Estimating Eligibility and Participation for the WIC Program: Final Report

Michele Ver Ploeg and David M. Betson, Editors, Panel to Evaluate the USDA's Methodology for Estimating Eligibility and Participation for the WIC Program, National Research Council

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Panel to Evaluate the USDA's Methodology for Estimating Eligibility and Participation for the WIC Program

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Committee on National Statistics
Division of Behavioral and Social Sciences and Education

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PANEL TO EVALUATE THE USDA'S METHODOLOGY FOR ESTIMATING ELIGIBILITY AND PARTICIPATION FOR THE WIC PROGRAM

Acknowledgments

The Panel to Evaluate the USDA's Methodology for the Estimating Eligibility and Participation for the WIC Program wishes to thank the many people and institutions that contributed to the preparation of the final report. The panel especially wishes to thank the staff of the Food and Nutrition Service (FNS) of the U.S. Department of Agriculture (USDA)—Jay Hirschman, Cindy Long, Dawn Aldridge, and Stephanie Schmidt, for their willingness to answer the panel's numerous questions on the rules and regulations of the WIC program. We also wish to acknowledge David Smallwood for his role as a liaison with the Economic Research Service (ERS), the funding agency within USDA for this project.

As chair of the panel, I would like to thank my fellow panel members for their commitment and patience through the numerous drafts of this report. Their timely and constructive involvement has made this report possible. While every member of the panel contributed to the final report, I would like to thank panel members Janet Currie and Karl Scholz for conducting numerous simulations and calculations using the Survey of Income and Program Participation (SIPP) that appear in this report. I would also like to thank Alicia Carriquiry and Carol Suitor for calculating the prevalence of nutritional risk under alternative definitions using the Continuing Survey of Food Intake by Individuals.

To prepare and draft this final report, the panel convened two meetings. The first meeting after the release of the panel's interim report was held on March 19 and 20, 2002, in Washington, DC. During the open session of this meeting, the panel heard two presentations of papers it had commissioned. One paper, by Alison Jacknowitz of RAND, reviewed current rates of breastfeeding among new mothers and data for estimating these rates. The second paper, by Aaron Yelowitz of the University of Kentucky, examined variability in family income around the time of a child's birth. The second meeting of the panel was a two-day retreat held June 17 and 18, 2002, at Woods Hole, Massachusetts. At this closed meeting, the panel finalized the conclusions and recommendations of the report draft.

Central to the work of the panel was the original examination of data from the Current Population Survey (CPS) and SIPP. Linda Giannarelli, Joyce Morton, Paul Johnson, and Laura Wheaton of the Urban Institute assisted the panel's examination of the CPS data and output from the TRIM model. The panel would also like to thank Sheila Zedlewski of the Urban Institute for making this work possible. The panel would like to thank Molly Dahl, University of Wisconsin–Madison, for the assistance she provided the panel in its examination of the SIPP data.

A staff that was both professional and a pleasure to work with assisted the panel. The panel's work could not have been completed without the admirable assistance of Michele Ver Ploeg, the study director. Her initial drafts of many of the sections of the report and attention to the overall management of the project were invaluable to the panel. We would also like to thank Constance Citro, senior program officer at the National Research Council, for her sound advice and counsel during the drafting of the final report. Finally, the panel acknowledges the able research and project assistance provided by Jamie Casey and Michael Siri.

This report has been reviewed in draft form by individuals chosen for their diverse perspectives and technical expertise, in accordance with procedures approved by the National Research Council (NRC) 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 reports 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 the review of this report: Howard Chernick, Department of Economics, Hunter College, and the Graduate Center, City

University of New York; Barbara Devaney, Mathematica Policy Research, Princeton, NJ; Peter Germanis, American Enterprise Institute, Washington, DC; Gordon H. Lewis, Heinz School of Public Policy and Management, Carnegie Mellon University; Arleen A. Liebowitz, Department of Policy Studies, University of California, Los Angeles; Randall J. Olsen, Center for Human Resource Research, Ohio State University; and Virginia A. Stallings, Joseph R. Stokes Research Institute, Nutrition Section, The Children's Hospital of Philadelphia.

Although the reviewers listed above have provided many constructive comments that greatly improved the final report, they were not asked to endorse the conclusions and recommendations nor did they see the final draft of the report prior to its release. The review of this report was overseen by Robert Moffitt, Department of Economics, Johns Hopkins University. Appointed by the National Research Council he was responsible for making certain that an independent examination of this report was conducted 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.

David M. Betson, *Chair*
Panel to Evaluate the USDA's
Methodology for Estimating Eligibility
and Participation for the WIC Program

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Executive Summary

The Special Supplemental Nutrition Program for Women, Infants, and Children, or WIC as it is better known, is a federal grant program to states that provides benefits and services to groups who are at substantial risk of poor nutrition. The program provides specific types of foods, nutritional risk screening, nutrition education, and other services to pregnant and postpartum women, infants, and young children who have low incomes and who are deemed to be at nutritional risk. The program was designed as a component of good pre- and postnatal health care and to improve the health status of these nutritionally vulnerable populations. WIC enjoys strong political support, largely because research has shown that the program has contributed to such positive outcomes as improved birthweights, reductions in Medicaid costs after birth, and reduced anemia in young children.

WIC is not an entitlement program—that is, the number of eligible people who can enroll may be limited by the amount of funds appropriated to the program. In order to help inform budgetary decisions for the program, each year the U.S. Department of Agriculture (USDA) estimates the number of people who are eligible for the program and the number who are expected to participate if the program is fully funded—meaning that allocated funds are sufficient to serve all who want to participate. The accuracy of these projections is very important. If the projections are too low, eligible people may not be able to receive WIC benefits. If the projections are too high, then other valuable programs may not receive appropriate levels of funding.

USDA estimates of eligibility and participation have come under critical scrutiny. In recent years, some coverage rates—which are computed as the number of women, infants, and children receiving WIC benefits in a given year divided by the USDA estimates of the number of people eligible for that same year—have exceeded 100 percent for some groups to which the program's benefits are targeted. Some advocates and state WIC agencies believe that these high coverage rates result from USDA estimates of eligible people that are too low and that there are additional eligible people who want to participate but are not being served with current funding levels. However, the high coverage rates have led some members of Congress to conclude that some participants are truly ineligible, and that funding could be reduced somewhat and still meet the needs of truly eligible people who would participate under full funding.

PANEL CHARGE AND APPROACH

In response to these concerns, the Food and Nutrition Service (FNS) of the USDA asked the Committee on National Statistics of the National Research Council to convene a panel of experts to review the methods used to estimate the national number of people eligible and likely to participate in WIC under full funding of the program. The panel is charged with reviewing alternative data sets and methods for estimating income eligibility, adjunctive eligibility (which occurs when people are eligible for WIC because they are enrolled in other federal public assistance programs) and nutritional risk, as well as for estimating participation if the program is fully funded.

To evaluate the current estimation methodology and alternatives to it, the panel considered the size and nature of errors produced by components of the methodology. When possible, the panel used alternative methods with available data to estimate eligibility and participation for WIC and compared these estimates with those using current FNS methods and data. The panel considered several factors for evaluating alternatives: the accuracy of the estimates that result from an approach, the feasibility of implementing an approach (e.g., the expense and burden of implementation), and the quality, availability, and timeliness of the data used by an approach.

The panel also based its assessments of methodologies on the premise that the methodology should reflect the current rules and practices of the program. For example, those who are enrolled in Medicaid, Temporary Assistance for Needy Families (TANF), or food stamps are adjunctively

eligible for WIC regardless of their incomes. Thus, estimates of eligibility should account for adjunctive eligibility, and the panel explored different methods for doing so.

THE WIC PROGRAM

Individuals must meet three types of eligibility to be fully eligible for WIC: categorical, income or adjunctive, and nutritional eligibility. Infants up to age 1, children ages 1 to 5 years, pregnant women, women who are less than 1 year postpartum and breastfeeding, and women who are less than 6 months postpartum but not breastfeeding are categorically eligible for WIC. To be income eligible for WIC, people in these categories must live in families with incomes below 185 percent of the federal poverty guidelines, or they must participate in Medicaid, food stamps, or TANF, which is called adjunctive eligibility. Finally, an individual must be considered nutritionally at risk by meeting at least one of many nutritional risk criteria (e.g., low birthweight). Once deemed eligible for WIC, individuals are certified to receive benefits for a number of months: infants are certified for 12 months, children for 6 months, pregnant women for the length of their pregnancy plus 6 weeks postpartum, and postpartum women, both breastfeeding and nonbreastfeeding, for 6 months.

ESTIMATING ELIGIBILITY AND PARTICIPATION

Estimates of WIC Eligibility

A major conclusion of the panel is that current estimation methods result in a substantial underestimate of eligibility because monthly income and adjunctive eligibility are not adequately measured. Panel estimates show that a substantially larger number of people would be eligible for WIC if a monthly income measure is used instead of an annual income measure, which is the measure currently used. Compared with estimates based on current USDA methods, estimates made using monthly income data from the Survey of Income and Program Participation (SIPP), accounting for WIC certification periods and adjunctive eligibility (through reported enrollment in food stamps, Medicaid, or TANF), resulted in a 46 and 54 percent increase in the number of income-eligible infants in 1997 and 1998,

respectively. The increases for older children were 34 and 36 percent, respectively, for those years.

The majority of the estimated increase in eligibility is due to the combination of accounting for monthly income and certification periods. Due to certification periods, it is possible for a person to be certified as eligible in months in which a person is not eligible based on that month's income or participation in means tested programs. The panel estimated that for infants in 1997, 18 percent of the months that were certified to infants were to infants whose monthly household income exceeded eligibility limits in one or more of the months in which they were certified, whose annual household income exceeded 185 percent of poverty, and who did not report participation in programs that confer adjunctive eligibility during the calendar year. For children, this figure is 14 percent.

The panel also determined that the current adjustment used to estimate the number of people adjunctively eligible for WIC is not adequate and results in an underestimate of eligibility. With expansions in the Medicaid program that raised the income limit for eligibility well over 185 percent of federal poverty guidelines in many states, some people with annual incomes over 185 percent of poverty could be eligible for WIC because they were enrolled in Medicaid, but they would not be counted as such in the eligibility estimates. Compared with estimates based on the current USDA methodology, eligibility estimates made using SIPP data and reported participation in Medicaid, TANF, and food stamps, accounting for adjunctive eligibility alone (without accounting for monthly income) results in an additional 18 percent of infants eligible and an additional 10 percent of children eligible for WIC.

The panel concludes that current estimation methods result in an underestimate of eligibility because monthly income and adjunctive eligibility are not addressed. Underestimates of eligibility imply that USDA coverage rate estimates for each eligibility category are overstated, assuming no changes in the level of WIC participants (both eligible and ineligible).

We also reviewed methods to estimate the percentage of postpartum women who breastfeed. The panel concludes that currently used adjustment factors, which are based on data collected in 1988, do not reflect current rates of breastfeeding in the population. More recent estimates show an increase in the percent of postpartum mothers who breastfeed their infants. The panel recommends that USDA should use more recent data to estimate new adjustment factors for the percentage of WIC-eligible postpartum women who breastfeed their infants.

Nationally representative data indicate that the percentage of income-eligible individuals who are fully eligible because they are also at nutritional risk is very close to 100 percent for every categorical group. In WIC service settings, feasible methods to screen for nutritional risk are not accurate enough to identify the small percentage of those who are income eligible but not at nutritional risk. The panel's analysis of the costs and benefits of administering a nutritional risk screen does not support using the screen for eligibility determination. In addition, a recent Institute of Medicine report recommends presuming that all women and children ages 2 to 5 years are nutritionally at risk. Based on these findings, the panel concludes that, for the purpose of making budgetary estimates, all income-eligible individuals should be considered nutritionally at risk. If the USDA adopts this recommendation, an adjustment for the prevalence of nutritional risk among the income-eligible population is not needed.

Estimates of WIC Participation Rates Among Eligible Individuals

Estimates of eligibility and reported WIC participation from SIPP show that WIC participation rates vary considerably across eligibility categories. The best available estimates of current participation rates show that 73 percent of eligible infants, 38 percent of children, and 67 percent of pregnant and postpartum women participate in WIC (Bitler, Currie, and Scholz, 2002). All of these estimates are lower than the 0.80 (80 percent) value used by USDA.[1] Further, these estimated participation rates do not include those individuals who report receiving WIC but are ineligible for WIC based upon their reported income and program participation status. Based on 1998 SIPP data, 5.7 percent of infant participants appear not to be eligible, 5.4 percent of child participants appear not to be eligible, and 6.2 percent of pregnant and postpartum women appear not to be eligible. The most recent USDA estimate of the number of ineligible WIC participants (over all eligibility categories) is 4.5 percent (USDA, 2001).

If those who report WIC participation even though they are not eligible are included as participants, these estimated participation rates (using

[1]The panel's estimates are based on SIPP data rather than the Current Population Survey and use monthly rather than annual income, account for certification periods, and account for adjunctive eligibility. Thus, the denominators used by the panel to estimate these participation rates are larger than those used by the current USDA estimation methodology.

the same estimate of eligibility—that is, the same denominator) would increase to 78 percent for infants, 40 percent for children, and 71 percent for pregnant and postpartum women. Given these estimates, the USDA's 80 percent participation assumption is very close to the estimated participation rate for infants and not far off for pregnant and postpartum women. However, participation rates for children are much below the 80 percent assumption.

ALTERNATIVE ESTIMATION STRATEGIES

Estimating Eligibility

The panel identified two strategies to estimate eligibility: one is a Current Population Survey (CPS)-based option and the other uses SIPP. Each has strengths and limitations in terms of accuracy, feasibility of implementation, and quality, availability, and timeliness of the data used.

The CPS-Based Option

The major limitation of the CPS for estimating WIC eligibility is that it measures only annual income and annual participation in WIC and in other public assistance programs that confer adjunctive eligibility for WIC. Use of a monthly measure of income instead of an annual measure, as is currently used, was chosen as the most appropriate time period to measure income to estimate eligibility because WIC regulations give great flexibility in the unit of time for which an applicant must report income and because variation in flows of income for families are better captured with a monthly income measure. The panel proposes the following new CPS-based option to improve the current CPS estimation. Step 3, which is a crude method to account for the major limitation in the current methodology, is discussed in greater detail at the end of the steps.

Step 1 To correct for CPS undercounts of infants and overcounts of children, use adjusted weights.

Step 2 To estimate the number of income-eligible infants and children (the core estimates), use annual income from the CPS.

Step 3 Use reported participation in Medicaid, TANF, and food stamps to approximate the number who are adjunctive eligible for WIC.

Step 4 To account for monthly income, apply a constant multiplier to

the core estimates based on annual income. The panel used Transfer Income Microsimulation (TRIM) data, which simulates monthly income based on the March CPS to estimate a multiplier for infants and children: 1.20 for infants and 1.05 for children. An alternative to using this TRIM-based multiplier is to use SIPP data to estimate a similar multiplier. The multiplier is used to approximate the incremental effect of using monthly income instead of annual income.

Step 5 To estimate the number of income-eligible pregnant women, apply an adjustment of 0.53 (instead of the 0.75 factor currently used) to the number of income-eligible infants, to account for income eligibility during pregnancy.

Step 6 To estimate the number of income-eligible postpartum women from CPS-based estimates (both breastfeeding and nonbreastfeeding), continue to use the current adjustment factor of 0.9844 to account for multiple births and infant and fetal deaths.

Step 7 To estimate the number of postpartum women in the breastfeeding and nonbreastfeeding eligibility categories, use updated estimates of breastfeeding rates among income-eligible postpartum women with the current USDA method of constructing adjustment factors

Step 8 To update the current adjustment factor for eligibility in the U.S. territories for all categorical groups, use 2000 census data.

Step 9 Presume all income-eligible individuals are also at nutritional risk and thus fully eligible.[2]

An alternative to the use of the monthly income multipliers in Step 4 is to use SIPP data to estimate similar multipliers and apply them to the CPS estimates of eligibility based on annual income. This alternative should be given serious consideration, since SIPP has better measures of monthly income. The panel did not have enough time or resources to estimate such a multiplier, so the stability of a SIPP-based adjustment for monthly in-

[2]If the USDA does not drop the nutritional risk screen for determining eligibility, then the panel's lower bound estimates of the prevalence of nutritional risk among the income-eligible population should be used to estimate eligibility. These lower bound estimates are: 100 percent for breastfeeding postpartum women, 97 percent for pregnant women, 97 percent for infants, and 99 percent of children ages 2 to 5.

come should be assessed before it is implemented. Considering the results presented above from the 1997 and 1998 SIPP panels about the effect of monthly income and adjunctive eligibility, it appears that the SIPP picks up more variation in income than the TRIM data. This is not surprising, given that TRIM tries to simulate monthly income based on an annual measure of income. It does indicate, however, that a SIPP-based multiplier is likely to be larger than the TRIM-based one given here.

Use of either of these proposed constant multipliers for monthly income (the TRIM-based ones or SIPP-based ones) would require that the multiplier be reestimated every few years. Its stability over time should also be continually reassessed.

The SIPP Option

An alternative option is to use SIPP alone to estimate eligibility. SIPP's major advantage is that it collects monthly income and program participation information. The SIPP also has an advantage in that it is possible to more directly estimate the number of income-eligible pregnant and postpartum women instead of inferring these numbers from the number of income-eligible infants.

The following steps would be taken to estimate WIC eligibility with SIPP:

Step 1 Use monthly income to estimate the number of infants, children, pregnant women, and postpartum women who are eligible.

Step 2 Include those who report participation in Medicaid, TANF, or food stamps as adjunctively eligible regardless of income.

Step 3 Appropriately account for certification periods for each group.

Step 4 Use updated estimates of breastfeeding rates among income-eligible postpartum women with the current USDA method of constructing adjustment factors to estimate the number of postpartum women in the breastfeeding and nonbreastfeeding eligibility categories.

Step 5 For all categorical groups, use 2000 census data to update the current adjustment factor for eligibility in the U.S. territories.

Step 6 Presume all income-eligible individuals are also at nutritional risk and thus fully eligible (see footnote 2).

Comparison of the Two Options

Each of these options has its merits and limitations. The panel agrees that to the extent that it is possible with currently available data, the procedure for estimating eligibility should take into account variation in income over a year and adjunctive eligibility. For this, SIPP is superior in that it collects monthly income and program participation. However, in order to take advantage of SIPP's longitudinal data, considerable time is required to accumulate enough waves of data to observe eligible people. Attrition between waves also complicates the use of SIPP and may affect data quality. Furthermore, the release of SIPP data has, in the recent past, been quite slow. Thus, the delays in data lead to a longer lag between the time the data are produced and the year for which estimates are being made. The CPS is produced on a more timely basis, but it does not collect monthly information on either income or program participation. USDA will need to weigh the benefits and limitations that each option presents.

Estimating Program Participation

Is WIC fully funded—that is, have sufficient funds been allocated to serve all those who wish to participate in the program? Given that in recent years the number of WIC participants served in a given year has been very close to the number USDA projected would be served in that year, priority waiting systems have seldom been used during these years, and USDA has rarely had to request supplementary funds from Congress, one might conclude that the full-funding participation levels have been achieved. If this is the case, then current participation levels could be used to determine how many participants future budgets should cover. Adopting this approach would essentially say that, even though not all eligible people are participating, we could not expect more people to participate given current program rules and administration, and assuming no change in external factors that might affect participation (e.g., the economy).

In the panel's view, however, concluding that WIC has been fully funded is not correct. Rather, the number of participants under full funding is a policy choice—that is, the number can be altered by changes in program rules or administrative practice. Policymakers may want WIC benefits to be targeted to those who have greater need, for example, those with the lowest incomes. Or, policymakers may want to increase the percent of eligible people who participate. There may be many people who are eligible

for WIC and who could benefit from the program but who are unaware of or cannot easily take part in it. Local outreach efforts or changes in the administration of the program (e.g., more conveniently located offices or evening office hours) may mean that a greater percentage of eligible people apply for the program. This does not necessarily mean that a full 100-percent participation rate can be achieved—administrative changes and program outreach will never reach all eligible people, and not all those who are eligible will choose to participate. Nor that a precise target participation rate can be achieved, as the decision to participate, given program rules, is a behavioral choice for an individual. But policy makers do hold a great deal of leverage in determining the full-funding level of participation.

The panel outlined a strategy to predict the number of participants each year for the purpose of making budget estimates. This strategy is based on the premise that the full-funding level of WIC participation is a policy goal and that policy makers can assess whether the goal, the full-funding participation rate (FFPR), has been achieved or not by using estimates of coverage rates. The strategy the panel recommends depends on whether the FFPR has been achieved or not. If the FFPR has been achieved, then the method to estimate participation levels is simply to use last year's participation levels. However, if the FFPR has not been achieved, then the method multiplies the desired FFPR by the estimated number of eligible persons in the eligibility category. The recommended steps are summarized as follows:

- Explicitly state the rate of participation in the WIC program that is consistent with the policy goal of fully funding the program.
- During the process of estimating the number of participants for budgetary planning, compute the number of eligible individuals by participant group (infants, children, and pregnant, breastfeeding postpartum, and nonbreastfeeding postpartum women) and their respective coverage rates using concurrent administrative data for the actual number of participants (i.e., use administrative data for the same year covered by the survey data that are used to estimate eligibility). Estimates of eligibility should be made using one of the options the panel recommends above.
- Separately for each participant group, determine whether the group's coverage rate exceeds the FFPR. If the coverage rate does exceed the FFPR, then use the most recently available administrative data on the number of participants to estimate the number of participants.

- If the group's coverage rate does not exceed the FFPR, then estimate the number of participants by multiplying the FFPR by the number of eligible individuals from the most recently available data. Alternatively, construct a three-year weighted average of past coverage rates. If the weighted average of coverage rates exceeds the FFPR, then the weighted average of past coverage rates for the group would be multiplied by the most recently available estimate of the number of eligible individuals from the participant group. Otherwise, the FFPR multiplied by the most recent estimate of the eligible individuals would be used.

The assessment of whether each category of eligible persons has met the desired rate of participation should be made each year. Furthermore, since it is likely that not all eligibility categories will meet the full funding level, separate assessments, and then corresponding estimation methods, should be made for each eligibility category. Policymakers could, as an alternative to setting full-funding participation goals by category, set them by other groups of priority, for example, by those in most need. This could be done within an eligibility category as well (e.g., infants with the lowest income).

The strategy outlined here to estimate the number of participants implicitly assumes that the number of eligible individuals and, correspondingly, the number of participants for the year from which there are data is the same as for the year for which participation is being predicted. However, changes in eligibility or participation could be caused by changes in demographic factors, the economy, or the eligibility rules of WIC or other programs that confer adjunctive eligibility. USDA should explore the accuracy and feasibility of methods to adjust eligibility and participation forecasts to account for such changes.

In the past, there has been an implicit pledge to fully fund the WIC program based on current eligibility rules. Policy makers can always change this pledge or the rules governing eligibility in the program. Nothing in this report should be construed to imply that if the estimated numbers of eligible individuals increases due to improvements in the estimation procedures, that increases in the WIC budget are required. On the contrary, if participation in the program remains constant, increased estimates of the number of eligible people imply only that coverage rates were not as high as previously thought.

1

Introduction

The Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) is a federal grant program to states that provides food and nutrition services to pregnant and postpartum women, infants, and young children who meet income eligibility criteria or who are enrolled in other federal public assistance programs (who are called adjunctively eligible) and who meet at least one approved criterion for nutritional risk. WIC emphasizes prevention. Its purpose is "to provide supplemental nutritious food as an adjunct to good health care during such critical times of growth and development in order to prevent the occurrence of health problems" (Public Law 94-105) and "improve the health status of these persons" (Public Law 95-627). In 2001, WIC served 7.3 million women, infants, and children and distributed just over $3 billion of food to participants. WIC is not an entitlement program—that is, the number of eligible people who can enroll may be limited by the amount of funds appropriated to the program.

Each year the United States Department of Agriculture (USDA) estimates the number of people eligible for WIC and the number of eligible people who are expected to participate in the program if funds are available. These estimates serve as a basis for making budget requests for the upcoming year. Inaccuracies in these projections can have detrimental consequences. If the projections are too low, eligible people may not be able to receive WIC benefits. If the projections are too high, then other valuable programs may not receive appropriate levels of funding. In recent years,

funding for WIC has been sufficient to serve all applicants seeking assistance.

To monitor the reasonableness of their estimates and how much of the eligible population the program serves, USDA computes coverage rates each year. Coverage rates are computed as the average monthly number of WIC participants in an eligibility category as reported in administrative records divided by estimates of the number of eligible people in that category for a given year. USDA estimates of the number of participants have come under critical scrutiny, in part because the number of infants and postpartum women who actually enrolled in the program has exceeded the number projected to be eligible by as much as 20 to 30 percent in recent years. These high coverage rates have led some members of Congress to conclude that some participants are truly ineligible, and that funding could be reduced somewhat and still meet the needs of truly eligible people who would participate under full funding (see U.S. House of Representatives, 1998). In contrast, some advocates and state WIC agencies believe that the estimates of the number of eligible persons are too low and that there are additional people who are eligible and would choose to participate, given their eligibility.

PANEL CHARGE

With these concerns in mind, USDA asked the Committee on National Statistics of the National Research Council to convene a panel of experts to review the methods used to estimate the national number of people eligible and likely to participate in the WIC program. The panel is charged with reviewing data and methods for estimating categorical eligibility, income eligibility, adjunctive eligibility from participation in other public assistance programs, and nutritional risk among the income eligible population, as well as for estimating participation if the program is fully funded. The panel was also asked to consider alternative methods and data for making these estimates.

As previously noted, the WIC program is intended to provide nutritious food supplements and services to help women, infants, and children to prevent future health problems and to promote healthy growth and development. There is no guarantee that the full complement of eligibility requirements will identify the individuals Congress truly intended to serve with the WIC program. Nor is it guaranteed that the benefits provided to

recipients are effective in alleviating the nutritional deficits envisioned. While both of these questions are important and deserve to be addressed, the charge to this panel was to review and suggest potential improvements to the methodology of the Food and Nutrition Service for estimating the number of eligible individuals who wish to participate given the existing rules, regulations, and practices of the WIC program. It was not the charge of the panel to examine the efficacy of the current eligibility rules and regulations or the states' implementation of them. Nor was it in the panel's charge to examine the efficacy of the WIC program in reducing the nutritional deficits of pregnant and postpartum women, infants, and children.

TIMELINE OF PANEL WORK

The panel's work has been conducted in two phases. The first phase of the study focused on the estimation issues that we determined would have the biggest impact on the final estimates. During the first phase, the panel met twice, including a meeting to convene a workshop on the estimation methodology. The panel's publication *Estimating Eligibility and Participation for the WIC Program: Phase I Report* (National Research Council, 2001) presents several major conclusions and recommendations for USDA:

- Current methods used to estimate eligibility for WIC result in a sizable underestimate of the number of people eligible for WIC. Not fully accounting for those who are adjunctively eligible for WIC is a key reason for the underestimation.
- Estimates of the prevalence of nutritional risk need to be reexamined with more recent data and with improved methods.
- Using participation rates for the Food Stamp Program as a proxy for participation in WIC is inappropriate, and a new method for estimating the percentage of eligible persons who are likely to participate should be developed.

Phase II of the study began in September 2001, during which time the panel has met twice. Our mission in Phase II was to more fully examine some of the issues covered in Phase I of the study and to investigate methods that could be used to estimate eligibility for and participation in WIC. Specifically, we conducted additional data analysis to assess whether our conclusions about adjunctive eligibility and the use of monthly income

instead of annual income could hold across multiple years.[1] In addition to the analysis of methods used to determine income and adjunctive eligibility, the panel considered weighting adjustments to correct for the undercount of infants in the data currently used to estimate eligibility, the Current Population Survey (CPS). The panel also explored methods for estimating the prevalence of nutritional risk among income-eligible populations. An extensive analysis of trends and determinants of WIC participation among eligible people was also undertaken by the panel.

Several components of the estimation methodology that the panel did not have time to take up in Phase I were explored in Phase II. We examined current assumptions used to estimate the number of eligible postpartum and breastfeeding women. Breastfeeding postpartum women are a separate eligibility category than nonbreastfeeding postpartum women and are given different food packages, have different certification periods, and are treated differently in the priority waiting system. The panel commissioned a paper to review the literature on breastfeeding rates among WIC-eligible populations, data sets for estimating breastfeeding prevalence among postpartum women, and methods for estimating the prevalence of breastfeeding. We also examined the assumptions currently made to infer the number of eligible pregnant women from the number of infants. A second commissioned paper examined family income variability around the time a child is born to assess the validity of the assumption that the income of an infant is similar to the income of the mother before the infant was born. We also reviewed current assumptions made to infer the number of eligible postpartum women. Finally, we examined use of the Survey of Income and Program Participation (SIPP) to estimate eligibility and participation for WIC.

PLAN OF THE REPORT

The remainder of this report describes the panel's findings regarding each of these components of the estimation methodology. In Chapter 2, we

[1]In further analyzing data used in the Phase I report, the panel discovered a problem with estimates of adjunctive eligibility. It did not affect the conclusion that current methods underestimate the number adjunctively eligible for WIC, but it did affect the size of the underestimation. The panel explained the problem and changes in estimates in a letter report issued to USDA on May 16, 2002.

describe the reasons that USDA makes eligibility and participation estimates each year and review the current methods for doing so. Chapter 3 considers the accuracy of the estimates resulting from the current methodology and outlines possible sources of error in these estimates.

Chapters 4–7 examine different aspects of the methods for estimating eligibility for WIC. The order in which issues are addressed follows the steps in the current methodology for estimating WIC eligibility. Chapter 4 reviews the methods for estimating the number of infants and children who are categorically eligible for WIC. Chapter 5 reviews current and alternative methods for estimating the number of income-eligible infants and children. This chapter discusses two major problems with the current methodology that the panel found in its Phase I report: the use of an annual measure of income and the lack of an adequate estimate of the number of people adjunctively eligible for WIC. The estimates of the number of income-eligible infants are especially important for the current methodology because they are used to infer the number of pregnant and postpartum women who are eligible. Chapter 6 discusses methods for inferring the number of income-eligible pregnant and postpartum women from the number of income-eligible infants. Methods to estimate how many of the income-eligible population are at nutritional risk are reviewed in Chapter 7.

Chapter 8 considers estimates of the number of eligible people who choose to participate in WIC. Chapter 9 outlines alternative methods for estimating eligibility and participation. Finally, in Chapter 10, we summarize our major findings and conclusions.

2

Overview of WIC and the Current Estimation Methodology

WIC started as a pilot program in 1972 and became a permanent program in fiscal year (FY) 1974, at which time it grew rapidly. The number of women, infants, and young children served per month increased from 0.2 million in FY 1974, to 3.6 million in FY 1988, to 7.2 million in FY 2000. WIC provides three types of benefits: supplemental food, usually in the form of vouchers or checks that can be exchanged for specific foods from participating retail grocers; nutrition education; and referrals to health care and to other social services.

The federal government gives grants to states, territories, and Indian tribes to provide the supplemental food, nutrition education, and health and social service referrals and to administer the program. State grant allocations are based on the amount the state received in the previous year and on the estimated number of income-eligible infants and children in that state.[1] States then fund local agencies that actually provide the services to participants. Since WIC is not an entitlement program, allocated amounts of funding may not be sufficient to serve all the eligible persons who wish to participate. If local agencies do not receive enough funds to serve all eligible applicants, they establish a prioritized waiting list. Federal regulations specify a seven-point priority system (7CFR Subpart C, Section

[1]These estimates of state levels of income eligibility are separate from the national-level estimates, but the sum of allocations to all states equals the national estimates.

246.7(d)4; *Federal Register*, April 19, 1995, 60 (75)19, 487–489, 491), in which priority is based on the type of nutritional risk and the eligibility category. In general, pregnant and breastfeeding women and infants have higher priority than children and nonbreastfeeding postpartum women. Within these groups, those who are nutritionally at risk based on anthropometric, hematologic, or other nutrition-related medical conditions have higher priority than those who qualify as nutritionally at risk based on inadequate diet (see U.S. Department of Agriculture, 2002, for further information on the WIC priority system). The last year a state had to implement a priority waiting list was 2002. States that experienced shortages of funds to serve all eligible applicants in 2002 obtained supplemental funding from the federal government.

This chapter explains how the estimates of eligibility and participation are used by the U.S. Department of Agriculture (USDA) and why the estimates are made. It also includes information on eligibility for WIC and a description of current USDA methods used to estimate eligibility and participation nationwide.

PURPOSES OF ESTIMATING ELIGIBILITY AND PARTICIPATION

The USDA estimates of eligibility and participation in the WIC program are used to guide budget requests for the program each year. The estimates of eligibility and the estimates of participation among eligibles are used for additional purposes—for example, to evaluate the effectiveness of the program in serving the eligible population.

Budgetary Planning

In the recent past, it has been the goal of both Congress and the administration to fully fund WIC—that is, to provide enough funds so that everyone who is eligible and wanted to participate in the program could. USDA has used estimates of the number of full-funding participants to inform budgetary requests. In the mid- to late 1990s, many observers came to the conclusion that the full-funding level of participants had been reached. This was because states had some unspent funds for FY 1996 and because coverage rates for the program (the number of participants divided by the number of people estimated to be eligible for the program) were well over 100 percent for infants and pregnant women throughout the late

1990s. However, some observers claimed that the number of people eligible for the program was underestimated, that there was still unmet need, and that more funding should be allocated to meet these needs. As discussed in Chapter 1, these two views were the impetus for the USDA request for this study.

Throughout this debate concerning the estimates of eligibility and participation, USDA has continued to make estimates of the number of people eligible and likely to participate in WIC. However, it has not made any changes to its methodology to address these criticisms because it is waiting for this panel's report. Although estimates of eligibility and participation continue to be made, they have not been used to inform budgetary requests. Instead, budgets have been set to serve a particular number of people believed to be close to the number of fully funded participants (about 7.5 million).

Is WIC Fully Funded?

As we discuss in Chapter 3, the number of participants served in a given year is very close to the number the budget was intended to support. A naive assessment might conclude that the methods used to estimate participation to inform budgetary requests are reasonably accurate. But this apparent accuracy is, in reality, an artifact of a circuitous process. Fund allocations based on participation estimates are made to states, and then the states use the funds to serve as many eligible applicants as they can with the funds. It is not surprising, then, that the number of participants served is very close to the number for which the budget was set. In the event that more eligible people apply for WIC than were originally budgeted for, states may implement a priority waiting system, or it is possible for states to receive supplementary funding to serve all those who are eligible, but in the recent past, waiting lists and supplementary funds have very rarely been needed.

It is not correct, however, to conclude that, since waiting lists and supplementary funds have not been needed, WIC has been fully funded. The number of participants under full funding is a policy choice—that is, the number can be altered by changes in program rules or administrative practice. Furthermore, there may be many people who are eligible for WIC and who could benefit from the program, but who are unaware of it or cannot easily take part. Local outreach efforts or changes in the administration of the program (e.g., more conveniently located offices, evening office

hours) may mean that a greater percentage of eligible people apply for the program. States receive funds that can be used for program outreach, but they have an incentive to increase program participation only to the level that their allocated funds allow them to serve additional participants. It is inherently more difficult to estimate the number of likely participants because participation in WIC is a behavioral choice.[2] Some individuals may decide that the benefits of WIC are too low to offset the time spent applying for the program, or that the stigma of participation is too high, or some eligible people may not be aware of the program. The panel focuses much more on the estimation of eligibility than on participation because eligibility is less of a behavioral choice than is the decision to participate.

Coverage Rate Estimates

Estimates of the number of eligible persons are also important for programmatic reasons. Each year the Food and Nutrition Service (FNS) of USDA publishes coverage rates for the WIC program. These rates estimate the percentage of eligible persons by category who participate in WIC. The estimates are computed by dividing the number of WIC participants in a year (based on administrative records) by the number of people estimated to be eligible for that year. USDA's estimated coverage rates, by category, for the past eight years are given in Table 2-1. These coverage rate estimates have been used by FNS and policy makers to gauge the span of the program over the eligible population. Notably, coverage rates for infants and postpartum women have exceeded 100 percent since 1994. In 2000, coverage rates for infants were 131 percent and coverage rates for postpartum women were 134 percent, indicating that over 30 percent more infants and women participated in WIC than were estimated to be eligible. Meanwhile, coverage rates for children and pregnant women were much lower, generally between 60 and 70 percent. Coverage rates in excess of 100 percent have prompted some members of Congress to raise concerns that ineligible people are participating in the program.

[2]There may be a behavioral component to eligibility also. An individual who is aware of the WIC program may change her behavior to become eligible for the program (e.g., WIC's benefits could offset some of the time a mother may have to work in order to gain the same level of consumption).

TABLE 2-1 USDA Estimates of Coverage Rates of Infants, Postpartum and Pregnant Women, and Young Children

Year	Infants	Postpartum Women	Pregnant Women	Children
1993	97.8	78.9	52.3	48.0
1994	111.0	101.2	59.0	56.9
1995	109.4	105.3	58.0	64.4
1996	113.8	117.2	62.0	69.5
1997	121.7	121.7	69.1	74.5
1998[a]	127.7	127.4	72.9	74.4
1999[a]	130.4	130.1	72.4	76.0
2000	130.9	134.1	72.9	78.8

[a]The coverage rate estimates for 1998 and 1999 are unofficial USDA estimates provided to the panel to show what the estimates would be using the existing methodology for those two years.

NOTE: Coverage rates are defined as the average monthly number of WIC participants (from administrative data) divided by the estimated number of eligible people (from the Current Population Survey) for each category for a given year.

Estimating the Effects of Changes in Program Policies

Estimates of eligibility and of participation among eligible people are also important to understanding how changes in the rules or administrative policies of WIC or of other programs affect eligibility and participation. WIC program rules and administrative policies change. Such changes may affect how many people are eligible for WIC and what percentage of those who are eligible are likely to participate. Furthermore, changes in other assistance programs can affect the number of people eligible and likely to participate in WIC because those who are enrolled in Medicaid, Temporary Assistance for Needy Families (TANF), and food stamps are adjunctively eligible for WIC. The only way to really understand how changes in these factors affect participation levels (and thus budget needs) is to use a model-based approach to estimating WIC participation, in which participation decisions of individuals are modeled. We return to this issue in Chapter 8.

Understanding External Influences on WIC Eligibility and Participation

External influences may affect the number of people eligible and the likelihood that they will participate. For example, a downturn in the

economy may mean more people are eligible for the program and more may participate. Changes in the birth rates of certain subgroups with a higher propensity to participate in WIC may affect program participation as well. Lower participation by some subgroups points to areas in which outreach may need to be more effective.

WIC ELIGIBILITY

Types of Eligibility and Certification Practices

To receive WIC benefits, an applicant must be categorically eligible, income eligible, and nutritionally at risk. Applicants must also be residents of the state in which they apply. Box 2-1 outlines the eligibility requirements for WIC. To be categorically eligible, an applicant must be an infant or child under the age of 5 years, a pregnant woman, a nonbreastfeeding postpartum woman less than 6 months postpartum, or a breastfeeding postpartum woman less than 12 months postpartum. The supplemental foods provided differ for each of the five eligibility categories. For example, the

BOX 2-1
WIC Eligibility Requirements

WIC staff follow state and local agency procedures to determine whether applicants meet each of the following requirements.

Categorical Eligibility

- A member of one of the WIC eligibility categories: infants ages 0–1 year; children ages 1–4 years; pregnant women; nonbreastfeeding women < 6 months postpartum; breastfeeding women < 12 months postpartum.

Income and Adjunctive Eligibility

- Live in a family with income ≤ 185 percent of federal poverty guidelines, or enrolled in Temporary Assistance for Needy Families, Food Stamp, or Medicaid programs (or other program for which state of residence confers adjunctive eligibility).

Nutritional Risk

- Meet at least one condition of nutritional risk.

food provided to a nonbreastfed infant includes infant formula, while the food provided to a child includes milk, vitamin C-rich juice, iron-fortified cereal, and eggs.

To be income eligible, an applicant's income must be less than or equal to 185 percent of the federal poverty guidelines, defined by the U.S. Department of Health and Human Services (DHHS) poverty guidelines according to family size. Those who are enrolled in the federal Medicaid, Food Stamp, or TANF programs are adjunctively eligible for WIC even if their income exceeds 185 percent of poverty. States also may use enrollment in other means-tested programs, such as the National School Lunch Program and the Supplemental Security Income (SSI) program, to qualify an applicant as automatically income eligible for WIC.

To be considered nutritionally at risk, an applicant must meet at least one of the many approved nutritional risk criteria. These risk criteria fall under five broad categories: anthropometric risk (e.g., underweight, obesity); biochemical risk (e.g., low hematocrit); medical risk (e.g., diabetes mellitus); dietary risk (e.g., inappropriate dietary patterns); and predisposing factors (e.g., homelessness).

Once it is determined that an applicant is fully eligible for WIC, she is then certified to receive WIC benefits for a period of time. The certification period over which an eligible applicant may receive monthly WIC benefits varies by the category of eligibility. Pregnant women can be certified from the time they become pregnant through 6 weeks postpartum. Postpartum women are certified for up to 6 months after giving birth if they are not breastfeeding and up to a year after giving birth if they breastfeed for more than 6 months. Infants are certified for 6 months or until they reach age 1 year—most often for their entire first year. Children are certified every 6 months, but not beyond their fifth birthday. If the eligibility status of a participant changes during the certification period, it should be reported to WIC staff. Except for the case in which a breastfeeding mother changes her status to nonbreastfeeding, which results in an increase in the amount of infant formula received, there is little incentive to declare changes in status.

