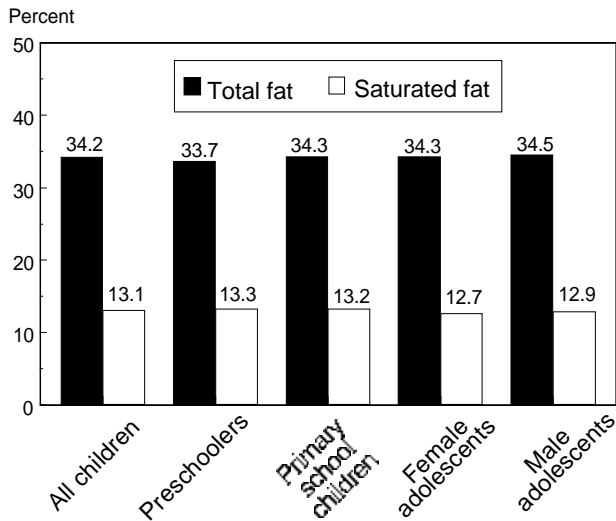


Figure 10  
**Percent of calories from total and saturated fat**



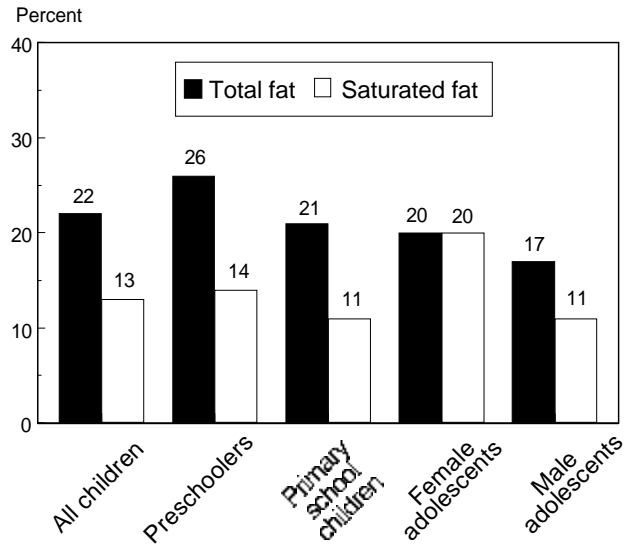
Compiled by USDA/ERS from CSFII 1989-91, 3-day weighted averages.

### Fat Intake

Carbohydrate, protein, and fat are the main energy sources for the body. Dietary fat supplies essential fatty acids for proper growth in children and is a carrier of fat-soluble vitamins, A, D, E, and K. However, excess fat consumption is now a source of concern in American diets, and has been associated with heart disease, certain cancers, obesity, and gall bladder disease. In this study, fat intakes are compared with the recommendations from the 1995 *Dietary Guidelines for Americans*: no more than 30 percent of calories from total fat and less than 10 percent of calories from saturated fat. On average, each gram of carbohydrate, protein, and fat generates 4, 4, and 9 calories. In this study, fat intakes were converted into calories and then divided by total calories from carbohydrate, protein, and fat to derive the percent of calories from fat.

Over the past decades, Americans have made substantial progress in reducing fat intakes in their diets, in part due to heightened dietary concerns and increased availability of nutritionally improved products in the market. For example, based on USDA food consumption survey data, the percentage of calories from fat in Americans' diets has been reduced from 40 percent in 1977/78 to 34-35 percent in 1989/91—a marked improvement but still above the recommended level.

Figure 11  
**Percent of children meeting the fat guidelines**



Compiled by USDA/ERS from CSFII 1989-91, 3-day weighted averages.

While caloric intakes of children varied substantially by age and gender, the share of calories from total and saturated fat was fairly consistent, differing by less than 1 percentage point for both total and saturated fat among the four age/gender groups (fig. 10). Children age 2-17 had an average of 34.2 and 13.1 percent of calories from total fat and saturated fat. About 22 percent of the children met the 30-percent guideline for total fat, and only 13 percent met the 10-percent guideline for saturated fat (fig. 11). Only 17 percent of male adolescents met the total-fat guideline (11 percent met the saturated-fat guideline), while 26 percent of preschoolers met the total-fat guideline (fig. 11).

