

# An Overview of Child Nutrition in the US

**F**amily mealtimes and food preferences exert strong influences on young children. That is important because eating habits formed in childhood often persist throughout life. Just as eating habits of adults in the US have changed, so, too, have those of our children. Information on diets of children and adolescents has been collected from large nationwide surveys as well as smaller longitudinal studies.

*Changes in Food Consumption:* Children's food choices reflect trends in nutrient and energy intakes and availability in the national food supply. During the past 25 years, cross-sectional data from the Bogalusa Heart Study<sup>1</sup> and USDA<sup>2,3</sup> showed that consumption of milk, vegetables, soups, breads, grains and eggs declined, and intake of fruit, fruit juices, sweetened beverages, poultry and cheese increased. While the percentage of energy intake from total fat and saturated fat fell from 38% to 33% and 16% to 11%, respectively, approximately 68% to 75% of children still exceed current dietary recommendations for intake of total and saturated fat. Mean dietary cholesterol intakes of children decreased between the 1970s and 1994, and have leveled off between 1988-1994 and 1999-2000. From 1989 to 1991 and 1994 to 1995, carbohydrate intake increased in 2- to 17-year-olds, primarily from increased intakes of grain mixtures (pizza, pasta and other dough-based dishes) and beverages (especially soft drinks).<sup>4</sup>

*Changes in Beverage Consumption:* Milk intake has changed dramatically over the past several decades. Between 1970 and 1997, annual per capita consumption of milk declined from 31 to 24 gallons.<sup>5</sup> Between 1977 and 1994, milk consumption declined 24% among boys and 32% among girls aged 6 to 11.<sup>6</sup> On the positive side, the proportion of children drinking reduced-fat or fat-free milk has doubled since the late 1970s, and by 1994, these milk types were consumed more frequently than whole milk. As milk drinking decreased during these years, carbonated soft drink consumption increased by 41%. As a result, the intake of carbonated soft drinks exceeded that of 100% fruit juice at age 5 and that of milk at age 13. Data indicate soft drinks are negatively associated with drinking milk and 100% fruit juice, thus reducing intake of many essential nutrients, including calcium, phosphorus, riboflavin, folate and vitamins A, B-12 and C.<sup>7</sup>

## Current Food, Energy and Nutrient Intake

The average reported energy intake of school-aged children is 91% of the Recommended Energy Allowance (REA),<sup>8</sup> suggesting either

an underreporting of energy intake or that the RDAs were set higher than children's actual needs. Evidence suggests the former, since data show that many children are in positive energy balance.

Average intakes of most vitamins and minerals for children 2 to 11 years of age exceed 100% of recommended levels when compared to the 1989 RDA.<sup>9</sup> The macronutrient composition of children's diets is similar to that of young adults; however, types of foods consumed and their contribution to intake of specific nutrients are different in children. There is also some regional and ethnic variation in types of foods consumed and their contribution to the diet; nonetheless, macronutrient composition of children's diets remains the same across culture and geography.

Children ages 3 to 5 years and 6 to 11 years have an average fiber intake of 11.4 g/day and 13.1 g/day, respectively, versus current recommendations of 14 g/1000 kcal. These levels of intake are almost unchanged from 1976. Only about 40% of dietary fiber for an average 10-year-old comes from vegetables, soups, fruit and fruit juices.<sup>9,10,11</sup>

In the US, most children's food choices do not meet the recommended food group servings from the Food Guide Pyramid. Notably, children are not eating recommended amounts of vegetables, fruit and whole grains. This accounts, in large part, for their low fiber intake. Optimal dietary advice for children is a total-diet approach that encourages them to eat vegetables, fruit and whole grains, with an emphasis on lower-fat options.<sup>1,12</sup>

## Children's Eating Patterns

Changes in children's eating patterns include increased consumption of foods in restaurants—including fast foods and take-out/delivery foods; eating larger amounts of foods; shifts in types of beverages consumed; and changes in meal patterns and meal frequency.<sup>13</sup>

