2	18,743,156	13,191,432	29.6
Group Quarters	7,059	6,798	3.7	7,059	6,798	3.7
Health Insurance	402,363	340,591	15.4	14,929,785	13,573,767	9.1
Total	8,336,701	5,891,486	29.3	189,988,856	115,198,655	39.4

SOURCE: Table prepared by the Census Bureau at the panel's request.

TABLE C-8 Filtering Results by State and Estimate Type (Alternate), 1-Year Data, 2012

State	Estimate Type	Total Tables	Tables Published	Tables Filtered, Percentage	Total Estimates	Estimates Published	Estimates Filtered, Percentage
Nation, Regions, and Divisions	Aggregate	1,064	1,062	0.2	4,340	4,338	0.0
Nation, Regions, and Divisions	Household count	2,535	2,485	2.0	54,687	52,761	3.5
Nation, Regions, and Divisions	Housing unit count	1,918	1,913	0.3	34,076	34,029	0.1
Nation, Regions, and Divisions	Population count	9,283	9,181	1.1	274,054	270,173	1.4
Nation, Regions, and Divisions	Gini coefficient	56	56	0.0	252	252	0.0
Nation, Regions, and Divisions	Median age of first marriage	10	10	0.0	20	20	0.0
Nation, Regions, and Divisions	Median	1,530	1,527	0.2	12,689	12,680	0.1
Nation, Regions, and Divisions	Ratio	168	167	0.6	224	223	0.4
Nation, Regions, and Divisions	Total	16,564	16,401	1.0	380,342	374,476	1.5
Alabama	Aggregate	9,804	8,332	15.0	39,990	30,513	23.7
Alabama	Household count	23,350	14,950	36.0	503,877	287,997	42.8
Alabama	Housing unit count	17,673	13,111	25.8	313,986	218,556	30.4

Alabama	Population count	85,408	52,332	38.7	2,507,600	1,402,679	44.1
Alabama	Gini coefficient	516	516	0.0	2,322	2,322	0.0
Alabama	Median age of first marriage	1	1	0.0	2	2	0.0
Alabama	Median	14,062	13,097	6.9	102,306	99,808	2.4
Alabama	Ratio	1,548	1,076	30.5	2,064	1,588	23.1
Alabama	Total	152,362	103,415	32.1	3,472,147	2,043,465	41.1
Alaska	Aggregate	1,672	1,493	10.7	6,820	5,353	21.5
Alaska	Household count	3,983	2,786	30.1	85,935	50,328	41.4
Alaska	Housing unit count	3,014	2,547	15.5	53,548	40,637	24.1
Alaska	Population count	14,574	10,674	26.8	427,841	279,446	34.7
Alaska	Gini coefficient	88	88	0.0	396	396	0.0
Alaska	Median age of first marriage	1	1	0.0	2	2	0.0
Alaska	Median	2,399	2,286	4.7	17,455	17,240	1.2
Alaska	Ratio	264	240	9.1	352	328	6.8
Alaska	Total	25,995	20,115	22.6	592,349	393,730	33.5
Arizona	Aggregate	11,248	9,641	14.3	45,880	33,507	27.0
Arizona	Household count	26,789	18,176	32.2	578,091	330,832	42.8
Arizona	Housing unit count	20,276	15,274	24.7	360,232	236,581	34.3
Arizona	Population count	97,986	66,647	32.0	2,876,903	1,725,339	40.0
Arizona	Gini coefficient	592	592	0.0	2,664	2,664	0.0

Continued

TABLE C-8 Continued

State	Estimate Type	Total Tables	Tables Published	Tables Filtered, Percentage	Total Estimates	Estimates Published	Estimates Filtered, Percentage
Arizona	Median age of first marriage	1	1	0.0	2	2	0.0
Arizona	Median	16,133	15,420	4.4	117,373	115,499	1.6
Arizona	Ratio	1,776	1,577	11.2	2,368	2,157	8.9
Arizona	Total	174,801	127,328	27.2	3,983,513	2,446,581	38.6
Arkansas	Aggregate	5,548	4,743	14.5	22,630	17,411	23.1
Arkansas	Household count	13,214	8,416	36.3	285,141	155,717	45.4
Arkansas	Housing unit count	10,001	7,355	26.5	177,682	117,560	33.8
Arkansas	Population count	48,336	29,507	39.0	1,419,128	769,301	45.8
Arkansas	Gini coefficient	292	292	0.0	1,314	1,314	0.0
Arkansas	Median age of first marriage	1	1	0.0	2	2	0.0
Arkansas	Median	7,958	7,527	5.4	57,898	56,763	2.0
Arkansas	Ratio	876	633	27.7	1,168	925	20.8
Arkansas	Total	86,226	58,474	32.2	1,964,963	1,118,993	43.1
California	Aggregate	65,588	56,624	13.7	267,530	199,464	25.4
California	Household count	156,204	108,710	30.4	3,370,881	1,963,613	41.7
California	Housing unit count	118,231	90,202	23.7	2,100,542	1,376,897	34.5
California	Population count	571,316	404,889	29.1	16,774,358	10,446,239	37.7

California	Gini coefficient	3,452	3,452	0.0	15,534	15,534	0.0
California	Median age of first marriage	1	1	0.0	2	2	0.0
California	Median	94,068	89,516	4.8	684,368	673,120	1.6
California	Ratio	10,356	9,262	10.6	13,808	12,694	8.1
California	Total	1,019,216	762,656	25.2	23,227,023	14,687,563	36.8
Colorado	Aggregate	9,196	7,958	13.5	37,510	28,243	24.7
Colorado	Household count	21,902	14,555	33.5	472,629	265,763	43.8
Colorado	Housing unit count	16,577	12,583	24.1	294,514	202,257	31.3
Colorado	Population count	80,112	54,609	31.8	2,352,104	1,466,073	37.7
Colorado	Gini coefficient	484	484	0.0	2,178	2,178	0.0
Colorado	Median age of first marriage	1	1	0.0	2	2	0.0
Colorado	Median	13,190	12,474	5.4	95,962	94,068	2.0
Colorado	Ratio	1,452	1,260	13.2	1,936	1,744	9.9
Colorado	Total	142,914	103,924	27.3	3,256,835	2,060,328	36.7
Connecticut	Aggregate	8,056	7,167	11.0	32,860	26,865	18.2
Connecticut	Household count	19,187	13,473	29.8	414,039	248,807	39.9
Connecticut	Housing unit count	14,522	11,693	19.5	258,004	189,369	26.6
Connecticut	Population count	70,182	50,553	28.0	2,060,549	1,356,909	34.1
Connecticut	Gini coefficient	424	424	0.0	1,908	1,908	0.0
Connecticut	Median age of first marriage	1	1	0.0	2	2	0.0

Continued

TABLE C-8 Continued

State	Estimate Type	Total Tables	Tables Published	Tables Filtered, Percentage	Total Estimates	Estimates Published	Estimates Filtered, Percentage
Connecticut	Median	11,555	11,062	4.3	84,067	82,792	1.5
Connecticut	Ratio	1,272	1,049	17.5	1,696	1,473	13.1
Connecticut	Total	125,199	95,422	23.8	2,853,125	1,908,125	33.1
Delaware	Aggregate	2,128	1,898	10.8	8,680	6,995	19.4
Delaware	Household count	5,069	3,594	29.1	109,371	67,641	38.2
Delaware	Housing unit count	3,836	3,055	20.4	68,152	50,184	26.4
Delaware	Population count	18,546	13,390	27.8	544,463	362,511	33.4
Delaware	Gini coefficient	112	112	0.0	504	504	0.0
Delaware	Median age of first marriage	1	1	0.0	2	2	0.0
Delaware	Median	3,053	2,939	3.7	22,213	21,933	1.3
Delaware	Ratio	336	285	15.2	448	397	11.4
Delaware	Total	33,081	25,274	23.6	753,833	510,167	32.3
District of Columbia	Aggregate	1,216	1,128	7.2	4,960	4,407	11.1
District of Columbia	Household count	2,897	2,235	22.9	62,499	42,875	31.4
District of Columbia	Housing unit count	2,192	1,951	11.0	38,944	33,633	13.6
District of Columbia	Population count	10,602	8,453	20.3	311,219	239,844	22.9

District of Columbia	Gini coefficient	64	64	0.0	288	288	0.0
District of Columbia	Median age of first marriage	1	1	0.0	2	2	0.0
District of Columbia	Median	1,745	1,701	2.5	12,697	12,607	0.7
District of Columbia	Ratio	192	176	8.3	256	240	6.3
District of Columbia	Total	18,909	15,709	16.9	430,865	333,896	22.5
Florida	Aggregate	29,412	24,908	15.3	119,970	89,361	25.5
Florida	Household count	70,048	45,863	34.5	1,511,625	844,426	44.1
Florida	Housing unit count	53,019	39,513	25.5	941,958	645,757	31.4
Florida	Population count	256,204	167,792	34.5	7,522,346	4,429,954	41.1
Florida	Gini coefficient	1,548	1,548	0.0	6,966	6,966	0.0
Florida	Median age of first marriage	1	1	0.0	2	2	0.0
Florida	Median	42,184	39,991	5.2	306,900	301,359	1.8
Florida	Ratio	4,644	3,568	23.2	6,192	5,076	18.0
Florida	Total	457,060	323,184	29.3	10,415,959	6,322,901	39.3
Georgia	Aggregate	16,036	13,357	16.7	65,410	47,754	27.0
Georgia	Household count	38,192	24,282	36.4	824,169	448,054	45.6

Continued

TABLE C-8 Continued

State	Estimate Type	Total Tables	Tables Published	Tables Filtered, Percentage	Total Estimates	Estimates Published	Estimates Filtered, Percentage
Georgia	Housing unit count	28,907	20,538	29.0	513,574	321,548	37.4
Georgia	Population count	139,692	87,114	37.6	4,101,434	2,273,697	44.6
Georgia	Gini coefficient	844	844	0.0	3,798	3,798	0.0
Georgia	Median age of first marriage	1	1	0.0	2	2	0.0
Georgia	Median	23,000	21,690	5.7	167,332	163,951	2.0
Georgia	Ratio	2,532	1,800	28.9	3,376	2,622	22.3
Georgia	Total	249,204	169,626	31.9	5,679,095	3,261,426	42.6
Hawaii	Aggregate	1,976	1,805	8.7	8,060	6,820	15.4
Hawaii	Household count	4,707	3,539	24.8	101,559	64,806	36.2
Hawaii	Housing unit count	3,562	2,963	16.8	63,284	47,577	24.8
Hawaii	Population count	17,222	13,353	22.5	505,589	355,001	29.8
Hawaii	Gini coefficient	104	104	0.0	468	468	0.0
Hawaii	Median age of first marriage	1	1	0.0	2	2	0.0
Hawaii	Median	2,835	2,725	3.9	20,627	20,385	1.2
Hawaii	Ratio	312	301	3.5	416	405	2.6
Hawaii	Total	30,719	24,791	19.3	700,005	495,464	29.2
Idaho	Aggregate	3,496	2,943	15.8	14,260	10,546	26.0
Idaho	Household count	8,327	4,960	40.4	179,679	91,351	49.2

Idaho	Housing unit count	6,302	4,328	31.3	111,964	67,472	39.7
Idaho	Population count	30,462	17,837	41.4	894,329	474,679	46.9
Idaho	Gini coefficient	184	184	0.0	828	828	0.0
Idaho	Median age of first marriage	1	1	0.0	2	2	0.0
Idaho	Median	5,015	4,683	6.6	36,487	35,487	2.7
Idaho	Ratio	552	391	29.2	736	573	22.1
Idaho	Total	54,339	35,327	35.0	1,238,285	680,938	45.0
Illinois	Aggregate	23,028	19,435	15.6	93,930	69,857	25.6
Illinois	Household count	54,844	34,953	36.3	1,183,521	633,264	46.5
Illinois	Housing unit count	41,511	30,103	27.5	737,502	477,515	35.3
Illinois	Population count	200,596	128,232	36.1	5,889,638	3,395,667	42.3
Illinois	Gini coefficient	1,212	1,212	0.0	5,454	5,454	0.0
Illinois	Median age of first marriage	1	1	0.0	2	2	0.0
Illinois	Median	33,028	31,267	5.3	240,288	235,857	1.8
Illinois	Ratio	3,636	2,646	27.2	4,848	3,854	20.5
Illinois	Total	357,856	247,849	30.7	8,155,183	4,821,470	40.9
Indiana	Aggregate	14,516	12,214	15.9	59,210	44,510	24.8
Indiana	Household count	34,572	21,879	36.7	746,049	409,976	45.0
Indiana	Housing unit count	26,167	19,049	27.2	464,894	309,023	33.5
Indiana	Population count	126,452	78,074	38.3	3,712,694	2,077,057	44.1

Continued

TABLE C-8 Continued

State	Estimate Type	Total Tables	Tables Published	Tables Filtered, Percentage	Total Estimates	Estimates Published	Estimates Filtered, Percentage
Indiana	Gini coefficient	764	764	0.0	3,438	3,438	0.0
Indiana	Median age of first marriage	1	1	0.0	2	2	0.0
Indiana	Median	20,820	19,627	5.7	151,472	148,337	2.1
Indiana	Ratio	2,292	1,606	29.9	3,056	2,364	22.6
Indiana	Total	225,584	153,214	32.1	5,140,815	2,994,707	41.7
Iowa	Aggregate	5,928	5,209	12.1	24,180	19,392	19.8
Iowa	Household count	14,119	8,848	37.3	304,671	164,101	46.1
Iowa	Housing unit count	10,686	8,021	24.9	189,852	132,693	30.1
Iowa	Population count	51,646	32,891	36.3	1,516,313	892,987	41.1
Iowa	Gini coefficient	312	312	0.0	1,404	1,404	0.0
Iowa	Median age of first marriage	1	1	0.0	2	2	0.0
Iowa	Median	8,503	8,023	5.6	61,863	60,593	2.1
Iowa	Ratio	936	688	26.5	1,248	1,000	19.9
Iowa	Total	92,131	63,993	30.5	2,099,533	1,272,172	39.4
Kansas	Aggregate	5,548	4,860	12.4	22,630	17,749	21.6
Kansas	Household count	13,214	8,774	33.6	285,141	161,123	43.5
Kansas	Housing unit count	10,001	7,662	23.4	177,682	123,772	30.3
Kansas	Population count	48,336	32,760	32.2	1,419,128	872,028	38.6

Kansas	Gini coefficient	292	292	0.0	1,314	1,314	0.0
Kansas	Median age of first marriage	1	1	0.0	2	2	0.0
Kansas	Median	7,958	7,573	4.8	57,898	56,989	1.6
Kansas	Ratio	876	736	16.0	1,168	1,028	12.0
Kansas	Total	86,226	62,658	27.3	1,964,963	1,234,005	37.2
Kentucky	Aggregate	7,144	6,067	15.1	29,140	22,884	21.5
Kentucky	Household count	17,015	10,820	36.4	367,167	205,706	44.0
Kentucky	Housing unit count	12,878	9,497	26.3	228,796	158,264	30.8
Kentucky	Population count	62,238	38,070	38.8	1,827,305	1,029,939	43.6
Kentucky	Gini coefficient	376	376	0.0	1,692	1,692	0.0
Kentucky	Median age of first marriage	1	1	0.0	2	2	0.0
Kentucky	Median	10,247	9,625	6.1	74,551	72,977	2.1
Kentucky	Ratio	1,128	766	32.1	1,504	1,142	24.1
Kentucky	Total	111,027	75,222	32.2	2,530,157	1,492,606	41.0
Louisiana	Aggregate	8,968	7,734	13.8	36,580	28,391	22.4
Louisiana	Household count	21,359	13,939	34.7	460,911	263,041	42.9
Louisiana	Housing unit count	16,166	12,025	25.6	287,212	197,787	31.1
Louisiana	Population count	78,126	49,442	36.7	2,293,793	1,310,440	42.9
Louisiana	Gini coefficient	472	472	0.0	2,124	2,124	0.0
Louisiana	Median age of first marriage	1	1	0.0	2	2	0.0

Continued

TABLE C-8 Continued

State	Estimate Type	Total Tables	Tables Published	Tables Filtered, Percentage	Total Estimates	Estimates Published	Estimates Filtered, Percentage
Louisiana	Median	12,863	12,058	6.3	93,583	91,512	2.2
Louisiana	Ratio	1,416	1,042	26.4	1,888	1,504	20.3
Louisiana	Total	139,371	96,713	30.6	3,176,093	1,894,801	40.3
Maine	Aggregate	3,192	2,680	16.0	13,020	9,827	24.5
Maine	Household count	7,603	4,530	40.4	164,055	85,749	47.7
Maine	Housing unit count	5,754	4,246	26.2	102,228	72,472	29.1
Maine	Population count	27,814	16,504	40.7	816,581	459,104	43.8
Maine	Gini coefficient	168	168	0.0	756	756	0.0
Maine	Median age of first marriage	1	1	0.0	2	2	0.0
Maine	Median	4,579	4,250	7.2	33,315	32,394	2.8
Maine	Ratio	504	329	34.7	672	497	26.0
Maine	Total	49,615	32,708	34.1	1,130,629	660,801	41.6
Maryland	Aggregate	9,044	7,890	12.8	36,890	29,304	20.6
Maryland	Household count	21,540	14,452	32.9	464,817	265,985	42.8
Maryland	Housing unit count	16,303	12,252	24.8	289,646	195,457	32.5
Maryland	Population count	78,788	54,648	30.6	2,313,230	1,482,312	35.9
Maryland	Gini coefficient	476	476	0.0	2,142	2,142	0.0
Maryland	Median age of first marriage	1	1	0.0	2	2	0.0

Maryland	Median	12,972	12,421	4.2	94,376	92,836	1.6
Maryland	Ratio	1,428	1,126	21.1	1,904	1,602	15.9
Maryland	Total	140,552	103,266	26.5	3,203,007	2,069,640	35.4
Massachusetts	Aggregate	13,224	11,586	12.4	53,940	43,107	20.1
Massachusetts	Household count	31,495	21,180	32.8	679,647	389,729	42.7
Massachusetts	Housing unit count	23,838	18,497	22.4	423,516	303,645	28.3
Massachusetts	Population count	115,198	79,023	31.4	3,382,265	2,131,098	37.0
Massachusetts	Gini coefficient	696	696	0.0	3,132	3,132	0.0
Massachusetts	Median age of first marriage	1	1	0.0	2	2	0.0
Massachusetts	Median	18,967	18,054	4.8	137,991	135,853	1.5
Massachusetts	Ratio	2,088	1,688	19.2	2,784	2,384	14.4
Massachusetts	Total	205,507	150,725	26.7	4,683,277	3,008,950	35.8
Michigan	Aggregate	18,012	15,468	14.1	73,470	56,740	22.8
Michigan	Household count	42,898	27,740	35.3	925,725	522,813	43.5
Michigan	Housing unit count	32,469	24,293	25.2	576,858	403,215	30.1
Michigan	Population count	156,904	99,600	36.5	4,606,796	2,666,717	42.1
Michigan	Gini coefficient	948	948	0.0	4,266	4,266	0.0
Michigan	Median age of first marriage	1	1	0.0	2	2	0.0
Michigan	Median	25,834	24,341	5.8	187,950	183,843	2.2
Michigan	Ratio	2,844	2,146	24.5	3,792	3,094	18.4

Continued

TABLE C-8 Continued

State	Estimate Type	Total Tables	Tables Published	Tables Filtered, Percentage	Total Estimates	Estimates Published	Estimates Filtered, Percentage
Michigan	Total	279,910	194,537	30.5	6,378,859	3,840,690	39.8
Minnesota	Aggregate	9,120	7,865	13.8	37,200	28,719	22.8
Minnesota	Household count	21,721	13,619	37.3	468,723	251,917	46.3
Minnesota	Housing unit count	16,440	12,211	25.7	292,080	201,543	31.0
Minnesota	Population count	79,450	51,057	35.7	2,332,667	1,410,629	39.5
Minnesota	Gini coefficient	480	480	0.0	2,160	2,160	0.0
Minnesota	Median age of first marriage	1	1	0.0	2	2	0.0
Minnesota	Median	13,081	12,260	6.3	95,169	93,118	2.2
Minnesota	Ratio	1,440	1,100	23.6	1,920	1,580	17.7
Minnesota	Total	141,733	98,593	30.4	3,229,921	1,989,668	38.4
Mississippi	Aggregate	4,560	3,746	17.9	18,600	13,714	26.3
Mississippi	Household count	10,861	6,850	36.9	234,363	131,752	43.8
Mississippi	Housing unit count	8,220	5,928	27.9	146,040	97,597	33.2
Mississippi	Population count	39,730	23,406	41.1	1,166,447	616,631	47.1
Mississippi	Gini coefficient	240	240	0.0	1,080	1,080	0.0
Mississippi	Median age of first marriage	1	1	0.0	2	2	0.0
Mississippi	Median	6,541	6,197	5.3	47,589	46,651	2.0
Mississippi	Ratio	720	433	39.9	960	669	30.3

Mississippi	Total	70,873	46,801	34.0	1,615,081	908,096	43.8
Missouri	Aggregate	10,716	9,018	15.8	43,710	32,772	25.0
Missouri	Household count	25,522	15,731	38.4	550,749	292,488	46.9
Missouri	Housing unit count	19,317	13,822	28.4	343,194	225,494	34.3
Missouri	Population count	93,352	56,179	39.8	2,740,844	1,513,278	44.8
Missouri	Gini coefficient	564	564	0.0	2,538	2,538	0.0
Missouri	Median age of first marriage	1	1	0.0	2	2	0.0
Missouri	Median	15,370	14,455	6.0	111,822	109,597	2.0
Missouri	Ratio	1,692	1,214	28.3	2,256	1,778	21.2
Missouri	Total	166,534	110,984	33.4	3,795,115	2,177,947	42.6
Montana	Aggregate	2,508	2,117	15.6	10,230	7,623	25.5
Montana	Household count	5,974	3,474	41.8	128,901	63,310	50.9
Montana	Housing unit count	4,521	3,253	28.0	80,322	52,596	34.5
Montana	Population count	21,856	12,338	43.5	641,648	337,085	47.5
Montana	Gini coefficient	132	132	0.0	594	594	0.0
Montana	Median age of first marriage	1	1	0.0	2	2	0.0
Montana	Median	3,598	3,290	8.6	26,178	25,289	3.4
Montana	Ratio	396	272	31.3	528	404	23.5
Montana	Total	38,986	24,877	36.2	888,403	486,903	45.2
Nebraska	Aggregate	2,964	2,675	9.8	12,090	9,778	19.1
Nebraska	Household count	7,060	4,854	31.2	152,337	91,867	39.7

Continued

TABLE C-8 Continued

State	Estimate Type	Total Tables	Tables Published	Tables Filtered, Percentage	Total Estimates	Estimates Published	Estimates Filtered, Percentage
Nebraska	Housing unit count	5,343	4,327	19.0	94,926	74,029	22.0
Nebraska	Population count	25,828	18,420	28.7	758,270	507,603	33.1
Nebraska	Gini coefficient	156	156	0.0	702	702	0.0
Nebraska	Median age of first marriage	1	1	0.0	2	2	0.0
Nebraska	Median	4,252	4,060	4.5	30,936	30,436	1.6
Nebraska	Ratio	468	389	16.9	624	545	12.7
Nebraska	Total	46,072	34,882	24.3	1,049,887	714,962	31.9
Nevada	Aggregate	3,648	3,281	10.1	14,880	11,709	21.3
Nevada	Household count	8,689	6,672	23.2	187,491	125,923	32.8
Nevada	Housing unit count	6,576	5,535	15.8	116,832	90,406	22.6
Nevada	Population count	31,786	24,941	21.5	933,203	664,296	28.8
Nevada	Gini coefficient	192	192	0.0	864	864	0.0
Nevada	Median age of first marriage	1	1	0.0	2	2	0.0
Nevada	Median	5,233	5,075	3.0	38,073	37,727	0.9
Nevada	Ratio	576	565	1.9	768	757	1.4
Nevada	Total	56,701	46,262	18.4	1,292,113	931,684	27.9
New Hampshire	Aggregate	4,712	4,081	13.4	19,220	15,368	20.0
New Hampshire	Household count	11,223	7,089	36.8	242,175	135,451	44.1

New Hampshire	Housing unit count	8,494	6,487	23.6	150,908	110,475	26.8
New Hampshire	Population count	41,054	26,606	35.2	1,205,321	743,504	38.3
New Hampshire	Gini coefficient	248	248	0.0	1,116	1,116	0.0
New Hampshire	Median age of first marriage	1	1	0.0	2	2	0.0
New Hampshire	Median	6,759	6,354	6.0	49,175	48,104	2.2
New Hampshire	Ratio	744	526	29.3	992	774	22.0
New Hampshire	Total	73,235	51,392	29.8	1,668,909	1,054,794	36.8
New Jersey	Aggregate	14,364	12,231	14.8	58,590	44,447	24.1
New Jersey	Household count	34,210	22,809	33.3	738,237	412,513	44.1
New Jersey	Housing unit count	25,893	19,164	26.0	460,026	299,964	34.8
New Jersey	Population count	125,128	85,070	32.0	3,673,820	2,256,145	38.6
New Jersey	Gini coefficient	756	756	0.0	3,402	3,402	0.0
New Jersey	Median age of first marriage	1	1	0.0	2	2	0.0
New Jersey	Median	20,602	19,661	4.6	149,886	147,466	1.6
New Jersey	Ratio	2,268	1,786	21.3	3,024	2,536	16.1
New Jersey	Total	223,222	161,478	27.7	5,086,987	3,166,475	37.8
New Mexico	Aggregate	4,484	3,852	14.1	18,290	13,740	24.9
New Mexico	Household count	10,680	7,418	30.5	230,457	137,880	40.2
New Mexico	Housing unit count	8,083	6,123	24.2	143,606	96,653	32.7
New Mexico	Population count	39,068	26,370	32.5	1,147,010	677,565	40.9