Flexibility in Determining Eligibility

Regulations governing the administration of the WIC program give considerable flexibility to local WIC agencies to determine whether an applicant is eligible. For example, WIC rules allow state and local agencies flexibility in the documentation used to verify an applicant's income and

in the time period (weekly, monthly, annually) covered by the documentation. Such variation among agencies creates uncertainty in selecting the most appropriate methods to estimate the number of people eligible for WIC on a national level. In this section, we discuss areas in which some flexibility is allowed—namely, the accounting period for measuring income and nutritional risk criteria. The accounting period for measuring income is likely to have the largest impact on estimates of eligibility made using nationally representative surveys. In Chapter 5 we provide estimates of eligibility using different accounting periods across multiple years of data.

Accounting Period for Income

State and local agencies have wide discretion over what accounting period is used to determine whether an applicant's income meets eligibility guidelines. Agencies may consider annual income or current income (either weekly or monthly). In 1998, 87.7 percent of local agencies accepted a pay stub, 80.2 percent accepted a W-2 form, 72.1 percent accepted a letter from an employer, and 81.1 percent accepted a tax form as documentation of income (United States Department of Agriculture, 2000b). We do not have information on what percentage of applicants actually present the different forms of income documentation.[3] USDA specifies only that the agency should consider whichever period is a more accurate indicator of the family's status. For example, an unemployed applicant may report income in the period during which she is unemployed, but a teacher who is paid on a 10-month basis should be asked to report income during the period for which she is employed. Variation in the application of rules about the accounting period for income means that definitions of income used to estimate eligibility may not exactly match definitions of income as they are applied by local WIC offices in assessing eligibility. For instance, for those whose income varies over the course of a year, monthly incomes may be below the eligibility threshold but annual incomes may be above the eligibility threshold. National estimates of eligibility based on a monthly measure are likely to be greater than eligibility estimates based on an annual measure. Chapter 5 addresses this topic in more detail.

[3]Given that a pay stub is probably the most readily accessible form of documentation, it is likely to be the most widely used.

Nutritional Risk Criteria

Prior to 1998, the nutritional risk criteria used by states were unstandardized, and states had wide latitude in determining which criteria to use and the cutoff values that would separate persons at risk from those not at risk. States now have adopted standardized anthropometric, medical, predisposing, and certain dietary risk criteria. However, they still are allowed to use cutoff values that are more stringent than those in the standardized list of criteria, and they may omit the use of some of the standardized criteria.

Since two widely used types of dietary risk criteria, *failure to meet dietary guidelines* and *inadequate diet*, still are unstandardized across states, local WIC offices use different methods for determining if a person is at dietary risk. Based on a recent Institute of Medicine report (2002) that reviewed the scientific basis for these two types of dietary risk, we anticipate that states soon will work to adopt standardized criteria for those two types of dietary risk as well. In the meantime, variation in local methods to determine nutritional risk could contribute to inaccuracies in national estimates of the numbers of persons eligible for WIC.

CURRENT METHODS FOR ESTIMATING ELIGIBILITY AND FULL-FUNDING PARTICIPATION

This section provides an overview of the methods currently used by USDA to make national estimates of the numbers of women, infants, and young children who are eligible for WIC and likely to participate if the program is fully funded. We first describe the methods USDA uses to estimate the number of persons fully eligible for WIC, that is, the number who meet categorical, income or adjunctive, and nutritional eligibility criteria. Boxes 2-2 through 2-6 provide an overview of the estimation steps for each eligibility category. We then describe the method used to estimate how many fully eligible persons will participate if funds are available. Greater detail on the currently used methods can be found in U.S. Department of Agriculture (1999a).

BOX 2-2
Overview of Steps in USDA Estimation of WIC-Eligible Infants

Infants (Age < 1 year)
Step 1: Core estimate of income-eligible infants from the CPS
Step 2: Add Medicaid adjunct eligible adjustment of 14,000
Step 3: Multiply by 1.0388 to account for U.S. territories
Step 4: Multiply by 0.95 to adjust for nutritional risk

SOURCE: Food and Nutrition Service, Office of Analysis and Evaluation; U.S. Department of Agriculture (1999a), Table 2 and Figure 10.

Estimates of the Number of Fully Eligible Persons

Estimates of the numbers of persons eligible for WIC are produced separately for each category of eligibility. The estimate of the number of infants who are eligible is especially important to obtaining an estimate of the total number eligible for WIC because it is used to derive the numbers of eligible pregnant and postpartum women. Estimates of income-eligible infants and children are referred to as the "core" estimates because they are

BOX 2-3
Overview of Steps in USDA Estimation of WIC-Eligible Children

Children (Ages 1 through 4)
Step 1: Core estimate of income-eligible children from the CPS
Step 2: Add Medicaid adjunct eligible adjustment of 76,000
Step 3: Multiply by 1.0388 to account for U.S. territories
Step 4: Multiply by 0.752 to adjust for nutritional risk

SOURCE: Food and Nutrition Service, Office of Analysis and Evaluation; U.S. Department of Agriculture (1999a), Table 2 and Figure 10.

BOX 2-4
Overview of Steps in USDA Estimation of WIC-Eligible Pregnant Women

Pregnant Women

Step 1: Core estimate of income-eligible infants from the CPS
Step 2: Multiply estimate of infants by 0.75 to compute total pregnant women
Step 3: Multiply by 1.0388 to account for U.S. territories
Step 4: Multiply by 0.913 to adjust for nutritional risk

SOURCE: Food and Nutrition Service, Office of Analysis and Evaluation; U.S. Department of Agriculture (1999a), Table 2 and Figure 10.

calculated directly from nationally representative survey data on those two groups.

USDA uses the March Demographic Supplement of the Current Population Survey (CPS) to estimate the number of infants and children living in families with annual incomes below 185 percent of federal poverty guide-

BOX 2-5
Overview of Steps in USDA Estimation of WIC-Eligible Nonbreastfeeding Postpartum Women

Nonbreastfeeding Postpartum Women

Step 1: Core estimate of income-eligible infants from the CPS
Step 2: Multiply estimate of infants by 0.9844 to adjust for multiple births and infant deaths
Step 3: Multiply by 0.374 to obtain total nonbreastfeeding postpartum women
Step 4: Multiply by 1.0388 to account for U.S. territories
Step 5: Multiply by 0.933 to adjust for nutritional risk

SOURCE: Food and Nutrition Service, Office of Analysis and Evaluation; U.S. Department of Agriculture (1999a), Table 2 and Figure 10.

BOX 2-6
Overview of Steps in USDA Estimation of WIC-Eligible Breastfeeding Women

Breastfeeding Postpartum Women

Step 1: Core estimate of income-eligible infants from the CPS
Step 2: Multiply estimate of infants by 0.9844 to adjust for multiple births and infant deaths
Step 3: Multiply by 0.171 to obtain total breastfeeding women
Step 4: Multiply by 1.0388 to adjust for U.S. territories
Step 5: Multiply by 0.889 to adjust for nutritional risk

SOURCE: Food and Nutrition Service, Office of Analysis and Evaluation; U.S. Department of Agriculture (1999a), Table 2 and Figure 10.

lines.[4] The March CPS gathers data on family income for the previous calendar year (e.g., the 2002 March CPS collected income for calendar year 2001). Appendix A provides more detail on the March CPS.

In assessing family income in the eligibility determination process, states can adopt either the income guidelines for the Free and Reduced Price School Lunch Program or the income guidelines for free or reduced price health care programs. Box 2-7 lists income sources counted under both guidelines. If the free and reduced price health care definition is used, the following sources of income are excluded for determining eligibility: the value of in-kind housing and other in-kind benefits and payments or benefits provided under certain federal programs (e.g., some social pro-

[4]The DHHS poverty guideline should not be confused with the Census Bureau's poverty thresholds, which are used to provide annual estimates of the number of individuals and families in poverty. The DHHS poverty guidelines that are used to administer many low-income transfer programs take into account only family size. The Census Bureau's poverty thresholds account for differences in family size, number of children, and age of the head of the family. DHHS issues new poverty guidelines annually, and WIC program offices begin using the new thresholds in June. For the purposes of developing eligibility estimates, USDA averages the guideline from the previous year with the guideline for the year of the CPS survey. For example, the March 2002 survey provides income data for calendar year 2001. To estimate the number of income-eligible individuals in 2001, USDA would average the guidelines for 2000 and 2001.

BOX 2-7
Income Sources Counted in Determining Income Eligibility for WIC

- Earnings
- Unemployment compensation
- Workers' compensation
- Social Security
- Supplemental Security Income
- Public assistance
- Veterans' payments
- Survivor benefits
- Disability benefits
- Pensions or retirement income
- Interest
- Dividends
- Rents
- Royalties and estates and trusts
- Education assistance
- Alimony
- Child support
- Financial aid from outside the household

grams, such as the Low Income Home Energy Assistance Program, the value of benefits from the Free and Reduced Price School Lunch Program, and payments to members of various Indian tribes).

For the purposes of estimating income eligibility, current USDA methods use annual census money income to define income, which includes all the sources listed in Box 2-7. Families are defined using the Census Bureau's family definition—that is, a group of two or more people related by birth, marriage, or adoption and residing together, including related subfamily members.

To obtain the number of income-eligible pregnant women, the current USDA method multiplies the number of income-eligible infants by 0.75. This adjustment accounts for the pregnancy lasting for 9 months of a year. The number of births is assumed to be constant over the time period between when the estimates of infants are made and the 9 months prior to the birth of the infant.

To obtain estimates of the numbers of breastfeeding and nonbreastfeeding postpartum women, the estimate of income-eligible infants is first adjusted downward slightly to account for multiple births and infant deaths. (The number of income-eligible infants is multiplied by 0.9844).[5] An adjustment is then made for the percentage of women who breastfeed and the duration of breastfeeding. The adjustment rate used to obtain the number of women who do not breastfeed and are less than 6 months postpartum is 0.374 (37.4 percent). The adjustment rate is 0.171 (17.1 percent) for the number who breastfeed and are less than 12 months postpartum. These adjustment factors are based on data from the 1988 National Maternal and Infant Health Survey (NMIHS) and were derived using life table methods that controlled for the age and income of mothers.

To estimate adjunctive eligibility for each of the categories, the USDA method makes a modest adjustment for infants and children who may be eligible for WIC because they are adjunctively eligible through participation in the Medicaid, Food Stamp, or TANF programs.[6] The method adds 14,000 infants and 76,000 children to the core estimates of the number of income-eligible infants and children. No adjustment is made for pregnant or postpartum women who may be adjunctively eligible.

Once the estimates of income-eligible people for each eligibility category are made, the USDA method adjusts for the percentage of people in each category who are at nutritional risk. The result is the number of fully eligible people. These adjustment factors are: 95 percent for infants, 75.2 percent for children, 91.3 percent for pregnant women, 93.3 percent for nonbreastfeeding postpartum women, and 88.9 percent of breastfeeding postpartum women. The nutritional risk adjustment factors used are based on estimates of the percentages of income-eligible people in each category who are at nutritional risk. All but one of these adjustment factors were obtained from the first WIC Eligibility Study (U.S. Department of Agriculture, 1987). The infant adjustment factor was increased from 72 to 95 percent in 1991 on the basis of more recent independent estimates of nutritional risk among infants, which showed that 95 percent of infants met a nutritional risk criterion.

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[5]This adjustment is based on data from the second WIC Eligibility Study (called WES II).

[6]This accounts for only 0.9 percent of all estimated eligible infants and 1.1 percent of all estimated eligible children in 1998.

Estimation of Full-Funding Participation

Not all of those who are eligible for WIC will participate in the program. Once the estimates of the numbers of fully eligible people in each category are made, the numbers are adjusted downward to account for this. Past practice in making this adjustment has assumed that participation rates for WIC will mirror participation rates for the Food Stamp Program for children ages 0 through 4 years. Until recently, the food stamp participation rates from the late 1980s were used to adjust the eligibility estimates, meaning that roughly 80 percent of eligible people were estimated to participate. Beginning with the 1995 estimates, USDA has not used the food stamp participation rate assumption, but rather has made budget requests with a goal of serving 7.5 million participants. To assess the reasonableness of this approach, the panel, in Chapter 8, estimates post-hoc participation rates for the WIC program but does not try to model participation decisions.

Forecasting WIC Eligibility and Participation

WIC eligibility and participation estimates based on a given year's survey data are used to forecast eligibility for the budget for a future fiscal year. The length of time between the gathering of these survey data and the period for which the budget is being developed—the forecasting period—can span as many as four years. For example, development of the budget for FY 2003 began in spring 2001. At that time, the latest March CPS data available were derived from the March 2000 CPS. This survey collects income data for the previous calendar year, which was 1999. Thus, 1999 data are used to inform the budgetary request for FY 2003. The estimates of eligibility and participation are used to inform the president's budget, which is submitted to Congress in the fall or winter. March CPS data are typically released in the fall of the year of the survey. Thus, it is possible that by the time the president's FY 2003 budget was finalized, the March 2001 CPS data may have become available and used to update the estimates made with the 2000 data. But even then, these data would be used to predict eligibility and participation three years in advance. Current methods for estimating eligibility and participation for WIC do not make adjustments for changes in the population or economy that might cause errors in these forecasts. This is equivalent to assuming no change in any of these factors.

SUMMARY

Each year USDA develops estimates of the number of people eligible and likely to participate in the WIC program. These estimates are used to inform budget requests and to evaluate the effectiveness of the program. Current methods for making these estimates use the March CPS to estimate the number of income-eligible infants and children. The estimates of infants, along with several adjustment factors, are used to estimate the number of income-eligible pregnant and postpartum women. To get the number fully eligible in each category, adjustments for the prevalence of nutritional risk among the income-eligible population are made. Finally, USDA assumes that participation in WIC among those who are eligible is similar to the participation rate for the food stamp program.

3

Accuracy and Sources of Errors

Estimates of the number of people eligible and likely to participate in WIC are useful for both budgetary and evaluative needs only to the extent to which they are reasonably accurate representations of their "true" levels and trends in eligibility and participation. It is not possible to observe actual eligibility for WIC in the population because eligibility is only observed when an individual applies for WIC benefits. However, administrative records can be utilized to construct a benchmark for examining the accuracy of the estimates of the number of participants.

This chapter begins by accessing the accuracy of the USDA method used to predict the number of women, infants, and children who participate in the program. For the overall population, USDA's methodology has led to relatively accurate forecasts of the number of participants. However, for the various subgroups of WIC eligible participants—women, infants and children—the accuracy of their forecasts of the total number has been poor. The chapter goes on to identify potential sources of error.

ACCURACY OF THE USDA METHODOLOGY

In preparing a budget request for the WIC program, USDA employs the most current survey data from the March Current Population Survey (CPS). As discussed in the previous chapter, the survey data for a given year could be used to predict eligibility and participation at least four years into the future. For example, when USDA was preparing their budget request

for 2002, they would have employed data covering calendar year 1998. The accuracy of this forecast of the number of participants in 2002 depends on two factors. The first is how well the methodology predicts the number of participants in the year for which there are data (in this example, 1997). The second is the validity of the assumption that participation will be unchanged over the forecast period.

To assess the level of prediction error in the estimates—the error resulting from the use of *currently* available data to predict *future* eligibility and participation—Table 3-1 compares the estimated number of participants by category with actual administrative counts of participants. This ratio was computed using data from 1992–2000. Estimates are first totaled over all categories and then given separately by each eligibility category.[1]

The first line of each category contains the ratio of the estimated number of WIC participants in a given year, *t*, to the actual number of WIC participants in the same year, *t* (labeled concurrent year ratio). Examining the first set of ratios, which are totaled over all categories, we see that the ratio of the estimated to actual number of participants ranges from 1.37 in 1992 to 0.86 in 2000. According to this measure of accuracy, the estimates of the number of participants were overstated by 37 percent in 1992 but understated by 14 percent in 2000. Patterns within eligibility categories vary greatly, however. The ratios for infants and breastfeeding postpartum women show a consistent underestimate of the number of WIC participants compared with administrative counts of actual participants. This underestimate is getting worse over time. For infants, the ratios range from about 0.80 in 1992 to about 0.61 in 2000. For breastfeeding postpartum women, the ratios range from 0.99 in 1992 to about 0.49 in 2000. Ratios for children show that the estimates initially overestimate the number of participants but are very close to the actual number of participants from 1998 onward. Estimates for pregnant women were overstated in early years but in subsequent years have been slightly understated. For nonbreastfeeding postpartum women, estimates of the number of participants are significantly understated for every year except 1992 and 1993.

These ratios do not really reflect the task USDA confronts each year in trying to predict eligibility and participation for the year the proposed budget is to cover. In actuality, estimates of the numbers eligible and likely

[1]Administrative records on the number of participants may include ineligible participants. Estimates of eligibility may differ from administrative records because of this, but we do not know how big these differences may be.

TABLE 3-1 Accuracy of Current Methods Used to Predict WIC Participants: Ratios of Estimated Participants to Actual Participants, 1992–2000

	1992	1993	1994
All Eligibility Categories			
Concurrent year ratios:[a]	1.365	1.300	1.111
Forecasted ratios:[b]			
Infants			
Concurrent year ratios:	0.795	0.790	0.693
Forecasted ratios:			
Children			
Concurrent year ratios:	1.756	1.642	1.385
Forecasted ratios:			
Pregnant Women			
Concurrent year ratios:		1.270	1.115
Forecasted ratios:			
Nonbreastfeeding Women			
Concurrent year ratios:		1.351	1.003
Forecasted ratios:			
Breastfeeding Women			
Concurrent year ratios:		0.993	0.770
Forecasted ratios:			
All Postpartum Women			
Concurrent year ratios:		1.218	0.919
Forecasted ratios:			

[a]Concurrent ratios = Estimated Participants in year t / Actual Participants in year t.
[b]Forecasted Ratios = Estimated Participants for year (t + 4) / Actual Participants year t.
Note: To compute the number of eligible persons who will participate, an 80 percent participation rate is assumed.

to participate for a given year, t, are used to predict the number of participants forecast for year t + 4 (e.g., data from 1992 are used to predict FY 1996 participants). To take the forecasting component of the estimation process into account, the estimated number of participants in year t are compared with the actual number of participants from administrative records from year t + 4 for each eligibility category and overall categories (labeled forecasted ratio). These ratios are given in the last line of each eligibility category.

1995	1996	1997	1998	1999	2000
1.020	0.961	0.908	0.865	0.842	0.860
	1.026	1.040	0.976	0.962	0.959
0.698	0.674	0.630	0.602	0.589	0.609
	0.732	0.738	0.657	0.668	0.650
1.197	1.117	1.069	1.023	0.996	1.014
	1.180	1.205	1.179	1.141	1.167
1.127	1.070	0.998	0.953	0.953	0.987
	1.164	1.170	1.039	1.082	1.054
0.932	0.845	0.796	0.774	0.755	0.781
	0.918	0.933	0.844	0.857	0.834
0.732	0.664	0.560	0.516	0.485	0.487
	0.722	0.656	0.563	0.550	0.520
0.861	0.780	0.705	0.672	0.646	0.660
	0.848	0.827	0.733	0.733	0.705

Actual number of participants come from FNS administrative records. Estimated numbers of participants are the USDA estimations given to the panel by USDA. The forecasted ratios assume that estimates of participation are used to predict the actual level of participants four years into the future.

Based on the forecasted ratios for total numbers of participants, it appears that the current USDA method of estimating the number of participants for a future budget cycle is quite accurate. The total number of predicted participants matches the number of actual participants quite closely, ranging from a slight overestimate in 1996 (2.6 percent) to a slight underestimate in 2000 (4.1 percent), indicating very small levels of errors. These smaller error levels are really just a coincidence, because the ratios for the total number of participants mask substantial over- and underestimation

among the different eligibility categories. Numbers of infant participants are substantially underestimated across all years, as are estimates of the number of breastfeeding postpartum women. In contrast, numbers of participating children are overestimated by 14 to 21 percent compared with administrative records. Numbers of participating pregnant women are overestimated also, but the degree is not so serious in later years. Numbers of nonbreastfeeding postpartum women are consistently underestimated and become more substantially underestimated in later years, so that by 2000, estimates are understated by about 17 percent.

Although USDA's current methods to estimate eligibility and participation seem to accurately forecast the overall number of participants, these methods do not accurately forecast specific eligibility categories. Accurately estimating the number of participants in each category is important because food package costs differ across each eligibility category. Furthermore, changes in program rules or program administration could affect eligibility and participation for each category differently. For example, increases in the Medicaid income thresholds in states for infants and children would affect eligibility of those groups but not that of pregnant and postpartum women.

SOURCES OF ERROR

The true number of eligible persons who are likely to participate is unknown. In making budgetary and programmatic decisions, USDA's goal is to come as close to the true number of eligibles and participants as possible. There are two possible sources of error in making these estimates: (1) errors that cause a systematic bias in the estimated number of persons eligible or likely to participate and (2) prediction errors.

Errors Causing Systematic Biases

Errors may arise because data or methods used to make the estimates are not able to fully capture all the programmatic features or the realities of individuals' economic and family situations, leading to inaccurate estimates of eligibility and participation. For example, the March CPS, the data set used currently to make eligibility estimates, collects annual income instead of monthly income. As Chapter 2 explains, local WIC agencies can use weekly and monthly income, rather than annual income, to determine whether an applicant is eligible for WIC. Variation in monthly income

could mean that some people gain eligibility for WIC in some months but have annual incomes that would otherwise make them ineligible for WIC. The following possible sources of systematic error are identified and discussed in this report:

- The undercount of infants and the overcount of children in the CPS.
- The use of annual rather than monthly income in estimating eligibility for WIC.
- Not fully accounting for adjunctive eligibility through means-tested programs, particularly Medicaid.
- The inaccuracy of adjustments to account for nutritional risk among income-eligible persons.
- The inaccuracy of adjustments to account for breastfeeding status among postpartum women.
- The inaccuracy of adjustments for the percentage of eligible persons who will participate in WIC.

Prediction Errors

The second source of errors arises because eligibility and participation must be predicted for future years from data that are probably four years old. For example, the following changes could lead to prediction errors:

- Demographic changes (e.g., lower birth rates or increased immigration).
- Changes in family structure (e.g., if the proportion of infants and children living in single-parent rather than two-parent families declines, then, since single-parent families are, on average, poorer than two-parent families, the proportion of those income-eligible infants and children should decline).
- Changes in the income distribution due to changes in wages or unemployment.
- Changes in program rules, including WIC, but also in other means-tested programs for which adjunctive eligibility is granted. Medicaid rule changes in recent years are a primary example.
- Changes in WIC program administrative practices.
- Changes in participation rates of other means-tested programs.
- The length of time between the year that data are available for esti-

mation and the year for which the estimate is being made. All else equal, a longer time period should lead to larger errors.

These changes could, of course, have opposite effects on estimates of eligibility and participation. For example, the increase in Medicaid income eligibility thresholds would tend to increase the number of eligible persons. However, the economic expansion of the late 1990s should have led to a decrease in the number of persons income eligible for WIC and for Medicaid. It is difficult to infer the extent to which these changes offset each other or not.

In considering current and alternative approaches to estimating eligibility and participation for WIC, the panel has attempted to address these two sources of errors.

EVALUATING CURRENT AND ALTERNATIVE METHODS FOR ESTIMATING ELIGIBILITY AND PARTICIPATION

In this report we evaluate methods currently used to estimate eligibility and participation for WIC and examine alternatives to current methods. We outline different methodological options and include recommendations for new approaches to the various components of the estimation methodology. The panel considered several factors for evaluating alternatives:

- The accuracy of the estimates.
- The feasibility of implementing an approach (e.g., the expense and burden of implementing an approach).
- The quality, availability, and timeliness of data used by an approach.
- Correspondence of the method with current WIC rules and their application at the local level. For example, adjunctive eligibility is part of the rules of the program, and methods for estimating eligibility should account for it.

For some components of the estimation process, it is not clear how to assess the accuracy of an approach. For example, the minor adjustment currently made to account for adjunctive eligibility appears to be inadequate (National Research Council, 2001). However, data limitations create problems in determining the true number of people who gain eligibility for WIC only through adjunctive eligibility. Estimates based on survey data

are limited because respondents underreport Medicaid and other program participation (although to what degree is not known). Administrative data on Medicaid enrollees do not identify the age of children nor the income of enrollees; therefore, no administrative data on the number of people who would gain eligibility for WIC solely through adjunctive eligibility are available. The panel also based its assessments of methodologies on the premise that the methodology should reflect current rules and practices of the program.

Finally, the panel recognizes that the USDA estimates serve different purposes and that different methods of estimation may be appropriate for different purposes. Evaluation of the effectiveness of the WIC program requires estimates of eligibility and participation. Because eligibility is not directly observed, estimates must be based on information reported from survey data. To make budgetary forecasts, reasonably accurate estimates might be forecasted based on administrative records from past years. Chapters 4–7 focus on the estimation of numbers of people eligible for WIC. Chapter 8 focuses on estimates of participation among eligible people and methods for estimating participation among them. In Chapter 9, we synthesize all our findings and provide different options for estimating eligibility and participation.

SUMMARY

This chapter began with an assessment of the accuracy of the USDA estimates to predict the number of WIC participants. Using available data to examine the accuracy of participation estimates, the panel found that the total number of participants matches the reported number quite closely. However, the numbers of participating infants and breastfeeding postpartum women are seriously underestimated, while the numbers of participating children and pregnant women are overestimated. The chapter also explains the two types of errors the panel investigated in its review of the current methodology—errors that cause systematic bias and prediction errors. Finally, in evaluating estimation methods, the panel considered accuracy, feasibility, characteristics of data sources, and correspondence of the method with current rules and their application at the local level.

4

Categorical Eligibility of Infants and Children

The first step both in eligibility determination and in estimating eligibility is to determine if an individual meets the categorical eligibility requirements, that is, whether the applicant is an infant, child, pregnant woman, breastfeeding postpartum woman, or nonbreastfeeding postpartum woman. As mentioned earlier, the current method for estimating eligibility for WIC uses the March Demographic Supplement of the Current Population Survey (CPS) to obtain a count of infants ages 0 through 12 months and the number of children ages 1 through 4 years. Since the numbers of pregnant and postpartum women cannot be directly observed in the CPS, estimates of the number of women in these categories are based on estimates of the number of infants in the CPS. Thus, the accuracy of the estimate of the number of income-eligible infants is especially important in the estimation process.

The panel's Phase I report found an undercount of infants in the CPS (National Research Council, 2001: Table 3-1). This undercount ranged between 1.0 and 4.1 percent in 1992–2000, and averaged over 2 percent a year. The CPS underestimated the number of children in 1992 and 1993 but overestimated that number in the years 1994–2000.

In this chapter, we consider why the CPS estimates undercount infants and outline a procedure that USDA can use to adjust the CPS estimates to more accurately estimate the numbers of infants and children. The chapter concludes with a general discussion of how the Survey of Income and Pro-

gram Participation (SIPP), an alternative data set for estimating WIC eligibility, compares to the CPS in estimating the number of infants and children.

EXPLANATION FOR THE UNDERCOUNT OF INFANTS

In its Phase I report, the panel hypothesized that the underestimation of infants is at least partially due to the age groupings for black and other race individuals used in the development of poststratification weights (National Research Council, 2001). CPS-based estimates of the numbers of persons less than 1 year old and 1 through 4 years are determined largely by the sampling weights. The last step in the development of CPS weights, sometimes referred to as a poststratification or population control adjustment, compares CPS estimates with the available Census Bureau population projections by age, gender, and race. These projections are derived through a month-by-month adjustment of decennial census counts that adds births, subtracts deaths (both births and deaths statistics come from vital records), accounts for net migration, and corrects for the decennial census undercount. The adjustment procedure is completed using total population projections available at the time of final CPS weight construction.[1]

CPS poststratification adjustments are done in age, gender, and race subgroups of sufficient sample size to yield adjustment factors that are stable. For infants and children, adjustments are made for each gender by single year of age for white respondents, two-year age groups for black respondents (0–1, 2–3, and 4–5 years) and a five-year age grouping (0–5 years) for other race respondents. These adjustment groups provide the larger sample sizes needed to obtain more stable values of the population control adjustments by gender.

Because the numbers of black and other race infants are not required

[1]The projection counts may, at the time of the CPS adjustment, not be based on the estimated number of births or deaths, since vital statistics used to provide final projections are not available until two to three years after the projection year. As vital statistics data become available, the Census Bureau releases new projections on a continuing basis for each year and month throughout the course of a decade. Thus, estimates of population counts derived from CPS weights do not agree with more recent Census Bureau population projections for March of a given year.

to match control totals for single-year age intervals, the estimated number of infants overall from the CPS does not match the number of infants in the control totals. The underestimation of infants may also be partly due to reporting error in the CPS—respondents may tend to push up the age of infants to 1 year when they are really only 10 months old. Or it may be the result of other unknown factors.

The panel examined the nature of the differences between CPS estimates and Census Bureau projections for single years of age for each of the three racial groups used in the adjustment process. Table 4-1 presents a comparison of the March CPS estimates and census projections of the number of children in single-year age intervals for each racial group for the year 2000. The pattern of the ratios, repeated across years, clearly shows that during the decade, CPS estimates substantially underestimate infants for black and other races and modestly underestimate the number of infants

TABLE 4-1 Census Projections and CPS Estimates by Single-Year Age Groups, March 2000

	White	Black	Other	Total
Age 0				
Census projection	3,103,504	623,345	235,485	3,962,334
CPS estimate	3,102,955	560,460	204,477	3,867,892
Ratio of projection to estimate	1.00	1.11	1.15	1.02
Age 1				
Census projection	3,092,302	604,020	228,588	3,924,910
CPS estimate	3,091,779	596,446	272,324	3,960,549
Ratio of projection to estimate	1.00	1.01	0.84	0.99
Age 2				
Census projection	3,059,341	593,856	231,388	3,884,585
CPS estimate	3,058,792	611,779	213,566	3,884,137
Ratio of projection to estimate	1.00	0.97	1.08	1.00
Age 3				
Census projection	3,065,235	587,374	230,898	3,883,507
CPS estimate	3,064,706	584,498	228,661	3,877,865
Ratio of projection to estimate	1.00	1.01	1.01	1.00
Age 4				
Census projection	3,121,016	608,019	230,192	3,959,227
CPS estimate	3,120,429	664,301	232,269	4,016,999
Ratio of projection to estimate	1.00	0.92	0.99	0.99

TABLE 4-2 Five-Year Accumulations of Census Projections and CPS Estimates by Single-Year Age Groups, March 1996–2000

	White	Black	Other	Total
Age 0				
Census projection	15,508,050	3,060,394	1,141,043	19,709,487
CPS estimate	15,416,027	2,851,665	1,019,426	19,287,118
Ratio of projection to estimate	1.01	1.07	1.12	1.02
Age 1				
Census projection	15,394,415	3,008,550	1,110,768	19,513,733
CPS estimate	15,407,985	3,182,528	1,198,862	19,789,375
Ratio of projection to estimate	1.00	0.95	0.93	0.99
Age 2				
Census projection	15,434,140	3,045,150	1,117,163	19,596,453
CPS estimate	15,463,718	2,979,156	1,198,652	19,562,526
Ratio of projection to estimate	1.00	0.95	1.00	1.00
Age 3				
Census projection	15,533,367	3,098,387	1,119,274	19,751,028
CPS estimate	15,533,536	3,221,080	1,127,924	19,882,540
Ratio of projection to estimate	1.00	0.96	0.99	0.99
Age 4				
Census projection	15,873,802	3,260,672	1,123,277	20,257,751
CPS estimate	15,875,210	3,201,070	1,147,431	20,223,711
Ratio of projection to estimate	1.00	1.02	0.98	1.00

across all races. For example, the CPS estimate of black infants is 11 percent below the census projection. The CPS estimates of white children of different age groups match the control totals very closely. For children ages 1 through 4 years who are black or of other races, the CPS estimates are sometimes too large and sometimes too small relative to control totals, but they closely match control totals for some age groups.

Table 4-2 presents the ratios for a five-year accumulation of census projections and CPS estimates.[2] The ratios are more stable estimates of the relationship between census projections and CPS estimates for the period 1996–2000 because they are based on five years of data. These ratios indi-

[2]The five-year interval was chosen to allow accumulation of sufficient CPS sample in each survey year of the "other race" groups.

cate what appears to be a consistent underestimate of the number of nonwhite infants in the CPS. The patterns of the ratios across single years of age and races, as well as the total across races, are similar to the ratios observed for the year 2000 comparison in Table 4-2.

ADJUSTMENT PROCEDURE TO IMPROVE THE ACCURACY OF THE COUNTS OF INFANTS AND CHILDREN

The panel considered the size of the underestimation of infants substantial enough to suggest a procedure to adjust CPS estimates as a correction. The five-year accumulated ratios of the census projections to the CPS estimates like those presented in Table 4-2 could be used to adjust the weight value for an individual in a given age and racial group in the corresponding cell in the table. For example, to estimate the number of infants in 2001, the cumulative ratios from 1996–2000 would be used to change the weights for the 2001 estimates. Use of these ratios would slightly increase the weight given to a white infant (multiply the CPS individual weight by 1.01), increase the weight given to a black infant (multiply the CPS individual weight by 1.07), and increase the weight given to an infant whose race falls into the "other" category (multiply the CPS individual weight by 1.12). A similar adjustment would be applied to each age and race group. Furthermore, for the sake of the panel's exercise, males and females were combined. The CPS weights are developed separately by gender, so for a complete adjustment, separate adjustments should be made for males and females.

Table 4-3 shows the results of this adjustment procedure using the 1996–2000 ratios for 2001 CPS estimates by age. A shift in estimates from older ages to infants is indicated by the percentage relative change for each age. For example, the adjustment results in a 2.1 percent increase in the total number of infants in 2001 and a 1.3 percent decrease in the total number of 1-year-olds.

There are several ways to use such accumulated ratios to adjust the CPS weights. In the example given in Table 4-3, we used accumulated ratios from five past years to estimate the next year's population (e.g., 1996–2000 accumulated ratios were used to adjust 2001 estimates). On one hand, to the extent that the ratios of accumulated data reflect stable trends over time (that is, relatively unchanging from year to year), the accumulated ratios from the 1996–2000 data could be made for several subsequent years, such as 2002, 2003, 2004, and 2005. On the other hand, if five-year accu-

TABLE 4-3 Adjustment of 2001 CPS Estimated Population by Race Using 1996–2000 Accumulated Census Projection to CPS Estimate Ratios

	White	Black	Other	Total
Age 0				
Ratio of projection to estimate	1.006	1.073	1.119	1.022
Revised 2001 CPS estimate	3,137,907	581,358	223,417	3,942,682
% relative change				2.13
Age 1				
Ratio of projection to estimate	0.999	0.945	0.927	0.986
Revised 2001 CPS estimate	3,094,949	657,197	223,060	3,975,206
% relative change				–1.31
Age 2				
Ratio of projection to estimate	0.998	0.945	0.998	1.002
Revised 2001 CPS estimate	3,093,102	615,377	262,134	3,970,613
% relative change				0.17
Age 3				
Ratio of projection to estimate	1.000	0.962	0.992	0.993
Revised 2001 CPS estimate	3,058,363	588,310	237,622	3,884,295
% relative change				–0.64
Age 4				
Ratio of projection to estimate	1.000	1.019	0.979	1.002
Revised 2001 CPS estimate	3,103,575	679,129	235,810	4,018,514
% relative change				0.17

The revised 2001 CPS estimates are made by multiplying the ratio of the 2001 population estimates by the five-year accumulated adjustment ratios by age and race.

mulated ratios can be computed for each year (for example, 1997–2001, 1998–2002, and so on) and used instead of the 1996–2000 ratios, changes in the trend of the ratios could be partially accounted for in the estimates. For example, to adjust the 2003 CPS estimates of infants and children, ratios accumulated over 1998, 1999, 2000, 2001, and 2002 could be used. The panel did not explore how stable the adjustments are over time to see if one of these two methods is preferable. But such an activity should be conducted before a specific procedure is chosen.

The panel does not give specific advice about how the adjustments are created (e.g., whether the five-year accumulated ratios in Table 4-2 could continue to be used in future years or if new five-year accumulated ratios

should be estimated every year). The five-year adjustments derived and presented in Table 4-2 should serve as a model for the general derivation of the adjustment factors. The multiple years of data used will help stabilize adjustments but still reflect changes in trends over time.

RECOMMENDATION: To accurately estimate the number of infants and children using the CPS, USDA should apply five-year accumulated ratio adjustment factors to individual CPS weights using a procedure similar to the one outlined above. The adjustment factors should be calculated separately by single-year age intervals for each of the CPS control total race and gender groups.

SIPP-BASED ESTIMATES OF THE NUMBERS OF INFANTS AND CHILDREN

SIPP could be used to produce estimates of the numbers of infants and children who are eligible for WIC. SIPP, like the CPS, uses census population projections by age, race, and gender to construct poststratification adjustments. The SIPP sample sizes are not large enough to support stable estimates of population controls for the "other race" category. Thus, SIPP population control adjustments are developed for each gender by single-year age intervals for nonblacks and for two-year age intervals for blacks (0–1, 2–3, and 4–5).

The panel compared SIPP estimates of the population from December 1997 with census projections for December 1997. The comparison shows that the SIPP slightly overestimates the number of infants compared with the census by 0.6 percent and overestimates the number of children by 4.1 percent. SIPP estimates of women of childbearing ages (15–45) for December 1997 overestimated the number of women relative to the census by 1.3 percent.

This comparison included only one month's estimates from SIPP. It is difficult to draw conclusions about the accuracy of the counts of infants in SIPP. Because the number of black infants is not required to match totals for single-year age groups, it is likely that the count of black infants would be underestimated relative to infants in the white category. In SIPP, people of other races are included in the white race category. In the CPS, infants reported as "other race" were underestimated more than white and black infants, relative to control totals. Not having separate controls for this group and including them in the nonblack category would reduce the problem of

underestimation of infants. However, the smaller SIPP sample sizes would result, all else equal, in less stability of estimates of single-year age groups for nonblacks and less stability in estimates of two-year age intervals for blacks. The SIPP estimates of the number of income-eligible infants are not used to estimate the number of pregnant and postpartum women as those from the CPS are. However, the presence of an infant in the household is used to infer that a woman was pregnant or that a woman is currently postpartum. If infants are undercounted, then estimates of the number of postpartum women will be undercounted as well. Whether or not this translates into an undercount of pregnant women depends on the reason why the infant was not counted. If the household was missed entirely, then information on the mother will not be available. If the mother of the infant rounds the infant's age up to 1 year, the mother's pregnancy status can still be inferred, but the timing to which pregnancy is attributed will be off by a number of months.

SUMMARY

This chapter examines the undercount of infants and overcount of children in the CPS relative to population control totals. The undercount is especially problematic for blacks and for members of other nonwhite racial groups. It appears to be at least partially due to the age groupings for black and other race individuals when the CPS poststratification weights are constructed. The panel recommends a procedure to adjust the CPS estimates of the numbers of infants and children to correct for the undercount. We did not examine whether such a procedure is needed to adjust SIPP-based estimates of these groups. If SIPP is used to estimate eligibility, further exploration of the accuracy of estimates of infants and the implications of any accuracies on the estimates of pregnant and postpartum women may be warranted.

5

Income and Adjunctive Eligibility of Infants and Children

Individuals who meet WIC's categorical eligibility criteria must also meet the program's income eligibility rules. WIC requires that the applicant's income does not exceed 185 percent of the federal government's poverty guidelines for the number of the individuals who are in the applicant's family. However, individuals may also gain eligibility if they are enrolled in any of the following means-tested transfer programs (adjunctive eligibility): Temporary Assistance for Needy Families (TANF), food stamps, or Medicaid. This chapter and the next examine alternative estimates of the number of individuals who are categorically eligible for the program and are eligible either on the basis of their income or through their enrollment in a means-tested program.

Currently, USDA estimates the number of infants and children who are income and adjunctively eligible by computing the number who live in families whose annual income is less than or equal to 185 percent of the family's poverty guideline amount. The panel, in its Phase I report (National Research Council, 2001), concluded that the use of annual income in lieu of a shorter time period for measuring income (e.g., over a month), combined with the failure to fully account for adjunctive eligibility results in a serious understatement of the numbers of infants and children who are potentially eligible for WIC. This finding was based on the analysis of the March 1999 Current Population Survey (CPS) file, which had been modified by the Urban Institute's Transfer Income Microsimulation 3 (TRIM) model. In particular, the TRIM model imputed monthly income and, based

on the reported participation in Medicaid and other income transfer programs, imputed enrollment in these programs to match enrollment levels found in administrative data.

While the CPS-based TRIM data provide one important source of information to judge the accuracy of USDA's current methodology, the Survey of Income and Program Participation (SIPP) is another valuable source of information. SIPP collects monthly income information from respondents, so there is no need to impute them as there is with the CPS. These monthly income reports would more accurately reflect the extent of variability of income over the course of the year than the TRIM-imputed income amounts. In the next two chapters, we examine the impact of income variability and adjunctive eligibility on estimates of eligibility by examining data from SIPP in comparison to the CPS. In Appendix C we attempt to reconcile the differences between the estimates of income variability and adjunctive eligibility from the CPS, TRIM, and SIPP.

