Chapter One
Introduction

This report describes the nutrition and health characteristics of participants and nonparticipants in the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC), using data from the Third National Health and Nutrition Examination Survey (NHANES-III).¹ The NHANES survey is the primary source of information used in monitoring the Nation’s nutrition and health status. NHANES-III was completed between 1988 and 1994 and provides data for a large nationally representative sample of individuals.²

A broad array of measures is used to describe the nutrition and health characteristics of WIC participants and two groups of nonparticipants: low-income individuals who were income-eligible for WIC (household income at or below 185 percent of poverty) and higher-income individuals who were not income-eligible for WIC (household income above 185 percent of poverty). Because of age-based variations in NHANES-III data collection protocols and small samples of pregnant and postpartum women, data were not consistently available for the three major categories of WIC participants (pregnant and postpartum women, infants, and children). Data availability was greatest for children and most limited for women.

For children, data are provided on dietary intake, breastfeeding and infant feeding history, birth characteristics, weight status, nutritional biochemistries, general measures of childhood health, and dental health. For infants, information is provided on breastfeeding and infant feeding practices, birth characteristics, and hospitalizations, accidents, and injuries since birth. Data reported for women include physical activity, use of alcohol and tobacco, pregnancy history, and dental health. Finally, data on general health status, exposure to second hand smoke, health insurance coverage, and access to a regular source of health care are provided for all three groups (women, infants, and children).

This research was not designed to assess program impacts or in any way attribute differences observed between WIC participants and either group of nonparticipants to an effect of the program. Rather, it was designed to establish a baseline from which to monitor the nutrition and health characteristics of WIC participants and nonparticipants over time and to generate questions and hypotheses for future research. The data presented in this report provide useful background information for researchers interested in studying the nutrition and health characteristics of low-income populations and/or the impact of participation in food assistance programs, or other variables, on nutrition and health characteristics. The data also provide important insights for individuals who plan and implement nutrition or health programs for preschool children, infants, and pregnant and postpartum women.

This introductory chapter provides an overview of the WIC Program as well as a brief descrip-

¹Similar reports have been prepared for participants and nonparticipants in the Food Stamp Program (FSP) (Fox and Cole, 2004a), for school-age children (Fox and Cole, 2004b), and for older adults (Cole and Fox, 2004).
²Beginning in 1999, NHANES became a continuing survey, without breaks between data collection cycles. Similar sampling and data collection procedures are used, although at least two years of data are necessary to have adequate sample sizes for subgroup analyses (Flegal et al., 2002). Data for the first two continuous years of the ongoing NHANES (1999-2000) have been released since the tabulations presented in this report were prepared. Data for subsequent years are expected in mid-2005.
tion of the NHANES-III data and the general approach to the analysis. The five chapters that follow present data on the nutrition and health characteristics listed previously. Details on data and methodology may be found in appendices referenced throughout the report.

The WIC Program

The WIC program, administered by the U.S. Department of Agriculture’s (USDA) Food and Nutrition Service (FNS), provides supplemental foods, nutrition education, and health and social service referrals to eligible pregnant women, breastfeeding and nonbreastfeeding postpartum women, infants, and children up to 5 years of age. In FY 2002, WIC served 7.5 million participants per month and accounted for approximately 11.4 percent of the $38 billion Federal expenditure for food assistance and nutrition programs (FANPs) (USDA, FNS, 2003a).

Program Eligibility

WIC eligibility is based on four factors: State residence, categorical eligibility, income eligibility, and nutritional risk. WIC participants must be residents of the State or other jurisdiction (U.S. territory or Indian Tribal Organization) supplying the WIC benefits, unless they are part of a migrant farm worker family.

Participants must also belong to one of five categorically eligible groups—women during pregnancy and up to 6 weeks after delivery, breastfeeding women (who may participate for up to a year after giving birth), postpartum women who are not breastfeeding (who may participate for up to 6 months after giving birth or other termination of pregnancy), infants (0-12 months), and children up to the age of 5 years. Children and infants comprise the majority of WIC participants. In April 2002, 50 percent of all WIC participants were children and 26 percent were infants. The remaining 24 percent were women—11 percent pregnant women, 7.5 percent postpartum nonbreastfeeding women, and 5.7 percent breastfeeding women (Bartlett et al., 2003 and Kresge, 2003).

Income-eligibility criteria are defined by each State WIC agency according to Federal guidelines. The income limit may not exceed 185 percent or be less than 100 percent of Federal poverty guidelines, which are based on household size. As of April 2000, all State agencies defined income eligibility for WIC as less than or equal to 185 percent of poverty (Bartlett et al., 2002).