Continued

TABLE C-8 Continued

State	Estimate Type	Total Tables	Tables Published	Tables Filtered, Percentage	Total Estimates	Estimates Published	Estimates Filtered, Percentage
New Mexico	Gini coefficient	236	236	0.0	1,062	1,062	0.0
New Mexico	Median age of first marriage	1	1	0.0	2	2	0.0
New Mexico	Median	6,432	6,062	5.8	46,796	45,821	2.1
New Mexico	Ratio	708	616	13.0	944	848	10.2
New Mexico	Total	69,692	50,678	27.3	1,588,167	973,571	38.7
New York	Aggregate	24,320	21,060	13.4	99,200	77,680	21.7
New York	Household count	57,921	39,008	32.7	1,249,923	725,103	42.0
New York	Housing unit count	43,840	33,581	23.4	778,880	552,023	29.1
New York	Population count	211,850	145,263	31.4	6,220,067	3,920,933	37.0
New York	Gini coefficient	1,280	1,280	0.0	5,760	5,760	0.0
New York	Median age of first marriage	1	1	0.0	2	2	0.0
New York	Median	34,881	33,117	5.1	253,769	249,407	1.7
New York	Ratio	3,840	3,063	20.2	5,120	4,341	15.2
New York	Total	377,933	276,373	26.9	8,612,721	5,535,249	35.7
North Carolina	Aggregate	19,228	16,436	14.5	78,430	59,243	24.5
North Carolina	Household count	45,794	30,036	34.4	988,221	560,090	43.3
North Carolina	Housing unit count	34,661	26,096	24.7	615,802	417,502	32.2

North Carolina	Population count	167,496	107,220	36.0	4,917,788	2,813,424	42.8
North Carolina	Gini coefficient	1,012	1,012	0.0	4,554	4,554	0.0
North Carolina	Median age of first marriage	1	1	0.0	2	2	0.0
North Carolina	Median	27,578	26,160	5.1	200,638	197,191	1.7
North Carolina	Ratio	3,036	2,246	26.0	4,048	3,258	19.5
North Carolina	Total	298,806	209,207	30.0	6,809,483	4,055,264	40.4
North Dakota	Aggregate	1,748	1,490	14.8	7,130	5,533	22.4
North Dakota	Household count	4,164	2,342	43.8	89,841	42,287	52.9
North Dakota	Housing unit count	3,151	2,261	28.2	55,982	38,009	32.1
North Dakota	Population count	15,236	8,849	41.9	447,278	245,451	45.1
North Dakota	Gini coefficient	92	92	0.0	414	414	0.0
North Dakota	Median age of first marriage	1	1	0.0	2	2	0.0
North Dakota	Median	2,508	2,336	6.9	18,248	17,818	2.4
North Dakota	Ratio	276	205	25.7	368	297	19.3
North Dakota	Total	27,176	17,576	35.3	619,263	349,811	43.5
Ohio	Aggregate	18,696	15,844	15.3	76,260	58,979	22.7
Ohio	Household count	44,527	28,199	36.7	960,879	537,780	44.0
Ohio	Housing unit count	33,702	24,800	26.4	598,764	415,348	30.6
Ohio	Population count	162,862	99,453	38.9	4,781,729	2,699,899	43.5
Ohio	Gini coefficient	984	984	0.0	4,428	4,428	0.0

Continued

TABLE C-8 Continued

State	Estimate Type	Total Tables	Tables Published	Tables Filtered, Percentage	Total Estimates	Estimates Published	Estimates Filtered, Percentage
Ohio	Median age of first marriage	1	1	0.0	2	2	0.0
Ohio	Median	26,815	25,055	6.6	195,087	190,486	2.4
Ohio	Ratio	2,952	2,024	31.4	3,936	3,008	23.6
Ohio	Total	290,539	196,360	32.4	6,621,085	3,909,930	40.9
Oklahoma	Aggregate	6,536	5,871	10.2	26,660	21,374	19.8
Oklahoma	Household count	15,567	11,495	26.2	335,919	217,836	35.2
Oklahoma	Housing unit count	11,782	9,695	17.7	209,324	158,066	24.5
Oklahoma	Population count	56,942	41,915	26.4	1,671,809	1,103,950	34.0
Oklahoma	Gini coefficient	344	344	0.0	1,548	1,548	0.0
Oklahoma	Median age of first marriage	1	1	0.0	2	2	0.0
Oklahoma	Median	9,375	9,135	2.6	68,207	67,655	0.8
Oklahoma	Ratio	1,032	933	9.6	1,376	1,277	7.2
Oklahoma	Total	101,579	79,389	21.8	2,314,845	1,571,708	32.1
Oregon	Aggregate	7,600	6,572	13.5	31,000	23,420	24.5
Oregon	Household count	18,101	11,471	36.6	390,603	209,714	46.3
Oregon	Housing unit count	13,700	10,226	25.4	243,400	160,813	33.9
Oregon	Population count	66,210	42,450	35.9	1,943,927	1,127,142	42.0
Oregon	Gini coefficient	400	400	0.0	1,800	1,800	0.0

Oregon	Median age of first marriage	1	1	0.0	2	2	0.0
Oregon	Median	10,901	10,159	6.8	79,309	77,355	2.5
Oregon	Ratio	1,200	1,016	15.3	1,600	1,416	11.5
Oregon	Total	118,113	82,295	30.3	2,691,641	1,601,662	40.5
Pennsylvania	Aggregate	19,608	17,076	12.9	79,980	64,375	19.5
Pennsylvania	Household count	46,699	30,431	34.8	1,007,751	580,082	42.4
Pennsylvania	Housing unit count	35,346	26,967	23.7	627,972	456,094	27.4
Pennsylvania	Population count	170,806	111,786	34.6	5,014,973	3,076,711	38.6
Pennsylvania	Gini coefficient	1,032	1,032	0.0	4,644	4,644	0.0
Pennsylvania	Median age of first marriage	1	1	0.0	2	2	0.0
Pennsylvania	Median	28,123	26,578	5.5	204,603	200,666	1.9
Pennsylvania	Ratio	3,096	2,310	25.4	4,128	3,340	19.1
Pennsylvania	Total	304,711	216,181	29.1	6,944,053	4,385,914	36.8
Rhode Island	Aggregate	3,040	2,656	12.6	12,400	9,664	22.1
Rhode Island	Household count	7,241	4,931	31.9	156,243	91,402	41.5
Rhode Island	Housing unit count	5,480	4,326	21.1	97,360	70,606	27.5
Rhode Island	Population count	26,490	18,348	30.7	777,707	493,758	36.5
Rhode Island	Gini coefficient	160	160	0.0	720	720	0.0
Rhode Island	Median age of first marriage	1	1	0.0	2	2	0.0

Continued

TABLE C-8 Continued

State	Estimate Type	Total Tables	Tables Published	Tables Filtered, Percentage	Total Estimates	Estimates Published	Estimates Filtered, Percentage
Rhode Island	Median	4,361	4,149	4.9	31,729	31,285	1.4
Rhode Island	Ratio	480	399	16.9	640	559	12.7
Rhode Island	Total	47,253	34,970	26.0	1,076,801	697,996	35.2
South Carolina	Aggregate	9,196	7,863	14.5	37,510	28,882	23.0
South Carolina	Household count	21,902	14,218	35.1	472,629	271,312	42.6
South Carolina	Housing unit count	16,577	12,392	25.2	294,514	205,115	30.4
South Carolina	Population count	80,112	50,584	36.9	2,352,104	1,345,196	42.8
South Carolina	Gini coefficient	484	484	0.0	2,178	2,178	0.0
South Carolina	Median age of first marriage	1	1	0.0	2	2	0.0
South Carolina	Median	13,190	12,491	5.3	95,962	94,308	1.7
South Carolina	Ratio	1,452	1,000	31.1	1,936	1,478	23.7
South Carolina	Total	142,914	99,033	30.7	3,256,835	1,948,471	40.2
South Dakota	Aggregate	1,900	1,702	10.4	7,750	6,259	19.2
South Dakota	Household count	4,526	2,800	38.1	97,653	52,373	46.4
South Dakota	Housing unit count	3,425	2,645	22.8	60,850	43,450	28.6
South Dakota	Population count	16,560	10,232	38.2	486,152	274,081	43.6
South Dakota	Gini coefficient	100	100	0.0	450	450	0.0
South Dakota	Median age of first marriage	1	1	0.0	2	2	0.0

South Dakota	Median	2,726	2,533	7.1	19,834	19,361	2.4
South Dakota	Ratio	300	226	24.7	400	326	18.5
South Dakota	Total	29,538	20,239	31.5	673,091	396,302	41.1
Tennessee	Aggregate	11,096	9,317	16.0	45,260	34,109	24.6
Tennessee	Household count	26,427	16,656	37.0	570,279	311,826	45.3
Tennessee	Housing unit count	20,002	14,448	27.8	355,364	236,094	33.6
Tennessee	Population count	96,662	58,967	39.0	2,838,029	1,572,582	44.6
Tennessee	Gini coefficient	584	584	0.0	2,628	2,628	0.0
Tennessee	Median age of first marriage	1	1	0.0	2	2	0.0
Tennessee	Median	15,915	14,975	5.9	115,787	113,477	2.0
Tennessee	Ratio	1,752	1,153	34.2	2,336	1,737	25.6
Tennessee	Total	172,439	116,101	32.7	3,929,685	2,272,455	42.2
Texas	Aggregate	41,800	34,782	16.8	170,500	121,254	28.9
Texas	Household count	99,551	65,921	33.8	2,148,303	1,187,084	44.7
Texas	Housing unit count	75,350	54,933	27.1	1,338,700	844,154	36.9
Texas	Population count	364,110	238,244	34.6	10,690,577	6,118,625	42.8
Texas	Gini coefficient	2,200	2,200	0.0	9,900	9,900	0.0
Texas	Median age of first marriage	1	1	0.0	2	2	0.0
Texas	Median	59,951	57,034	4.9	436,159	428,613	1.7
Texas	Ratio	6,600	5,150	22.0	8,800	7,302	17.0

Continued

TABLE C-8 Continued

State	Estimate Type	Total Tables	Tables Published	Tables Filtered, Percentage	Total Estimates	Estimates Published	Estimates Filtered, Percentage
Texas	Total	649,563	458,265	29.5	14,802,941	8,716,934	41.1
Utah	Aggregate	5,472	4,718	13.8	22,320	16,700	25.2
Utah	Household count	13,033	8,342	36.0	281,235	153,102	45.6
Utah	Housing unit count	9,864	7,194	27.1	175,248	113,049	35.5
Utah	Population count	47,674	31,608	33.7	1,399,691	847,537	39.4
Utah	Gini coefficient	288	288	0.0	1,296	1,296	0.0
Utah	Median age of first marriage	1	1	0.0	2	2	0.0
Utah	Median	7,849	7,310	6.9	57,105	55,707	2.4
Utah	Ratio	864	762	11.8	1,152	1,050	8.9
Utah	Total	85,045	60,223	29.2	1,938,049	1,188,443	38.7
Vermont	Aggregate	1,140	1,018	10.7	4,650	3,844	17.3
Vermont	Household count	2,716	1,638	39.7	58,593	31,410	46.4
Vermont	Housing unit count	2,055	1,552	24.5	36,510	27,442	24.8
Vermont	Population count	9,940	6,287	36.8	291,782	180,089	38.3
Vermont	Gini coefficient	60	60	0.0	270	270	0.0
Vermont	Median age of first marriage	1	1	0.0	2	2	0.0
Vermont	Median	1,636	1,522	7.0	11,904	11,628	2.3
Vermont	Ratio	180	142	21.1	240	202	15.8

Vermont	Total	17,728	12,220	31.1	403,951	254,887	36.9
Virginia	Aggregate	13,908	11,812	15.1	56,730	42,468	25.1
Virginia	Household count	33,124	21,201	36.0	714,801	385,210	46.1
Virginia	Housing unit count	25,071	18,181	27.5	445,422	284,987	36.0
Virginia	Population count	121,156	79,528	34.4	3,557,198	2,124,826	40.3
Virginia	Gini coefficient	732	732	0.0	3,294	3,294	0.0
Virginia	Median age of first marriage	1	1	0.0	2	2	0.0
Virginia	Median	19,948	18,863	5.4	145,128	142,474	1.8
Virginia	Ratio	2,196	1,673	23.8	2,928	2,401	18.0
Virginia	Total	216,136	151,991	29.7	4,925,503	2,985,662	39.4
Washington	Aggregate	13,376	11,681	12.7	54,560	41,372	24.2
Washington	Household count	31,857	20,849	34.6	687,459	374,305	45.6
Washington	Housing unit count	24,112	18,268	24.2	428,384	285,283	33.4
Washington	Population count	116,522	77,902	33.1	3,421,139	2,041,371	40.3
Washington	Gini coefficient	704	704	0.0	3,168	3,168	0.0
Washington	Median age of first marriage	1	1	0.0	2	2	0.0
Washington	Median	19,185	18,036	6.0	139,577	136,726	2.0
Washington	Ratio	2,112	1,851	12.4	2,816	2,551	9.4
Washington	Total	207,869	149,292	28.2	4,737,105	2,884,778	39.1
West Virginia	Aggregate	4,256	3,572	16.1	17,360	13,431	22.6

Continued

TABLE C-8 Continued

State	Estimate Type	Total Tables	Tables Published	Tables Filtered, Percentage	Total Estimates	Estimates Published	Estimates Filtered, Percentage
West Virginia	Household count	10,137	6,198	38.9	218,739	120,741	44.8
West Virginia	Housing unit count	7,672	5,516	28.1	136,304	93,340	31.5
West Virginia	Population count	37,082	21,376	42.4	1,088,699	585,603	46.2
West Virginia	Gini coefficient	224	224	0.0	1,008	1,008	0.0
West Virginia	Median age of first marriage	1	1	0.0	2	2	0.0
West Virginia	Median	6,105	5,649	7.5	44,417	43,187	2.8
West Virginia	Ratio	672	412	38.7	896	636	29.0
West Virginia	Total	66,149	42,948	35.1	1,507,425	857,948	43.1
Wisconsin	Aggregate	11,780	10,332	12.3	48,050	38,904	19.0
Wisconsin	Household count	28,056	17,900	36.2	605,433	341,563	43.6
Wisconsin	Housing unit count	21,235	16,046	24.4	377,270	267,615	29.1
Wisconsin	Population count	102,620	66,023	35.7	3,012,962	1,826,073	39.4
Wisconsin	Gini coefficient	620	620	0.0	2,790	2,790	0.0
Wisconsin	Median age of first marriage	1	1	0.0	2	2	0.0
Wisconsin	Median	16,896	15,906	5.9	122,924	120,271	2.2
Wisconsin	Ratio	1,860	1,442	22.5	2,480	2,062	16.9
Wisconsin	Total	183,068	128,270	29.9	4,171,911	2,599,280	37.7
Wyoming	Aggregate	1,140	944	17.2	4,650	3,374	27.4

Wyoming	Household count	2,716	1,559	42.6	58,593	27,446	53.2
Wyoming	Housing unit count	2,055	1,442	29.8	36,510	22,824	37.5
Wyoming	Population count	9,940	5,777	41.9	291,782	153,483	47.4
Wyoming	Gini coefficient	60	60	0.0	270	270	0.0
Wyoming	Median age of first marriage	1	1	0.0	2	2	0.0
Wyoming	Median	1,636	1,539	5.9	11,904	11,609	2.5
Wyoming	Ratio	180	138	23.3	240	198	17.5
Wyoming	Total	17,728	11,460	35.4	403,951	219,206	45.7
Puerto Rico	Aggregate	5,776	4,636	19.7	23,560	16,822	28.6
Puerto Rico	Household count	13,757	8,947	35.0	296,859	165,891	44.1
Puerto Rico	Housing unit count	9,880	7,036	28.8	179,436	113,694	36.6
Puerto Rico	Population count	50,170	28,510	43.2	1,469,839	722,664	50.8
Puerto Rico	Gini coefficient	304	304	0.0	1,368	1,368	0.0
Puerto Rico	Median age of first marriage	1	1	0.0	2	2	0.0
Puerto Rico	Median	8,285	7,916	4.5	60,277	59,383	1.5
Puerto Rico	Ratio	912	566	37.9	1,216	814	33.1
Puerto Rico	Total	89,085	57,916	35.0	2,032,557	1,080,638	46.8

NOTE: The Gini coefficient is a measure of statistical dispersion.
SOURCE: Table prepared by the Census Bureau at the panel's request.

Appendix D

Data Quality Filtering Rates, 3-Year Data, 2010-2012

The American Community Survey (ACS) data quality filtering process identifies data products with the highest concentration of estimates that have low precision and prevents their publication: see discussion in Chapter 5. This appendix shows the filtering rates for the 2010-2012 3-year ACS data.

- Table D-1 shows filtering rates by population for noniterated tables.
- Table D-2 shows filtering rates by population for iterated tables.
- Table D-3 shows filtering rates by estimate type.
- Table D-4 shows filtering rates by collapsing type and estimate type.
- Table D-5 shows filtering rates by state and estimate type.
- Table D-6 shows filtering rates by iteration group for iterated count tables.
- Table D-7 shows filtering rates by topic.
- Table D-8 shows an alternate (to Table D-5) for filtering rates by state and estimate type.

TABLE D-1 Filtering Results by Population, Noniterated Tables Only, 3-Year Data, 2010-2012

Population Size Range (thousands)	Total Tables	Tables Published	Tables Filtered, Percentage	Total Estimates	Estimates Published	Estimates Filtered, Percentage
20-25	1,281,533	930,436	27.4	34,276,913	18,332,126	46.5
25-30	910,768	694,173	23.8	24,360,688	14,090,196	42.2
30-25	635,448	500,623	21.2	16,996,376	10,386,189	38.9
25-40	521,584	423,445	18.8	13,950,944	8,951,191	35.8
40-45	432,849	358,405	17.2	11,577,821	7,677,190	33.7
45-50	343,533	290,294	15.5	9,188,549	6,319,814	31.2
50-55	297,873	254,103	14.7	7,967,181	5,590,913	29.8
55-60	251,533	216,564	13.9	6,727,761	4,816,819	28.4
60-65	229,052	200,945	12.3	6,126,276	4,555,935	25.6
65-100	947,804	848,956	10.4	25,351,532	19,806,601	21.9
100-125	1,138,523	1,047,248	8.0	30,452,071	25,544,002	16.1
125-150	658,537	613,895	6.8	17,614,529	15,297,095	13.2
150-200	642,041	605,176	5.7	17,172,917	15,317,946	10.8
200-250	205,193	195,102	4.9	5,488,341	5,023,760	8.5
250-500	346,172	333,247	3.7	9,259,200	8,716,743	5.9
500-1,000	499,204	487,750	2.3	13,350,804	12,970,513	2.8
1,000+	205,489	202,324	1.5	5,493,809	5,437,861	1.0
Total	9,547,136	8,202,686	14.1	255,355,712	188,834,894	26.1

SOURCE: Table prepared by the Census Bureau at the panel's request.

TABLE D-2 Filtering Results by Population, Iterated Tables Only, 3-Year Data, 2010-2012

Population Size Range (thousands)	Total Tables	Tables Published	Tables Filtered, Percentage	Total Estimates	Estimates Published	Estimates Filtered, Percentage
20-25	1,010,592	340,521	66.3	17,981,568	4,151,834	76.9
25-30	718,272	262,391	63.5	12,780,288	3,260,009	74.5
30-25	501,120	191,327	61.8	8,916,480	2,397,326	73.1
25-40	411,336	168,044	59.1	7,318,944	2,111,617	71.1
40-45	341,388	143,782	57.9	6,074,352	1,815,052	70.1
45-50	270,918	119,254	56.0	4,820,472	1,514,808	68.6
50-55	234,900	107,768	54.1	4,179,600	1,355,424	67.6
55-60	198,360	92,981	53.1	3,529,440	1,181,114	66.5
60-65	180,612	88,391	51.1	3,213,648	1,115,774	65.3
65-100	747,504	396,124	47.0	13,300,416	5,111,461	61.6
100-125	897,840	522,510	41.8	15,975,360	6,879,182	56.9
125-150	519,390	318,316	38.7	9,241,560	4,262,835	53.9
150-200	506,340	328,601	35.1	9,009,360	4,483,020	50.2
200-250	161,820	112,641	30.4	2,879,280	1,561,630	45.8
250-500	273,006	208,553	23.6	4,857,624	3,048,963	37.2
500-1,000	393,588	327,196	16.9	7,003,152	5,116,721	26.9
1,000+	161,829	148,857	8.0	2,879,298	2,509,945	12.8
Total	7,528,815	3,877,257	48.5	133,960,842	51,876,715	61.3

SOURCE: Table prepared by the Census Bureau at the panel's request.

TABLE D-3 Filtering Results by Estimate Type, 3-Year Data, 2010-2012

Estimate Type	Total Tables	Tables Published	Tables Filtered, Percentage	Total Estimates	Estimates Published	Estimates Filtered, Percentage
Aggregate	1,096,148	935,864	14.6	4,471,130	3,410,113	23.7
Household Count	2,610,616	1,712,534	34.4	56,336,397	31,923,918	43.3
Housing Unit Count	1,974,964	1,482,777	24.9	35,095,289	24,295,615	30.8
Population Count	9,591,230	6,263,835	34.7	281,483,738	169,393,545	39.8
Gini Coefficient	57,692	57,692	0.0	259,614	259,614	0.0
Median Age of First Marriage	62	62	0.0	124	124	0.0
Median	1,572,163	1,494,055	5.0	11,439,494	11,238,728	1.8
Ratio	173,076	133,124	23.1	230,768	189,952	17.7
Total	17,075,951	12,079,943	29.3	389,316,554	240,711,609	38.2

NOTE: The Gini coefficient is a measure of statistical dispersion.
SOURCE: Table prepared by the Census Bureau at the panel's request.

TABLE D-4 Filtering Results by Collapsed Category and Estimate Type, 3-Year Data, 2010-2012

Estimate Type	Collapsed Category	Total Tables	Tables Published	Tables Filtered, Percentage	Total Estimates	Estimates Published	Estimates Filtered, Percentage
Aggregate	B tables where no C table exists	807,688	721,579	10.7	2,379,795	1,894,419	20.4
Household Count	B tables where no C table exists	533,704	479,420	10.2	5,178,016	4,912,236	5.1
Housing Unit Count	B tables where no C table exists	879,380	729,051	17.1	13,613,479	10,455,667	23.2
Population Count	B tables where no C table exists	2,048,705	1,448,234	29.3	29,169,638	23,722,179	18.7
Gini Coefficient	B tables where no C table exists	57,692	57,692	0.0	259,614	259,614	0.0
Median Age of First Marriage	B tables where no C table exists	62	62	0.0	124	124	0.0
Median	B tables where no C table exists	1,572,163	1,494,055	5.0	11,439,494	11,238,728	1.8
Ratio	B tables where no C table exists	173,076	133,124	23.1	230,768	189,952	17.7
Total	B tables where no C table exists	6,072,470	5,063,217	16.6	62,270,928	52,672,919	15.4

Aggregate	B tables where a C table does exist	144,230	89,008	38.3	1,298,070	818,965	36.9
Household count	B tables where a C table does exist	1,038,456	569,073	45.2	32,927,709	16,526,328	49.8
Housing Unit Count	B tables where a C table does exist	547,792	319,613	41.7	15,037,831	8,400,795	44.1
Population Count	B tables where a C table does exist	3,763,981	2,121,407	43.6	178,379,828	91,328,571	48.8
Total	B tables where a C table does exist	5,494,459	3,099,101	43.6	227,643,438	117,074,659	48.6
Aggregate	C tables	144,230	125,277	13.1	793,265	696,729	12.2
Household count	C tables	1,038,456	664,041	36.1	18,230,672	10,485,354	42.5
Housing Unit Count	C tables	547,792	434,113	20.8	6,443,979	5,439,153	15.6
Population Count	C tables	3,778,544	2,694,194	28.7	73,934,272	54,342,795	26.5
Total	C tables	5,509,022	3,917,625	28.9	99,402,188	70,964,031	28.6

NOTE: The Gini coefficient is a measure of statistical dispersion.
SOURCE: Table prepared by the Census Bureau at the panel's request.

