

**CHILDREN'S DIETS IN THE MID-1990'S:
DIETARY INTAKE AND ITS RELATIONSHIP WITH SCHOOL
MEAL PARTICIPATION**

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Background

Children's diets may influence their lives in a variety of ways, including affecting their growth, health outcomes, and cognitive development. The U.S. Department of Agriculture has developed several nutrition programs to promote healthy eating among children, including the National School Lunch Program (NSLP) and the School Breakfast Program (SBP). As of 1996 (the last year covered by this study) approximately 26 million students participated in the lunch program and 6.6 million participated in the breakfast program each school day. By fiscal year 1999, average daily participation was nearly 27 million for the NSLP and was 7.3 million for the SBP.

This report is the first of two reports on the nutrition of children using findings from the analysis of the 1994_1996 Continuing Survey of Food Intake by Individuals (CSFII). The key objectives of the overall study are to describe the diets of school-aged U.S. children as of the mid-1990s, examine relationships between children's participation in the school meal programs and their dietary intake, and examine changes in intake between the periods 1989-1991 and 1994-1996. This first report describes children's mean food and nutrient intake, reports the percentage meeting various dietary standards, and compares the diets of participants and nonparticipants in the school meal programs. A second report focuses on changes between the early and mid-1990s in the dietary intake of children.

The 1994-1996 CSFII collected dietary intake and other data from a nationally representative sample of noninstitutionalized residents of the United States. The analysis in this report uses data from nearly 2,700 children ages 6 through 18 years who completed two nonconsecutive days of dietary intake interviews. Parents assisted children ages 6 through 11 years in

reporting their intakes; older children reported their food and beverage consumption independently.

The analysis presented in this report includes several important methodological features. To address the issue of what proportion of children meet various dietary standards, we used statistical methods to obtain unbiased estimates of the distribution of usual intake using two days of intake information for each child. Since accepted reference standards (Estimated Average Requirements [EARs]) have not yet been developed for nutrients other than the B-vitamins, phosphorus, and magnesium, we assigned reference standards derived from the 1989 Recommended Dietary Allowances (RDAs) or Adequate Intakes (AIs) for the remaining nutrients.

Since the CSFII provides no direct measure of school meal participation status on the days of dietary data collection, we determined participation largely according to the foods the student reported having obtained and consumed from the school cafeteria on that day. Finally, in examining the relationship between school meal participation and dietary intake, we obtained regression-adjusted mean food and nutrient intake estimates after controlling for observable characteristics of participants and nonparticipants. Fifteen types of variables were used in the regression adjustment.

Findings

Children's Dietary Intakes

On average, students' reported daily consumption of food energy is less than the Recommended Energy Allowance (REA), especially among females. Mean food energy intakes by males ranged from 96 to 97 percent of the REA, whereas intakes by females ranged from 83 to 87 percent of the REA. These

relatively low reported intakes may have been the result of underreporting of food intake by children. Alternatively, the reported intakes may have been accurate but the children's actual energy requirements may have been lower than implied by the REA due to low physical activity levels among children.

Children's mean intakes of most vitamins and minerals exceed the RDA; however, mean intakes of vitamin E, folate, and zinc are less than this dietary standard. In addition, children's mean intake of calcium is below the AI and children's median intakes of vitamin A and magnesium are below the RDA.

Mean daily intakes of many vitamins and minerals relative to dietary standards differ greatly by age and gender. Despite the differences, for vitamin C and for B vitamins other than folate, mean intakes for all groups are well in excess of the RDA. For folate and the other vitamins and minerals, one or more age/gender group has a mean intake less than the RDA. Females ages 14 to 18 have the lowest mean intakes of vitamins and minerals.