The distributions of total fat and saturated fat intakes by meal/snack category and food source exhibited similar patterns among age/gender groups (table 2). For all children, evening meals provided the largest share of fat intakes, exceeding one-third of the total (37 percent for total fat and 36 percent for saturated fat) (table 2). Home foods accounted for 70 percent of total and saturated fat intakes. Among the four away-from-home food sources, schools provided the highest percentages of calories, total fat, and saturated fat. Among the four groups of children, female adolescents had the highest proportion of fat intakes (35 and 36 percent for total and saturated fat) from away-from-home sources mainly because they had the highest tendency to eat foods away from home.

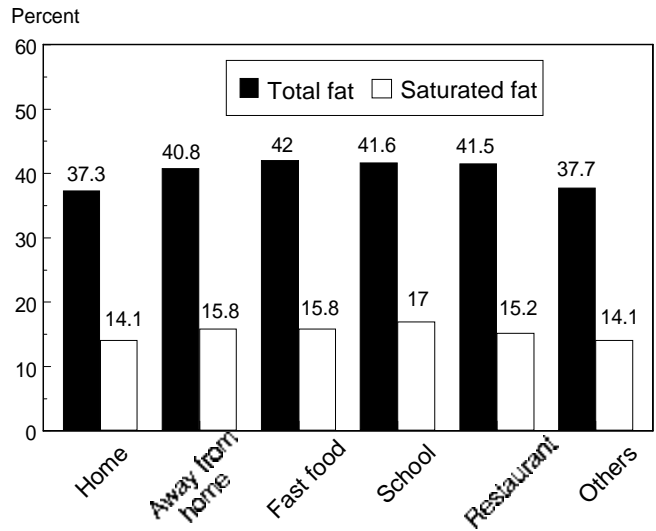
To compare the nutritional quality of meals and snacks eaten at different locations and occasions, we can examine their nutrient-to-calorie density (the amount of a nutrient per 1,000 calories (called nutrient density hereafter). Nutrient densities of foods by meal/snack category and source are reported in table 3. Because energy intake varies from person to person, average nutrient density in this study is weighted by the individual energy intake.

The distribution pattern of fat density across the four meal/snack categories is quite similar among the four groups of children. For all children, morning meals had the lowest total fat (32.3 grams per 1,000 calories) and saturated fat (13.4 grams per 1,000 calories) densities among the four meals and snacks. Among all children, midday meals had the highest total and saturated fat densities (41.5 grams of total fat and 15.6 grams of saturated fat per 1,000 calories), about 29 and 16 percent higher in total and saturated fat than morning meals. Evening meals had a slightly lower fat density (40.9 grams of total fat and 14.8 grams of saturated fat per 1,000 calories) than midday meals. Snacks had a fat density slightly higher than morning meals but much lower than midday and evening meals; however, snacks eaten by male adolescents had a fat density lower than the level in morning meals.

Home foods had a lower fat density (37.3 grams of total fat and 14.1 grams of saturated fat per 1,000 calories) than away-from-home foods (40.8 grams per 1,000 calories and 15.8 grams per 1,000 calories) (fig. 12). The higher fat density for away-from-home foods occurred across age and gender. This is an important finding for nutrition educators and policymakers because dining out is expected to continue its upward trend. Since 1994, the Nutrition Labeling and Education Act (NLEA) has required that virtually all packaged foods carry a standardized nutrition label. Foods sold in restaurants are not required to routinely carry nutrition information. However, if a restaurant item carries a health or nutrient claim (such as "low fat"), it is expected that the item meets FDA's definition of the claim (e.g., a low-fat meal should contain no more than 10 grams of fat). Moreover, if a claim is made, the restaurant must furnish nutrition information about the food to consumers, upon request. However, in most instances, less nutrition information is available to consumers when they eat out.

Figure 12

**Total and saturated fat-to-calories density: at home and away from home**



Compiled by USDA/ERS from CSFII 1989-91, 3-day weighted averages.

