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Nutrition and Health Characteristics of Low-Income Populations

Volume II, WIC Program Participants and Nonparticipants

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*Food Assistance & Nutrition
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Abstract

Data from the Third National Health and Nutrition Examination Survey (NHANES-III), conducted in 1988-94, were used to compare the nutrition and health characteristics of participants and nonparticipants in the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC). This research was designed to establish a baseline from which to monitor the nutritional and health characteristics of WIC participants and nonparticipants over time. Because of age-based variations in the survey protocols and small samples of pregnant and postpartum women, data were not consistently available among women, infants, and children. Data availability was the richest for children and most limited for pregnant women.

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Executive Summary

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

Data were examined for three groups that comprise the three major categories of WIC participants: pregnant and postpartum women, infants, and children (1-4 years of age).³ WIC participants are compared to 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). 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? And what are the nutrition- and health-related disparities between WIC participants and individuals who are not constrained by low incomes? These 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.

It should be noted that *this research was not designed to assess program impacts or in any way attribute differences between WIC participants and nonparticipants to an effect of the program*. Rather, this research provides 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.

A broad array of measures is used to describe the nutrition and health characteristics of WIC participants and nonparticipants.⁴ These measures include dietary intake, health-related behaviors, measures of health status, health conditions, and risks, and access to health care services. In reviewing findings, it is important to realize that many of the characteristics examined are used (or were used at the time the NHANES-III data were collected) as nutritional risks that qualify individuals for WIC participation. Therefore, differences observed between WIC participants and nonparticipants may be a reflection of criteria for selection into the program.

All reported population estimates have been population-adjusted, or standardized according to the year 2000 distribution of pregnant and postpartum women, infants, and children 1-4 years of age. Population adjustment eliminates between-group differences that are due solely to differences in the sample distribution across the three categories of WIC participants (women, infants, and children). Similarly, estimates reported for all

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. Data for the first two continuous years of the ongoing NHANES (1999-2000) have been released since the time the tabulations presented in this report were prepared. Data for subsequent years are expected in mid-2005.

³The 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.

⁴Because 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.

children have been age adjusted (based on year 2000 Census data) to eliminate between-group differences that are due solely to differences in the age distributions of the groups.

Dietary Intakes of Children

Dietary intake was assessed using data from a single 24-hour recall. In addition to energy intake, the analysis examined intakes of nine key nutrients and dietary components: vitamin C, iron, zinc, calcium, total fat, saturated fat, cholesterol, sodium, and fiber. Estimates of usual intake were generated using the personal computer version of the Software for Intake Distribution Estimation.⁵ Healthy Eating Index (HEI) scores (Kennedy et al., 1995) were also examined. Both of these analyses were limited to children. The HEI analysis was limited to 2-4-year-old children because the standards used in the HEI to assess intakes of total fat, saturated fat, cholesterol, and sodium are not applicable to 1-year-olds.

- **Meal Consumption.** Most children consume three meals per day. WIC children were more likely than higher-income children to consume fewer than three meals per day (16% vs. 10) and less likely to eat breakfast on a daily basis (88% vs. 94%). These differences were largely attributable to differences among 2-year-olds.
- **Energy.** Usual food energy consumption was significantly higher for WIC children compared with nonparticipants. WIC children consumed an average of 107% of the 1989 Recommended Energy Allowance vs. 101% and 99% for income-eligible and higher-income nonparticipant children, respectively.
- **Vitamin C, Iron, and Zinc.** The usual diets of virtually all 1-4-year-old children provided adequate amounts of vitamin C, iron, and zinc, relative to defined Estimated Average Requirements (EARs). There were statistically significant differences between WIC participants and nonparticipants for the percentage of children with adequate intakes of vitamin C and iron; however, the differences were substantively negligible.
- **Calcium.** It was not possible to assess the prevalence of adequate calcium intakes among children because the required dietary standard—the EAR—has not been established for calcium. The mean usual calcium intake of 1-4-year-old children exceeded the defined Adequate Intake (AI), suggesting that, overall, children's calcium intakes were adequate.⁶ On average, the usual calcium intake of WIC children was significantly greater than the usual calcium intakes of both groups of nonparticipant children. In all cases, however, mean intakes exceeded the AI by a substantial margin.
- **Percent of Energy from Fat.** On average, the usual diets consumed by 2-4-year-old children provided 33 percent of energy from fat. This level of fat intake exceeded the *Dietary Guidelines for Americans* recommendation of no more than 30 percent of total energy (U.S. Departments of Agriculture and Health (USDA) and Human Services (DHHS), 2000) but fell within the more recently defined Acceptable Macronutrient Distribution Ranges (AMDRs) for fat intake (30-40% of total energy for 2-3-year-olds and 25-35% for 4-year-olds) (Institute of Medicine (IOM), 2002b). Among

