

United States
Department of
Agriculture



Economic
Research
Service

E-FAN-04-014-1

December 2004



Nutrition and Health Characteristics of Low-Income Populations

Volume I, Food Stamp Program Participants and Nonparticipants

Mary Kay Fox
Nancy Cole



*Food Assistance & Nutrition
Research Program*



E-FAN-04-014-1

December 2004

Nutrition and Health Characteristics of Low-Income Populations

Volume I, Food Stamp Program Participants and Nonparticipants

By Mary Kay Fox and Nancy Cole, Abt Associates Inc.

ERS project representative: Biing-Hwan Lin, 202-694-5458,
blin@ers.usda.gov

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 Food Stamp Program (FSP). FSP participants were compared with two groups of nonparticipants—those who were income-eligible for the FSP (income at or below 130 percent of poverty) and those with higher incomes (income above 130 percent of poverty). This research was designed to establish a baseline from which to monitor the nutritional and health characteristics of FSP participants and nonparticipants over time.

This report was prepared by Abt Associates Inc., under a research contract for the Economic Research Service. The views expressed are those of the authors and not necessarily those of ERS or USDA.

Acknowledgments

The authors wish to acknowledge the invaluable contributions of Ellie Lee, who completed all of the special programming required to estimate usual dietary intakes, and Nancy Burstein, who served as technical reviewer and offered many comments that improved the report. We also acknowledge Andrew McLaughlin, who diligently checked and proofed the report, and Linda Hatcher of the Economic Research Service, who completed the final copy edit. Thanks are also due to our project officer at the Economic Research Service, Biing-Hwan Lin, who along with colleagues Betsy Frazao, David Smallwood, Margaret Andrews, and Joanne Guthrie, generated the idea that resulted in this series of reports. Kevin Dodd at the National Cancer Institute and Alicia Carriquiry at the University of Iowa are also acknowledged for the consultation and advice they provided to staff at ERS and Abt Associates in conceptualizing and implementing the approach used to estimate usual dietary intakes. Finally, the report benefited from thoughtful review and critique by Biing-Hwan Lin, Betsy Frazao, and Margaret Andrews of the Economic Research Service and Steven Carlson of the Food and Nutrition Service.

Contents

Acknowledgments.....	ii
Executive Summary.....	ix
Chapter One: Introduction.....	1
The Food Stamp Program.....	2
Program Eligibility.....	2
Program Participation.....	2
Nutrition Education.....	4
The Third National Health and Nutrition Examination Survey.....	4
Analytic Approach.....	5
Age Adjustment.....	7
Statistical Tests.....	7
Chapter Two: Usual Intake of Food Energy and Nutrients.....	11
Participation in Other Food and Nutrition Assistance Programs.....	11
The WIC Program.....	11
The School Meal Programs.....	12
The National School Lunch Program.....	13
The School Breakfast Program.....	13
The Elderly Nutrition Program.....	14
Household Food Sufficiency.....	15
Meals and Snacks Consumed.....	16
Number of Meals Consumed.....	16
Consumption of Breakfast.....	16
Number of Snacks Consumed.....	16
Usual Intake of Food Energy and Key Nutrients.....	17
Standards Used to Assess Adequacy of Usual Intake.....	17
Food Energy.....	18
Vitamin C.....	20
Iron.....	20
Zinc.....	22
Calcium.....	22
Consumption of Milk and Soft Drinks.....	23
Use of Dietary Supplements.....	24
Chapter Three: Healthy Eating Index Scores and Usual Intake of Dietary Fiber.....	27
Healthy Eating Index Scores.....	27
Total HEI Scores.....	28
Food-based Component Scores.....	29
Males.....	30
Females.....	30
Nutrient-based Component Scores.....	33

Percentage of Persons Meeting Standards for HEI Nutrients: Usual	
Intakes vs.24-Hour Intakes	34
Percent of Energy from Total Fat	35
Percent of Energy from Saturated Fat	36
Cholesterol.....	37
Sodium.....	38
Usual Intake of Dietary Fiber	40
Chapter Four: Other Measures of Nutritional Status	43
Weight Status.....	43
Children 2-19 Years	43
Prevalence of Overweight and Being at Risk of Overweight.....	44
Prevalence of Underweight.....	44
Prevalence of Growth Retardation.....	45
Adults 20 Years and Older	45
Mean Body Mass Index	45
Distribution of Body Weight	45
Weight Change Since Age 25 and in the Past 10 Years	46
Weight Change Since Age 25	46
Weight Change in the Past 10 Years Among Adults 36 and Older.....	47
Accuracy of Perceptions about Body Weight.....	47
Desire to Lose Weight	48
Attempts to Lose Weight During the Past 12 Months	49
Nutritional Biochemistries.....	50
Iron Deficiency, Iron-Deficiency Anemia, and Anemia	50
Red Blood Cell (RBC) Folate	52
Serum Vitamin B ₁₂	53
Serum Cholesterol and Related Measures.....	53
Bone Density.....	54
Chapter Five: Health-Related Behaviors	55
Breastfeeding and Other Infant Feeding Practices.....	55
Initiation and Duration of Breastfeeding.....	55
Use of Supplemental Formula Among Breastfed Infants.....	56
Use of Cow's Milk Before 12 Months of Age	56
Use of a Baby Bottle	57
Introduction of Solid Foods.....	58
Physical Activity Among Children and Adolescents.....	58
Percent of Children Engaging in Vigorous Physical Activity at Least	
Three Times per Week	59
Participation in Organized Exercise Programs or Sports Teams.....	60
Television Viewing Among Children and Adolescents.....	60
Physical Activity Among Adults	61
Number of Physical Activities in the Past Month	62
Walking.....	62
Weekly Frequency of Physical Activity.....	63

