Chapter Three

Healthy Eating Index Scores and Usual Intake of Dietary Fiber

This chapter describes the nutritional quality of diets consumed by the Nation's older adults. The analysis focuses on the Healthy Eating Index (HEI), a summary measure of overall nutritional quality developed by USDA's Center for Nutrition Policy and Promotion (CNPP) (Kennedy et al., 1995). Usual intake of dietary fiber is also examined.

To maintain consistency across all analyses of diet-related measures, the age groups used in this chapter are the same as those used in the preceding chapter and differ slightly from those used elsewhere in the report. Specifically, the two oldest age groups (80-84-years and 85 years and older) were combined because sample sizes for the latter group were insufficient to support estimation of usual energy and nutrient intakes (see appendix C).

Healthy Eating Index Scores

The HEI provides an overall picture of the types and quantities of food individuals consume and their compliance with recommended dietary practices (Basiotis et al., 2002). The index includes an overall score as well as 10 component scores, all of which are weighted equally in the overall score. The 10 component scores measure different aspects of a healthy diet relative to current public health recommendations. The HEI scores used in this analysis were computed by NCHS staff, following USDA guidelines, and were included in a public-release data file (NCHS, 2000).

Six of the component scores are food-based and evaluate food consumption in comparison with USDA Food Guide Pyramid recommendations for intake of grains, vegetables, fruits, dairy, and meat, as well as the level of variety in the diet (USDA, CNPP, 1996). Four component scores are nutrient-based and assess compliance with *Dietary Guidelines for Americans* recommendations for daily intake of fat, saturated fat, cholesterol, and sodium (USDA and U.S. DHHS, 2000).[1] The specific reference standards used for each HEI component are described in the following discussions and are listed in appendix B. The appendix also provides technical details about how food consumption data needed to estimate HEI scores were derived from the NHANES-III 24-hour recall data.

The HEI data are based on the single 24-hour recall collected in NHANES-III. It was not possible to develop HEI scores that reflect usual intakes, as was done for the nutrients assessed in the preceding chapter. There were two major impediments to such an analysis. First, the HEI scoring algorithm is applied at the *individual* level but the adjustment technique used to generate estimates of usual nutrient intakes adjusts *distributions* rather than individual observations (see appendix C). Second, the HEI includes six food-based components and it is not possible to generate estimates of usual food intake (as opposed to usual nutrient

[1]When the HEI was first developed, the standards for cholesterol and sodium were based on recommendations made in the NRC's *Diet and Health* report (NRC, 1989b) because the version of the *Dietary Guidelines* in effect at the time did not include quantitative standards for these nutrients (USDA and U.S. DHHS, 1995). Since that time, the NRC standards for sodium and cholesterol have been incorporated into both the Nutrition Facts section of food labels and the most recent version of the *Dietary Guidelines* (USDA and U.S. DHHS, 2000).

intake) because distributions of daily food intake tend to be highly skewed and to include a large proportion of zeros (Dodd, 2001).

Although it was not possible to incorporate information on usual nutrient intakes into HEI scores, usual intake distributions were estimated for the nutrients considered in the HEI. These include the percentage of food energy (calories) from fat and saturated fat as well as total intakes of cholesterol and sodium. In addition, a separate analysis was conducted to compare HEI data and usual intake data on estimates of the percentage of older adults who consumed diets consistent with the various reference standards.

Because of the large number of variables examined and the additional comparisons (HEI estimates vs. usual intake estimates) presented in this chapter, the text discussion focuses on significant findings for the aggregate analysis (all older adults) and the gender-specific analyses. Information about significant between-group differences that may have been observed only for specific gender- and/or age-groups may be found in the detailed appendix tables referenced throughout the text.

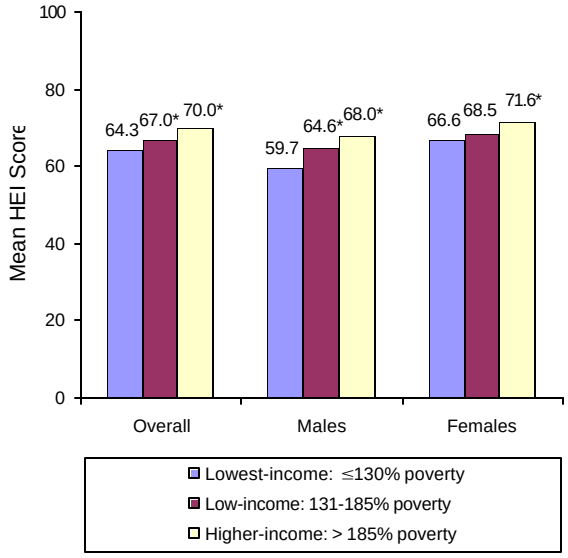
Total HEI Scores

On average, older adults scored 68.4, out of a possible 100, on the HEI (table D-29). Overall, females had higher mean HEI scores than males (69.9 vs. 66.2) (statistical significance of gender-based difference not tested).

Older adults in the lowest-income group scored lower on the HEI than older adults in either of the other income groups (64.3 vs. 67.0 and 70.0) (figure 12). This general pattern was observed for both males and females; however, the difference between the lowest-income group and the low-income group was statistically significant only for males.

Researchers at CNPP have defined cutoffs that can be used to interpret what HEI scores say

Figure 12—Mean Healthy Eating Index (HEI) scores: Older adults



*Statistically significant difference from lowest-income group at the .05 level or better.
Source: NHANES-III, 1988-94.

about overall diet quality (Basiotis et al., 2002). Total HEI scores over 80 imply a "good" diet. Scores between 51 and 80 indicate a "need for improvement." And scores below 51 are indicative of a "poor" diet. Using these criteria, a majority of older adults in all three income groups needed to make improvements in their diets. Overall, 22 percent of older adults had "good" diets, while 67 percent showed a need for improvement and 11 percent had "poor" diets (table D-30). In all three income groups, the percentage of females who consumed "good" diets was consistently greater than the percentage of males. Similarly, the percentage of females with "poor" diets was consistently lower than the percentage of males (statistical significance of gender-based differences not tested).