During the 1989-91 period, foods prepared at schools were higher in fat, fiber, and calcium and lower in cholesterol, iron, and sodium when compared with home foods. Similar results were obtained in a 1993 USDA-sponsored assessment of the nutrient quality of school meals. Consequently, USDA began working on an initiative to improve school meals in 1993. To show support for USDA, the Congress passed the Healthy Meals for Healthy Americans Act of 1994 (Public Law 103-448) requiring that meals served under the National School Lunch Program and School Breakfast Program meet the *Dietary Guidelines for Americans* by July 1, 1996. In June 1994, USDA launched the School Meals Initiative for Healthy Children, a comprehensive approach to turning Congress' mandate into a successful program. The Initiative includes both actions to support State and local food service organizations in improving school meals and a broad-based nutrition promotion program to increase the popularity of school meals and encourage children to improve their overall diets.

The fact that school meals and snacks were high in total and saturated fat has been recognized by the USDA. A USDA-sponsored assessment of the nutritional quality of school meals indicated that while school lunches provide one-third or more of the daily RDA for key nutrients, very few schools meet the dietary guidelines for total and saturated fat (Burghardt and others, 1993). Consequently, the Healthy Meals for Healthy Americans Act of 1994 (Public Law 103-448) requires that meals served

**Table 3—Nutrient-to-calorie density of dietary components by meal/snack categories and food sources**

Age/gender groups/ nutrient-to-calorie density <sup>1</sup>	Total fat	Saturated fat	Cholesterol	Sodium	Fiber	Calcium	Iron
Unit per 1,000 calories	<i>grams</i>	<i>grams</i>	<i>mg</i>	<i>mg</i>	<i>mg</i>	<i>mg</i>	<i>mg</i>
Children age 2-17							
Morning meals	32.3	13.4	188	1471	5.9	731	12.7
Midday meals	41.5	15.6	119	1774	7.1	502	5.7
Evening meals	40.9	14.8	139	1950	7.1	414	6.5
Snacks	34.7	13.9	71	997	5.5	437	4.5
Preschoolers							
Morning meals	32.1	13.6	204	1468	6.1	795	13.4
Midday meals	41.7	16.0	127	1858	6.8	540	5.8
Evening meals	40.0	14.9	143	1939	7.2	481	6.5
Snacks	34.4	14.7	75	891	5.6	520	4.7
Primary school children							
Morning meals	31.4	13.3	190	1476	6.0	749	13.0
Midday meals	40.9	15.4	111	1738	7.4	505	5.5
Evening meals	41.5	15.1	140	1916	7.0	437	6.3
Snacks	34.7	13.7	72	1001	5.4	395	4.3
Female adolescents							
Morning meals	32.7	13.5	179	1475	5.8	692	12.2
Midday meals	41.7	15.4	127	1774	6.7	474	5.9
Evening meals	39.9	14.1	135	1968	7.2	346	6.5
Snacks	36.0	13.5	69	1158	5.7	408	4.4
Male adolescents							
Morning meals	33.9	13.2	174	1464	5.5	654	11.7
Midday meals	42.5	15.7	122	1763	6.9	480	5.9
Evening meals	41.4	14.4	135	2007	7.1	373	6.6
Snacks	33.8	13.8	65	968	5.5	449	4.8
Children age 2-17							
Home foods	37.3	14.1	137	1687	6.7	521	7.8
Away from home <sup>2</sup>	40.8	15.8	122	1574	6.4	469	5.6
Fast food	42.0	15.8	109	1584	5.7	372	5.5
Schools	41.6	17.0	124	1566	7.6	623	5.7
Restaurants	41.5	15.2	161	1736	6.1	393	5.9
Others	37.7	14.1	121	1514	5.5	374	5.4
Preschoolers							
Home foods	36.9	14.6	145	1644	6.6	600	7.9
Away from home <sup>2</sup>	40.4	15.5	122	1580	6.3	471	6.0
Fast food	41.5	15.6	104	1536	5.7	356	5.5
Schools	39.5	16.4	127	1567	7.3	653	6.7
Restaurants	42.3	14.1	158	1890	5.8	349	5.6
Others	39.4	15.1	123	1533	6.0	444	5.8
Primary school children							
Home foods	37.2	14.1	137	1663	6.7	522	7.8
Away from home <sup>2</sup>	40.6	15.9	117	1587	6.7	493	5.6
Fast food	42.8	16.0	110	1659	5.8	376	5.7
Schools	40.9	16.9	120	1573	7.9	644	5.6
Restaurants	42.9	15.6	135	1669	6.4	383	5.9
Others	36.2	14.0	115	1496	5.3	366	5.3
Female adolescents							
Home foods	37.4	13.8	135	1787	6.8	469	7.8
Away from home <sup>2</sup>	41.0	15.5	122	1532	6.1	430	5.4
Fast food	41.3	15.5	104	1476	5.8	374	5.2
Schools	42.4	16.6	126	1559	7.2	563	5.5
Restaurants	40.3	15.2	179	1591	5.6	410	5.5
Others	39.0	14.3	123	1550	5.6	344	5.4
Male adolescents							
Home foods	37.9	13.7	129	1707	6.7	471	7.9
Away from home <sup>2</sup>	41.4	16.1	130	1584	6.2	460	5.5
Fast food	41.7	15.9	116	1607	5.5	373	5.5
Schools	43.8	18.1	130	1555	7.2	609	5.3
Restaurants	40.0	15.5	185	1856	6.1	427	6.5
Others	37.5	13.4	128	1488	5.4	352	5.4