Nearly all children meet the reference standard for most B vitamins, but many children of all ages are at risk of inadequate intakes of folate, magnesium, zinc, and vitamins A and E. In addition, a large proportion of children have calcium intakes well below the AI level. Particularly large proportions of children have low intakes of several of these nutrients. For example, fewer than half of all children meet the reference standards for folate and calcium and between half and two-thirds meet the standards for vitamin E, magnesium, and zinc.

Teenage girls are at especially high risk of having low vitamin and mineral intakes. For three nutrients (folate, calcium, and magnesium), fewer than 15 percent of 14-to 18-year-old females meet reference standards. Half or just over half of these teenage girls meet the reference standards for vitamin A, vitamin E, iron, phosphorus, and zinc. Females ages 9 to 13 also tend to have low intakes of the same set of vitamins and minerals as teenage girls. In general, children aged 6 to 8 (both males and

females) are likely to meet the standards for vitamins and minerals; the exceptions to this are vitamin E and zinc.

Non-Hispanic blacks and "others" are at increased risk of low or inadequate intakes of folate, magnesium, calcium, phosphorus, and vitamin A. Hispanics and "others" are at increased risk of low or inadequate intake of vitamin E. Household income did not appear to be consistently related to risk of inadequate intake.

Most children take fewer than the recommended number of servings of the five major food groups, especially in relation to their energy requirements. Only 2 percent of children meet Food Guide Pyramid servings recommendations for all five major food groups. Girls ages 14 to 18 have especially low intakes of fruits and dairy products, and this is consistent with their low mean nutrient intakes. Overall, the percentages of children meeting the recommended number of food group servings are 14 percent for fruit, 17 percent for meat, 20 percent for vegetables, 23 percent for grain, and 30 percent for milk.

Children are heavy consumers of regular or diet soda. Overall, 56 to 85 percent of children (depending on age and gender) consume soda on any given day. Teenage males are especially heavy consumers of soda, with over a third consuming more than three servings a day.

Small percentages of children meet the recommendations for intake of total fat, saturated fat, fiber, and sodium. Fewer than one-third of females ages 14 to 18 meet the recommendations for total fat and saturated fat intake, but even smaller percentages of children meet these recommendations among the other age/gender groups. Among 9- to 13-year-old males, for example, only 14 percent meet the total fat recommendation and 6 percent meet the saturated fat recommendation. Young children are most likely to meet the recommendations for sodium and fiber.

Black children are very unlikely to meet recommendations for total fat, saturated fat, and

sodium intake. Only 7 percent of black children limit their total fat intake to 30 percent or less of food energy, 5 percent limit their saturated fat intake to less than 10 percent of food energy, and 11 percent limit their sodium intake to 2,400 mg. Non-Hispanic whites and "others" are the racial/ethnic groups most likely to meet recommendations for total fat, saturated fat, and cholesterol.

Children's diets are high in added sugars. For all children, added sugars--including sugars used as ingredients in processed foods or added to foods as they are consumed--contribute a mean of 20 percent of total food energy. Differences as a percentage of calories are relatively small for the age/gender groups. However, absolute mean intake of added sugars ranges from 19 teaspoons for females ages 6 to 8 years to 36 teaspoons/day (3/4 cup) for males ages 14 to 18 years.

Compared with lunch and 24-hour intake, breakfast tends to be substantially higher in nutrient density for vitamins and minerals. Breakfast contributes a higher percentage of essential nutrients relative to its energy contribution than do lunch and other meals during the day. Furthermore, children's intakes of fat, saturated fat, and sodium are closer to being in line with dietary recommendations at breakfast than at other meals during the day. However, substantial proportions of children skip breakfast. Nearly 20 percent of females ages 14 to 18 skipped breakfast on both days for which intake was reported, which may contribute to their low mean intake of nutrients.

Relationship Between School Meal Program Participation and Dietary Intake

The school meal programs play a substantial role in the diets of school-aged children. On average, however, children get much more food away from school than at school. Because many children do not participate in the school meal programs, foods from the school cafeteria (most, but not all of which are offered as part of the NSLP or SBP) contribute a mean of 19 percent of the daily food energy intake of all children on school days; children get the rest of their food elsewhere. On the other hand, SBP participants,

most of whom also consume a school lunch, obtain about half of their food energy for the day from school cafeteria foods.