TABLE D-5 Filtering Results by State and Estimate Type, 3-Year Data, 2010-2012

State	Estimate Type	Total Tables	Tables Published	Tables Filtered, Percentage	Total Estimates	Estimates Published	Estimates Filtered, Percentage
Geographies Crossing States	Aggregate	17,404	16,258	6.6	70,990	63,787	10.1
Geographies Crossing States	Household count	41,450	32,409	21.8	894,477	644,408	28.0
Geographies Crossing States	Housing unit count	31,373	27,812	11.4	557,386	497,050	10.8
Geographies Crossing States	Population count	152,294	120,621	20.8	4,471,148	3,453,956	22.8
Geographies Crossing States	Gini coefficient	916	916	0.0	4,122	4,122	0.0
Geographies Crossing States	Median age of first marriage	10	10	0.0	20	20	0.0
Geographies Crossing States	Median	24,965	24,143	3.3	183,184	181,214	1.1
Geographies Crossing States	Ratio	2,748	2,442	11.1	3,664	3,356	8.4
Geographies Crossing States	Total	271,160	224,611	17.2	6,184,991	4,847,913	21.6
Alabama	Aggregate	19,152	16,310	14.8	78,120	60,085	23.1
Alabama	Household count	45,613	29,682	34.9	984,315	563,770	42.7
Alabama	Housing unit count	34,524	26,025	24.6	613,368	434,376	29.2

Alabama	Population count	167,584	103,411	38.3	4,918,330	2,785,552	43.4
Alabama	Gini coefficient	1,008	1,008	0.0	4,536	4,536	0.0
Alabama	Median age of first marriage	1	1	0.0	2	2	0.0
Alabama	Median	27,469	26,047	5.2	199,845	196,259	1.8
Alabama	Ratio	3,024	2,057	32.0	4,032	3,021	25.1
Alabama	Total	298,375	204,541	31.4	6,802,548	4,047,601	40.5
Alaska	Aggregate	2,964	2,694	9.1	12,090	9,802	18.9
Alaska	Household count	7,060	5,121	27.5	152,337	94,739	37.8
Alaska	Housing unit count	5,343	4,550	14.8	94,926	75,833	20.1
Alaska	Population count	25,939	19,673	24.2	761,209	529,600	30.4
Alaska	Gini coefficient	156	156	0.0	702	702	0.0
Alaska	Median age of first marriage	1	1	0.0	2	2	0.0
Alaska	Median	4,252	4,134	2.8	30,936	30,678	0.8
Alaska	Ratio	468	450	3.8	624	606	2.9
Alaska	Total	46,183	36,779	20.4	1,052,826	741,962	29.5
Arizona	Aggregate	17,860	15,301	14.3	72,850	54,215	25.6
Arizona	Household count	42,536	29,433	30.8	917,913	540,997	41.1
Arizona	Housing unit count	32,195	24,785	23.0	571,990	395,567	30.8
Arizona	Population count	156,279	108,569	30.5	4,586,541	2,865,865	37.5
Arizona	Gini coefficient	940	940	0.0	4,230	4,230	0.0

Continued

TABLE D-5 Continued

State	Estimate Type	Total Tables	Tables Published	Tables Filtered, Percentage	Total Estimates	Estimates Published	Estimates Filtered, Percentage
Arizona	Median age of first marriage	1	1	0.0	2	2	0.0
Arizona	Median	25,616	24,604	4.0	186,364	183,643	1.5
Arizona	Ratio	2,820	2,425	14.0	3,760	3,313	11.9
Arizona	Total	278,247	206,058	25.9	6,343,650	4,047,832	36.2
Arkansas	Aggregate	12,084	10,128	16.2	49,290	36,819	25.3
Arkansas	Household count	28,780	18,215	36.7	621,057	342,919	44.8
Arkansas	Housing unit count	21,783	15,922	26.9	387,006	259,360	33.0
Arkansas	Population count	105,739	63,261	40.2	3,103,249	1,680,280	45.9
Arkansas	Gini coefficient	636	636	0.0	2,862	2,862	0.0
Arkansas	Median age of first marriage	1	1	0.0	2	2	0.0
Arkansas	Median	17,332	16,383	5.5	126,096	123,696	1.9
Arkansas	Ratio	1,908	1,287	32.5	2,544	1,907	25.0
Arkansas	Total	188,263	125,833	33.2	4,292,106	2,447,845	43.0
California	Aggregate	103,436	91,544	11.5	421,910	330,438	21.7
California	Household count	246,342	179,169	27.3	5,316,069	3,336,271	37.2
California	Housing unit count	186,457	149,696	19.7	3,312,674	2,392,449	27.8
California	Population count	905,069	672,503	25.7	26,562,683	18,006,910	32.2

California	Gini coefficient	5,444	5,444	0.0	24,498	24,498	0.0
California	Median age of first marriage	1	1	0.0	2	2	0.0
California	Median	148,350	141,961	4.3	1,079,282	1,063,372	1.5
California	Ratio	16,332	14,978	8.3	21,776	20,344	6.6
California	Total	1,611,431	1,255,296	22.1	36,738,894	25,174,284	31.5
Colorado	Aggregate	13,832	12,230	11.6	56,420	44,939	20.3
Colorado	Household count	32,943	23,035	30.1	710,895	432,301	39.2
Colorado	Housing unit count	24,934	19,778	20.7	442,988	329,212	25.7
Colorado	Population count	121,034	86,458	28.6	3,552,140	2,384,814	32.9
Colorado	Gini coefficient	728	728	0.0	3,276	3,276	0.0
Colorado	Median age of first marriage	1	1	0.0	2	2	0.0
Colorado	Median	19,839	18,962	4.4	144,335	142,050	1.6
Colorado	Ratio	2,184	1,910	12.5	2,912	2,636	9.5
Colorado	Total	215,495	163,102	24.3	4,912,968	3,339,230	32.0
Connecticut	Aggregate	17,480	14,927	14.6	71,300	54,273	23.9
Connecticut	Household count	41,631	27,414	34.2	898,383	502,431	44.1
Connecticut	Housing unit count	31,510	23,930	24.1	559,820	387,049	30.9
Connecticut	Population count	152,954	103,260	32.5	4,488,956	2,781,563	38.0
Connecticut	Gini coefficient	920	920	0.0	4,140	4,140	0.0
Connecticut	Median age of first marriage	1	1	0.0	2	2	0.0

Continued

TABLE D-5 Continued

State	Estimate Type	Total Tables	Tables Published	Tables Filtered, Percentage	Total Estimates	Estimates Published	Estimates Filtered, Percentage
Connecticut	Median	25,071	23,917	4.6	182,399	179,378	1.7
Connecticut	Ratio	2,760	2,180	21.0	3,680	3,096	15.9
Connecticut	Total	272,327	196,549	27.8	6,208,680	3,911,932	37.0
Delaware	Aggregate	2,660	2,332	12.3	10,850	8,571	21.0
Delaware	Household count	6,336	4,330	31.7	136,713	80,878	40.8
Delaware	Housing unit count	4,795	3,725	22.3	85,190	61,796	27.5
Delaware	Population count	23,279	16,117	30.8	683,141	440,770	35.5
Delaware	Gini coefficient	140	140	0.0	630	630	0.0
Delaware	Median age of first marriage	1	1	0.0	2	2	0.0
Delaware	Median	3,816	3,645	4.5	27,764	27,307	1.6
Delaware	Ratio	420	343	18.3	560	483	13.8
Delaware	Total	41,447	30,633	26.1	944,850	620,437	34.3
District of Columbia	Aggregate	836	788	5.7	3,410	3,106	8.9
District of Columbia	Household count	1,992	1,575	20.9	42,969	30,206	29.7
District of Columbia	Housing unit count	1,507	1,405	6.8	26,774	25,053	6.4

District of Columbia	Population count	7,319	6,030	17.6	214,733	175,843	18.1
District of Columbia	Gini coefficient	44	44	0.0	198	198	0.0
District of Columbia	Median age of first marriage	1	1	0.0	2	2	0.0
District of Columbia	Median	1,200	1,173	2.3	8,732	8,639	1.1
District of Columbia	Ratio	132	128	3.0	176	172	2.3
District of Columbia	Total	13,031	11,144	14.5	296,994	243,219	18.1
Florida	Aggregate	45,144	38,860	13.9	184,140	141,875	23.0
Florida	Household count	107,515	73,622	31.5	2,320,167	1,381,149	40.5
Florida	Housing unit count	81,378	62,962	22.6	1,445,796	1,053,421	27.1
Florida	Population count	395,014	271,059	31.4	11,593,144	7,324,130	36.8
Florida	Gini coefficient	2,376	2,376	0.0	10,692	10,692	0.0
Florida	Median age of first marriage	1	1	0.0	2	2	0.0
Florida	Median	64,747	61,929	4.4	471,051	464,001	1.5
Florida	Ratio	7,128	5,716	19.8	9,504	7,992	15.9
Florida	Total	703,303	516,525	26.6	16,034,496	10,383,262	35.2
Georgia	Aggregate	30,324	25,380	16.3	123,690	90,568	26.8

Continued

TABLE D-5 Continued

State	Estimate Type	Total Tables	Tables Published	Tables Filtered, Percentage	Total Estimates	Estimates Published	Estimates Filtered, Percentage
Georgia	Household count	72,220	46,894	35.1	1,558,497	877,196	43.7
Georgia	Housing unit count	54,663	40,202	26.5	971,166	646,732	33.4
Georgia	Population count	265,339	167,438	36.9	7,787,329	4,444,247	42.9
Georgia	Gini coefficient	1,596	1,596	0.0	7,182	7,182	0.0
Georgia	Median age of first marriage	1	1	0.0	2	2	0.0
Georgia	Median	43,492	41,391	4.8	316,416	311,177	1.7
Georgia	Ratio	4,788	3,430	28.4	6,384	4,956	22.4
Georgia	Total	472,423	326,332	30.9	10,770,666	6,382,060	40.7
Hawaii	Aggregate	3,268	2,939	10.1	13,330	11,007	17.4
Hawaii	Household count	7,784	5,832	25.1	167,961	108,097	35.6
Hawaii	Housing unit count	5,891	4,833	18.0	104,662	77,733	25.7
Hawaii	Population count	28,599	21,861	23.6	839,277	586,996	30.1
Hawaii	Gini coefficient	172	172	0.0	774	774	0.0
Hawaii	Median age of first marriage	1	1	0.0	2	2	0.0
Hawaii	Median	4,688	4,559	2.8	34,108	33,797	0.9
Hawaii	Ratio	516	484	6.2	688	652	5.2
Hawaii	Total	50,919	40,681	20.1	1,160,802	819,058	29.4

Idaho	Aggregate	7,600	6,436	15.3	31,000	23,017	25.8
Idaho	Household count	18,101	11,130	38.5	390,603	206,262	47.2
Idaho	Housing unit count	13,700	9,937	27.5	243,400	159,044	34.7
Idaho	Population count	66,504	41,042	38.3	1,951,746	1,105,753	43.3
Idaho	Gini coefficient	400	400	0.0	1,800	1,800	0.0
Idaho	Median age of first marriage	1	1	0.0	2	2	0.0
Idaho	Median	10,901	10,225	6.2	79,309	77,450	2.3
Idaho	Ratio	1,200	955	20.4	1,600	1,355	15.3
Idaho	Total	118,407	80,126	32.3	2,699,460	1,574,683	41.7
Illinois	Aggregate	51,984	43,540	16.2	212,040	156,976	26.0
Illinois	Household count	123,805	77,937	37.0	2,671,707	1,422,526	46.8
Illinois	Housing unit count	93,708	66,877	28.6	1,664,856	1,071,698	35.6
Illinois	Population count	454,864	286,110	37.1	13,349,674	7,728,965	42.1
Illinois	Gini coefficient	2,736	2,736	0.0	12,312	12,312	0.0
Illinois	Median age of first marriage	1	1	0.0	2	2	0.0
Illinois	Median	74,557	70,795	5.0	542,421	532,957	1.7
Illinois	Ratio	8,208	5,883	28.3	10,944	8,595	21.5
Illinois	Total	809,863	553,879	31.6	18,463,956	10,934,031	40.8
Indiana	Aggregate	31,692	26,427	16.6	129,270	95,345	26.2
Indiana	Household count	75,478	46,551	38.3	1,628,805	875,668	46.2

Continued

TABLE D-5 Continued

State	Estimate Type	Total Tables	Tables Published	Tables Filtered, Percentage	Total Estimates	Estimates Published	Estimates Filtered, Percentage
Indiana	Housing unit count	57,129	41,036	28.2	1,014,978	673,998	33.6
Indiana	Population count	277,309	166,360	40.0	8,138,635	4,495,890	44.8
Indiana	Gini coefficient	1,668	1,668	0.0	7,506	7,506	0.0
Indiana	Median age of first marriage	1	1	0.0	2	2	0.0
Indiana	Median	45,454	42,841	5.7	330,690	323,772	2.1
Indiana	Ratio	5,004	3,441	31.2	6,672	5,105	23.5
Indiana	Total	493,735	328,325	33.5	11,256,558	6,477,286	42.5
Iowa	Aggregate	12,312	10,623	13.7	50,220	39,429	21.5
Iowa	Household count	29,323	18,331	37.5	632,775	343,200	45.8
Iowa	Housing unit count	22,194	16,671	24.9	394,308	282,406	28.4
Iowa	Population count	107,734	66,977	37.8	3,161,800	1,852,734	41.4
Iowa	Gini coefficient	648	648	0.0	2,916	2,916	0.0
Iowa	Median age of first marriage	1	1	0.0	2	2	0.0
Iowa	Median	17,659	16,687	5.5	128,475	126,065	1.9
Iowa	Ratio	1,944	1,452	25.3	2,592	2,100	19.0
Iowa	Total	191,815	131,390	31.5	4,373,088	2,648,852	39.4
Kansas	Aggregate	13,528	11,464	15.3	55,180	40,436	26.7

Kansas	Household count	32,219	20,473	36.5	695,271	369,905	46.8
Kansas	Housing unit count	24,386	18,080	25.9	433,252	291,320	32.8
Kansas	Population count	118,374	75,717	36.0	3,474,072	2,017,520	41.9
Kansas	Gini coefficient	712	712	0.0	3,204	3,204	0.0
Kansas	Median age of first marriage	1	1	0.0	2	2	0.0
Kansas	Median	19,403	18,397	5.2	141,163	138,518	1.9
Kansas	Ratio	2,136	1,757	17.7	2,848	2,465	13.4
Kansas	Total	210,759	146,601	30.4	4,804,992	2,863,370	40.4
Kentucky	Aggregate	16,568	13,637	17.7	67,580	50,026	26.0
Kentucky	Household count	39,459	24,218	38.6	851,511	466,284	45.2
Kentucky	Housing unit count	29,866	21,269	28.8	530,612	350,940	33.9
Kentucky	Population count	144,974	82,743	42.9	4,254,752	2,249,359	47.1
Kentucky	Gini coefficient	872	872	0.0	3,924	3,924	0.0
Kentucky	Median age of first marriage	1	1	0.0	2	2	0.0
Kentucky	Median	23,763	22,330	6.0	172,883	169,135	2.2
Kentucky	Ratio	2,616	1,616	38.2	3,488	2,474	29.1
Kentucky	Total	258,119	166,686	35.4	5,884,752	3,292,144	44.1
Louisiana	Aggregate	17,328	14,935	13.8	70,680	55,752	21.1
Louisiana	Household count	41,269	27,718	32.8	890,571	530,868	40.4
Louisiana	Housing unit count	31,236	23,893	23.5	554,952	400,502	27.8

Continued

TABLE D-5 Continued

State	Estimate Type	Total Tables	Tables Published	Tables Filtered, Percentage	Total Estimates	Estimates Published	Estimates Filtered, Percentage
Louisiana	Population count	151,624	98,186	35.2	4,449,922	2,652,422	40.4
Louisiana	Gini coefficient	912	912	0.0	4,104	4,104	0.0
Louisiana	Median age of first marriage	1	1	0.0	2	2	0.0
Louisiana	Median	24,853	23,610	5.0	180,813	177,680	1.7
Louisiana	Ratio	2,736	2,038	25.5	3,648	2,932	19.6
Louisiana	Total	269,959	191,293	29.1	6,154,692	3,824,262	37.9
Maine	Aggregate	6,840	5,773	15.6	27,900	21,374	23.4
Maine	Household count	16,291	9,742	40.2	351,543	183,977	47.7
Maine	Housing unit count	12,330	9,045	26.6	219,060	155,835	28.9
Maine	Population count	59,854	35,519	40.7	1,756,576	1,000,790	43.0
Maine	Gini coefficient	360	360	0.0	1,620	1,620	0.0
Maine	Median age of first marriage	1	1	0.0	2	2	0.0
Maine	Median	9,811	9,140	6.8	71,379	69,676	2.4
Maine	Ratio	1,080	740	31.5	1,440	1,100	23.6
Maine	Total	106,567	70,320	34.0	2,429,520	1,434,374	41.0
Maryland	Aggregate	14,060	12,200	13.2	57,350	45,118	21.3
Maryland	Household count	33,486	22,262	33.5	722,613	409,599	43.3

Maryland	Housing unit count	25,345	19,045	24.9	450,290	304,114	32.5
Maryland	Population count	123,029	85,128	30.8	3,610,691	2,330,399	35.5
Maryland	Gini coefficient	740	740	0.0	3,330	3,330	0.0
Maryland	Median age of first marriage	1	1	0.0	2	2	0.0
Maryland	Median	20,166	19,296	4.3	146,714	144,536	1.5
Maryland	Ratio	2,220	1,806	18.6	2,960	2,542	14.1
Maryland	Total	219,047	160,478	26.7	4,993,950	3,239,640	35.1
Massachusetts	Aggregate	29,716	24,918	16.1	121,210	91,213	24.7
Massachusetts	Household count	70,772	43,638	38.3	1,527,249	786,892	48.5
Massachusetts	Housing unit count	53,567	38,417	28.3	951,694	618,475	35.0
Massachusetts	Population count	260,019	162,951	37.3	7,631,193	4,390,570	42.5
Massachusetts	Gini coefficient	1,564	1,564	0.0	7,038	7,038	0.0
Massachusetts	Median age of first marriage	1	1	0.0	2	2	0.0
Massachusetts	Median	42,620	40,397	5.2	310,072	304,199	1.9
Massachusetts	Ratio	4,692	3,387	27.8	6,256	4,951	20.9
Massachusetts	Total	462,951	315,273	31.9	10,554,714	6,203,340	41.2
Michigan	Aggregate	40,356	34,579	14.3	164,610	126,653	23.1
Michigan	Household count	96,112	62,140	35.3	2,074,089	1,174,612	43.4
Michigan	Housing unit count	72,747	54,368	25.3	1,292,454	915,864	29.1
Michigan	Population count	353,119	224,355	36.5	10,363,573	6,115,595	41.0
Michigan	Gini coefficient	2,124	2,124	0.0	9,558	9,558	0.0

Continued

TABLE D-5 Continued

State	Estimate Type	Total Tables	Tables Published	Tables Filtered, Percentage	Total Estimates	Estimates Published	Estimates Filtered, Percentage
Michigan	Median age of first marriage	1	1	0.0	2	2	0.0
Michigan	Median	57,880	54,719	5.5	421,092	412,512	2.0
Michigan	Ratio	6,372	4,856	23.8	8,496	6,980	17.8
Michigan	Total	628,711	437,142	30.5	14,333,874	8,761,776	38.9
Minnesota	Aggregate	24,168	20,547	15.0	98,580	74,860	24.1
Minnesota	Household count	57,559	35,168	38.9	1,242,111	651,235	47.6
Minnesota	Housing unit count	43,566	31,668	27.3	774,012	518,581	33.0
Minnesota	Population count	211,474	132,541	37.3	6,206,452	3,685,418	40.6
Minnesota	Gini coefficient	1,272	1,272	0.0	5,724	5,724	0.0
Minnesota	Median age of first marriage	1	1	0.0	2	2	0.0
Minnesota	Median	34,663	32,637	5.8	252,183	247,139	2.0
Minnesota	Ratio	3,816	2,849	25.3	5,088	4,119	19.0
Minnesota	Total	376,519	256,683	31.8	8,584,152	5,187,078	39.6
Mississippi	Aggregate	14,212	11,334	20.3	57,970	40,947	29.4
Mississippi	Household count	33,848	20,696	38.9	730,425	388,014	46.9
Mississippi	Housing unit count	25,619	17,670	31.0	455,158	283,413	37.7
Mississippi	Population count	124,359	69,310	44.3	3,649,725	1,835,004	49.7

Mississippi	Gini coefficient	748	748	0.0	3,366	3,366	0.0
Mississippi	Median age of first marriage	1	1	0.0	2	2	0.0
Mississippi	Median	20,384	19,299	5.3	148,300	145,293	2.0
Mississippi	Ratio	2,244	1,241	44.7	2,992	1,937	35.3
Mississippi	Total	221,415	140,299	36.6	5,047,938	2,697,976	46.6
Missouri	Aggregate	25,232	20,777	17.7	102,920	74,454	27.7
Missouri	Household count	60,093	36,467	39.3	1,296,795	676,354	47.8
Missouri	Housing unit count	45,484	31,996	29.7	808,088	516,883	36.0
Missouri	Population count	220,784	129,941	41.1	6,479,690	3,514,832	45.8
Missouri	Gini coefficient	1,328	1,328	0.0	5,976	5,976	0.0
Missouri	Median age of first marriage	1	1	0.0	2	2	0.0
Missouri	Median	36,189	34,221	5.4	263,285	258,255	1.9
Missouri	Ratio	3,984	2,717	31.8	5,312	4,041	23.9
Missouri	Total	393,095	257,448	34.5	8,962,068	5,050,797	43.6
Montana	Aggregate	4,788	4,160	13.1	19,530	15,392	21.2
Montana	Household count	11,404	7,036	38.3	246,081	134,368	45.4
Montana	Housing unit count	8,631	6,570	23.9	153,342	111,644	27.2
Montana	Population count	41,899	25,523	39.1	1,229,617	718,131	41.6
Montana	Gini coefficient	252	252	0.0	1,134	1,134	0.0
Montana	Median age of first marriage	1	1	0.0	2	2	0.0

Continued

TABLE D-5 Continued

State	Estimate Type	Total Tables	Tables Published	Tables Filtered, Percentage	Total Estimates	Estimates Published	Estimates Filtered, Percentage
Montana	Median	6,868	6,445	6.2	49,968	48,813	2.3
Montana	Ratio	756	588	22.2	1,008	836	17.1
Montana	Total	74,599	50,575	32.2	1,700,682	1,030,320	39.4
Nebraska	Aggregate	7,828	6,651	15.0	31,930	24,325	23.8
Nebraska	Household count	18,644	11,521	38.2	402,321	210,894	47.6
Nebraska	Housing unit count	14,111	10,350	26.7	250,702	171,750	31.5
Nebraska	Population count	68,499	42,485	38.0	2,010,297	1,161,206	42.2
Nebraska	Gini coefficient	412	412	0.0	1,854	1,854	0.0
Nebraska	Median age of first marriage	1	1	0.0	2	2	0.0
Nebraska	Median	11,228	10,627	5.4	81,688	80,245	1.8
Nebraska	Ratio	1,236	931	24.7	1,648	1,343	18.5
Nebraska	Total	121,959	82,978	32.0	2,780,442	1,651,619	40.6
Nevada	Aggregate	5,548	5,017	9.6	22,630	18,255	19.3
Nevada	Household count	13,214	10,099	23.6	285,141	192,568	32.5
Nevada	Housing unit count	10,001	8,408	15.9	177,682	138,420	22.1
Nevada	Population count	48,549	37,452	22.9	1,424,787	1,009,547	29.1
Nevada	Gini coefficient	292	292	0.0	1,314	1,314	0.0

Nevada	Median age of first marriage	1	1	0.0	2	2	0.0
Nevada	Median	7,958	7,650	3.9	57,898	57,252	1.1
Nevada	Ratio	876	843	3.8	1,168	1,133	3.0
Nevada	Total	86,439	69,762	19.3	1,970,622	1,418,491	28.0
New Hampshire	Aggregate	6,460	5,360	17.0	26,350	19,987	24.1
New Hampshire	Household count	15,386	8,893	42.2	332,013	162,405	51.1
New Hampshire	Housing unit count	11,645	8,303	28.7	206,890	141,352	31.7
New Hampshire	Population count	56,529	33,215	41.2	1,658,991	926,157	44.2
New Hampshire	Gini coefficient	340	340	0.0	1,530	1,530	0.0
New Hampshire	Median age of first marriage	1	1	0.0	2	2	0.0
New Hampshire	Median	9,266	8,701	6.1	67,414	65,813	2.4
New Hampshire	Ratio	1,020	686	32.7	1,360	1,026	24.6
New Hampshire	Total	100,647	65,499	34.9	2,294,550	1,318,272	42.5
New Jersey	Aggregate	36,024	29,969	16.8	146,940	107,146	27.1
New Jersey	Household count	85,795	54,255	36.8	1,851,447	956,957	48.3
New Jersey	Housing unit count	64,938	45,563	29.8	1,153,716	693,003	39.9
New Jersey	Population count	315,214	205,489	34.8	9,251,104	5,418,000	41.4
New Jersey	Gini coefficient	1,896	1,896	0.0	8,532	8,532	0.0
New Jersey	Median age of first marriage	1	1	0.0	2	2	0.0

Continued

TABLE D-5 Continued

State	Estimate Type	Total Tables	Tables Published	Tables Filtered, Percentage	Total Estimates	Estimates Published	Estimates Filtered, Percentage
New Jersey	Median	51,667	49,350	4.5	375,891	370,104	1.5
New Jersey	Ratio	5,688	4,327	23.9	7,584	6,189	18.4
New Jersey	Total	561,223	390,850	30.4	12,795,216	7,559,933	40.9
New Mexico	Aggregate	8,968	7,798	13.0	36,580	28,167	23.0
New Mexico	Household count	21,359	15,289	28.4	460,911	288,825	37.3
New Mexico	Housing unit count	16,166	12,686	21.5	287,212	202,799	29.4
New Mexico	Population count	78,474	54,741	30.2	2,303,052	1,424,855	38.1
New Mexico	Gini coefficient	472	472	0.0	2,124	2,124	0.0
New Mexico	Median age of first marriage	1	1	0.0	2	2	0.0
New Mexico	Median	12,863	12,389	3.7	93,583	92,337	1.3
New Mexico	Ratio	1,416	1,242	12.3	1,888	1,708	9.5
New Mexico	Total	139,719	104,618	25.1	3,185,352	2,040,817	35.9
New York	Aggregate	53,200	45,209	15.0	217,000	165,763	23.6
New York	Household count	126,701	81,381	35.8	2,734,203	1,491,293	45.5
New York	Housing unit count	95,900	70,434	26.6	1,703,800	1,147,630	32.6
New York	Population count	465,504	306,619	34.1	13,661,946	8,341,931	38.9
New York	Gini coefficient	2,800	2,800	0.0	12,600	12,600	0.0

New York	Median age of first marriage	1	1	0.0	2	2	0.0
New York	Median	76,301	72,366	5.2	555,109	545,234	1.8
New York	Ratio	8,400	6,548	22.0	11,200	9,340	16.6
New York	Total	828,807	585,358	29.4	18,895,860	11,713,793	38.0
North Carolina	Aggregate	31,996	28,019	12.4	130,510	102,926	21.1
North Carolina	Household count	76,202	51,688	32.2	1,644,429	979,234	40.5
North Carolina	Housing unit count	57,677	45,049	21.9	1,024,714	750,519	26.8
North Carolina	Population count	279,969	185,937	33.6	8,216,703	4,995,772	39.2
North Carolina	Gini coefficient	1,684	1,684	0.0	7,578	7,578	0.0
North Carolina	Median age of first marriage	1	1	0.0	2	2	0.0
North Carolina	Median	45,890	43,745	4.7	333,862	328,771	1.5
North Carolina	Ratio	5,052	4,003	20.8	6,736	5,667	15.9
North Carolina	Total	498,471	360,126	27.8	11,364,534	7,170,469	36.9
North Dakota	Aggregate	3,268	2,820	13.7	13,330	10,210	23.4
North Dakota	Household count	7,784	4,604	40.9	167,961	84,404	49.7
North Dakota	Housing unit count	5,891	4,437	24.7	104,662	76,548	26.9
North Dakota	Population count	28,599	17,117	40.1	839,277	483,631	42.4
North Dakota	Gini coefficient	172	172	0.0	774	774	0.0
North Dakota	Median age of first marriage	1	1	0.0	2	2	0.0