Based on mean HEI scores, the diets consumed by the lowest-income older adults were more likely than the diets consumed by older adults in the other two income groups to be of poor nutritional quality (19% vs. 13% and 9%) (table D-30). Moreover, older adults in the lowest-income group were less likely than older adults in the higher-income group to consume diets that were considered to be of good nutritional quality.

Thirteen percent of older adults in the low-income group consumed "good" diets, compared with 25 percent of older adults in the higher-income group.

This general pattern of differences was noted for both males and females; however, differences between the lowest- and low-income groups were most pronounced for males. Among males, differences between the lowest-income group and the low-income group were statistically significant for the percentage with poor diets (27% vs. 18%) as well as for the percentage with good diets (7% vs. 16%) (figure 13). Among females, the pattern of differences between the low- and lowest-income groups was similar, but neither of the between-group differences was statistically significant (figure 14).

Food-based Component Scores

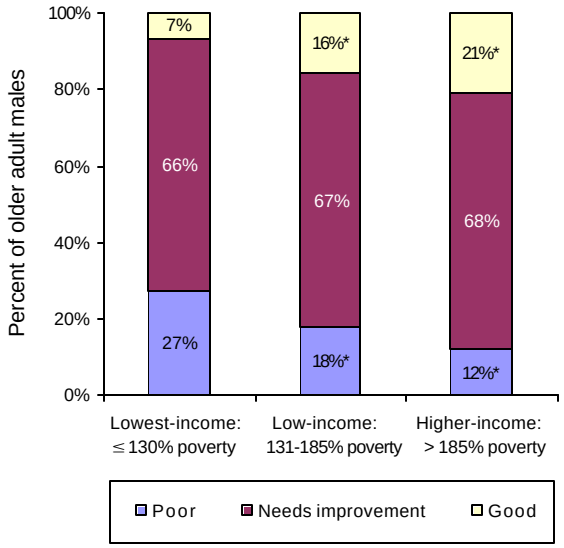
Standards for the food-based HEI component scores reflect daily goals for consumption of foods from each of the five good groups specified in the Food Guide Pyramid (USDA, CNPP, 1996). Serving guidelines are associated with recommended energy intake. For older adults, the recommended numbers of daily servings for males and females are:

- Grains: 9.1 servings for males and 7.4 servings for females
- Vegetables: 4.2 servings for males and 3.5 servings for females
- Fruits: 3.2 servings for males and 2.5 servings for females
- Milk: 2 servings for both males and females
- Meat: 2.5 servings for males and 2.2 servings for females[2]

The HEI also includes a food-based score for dietary variety. Although the need for variety in the diet is a theme in all major public health nutrition guidelines, there are no specific quantitative recommendations. For purposes of the HEI, dietary variety is assessed by totaling the number of different types of food a person

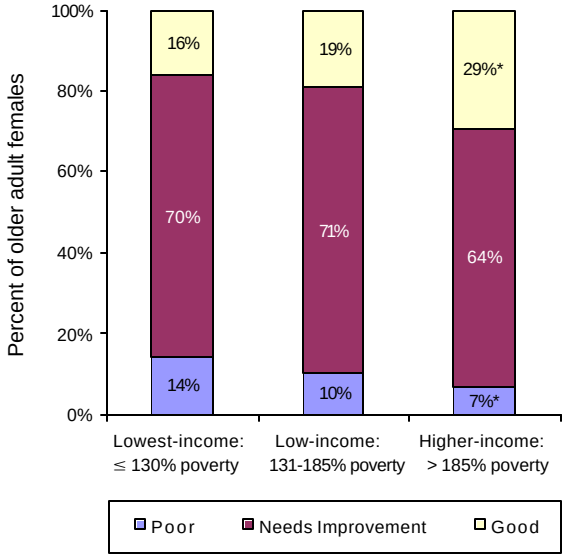
[2]One serving of meat is equivalent to 2.5 ounces of lean meat. Dried beans and peas, peanut butter, eggs, nuts, seeds, and tofu are also included in the meat group (see appendix B).

Figure 13—Distribution of total HEI scores: Older adult males



*Statistically significant difference from lowest-income group at the .05 level or better.
Source: NHANES-III, 1988-94.

Figure 14—Distribution of total HEI scores: Older adult females



*Statistically significant difference from lowest-income group at the .05 level or better.
Source: NHANES-III, 1988-94.

consumes in a day. Similar foods are grouped together and tabulations consider only food components that contribute at least one-half serving toward any food group. Fats, sweets, seasonings, and similar foods are not included (NCHS, 2000). A perfect score of 10 is assigned when a person consumes at least one-half serving of eight different foods.

Males

Data on food-based HEI component scores (tables D-32 to D-43) indicate that the food consumption goals that presented the most difficulty for older adult males were the goals for fruit and grains. Mean scores for the fruit component ranged from 3.5 to 5.0, compared with a perfect score of 10 (figure 15), and less than 25 percent of males in each income group consumed the recommended number of servings (figure 16). Mean scores for the grain component were higher (5.8 to 6.9); however, the percentage of males who consumed the recommended number of grain servings was comparably low, at less than 25 percent for each income group.

The food consumption goal that appeared least problematic for older adult males, although there was still room for improvement, was the goal for dietary variety. Mean scores for this component ranged from 6.4 to 8.6 (figure 15) and, in all three income groups, the percentage of males who met the HEI standard was notably higher for the variety score than for any of the five other food-based component scores (figure 16).

Males in the lowest-income group scored lower, on average, than males in either of the other income groups on all six of the food-based HEI components (figure 15). With one exception (the difference between the lowest- and low-income groups on the vegetable score), all of the between-group differences were statistically significant.

In addition, the percentage of males who satisfied the various food-based HEI standards tended to be lower for the lowest-income group than for either of the other income groups (figure 16). Differences between males in the lowest-income group and those in the low-income group were statistically significant for the dairy, meat, and variety components. Differences between males in the lowest- and higher-income groups were statistically significant for grains, fruit, dairy, and variety. The only food-based component for which no statistical difference was observed between groups was vegetables.