The first section of this chapter reviews the WIC program rules pertaining to income and adjunctive eligibility. This review shows that the program does not contain a single precise definition of the time period over which an applicant's income should be considered in assessing eligibility. This flexibility in program rules implies that determination of an individual's eligibility will depend on a judgment as to whether a pay period, a week, a month, or a year is the appropriate time period to employ to assess an individual's income eligibility. Given this local flexibility, it is not clear what time period should be used to measure income in order to estimate eligibility. An annual income measure is currently used, but there are monthly income alternatives. The final section of the chapter examines the impact of using monthly income instead of annual income and allowing for eligibility through other means-tested programs.

INCOME AND ADJUNCTIVE ELIGIBILITY RULES

In determining income eligibility for WIC, there are three important concepts: the economic unit, the definition of income, and the time period for which the income is to be considered. WIC policy is to define the economic unit in the following manner:

> It is reasonable to assume that persons (other than those living in institutional settings and homeless facilities) living in the residences of others, whether related or not, are likely to be receiving support and some commingling of resources which renders them members of the economic unit with

> which they live. However, it is possible to establish that more than one economic unit lives under one roof through appropriate questioning, which helps to make a reasonable determination that there is general economic independence of the units, i.e., that financial resources and support are retained independently. For example, a pregnant woman who is sharing an apartment with her sister may be determined to be a separate economic unit from her sister if the certifier can reasonably establish that she has a source of income and is paying her proportionate share of household, living and personal expenses (Final WIC Policy Memorandum 99-4:8).

Income is defined to be the gross cash income before deductions for income taxes, employees' social security taxes, insurance premiums, bonds, etc. Income includes the following items:

1. Monetary compensation for services, including wages, salary, commissions, and fees.
2. Net income from farm and nonfarm self-employment.
3. Social security benefits.
4. Dividends or interest on savings or bonds, income from estates or trusts, and net rental income.
5. Public assistance and welfare payments.
6. Unemployment compensation.
7. Government civilian employee and military retirement or pensions or veterans' payments.
8. Private pensions and annuities.
9. Alimony and child support payments.
10. Regular contributions from persons not living in the household.
11. Net royalties.
12. Other cash income.

Other cash income includes but is not limited to cash amounts received or withdrawn from any source, including savings, investments, trust accounts, and other resources that are readily available to the family.

If a state agency chooses to use income guidelines identical to those used for state or local free or reduced-price health care, it may also wish to use the corresponding health care definition of income. However, when applying the free or reduced-price health care definition of income, the following exclusions must continue to be considered:

1. The value of in-kind housing or other in-kind benefits.

2. Payments or benefits provided under certain federal programs as specified by law.

In addition, no expenses due to hardship or other deductions are allowed unless the state agency can demonstrate that a household's gross income before the deductions does not exceed the limit for reduced-price school meals. The definition of income for WIC purposes, as established by the National School Lunch Program, includes gross cash income earned by any and all members of a family. Cash income also includes student financial assistance, such as grants and scholarships, except those grants and scholarships excluded as income, as set forth in Section 246.7 (2)(iv) of the regulations, such as Pell Grants, State Student Incentive Grants, and National Direct Student Loans (Food and Nutrition Service Instruction Memo 803-3).

USDA provides the following instructions to state and local WIC agencies with regard to the time period for which income should be considered when determining income eligibility.

> In determining the income eligibility of an applicant, the State agency may instruct local agencies to consider the income of the family during the past 12 months and the family's current rate of income to determine which indicator more accurately reflects the family's status. However, persons from families with adult members who are unemployed shall be eligible based on income during the period of unemployment if the loss of income causes the current rate of income to be less than the State or local agency's income guidelines for Program eligibility. State agencies have, and should exercise, flexibility in deciding whether to use an applicant's current or annual rate of income. For example, the family of a striker may have a lower income during the period of a strike (depending on the union benefits and other sources of income), but have an annual income which would exceed the WIC limit. In this case, the use of current income (while on strike) may be more appropriate. However, in the case of families of self-employed persons, including farmers or seasonally employed persons whose income fluctuates, annual income may be the more appropriate indicator of the need for WIC benefits. Other examples in which the use of annual income is more appropriate include: (1) a family member who is on a temporary leave of absence from employment, such as maternity leave or to take an extended vacation; (2) teachers who are paid on a 10-month basis and are temporarily on leave during the summer months; and (3) college students who work only during the summer months and/or their school breaks (Food and Nutrition Service Instruction Memo 803-3:5).

The Panel's Definitions

While the regulation appears to be quite specific in its intent to limit WIC eligibility to those individuals with low to moderate incomes, a high level of discretion is left to the local level in implementing these regulations. While flexibility and discretion in the program may be desirable, a lack of uniformity and specificity in the eligibility rules creates complexity and uncertainty in estimating the number of individuals who are eligible.

In the absence of specific information on the implementation of WIC income regulations across localities and by WIC staff, we use the following definitions to represent the intent of the WIC regulations:

Economic Unit: All individuals who are related by blood or marriage and reside in the same household. This is what is known as the census definition of a family.

Income: All forms of income received in the form of cash, which include but are not limited to wages, salaries, self-employment income, rents, dividends, unemployment and disability insurance, and the receipt of Supplemental Security Income and TANF. This concept of income is known as census family money income.

Time Period: The previous month will be designated as the appropriate time period for determining both the size of the economic unit and the income to be considered.

Although these definitions are certainly not used uniformly in the field to determine eligibility for WIC, we use these assumptions here because they can be operationalized in the major data sets used to estimate eligibility and participation and because they closely match the wording of the legislation.[1]

In this chapter, we estimate the effect of using monthly data instead of annual data, accounting for adjunctive eligibility and accounting for certification periods.[2] One might believe that, armed with all the relevant infor-

[1]Differences in how localities implement regulations could cause errors in the estimates presented in this report, as the estimates are made using a single method to account for income and the economic unit, while local practice may vary from that. Such variation increases the uncertainty level in the estimates, but there is no a priori reason to believe there would be a systematic bias in the estimates.

[2]Once an infant is found to be income eligible, he or she is certified to be eligible for up to one year. Children and pregnant and postpartum women are certified as eligible for 6-month periods.

mation on a WIC applicant, it would be possible to determine whether an individual is eligible for WIC or not. However, the language of the program's eligibility rules and regulations does not lead to strict determination of who is eligible and who is not. Consider the following extreme example. A mother with a child who is 2 years old has annual income that exceeds 185 percent of the poverty guideline. However, in May, she loses her job and her income falls below 185 percent of poverty. In June, she finds a new job and her income again exceeds the WIC income limits. In this case, would the 2-year-old child be eligible for WIC and, if so, for how many months? If the mother goes to the WIC office in May, her child will meet the WIC income eligibility limits and will be certified to receive benefits for 6 months. WIC regulations 246.7(i)(10) state that a participant may not withhold or conceal information to obtain benefits. One interpretation of this regulation is that, in June, the mother is obligated to report to the WIC offices that she has gained employment and report her income. This interpretation implies that the child would have had only one month of eligibility. However, based on correspondence from Food and Nutrition Service (FNS) officials, it is WIC policy to apply the regulation only when the mother is applying for benefits. The mother has no subsequent obligation to reveal that her family's income has changed. When the mother reapplies for benefits in November, the child would not be recertified if the mother's income continued to exceed 185 percent of poverty. This interpretation implies that if the WIC offices do not discover that the mother is employed, the child has 6 months of eligibility.

In the panel's Phase I report, the effect of different definitions of the economic unit was estimated and found to have a small impact on the numbers estimated to be eligible (National Research Council, 2001). Use of a restrictive definition of the economic unit (one that would tend to make the family ineligible for WIC) decreased eligibility estimates for infants by 0.2 percent and for children by 0.3 percent. Use of a generous definition of the economic unit (one that would tend to make the family eligible for WIC) increased the number of infants estimated to be eligible by 1 percent and increased the number of children estimated to be eligible by 1.5 percent.

Relevance for Estimating the Number of Income-Eligible Individuals

USDA utilizes the March Income and Demographic Supplement to the Current Population Survey to estimate the number of WIC income-

eligible individuals. Since the CPS contains only annual income information from respondents, USDA's estimates of the number of infants and children who are both categorically eligible and income eligible are based on the counts of individuals with annual census family money income less than or equal to 185 percent of the poverty guidelines of the U.S. Department of Health and Human Services (DHHS). USDA's methodology currently makes a very small adjustment to account for the possibility that infants and children may also be adjunctively eligible through enrollment in other means-tested programs.

While the CPS is the primary source of data used for the analysis of many low-income programs, it is not an ideal data base for the estimation of the number of WIC-eligible individuals. The CPS survey design requires the household respondent to list the ages of all household members as of March of the survey year; however, annual income information is collected from the previous year. Ideally we would want to know the family structure and membership during the previous year—the year for which annual income is measured. Given that family structure is not static, especially in the low-income population, the number of family members in the previous year could be quite different from what it is in March of the following year. For example, consider a child who is born in February of the survey year. In this case, the income from the previous year does not refer to the income available to the infant at the time of WIC application, but the income that would have been considered when the mother applied as a pregnant woman. Moreover, the snapshot of the family provided by the CPS is not a true picture of how family membership and hence eligibility can change over the course of the year.

Variability of income over the course of the year has always been considered a serious source of bias in the estimates of the number of income-eligible infants and children. For budgetary purposes, USDA is interested in predicting the number of infants and children that will be eligible to participate during the year. Given that the CPS does not collect monthly family income information, USDA assumes that if the family's annual income is less than or equal to 185 percent of federal poverty guidelines, the infants and children in the family will be eligible for 12 months. Otherwise they will have zero months of eligibility.

The use of annual income to determine income eligibility provides an accurate determination of the number of months an infant or child is income eligible only if the family's monthly income is constant over the year. However, if monthly income does vary, then USDA's use of annual income

could produce two potential errors. First, an error will occur if the individual's annual family income is less than or equal to 185 percent of the federal poverty guidelines, but for some months the individual has at least one month in which her income is greater than the eligibility limit. In other words, this individual would be ineligible for WIC in the months for which income is above the eligibility cutoff. The second type of error will occur for individuals whose average monthly income is greater than 185 percent of federal poverty guidelines but who have some months in which their income is less than or equal to it. In these cases, the use of annual income understates the number of months the individual would have been income eligible. These two types of errors have opposite effects on the average number of months that family income is less than or equal to 185 percent of federal poverty guidelines. However, as we will see, once WIC certification periods are considered (1 year for infants and 6 months for every other categorical group), more people have annual incomes above but at least one month of income below 185 percent of federal poverty guidelines.

Focusing on the average number of months that family income is sufficiently low to qualify for WIC can be misleading. WIC does not require individuals to be income eligible each month during their participation in the program. Once an infant is found to be eligible, the infant is certified for 12 months of eligibility, or until the first birthday. Children must be certified as income eligible every 6 months. This certification process will tend to dampen the impact of errors created because individuals have annual income less than or equal to 185 percent of federal poverty guidelines but monthly income that is not consistently below the income threshold. Certification, however, will increase the significance of the errors produced, because individuals have annual income greater than 185 percent of poverty but dips in monthly income below the eligibility threshold. The combination of the use of annual income and ignoring the certification process may significantly understate the average number of infants and children who are income eligible at the time of application.

A final area of concern pertains to the inadequate method currently used to account for adjunctive eligibility through enrollment in the other means-tested programs, especially Medicaid. In an effort to ensure the health coverage of infants and young children, over the past decade the Congress and state governments have increased the income limits for eligibility in the Medicaid program. Many states have income limits for infants and children that exceed 185 percent of the federal poverty guidelines (see

National Governors Association, 2003). Even in states with Medicaid income limits at or below 185 percent of poverty guidelines, differences in how the two programs define income mean that individuals whose income as calculated by WIC was greater than 185 percent of poverty might be income eligible for Medicaid and thus adjunctively eligible for WIC. The Medicaid program uses a net measure of income, allowing various deductions in income. WIC allows no deductions. Hence, estimates of the eligible population need to account for adjunctive eligibility.

The preceding information describes reasons that the current methods understate the number of individuals who are eligible for WIC. While USDA could easily modify its methodology to account for adjunctive eligibility by using participation in means-tested programs reported by the survey respondent, the impact of monthly income cannot be simply introduced into estimates that rely on annual income reports from the CPS. In the next section, we use SIPP to examine the consequences of relying on annual income and the failure to fully account for adjunctive eligibility.

IMPACT OF MONTHLY INCOME AND ADJUNCTIVE ELIGIBILITY

Using SIPP data

Gordon et al. (1997) undertook the first comprehensive examination of the impact of monthly income on the estimates of the number of income-eligible infants and children.[3] Utilizing SIPP data from the 1990 and 1991 full panel files, the authors constructed a pooled extract covering calendar years 1990 through 1992. Table 5-1 (first column) summarizes this study's results.

Employing the USDA methodology with the March CPS public use files, Gordon et al. (1997) estimated that 42.6 percent of all infants and 42.5 percent of children would have been income eligible during the period 1990 to 1992. When they utilized SIPP monthly income data to construct an annual measure of income to mirror the CPS annual data, Gordon et al. estimated that a slightly smaller percentage of infants (41.7 percent) and children (41.8 percent) would have been income eligible.

[3]Heiser and Doyle (1990) and Doyle (1990) examined the question of monthly versus annual income; however, both studies employed only one month of SIPP data.

TABLE 5-1 Estimates of Income Eligibility Based on Monthly Versus Annual Income (Percentage of All Individuals), 1990–1992, 1997, and 1998

	1990–2 (Pooled Data)[a]	1997[b]	1998[b]
Infants			
CPS			
Annual	42.6	39.7	39.2
SIPP			
Annual	41.7	38.9	35.1
Average monthly	43.8	43.5	41.3
Eligible in any month	52.1	58.9	57.5
Certification periods		56.6	54.1
Children			
CPS			
Annual	42.5	41.1	40.4
SIPP			
Annual	41.8	42.4	39.6
Average monthly	41.5	44.8	42.1
Eligible in any month	52.8	62.0	59.4
Certification periods		56.8	53.9

[a]Gordon et al. (1997:Table III.1).

[b]The CPS estimates are from panel calculations based on extracts from the Urban Institute TRIM files for the respective calendar years. The SIPP estimates are from calculations made by Bitler et al. (2002).

These results provide some evidence that the annualized SIPP data closely replicate the estimates found in the March CPS.

Gordon et al. (1997) then utilized the monthly data from SIPP by first computing the number of months that infants and children would have been income eligible (labeled "average monthly" in the table). They estimated that infants would be found eligible 43.8 percent of the total possible number of months that they were categorically eligible as infants. The corresponding estimate for children was 41.5 percent. These average monthly estimates were only 5 percent higher for infants and 1 percent lower for children than the SIPP annual estimates. In neither case were the differences statistically different.

The average number of months that an infant or child would have

been income eligible reflects the situation in which WIC staff recertify individuals on a monthly basis. This does not reflect actual WIC regulations or practice. As we noted above, it is unclear whether the resulting eligibility estimates based on this certification process will differ greatly from estimates based on the use of annual income. To provide an upper-bound estimate of the effect of the use of monthly income, Gordon et al. (1997) estimated the percentage of infants and children that had at least one month of income eligibility. This estimate is intended to reflect a certification process in which individuals are given 12 months of eligibility if their worst month during the year is less than 185 percent of federal poverty guidelines. Gordon et al. found that when this upper bound certification procedure was employed, there was a significant increase in the number of infants (52 percent of all infants, or 25 percent more than when annual income is employed) and children (53 percent of all children, or 26 percent more than when annual income is employed).

The Gordon et al. (1997) study suggests that not using monthly income nor accounting for the WIC certification process is an important shortcoming of the USDA methodology. However, because the study uses older data and did not simulate realistic WIC certification periods, two members of the panel undertook an similar analysis using data from the 1996 SIPP panel.[4] Table 5-1 (second and third columns) presents estimates from the 1996 SIPP panel for calendar years 1997 and 1998.

When SIPP data were used to create annual measures of income and family structure for these same years, a smaller proportion of infants was found to be income eligible than implied by the CPS—a result that is consistent with the Gordon et al. (1997) study. The results are somewhat mixed for children. In 1997, the annualized SIPP shows a slight increase in the proportion of income-eligible children compared with the CPS, while in 1998 the proportion is lower. These differences are minor, however, so we conclude that the proportion of infants and children who are income eligible based on annual income is roughly equal from the March CPS and from the annualized SIPP data.

The use of monthly certification periods (average monthly) continues to create a small increase in the number of income-eligible children (6 percent increase in both 1997 and 1998) but a larger impact on infants (12

[4]Panel members Janet Currie and John Karl Scholz as a part of a larger research project provided the estimates reported in this chapter (see Bitler et al., 2002).

and 17 percent increases). Using the eligible-in-any-month measure dramatically increases eligibility estimates. Compared with the use of annual income, the SIPP data indicate that there would be between 52 and 64 percent more income-eligible infants in 1997 and 1998, respectively. The estimates for children are equally large—46 and 50 percent in the two years. These estimates of eligibility appear to become significantly larger over the decade of the 1990s. The proportion of infants who were income eligible rose from 52 percent in the early 1990s to roughly 59 percent in 1997. The proportion of children rose even faster, from 53 to 62 percent in the same period.

Unlike the CPS data, the SIPP panel data permit a more accurate representation of the WIC certification process. When this process is considered (e.g., if the monthly family income for a child is below the income eligibility threshold, the child is considered eligible for the next 6 months; for infants, someone who becomes eligible in a month is then considered eligible for the next 12 months or until the end of the calendar year for which the estimates are being made), combined with the use of SIPP monthly income, there remains a significant and large increase in the number of months that infants and children are income eligible compared with the situation when annual income is used. In 1997 and 1998, there are 46 and 54 percent more infants and 34 and 36 percent more children who are income eligible for WIC.

These calculations from the 1996 SIPP panel indicate that the impact of monthly income is significantly different from what was found in the earlier Gordon et al. study (1997). Given that the SIPP data are reported and are not the result of imputations, we conclude that the impact of the use of monthly income with certification periods is larger than previous estimations indicated. Compared with the use of annual income, 50 percent more infants and 35 percent more children may be income eligible for WIC when monthly income and certification periods are considered.

Combined Impact of Monthly Income, Adjunctive Eligibility, and Certification Periods

The current USDA methodology makes only a minor adjustment to account for infants and children who gain WIC eligibility by their enrollment in TANF, food stamps, or Medicaid. It makes no adjustment for women who gain adjunctive eligibility. Table 5-2 shows the impact of including all those who report participation in other means-tested programs

TABLE 5-2 Percentage of Infants and Children Who Are Income Eligible and Adjunctively Eligible

	Calendar Year 1997	Calendar Year 1998
Infants		
CPS		
Annual income	39.7	39.2
Annual income and adjunctive eligibility[a]	46.7	46.7
SIPP		
Annual income	38.9	35.1
Monthly income	56.6	54.1
Monthly income and adjunctive eligibility	60.0	58.1
Children		
CPS		
Annual	41.1	40.4
Annual income and adjunctive eligibility	45.2	46.0
SIPP		
Annual income	42.4	39.6
Monthly income	56.8	53.9
Monthly income and adjunctive eligibility	59.0	56.7

[a]Persons who report participation in TANF, food stamps, or Medicaid are included as adjunctively eligible for WIC regardless of their incomes.

on CPS-based estimates of eligibility (using the annual measure of income). Estimates for both infants and children are presented. The impact of this simple alteration in the USDA methodology has a substantial impact on the estimate of the number of eligible infants and children in 1997 and 1998. The proportion of eligible infants is estimated to increase from 39.7 to 46.7 percent, or by 18 percent; a similar increase is found in 1998. The proportion of children increases from 41.1 to 45.2 percent in 1997, which is a 10 percent increase; a slightly larger increase is found in 1998.

This comparison suggests that failing to consider adjunctive eligibility serves to understate the number of infants and children eligible for WIC, and the magnitude of these numbers may be overstated because some of these people may also qualify if a monthly income measure is used. Individuals who participate in these means-tested programs can have moderate income when considered on an annual basis, but they are most likely to have low incomes for several months during the year. Hence, including

those who report participation in these means-tested programs will include some individuals who have monthly incomes that would have qualified them for WIC although their annual income exceeded the WIC income limits. To more accurately reflect the marginal effect of adjunctive eligibility, we employed the SIPP data. The results of these calculations appear in Table 5-2.

As we have already observed, the use of monthly income and certification periods has a significant and substantial impact on the estimates of the number of income-eligible infants and children. Estimates of income-eligible infants increased by 46 and 54 percent in 1997 and 1998, respectively. The number of income-eligible children rises 34 and 36 percent. The marginal impact of using the SIPP-reported enrollment in TANF, food stamps, and Medicaid to simulate adjunctive eligibility is smaller in comparison to the impact of monthly income and is smaller in comparison with the impact that was found in the CPS. Compared with the estimates that incorporate monthly income and certification periods, adjunctive eligibility increases the estimates of the number of WIC-eligible infants by roughly 6 percent, while estimates of income-eligible children are increased by 5 percent. To the extent that comparisons between the CPS and SIPP can be made, these estimates suggest that a significant proportion of the impact of adjunctive eligibility found in the CPS reflected eligibility that also could be gained through consideration of low monthly income.

The relatively small impact of considering adjunctive eligibility found in SIPP as well as in the CPS could be the result of the underreporting of participation in TANF and food stamps. But underreporting of these programs is a less serious problem for estimating WIC eligibility, because the income eligibility limits of these programs are considerably below the income eligibility limit of the WIC program, and thus few people will gain eligibility for WIC through participation in TANF or food stamps alone. Underreporting of participation in Medicaid is potentially a much more serious problem, because the income eligibility limits of Medicaid are, in most states, equal to or above the WIC eligibility limits. Thus, there is potential for a greater number of people to gain eligibility for WIC solely through enrollment in Medicaid.

Some studies have attempted to gauge the extent of underreporting of Medicaid in the CPS and SIPP, but mixed results have been found, and none of the results pertains exactly to the WIC-eligible population of infants and children under the age of 5, pregnant women, and women less than 12 months postpartum. Wheaton and Giannarelli (2000) found that

the percentage of households (with a noninstitutionalized head) reporting Medicaid participation in the March CPS accounted for only 68 percent of the Medicaid caseload in 1998. In a slightly different comparison of the number of survey-reported Medicaid recipients under age 65 (which again, does not exactly match the WIC-eligible population) to the number of recipients reported in the Medicaid administrative files under age 65, Bitler et al. (2002) found overreporting of Medicaid receipt in 1997 in both the March CPS and SIPP. The ratio of reported recipients to administrative totals was 112.8 percent in the March CPS, and 117.9 percent in SIPP. However, the 1998 ratios show sizable underreporting of WIC participation in the March CPS (87.3 percent) and a slight underreporting in SIPP (95.7 percent).[5] In a study that linked individual Medicaid records in California to individual SIPP survey responses of Medicaid enrollment for respondents from California, Card et al. (2001) found that SIPP underestimates the California Medicaid enrollment totals by about 10 percent. This study also found that some respondents who reported Medicaid enrollment were not identified as actual Medicaid enrollees by the administrative data. Such false positive reports for low-income children were not small, either (possibly up to 20 percent for poor children in California).

It is difficult to gauge the exact magnitude of this problem, however, because the administrative data from the Medicaid program are not reported specifically for the age group of infants and children under age 5. In comparing SIPP reports to CPS reports, it appears that SIPP data have a higher proportion of infants and roughly an equivalent proportion of children reporting Medicaid participation. In 1997, 26.2 percent of infants and 20.6 percent of children reported Medicaid participation. In the same year, the CPS indicates that 24.7 percent of infants and 21.2 percent of children participated in Medicaid. In 1998, the proportions were similar. The SIPP data reports that 24.9 percent of infants and 19.5 percent of children were in the Medicaid program, while the proportions from the CPS are 22.9 percent and 19.2 percent, respectively.

[5]Bitler et al. (2002) used the Medicaid recipiency report for each member of the household, summed these for the household, and weighted them by the household-supplement weight, which may explain the difference in their results compared with the Wheaton and Giannarelli (2000) results.

Certification Periods and Eligibility

Accounting for monthly income, certification periods, and adjunctive eligibility has a large impact on the estimated number of eligible persons. This might raise concerns that the 6-, 9-, and 12-month certification periods allow some people who gain eligibility for WIC due to one or two months of low income or means tested program participation to continue to be certified for WIC for months in which they are not income or adjunctively eligible. Table 5-3 attempts to explain how prevalent such people might be. The 1997 SIPP data are used to split the estimates of eligible infants and children into one of three categories: (1) those whose months of eligibility exactly equal the number of months for which they would be certified as eligible (e.g. they are eligible each month after the month in which they were initially certified as eligible); (2) those whose numbers of months of eligibility are less than the number of months they would be certified as eligible but who have annual incomes below 185 percent of poverty or who report participation in means tested programs

TABLE 5-3 Percentage Distribution of the Number of Months of Simulated Certification by Simulated Months and Type of Eligibility for Infants and Children in 1997

	Distribution of Simulated Months of Certification		
Simulated Months and Type of Eligibility	Infants	Children	Total
Every month[a]	67.8	74.3	72.8
Not every month but simulated eligibility based on annual or adjunctive[b]	*14.1*	*11.2*	*11.8*
Not every month but at least one month of low income[c]	18.1	14.5	15.3

[a]Number of months of simulated eligibility exactly equals number of months of simulated certification.

[b]Number of months of simulated eligibility less than number of months of simulated certification, but annual income is less than 185 percent of poverty or adjunctively eligible.

[c]Number of months of simulated eligibility less than number of months of simulated certification, annual income greater than 185 percent of poverty, not adjunctively eligible, but had at least one month of income below 185 percent of poverty.

and are adjunctively eligible; and (3) those whose number of months of eligibility are less than the number of months they would be certified and have annual income above 185 percent of poverty and are not adjunctively eligible. It is this last group that is of most concern because presumably they only have a few months where their incomes dip below the eligibility threshold, yet they could be certified for receipt of WIC for more months. Table 5-3 shows the distribution of the number of months of certification to these three types of eligible infants and children.[6]

The last row in Table 5-3 shows the number of case months during 1997 that fall into the third category—that is, months in which an infant or child was certified as eligible but not eligible that month based on that month's income, nor annual income or adjunctive eligibility. Of the months that were certified to infants, 18 percent were to infants whose monthly household income exceeded eligibility limits in one or more of the months in which they were certified, whose annual household income exceeded 185 percent of poverty, and who did not report participation in programs that confer adjunctive eligibility during the calendar year (the third group from the above classification). And 14 percent of all the months certified to children were to children with similar eligibility status.[7]

Although 18 and 14 percent of the certification months are not small numbers, it is important to recognize that many of the individuals that these months represent could have been eligible for 5 months of a 6-month certification period, but would have one month included in the last category. We calculated the average number of months of certification and the

[6]Note that censoring before 1997 means we do not observe the full income and certification periods of all individuals. Table 5-3 includes those individuals who were certified in 1996 but have certification carry-over periods into 1997.

[7]We also examined the reported participation rates of those falling into the third category of eligibility. Twenty-five percent of infants and 11 percent of children in this category reported participation in WIC. These are low participation rates compared to those of all eligible infants and children (see Chapter 8). However, these rates are not adjusted for underreporting of WIC participation (as Chapter 8 estimates are) because we do not have information to allocate aggregate levels of participation into the three types of eligibility categories in Table 5-3. Those persons who have fewer months of income eligibility than they would have been certified for (third category) have greater incomes and thus may have higher rates of underreporting of WIC participation. This may be due to a greater perceived stigma or because they do not recall short periods of participation (they may have picked up WIC benefits only for the one or two months they had low income even though they were certified for more months).

average number of months of eligibility of infants and children who fall in this third category. We find that infants from this category received 5.8 months of certification on average but were eligible for 1.6 months on average. Children received 4.5 months of certification for 1.9 months of eligibility on average.

SUMMARY

Neither the CPS nor SIPP data are ideal for estimating the number of WIC income- and adjunctively eligible infants and children. The SIPP data provide a more reliable estimate of monthly income, which is demonstrated by the large and significant effect of using monthly income for eligibility estimates. The use of the SIPP data requires that reported enrollment in means-tested programs must be employed to impute adjunctive eligibility. There is some question about whether the reporting of participation in these programs is accurate. Thus, some concern must be given to whether total eligibility is understated. At this stage, the panel cannot assign too much confidence to the point estimates. However, one conclusion is inescapable—the use of the public use CPS files significantly understates the proportion of infants and children who are eligible for WIC on the basis of monthly income. Instead of roughly 40 percent eligibility of all infants and children, the true percentage of all infants and children who are WIC eligible may be as high as 54 percent.

CONCLUSION: The current method used to estimate income eligibility for infants and children significantly understates the numbers eligible because income variation over time and adjunctive eligibility are not adequately measured.

The essence of this conclusion is that our estimates show that more people are eligible for the program when monthly income and adjunctive eligibility are considered in the estimation methodology. It does not necessarily imply that these additional eligible people will participate in WIC. Those who gain eligibility through Medicaid participation or because they have a few months of income below 185 percent of poverty are likely to have higher incomes than other eligible people. These higher income groups may find the relatively small value of WIC food packages too small to entice them to participate. The only claim of the conclusion is that current methods used to estimate eligibility underestimate it.

6

Estimation of the Number of Income-Eligible Pregnant and Postpartum Women

Because the number of pregnant and postpartum women cannot be directly observed with Current Population Survey (CPS) data, current USDA methods use the number of income-eligible infants to infer the number of women who are pregnant and who are up to 1 year postpartum. Various adjustments are made to the core estimates of income-eligible infants to obtain estimates of the number of income-eligible women. These include adjustments for multiple births and infant and fetal deaths, adjustments to account for the length of time a woman is pregnant, and adjustments to account for the percentage of postpartum women who breastfeed their infants. The methods also make assumptions about how the number of income-eligible infants translates into the number of income-eligible pregnant and postpartum women. For example, the method assumes that the family income for an infant is the same as family income during the time the mother was pregnant with the infant.

This chapter reviews several of the adjustment procedures and assumptions currently used to estimate the number of income-eligible pregnant and postpartum women based on the number of income-eligible infants. Assumptions about multiple births and fetal and infant deaths, about income during the time before and after a child is born, and about breastfeeding rates are reviewed.

PREGNANT WOMEN

A pregnant woman is income eligible for WIC if her family income is at or below 185 percent of federal poverty guidelines. Alternatively, income eligibility can be achieved if the woman is adjunctively eligible—that is, if she is enrolled in Medicaid, the Food Stamp Program, or Temporary Assistance for Needy Families (TANF). The current USDA method to estimate the number of income-eligible pregnant women is based on the number of income-eligible infants: the number of income-eligible pregnant women is estimated by multiplying the number of income-eligible infants by 0.75 to account for a pregnancy of 9 of the 12 months of a year. This method assumes that the number of fetal and infant deaths equals the number of multiple births (i.e., there is no adjustment for fetal or infant deaths or multiple births). In this section, we assess the validity of this assumption.

Assumptions Regarding Fetal and Infant Deaths and Multiple Births

The current USDA estimation methodology assumes that the number of fetal and infant deaths and the number of multiple births cancel each other out. On one hand, using the number of infants to estimate the number of pregnant women without accounting for fetal and infant deaths would understate the number of pregnant women. On the other hand, using the number of infants to estimate the number of pregnant women without accounting for the presence of multiple births would overstate the number of pregnant women.

USDA (1999a) cites evidence from the Second WIC Eligibility Study (WES II) that multiple births are slightly more common than fetal and infant deaths. According to the WES II study, which based its findings on data from the late 1980s and early 1990s, an adjustment factor of 0.74 would be more accurate, instead of the current factor of 0.75. Using more recent but somewhat limited data, the panel made crude estimates of fetal and infant deaths and multiple births. These estimates show that the effects of multiple births and fetal and infant deaths do nearly cancel each other out. Vital statistics data for the year 2000 show 64,000 live births that were second- or higher-order births in multiple deliveries. These data also show 28,000 infant deaths. We do not, however, have good data on the number of fetal deaths since data on fetal deaths are not collected consistently at the national level due to many differing definitions by states. Thus, any estimate of fetal deaths will be problematic. To compare the number of fetal

deaths with the number of infant deaths, the panel chose to look at fetal and infant death reports in one state, North Carolina.[1] In North Carolina, the number of reportable fetal deaths each year approximately equals the number of infant deaths. Assuming that this also is true for the United States as a whole, there would be 56,000 infant deaths and fetal deaths in 2000 (28,000 plus 28,000).[2] The 2000 census measured 3,806,000 infants in the United States (all income levels). Subtracting the 64,000 second- or higher-order multiple births from the 3,806,000 infants and adding the estimated 56,000 fetal and infant deaths results in an adjustment factor of 0.9979, which is essentially 1.0.

It could be argued that these results for the entire population are not applicable to the WIC population, which has lower income and therefore is likely to experience a higher infant death rate. Data on multiple births and fetal and infant deaths by family income level are not available. However, we can repeat the analysis above for blacks, who on average are from lower income households and for whom infant mortality is higher than for whites. In 2000 in the United States there were 10,700 second- or higher-order multiple births and 8,500 infant deaths for blacks. We again assume that the number of fetal deaths is equal to the number of infant deaths. Subtracting the second- or higher-order multiple births and adding the estimated fetal and infant deaths to the 2000 population of 549,000 black infants (with one race listed) results in an adjustment factor for blacks of 1.012. Fetal and infant mortality rates of blacks are higher than those of whites. But blacks constitute approximately one-fourth of all WIC participants (23 percent in 1998; U.S. Department of Agriculture, 2000b). Thus, it is likely that fetal and infant mortality in the WIC-eligible population is not as high as it is for the black population, and thus, the adjustment of 1.012 is probably too high for all WIC infants.

The WES II study found that multiple births were slightly more common than fetal deaths (U.S. Department of Agriculture, 1999a). Our crude analysis indicates that multiple births are slightly more common than fetal

[1]In North Carolina and a number of other states, a fetal death is reportable if it occurs after 20 or more weeks of gestation.

[2]Even if consistent data were available for fetal deaths at all gestational ages, it is not clear that very early spontaneous fetal deaths should be counted for purposes of this methodology (some occur before the woman knows she is pregnant).

and infant deaths in the general population, but that fetal and infant deaths may be slightly more common than multiple births in low-income populations.

Income Variability

The current USDA methodology does not directly utilize data on women to estimate the number of income-eligible and adjunctively eligible pregnant women. Instead, constant "multipliers" are applied to the estimated number of WIC-eligible infants.

The current method used to estimate income-eligible pregnant women assumes that family income during pregnancy is similar to family income after the birth of a child—no adjustment is made for changes in family income that occur around the time of childbirth. The method assumes that the number of income-eligible pregnant women is equal to 75 percent of the number of income-eligible infants. Variation in family income around the birth of a child was raised as a possible flaw in the current USDA estimation methodology (USDA, 1999a). For example, a woman may temporarily drop out of the labor force when the child is born, resulting in diminished earnings when the child is an infant. In this example, the assumption that family income during pregnancy is the same as family income in the first year after the birth of the child will result in an overestimation of the number of pregnant women eligible for WIC. But in another example, couples not previously married or living together but having a child together may marry or move in together, which may increase family income around the time the child is born.

With Survey of Income and Program Participation (SIPP) longitudinal data, pregnant women can be identified by observing the birth of a child and counting back 9 months to collect the income and other information for the mother. The panel has considered two estimates of the ratio of the average number of months of eligibility for pregnant women relative to the average number of months of eligibility of infants. The first estimate is from the 1996 SIPP panel. The other is from a paper prepared for the panel to examine the variability of pregnant women's income.

Using data from the 1996 SIPP panel, the ratio of the number of income-eligible and adjunctively eligible pregnant women to the number of income-eligible and adjunctively eligible infants was calculated for the years 1997 and 1998. In 1997, the ratio was 90.7 percent and in 1998 the ratio was 92.7 percent. These ratios indicate that between 7 and 9 percent

of infants had mothers who were not eligible for the full 9 months of pregnancy.

The panel also commissioned a paper on the variability of income around the birth of a child, titled *Income Variability and WIC Eligibility: Evidence from the SIPP* (Yelowitz, 2002). This paper exploits the monthly longitudinal data from SIPP to track the income of women while they were pregnant through the first year after the birth of their child. SIPP data from the 1990, 1991, 1992, 1993, and 1996 panels were pooled.

Yelowitz (2002) calculated the probability that a pregnant woman was eligible for WIC in each month during her pregnancy given that her infant was eligible for at least one month between birth and his or her first birthday. The proportion of women eligible for WIC at least one month during pregnancy who had infants who were eligible at least one month during the first year ranges from 60 percent in the first month of pregnancy up to 80 percent in the month right before birth. Using these results, the weighted average number of months a pregnant woman was eligible was 6.4.[3] This implies that the 0.75 adjustment for pregnant women is too high. SIPP-based estimates indicate that an adjustment factor of 0.53 would be more accurate (6.4 divided by 12 months).

These results reiterate the conclusion of Chapter 5 that income variability over the course of a year can be significant. They can demonstrate the importance of measuring income on a monthly basis. For example, if an adjustment factor of 0.53 is applied to the 2001 CPS estimates of income-eligible infants, the resulting estimate of the number of income-eligible pregnant women would be 804,000 instead of 1,138,000—which is the number of income-eligible pregnant women that result from multiplying the number of income-eligible infants by 0.75.

Other Considerations

Although a pregnant woman is eligible as soon as she becomes pregnant, there is usually a delay between the time a mother conceives and the time she realizes she is pregnant. It is likely that there is also a lag between the time a woman finds out she is pregnant and the time she applies for

[3]Yelowitz also found that a small number of pregnant women were eligible during pregnancy but their infants were never eligible. This translates into an additional 0.76 of a month of eligibility over all pregnant women.

WIC. The current method of estimating the number of pregnant women does not take either of these lags into account.

These lags affect participation rather than eligibility. The USDA publication *WIC Participant and Program Characteristics 1998* indicates that nearly half of women who enroll in WIC enroll during their second or third trimester of pregnancy. The current method of using the 0.75 adjustment factor to obtain the number of eligible pregnant women based on the number of eligible infants would therefore substantially overstate the number of pregnant women who *participate* in WIC, but not the number who are *eligible* for WIC.

The assumptions examined in this section must be made because it is not possible to directly identify pregnant women using the CPS. SIPP data allow direct estimation of the number of pregnant women. Since the SIPP data are longitudinal, one can match infants with their mothers and obtain characteristics of the mother when she is pregnant, which is an advantage SIPP has over the CPS.

POSTPARTUM WOMEN

A postpartum woman is categorically eligible for WIC if she is less than 6 months postpartum or if she is 6 months to a year postpartum and breastfeeding. A categorically eligible postpartum woman is income eligible for WIC if her family income is at or below 185 percent of the federal poverty level, or if she is enrolled in Medicaid, the Food Stamp Program, or TANF (i.e., is adjunctively eligible).

Estimates of breastfeeding and nonbreastfeeding women are made separately because food package costs differ depending on breastfeeding status. Estimates of breastfeeding duration are necessary because some women stop breastfeeding and return to the WIC service site to obtain formula for their infant. If they change their status from breastfeeding to nonbreastfeeding during the first 6 months postpartum, women receive a smaller and thus less expensive food package, although their infant's food package is now more expensive because it includes infant formula. During the second 6 months, nonbreastfeeding women are not eligible to receive a food package for themselves, but their income-eligible infants can receive the full infant food package.

Current USDA methodology estimates the number of income-eligible postpartum women based on the number of income-eligible infants, with two adjustments. First, an adjustment of 0.9844 for multiple births and

infant deaths is made. Second, an adjustment is made to account for the percentage of postpartum women who breastfeed their infants and the duration of breastfeeding(see Boxes 2-5 and 2-6).

The current method to adjust for breastfeeding rates and duration is based on data from the National Maternal and Infant Health Survey (NMIHS), which was fielded in 1988. The NMIHS data show that when breastfeeding rates were fully adjusted for the duration of breastfeeding among postpartum women at a point in time, 37.4 percent were not breastfeeding and were less than 6 months postpartum, and 17.1 percent were breastfeeding (12.5 percent less than 6 months postpartum, and 4.6 percent more than 6 months postpartum). Thus the number of income-eligible infants is multiplied by 0.374 to estimate total nonbreastfeeding women less than 6 months postpartum. To estimate total breastfeeding women, the number of income-eligible infants is multiplied by 0.171. Note that the 0.374 adjustment factor plus the 0.125 adjustment factor for breastfeeding less than 6 months equals 0.50, which is the factor that would be applied to the number of income-eligible infants to estimate the total number of income-eligible women eligible for WIC until 6 months postpartum.

The panel examined two types of adjustment factors used to estimate the number of eligible postpartum women—those for estimating breastfeeding status and those used to account for fetal and infant deaths and multiple births. We also briefly discuss the method used to account for adjunctive eligibility of postpartum women.

Adjustment Factors to Account for Breastfeeding Status

Recent Trends in Breastfeeding Rates

Because the data used to estimate the percentage of breastfeeding women are more than 14 years old, the panel commissioned a paper to examine more current data on breastfeeding rates and duration, review breastfeeding trends and correlates, and review data sources and consider implications for estimating WIC eligibility. This paper, titled *Estimating Eligibility for WIC: The Role of Breastfeeding* (Jacknowitz, 2002), clearly demonstrates that the breastfeeding rates from the 1988 NMIHS are out of date.