Change in Level of Physical Activity Over Time	64
Alcohol Consumption	64
Tobacco Use	65
Mean Age Began Smoking.....	66
Exposure to Second-Hand Smoke.....	66
Chapter Six: Health Status, Conditions, and Risks.....	69
General Health Status	69
Health Conditions and Risks of Adults.....	70
High Blood Pressure.....	70
Other Chronic Conditions	71
Risk of Coronary Heart Disease.....	72
Pregnancy and Childbirth History	72
Birth Characteristics of Infants and Children	73
Maternal Age.....	74
Maternal Smoking During Pregnancy.....	74
Birthweight (Self-Report).....	74
Neonatal Intensive Care Stays.....	76
Measures of Childhood Health	76
Hospitalizations Since Birth.....	76
Accidents, Injuries, and Poisonings Requiring Medical Attention	76
Chronic Respiratory Conditions.....	77
Lead Poisoning.....	77
Dental Health	79
Visits to a Dentist or Dental Hygienist.....	79
Chapter Seven: Access to Health Care Services.....	81
Health Insurance Coverage.....	81
Regular Source of Health Care	83
Use of Health Care Services in the Past Year.....	84
References.....	85
Appendix A: NHANES-III Data Files	
Appendix B: Reference Standards	
Appendix C: Reporting Guidelines	
Appendix D: Detailed Tables	

List of tables and figures

Table 1—Number of NHANES-III respondents: FSP participants and nonparticipants	6
Table 2—Age distribution of FSP participants and nonparticipants in NHANES-III sample frame and year 2000 population	8
Figure 1—Percent of income- and categorically eligible infants and children participating in the WIC Program.....	12
Figure 2—Percent of children 5-16 years eating school lunch 5 days per week	13
Figure 3—Percent of children 5-16 years eating school breakfast 5 days per week	14
Figure 4—Percent of adults 60 and older participating in the Elderly Nutrition Program	15
Figure 5—Distribution of persons by household food sufficiency status.....	15
Figure 6—Mean usual intake of food energy as a percent of the 1989 Recommended Energy Allowance	18
Figure 7—Mean usual intake of food energy as a percent of the 1989 Recommended Energy Allowance: Males	19
Figure 8—Mean usual intake of food energy as a percent of the 1989 Recommended Energy Allowance: Females.....	19
Figure 9—Percent of persons with adequate usual intake of vitamin C	20
Figure 10—Percent of persons with adequate usual intake of iron	21
Figure 11—Percent of menarche-aged females with adequate usual intake of iron	21
Figure 12—Percent of persons with adequate usual intake of zinc	22
Figure 13—Percent of adults 71 and older with adequate usual intake of zinc	23
Figure 14—Mean usual intake of calcium as a percent of Adequate Intake.....	23
Figure 15—Percent of persons using dietary supplements in the past month	25
Figure 16—Mean Healthy Eating Index (HEI) scores.....	28
Figure 17—Distribution of total HEI scores.....	29
Figure 18—Mean scores for HEI food-based components: Males.....	31
Figure 19—Percent of persons meeting HEI standards for food-based components: Males.....	31
Figure 20—Mean scores for HEI food-based components: Females	32
Figure 21—Percent of persons meeting HEI standards for food-based components: Females	32
Figure 22—Mean scores for HEI nutrient-based components.....	34
Figure 23—Percent of persons meeting <i>Dietary Guidelines</i> recommendation for total fat: One-day (HEI) estimates vs. usual intake estimates.....	35
Figure 24—Percent of persons meeting <i>Dietary Guidelines</i> recommendation for saturated fat: One-day (HEI) estimates vs. usual intake estimates	37
Figure 25—Percent of persons meeting <i>Dietary Guidelines</i> recommendation for cholesterol: One-day (HEI) estimates vs. usual intake estimates.....	38
Figure 26—Percent of persons meeting <i>Dietary Guidelines</i> recommendation for sodium: One-day (HEI) estimates vs. usual intake estimates.....	38
Figure 27—Percent of females 12-19 years who were overweight or at risk of overweight.....	44
Figure 28—Mean Body Mass Index: Adults	45
Figure 29—Distribution of body weight: Adult females	46
Figure 30—Distribution of body weight: Adult males	46
Figure 31—Mean weight gain since age 25.....	47
Figure 32—Percent of adult females who perceived themselves to be overweight	48
Figure 33—Percent of overweight and obese adults who expressed a desire to lose weight	49