⁵Because NHANES-III included a very small sample of second dietary recalls, which are needed to estimate intraindividual variation in intake, variance components were derived from the Continuing Survey of Food Intake of Individuals (CSFII), 1994-96 (see appendix C).

⁶Mean usual intakes that exceed the AI suggest that the likelihood of inadequate intake is low.

2- and 3-year-olds, usual intakes that fell outside the AMDR tended to be lower than the recommended range rather than higher. In contrast, roughly 15 to 25 percent of 4-year-olds had usual fat intakes that exceeded the upper end of the AMDR.

Distributions of usual fat intake showed no significant differences between WIC children and income-eligible nonparticipant children. In contrast, fat intakes of WIC children were significantly greater than those of higher-income nonparticipant children, particularly for 2-year-olds and 4-year-olds. For 2-year-olds, these differences affected the proportion of children who had usual fat intakes within the AMDR. For 4-year-olds, significant between-group differences were concentrated at the lower end of the distribution and intakes of both groups fell within the AMDR.

- **Percent of Energy from Saturated Fat.** Saturated fat intake was evaluated relative to the *Dietary Guidelines* recommendation that saturated fat provide less than 10 percent of total energy (USDA and U.S. DHHS, 2000). On average, the usual diets of 2-4-year-old children in all three groups exceeded this standard. WIC children consumed significantly more saturated fat, on average, than nonparticipating children in the higher-income group (12.9% of usual energy intake vs. 12.1%) and were significantly less likely to have usual saturated fat intakes that were consistent with the *Dietary Guidelines* recommendation (6% of children vs. 17%).
- **Cholesterol.** Mean usual cholesterol intakes of 2-4-year-old children in all three groups were consistent with the *Dietary Guidelines* recommended maximum of 300 mg. (USDA and U.S. DHHS, 2000). WIC children, however, consumed significantly more cholesterol than both groups of nonparticipant children and were less likely than higher-income children to meet the *Dietary Guidelines* recommendation for cholesterol (82% of children vs. 96%).
- **Sodium.** The *Dietary Guidelines* recommend a maximum daily sodium intake of 2,400 mg (USDA and U.S. DHHS, 2000). On average, usual sodium intakes of all three groups of 2-4-year-old children came close to this goal, but only higher-income children actually met it. The mean usual sodium intake of WIC children was 2,513 mg. compared with 2,460 mg. for income-eligible nonparticipant children and 2,277 mg. for higher-income nonparticipant children. The difference between WIC children and higher-income children was statistically significant.

Children's usual sodium intakes exceeded the more recently defined Tolerable Upper Intake Levels (UL) by a substantial margin. The ULs are notably more stringent than the *Dietary Guidelines* recommendation—1,500 mg. for 2-3-year-olds and 1,900 mg. for 4-year-olds (IOM, 2004). Few children consumed diets that did not exceed the UL. There were few significant differences in the distributions of usual sodium intake of WIC children and income-eligible nonparticipant children. However, significant differences in the usual sodium intakes of WIC children and higher-income children were noted at every percentile of the distribution. In all cases, usual intake was greater for WIC children. Differences were concentrated among 3-year-olds. In this age group, the difference in usual intakes at the 10th percentile (1,637 mg. vs. 1,584 mg.) suggests that a greater proportion of higher-income children than WIC children consumed diets that were consistent with the sodium UL.