Continued

TABLE D-5 Continued

State	Estimate Type	Total Tables	Tables Published	Tables Filtered, Percentage	Total Estimates	Estimates Published	Estimates Filtered, Percentage
North Dakota	Median	4,688	4,406	6.0	34,108	33,436	2.0
North Dakota	Ratio	516	388	24.8	688	560	18.6
North Dakota	Total	50,919	33,945	33.3	1,160,802	689,565	40.6
Ohio	Aggregate	50,236	41,478	17.4	204,910	152,289	25.7
Ohio	Household count	119,642	72,354	39.5	2,581,869	1,359,143	47.4
Ohio	Housing unit count	90,557	63,886	29.5	1,608,874	1,055,151	34.4
Ohio	Population count	439,569	255,331	41.9	12,900,783	6,964,494	46.0
Ohio	Gini coefficient	2,644	2,644	0.0	11,898	11,898	0.0
Ohio	Median age of first marriage	1	1	0.0	2	2	0.0
Ohio	Median	72,050	67,667	6.1	524,182	512,249	2.3
Ohio	Ratio	7,932	5,071	36.1	10,576	7,681	27.4
Ohio	Total	782,631	508,432	35.0	17,843,094	10,062,907	43.6
Oklahoma	Aggregate	14,136	12,561	11.1	57,660	45,618	20.9
Oklahoma	Household count	33,667	24,448	27.4	726,519	462,107	36.4
Oklahoma	Housing unit count	25,482	20,728	18.7	452,724	344,996	23.8
Oklahoma	Population count	123,694	88,806	28.2	3,630,208	2,362,490	34.9
Oklahoma	Gini coefficient	744	744	0.0	3,348	3,348	0.0

Oklahoma	Median age of first marriage	1	1	0.0	2	2	0.0
Oklahoma	Median	20,275	19,486	3.9	147,507	145,734	1.2
Oklahoma	Ratio	2,232	1,976	11.5	2,976	2,714	8.8
Oklahoma	Total	220,231	168,750	23.4	5,020,944	3,367,009	32.9
Oregon	Aggregate	14,744	12,810	13.1	60,140	45,950	23.6
Oregon	Household count	35,115	23,044	34.4	757,767	423,813	44.1
Oregon	Housing unit count	26,578	20,519	22.8	472,196	334,925	29.1
Oregon	Population count	129,014	84,737	34.3	3,786,344	2,271,519	40.0
Oregon	Gini coefficient	776	776	0.0	3,492	3,492	0.0
Oregon	Median age of first marriage	1	1	0.0	2	2	0.0
Oregon	Median	21,147	19,987	5.5	153,851	150,798	2.0
Oregon	Ratio	2,328	1,985	14.7	3,104	2,755	11.2
Oregon	Total	229,703	163,859	28.7	5,236,896	3,233,254	38.3
Pennsylvania	Aggregate	44,536	37,446	15.9	181,660	140,228	22.8
Pennsylvania	Household count	106,067	65,584	38.2	2,288,919	1,224,673	46.5
Pennsylvania	Housing unit count	80,282	58,635	27.0	1,426,324	986,937	30.8
Pennsylvania	Population count	389,694	241,407	38.1	11,437,008	6,675,419	41.6
Pennsylvania	Gini coefficient	2,344	2,344	0.0	10,548	10,548	0.0
Pennsylvania	Median age of first marriage	1	1	0.0	2	2	0.0

Continued

TABLE D-5 Continued

State	Estimate Type	Total Tables	Tables Published	Tables Filtered, Percentage	Total Estimates	Estimates Published	Estimates Filtered, Percentage
Pennsylvania	Median	63,875	60,314	5.6	464,707	455,258	2.0
Pennsylvania	Ratio	7,032	4,929	29.9	9,376	7,265	22.5
Pennsylvania	Total	693,831	470,660	32.2	15,818,544	9,500,330	39.9
Rhode Island	Aggregate	4,940	4,236	14.3	20,150	15,371	23.7
Rhode Island	Household count	11,766	7,498	36.3	253,893	139,286	45.1
Rhode Island	Housing unit count	8,905	6,668	25.1	158,210	110,568	30.1
Rhode Island	Population count	43,229	27,750	35.8	1,268,651	758,219	40.2
Rhode Island	Gini coefficient	260	260	0.0	1,170	1,170	0.0
Rhode Island	Median age of first marriage	1	1	0.0	2	2	0.0
Rhode Island	Median	7,086	6,726	5.1	51,554	50,630	1.8
Rhode Island	Ratio	780	613	21.4	1,040	873	16.1
Rhode Island	Total	76,967	53,752	30.2	1,754,670	1,076,119	38.7
South Carolina	Aggregate	15,656	13,453	14.1	63,860	49,924	21.8
South Carolina	Household count	37,287	24,727	33.7	804,639	472,261	41.3
South Carolina	Housing unit count	28,222	21,659	23.3	501,404	363,475	27.5
South Carolina	Population count	136,994	87,731	36.0	4,020,548	2,369,935	41.1
South Carolina	Gini coefficient	824	824	0.0	3,708	3,708	0.0

South Carolina	Median age of first marriage	1	1	0.0	2	2	0.0
South Carolina	Median	22,455	21,322	5.0	163,367	160,486	1.8
South Carolina	Ratio	2,472	1,785	27.8	3,296	2,593	21.3
South Carolina	Total	243,911	171,502	29.7	5,560,824	3,422,384	38.5
South Dakota	Aggregate	4,028	3,363	16.5	16,430	12,523	23.8
South Dakota	Household count	9,594	5,591	41.7	207,021	100,629	51.4
South Dakota	Housing unit count	7,261	5,296	27.1	129,002	88,825	31.1
South Dakota	Population count	35,249	20,660	41.4	1,034,447	570,521	44.8
South Dakota	Gini coefficient	212	212	0.0	954	954	0.0
South Dakota	Median age of first marriage	1	1	0.0	2	2	0.0
South Dakota	Median	5,778	5,509	4.7	42,038	41,255	1.9
South Dakota	Ratio	636	442	30.5	848	652	23.1
South Dakota	Total	62,759	41,074	34.6	1,430,742	815,361	43.0
Tennessee	Aggregate	21,964	18,424	16.1	89,590	66,842	25.4
Tennessee	Household count	52,310	33,111	36.7	1,128,837	633,970	43.8
Tennessee	Housing unit count	39,593	28,931	26.9	703,426	482,324	31.4
Tennessee	Population count	192,189	115,591	39.9	5,640,459	3,128,451	44.5
Tennessee	Gini coefficient	1,156	1,156	0.0	5,202	5,202	0.0
Tennessee	Median age of first marriage	1	1	0.0	2	2	0.0

Continued

TABLE D-5 Continued

State	Estimate Type	Total Tables	Tables Published	Tables Filtered, Percentage	Total Estimates	Estimates Published	Estimates Filtered, Percentage
Tennessee	Median	31,502	29,809	5.4	229,186	224,678	2.0
Tennessee	Ratio	3,468	2,342	32.5	4,624	3,488	24.6
Tennessee	Total	342,183	229,365	33.0	7,801,326	4,544,957	41.7
Texas	Aggregate	69,236	59,054	14.7	282,410	211,287	25.2
Texas	Household count	164,892	114,271	30.7	3,558,369	2,131,595	40.1
Texas	Housing unit count	124,807	95,908	23.2	2,217,374	1,554,124	29.9
Texas	Population count	605,819	415,549	31.4	17,780,033	11,036,690	37.9
Texas	Gini coefficient	3,644	3,644	0.0	16,398	16,398	0.0
Texas	Median age of first marriage	1	1	0.0	2	2	0.0
Texas	Median	99,300	95,020	4.3	722,432	711,516	1.5
Texas	Ratio	10,932	8,916	18.4	14,576	12,472	14.4
Texas	Total	1,078,631	792,363	26.5	24,591,594	15,674,084	36.3
Utah	Aggregate	9,880	8,534	13.6	40,300	30,374	24.6
Utah	Household count	23,531	15,234	35.3	507,783	279,823	44.9
Utah	Housing unit count	17,810	13,087	26.5	316,420	208,631	34.1
Utah	Population count	86,454	57,797	33.1	2,537,256	1,566,825	38.2
Utah	Gini coefficient	520	520	0.0	2,340	2,340	0.0

Utah	Median age of first marriage	1	1	0.0	2	2	0.0
Utah	Median	14,171	13,475	4.9	103,099	101,133	1.9
Utah	Ratio	1,560	1,343	13.9	2,080	1,855	10.8
Utah	Total	153,927	109,991	28.5	3,509,280	2,190,983	37.6
Vermont	Aggregate	2,812	2,430	13.6	11,470	9,196	19.8
Vermont	Household count	6,698	4,063	39.3	144,525	77,346	46.5
Vermont	Housing unit count	5,069	3,789	25.3	90,058	66,509	26.1
Vermont	Population count	24,609	15,288	37.9	722,175	436,223	39.6
Vermont	Gini coefficient	148	148	0.0	666	666	0.0
Vermont	Median age of first marriage	1	1	0.0	2	2	0.0
Vermont	Median	4,034	3,742	7.2	29,350	28,535	2.8
Vermont	Ratio	444	321	27.7	592	469	20.8
Vermont	Total	43,815	29,782	32.0	998,838	618,946	38.0
Virginia	Aggregate	24,624	20,891	15.2	100,440	76,008	24.3
Virginia	Household count	58,645	37,951	35.3	1,265,547	700,735	44.6
Virginia	Housing unit count	44,388	32,671	26.4	788,616	527,545	33.1
Virginia	Population count	215,464	140,832	34.6	6,323,554	3,831,884	39.4
Virginia	Gini coefficient	1,296	1,296	0.0	5,832	5,832	0.0
Virginia	Median age of first marriage	1	1	0.0	2	2	0.0
Virginia	Median	35,317	33,584	4.9	256,941	252,577	1.7

Continued

TABLE D-5 Continued

State	Estimate Type	Total Tables	Tables Published	Tables Filtered, Percentage	Total Estimates	Estimates Published	Estimates Filtered, Percentage
Virginia	Ratio	3,888	2,918	24.9	5,184	4,198	19.0
Virginia	Total	383,623	270,144	29.6	8,746,116	5,398,781	38.3
Washington	Aggregate	23,256	20,548	11.6	94,860	73,780	22.2
Washington	Household count	55,387	37,731	31.9	1,195,239	689,396	42.3
Washington	Housing unit count	41,922	33,031	21.2	744,804	538,010	27.8
Washington	Population count	203,494	142,279	30.1	5,972,248	3,821,974	36.0
Washington	Gini coefficient	1,224	1,224	0.0	5,508	5,508	0.0
Washington	Median age of first marriage	1	1	0.0	2	2	0.0
Washington	Median	33,355	31,660	5.1	242,667	238,501	1.7
Washington	Ratio	3,672	3,300	10.1	4,896	4,518	7.7
Washington	Total	362,311	269,774	25.5	8,260,224	5,371,689	35.0
West Virginia	Aggregate	8,056	6,610	17.9	32,860	24,797	24.5
West Virginia	Household count	19,187	11,566	39.7	414,039	224,961	45.7
West Virginia	Housing unit count	14,522	10,310	29.0	258,004	176,036	31.8
West Virginia	Population count	70,494	38,962	44.7	2,068,848	1,070,330	48.3
West Virginia	Gini coefficient	424	424	0.0	1,908	1,908	0.0
West Virginia	Median age of first marriage	1	1	0.0	2	2	0.0

West Virginia	Median	11,555	10,893	5.7	84,067	82,233	2.2
West Virginia	Ratio	1,272	703	44.7	1,696	1,115	34.3
West Virginia	Total	125,511	79,469	36.7	2,861,424	1,581,382	44.7
Wisconsin	Aggregate	23,560	20,273	14.0	96,100	75,050	21.9
Wisconsin	Household count	56,111	35,054	37.5	1,210,863	662,869	45.3
Wisconsin	Housing unit count	42,470	32,078	24.5	754,540	545,945	27.6
Wisconsin	Population count	206,154	130,384	36.8	6,050,316	3,646,280	39.7
Wisconsin	Gini coefficient	1,240	1,240	0.0	5,580	5,580	0.0
Wisconsin	Median age of first marriage	1	1	0.0	2	2	0.0
Wisconsin	Median	33,791	32,029	5.2	245,839	241,125	1.9
Wisconsin	Ratio	3,720	2,830	23.9	4,960	4,070	17.9
Wisconsin	Total	367,047	253,889	30.8	8,368,200	5,180,921	38.1
Wyoming	Aggregate	3,648	3,134	14.1	14,880	11,230	24.5
Wyoming	Household count	8,689	5,161	40.6	187,491	94,126	49.8
Wyoming	Housing unit count	6,576	4,778	27.3	116,832	75,223	35.6
Wyoming	Population count	31,924	19,152	40.0	936,862	514,976	45.0
Wyoming	Gini coefficient	192	192	0.0	864	864	0.0
Wyoming	Median age of first marriage	1	1	0.0	2	2	0.0
Wyoming	Median	5,233	4,924	5.9	38,073	37,252	2.2
Wyoming	Ratio	576	442	23.3	768	634	17.4

Continued

TABLE D-5 Continued

State	Estimate Type	Total Tables	Tables Published	Tables Filtered, Percentage	Total Estimates	Estimates Published	Estimates Filtered, Percentage
Wyoming	Total	56,839	37,784	33.5	1,295,772	734,307	43.3
Puerto Rico	Aggregate	10,716	8,735	18.5	43,710	32,390	25.9
Puerto Rico	Household count	25,522	17,178	32.7	550,749	325,479	40.9
Puerto Rico	Housing unit count	18,330	13,406	26.9	332,901	224,022	32.7
Puerto Rico	Population count	93,487	55,860	40.2	2,737,843	1,452,308	47.0
Puerto Rico	Gini coefficient	564	564	0.0	2,538	2,538	0.0
Puerto Rico	Median age of first marriage	1	1	0.0	2	2	0.0
Puerto Rico	Median	15,370	14,787	3.8	111,822	110,365	1.3
Puerto Rico	Ratio	1,692	1,084	35.9	2,256	1,568	30.5
Puerto Rico	Total	165,682	111,615	32.6	3,781,821	2,148,672	43.2

NOTE: The Gini coefficient is a measure of statistical dispersion.
SOURCE: Table prepared by the Census Bureau at the panel's request.

TABLE D-6 Filtering Results by Iteration Group, Iterated Count Tables Only, 3-Year Data, 2010-2012

Iteration	Total Tables	Tables Published	Tables Filtered, Percentage	Total Estimates	Estimates Published	Estimates Filtered, Percentage
White Alone	721,150	703,761	2.4	14,653,768	14,017,952	4.3
Black or African American Alone	721,150	370,398	48.6	14,653,768	5,633,576	61.6
American Indian and Alaska Native	721,150	90,489	87.5	14,653,768	1,039,672	92.9
Asian Alone	721,150	253,623	64.8	14,653,768	3,413,431	76.7
Native Hawaiian and Other Pacific Islander Alone	721,150	16,387	97.7	14,653,768	183,166	98.8
Some Other Race Alone	721,150	221,964	69.2	14,653,768	2,951,471	79.9
Two or More Races	721,150	241,037	66.6	14,653,768	2,958,284	79.8
White Alone, Not Hispanic or Latino	721,150	684,367	5.1	14,653,768	13,460,635	8.1
Hispanic or Latino	721,150	424,626	41.1	14,653,768	6,421,142	56.2
Total	6,490,350	3,006,652	53.7	131,883,912	50,079,329	62.0

NOTE: Only count estimate tables—persons, households, and housing units—are included.
SOURCE: Table prepared by the Census Bureau at the panel's request.

TABLE D-7 Filtering Results by Topic, 3-Year Data, 2010-2012

Topic	Total Tables	Tables Published	Tables Filtered, Percentage	Total Estimates	Estimates Published	Estimates Filtered, Percentage
Sex and Age	432,690	314,372	27.3	6,346,120	3,864,256	39.1
Race	201,923	109,777	45.6	1,976,022	524,038	73.5
Hispanic	72,115	47,401	34.3	1,110,571	536,000	51.7
Ancestry	201,922	104,701	48.1	12,288,396	3,059,644	75.1
Citizenship	576,779	363,488	37.0	15,358,139	6,677,680	56.5
Place of Birth	317,447	268,744	15.3	5,962,198	5,582,182	6.4
Migration	417,986	262,796	37.1	8,405,849	5,837,059	30.6
Journey to Work	1,211,532	841,093	30.6	30,187,339	20,096,558	33.4
Relationship	144,230	139,183	3.5	2,307,680	2,231,751	3.3
Grandparents	346,152	176,413	49.0	3,072,099	1,556,001	49.4
Household Type	807,741	565,975	29.9	7,283,774	5,355,552	26.5
Marital Status	332,056	207,713	37.4	7,531,845	5,024,735	33.3
Fertility	274,037	197,762	27.8	3,129,791	2,527,356	19.2

School Enrollment	418,267	276,855	33.8	7,788,420	5,542,292	28.8
Educational Attainment	533,651	331,444	37.9	9,115,336	6,666,030	26.9
Language	403,844	246,391	39.0	10,110,523	5,238,550	48.2
Poverty	1,456,723	953,475	34.5	38,220,950	22,687,890	40.6
Disability	504,805	444,232	12.0	11,913,398	11,213,621	5.9
Income	2,350,949	1,680,370	28.5	32,422,904	15,600,775	51.9
Earnings	490,382	298,364	39.2	21,360,463	8,999,525	57.9
Veteran Status	403,844	235,617	41.7	9,432,642	5,386,174	42.9
Food Stamps	259,614	206,700	20.4	2,307,680	1,987,706	13.9
Employment Status	562,497	376,428	33.1	25,096,020	14,629,975	41.7
Occupation/ Industry	692,310	455,587	34.2	47,772,132	24,744,776	48.2
Housing	2,825,921	2,266,705	19.8	38,297,195	27,555,947	28.0
Group Quarters	14,423	14,017	2.8	14,423	14,017	2.8
Health Insurance	822,111	694,340	15.5	30,504,645	27,571,519	9.6
Total	17,075,951	12,079,943	29.3	389,316,554	240,711,609	38.2

SOURCE: Table prepared by the Census Bureau at the panel's request.

TABLE D-8 Filtering Results by State and Estimate Type (Alternate), 3-Year Data, 2010-2012

State	Estimate Type	Total Tables	Tables Published	Tables Filtered, Percentage	Total Estimates	Estimates Published	Estimates Filtered, Percentage
Nation, regions, and divisions	Aggregate	1,064	1,064	0.0	4,340	4,340	0.0
Nation, regions, and divisions	Household count	2,535	2,513	0.9	54,687	53,671	1.9
Nation, regions, and divisions	Housing unit count	1,918	1,917	0.1	34,076	34,065	0.0
Nation, regions, and divisions	Population count	9,319	9,290	0.3	274,993	273,638	0.5
Nation, regions, and divisions	Gini coefficient	56	56	0.0	252	252	0.0
Nation, regions, and divisions	Median age of first marriage	10	10	0.0	20	20	0.0
Nation, regions, and divisions	Median	1,530	1,529	0.1	12,689	12,688	0.0
Nation, regions, and divisions	Ratio	168	168	0.0	224	224	0.0
Nation, regions, and divisions	Total	16,600	16,547	0.3	381,281	378,898	0.6
Alabama	Aggregate	19,608	16,739	14.6	79,980	61,794	22.7
Alabama	Household count	46,699	30,544	34.6	1,007,751	580,485	42.4
Alabama	Housing unit count	35,346	26,771	24.3	627,972	447,775	28.7

Alabama	Population count	171,574	106,665	37.8	5,035,432	2,877,020	42.9
Alabama	Gini coefficient	1,032	1,032	0.0	4,644	4,644	0.0
Alabama	Median age of first marriage	1	1	0.0	2	2	0.0
Alabama	Median	28,123	26,683	5.1	204,603	200,993	1.8
Alabama	Ratio	3,096	2,123	31.4	4,128	3,111	24.6
Alabama	Total	305,479	210,558	31.1	6,964,512	4,175,824	40.0
Alaska	Aggregate	2,964	2,694	9.1	12,090	9,802	18.9
Alaska	Household count	7,060	5,121	27.5	152,337	94,739	37.8
Alaska	Housing unit count	5,343	4,550	14.8	94,926	75,833	20.1
Alaska	Population count	25,939	19,673	24.2	761,209	529,600	30.4
Alaska	Gini coefficient	156	156	0.0	702	702	0.0
Alaska	Median age of first marriage	1	1	0.0	2	2	0.0
Alaska	Median	4,252	4,134	2.8	30,936	30,678	0.8
Alaska	Ratio	468	450	3.8	624	606	2.9
Alaska	Total	46,183	36,779	20.4	1,052,826	741,962	29.5
Arizona	Aggregate	18,088	15,508	14.3	73,780	54,998	25.5
Arizona	Household count	43,079	29,804	30.8	929,631	547,922	41.1
Arizona	Housing unit count	32,606	25,125	22.9	579,292	401,093	30.8
Arizona	Population count	158,274	109,984	30.5	4,645,092	2,903,105	37.5
Arizona	Gini coefficient	952	952	0.0	4,284	4,284	0.0
Arizona	Median age of first marriage	1	1	0.0	2	2	0.0

Continued

TABLE D-8 Continued

State	Estimate Type	Total Tables	Tables Published	Tables Filtered, Percentage	Total Estimates	Estimates Published	Estimates Filtered, Percentage
Arizona	Median	25,943	24,919	3.9	188,743	185,990	1.5
Arizona	Ratio	2,856	2,459	13.9	3,808	3,359	11.8
Arizona	Total	281,799	208,752	25.9	6,424,632	4,100,753	36.2
Arkansas	Aggregate	12,692	10,688	15.8	51,770	38,960	24.7
Arkansas	Household count	30,228	19,352	36.0	652,305	364,640	44.1
Arkansas	Housing unit count	22,879	16,892	26.2	406,478	276,190	32.1
Arkansas	Population count	111,059	67,472	39.2	3,259,385	1,795,895	44.9
Arkansas	Gini coefficient	668	668	0.0	3,006	3,006	0.0
Arkansas	Median age of first marriage	1	1	0.0	2	2	0.0
Arkansas	Median	18,204	17,234	5.3	132,440	129,991	1.8
Arkansas	Ratio	2,004	1,375	31.4	2,672	2,025	24.2
Arkansas	Total	197,735	133,682	32.4	4,508,058	2,610,709	42.1
California	Aggregate	103,740	91,830	11.5	423,150	331,538	21.7
California	Household count	247,066	179,752	27.2	5,331,693	3,347,579	37.2
California	Housing unit count	187,005	150,186	19.7	3,322,410	2,400,691	27.7
California	Population count	907,729	674,719	25.7	26,640,751	18,068,444	32.2
California	Gini coefficient	5,460	5,460	0.0	24,570	24,570	0.0
California	Median age of first marriage	1	1	0.0	2	2	0.0

California	Median	148,786	142,388	4.3	1,082,454	1,066,515	1.5
California	Ratio	16,380	15,025	8.3	21,840	20,407	6.6
California	Total	1,616,167	1,259,361	22.1	36,846,870	25,259,746	31.4
Colorado	Aggregate	13,832	12,230	11.6	56,420	44,939	20.3
Colorado	Household count	32,943	23,035	30.1	710,895	432,301	39.2
Colorado	Housing unit count	24,934	19,778	20.7	442,988	329,212	25.7
Colorado	Population count	121,034	86,458	28.6	3,552,140	2,384,814	32.9
Colorado	Gini coefficient	728	728	0.0	3,276	3,276	0.0
Colorado	Median age of first marriage	1	1	0.0	2	2	0.0
Colorado	Median	19,839	18,962	4.4	144,335	142,050	1.6
Colorado	Ratio	2,184	1,910	12.5	2,912	2,636	9.5
Colorado	Total	215,495	163,102	24.3	4,912,968	3,339,230	32.0
Connecticut	Aggregate	18,392	15,805	14.1	75,020	57,808	22.9
Connecticut	Household count	43,803	29,322	33.1	945,255	540,705	42.8
Connecticut	Housing unit count	33,154	25,504	23.1	589,028	415,494	29.5
Connecticut	Population count	160,934	110,426	31.4	4,723,160	2,992,066	36.7
Connecticut	Gini coefficient	968	968	0.0	4,356	4,356	0.0
Connecticut	Median age of first marriage	1	1	0.0	2	2	0.0
Connecticut	Median	26,379	25,207	4.4	191,915	188,854	1.6
Connecticut	Ratio	2,904	2,318	20.2	3,872	3,282	15.2
Connecticut	Total	286,535	209,551	26.9	6,532,608	4,202,567	35.7

Continued

TABLE D-8 Continued

State	Estimate Type	Total Tables	Tables Published	Tables Filtered, Percentage	Total Estimates	Estimates Published	Estimates Filtered, Percentage
Delaware	Aggregate	3,268	2,907	11.0	13,330	10,852	18.6
Delaware	Household count	7,784	5,539	28.8	167,961	105,351	37.3
Delaware	Housing unit count	5,891	4,731	19.7	104,662	79,585	24.0
Delaware	Population count	28,599	20,643	27.8	839,277	572,187	31.8
Delaware	Gini coefficient	172	172	0.0	774	774	0.0
Delaware	Median age of first marriage	1	1	0.0	2	2	0.0
Delaware	Median	4,688	4,503	3.9	34,108	33,619	1.4
Delaware	Ratio	516	428	17.1	688	600	12.8
Delaware	Total	50,919	38,924	23.6	1,160,802	802,970	30.8
District of Columbia	Aggregate	1,216	1,167	4.0	4,960	4,648	6.3
District of Columbia	Household count	2,897	2,427	16.2	62,499	48,045	23.1
District of Columbia	Housing unit count	2,192	2,073	5.4	38,944	37,073	4.8
District of Columbia	Population count	10,644	9,200	13.6	312,318	269,318	13.8
District of Columbia	Gini coefficient	64	64	0.0	288	288	0.0

District of Columbia	Median age of first marriage	1	1	0.0	2	2	0.0
District of Columbia	Median	1,745	1,717	1.6	12,697	12,603	0.7
District of Columbia	Ratio	192	188	2.1	256	252	1.6
District of Columbia	Total	18,951	16,837	11.2	431,964	372,229	13.8
Florida	Aggregate	45,220	38,934	13.9	184,450	142,176	22.9
Florida	Household count	107,696	73,765	31.5	2,324,073	1,383,863	40.5
Florida	Housing unit count	81,515	63,093	22.6	1,448,230	1,055,789	27.1
Florida	Population count	395,679	271,622	31.4	11,612,661	7,339,985	36.8
Florida	Gini coefficient	2,380	2,380	0.0	10,710	10,710	0.0
Florida	Median age of first marriage	1	1	0.0	2	2	0.0
Florida	Median	64,856	62,035	4.3	471,844	464,791	1.5
Florida	Ratio	7,140	5,728	19.8	9,520	8,008	15.9
Florida	Total	704,487	517,558	26.5	16,061,490	10,405,324	35.2
Georgia	Aggregate	31,084	26,101	16.0	126,790	93,430	26.3
Georgia	Household count	74,030	48,349	34.7	1,597,557	905,142	43.3
Georgia	Housing unit count	56,033	41,462	26.0	995,506	669,609	32.7
Georgia	Population count	271,989	172,926	36.4	7,982,499	4,599,432	42.4
Georgia	Gini coefficient	1,636	1,636	0.0	7,362	7,362	0.0