Several nationally representative surveys provide consistent data demonstrating that the rate of breastfeeding among all mothers has increased

substantially since the NMIHS-based estimates were produced. Figure 6-1 (from Jacknowitz, 2002) shows estimates of breastfeeding initiation rates from various data sources for all new mothers from 1970 to 2000, and Figure 6-2 shows trends in breastfeeding initiation rates from various data sources for women who participate in WIC. The figures show increases during the 1990s in breastfeeding initiation rates for both new mothers and mothers who participate in WIC. For WIC mothers, initiation rates have increased from 37 percent in 1988 (using the NMIHS data) to 54 percent in 1998 (using data from the National Survey of WIC Participants). Data from the Ross Laboratories Mothers Survey, which were collected each year from 1988 to 1998, also show the upward trend in breastfeeding among WIC mothers (Figure 6-2).

These figures refer to breastfeeding status shortly after delivery. Among the data sources used to prepare these figures, only the Ross Laboratories

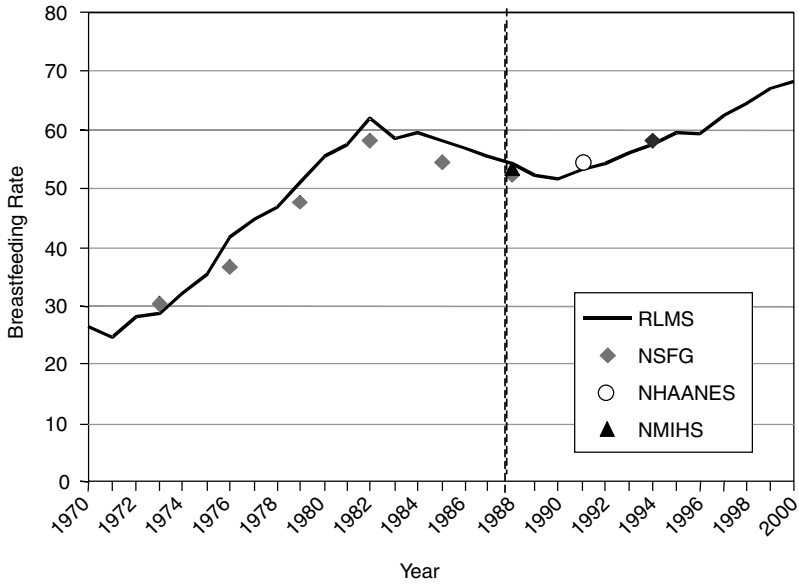

FIGURE 6-1 Trends in breastfeeding initiation rates for all mothers (1970–2000).
NOTES: RLMS = Ross Laboratories Mothers Survey (Ryan, 2000); NSFG = National Survey of Family Growth (NCHS, 1998); NHANES = National Health and Nutrition Examination Survey (Burstein et al., 2000); NMIHS = National Maternal and Infant Health Survey (Visness and Kennedy, 1997). The vertical line marks the year of data collection for data used in the current FNS method.
SOURCE: Jacknowitz (2002).

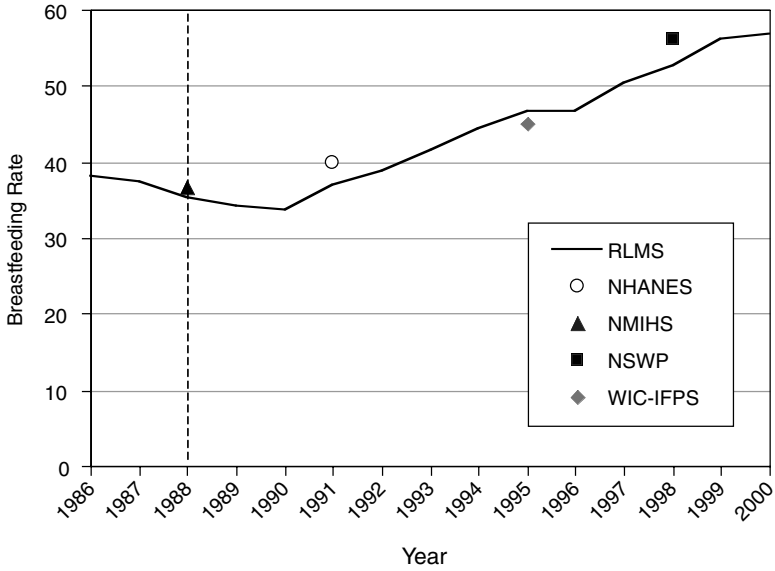

FIGURE 6-2 Trends on breastfeeding initiation rates for WIC mothers (1986–2000). NOTES: RLMS = Ross Laboratories Mothers Survey (Ryan, 2000); NHANES = National Health and Nutrition Examination Survey (Burstein et al., 2000); NMIHS = National Maternal and Infant Health Survey (Visness and Kennedy, 1997); NSWP = National Survey of WIC Participants and Their Local Agencies (Cole et al., 2001); WIC-IFP S= WIC Infant Feeding Practices Survey (Baydar et al., 1997). The vertical line marks the year of data collection for data used in the current FNS method. SOURCE: Jacknowitz (2002).

Mothers Survey provides annual data on breastfeeding status of mothers at later points in their postpartum period. Figure 6-3 shows upward trends in 6-month postpartum breastfeeding rates for all mothers and for WIC-participating mothers. (Six months postpartum is the time when mothers must be recertified to remain eligible as breastfeeding postpartum women.) The breastfeeding rate for WIC mothers more than doubled over this time period (from 8 to 20 percent).

Jacknowitz (2002) used data from the 2000 Ross Laboratories Mothers Survey to calculate updated breastfeeding adjustment factors. These updated adjustment factors are 0.190 for women with infants less than 6 months postpartum (compared with the 0.125 currently used), 0.086 for women with infants between 6 to 12 months postpartum (compared with 0.046), and 0.310 for nonbreastfeeding women less than 6 months postpartum (compared with 0.374). Using USDA's 1999 estimates of the num-

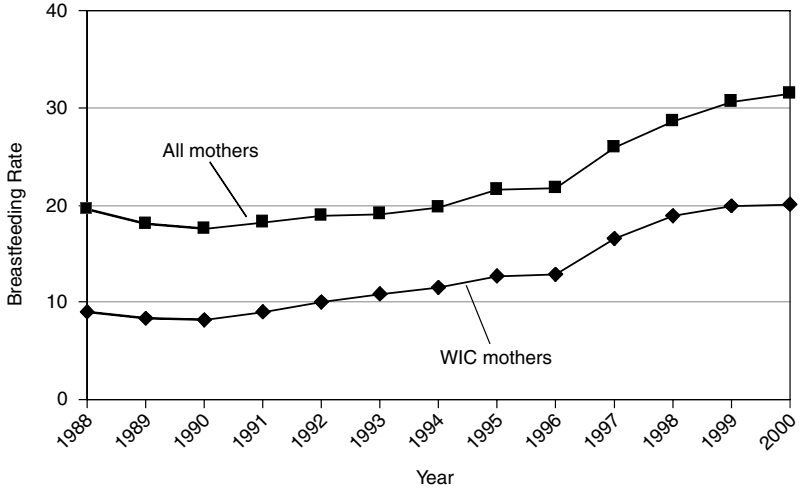

FIGURE 6-3 Trends in breastfeeding rates 6 moths after birth for all mothers and WIC mothers, Ross Laboratories Mothers Survey (1988–2000). Data sources: Ryan et al. (1991); Ryan (2000); and Smith (2001).
SOURCE: Jacknowitz (2002).

ber of income-eligible postpartum women and these updated adjustment factors, Jacknowitz found that an additional 63,000 women were income-eligible as breastfeeding women between 6 and 12 months postpartum (there is a corresponding decrease in the number of income-eligible nonbreastfeeding women). [4]

Although none of these estimates represents the exact population of interest—that is, WIC-eligible postpartum women—we expect rates for WIC-eligible mothers to fall somewhere in between the rates for all mothers and WIC-participating mothers because we expect the WIC-eligible mothers will have higher income and educational status than WIC-participating mothers but lower income and educational status than all mothers.[5]

[4]Because of data limitations, Jacknowitz was not able to adjust the rates for maternal age or for income; moreover, the analysis used breastfeeding rates for WIC participants, not those who were WIC eligible.

[5]In her summary of the literature on correlates of breastfeeding status, Jacknowitz (2002) reports that lower educated mothers are less likely to initiate breastfeeding than more highly educated mothers, but that the relationship between income and breastfeeding initiation is not clear. Bitler et al. (2002) find a strong negative correlation between the likelihood of WIC participation and educational status.

It is clear, however, that breastfeeding rates have changed substantially and that the adjustment factors used by USDA to estimate the number of breastfeeding and nonbreastfeeding postpartum women are out of date.

CONCLUSION: The adjustment factors currently used to estimate the number of postpartum women who breastfeed are out of date. More recent estimates of breastfeeding status indicate that a greater percentage of postpartum women now breastfeed than in the late 1980s, when the adjustment factors were developed.

Updating Estimates of the Number of Breastfeeding Postpartum Women

The panel recommends that USDA update breastfeeding adjustment factors using more recent data sources. Breastfeeding rates, fully adjusted for duration, should be converted into breastfeeding adjustment factors for women less than 6 months postpartum and for women 6 months to 1 year postpartum in the same manner in which previous adjustment factors have been constructed. These adjustment factors should then be applied to estimates of the number of income-eligible women less than 12 months postpartum.

Potential data sources for calculating the factors to adjust for breastfeeding rates and duration include the Early Childhood Longitudinal Study-Birth Cohort (ECLS-B), the National Health and Nutrition Examination Survey (NHANES), and the published aggregate totals from the Ross Laboratories Mothers Survey. Each of these data sources has limitations to its use (see Jacknowitz, 2002, for a more complete discussion).

NHANES is a nationally representative survey of the civilian noninstitutionalized population ages 2 months and older. ECLS-B is a nationally representative survey of children born in 2001. Both the NHANES and the ECLS-B data collect information on income and program participation status, so it is possible to estimate the number of WIC income-eligible mothers.

The NHANES data have a small sample size but are collected annually, and therefore data from several years could be pooled to produce more reliable estimates. ECLS-B has a larger sample size (15,000 children born in calendar year 2001). However, unlike NHANES, it is not certain that updates will be conducted later.

Each of these data sets collects different measures of breastfeeding status and duration. NHANES asks if the sampled child (who is at least 2

months old) is currently breastfed and, if not, when breastfeeding stopped. ECLS-B also asks these questions but asks them over three waves of longitudinal data collection (at age 9 months, 18 months, and 30 months). Both sets would allow construction of a measure of the duration of breastfeeding.

ECLS-B and NHANES both release public use data. The ECLS-B survey is scheduled to release its first wave of data in 2003. NHANES data waves from 1999 and 2000 are currently being released and will continue to be released in two-year groupings.

Another data source, the Ross Laboratories Mothers Survey (RLMS), is produced on a regular basis and collects data on breastfeeding status at different points in the postpartum period (initiation, 1 month postpartum, 2 months postpartum, etc.). RLMS is designed as a nationally representative sample of mothers with infants up to 12 months old and has a very large sample size (over 400,000 in 2000). However, response rates for this survey have been quite low in the recent past (e.g., 31 percent in 2000). The estimated rates of breastfeeding do, however, track quite closely to those produced from other nationally representative data sources (see Figures 6-1 and 6-2). RLMS does not, however, collect income information and so it is not possible to use the data to estimate breastfeeding rates among WIC income-eligible women. It does collect information about WIC participation. RLMS is a proprietary data source and not available for public use. Thus, it is not clear whether USDA can regularly obtain these data to continually update its breastfeeding adjustment factors. However, results from this survey have been published periodically, including estimated rates of breastfeeding status for each month after a child's birth.

Given that survey data for breastfeeding status are not available on an annual basis, the panel considered whether synthetic estimates of breastfeeding rates could be produced in each year that the survey is not done. The synthetic estimates would be used to update the latest breastfeeding adjustment factor to account for changes in the distribution of the relevant population by reweighting the subgroup-specific breastfeeding rates. For example, if Hispanic mothers have higher rates of breastfeeding and the share of Hispanic mothers in the income-eligible population is known to have increased, the most recently available estimates of breastfeeding rates could be updated to reflect the increases in the percentage of the population that is Hispanic (and likely to have higher rates of breastfeeding). However, as Jacknowitz (2002) shows, group-specific breastfeeding rates have changed considerably more than population shares have. Thus, it is more important for USDA to use a method that

reflects changes in breastfeeding rates than one that reflects only changes in population shares.

The panel concludes that currently used adjustment factors for breastfeeding rates do not reflect the number of income-eligible postpartum women who breastfeed. The panel recommends that new estimates of the number of breastfeeding postpartum women should be made to reflect more recent trends in breastfeeding rates.

RECOMMENDATION: Updated adjustment factors for breastfeeding rates among WIC-eligible populations should be produced and applied to estimates of the number of income-eligible postpartum women to determine the numbers breastfeeding and not breastfeeding.

Data from the 1999 and 2000 NHANES should be available soon but will need to be combined with data from 2001 to create a large enough sample size to produce reliable estimates. Until those data are available, the most recently published breastfeeding rates from RLMS for WIC-participating postpartum women at initiation and 6 months postpartum would provide a better basis for the calculations used to set the adjustment factors.

Adjustment Factors for Infant and Fetal Deaths and Multiple Births

If the CPS continues to be used as the base data set from which eligibility estimates for postpartum women are produced, it is reasonable to continue to base these estimates on the number of income-eligible infants. An adjustment for fetal deaths is not needed, since all fetal deaths would already be excluded from the count of infants. Most of the infant deaths would not be observable by the CPS and hence not part of the count of infants. (One-half of all infant deaths in the United States occur in the first day of life, and two-thirds occur in the first month.) However, an income-eligible woman whose infant died would continue to be eligible for WIC until 6 months postpartum. Therefore, not adjusting for infant deaths would result in a very small undercount of eligible postpartum women.

A count of infants that includes multiple births would overestimate the number of postpartum women. Using the figures for 2000 presented in the section on pregnant women, subtracting the 64,000 second- or higher-order multiple births from the census count of 3,806,000 infants results in an adjustment factor of 0.9832, which is very close to the current adjustment factor of 0.9844. It is reasonable to continue to use this small adjust-

ment for multiple births in estimating the number of postpartum women. Given that the number of multiple births has increased substantially in the past decade (National Center for Health Statistics, 2001), this adjustment factor should be reevaluated periodically using the latest U.S. vital statistics data.

SIPP-BASED ESTIMATES OF PREGNANT AND POSTPARTUM WOMEN

This chapter's review of methods used to estimate categorical eligibility has primarily assumed that the CPS is the base data set used to estimate eligibility. However, one important advantage of SIPP is relevant to the discussion of estimating categorical eligibility in this chapter. Specifically, the longitudinal data of SIPP can be used to observe the number of categorically eligible pregnant and postpartum women. Income, program participation, and family living arrangements can be measured at the time that a woman is pregnant and during her postpartum period, meaning that this information does not need to be inferred from information on infants.[6] The presence of an infant in the household and information on the relation of household members is used to infer that a woman is the mother of an infant. Furthermore, several waves of data are needed in order to observe the periods over which a mother is pregnant and a child is born to directly estimate the number of pregnant and postpartum women, so the estimates are not as timely as CPS-based estimates. Nonetheless, the advantage of directly observing pregnant and postpartum women is a key one.

CONCLUSION: SIPP data allow the direct observation of the number of pregnant and postpartum women and their income, program participation, and living arrangements during the pregnancy and postpartum periods—which is a major advantage over CPS data.

SUMMARY

This chapter has reviewed the methods for estimating the number of income-eligible and adjunctively eligible pregnant and postpartum women.

[6]Like the CPS, breastfeeding status is not collected in SIPP. Infant and fetal deaths are not observed in SIPP either; however, multiple births can be observed in SIPP and correctly accounted for when identifying the infants' mother.

Current methods used to infer the numbers of income-eligible pregnant women from the number of income-eligible infants tend to overstate the number of women in these categories. The panel concluded that the assumption that the numbers of infant and fetal deaths are roughly equal to the number of multiple births is reasonable. However, the 0.75 adjustment used to obtain the number of pregnant women from the number of infants does not consider that women may not be income eligible for the entire period of their pregnancy. Estimates from Yelowitz (2002) imply that women whose infants are eligible for WIC are themselves income eligible or adjunctively eligible for 6.4 months of the 9-month pregnancy period.

With regard to the estimation of the number of breastfeeding and nonbreastfeeding postpartum women, the panel concludes that current adjustments used to account for breastfeeding status among postpartum women are out of date—they substantially underestimate the number of women who breastfeed—and recommends that USDA update these adjustments.

Finally, the panel concluded that the ability to directly estimate the number of pregnant and postpartum women with SIPP is a key advantage of that data set over the CPS-based estimates of pregnant and postpartum women.

7

Estimating Eligibility Based on Meeting Nutritional Risk Criteria

To be fully eligible for WIC benefits, applicants who meet categorical and income eligibility requirements also must be deemed nutritionally at risk by meeting at least one nutritional risk criterion. Five types of nutritional risk criteria are considered in determining whether a person is nutritionally at risk: anthropometric, biochemical, clinical/health/medical, dietary, and other. Examples of each type of risk appear in Table 7-1, as does the number of criteria considered for each type. Each nutritional risk criterion includes an indicator of nutritional risk and a cutoff point. For example, for young children, a blood lead value equal to or greater than 10 micrograms per deciliter is an approved criterion for nutritional risk, so that a child with a blood lead level above the 10 microgram level would qualify as nutritionally at risk.

To determine whether an applicant meets at least one of the nutrition risk criteria, a competent professional authority at the local WIC office administers a nutritional risk screen to the applicant. For example, an applicant's height, weight, and hemoglobin values are measured and compared with the cutoff values for the respective nutritional risk criteria. Checks for health conditions that confer eligibility are also made. In most cases, the staff member asks the applicant or caregiver for information about the applicant's food intake. Generally, this involves either a 24-hour diet recall (asking what foods and beverages were consumed the previous day, and in what amounts) or a food frequency questionnaire (obtaining information on the frequency with which the applicant consumed specified foods and the portion sizes usually consumed).

TABLE 7-1 Types of Nutritional Risk Criteria Used in WIC, Numbers of Criteria, and Examples

Type of Risk Criteria	Number of Criteria by Type[a]	Examples
Anthropometric	18	Underweight, overweight
Biochemical	2	Low hematocrit
Clinical/health/medical	43	Diagnosed diabetes mellitus
Dietary	19	Food intake that does not meet food guide pyramid specifications, improper dilution of formula
Other	14	Regression, migrancy, homelessness

[a]Numbers are based on *WIC Policy Memorandum 98-9* (U.S. Department of Agriculture, 1998). Some criteria have subcriteria, such as specific kinds of gastrointestinal disorders. Some but not all criteria apply to every categorical group (women, infants, and children). For example, many of the criteria applicable to infants do not apply to any other category.

To account for the nutritional risk requirement in estimating WIC eligibility, the current USDA method adjusts the estimated number of income-eligible persons in each categorical group downward using the adjustment factors listed in Table 7-2. The results are estimates of fully eligible individuals in each category. The adjustment factors for all categories

TABLE 7-2 Adjustment Factors Currently Used to Estimate the Number of Income-Eligible People Who Also Meet Nutritional Risk Eligibility Criteria

Category	Adjustment Factor
Infants	0.950
Children	0.752
Pregnant women	0.913
Nonbreastfeeding postpartum women	0.933
Breastfeeding postpartum women	0.889

except infants were based on estimates of nutritional risk for income-eligible individuals obtained from the first WIC Eligibility Study (WES I), which used data collected in the early 1980s (U.S. Department of Agriculture, 1987). The procedure for determining these adjustment factors was to develop a list of the nutritional risk criteria most commonly used by the states (modal nutritional risk criteria) and to use nationally representative data sets to estimate the proportion of income-eligible women, infants, and young children who met one or more of these criteria. Modal nutritional risk criteria were used because, until 1998, regulations allowed each state to establish its own nutritional risk criteria. Prior to 1998, the states used different numbers and kinds of indicators of nutritional risk and different cutoff points. To produce the adjustment factors, the study combined data from two surveys—the 1980 National Natality Survey and the 1978–1980 National Health and Nutrition Examination Survey.

In 1991, USDA increased the adjustment factor for infants from the WES I value of 0.752 to 0.950. The higher value was adopted to account for the high percentage of infants who met a "predisposing" nutritional risk criterion (and thus were WIC eligible) based on "other" risk—specifically, their mother's participation or eligibility for participation in WIC (see the discussion of criterion 701 in the section "Method for Infants to Age 1 Year"). WES II proposed higher adjustment factors for the nutritional risk of women and children, but USDA has not adopted them (U.S. Department of Agriculture, 1999a).

This chapter critiques the current method used to make national estimates of the proportions of income-eligible persons who meet at least one nutritional risk criterion (and thus are fully eligible) and discusses alternative methods for estimating those who meet a criterion. In discussing alternatives, the difficulties of assessing nutritional risk in the field and of estimating the prevalence of nutritional risk with survey data are considered. To give a conservative estimate of the level of nutritional risk in the income-eligible population, lower bound estimates of the prevalence of nutritional risk are presented. We find that for all groups for which quality data are available, even the lower bound estimates of the prevalence of nutritional risk are very close to 100 percent. For one group, children ages 1 to 2, data limitations prevent us from presenting lower bound estimates. The chapter also contains a discussion of the costs and benefits of using a dietary risk screen to determine eligibility. Finally, it provides recommendations regarding methods to estimate the percentages of categorically eli-

gible and income-eligible individuals who meet at least one nutritional risk criterion.

CRITIQUE OF CURRENT METHOD

The panel's Phase I report concludes that "the estimates of nutritional risk currently used may not accurately reflect the actual number at nutritional risk" (National Research Council, 2001:6). That report identifies a number of concerns with the current USDA nutritional risk adjustment factors and with the adjustment factors estimated in WES II (U.S. Department of Agriculture, 1999b). These concerns include the use of old data, the method used to account for variation in nutritional risk criteria across states, the use of data on only one day of diet recall, and the method used to combine separate estimates of risk from different data sources.

The adjustment factors for the categorical groups other than infants need to be reconsidered for three major reasons: (1) they are based on survey data that are more than 20 years old; (2) states have adopted a relatively standardized set of anthropometric, biochemical, clinical/health/medical, predisposing, and certain dietary risk criteria from an approved list (U.S. Department of Agriculture, 1998); and (3) a recent Institute of Medicine (IOM) report recommends presuming that all income-eligible women and children ages 2 years and older are at dietary risk (Institute of Medicine, 2002).[1] As shown in Table 7-1, the term *dietary risk* refers to a type of risk that encompasses many specific criteria. All the dietary criteria relate to some aspect of dietary intake. The recommendation of the IOM is made in a report that does not address infants or children under age 2 years, but the presumption of dietary risk for women and children at least 2 years of age also would be a presumption of nutritional risk. USDA has not yet taken an official position on the IOM recommendation concerning presumption of dietary risk.

[1]This recommendation is based on the IOM report's two major findings: (1) studies suggest that nearly all children ages 2 years and older and all women in the childbearing years are at dietary risk because they fail to meet the dietary guidelines as translated by recommendations of the food guide pyramid and (2) no known assessment methods can identify or hold promise of accurately identifying the small percentages of women and children who do meet the proposed criterion "failure to meet dietary guideline" with the limited amount of on-site information about food intake that is available to WIC field staffs.

POSSIBLE METHODS TO ESTIMATE NUTRITIONAL RISK

The standard method of estimating the prevalence of a risk is to operationalize the definition of risk in quantitative terms (by specifying an indicator and a cutoff value) and use survey data to determine the percentage of individuals who fall above or below the specified cutoff value. An example of a nutritional risk prevalence is the percentage of children ages 1 to 5 years who have been diagnosed with diabetes mellitus. Since nutritional risk may take many forms, however, there are many approved nutritional risk criteria for each categorical group served by WIC. This means that the method used to estimate the prevalence of nutritional risk within a categorical group must consider the risk of failing to meet at least one of the many criteria applicable to that group.

The panel considered new approaches to estimate the risk of meeting at least one nutritional risk criterion in the income-eligible population. Different data sources were considered. As we discuss in this chapter, the lack of relevant national data about dietary risk of children ages 1 to 2 years limits our ability to estimate the percentage of these children who meet income eligibility requirements but not nutritional risk criteria. For the other groups, the panel made what we consider to be conservative, lower bound estimates of the prevalence of nutritional risk. The following section discusses how these estimates were made and presents our lower bound estimates.

National Data Sets for Estimating Risk Prevalence

A big obstacle to estimating the proportion of the income-eligible population that meets at least one criterion for nutritional risk is the lack of a single data source that contains information regarding all the risk criteria for the relevant population groups. Two nationally representative surveys that measure many nutritional risks—the Continuing Survey of Food Intake by Individuals (CSFII) and the National Health and Nutrition Examination Survey (NHANES)—provide data related to the nutritional risk criteria. Neither survey, however, covers all of the nearly 100 approved nutritional risk criteria. For example, neither CSFII nor NHANES provides data to estimate the percentage of income-eligible people with food allergies, infectious disorders, pica, or severe nausea and vomiting, which are risk criteria for one or more categorical groups. Table 7-3 lists the indicators for approved nutritional risks, and identifies which survey, if any, provides

TABLE 7-3 Available Data Related to Estimating Nutritional Risk, by Survey

Nutritional Risk Indicator[a] (Code, Description) for Criterion	Categorical Groups to Which Criterion Is Applicable	Related Data Available, by Survey	
		NHANES	CSFII
101-103, Low weight for height	Each	Measured	Self-reported
111-114, High weight for height	Each	Measured	Self-reported
121, Short stature	Infants, children	Measured	Self-reported
134, Failure to thrive	Infants		
135, Inadequate growth	Infants, children		
141, Low birthweight	Infants		
142, Prematurity	Infants		
151, Small for gestational age	Infants		
152, Low head circumference	Infants		
153, Large for gestational age	Infants		
201, Low hematocrit/ low hemoglobin	Each	Yes	
211, Elevated blood lead	Each	Yes	
311, History of preterm delivery	Pregnant women		
312, History of low birthweight	Pregnant women		
321, History of spontaneous abortion, fetal or neonatal loss	Pregnant women		
331, Pregnancy at a young age	Pregnant women		
332, Closely spaced pregnancies	Pregnant women		
333, High parity and young age	Pregnant women		
334, Lack of adequate prenatal care	Pregnant women		
335, Multifetal gestation	Pregnant women		
336, Fetal growth restriction	Pregnant women		

TABLE 7-3 Continued

Nutritional Risk Indicator[a] (Code, Description) for Criterion	Categorical Groups to Which Criterion Is Applicable	Related Data Available, by Survey	
		NHANES	CSFII
337, History of birth of an infant who is large for gestational age	Pregnant women		
338, Pregnant woman currently breastfeeding	Pregnant women		
339, History of birth with nutrition-related congenital or birth defect	Pregnant women		
341, Nutrient deficiency diseases	Each		
342, Gastrointestinal disorders	Each		
343, Diabetes mellitus	Pregnant women	Yes	Yes
344, Thyroid disorders	Each		
345, Hypertension, chronic or pregnancy induced	Each	Yes	
346, Renal disease	Each		
347, Cancer	Each	Yes	
348, Central nervous system disorders	Each		
349, Genetic and congenital disorders	Each		
350, Pyloric stenosis	Infants		
351, Inborn errors of metabolism	Each		
352, Infectious diseases	Each		
353, Food allergies	Each		Yes
354, Celiac disease	Each		
355, Lactose intolerance	Each		
356, Hypoglycemia	Each		
357, Drug-nutrient interactions	Each		
358, Eating disorders	Pregnant women		
359, Recent major surgery, trauma, burns	Each		
360, Other medical conditions	Each	Yes	Yes
361, Depression	Each		

continued

TABLE 7-3 Continued

Nutritional Risk Indicator[a] (Code, Description) for Criterion	Categorical Groups to Which Criterion Is Applicable	Related Data Available, by Survey	
		NHANES	CSFII
362, Developmental, sensory, or motor disabilities interfering with the ability to eat	Each		
371, Maternal smoking	Pregnant women	Yes	
372, Alcohol and illegal drug use	Pregnant women	Yes	
381, Dental problems	Each		
401, Failure to meet USDA/DHHS Dietary Guidelines for Americans	Each		Yes. Asks about 2 days' food consumption.
402, Vegan diets	Each		
403, Highly restrictive diets	Each	Yes. Asks about amount of foods eaten.	
411, Inappropriate infant feeding practices	Infants	Yes. Asks when an infant is fed breastmilk, formula, milk, and solid foods.	
412, Early introduction of solid foods	Infants	Yes. See above.	
413, Feeding cow milk during the first 12 months	Infants	Yes. See above.	
414, No dependable source of iron for infants at 6 months of age or later	Infants		
415, Improper dilution of formula	Infants		
416, Feeding other foods low in essential nutrients	Infants		
417, Lack of sanitation in preparation, handling, and storage of formula or expressed breastmilk	Infants		
418, Infrequent breastfeeding as sole source of nutrients	Infants		

TABLE 7-3 Continued

Nutritional Risk Indicator[a] (Code, Description) for Criterion	Categorical Groups to Which Criterion Is Applicable	Related Data Available, by Survey	
		NHANES	CSFII
419, Inappropriate use of nursing bottles	Infants		
420, Excessive caffeine intake	Pregnant women		
421, Pica	Each		
422, Inadequate diet	Each		
423, Inappropriate or excessive intake of dietary supplements including vitamins, minerals, and herbal remedies	Each	Yes. Asks about all prescription and nonprescription minerals, dietary supplements.	Yes. Asks about intake. vitamins,
424, Inadequate vitamin/ mineral supplementation	Each	Yes. See above.	Yes
425, Inappropriate feeding practices for children	Children		
426, Inadequate folic acid intake to prevent neural tube defects	Pregnant women	Yes. See above.	Yes
501, Possibility of regression	Each		
502, Transfer of certification	Each		
503, Presumptive eligibility for pregnant women	Pregnant women		
601, Breastfeeding mother of infant at nutritional risk	Pregnant women		
602, Breastfeeding complications or potential complications	Pregnant women		
603, Breastfeeding complications or potential complications	Infants		
701, Infant up to 6 months old of WIC mother or of a woman who would have been eligible during pregnancy	Infants		
702, Breastfeeding infant of woman at nutritional risk	Infants		

continued

TABLE 7-3 Continued

Nutritional Risk Indicator[a] (Code, Description) for Criterion	Categorical Groups to Which Criterion Is Applicable	Related Data Available, by Survey	
		NHANES	CSFII
703, Infant born of woman with mental retardation or alcohol or drug abuse during most recent pregnancy	Infants		
801, Homelessness	Each		
802, Migrancy	Each		
901, Recipient of abuse	Each		
902, Woman or infant/child of primary giver with limited ability to make feeding decisions and/or prepare food	Each		
903, Foster care	Each		

[a]The code numbers and brief descriptions are from U.S. Department of Agriculture (1998). This memorandum provides detailed information about each criterion for nutritional risk. CSFII = Continuing Survey of Food Intake by Individuals; NHANES = National Health and Nutrition Examination Survey

NOTE: Neither survey provides data related to more than 50 of the approved nutritional risk criteria.

data related to the indicator. The panel used both data sets when considering lower bound estimates of the proportion of individuals meeting at least one criterion. The next section describes these two data sources. We note that in the future the CSFII will be discontinued and incorporated into NHANES.

Continuing Survey of Food Intake by Individuals

The CSFII surveys fielded in 1994–1996 and 1998 provide the most recent dietary intake data available from a nationwide food consumption survey. CSFII data have a large sample size for children categorically eligible for WIC (those less than 5 years of age) and include an oversample of low-income persons. However, the survey includes only a small number of

pregnant and breastfeeding women and does not identify other postpartum women. The 1998 supplementary CSFII survey was conducted to increase the sample size for children from birth through age 9 years and was designed so that the combined 1994–1998 sample of children constitutes a nationally representative probability sample. The combined 1994–1998 CSFII includes over 2,500 children ages 2 to 5 years who live in households with incomes at or below 185 percent of federal poverty guidelines.

The 1994–1998 CSFII is a reliable nationwide data source for estimating the proportion of income-eligible individuals for WIC who meet the dietary risk criterion *failure to meet dietary guidelines* as specified in the report *Dietary Risk Assessment in the WIC Program* (Institute of Medicine, 2002). The 1994–1998 CSFII collects two nonconsecutive 24-hour recalls of dietary intake for each individual in the sample (this replicate diet recall is missing for a negligibly small proportion of individuals in the sample). Replicate diet recalls offer an advantage when the quantity of interest is the *usual* dietary intake of a food or food group. Because food intake is variable from day to day, a single day's food intake provides a very unreliable estimate of the usual or habitual intake of an individual. The CSFII sample includes respondents from every state except Alaska and Hawaii. The survey collects data during all months and seasons of the year in urban, suburban, and rural areas. CSFII collects data on respondents' participation in food assistance programs (including WIC), on income, and on other sociodemographic variables.

Nonetheless, the CSFII is limited for estimating the proportion of individuals who meet at least one of the many nutritional risk criteria. The survey does not contain information on most of the nondietary measures of nutritional risk, such as biochemical and clinical/health/medical status. Furthermore, the anthropometric data it includes are self-reported rather than standardized measurements, and the survey lacks information on the consumption of dietary supplements.

National Health and Nutrition Examination Survey

NHANES provides nationally representative data relevant to many of the nutritional risk criteria in four of the five risk categories. Using highly standardized methods, NHANES obtains anthropometric and biochemical measurements and a broad range of data related to health and medical problems. In addition, it collects one-day dietary intake data through the

use of a 24-hour recall, plus information on the consumption of dietary supplements. NHANES collects a second nonconsecutive 24-hour recall for a subsample to allow statistical adjustment for day-to-day variation in food intake. The percentage of individuals providing replicate food intake recalls varies for surveys conducted during different time periods. The 1999–2000 NHANES collected a second, nonconsecutive 24-hour recall from approximately 10 percent of respondents.

NHANES III Phase II (1991–1994), the most recent NHANES data available at the time of the study, has the advantage of a relatively large sample size for racial, ethnic, and age groups that are overrepresented in the WIC population: it oversampled children under age 5 years, Mexican Americans, and black Americans. In addition, it is the only nationwide survey that collects information on supplement intake. Since NHANES provides data on health and on food and supplement intake for the same individuals, it is possible to combine information on different nutritional risk criteria for the same individuals.

The following characteristics of the NHANES III Phase II data limit their usefulness for estimating the proportion of income-eligible individuals who meet dietary risk criteria:

- A second nonconsecutive 24-hour recall was administered to only a 5 percent subsample of individuals in NHANES III, and individuals in the subsample were offered a cash incentive to return for a second interview.
- The sample includes few pregnant or breastfeeding women, resulting in very small numbers of such individuals with a replicate observation.
- The sample includes relatively few infants, and no replicate dietary information was obtained for them. Furthermore, no biochemical measurements were obtained for the infants.
- Information on income is missing for approximately 25 percent of the sample.
- There is no information on Medicaid enrollment.

Beginning in 2002, NHANES is being conducted each year with sample sizes of approximately 5,300 persons. Oversampling of specific population groups will vary from year to year. The survey design will provide a nationally representative sample of 10,000 individuals every two years. At least several years of new NHANES data will be needed to obtain

sample sizes large enough to be useful for estimating the proportion of categorically eligible individuals meeting at least one nutritional risk criterion among the population groups served by WIC.

The new NHANES incorporates elements of the CSFII, such as the instrument used to collect dietary intake data and a sampling design that calls for obtaining two nonconsecutive observations for 100 percent of individuals in the sample. The new NHANES survey will provide valuable information on food intake and anthropometric and health-related variables on the same individuals in the sample, and in addition, the two 24-hour recalls will permit assessment of the dietary status of various subpopulations. With the reduced sample sizes, there might not be a sufficiently large number of WIC categorically eligible individuals in the sample. On the positive side, however, the new two-year cycle allows for frequent updating of estimates of the proportion of individuals who meet eligibility criteria including the nutritional risk criteria.

Setting Lower Bounds on Estimates of Risk Prevalence

The more recent estimates of nutritional risk from the WES II study used data from two different surveys to cover as many of the nutritional risk criteria as possible. The study made two separate estimates of nutritional risk prevalence, which it then averaged to obtain the final prevalence estimate. In our Phase I report, the panel criticized this method of combining the two estimates. Because meeting any one of the nutritional risk criteria qualifies one as eligible, the estimated prevalence could not be below any one of the separate estimates of prevalence. There is, however, no statistical basis for combining two estimates of nutrition risk prevalence.

Since a single current data source does not provide all the data needed to estimate the percentage of individuals who would meet at least one of the many approved nutritional risk criteria, the panel investigated ways to set a lower bound for the proportion of income-eligible pregnant and postpartum women, infants, and children who would do so. The panel first identified the single most common type of nutritional risk for each of the categorical groups. As discussed below, dietary risk is the most commonly identified risk for women and children, and "other" or "predisposing" risk is the most commonly identified risk for infants. Because of differences in the most common criteria, we treated three groups—women and children ages 2 to 5, infants, and children ages 1–2—separately. Using this approach, the estimated percentage of individuals meeting the most commonly iden-

tified nutritional risk criterion could serve as a lower bound estimate of the percentage of income-eligible persons who are fully eligible because they also meet at least one nutritional risk criterion. For example, if we know that 95 percent of all income-eligible women meet a dietary risk criterion, then the prevalence of nutritional risk in the income-eligible population of women is at least 95 percent.

Lower Bound Estimates for Pregnant Women, Postpartum Women, and Children Ages 2 to 5 Years

Dietary risk is the type of nutritional risk criterion most commonly reported for women and children ages 2 to 5 years. According to *WIC Participant and Program Characteristics 1998* (U.S. Department of Agriculture, 2000b), state WIC agencies report dietary risk at the time of certification for 47 percent of women, 69 percent of 2-year-old children, and 71 percent of 3- and 4-year-old children. It is likely that these values underestimate the percentages of persons who meet a dietary risk criterion because only 64 percent of the state agencies keep a record of all the risk criteria that an individual meets (U.S. Department of Agriculture, 2000b:72). The panel used data from CSFII 1994–1998 to estimate lower bounds on the percentages of pregnant women, postpartum women, and children ages 2 to 5 years who met a dietary risk criterion. Two dietary risk criteria were employed: one that uses the IOM's proposed dietary risk criterion and one that uses the modal dietary standards used in the WES II study.

The panel's first analysis used the IOM's proposed dietary risk criterion "failure to meet dietary guidelines," defined as "consuming fewer than the recommended number of servings from one or more of the five basic food groups (grains, fruits, vegetables, milk products, and meat or beans) based on an individual's estimated energy needs" (Institute of Medicine, 2002). Our analysis follows up on work done by Krebs-Smith et al. (1997) and by Munoz et al. (1997). Krebs-Smith and colleagues, using older data from CSFII 1989–1991, provided evidence that less than 1 percent of U.S. women consumed the recommended number of servings, regardless of income. Munoz et al. (1997), using the same data source, found that less than 1 percent of U.S. children ages 2 to 5 years consumed the recommended number of servings, regardless of income. Both of these studies minimized bias by using three days of dietary intake data. The results of these studies suggest that adjustment factors to account for nutritional risk should be 0.99 for the women and children.

The panel sought to update findings from Krebs-Smith et al. (1997) and Munoz et al. (1997) regarding the percentages of pregnant women, breastfeeding women, and young children who meet or fail to meet dietary guidelines. The panel used the same methods used in these studies, except that more recent data were used and the panel specifically examined dietary risk among those income eligible for WIC. The first sections of Box 7-1 and Box 7-2 give the specifications for the criterion "failure to meet dietary guidelines" proposed by the IOM (2002). Box 7-1 gives the criteria for children aged 2–5 and Box 7-2 gives the criteria for pregnant and postpartum women. The panel used these specifications in its first analysis to estimate the percentages of children ages 2 to 5 years, pregnant women, and breastfeeding women who meet a dietary risk criterion. The analysis involves comparing each individual's reported intake of foods from five basic food groups with cutoff points related to specifications in the food guide pyramid. For the pregnant women and breastfeeding women, we conducted separate analyses for those with incomes at or below 185 of percent of federal poverty guidelines from those with incomes above 185 of percent of federal poverty guidelines to determine whether results would differ if adjunctive eligibility was considered.

The panel's second analysis used the modal dietary standards applied in WES II (U.S. Department of Agriculture, 1999a). The modal standards were based on the operational definitions of the dietary risk criteria used in each state at the time of the study, as reported in the 1992–1994 State Plans of Operation. If more than 50 percent of the states used a criterion, it was included in the modal set. In determining the set of modal dietary risk standards, states were weighted according to their share of the income-eligible population. Separate modal standards were developed for infants, children, and women, but the women's eligibility status (pregnant, breastfeeding, postpartum nonbreastfeeding) was not considered in developing the standards. The modal standards, which appear in the second sections of Box 7-1 and Box 7-2, consider intake from seven different food groups.[2] Persons who failed to meet at least one of the modal dietary risk standards were considered to be nutritionally at risk.

[2]As shown in Box 7-1 and Box 7-2, the modal dietary risk criterion specifies a greater number of milk servings than does the proposed IOM criterion and two additional food groups—vitamin A and vitamin C foods. Thus, the modal criterion for dietary risk is more likely to confer eligibility for WIC than is failure to meet dietary guidelines.

BOX 7-1
Standards Used to Estimate the Prevalence of Dietary Risk Among Children Ages 2 to 5 Years

Institute of Medicine Proposed Standard: proportion of children at dietary risk equals the proportion with intakes below

2 servings of dairy OR
2 servings of meat and legumes OR
2 servings of fruit OR
3 servings of vegetables OR
6 servings of grain

Child must have intake below the cutoff point in at least one of five food groups to be considered at dietary risk. Meeting the standard indicates that the child meets the pyramid guideline of Dietary Guidelines for Americans (U.S. Department of Agriculture/Department of Health and Human Services, 2000).