Income eligibility may also be established by participation in other means-tested programs. FNS regulations require WIC agencies to accept applicants as adjunctively income-eligible for WIC if they document participation in Medicaid, Temporary Assistance for Needy Families (TANF), or the Food Stamp Program (FSP).3 As of October 1998, applicants not certified under adjunctive income-eligibility provisions must present documentation of income at certification (P.L. 105-336). Before P.L. 105-336 went into effect, some States allowed applicants to self-report income without documentation.

Finally, each WIC participant must be determined to be at nutritional risk, based on assessment by a competent professional authority such as a physician, nutritionist, nurse, or other health professional. For participants over 9 months of age, assessment of nutritional risk must include, at a minimum, measurement of height (or

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3Since the mid-1980s, several legislative actions have expanded Medicaid income eligibility for pregnant women, infants, and children. As a result, some States have adopted Medicaid income-eligibility limits that exceed the WIC maximum of 185 percent of poverty. Although the number of States using such income-eligibility requirements has been increasing in recent years, this situation was relatively uncommon when the NHANES-III data were being collected. In 1990, the earliest year for which data are available, Medicaid eligibility guidelines in all States were consistent with WIC eligibility guidelines (National Governor’s Association (NGA), 1990). In 1994, the last year of NHANES-III data collection, two States had Medicaid income-eligibility limits for pregnant women and infants that exceeded the WIC cutoff (NGA, 1994).
In addition, there has been a slight shift in the composition of the WIC participant population since the early 1990s. This shift occurred largely as a result of increased funding that allowed local programs to serve lower-priority participant groups, such as children. Specifically, the number of children has increased, relative to the number of women and infants. In 1990, children comprised 46.3 percent of WIC participants. In 2002, children comprised 50.1 percent of all WIC participants. Over the same time period, the percentage of WIC participants who were pregnant or postpartum women remained relatively constant (23.9% in 1990 vs. 24.1% in 2002), and the percentage of WIC participants who were infants decreased (29.8% in 1990 vs. 25.7% in 2002) (Randall and Boast, 1994 and Bartlett et al., 2003).

**Program Benefits**

WIC seeks to improve the health of program participants by serving as an adjunct to good health care and by providing supplemental foods, nutrition education, and referral to needed health and social services.

**Supplemental Foods**

The supplemental foods provided by WIC are good sources of nutrients that research has identified as typically lacking in the diets of low-income pregnant women and children—protein, iron, calcium, and vitamins A and C. Foods available in WIC food packages include milk, eggs, cheese, dried beans and peas, peanut butter, full-strength (100%) fruit or vegetable juices, breakfast cereals that are high in iron and low in sugar, and, for certain breastfeeding women, carrots and canned tuna. Infant packages include iron-fortified infant formula and

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WIC employs a priority system for filling vacancies that occur after a local agency has reached its maximum caseload (based on available funding). Children have a lower priority in this system than pregnant women, breastfeeding women, and infants with specific types of nutritional risks.
infant cereals as well as infant juices that are high in vitamin C.

The type and quantity of foods provided vary according to participants’ eligibility category, nutritional needs, and, to the extent possible, personal preferences. Most WIC participants receive vouchers or checks to use in purchasing supplemental foods at local grocery stores. In a limited number of geographic areas, foods are delivered to participants’ homes or participants pick up foods at warehouses. In recent years, several States have conducted pilot tests on the use of electronic benefits transfer (EBT) systems in disbursing WIC benefits. At least one State has implemented EBT Statewide and several other States are considering Statewide EBT systems.

**Nutrition Education**

The WIC food package does not meet participants’ total nutrient needs. Therefore, nutrition education is an essential part of the WIC Program. It provides a mechanism for ensuring that WIC participants learn about healthy eating practices and that they are encouraged to adopt positive food-related attitudes and behaviors. Program regulations define two broad goals for WIC nutrition education:

- to stress the relationship between proper nutrition and good health, with special emphasis on the nutritional needs of the program’s target populations; and

- to assist individuals at nutritional risk in achieving a positive change in food habits, resulting in improved nutritional status and the prevention of nutrition-related problems.

In practice, WIC nutrition education encompasses many other topics such as breastfeeding promotion, the need to avoid cigarettes, alcohol, illicit drugs, and over-the-counter medications during pregnancy, and the importance of childhood immunizations.