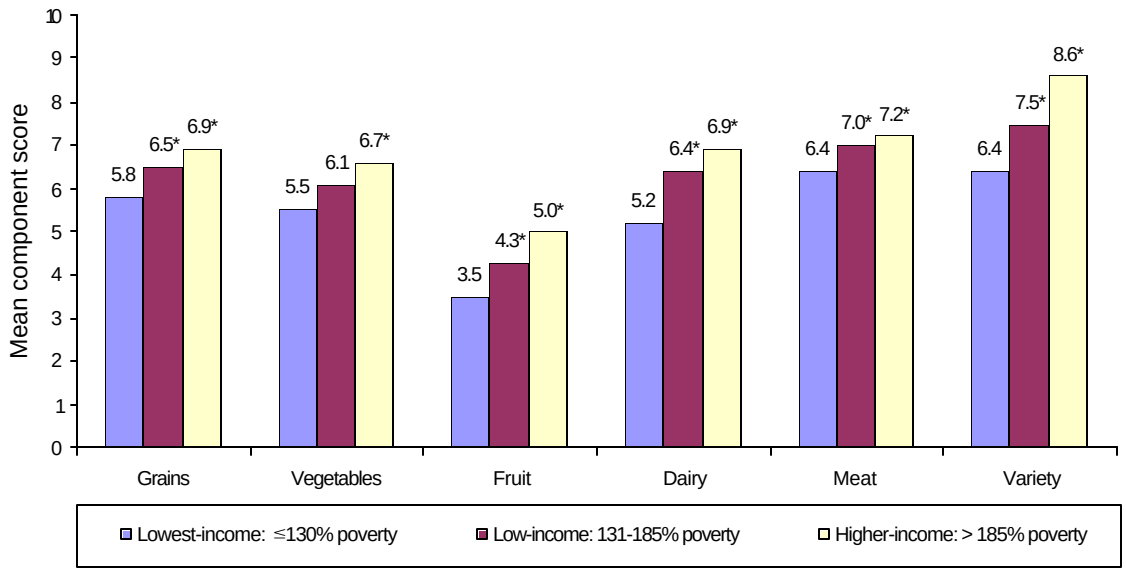
Data on the mean number of servings consumed from each food group (tables D-32 to D-40) reveal that, on average, males in the lowest-income group consumed almost three-quarters (0.7) of a serving less grains and more than half (0.6) a serving less dairy products than their counterparts in the low-income group. Compared with males in the higher-income group, males in the lowest-income group consumed about one and a third fewer servings of grains and almost three-quarters (0.7) of a serving less dairy products.

Females

For older adult females, the food consumption goal that presented the most difficulty was the goal for grains. Mean scores for the grain component ranged from 6.1 to 6.5 and, with the exception of the variety component, were not that different from scores for the other food-based components (figure 17). However, less than 20 percent of older adult females in each of the three income groups consumed the recommended 7.4 servings of grains per day (figure 18).

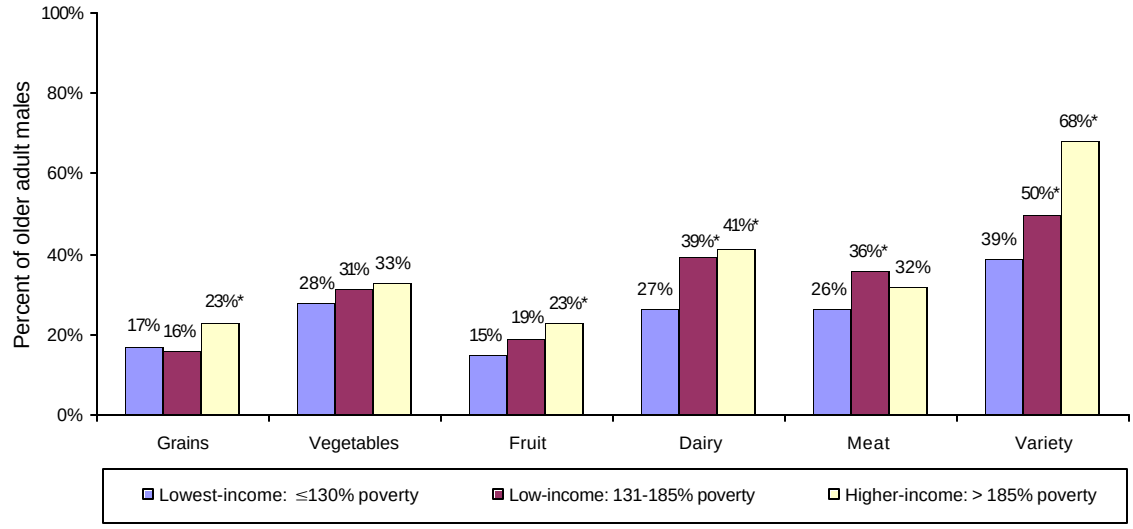
The food consumption goal that appeared least problematic for older adult females, like older adult males, was the goal for variety. Mean scores for this component ranged from 6.7 to