Modal from the Second WIC Eligibility Survey (WES II): proportion of children at dietary risk equals the proportion with intakes below

4 servings of dairy OR
2 servings of meat and legumes OR
6 servings of grains OR
5 servings of total fruits and vegetables OR
1 serving of vitamin A foods OR
1 serving of vitamin C foods OR
3 servings of other fruits and vegetables

Child must have intake below the cutoff point in at least one of seven food groups to be considered at dietary risk. Meeting the standard indicates that the child meets the modal criteria used in the Second WIC Eligibility Study.

In WES II, the category-specific standards for dietary risk were applied to NHANES III Phase I data for one day's dietary intake. The study found that 94 percent of women ages 17 to 49 years and 85 percent of children ages 1 to 5 years were at dietary risk regardless of income. (The report does not provide a separate estimate of this dietary risk adjusted for income.) Those results suggest that lower bound adjustment factors for nutritional

BOX 7-2
Standards Used to Estimate the Prevalence of Dietary Risk Among Pregnant and Postpartum Women

Pregnant Women

Institute of Medicine Proposed Standard: proportion of pregnant women at dietary risk equals the proportion with intakes below

2 servings of dairy OR
6 oz. of meat and legumes OR
7 servings of grains OR
2.3 servings of fruits OR
3.3 servings vegetables

Modal from the Second WIC Eligibility Survey (WES II): proportion of pregnant women at dietary risk equals the proportion with intakes below

3 servings of dairy OR
3 servings of meat and legumes OR
6 servings of grains OR
5 servings of total fruits and vegetables OR
1 serving of vitamin A foods OR
1 serving of vitamin C foods OR
3 servings of other fruits and vegetables

Postpartum Women

Institute of Medicine Proposed Standard: proportion of postpartum women at dietary risk equals the proportion with intakes below

2 servings of dairy OR
6 oz. of meat and legumes OR
9 servings of grains OR
3 servings of fruits OR
4 servings of vegetables OR

Modal from the Second WIC Eligibility Survey (WES II): proportion of postpartum women at dietary risk equals the proportion with intakes below

2 servings of dairy OR
2 servings of meat and legumes OR
6 servings of grains OR
5 servings of total fruits and vegetables OR
1 serving of vitamin A foods OR
1 serving of vitamin C foods OR
3 servings of other fruits and vegetables

TABLE 7-4 Estimated Proportion of Income-Eligible Children Ages 2–5 Years at Dietary Risk Based on Consumption in Each Food Group and the Total Proportion Over All Food Groups

	Percentage at Dietary Risk, by Criterion and Food Group			
	IOM Proposed Criterion		Modal Criterion	
Food Group	1-day	2-day mean	1-day	2-day mean
Dairy	57	61	93	96
Meat and legumes	7	3	7	3
Fruits	63	67	N/A	N/A
Vegetables	80	85	N/A	N/A
Grains	68	70	68	70
Fruits and vegetables	N/A	N/A	60	63
Vitamin A fruits	N/A	N/A	95	97
Vitamin C fruits	N/A	N/A	72	75
Total at dietary risk	98	99	100	100

Data source: 1994–1996, 1998 Continuing Survey of Food Intake by Individuals (CSFII). One-day or two-day weights were used in calculations, as appropriate.

risk would be 0.94 for women and 0.85 for children—values that are higher than the adjustment factors currently in use (which are based on WES I).

Table 7-4 (bottom row) shows the estimated proportions of children ages 2 to 5 years living in households with annual income below 185 percent of federal poverty guidelines who would be considered to be at dietary risk under the proposed IOM criterion and the modal criterion. The table also includes percentages of those whose intake is below the criterion for each food group and for any of the food groups using both one day and two days of dietary recall data. These results illustrate three important points. First, the estimated proportion of income-eligible children ages 2 to 5 years who would be considered at dietary risk is essentially 100 percent. That is, by using either the criterion proposed by the IOM (2002) or the modal criterion used in WES II, virtually all income-eligible children ages 2 to 5 years would be fully eligible. This finding is consistent with the results reported by Munoz et al. (1997). Estimates of other types of risk (such as anthropometric and biochemical) become irrelevant if essentially all individuals are at nutritional risk based on dietary criteria.

Second, the estimate of the proportion of income-eligible children clas-

sified as being at dietary risk is sensitive to the criterion that is applied. Using the IOM recommendations (see Box 7-1), almost 100 percent of the children reported consuming at least the recommended number of servings for at least one of the food group thresholds (data not shown). Approximately 72 percent reported meeting at least two of the food group thresholds, but only slightly over 35 percent of the children consumed the recommended number of servings for at least three of the food groups. The proportion of children who report meeting at least four of the food group thresholds drops to only 10 percent. These percentages do not change noticeably if the WES II modal criteria are used instead. In that case, almost 99 percent of the children report meeting the intake recommendations for at least one food group (out of seven), but only 65 and 33 percent reported consuming the recommended number of servings of at least two or three food groups, respectively. Third, using the mean intake for two days leads to slightly higher prevalences of dietary risk than does the intake for a single day. This is true for all food groups except the meat and legume group.

Using the IOM's definition of failure to meet dietary guidelines for women, we find that 97 percent of pregnant women with income below 185 percent of federal poverty guidelines are at risk, using the average of two days of intake data (data not shown). Among breastfeeding women, the estimated proportions of women with incomes below 185 percent of poverty at risk is 100 percent.[3]

Our findings for children, pregnant women, and breastfeeding women support the IOM's recommendation to "presume that *all* income- and categorically eligible women and children aged 2 to 5 years are at dietary risk" based on the criterion of failure to meet dietary guidelines specified above (Institute of Medicine, 2002). Dietary risk, in turn, would make them fully eligible for WIC. This does not mean that the nutritional risk assessment should be eliminated, as the information gathered by the assessment may still be used in tailoring the food package to the individual, developing nutrition education plans, or making referrals.

[3]Estimates for pregnant and breastfeeding women with income above 185 percent of the poverty line were also made: 97 percent of pregnant women and 100 percent of breastfeeding women with incomes above 185 percent of the federal poverty guideline were at risk based on the IOM criterion.

Lower Bound Estimates for Infants

If a postpartum woman participates in WIC or would have been eligible for WIC during her pregnancy, her infant is automatically considered to be at risk and fully eligible (criterion number 701 for "other" nutritional risk—U.S. Department of Agriculture, 1998). This is a widely used criterion: according to *1998 WIC Participant and Program Characteristics* (U.S. Department of Agriculture, 2000b), 74 percent of all infants who participate in WIC had mothers who were eligible or participating in WIC during pregnancy. However, this percentage is likely to be an underestimate for two major reasons:

- Only about 64 percent of states record all the nutritional risk criteria under which a person is found eligible (U.S. Department of Agriculture, 2000b). Risk under this criterion might not be reported, for example, for infants at high risk because of a medical condition.
- If, as discussed above, more than 97 percent of income-eligible pregnant women are at dietary risk, at least 97 percent of infants would have mothers who were at dietary risk during pregnancy.

Since infants ordinarily are certified for a one-year period, the above information implies that an adjustment factor of 0.97 is a reasonable lower bound for obtaining estimates of income-eligible infants who also meet a nutritional risk criterion. This is slightly higher than the value of 0.95, which is currently used by USDA.

Lower Bound Estimates for Children Ages 1 to 2 Years

In 1998, 65 percent of children ages 1–2 years have an identified dietary risk, a majority of them because of inadequate or inappropriate nutrient intake (U.S. Department of Agriculture, 2000b). The next most common category of nutritional risk is anthropometric: 38 percent of children of this age meet at least one of the relevant anthropometric criteria (e.g., low or high weight for height or inappropriate growth or weight gain pattern). As stated previously, these percentages are likely to be underestimates of the WIC participants meeting these criteria, since not all state WIC agencies report all applicable nutritional risks.

Criterion 425, "inappropriate feeding practices for children," actually

includes nine subcriteria, any one of which could be used to establish dietary risk of children in this age group. For many of these subcriteria, survey data are not available to estimate the prevalence of young children who meet one or more of them. The identification of some of the risks would rely on information that is not collected by either CSFII nor NHANES. One such subcriterion is "Routine consumption or feeding of foods low in essential nutrients and high in calories that replace age-appropriate nutrient dense foods needed for growth and development between 12 and 24 months of age."

We do not have data to estimate the lower bound of the prevalence of nutritional risk among children ages 1 to 2 years. However, considering the very large variation in day-to-day intake by children of these ages, the many subcriteria that could be used to confer dietary risk, the relatively high percentage of children with an anthropometric risk, and the array of other nutritional risk criteria, it is reasonable to expect that a very high percentage of these children would have at least one nutritional risk. Furthermore, for previously certified children without other nutritional risks, criterion 501, "possibility of regression," may be used in certain circumstances. Such children are considered at nutritional risk when the competent professional authority at the WIC site determines a possibility of regression of nutritional status if the applicant does not continue to receive WIC benefits. This criterion reflects the preventive nature of WIC.

Assessing Nutritional Risk in the Field

Compared with estimating the percentage of individuals in a population who meet at least one nutritional risk criterion, screening for nutritional risk, especially for dietary risk, is an even more daunting task in the WIC service site. Since WIC field staff are required to screen for nutritional risk to determine full eligibility for WIC, and since dietary risk is the most common risk reported for women and children, effective screening for nutritional risk requires an accurate screening method for dietary risk. This section briefly describes the inherent limitations of the methods available to WIC staff for screening for dietary risk.

To assess dietary risk, WIC field staff generally obtain a single 24-hour diet recall or administer a food frequency questionnaire. Regardless of the skill of the staff member, both of these instruments have serious shortcomings if the goal is to determine whether or not the individual's usual intake of the food groups meets the criterion for dietary risk. Significant measure-

ment error is associated with these instruments, albeit of a different nature for each.

In the case of food frequency questionnaires, the measurement error is due to the failure of the instrument to accurately capture the usual or long-run average intake of foods (e.g., Kipnis et al., 1999). Moreover, studies have shown that food frequency questionnaires do a poor job of measuring "true" energy intake (Kipnis et al., 1999).

A single 24-hour recall, designed to capture daily food intake, provides limited information about the individual's usual intake of food. Two recent IOM reports (Institute of Medicine, 2000, 2002) have documented that it is very difficult to assess the usual dietary intake of an individual accurately when only one or a few days of dietary intake data are available. In fact, information on daily dietary intake is subject to so much error that one could conclude that a person does not meet the criterion for dietary risk (that is, her habitual intake of a food group is at least equal to the cutoff point) only if the person's mean intake of that food group were considerably higher than the cutoff point (Institute of Medicine, 2000).

The following example illustrates the problem with the 24-hour recall. If the applicant is a child age 2 to 5 years, then he or she would need to have a usual intake of two or more servings of fruit and six or more servings of grains (and also satisfy other dietary criteria) to be considered ineligible for WIC. However, the WIC staff member has only one day's intake, not usual intake. Given that fruit and grain consumption varies from day to day, how high would a single-day intake of fruits and grains (or other food group) need to be to conclude, with some degree of certainty, that the child's usual intake makes him or her ineligible? To answer this question, it is necessary to know the day-to-day variance in the child's daily intake of fruits and grains. Using the 1994–1998 CSFII data for children ages 2 to 5 years, the panel estimated the day-to-day standard deviation of number of servings of fruits and grains to be 0.98 and 1.64 servings, respectively. Then the panel computed the mean intake based on one day of data that would result in rejection of the hypothesis that the child's usual intake does not meet the criterion. They did this under the assumptions that daily intake of fruits and grains for the child is normally distributed and that the child's day-to-day variance in intake is similar to the population estimate. For a confidence level of 97.5 percent, the calculation is the following:

$$\text{one day mean} \geq 1.96 \times \text{SD of daily intake} + \text{threshold},$$

which in the case of fruits, results in

$$\text{one day mean} \geq 1.96 \times 0.98 + 2.$$

Thus, the one-day intake of fruits reported by the child would have to be at least 3.9 servings before the WIC staff member could confidently conclude that the child's usual fruit consumption meets the threshold of two servings per day. In the case of grains, the daily reported intake would need to be slightly higher than nine servings for the WIC staff to be confident that the child is meeting the grain servings criterion. Clearly, a single 24-hour recall provides little information about the child's usual intake of the food. Therefore, a WIC field member would need to observe a very high intake on one day before she could be sure that, on the average, the child consumes enough of the food.

Regardless of the instrument used by the WIC field staff, assessing dietary intakes for an individual is very challenging, even under the best of circumstances. With the inherent limitations of practical methods to assess dietary intake of individuals, it is arguably impossible for WIC field staff to distinguish the persons who do not meet the dietary risk criterion from those who do.

COST-BENEFIT ANALYSIS OF ASSESSING THE DIETARY RISK OF WIC APPLICANTS FOR DETERMINING ELIGIBILITY

Considering the limitations of methods to screen for dietary risk, the panel examined the costs and benefits of screening for dietary risk. It is possible that because of inaccuracies in the screening process for dietary risk, individuals who truly meet a dietary risk criterion for nutritional risk and who would benefit from the WIC program might be excluded from participating, while others who do not meet the criterion might be allowed to enroll.

Two potential remedies could reduce the costs of these errors in dietary risk eligibility determination.[4] One remedy would be to improve the accuracy of the screening process. The other would be to presume that all categorically and income-eligible individuals are at dietary risk—an approach

[4]Benefits and costs here are defined broadly, including all the benefits of the program to society and all the costs to society associated with the program.

that was recommended for women and children over age 2 years in the recent IOM report (Institute of Medicine, 2002).

The principal way to improve the accuracy of the eligibility screen to assess the dietary component of nutritional risk would be to collect several additional days of information on an applicant's food intake using the best methods available. However, collecting this additional information would increase the burden on the applicant and increase the administrative costs of the program in the time and effort needed to collect and review the information. Increasing the burden on the WIC applicant might be a barrier to participation and thus result in an increased number of unserved people who are nutritionally at risk. Assuming that WIC benefits reduce nutritional risk in the eligible population, if fewer eligible individuals apply because of an additional burden, then fewer eligible people would receive the nutritional benefits of WIC and more people would be at nutritional risk.

The panel finds the presumption of nutritional risk a more appealing approach to consider. This approach is consistent with the IOM recommendation to presume that all categorically and income-eligible women and children ages 2 to 5 years are at dietary risk (and thus at nutritional risk).[5] If this remedy were applied, then it would no longer be necessary to account for nutritional risk in the estimates of the number of WIC-eligible individuals for budgetary purposes.

Presuming that all are at nutritional risk could have at least one negative and at least one positive effect. In particular, it could increase the proportion of participants who are not at nutritional risk and who thus would benefit less from the program.[6] However, presuming that all are at nutritional risk in determining eligibility would eliminate the possibility of incorrectly denying eligibility to any applicants who are at risk and would benefit from the program.

We illustrate these two possible effects of ignoring the nutritional risk screen with two examples—one in which the nutritional risk screen is used

[5]The Institute of Medicine (2002) report emphasized that the assessment of nutritional risk remains valuable for tailoring the contents of the food package and the nutritional education and referral services that should be given to an individual. Moreover the assessment of anthropometric, biochemical, and medical/clinical risks is necessary for application of the priority system, should funding be insufficient to serve all who apply.

[6]Program data are unavailable to determine the percentage of applicants who are found ineligible based on lack of nutritional risk alone.

and one in which the nutritional risk screen is ignored. For both examples, assume that 1,000 individuals are both categorically eligible and income eligible for the program, and that 95 percent of those categorically eligible and income eligible are truly at nutritional risk, as defined by meeting a dietary criterion for nutritional risk. Further assume that, because of limitations inherent in the screening procedure, the chance of excluding an individual who is truly at risk is 10 percent (sensitivity equals 90 percent), and the chance of incorrectly certifying an individual as nutritionally at risk is also 10 percent (specificity equals 90 percent). Considering the poor accuracy of the screening tests, it is highly unlikely that both the sensitivity and specificity would be this high. Thus, the calculations probably represent a "best case" scenario.

In the first example, when the nutritional risk screen is employed, 5 of the 50 truly ineligible persons would be screened as eligible and 95 of the 950 truly eligible persons would be screened as ineligible. A total of 860 individuals would be screened as fully eligible. These results are summarized in Table 7-5, part A.

In the second example, when the nutritional screen is *not* employed to determine eligibility, all of the 1,000 individuals would be certified as fully eligible. Of these, 50 would not be truly eligible (part B). However, as can be seen by comparing part A with part B, the 95 at-risk individuals who would not have been certified on the basis of the inaccurate nutritional screen would now be eligible for benefits.

Is it economically rational to presume that all are at nutritional risk and thus fully eligible? This depends on whether the net social benefits of providing WIC benefits to an additional 95 individuals who are at risk are greater than the net social costs of providing WIC benefits to the 45 individuals who are not at risk and would not pass the nutritional risk screen.

The panel formalized this cost-benefit calculation. Table 7-6 presents a set of the critical values that the net social benefits of the WIC program would have to be in order to warrant ignoring the costs associated with the presumption that all income-eligible individuals are at nutritional risk and thus fully eligible for WIC (see Appendix B for the formalization of this analysis). These different critical values are calculated assuming different true levels of the prevalence of nutritional risk in the income-eligible population, different levels of the relative predictive power of the screening procedure (the ratio of the probability that someone who is truly not at risk is screened as at risk to the probability that someone who is truly at risk is screened as at risk), and different values of the net social benefits of WIC to

TABLE 7-5 Effects of Using or Not Using a Screen for Nutritional Risk on the Number Found Eligible or Ineligible, by Their True Nutritional Risk Status

A
Numbers eligible and ineligible when the nutritional screen is used.

	Fully Eligible Based on Nutritional Risk Screen		
Truly at Nutritional Risk	Yes	No	Total
Yes	855	95	950
No	5	45	50
Total	860	140	1,000

B
Numbers eligible and ineligible when the nutritional screen is not used.

	Fully Eligible (No Nutritional Risk Screen)		
Truly at Nutritional Risk	Yes	No	Total
Yes	950	0	950
No	50	0	50
Total	1,000	0	1,000

NOTE: Both panels assume that 95 percent of income-eligible populations are truly at nutritional risk and that the nutrition risk screen has a 90 percent sensitivity and 90 percent specificity.

those fully eligible. Examining the table, if the true proportion of income-eligible persons at nutritional risk is 0.90 and if the probability of accurately screening someone who is truly not at risk equals the probability of inaccurately screening someone who is truly at risk, then the net benefits of WIC should be at least 1.56 to justify presumption of nutritional risk—that is, for each dollar of program expenditures, program benefits must be equal to $1.56. As the screening procedure becomes more accurate (the relative probability of correctly identifying those not at risk increases—moving down columns), the net benefits of WIC must be larger to justify presumption of nutritional risk. As the true prevalence of nutritional risk in the population increases (moving from left to right across rows), the net benefits of WIC needed to justify presumption of nutritional risk decrease.

Several studies have made estimates of the net benefits of the WIC

TABLE 7-6 Critical Values, by Prevalence of Nutritional Risk and Hypothetical Values of the Accuracy of the Screening Procedure, of Net Social Benefits of WIC Needed to Ignore the Nutritional Screening Procedure

	Prevalence of Nutritional Risk in the Income-Eligible Population		
Accuracy of Screen	0.90	0.95	0.99
1.0	1.28	1.26	1.25
2.0	1.31	1.28	1.26
5.0	1.39	1.32	1.26
10.0	1.53	1.38	1.28

NOTE: Accuracy level of the screen for nutritional risk is measured as the probability the screen will accurately assess someone not truly at risk divided by the probability the screen will inaccurately assess someone who truly is at risk as not at risk. See Appendix B for details on how the net social benefit levels needed to ignore the screen are calculated.

program. The most robust findings on the net benefits of the program in the WIC evaluation literature have examined the effect of WIC on pregnancy outcomes. For example, a General Accounting Office (GAO) study (U.S. General Accounting Office, 1992) found that for every $1 spent on pregnant women, WIC saved $3.50 on medical and disability costs because there were fewer low-birthweight births. In a study that attempted to account for selection bias in the GAO estimates, Devaney et al. (1992) found savings of $2.29 for every dollar of WIC expenditures. If the GAO estimates or the Devaney et al. estimates are correct, then it is clear that the net benefits of WIC for pregnant women are large enough to justify the presumption of nutritional risk for eligibility purposes. Only if the true benefits of WIC are much lower than these estimates is it inadvisable to presume all are at nutritional risk. For example, if the screening procedure can accurately identify those not at nutritional risk (predictive power ratio of at least 5), and if the true prevalence of nutritional risk is 90 percent, then a net benefit of 1.39 would not be great enough to justify ignoring the screen and presuming that all are at nutritional risk.

Whether the presumption of nutritional risk should be made for categorical groups other than pregnant women depends on four factors: as-

sumptions about the net benefits of WIC participation to these groups, the percentage of income-eligible persons who are truly at nutritional risk, the accuracy of the screening method, and the assumptions about the excess burden of raising tax money to fund the program (see Appendix B). Our lower bound estimates of the prevalence of nutritional risk for women, infants, and children ages 2 to 5 years are well over 90 percent. Furthermore, as the preceding section discussed, the dietary risk screen used to determine WIC eligibility has a high level of inaccuracy. Given these two factors—even using lower bound estimates of the net benefits of WIC—presuming that all are at nutrition risk, is justified. However, if new information about the prevalence of nutritional risk or of WIC's benefits becomes available, or if a more accurate screen is found, this presumption should be reexamined. The calculations outlined here and in Appendix B give the framework for such an analysis.

SUMMARY

In this chapter, the panel critiqued current methods used to adjust the number of categorically and income-eligible persons to account for those who do not meet at least one criterion for nutritional risk. The chapter also presented lower bound estimates of the prevalence of nutritional risk and discussed the inherent limitations of accurate assessment of the dietary risk of an individual. Finally, the chapter examined cost-benefit ratios needed in order to presume that all income-eligible persons meet nutritional risk criteria and are therefore fully eligible for WIC.

The cost-benefit analysis found that, based on estimates of the net benefits of WIC, ignoring the nutritional risk screen to determine eligibility is justified. A nutritional risk screen would be justifiable, however, if a revised, highly accurate screen that correctly identifies individuals who are not at nutritional risk were available, and if the actual prevalence of nutritional risk was considerably lower than the current estimate. Lower bound estimates of dietary risk among income-eligible infants, women, and children ages 2 to 5 years all are at least 97 percent, and those children ages 1 to 2 are likely to be that high as well.

CONCLUSION: Given very high estimates of the prevalence of nutritional risk among income-eligible populations, gross inaccuracies in screening procedures for dietary risk, and cost-benefit calculations of administering the screen, the panel concludes that a nutritional risk

screen is not useful for determining eligibility. If USDA drops this aspect of eligibility determination, no adjustment for the prevalence of nutritional risk is needed to estimate eligibility.

The IOM report recommends that all women and children ages 2 to 5 years who meet all other eligibility requirements should be presumed to meet the requirement of nutritional risk through the *failure to meet dietary guidelines* criterion (Institute of Medicine, 2002). The dietary guidelines used in the criterion do not apply to infants and children between the ages of 1 and 2, so the IOM recommendation does not specifically apply to children of these ages. However, if the recommendation is adopted, all infants will necessarily also be considered at nutritional risk because an infant whose mother was considered to be nutritionally at risk during pregnancy is also considered to meet nutritional risk requirements. Thus, an implication of the IOM recommendation is that all infants will also be presumed to be at nutritional risk. If the IOM recommendation is not adopted by USDA, then the lower bound estimates of the prevalence of nutritional risk given earlier in this chapter should be used to estimate the number fully eligible for WIC. These lower bound estimates are: 0.97 for pregnant women, 1.00 for postpartum women, 0.97 for infants, and 0.98 for children ages 2 to 5. There are no data to make a lower bound estimate of the prevalence of nutritional risk among children ages 1 to 2. However, given that the diets of children at this age are probably not that different from the diets of children ages 2 to 5, and the many other criteria that could be used to confer nutritional risk of children at this age, the prevalence of nutritional risk among children ages 1 to 2 is also likely to be very high.

If all income-eligible people are considered to be nutritionally at risk and no downward adjustment for nutritional risk is made to the estimates of those who are income eligible, the number of those estimated to be eligible for WIC will increase. Eligibility estimates for children will increase the most because the current adjustment factor for nutritional risk for children is 0.752—lower than that for any other group. In 1999, 6.4 million children were estimated to be income eligible for WIC and 4.8 million were estimated to be both income eligible and nutritionally at risk.

USDA should periodically assess the findings leading to the conclusion that the nutritional risk screen is not useful to determine eligibility. Better data to measure the prevalence of nutritional risk may become available, or if the program is highly successful at reducing nutritional problems or nutritional behaviors of the population otherwise improve, the preva-

lence of nutritional risk in the population may decrease. If it decreases significantly, and if the screen for nutritional risk becomes more accurate, screening would become more important in targeting WIC's benefits to intended groups. The eligibility estimates would then need to be adjusted accordingly (i.e., by the percentage of the income-eligible population at nutritional risk).

8

Estimating WIC Participation Among Eligible People

The panel was asked to investigate the best ways to determine likely participation among eligible persons assuming that the program is fully funded. This chapter examines participation among those who are eligible for WIC. As we emphasized in Chapter 2, the level of WIC participation is, to a certain extent, a policy choice. Funding levels can be set so that a certain number of people are served. Or program rules and administrative practices can be set so that participants are encouraged or discouraged from participating—for example, more convenient office locations or office hours could be set to encourage more eligible people to participate. This chapter presumes that part of the reason USDA estimates WIC eligibility and participation is to better understand the performance of the program (e.g., coverage rates) and to understand what factors affect program participation; and it presumes that the estimates are not used solely to guide budgetary decisions.

The chapter begins with a discussion of data sources that are available to estimate participation among eligible people. We then provide the panel's best estimates of WIC participation rates and discuss a method for making such estimates. Based on data from the Survey of Income and Program Participation (SIPP), we provide estimates from Bitler et al. (2002) that show that eligible infants have high WIC participation, eligible pregnant and postpartum women have somewhat lower participation, and eligible children ages 1 through 4 years have considerably lower participation. The

chapter then shows examples of how USDA could model WIC participation in order to consider how changes in program priorities or changes in policy might affect participation levels. For example, in examining correlates of WIC participation, Bitler et al. (2002) found that WIC participation is higher in states with program rules that reduce the transaction costs of using the program (such as fewer required visits), but participation is not related to state-level measures of need, such as poverty and unemployment rates.[1]

DATA SOURCES TO ESTIMATE WIC PARTICIPATION AMONG ELIGIBLE PEOPLE

This section reviews data sources available to measure WIC participation. The data sources reviewed include administrative data from the WIC program and data from surveys of the national population, the Current Population Survey (CPS) and SIPP. Both the CPS and SIPP have different strengths and limitations for estimating eligibility, which we discussed in Chapter 5. In this section, we focus on their strengths and limitations for measuring participation. Administrative data cannot be used to estimate eligibility because such data contain information only on WIC participants and would therefore miss eligible nonparticipants. They can, however, be used to check survey reports of participation, and so are discussed in that context here. Table 8-1 lists a number of characteristics of interest for estimating WIC participation that are available in selected data sets.

Administrative Data

The official USDA numbers regarding WIC caseloads come from counts of the number of people who actually received WIC services in a given month. People who have been certified as eligible and thus who are "on the books" but are not receiving services for some reason are not counted. A shortcoming of the official administrative caseload data is that they are not broken out by demographic subgroups, such as age, race, and education level. To remedy this deficiency, USDA conducts a biannual survey of state program directors called the Survey of Program and Participant Characteristics. In addition to information about such participant charac-

[1]The content of this part of the chapter draws heavily from Bitler, Currie, and Scholz (2002).

teristics as race and age, this survey asks detailed information about state program characteristics, which we discuss below.

Periodically, the Food and Nutrition Service (FNS) at USDA surveys a nationally representative sample of persons certified for WIC. These surveys allow FNS to assess the degree of need of WIC recipients and also to verify actual eligibility of persons certified for WIC. Most recently, the Survey of WIC Participants and their Local Agencies sampled persons certified for WIC in spring 1998.

1995–1999 CPS Food Security Supplements[2]

The Food Security Supplement (FSS) is one of two different supplements to the regular monthly CPS that collects data on WIC participation (the annual March demographic survey is the second). The FSS contains questions about WIC participation, but it does not have enough information on income to assess WIC eligibility. The FSS provides information about whether anyone in the household received WIC benefits in the 30 days prior to the interview. A limitation of these data is that the program participation questions are asked about the household rather than about the individual, making it impossible to determine which members of the household receive benefits. A second significant problem is that households are screened before they are asked about participation in food programs, so that only households with incomes below a certain level are asked the questions.[3]

Since the income screen depends on the number of persons in the household, the size of the household is critical to determining whether or

[2]This section draws from the 1995 CPS Food Security Supplement Interviewer Instructions (CPS Interviewer Memorandum no. 95–05) and from Attachment 9 of the August 1998 CPS Technical Documentation, which is the Food Security Supplement Questionnaire. The Food Security Supplement was administered in April 1995, 1997, and 1999 and in September 1996 and August 1998.

[3]Households without this income measure ("don't know or refusals") were also asked about their use of food assistance programs. The annual income cutoff was $15,000 for a one-person household and then went up by $5,000 for each additional household member up to a household size of six. For households of seven or eight persons, the cutoff was $50,000, for nine persons it was $60,000, and for larger households it was $75,000. WIC participation questions were further restricted to households with categorically eligible persons, specifically, households containing women ages 15–45 or a child under age 5. Households were first asked whether any household member had received WIC in the last 30 days. Those who answered yes to this question were then asked how many persons in the household had

TABLE 8-1 Descriptions of National Sources of Data Related to WIC Participation

Data Source	Participant Counts	Rates
FNS administrative counts (88–00) by state, for month aggregate data	All, women, children 1–4, infants; women by category 91–00	Y
USDA FNS PC surveys by region, for April 92, 94, 96, 98	All, women by category, children, infants	Y
National Survey of WIC Recipients and their Local Agencies	Nationally representative sample of WIC recipients in the contiguous US certified in spring 1998	Y
CPS Food Security Supplements (95–99) by state, for month before survey was done, Household data	Total if pass income screen estimate: women, infants, children in household	Y
CPS Annual Demographic File (98–01) by state, for previous calendar year, individual data	Women if pass income screen. Estimate: children, infants in family of women	Y
SIPP (1996 , waves…) By state, by month, Individual data	Any person last month	Y

Acronyms:
AFDC = Aid to Families with Dependent Children
CPS = Current Population Survey
FNS = Food and Nutrition Service
PC = participant characteristics
SIPP = Survey of Income and Program Participation
TANF = Temporary Assistance for Needy Families
USDA = U.S. Department of Agriculture
WIC = Special Supplemental Nutrition Program for Women, Infants, and Children

Demographics	Income	Calculate Eligibility	Participation Regs.	Other Public Assistance Programs	Effects of WIC on other outcomes?
N	N	N	Y, State level	NA (Other Government Sources)	N
Y	Y	Y	N	AFDC/TANF Food Stamps Medicaid	N
Y	Y	Y	N	Y	N
Y	N	N	N	Food Stamps (HH measured last month)	N
Y	Y (only annual income)	N	Y, State and individual level	AFDC/TANF Food Stamps Medicaid	N
Y	Y	Y	Y, State and individual level	AFDC/TANF Food Stamps Medicaid	Y

not the questions are asked. In practice, the FSS uses the full number of persons in the household, whether or not these persons are related. This definition of a household may not correspond to the one that would be used by a local WIC office to determine eligibility.

This screening procedure is likely to result in the undercounting of persons receiving WIC for several reasons. First, in states with Medicaid thresholds above the income screen, some people eligible for WIC (and who receive it) are not even asked the WIC questions. Second, other eligible WIC recipients will have incomes above the screen in the first month in which a household is surveyed, but below that level in subsequent months.[4] Working in the other direction, the FSS's use of the broadest possible measure of the household may help to mitigate the undercounting caused by the income screen because the WIC household may not include all the unrelated members of a household, but only those deemed by a WIC eligibility worker to be "sharing resources."

A second screen was added prior to the program participation questions in 1998 and 1999. In addition to asking WIC questions to all households passing the income screen (and all those responding "don't know" or "refuse"), households who answer "yes," "don't know," or "refuse" to a further screening question about food insecurity are asked about participation in food assistance programs.[5] This additional question will mitigate the undercounting induced by the income screen only if those who are missed by the income screen experience this type of problem. In order to assess the effect of this change in the screen, Bitler et al. (2002) constructed a WIC participation measure that uses a consistent screen by discarding those persons who were asked about WIC only because of the new screening question. The less restrictive screening procedure yielded additional participants

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received WIC. This value was top-coded at 4, although relatively few households are likely to have been impacted by the top-coding, given that, in general, few households will have more than four people participating in WIC. Unless the number of persons receiving WIC is exactly equal to the number of persons who are potentially eligible, we cannot identify the specific people in the household receiving benefits.

[4]The FSS was not necessarily administered in the same month in which the household entered the survey, so there could easily be income discrepancies between the screening questions and the household's status at the time of the FSS.

[5]The additional question reads: "People do different things when they are running out of money for food in order to make their food or their food money go further. In the last 12 months…, did you ever run short of money and try to make your food or your food money go further?"

(between 0.89 and 0.97 million). This provides evidence that the income screen causes some participants to be missed.

Annual Demographic File (March CPS)[6]

Starting in 1998, experimental questions on program participation were added to the March CPS. Two specific questions ask whether any females age 15 or older in the household participated in WIC in the last calendar year and the number of WIC participants in the family. In 2001, these variables were included in the publicly released data file for the first time.[7] As in the FSS, the March CPS questions are asked only if the household's income is less than an income screen, but the income screen is generally much higher than in the FSS, and so would be expected to result in less undercounting.[8]

The March CPS offers a significant advantage over the FSS in that it measures household income and it also asks questions about participation in other programs, such as welfare and Medicaid. The latter is particularly important, since those who participate in Medicaid are adjunctively eligible for WIC, and Medicaid often has income cutoffs above 185 percent of federal poverty guidelines.

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[6]This information comes from Appendix D of the 2001 March CPS Technical Documentation, the CPS Field Representatives/Interviewer Memorandum No. 2001-03 Items Booklet—Feb/March/April 2002, which is the Facsimile of March Supplement Questionnaire, along with the 1998–2000 questionnaires.

[7]The WIC and food stamp questions in the March CPS refer to participation in the last year rather than in the last month, so they are not directly comparable to the FSS questions. Counts of WIC recipients are almost certain to be higher in the March CPS than in the FSS.

[8]In 1998–1999 the cutoff for being asked the WIC questions in the March CPS was $20,000 for one-person households, $30,000 for two- or three-person households, and $50,000 for four- or more person households. In 2000–2001 the screen was $30,000 for one-person households and $50,000 for larger households. Persons who answered "don't know" "refuse" to the income question were also asked WIC questions. Thus, households with fewer than seven possibly unrelated persons were more likely to be asked the WIC questions in the March CPS than in the FSS, while those with more members would be less likely to be asked in the March CPS than in the FSS. We examined the importance of the different income screens by also imposing the narrower FSS screen onto the March CPS data. Of people asked the WIC questions by the FSS, only 58 would have been missed by the March CPS. But half of those asked the WIC questions in the March CPS would have been missed under the FSS income screens.

Survey of Income and Program Participation

SIPP asks about WIC each period for all households with a woman age 15–45. There are no other screens. Unlike the CPS surveys, SIPP asks which individuals in the household receive WIC. Hence, it is straightforward to estimate WIC eligibility and participation among eligible people using SIPP.

WIC and Other Transfers in the CPS and SIPP

Reports of WIC Receipt

Program participation is generally undercounted in social surveys. Bitler et al. (2002) provide an analysis that shows substantial underreporting of WIC participation in the CPS and SIPP. The ratio of the estimated number of persons who report WIC receipt to the administrative totals is about 0.7 in the FSS data. Underreporting for infants is even worse than underreporting for adults, with a ratio of around 0.6. Reported WIC coverage in SIPP is similar to the FSS. SIPP appears to have somewhat better coverage of WIC infants than the CPS, but still only three-quarters of infant WIC recipients appear in SIPP. The undercount of food stamp participation is much less severe than the undercount of WIC participation. Bitler et al. (2002) found that population estimates of the number of food stamp recipients in the FSS and in SIPP account for 85 percent of the administrative totals. There is less undercounting of Medicaid, Aid to Families with Dependent Children (AFDC), and Temporary Assistance for Needy Families (TANF) participation in both of these data sets.

In 1999 and 2000, the March CPS estimates of the number of WIC participants were over 90 percent of the number of actual WIC recipients. One possible reason for the relatively higher coverage of the March CPS compared with the FSS is that the income screen was higher, so that more participating households are actually asked the questions about WIC participation. Bitler et al. (2002) estimate that the more generous income screen in the March CPS adds 890,000 WIC recipients in 1999 and 970,000 in 2000, relative to what would have been obtained with the more restrictive FSS screens. However, the March CPS asks about WIC receipt at any point during the year. If families receive WIC for fewer than 12 months a year, the average months of receipt will exceed the count of the number of families receiving WIC at some point during the year.

Characteristics of WIC Recipients Nationally and in the CPS and SIPP

These results raise the question of whether the data are adequate for supporting analyses of WIC eligibility and participation. One way to assess potential biases that might arise from using the CPS and SIPP to study WIC, is to compare the characteristics of WIC recipients in the CPS and SIPP with those reported from the FNS publications *WIC Participants and Program Characteristics 1998*, a census of WIC recipients in April 1998, and the *National Survey of WIC Participants and Their Local Agencies*, a survey of WIC recipients.

Bitler et al. (2002) show that for April 1998 (the reference period for the 1998 national survey), the distribution of race and ethnicity of the WIC population is very close to that in the national data in the FSS and the March CPS. The proportion of the WIC sample in SIPP that is black closely matches the national totals, but SIPP seems to overrepresent white WIC recipients and underrepresent Hispanic recipients. SIPP more accurately allocates WIC recipients into categorical eligibility groups than the CPS. Since the CPS does not identify which people in the household actually receive WIC, analysts must either assume that everyone within the household gets benefits or make some alternative ad hoc assumption.

One striking discrepancy between the survey data and the administrative data is that income for the total WIC population and across almost every subgroup is higher in SIPP and the March CPS than it is in the national WIC survey, even when using a family rather than a household measure of income in the CPS. The fact that WIC participants appear to have higher incomes on average than those that are reported to WIC administrators does not necessarily imply noncompliance with program rules, since the incomes reported to CPS and SIPP surveyors remain below WIC cutoffs. We estimate that in the 2000 March CPS, for example, 80 percent of WIC participants reported incomes less than 185 percent of federal poverty guidelines, and 48 percent had incomes less than 100 percent of the guidelines. Furthermore, given the flexibility that WIC staff workers have in determining the time period for which income is measured to establish eligibility and income variation over the year, it is not surprising that the survey and administrative data do not match.

It is clear that the FSS, the March CPS, and SIPP undercount WIC recipients, and the problem is more severe for WIC than it is for other transfers. But these comparisons suggest that missing recipients appear to be approximately randomly distributed across categorically eligible WIC

groups. While the incomes of WIC recipients are higher in the CPS and SIPP than in the WIC administrative data, it is plausible that incomes are underreported to WIC administrators. But the discrepancies documented in this section serve as a qualification to CPS- and SIPP-based analyses of WIC. Those with incomes greater than 185 percent of federal poverty guidelines are likely to be adjunctively eligible.

Despite underreporting of WIC participation in the CPS and SIPP, the characteristics of WIC recipients in the SIPP and CPS are similar to the characteristics of WIC recipients nationally. We conclude that SIPP- and CPS-based analyses of WIC may be informative. These comparisons suggest that estimates of WIC eligibility and participation based on the CPS could be improved with several modifications to the current methods used by the FSS and the March CPS to obtain information on WIC participation.

RECOMMENDATION: The income screen used to determine whether a CPS Food Security Supplement respondent is asked survey questions about WIC participation should be modified or eliminated so that all people who are in fact eligible for WIC are asked the question about WIC participation.

RECOMMENDATION: The March CPS and the Food Security Supplement should ask which individuals in the household receive WIC.

RECOMMENDATION: A monthly measure of WIC participation should be collected on the March CPS and the Food Security Supplement.

A more appropriate income screen for the WIC participation questions in the FSS would mean that more people who are eligible and who may participate in WIC will be asked about their WIC participation, and more accurate measures of WIC participation could be made. Asking which individuals in the household receive WIC would help parcel out participation counts into eligibility categories. Two alternative measures of monthly WIC participation could be considered. One could ask about WIC participation for each month in the year prior to the survey. This would yield a more accurate measure of WIC participation than the current annual measure used—which asks about WIC participation in the prior calendar year—and it would correspond to the time period for which income is

measured in the March CPS. Still, recall errors could be introduced. Asking about WIC participation in the month prior to the survey would presumably result in a more accurate measure of WIC participation than the current method, because it does not require as long a recall period. However, this measure would not correspond to the period over which income is measured in the survey and covers only one month.

The March CPS has many uses beyond calculating WIC eligibility and participation, and USDA does not have the authority to make these recommended changes. However, it does sponsor the collection of the Food Security Supplement by the Census Bureau. To the extent that the questions on WIC in these two CPS supplements can be modified without compromising the other goals of the survey, the panel recommends these changes because the resulting improvements in data quality would clearly enhance the value of the CPS for analyzing WIC participation.