<sup>1</sup> Because energy intake varies from person to person, nutrient-to-calorie density is weighted by the individual energy intake in addition to the population weight.<sup>2</sup> Away from home presents the aggregate of fast foods, schools, restaurants, and others.

Compiled by USDA/ERS from 1989-91 CSFII, 3-day averages weighted by population and individual energy intake.

under the National School Lunch Program and School Breakfast Program meet the *Dietary Guidelines for Americans*. USDA launched the School Meals Initiative for Healthy Children, a comprehensive approach to turning Congress's mandate into a successful program. The Initiative includes both actions to support State and local food service organizations in improving school meals and a broad-based nutrition promotion program to increase the popularity of school meals and encourage children to improve their overall diets. The Initiative represents the first programwide reform of the school meals program since it was established by President Truman in 1946.

In addition, USDA has intensified its efforts in improving children's diets. Under Team Nutrition, USDA intends to educate children to make healthy choices about food. Children are encouraged to eat a variety of foods; increase grain products, vegetables, and fruits in their diets; and lower fat intakes.

### Cholesterol Intake

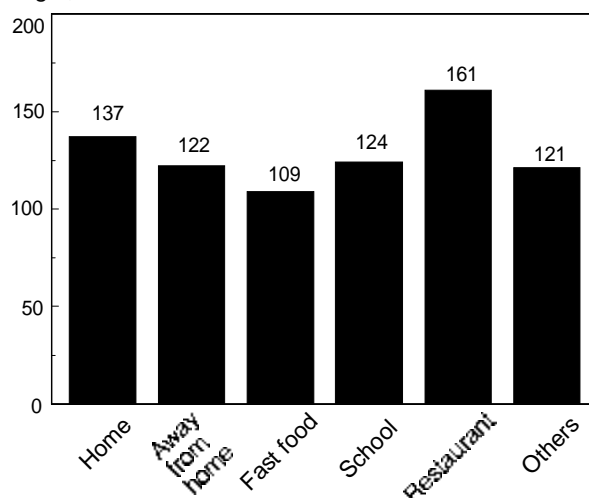
Dietary cholesterol is not a fat, but rather a fatlike substance that is found only in animal products. Too much cholesterol in the blood can accumulate in the walls of the blood vessels, which can reduce the flow of blood in major arteries and lead to heart attack. Most cholesterol in blood is manufactured by the body at a rate of 800 to 1,500 mg per day, compared with a 3-day average intake of 258 mg/day in American diets during 1989-91. There is no RDA for cholesterol. Many health authorities recommend a daily cholesterol intake of less than 300 mg, which is used as the Daily Reference Value (DRV) by the FDA. This DRV value does not vary across age/gender groups.

The 1989-91 CSFII data reveal that most children met the recommendation for cholesterol. Children age 2-17 had an average daily cholesterol intake of 236 mg, and 77 percent of them met the recommendation (table 1). Older children ate more and hence had higher cholesterol intakes. Preschoolers had an average cholesterol intake of 196 mg per day, and 86 percent of them met the recommendation. Cholesterol intake increased to 236 mg for primary school children (77 percent met the recommendation) and to 303 mg for male adolescents (64 percent met the recommendation).