Healthy Eating Index Scores

- On average, 2-4-year-old children scored 70.4 out of a possible 100 on the HEI. Slightly more than a quarter (26%) had “good” diets, 8 percent had “poor” diets, and the majority (66%) had diets needing improvement. These general patterns were observed for all three groups of 2-4-year-old children and none of the differences in total HEI scores between WIC participants and nonparticipants was statistically significant. The HEI is a composite score constructed from 10 individual scores: five food groups (grains, vegetables, fruits, dairy, and meat), four nutrient-based components, and a variety score.⁷
- The HEI food consumption goal that presented the greatest difficulty for 2-4-year-old children was the goal for vegetable consumption. Mean scores for the vegetable component of the HEI ranged from 4.8 to 5.1, compared with a perfect score of 10, and less than one-quarter of the children in each group consumed the recommended number of daily vegetable servings.
- The only difference in food-based HEI component scores of WIC children and income-eligible nonparticipant children was observed for the fruit component (WIC children scored significantly higher with a score of 6.4 vs. 5.3). WIC food packages include 100% fruit juices, which are counted in the fruit component of the HEI.
- Differences in food-based HEI component scores of WIC children and higher-income nonparticipant children were observed for the dairy and meat scores. WIC children had significantly lower mean scores for the dairy component, although the size of the difference was relatively small (7.8 vs. 8.2). WIC children had significantly *higher* scores for the meat component and the difference in scores was substantial (7.0 vs. 5.7). WIC food packages include eggs, peanut butter, and dried beans and peas—all foods that are considered in the meat component of the HEI.

Health-Related Behaviors

Breastfeeding

Official WIC policy has always encouraged breastfeeding, while at the same time providing access to infant formula for nonbreastfeeding infants. The focus on breastfeeding promotion increased during the late 1980s and early 1990s. Therefore, NHANES-III data were collected during a time when WIC breastfeeding promotion strategies were evolving and do not reflect current program policies and procedures in this area. For this reason, NHANES-III breastfeeding data for WIC participants must be interpreted with caution.

- At the time NHANES-III data were collected, 54 percent of all infants and children under the age of 5 had been breastfed for some period of time. Among those ever breastfed, 41 percent had been breastfed for at least 6 months and 16 percent had been breastfed for at least a year.
- WIC infants were significantly less likely to have ever been breastfed than either income-eligible or higher-income nonparticipant infants (39% vs. 51% and 71%). Among infants ever breastfed, WIC

⁷The nutrient-based components compare intakes to recommendations included in the *Dietary Guidelines for Americans* and in the National Research Council's *Diet and Health* report (NRC, 1989b).

infants were significantly less likely than higher-income infants to have been breastfed for 6 months (31% vs. 42%).

- WIC children 1-4 years of age were significantly less likely than higher-income children to have ever been breastfed (41% vs. 67%). Among children who were breastfed as infants, however, there were no differences between WIC participants and nonparticipants in the percentage breastfed for 6 months or more, the percentage breastfed for a year or more, or in the mean duration of breastfeeding.
- Overall, breastfed WIC infants were significantly more likely to receive supplemental formula than breastfed infants in either of the nonparticipant groups (91% vs. 81% and 78%). In addition, breastfed WIC infants were fed formula on a daily basis at a significantly younger age than higher-income breastfed infants (6.6 weeks vs. 9.1 weeks).
- Among 1-4-year-old children who had been breastfed, there were no significant differences, overall, between WIC participants and either group of nonparticipants in the percentage who never received supplemental formula or in the age at which formula was first fed on a daily basis.