WIC PARTICIPATION AMONG ELIGIBLE PEOPLE

In this section we estimate the percentage of people who are income and categorically eligible who participate in WIC. The SIPP data are used to make these estimates because the data set allows direct observation of pregnant and postpartum women, because it includes monthly income for modeling eligibility, and because it specifies which household members receive WIC benefits.

In order to be income eligible for WIC, a categorically eligible person must have income less than or equal to 185 percent of federal poverty guidelines, or be enrolled in a program, for example Medicaid, which confers adjunctive eligibility. The calculations reported in this section are based on the assumption that any family whose *monthly* income falls below 185 percent of federal poverty guidelines is eligible for reasons discussed in Chapter 5. Although WIC offices may use annual income in some circumstances, we believe that the use of monthly income more closely approximates the concept of income that is generally used in practice. Once an individual becomes eligible for WIC, it is assumed that she remains eligible for the relevant certification period. These estimates also presume that all income-eligible persons are nutritionally at risk and fully eligible for WIC.

Estimates of Participation Among Eligible People

Table 8-2 presents information on average monthly WIC eligibility and participation in 1998. In the first panel, for example, we classify all

TABLE 8-2 WIC Eligibility and Participation Average Monthly Totals for 1998

	Number	Percentage
Total Infants	4,078,482	100.0
Eligible for WIC	2,367,746	58.1
Not eligible for WIC	1,710,736	41.9
Eligible participants	1,734,276	73.2
Eligible nonparticipants	633,470	26.8
Ineligible participants	105,724	5.7[a]
Total Children Ages 1–4	15,947,451	100.0
Eligible for WIC	9,039,031	56.7
Not eligible for WIC	6,908,420	43.3
Eligible participants	3,423,755	37.9
Eligible nonparticipants	5,615,276	62.1
Ineligible participants	196,245	5.4[a]
Total Pregnant and Postpartum Women	3,859,628	100.0
Eligible for WIC	2,087,530	54.1
Not eligible for WIC	1,772,098	45.9
Eligible participants	1,388,396	66.5
Eligible nonparticipants	699,134	33.5
Ineligible participants	91,604	6.2[a]

[a]Percentages are the percentage of all participants who are not eligible to participate.
SOURCE: Bitler, Currie, and Scholz (2002).

infants in SIPP in each month of 1998 into estimated eligibles and ineligibles and into those who do and do not receive WIC. For this portion of the analysis, an adjustment that increases the number of WIC recipients by the amount that the SIPP data undercounts recipients in a particular group is made, using the administrative data as the benchmark. These allocated individuals are placed in the eligible and ineligible groups in the same proportion as individuals whose status is observed in the data. A corresponding adjustment to the number of nonrecipients is made, reducing the number of eligible and ineligible nonrecipients by the increase in the number of eligible and ineligible recipients.

The first panel of the table shows that 58 percent of all infants were eligible for WIC in a given month in 1998. The WIC participation rate

among eligible infants was 73 percent. We also find that, of the infants receiving WIC, 6 percent were estimated to be ineligible for the benefits. This error rate is consistent with the error rate for infants reported in the National Survey of WIC Participants (U.S. Department of Agriculture, 2001).

The second panel of the table shows a similar analysis for children. Of the 16 million children in this age group, 57 percent are estimated to be eligible for WIC. Of the 9 million eligible children, 38 percent receive WIC benefits. Of the 3.5 million children receiving benefits, we estimate that 5.4 percent do not meet the income or adjunctive eligibility criteria (and have not done so in the past six months). Thus, our evidence is consistent with that of Burstein et al. (2000), who show, using data from the 1993 SIPP, that infants are much more likely than older children to participate in the program. Indeed, Burstein et al. show that many children exit on their first birthdays, when the dollar value of the WIC package decreases (since it no longer includes infant formula).

The third panel of the table presents information on WIC eligibility and participation by pregnant and postpartum women for the first 6 months postpartum.[9] We are not able to consider the second 6 months postpartum when only women who are breastfeeding are eligible, since we cannot observe their infant feeding practices and did not want to assume a distribution of women allocated into breastfeeding status by eligibility status. Of the 3.9 million pregnant women and women less than 6 months postpartum, 2.1 million or 54 percent are eligible for WIC. Of those who are eligible, 66.5 percent actually receive benefits.[10] We estimate that 6.2 percent of the 1.5 million women receiving WIC are not eligible for benefits. We have the least amount of confidence in our estimates for women, because, as shown in the table, the WIC undercounting problem in SIPP is

[9]The analysis for women is somewhat more complicated than the analyses for infants and children. Weighted estimates suggest that roughly 364,000 women report receiving WIC, yet they do not appear to have a child (or fetus) of an age that would lead them to be eligible. In the bottom panel of Table 8-2, we allocate these women to categorically eligible groups in proportion to the groups whose status we do observe. This procedure results in allocating 56 percent of the unclassified women to the "pregnancy group," 29 percent to nonbreastfeeding postpartum, and the remainder to breastfeeding.

[10]The participation rate (among eligibles) cannot be 100 percent for pregnant women under our methodology unless all pregnant women began receiving WIC benefits in the first month of pregnancy.

more severe for women than it is for other groups. Hence, our assumption that unobserved WIC recipients should be allocated to eligible and ineligible status in the same proportion as observed WIC recipients (among the two groups of women) is a bolder assumption.

The USDA has recently conducted another WIC income verification study where individuals receiving WIC were surveyed and information about their income and program participation status was collected. This study found that over all categories of eligibility, 4.5 percent of WIC participants appeared to be ineligible to receive WIC (USDA, 2001). The figures provided by Bitler et al. (2002) are quite close to the USDA estimates.

The results in Table 8-2 are striking, since they suggest that a program that served all eligible people would be considerably larger than the current one. Only 73 percent of eligible infants, 67 percent of eligible pregnant and postpartum women, and 38 percent of eligible children ages 1 to 4 receive benefits.

These participation estimates differ sharply from the implied WIC participation rates used to prepare budget estimates. Recall that the USDA methodology assumed that 80 percent of eligible persons would participate in WIC. Estimates shown here indicate that participation rates among eligible people in each eligibility category are lower than the rates obtained using the current USDA methodology. Participation rates for children, particularly, are much lower than 80 percent.

CONCLUSION: WIC participation rates among eligible persons are substantially lower than the 80 percent rate assumed in the process of estimating the number of eligible people likely to participate in WIC. WIC participation rates also vary substantially across eligibility category.

These participation rate estimates are based on eligibility estimates that differ from the estimates used to produce the current USDA eligibility estimates. Our eligibility estimates are based on the SIPP data rather than the CPS. Furthermore, our eligibility estimates use monthly rather than annual income, account for certification periods, and account for adjunctive eligibility—factors that the panel demonstrated should be taken into account so that the estimates reflect program rules regarding eligibility as closely as possible. The denominators used to estimate these participation

rates (which are estimates of the number of eligible people) are thus larger than those used by the current estimation methodology.

If those who report WIC participation even though they are not eligible are included as participants, these estimated participation rates (using the same estimate of eligibility—that is, the same denominator) would increase to 78 percent for infants, 40 percent for children, and 71 percent for pregnant and postpartum women. Given these estimates, the USDA's 80 percent participation assumption is very close to the estimated participation rate for infants and not far off for pregnant and postpartum women. However, participation rates for children are much below the 80 percent assumption.

Coverage Rates Recalculated

USDA's estimated coverage rates (the ratio of WIC participants from administrative data to the estimated number of eligible persons) were reported in Table 2-1. For the past several years, those coverage rates were estimated to exceed 100 percent for infants and for postpartum women, and to range from 60 to 70 percent for children and pregnant women. The estimates of eligibility presented in this chapter imply that actual coverage rates are much lower than reported in Chapter 2. Using the 1998 estimates of eligibility based on SIPP data (Table 8-2) and the 1998 administrative total number of WIC participants from administrative data, we estimate a coverage rate of 79.6 percent for infants and 41.5 percent for children. For the same year, coverages rates based on USDA estimates of eligibility were 127.7 percent for infants and 74.4 percent for children. We did not estimate participation rates for pregnant women separately from postpartum women and so cannot estimate new coverage rates for these groups. However, coverage rates for pregnant and postpartum women based on these estimates of eligibility should also fall.

CONCLUSION: Coverage rate estimates based on currently used methods of estimating eligibility are overstated. Coverage rates for children, infants, and women based on eligibility estimates that account for monthly income, adjunctive eligibility, and WIC certification practices are substantially lower than those based on current estimation methods.

RECOMMENDATION: If participation rate estimates are used to make budgetary forecasts or to understand responses in changes to program rules and policies, separate estimates should be made for each eligibility category.

FACTORS CORRELATED WITH WIC PARTICIPATION

The decision to participate in WIC is a choice that a family makes (if they are eligible). In making this choice, the family may weigh what it believes to be are the benefits of WIC (the value and content of the food packages and the value of nutritional services and referrals) against what they believe are the costs of the program (e.g., time and effort to find out about the program, going into the WIC office, going through the eligibility screen, a stigma of participation) in deciding whether to go through the eligibility screening process.[11]

Understanding the factors that affect WIC participation could be advantageous to program administrators because such information could be used to forecast changes in participation levels (e.g., in times of recession) or to understand where outreach might be most effectively targeted. In this section, we outline a framework for considering WIC participation. We examine four sets of factors that may influence WIC participation. First, we examine how participation in WIC correlates with participation in other programs. For example, current FNS methodology for estimating eligibility and participation assumes that WIC participation is closely linked to participation in the food stamp program but ignores the linkage between WIC and Medicaid. Second, personal characteristics may make people more or less likely to participate. Third, WIC program characteristics differ substantially from state to state, and these variations may also be linked to differences in WIC participation. Fourth, such external factors as the economy or birth rates may change, and that may affect eligibility and participation.

[11]In weighing the costs and benefits of WIC participation, it is possible that a family may change its behavior to make itself eligible for WIC (e.g., the benefits of the WIC program are enough to affect a woman's labor supply decisions and hence affect her income). However, the value of the food packages is small enough to make it hard to believe that the presence of the WIC program greatly affects this choice. The panel's estimates of participation assume that income is exogenous to this decision.

We summarize work conducted by Bitler et al. (2002), who used three different models and data sets to examine WIC participation. They examined (1) state-level variations in WIC participation using state administrative data from 1992–2000 and (2) individual-level differences in participation with individual-level data from the March CPS for years 1997–2000 and 1998 SIPP data. The state-level model is estimated to better understand how features of the administration of WIC programs (e.g., food package costs, timing of benefit issuance) are correlated with participation; how WIC program characteristics and other program characteristics (e.g., the maximum monthly AFDC/TANF benefit or the Medicaid eligibility threshold) are correlated with participation; and how state-level economic and demographic characteristics (e.g., the unemployment rate or the percentage of births to unmarried mothers) are correlated with WIC participation.

State-Level Models of WIC Participation

Results from Bitler et al. (2002) show that variations in WIC participation over the period 1992–2000 are not strongly related to changes in need, at least as measured by the unemployment rate or the poverty rate. However, demographic characteristics are important. The share of the state population that is Hispanic has a consistently large and positive effect on WIC participation rates. The share of blacks has the opposite effect. The share of births to unmarried mothers has a significantly negative effect on the probability that children participate. The programmatic variables indicate that there is no strong relationship between WIC participation and AFDC/TANF participation. However, higher AFDC/TANF benefits are associated with lower WIC participation rates, perhaps because the larger TANF benefits offset the need for the relatively smaller WIC benefits. The Medicaid enrollment rate is positively associated with WIC participation among children but negatively associated with participation for infants.

Features of the way that WIC programs are administered across states are also correlated with participation levels in states. The cost of the women's food package is positively correlated with participation for children, meaning that the higher costs of women's food packages are associated with higher levels of participation for children, and negatively correlated with participation for infants, meaning that the higher costs of women's food packages are associated with lower levels of participation for infants. This coefficient is difficult to interpret, however, given that if a woman does not

breastfeed, the value of her food package is smaller than if she does, but the value of her infant's food package increases because of the addition of formula given to her infant. Three other characteristics that relate to the stringency with which the programs are operated are negatively correlated with participation: dispersing WIC benefits monthly (as opposed to less frequently, which means fewer visits into the WIC office), requiring proof of income, and having a higher nutritional risk cutoff for pregnant women.

These models were estimated with state fixed effects—that is, a dummy variable for each state was included in the model to control for unmeasured differences between states. The results indicate that there is considerable variation in total WIC participation rates across states, even after controlling for all the variables included in these models. Differences may reflect important unobserved differences in the way that the program operates across states and suggest that further information about how the program is operated might be useful in explaining WIC participation.

Individual-Level Models

Individual-level data from the March CPS and SIPP were used to examine individual characteristics associated with WIC participation among eligibles. Several findings are consistent across both data sets. First, Medicaid enrollment is strongly linked to WIC participation. Results based on the SIPP data show that Medicaid participants are 50 percent more likely to participate in WIC than those not enrolled in Medicaid. Food stamp participation is also positively associated with WIC participation, but the association is not as strong. Results from both data sets also show that Hispanics are more likely to participate in WIC than whites, and Asians are less likely to participate than whites. The mother's education level is negatively associated with WIC participation (i.e., more educated mothers are less likely to participate). This finding may reflect a lack of awareness among some more educated women of their eligibility (i.e., because income eligibility levels for low-income assistance programs are not typically as high as 185 percent of poverty), or a higher opportunity cost of participating in the program among the more educated.

These analyses of WIC participation suggest several tentative conclusions. First, WIC participation does not seem to be strongly correlated with state-level indicators of economic need, such as poverty and unemployment rates. Given the WIC income eligibility cutoff of 185 percent of federal poverty guidelines, it is possible that many families who fall into

poverty as a result of an economic recession were already eligible for WIC. Second, WIC participation is strongly associated with individual demographic characteristics, such as education, race, and marital status, even after conditioning on income. For example, eligible Hispanics are more likely to participate in WIC, while eligible Asians are less likely. These findings could, for example, be used as an indicator that outreach targeted toward Asian women might be beneficial. Third, WIC program characteristics may play an important role in WIC participation. In general, factors that increase the transaction costs of applying for WIC (e.g., monthly distribution of benefits compared with quarterly distribution) are associated with reduced participation. This type of analysis could be conducted in a state using local-level data. Such an analysis could give state-level officials a better idea of how administrative changes in the programs could be made in order to achieve program goals.

These results have important implications for the process of forecasting future WIC participation levels. On one hand, if the economy does not have a huge impact on levels of participation, then it may not be crucial to account for changes in the economy when forecasting participation levels into future years, although changes in the economy will affect the number of people who are eligible for WIC. On the other hand, participation rates differ significantly across demographic groups. Demographic changes among groups with high propensities to participate could affect the overall participation rate. Although demographic changes can be slow to occur, such changes could introduce uncertainty in the forecasted counts. Results from these analyses also suggest that changes in program rules or administrative practices are associated with changes in participation rates. Thus, another source of uncertainty in forecasted estimates of participation is introduced if states change the way they run their WIC programs or if changes in program rules are implemented. The next chapter discusses the implications of these results while comparing different methods for forecasting WIC participation.

SUMMARY

This chapter has reviewed data sources for estimating WIC participation among those who are estimated to be eligible for WIC. This review found that SIPP is a good source of data for these estimates. Furthermore, it was noted that the March supplement to the CPS and the Food Security Supplement of the CPS could be used to estimate WIC participation, but

there are limitations. The FSS procedure to screen for WIC participation results in not asking some people who are eligible for WIC and may participate in it whether they receive WIC. And neither the March CPS nor the FSS asks for monthly measures of WIC participation or collects information on which individuals in the household receive WIC. The panel recommends improvements to these data sources that will improve estimates of participation among eligible persons.

Results from the Bitler et al. (2002) study that used 1998 SIPP data to estimate eligibility and participation show that participation rates are much lower than the 80 percent participation rates used in USDA's current methodology. Furthermore, participation rates vary considerably across eligibility categories.

Finally, the panel outlined a framework for estimating the relationship between WIC participation and demographic characteristics, economic conditions, and state programmatic conditions. Results of this analysis show that WIC participation is not closely related to economic conditions, but it is strongly associated with some demographic characteristics of individuals (e.g., Hispanics are more likely to participate than Asians) and that state-level administrative and program rules can affect WIC participation.

9

Options for Estimating Eligibility and Participation

The panel was asked to evaluate current methods used to estimate WIC eligibility and participation and to offer recommendations to improve these estimates. This chapter presents two estimation strategies that summarize our recommendations for ways to improve estimates of the numbers of eligible individuals, as well as an approach to predict the number of participants.

ALTERNATIVE STRATEGIES FOR PREDICTING ELIGIBILITY

Estimating the number of eligible individuals is central to prediction of the number of WIC participants. The estimates are needed to make budget requests and to calculate coverage rates. The panel proposes two options for estimating of the number of WIC-eligible individuals. The first option continues to employ the Current Population Survey (CPS) for annual estimates of the eligible population but recommends ways to improve its use. The second option employs the Survey of Income and Program Participation (SIPP) to estimate WIC eligibility.

The CPS Option

The CPS has both advantages and disadvantages for estimating eligibility. The chief advantage is the regular and quick release of the CPS from

the Census Bureau for public use. The data are collected in March, and the public use file is regularly released in the fall of the same year. The CPS has a relatively large sample that ensures adequate sampling rates for infants and children. It has numerous questions pertaining to income sources and participation in other government programs. Given its long history, there is a good deal of experience with the survey. The survey design also makes it relatively easy to access and use. However, as the report has discussed, the CPS has flaws in terms of its ability to estimate eligibility for WIC. The primary disadvantage is that it does not measure monthly income flows for the family. As Chapter 5 documented, the use of annual income instead of the conceptually more appropriate monthly income results in substantial underestimation of the numbers of eligible infants and children. A second disadvantage of the CPS is that it is impossible to identify, even indirectly, women who are pregnant. Moreover, the CPS does not identify which household members receive WIC benefits.

If the March CPS is used to prepare eligibility and participation estimates, it is the panel's view that improvements can be made to the current USDA methodology. The improvements offer a better use of the data contained in the CPS and an approach to account for the lack of monthly data in the CPS.

Currently, USDA uses the following information from the CPS to determine income eligibility:

- Age (used to identify infants and children),
- Family relationship (used to identify foster children),[1]
- Size of census family and state of residence (used to determine the appropriate poverty threshold),[2] and
- Family income (used to determine whether the individual meets the income eligibility limits of the program).

However, the CPS contains significantly more data on individuals that could be used to improve the determination of eligibility. In the case of infants and children, the CPS contains reported participation in the means-

[1]Foster children are assumed to be WIC eligible regardless of the income of the foster family.

[2]A census family is defined to be all individuals who live together in a household who are related by blood or marriage.

tested programs (Temporary Assistance for Needy Families or TANF, food stamps, and Medicaid) used to determine adjunctive eligibility for WIC. Underreporting of program participation is a problem, as reported participation is less in the CPS than the number of participants reported from administrative records. Despite this shortcoming, using reported program participation to account for those adjunctively eligible is preferable to the very small adjustment for adjunctive eligibility that is currently made.

Table 9-1 documents that ignoring the reported participation in TANF, food stamps, and Medicaid can have a significant effect on the estimates of the number of infants and children. The row labeled "USDA methodology" presents the estimates of the annual number of eligible infants and children using the current USDA methodology for calendar years 1994 to 1999. The next row, labeled "Using reported enrollment," continues to use the current USDA methodology but also counts as eligible any infant or child who reported enrollment in TANF, food stamps, or Medicaid. The use of reported enrollment in means-tested programs provides a direct method to identify WIC eligible infants and children who are adjunctively eligible. For infants, the impact of the use of reported enrollment has

TABLE 9-1 Current Population Survey (CPS) and Transfer Income Microsimulation Model (TRIM) Estimates of Eligibility

	Year					
	1994	1995	1996	1997	1998	1999
Infants						
USDA methodology	1,628	1,669	1,620	1,543	1,492	1,470
Using reported enrollment	1,867	1,905	1,931	1,817	1,777	1,799
TRIM imputed CPS	2,231	NA	2,357	2,170	2,130	2,133
Multiplier[a]	1.195	NA	1.221	1.194	1.200	1.186
Children						
USDA methodology	7,350	6,963	6,893	6,813	6,375	6,076
Using reported enrollment	8,407	7,560	7,890	7,486	7,263	7,173
TRIM imputed CPS	8,701	NA	8,341	7,821	7,678	7,398
Multiplier[a]	1.035	NA	1.057	1.045	1.057	1.031

[a]Multiplier computed as "TRIM imputed CPS" estimate divided by "Using reported enrollment" estimate.
The panel did not obtain TRIM data for 1995. Estimates are in 1,000s.
NA = Not available.

steadily grown from 14 to 22 percent during this six-year period. For children, the percentage increase in the number eligible has been erratic but averages 13 percent.

The CPS gives only annual instead of the more program-relevant monthly income. To account for how monthly income and certification periods affect eligibility estimates, we propose that a multiplier (or proportional adjustment factor) be developed that could be applied to the estimates of the number of eligible infants and children.

The panel estimated eligibility for WIC using monthly income for 1994–1999 based on Transfer Income Microsimulation data (TRIM), which imputes CPS reports of annual income into monthly measures. (The TRIM model and the estimates of income-eligible infants and children are discussed in Appendix C.) These estimates were used to assess the size of the impact that a monthly income measure has on estimates of eligibility and how stable that impact is over time. The stability of the multipliers is the major factor in deciding whether to use it.

The row labeled "TRIM imputed CPS" in Table 9-1 reports the number of infants and children estimated to be eligible from CPS data that have imputed monthly income created by the TRIM model. The next row in the table, labeled "Multiplier," contains the ratio of the eligibility estimates based on the TRIM model's imputed monthly income relative to the CPS-based estimate using annual income plus those who report participation in means-tested programs (row labeled "Using reported enrollment"). This multiplier is intended to adjust the annual estimates of eligibility to account for variation in monthly income. This adjustment factor appears to be quite stable for both infants and children for the five years reported. The multiplier for infants ranges between 1.19 and 1.22 percent. Averaged over all the years, the multiplier is 1.20. The multiplier for children ranges from 1.03 to 1.06 and is, on average, 1.05.[3]

[3]The TRIM model estimates based on the CPS cannot fully account for the impact that certification periods will have on eligibility estimates. With the TRIM data, it is possible only to partially simulate the role that certification periods play in the eligibility process over the course of the year for children. In this case, children are assumed to have 6 months of WIC eligibility if they have 1 to 7 months of income that fall below 185 percent of the federal poverty guidelines. Otherwise they are simulated to have 12 months of eligibility during the year. Infants are assumed to have 12 months of eligibility if they have at least 1 month of income less than 185 percent of poverty.

While this multiplier would address some of the major shortcomings presented by the use of the annual CPS data, it is far from a perfect solution. Although the TRIM model is routinely used by some government agencies to analyze other transfer programs aimed at the low-income population such as TANF and Medicaid, the validity of the imputed monthly income amounts have not been recently examined.[4] Reliance on imputed monthly income amounts may produce unreliable estimates of the appropriate multiplier. The stability and accuracy of these two multipliers would need to be assessed periodically.[5]

As discussed in Chapter 5, the SIPP data provide a more reliable source of information on monthly income, and hence the SIPP data would be a preferable data source to construct a multiplier to be applied to the base CPS estimates of income eligibility estimated from annual income and reported enrollment in means-tested programs.[6] If SIPP is used to construct the multiplier, it is important that estimates appropriately account for WIC certification periods and include those infants and children who would be eligible based on their annual income and reported participation in means-tested programs.

Because the panel had only two years of SIPP data with which to construct a multiplier, its stability could not be examined. If USDA decides to use SIPP to create this multiplier, it should be examined more fully.

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[4]The last formal evaluation of the TRIM model's imputation of monthly income was performed in 1990. The results of this evaluation are reported in Long (1990). After this evaluation, several modifications to the imputation procedures were adopted that appear in the current version of the TRIM model.

[5]While TRIM is operated and maintained by the Urban Institute through contracts with the U.S. Department of Health and Human Services (DHHS), TRIM data files are publicly available through the Urban Institute web site free of charge. Given the amount of data imputation and the fact that the public release of the data must be approved by DHHS, the release of these files occurs much later than the release of the March CPS file for that same year. However, for the purpose of checking the stability of the multiplier for monthly income, certification periods, and adjunctive eligibility, the delay in the release of the TRIM data should not pose a problem for this purpose.

[6]For this option, the panel is proposing that the March CPS continue to be utilized to produce annual estimates of WIC eligibility to which a multiplier based on an analysis of the SIPP data would be applied. The second option proposed is based on the yearly use of SIPP data, to which no multiplier would be applied.

Regardless of whether this multiplier is produced from the TRIM imputed CPS data or SIPP data, it should be examined at least once every five years to determine whether its use continues to be appropriate. The amount of month-to-month income variability could increase or decrease, rendering the constant multiplier as inaccurately reflecting current income dynamics. Furthermore, the multiplier could also lead to inaccuracies in estimation if rules for means-tested programs, especially Medicaid, change.

In the case of pregnant women, the proposed CPS option partially accounts for the differences in income prior to the birth of the child and during the postpartum period. The current USDA methodology assumes that if an infant is income eligible for WIC, then the mother would have been income eligible during her pregnancy. However, in Chapter 6, the panel cites evidence that income variability during pregnancy reduces the percentages of women who are income eligible during pregnancy. The panel proposed lowering the adjustment factor of 0.75 that reflects that a pregnant mother is, at most, eligible for nine months (.75 = 9/12) to 0.533 to account for the differences in income variability during pregnancy and the first year postpartum. However, the panel did not examine whether potential differences in the impact of adjunctive eligibility for pregnant and postpartum women would significantly differ from those of infants.

Accounting for monthly income and adjunctive eligibility are high priorities for improving CPS-based estimates of eligibility. In this report, the panel recommends several additional adjustments to current methods:

- Adjust the CPS weights for the undercount of infants and overcount of children (Chapter 4).
- To estimate the number of income-eligible postpartum women from CPS-based estimates (both breastfeeding and nonbreastfeeding), continue to use the current adjustment factor of 0.9844 to account for multiple births and infant and fetal deaths (Chapter 6).
- To obtain the number of income-eligible pregnant women, apply an adjustment of 0.533 (instead of the 0.75 factor) to the number of income-eligible infants (Chapter 6).
- Use more recent data to estimate breastfeeding rates and duration among income-eligible women less than 12 months postpartum. Apply them to the estimates of income-eligible postpartum women to determine the number breastfeeding and nonbreastfeeding (Chapter 6).

- If the nutritional risk screen is no longer used to determine WIC eligibility, then no adjustment to account for the percentage of the income-eligible population that is at nutritional risk should be made (Chapter 7).[7]

Box 9-1 compares the current and proposed methods for estimating eligibility for infants and children. Box 9-2 makes the same comparison for pregnant women and Box 9-3 for postpartum women.

The CPS option attempts to overcome data deficiencies by using constant adjustment factors. The accuracy of these adjustments may decline over time. Furthermore, the method implicitly assumes that the multiplier for income variability and for adjunctive eligibility for infants applies uniformly to the variability and adjunctive eligibility of pregnant and postpartum women (e.g., the effects of income variability on estimates of eligible infants is the same as the effects of income variability on eligibility estimates for pregnant and postpartum women).

A preferable option is to use more appropriate data so that adjustment factors would not be needed. As we have previously noted, SIPP contains many features that are useful for estimating eligibility.

The SIPP Option

A second option for estimating eligibility is to use SIPP data from waves covering the period of time for which eligibility needs to be predicted. Box 9-4 contains the steps that would be used to estimate eligibility using this SIPP option. Monthly income measures would be employed to determine eligibility in a given month, and appropriate certification periods could also be constructed. Reported enrollment in TANF, food stamps, and Medicaid could also be used to account for adjunctive eligibility. Because of underreporting of program participation, the number adjunctively eligible may still be understated. To correct for this, program enrollment,

[7]If USDA does not drop the nutritional risk screen for determining eligibility, then the panel's lower bound estimates of the prevalence of nutritional risk among the income-eligible population should be used to estimate eligibility. These lower bound estimates are: 100 percent for breastfeeding postpartum women, 97 percent for pregnant women, 97 percent for infants, and 99 percent of children ages 2 to 5.

BOX 9-1
Using the CPS-Based Option: A Comparison of Current USDA Methods and the Panel's Recommended Methods to Estimate Eligibility of Infants and Children

Steps to Estimate Eligibility for Infants and Children	Current USDA Method	Panel's Recommendation
Estimate core number of infants and children with CPS	Yes	Yes
Adjust CPS weights to account for the undercount of infants	No	Yes
Count infants and children eligible for WIC if their annual income is less than 185 percent of federal poverty guidelines	Yes	Yes
Count as eligible all infants and children who report enrollment in Medicaid, TANF, and food stamps	No	Yes
Use constant multiplier to adjust for monthly income	No	Yes (1.2 for infants, & 1.05 for children), or estimate multiplier from SIPP data
Use a constant multiplier to adjust number of income eligible infants and children for additional eligibility in the U.S. Territories	1.038	Use 2000 census data to update this multiplier
Adjustment for the number of infants who are nutritionally at risk	0.930	Presume all are nutritionally at risk if USDA adopts IOM report recommendation
Adjustment for the number of children who are nutritionally at risk	0.752	Presume all are nutritionally at risk if USDA adopts IOM report recommendation

BOX 9-2
Using the CPS-Based Option: A Comparison of Current USDA Methods and the Panel's Recommended Methods to Estimate Eligibility of Pregnant Women

Steps to Estimate Eligibility for Pregnant Women	Current USDA Method	Panel's Recommendation
Start with the estimates of fully eligible infants	Yes	Yes
To obtain the number of pregnant women, use a constant multiplier to account for the length of pregnancy and income of the woman during pregnancy	0.750	0.533
Multiplier to adjust number of income-eligible infants and children for additional eligibility in the U.S. territories	1.038	Use 2000 census data to update this multiplier
Adjustment for the number of pregnant women who are nutritionally at risk	0.913	Presume all are nutritionally at risk if USDA adopts IOM report recommendation

especially Medicaid enrollment, could be imputed to match control totals from administrative data, as the TRIM model does with the CPS.[8]

The SIPP data provide other advantages over the CPS. Instead of in-

[8]It should be noted that just because the enrollment counts match administrative totals does not mean that the imputation process correctly assigns participation to the individuals in the survey who indeed participated in the means-tested programs but did not report participation. In particular, errors in the imputation process could assign participation to too many or too few individuals with incomes over 185 percent of federal poverty guidelines. If this is the case, the imputation process will create biases in the estimates of the number of eligible individuals.

BOX 9-3
Using the CPS-Based Option: Comparison of Current USDA Methods and the Panel's Recommended Methods to Estimate Eligibility of Postpartum Women

Steps to Estimate Eligibility for Postpartum Women	Current USDA Method	Panel's Recommendation
Start with the estimates of fully eligible infants	Yes	Yes
To estimate the number of postpartum women, use a constant multiplier to account for fetal and infant deaths and multiple births	0.9844	0.9844
Use a constant multiplier to estimate the number of women less than 6 months postpartum and who do not breastfeed	0.374	Recommends new multiplier be estimated with recent data
Use a constant multiplier to estimate the number of women less than 12 months postpartum who breastfeed	0.171	Recommends new multiplier be estimated with recent data
Use a constant multiplier to adjust number of income eligible infants and children for additional eligibility in the U.S. Territories	1.038	Use 2000 census data to update this multiplier
Adjustment for the number of nonbreastfeeding postpartum women who are nutritionally at risk	0.933	No adjustment
Adjustment for the number of breastfeeding postpartum women who are nutritionally at risk	0.889	No adjustment

BOX 9-4
Using the SIPP Option: Steps to Estimate Eligibility for All Categorical Groups

Steps to Estimate Eligibility Using the SIPP

- Estimate the number of infants, children, pregnant women, and women less than 12 months postpartum. The presence of an infant in the household and information on relationships of household members are used to identify pregnant and postpartum women.
- Use reported monthly income and account for certification periods for each categorical group to estimate income eligibility.
- Use reported enrollment in Medicaid, Temporary Assistance for Needy Families, or food stamps to account for adjunctive eligibility.
- To estimate the number of breastfeeding and nonbreastfeeding postpartum women, estimate with more recent data breastfeeding rates among income-eligible postpartum women and use these to adjust the number of income-eligible postpartum women.
- Presume that all income eligible individuals are nutritionally at risk if USDA adopts IOM report recommendation.

ferring the number of pregnant women and their monthly income through the use of adjustment factors based on the estimates of the number of income-eligible infants, SIPP data allow one to observe income over the course of a woman's pregnancy. Eligibility of postpartum women can also be directly observed in SIPP. Furthermore, SIPP also specifies which household members receive WIC benefits, which helps in estimating adjunctive eligibility. SIPP, like the CPS, does not provide direct information on breastfeeding status of mothers, so that the adjustment factors for the rate and duration of breastfeeding status will need to continue to be used if the SIPP is used to estimate eligibility.

SIPP does have some limitations relative to the CPS. First, given the complexity of the data, the public release of SIPP lags that of the CPS. Second, using monthly income instead of annual income requires more data in order to accurately model certification periods. For example, in

order to determine whether an 11-month-old infant is eligible that month, the monthly income from the previous 10 months is required (e.g., an infant may not be eligible in her 11th month, but she may have been eligible in a previous month and certified as eligible for the next 12 months). To determine whether a women is pregnant in December would require up to eight months of data in the next calendar year. Estimating eligibility from SIPP for any calendar year will require data from the waves for the year of interest, all of the waves from the preceding year, and at least three waves from the following year. Even if the timing of the release of SIPP closely matched that of the CPS, there would still be a wait of a year in order to estimate eligibility and participation for the same year from both SIPP and the CPS. Both of these factors would lengthen the forecast period—the time period between when data are available for analysis and the time for which budget decisions are being made—and hence, potentially increase prediction error.

Another potential problem with SIPP's longitudinal data is cumulative attrition over waves of interviews, although response rates for each wave are high. Evidence from previous SIPP panels suggests that attrition is more likely to occur among young adults, males, minority groups, never-married people, people with incomes below the poverty level, and people with low educational attainment (Lamas et al., 1994). Since the Census Bureau is well aware of the problem of attrition, SIPP makes a number of reasonable efforts to reduce this type of nonresponse. Weights are designed to reduce nonresponse bias and, through poststratification, are made to resemble the month-by-month U.S. population by age, race, and gender.

Comparison of Options

Table 9-2 presents estimates of the number of infants, children, and pregnant women who are eligible for WIC and coverage rates for these groups computed by using the current USDA methodology and the panel's proposed methodologies for CPS and SIPP options.[9] We focus on the years

[9]We have chosen not to present results for breastfeeding and postpartum women since we do not make specific recommendations pertaining to the proportional adjustment factors to be used for breastfeeding rates less than 6 months and greater than 6 months. These two rates are needed to estimate eligibility for these two groups under both the CPS and SIPP options. The estimates based on the current USDA method do not make an adjustment for the prevalence of nutritional risk among the income-eligible populations.

TABLE 9-2 Eligibility and Coverage Rate Estimates of Infants, Children, and Pregnant Women

	Year					
	1994	1995	1996	1997	1998	1999
Infants						
USDA methodology						
Eligibility (in 1,000)	1,628	1,669	1,620	1,543	1,492	1,470
Coverage rate	116%	115%	119%	127%	133%	136%
CPS option estimates						
Eligibility (in 1,000)	2,298	2,345	2,377	2,236	2,187	2,215
Coverage rate	78%	79%	77%	83%	86%	86%
SIPP option estimates						
Eligibility (in 1,000)				2,493	2,368	
Coverage rate				75%	80%	
Children						
USDA methodology						
Eligibility (in 1,000)	7,350	6,963	6,893	6,813	6,375	6,076
Coverage rate	58%	67%	72%	75%	78%	80%
CPS option estimates						
Eligibility (in 1,000)	8,785	7,900	8,245	7,823	7,590	7,496
Coverage rate	36%	44%	45%	49%	49%	49%
SIPP option estimates						
Eligibility (in 1,000)				9,383	9,039	
Coverage rate				41%	41%	
Pregnant Women						
USDA methodology						
Eligibility (in 1,000)	1,202	1,232	1,196	1,139	1,102	1,085
Coverage rate	67%	66%	69%	74%	78%	78%
CPS option estimates						
Eligibility (in 1,000)	1,206	1,230	1,247	1,173	1,147	1,162
Coverage rate	66%	66%	66%	72%	75%	73%
SIPP option estimates						
Eligibility (in 1,000)				1,465	1,329	
Coverage rate				58%	65%	

of 1997 and 1998, since estimates using all three data sets are available only for those two years.

For infants in 1997, the panel's CPS option results in a 45-percent increase in eligibility estimates over estimates based on current methodology. The SIPP option results in a 62-percent increase in eligibility estimates. In 1998, the CPS option results in a 46-percent increase in the number of infants estimated to be eligible for WIC, while the SIPP option results in a 59-percent increase in the number of infants estimated to be eligible.

For children, the CPS option results in a 15-percent increase in eligibility estimates over estimates based on the current methodology, while the SIPP option results in a 38-percent increase in eligibility estimates for 1997. In 1998, the CPS option results in a 19-percent increase in the number of infants estimated to be eligible for WIC, while the SIPP option results in a 42-percent increase in the number of infants estimated to be eligible.

For pregnant women, the CPS option yields roughly the same number of eligible women in 1997 and 1998. Employing the SIPP data, there are significantly more eligible pregnant women. In 1997, 29 percent more pregnant women are estimated to be eligible. The 1998 SIPP estimates show a 21 percent increase in the number of eligible pregnant women compared with estimates based on the current method.

These considerably greater estimates of eligibility compared with estimates based on the current methodology translate into coverage rates under 100 percent. Using the panel's proposed CPS-based estimates, the coverage rates for infants range from 77 percent in 1996 to 86 percent in 1998 and 1999. Coverage rates for children range from 36 percent in 1994 to 49 percent in 1997–1999. SIPP-based coverage rate estimates for infants range from 75 to 80 percent and for children are 41 percent. CPS-based coverage rates for pregnant women, which range from 66 to 75 percent, are only slightly lower than those estimated using the current USDA methodology. SIPP-based coverage rates for pregnant women are 58 percent in 1997 and 65 percent in 1998.

The SIPP coverage rate estimates are lower than those using the CPS-based option, which is a reflection of the larger numbers of eligible individuals estimated by SIPP data. The panel examined the differences between the CPS-based option estimates and those derived from the SIPP data. The majority of the difference was due to differences in monthly income from the two data sources. The smaller degree of variability in the

TRIM-imputed monthly income, compared with the SIPP data, resulted in fewer children being found eligible during the course of the year (a fuller description of this reconciliation is found in Appendix C).

Of course, even with these lower coverage estimates, there may still be ineligible people participating in WIC. If so, true coverage rates could be even lower. We further emphasize that these lower estimates of coverage rates are due to increases in eligibility estimates after accounting for monthly income and adjunctive eligibility. They use the same participation levels obtained from administrative data.

PREDICTING WIC FULL-FUNDING PARTICIPATION

Each year, USDA submits to Congress a budget requesting funds for the WIC program. In recent years, the administration has submitted to Congress a budget requesting sufficient funds for the WIC program so that every eligible individual who wishes to participate may enroll in the program—in other words, fully fund the program. To estimate the level of full funding for the WIC program, the primary question is how many of the eligible individuals will choose to participate. If waiting lists for the WIC program, which would deny eligible individuals from receiving benefits, have not occurred, then one would be tempted to conclude that the funding had been adequate to meet the congressional desire to fully fund WIC.[10] If the absence of waiting lists indicates that full funding has been achieved, any future changes in the funding level of the program would reflect anticipated changes in the number of individuals eligible for WIC or changes in the rate by which individuals chose to participate.

Concluding that full-funding levels are achieved if waiting lists are not needed may not be appropriate. This conclusion assumes that a family's decision to participate in the WIC program is not influenced by administrative practices of the local WIC programs. Chapter 8 indicated that the family's decision to participate was influenced by the amount of information they have about the program, the level of benefits they can expect to receive, and the costs of acquiring these benefits. Even with an absence of waiting lists, a family's decision to participate may also depend on the

[10]For purposes of this discussion, we assume that there are no excess funds of the program and the program does not serve individuals who are not eligible.

amount of program outreach, the proximity of WIC offices, their hours of operation, and other administrative practices of local WIC offices. The panel heard testimony from several state directors during its first phase of work. One state WIC director indicated that, for many years, the WIC program in her state concentrated outreach efforts on women and infants, since they were concerned that funds would be insufficient to serve children too. However, once it became evident that funding was adequate to serve children, the state then began to concentrate outreach on children. States direct funds to local offices, which use funding targets. State agencies can lose future funding if they fail to meet the state-specified targets. The incentives to raise or lower participation in the program to hit these funding targets may be a potent force in determining the actual rate of participation (coverage rate) in a year. These examples and observations have led us to conclude that the rate at which eligible individuals participate in the WIC program (participation rate) should be viewed as much as a policy choice as it is a reflection of individual behavior to participate.

