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Healthy Eating Index Scores Among Adults, 60 Years of Age and Over, by Sociodemographic and Health Characteristics: United States, 1999–2002

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Abstract

Objective—This report presents Healthy Eating Index (HEI) scores for adults, 60 years of age and over, from the National Health and Nutrition Examination Survey (NHANES), 1999–2002, and examines the association between the HEI scores and sex, age, race and ethnicity, education, smoking status, tooth retention, self-reported health, and body mass index (BMI).

Methods—The percentage of older adults meeting the recommendations for the HEI components and dietary quality based on the overall score were estimated. Means and standard errors were calculated for selected sociodemographic and health characteristics for the total population and stratified by sex. A two-tailed *t*-test or analysis of variance was used to test the effects of the sociodemographic and health characteristics on the HEI scores. When a characteristic consisted of three levels, the Bonferroni method of adjustment was used to assess significant differences in the mean scores.

Results—Seventy-two percent of older adults met the guidelines for cholesterol intake and 56% met the recommendation for diet variety, but less than one-third met the recommendations for HEI's five food groups. Only 17% of older adults consumed a "good" quality diet. Males had higher scores for some components, but females had higher scores for others. Age significantly influenced several HEI components, but not in a consistent fashion. Non-Hispanic white persons usually had the highest scores and non-Hispanic black persons had the lowest scores. Adults with more years of education usually had higher scores but smokers usually had lower scores. Edentulous persons and those who rated their health as fair or poor generally ate fewer servings of fruits and vegetables, ate a less varied diet, and had a poorer quality diet than persons with teeth or who rated their health higher. Females with a BMI of 30 or higher ate fewer servings of dairy products, consumed a higher percentage of calories from total and saturated fat, and had a lower quality diet than those whose BMI was less than 30.

Conclusions—This research demonstrates that many older adults' diets need improvement, and that many sociodemographic and health characteristics were associated with their intake of food and nutrient groups and overall dietary quality.

Keywords: Healthy Eating Index • diet quality • older adults • National Health and Nutrition Examination Survey (NHANES)

Introduction

Diet and nutrition play important roles in maintaining health and preventing disease (1,2). This is especially important for older adults where proper nutrition plays a crucial role in helping them maintain good health and functioning. Between 1997 and 2005, 5 out of the 10 leading chronic conditions in adults 65 years of age and over were hypertension, all types of heart disease, coronary heart disease, any cancer, and diabetes (3). A healthful diet may reduce the risk of developing these diseases. Furthermore, many older adults are at increased nutritional risk due to inadequate dietary intakes of energy and nutrients. Some other risk factors for poor nutrition include disease, physical limitations and chewing difficulties, polypharmacy, living alone, lack of transportation, and limited income (4,5). The presence of these and other risk factors may lead to subclinical malnutrition, which could result in more rapid deterioration of health and early death (6,7).

The Healthy Eating Index (HEI) is a tool developed by the U.S. Department of Agriculture's (USDA) Center for Nutrition Policy and

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Promotion (CNPP) to assess the overall quality of a person's diet. HEI is based on a 10-component system composed of five food groups, four nutrients, and a measure of variety in food intake (8). HEI provides an overall picture of the type and quantity of foods people eat, their compliance with specific dietary recommendations, and the variety in their diets (9).

Basiotis et al (9) and Juan et al (10) have presented HEI scores from the National Health and Nutrition Examination Survey (NHANES), 1999–2000. Basiotis et al (9) reported mean HEI component and overall scores based on selected demographic and socioeconomic characteristics for the population as a whole, while Juan et al (10) reported mean HEI component and overall scores for older Americans, in general, and the overall HEI score by poverty status. This report presents HEI scores for adults, 60 years of age and over, from NHANES 1999–2002. In addition to examining sociodemographic characteristics, this report also examines the relationships between smoking status, tooth retention, self-reported health, body mass index (BMI), and HEI scores in older adults.

Methods

Sample population

NHANES is a cross-sectional nationally representative health and nutrition examination survey conducted by the Centers for Disease Control and Prevention, National Center for Health Statistics (NCHS). The survey design is a complex, stratified, multistage probability sample of the civilian, noninstitutionalized U.S. population. In 1999–2002, adults 60 years of age and over were oversampled to improve the precision of the estimates for this age group.