Each year, State agencies are required to use for nutrition education activities an amount that is equal to at least one-sixth of their annual expenditures for nutrition services and administrative (NSA) costs. Local WIC agencies are required to offer all adult participants and caretakers of infant and child participants at least two nutrition education contacts during each certification period. Participants are generally certified for periods of 6 months; however, infants may be certified for 1 year and pregnant women are certified for the duration of their pregnancy and up to 6 weeks postpartum. For infants with certifications that extend beyond 6 months, nutrition education must be offered to parents or caregivers on a quarterly basis.

Although local WIC agencies are required to offer nutrition education, participants are free to decline these services without affecting receipt of other program benefits. There is evidence that some WIC participants do not take advantage of the nutrition education opportunities provided by WIC (Fox et al., 1999). To maximize participation, local agencies tend to schedule nutrition education activities to coincide with issuance of WIC vouchers.

State and local WIC agencies have broad autonomy to develop plans and procedures for providing nutrition education to WIC participants. Consequently, WIC nutrition education is quite diverse and may vary both in quantity and quality from one site to the next. A variety of different methods may be used to provide nutrition education. For example, participants may be counseled one-on-one, may attend classes, or may view videos, filmstrips, or slide presentations on a variety of nutrition- and health-related topics. Providers are encouraged to ensure that nutrition education messages take
into account participants’ educational levels, nutritional needs, household situations, and cultural preferences.

**Referrals to Health Care and Social Services**

Local WIC agencies are expected to promote routine use of preventive health care services. Through co-location with health service providers or referrals to other agencies, WIC service delivery sites serve as a link between the participant and the health care system. Coordination between WIC and social service programs has increased since 1989, when Federal law created adjunctive income-eligibility for WIC benefits based on eligibility for other programs. Local WIC staff are encouraged to provide referrals, as needed, to appropriate social services, such as the FSP, Medicaid, TANF, and other programs relevant to participants’ needs (such as smoking cessation programs, alcohol and drug treatment programs, parenting classes). The degree to which local WIC agencies facilitate access and referrals to other services varies, depending on the adequacy of health and social service infrastructures at the State and local level and the extent to which participants are already linked into health and social service networks before coming to WIC (Fox et al., 1999).

**The Third National Health and Nutrition Examination Survey**

NHANES-III was conducted by the National Center for Health Statistics (NCHS), Centers for Disease Control and Prevention (CDC) between 1988 and 1994. The survey included interviews and physical examinations and was designed to provide national estimates of the health and nutrition status of the civilian, noninstitutionalized population in the 50 United States.

NHANES-III was based on a complex multistage probability sample design (NCHS, 1994). Persons were selected on the basis of sex, age, and race or ethnicity. Children under 6 years of age, adults over 60 years of age, and black and Mexican American persons were oversampled. NHANES-III collected data from 33,994 persons 2 months of age and older. Response rates were 85.6 percent for the household interviews and 78.8 percent for the physical examinations (NCHS, 1996). Total NHANES-III samples for the population subgroups served by WIC are 4,744 children under 5 years of age, 1,961 infants, and 667 pregnant and postpartum women.

Interviews were conducted in respondents’ homes and physical examinations and measurements were completed in a Mobile Exam Center (MEC). The MEC examination included a physical exam, dietary interview, health interview, blood tests, body measurements, and a dental exam. The dietary interview included a single 24-hour recall that collected quantitative data on foods and beverages consumed during the preceding 24 hours. NCHS staff used these data to calculate nutrient intakes, using food composition data from the Survey Nutrient Database maintained by USDA’s Agricultural Research Service (ARS).

**Analytic Approach**

WIC participants and nonparticipants in the NHANES-III sample were identified by response to a question that asked about current WIC participation: “(Are you/is [infant/child]) now receiving benefits from the WIC program?” This question was asked during the MEC interview, which included a subsample of all NHANES-III respondents. Consequently, the analyses presented in this report are based on the MEC-examined subsample. (The other volumes in this series use the NHANES-III household

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5For adults (17 years and older), NHANES-III also included a food frequency questionnaire, administered as part of the household interview. The food frequency had a 1-month reference period and was designed to collect qualitative information about dietary patterns. Data from the food frequency were not analyzed for this report.
Respondents who reported current WIC participation were considered WIC participants. Those who did not report current participation were considered nonparticipants. Nonparticipants were further subdivided into those who were income-eligible for WIC (household income at or below the WIC cutoff of 185 percent of poverty) and those whose income exceeded eligibility requirements (income above 185 percent of poverty).