*Meals Eaten at Home and Away from Home:* The prototypical pattern of family eating is changing as fewer families eat meals at home together. Children who do enjoy family-style dining at home show higher intakes of vegetables and fruits, fiber, folate, calcium, iron and vitamins B-6, B-12, C and E. They also report lower intakes of soft drinks, fried foods, saturated fats and trans fatty acids.<sup>14</sup>

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As children mature, they typically eat more meals away from home: preschool children eat out 18% of the time, compared to 26% for middle-school children. Fast-food restaurants account for more than half of away-from-home meals and contribute approximately 10% of children's total energy intake. Higher intakes of fat, saturated fat, cholesterol and sodium, and lower intakes of fiber, calcium and iron are seen in children who eat fast foods versus those who do not.<sup>15-18</sup>

*Portion Sizes:* Some studies have shown that eating larger portions of foods can contribute to higher energy intake. This is particularly true as children grow older. In a study conducted by Rolls, Engell and Birch, 5-year-old children ate more when they were served larger portions. However, portion sizes had little effect on the intake of 3-1/2-year-olds.<sup>19</sup>

Data from the Continuing Survey of Food Intake by Individuals from 1989 to 1991, 1994 to 1996, and 1996 to 1998, suggest that average amounts of food consumed both inside and outside the home increased for some foods.<sup>20</sup> Intake of salty snacks, desserts, soft drinks, fruit drinks, French fries, cheeseburgers, hamburgers and Mexican food reportedly increased. On the other hand, reported average intake decreased for margarine, chicken, pizza and macaroni and cheese.<sup>21</sup>

*Meal Patterns and Meal Frequency:* About 10% of children skip breakfast. Of those children who do eat breakfast, 49% eat at home and 51% eat at school.<sup>22</sup> Only 2% of children skip lunch. For example, although the percentage of 10-year-old children eating school lunch decreased from 90% to 78% between 1973 and 1994, the percentage of 10-year-old children bringing lunch from home increased from 1% to 11% during this same period.<sup>13, 14</sup>

Ninety-eight percent of 6- to 18-year-old students report eating at least three times a day, and more than 50% report eating five or more times.<sup>23</sup> Sixty-six percent of students reported eating an afternoon snack, and nearly that percentage said they ate an evening snack, while only 15% said they ate a morning snack. Specific eating occasions differ somewhat by age and gender, and younger students are more likely to consume breakfast, lunch and an afternoon snack. From 1977 to 1996, the percentage of children aged 6 to 11 years consuming snacks increased. About 82% reported eating snacks; snacks supplied 20% of total daily energy intake and 19% of total fat and saturated fat intake.<sup>9, 24</sup>

*Consumption of Energy-Dense, Low-Nutrient-Dense Foods:* Data from NHANES III showed that intake of low-nutrient-dense foods by children accounted for more than 30% of daily energy intake and

reflected items such as soft drinks, candy, table sweeteners, baked and dairy desserts, salty snacks and discretionary fats.<sup>25</sup> More frequent consumption of these low-nutrient-dense foods was associated with higher overall energy intake and lower intake of nutrient-dense foods, resulting in lower intakes of some vitamins and minerals.

## Role of Parents and Caregivers in Developing Healthy Eating Behaviors

Taste, cultural norms, food availability and nutrition influence food choices. The most influential aspect of a young child's immediate environment is the family, so it's not surprising that parents have a major impact on children's eating patterns and food habits.<sup>26</sup> Eating habits of young adults, such as eating all food on the plate, using food as a reward, eating dessert and eating regularly scheduled meals are related to feeding practices reportedly developed during their childhood.<sup>27</sup> Consideration of nutrition by young adults when selecting food is related to the memory of their parents talking about nutrition during childhood.<sup>28</sup>