Figure 34—Percent of overweight and obese adults who tried to lose weight in the past 12 months.....	49
Figure 35—Percent of females of childbearing age with iron deficiency.....	51
Figure 36—Percent of specific population groups with anemia/low hemoglobin.....	52
Figure 37—Percent of persons with low levels of RBC folate.....	52
Figure 38—Percent of persons with high levels of total cholesterol.....	53
Figure 39—Percent of adults 80 and over with severely reduced bone density.....	54
Figure 40—Prevalence of breastfeeding.....	55
Figure 41—Percent of children 1-3 years still using a baby bottle.....	57
Figure 42—Frequency of vigorous physical activity among males 8-16 years.....	59
Figure 43—Percent of females 8-16 years exercising vigorously at least three times per week.....	60
Figure 44—Percent of children 8-16 years participating in organized exercise programs or sports teams.....	60
Figure 45—Percent of children 5-16 years watching 2 hours or less of television per day.....	61
Figure 46—Distribution of adults by number of different physical activities in past month.....	62
Figure 47—Percent of adults engaging in physical activity at least three times per week and five times per week.....	63
Figure 48—Mean number of alcoholic drinks consumed on an average drinking day.....	65
Figure 49—Percent of persons 12 years and older who were or are smokers.....	65
Figure 50—Mean age when became a regular smoker.....	66
Figure 51—Percent of nonsmokers with high serum cotinine levels.....	67
Figure 52—Self-reported general health status.....	69
Figure 53—Physician-assessed general health status.....	69
Figure 54—Self-reported high blood pressure vs. physician-assessed high blood pressure.....	70
Figure 55—Percent of adults reporting chronic health conditions.....	71
Figure 56—Mean 10-year risk of coronary heart disease.....	72
Figure 57—Mean number of pregnancies and mean number of live births among females who were ever pregnant.....	73
Figure 58—Percent of females who were teens at the time of their first live birth.....	73
Figure 59—Percent of infants and children whose mothers smoked during pregnancy.....	74
Figure 60—Reported mean birthweight of infants and children.....	75
Figure 61—Percent of infants and children born low birthweight, based on reported birthweight.....	75
Figure 62—Percent of infants and children with at least one hospitalization since birth.....	76
Figure 63—Percent of children with high blood lead levels.....	78
Figure 64—Percent of children with high blood lead levels: NHANES-III, Phase I and Phase II.....	78
Figure 65—Percent of persons who have visited a dentist or dental hygienist.....	79
Figure 66—Percent of persons with any health insurance coverage.....	82
Figure 67—Percent of preschool children with any health insurance coverage.....	82
Figure 68—Percent of adult males with any health insurance coverage.....	82
Figure 69—Percent of females of childbearing age with any health insurance coverage.....	83
Figure 70—Percent of persons with Medicaid and percent with private health insurance.....	83
Figure 71—Percent of persons with a regular source of health care.....	84
Figure 72—Percent of persons who see a regular physician or other health care provider.....	84

Executive Summary

This report describes the nutrition and health characteristics of participants and nonparticipants in the Food Stamp Program (FSP), 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

FSP participants are compared with two groups of nonparticipants: low-income individuals who were income-eligible for the FSP (household income at or below 130 percent of poverty) and higher-income individuals who were not income-eligible for the FSP (household income above 130 percent of poverty). These comparisons provide useful insights into policy-relevant questions, for example: are low-income individuals with the greatest nutritional and health needs receiving FSP services? Comparisons between FSP participants and higher-income nonparticipants are also of interest. These comparisons provide information on nutrition- and health-related disparities between FSP participants and individuals who are not constrained by low incomes. Both sets of comparisons also provide information on whether FSP participants do as well as other groups with respect to critical measures of nutrition and health status.

It should be noted that *this research was not designed to assess program impacts or in any way attribute differences observed between FSP 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 FSP 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 FSP participants and nonparticipants. These include dietary intake, body weight, selected nutritional biochemistries, bone density, health-related behaviors, measures of health status, conditions, and risks, and access to health care. All population estimates have been age-adjusted (based on year 2000 census data) to eliminate between-group differences that were due solely to differences in the age distribution of the groups.

Dietary Intake

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.³ Healthy Eating Index (HEI) scores (Kennedy et al., 1995) were also examined.

¹ Similar reports have been prepared for participants and nonparticipants in the WIC program (Cole and Fox, 2004a), for school-age children (Fox and Cole, 2004), and for older adults (Cole and Fox, 2004b).

² Beginning 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 time the tabulations presented in this report were prepared. Data for subsequent years are expected in mid-2005.

³ Because 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).