Continued

TABLE D-8 Continued

State	Estimate Type	Total Tables	Tables Published	Tables Filtered, Percentage	Total Estimates	Estimates Published	Estimates Filtered, Percentage
Georgia	Median age of first marriage	1	1	0.0	2	2	0.0
Georgia	Median	44,582	42,455	4.8	324,346	319,055	1.6
Georgia	Ratio	4,908	3,542	27.8	6,544	5,108	21.9
Georgia	Total	484,263	336,472	30.5	11,040,606	6,599,140	40.2
Hawaii	Aggregate	3,268	2,939	10.1	13,330	11,007	17.4
Hawaii	Household count	7,784	5,832	25.1	167,961	108,097	35.6
Hawaii	Housing unit count	5,891	4,833	18.0	104,662	77,733	25.7
Hawaii	Population count	28,599	21,861	23.6	839,277	586,996	30.1
Hawaii	Gini coefficient	172	172	0.0	774	774	0.0
Hawaii	Median age of first marriage	1	1	0.0	2	2	0.0
Hawaii	Median	4,688	4,559	2.8	34,108	33,797	0.9
Hawaii	Ratio	516	484	6.2	688	652	5.2
Hawaii	Total	50,919	40,681	20.1	1,160,802	819,058	29.4
Idaho	Aggregate	8,056	6,822	15.3	32,860	24,426	25.7
Idaho	Household count	19,187	11,801	38.5	414,039	218,901	47.1
Idaho	Housing unit count	14,522	10,547	27.4	258,004	169,101	34.5
Idaho	Population count	70,494	43,524	38.3	2,068,848	1,172,323	43.3
Idaho	Gini coefficient	424	424	0.0	1,908	1,908	0.0

Idaho	Median age of first marriage	1	1	0.0	2	2	0.0
Idaho	Median	11,555	10,829	6.3	84,067	82,084	2.4
Idaho	Ratio	1,272	1,011	20.5	1,696	1,435	15.4
Idaho	Total	125,511	84,959	32.3	2,861,424	1,670,180	41.6
Illinois	Aggregate	53,960	45,379	15.9	220,100	164,127	25.4
Illinois	Household count	128,511	81,506	36.6	2,773,263	1,493,804	46.1
Illinois	Housing unit count	97,270	69,947	28.1	1,728,140	1,126,377	34.8
Illinois	Population count	472,154	299,199	36.6	13,857,116	8,103,509	41.5
Illinois	Gini coefficient	2,840	2,840	0.0	12,780	12,780	0.0
Illinois	Median age of first marriage	1	1	0.0	2	2	0.0
Illinois	Median	77,391	73,532	5.0	563,039	553,354	1.7
Illinois	Ratio	8,520	6,154	27.8	11,360	8,970	21.0
Illinois	Total	840,647	578,558	31.2	19,165,800	11,462,923	40.2
Indiana	Aggregate	33,212	27,885	16.0	135,470	101,097	25.4
Indiana	Household count	79,098	49,622	37.3	1,706,925	937,352	45.1
Indiana	Housing unit count	59,869	43,609	27.2	1,063,658	720,454	32.3
Indiana	Population count	290,609	177,784	38.8	8,528,975	4,826,639	43.4
Indiana	Gini coefficient	1,748	1,748	0.0	7,866	7,866	0.0
Indiana	Median age of first marriage	1	1	0.0	2	2	0.0

Continued

TABLE D-8 Continued

State	Estimate Type	Total Tables	Tables Published	Tables Filtered, Percentage	Total Estimates	Estimates Published	Estimates Filtered, Percentage
Indiana	Median	47,634	44,977	5.6	346,550	339,552	2.0
Indiana	Ratio	5,244	3,667	30.1	6,992	5,411	22.6
Indiana	Total	517,415	349,293	32.5	11,796,438	6,938,373	41.2
Iowa	Aggregate	13,300	11,529	13.3	54,250	42,874	21.0
Iowa	Household count	31,676	20,075	36.6	683,553	376,773	44.9
Iowa	Housing unit count	23,975	18,200	24.1	425,950	309,106	27.4
Iowa	Population count	116,379	73,432	36.9	3,415,521	2,033,940	40.5
Iowa	Gini coefficient	700	700	0.0	3,150	3,150	0.0
Iowa	Median age of first marriage	1	1	0.0	2	2	0.0
Iowa	Median	19,076	18,053	5.4	138,784	136,257	1.8
Iowa	Ratio	2,100	1,585	24.5	2,800	2,285	18.4
Iowa	Total	207,207	143,575	30.7	4,724,010	2,904,387	38.5
Kansas	Aggregate	13,908	11,826	15.0	56,730	41,845	26.2
Kansas	Household count	33,124	21,234	35.9	714,801	385,275	46.1
Kansas	Housing unit count	25,071	18,712	25.4	445,422	302,699	32.0
Kansas	Population count	121,699	78,538	35.5	3,571,657	2,099,064	41.2
Kansas	Gini coefficient	732	732	0.0	3,294	3,294	0.0
Kansas	Median age of first marriage	1	1	0.0	2	2	0.0

Kansas	Median	19,948	18,932	5.1	145,128	142,467	1.8
Kansas	Ratio	2,196	1,815	17.3	2,928	2,543	13.1
Kansas	Total	216,679	151,790	29.9	4,939,962	2,977,189	39.7
Kentucky	Aggregate	17,936	14,909	16.9	73,160	54,921	24.9
Kentucky	Household count	42,717	26,671	37.6	921,819	514,662	44.2
Kentucky	Housing unit count	32,332	23,428	27.5	574,424	390,144	32.1
Kentucky	Population count	156,944	91,801	41.5	4,606,058	2,506,517	45.6
Kentucky	Gini coefficient	944	944	0.0	4,248	4,248	0.0
Kentucky	Median age of first marriage	1	1	0.0	2	2	0.0
Kentucky	Median	25,725	24,225	5.8	187,157	183,280	2.1
Kentucky	Ratio	2,832	1,809	36.1	3,776	2,739	27.5
Kentucky	Total	279,431	183,788	34.2	6,370,644	3,656,513	42.6
Louisiana	Aggregate	17,556	15,115	13.9	71,610	56,397	21.2
Louisiana	Household count	41,812	28,047	32.9	902,289	537,338	40.4
Louisiana	Housing unit count	31,647	24,165	23.6	562,254	404,831	28.0
Louisiana	Population count	153,619	99,226	35.4	4,508,473	2,679,316	40.6
Louisiana	Gini coefficient	924	924	0.0	4,158	4,158	0.0
Louisiana	Median age of first marriage	1	1	0.0	2	2	0.0
Louisiana	Median	25,180	23,919	5.0	183,192	180,003	1.7

Continued

TABLE D-8 Continued

State	Estimate Type	Total Tables	Tables Published	Tables Filtered, Percentage	Total Estimates	Estimates Published	Estimates Filtered, Percentage
Louisiana	Ratio	2,772	2,054	25.9	3,696	2,960	19.9
Louisiana	Total	273,511	193,451	29.3	6,235,674	3,865,005	38.0
Maine	Aggregate	7,220	6,125	15.2	29,450	22,728	22.8
Maine	Household count	17,196	10,354	39.8	371,073	196,131	47.1
Maine	Housing unit count	13,015	9,610	26.2	231,230	166,082	28.2
Maine	Population count	63,179	37,829	40.1	1,854,161	1,068,622	42.4
Maine	Gini coefficient	380	380	0.0	1,710	1,710	0.0
Maine	Median age of first marriage	1	1	0.0	2	2	0.0
Maine	Median	10,356	9,656	6.8	75,344	73,560	2.4
Maine	Ratio	1,140	791	30.6	1,520	1,171	23.0
Maine	Total	112,487	74,746	33.6	2,564,490	1,530,006	40.3
Maryland	Aggregate	15,428	13,493	12.5	62,930	50,291	20.1
Maryland	Household count	36,744	24,905	32.2	792,921	463,275	41.6
Maryland	Housing unit count	27,811	21,256	23.6	494,102	343,533	30.5
Maryland	Population count	134,999	95,015	29.6	3,961,997	2,616,458	34.0
Maryland	Gini coefficient	812	812	0.0	3,654	3,654	0.0
Maryland	Median age of first marriage	1	1	0.0	2	2	0.0

Maryland	Median	22,128	21,216	4.1	160,988	158,692	1.4
Maryland	Ratio	2,436	1,998	18.0	3,248	2,806	13.6
Maryland	Total	240,359	178,696	25.7	5,479,842	3,638,711	33.6
Massachusetts	Aggregate	31,996	27,105	15.3	130,510	99,990	23.4
Massachusetts	Household count	76,202	48,175	36.8	1,644,429	878,338	46.6
Massachusetts	Housing unit count	57,677	42,241	26.8	1,024,714	687,599	32.9
Massachusetts	Population count	279,969	180,025	35.7	8,216,703	4,891,233	40.5
Massachusetts	Gini coefficient	1,684	1,684	0.0	7,578	7,578	0.0
Massachusetts	Median age of first marriage	1	1	0.0	2	2	0.0
Massachusetts	Median	45,890	43,590	5.0	333,862	327,790	1.8
Massachusetts	Ratio	5,052	3,730	26.2	6,736	5,414	19.6
Massachusetts	Total	498,471	346,551	30.5	11,364,534	6,897,944	39.3
Michigan	Aggregate	40,964	35,128	14.2	167,090	128,768	22.9
Michigan	Household count	97,560	63,216	35.2	2,105,337	1,195,393	43.2
Michigan	Housing unit count	73,843	55,319	25.1	1,311,926	933,032	28.9
Michigan	Population count	358,439	228,366	36.3	10,519,709	6,228,579	40.8
Michigan	Gini coefficient	2,156	2,156	0.0	9,702	9,702	0.0
Michigan	Median age of first marriage	1	1	0.0	2	2	0.0
Michigan	Median	58,752	55,562	5.4	427,436	418,783	2.0
Michigan	Ratio	6,468	4,938	23.7	8,624	7,094	17.7

Continued

TABLE D-8 Continued

State	Estimate Type	Total Tables	Tables Published	Tables Filtered, Percentage	Total Estimates	Estimates Published	Estimates Filtered, Percentage
Michigan	Total	638,183	444,686	30.3	14,549,826	8,921,353	38.7
Minnesota	Aggregate	25,232	21,532	14.7	102,920	78,707	23.5
Minnesota	Household count	60,093	37,001	38.4	1,296,795	686,787	47.0
Minnesota	Housing unit count	45,484	33,322	26.7	808,088	548,425	32.1
Minnesota	Population count	220,784	139,445	36.8	6,479,690	3,883,315	40.1
Minnesota	Gini coefficient	1,328	1,328	0.0	5,976	5,976	0.0
Minnesota	Median age of first marriage	1	1	0.0	2	2	0.0
Minnesota	Median	36,189	34,092	5.8	263,285	258,084	2.0
Minnesota	Ratio	3,984	2,992	24.9	5,312	4,318	18.7
Minnesota	Total	393,095	269,713	31.4	8,962,068	5,465,614	39.0
Mississippi	Aggregate	14,592	11,658	20.1	59,520	42,154	29.2
Mississippi	Household count	34,753	21,342	38.6	749,955	400,803	46.6
Mississippi	Housing unit count	26,304	18,207	30.8	467,328	292,547	37.4
Mississippi	Population count	127,684	71,540	44.0	3,747,310	1,896,649	49.4
Mississippi	Gini coefficient	768	768	0.0	3,456	3,456	0.0
Mississippi	Median age of first marriage	1	1	0.0	2	2	0.0
Mississippi	Median	20,929	19,820	5.3	152,265	149,182	2.0

Mississippi	Ratio	2,304	1,280	44.4	3,072	1,996	35.0
Mississippi	Total	227,335	144,616	36.4	5,182,908	2,786,789	46.2
Missouri	Aggregate	26,448	21,925	17.1	107,880	78,996	26.8
Missouri	Household count	62,989	38,715	38.5	1,359,291	721,028	47.0
Missouri	Housing unit count	47,676	33,940	28.8	847,032	551,731	34.9
Missouri	Population count	231,424	138,302	40.2	6,791,962	3,753,754	44.7
Missouri	Gini coefficient	1,392	1,392	0.0	6,264	6,264	0.0
Missouri	Median age of first marriage	1	1	0.0	2	2	0.0
Missouri	Median	37,933	35,925	5.3	275,973	270,847	1.9
Missouri	Ratio	4,176	2,889	30.8	5,568	4,277	23.2
Missouri	Total	412,039	273,089	33.7	9,393,972	5,386,899	42.7
Montana	Aggregate	4,788	4,160	13.1	19,530	15,392	21.2
Montana	Household count	11,404	7,036	38.3	246,081	134,368	45.4
Montana	Housing unit count	8,631	6,570	23.9	153,342	111,644	27.2
Montana	Population count	41,899	25,523	39.1	1,229,617	718,131	41.6
Montana	Gini coefficient	252	252	0.0	1,134	1,134	0.0
Montana	Median age of first marriage	1	1	0.0	2	2	0.0
Montana	Median	6,868	6,445	6.2	49,968	48,813	2.3
Montana	Ratio	756	588	22.2	1,008	836	17.1
Montana	Total	74,599	50,575	32.2	1,700,682	1,030,320	39.4
Nebraska	Aggregate	8,284	7,086	14.5	33,790	26,024	23.0

Continued

TABLE D-8 Continued

State	Estimate Type	Total Tables	Tables Published	Tables Filtered, Percentage	Total Estimates	Estimates Published	Estimates Filtered, Percentage
Nebraska	Household count	19,730	12,413	37.1	425,757	227,878	46.5
Nebraska	Housing unit count	14,933	11,124	25.5	265,306	185,558	30.1
Nebraska	Population count	72,489	45,939	36.6	2,127,399	1,259,248	40.8
Nebraska	Gini coefficient	436	436	0.0	1,962	1,962	0.0
Nebraska	Median age of first marriage	1	1	0.0	2	2	0.0
Nebraska	Median	11,882	11,264	5.2	86,446	84,968	1.7
Nebraska	Ratio	1,308	1,000	23.5	1,744	1,436	17.7
Nebraska	Total	129,063	89,263	30.8	2,942,406	1,787,076	39.3
Nevada	Aggregate	5,852	5,290	9.6	23,870	19,255	19.3
Nevada	Household count	13,938	10,656	23.5	300,765	203,281	32.4
Nevada	Housing unit count	10,549	8,876	15.9	187,418	146,130	22.0
Nevada	Population count	51,209	39,519	22.8	1,502,855	1,066,407	29.0
Nevada	Gini coefficient	308	308	0.0	1,386	1,386	0.0
Nevada	Median age of first marriage	1	1	0.0	2	2	0.0
Nevada	Median	8,394	8,072	3.8	61,070	60,388	1.1
Nevada	Ratio	924	888	3.9	1,232	1,194	3.1
Nevada	Total	91,175	73,610	19.3	2,078,598	1,498,043	27.9

New Hampshire	Aggregate	8,664	7,437	14.2	35,340	28,241	20.1
New Hampshire	Household count	20,635	12,874	37.6	445,287	241,285	45.8
New Hampshire	Housing unit count	15,618	11,821	24.3	277,476	205,272	26.0
New Hampshire	Population count	75,814	48,304	36.3	2,224,984	1,366,522	38.6
New Hampshire	Gini coefficient	456	456	0.0	2,052	2,052	0.0
New Hampshire	Median age of first marriage	1	1	0.0	2	2	0.0
New Hampshire	Median	12,427	11,743	5.5	90,411	88,509	2.1
New Hampshire	Ratio	1,368	998	27.0	1,824	1,454	20.3
New Hampshire	Total	134,983	93,634	30.6	3,077,376	1,933,337	37.2
New Jersey	Aggregate	37,316	31,229	16.3	152,210	112,219	26.3
New Jersey	Household count	88,872	57,036	35.8	1,917,849	1,014,218	47.1
New Jersey	Housing unit count	67,267	47,805	28.9	1,195,094	733,041	38.7
New Jersey	Population count	326,519	215,844	33.9	9,582,893	5,722,909	40.3
New Jersey	Gini coefficient	1,964	1,964	0.0	8,838	8,838	0.0
New Jersey	Median age of first marriage	1	1	0.0	2	2	0.0
New Jersey	Median	53,520	51,183	4.4	389,372	383,541	1.5
New Jersey	Ratio	5,892	4,525	23.2	7,856	6,455	17.8
New Jersey	Total	581,351	409,587	29.5	13,254,114	7,981,223	39.8
New Mexico	Aggregate	9,120	7,946	12.9	37,200	28,754	22.7
New Mexico	Household count	21,721	15,571	28.3	468,723	294,303	37.2

Continued

TABLE D-8 Continued

State	Estimate Type	Total Tables	Tables Published	Tables Filtered, Percentage	Total Estimates	Estimates Published	Estimates Filtered, Percentage
New Mexico	Housing unit count	16,440	12,935	21.3	292,080	207,205	29.1
New Mexico	Population count	79,804	55,834	30.0	2,342,086	1,455,151	37.9
New Mexico	Gini coefficient	480	480	0.0	2,160	2,160	0.0
New Mexico	Median age of first marriage	1	1	0.0	2	2	0.0
New Mexico	Median	13,081	12,600	3.7	95,169	93,910	1.3
New Mexico	Ratio	1,440	1,266	12.1	1,920	1,740	9.4
New Mexico	Total	142,087	106,633	25.0	3,239,340	2,083,225	35.7
New York	Aggregate	54,036	46,029	14.8	220,410	169,082	23.3
New York	Household count	128,692	83,176	35.4	2,777,169	1,528,101	45.0
New York	Housing unit count	97,407	71,894	26.2	1,730,574	1,173,868	32.2
New York	Population count	472,819	313,307	33.7	13,876,633	8,538,778	38.5
New York	Gini coefficient	2,844	2,844	0.0	12,798	12,798	0.0
New York	Median age of first marriage	1	1	0.0	2	2	0.0
New York	Median	77,500	73,548	5.1	563,832	553,910	1.8
New York	Ratio	8,532	6,677	21.7	11,376	9,513	16.4
New York	Total	841,831	597,476	29.0	19,192,794	11,986,052	37.5
North Carolina	Aggregate	32,528	28,531	12.3	132,680	104,965	20.9
North Carolina	Household count	77,469	52,747	31.9	1,671,771	1,000,544	40.2

North Carolina	Housing unit count	58,636	45,946	21.6	1,041,752	766,536	26.4
North Carolina	Population count	284,624	189,862	33.3	8,353,322	5,108,751	38.8
North Carolina	Gini coefficient	1,712	1,712	0.0	7,704	7,704	0.0
North Carolina	Median age of first marriage	1	1	0.0	2	2	0.0
North Carolina	Median	46,653	44,489	4.6	339,413	334,265	1.5
North Carolina	Ratio	5,136	4,081	20.5	6,848	5,773	15.7
North Carolina	Total	506,759	367,369	27.5	11,553,492	7,328,540	36.6
North Dakota	Aggregate	3,724	3,234	13.2	15,190	11,780	22.4
North Dakota	Household count	8,870	5,340	39.8	191,397	98,057	48.8
North Dakota	Housing unit count	6,713	5,131	23.6	119,266	89,047	25.3
North Dakota	Population count	32,589	19,932	38.8	956,379	562,471	41.2
North Dakota	Gini coefficient	196	196	0.0	882	882	0.0
North Dakota	Median age of first marriage	1	1	0.0	2	2	0.0
North Dakota	Median	5,342	5,014	6.1	38,866	38,092	2.0
North Dakota	Ratio	588	448	23.8	784	644	17.9
North Dakota	Total	58,023	39,296	32.3	1,322,766	800,975	39.4
Ohio	Aggregate	51,756	42,839	17.2	211,110	157,510	25.4
Ohio	Household count	123,262	74,890	39.2	2,659,989	1,409,100	47.0
Ohio	Housing unit count	93,297	66,179	29.1	1,657,554	1,096,832	33.8

Continued

TABLE D-8 Continued

State	Estimate Type	Total Tables	Tables Published	Tables Filtered, Percentage	Total Estimates	Estimates Published	Estimates Filtered, Percentage
Ohio	Population count	452,869	264,591	41.6	13,291,123	7,227,611	45.6
Ohio	Gini coefficient	2,724	2,724	0.0	12,258	12,258	0.0
Ohio	Median age of first marriage	1	1	0.0	2	2	0.0
Ohio	Median	74,230	69,725	6.1	540,042	527,823	2.3
Ohio	Ratio	8,172	5,261	35.6	10,896	7,951	27.0
Ohio	Total	806,311	526,210	34.7	18,382,974	10,439,087	43.2
Oklahoma	Aggregate	14,364	12,759	11.2	58,590	46,366	20.9
Oklahoma	Household count	34,210	24,840	27.4	738,237	469,312	36.4
Oklahoma	Housing unit count	25,893	21,058	18.7	460,026	350,433	23.8
Oklahoma	Population count	125,689	90,215	28.2	3,688,759	2,399,990	34.9
Oklahoma	Gini coefficient	756	756	0.0	3,402	3,402	0.0
Oklahoma	Median age of first marriage	1	1	0.0	2	2	0.0
Oklahoma	Median	20,602	19,803	3.9	149,886	148,089	1.2
Oklahoma	Ratio	2,268	2,006	11.6	3,024	2,754	8.9
Oklahoma	Total	223,783	171,438	23.4	5,101,926	3,420,348	33.0
Oregon	Aggregate	15,200	13,224	13.0	62,000	47,515	23.4
Oregon	Household count	36,201	23,870	34.1	781,203	440,202	43.7

Oregon	Housing unit count	27,400	21,213	22.6	486,800	346,691	28.8
Oregon	Population count	133,004	87,741	34.0	3,903,446	2,353,639	39.7
Oregon	Gini coefficient	800	800	0.0	3,600	3,600	0.0
Oregon	Median age of first marriage	1	1	0.0	2	2	0.0
Oregon	Median	21,801	20,606	5.5	158,609	155,471	2.0
Oregon	Ratio	2,400	2,050	14.6	3,200	2,844	11.1
Oregon	Total	236,807	169,505	28.4	5,398,860	3,349,964	38.0
Pennsylvania	Aggregate	46,360	39,174	15.5	189,100	147,113	22.2
Pennsylvania	Household count	110,411	69,154	37.4	2,382,663	1,296,882	45.6
Pennsylvania	Housing unit count	83,570	61,622	26.3	1,484,740	1,040,339	29.9
Pennsylvania	Population count	405,654	254,686	37.2	11,905,416	7,060,386	40.7
Pennsylvania	Gini coefficient	2,440	2,440	0.0	10,980	10,980	0.0
Pennsylvania	Median age of first marriage	1	1	0.0	2	2	0.0
Pennsylvania	Median	66,491	62,863	5.5	483,739	474,137	2.0
Pennsylvania	Ratio	7,320	5,186	29.2	9,760	7,618	21.9
Pennsylvania	Total	722,247	495,126	31.4	16,466,400	10,037,457	39.0
Rhode Island	Aggregate	5,548	4,822	13.1	22,630	17,703	21.8
Rhode Island	Household count	13,214	8,795	33.4	285,141	165,907	41.8
Rhode Island	Housing unit count	10,001	7,727	22.7	177,682	129,749	27.0
Rhode Island	Population count	48,549	32,583	32.9	1,424,787	900,629	36.8

Continued

TABLE D-8 Continued

State	Estimate Type	Total Tables	Tables Published	Tables Filtered, Percentage	Total Estimates	Estimates Published	Estimates Filtered, Percentage
Rhode Island	Gini coefficient	292	292	0.0	1,314	1,314	0.0
Rhode Island	Median age of first marriage	1	1	0.0	2	2	0.0
Rhode Island	Median	7,958	7,583	4.7	57,898	56,933	1.7
Rhode Island	Ratio	876	707	19.3	1,168	999	14.5
Rhode Island	Total	86,439	62,510	27.7	1,970,622	1,273,236	35.4
South Carolina	Aggregate	16,188	13,964	13.7	66,030	51,968	21.3
South Carolina	Household count	38,554	25,784	33.1	831,981	493,165	40.7
South Carolina	Housing unit count	29,181	22,570	22.7	518,442	379,995	26.7
South Carolina	Population count	141,649	91,730	35.2	4,157,167	2,485,658	40.2
South Carolina	Gini coefficient	852	852	0.0	3,834	3,834	0.0
South Carolina	Median age of first marriage	1	1	0.0	2	2	0.0
South Carolina	Median	23,218	22,065	5.0	168,918	165,973	1.7
South Carolina	Ratio	2,556	1,865	27.0	3,408	2,701	20.7
South Carolina	Total	252,199	178,831	29.1	5,749,782	3,583,296	37.7
South Dakota	Aggregate	4,256	3,578	15.9	17,360	13,368	23.0
South Dakota	Household count	10,137	5,998	40.8	218,739	108,177	50.5
South Dakota	Housing unit count	7,672	5,668	26.1	136,304	95,388	30.0
South Dakota	Population count	37,244	22,266	40.2	1,092,998	614,616	43.8

South Dakota	Gini coefficient	224	224	0.0	1,008	1,008	0.0
South Dakota	Median age of first marriage	1	1	0.0	2	2	0.0
South Dakota	Median	6,105	5,828	4.5	44,417	43,626	1.8
South Dakota	Ratio	672	475	29.3	896	697	22.2
South Dakota	Total	66,311	44,038	33.6	1,511,724	876,882	42.0
Tennessee	Aggregate	22,952	19,341	15.7	93,620	70,432	24.8
Tennessee	Household count	54,663	34,873	36.2	1,179,615	668,081	43.4
Tennessee	Housing unit count	41,374	30,496	26.3	735,068	510,794	30.5
Tennessee	Population count	200,834	122,171	39.2	5,894,180	3,312,356	43.8
Tennessee	Gini coefficient	1,208	1,208	0.0	5,436	5,436	0.0
Tennessee	Median age of first marriage	1	1	0.0	2	2	0.0
Tennessee	Median	32,919	31,171	5.3	239,495	234,854	1.9
Tennessee	Ratio	3,624	2,480	31.6	4,832	3,678	23.9
Tennessee	Total	357,575	241,741	32.4	8,152,248	4,805,633	41.1
Texas	Aggregate	69,388	59,196	14.7	283,030	211,808	25.2
Texas	Household count	165,254	114,553	30.7	3,566,181	2,137,357	40.1
Texas	Housing unit count	125,081	96,146	23.1	2,222,242	1,558,384	29.9
Texas	Population count	607,149	416,597	31.4	17,819,067	11,065,211	37.9
Texas	Gini coefficient	3,652	3,652	0.0	16,434	16,434	0.0