Figure 15—Mean scores for HEI food-based components: Older adult males



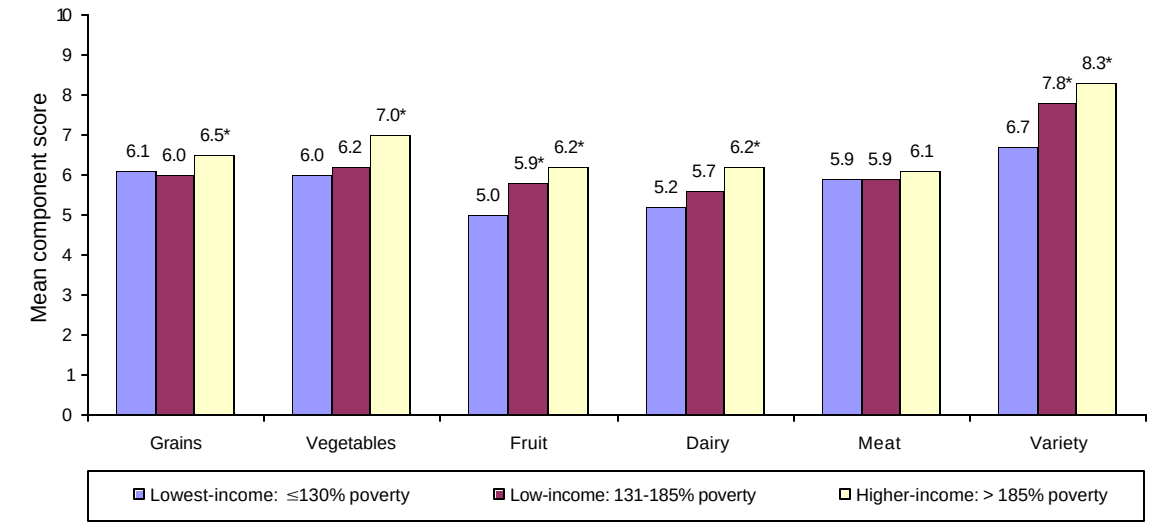
*Statistically significant difference from lowest-income group at the .05 level or better.
Source: NHANES-III, 1988-94.

Figure 16—Percent of older adults meeting HEI standards for food-based components: Males



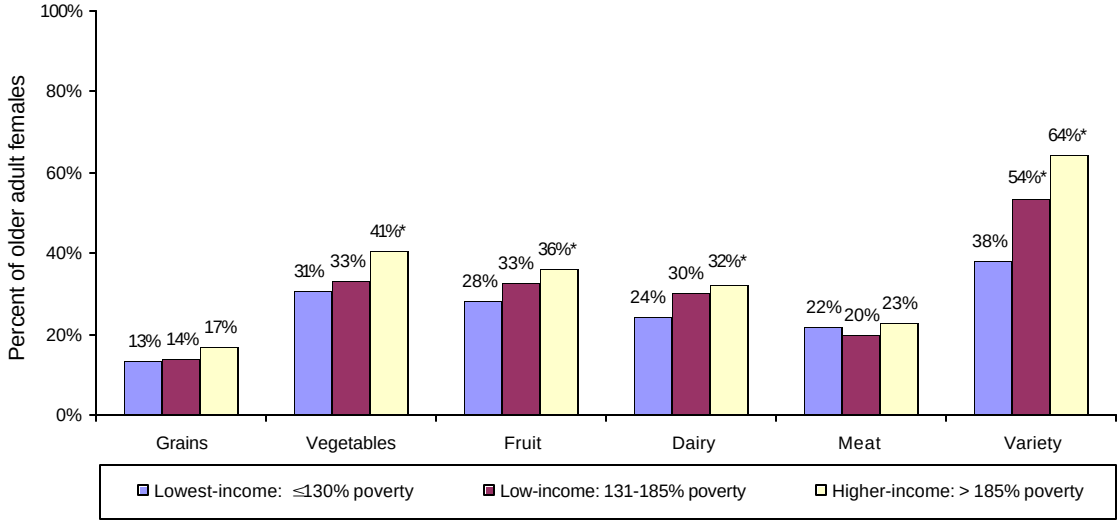
*Statistically significant difference from lowest-income group at the .05 level or better.
Source: NHANES-III, 1988-94.

Figure 17—Mean scores for HEI food-based components: Older adult females



*Statistically significant difference from lowest-income group at the .05 level or better.
Source: NHANES-III, 1988-94.

Figure 18—Percent of older adults meeting HEI standards for food-based components: Females



*Statistically significant difference from lowest-income group at the .05 level or better.
Source: NHANES-III, 1988-94.

8.3 (figure 17) and, in all three income groups, the percentage of older adult females who met the HEI standard was greater for the variety component than for any of the five other food-based components (figure 18). There was still room for improvement, however: 36 to 62 percent of older adult females failed to meet the HEI standard for variety.

In comparison with females in the low-income group, females in the lowest-income group scored lower, on average, for the fruit component and the variety component (figure 17). In addition, a significantly smaller percentage of older adult females in the lowest-income group satisfied the HEI standard for dietary variety (figure 18).

Differences between the lowest-income group and the higher-income group were more widespread. Older adult females in the lowest-income group had significantly lower mean HEI scores than older adult females in the higher-income group for all food-based components except meat (figure 17). Moreover, for all food-based components except grains and meat, older adult females in the lowest-income group were less likely than their higher-income counterparts to satisfy the HEI standard (figure 18).

Data on the mean number of servings consumed from each food group (tables D-32 to D-40) show that, compared with females in the low-income group, females in the lowest-income group consumed about a third of a serving less fruit per day. In comparison with higher-income females, females in the lowest-income group consumed about a third of a serving less grains, more than half (0.6) a serving less vegetables, almost half (0.4) a serving less fruit, and about a third of a serving less dairy foods.