- **Meal consumption.** Overall, 35 percent of individuals 1 year of age and older consumed fewer than three meals in the preceding 24 hours. FSP participants were significantly more likely than higher-income nonparticipants to have consumed fewer than three meals in the preceding 24 hours (44% vs. 33%).
- **Energy.** On average, FSP participants consumed more food energy than income-eligible nonparticipants (95% of the 1989 Recommended Energy Allowance vs. 91%). FSP participants also consumed more food energy than higher-income nonparticipants, but this difference (95% vs. 93%) was not statistically significant.
- **Vitamin C.** Among males, FSP participants were significantly *more* likely than income-eligible nonparticipants to have an adequate usual intake of vitamin C (76% vs. 68%). Among females, FSP participants were significantly *less* likely than either group of nonparticipants to consume an adequate amount of vitamin C (75% vs. 79-80%).
- **Iron.** FSP participants were significantly less likely than higher-income nonparticipants to consume adequate amounts of iron (91% vs. 95%). Among menstruating females, who are at greater risk of consuming inadequate amounts of iron than other subgroups, differences between FSP females and higher-income females differed by age. Among 14-18-year-olds, FSP females were *more* likely than higher-income females to have an adequate iron intake (90% vs. 77%). Among females 19-50 years of age, the trend was reversed, with FSP females being *less* likely than their higher-income counterparts to consume adequate amounts of iron (77-80% vs. 84-86%).
- **Zinc.** FSP participants were significantly less likely than either group of nonparticipants to have an adequate zinc intake (80% vs. 83% and 88%). The oldest adults (71 years and older) were at the greatest risk of inadequate zinc intake and the risk was significantly greater for FSP participants than for higher-income nonparticipants (49% vs. 71% had adequate intake).
- **Calcium.** It was not possible to assess the prevalence of adequate calcium intakes among older adults because the required dietary standard—the EAR—has not been established for calcium. Mean usual calcium intakes were compared to established Adequate Intake (AI) levels. On average, FSP participants consumed a significantly smaller percentage of the AI for calcium than either income-eligible nonparticipants or higher-income nonparticipants (73% vs. 79% and 83%).
- **Percent of Energy from Fat.** On average, persons 2 years and older obtained about 34 percent of their food energy from fat.⁴ 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 more recently defined Acceptable Macronutrient Distribution Ranges (AMDRs) for fat intake (Institute of Medicine (IOM), 2002b).⁵ FSP participants had a significantly lower usual fat intake than

⁴Assessment of fat, saturated fat, cholesterol, sodium, and fiber intake was limited to persons 2 years and older because the reference standards used for most of these dietary components (the *Dietary Guidelines for Americans*) are not designed for younger children.

⁵AMDRs for fat intake have been defined for three different age groups: children 1 to 3 years (30-40% of energy); children 4 to 18 years (25-35%); and all those 19 years and older (20-35%).

higher-income nonparticipants (33.1% of total energy vs. 33.6%).

Distributions of usual fat intake suggest that, in several subgroups (4-8-years, 14-18-years, 31-50-years, and 71 years and older), FSP participants were more likely than one or both groups of nonparticipants to have usual fat intakes that fell within the relevant AMDR. A different pattern was observed for 1-3-year-olds. Although, few children in this age group had usual fat intakes that exceeded the upper end of the AMDR, the distributions suggest that this was more likely to occur for FSP participants than for either group of nonparticipants (usual intakes at the 95th percentile were 41.7% vs. 39.4% and 39.0%, compared with an AMDR of 30-40%). At the opposite end of the distribution, 1-3-year-old FSP participants were *less* likely than income-eligible nonparticipants and *more* likely than higher-income nonparticipants to have usual fat intakes that fell within the lower bound of the AMDR (usual intakes at the 15th percentile were 29.2% vs. 31.2% and 27.6%).

- **Percent of Energy from Saturated Fat.** The mean usual saturated fat intake of persons 2 and older exceeded the *Dietary Guidelines* recommendation that saturated fat provide less than 10 percent of total energy (USDA and U.S. DHHS, 2000). There were no significant between-group differences in the mean usual intake of saturated fat; in all three participant/nonparticipant groups, saturated fat contributed roughly 11 percent of usual energy intake. FSP participants were significantly less likely than income-eligible nonparticipants to meet the *Dietary Guidelines* recommendation for saturated fat (23% vs. 27%).
- **Cholesterol.** The mean usual cholesterol intake of persons 2 and older (271 mg.) was consistent with the *Dietary Guidelines* recommended maximum of 300 mg. (USDA and U.S. DHHS, 2000). The mean usual cholesterol intake of FSP participants was significantly greater than the mean usual intake of higher-income nonparticipants (291 mg. vs. 267 mg.). In addition, FSP participants were significantly less likely than higher-income nonparticipants to have usual cholesterol intakes that were consistent with the *Dietary Guidelines* recommendation (61% vs. 68%).