Infant Feeding Practices

- WIC infant feeding guidelines, as well as guidelines issued by the American Academy of Pediatrics (AAP), recommend that cow's milk not be introduced until 12 months of age (USDA, FNS, 2003c and AAP, 2003). Early introduction of cow's milk was significantly less common for WIC infants and children than for infants and children in either of the nonparticipant groups (11% vs. 27% and 18% for infants and 31% vs. 46% and 41% for children).
- It is recommended that infants be fed beverages from cups rather than bottles as soon as they are able to sit erectly on their own. At about a year of age, there was a noteworthy decline in use of baby bottles in all three groups of children. However, the rate of decline was significantly slower for WIC children than for higher-income children. At each year of age, the proportion of children using a baby bottle was significantly greater for WIC participants than for higher-income nonparticipants.
- Recommended infant feeding practices suggest that infants not receive solid foods before they are 4 months old (USDA, FNS, 2003c and AAP, 2003). WIC infants and children were no more or less likely than nonparticipant infants and children to be fed solid foods before they were 4 months of age. On average, however, WIC children were significantly older than higher-income children (6.3 months vs. 5.5 months) when they began to eat solid foods on a daily basis.

Physical Activity Practices of Pregnant and Postpartum Women

- Pregnant and postpartum women enrolled in WIC were about as physically active as income-eligible nonparticipants, but less physically active than higher-income nonparticipants.⁸ Twenty-seven percent of WIC women engaged in some physical activity at least three times per week, and 15

⁸Sample sizes were too small to support separate analyses for pregnant and postpartum women.

percent engaged in physical activity at least five times per week. This compares with 45 percent and 34 percent of higher-income nonparticipants, respectively.

Women's Use of Alcohol and Tobacco

- Patterns of alcohol consumption among pregnant and postpartum women were comparable for WIC participants and income-eligible nonparticipants. WIC participants, however, were less likely than higher-income nonparticipants to have consumed 12 or more alcoholic drinks in their lifetime (72% vs. 85%) or during the past year (21% vs. 46%). Among women who consumed alcohol during the past year, the mean number of drinks consumed on an average drinking day was significantly *greater* for WIC participants than for higher-income nonparticipants.
- There were no significant differences between WIC participants and either group of nonparticipants in the prevalence of smoking (ever or in the past 5 days) or in the mean number of cigarettes smoked by current smokers. However, WIC women reportedly started smoking at a younger age than higher-income women.

Health Status, Conditions, and Risks

General Health Status

- WIC participants and income-eligible nonparticipants had approximately equivalent health status, as measured by both self-reports and physician assessments. Roughly 63 percent of WIC participants and income-eligible nonparticipants rated their health as very good or excellent, 30 percent rated their health as good, and about 7 percent rated their health as fair or poor. According to physician assessments, which tended to be more positive, more than 85 percent of both WIC participants and income-eligible nonparticipants were in very good or excellent health and 12 percent of both groups were in good health.
- WIC participants were significantly *less* likely than higher-income nonparticipants to rate their health status as very good or excellent (62% vs. 84%) and were significantly *more* likely to rate their health status as fair or poor (8% vs. 2%). These between-group differences were consistently observed for women, infants, and children. Physician assessments revealed the same pattern of differences between WIC participants and higher-income nonparticipants; however, the magnitude of the between-group differences was smaller and only the difference in the percentage considered to be in excellent or very good health was statistically significant (87% vs. 91%). The between-group difference was concentrated among women.

Pregnancy and Childbirth History

- There were no significant differences between WIC women and income-eligible women in the mean number of pregnancies, mean number of live births, mean age at time of first live birth, or the percent of women who were teenagers or more than 35 years of age at the time of their first live birth. In comparison with higher-income nonparticipants, however, WIC participants had a significantly greater number of live births (1.6 vs. 1.1), were significantly younger at the time of their first live birth, and were more likely to have been teenagers.