Figure 13

### Cholesterol-to-calories density: at home and away from home

mg/1,000 calories



Compiled by USDA/ERS from CSFII 1989-91, 3-day weighted averages.

The cholesterol densities in children's diets were 133 and 132 mg per 1,000 calories for females and males. Average REA's are 2,200 and 2,900 calories for female and male adults age 19-50. To meet the 300-mg guideline for cholesterol intake while consuming their average REA's, women age 19-50 should consume no more than 136 mg cholesterol per 1,000 calories and men age 19-50 no more than 103 mg cholesterol per 1,000 calories. Clearly, male children have a more urgent need to modify their eating habits as they grow older in order to meet the recommended cholesterol intake guideline during adulthood.

The cholesterol distribution mirrors the caloric distribution: the evening meal's share of cholesterol intake increased with age while the morning meal's share decreased with age (table 2). Older children ate out more often and hence obtained a higher proportion of calories and cholesterol away from home. Foods prepared at schools had the largest shares of calories and cholesterol intake among the four away-from-home sources.

For all children, morning meals had the highest cholesterol density (188 mg per 1,000 calories) among the four meal/snack categories. Evening meals had a cholesterol density of 139 mg per 1,000 calories and snacks only 71 mg per 1,000 calories (table 3).

Home foods had a higher cholesterol density (137 mg per 1,000 calories) than away-from-home foods (122 mg per 1,000 calories) (fig. 13). However, foods

prepared at restaurants with waiter/waitress services had the highest cholesterol density (161 mg per 1,000 calories) among all food sources, averaging 18 percent higher than home foods. Fast foods had a cholesterol density of 109 mg per 1,000 calories, about 80 percent of the level in home foods. School meals had a cholesterol density (124 mg per 1,000 calories) higher than fast foods but lower than home foods by about 10 percent.

The cholesterol density in morning meals, evening meals, and snacks tended to decrease with age. Cholesterol density in home foods also tended to decrease with age. Restaurant foods consumed by adolescents had a much higher cholesterol density than those consumed by younger children. Older children ate more and hence consumed more cholesterol, but the cholesterol density decreased with age, from 140 mg per 1,000 calories among preschoolers to 131 mg per 1,000 calories among primary school children to 130 mg per 1,000 calories among adolescents.

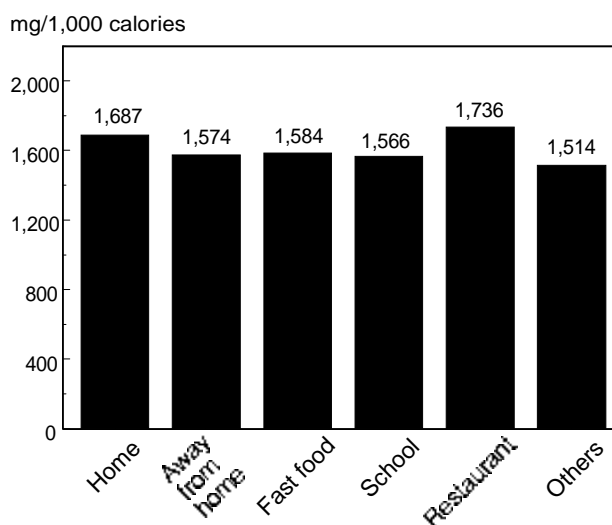
## Sodium Intake

Most Americans consume more sodium than is needed. Epidemiological studies indicate a relationship between a high sodium intake and the occurrence of high blood pressure and stroke (USDHHS, 1988). Sodium estimates in CSFII include sodium occurring naturally in foods, added via food processing, and used in food preparation. They do not include sodium added at the table.

Children in the 1989-91 CSFII surveys consumed an average of 2,948 mg of sodium. The FDA's Daily Reference Value for sodium is 2,400 mg, a fixed amount regardless of age and gender. Daily sodium intakes increased with age, from 2,274 mg for preschoolers to 2,947 mg for primary school children to 3,926 mg among male adolescents (table 1). The percentage of children meeting the sodium recommendation decreased with age, declining from 60 percent among preschoolers to 10 percent among male adolescents.