Nutrient-based Component Scores

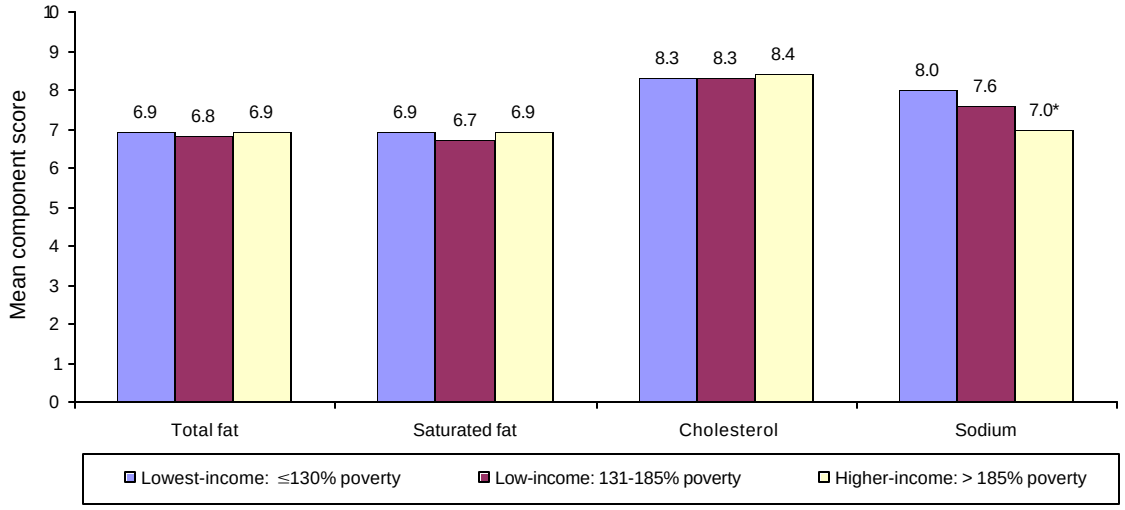
The four nutrient-based component scores of the HEI assess nutritional quality on the basis of how well individuals' diets conform to recommendations for intake of total fat, saturated fat, cholesterol, and sodium. The standards used in making these assessments are based on recommendations included in the *Dietary Guidelines for Americans* (USDA and U.S. DHHS, 2000).[3] The standards for total fat, saturated fat, and sodium are also included in the *Healthy People 2010* objectives (U.S. DHHS, 2000a). Standards for total fat and saturated fat are no more than 30 percent of total energy and less than 10 percent of total energy, respectively. The standard for cholesterol is less than 300 mg. and the standard for sodium is 2,400 mg.

Since the time HEI scores were computed by NCHS staff and the tabulations presented in this report were prepared, new reference standards have been established for fat (IOM, FNB, 2002b) and sodium (IOM, FNB, 2004) intake. These new standards are discussed in the text that follows. The IOM report in which the new standard for fat intake is defined also discusses intake of saturated fat and cholesterol, but does not define specific standards for intake of these dietary components.

There were few differences between income groups on mean scores for the nutrient-based HEI components (figure 19 and tables D-44 to D-51). There were no significant between-group differences in mean scores for the total fat, saturated fat, and cholesterol components of the HEI. For the sodium component, older adults in the lowest-income group had a significantly greater mean score than older adults in the higher-income group (8.0 vs. 7.0). Findings were consistent for both males and females.

[3]As noted previously, HEI standards for cholesterol and sodium were initially based on recommendations made in the NRC's *Diet and Health* report (NRC, 1989b). These recommendations have subsequently been incorporated into the Nutrition Facts section on food labels and the most recent version of the *Dietary Guidelines*.

Figure 19—Mean scores for HEI nutrient-based components: Older adults



*Statistically significant difference from lowest-income group at the .05 level or better.
Source: NHANES-III, 1988-94.

Percentage of Older Adults Meeting Standards for HEI Nutrients: Usual Intakes vs. 24-hour Intakes

As noted in the introduction to this chapter, usual intakes of fat, saturated fat, cholesterol, and sodium were estimated, as described in Chapter Two and appendix C, even though these data could not be incorporated into HEI scores. The following sections describe findings from the usual intake analyses, particularly with respect to estimates of the percentages of older adults who satisfied the *Dietary Guidelines* recommendations considered in the HEI. These findings are contrasted with those from the HEI analysis. Estimates based on usual intake analyses are more reliable than those available from the HEI because the former have been adjusted to remove within-person variation (see appendix C).

Percent of Energy from Total Fat

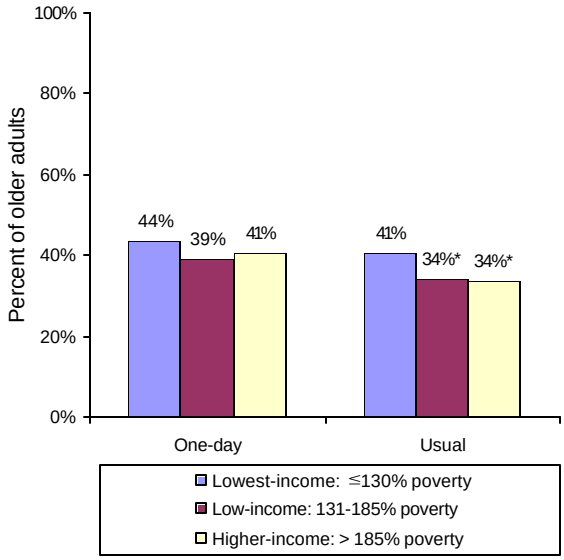
The diets usually consumed by older adults were somewhat high in fat compared with the *Dietary Guidelines* recommendation that no more than 30 percent of total energy come from fat. On average, older adults obtained 32.2 percent of their food energy from fat (table D-52).

The lowest-income older adults had a significantly lower mean intake of fat, as a percent of total energy, than older adults in either of the other income groups (31.6% vs. 32.7% and 32.4%). This difference was concentrated among females (30.7% vs. 32.0% and 31.9%).

According to the HEI data, which are based on a single 24-hour recall, 41 percent of older adults satisfied the *Dietary Guidelines* recommendation for fat intake (table D-44). Moreover, the HEI data suggest that there were no statistically significant differences between the lowest-income group and either of the other income groups in this regard (figure 20).

The more reliable estimates of usual energy and fat intake indicate that the proportion of older adults whose diets were consistent the *Dietary Guidelines* recommendation was actually lower—36 percent (table D-53) rather than 41 percent. Moreover, estimates of usual energy and fat intake indicate that older adults in the lowest-income group were more likely than older adults in either of the other income groups to satisfy the *Dietary Guidelines* recommendation for fat (41% vs. 34% for each of the other groups) (figure 20). As noted previously, differences in usual fat intake were primarily attribut-

Figure 20—Percent of older adults meeting *Dietary Guidelines* recommendation for total fat: One-day (HEI) estimates vs. usual intake estimates



*Statistically significant difference from lowest-income group at the .05 level or better.
Note: *Dietary Guidelines* recommendation has been replaced by AMDR (see text and appendix B).
Source: NHANES-III, 1988-94.

able to differences among females. Among females, 47 percent of the lowest-income group had usual energy and fat intakes that were consistent with the *Dietary Guidelines*, compared with 37 percent for each of the other income groups (table D-53).