Birth Characteristics of Infants and Children

- WIC infants were born to younger mothers, on average, than either income-eligible infants or higher-income infants (mean age of 24.1 years vs. 25.7 years and 28.9 years). In addition, WIC children were born to younger mothers than higher-income children (24.8 years vs. 28.2 years).
- WIC infants were also significantly more likely than infants in either nonparticipant group to be born to teenage mothers (23% vs. 14% and 3%). A similar pattern was observed among children; however, the difference between WIC children and income-eligible children was not statistically significant.
- Both WIC infants and WIC children were less likely than their higher-income nonparticipant counterparts to be born to mothers over age 35 (4% vs. 11% for infants and 4% vs. 9% for children).
- There was no significant difference between WIC infants and children and income-eligible infants and children in the percentage born to women who smoked during the pregnancy. In comparison with higher-income infants and children, however, WIC infants and children were significantly more likely to have been born to mothers who smoked (27% vs. 17% for infants and 29% vs. 19% for children).
- WIC infants and children had significantly lower mean birthweights (as reported by parents and caregivers) and were more likely to be low birthweight (less than 2,500 gm. or 5.5 pounds), than nonparticipant infants and children. The prevalence of low birthweight among WIC infants was twice that of income-eligible infants and three times that of higher-income infants (12% vs. 6% and 4%). Children showed a comparable pattern, but the between-group disparities were smaller (12% vs. 8% and 5%). These results are not surprising, given that low birthweight is a nutritional risk criteria used to establish program eligibility. Moreover, low birthweight infants may stay on WIC longer than normal weight infants because they tend to have more problems.

Children's Weight Status

- Among 1-4-year-old children, there was no significant difference between WIC participants and income-eligible nonparticipants in the prevalence of overweight (defined as being at or above the 95th percentile on CDC weight-for-height growth charts). However, WIC children were significantly more likely to be overweight than higher-income children (7% vs. 4%). There were no statistically significant differences between WIC participants and either group of nonparticipants in the percentage of children at risk of overweight (at or above the 85th percentile on the weight-for-height growth charts).
- WIC children were significantly more likely than income-eligible children to be underweight (weight-for-height below the 5th percentile) (7% vs. 3%). There was no significant difference between WIC children and higher-income children in the prevalence of underweight.
- WIC children had a greater prevalence of growth retardation (height-for-age below the 5th percentile) than either group of nonparticipant children (9% vs. 5% and 2%); however, only the difference between WIC children and higher-income children was statistically significant.

Iron Deficiency, Iron Deficiency Anemia, and Anemia

- **Iron Deficiency.** The overall prevalence of iron deficiency among 1-4-year-old children was about 6 percent. Prevalence was greatest among 1-year-olds (13%) and was substantially lower for older children. Overall, WIC children were significantly less likely than income-eligible children to be iron deficient (5% vs. 10%). Overall, there was no significant difference between WIC children and higher-income children in the prevalence of iron deficiency.
- **Iron Deficiency Anemia.** Iron-deficiency anemia (defined as being iron-deficient *and* having a low hemoglobin) was observed in about 2 percent of all 1-4-year-old children. WIC children were significantly more likely than higher-income children to have iron-deficiency anemia, although this was a relatively uncommon finding for all children, particularly those older than 2.
- **Anemia.** The prevalence of anemia, defined on the basis of low hemoglobin or hematocrit, was substantially greater than the prevalence of iron-deficiency anemia, as assessed in this analysis. Low hemoglobin levels may be caused by factors unrelated to iron status, including infection, inflammation, deficiencies of other nutrients (unlikely with this age group), and hereditary anemias. WIC children were no more or less likely than income-eligible nonparticipant children to have anemia (low hemoglobin). In comparison with higher-income children, however, WIC children were more likely to be anemic (9% vs. 6%).

Lead Poisoning

The problem of lead poisoning has been declining sharply in recent years. Between NHANES-II (1976-80) and the first phase of NHANES-III (1988-91), the overall prevalence of lead poisoning in the population as a whole decreased from 77.8 percent to 4.4 percent (CDC, 1997). Between Phase I (1988-91) and Phase II (1991-94) of NHANES-III, the overall prevalence of high blood lead levels continued to decline, with percentage point decreases generally being greater among groups with the highest prevalence of elevated lead levels during Phase I (CDC, 1997).

- According to data from Phase II of the NHANES-III data collection, WIC children were significantly more likely than either group of nonparticipating children to have elevated levels of blood lead.