The sodium densities were 169 and 164 mg per 1,000 calories for females and males age 2 to 17. To meet the 2,400-mg sodium recommendation while consuming their average REA's, women and men age 19 to 50 need to consume no more than 109 and 83 mg of sodium per 1,000 calories. Therefore, major

Figure 14  
**Sodium-to-calories density: at home and away from home**



Compiled by USDA/ERS from CSFII 1989-91, 3-day weighted averages.

dietary changes have to occur as children grow up for them to meet the recommended limit on sodium intake as adults.

Among all children, evening meals accounted for 42 percent of sodium intake, followed by midday meals (32 percent) and morning meals (18 percent). Snacks accounted for 15 percent of calories and 9 percent of sodium intakes (table 3), indicating snacks eaten by children were quite low in sodium.

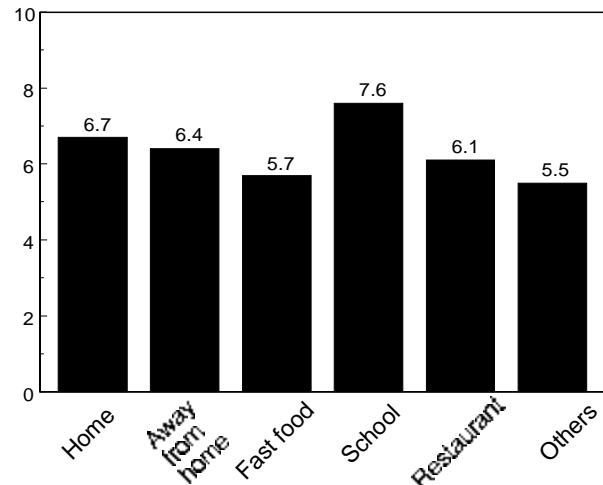
Sodium-to-calorie density pattern across the four meal/snack categories was similar among the four groups (table 3). Snacks contained the least amount of sodium per calorie (997 mg per 1,000 calories). Midday and evening meals were high in sodium density (1,774 and 1,950 mg per 1,000 calories). Home foods had a higher sodium density than away-from-home foods (1,687 mg per 1,000 calories vs. 1,574 mg per 1,000 calories), with the exception of restaurant foods (1,736 mg per 1,000 calories). The major source of sodium in children's diets comes from processed foods (Kennedy and Goldberg, 1995). Therefore, strategies to reduce sodium intake must involve not only meal preparers but also food manufacturers.

School meals had the largest share of sodium intake among the four away-from-home sources, but the sodium density in school meals (1,566 mg per 1,000 calories) was lower than the level in fast foods (1,584 mg per 1,000 calories) and restaurant foods (1,736 mg per 1,000 calories) (fig. 14).

Figure 15

**Fiber-to-calories density: at home and away from home**

Grams/1,000 calories



Compiled by USDA/ERS from CSFII 1989-91, 3-day weighted averages.

**Fiber Intake**

Dietary fiber has important health benefits in childhood, especially in promoting normal laxation. In addition, fiber may help reduce the risk of heart disease and some cancers. The National Cancer Institute recommends a daily intake of 20 to 30 grams with an upper limit of 35 grams per day. A new recommendation from the American Health Foundation proposes that a reasonable goal for dietary fiber intake during childhood and adolescence may be the child's age plus 5 grams per day—"age plus 5" (Williams, 1995). This "age plus 5" guideline levels out with 17-year-olds eating 22 grams/day, within the range recommended by the National Cancer Institute.

Despite intensive efforts by nutritionists, manufacturers, and others in the health care industry to promote the virtues of fiber, intakes remain below the recommended level. During 1989-1991, children consumed 11.8 grams of fiber per day, or 88 percent of the "age plus 5" recommendation (table 1). Fiber intake, both as a percentage of the "age plus 5" recommendation and as a percentage of children meeting the recommendation, decreased with age. More than half of preschoolers exceeded the "age plus 5" recommendation, with average intakes 8 percent above the recommendation. Primary school children had an average fiber intake of 12 grams per day, or 90 percent of the "age plus 5" recommendation, and 30 percent of them met the recommended level. Slightly more than 10 percent of female adolescents

met the "age plus 5" recommendation, with an average intake of 11.8 grams per day (61 percent of the recommended level).