Parents influence children's dietary practices in at least five areas: availability and accessibility of foods, meal structure, adult food modeling, food socialization practices and food-related parenting style. The social environment in which the child is fed is critical in establishing lifelong healthy eating habits.<sup>29</sup> For example, parental adiposity is positively associated with children's preferences for energy-dense foods, high total fat intakes and increased sedentary activities.<sup>30, 31</sup> Among African-American parents, modeling of healthful dietary behavior is positively associated with children's lower dietary fat intake and higher intake of fruits and vegetables.<sup>32</sup>

"I don't like it, and I won't eat it" is a frequent cry heard from young children.<sup>33</sup> It is important to understand that children learn to prefer foods through repeated exposures to those foods. Children need a minimum of eight to ten exposures to a new food to develop increased liking for that food.<sup>34</sup> Parents and other child caregivers should provide opportunities for children to learn to like a variety of nutritious foods by regularly offering these foods. When nutritious foods are easily accessible and ready to eat, children are more likely to eat them. For example, children are more likely to eat carrots that have been cleaned and cut into age-appropriate shapes and sizes than they are to choose a carrot from a bag of full-sized, unpeeled carrots.

Three- to 5-year-old children adjust meal sizes, according to the energy density of food available and their food intake across

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successive meals, to regulate their energy intake. However, feeding practices of caregivers influence children's responsiveness to energy density and meal size. When parents assume management of meal sizes or urge children to eat, rather than allowing them to focus on internal hunger cues, a child's ability to control meal size in response to energy density is diminished. This may be especially problematic in girls with high body mass indices and may contribute to chronic dieting and dietary restraint that has become common.<sup>35-38</sup> According to Satter, child feeding practices should focus on the division of parental and child responsibility: "... parents are responsible for presenting a variety of healthful foods to children and deciding the manner in which these foods are presented and children are responsible for whether and how much they eat."<sup>39</sup>

### Areas of Children's Nutrition that Need Improvement

Children's health has improved over the past three decades, as seen by lower infant mortality and a decline in nutrition deficiency diseases, such as rickets or pellagra. However, the number of children who are overweight has increased dramatically since the 1970s. Approximately 10.4% of children 2 to 5 years of age and 15.3% of children 6 to 11 years of age are overweight. Overweight has led to diseases previously seen only in adults, such as type 2 diabetes. As a result, dietary guidance for children now focuses on reducing over-consumption of food and increasing physical activity.

Undernutrition and growth retardation, as well as acute child nutrition problems such as iron-deficiency anemia and dental caries, remain a problem for some children. Nearly 11% of all US households (11.5 million households) are food insecure. Food insecurity affects children's emotional, behavioral and cognitive devel-

opment. Availability of child nutrition programs in schools and nutrition assistance programs helps assuage the impact that food insecurity has on children. The National School Lunch and Breakfast programs increase the likelihood that children will eat breakfast or lunch, thus improving their nutrition status.

Incidence of iron-deficiency anemia has decreased. It is, however, important to continue to monitor children's iron status since the prevalence of iron-deficiency in vulnerable populations exceeds that recommended in Healthy People 2010. Iron-rich foods, such as meat and fortified cereals, should be included in the diet to ensure that iron requirements continue to be met.

As with adults, critical dietary concerns for children include higher than recommended intake of saturated and trans fatty acids and inadequate intake of calcium and fiber. High saturated fat intake is associated with increased plasma cholesterol in children, ultimately increasing risk of cardiovascular disease. Failure to meet calcium requirements, in combination with a lack of physical activity, can prevent maximal skeletal growth and bone mineralization, increasing risk of osteoporosis. Adequate intake of dietary fiber decreases the risk of several chronic diseases, including heart disease, obesity, diabetes and, possibly, colon cancer. Diets high in fiber also tend to have less fat, cholesterol and energy than diets low in fiber.

Eating behaviors are learned early in life and commonly persist into adulthood. Overall major gains in future public health would be achieved if diets of children were aligned with the *Dietary Guidelines for Americans* and if physical activity levels were increased. Better understanding of how the family influences children's food preferences and intake is key if we want to establish healthful eating behaviors in early childhood, a time that may ultimately make the most difference for long-term health.