Participants and nonparticipants were divided into three subgroups corresponding to the three major categories of WIC participants: pregnant and postpartum women, infants (2-12 months of age), and children (1-4 years of age). To accurately reflect categorical-eligibility criteria, the sample of women was limited to pregnant women, nonbreastfeeding women who gave birth within the past 6 months, and breastfeeding women who gave birth within the past 12 months.

For each variable examined, detailed tables were produced showing estimates for each of the subgroups for which data were available. Data for children were also broken down by year of age. Readers interested in comparing data for women, infants, or children to the population as a whole, or to other subgroups of the population, are referred to volume I in this series (Fox and Cole, 2004a). The detailed tables that accompany that volume include data for the entire population as well as for 72 gender-and-age-specific subgroups.

Table 1 illustrates the format used in the detailed tabulations. Table columns show data for all persons as well as for WIC participants and the two groups of nonparticipants. Table rows show data for the specific subgroups included in the tabulation. Table 1 also shows the maximum sample size for each table cell. For comparison purposes, sample sizes for the full NHANES-III household interview are provided as well (column 1). (As noted previously, this report used the MEC-examined sample because the question on current WIC participation was collected as part of the MEC interview).

All detailed tables include footnotes that clearly identify data source(s). Brief descriptions of the various NHANES-III data files are provided in appendix A. Tables also include footnotes, as appropriate, that identify reference standards used in interpreting NHANES-III data. Reference standards are described in appendix B. To the extent possible, standards are based on those used in the Healthy People 2010 objectives (U.S. Department of Health and Human Services (U.S. DHHS), 2000a).

Age and Population Adjustment

Detailed tables that show data for children by year of age also present data for the total population of children. These “Total, age-adjusted” estimates are standardized according to the age distribution of the U.S. population in the year...
### Table 1—Number of NHANES-III respondents: WIC participants and nonparticipants

<table>
<thead>
<tr>
<th>Household Interview</th>
<th>MEC Examined</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total persons</td>
<td>Total Persons</td>
<td>Currently Receiving WIC Benefits</td>
<td>Income-eligible Nonparticipants</td>
<td>Higher-income Nonparticipants</td>
</tr>
<tr>
<td>Women(^1)</td>
<td>1,050</td>
<td>667</td>
<td>181</td>
<td>247</td>
<td>185</td>
</tr>
<tr>
<td>Infants</td>
<td>2,107</td>
<td>1,961</td>
<td>787</td>
<td>348</td>
<td>731</td>
</tr>
<tr>
<td>Children</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 year old</td>
<td>1,339</td>
<td>1,258</td>
<td>419</td>
<td>391</td>
<td>357</td>
</tr>
<tr>
<td>2 years old</td>
<td>1,350</td>
<td>1,269</td>
<td>253</td>
<td>545</td>
<td>387</td>
</tr>
<tr>
<td>3 years old</td>
<td>1,186</td>
<td>1,119</td>
<td>201</td>
<td>513</td>
<td>325</td>
</tr>
<tr>
<td>4 years old</td>
<td>1,169</td>
<td>1,098</td>
<td>137</td>
<td>547</td>
<td>342</td>
</tr>
<tr>
<td>All children</td>
<td>5,044</td>
<td>4,744</td>
<td>1,010</td>
<td>1,986</td>
<td>1,411</td>
</tr>
<tr>
<td>Total</td>
<td>8,201</td>
<td>7,372</td>
<td>1,978</td>
<td>2,591</td>
<td>2,327</td>
</tr>
</tbody>
</table>

\(^1\) Pregnant women responded yes to ‘Are you now pregnant? Pregnant women identified only by urinalysis results are not included in table.

Source: NHANES-III, 1988-94. WIC participation is asked during the MEC exam.

Population estimates are shown in table 2. The year 2000 population distribution shown in column 1 of table 2 was used to weight participant categories (W-I-C) in the NHANES-III sample frame, for WIC participants and each group of nonparticipants, so that totals reflect the year 2000 population distribution.

### Statistical Tests

In addition to descriptive tabulations, the statistical significance of differences between WIC participants and each group of nonparticipants was tested using t-tests. When multiple outcome categories were examined simultaneously, the Bonferroni adjustment was used to adjust for multiplicity (Lohr, 1999). Nonetheless, because of the large number of t-tests conducted, caution must be exercised in interpreting results. In general, findings discussed in the text are limited to those with strong statistical significance (1 percent level or better) or those that are part of an obvious trend or pattern in the data.