Sodium. The mean usual sodium intakes of persons 2 and older (3,463 mg.) exceeded the *Dietary Guidelines* recommended maximum of 2,400 mg. (USDA and U.S. DHHS, 2000) as well as the more recently defined Tolerable Upper Intake Levels (UL) (IOM, 2004).⁶ Overall, FSP participants had a significantly lower usual sodium intake than higher-income nonparticipants (3,339 mg. vs. 3,518 mg.). Nonetheless, distributions of usual sodium intake suggest that FSP participants aged 2-3-years, 4-8-years, and 14-18-years were significantly *less* likely than comparably aged higher-income nonparticipants to have usual sodium intakes consistent with the UL. The trend was reversed for older age groups. For all subgroups of adults 19 and older, FSP participants were significantly more likely than higher-income nonparticipants to have usual sodium intakes that were consistent with the UL.

⁶ULs for sodium are lower than the *Dietary Guidelines* recommendation, especially for the youngest age groups. The ULs are 1,500 mg. for 2-3-year-olds, 1,900 mg. for 4-8-year-olds, 2,200 mg. for 9-13-year-olds, and 2,300 mg. for all those 14 years and older.

Health Eating Index Scores

- For all persons 2 years and older, the mean HEI score was 64.0 out of a possible 100. On average, FSP participants scored lower on the HEI than either income-eligible or higher-income nonparticipants (60.2 vs. 61.8 and 64.8). The HEI is a composite score constructed from 10 individual scores: five food-based scores that assess intake of grains, vegetables, fruits, dairy, and meat, four nutrient-based scores, and a variety score.⁷
- FSP participants were *more* likely than higher-income nonparticipants to consume poor diets (24% vs. 15%) and *less* likely to consume “good” diets (6% vs. 12%).
- FSP males had significantly lower mean scores than income-eligible males for both the grain (6.3 vs. 6.9) and variety (6.6 vs. 7.2) components of the HEI. For both of these components, significantly fewer FSP males than income-eligible males satisfied the HEI standard (23% vs. 28% for the grain component and 42% vs. 48% for the variety component). Differences between FSP males and higher-income males were more widespread. FSP males had significantly lower mean scores than higher-income males on all of the food-based HEI components except meat. The same pattern was true for the percentage of males meeting HEI standards for the food-based components.
- Mean scores for female FSP participants and income-eligible females were significantly different for three of the six food-based HEI components: fruit, meat, and variety. For the fruit and variety components, FSP females had significantly lower mean scores than income-eligible females (3.1 vs. 3.9 for the fruit component and 6.5 vs. 6.9 for the variety component). For both of these components, significantly fewer FSP females than income-eligible females satisfied the HEI standard (13% vs. 22% for the fruit component and 39% vs. 45% for the variety component). FSP females were also less likely than income-eligible females to meet the HEI standard for vegetables (19% vs. 24%). For the meat component, the difference between FSP females and income-eligible females ran in the opposite direction. In comparison with income-eligible females, FSP females scored *higher*, on average, on the meat component (6.6 vs. 6.2) and were *more* likely to consume the recommended number of meat servings per day (30% vs. 25%).
- Mean HEI scores for FSP females and higher-income females were significantly different for all food-based components except grains. The same pattern was true for the percentage of females meeting HEI standards for food-based components. With the exception of the meat component, mean scores were significantly lower for FSP females than for higher-income females, and FSP females were significantly less likely than higher-income females to satisfy HEI standards. As noted in the comparison of FSP females and income-eligible females, the between-group difference for the meat component ran in the opposite direction.
- There were no significant differences between FSP participants and income-eligible nonparticipants on any of the nutrient-based components of the HEI. Significant differences were observed between FSP participants and higher-income nonparticipants for the cholesterol and

⁷The nutrient-based components compare intakes of total fat, saturated fat, cholesterol, and sodium to recommended maximums.

sodium components. FSP participants had a significantly *lower* mean score for cholesterol (7.3 vs. 7.9) and a significantly *higher* mean score for sodium (6.4 v. 6.0).

Body Weight

Body weight was assessed on the basis of body mass index (BMI), a measure of the relationship between height and weight that is the commonly accepted index for classifying adiposity (or fatness) in adults (CDC, 2003).⁸ For adults (20 and older), a healthy weight is defined as a BMI that is at least 18.5 but less than 25. Overweight is defined as a BMI of 25.0 to 29.9, and obesity is defined as a BMI of 30 or more. A BMI below 18.5 indicates underweight.

For children, BMIs were compared to a BMI-for-age growth chart developed by the CDC (Kuczmarski et al., 2002). Because this growth chart is designed for ages 2 and over, children less than 2 years were excluded from the analysis. In assessing children's weight status, use of the word "obesity" is avoided because of potential negative connotations (CDC, 2003). Instead, assessment of weight status focuses on the prevalence of overweight (defined as BMI-for-age at or above the 95th percentile), the prevalence of being at risk of overweight (defined as BMI-for-age between the 85th and 95th percentiles), and the prevalence of underweight (defined as BMI-for-age below the 5th percentile). The prevalence of retarded linear growth (height-for-age below the 5th percentile) was also assessed.