For all children, morning meals and snacks contained 5.9 grams of fiber per 1,000 calories (table 3); midday and evening and meals had the same fiber density of 7.1 grams.

The fiber density in home foods (6.7 grams per 1,000 calories) was higher than away-from-home foods (6.4 grams per 1,000 calories) as a whole (fig. 15). However, foods prepared at schools and day-care facilities had the highest fiber density (7.6 grams per 1,000 calories) among foods from all sources, averaging 113 percent of the level in home foods and 133 percent of the level in fast foods (5.7 grams per 1,000 calories). Adolescents tended to have a lower fiber density from school foods than did younger children. If eating out continues to increase in popularity, fiber intake in adolescents' and adults' diets could decrease.

**Iron Intake**

Iron deficiency has been shown to cause functional impairments in work performance, behavior, intellectual development, and resistance to infections. Health care experts have identified iron as a priority category for nutrition monitoring. Young children, adolescents, and women of childbearing age are considered to be at greatest risk of iron deficiency. The 1989 RDA's are 10 mg of iron per day for children age 1-10, 12 mg for males age 11-17, and 15 mg for females age 11-17.

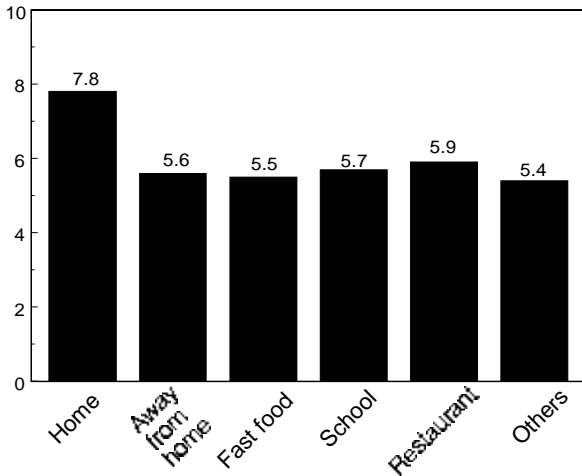
The 1989-91 CSFII data show that less than half of preschoolers met their iron recommendations (table 1). However, the majority of primary school children (64 percent) and male adolescents (71 percent) met their iron recommendations, and their average intakes exceeded their respective recommendations. Only 21 percent of female adolescents met their iron RDA, and their average intake fell below the RDA by 16 percent.

The RDA's are recommendations for usual intake. Nutrient intakes vary from day to day and a lower-than-recommended intake on a given day does not necessarily indicate a poor diet. Moreover, the RDA's are recommended allowances, not requirements--they are intentionally set high to cover the needs of almost everyone in a given age-sex group. Therefore, nutrient intakes below the RDA do

Figure 16

**Iron-to-calories density: at home and away from home**

Grams/1,000 calories



Compiled by USDA/ERS from CSFII 1989-91, 3-day weighted averages.

not necessarily mean that physiological nutrient deficiencies exist. Nevertheless, such a high prevalence of low intakes indicates a need for dietary guidance and improvement.

For all children, morning meals had the largest share (36 percent) of iron intakes (table 2). Because morning meals accounted for only 21 percent of calories, morning meals had an iron density (12.7 mg per 1,000 calories) far exceeding the levels in other meals and snacks (table 3). One reason for the high iron density in morning meals is the iron fortification of breakfast cereals.

Iron density in morning meals decreased with age, from 13.4 mg per 1,000 calories among preschoolers to 11.7 mg per 1,000 calories among female adolescents. Evening meals had the second highest iron density (6.5 mg per 1,000 calories), while iron density in midday meals and snacks reached only 45 and 35 percent of the level in morning meals.

Relatively high iron density in morning meals is correlated with relatively high iron density in home foods. Away-from-home foods had an iron density of 5.6 mg per 1,000 calories (fig. 16), about 72 percent of the level in home foods (7.8 mg per 1,000 calories). Female adolescents had the fewest meals and snacks, had the highest proportions of both meals and snacks from outside their home, had the highest tendency to skip morning meals, and had the highest

iron RDA among the four groups of children. Consequently, they were the only group of children with an average iron intake falling below the RDA.