To understand the consequence of viewing the participation rate as a policy choice, consider the context of how budget requests for the WIC program are created. Assume that there is a four-year lag between the year the data used for the prediction budget submission were collected and the year for which the budget request is being made. For example, in the process of preparing the WIC budget request for 2003, assume that USDA employs data that reflect the demographic and economic characteristics of individuals in 1999. Using these data and the methodology described earlier in the chapter, USDA would first estimate the number of eligible individuals in the categories of infants, children, and pregnant and postpartum women in 1999. The next step is to project forward the number of eligible individuals from 1999 to 2003.[11] Finally, USDA would explicitly make a judgment about an appropriate participation rate among eligible individuals, which is then the policy goal for the program in 2003. In setting these goals, USDA should take into account current coverage rates of the various groups and the likelihood that changes in administrative practices can in-

[11]Historically, USDA has assumed that there is no change in the number of eligible individuals over the four-year period. Some adjustments could be made for changes in demographic factors such as birth rates, mortality rates, and immigration, but if economic conditions and other program rules do not change eligibility during a four-year period, it would be a reasonable decision not to adjust the eligibility estimates from 1999 to 2003.

fluence participation among eligible individuals.[12] Assuming that additional administrative changes and program outreach efforts aimed at increasing participation levels will have a diminishing return on increasing WIC participation, and given the relatively low benefit values and the inherent stigma that some recipients attach to receiving public assistance benefits, it is likely that the full-funding participation rate (FFPR) is substantially below 100 percent. Furthermore, it is likely that the FFPR will differ across the five demographic eligibility groups of pregnant women, infants, children, and breastfeeding and nonbreastfeeding postpartum women.

In the process of making a budget request, policy makers will have set their goal for participation in the program and will assess whether more or less funding is needed for the program, as compared with previous years. Coverage rates are used to make this assessment. For example, when preparing the budget request for 2003, policy makers would have estimates of both the number of eligible individuals in 1999 (E_{1999}), and the number of participants in 1999 (P_{1999}), which comes from administrative data. From these two pieces of information they could compute the WIC coverage rates in 1999 (CR_{1999}) as:

$$CR_{1999} = \frac{P_{1999}}{E_{1999}}$$

For example, if USDA employs the CPS-based option for estimating eligibility, it would have estimated 2,215,000 eligible infants (Table 9-2), implying that 86 percent of eligible infants were served during 1999. The USDA's method to estimate the number of eligible infants who will participate assumed an 80 percent participation rate. For the time being, let us assume that this 80 percent participation rate was actually the policy goal for the program—that is, the goal was to allocate funds to serve 80 percent of those who were eligible.[13] Because the estimated coverage rate exceeds

[12]Empirical studies on the decision to participate in WIC similar to the ones reported in Chapter 8 or perhaps a study that interviews people eligible for WIC who chose not to participate could inform these types of decisions to be made by USDA and the Congress.

[13]One interpretation of the USDA assumption that 80 percent of eligible individuals will participate is that the assumption was more of a statement of a policy goal than a "behavioral" prediction about actual participation in the program.

the full-funding participation rate and there were no waiting lists for this group, a reasonable inference is that the program was fully funded in 1999.

To make budgetary decisions, estimates of the number of eligible infants using 1999 data would be used to forecast the number of eligible infants for 2003. Ideally, in making this forecast, one would want to take into account changes in the population, the economy, and eligibility rules (not only for WIC but also for other means-tested programs that affect adjunctive eligibility) over the four-year period. Trying to account for the impact of these factors may improve the expected accuracy of the forecast. However, the potential variability of the forecast errors may be high. Because modeling these potential changes could introduce error, it may be better (based on mean square error criteria) to forecast no change in the number of eligible infants (or any group) over the four-year period.[14] Historically, USDA has made this judgment and assumed that the number of eligible individuals does not change over the four-year period (E_{2003}=E_{1999}).

Once the number of eligible infants in 2003 is forecasted, the next step is to estimate the number of full-funding participants. If (as our example suggests) the program was determined to be fully funded for infants, the same percentage of eligible infants should be expected to participate in 2003 if the program's administrative practices and other factors that affect participation were not changed. If this is the desired full-funding participation level, USDA should use the following formula to estimate participation in 2003:

$$FFPR \times E_{2003} = CR_{1999} \times E_{2003}$$

This is, simply, the coverage rate in 1999 multiplied by the number of infants estimated to be eligible in 2003. However, since the USDA implicitly assumes that the number of eligible infants does not change over the forecasting period (from 1999 to 2003), the above expression can be rewritten as

$$FFPR \times E_{2003} = CR_{1999} \times E_{2003} = \frac{P_{1999}}{E_{1999}} \times E_{1999} = P_{1999}$$

[14]Assume that the true change in the number of eligible infants is Δ while the prediction of the change based on a forecasting model is $D = \Delta + \varepsilon$ where ε is the error in the forecast and its expected value is 0 and variance is σ^2. Predicting no change will be better than modeling the change on a mean squared error basis if Δ^2 is less than σ^2, in other words, if the variability in the forecast errors is expected to be greater than the change or bias in predicting no change.

which is the number of participating infants in 1999.

Now consider the case of children. Employing the CPS option, we estimate that in 1999 7,496,000 children would be eligible. In 1999, 3,673,040 children were served by WIC. This corresponds to a 49-percent coverage rate in 1999. Given this lower coverage rate, USDA may conclude that more eligible children could be served through greater administrative efforts. Assume that USDA chooses a policy goal (FFPR) of serving 60 percent of the eligible children. Since the most current coverage rate is less than the full-funding participation rate, the estimate of the number of children eligible and likely to participate under full funding would equal:

$$FFPR \times E_{2003} = FFPR \times E_{1999}$$

The USDA would request funding to serve 4,498,000 children (0.60 × 7,496,000), which is 22 percent greater than the 1999 figure.

The paragraphs above outline the strategy the panel recommends to estimate the number of full-funding participants. Within this strategy, there are two possible methods to be used—which one is chosen depends on whether policy makers decide that full-funding participation levels have been achieved or not:

- If the FFPR has been achieved, then last year's participation levels can be used to estimate next year's participation levels.
- If the FFPR has not been achieved, then the desired FFPR can be multiplied by the estimated number of eligible persons in the eligibility category.[15]

This strategy can be represented by the following equation, assuming that there is a four-year time difference between the year for which the budget is prepared (year t) and the most recent year for which the number of eligible individuals can be estimated (year $t - 4$):

[15]A variant of this method is to use a weighted average of coverage rates for the past three years, presuming that this would be a more stable estimate of the coverage rate experienced over the time period. This variant is discussed below.

Panel's Alternative Strategy:

$$\text{If } \mathrm{CR}_{t-4} \geq FFPR \text{ then } FFP_t = CR_{t-4} \times E_{t-4} = P_{t-4}$$

$$\text{If } \mathrm{CR}_{t-4} < FFPR \text{ then } FFP_t = FFPR \times E_{t-4}$$

This method is based on the assumption that coverage rates do not exceed 100 percent. If coverage rates for any group begin to exceed 100 percent, then USDA should undertake an investigation as to whether eligibility is being significantly understated or whether there has been a substantial increase in the number of participants who are ineligible for the program. It is likely that some categorical groups may have achieved the full-funding level, while others have not. Thus, the assessment of which estimator to use should be conducted separately for each categorical eligibility group.

It is instructive to compare the USDA methodology for predicting the number of participants for budget requests to the panel's proposed strategy. The USDA strategy for forecasting the number of fully funded participants (FFP) is equal to:

Current USDA Method:

$$FFP_t = 0.80 \times E_t = 0.80 \times E_{t-4}$$

recalling that the USDA assumes that eligibility does not change over the four-year prediction period.

Table 9-3 examines the percentage difference between the predicted number of participants (made using the USDA's current methodology to estimate eligibility and participation) and the actual number of participants (from administrative records). We call this percentage difference the "prediction error rate." The use of the actual number of participants is relevant only if the program is considered to be fully funded. For the sake of comparison we assume that the program has been fully funded from 1996. The results of this comparison are presented in Table 9-3 in the panel labeled "USDA methodology." The percentage difference between the actual number of participants and the estimated number of participants for infants ranges from negative 26 to negative 39 percent, indicating that the estimates are smaller than the actual number who are served. For postpartum women, the prediction error rate is also negative, ranging from 15 percent in 1996 to 36 percent in 2001. Instead of getting better over time, the prediction of the number of participants in these categories is getting worse. However, the predicted number of children and pregnant women exceeded the actual numbers of participants. While the prediction error for children is roughly constant over this period, USDA predictions for preg-

TABLE 9-3 Comparison of Methods for Predicting Participation Levels: Percentage Difference Between Estimated Number of Participants and the Actual Number of Participants

USDA Methodology (Assume 80% of eligible persons participate)[a]					
	Infants	Children	Pregnant Women	Postpartum Women	Total
1996	–27%	+18%	+16%	–15%	+3%
1997	–26%	+21%	+17%	–17%	+4%
1998	–34%	+18%	+4%	–27%	–2%
1999	–33%	+14%	+8%	–27%	–4%
2000	–35%	+17%	+5%	–30%	–4%
2001	–39%	+14%	+2%	–36%	–8%
Alternative Method Recommended by the Panel if the Full-Funding Goal Is Achieved (Use administrative counts from time $t-3$ to predict participation in t)[b]					
	Infants	Children	Pregnant Women	Postpartum Women	Total
1996	–5%	–24%	–6%	–28%	–18%
1997	–4%	–17%	–6%	–19%	–13%
1998	–4%	–7%	–6%	–13%	–6%
1999	–4%	+1%	–2%	–9%	–2%
2000	–2%	+8%	+1%	–5%	+3%
2001	–2%	+4%	+4%	–8%	+1%

[a]Percentage difference between estimates of the number of participants based on USDA's method for estimating the number of eligible people who will participate (assuming an 80 percent participation rate) and the actual number of participants from administrative records.

[b]Percentage difference between estimates of the number of participants and actual number of participants when estimates assume that the number of predicted participants will be equal to the last year's number of participants.

nant women have improved. If one is not concerned with estimating participation within eligibility categories but only with the total counts of participants, the USDA predictions are surprisingly good. In 1996 and 1997, USDA's predicted number of participants exceeded actual numbers of participants. However, since 1997, the USDA methodology has led to a growth in the underestimate of the actual number of participants.

In recent years, USDA has not used the 80-percent participation assumption to estimate the number of eligible people who will participate. Rather, it has been the department's practice to fund WIC at a level that will serve 7.5 million people. Figure 9-1 shows that this has been a successful way to "predict" the number of WIC participants. The number of WIC participants has remained steady for the past five years. Even during a time of historic economic expansion and declining participation in other social welfare programs, the level of WIC participation has remained fairly constant. This may be an indication that the number of participants is a policy choice, one that can, in effect, be set at a level that meets goals for the program.

If it is determined that the FFPR has not been achieved, it may be desirable to use the weighted average of the past three years' coverage rates to multiply by the estimated number of eligible persons in the category (instead of using just the last available year's coverage rate). In other words, with the panel's alternative strategy, CR_{t-4} would be replaced by a coverage rate that is a weighted average of coverage rates of the previous three years (coverage rates from years $t - 4$, $t - 5$ and $t - 6$). This weighted average would presumably be a more stable estimate of the actual coverage rate, although this presumption should be explored.

The second panel of Table 9-3 present the prediction error under the alternative strategy outlined above to estimate the number of participants when the full funding goal has been achieved. For illustrative purposes, we assume that the most recently available survey data are from four years

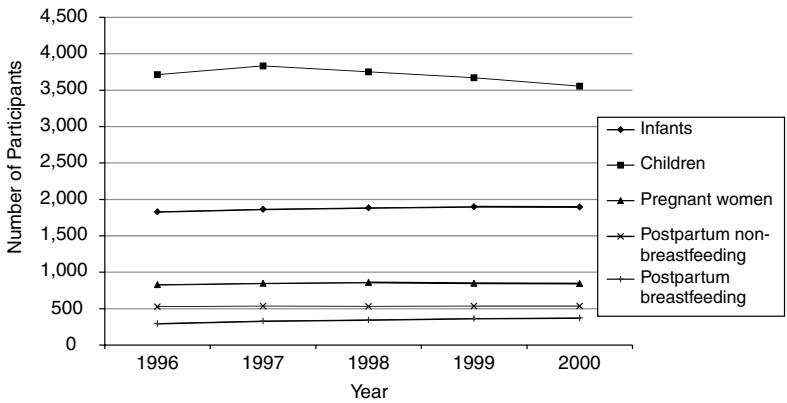

FIGURE 9-1 Number of WIC participants 1996–2000, by category.

prior to the year for which we wish to predict. Furthermore, we assume that the most recent administrative data are from three years prior to the year for which we are predicting. The panel labeled "method if full-funding is achieved" uses administrative counts of the number of participants from administrative records to predict participation.[16] This method would be used if policy makers judged that the FFPR has been achieved. The numbers reported in the panels are the percentage difference between predictions of participants and the actual number of participants from administrative records three and four years later.

The relative accuracy of the alternative strategy depends on the stability of the number of participants over a four- or three-year period. Table 9-4 presents annual growth rates in the number of WIC participants by category. Over the period since 1994, the average annual growth in the number of infant and pregnant women participants has been relatively moderate. Consequently, the use of past participation in the program for these groups has led to rather "accurate" forecasts of the number of participants, especially in comparison to the strategy employed by USDA.

For both children and postpartum women, the annual growth in their participation did not fall below 5 percent until 1997 for children and a year later for postpartum women (Table 9-4). In previous years, the growth in the participation of these groups meant that using past participation as an indicator of future participation would lead to substantial underestimates of participation. The alternative forecast strategy tends to understate the number of participants in future years. This is reflected in the results presented in Table 9-3 for the time period of 1996 to 1998 for children. For postpartum women, it is not until the growth in this group has slowed that this approach becomes accurate. Here the alternative strategy does no better than the current USDA method. However, when growth in the participation of these groups declines, the strategy of using past participation to predict future participation significantly improves the accuracy of the estimates.

[16]We could not provide estimates of the variation using a weighted average of past coverage rates since we did not have sufficient past years' data available to construct the weighted averages for all the years from 1996 to 2001. Recall when making a prediction for year t, the most recent data available are assumed to be four years prior. Hence to construct even a three-year weighted average of past coverage rates, we would need data from six years prior to the year we are predicting. Given that we had coverage rates from 1994 to 1999, we could have provided estimates only for 2000 and 2001.

TABLE 9-4 Annual Growth Rates in the Number of WIC Participants (percentage)

	Infants	Children	Pregnant Women	Postpartum Women	Total
1992	8.0	12.6	NA	NA	10.4
1993	3.4	12.8	NA	NA	9.6
1994	2.6	13.4	2.6	19.3	9.4
1995	1.7	9.7	1.5	9.4	6.4
1996	0.5	6.1	2.1	7.0	4.3
1997	2.0	3.3	2.3	5.4	3.1
1998	1.1	–2.2	1.3	1.4	–0.5
1999	0.8	–2.1	–1.6	2.6	–0.8
2000	–0.2	–3.2	–0.3	1.0	–1.5
2001	1.4	1.4	–1.7	4.9	1.5

NA = not available.

This result is what we would expect. If there is significant growth in any group, then one of two factors have occurred—either there has been a growth in the number of eligible individuals or there has been an increase in the rate at which eligible individuals choose to participate in the program. In the absence of any evidence that eligibility has grown, it must be the case that not all eligible people were participating. Thus, the primary assumption underlying these alternative strategies was not met—the program had not achieved a full-funding rate of participation. In these years, instead of using the actual coverage rate, the implicitly higher full-funding participation rate should have been employed. Consequently, the forecast of participation would have yielded a higher number of participants and reduced the difference between the forecast and the actual number of participants.

The Panel's Recommended Strategy for Estimating Participation

After examining this alternative strategy for predicting participation and two of its three variants, the panel recommends that USDA forecast future numbers of participants in the following manner:

- Explicitly state the rate of participation in the WIC program that is consistent with the policy goal of fully funding the program. This is the full-funding participation rate (FFPR).

- During the process of creating a budget request, compute the number of eligible individuals by participant group (infants, children, and pregnant, breastfeeding postpartum, and nonbreastfeeding postpartum women) and their respective coverage rates using concurrent administrative data for the actual number of participants (i.e., use administrative data for the same year covered in the survey data that is used to estimate eligibility). Estimates of eligibility should be made using one of the methods outlined by the panel in the first part of this chapter. Policy makers could, as an alternative to setting full-funding participation goals by category, set them by other groups of priority, for example, by those in most need. This could be done within an eligibility category as well (e.g. infants with the lowest income).
- Separately for each participant group, determine whether the group's coverage rate exceeds the FFPR. If the coverage rate does exceed the FFPR, then use the most recently available administrative data on the number of participants to estimate the future number of participants.
- If the group's coverage rate does not exceed the FFPR, then estimate the number of participants by multiplying the FFPR by the number of eligible individuals from the most recently available data. Alternatively, USDA could construct a three-year weighted average of past coverage rates.[18] If the weighted average of coverage rates exceeds the FFPR, then the weighted average of past coverage rates for the group would be multiplied by the most recently available estimate of the number of eligible individuals from the participant group.

This recommendation implicitly assumes that the number of eligible individuals and, correspondingly, the number of participants for the year from which there are data is the same as for the year for which participation is being predicted. During this period of time, changes in eligibility could be caused by changes in demographic factors, the economy, or the eligibility rules of WIC or other programs that provide adjunctive eligibility. While it is unlikely that demographic shifts will occur during this relatively short

[18]One suggestion is to use an exponential weighting scheme so that more recent coverage rates receive higher weights.

time period, the latter two factors could greatly influence future participation in WIC. In the panel's judgment, USDA should explore the accuracy and feasibility of methods to adjust eligibility and participation forecasts to account for such changes.

The effects of changes in the eligibility rules for WIC can, in principle, be estimated by "simulating" the new rules with existing data, such as the CPS or SIPP. While this approach will lead to estimates of the number of eligible individuals under the new rules, to forecast the number of participants will be difficult because there is a greater degree of individual choice in the decision to participate. Modeling such behavioral choices is more difficult. If the changes in eligibility rules reduce the size of the eligible population, then future participation rates may be higher than current coverage rates. Hence, using the most recent coverage rate may understate the future number of participants. Conversely, rule changes that expand eligibility will have the opposite effect. Coverage rates will be much lower because of the increase in eligibility, assuming participation levels do not change. Thus, USDA may want to reassess what it defines or believes to be the FFPR if such changes take place. If the USDA deviates from the use of either the FFPR or the most current coverage rate to forecast future participation, it should explicitly state this deviation in its forecast and the justification for doing it.

SUMMARY

This chapter outlines two methods to improve estimates of eligibility for WIC and proposes a method to forecast participation. The proposed improvements in estimating eligibility seek to better account for income variation and adjunctive eligibility. The proposed improvements for predicting participation seek to reduce the size of errors associated with prediction into the future.

Regardless of which of the methods are chosen, it will be important to periodically review their performance. The panel encourages USDA to continue the efforts it has made, previous to this panel's formation, to review the methods and their assumptions.

10

Summary

This report has reviewed the current methodology used by USDA to estimate, on a national basis, eligibility and participation for the WIC program. Our review first described the two basic purposes for which the estimates are being made: to develop budget estimates for the upcoming fiscal years and to gauge how well the program is reaching the population it intends to reach, that is, program coverage. To a lesser extent, the estimates are also used to estimate how program changes affect eligibility and participation and how external influences, such as economic conditions, affect eligibility and participation. The panel has argued that if the purpose of the estimates is to understand program coverage and evaluate the effectiveness of program characteristics, then it is essential to estimate the number of people eligible for WIC and the percentage of those who may participate in WIC.

ESTIMATING ELIGIBILITY

The panel concludes that current estimation methods result in a substantial underestimate of eligibility because monthly income and adjunctive eligibility are not adequately addressed. Panel estimates show that a significantly greater number of people would be determined eligible for WIC if a monthly income measure were used instead of an annual income measure. Using Survey of Income and Program Participation (SIPP) data,

the use of monthly income (and accounting for WIC certification periods and adjunctive eligibility—through reported enrollment in food stamps, Medicaid, or Temporary Assistance for Needy Families—TANF) resulted in a 46 and 54 percent increase in the number of income-eligible infants in 1997 and 1998, respectively, and a 34 and 36 percent increase in 1997 and 1998 for children, compared with the current USDA estimates.

The panel also determined that current methods used to estimate eligibility do not adequately account for adjunctive eligibility. With expansions in the Medicaid program that raised the income limit for eligibility well over 185 percent of federal poverty guidelines in many states, some people with annual incomes over 185 percent of poverty could be eligible for WIC because they were enrolled in Medicaid, but they would not be counted as such in the eligibility estimates. Using SIPP data and reported participation in Medicaid and other public assistance programs that confer adjunctive eligibility (TANF and food stamps), the panel estimates that an additional 18 percent of infants are eligible for WIC and an additional 10 percent of children are eligible compared with estimates based on the current USDA methodology, which uses an annual income measure. The panel concludes that current estimation methods result in an underestimate of eligibility because monthly income and adjunctive eligibility are not addressed.

Options for Estimating Eligibility

The panel proposes two options for USDA to consider using in order to estimate income eligibility for WIC. One option maintains the March Current Population Survey (CPS) as the base survey from which eligibility estimates are derived, but it uses multipliers to make appropriate adjustments. The second option relies on SIPP, which has a longitudinal design and collects monthly data on income and program participation. An outline of these two options is given below:

CPS with multipliers: Use annual income to estimate the number of infants and children eligible for WIC. Count those who report receiving Medicaid, food stamps, or TANF as adjunctively eligible. Use a constant multiplier to increase the estimates to account for monthly income and certification practice and underreporting of participation in means-tested programs in the CPS. This multiplier could be based on the estimates from the Transfer Income Microsimulation (TRIM)

model (a multiplier of 1.20 for infants and 1.05 for children), or on a SIPP-based multiplier. These core estimates for infants and children would then be used to estimate the number of eligible pregnant and postpartum women.

SIPP option: Use monthly income and account for WIC certification practice to estimate the number of income-eligible infants and children. Count those who report receiving Medicaid, food stamps, or TANF as adjunctively eligible. Directly estimate the number of eligible pregnant and postpartum women.

Both of these options have benefits and limitations. The major limitation of the SIPP data is that their public release is not as regular or as quick as the CPS. The major limitation of the CPS-based option is that month-to-month income variability that differs from the panel's estimate would introduce error in the constant multiplier proposed to correct for the use of annual income. Either option is better than the current method because they both account for income variation across the year and adjunctive eligibility.

Accounting for monthly income and adjunctive eligibility are high priorities for improving CPS-based estimates of eligibility. The panel also makes recommendations about the methods used to infer the number of income-eligible pregnant and postpartum women from the number of income-eligible infants, to estimate breastfeeding rates among postpartum women, and to estimate the prevalence of nutritional risk. These recommendations can be summarized as follows:

1. To correct for CPS undercounts of infants and overcounts of children, use adjusted weights (Chapter 4).
2. To estimate the number of income-eligible postpartum women from CPS-based estimates (both breastfeeding and nonbreastfeeding), continue to use the current adjustment factor of 0.9844 to account for multiple births and infant and fetal deaths (Chapter 6).
3. To obtain the number of income-eligible pregnant women, apply an adjustment of 0.533 (instead of the 0.75 factor) to the number of income-eligible infants to account for income variability during pregnancy (Chapter 6).
4. Use more recent data to estimate breastfeeding rates and duration among income-eligible postpartum women less than 12 months

postpartum. Apply them to the estimates of income-eligible postpartum women to determine the number breastfeeding and nonbreastfeeding (Chapter 6).

5. The percentage of the income-eligible population also at nutritional risk is very close to 100 percent. Methods used to screen for nutritional risk are not accurate enough to precisely identify the small percentage of those who are income eligible but not at nutritional risk. As a result, the panel concludes that a nutritional risk screen is not useful for determining eligibility. If the USDA drops this aspect of eligibility determination, no adjustment for the prevalence of nutritional risk is needed to estimate eligibility (Chapter 7).

The first three recommendations apply to the CPS-based option for estimating eligibility. The last two recommendations apply to both the CPS-based and SIPP-based options for estimating eligibility.

ESTIMATING FULL-FUNDING PARTICIPATION

The full-funding participation rate (FFPR) is the percentage of individuals eligible for WIC who choose to participate, if funds are sufficient to serve them. The panel makes the claim and illustrates that changes in program administrative practice or changes in program outreach can increase or decrease the number of WIC participants. The FFPR is a level of participation that policy makers could set a goal to achieve. Based on the premise that the full-funding level of WIC participation is a policy goal, the panel recommends a strategy to predict the number of participants each year for the purpose of making budget estimates. The strategy the panel recommends depends on whether the goal FFPR has been achieved or not. If the FFPR has been achieved, then the method to estimate participation levels is simply to use last year's participation levels. However, if the FFPR has not been achieved, then the method multiplies the desired FFPR by the estimated number of eligible persons in the eligibility category. The assessment of whether each category of eligible persons has met the desired rate of participation should be made each year. Furthermore, because it is likely that not all eligibility categories will meet the full funding level, separate assessments and estimation strategies should be made for each eligibility category.

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APPENDIX A

Data Sources and Coverage Issues

This report considers the use of the Current Population Survey (CPS) or the Survey of Income and Program Participation (SIPP) to make national estimates of the number of people eligible and likely to participate in WIC. In this appendix, we present details on each of these surveys. The appendix also addresses two issues of survey coverage that were raised in response to the panel's interim report (National Research Council, 2001): the coverage of undocumented immigrants and the coverage of military populations.

DATA SOURCES

The March CPS is the data set currently used to estimate WIC eligibility and participation. While the CPS has many advantages, it does have limitations. Still, there are few viable options to the CPS. The most promising alternative, SIPP, has several advantages over the CPS, but it too has limitations. This section provides background information on both of these surveys and points out their advantages and limitations for the specific purpose of estimating WIC eligibility and participation.

Neither SIPP nor the CPS collect data on nutritional risk or breastfeeding status. Thus, information on the prevalence of these two conditions in the income-eligible population must be collected from other data sources and a multiplier used to adjust for them. Alternative data sources

for making estimates of the prevalence of nutritional risk and the prevalence and duration of breastfeeding among income-eligible populations are discussed in Chapter 6 (breastfeeding status) and Chapter 7 (nutritional risk).

March CPS

The March CPS is an annual supplemental survey to the monthly CPS. In addition to the information collected in the monthly survey, the March CPS collects data on household income, participation in federal programs, and demographic characteristics of the household. The March CPS is a cross-sectional household survey of the civilian noninstitutionalized population of the United States. Over 60,000 housing units are sampled.

Since the CPS is a cross-sectional survey, individuals and their characteristics are observed at only one point in time. This has implications for estimating the number of individuals in each of the WIC eligibility categories. Data are collected on the ages of individuals in the household, which means that it is possible to directly infer the number of infants up to age 1 and the number of children age 1 through 4. It is also possible to observe the number of women less than 1 year postpartum by observing the number of infants less than a year old and identifying their mothers in the household.[1] Because the survey does not, however, ask women about their pregnancy status, it is not possible to directly observe the number of pregnant women. The survey does not collect data on breastfeeding status either, so it is not possible to separate postpartum women into breastfeeding and nonbreastfeeding status.

The March CPS collects detailed information about annual income for the previous year, covering all the sources needed to determine income eligibility for WIC. The CPS does not collect monthly income data. The CPS also collects information on household participation in programs used to confer adjunctive eligibility for WIC, including Temporary Assistance for Needy Families (TANF), food stamps, Medicaid, and the State Children's Health Insurance Program (SCHIP).

The CPS recently added questions on WIC receipt in the household in

[1]It is not possible to observe postpartum women who do not live with their infants. These women are categorically eligible for WIC for up to 6 months as nonbreastfeeding postpartum women.

the past year, which is relevant to the estimation of WIC participation rates. However, the questionnaire does not ask who in the household receives WIC benefits, or when or how often WIC benefits are received. An income screen is used to determine which respondents are asked about WIC receipt. This screen is sufficiently low that some people above it may be eligible for WIC—particularly those who are enrolled in Medicaid but who have income above the WIC threshold—and yet would not be asked the questions about the receipt of WIC benefits.

CPS coverage of the U.S. population in general is lower than that of the decennial census but still quite high. However, coverage of some minority groups is not as complete. For example, the overall coverage rate for the March 2001 CPS (the ratio of March CPS counts to 2000 census counts) is about 92 percent, but the coverage rate for black females ages 20–29 in 2001 was 81 percent (U.S. Census Bureau, 2002). Coverage of illegal immigrants in the CPS is a special concern for some states with large immigrant populations because illegal immigrants are eligible for WIC. When compared with independent estimates of the number of undocumented immigrants, the CPS counts match closely (Passel, 2001). However, the CPS population weights are based on updated 1990 population projections that appear to severely underestimate the number of undocumented immigrants (Passel, 2001). As a result, until CPS weights are based on updated population projections, the CPS probably will underestimate the number of undocumented immigrants.

Nonresponse rates for the March CPS are generally low. In 2001, the nonresponse rate for the March supplement was 8.5 percent, which, when added to the nonresponse rate for the monthly survey, results in a total nonresponse rate of 15.9 percent.

A key advantage of the March CPS for estimating WIC eligibility and participation is that it is conducted and released on a regular and timely basis. Every year the March supplement is conducted in March and data are released in the fall of the same year.

Survey of Income and Program Participation

SIPP is a longitudinal household survey representative of the U.S. civilian noninstitutionalized population. The first SIPP panel was interviewed in 1984, and a new panel was introduced each year thereafter until 1993. Since 1993, a new panel was introduced in 1996 and again in 2001. Panel sample size ranges from 14,000–37,000 households. Panels are followed

for two and a half to four years. Households in the panel are interviewed every four months.

Because SIPP is longitudinal, it is possible, by construction, to directly estimate the number of pregnant and postpartum women by observing infants in the sample.[2] The survey does not collect information on the breastfeeding status of postpartum women.

The SIPP collects detailed information on each household's income, including all the sources of income used to determine WIC eligibility. A big advantage of SIPP is that it collects monthly income.

Collecting information on participation in federal programs is a major component of SIPP's mission. Data about AFDC/TANF, food stamps, and Medicaid are collected in SIPP on a monthly basis. As in the CPS, underreporting of program participation is a problem in SIPP. SIPP interviews respondents every four months and uses a four-month recall period. Under this format, for some items in the survey, respondents tend to report the same thing for all four months of a recall period. For example, a respondent may report four months of food stamps receipt and then report four months of nonreceipt for the next interview period. This so-called seam bias may be an indication of response error (see National Research Council, 1993 for a more thorough documentation of this problem).

SIPP collects data on WIC participation. Unlike the CPS, it does not use an income screen in asking these questions, and it collects information about which household members receive WIC.

Coverage of the U.S. population in general in SIPP is comparable to that of the CPS. There are no estimates of how well SIPP covers undocumented immigrants. However, SIPP weights are also based on 1990-based population projections that appear to underestimate the number of undocumented immigrants.

Response rates for each interview wave are generally high in SIPP. However, cumulative attrition over the waves of the interviews can be severe. By the eighth wave of the 1996 panel, 31 percent of the original panel were nonrespondents (U.S. Census Bureau, 1998). Evidence from previous panels suggests that attrition is more likely to occur among young adults, males, minority groups, never-married people, people with incomes below the poverty level, and people with low educational attainment (Lamas et al.,

[2]Like the CPS, it is not possible to observe postpartum women who do not live with their infants.

1994). To observe 9 months of pregnancy and 1 year of the postpartum period, several waves of information on a household are needed. Differential attrition of WIC-eligible populations could result in an underestimate of eligibility.

The longitudinal nature of SIPP means that data production is a more complicated process than that required for the CPS. As a result, it can be one, two, or more years after a panel is interviewed before the data are released. Moreover, SIPP data files are not released on a regular schedule as the CPS estimates are.

SPECIAL POPULATIONS COVERAGE ISSUES

The accuracy of the estimates of WIC eligibility depend on the quality of survey data used to make the estimates and how well those surveys cover the WIC-eligible population. Some populations served by WIC (e.g., low-income populations, immigrants) may be underrepresented because of nonresponse, meaning that estimates based on these data, if not adjusted for characteristics that make one not respond, may be biased. Other populations (e.g., families of military personnel who live on base) may not be part of the sampling universe of the survey and not represented in estimates of WIC eligibility. This section briefly examines such coverage issues in SIPP and the CPS. Responding to concerns raised about underestimates of WIC-eligible people in certain states, we specifically focus on coverage of undocumented immigrants and of military personnel and their families. Immigrants are eligible for WIC regardless of whether they are documented or not. WIC has no special rules for military personnel and their family members living in the United States. We also briefly discuss estimates of the number of eligible people in the U.S. territories of Puerto Rico, American Samoa, Guam, and the Virgin Islands.

Both the CPS and SIPP are designed to represent the U.S. civilian noninstitutionalized population. In theory, this means that both surveys should cover immigrants regardless of their documented status. However, reasons possibly leading to undercoverage of undocumented immigrants include language barriers, migration, and avoidance of interviewers from an agency of the federal government because of perceived fears of being turned in to the Immigration and Naturalization Service (INS).[3]

[3]INS is now the Bureau of Citizenship and Immigration Services in the Department of Homeland Security.

Coverage of Undocumented Immigrants

Estimates of the number of undocumented immigrants in the United States have received considerable attention recently because of significant discrepancies in estimates of the 2000 U.S. population among three data sources. The 2000 census provided one estimate. The Accuracy and Coverage Evaluation Survey (ACE), which is a survey conducted shortly after the 2000 census based on a sample of the population, provided the second estimate. The final estimate used population projections based on demographic techniques, called demographic analysis (DA), takes the base population projections from the census year 1990, adds births and subtracts deaths from birth and death records, and adds net immigration from INS administrative records. The estimated population of the United States in 2000 based on DA was 279.6 million. Estimates based on the 2000 census were 281.4 million, and estimates based on the ACE were 284.7 million. Undercounts of the number of undocumented immigrants in DA were considered as a possible explanation for the relatively low estimates from this data source.

To examine estimates of the number of undocumented immigrants, Passel (2001) compared March 2000 CPS survey data with data from the Census 2000 Supplementary Survey (C2SS)—an independent sample survey of 700,000 households conducted at the same time as the 2000 census. C2SS includes questions on country of origin, citizenship, and year of immigration to the United States if foreign-born (the census short-form does not include these questions, so it is not possible to estimate the number of undocumented immigrants with census data). Passel's work with the CPS provides an opportunity to assess how estimates of the number of undocumented immigrants from the CPS compare with other estimates from recent sources of data.

Two estimates of the number of undocumented immigrants were made based on the CPS data. One used a weighting scheme controlled to the CPS population control totals, and the other used a weighting scheme controlled to 2000 census data. The second weighting scheme was used to better match the CPS population (civilian noninstitutionalized population) to the 2000 census population (all persons in the United States), which is the population represented in the C2SS survey.

The CPS estimate of undocumented immigrants based on CPS weights was 6.6 million—close to DA estimates of 6 million, but still 11 percent higher. The CPS population controls are based on DA-like projections.

The estimates of undocumented immigrants in the CPS weighted to the 2000 census population control totals (8.3 million) were very close to the estimate of undocumented immigrants in the C2SS survey. The weighting scheme used tried to match the CPS population (civilian noninstitutionalized population) to the 2000 census population (all persons in the United States), which is the population represented in the C2SS survey (Passel 2001).

CPS estimates of undocumented immigrants weighted to the 2000 census population controls compare closely to estimates from the larger C2SS data source. Current and recent years' CPS weights are still based on 1990 census-based control totals, which are constructed in a manner that is quite similar to the DA estimates. Thus, as long as the CPS weights are still based on 1990 census estimates, the CPS will undercount undocumented immigrants. After the CPS is redesigned based on 2000 census results (which will probably happen in 2003), it appears that CPS estimates of undocumented immigrants will at least be comparable to 2000 level estimates.

Estimates of undocumented immigrants from the SIPP are not available, although it would be possible to make them. The latest waves of SIPP data are also controlled to 1990 census-based populations, so any underestimate of undocumented immigrants due to recent immigration throughout the 1990s is likely to be manifest in SIPP as well. The longitudinal nature of SIPP requires reinterviewing survey respondents. If immigrant populations are harder to interview initially, they are also likely to be harder to reinterview. It is thus possible that disproportionate attrition could occur for immigrant populations, which could add an additional complication to immigrant coverage in the SIPP. Furthermore, immigrants who enter the country after a SIPP panel begins would not be covered by the data.

Coverage of Military Personnel

Members of the military who live on a military base are not included in the sampling universe of the CPS or SIPP; however, their family members who live off base are included. Military members who live off base are also included in the sampling universe of these two surveys. According to data from the 2000 Survey of Active Duty Personnel, over half of military personnel with children live off base and are therefore part of the sampling

frame for the CPS and SIPP.[4] In 2000, 57 percent of infants and 56 percent of children with at least one parent in the military stationed in the United States lived off base.[5] Thus, more than half of those in military families are covered in the CPS-based WIC eligibility estimates.

WIC eligible family members of military personnel who live on base are not fully accounted for in the CPS and SIPP sampling frames and therefore are not included in estimates of eligibility for WIC. The resulting number of potentially missed income-eligible infants and children is small since the total number of infants and children living on base is small (at most 31,855 infants and 144,876 children ages 1 to 5 in 2000).

Another complication in estimating the number of military family members eligible for WIC concerns how sources of income are counted toward eligibility determination and what income data are collected on the CPS. Housing allowances received because a family member is enlisted in the military may be counted as income when the income eligibility of a WIC applicant is being determined. The CPS March Income Supplement does not specifically ask for income from housing allowances or other benefits specific to military personnel. Therefore, CPS or SIPP estimates of incomes of military personnel would tend to overestimate eligibility for WIC. It is not clear how large such an overestimate may be, but it would affect estimates of off-base military personnel, since the CPS and SIPP cover only off-base military families. Since WIC income eligibility guidelines are flexible in terms of reporting income, it is not clear that the housing allowance is consistently counted toward an applicant's income in WIC offices anyway. If this is the case, then the overestimation of income-eligible women, infants, and children with family members in the military due to income accounting differences may be small.

General Coverage of Low Income and WIC-Eligible Populations

A general question for using the CPS or SIPP to estimate WIC eligibility is how well WIC-eligible populations are covered. There are no direct

[4]The survey, which is conducted by the Defense Manpower Data Center, samples about 60,000 active-duty members of the Army, Navy, Air Force, Marine Corps, and Coast Guard. It is a mail survey that is conducted approximately every two years.

[5]There is a new WIC program for families of military personnel who are stationed overseas, but funds for this program are provided through the Department of Defense, so eligible families do not need to be acconted for in the USDA eligibility estimates.

measures of how well low-income populations are covered in these surveys, but both surveys undercover minority populations, which tend to have lower incomes, to a similar degree (Kalton, 1998). Surveys with control totals based on 1990 census data do adjust for the undercount of minorities in the 1990 census. However, these adjustments do not necessarily fully account for an undercount of low-income populations. When the CPS and SIPP are redesigned based on 2000 census population totals, no adjustments for an undercount of the U.S. population will be made. The net undercount of the 2000 census population by race was not as great as that of the 1990 census.

ESTIMATES OF THE NUMBER OF ELIGIBLE PEOPLE IN THE TERRITORIES

Since neither the CPS or SIPP universes include the U.S. territories, to estimate the number of income-eligible infants and children residing in American Samoa, Guam, Puerto Rico, and the U.S. Virgin Islands who are eligible to receive WIC, the Food and Nutrition Service employs a constant multiplier of 1.0388 to adjust the estimates derived from the CPS. This proportional adjustment was estimated from the 1990 census.

As a crude check on this method, Table A-1 uses WIC administrative data on the number of participants in the territories and in the United States and shows the ratio of participants in the territories to participants in the United States. From 1996 to 2000, the ratio was consistently 3.2 percent. These calculations indicate that the 3.88 percent adjustment for eligibility in the territories is in the right ballpark, at least in terms of participants. However, recent data from the 2000 census long form include the U.S. territories and should be used to update this adjustment factor. Throughout the decade between censuses, a crude multiplication factor

TABLE A-1 Ratio of WIC Participants from the U.S. Territories to WIC Participants from United States: 1996–2000

Number of Participant	1996	1997	1998	1999	2000
Total territories	222,596	230,421	225,806	224,829	233,458
United States	6,965,235	7,176,445	7,141,591	7,086,377	6,964,801
Ratio	0.032	0.032	0.032	0.032	0.034

could be derived annually from data on pregnant women participating in WIC by using similar ratios as those produced in Table A-1. The ratio of WIC participants in the territories to the total number of WIC participants (United States plus the territories) could be added to the total number of WIC income-eligible persons by category. This adjustment factor could be based on any difference in WIC participation rates between the United States and its territories. These participation rates could be computed for decennial census years, when a measure of the income-eligible women in the territories is available.

APPENDIX B

Nutritional Screening and Budget Estimates

Gaining eligibility for the WIC program requires applicants to be categorically eligible along three separate dimensions—categorical eligibility (pregnant or postpartum women, infants and children under the age of five), income eligible (income less than or equal to 185 percent of federal poverty guidelines or adjunctive eligibility through enrollment in selected means tested programs), and nutritionally eligible. An applicant must also be a resident of the state in which she is applying. Screening applicants for nutritional risk is the most problematic eligibility criterion for WIC staff to administer for the reasons described in Chapter 7 of the report.

Perhaps the greatest difficulty in assessing nutritional risk in the field is assessing who among the income eligible population is not at dietary risk. A recent report of the Institute of Medicine (IOM) highlights these problems, arguing that a WIC staff worker has such limited information on an applicant's usual food intake and this information is measured with so much error that it is nearly impossible to identify applicants who are not at risk. Estimates of the prevalence of nutritional risk that are available indicate that nearly all income-eligible children ages 2–5 years and women would qualify as nutritionally at risk. On the basis of these findings, the IOM report recommends the presumption that all income-eligible women and children ages 2–5 years are at dietary risk. This appendix formalizes the conditions under which it is appropriate for budgetary purposes to presume that all categorically- and income-eligible people are at nutritional risk.