As mentioned in the introduction to this section, a new reference standard has been established for fat intake since the time HEI scores were computed by NCHS staff and the tabulations presented in this report were prepared. This standard, referred to as an Acceptable Macronutrient Distribution Range (AMDR), defines a range of acceptable intakes for different life-stage groups. For adults, the AMDR for fat is 20-35 percent of total energy (IOM, FNB, 2002b). By comparison, the *Dietary Guidelines* recommendation (no more than 30% of energy from fat) defines a more stringent upper bound for fat intake and does not define a lower bound.

Mean usual fat intakes of all three income groups fell within the AMDR (table D-52). This was true for both males and females. Distributions of usual fat intake provide some information about the percentage of older adults whose usual fat intakes were consistent with the AMDR. The data suggest that usual intakes that fell outside the AMDR tended to be higher than the recommended range rather than lower. For all older adults, the 5th percentile of the distribution of usual fat intake was 22.3 percent of total energy, while the 75th percentile was 36.3 percent (table D-54). This indicates that, overall, more than 25 percent of older adults had usual fat intakes that exceeded the AMDR. This general pattern was observed for both males and females; however, mean fat intakes were somewhat lower for females than for males at both the 5th and 75th percentiles (statistical significance of gender-based differences not tested).

There were relatively few statistically significant differences between income groups in the distribution of usual fat intakes. Differences that were observed were largely concentrated among females and at the lower end of the distribution. The data suggest that older adult females in the lowest-income group were more likely than older adult females in the other two income groups to have usual fat intakes that fell below the lower bound of the AMDR. Intakes at the 5th percentile were 19.6 percent of energy for the lowest-income females, compared with 22.9 percent and 22.7 percent for females in the other two income groups.

Percent of Energy from Saturated Fat

On average, the usual diets of older adults exceeded the *Dietary Guidelines* recommendation of less than 10 percent of energy from saturated fat. In all three income groups, saturated fat contributed roughly 11 percent of usual energy intake, on average (table D-55).[4] Females had somewhat lower mean usual intakes

[4]The full distribution of usual saturated fat intakes (as a percent of usual energy intake) is presented in table D-57.

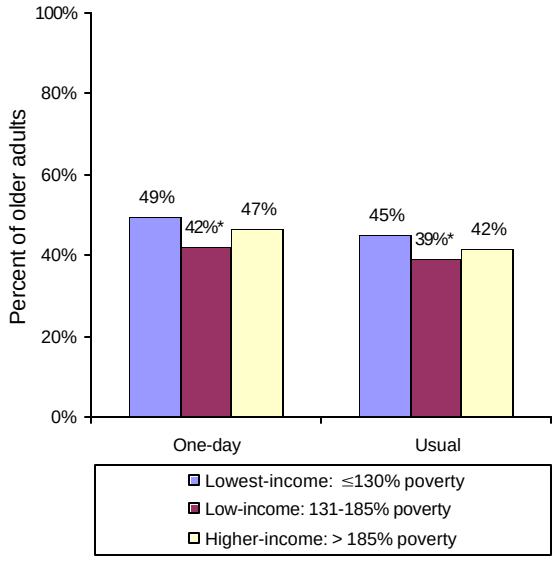
of saturated fat than males but, overall, mean usual intakes of males and females in all three income groups exceeded the *Dietary Guidelines* recommendation (statistical significance of gender-based differences not tested).

The mean usual saturated fat intake of the lowest-income older adults was significantly lower than the mean usual intake of older adults in the low-income group (10.5% of usual energy intake vs. 11.0%). This difference was largely attributable to a difference among females. There was no significant difference, overall, between mean usual intakes of the lowest-income and higher-income groups.

According to the single-day recall used to compute HEI scores, the percentage of older adults who satisfied the *Dietary Guidelines* recommendation for saturated fat intake was 47 percent overall (table D-46) and ranged from 42 percent to 49 percent across income groups (figure 21). In addition, older adults in the lowest-income group were significantly more likely than older adults in the low-income group to have usual saturated fat intakes that were consistent with the *Dietary Guidelines*. This difference was concentrated among females (table D-46).

The more reliable estimates of usual energy and saturated fat intake indicate that the percentage of older adults whose diets satisfied the recommendation for saturated fat was actually lower—42 percent overall (table D-56) and between 39 percent and 45 percent for the three income groups (figure 21). Like the HEI estimates, the usual intake estimates showed that older adults in the lowest-income group were more likely than older adults in the low-income group to satisfy the standard for saturated fat (45% vs. 39%). And, as noted in the HEI estimates, this difference was concentrated among females.

Figure 21—Percent of older adults meeting *Dietary Guidelines* recommendation for saturated fat: One-day (HEI) estimates vs. usual intake estimates



*Statistically significant difference from lowest-income group at the .05 level or better.
Source: NHANES-III, 1988-94.

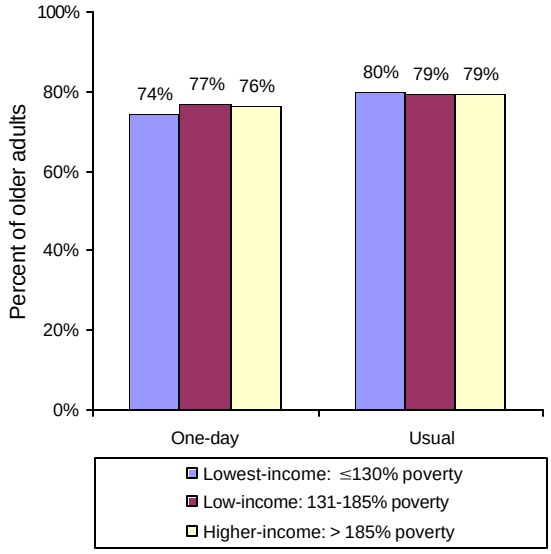
Cholesterol

The *Dietary Guidelines* recommend that cholesterol intake not exceed 300 mg. per day. On average, the diets usually consumed by older adults were consistent with this recommendation (table D-58).[5] This was true for males and females, as well as for each of the three income groups. Overall, the mean usual cholesterol intake of older adults was 227 mg. There were no significant differences between income groups, overall or by gender, in mean usual intake of cholesterol.