Continued

TABLE D-8 Continued

State	Estimate Type	Total Tables	Tables Published	Tables Filtered, Percentage	Total Estimates	Estimates Published	Estimates Filtered, Percentage
Texas	Median age of first marriage	1	1	0.0	2	2	0.0
Texas	Median	99,518	95,231	4.3	724,018	713,095	1.5
Texas	Ratio	10,956	8,939	18.4	14,608	12,503	14.4
Texas	Total	1,080,999	794,315	26.5	24,645,582	15,714,794	36.2
Utah	Aggregate	10,032	8,678	13.5	40,920	30,907	24.5
Utah	Household count	23,893	15,476	35.2	515,595	284,333	44.9
Utah	Housing unit count	18,084	13,322	26.3	321,288	212,736	33.8
Utah	Population count	87,784	58,771	33.1	2,576,290	1,593,827	38.1
Utah	Gini coefficient	528	528	0.0	2,376	2,376	0.0
Utah	Median age of first marriage	1	1	0.0	2	2	0.0
Utah	Median	14,389	13,681	4.9	104,685	102,693	1.9
Utah	Ratio	1,584	1,367	13.7	2,112	1,887	10.7
Utah	Total	156,295	111,824	28.5	3,563,268	2,228,761	37.5
Vermont	Aggregate	3,420	2,979	12.9	13,950	11,337	18.7
Vermont	Household count	8,146	4,955	39.2	175,773	94,492	46.2
Vermont	Housing unit count	6,165	4,654	24.5	109,530	82,322	24.8
Vermont	Population count	29,929	18,671	37.6	878,311	533,130	39.3
Vermont	Gini coefficient	180	180	0.0	810	810	0.0

Vermont	Median age of first marriage	1	1	0.0	2	2	0.0
Vermont	Median	4,906	4,561	7.0	35,694	34,738	2.7
Vermont	Ratio	540	400	25.9	720	580	19.4
Vermont	Total	53,287	36,401	31.7	1,214,790	757,411	37.7
Virginia	Aggregate	25,688	21,898	14.8	104,780	80,019	23.6
Virginia	Household count	61,179	39,932	34.7	1,320,231	740,539	43.9
Virginia	Housing unit count	46,306	34,368	25.8	822,692	558,151	32.2
Virginia	Population count	224,774	148,119	34.1	6,596,792	4,038,979	38.8
Virginia	Gini coefficient	1,352	1,352	0.0	6,084	6,084	0.0
Virginia	Median age of first marriage	1	1	0.0	2	2	0.0
Virginia	Median	36,843	35,056	4.9	268,043	263,557	1.7
Virginia	Ratio	4,056	3,063	24.5	5,408	4,399	18.7
Virginia	Total	400,199	283,789	29.1	9,124,032	5,691,730	37.6
Washington	Aggregate	23,712	20,964	11.6	96,720	75,361	22.1
Washington	Household count	56,473	38,552	31.7	1,218,675	705,868	42.1
Washington	Housing unit count	42,744	33,731	21.1	759,408	550,320	27.5
Washington	Population count	207,484	145,304	30.0	6,089,350	3,905,832	35.9
Washington	Gini coefficient	1,248	1,248	0.0	5,616	5,616	0.0
Washington	Median age of first marriage	1	1	0.0	2	2	0.0

Continued

TABLE D-8 Continued

State	Estimate Type	Total Tables	Tables Published	Tables Filtered, Percentage	Total Estimates	Estimates Published	Estimates Filtered, Percentage
Washington	Median	34,009	32,271	5.1	247,425	243,164	1.7
Washington	Ratio	3,744	3,368	10.0	4,992	4,610	7.7
Washington	Total	369,415	275,439	25.4	8,422,188	5,490,773	34.8
West Virginia	Aggregate	9,728	8,111	16.6	39,680	30,659	22.7
West Virginia	Household count	23,169	14,324	38.2	499,971	279,805	44.0
West Virginia	Housing unit count	17,536	12,788	27.1	311,552	220,983	29.1
West Virginia	Population count	85,124	49,055	42.4	2,498,222	1,356,967	45.7
West Virginia	Gini coefficient	512	512	0.0	2,304	2,304	0.0
West Virginia	Median age of first marriage	1	1	0.0	2	2	0.0
West Virginia	Median	13,953	13,153	5.7	101,513	99,323	2.2
West Virginia	Ratio	1,536	907	41.0	2,048	1,407	31.3
West Virginia	Total	151,559	98,851	34.8	3,455,292	1,991,450	42.4
Wisconsin	Aggregate	24,928	21,548	13.6	101,680	80,084	21.2
Wisconsin	Household count	59,369	37,593	36.7	1,281,171	713,951	44.3
Wisconsin	Housing unit count	44,936	34,258	23.8	798,352	585,260	26.7
Wisconsin	Population count	218,124	139,824	35.9	6,401,622	3,919,873	38.8
Wisconsin	Gini coefficient	1,312	1,312	0.0	5,904	5,904	0.0
Wisconsin	Median age of first marriage	1	1	0.0	2	2	0.0

Wisconsin	Median	35,753	33,926	5.1	260,113	255,270	1.9
Wisconsin	Ratio	3,936	3,022	23.2	5,248	4,334	17.4
Wisconsin	Total	388,359	271,484	30.1	8,854,092	5,564,678	37.2
Wyoming	Aggregate	3,724	3,188	14.4	15,190	11,439	24.7
Wyoming	Household count	8,870	5,246	40.9	191,397	95,480	50.1
Wyoming	Housing unit count	6,713	4,859	27.6	119,266	76,325	36.0
Wyoming	Population count	32,589	19,481	40.2	956,379	523,772	45.2
Wyoming	Gini coefficient	196	196	0.0	882	882	0.0
Wyoming	Median age of first marriage	1	1	0.0	2	2	0.0
Wyoming	Median	5,342	5,030	5.8	38,866	38,034	2.1
Wyoming	Ratio	588	445	24.3	784	641	18.2
Wyoming	Total	58,023	38,446	33.7	1,322,766	746,575	43.6
Puerto Rico	Aggregate	10,716	8,735	18.5	43,710	32,390	25.9
Puerto Rico	Household count	25,522	17,178	32.7	550,749	325,479	40.9
Puerto Rico	Housing unit count	18,330	13,406	26.9	332,901	224,022	32.7
Puerto Rico	Population count	93,487	55,860	40.2	2,737,843	1,452,308	47.0
Puerto Rico	Gini coefficient	564	564	0.0	2,538	2,538	0.0
Puerto Rico	Median age of first marriage	1	1	0.0	2	2	0.0
Puerto Rico	Median	15,370	14,787	3.8	111,822	110,365	1.3

Continued

TABLE D-8 Continued

State	Estimate Type	Total Tables	Tables Published	Tables Filtered, Percentage	Total Estimates	Estimates Published	Estimates Filtered, Percentage
Puerto Rico	Ratio	1,692	1,084	35.9	2,256	1,568	30.5
Puerto Rico	Total	165,682	111,615	32.6	3,781,821	2,148,672	43.2

NOTE: The Gini coefficient is a measure of statistical dispersion.
SOURCE: Table prepared by the Census Bureau at the panel's request.

Appendix E

2014 American Community Survey Mail Questionnaire

13194014

U.S. DEPARTMENT OF COMMERCE
Economics and Statistics Administration
U.S. CENSUS BUREAU

THE American Community Survey

This booklet shows the content of the American Community Survey questionnaire.

Start Here

Respond online today at:
https://respond.census.gov/acs
OR
Complete this form and mail it back as soon as possible.

This form asks for information about the people who are living or staying at the address on the mailing label and about the house, apartment, or mobile home located at the address on the mailing label.

If you need help or have questions about completing this form, please call **1-800-354-7271.** The telephone call is free.

Telephone Device for the Deaf (TDD): Call 1–800–582–8330. The telephone call is free.

¿NECESITA AYUDA? Si usted habla español y necesita ayuda para completar su cuestionario, llame sin cargo alguno al **1-877-833-5625.** Usted también puede completar su entrevista por teléfono con un entrevistador que habla español. O puede responder por Internet en: https://respond.census.gov/acs

For more information about the American Community Survey, visit our web site at: http://www.census.gov/acs/www/

➜ **Please print today's date.**
Month Day Year

➜ **Please print the name and telephone number of the person who is filling out this form.** We may contact you if there is a question.
Last Name
First Name MI
Area Code + Number

➜ **How many people are living or staying at this address?**
- **INCLUDE** everyone who is living or staying here for more than 2 months.
- **INCLUDE** yourself if you are living here for more than 2 months.
- **INCLUDE** anyone else staying here who does not have another place to stay, even if they are here for 2 months or less.
- **DO NOT INCLUDE** anyone who is living somewhere else for more than 2 months, such as a college student living away or someone in the Armed Forces on deployment.

Number of people

➜ **Fill out pages 2, 3, and 4 for everyone, including yourself, who is living or staying at this address for more than 2 months. Then complete the rest of the form.**

FORM **ACS-1(INFO)(2014)KFI**
(06-06-2013)

OMB No. 0607-0810

13194022

Person 1

(Person 1 is the person living or staying here in whose name this house or apartment is owned, being bought, or rented. If there is no such person, start with the name of any adult living or staying here.)

1 What is Person 1's name?
Last Name *(Please print)* First Name MI

2 How is this person related to Person 1?
☒ Person 1

3 What is Person 1's sex? *Mark (X) ONE box.*
☐ Male ☐ Female

4 What is Person 1's age and what is Person 1's date of birth?
Please report babies as age 0 when the child is less than 1 year old.
Print numbers in boxes.
Age (in years) Month Day Year of birth

→ **NOTE: Please answer BOTH Question 5 about Hispanic origin and Question 6 about race. For this survey, Hispanic origins are not races.**

5 Is Person 1 of Hispanic, Latino, or Spanish origin?
☐ **No,** not of Hispanic, Latino, or Spanish origin
☐ Yes, Mexican, Mexican Am., Chicano
☐ Yes, Puerto Rican
☐ Yes, Cuban
☐ Yes, another Hispanic, Latino, or Spanish origin – *Print origin, for example, Argentinean, Colombian, Dominican, Nicaraguan, Salvadoran, Spaniard, and so on.*

6 What is Person 1's race? *Mark (X) one or more boxes.*
☐ White
☐ Black or African Am.
☐ American Indian or Alaska Native — *Print name of enrolled or principal tribe.*
☐ Asian Indian ☐ Japanese ☐ Native Hawaiian
☐ Chinese ☐ Korean ☐ Guamanian or Chamorro
☐ Filipino ☐ Vietnamese ☐ Samoan
☐ Other Asian – *Print race, for example, Hmong, Laotian, Thai, Pakistani, Cambodian, and so on.*
☐ Other Pacific Islander – *Print race, for example, Fijian, Tongan, and so on.*
☐ Some other race – *Print race.*

Person 2

1 What is Person 2's name?
Last Name *(Please print)* First Name MI

2 How is this person related to Person 1? *Mark (X) ONE box.*
☐ Husband or wife
☐ Biological son or daughter
☐ Adopted son or daughter
☐ Stepson or stepdaughter
☐ Brother or sister
☐ Father or mother
☐ Grandchild
☐ Parent-in-law
☐ Son-in-law or daughter-in-law
☐ Other relative
☐ Roomer or boarder
☐ Housemate or roommate
☐ Unmarried partner
☐ Foster child
☐ Other nonrelative

3 What is Person 2's sex? *Mark (X) ONE box.*
☐ Male ☐ Female

4 What is Person 2's age and what is Person 2's date of birth?
Please report babies as age 0 when the child is less than 1 year old.
Print numbers in boxes.
Age (in years) Month Day Year of birth

→ **NOTE: Please answer BOTH Question 5 about Hispanic origin and Question 6 about race. For this survey, Hispanic origins are not races.**

5 Is Person 2 of Hispanic, Latino, or Spanish origin?
☐ **No,** not of Hispanic, Latino, or Spanish origin
☐ Yes, Mexican, Mexican Am., Chicano
☐ Yes, Puerto Rican
☐ Yes, Cuban
☐ Yes, another Hispanic, Latino, or Spanish origin – *Print origin, for example, Argentinean, Colombian, Dominican, Nicaraguan, Salvadoran, Spaniard, and so on.*

6 What is Person 2's race? *Mark (X) one or more boxes.*
☐ White
☐ Black or African Am.
☐ American Indian or Alaska Native — *Print name of enrolled or principal tribe.*
☐ Asian Indian ☐ Japanese ☐ Native Hawaiian
☐ Chinese ☐ Korean ☐ Guamanian or Chamorro
☐ Filipino ☐ Vietnamese ☐ Samoan
☐ Other Asian – *Print race, for example, Hmong, Laotian, Thai, Pakistani, Cambodian, and so on.*
☐ Other Pacific Islander – *Print race, for example, Fijian, Tongan, and so on.*
☐ Some other race – *Print race.*

2

13194030

Person 3

1 **What is Person 3's name?**
Last Name *(Please print)* First Name MI

2 **How is this person related to Person 1?** *Mark (X) ONE box.*
- ☐ Husband or wife
- ☐ Biological son or daughter
- ☐ Adopted son or daughter
- ☐ Stepson or stepdaughter
- ☐ Brother or sister
- ☐ Father or mother
- ☐ Grandchild
- ☐ Parent-in-law
- ☐ Son-in-law or daughter-in-law
- ☐ Other relative
- ☐ Roomer or boarder
- ☐ Housemate or roommate
- ☐ Unmarried partner
- ☐ Foster child
- ☐ Other nonrelative

3 **What is Person 3's sex?** *Mark (X) ONE box.*
- ☐ Male
- ☐ Female

4 **What is Person 3's age and what is Person 3's date of birth?**
Please report babies as age 0 when the child is less than 1 year old.
Print numbers in boxes.
Age (in years) Month Day Year of birth

➜ **NOTE: Please answer BOTH Question 5 about Hispanic origin and Question 6 about race. For this survey, Hispanic origins are not races.**

5 **Is Person 3 of Hispanic, Latino, or Spanish origin?**
- ☐ **No,** not of Hispanic, Latino, or Spanish origin
- ☐ Yes, Mexican, Mexican Am., Chicano
- ☐ Yes, Puerto Rican
- ☐ Yes, Cuban
- ☐ Yes, another Hispanic, Latino, or Spanish origin – *Print origin, for example, Argentinean, Colombian, Dominican, Nicaraguan, Salvadoran, Spaniard, and so on.*

6 **What is Person 3's race?** *Mark (X) one or more boxes.*
- ☐ White
- ☐ Black or African Am.
- ☐ American Indian or Alaska Native — *Print name of enrolled or principal tribe.*
- ☐ Asian Indian
- ☐ Chinese
- ☐ Filipino
- ☐ Other Asian – *Print race, for example, Hmong, Laotian, Thai, Pakistani, Cambodian, and so on.*
- ☐ Japanese
- ☐ Korean
- ☐ Vietnamese
- ☐ Native Hawaiian
- ☐ Guamanian or Chamorro
- ☐ Samoan
- ☐ Other Pacific Islander – *Print race, for example, Fijian, Tongan, and so on.*
- ☐ Some other race – *Print race.*

Person 4

1 **What is Person 4's name?**
Last Name *(Please print)* First Name MI

2 **How is this person related to Person 1?** *Mark (X) ONE box.*
- ☐ Husband or wife
- Biological son or daughter
- Adopted son or daughter
- Stepson or stepdaughter
- Brother or sister
- Father or mother
- Grandchild
- Parent-in-law
- ☐ Son-in-law or daughter-in-law
- ☐ Other relative
- ☐ Roomer or boarder
- ☐ Housemate or roommate
- ☐ Unmarried partner
- ☐ Foster child
- ☐ Other nonrelative

3 **What is Person 4's sex?** *Mark (X) ONE box.*
- ☐ Male
- ☐ Female

4 **What is Person 4's age and what is Person 4's date of birth?**
Please report babies as age 0 when the child is less than 1 year old.
Print numbers in boxes.
Age (in years) Month Day Year of birth

➜ **NOTE: Please answer BOTH Question 5 about Hispanic origin and Question 6 about race. For this survey, Hispanic origins are not races.**

5 **Is Person 4 of Hispanic, Latino, or Spanish origin?**
- ☐ **No,** not of Hispanic, Latino, or Spanish origin
- ☐ Yes, Mexican, Mexican Am., Chicano
- ☐ Yes, Puerto Rican
- ☐ Yes, Cuban
- ☐ Yes, another Hispanic, Latino, or Spanish origin – *Print origin, for example, Argentinean, Colombian, Dominican, Nicaraguan, Salvadoran, Spaniard, and so on.*

6 **What is Person 4's race?** *Mark (X) one or more boxes.*
- ☐ White
- ☐ Black or African Am.
- ☐ American Indian or Alaska Native — *Print name of enrolled or principal tribe.*
- ☐ Asian Indian
- ☐ Chinese
- ☐ Filipino
- ☐ Other Asian – *Print race, for example, Hmong, Laotian, Thai, Pakistani, Cambodian, and so on.*
- ☐ Japanese
- ☐ Korean
- ☐ Vietnamese
- ☐ Native Hawaiian
- ☐ Guamanian or Chamorro
- ☐ Samoan
- ☐ Other Pacific Islander – *Print race, for example, Fijian, Tongan, and so on.*
- ☐ Some other race – *Print race.*

13194048

Person 5

1 What is Person 5's name?
Last Name *(Please print)* First Name MI

2 How is this person related to Person 1? *Mark (X) ONE box.*
- ☐ Husband or wife
- ☐ Biological son or daughter
- ☐ Adopted son or daughter
- ☐ Stepson or stepdaughter
- ☐ Brother or sister
- ☐ Father or mother
- ☐ Grandchild
- ☐ Parent-in-law
- ☐ Son-in-law or daughter-in-law
- ☐ Other relative
- ☐ Roomer or boarder
- ☐ Housemate or roommate
- ☐ Unmarried partner
- ☐ Foster child
- ☐ Other nonrelative

3 What is Person 5's sex? *Mark (X) ONE box.*
☐ Male ☐ Female

4 What is Person 5's age and what is Person 5's date of birth?
Please report babies as age 0 when the child is less than 1 year old.
Print numbers in boxes.
Age (in years) Month Day Year of birth

→ **NOTE: Please answer BOTH Question 5 about Hispanic origin and Question 6 about race. For this survey, Hispanic origins are not races.**

5 Is Person 5 of Hispanic, Latino, or Spanish origin?
- ☐ **No,** not of Hispanic, Latino, or Spanish origin
- ☐ Yes, Mexican, Mexican Am., Chicano
- ☐ Yes, Puerto Rican
- ☐ Yes, Cuban
- ☐ Yes, another Hispanic, Latino, or Spanish origin – *Print origin, for example, Argentinean, Colombian, Dominican, Nicaraguan, Salvadoran, Spaniard, and so on.*

6 What is Person 5's race? *Mark (X) one or more boxes.*
- ☐ White
- ☐ Black or African Am.
- ☐ American Indian or Alaska Native — *Print name of enrolled or principal tribe.*
- ☐ Asian Indian
- ☐ Chinese
- ☐ Filipino
- ☐ Other Asian – *Print race, for example, Hmong, Laotian, Thai, Pakistani, Cambodian, and so on.*
- ☐ Japanese
- ☐ Korean
- ☐ Vietnamese
- ☐ Native Hawaiian
- ☐ Guamanian or Chamorro
- ☐ Samoan
- ☐ Other Pacific Islander – *Print race, for example, Fijian, Tongan, and so on.*
- ☐ Some other race – *Print race.*

→ **If there are more than five people living or staying here, print their names in the spaces for Person 6 through Person 12.**
We may call you for more information about them.

Person 6
Last Name *(Please print)* First Name MI
Sex ☐ Male ☐ Female **Age (in years)**

Person 7
Last Name *(Please print)* First Name MI
Sex ☐ Male ☐ Female **Age (in years)**

Person 8
Last Name *(Please print)* First Name MI
Sex ☐ Male ☐ Female **Age (in years)**

Person 9
Last Name *(Please print)* First Name MI
Sex ☐ Male ☐ Female **Age (in years)**

Person 10
Last Name *(Please print)* First Name MI
Sex ☐ Male ☐ Female **Age (in years)**

Person 11
Last Name *(Please print)* First Name MI
Sex ☐ Male ☐ Female **Age (in years)**

Person 12
Last Name *(Please print)* First Name MI
Sex ☐ Male ☐ Female **Age (in years)**

13194055

Housing

➔ **Please answer the following questions about the house, apartment, or mobile home at the address on the mailing label.**

1 Which best describes this building? *Include all apartments, flats, etc., even if vacant.*

- ☐ A mobile home
- ☐ A one-family house detached from any other house
- ☐ A one-family house attached to one or more houses
- ☐ A building with 2 apartments
- ☐ A building with 3 or 4 apartments
- ☐ A building with 5 to 9 apartments
- ☐ A building with 10 to 19 apartments
- ☐ A building with 20 to 49 apartments
- ☐ A building with 50 or more apartments
- ☐ Boat, RV, van, etc.

2 About when was this building first built?

- ☐ 2000 or later – *Specify year*
- ☐ 1990 to 1999
- ☐ 1980 to 1989
- ☐ 1970 to 1979
- ☐ 1960 to 1969
- ☐ 1950 to 1959
- ☐ 1940 to 1949
- ☐ 1939 or earlier

3 When did PERSON 1 (listed on page 2) move into this house, apartment, or mobile home?

Month Year

A *Answer questions 4 – 6 if this is a HOUSE OR A MOBILE HOME; otherwise, SKIP to question 7a.*

4 How many acres is this house or mobile home on?

- ☐ Less than 1 acre ➔ *SKIP to question 6*
- ☐ 1 to 9.9 acres
- ☐ 10 or more acres

5 IN THE PAST 12 MONTHS, what were the actual sales of all agricultural products from this property?

- ☐ None
- ☐ $1 to $999
- ☐ $1,000 to $2,499
- ☐ $2,500 to $4,999
- ☐ $5,000 to $9,999
- ☐ $10,000 or more

6 Is there a business (such as a store or barber shop) or a medical office on this property?

- ☐ Yes
- ☐ No

7 a. How many separate rooms are in this house, apartment, or mobile home? *Rooms must be separated by built-in archways or walls that extend out at least 6 inches and go from floor to ceiling.*

- *INCLUDE bedrooms, kitchens, etc.*
- *EXCLUDE bathrooms, porches, balconies, foyers, halls, or unfinished basements.*

Number of rooms

b. How many of these rooms are bedrooms? *Count as bedrooms those rooms you would list if this house, apartment, or mobile home were for sale or rent. If this is an efficiency/studio apartment, print "0".*

Number of bedrooms

8 Does this house, apartment, or mobile home have –

	Yes	No
a. hot and cold running water?	☐	☐
b. a flush toilet?	☐	☐
c. a bathtub or shower?	☐	☐
d. a sink with a faucet?	☐	☐
e. a stove or range?	☐	☐
f. a refrigerator?	☐	☐
g. telephone service from which you can both make and receive calls? *Include cell phones.*	☐	☐

9 At this house, apartment, or mobile home – do you or any member of this household own or use any of the following computers?

- *EXCLUDE GPS devices, digital music players, and devices with only limited computing capabilities, for example: household appliances.*

	Yes	No
a. Desktop, laptop, netbook, or notebook computer	☐	☐
b. Handheld computer, smart mobile phone, or other handheld wireless computer	☐	☐
c. Some other type of computer *Specify*	☐	☐

10 At this house, apartment, or mobile home – do you or any member of this household access the Internet?

- ☐ Yes, with a subscription to an Internet service
- ☐ Yes, without a subscription to an Internet service ➔ *SKIP to question 12*
- ☐ No Internet access at this house, apartment, or mobile home ➔ *SKIP to question 12*

11 At this house, apartment, or mobile home – do you or any member of this household subscribe to the Internet using –

	Yes	No
a. Dial-up service?	☐	☐
b. DSL service?	☐	☐
c. Cable modem service?	☐	☐
d. Fiber-optic service?	☐	☐
e. Mobile broadband plan for a computer or a cell phone?	☐	☐
f. Satellite Internet service?	☐	☐
g. Some other service? *Specify service*	☐	☐

13194063

Housing (continued)

12 How many automobiles, vans, and trucks of one-ton capacity or less are kept at home for use by members of this household?

- ☐ None
- ☐ 1
- ☐ 2
- ☐ 3
- ☐ 4
- ☐ 5
- ☐ 6 or more

13 Which FUEL is used MOST for heating this house, apartment, or mobile home?

- ☐ Gas: from underground pipes serving the neighborhood
- ☐ Gas: bottled, tank, or LP
- ☐ Electricity
- ☐ Fuel oil, kerosene, etc.
- ☐ Coal or coke
- ☐ Wood
- ☐ Solar energy
- ☐ Other fuel
- ☐ No fuel used

14 a. LAST MONTH, what was the cost of electricity for this house, apartment, or mobile home?

Last month's cost – *Dollars*

$ .00

OR

- ☐ Included in rent or condominium fee
- ☐ No charge or electricity not used

b. LAST MONTH, what was the cost of gas for this house, apartment, or mobile home?