NSLP participation is associated with higher mean intakes of food energy and of many nutrients, both at lunch and over 24 hours. After controlling for observable characteristics, NSLP participants consume a mean of 94 percent of the REA over 24 hours (on school days), whereas nonparticipants consume 88 percent. Relative to nonparticipants, participants consume greater amounts of vitamins B6, vitamin B12, thiamin, riboflavin, calcium, phosphorus, magnesium, and zinc. The differences in the 24-hour intake of these nutrients are largely explained by the differences in participants' and nonparticipants' intakes of all foods at lunch.

NSLP participants continue to have higher mean intakes of total fat, saturated fat, and sodium than nonparticipants, both at lunch and over 24 hours. Total fat intake from all foods consumed at lunch is 37 percent of food energy for participants and 32 percent for nonparticipants, while saturated fat intake is 15 and 11 percent, respectively. These findings are consistent with reports from earlier studies. Higher intakes of fat at lunch almost entirely explain the 24-hour differences in fat intake between the two groups. Participants' intakes at lunch may have included a la carte foods sold in the school cafeteria and other foods in addition to foods that were part of the school lunch.

NSLP participants have substantially lower intakes of added sugars than do nonparticipants. At lunch, added sugars contribute 13.2 percent of food energy for participants and 22.9 percent for nonparticipants. Nonparticipants also consume significantly more added sugars over 24 hours. This difference leads to a corresponding difference in carbohydrate intake--participants' carbohydrate intake as a percentage of food energy is lower than that of nonparticipants.

NSLP participants are more likely than nonparticipants to consume vegetables, milk and milk products, and meat and meat substitutes,

both at lunch and over 24 hours; they also consume less soda and/or fruit drinks. Participants consume an average of 1.3 servings of vegetables at lunch compared with 0.6 servings by nonparticipants. Similarly, participants consume more milk servings at lunch than do nonparticipants (0.8 versus 0.2 servings). Perhaps as a substitute for milk, nonparticipants consume an average of 0.4 servings of soda and 0.3 servings of fruit drinks at lunch, compared with 0.2 and 0.1, respectively, for participants.

SBP participation is associated with higher intakes of food energy, calcium, phosphorus, and vitamin C. These higher intakes are evident over 24 hours, not just at breakfast. For example, participants' regression-adjusted mean food energy intake is 96 percent of the REA, compared with 90 percent among nonparticipants. Significantly larger percentages of participants than nonparticipants meet reference standards for vitamin C, vitamin B12, thiamin, and calcium. The favorable findings for vitamin C and calcium may be related, in part, to participants' much higher intakes of fruit and milk.

Students who participate in both the school breakfast and school lunch programs have

higher mean intakes of food energy, seven vitamins and minerals, total fat, saturated fat, fiber, and sodium than do students who participate in neither program. Participants are significantly more likely to meet the dietary standards for the intake of vitamin C, vitamin B6, vitamin B12, thiamin, riboflavin, calcium, iron, magnesium, phosphorus and zinc. On the other hand, participants are less likely to meet fat and sodium guidelines. For example, 15 percent of participants and 32 percent of nonparticipants have daily intakes of saturated fat less than 10 percent of food energy. Intake of added sugars is lower for participants. Compared with students who participate in neither program, participants in both programs consume (at breakfast and lunch) more than twice as many servings of milk and of fruit and vegetables combined and one-quarter the number of servings of soda and fruit drinks.

Improvements in the school meal programs can be a positive step in promoting healthy eating among children. In particular, improvements are needed to promote children's intakes that are consistent with dietary recommendations related to intake of fat, saturated fat, sodium, and fiber.

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