The HEI data and usual intake data lead to comparable conclusions about the proportion of older adults who satisfied the recommendation for cholesterol. Both data sets indicate that more than 70 percent of older adults in all three income groups met the standard (figure 22 and tables D-48 and D-59). In addition, while neither analysis found significant differences between income groups at the population level, both

[5]The full distribution of usual cholesterol intakes is presented in table D-60.

Figure 22—Percent of older adults meeting *Dietary Guidelines* recommendation for cholesterol: One-day (HEI) estimates vs. usual intake estimates



*Statistically significant difference from lowest-income group at the .05 level or better.
Source: NHANES-III, 1988-94.

analyses found that females in the lowest-income group were less likely than those in the higher-income group to consume less than 300 mg. of cholesterol per day (tables D-48 and D-59)

Sodium

The *Dietary Guidelines* recommend that daily intake of sodium not exceed 2,400 mg. On average, usual sodium intakes of all three groups of older adults exceeded this goal (table D-61). Only females in the lowest-income group had a mean usual sodium intake that was consistent with this standard (2,269 mg.).

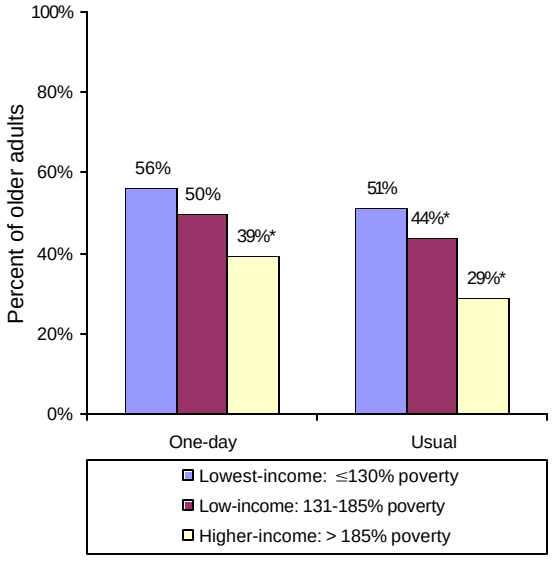
The usual diets of older adults in the lowest-income group provided significantly less sodium than the usual diets of older adults in either of the other income groups (2,538 mg. vs. 2,706 mg. and 2,984 mg.). This difference may be a reflection of the fact that, as discussed in Chapter Two, older adults in the lowest-income group consumed less food energy than older adults in either of the other income groups (table D-11).

The difference between the lowest-income group and the low-income group in mean usual intake of sodium was not observed in either of the gender-specific analyses, but the difference between the lowest-income group and the higher-income group was observed separately for both males and females.

The HEI data indicate that, across income groups, between 39 and 56 percent of older adults satisfied the *Dietary Guidelines* recommendation for sodium (figure 23 and table D-50). These data also indicate that older adults in the lowest-income group were significantly more likely than older adults in the higher-income group to satisfy this standard (56% vs. 39%). This difference was observed for both males and females.

Estimates of usual sodium intake indicate that the proportion of older adults who consumed diets that were consistent with the *Dietary Guidelines* recommendation for sodium was

Figure 23—Percent of older adults meeting *Dietary Guidelines* recommendation for sodium: One-day (HEI) estimates vs. usual intake estimates



*Statistically significant difference from lowest-income group at the .05 level or better.
Note: *Dietary Guidelines* recommendation has been replaced by UL (see text and appendix B).
Source: NHANES-III, 1988-94.

actually lower, ranging from 29 percent to 51 percent across income groups (figure 23 and table D-62). Moreover, according to the usual intake data, older adults in the lowest-income group were more likely than older adults in either of the other income groups to satisfy the standard for sodium (51% vs. 44% and 29%). Both of these between-group differences were observed for males and females; however, the difference between the lowest-income group and the low-income group was not significant for females.

As noted previously, new reference standards have been established for sodium intake since the time HEI scores were computed by NCHS staff and the tabulations presented in this report were prepared. Standards have been defined for both Adequate Intake (AI) and the Tolerable Upper Intake Level (UL) (IOM, FNB, 2004). Given that the major concern about sodium is the potential for excess consumption, the standard of greatest interest for this analysis is the UL.[6] The UL is the highest intake likely to pose no adverse health effects; chronic consumption above the UL may increase risk of adverse effects. In the case of sodium, the primary potential adverse effect is the development of high blood pressure (IOM, FNB, 2004). For adults 19 years and older, the UL for sodium is 2,300 mg. (2.3 gm.), about 4 percent lower than the *Dietary Guidelines* recommendation.

Detailed distributions of usual sodium intake indicate that less than half of all older adults consumed diets that did not exceed the UL (table D-63). Usual sodium intakes at the 50th percentile of the distribution ranged from 2,370 mg. to 2,820 mg. across the three income groups. There were no significant differences between the lowest-income group and low-income group in the distribution of usual sodium intake, overall or by gender. In contrast, significant differences between older adults in the lowest-income and the higher-income groups were noted at every percentile examined except the 95th.[7] In every case, sodium intake was significantly lower for the lowest-income older adults. Differences in sodium intakes at the 25th and 50th percentiles (1,840 mg. and 2,370 mg. for the lowest-income group vs. 2,305 mg. and 2,870 mg. for the higher-income group) suggest that older adults in the lowest-income group were more likely than older adults in the higher-income group to have usual sodium intakes consistent with the UL. Comparable patterns were observed for both males and females; however, mean usual sodium intakes were consistently greater for males.

It is important to note that NHANES-III estimates of sodium intake include only sodium found in foods and beverages reported by respondents. Sodium from table salt is not included in nutrient calculations because its use cannot be measured (estimated) reliably. To get some insight into additional sources of sodium, the NHANES-III dietary intake interview included a question about use of table salt.