A total of 4,976 adults, 60 years of age and over, were eligible to participate in NHANES 1999–2002. The survey includes an interview conducted in the home and a subsequent health examination performed at a mobile examination center (MEC). Of the eligible sample, 3,706 adults 60 years of age and over, or 74%, participated in the household interview. Approximately 87% (3,234) of them also participated in the MEC exam.

Only adults 60 years of age and over who participated in both the household interview and the oral health examination in the MEC were included in the analytic sample (n=3,234). In addition, 173 participants were excluded because they had missing HEI scores; and one person was excluded because of incomplete information on tooth retention. The final analytic sample consisted of 3,060 adults 60 years of age and over.

Dietary data

Trained interviewers conducted dietary recall interviews using automated data collection systems during the MEC examination. In 1999–2001 the NHANES computer-assisted dietary interview system (CADI) was used. A description of the CADI system can be found at the NHANES 1999–2000 exam files website under the documentation for the dietary interview components [http://www.cdc.gov/nchs/about/major/nhanes/exam99_00.htm]. Beginning in 2002, USDA's Continuing Survey of Food Intakes by Individuals (CSFII) and NHANES were integrated. USDA's Automated Multiple-Pass Method (AMPM) was used to collect dietary recall data for the integrated dietary component. A description of the AMPM system can be found at the USDA Food Surveys Research Group website under ''Automated Multiple-Pass Method'' [http://www.ars.usda.gov/main/site_main.htm?modecode=12–35-50–00]. Collection and processing procedures for the two approaches were similar. Detailed descriptions of the 1999–2000 and 2001–2002 dietary interview and data processing procedures can be found under the dietary interview components at http://www.cdc.gov/nchs/about/major/nhanes/exam99_00.htm and http://www.cdc.gov/nchs/about/major/nhanes/exam01_02.htm, respectively.

One 24-hour dietary recall was used to estimate intakes from foods and beverages. USDA calculated HEI component and overall scores from these recalls for individuals with complete food intake records. Prior research has indicated that food intake data based on 1-day dietary recalls are reliable measures of usual intakes of population groups (11). Data files for HEI 1999–2000 and 2001–2002 were downloaded from the USDA Center for Nutrition Policy and Promotion website [http://www.cnpp.usda.gov/HealthyEatingIndex.htm].

Structure of Healthy Eating Index

The overall HEI score is the sum of 10 dietary components, weighted equally. Each component of the index has a maximum score of 10 and a minimum score of zero. The maximum overall HEI score is 100. High component scores indicate intakes close to the recommended ranges or amounts; low component scores indicate less compliance with the recommended ranges or amounts (9). Table A presents the components and scoring system for adults 51 years of age and over. The 10 components are:

- Components 1–5 measure the degree to which a person's diet conforms to the recommended number of servings for the five major food groups of the Food Guide Pyramid: meat, dairy, fruits, vegetables, and grains.
- Component 6 measures total fat consumption as a percentage of total food energy (calorie) intake.
- Component 7 measures saturated fat consumption as a percentage of total food energy intake.
- Component 8 measures total cholesterol intake.
- Component 9 measures total sodium intake.
- Component 10 examines variety in a person's diet (9).

Food group components of the Food Guide Pyramid

The Food Guide Pyramid translates recommendations from the *Dietary Guidelines for Americans* (12) into types and amounts of foods people can eat to have a healthful diet. The recommended number of pyramid servings for the five food groups depends on a person's caloric requirement (9). USDA estimated

Table A. Components of the Healthy Eating Index scoring system for adults 51 years of age and over[1]

Healthy Eating Index components	Criteria for minimum score of zero	Criteria for maximum score of 10 for males	Criteria for maximum score of 10 for females
Food group:			
Meat	0 servings	2.5 servings[2,3]	2.2 servings[2,3]
Dairy	0 servings	2.0 servings	2.0 servings
Fruits	0 servings	3.2 servings	2.5 servings
Vegetables	0 servings	4.2 servings	3.5 servings
Grains	0 servings	9.1 servings	7.4 servings
Nutrient and variety:			
Total fat	≥45% of energy	≤30% of energy	≤30% of energy
Saturated fat	≥15% of energy	<10% of energy	<10% of energy
Cholesterol	≥450 mg	≤300 mg	≤300 mg
Sodium	≥4,800 mg	≤2,400 mg	≤2,400 mg
Dietary variety	≤3 different items in a day	≥8 different items in a day	≥8 different items in a day