**Calcium Intake**

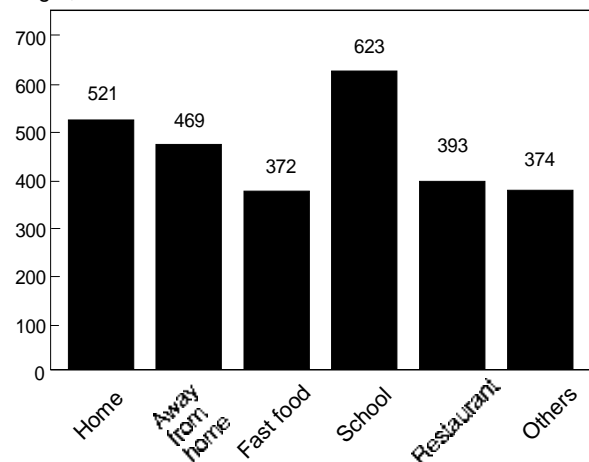
Calcium is essential in the formation of bones and teeth and in the maintenance of bone strength; it is also required for contraction of muscle, clotting of blood, and integrity of cell membranes. Low calcium intake is one of several factors associated with osteoporosis, a loss of bone mass that increases susceptibility to fractures (USDHHS/USDA, 1986). *The NIH Consensus Statement* on optimal calcium intake suggests that higher intakes of dietary calcium during adolescence and early adulthood could increase peak bone mass and delay the onset of bone fractures later in life (USDHHS, 1988). Thus, increased consumption of foods rich in calcium may be especially beneficial for adolescents and young women.

The 1989 daily calcium RDA's are 800 mg for children up to 10 years in age and 1,200 mg for older children. The CSFII data suggest that adolescents, in particular females, need to consume more calcium. Female adolescents had an average calcium intake of only 820 mg per day (68 percent of the RDA), and only 16 percent of them met the RDA (table 1). Male adolescents had a calcium intake of 1,103 mg per day (92 percent of the RDA), and 38 percent of them met the calcium recommendation. More than half of primary school children met their calcium

Figure 17

**Calcium-to-calories density: at home and away from home**

Mg/1,000 calories



Compiled by USDA/ERS from CSFII 1989-91, 3-day weighted averages.

recommendation, with an average intake of 923 mg per day (9 percent above their RDA). Slightly less than half of preschoolers met their calcium RDA, and their average intake just met the recommended 800 mg per day.

Among commonly eaten foods, milk and cheese are the richest sources of calcium. The CSFII data show that as children entered secondary school, they curtailed drinking milk as beverage from more than 11 cups in 3 days as primary school children to 6-9 cups. Other foods rich in calcium include dark-green leafy vegetables, certain canned fish (with soft bones), tofu (processed with calcium sulfate), and tortillas (made from lime-processed corn).

As with fiber, home foods were richer in calcium density (521 mg per 1,000 calories) than were away-from-home foods (469 mg per 1,000 calories) as a whole (fig. 17). However, meals and snacks prepared at schools had much higher calcium density (623 mg per 1,000 calories) than home foods. For example, school meals and snacks prepared for primary school children had a calcium density of 644 mg per 1,000 calories, 123 percent of the level in home foods and 171 percent of fast foods. Because of reduced milk drinking among older children, calcium density per calorie in school meals decreased with age.

Relatively high calcium density in home foods is related to relatively high calcium density in morning meals (731 mg per 1,000 calories) because of milk and cereals. For all children, midday meals had the second highest calcium density (502 mg per 1,000 calories), and evening meals the lowest (414 mg per 1,000 calories) (table 3).

While increased consumption of foods rich in calcium may be especially beneficial to adolescents and young women, female adolescents fared worst in meeting their calcium recommendation. The calcium density in the diet of female adolescents was 456 grams per 1,000 calories, which was 16 percent below the target of 545 grams (1,200 grams divided by the REA of 2,200 calories). Compared with other children, female adolescents drank the least amount of fluid milk, had the highest tendency to skip morning meals (which had the highest calcium density), and had the highest share of calories from fast-food places (which had a calcium density much lower than foods prepared at home, schools, or restaurants).