NUTRITIONAL RISK SCREENING

We assume that individuals are correctly identified as categorically and income eligible for WIC. To complete the eligibility process and gather information needed for WIC's nutrition services if the individual were found eligible, WIC staff obtain anthropometric measurements, laboratory test results, and medical, dietary, and social information about the applicant. In collecting these data, the WIC office is constrained by resources and time and thus cannot collect ideal information to determine whether an applicant is truly at nutritional risk and hence WIC eligible. This lack of information could lead to errors in the screening process. Some applicants that are truly at risk will be identified as not at risk, while some who are truly not at risk will be labeled as being at nutritional risk. We use R to denote that an individual is truly at risk while r denotes that the screening process found them to be at risk. A bar over either R or r denotes that the individual was not at risk. The screening process can be described by four conditional probabilities where

$p\left[r \mid R\right]$ = probability of correctly identifying someone at risk;

$p\left[\bar{r} \mid R\right]$ = probability of incorrectly labeling someone who truly was at risk as not at risk;

$p\left[\bar{r} \mid \bar{R}\right]$ = probability of correctly identifying someone not at risk; and

$p\left[r \mid \bar{R}\right]$ = probability of incorrectly labeling someone who was not at risk as being at risk

where

$$p\left[r \mid R\right] + p\left[\bar{r} \mid R\right] = 1 \quad \text{and} \quad \mathrm{p}\left[\mathrm{r} \mid \overline{\mathrm{R}}\right] + p\left[\bar{r} \mid \bar{R}\right] = 1.$$

If the screening process is perfect in the sense that it does not make errors, then

$$p\left[r \mid R\right] = 1 = p\left[\bar{r} \mid \bar{R}\right] \quad \text{and} \quad p\left[\bar{r} \mid R\right] = 0 = p\left[r \mid \bar{R}\right].$$

Screening Procedures and the Social Net Benefit of WIC

We assume that a dollar of WIC vouchers produces B dollars of benefits (both to the recipient and to society) if the recipient is at nutritional

risk. Otherwise, if the recipient is not at nutritional risk, then a dollar of WIC vouchers will create only a dollar of benefits for the individual. However, the cost to society of the dollar of WIC vouchers is the opportunities that society had to forgo in order to provide the necessary funds for the WIC program. For society to provide a dollar of taxes for the WIC program, it will have to give up a dollar of spending and the associated net benefits that dollar of spending would have provided had it gone to a different use. We denote the net benefit of the private spending that society had to forgo as the excess burden of the tax (q). Hence the total cost of raising a dollar of taxes for WIC would be $1 + q$.

We will assume that WIC does provide a net benefit to society of providing WIC to an individual who is at nutritional risk. Thus

$$NB\left[R\right] = B - \left(1+q\right) > 0 .$$

The net benefits to society of providing WIC to an individual who is not at nutritional risk equals

$$NB\left[\overline{R}\right] = 1 - \left(1+q\right) = -q < 0 .$$

(In all cases, net benefits are stated relative to no WIC program at all.) Clearly it would not be rational to provide WIC to those who are not at nutritional risk if we could perfectly determine whether or not an applicant was at nutritional risk. The question we entertain is, if the procedure for screening for nutritional risk is less than perfect, is society better off using the results of the screening procedure for determining WIC eligibility, or is society better off presuming that all are at nutritional risk and granting eligibility to all categorical and income-eligible applicants?

The expected net benefit per applicant, presuming that all are at nutritional risk and thus ignoring the results of the nutritional risk screen equals

$$ENB\left[Ignore\right] = \pi\left(B - \left(1+q\right)\right) - \left(1-\pi\right)q = \pi\left(B-1\right) - q$$

where π is the true proportion of the population that is at nutritional risk.

Note that the first term is the amount that the WIC benefits realized by individuals who are at nutritional risk exceed their budget cost ($1) times the probability an individual is at risk.

To compute the expected net benefit per applicant of using an imperfect screening procedure, we consider the following four outcomes of the screen. If the applicant is found to be at risk when they truly are at risk, then the net benefit to society of giving these individuals WIC will be

$$NB\left[r \mid R\right] = NB\left[R\right] = B - \left(1 + q\right).$$

If the individual is found to be at risk but is not truly at risk, then the net benefit to society of giving benefits to these individuals is

$$NB\left[r \mid \bar{R}\right] = NB\left[\bar{R}\right] = -q\,.$$

If, on the basis of the screening procedure, the individual is found not to be at risk, then WIC vouchers are not provided to the individual and hence the net social benefits are zero in both cases. No program costs are incurred and no program benefits are received. Therefore

$$NB\left[\bar{r} \mid \bar{R}\right] = 0 = NB\left[\bar{r} \mid R\right].$$

The expected benefit per applicant of using the results of the screening procedure equals

$$\begin{aligned} ENB\left[Use\right] &= \pi\left(p\left[r \mid R\right] \times NB\left[r \mid R\right]\right) + \left(1 - \pi\right)\left(\mathrm{p}\left[\mathrm{r} \mid \bar{\mathrm{R}}\right] \times NB\left[r \mid \bar{R}\right]\right) \\ &= \pi \times p\left[r \mid R\right] \times \left(B - \left(1 + q\right)\right) - \left(1 - \pi\right) \times p\left[r \mid \bar{R}\right] \times q\,. \end{aligned}$$

After some algebra, the above expression can be written as

$$ENB\left[Use\right] = ENB\left[Ignore\right] + \left(1 - \pi\right) p\left[\bar{r} \mid \bar{R}\right] \mathrm{q} \; - \pi\, \mathrm{p}\left[\bar{\mathrm{r}} \mid \mathrm{R}\right] \left(\mathrm{B} - \left(1 + \mathrm{q}\right)\right).$$

There will be net gain to society of using the results of the nutritional screen when

$$ENB\left[Use\right] > ENB\left[Ignore\right]$$

or when

$$\left(1 - \pi\right) p\left[\bar{r} \mid \bar{R}\right] q > \pi\, p\left[\bar{r} \mid R\right] \left(\mathrm{B} - \left(1 + \mathrm{q}\right)\right)\,. \qquad (1)$$

The term $B - (1 + q)$ represents the opportunity cost to society of the error from labeling someone who is truly at risk as not at risk. Hence the right-hand side of equation 1 is the expected costs of making this type of mistake, which will not occur if one ignores the results of the nutritional screen. The left-hand side represents the expected benefits of using the results of the screen to identify those not at risk and denying them benefits. Hence the above condition states that if the expected net benefits to society of using the results of the nutritional screen exceed the expected costs, then the results of the screen should be used for eligibility and budget determination. However, if the opposite is true, then it is rational to ignore the results of the nutritional screen for budgetary purposes. Of course, the gathered information on the applicant's nutrition is still available for other pur-

poses, such as tailoring the food package to the individual, planning nutrition education, and making referrals.

Should Nutritional Risk Screening Be Used to Determine Eligibility?

The answer to this question depends on the relative magnitude of the benefits of the WIC program, the excess burden to the tax system, the true proportion of the WIC population at risk, and the accuracy of the screening procedure. In the absence of precise information about any of these dimensions, we first restate the condition for when not to use the nutritional screen for budgetary purposes. Let C denote the total economic cost of \$1 of WIC expenditures, $1 + q$. Then the condition for when to ignore the results of the nutritional test can be written as

$$\text{Ignore nutritional screen if} \quad \frac{\mathrm{B}}{\mathrm{C}} > 1 + \frac{1-\pi}{\pi} \times \frac{p\left[\bar{r} \mid \bar{R}\right]}{p\left[\bar{r} \mid R\right]} \times \frac{q}{1+q}. \quad (2)$$

In the previous discussion, we already assumed that when WIC is provided to an individual truly at risk, the program generates a net benefit for society ($B/C > 1$). While this assumption is necessary, it is not sufficient for us to ignore the results of the nutritional screen for the determination of WIC eligibility or to construct the budget request for the program. The assumption would be sufficient in the unlikely situations in which either (1) all applicants are truly at risk ($\pi = 1$), or (2) the screening procedure would never determine anyone not at risk when they truly are not at risk ($p\left[\bar{r} \mid \bar{R}\right] = 0$), or (3) the excess burden of tax is zero ($q = 0$). Since these conditions are unlikely to be met, the question of whether or not one should use the results of the nutritional screen for eligibility determination must include consideration of what is known about each of these parameters.

What is the true proportion of the WIC population who are at nutritional or medical risk (π)?

Based on previous estimates, the Food and Nutrition Service (FNS) has assumed that 95 percent of income-eligible infants, 89 percent of income-eligible pregnant women, 93 percent of income-eligible postpartum women, and 75 percent of children are at nutritional or medical risk. The panel has discussed in this report that these estimates are most likely an

underestimate of the true proportions. In particular, the panel concludes that the true proportions for all groups would be in the 95 to 99 percent range. If we adopt a broader range for p from .90 to .99 then the term $(1 - \pi)/\pi$ would range from 0.010 to 0.111.

What is the relative predictive power of the screening procedure

$$\frac{p\left[\bar{r} \mid \bar{R}\right]}{p\left[\bar{r} \mid R\right]}?$$

Little is known about the ability of the screening procedure to predict those individuals who are not at nutritional risk. In general, one would expect screening procedures to be more likely to find an applicant at risk when they are at risk, than finding someone at risk when they are not. Thus

$$p\left[r \mid R\right] > p\left[r \mid \bar{R}\right].$$

Equivalently, we expect that

$$p\left[\bar{r} \mid \bar{R}\right] > p\left[\bar{r} \mid R\right]$$

We expect the ratio $p\left[\bar{r} \mid \bar{R}\right] / p\left[\bar{r} \mid R\right]$ to range from 1 to infinity; the limiting case is when the screening procedures always correctly identify those at risk. Since we do not have any definitive information on how accurate the screening procedure is, we will allow this ratio to range from 1.0 (the screening process is random) to 10.0 (a highly discriminating procedure).

What is the size of the excess burden of taxation (q)?

The taxation literature has attempted to quantify this concept in the United States and there is a wide range of estimates of the excess burden of taxation.[1] Estimates of the excess burden range from $0.15 to $0.40 per dollar of taxes collected. Since most of the estimates are based on the tax system prior to the 1986 tax reform act, which lowered the marginal tax rates that many taxpayers faced, the panel judges that an estimate of $0.25 for the excess burden of taxation is a reasonable assumption.

We can use these estimates to determine a range for the critical values for the benefits of WIC per dollar of WIC spending (B) that would have to

[1]See Browning (1976, 1978, 1987), Hausman (1981), Ballard, Shoven, and Fullerton (1987) and Stuart (1984).

be achieved in order to justify ignoring the screening test for eligibility determination. Taking the lowest values of the respective ranges for $(1 - \pi)/\pi$, the relative predictive power of the screen procedures, and q, then B must exceed $1.15 in order to justify ignoring the results of the screen procedure. If we use these upper bound values for these variables, then B must exceed $1.84.

To consider some intermediate values for the critical value for B, Table B-1 employs the midrange value for the excess burden of taxation. These critical values are generated by assuming an excess burden of $0.25 per dollar of taxes collected. For WIC to generate a net benefit, it must generate at least $1.25 of benefits for the government to rationally fund this program; thus, the WIC benefits to at-risk individuals must be only modestly higher to ignore the nutritional screen in determining eligibility for WIC. For example, if the true probability of being at risk is 90 percent, then the benefits have to be only $1.53 or $0.28 higher than the program costs to ignore the nutritional screen even if the screen is highly reliable at detecting those not at risk (assuming a value of 10.0).

What Are the Economic Benefits of WIC?

An early study of the WIC program by the U.S. General Accounting Office (GAO) found that a dollar of WIC spending could generate $3.50 of savings to medical and disability programs (U.S. General Accounting Office, 1992). If this finding is true, then based on the above calculations we could safely ignore the nutritional risk criteria for eligibility determination. Yet Besharov and Germanis (2001) note that this $3.50 to $1 benefit

TABLE B-1 Critical Values for B to Ignore the Screen Procedure When q Equals 0.25

Value of $p\left[\bar{r} \mid \overline{R}\right] / p\left[\bar{r} \mid R\right]$	Value for π equals 0.90	0.95	0.99
1.0	1.28	1.26	1.25
2.0	1.31	1.28	1.26
5.0	1.39	1.32	1.26
10.0	1.53	1.38	1.28

to cost ratio pertains to pregnant women and that caution should be used before one generalizes to other target groups in the WIC program: postpartum women, infants, and children. Furthermore, they contend that evaluation studies that have produced these results are susceptible to a self-selection bias in their design and hence overstate the true effect of the WIC program.

Researchers who have attempted to control for self-selection and potential simultaneity in the evaluation have found lower levels of benefits to the program. For example, Devaney et al. (1992) found that WIC created lower savings for pregnant women than previously estimated by GAO. With lower future savings in other government programs, the upper bound estimate of the net benefit per dollar of WIC spending fell to $2.29.

For other categorically eligible groups, the body of estimates of the benefits from WIC is less robust. While WIC is believed to reduce anemia among infants and children and to provide modest improvements in children's diets, little is known about the dollar value of these improvements. Little is known about the impact of WIC for postpartum women. Hence some caution should be exercised when generalizing the benefits of the WIC program for pregnant women to other groups participating in the program.

CONCLUSION

If a low-cost screening procedure existed that could perfectly determine which applicants are at nutritional and medical risk, then it should be used for eligibility determination. Such a screening procedure does not exist and errors in eligibility determination will be made. Some applicants who are at risk and are truly eligible will be denied participation in the WIC program. Others who are not at risk and not truly eligible will be allowed to participate based on the faulty procedure. Both types of errors impose a cost on society. This appendix explored the conditions in which it is in society's interest of maximizing the net benefits from the administered WIC program to presume that all categorically eligible and income-eligible persons are at nutritional risk and thus to ignore nutritional risk in the budgetary process.

The potential gain to society of the presumption of nutritional risk is created because there is no chance that an applicant that is truly eligible would be denied eligibility on the basis of a faulty screening procedure. The magnitude of the social gain reflects two factors: the probability of making

this type of error and the magnitude of the net benefits to society of providing WIC to those who are at risk. However, presuming that all are at nutritional risk imposes a cost on society by providing WIC benefits to those applicants who were truly not eligible and would have been identified as ineligible by the screening procedure. The magnitude of these costs reflects the probability of providing benefits to those who would have been screened as ineligible, multiplied by the net cost of raising the necessary funds for the program.

Whether or not society is better off by presuming that all categorically and income-eligible persons are at nutritional risk is theoretically indeterminate. However, it is very likely that presuming nutritional risk can be justified given the high probability in the population that income-eligible individuals are at nutritional risk. For example, let us assume that 99 percent of the population is at risk and we have a relatively accurate procedure of detecting those individuals who are not at risk—the probability of detecting an individual not at risk who is truly not at risk is 10 times more likely than mistakenly identifying an individual not at risk who was truly at risk. Even when we assume a very high net cost of raising revenues ($0.40 per dollar raised), as long as benefits from spending a dollar on WIC are $0.84 more then the total cost of raising the dollar ($1.40), it would be rational to ignore the results of the screening procedure for eligibility determination and consequently for budget proposals. We stress, however, that a decision to presume that all are at nutritional risk does not mean that a nutritional screen should not be performed. Nutritional screening is used to implement the priority system when funds are limited, and the information obtained is used in tailoring the food package to the individual, planning nutrition education, and making appropriate referrals.

APPENDIX C

Reconciling Different Estimates of Income and Adjunctive Eligibility

This report has attempted to characterize how estimates of eligibility and participation vary when new methods of estimation are used. The primary focus of this analysis is on estimating income and adjunctive eligibility. To conduct this analysis, the panel employed three different data sets to estimate the effects alternative methods have on eligibility and participation estimates: the March Current Population Survey (CPS), the Survey of Income and Program Participation (SIPP), and the Transfer Income Microsimulation model data (TRIM), which is based on the March CPS. The CPS is the data base that USDA currently uses to estimate eligibility. The SIPP and TRIM data bases each have features that allow estimation of new methodologies, but each does so in different ways. For example, SIPP directly asks respondents to report their monthly income, while TRIM uses annual reports of income and benefit receipt combined with respondent accounts of employment periods throughout the year to simulate monthly income. These differing approaches yield different estimates of eligibility. In this appendix, we attempt to explain why estimates of eligibility differ across these data sets. We first examine differences in estimates of eligibility when monthly income and WIC certification periods are used to estimate eligibility. We then examine differences in estimating adjunctive eligibility.

ESTIMATES OF ELIGIBILITY USING MONTHLY INCOME MEASURES AND ACCOUNTING FOR WIC CERTIFICATION PERIODS

While the March CPS does not provide monthly income data, the Urban Institute's Transfer Income Microsimulation model (TRIM 3) provides routines that impute monthly income to CPS files. These imputation routines utilize the income and unemployment data from the CPS to reflect both monthly unemployment flows and the degree of income variability found in SIPP. Estimates of the proportion of infants and children income eligible from this modified CPS data base and the SIPP 1996 Panel data are presented in Table C-1.

Employing the TRIM imputed monthly income and using a monthly certification period (the row labeled "average monthly" in the table), we find roughly the same percentages of income-eligible infants and children that were found by Gordon et al. (1997). The number of eligible infants increases 3 percent over the estimates using annual income, while the number of income-eligible children increases by 1 to 2 percent. If we impute 12 months of eligibility to infants and children if their worst month's income is less than 185 percent of federal poverty guidelines (the "eligible in any month" row), again we find roughly the same percentage increases (28 and 24 percent) in the number of income-eligible infants that were found in the Gordon et al. study and a slightly smaller increase in the number of children (19 and 20 percent).

The monthly income data imputed with the TRIM model does not provide sufficient information to fully model the WIC certification process. Since the public use files of the CPS do not provide the birthdates of individuals (only ages in March), we cannot model which month in the year infants initially become eligible and hence the number of months during the year they are income eligible. A similar problem occurs for children ages 1 through 4. To provide an upper bound estimate, we assume that all infants would be eligible for 12 months if their worst month's income qualified them for WIC. For children, we imputed 6 months of eligibility if their worst month's income qualified them for WIC and an additional 6 months of eligibility if their seventh worst month also made them income eligible. An alternative would be the second worst month.

This modeling of the WIC certification process does not alter the estimates of the percentage of infants who are income eligible. The number of income-eligible children is reduced by this modeling of WIC certification

TABLE C-1 Estimates of the Monthly Versus Annual Income Eligibility (Percentage of All Individuals)

	1997		1998	
Infants				
CPS/TRIM3				
Annual	39.7		39.2	
Average monthly	40.8	(1.03)	40.2	(1.03)
Eligible in any month	50.6	(1.28)	48.7	(1.24)
Certification periods	50.6	(1.28)	48.7	(1.24)
SIPP				
Annual	38.9		35.1	
Average monthly	43.5	(1.12)	41.3	(1.17)
Eligible in any month	58.9	(1.52)	57.5	(1.64)
Certification periods	56.6	(1.46)	54.1	(1.54)
Children				
CPS/TRIM3				
Annual	41.1		40.4	
Average monthly	41.5	(1.01)	41.1	(1.02)
Eligible in any month	49.0	(1.19)	48.4	(1.20)
Certification periods	45.9	(1.12)	45.5	(1.13)
SIPP				
Annual	42.4		39.6	
Average monthly	44.8	(1.06)	42.1	(1.06)
Eligible in any month	62.0	(1.46)	59.4	(1.50)
Certification periods	56.8	(1.34)	53.9	(1.36)

NOTE: The bracketed numbers represent the ratio of respective estimate to the corresponding estimate using annual income eligibility.
SOURCES: The CPS estimates are from panel calculations based on extracts from the Urban Institute TRIM files for the respective calendar years. The SIPP estimates are from calculations made by Bitler et al. (2002).

periods. Instead of 19- and 20-percent increases in the number of income-eligible children when only the worst month was considered, monthly income with the certification process is estimated to increase the number of income-eligible children 12 and 13 percent compared with estimates employing an annual measure of income.

Comparing the estimates derived from the TRIM data with those employing data from the 1996 SIPP panel, we conclude that the marginal effect of monthly income with WIC certification periods is significantly larger when employing the SIPP data as opposed to the TRIM data. The

SIPP data produces a marginal effect that is roughly twice that found when using the TRIM data, even though monthly income was imputed to reflect the variability of income found in the SIPP data. In an attempt to understand these differences, we examined the SIPP- and TRIM-imputed distribution of children by the number of months their monthly income was less than 185 percent of federal poverty guidelines. These distributions, as well as the distribution of children who had at least one month in which their income was less than 185 percent of poverty are presented in Table C-2.

The distribution of TRIM-imputed months of income eligibility is quite different from the distribution based on the reported incomes in SIPP. Children are more likely (roughly 20 percent more likely) to have at least one month of income eligibility in SIPP than in the TRIM-imputed data.

TABLE C-2 Distribution of Children Ages 1 to 4 Years by the Number of Months in Which Monthly Income Is Less Than or Equal to 185 Percent of Poverty in 1998 (Percentage)

	SIPP		CPS/TRIM	
Number of Months	All Children	Months Greater Than Zero	All Children	Months Greater Than Zero
0	40.8		51.6	
1	4.5	7.5	1.6	3.3
2	3.4	5.7	1.0	2.0
3	3.1	5.2	1.0	2.0
4	4.1	6.8	.9	1.9
5	1.8	3.1	.5	1.1
6	2.2	3.7	.9	1.9
7	2.5	4.2	.7	1.4
8	3.5	5.9	6.1	12.5
9	2.4	4.1	1.4	2.8
10	3.4	5.7	1.3	2.6
11	4.5	7.6	1.0	2.1
12	23.9	40.4	32.2	66.4
Computed percentage of all children employing the above distributions:				
Average monthly	41.3			41.1
Eligible in any month	59.2	(1.43)	48.4	(1.18)
Certification periods	49.7	(1.20)	45.5	(1.11)

Note: Numbers in parentheses represent the percentage increase in eligibility compared with estimates using annual income.

But the distribution of children who have at least one month of eligibility is also quite different. In the SIPP data, the modal value is 12 months. However, 60 percent of children have at least 1 month but less than 12 months of eligibility. The TRIM-imputed data, however, show a large percentage of children with 8 months of eligibility. The spike at 8 months reflects a peculiarity of the TRIM imputation routines. Each year there are four months with one more weekly pay period than the other eight months. TRIM accounts for these monthly differences and constructs eight months with fewer numbers of pay periods and hence less income. TRIM also imputes a much higher proportion of children with 12 months of income eligibility (66 percent) than is found in the SIPP data (40 percent).

This evidence suggests that the differences between the SIPP and TRIM estimates can be explained in the following manner. Since we cannot estimate the effect of which months the children are certified as income eligible in the TRIM data, we can try to make SIPP estimates closer to the TRIM data by using the distributions of income-eligible months in Table C-2. Using the distribution of all children in the SIPP data to weight the number of months of eligibility, we can compute an average monthly estimate of the proportion of children in SIPP that is identical to the estimate from the TRIM data. Making this calculation, we find that 41.3 percent of children in 1998 were income eligible if monthly income was employed. This is almost identical to the 41.1 percent estimated from the TRIM data.[1]

The upper bound estimate, "eligible in any month," increases in the SIPP data by 43 percent compared with the estimates that use monthly certification, "average monthly." The similar estimate from the TRIM increases only 18 percent. The difference is the result of the underlying difference in the SIPP estimates of the number of eligible children with at least one month of eligibility, which is much greater than the TRIM estimate.

To mirror the TRIM certification process in the SIPP data, we imputed 6 months of income eligibility to those children with 1 to 6 months of income eligibility and 12 months of eligibility to those children with 7 to 12 months of eligibility. Compared with the situation when monthly certification periods (average monthly) are employed, these calculations indicate that the SIPP data would have estimated that 20 percent more chil-

[1]The computed SIPP estimates in Table C-3 will not match the estimates for the SIPP data found in Table 5-1 because the earlier estimates take account of the timing of certification during the year, while the calculations in Table C-3 do not. But these calculations are done to make the SIPP estimates mirror what is done in the TRIM-imputed data.

dren (49.7 instead of 41.3 percent) would have been eligible. The identical calculations from the TRIM data indicate only 11 percent more children are estimated to be eligible (45.5 instead of 41.1 percent). To decompose this difference, we first divide the population of children with at least 1 month of income eligibility into two groups—one in which the children have 1 to 6 months of eligibility and the other in which the children have 7 to 12 months of eligibility. In the SIPP data, the first group constitutes 32.1 percent of the total number of children with at least 1 month of eligibility. When this form of certification is used instead of monthly certification, this group has an average gain of 3.2 months of income eligibility. In the TRIM data, this group experiences the same average gain in eligibility, but constitutes only 12.2 percent of the total number of children with at least 1 month of eligibility. In the second group of children with 7 to 12 months of eligibility, the SIPP data indicate that 67.9 percent of children with at least 1 month of eligibility are in this group and would experience an average gain of 1.1 months when certification is accounted for in this manner. The TRIM data show a larger proportion of children with at least 1 month of eligibility falling in the 7 to12 month group and experience an average gain of only 0.8 months.[2] Thus, SIPP is indicating a much larger gain in income eligibility due to the WIC certification process and monthly income because of two factors:

- SIPP reported monthly income indicates that among those children with at least one month of eligibility, the average increase in the months of eligibility is largely due to more children having only a few months (1 to 5) in which the effect of certification on the average number of months is greater than when the child has 7 to 12 months of monthly eligibility.
- SIPP data indicate that a higher proportion of children have at least 1 month of eligibility.

Table C-3 extends the TRIM-based analysis to calendar years 1994 through 1999. This longer time series of estimates shows the relative stability of the impact of imputed monthly income on the size of income-eligible populations. The proportion of all infants and children who are income

[2]The average increase in the number of months of eligibility is smaller in the second group because of the high proportion of children at 12 months of eligibility compared with six months, when certification has no effect.

TABLE C-3 Estimates of the Percentage of All Individuals Who Are Income Eligible for WIC Using Monthly Income Versus Annual Income

	1994		1995		1996		1997		1998		1999	
Infants												
Annual	42.2		42.9		42.5		39.7		39.2		38.0	
Average monthly	43.6	(1.03)	43.2	(1.01)	43.7	(1.03)	40.8	(1.03)	40.2	(1.03)	38.4	(1.01)
Eligible in any month	54.3	(1.29)	52.8	(1.23)	53.5	(1.26)	50.6	(1.28)	48.7	(1.24)	47.5	(1.25)
Certification periods	54.3	(1.29)	52.8	(1.23)	53.5	(1.26)	50.6	(1.28)	48.7	(1.24)	47.5	(1.25)
Children												
Annual	44.7		43.1		43.2		41.1		40.4		38.6	
Average monthly	45.6	(1.02)	43.4	(1.01)	43.6	(1.01)	41.5	(1.01)	41.1	(1.02)	39.0	(1.02)
Eligible in any month	53.5	(1.20)	51.4	(1.19)	51.5	(1.19)	49.0	(1.19)	48.4	(1.20)	46.2	(1.20)
Certification periods	50.0	(1.12)	47.9	(1.11)	48.0	(1.11)	45.9	(1.12)	45.5	(1.13)	43.2	(1.12)

Note: Numbers in parentheses represent the percentage increase in eligibility compared with estimates using annual income.

eligible (accounting for monthly income and certification periods) has been declining over the seven-year period. However, the impact of monthly income and certification on eligibility estimates compared with estimates based on annual income is constant throughout the period. For infants, use of monthly income and certification periods increases eligibility estimates by 23 to 29 percent. For children, the estimated increase is very stable at 11 to 13 percent.

ADJUNCTIVE ELIGIBILITY AND UNDERREPORTING OF MEANS-TESTED PROGRAMS

In Chapter 5, we observed that both the public use CPS and SIPP data may suffer from underreporting of participation in means-tested programs that would create eligibility for individuals in the WIC program. To examine the effect underreporting may have on the number of people who gain WIC eligibility through adjunctive eligibility, we used TRIM data with imputed participation in these programs. The imputation procedure in TRIM makes sure the number of participants for each program matches control totals recorded by the programs' administrative records. Table C-4 presents estimates of the proportion of income and adjunctively eligible infants and children from TRIM imputed data for 1994 and 1996 through 1999 and from SIPP data for calendar years 1997 and 1998. The bracketed numbers represent the ratio of the proportion of eligible people in the row relative to the number eligible from the previous step (the row directly above). For example, in 1994, TRIM estimates that 42.2 percent of infants would be eligible based on their annual income. This proportion increases to 54.3 percent when monthly income and certification periods alone are used in the determination of income eligibility. This represents a 29 percent increase in the number of children eligible compared with estimates that use annual income. When adjunctive eligibility is also considered, the proportion of infants rises to 58 percent, or a 7 percent (1.07 = 58.2/54.3) increase in the number of eligible infants due to the marginal addition of adjunctive eligibility to the eligibility determination process.[3]

[3]The marginal effect of adjunctive eligibility may be understated while the effect of monthly income may be overstated due to the manner it is being estimated in Table C-4. The effect of monthly income includes not only a "pure" effect of monthly income but also an interaction effect monthly income has with adjunctive eligibility—the effect representing the number of individuals who would qualify for WIC either due to monthly income or enrollment in a means-tested program.

TABLE C-4 Infants and Children Who Are Income Eligible and Adjunctively Eligible (Percentage)

Calendar Year	1994		1996		1997		1998		1999	
Infants										
CPS/TRIM										
Annual	42.2		42.5		39.7		39.2		38.0	
Monthly income	54.3	(1.29)	53.5	(1.26)	50.6	(1.28)	48.7	(1.24)	47.5	(1.25)
Income and adjunctively	58.2	(1.07)	62.3	(1.16)	56.1	(1.11)	56.0	(1.15)	55.3	(1.16)
SIPP										
Annual					38.9		35.1			
Monthly income					56.6	(1.46)	54.1	(1.54)		
Income and adjunctively					60.0	(1.06)	58.1	(1.07)		
Children										
CPS/TRIM										
Annual	44.7		43.2		41.1		40.4		38.6	
Monthly income	50.0	(1.12)	48.0	(1.11)	45.9	(1.12)	45.5	(1.13)	43.2	(1.12)
Income and adjunctively	53.5	(1.07)	52.7	(1.10)	49.7	(1.08)	48.9	(1.07)	47.2	(1.09)
SIPP										
Annual					42.4		39.6			
Monthly income					56.8	(1.34)	53.9	(1.36)		
Income and adjunctive					59.0	(1.04)	56.7	(1.05)		

The marginal effect of considering adjunctive eligibility is smaller than the effect of employing monthly income as opposed to annual income. While the TRIM estimates show a slightly larger marginal effect for both infants (11 and 15 percent increases in 1997 and 1998, respectively) and children (8 and 7 percent) than found in the SIPP data, the differences are explainable. In the SIPP data, enrollment in the means-tested programs is reported by the respondents. The TRIM data imputes individual enrollment in these programs so that the data reflects enrollment found in administrative program data. Table C-5 presents the average monthly counts of the number of infants and children reporting enrollment in Medicaid in SIPP and the CPS survey as well as the corresponding estimates in the TRIM-imputed data. Clearly the larger effects are the result of roughly 50 percent more infants and children having enrollment status in the TRIM data than in the SIPP data, which uses reported participation.

While a clear case can be made that SIPP data may understate the marginal effect of adjunctive eligibility due to using reported as opposed to actual enrollment in these means-tested programs, the TRIM-imputed data do not necessarily represent truth. TRIM utilizes characterizations of state Medicaid programs to determine Medicaid eligibility in order to assign enrollment to those who are eligible for benefits. However, these control totals pertain to all children under age 18 years, not to the WIC target group of children under age 5 years. Hence there is no guarantee that TRIM is assigning enrollment of infants and children under age 5 in a way that reflects the true number of that age who are enrolled. They may be over- or understating the true number. In addition, the routine employed by TRIM assigns enrollment to nonreporters in order to hit state-level control totals

TABLE C-5 Average Monthly Receipt of Medicaid as a Percentage of Total Population of Infants and Children

	SIPP Reported	CPS Reported	TRIM Imputed
1997			
Infants	26.2	24.7	38.0
Children (1 to 4 years)	20.6	21.2	31.1
1998			
Infants	24.9	22.9	37.5
Children (1 to 4 years)	19.5	19.2	28.9

on a completely random basis. The assignment does not take into account the specific income of the family. It is possible that TRIM may be assigning too many high-income infants and children to enrollment status and hence overstating the true marginal effect of adjunctive eligibility.

APPENDIX D

Biographical Sketches of Panel Members and Staff

DAVID M. BETSON (*Chair*) is associate professor of economics at the University of Notre Dame. His previous positions have been as a visiting scholar at the Joint Center for Poverty Research of the University of Chicago and Northwestern University, a research associate at the Institute for Research on Poverty at the University of Wisconsin, and an economist in the Office of the Assistant Secretary for Planning and Evaluation in the U.S. Department of Health, Education, and Welfare. His research examines the effects of governments on the distribution of economic well-being with special reference to the measurement of poverty and the analysis of child support policy. He received a Ph.D. degree in economics from the University of Wisconsin–Madison.

PAUL BUESCHER is head of the Statistical Services Branch of the State Center for Health Statistics in North Carolina. He oversees branch activities including the production, editing, and analysis of vital statistics data files; analyses of Medicaid, hospital discharge, and county health department patient data files; and publication of many annual reports and special studies of the Center. He serves as project director for both the Centers for Disease Control and Prevention (CDC) Pregnancy Risk Assessment Monitoring System (PRAMS) and the CDC Behavioral Risk Factor Surveillance System (BRFSS) in North Carolina. He is adjunct associate professor in the Department of Maternal and Child Health of the University of North Caro-

lina School of Public Health and works with university colleagues to promote collaborative research agendas. He received a Ph.D. in sociology and demography from the University of North Carolina at Chapel Hill.

ALICIA CARRIQUIRY is associate professor of statistics at Iowa State University. She specializes in linear models, Bayesian statistics, and general methods. Her recent research focuses on nutrition and dietary assessment. She is on the editorial board of *Bayesian Statistics* and an editor for *Statistical Science*. She is currently a member of the Committee on Uses and Interpretations of Dietary Reference Intakes at the Institute of Medicine. She has been elected a fellow of the American Statistical Association and is an elected member of the International Statistical Institute. She received a Ph.D. in statistics and animal science from Iowa State University.

CONSTANCE F. CITRO is a senior program officer for the Committee on National Statistics. She is a former vice president and deputy director of Mathematica Policy Research, Inc., and was an American Statistical Association/National Science Foundation research fellow at the U.S. Census Bureau. For the committee, she has served as study director for numerous projects, including the Panel on Poverty and Family Assistance, the Panel to Evaluate the Survey of Income and Program Participation, the Panel to Evaluate Microsimulation Models for Social Welfare Programs, and the Panel on Decennial Census Methodology. Her research has focused on the quality and accessibility of large, complex microdata files, as well as analysis related to income and poverty measurement. She is a fellow of the American Statistical Association. She received a B.A. degree from the University of Rochester and M.A. and Ph.D. degrees in political science from Yale University.

JANET CURRIE is professor of economics at the University of California, Los Angeles. She was at the Massachusetts Institute of Technology as an assistant and then associate professor. Her recent work focuses on the effects of welfare programs on poor children. In particular, she has studied the Head Start program and Medicaid. She is a consultant with the labor and population group at RAND; a research associate at the National Bureau of Economic Research; and a faculty associate at the Chicago/Northwestern Poverty Center. She is an editor of the *Journal of Labor Economics* and on the editorial board of the *Quarterly Journal of Economics* and the

Journal of Health Economics. She received a Ph.D. in economics from Princeton University.

JULIE DaVANZO is an economist/demographer who is a senior economist at RAND. She directs RAND's Center for the Study of the Family in Economic Development and its Population Matters project, whose purpose is to disseminate the policy-relevant findings of population research. She has served as a member of the National Research Council's Committee on Population and as a member of the Population Research Committee of the National Institute of Child Health and Human Development. She is currently a member of the Committee on National Statistics. She has designed and directed the Malaysian Family Life Surveys (1976, 1988, 2001), a widely used data base for the study of demographic and health issues in developing countries. She has also done research on infant feeding, both in the United States and in several developing countries. She received M.A. and Ph.D. degrees in economics from the University of California, Los Angeles.

JOHN F. GEWEKE is the Harlan McGregor chair in economic theory as well as professor of economics and statistics at the University of Iowa. Formerly he was a professor in the Department of Economics at the University of Minnesota and adviser to the Federal Reserve Bank of Minneapolis. He was the director of the Institute of Statistics and Decision Sciences at Duke University and professor in the Department of Economics at the University of Wisconsin. He is currently a member of the National Research Council's (NRC) Division of Behavioral and Social Sciences and Education and is a former member of the NRC's Committee on National Statistics and the Panel on the Demographic and Economic Impacts of Immigration. He is a fellow of the Econometric Society and the American Statistical Association. His research has included time series and Bayesian econometric methods, with applications in macroeconomics and labor economics. He has a B.S. from Michigan State University and a Ph.D. in economics from the University of Minnesota.

DAVID GREENBERG is professor of economics at the University of Maryland, Baltimore County. He is a member of the American Economic Association, the Industrial Relations Research Association, and the Association for Public Policy and Management. He is also a research affiliate of

the Institute for Research on Poverty at the University of Wisconsin. He has been a research fellow at the Centre for Research in Social Policy at Loughborough University. He has served on advisory panels for several different federally funded research projects, including a special U.S. General Accounting Office Advisory Panel on Computer Matching Cost-Effectiveness Methodology and a Maryland Expert Panel on Drug Abuse Benefits. He has consulted widely for both public- and private-sector organizations and regularly serves as a referee for various academic journals. He received a Ph.D. in economics from the Massachusetts Institute of Technology.

ROBERT P. INMAN is the Miller-Sherrerd professor of finance and economics at the Wharton School of the University of Pennsylvania and professor of economics and law at the Law School of the University of Pennsylvania. In addition to his appointment as a professor at the Wharton School, he currently serves as a senior fellow of the Leonard Davis Institute of Health Economics, University of Pennsylvania; as a research associate of the National Bureau of Economic Research, Cambridge, Massachusetts; and as a fellow of the Center of Fiscal and Monetary Affairs, part of the Government of Japan. He is an associate editor of two professional research journals, *Public Finance Quarterly* and *Regional Science and Urban Economics*. His research focuses on the design and impact of fiscal policies. He was elected a fellow of the Center for the Advanced Study in the Behavioral Sciences (1992–1993) and the Fulbright professor of economics (2000) at the European University Institute. He received a Ph.D. in economics from Harvard University.

JAMES LEPKOWSKI is a senior research scientist at the Institute for Social Research and associate professor of biostatistics at the University of Michigan. He is also a research professor in the Joint Program in Survey Methodology at the University of Maryland. He currently directs the University of Michigan's Summer Institute in Survey Research Techniques, while continuing to conduct a variety of survey methodology research. He designs and analyzes a variety of survey samples, including area probability and telephone samples of households in the United States and in developing countries. He actively consults on sample designs for surveys in Africa, Asia, and Europe. The substantive content of most of this work has been health or social conditions, including those that occur infrequently in the

population. He received a B.S. in mathematics from Illinois State University and a Ph.D. in biostatistics from the University of Michigan.

JOHN KARL SCHOLZ is a professor of economics and director of the Institute for Research on Poverty at the University of Wisconsin–Madison. In 1997–1998 he was the deputy assistant secretary for tax analysis at the U.S. Department of the Treasury, and from 1990–1991 he was a senior staff economist at the Council of Economic Advisers. He has written extensively on the earned income tax credit and low-wage labor markets. He also writes on public policy and household saving, charitable contributions, and bankruptcy laws. He is a research associate at the National Bureau of Economic Research. He received a Ph.D. in economics from Stanford University.

CAROL WEST SUITOR is a nutrition consultant working out of Northfield, Vermont. Currently, she is assisting the March of Dimes' Task Force for Nutrition and Optimal Human Development. Recently, she assisted the year 2000 Dietary Guidelines Advisory Committee; studied school children's diets in conjunction with Mathematica Policy Research, Inc.; and served on the advisory committee for the Harvard School of Public Health's Dietary Intake, Economic Research Service/U.S. Department of Agriculture grant. A study director for the Institute of Medicine for eight years, she directed studies of nutritional status during pregnancy and lactation (four studies); WIC nutrition risk criteria; dietary reference intakes on the B vitamins and choline; and others. At the National Center for Education in Maternal and Child Health, Georgetown University, she managed projects on maternal and child nutrition. At Harvard School of Public Health, she worked on the development and testing of instruments for collecting dietary information from low-income women. She currently serves on the Institute of Medicine's Committee on Dietary Risk Assessment in the WIC Program. She has a B.S. degree from Cornell University, an M.S. from the University of California at Berkeley, and Sc.M. and Sc.D. degrees from the Harvard School of Public Health.

MICHELE VER PLOEG (*Study Director*) is a member of the staff of the Committee on National Statistics. In addition to the study on Estimating WIC Eligibility and Participation, she directed the panel study on Data and Methods for Measuring the Effects of Changes in Social Welfare Policies. Her research interests include the effects of social policies on families

and children, the outcomes of children who experience poverty and changes in family composition, and individuals' education attainment choices. She received a B.A. in economics from Central College and a Ph.D. in policy analysis and management from Cornell University.