Adults (20 and Older)

- Adult FSP participants had a significantly greater mean BMI than either income-eligible nonparticipants or higher-income nonparticipants (28.3 vs. 26.9 and 26.4). The differences between groups were entirely attributable to differences among females (29.3 vs. 27.4 and 26.1).
- Female FSP participants were significantly *less* likely than either income-eligible females or higher-income females to be at a healthy weight (28% vs. 36% and 49%) and significantly *more* likely to be obese (42% vs. 30% and 22%).
- There were no statistically significant differences between FSP males and income-eligible males in the distribution of body weight. In comparison with higher-income males, however, FSP males were *more* likely to be at a healthy weight (44% vs. 37%) and *less* likely to overweight (29% vs. 42%).

Children 2-19 Years

- In comparison with higher-income children, FSP children had a significantly greater mean BMI (19.8 vs. 19.2) and were significantly more likely to be overweight (12% vs. 9%). These differences were concentrated among 12-19-year-old females. FSP females in this age group had a significantly greater mean BMI than comparably aged higher-income females (23.7 vs. 21.8). In addition, they were almost twice as likely to be overweight (13% vs. 7%) and almost twice as likely to be at risk of overweight (22% vs. 12%).

⁸BMI is equal to [weight in kilograms] ÷ [height in meters]².

- FSP children were significantly *less* likely than higher-income children to be underweight (3% vs. 4%). This difference was concentrated among 3-5-year-old males. In this subgroup, the prevalence of underweight among FSP participants was less than half that of higher-income nonparticipants (3% vs. 7%).
- FSP children were twice as likely as higher-income nonparticipant children to have retarded linear growth (6% vs. 3%).

Nutritional Biochemistries

- **Iron Deficiency.** FSP participants were twice as likely as higher-income nonparticipants to be iron deficient (10% vs. 5%). This difference was concentrated among females of childbearing age, particularly 20-29-year-olds (14% vs. 6%) and 30-39-year-olds (20% vs. 9%).
- **Iron-deficiency Anemia.** FSP participants were twice as likely as higher-income nonparticipants to have iron-deficiency anemia (4% vs. 2%). Differences between the two groups were concentrated among 1-2-year-olds (5% vs. 1%) and among females (5% vs. 3%).
- **Anemia.** Overall, the prevalence of anemia (defined on the basis of low hemoglobin) among FSP participants was double that of higher-income nonparticipants (14% vs. 7%). Among 1-2-year-olds, 3-5-year-olds, 20-29-year-olds, and adults 70 and older, FSP participants were significantly more likely than either income-eligible nonparticipants or higher-income nonparticipants to have anemia.
- **Low Red Blood Cell (RBC) Folate.** FSP participants were significantly more likely than higher-income nonparticipants to have low RBC folate (11% vs. 6%).
- **Low Serum Vitamin B₁₂.** FSP participants were significantly less likely than higher-income nonparticipants to have low levels of serum vitamin B₁₂ (2% vs. 3%).
- **High and Borderline-high Total Cholesterol.** FSP participants were significantly less likely than income-eligible nonparticipants to have a high total cholesterol (16% vs. 19%). This difference was concentrated among females, with FSP participants significantly less likely than either group of nonparticipants to have a high cholesterol (16% vs. 20% and 19%). There were no significant differences between FSP participants and either group of nonparticipants in the prevalence of borderline-high cholesterol levels.

Bone Density

- Among those most at risk of osteoporosis—adults 80 and over—FSP participants were significantly more likely than higher-income nonparticipants to have severely reduced bone density (42% vs. 24%).
- A notably different pattern was observed among younger adult males. FSP males were significantly *less* likely than income-eligible males (20-29 years and 40-49 years) and higher-income males (20-29 years through 40-49 years) to have reduced or severely reduced bone density.

Health-Related Behaviors

Initiation and Duration of Breastfeeding

- Among women who had given birth within the preceding 2 years, FSP participants were significantly less likely than either income-eligible nonparticipants or higher-income nonparticipants to have breastfed their infant(s) (45% vs. 59% and 63%). Similarly, FSP infants and children under the age of 6 were significantly less likely to have ever been breastfed than either income-eligible or higher-income nonparticipant infants and children (33% vs. 48% and 63%).
- Among infants and children who had been breastfed, FSP infants and children were significantly less likely than either group of nonparticipants to have been breastfed for at least 6 months (36% vs. 43-44%).
- Among the youngest breastfed infants (2-6-month-olds and 7-11-month-olds), FSP participants were significantly more likely than either of the nonparticipant groups to have received supplemental infant formula. In addition, among infants and 2-year-olds, breastfed FSP participants were first fed formula on a daily basis at a significantly earlier age than breastfed higher-income nonparticipants.

Other Infant Feeding Practices

- 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. However, in comparison with higher-income children, the rate of decline was significantly slower for FSP children. Among 1-4-year-olds, the percentage using a baby bottle was significantly greater for FSP participants than for higher-income nonparticipants at each year of age. Among 4-year-olds, the difference between FSP participants and income-eligible nonparticipants was also statistically significant.
- Recommended infant feeding practices suggest that infants not receive solid foods until they are at least 4 months old. Parents of FSP infants and children were more likely to adhere to this guideline than parents of either income-eligible nonparticipants or higher-income nonparticipants (20% vs. 24% for both groups of nonparticipants).