Last month's cost – *Dollars*

$ .00

OR

- ☐ Included in rent or condominium fee
- ☐ Included in electricity payment entered above
- ☐ No charge or gas not used

c. IN THE PAST 12 MONTHS, what was the cost of water and sewer for this house, apartment, or mobile home? *If you have lived here less than 12 months, estimate the cost.*

Past 12 months' cost – *Dollars*

$ .00

OR

- ☐ Included in rent or condominium fee
- ☐ No charge

d. IN THE PAST 12 MONTHS, what was the cost of oil, coal, kerosene, wood, etc., for this house, apartment, or mobile home? *If you have lived here less than 12 months, estimate the cost.*

Past 12 months' cost – *Dollars*

$ .00

OR

- ☐ Included in rent or condominium fee
- ☐ No charge or these fuels not used

15 IN THE PAST 12 MONTHS, did you or any member of this household receive benefits from the Food Stamp Program or SNAP (the Supplemental Nutrition Assistance Program)? *Do NOT include WIC, the School Lunch Program, or assistance from food banks.*

- ☐ Yes
- ☐ No

16 Is this house, apartment, or mobile home part of a condominium?

- ☐ Yes → **What is the monthly condominium fee?** *For renters, answer only if you pay the condominium fee in addition to your rent; otherwise, mark the "None" box.*

  Monthly amount – *Dollars*

  $ .00

  OR

  ☐ None
- ☐ No

17 Is this house, apartment, or mobile home – *Mark (X) ONE box.*

- ☐ Owned by you or someone in this household with a mortgage or loan? *Include home equity loans.*
- ☐ Owned by you or someone in this household free and clear (without a mortgage or loan)?
- ☐ Rented?
- ☐ Occupied without payment of rent? → *SKIP to* **C** *on the next page*

13194071

Housing (continued)

B *Answer questions 18a and b if this house, apartment, or mobile home is RENTED. Otherwise, SKIP to question 19.*

18 a. What is the monthly rent for this house, apartment, or mobile home?

Monthly amount – *Dollars*

$ .00

b. Does the monthly rent include any meals?

☐ Yes
☐ No

C *Answer questions 19 – 23 if you or any member of this household OWNS or IS BUYING this house, apartment, or mobile home. Otherwise, SKIP to* **E**.

19 About how much do you think this house and lot, apartment, or mobile home (and lot, if owned) would sell for if it were for sale?

Amount – *Dollars*

$ .00

20 What are the annual real estate taxes on THIS property?

Annual amount – *Dollars*

$ .00

OR

☐ None

21 What is the annual payment for fire, hazard, and flood insurance on THIS property?

Annual amount – *Dollars*

$ .00

OR

☐ None

22 a. Do you or any member of this household have a mortgage, deed of trust, contract to purchase, or similar debt on THIS property?

☐ Yes, mortgage, deed of trust, or similar debt
☐ Yes, contract to purchase
☐ No → *SKIP to question 23a*

b. How much is the regular monthly mortgage payment on THIS property? *Include payment only on FIRST mortgage or contract to purchase.*

Monthly amount – *Dollars*

$ .00

OR

☐ No regular payment required → *SKIP to question 23a*

c. Does the regular monthly mortgage payment include payments for real estate taxes on THIS property?

☐ Yes, taxes included in mortgage payment
☐ No, taxes paid separately or taxes not required

d. Does the regular monthly mortgage payment include payments for fire, hazard, or flood insurance on THIS property?

☐ Yes, insurance included in mortgage payment
☐ No, insurance paid separately or no insurance

23 a. Do you or any member of this household have a second mortgage or a home equity loan on THIS property?

☐ Yes, home equity loan
☐ Yes, second mortgage
☐ Yes, second mortgage and home equity loan
☐ No → *SKIP to* **D**

b. How much is the regular monthly payment on all second or junior mortgages and all home equity loans on THIS property?

Monthly amount – *Dollars*

$ .00

OR

☐ No regular payment required

D *Answer question 24 if this is a MOBILE HOME. Otherwise, SKIP to* **E**.

24 What are the total annual costs for personal property taxes, site rent, registration fees, and license fees on THIS mobile home and its site? *Exclude real estate taxes.*

Annual costs – *Dollars*

$ .00

E *Answer questions about PERSON 1 on the next page if you listed at least one person on page 2. Otherwise, SKIP to page 28 for the mailing instructions.*

13194089

Person 1

➔ **Please copy the name of Person 1 from page 2, then continue answering questions below.**

Last Name

First Name MI

7 Where was this person born?

- ☐ In the United States – *Print name of state.*
- ☐ Outside the United States – *Print name of foreign country, or Puerto Rico, Guam, etc.*

8 Is this person a citizen of the United States?

- ☐ Yes, born in the United States ➔ *SKIP to question 10a*
- ☐ Yes, born in Puerto Rico, Guam, the U.S. Virgin Islands, or Northern Marianas
- ☐ Yes, born abroad of U.S. citizen parent or parents
- ☐ Yes, U.S. citizen by naturalization – *Print year of naturalization*
- ☐ No, not a U.S. citizen

9 When did this person come to live in the United States? *Print numbers in boxes.*

Year

10 a. At any time IN THE LAST 3 MONTHS, has this person attended school or college? *Include only nursery or preschool, kindergarten, elementary school, home school, and schooling which leads to a high school diploma or a college degree.*

- ☐ No, has not attended in the last 3 months ➔ *SKIP to question 11*
- ☐ Yes, public school, public college
- ☐ Yes, private school, private college, home school

b. What grade or level was this person attending? *Mark (X) ONE box.*

- ☐ Nursery school, preschool
- ☐ Kindergarten
- ☐ Grade 1 through 12 – *Specify grade 1 – 12*
- ☐ College undergraduate years (freshman to senior)
- ☐ Graduate or professional school beyond a bachelor's degree *(for example: MA or PhD program, or medical or law school)*

11 What is the highest degree or level of school this person has COMPLETED? *Mark (X) ONE box. If currently enrolled, mark the previous grade or highest degree received.*

NO SCHOOLING COMPLETED

- ☐ No schooling completed

NURSERY OR PRESCHOOL THROUGH GRADE 12

- ☐ Nursery school
- ☐ Kindergarten
- ☐ Grade 1 through 11 – *Specify grade 1 – 11*
- ☐ 12th grade – **NO DIPLOMA**

HIGH SCHOOL GRADUATE

- ☐ Regular high school diploma
- ☐ GED or alternative credential

COLLEGE OR SOME COLLEGE

- ☐ Some college credit, but less than 1 year of college credit
- ☐ 1 or more years of college credit, no degree
- ☐ Associate's degree *(for example: AA, AS)*
- ☐ Bachelor's degree *(for example: BA, BS)*

AFTER BACHELOR'S DEGREE

- ☐ Master's degree *(for example: MA, MS, MEng, MEd, MSW, MBA)*
- ☐ Professional degree beyond a bachelor's degree *(for example: MD, DDS, DVM, LLB, JD)*
- ☐ Doctorate degree *(for example: PhD, EdD)*

F *Answer question 12 if this person has a bachelor's degree or higher. Otherwise, SKIP to question 13.*

12 This question focuses on this person's BACHELOR'S DEGREE. Please print below the specific major(s) of any BACHELOR'S DEGREES this person has received. *(For example: chemical engineering, elementary teacher education, organizational psychology)*

13 What is this person's ancestry or ethnic origin?

(For example: Italian, Jamaican, African Am., Cambodian, Cape Verdean, Norwegian, Dominican, French Canadian, Haitian, Korean, Lebanese, Polish, Nigerian, Mexican, Taiwanese, Ukrainian, and so on.)

14 a. Does this person speak a language other than English at home?

- ☐ Yes
- ☐ No ➔ *SKIP to question 15a*

b. What is this language?

For example: Korean, Italian, Spanish, Vietnamese

c. How well does this person speak English?

- ☐ Very well
- ☐ Well
- ☐ Not well
- ☐ Not at all

15 a. Did this person live in this house or apartment 1 year ago?

- ☐ Person is under 1 year old ➔ *SKIP to question 16*
- ☐ Yes, this house ➔ *SKIP to question 16*
- ☐ No, outside the United States and Puerto Rico – *Print name of foreign country, or U.S. Virgin Islands, Guam, etc., below; then SKIP to question 16*
- ☐ No, different house in the United States or Puerto Rico

b. Where did this person live 1 year ago?

Address (Number and street name)

Name of city, town, or post office

Name of U.S. county or municipio in Puerto Rico

Name of U.S. state or Puerto Rico **ZIP Code**

13194097

Person 1 (continued)

16 Is this person CURRENTLY covered by any of the following types of health insurance or health coverage plans? *Mark "Yes" or "No" for EACH type of coverage in items a – h.*

	Yes	No
a. Insurance through a current or former employer or union (of this person or another family member)	☐	☐
b. Insurance purchased directly from an insurance company (by this person or another family member)	☐	☐
c. Medicare, for people 65 and older, or people with certain disabilities	☐	☐
d. Medicaid, Medical Assistance, or any kind of government-assistance plan for those with low incomes or a disability	☐	☐
e. TRICARE or other military health care	☐	☐
f. VA (including those who have ever used or enrolled for VA health care)	☐	☐
g. Indian Health Service	☐	☐
h. Any other type of health insurance or health coverage plan – *Specify*	☐	☐

17 a. Is this person deaf or does he/she have serious difficulty hearing?

☐ Yes
☐ No

b. Is this person blind or does he/she have serious difficulty seeing even when wearing glasses?

☐ Yes
☐ No

G *Answer question 18a – c if this person is 5 years old or over. Otherwise, SKIP to the questions for Person 2 on page 12.*

18 a. Because of a physical, mental, or emotional condition, does this person have serious difficulty concentrating, remembering, or making decisions?

☐ Yes
☐ No

b. Does this person have serious difficulty walking or climbing stairs?

☐ Yes
☐ No

c. Does this person have difficulty dressing or bathing?

☐ Yes
☐ No

H *Answer question 19 if this person is 15 years old or over. Otherwise, SKIP to the questions for Person 2 on page 12.*

19 Because of a physical, mental, or emotional condition, does this person have difficulty doing errands alone such as visiting a doctor's office or shopping?

☐ Yes
☐ No

20 What is this person's marital status?

☐ Now married
☐ Widowed
☐ Divorced
☐ Separated
☐ Never married → *SKIP to* **I**

21 In the PAST 12 MONTHS did this person get –

	Yes	No
a. Married?	☐	☐
b. Widowed?	☐	☐
c. Divorced?	☐	☐

22 How many times has this person been married?

☐ Once
☐ Two times
☐ Three or more times

23 In what year did this person last get married?

Year

I *Answer question 24 if this person is female and 15 – 50 years old. Otherwise, SKIP to question 25a.*

24 Has this person given birth to any children in the past 12 months?

☐ Yes
☐ No

25 a. Does this person have any of his/her own grandchildren under the age of 18 living in this house or apartment?

☐ Yes
☐ No → *SKIP to question 26*

b. Is this grandparent currently responsible for most of the basic needs of any grandchildren under the age of 18 who live in this house or apartment?

☐ Yes
☐ No → *SKIP to question 26*

c. How long has this grandparent been responsible for these grandchildren? *If the grandparent is financially responsible for more than one grandchild, answer the question for the grandchild for whom the grandparent has been responsible for the longest period of time.*

☐ Less than 6 months
☐ 6 to 11 months
☐ 1 or 2 years
☐ 3 or 4 years
☐ 5 or more years

26 Has this person ever served on active duty in the U.S. Armed Forces, Reserves, or National Guard? *Mark (X) ONE box.*

☐ Never served in the military → *SKIP to question 29a*
☐ Only on active duty for training in the Reserves or National Guard → *SKIP to question 28a*
☐ Now on active duty
☐ On active duty in the past, but not now

27 When did this person serve on active duty in the U.S. Armed Forces? *Mark (X) a box for EACH period in which this person served, even if just for part of the period.*

☐ September 2001 or later
☐ August 1990 to August 2001 (including Persian Gulf War)
☐ May 1975 to July 1990
☐ Vietnam era (August 1964 to April 1975)
☐ February 1955 to July 1964
☐ Korean War (July 1950 to January 1955)
☐ January 1947 to June 1950
☐ World War II (December 1941 to December 1946)
☐ November 1941 or earlier

28 a. Does this person have a VA service-connected disability rating?

☐ Yes (such as 0%, 10%, 20%, ... , 100%)
☐ No → *SKIP to question 29a*

b. What is this person's service-connected disability rating?

☐ 0 percent
☐ 10 or 20 percent
☐ 30 or 40 percent
☐ 50 or 60 percent
☐ 70 percent or higher

13194105

Person 1 (continued)

29 **a. LAST WEEK, did this person work for pay at a job (or business)?**

- ☐ Yes → *SKIP to question 30*
- ☐ No – Did not work (or retired)

b. LAST WEEK, did this person do ANY work for pay, even for as little as one hour?

- ☐ Yes
- ☐ No → *SKIP to question 35a*

30 **At what location did this person work LAST WEEK?** *If this person worked at more than one location, print where he or she worked most last week.*

a. Address (Number and street name)

If the exact address is not known, give a description of the location such as the building name or the nearest street or intersection.

b. Name of city, town, or post office

c. Is the work location inside the limits of that city or town?

- ☐ Yes
- ☐ No, outside the city/town limits

d. Name of county

e. Name of U.S. state or foreign country

f. ZIP Code

31 **How did this person usually get to work LAST WEEK?** *If this person usually used more than one method of transportation during the trip, mark (X) the box of the one used for most of the distance.*

- ☐ Car, truck, or van
- ☐ Bus or trolley bus
- ☐ Streetcar or trolley car
- ☐ Subway or elevated
- ☐ Railroad
- ☐ Ferryboat
- ☐ Taxicab
- ☐ Motorcycle
- ☐ Bicycle
- ☐ Walked
- ☐ Worked at home → *SKIP to question 39a*
- ☐ Other method

J *Answer question 32 if you marked "Car, truck, or van" in question 31. Otherwise, SKIP to question 33.*

32 **How many people, including this person, usually rode to work in the car, truck, or van LAST WEEK?**

Person(s)

33 **What time did this person usually leave home to go to work LAST WEEK?**

Hour : Minute

- ☐ a.m.
- ☐ p.m.

34 **How many minutes did it usually take this person to get from home to work LAST WEEK?**

Minutes

K *Answer questions 35 – 38 if this person did NOT work last week. Otherwise, SKIP to question 39a.*

35 **a. LAST WEEK, was this person on layoff from a job?**

- ☐ Yes → *SKIP to question 35c*
- ☐ No

b. LAST WEEK, was this person TEMPORARILY absent from a job or business?

- ☐ Yes, on vacation, temporary illness, maternity leave, other family/personal reasons, bad weather, etc. → *SKIP to question 38*
- ☐ No → *SKIP to question 36*

c. Has this person been informed that he or she will be recalled to work within the next 6 months OR been given a date to return to work?

- ☐ Yes → *SKIP to question 37*
- ☐ No

36 **During the LAST 4 WEEKS, has this person been ACTIVELY looking for work?**

- ☐ Yes
- ☐ No → *SKIP to question 38*

37 **LAST WEEK, could this person have started a job if offered one, or returned to work if recalled?**

- ☐ Yes, could have gone to work
- ☐ No, because of own temporary illness
- ☐ No, because of all other reasons (in school, etc.)

38 **When did this person last work, even for a few days?**

- ☐ Within the past 12 months
- ☐ 1 to 5 years ago → *SKIP to* **L**
- ☐ Over 5 years ago or never worked → *SKIP to question 47*

39 **a. During the PAST 12 MONTHS (52 weeks), did this person work 50 or more weeks? Count paid time off as work.**

- ☐ Yes → *SKIP to question 40*
- ☐ No

b. How many weeks DID this person work, even for a few hours, including paid vacation, paid sick leave, and military service?

- ☐ 50 to 52 weeks
- ☐ 48 to 49 weeks
- ☐ 40 to 47 weeks
- ☐ 27 to 39 weeks
- ☐ 14 to 26 weeks
- ☐ 13 weeks or less

40 **During the PAST 12 MONTHS, in the WEEKS WORKED, how many hours did this person usually work each WEEK?**

Usual hours worked each WEEK

13194113

Person 1 (continued)

L *Answer questions 41 – 46 if this person worked in the past 5 years. Otherwise, SKIP to question 47.*

41 – 46 CURRENT OR MOST RECENT JOB ACTIVITY. *Describe clearly this person's chief job activity or business last week. If this person had more than one job, describe the one at which this person worked the most hours. If this person had no job or business last week, give information for his/her last job or business.*

41 Was this person – *Mark (X) ONE box.*

- ☐ an employee of a PRIVATE FOR-PROFIT company or business, or of an individual, for wages, salary, or commissions?
- ☐ an employee of a PRIVATE NOT-FOR-PROFIT, tax-exempt, or charitable organization?
- ☐ a local GOVERNMENT employee (city, county, etc.)?
- ☐ a state GOVERNMENT employee?
- ☐ a Federal GOVERNMENT employee?
- ☐ SELF-EMPLOYED in own NOT INCORPORATED business, professional practice, or farm?
- ☐ SELF-EMPLOYED in own INCORPORATED business, professional practice, or farm?
- ☐ working WITHOUT PAY in family business or farm?

42 For whom did this person work?

If now on active duty in the Armed Forces, mark (X) this box → ☐ *and print the branch of the Armed Forces.*

Name of company, business, or other employer

43 What kind of business or industry was this? *Describe the activity at the location where employed. (For example: hospital, newspaper publishing, mail order house, auto engine manufacturing, bank)*

44 Is this mainly – *Mark (X) ONE box.*

- ☐ manufacturing?
- ☐ wholesale trade?
- ☐ retail trade?
- ☐ other (agriculture, construction, service, government, etc.)?

45 What kind of work was this person doing? *(For example: registered nurse, personnel manager, supervisor of order department, secretary, accountant)*

46 What were this person's most important activities or duties? *(For example: patient care, directing hiring policies, supervising order clerks, typing and filing, reconciling financial records)*

47 INCOME IN THE PAST 12 MONTHS

Mark (X) the "Yes" box for each type of income this person received, and give your best estimate of the TOTAL AMOUNT during the PAST 12 MONTHS. (NOTE: The "past 12 months" is the period from today's date one year ago up through today.)

Mark (X) the "No" box to show types of income NOT received.

If net income was a loss, mark the "Loss" box to the right of the dollar amount.

For income received jointly, report the appropriate share for each person – or, if that's not possible, report the whole amount for only one person and mark the "No" box for the other person.

a. Wages, salary, commissions, bonuses, or tips from all jobs. *Report amount before deductions for taxes, bonds, dues, or other items.*

☐ Yes → $ .00
☐ No
TOTAL AMOUNT for past 12 months

b. Self-employment income from own nonfarm businesses or farm businesses, including proprietorships and partnerships. *Report NET income after business expenses.*

☐ Yes → $ .00 ☐ Loss
☐ No
TOTAL AMOUNT for past 12 months

c. Interest, dividends, net rental income, royalty income, or income from estates and trusts. *Report even small amounts credited to an account.*

☐ Yes → $ .00 ☐ Loss
☐ No
TOTAL AMOUNT for past 12 months

d. Social Security or Railroad Retirement.

☐ Yes → $ .00
☐ No
TOTAL AMOUNT for past 12 months

e. Supplemental Security Income (SSI).

☐ Yes → $ .00
☐ No
TOTAL AMOUNT for past 12 months

f. Any public assistance or welfare payments from the state or local welfare office.

☐ Yes → $ .00
☐ No
TOTAL AMOUNT for past 12 months

g. Retirement, survivor, or disability pensions. *Do NOT include Social Security.*

☐ Yes → $ .00
☐ No
TOTAL AMOUNT for past 12 months

h. Any other sources of income received regularly such as Veterans' (VA) payments, unemployment compensation, child support or alimony. *Do NOT include lump sum payments such as money from an inheritance or the sale of a home.*

☐ Yes → $ .00
☐ No
TOTAL AMOUNT for past 12 months

48 What was this person's total income during the PAST 12 MONTHS? *Add entries in questions 47a to 47h; subtract any losses. If net income was a loss, enter the amount and mark (X) the "Loss" box next to the dollar amount.*

☐ None OR $ .00 ☐ Loss
TOTAL AMOUNT for past 12 months

→ **Continue with the questions for Person 2 on the next page. If no one is listed as person 2 on page 2, SKIP to page 28 for mailing instructions.**

13194121

Person 2

The balance of the questionnaire has questions for Person 2, Person 3, Person 4, and Person 5. The questions are the same as the questions for Person 1.

13194279

27

13194287

Mailing Instructions

Please make sure you have...

- listed all names and answered the questions on pages 2, 3, and 4
- answered all Housing questions
- answered all Person questions for each person.

Then...

- put the completed questionnaire into the postage-paid return envelope. If the envelope has been misplaced, please mail the questionnaire to:
  U.S. Census Bureau
  P.O. Box 5240
  Jeffersonville, IN 47199-5240
- make sure the barcode above your address shows in the window of the return envelope.

Thank you for participating in the American Community Survey.

For Census Bureau Use

POP EDIT PHONE

EDIT CLERK TELEPHONE CLERK

JIC1 JIC2

JIC3 JIC4

The Census Bureau estimates that, for the average household, this form will take 40 minutes to complete, including the time for reviewing the instructions and answers. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to: Paperwork Project 0607-0810, U.S. Census Bureau, 4600 Silver Hill Road, AMSD – 3K138, Washington, D.C. 20233. You may e-mail comments to Paperwork@census.gov; use "Paperwork Project 0607-0810" as the subject. Please DO NOT RETURN your questionnaire to this address. Use the enclosed preaddressed envelope to return your completed questionnaire.

Respondents are not required to respond to any information collection unless it displays a valid approval number from the Office of Management and Budget. This 8-digit number appears in the bottom right on the front cover of this form.

Form ACS-1(INFO)(2014)KFI (06-06-2013)

Appendix F

ACS Questions by Year Introduced and Agency

This appendix shows the American Community Survey questions by the year each was introduced to the ACS or the census long form. It also shows which federal agencies were using each question prior to the 2014 content review, which is intended to update the inventory of uses.

TABLE F-1 ACS Questions by Year Introduced and Agency Use

Question Number	Question	Year Added	Agency
Housing Question #01	Which best describes this building? Include all apartments, flats, etc., even if vacant.	1940	Environmental Protection Agency Housing and Urban Development
Housing Question #02	About when was this building first built?	1940	Department of Energy Environmental Protection Agency Federal Reserve Board Health and Human Services Housing and Urban Development
Housing Question #03	When did PERSON 1 (listed on page 2) move into this house, apartment, or mobile home?	1960	Environmental Protection Agency Housing and Urban Development
Housing Question #04	How many acres is this house or mobile home on?	1960	Environmental Protection Agency Housing and Urban Development Department of Agriculture
Housing Question #05	IN THE PAST 12 MONTHS, what were the actual sales of all agricultural products from this property?	1960	Housing and Urban Development Department of Agriculture
Housing Question #06	Is there a business (such as a store or barber shop) or medical office on this property?	1950	Environmental Protection Agency Housing and Urban Development
Housing Question #07a	How many separate rooms are in this house, apartment, or mobile home?	1940	Department of Energy Environmental Protection Agency Health and Human Services Housing and Urban Development
Housing Question #07b	How many of these rooms are bedrooms?	1960	Department of Energy Environmental Protection Agency Health and Human Services Housing and Urban Development

TABLE F-1 Continued

Question Number	Question	Year Added	Agency
Housing Questions #08a	Does this house, apartment, or mobile home have hot and cold running water?	1940	Health and Human Services Housing and Urban Development
Housing Questions #08b	Does this house, apartment, or mobile home have a flush toilet?	1940	Health and Human Services Housing and Urban Development
Housing Questions #08c	Does this house, apartment, or mobile home have a bathtub or shower?	1940	Health and Human Services Housing and Urban Development
Housing Questions #08d	Does this house, apartment, or mobile home have a sink with a faucet?	1970	Health and Human Services Housing and Urban Development
Housing Questions #08e	Does this house, apartment, or mobile home have a stove or range?	1970	Health and Human Services Housing and Urban Development
Housing Questions #08f	Does this house, apartment, or mobile home have a refrigerator?	1940	Health and Human Services Housing and Urban Development
Housing Question #08g	Does this house, apartment, or mobile home have telephone service from which you can both make and receive calls? Include cell phones.	1960	Federal Communications Commission Health and Human Services

TABLE F-1 Continued

Question Number	Question	Year Added	Agency
Housing Question #9	At this house, apartment, or mobile homedo you or any member of this household own or use any of the following computers? a. Desktop, laptop, netbook, or notebook computer, b. Handheld computer, smart mobile phone, or other handheld wireless computer, c. Some other type of computer	2013	Federal Communications Commission National Telecommunications and Information Administration
Housing Question #10	At this house, apartment, or mobile home—do you or any member of this household access the Internet?	2013	Federal Communications Commission National Telecommunications and Information Administration
Housing Question #11	At this house, apartment, or mobile home—do you or any member of this household subscribe to the Internet using— a. Dial-up service? b. DSL service? c. Cable modem service? d. Fiber-optic service? e. Mobile broadband plan for a computer or a cell phone? f. Satellite Internet service? g. Some other service?	2013	Federal Communications Commission National Telecommunications and Information Administration
Housing Question #12	How many automobiles, vans, and trucks of one-ton capacity or less are kept at home for use by members of this household?	1960	Department of Energy Department of Transportation Environmental Protection Agency Health and Human Services Department of Agriculture
Housing Question #13	Which FUEL is used MOST for heating this house, apartment, or mobile home?	1940	Department of Energy Housing and Urban Development Department of Agriculture

TABLE F-1 Continued

Question Number	Question	Year Added	Agency
Housing Question #14	a. LAST MONTH, what was the cost of electricity for this house, apartment, or mobile home? b. LAST MONTH, what was the cost of gas for this house, apartment, or mobile home? c. IN THE PAST 12 MONTHS, what was the cost of water and sewer for this house, apartment, or mobile home? d. IN THE PAST 12 MONTHS, what was the cost of oil, coal, kerosene, wood, etc., for this house, apartment, or mobile home?	1940	Environmental Protection Agency Health and Human Services Housing and Urban Development Department of Agriculture
Housing Question #15	IN THE PAST 12 MONTHS, did you or any member of this household receive benefits from the Food Stamp Program or SNAP (the Supplemental Nutrition Assistance Program)?	2005	Health and Human Services Department of Agriculture
Housing Question #16	Is this house, apartment, or mobile home part of a condominium? What is the monthly condominium fee?	1990	Health and Human Services Housing and Urban Development Environmental Protection Agency Department of Agriculture
Housing Question #17	Is this house, apartment, or mobile home—Owned by you or someone in this household with a mortgage or loan? Owned by you or someone in this household free and clear (without a mortgage or loan)? Rented? Occupied without payment of rent?	1890	Federal Communications Commission Health and Human Services Housing and Urban Development