#### References:

- Nicklas TA, Elkasabany A, Srinivasan SR, Berenson G. Trends in nutrient intake of 10-year-old children over two decades (1973-1994): the Bogalusa Heart Study. *Am J Epidemiol.* 2001; 153:969-77.
- Nutrient content of the U.S. food supply, 1909-1994: a summary. Washington, DC: U.S. Department of Agriculture, Center for Nutrition Policy and Promotion, 1998. Available at: [www.usda.gov/cnpp/Pubs/Food%20Supply/foodsupplyrpt.pdf](http://www.usda.gov/cnpp/Pubs/Food%20Supply/foodsupplyrpt.pdf). Accessed November 4, 2003.
- Briefel RR, Johnson CL. Secular trends in dietary intake in the United States. *Ann Rev Nutr.* 2004; 24:401-31.
- Morton JF, Guthrie JF. Changes in children's total fat intakes and their food group sources of fat, 1989-91 versus 1994-95: implications for diet quality. *Family Econ Nutr Rev.* 1998; 11:45-57.
- Gerritor S, Putnam J, Bente L. Milk and milk products: their importance in the American diet. *Food Rev.* 1998; 21:29-37.
- Borrad L, Enns CW, Mickle S. What we eat: USDA surveys food consumption changes. Washington, DC: Food Review. USDA Economic Research Service, 1996.
- Harnack L, Stang J, Story M. Soft drink consumption among US children and adolescents: nutritional consequences. *J Am Diet Assoc.* 1999; 99:436-41.
- Nielsen SJ, Siega-Riz AM, Popkin BM. Trends in energy intake in U.S. between 1977 and 1996: similar shifts seen across age groups. *Obes Res.* 2002; 10:370-8.
- Wilson JAW, Enns CS, Goldman JD. Data tables: Combined Results from USDA's 1994 and 1995 Continuing Survey of Food Intakes of Individuals (serial online). 1998. Available at: [www.barc.usda.gov/bhnrc/food\\_survey/home.htm](http://www.barc.usda.gov/bhnrc/food_survey/home.htm). Accessed February 10, 1998.

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## References Continued:

10. Nicklas TA, Farris RP, Myers L, Berenson GS. Dietary fiber intake of children and young adults: the Bogalusa Heart Study. *J Am Diet Assoc.* 1995; 95:209-14.
11. Nicklas TA, Myers L, Berenson GS. Dietary fiber intake of children: the Bogalusa Heart Study. *Pediatrics.* 1995; 96:988-94.
12. Munoz KA, Krebs-Smith SM, Ballard-Barbash R, Cleveland LE. Food intakes of U.S. children and adolescents compared with recommendations. *Pediatrics.* 1997; 100:323-9.
13. Nicklas TA, Morales M, Linares A, Yang SJ, Baranowski T, De Moor C, Berenson G. Children's meal patterns have changed over a 21-year period: the Bogalusa Heart Study. *J Am Diet Assoc.* 2004; 104:753-61.
14. Gillman MW, Rifas-Shiman SL, Frazier AL, Rockett HR, Camargo CA, Jr., Field AE, Berkey CS, Colditz GA. Family dinner and diet quality among older children and adolescents. *Arch of Fam Med.* 2000; 9:235-40.
15. Lin B, Guthrie J, Frazao E. Popularity of dining out presents barrier to dietary improvements. *Food Rev.* 1998; 21:2-10.
16. Lin B, Guthrie J, Frazao E. Quality of children's diets at and away from home: 1994-96. *Food Rev.* 1999; 22:2-10.
17. Guthrie JF, Lin BH, Frazao E. Role of food prepared away from home in the American diet, 1977-78 versus 1994-96: changes and consequences. *J Nutr Educ Behav.* 2002; 34:140-50.
18. Zoumas-Morse C, Rock CL, Sobo EJ, Neuhauser ML. Children's patterns of macronutrient intake and associations with restaurant and home eating. *J Am Diet Assoc.* 2001; 101:923-5.
19. Rolls BJ, Engell D, Birch LL. Serving portion size influences 5-year-old but not 3-year-old children's food intakes. *J Am Diet Assoc.* 2000; 100:232-4.
20. Nielsen SJ, Popkin BM. Patterns and trends in food portion sizes, 1977-1998. *JAMA.* 2003; 289:450-3.
21. Smiciklas-Wright H, Mitchell DC, Mickle SJ, Goldman JD, Cook A. Foods commonly eaten in the United States, 1989-1991 and 1994-1996: are portion sizes changing? *J Am Diet Assoc.* 2003; 103:41-7.
22. Nicklas T, Bao W, Berenson G. Nutrient contribution of the breakfast meal classified by source in 10-year-old children: home versus school. *School Food Serv Res Rev.* 1993; 17:125-32.
23. Burghardt JA. School nutrition dietary assessment study: overview of the study design. *Am J Clin Nutr.* 1995; 61:182S-186S.
24. Jahns L, Siega-Riz AM, Popkin BM. The increasing prevalence of snacking among US children from 1977 to 1996. *J Pediatr.* 2001; 138:493-8.
25. Kant AK. Reported consumption of low-nutrient-density foods by American children and adolescents: nutritional and health correlates, NHANES III, 1988 to 1994. *Arch Pediatr Adolesc Med.* 2003; 157:789-96.
26. Hornack L, Block G, Lane S. Influence of selected environmental and personal factors on dietary behavior for chronic prevention: a review of the literature. *J Nutr Educ.* 1997; 29:306-12.
27. Vauthier JM, Lluch A, Lecomte E, Artur Y, Herbeth B. Family resemblance in energy and macronutrient intakes: the Stanislas family study. *Int J Epidemiol.* 1996; 25:1030-7.
28. Branan L, Fletcher J. Comparison of college students' current eating habits and recollections of their childhood eating practices. *J Nutr Educ.* 1999; 31:304-10.
29. Nicklas TA, Baranowski T, Baranowski J, Cullen K, Rittenberry L, Olvera N. Family and child-care provider influences on preschool children's fruit, juice, and vegetable consumption. *Nutr Rev.* 2001; 59:224-35.
30. Fisher JO, Birch LL. Fat preferences and fat consumption of 3- to 5-year-old children are related to parental adiposity. *J Am Diet Assoc.* 1995; 95:759-64.
31. Eck LH, Klesges RC, Hanson CL, Slawson D. Children at familial risk for obesity: an examination of dietary intake, physical activity and weight status. *Int J Obes.* 1992; 16:71-8.
32. Tibbs T, Haire-Joshu D, Schechtman KB, Brownson RC, Nanney MS, Houston C, Auslander W. The relationship between parental modeling, eating patterns, and dietary intake among African-American parents. *J Am Diet Assoc.* 2001; 101:535-41.
33. Birch LL, Fisher JA. Appetite and eating behavior in children. In: Gaull GE, ed. *The Pediatric Clinics of North America: Pediatric Nutrition.* Philadelphia, PA: W. B. Saunders, 1995:931-53.
34. Birch LL, Marlin DW. I don't like it; I never tried it: effects of exposure on two-year old children's food preferences. *Appetite.* 1982; 3:353-60.
35. Birch LL, Deysher M. Caloric compensation and sensory specific satiety: evidence for self-regulation of food intake by young children. *Appetite.* 1986; 7:323-31.
36. Birch LL, Johnson S, Andersen G, Peters JC, Schulte M. The variability of young children's energy intake. *N Engl J Med.* 1991; 324:232-7.
37. Birch LL, Fisher JO. Development of eating behaviors among children and adolescents. *Pediatrics.* 1998; 101:539-49.
38. Johnson SL, Birch LL. Parents' and children's adiposity and eating style. *Pediatrics.* 1994; 94:653-61.
39. Satter E. *Child of Mine.* Palo Alto, CA: Bull Publishing, 1986.