[1]The scoring range for each of the 10 components is 0 to 10.
[2]The number of servings per day for meat, dairy, fruits, vegetables, and grains depend on the recommended energy allowance specified in the Food Guide Pyramid (9,12). The recommended energy allowance for males, 51 years of age and over, is 2,300 Kcal and the recommended energy allowance for females is 1,900 Kcal.
[3]One serving of meat equals 2.5 ounces of lean meat.

the recommended number of servings for the five food groups for males and females, 51 years of age and over, based on their recommended energy allowance. The recommended energy allowance for males, 51 years of age and over, is 2,300 kilocalories and the recommended energy allowance for females is 1,900 kilocalories (9,13). Table A lists the recommended number of servings for each of the food groups. One serving of meat equals 2.5 ounces of lean meat. If a person's diet met or exceeded the recommended number of servings for a food group that person was awarded a score of 10 points. If a person did not eat any item from the food group a score of zero was assigned. Intermediate scores were calculated proportionately to the number of servings or partial servings that a person consumed. For example, if eight servings are recommended for a food group and a person only consumed four servings then the component score would be 5 points (9).

Nutrient and variety components

The nutrient and variety components were scored differently (Table A). If a person's total fat intake was less than or equal to 30% of total calories per day that person received a score of 10 points. If fat intake was equal to or greater than 45% of total calories per day that person received a score of zero, and fat intakes between 30% and 45% were scored proportionately (9).

If a person's saturated fat intake was less than 10% of total calories per day that person received a score of 10 points (Table A). If their saturated fat intake was equal to or greater than 15% of total calories per day that person received a score of zero. Intermediate saturated fat intakes were scored proportionately (9).

If a person's cholesterol intake was 300 milligrams or less per day that person received a score of 10 points (Table A). If their cholesterol intake was 450 milligrams or more per day that person received a score of zero, and intakes between 300 and 450 milligrams were scored proportionately (9).

If a person's sodium intake was 2,400 milligrams or less per day that person received a score of 10 points (Table A). If their sodium intake was 4,800 milligrams or more per day that person received a score of zero, and intakes between 2,400 and 4,800 milligrams were scored proportionately (9).

USDA calculated the variety score by totaling the number of different foods an individual ate in a day in amounts sufficient to contribute at least one-half of a serving in a food group (Table A). A person received a score of 10 points if he or she consumed at least half a serving of eight or more different types of foods in a day. A person received a score of zero if he or she consumed at least half a serving of three or fewer different foods in a day. Intermediate scores were calculated proportionately (9).

The overall or total HEI score is a summary measure of the overall quality of a person's diet. It is calculated by summing each of the 10 component scores. The maximum overall score for the 10 components combined is 100. An HEI over 80 implies a ''good'' diet, an HEI score between 51 and 80 implies a diet that ''needs improvement,'' and an HEI score less than 51 implies a ''poor'' diet (9). A more detailed description about the coding system can be found in Basiotis et al (9).

Sociodemographic and health characteristics

Sociodemographic and health characteristic data came from the household interview questionnaire and the health examination at the MEC. Trained interviewers administered the household interview questionnaire and the dietary recall. Trained dentists conducted the dental examinations at the MEC. Additional information on the oral health examination, including the quality of the tooth retention data, is described elsewhere (14).

Age was categorized into three groups: 60–69 years old, 70–79 years old, and 80 years of age or over. Analyses were performed on non-Hispanic white persons, non-Hispanic black persons, and Mexican-American persons. Participants who did not identify themselves as belonging to one of these categories were not analyzed separately but were included in the total sample results. Education was categorized into three groups: less than high school, high school diploma including a General Education Development high school equivalency degree (GED), or more than high school. The smoking status variable was based on cigarette smoking only. Participants who never smoked or smoked less than 100 cigarettes in their lifetime were labeled ''never smokers,''

participants who smoked at least 100 cigarettes in their lifetime, but were not currently smoking were labeled ''former smokers,'' and participants who had smoked at least 100 cigarettes in their lifetime and currently smoked some days or everyday were labeled ''current smokers.''