Overall, 39 percent of older adults reported use of table salt (table D-64). The percentage of males who used table salt was greater than the percentage of females (46% vs. 35%) (statistical significance of gender-based difference not tested). In addition, older adults in the lowest-income group were less likely to use table salt than older adults in the higher-income group (35% vs. 41%). This difference was attributable to a difference among females. These results indicate that actual differences in usual sodium intakes of older adults in the lowest- and higher-income groups are likely to be greater than

[6]The AI for sodium is 1,300 mg. (1.3 gm.) for persons between 50 and 70 years of age and 1,200 mg. (1.2 gm.) for persons 71 years and older. Given the mean usual intakes of sodium described in the text and shown in table D-61, sodium intakes of all three groups of older adults can be assumed to be "adequate."

[7]Intakes were compared at the 5th, 10th, 15th, 25th, 50th, 75th, 85th, 90th, and 95th percentiles.

observed in the preceding analysis, especially for females.

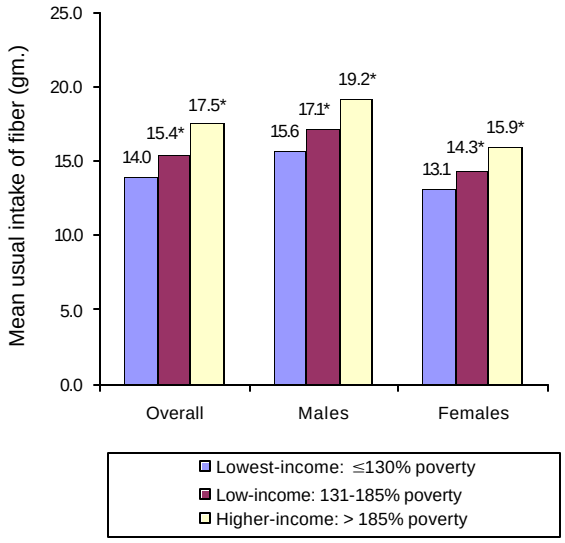
Usual Intake of Dietary Fiber

On average, older adults' usual intake of dietary fiber was 16.5 gm. per day (table D-65).[8] Mean usual intake of dietary fiber was greater for males than for females (18.4 gm. vs. 15.0 gm.) (statistical significance of gender-based difference not tested).

Older adults in the lowest-income group consumed significantly less dietary fiber, on average, than older adults in either of the other income groups. Overall, the usual diets of the lowest-income older adults provided 14.0 gm. of dietary fiber, compared with 15.4 gm. for low-income older adults and 17.5 gm. for higher-income older adults (figure 24). This pattern was observed for both males and females.

[8]The full distribution of usual dietary fiber intakes is presented in table D-67.

Figure 24—Mean usual intake of dietary fiber: Older adults



*Statistically significant difference from lowest-income group at the .05 level or better.
Source: NHANES-III, 1988-94.

At the time the analyses presented in this report were completed, there was no established standard for intake of dietary fiber. To assess the adequacy of fiber intakes, a standard of 25 gm. per day was used as a reference point. This standard has been used in previous research and is similar to the recommendation for fiber intake made by the American Heart Association (see appendix B).

Only 11 percent of all older adults had usual dietary fiber intakes of 25 gm. or more (table D-66). The difference between males and females was striking. Eighteen percent of older adult males had usual intakes of dietary fiber that met or exceeded this benchmark. In contrast, only 6 percent of older adult females had usual intakes in this range (statistical significance of gender-based difference not tested).

Older adults in the lowest-income group were no more or less likely than older adults in the low-income group to meet the 25 gm. benchmark for intake of dietary fiber. However, in comparison with the higher-income group, older adults in the lowest-income group were significantly less likely to meet this standard (5% vs. 13%). This was true for both males and females. Females in the lowest-income group were also less likely to meet the standard than females in the low-income group.

Since this analysis was completed, AIs have been defined for fiber (IOM, FNB, 2002b). The AIs have been defined for *total* fiber, which includes dietary fiber as well fructo-oligosaccharides, compounds which are destroyed in the current analytic methods used to quantitate fiber in foods (IOM, FNB, 2002b). Although fructo-oligosaccharides are assumed to make up a relatively small percentage of total fiber, it is estimated that, on average, American adults consumed approximately 5.1 gm. more fiber per day than estimated in the most recent Continuing Survey of Food Intakes of Individuals (CSFII)

because CSFII data, like the data used in this analysis, include only dietary fiber (IOM, FNB, 2002b).

The AIs for total fiber are shown in appendix B. Some AIs are higher than the standard used in this analysis (25 gm.) and some are lower. The AI for all older adult males (30 gm.) is higher, as is the AI for females 70 years of age and older (28 gm.). But the AI for females younger than 70 (21 gm.) is lower.

As noted in Chapter Two, AIs cannot be used to assess the prevalence of adequate intakes, so assessment of usual intakes must focus on comparison of mean intakes to gender-and-age appropriate AIs. As figure 24 illustrates, older adults' mean usual intakes of dietary fiber fell short of the new AIs. Some of this disparity is due to the differences in fiber data (dietary fiber vs. total fiber). However, even if one were to assume that mean usual intakes of dietary fiber were actually 5 gm. higher (the average increment estimated for American adults, overall, to account for fructo-oligosaccharides, as described previously), mean intakes of all subgroups of males and virtually all subgroups of females would still fall short of their gender-and-age-specific AI (table D-65). Only the youngest females (60-64-year-olds and 65-69-year-olds) in the higher-income group would have mean usual fiber intakes that met or approximated the AI.

The differences observed between income groups in mean usual intakes of dietary fiber are real, regardless of which reference standard is used to assess intakes. However, the advent of the AIs for fiber means that results of the analysis that compared usual intakes of dietary fiber to the 25 gm. per day reference standard must be interpreted with caution. These estimates cannot be interpreted as valid estimates of the percentage of older adults consuming adequate amounts of fiber.