Exposure to Second-hand Smoke

- WIC participants were no more or less likely than income-eligible nonparticipants to be exposed to second-hand smoke produced by smokers living in the same household. In comparison with their higher-income nonparticipant counterparts, however, WIC participants were more likely to be exposed to second-hand smoke. This was true for all three categories of WIC participants (women, infants, and children).
- NHANES-III measured serum cotinine in all respondents 4 years of age and older. Serum cotinine is a breakdown product of nicotine that is used as a biological marker for tobacco use and exposure to environmental tobacco smoke. There were no significant differences between WIC participants and income-eligible nonparticipants in the prevalence of high serum cotinine levels, but WIC participants had higher prevalence when compared with higher-income nonparticipants (78% vs. 52%).

Dental Health

- WIC women and income-eligible women had comparable numbers of missing, decayed, and filled teeth. In comparison with higher-income women, however, WIC women had fewer teeth that were missing, decayed, or filled.⁹
- Children 2 to 4 years of age had, on average, about one missing, decayed, or filled tooth. Although differences between groups were small, WIC children had significantly fewer missing, decayed, or filled teeth than higher-income children. This difference was observed for each age-specific cohort except 3-year-olds.
- Close to 100 percent of pregnant and postpartum women reported visiting a dentist or dental hygienist at least once in their lifetime, and 63 percent reported visiting a dental health professional in the past year. There were no statistically significant differences between WIC women and either group of nonparticipating women in these health practices.
- Among children 2-4 years old, 38 percent visited a dental health professional at least once and 36 percent visited a dental health professional in the past year. WIC children were no more or less likely to have had dental care visits than higher-income children. However, WIC children were significantly more likely than income-eligible children to have visited a dental health practitioner, ever (41% vs. 30%) or in the past year (39% vs. 29%).

Access to Health Care Services

Health Insurance Coverage

- Among women, there was no difference between WIC participants and income-eligible nonparticipants in the rate of health insurance coverage (79% vs. 80%). However, in comparison with higher-income women, women participating in WIC were significantly less likely to have health insurance.
- Among infants and children, WIC participants were *more* likely than income-eligible nonparticipants and *less* likely than higher-income nonparticipants to have health insurance.
- WIC participants were significantly *less* likely than individuals in either of the nonparticipant groups to have private health insurance coverage and were *more* likely to be receiving Medicaid benefits. These patterns were observed separately for women, infants, and children; however, among women, the difference between WIC participants and income-eligible nonparticipants in the receipt of private health insurance was not statistically significant.

⁹Reasons for differences between WIC participants and higher-income nonparticipants in the number of missing, decayed, and filled teeth could not be explored in this report. It is possible that the difference is due to better dental care for higher-income nonparticipants. For example, higher-income nonparticipants may have more *filled* teeth than WIC participants, resulting from attention to caries detected by x-ray rather than those causing pain or clearly visible on the exterior of a tooth.

Regular Source of Health Care

- More than 8 out of 10 pregnant and postpartum women reported having a regular source of health care—that is, a clinic, health center, or doctor’s office that was usually used for health care needs or to obtain health-related advice and information. There were no significant differences between WIC participants and nonparticipants in this regard.
- Overall, 97 percent of all infants and 95 percent of children had a regular source of health care. Nonetheless, WIC infants were significantly *more* likely than income-eligible nonparticipant infants and just as likely as higher-income nonparticipant infants to have a regular source of health care. Among children, WIC participants were *more* likely than income-eligible nonparticipants and *less* likely than higher-income nonparticipants to have a regular source of health care.
- WIC participants were no more or less likely to have a regular health care provider than their counterparts in the income-eligible nonparticipant group. However, in comparison with higher-income nonparticipants, all three categories of WIC participants were less likely to have a regular health care provider. Between-group differences were most substantial for women and children. Just over half (53%) of WIC women reported having a regular provider, compared with 82 percent of higher-income women. Similarly, 69 percent of WIC children had a regular health care provider, compared with 87 percent of higher-income children.