TABLE F-1 Continued

Question Number	Question	Year Added	Agency
Housing Question #18	a. What is the monthly rent for this house, apartment, or mobile home? b. Does the monthly rent include any meals?	1940	Department of Transportation Environmental Protection Agency Federal Communications Commission Health and Human Services Housing and Urban Development
Housing Question #19	About how much do you think this house and lot, apartment, or mobile home (and lot, if owned) would sell for if it were for sale?	1850	Department of Labor Department of Transportation Health and Human Services Housing and Urban Development
Housing Question #20	What are the annual real estate taxes on THIS property?	1980	Health and Human Services Environmental Protection Agency Housing and Urban Development Department of Agriculture
Housing Question #21	What is the annual payment for fire, hazard, and flood insurance on THIS property?	1980	Health and Human Services Environmental Protection Agency Housing and Urban Development Department of Agriculture
Housing Question #22	a. Do you or any member of this household have a mortgage, deed of trust, contract to purchase, or similar debt on THIS property? b. How much is the regular monthly mortgage payment on THIS property? c. Does the regular monthly mortgage payment include payments for real estate taxes on THIS property? d. Does the regular monthly mortgage payment include payments for fire, hazard, or flood insurance on THIS property?	1890	Environmental Protection Agency Housing and Urban Development Department of Agriculture Health and Human Services

TABLE F-1 Continued

Question Number	Question	Year Added	Agency
Housing Question #23	a. Do you or any member of this household have a second mortgage or a home equity loan on THIS property? b. How much is the regular monthly payment on all second or junior mortgages and all home equity loans on THIS property?	1940	Health and Human Services Environmental Protection Agency Housing and Urban Development Department of Agriculture
Housing Question #24	What are the total annual costs for personal property taxes, site rent, registration fees, and license fees on THIS mobile home and its site?	1990	Health and Human Services Environmental Protection Agency Housing and Urban Development Department of Agriculture
Population Question #02	How is this person related to Person 1?	1880	Department of Energy Department of Education Department of Transportation Federal Communications Commission Health and Human Services Housing and Urban Development National Telecommunications and Information Administration Department of Agriculture Department of Veterans Affairs
Population Question #03	What is Person 1's sex?	1790	Department of Justice Department of Labor Department of Transportation Environmental Protection Agency Federal Communications Commission Health and Human Services Housing and Urban Development National Science Foundation National Telecommunications and Information Administration Department of Agriculture Department of Veterans Affairs

TABLE F-1 Continued

Question Number	Question	Year Added	Agency
Population Question #04	What is Person 1's age and what is Person 1's date of birth?	1790	Department of Education Department of Justice Department of Labor Department of Transportation Environmental Protection Agency Federal Communications Commission Health and Human Services Housing and Urban Development National Science Foundation National Telecommunications and Information Administration Department of Agriculture Department of Veterans Affairs
Population Question #05	Is Person 1 of Hispanic, Latino, or Spanish origin?	1970	Department of Justice Department of Labor Department of Transportation Equal Employment Opportunity Commission Environmental Protection Agency Federal Communications Commission Federal Reserve Board Health and Human Services Housing and Urban Development National Science Foundation National Telecommunications and Information Administration Department of Agriculture Department of Veterans Affairs

TABLE F-1 Continued

Question Number	Question	Year Added	Agency
Population Question #06	What is Person 1's race?	1790	Department of Justice Department of Labor Department of Transportation Equal Employment Opportunity Commission Environmental Protection Agency Federal Communications Commission Federal Reserve Board Health and Human Services Housing and Urban Development National Science Foundation National Telecommunications and Information Administration Department of Agriculture Department of Veterans Affairs
Population Question #07	Where was this person born?	1850	Department of Education Department of Labor Federal Communications Commission Health and Human Services National Science Foundation
Population Question #08	Is this person a citizen of the United States?	1820	Department of Labor Federal Communications Commission Health and Human Services National Science Foundation Department of Agriculture
Population Question #09	When did this person come to live in the United States?	1890	Department of Education Department of Labor Health and Human Services National Science Foundation

TABLE F-1 Continued

Question Number	Question	Year Added	Agency
Population Question #10	a. At any time IN THE LAST 3 MONTHS, has this person attended school or college? b. What grade or level was this person attending?	1850	Department of Education Department of Labor Equal Employment Opportunity Commission Federal Communications Commission Health and Human Services National Science Foundation National Telecommunications and Information Administration Department of Agriculture Department of Veterans Affairs
Population Question #11	What is the highest degree or level of school this person has COMPLETED?	1940	Department of Education Environmental Protection Agency Health and Human Services Department of Veterans Affairs
Population Question #12	This question focuses on this person's BACHELOR'S DEGREE. Please print below the specific major(s) of any BACHELOR'S DEGREES this person has received.	2009	Department of Labor National Science Foundation
Population Question #13	What is this person's ancestry or ethnic origin?	1970	Department of Labor Equal Employment Opportunity Commission Environmental Protection Agency Health and Human Services
Population Question #14	a. Does this person speak a language other than English at home? b. What is this language? c. How well does this person speak English?	1890	Department of Education Department of Labor Environmental Protection Agency Federal Communications Commission Health and Human Services Department of Veterans Affairs

TABLE F-1 Continued

Question Number	Question	Year Added	Agency
Population Question #15	a. Did this person live in this house or apartment 1 year ago? b. Where did this person live 1 year ago?	1940	Department of Labor Department of Transportation Environmental Protection Agency Health and Human Services Housing and Urban Development Department of Agriculture Department of Veterans Affairs
Population Question #16	Is this person CURRENTLY covered by any of the following types of health insurance or health coverage plans?	2008	Health and Human Services
Population Question #17	a. Is this person deaf or does he/she have serious difficulty hearing? b. Is this person blind or does he/she have serious difficulty seeing even when wearing glasses?	1850	Department of Justice Department of Labor Department of Transportation Environmental Protection Agency Federal Communications Commission Health and Human Services Housing and Urban Development National Science Foundation National Telecommunications and Information Administration Department of Veterans Affairs
Population Question #18	a. Because of a physical, mental, or emotional condition, does this person have serious difficulty concentrating, remembering, or making decisions? b. Does this person have serious difficulty walking or climbing stairs? c. Does this person have difficulty dressing or bathing?	1880	Department of Justice Department of Labor Department of Transportation Environmental Protection Agency Federal Communications Commission Health and Human Services Housing and Urban Development National Science Foundation National Telecommunications and Information Administration Department of Veterans Affairs

TABLE F-1 Continued

Question Number	Question	Year Added	Agency
Population Question #19	Because of a physical, mental, or emotional condition, does this person have difficulty doing errands alone such as visiting a doctor's office or shopping?	1880	Department of Justice Department of Labor Department of Transportation Environmental Protection Agency Federal Communications Commission Health and Human Services Housing and Urban Development National Science Foundation National Telecommunications and Information Administration Department of Veterans Affairs
Population Question #20	What is this person's marital status?	1880	Federal Communications Commission Health and Human Services Housing and Urban Development National Science Foundation Department of Agriculture
Population Question #21	In the PAST 12 MONTHS did this person get a. Married? b. Widowed? c. Divorced?	1850	Health and Human Services
Population Question #22	How many times has this person been married?	1910	Health and Human Services
Population Question #23	In what year did this person last get married?	1910	Health and Human Services
Population Question #24	Has this person given birth to any children in the past 12 months?	1890	Environmental Protection Agency Health and Human Services

TABLE F-1 Continued

Question Number	Question	Year Added	Agency
Population Question #25	a. Does this person have any of his/her own grandchildren under the age of 18 living in this house or apartment? b. Is this grandparent currently responsible for most of the basic needs of any grandchildren under the age of 18 who live in this house or apartment? How long has this grandparent been responsible for these grandchildren?	2000	Health and Human Services
Population Question #26	Has this person ever served on active duty in the U.S. Armed Forces, Reserves, or National Guard?	1890	Department of Labor Federal Communications Commission Health and Human Services Department of Veterans Affairs
Population Question #27	When did this person serve on active duty in the U.S. Armed Forces?	1890	Department of Labor Federal Communications Commission Health and Human Services Department of Veterans Affairs
Population Question #28	a. Does this person have a VA service-connected disability rating? b. What is this person's service-connected disability rating?	2008	Department of Labor Department of Veterans Affairs
Population Question #29	a. LAST WEEK, did this person work for pay at a job (or business)? b. LAST WEEK, did this person do ANY work for pay, even for as little as one hour?	1910	Department of Labor Department of Transportation Equal Employment Opportunity Commission Federal Communications Commission Health and Human Services Department of Veterans Affairs

TABLE F-1 Continued

Question Number	Question	Year Added	Agency
Population Question #30	At what location did this person work LAST WEEK?	1960	Department of Labor Department of Transportation Equal Employment Opportunity Commission Environmental Protection Agency Federal Reserve Board Health and Human Services National Science Foundation
Population Question #31	How did this person usually get to work LAST WEEK?	1960	Department of Energy Department of Labor Department of Transportation Environmental Protection Agency Federal Reserve Board Health and Human Services
Population Question #32	How many people, including this person, usually rode to work in the car, truck, or van LAST WEEK?	1980	Department of Energy Department of Labor Department of Transportation Environmental Protection Agency Federal Reserve Board Health and Human Services
Population Question #33	What time did this person usually leave home to go to work LAST WEEK?	1990	Department of Energy Department of Labor Department of Transportation Environmental Protection Agency Federal Reserve Board Health and Human Services
Population Question #34	How many minutes did it usually take this person to get from home to work LAST WEEK?	1980	Department of Energy Department of Labor Department of Transportation Environmental Protection Agency Federal Reserve Board Health and Human Services

TABLE F-1 Continued

Question Number	Question	Year Added	Agency
Population Question #35	a. LAST WEEK, was this person on layoff from a job? b. LAST WEEK, was this person TEMPORARILY absent from a job or business? c. Has this person been informed that he or she will be recalled to work within the next 6 months OR been given a date to return to work?	1890	Department of Labor Department of Transportation Equal Employment Opportunity Commission Federal Communications Commission Health and Human Services Department of Veterans Affairs
Population Question #36	During the LAST 4 WEEKS, has this person been ACTIVELY looking for work?	1930	Department of Labor Department of Transportation Equal Employment Opportunity Commission Federal Communications Commission Health and Human Services Department of Veterans Affairs
Population Question #37	LAST WEEK, could this person have started a job if offered one, or returned to work if recalled?	1930	Department of Labor Department of Transportation Equal Employment Opportunity Commission Federal Communications Commission Health and Human Services Department of Veterans Affairs
Population Question #38	When did this person last work, even for a few days?	1930	Department of Labor Department of Transportation Health and Human Services Department of Agriculture Department of Labor Equal Employment Opportunity Commission Federal Communications Commission Health and Human Services Department of Veterans Affairs

TABLE F-1 Continued

Question Number	Question	Year Added	Agency
Population Question #39	a. During the PAST 12 MONTHS (52 weeks), did this person work 50 or more weeks? Count paid time off as work. b. How many weeks DID this person work, even for a few hours, including paid vacation, paid sick leave, and military service?	1880	Department of Labor Department of Transportation Health and Human Services National Science Foundation Department of Agriculture Department of Veterans Affairs
Population Question #40	During the PAST 12 MONTHS, in the WEEKS WORKED, how many hours did this person usually work each WEEK?	1940	Department of Labor Department of Transportation Environmental Protection Agency Health and Human Services National Science Foundation Department of Agriculture Department of Veterans Affairs
Population Question #41	Was this person – an employee of a PRIVATE FOR-PROFIT company or business, or of an individual, for wages, salary, or commissions? an employee of a PRIVATE NOT-FOR-PROFIT, tax-exempt, or charitable organization? a local GOVERNMENT employee (city, county, etc.)? a state GOVERNMENT employee? a Federal GOVERNMENT employee? SELF-EMPLOYED in own NOT INCORPORATED business, professional practice, or farm? SELF-EMPLOYED in own INCORPORATED business, professional practice, or farm? working WITHOUT PAY in family business or farm?	1910	Department of Education Department of Labor Department of Transportation Equal Employment Opportunity Commission Environmental Protection Agency Health and Human Services Department of Veterans Affairs

TABLE F-1 Continued

Question Number	Question	Year Added	Agency
Population Question #42	For whom did this person work?	1970	Department of Education Department of Labor Department of Transportation Equal Employment Opportunity Commission Environmental Protection Agency Health and Human Services National Science Foundation Department of Veterans Affairs
Population Question #43	What kind of business or industry was this?	1910	Department of Education Department of Labor Department of Transportation Equal Employment Opportunity Commission Environmental Protection Agency Health and Human Services National Science Foundation Department of Veterans Affairs
Population Question #44	Is this mainly – manufacturing? wholesale trade? retail trade? other (agriculture, construction, service, government, etc.)?	1910	Department of Education Department of Labor Department of Transportation Equal Employment Opportunity Commission Environmental Protection Agency Health and Human Services National Science Foundation Department of Veterans Affairs
Population Question #45	What kind of work was this person doing?	1850	Department of Education Department of Labor Department of Transportation Equal Employment Opportunity Commission Health and Human Services National Science Foundation Department of Veterans Affairs
Population Question #46	What were this person's most important activities or duties?	1970	Department of Education Department of Labor Department of Transportation Equal Employment Opportunity Commission Health and Human Services National Science Foundation Department of Veterans Affairs

TABLE F-1 Continued

Question Number	Question	Year Added	Agency
Population Question #47a	INCOME IN THE PAST 12 MONTHS a. Wages, salary, commissions, bonuses, or tips from all jobs.	1940	Department of Energy Department of Education Department of Labor Department of Transportation Environmental Protection Agency Federal Communications Commission Federal Reserve Board Health and Human Services Housing and Urban Development National Science Foundation Department of Agriculture Department of Veterans Affairs
Population Question #47b	INCOME IN THE PAST 12 MONTHS b. Self-employment income from own nonfarm businesses or farm businesses, including proprietorships and partnerships.	1940	Department of Energy Department of Education Department of Labor Department of Transportation Environmental Protection Agency Federal Communications Commission Federal Reserve Board Health and Human Services Housing and Urban Development National Science Foundation Department of Agriculture Department of Veterans Affairs
Population Question #47c	INCOME IN THE PAST 12 MONTHS c. Interest, dividends, net rental income, royalty income, or income from estates and trusts.	1980	Department of Energy Department of Education Department of Labor Department of Transportation Environmental Protection Agency Federal Communications Commission Federal Reserve Board Health and Human Services Housing and Urban Development National Science Foundation Department of Agriculture Department of Veterans Affairs

TABLE F-1 Continued

Question Number	Question	Year Added	Agency
Population Question #47d	INCOME IN THE PAST 12 MONTHS d. Social Security or Railroad Retirement.	1970	Department of Energy Department of Education Department of Labor Department of Transportation Environmental Protection Agency Federal Communications Commission Federal Reserve Board Health and Human Services Housing and Urban Development National Science Foundation Department of Agriculture Department of Veterans Affairs
Population Question #47e	INCOME IN THE PAST 12 MONTHS e. Supplemental Security Income (SSI).	1980	Department of Energy Department of Education Department of Labor Department of Transportation Environmental Protection Agency Federal Communications Commission Federal Reserve Board Health and Human Services Housing and Urban Development National Science Foundation Department of Agriculture Department of Veterans Affairs
Population Question #47f	INCOME IN THE PAST 12 MONTHS f. Any public assistance or welfare payments from the state or local welfare office.	1970	Department of Energy Department of Education Department of Labor Department of Transportation Environmental Protection Agency Federal Communications Commission Federal Reserve Board Health and Human Services Housing and Urban Development National Science Foundation Department of Agriculture Department of Veterans Affairs

TABLE F-1 Continued

Question Number	Question	Year Added	Agency
Population Question #47g	INCOME IN THE PAST 12 MONTHS g. Retirement, survivor, or disability pensions.	1990	Department of Energy Department of Education Department of Labor Department of Transportation Environmental Protection Agency Federal Communications Commission Federal Reserve Board Health and Human Services Housing and Urban Development National Science Foundation Department of Agriculture Department of Veterans Affairs
Population Question #47h	INCOME IN THE PAST 12 MONTHS h. Any other sources of income received regularly such as Veterans' (VA) payments, unemployment compensation, child support or alimony.	1960	Department of Energy Department of Education Department of Labor Department of Transportation Environmental Protection Agency Federal Communications Commission Federal Reserve Board Health and Human Services Housing and Urban Development National Science Foundation Department of Agriculture Department of Veterans Affairs
Population Question #48	What was this person's total income during the PAST 12 MONTHS?	1980	Department of Energy Department of Education Department of Labor Department of Transportation Environmental Protection Agency Federal Communications Commission Federal Reserve Board Health and Human Services Housing and Urban Development National Science Foundation Department of Agriculture Department of Veterans Affairs

SOURCE: Table provided to the panel by the Census Bureau.

Appendix G

Biographical Sketches of Panel Members and Staff

Alan M. Zaslavsky (*Chair*) is a professor of statistics in the Department of Health Care Policy at Harvard Medical School. His statistical research interests include surveys, census methodology, small area estimation, official statistics, missing data, hierarchical modeling, and Bayesian methodology. His research topics in health care policy focus on measurement of the quality of care provided by health plans through consumer assessments and clinical and administrative data. His current major projects include survey implementation for the Medicare system, methodology for studies in psychiatric epidemiology, studies on determinants of quality of care in Medicare, and measurement of disparities in health care. He is a fellow of the American Statistical Association. He has a Ph.D. in applied mathematics from the Massachusetts Institute of Technology.

Michael Davern is senior vice president and director of the Public Health Research Department at the National Opinion Research Center (NORC) at the University of Chicago. His work focuses on survey research, public health data, linking surveys with administrative data, and Census Bureau data, as well as the use of these data for policy research simulation and evaluation. Previously, at the University of Minnesota, he was an assistant professor of health policy and management and research director of the State Health Access Data Assistance Center and codirector of the U.S. Census Bureau's Research Data Center. He also previously served as a statistician for the Labor Force and Transfer Programs Statistics Branch of the U.S. Census Bureau. A major focus of his work has involved applying state-level data to health policy issues and helping states monitor trends in health insurance coverage rates. He has a Ph.D. in sociology from the University of Notre Dame.

Jeff Hardcastle serves as the demographer for the state of Nevada in the Nevada Small Business Development Center at the University of Nevada at Reno. He is responsible for producing annual state, county, city, and unincorporated town estimates; population projections; age, sex, race, and Hispanic origin estimates and projections; disseminating data to interested parties and the general public; networking with other state agencies; representing the state of Nevada to the Federal-State Cooperative Program for Population Estimates (FSCPE) and the Federal-State Cooperative Program for Population Projections (FSCPP). He served four terms as chair of FSCPE Steering Committee and as chair of FSCPP. He served as the Nevada's governor's liaison for the 2010 census and participated in the Census Bureau's Local Update of Census Address Program and count review. He was a contributor to the *Encyclopedia of the U.S. Census, Second Edition*. He has an M.A. in urban and regional planning from the University of Colorado at Denver.

Scott H. Holan is an associate professor in the Department of Statistics at the University of Missouri. His research interests include time-series analysis, spatial-temporal models, econometrics, Bayesian methodology, nonparametric and semiparametric methods, functional data analysis, and data confidentiality. He is a principal investigator for a joint U.S. National Science Foundation/U.S. Census Bureau research node to develop new data analysis and modeling methodologies for the American Community Survey. He has been the recipient of several research fellowships to work on problems involving seasonality and data confidentiality. He is a fellow of the American Statistical Association and an elected member of the International Statistics Institute. He has a Ph.D. in statistics from Texas A&M University.

James S. House is the Angus Campbell distinguished university professor of survey research, public policy, and sociology; research professor in the Department of Epidemiology; and research professor affiliate at the Population Studies Center of the Institute for Social Research, all at the University of Michigan. He previously served as director of the Survey Research Center at the Institute for Social Research and held positions at Duke University and the University of North Carolina at Chapel Hill. His research interests include social psychology, political sociology, social structure and personality, psychosocial and socioeconomic factors in health, survey research methods, and American society. He is a member of the National Academy of Sciences, the Institute of Medicine, the American Academy of Arts and Sciences, the American Association for the Advancement of Science, and the American Sociological Association. He has served as editor or associate editor of the *Journal of Health and Social Behavior*, *Work & Stress*, and *Journal of Occupational Behavior*; and has served on the editorial board of *Sociometry*, *Journal of Behavioral Medicine*, and *Annual Review of Sociology*. He has a Ph.D. in social psychology from the University of Michigan.

David Hubble is a senior statistician at Westat, where his work has involved the National Assessment of Education Progress, the Minnesota Adult Tobacco Survey, and other survey design and technical assistance projects. Previously, his work at the U.S. Census Bureau covered many aspects of designing, planning, and conducting demographic surveys and census evaluations. His research interests cover a wide range of topics, including survey design, sampling frame creation, sample selection, data collection methods, missing data mitigation, weighting procedures, estimation techniques, variance estimation, methodological investigations, and experimental designs. He has an M.A. in statistics from Boston University.

Linda A. Jacobsen is vice president of U.S. programs at the Population Reference Bureau in Washington, D.C. Previously, she was a senior executive and chief demographer for two leading marketing information companies, the research director at *American Demographics*, and a faculty member at Cornell University and the University of Iowa, conducting research and teaching graduate courses in sociology and demography. Her research has focused on family and household demography, population estimates and projections, and poverty and inequality. She has been a featured speaker on U.S. demographic trends at the Knight Center for Specialized Journalism and at Harvard University's Program for Newly Elected Members of Congress. Her extensive research experience with the American Community Survey (ACS) includes coauthoring two of the U.S. Census Bureau's Compass handbooks for understanding and using ACS data. She is chair of the Government and Public Affairs Committee of the Population Association of America and a member of the board of directors of the Council of Professional Associations on Federal Statistics. She has a Ph.D. in sociology from the University of Wisconsin–Madison.

Michael W. Link is chief methodologist for research methods at the Nielsen Company. Previously, he worked in survey research at the University of South Carolina, RTI International, and the Centers for Disease Control and Prevention. His work has centered on developing techniques for improving survey participation and data quality (use of address-based sampling, impact of call screening technologies), methodological issues involving use of multiple modes in data collection (web, mail, computer-assisted telephone interview, field, mobile, meters), and obtaining participation from hard-to-survey populations (linguistically isolated, racial and ethnic groups). His current research focuses on emerging technologies, such as mobile and social platforms, as vehicles for measuring and understanding public attitudes and behaviors. He is a co-recipient of the Warren J. Mitofsky Innovators Award from the American Association of Public Opinion Research. He has a Ph.D. in political science from the University of South Carolina.

Jennifer H. Madans is co-deputy director and associate director for science at the National Center for Health Statistics (NCHS) at the U.S. Department of Health and Human Services. Previously, she was in the Division of Biostatistics and Epidemiology of the Department of Community and Family Medicine at the School of Medicine and in the Department of Demography, both at Georgetown University. She is a recipient of the Public Health Service Superior Service Award, the NCHS Director's Award in Methodological Statistics, and the NCHS Elijah White Memorial Award. She is a fellow of the American Statistical Association, and a member of the American Sociological Association, the Population Association of America, the American Public Health Association, the Society for Epidemiological Research, and the Gerontological Society of America. She has a Ph.D. in sociology from the University of Michigan.

Krisztina Marton (*Study Director*) is a senior program officer with the Committee on National Statistics (CNSTAT). She is currently serving as study director for the Standing Committee on Integrating New Behavioral Health Measures Into the Substance Abuse and Mental Health Services Administration's Data Collection Programs. She served as study director for several CNSTAT consensus panels, workshops, and expert meetings, including the Panel on Statistical Methods for Measuring the Group Quarters Population in the American Community Survey. Prior to joining CNSTAT, she was a survey researcher at Mathematica Policy Research and a survey director in the Ohio State University Center for Survey Research. She has a Ph.D. in communication with an interdisciplinary specialization in survey research from Ohio State University.

David A. Plane is a professor in the School of Geography and Development at the University of Arizona. His research focuses on the dynamics of migration systems and methods for analyzing human population distribution and redistribution. His current work is focused on migration across the lifecycle and the linkages between urban hierarchies and migration patterns. His other major interests are in transportation, regional science, regional development, and quantitative modeling. He has a Ph.D. in regional science from the University of Pennsylvania.

Jerome P. Reiter is the Mrs. Alexander Hehmeyer professor of statistical science in the Department of Statistical Science at Duke University. His methodological research focuses mainly on statistical methods for protecting data confidentiality, handling missing data, and analysis of complex data. His primary application areas are in official statistics and public policy. He is also the principal investigator for a joint U.S. National Science Foundation/U.S. Census Bureau research node of the Triangle Census Research Network, which is dedicated to improving the practice of data dissemination among federal statistical agencies. He has a Ph.D. in statistics from Harvard University.

Joseph J. Salvo is director of the Population Division at the New York City Department of City Planning. He is also an adjunct associate professor in the Urban Affairs and Planning Department at Hunter College of the City University of New York. His previous positions include a year at the U.S. Census Bureau. His work has broadly focused on immigration, the application of small area data for policies and programs, the use of census data and data from the American Community Survey. He is a past president of the Association of Public Data Users and a fellow of the American Statistical Association. He is a recipient of the Sloan Public Service Award from the Fund for the City of New York. He has a Ph.D. in sociology from Fordham University.

Robert L. Santos is a senior institute methodologist at the Urban Institute in Washington, D.C. Previously, he worked at NuStats, NORC at the University of Chicago, and the Survey Research Center at the University of Michigan. He has served as a member of the Census Advisory Committee of Professional Associations and on the editorial board of the *Public Opinion Quarterly*, and he has held numerous elected and appointed leadership positions in both the American Statistical Association and the American Association for Public Opinion Research. He is a fellow of the American Statistical Association and a recipient of its Founder's Award for excellence in survey statistics and contributions to the statistical community. He received an M.A. in statistics from the University of Michigan.

COMMITTEE ON NATIONAL STATISTICS

The Committee on National Statistics was established in 1972 at the National Academies to improve the statistical methods and information on which public policy decisions are based. The committee carries out studies, workshops, and other activities to foster better measures and fuller understanding of the economy, the environment, public health, crime, education, immigration, poverty, welfare, and other public policy issues. It also evaluates ongoing statistical programs and tracks the statistical policy and coordinating activities of the federal government, serving a unique role at the intersection of statistics and public policy. The committee's work is supported by a consortium of federal agencies through a National Science Foundation grant.