Text discussions generally focus on differences between WIC participants and one or both groups of nonparticipants. Reference may be made to other between-group differences when the differences are noteworthy, for example, differences among children by year of age. The statistical significance of these secondary comparisons has not been tested, and this fact is

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8Separate estimates for children by year of age, infants, and women do represent true or raw estimates for these population subgroups.

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9Table 2 shows Census 2000 population estimates for infants and children (by year of age and total) in April 2000. The estimated population of women (pregnant, breastfeeding, and nonbreastfeeding postpartum) in April 2000 is based on the number of births in the year 2000 adjusted by the following multipliers: number of pregnant women with gestation > 3 months = # births * 7/12; number of postpartum women (breastfeeding and nonbreastfeeding) who gave birth in past 6 months = # births * 0.5; number of breastfeeding women between 6 and 12 months postpartum = # births * 0.2.
Table 2—Age distribution of WIC participants and nonparticipants in NHANES-III sample frame and year 2000 population

<table>
<thead>
<tr>
<th></th>
<th>Year 2000 population distribution</th>
<th>NHANES-III sample frame</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total Persons</td>
<td>Total Persons¹</td>
</tr>
<tr>
<td>Women</td>
<td>5,208</td>
<td>21.6</td>
</tr>
<tr>
<td>Infants</td>
<td>3,815</td>
<td>15.8</td>
</tr>
<tr>
<td>Children</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 year old</td>
<td>3,789</td>
<td>15.7</td>
</tr>
<tr>
<td>2 years old</td>
<td>3,757</td>
<td>15.6</td>
</tr>
<tr>
<td>3 years old</td>
<td>3,753</td>
<td>15.5</td>
</tr>
<tr>
<td>4 years old</td>
<td>3,825</td>
<td>15.8</td>
</tr>
<tr>
<td>All children</td>
<td>15,124</td>
<td>62.6</td>
</tr>
<tr>
<td>Total</td>
<td>24,147</td>
<td>100.0</td>
</tr>
</tbody>
</table>

¹ Total includes persons with missing income.


The estimated population of pregnant, breastfeeding, and nonbreastfeeding postpartum women for April 2000 is based on the number of births in the year 2000 adjusted by the following multipliers: number of pregnant women = # births * 7/12; number of postpartum women (breastfeeding and nonbreastfeeding) who gave birth in past 6 months = # births * 0.5; number of breastfeeding women between 6 and 12 months postpartum = # births * 0.2. It is assumed that pregnant women self-report their pregnancy status only after the second month of pregnancy.
noted in the text. Statistical tests were not performed on these second-level differences because of the expansive number of statistical tests performed in the main analysis and because these comparisons are not the focus of the report.

Additional information about the analytic approach, including use of NHANES-III sampling weights, calculation of standard errors, age standardization, and guidelines used to flag point estimates deemed to be statistically unreliable, is provided in appendix C. Individual point estimates may be deemed statistically unreliable because of small sample size or a large coefficient of variation. In keeping with NHANES-III reporting guidelines, such estimates are reported in detailed tables and are clearly flagged.

The chapters that follow summarize key findings. Graphics are used to illustrate observed differences between WIC participants and nonparticipants. Differences that are statistically significant at the 5 percent level or better are highlighted. Detailed tables provided in appendix D differentiate three levels of statistical significance (p <.001, .01, and .05). It is important to note that differences between WIC participants and nonparticipants may be statistically significant even if point estimates are unreliable. When this occurs, the text describes the existence and direction of the significant difference and identifies the group(s) for which point estimates are unreliable.

Comparisons between WIC participants and income-eligible nonparticipants are of primary interest. These comparisons provide useful insights into policy-relevant questions about program targeting, for example: are low-income individuals with the greatest nutritional and health needs receiving WIC services? Comparisons between WIC participants and higher-income nonparticipants are also of interest. These comparisons provide information on nutrition- and health-related disparities between WIC participants and individuals who are not constrained by low incomes. Both sets of comparisons also provide information on whether WIC participants do as well as other groups with respect to outcomes that WIC might be expected to improve.

As noted previously, however, this research was not designed to measure program impacts. Thus, significant differences that are observed between participants and nonparticipants cannot be attributed to participation in the WIC program; and similarly, the absence of a significant difference cannot be interpreted as evidence that WIC participation has no effect. Accurate assessment of WIC impacts requires specially designed studies or, at a minimum, complex analytical models that require a variety of measures that are not available in the NHANES-III dataset. It is also important to remember that, for characteristics used to define nutritional risk, differences observed between participants and nonparticipants may simply be a reflection of criteria for selection into the program.