Physical Activity and Television Viewing Among Children

- In comparison with higher-income nonparticipant children, FSP children were less likely to engage in vigorous physical activity (mean time per week: 4.4 times vs. 4.8 times and percent engaging in vigorous physical activity at least three times per week: 74% vs. 81%) and less likely to be involved in team sports or other organized exercise programs (50% vs. 68%).
- Among children 5-16 years, FSP participants watched significantly more television, on average, than higher-income children. Higher-income males spent about 18 minutes less per day in front of the television than their FSP participant counterparts. Higher-income females spent about 35 fewer minutes per day watching television than FSP females. FSP children were less likely than

higher-income children to meet the *Healthy People 2010* goal (U.S. DHHS, 2000a) of limiting television viewing to no more than 2 hours per day (55% vs. 68%).

Physical Activity Among Adults

- Among adults (17 years and older) FSP participants were significantly *more* likely than either group of nonparticipants to engage in no physical activities (33% vs. 24% and 13%) and significantly *less* likely to engage in three or more physical activities (19% vs. 30% and 45%).
- In addition, FSP adults were less likely than adults in either of the nonparticipant groups to have walked a mile or more without stopping at least once during the past month (42% vs. 46% and 51%) and to have been physically active three or more times per week (37% vs. 51% and 60%) or five or more times per week (28% vs. 40% and 46%).

Alcohol Consumption

- Among persons 12 years and older, FSP participants were significantly less likely than higher-income nonparticipants to have consumed 12 or more alcoholic beverages—both over a lifetime (74% vs. 82%) and within the past year (37% vs. 52%). When drinking, however, FSP participants consumed more alcoholic beverages, on average, than higher-income nonparticipants (5 drinks vs. 3 drinks).

Tobacco Consumption

- FSP participants were significantly more likely than either income-eligible nonparticipants or higher-income nonparticipants to have ever smoked (defined as having smoked at least 100 cigarettes in a lifetime) (57% vs. 51% and 48%). Current use of cigarettes (defined as having smoked cigarettes in the last 5 days, regardless of whether 100 or more cigarettes had been smoked over a lifetime) was also significantly more common among FSP participants than either income-eligible or higher-income nonparticipants (44% vs. 35% and 25%).
- FSP participants started smoking at a younger age than either group of nonparticipants (16.3 years vs. 17.0 years and 17.2 years).
- Nonsmoking FSP participants were more likely than nonsmokers in either group of nonparticipants to be exposed to second-hand smoke produced by other household members (34% vs. 26% and 18%). The exposure of infants and young children to second-hand smoke is of special concern. FSP infants under a year of age were more likely than infants in either of the nonparticipant groups to be exposed to second-hand smoke (53% vs. 42% and 27%). In addition, FSP children between the ages of 1 and 5 were more likely to be exposed to second-hand smoke than comparably aged children in the higher-income nonparticipant group.
- The percentage of nonsmoking FSP participants with high serum cotinine levels was significantly greater than the percentage of nonsmokers in either the income-eligible or higher-income nonparticipant groups (75% vs. 70% and 62%). Cotinine is a breakdown product of nicotine, and is used as a biological marker for tobacco use and exposure to environmental tobacco smoke. The

prevalence of abnormal serum cotinine levels in children was exceptionally high for FSP participants.

Health Status

- FSP participants were *less* likely than either group of nonparticipants to rate their health status as being very good or excellent (33% vs. 40% and 63%) and *more* likely to rate their health status as fair or poor (32% vs. 24% and 10%).
- Physician assessments of general health status were consistently more positive than self-assessments, but the general trends were largely consistent with those observed in the self-reported data. Physicians found that FSP participants were *less* likely to be in excellent or very good health than either group of nonparticipants (61% vs. 66% and 76%) and *more* likely to be in fair or poor health (13% vs. 11% and 5%).

Chronic Health Conditions Among Adults

- FSP participants were more likely than either income-eligible or higher-income nonparticipants to report having diabetes (10% vs. 7% and 5%) and emphysema or congestive heart failure (9% vs. 6% and 4%).⁹ FSP participants were also more likely than higher-income nonparticipants to report having had a heart attack (5% vs. 3%) or a stroke (4% vs. 2%) and to actually have high blood pressure (based on physician assessment) (23% vs. 18%).
- Both FSP males and FSP females had significantly greater 10-year risks of coronary heart disease than their counterparts in the higher-income nonparticipant group. In addition, FSP males were significantly more likely than higher-income nonparticipant males to have a 10-year-risk that exceeded 10 percent (35% vs. 30%).

Pregnancy and Childbirth History

- FSP females were significantly more likely than either income-eligible or higher-income females to have been pregnant one or more times (93% vs. 84% and 78%). Among females who had ever been pregnant, FSP participants had significantly more pregnancies (4.4 vs. 3.5 and 2.9) and more live births (3.4 vs. 2.8 and 2.1) than either group of nonparticipants.
- Female FSP participants were significantly younger at the time of their first live birth than either income-eligible nonparticipant females or higher-income nonparticipant females (19.8 years vs. 21.0 years and 22.4 years). In addition, FSP females were significantly more likely than either group of nonparticipant females to have been teenagers at the time of their first live birth (59% vs. 47% and 30%).

⁹ Congestive heart failure and emphysema were combined for this analysis because the prevalence of each condition was so low that most point estimates in the individual tabulations were statistically unreliable.

Birth Characteristics of Infants and Children

- Among infants and children under 12 years of age, FSP participants were born to younger mothers, on average, than either group of nonparticipants (23.7 years vs. 24.7 years and 27.0 years). FSP infants and children were also more likely than infants and children in either of the nonparticipant groups to have been born to a teen mother (26% vs. 17% and 8%). FSP infants and children were less likely than higher-income nonparticipant infants and children to have been born to mothers over the age of 35 (4% vs. 6%).
- Infants and children participating in the FSP were more likely than either income-eligible or higher-income infants and children to have been born to women who smoked during the pregnancy (31% vs. 23% and 21%).
- Based on self-reported data, infants and children participating in the FSP had a significantly lower mean birthweight than either income-eligible nonparticipants or higher-income nonparticipants. Infants and children in FSP households were also more likely than infants and children in either of the two nonparticipant groups to have been low birthweight (less than 2,500 gm. or 5.5 pounds) (13% vs. 8% and 5%).

Measures of Childhood Health

- Among infants and 3-5-year-olds, the percentage of FSP participants who had been hospitalized at least once since birth was significantly greater than the percentage of either income-eligible or higher-income nonparticipants.
- Infants and children (up to the age of 16) participating in the FSP were significantly less likely than higher-income nonparticipant infants and children to have had an accident, injury, or poisoning that required medical attention (9% vs. 16%).
- Compared with higher-income nonparticipants, FSP infants and children under the age of 6 were more likely to have both asthma and chronic bronchitis. In addition, FSP children between 3 and 16 were significantly *less* likely to have hay fever than comparably aged higher-income children.

Lead Poisoning

- Infants and children participating in the FSP were significantly more likely than infants and children in either group of nonparticipants to have been screened for lead poisoning (17% vs. 10% and 6%).
- Based on NHANES-III laboratory tests, FSP children were significantly more likely than children in either of the nonparticipant groups to have high levels of blood lead (6% vs. 4% and 1%).

Dental Health

- Among adults 80 and older, the mean number of missing, decayed, and filled teeth was significantly higher for FSP participants than for either group of nonparticipants. In addition, among children 2–11 years and adults 60-69 years, FSP participants had more missing, decayed,

or filled teeth than higher-income nonparticipants. Among females 40-49 years, the trend was reversed. In this cohort, FSP participants had significantly fewer decayed, missing, or filled teeth than either group of nonparticipants.

- FSP participants were significantly less likely than higher-income nonparticipants to have visited a dental health professional at least once (90% vs. 95%) or within the past year (45% vs. 70%).

Health Insurance Coverage

- Overall, FSP participants were *more* likely than income-eligible nonparticipants and *less* likely than higher-income nonparticipants to have health insurance (81% vs. 67% and 93%). FSP participants were significantly *more* likely to have Medicaid coverage (59% vs. 15% and 2%) and significantly *less* likely to have private health insurance (26% vs. 48% and 89%).
- Among preschool-age children (1 to 5 years), the difference between FSP participants and higher-income nonparticipants in health insurance coverage was not statistically significant. In these age groups, only about 5 percent of FSP participants and a comparable percentage of higher-income nonparticipants were lacking insurance. In contrast, 23 to 26 percent of income-eligible nonparticipants in this age group had no health insurance. Differences between FSP participants and income-eligible nonparticipants were statistically significant. A comparable pattern was observed for infants.
- Among the oldest adults (70 years and older), there were essentially no significant differences between FSP participants and either group of nonparticipants in health insurance coverage. In this age cohort, close to 100 percent of the individuals in all three participant/nonparticipant groups were covered by some form of insurance.
- Among other adults (20 to 69 years), the statistical significance of the difference between FSP participants and income-eligible nonparticipants varied by gender. Among males, there were no significant differences between FSP participants and income-eligible nonparticipants in rates of insurance coverage. This pattern was also observed for females between 50 and 69 years of age. Among women of childbearing age (20-49 years), however, FSP participants were significantly more likely than income-eligible nonparticipants to have health insurance.

Regular Source of Health Care

- FSP participants were *more* likely than income-eligible nonparticipants and *less* likely than higher-income nonparticipants to have a regular source of health care (81% vs. 74% and 84%).
- FSP participants were significantly less likely than higher-income nonparticipants to have a regular health care provider (63% vs. 73%).