Tooth retention was calculated based on a count of the number of permanent teeth that were present. The 12 anterior and 16 posterior teeth excluding third molars were used for this count. Dental implants were considered to be equivalent to natural teeth and were counted as if the replaced permanent tooth was present. Participants who had no remaining natural permanent teeth or implants were defined as edentulous. Edentulous participants may have used removable dental prostheses (dentures), but the impact of denture use was not assessed. The remaining two tooth retention categories were 1–20 natural teeth and 21 or more natural teeth.

Body mass index (BMI) measures relative weight for height and is used to assess overweight and obesity. Weight and height were measured in the MEC using standardized techniques and equipment. BMI was calculated by dividing weight in kilograms by the square of height in meters (kg/m^2). The National Heart, Lung, and Blood Institute classifies overweight as a BMI of 25.0 to 29.9, obesity as a BMI of 30.0 to 39.9, and extreme obesity as a BMI of 40.0 or more. A BMI of 18.5 to 24.9 represents normal weight and a BMI of less than 18.5 represents underweight (15). Underweight and extreme obesity were not examined separately in this report. Instead underweight was combined with normal weight and extreme obesity was combined with obesity.

Data analyses

Estimates are presented for the percentage of older adults meeting the dietary recommendations for the 10 HEI components. The mean overall HEI score and the diet quality ratings (good, needs improvement, or poor) are presented for the total population. Means and standard errors for all the HEI scores are presented by selected sociodemographic and health characteristics for the total population and stratified by sex. The standard errors were estimated using the Taylor series linearization, a method that incorporates the sample weights and accounts for the sample design (16). These estimates were weighted using the NHANES 4-year MEC exam weights to produce national estimates. The sample weights incorporate the differential probabilities of selection and include adjustments for oversampling of certain populations and nonresponse to the household interview and MEC examination. The relative standard error (RSE) is the statistical criterion used to determine the reliability of the estimates and is calculated as the ratio of the standard error of the mean to the mean multiplied by 100. The larger the RSE, the less reliable the estimates are. A RSE greater than 30% is often recommended to define estimates that are not reliable (17). All of the estimates presented in these tables have RSEs less than 15% and are considered to be statistically reliable. All data were analyzed using SAS for Windows (release 9.1; SAS Institute Inc, Cary, N.C.) and SUDAAN (release 9.0; Research Triangle Institute Inc, Research Triangle Park, N.C.).

Age-adjusted estimates were also calculated for the 10 component and overall HEI scores using the direct method of adjustment and the U.S. Census population estimates for the year 2000 (18). The difference between mean age-adjusted and crude component scores ranged from 0.1 to 0.7 and the difference between mean age-adjusted and crude overall HEI scores ranged from 0.1 to 1.5, but usually the difference was less than 0.4 for all of the HEI scores. Since the age-adjusted and crude scores were quite similar, age-adjusted estimates have not been presented in the main body of this paper but are available in the ''Technical Notes.''

A two-tailed *t*-test or analysis of variance was used to test the effects of the selected sociodemographic and health characteristics on the HEI scores. *P*-values were based on two-sided tests with a critical value of 0.05. The Bonferroni method of adjusting for the family of pairwise comparisons was used when assessing significant differences in mean HEI scores across the levels of each of the sociodemographic variables and health characteristics (19). All differences described in this paper are statistically significant.

Results

Healthy Eating Index component and overall scores

The largest percentages of older adults meeting any of the dietary recommendations were for cholesterol and diet variety. Seventy-two percent consumed no more than 300 milligrams of cholesterol per day, and 56% consumed eight or more different types of foods per day (Figure 1). Consistent with these results, the highest component scores were for the cholesterol and diet variety components (8.0 and 7.8, respectively) (Table 1). Forty-two percent consumed no more than 2,400 milligrams of sodium per day, and 47% consumed less than 10% of energy from saturated fat (Figure 1). Thirty-two percent and 34% met the dietary recommendations for vegetables and total fat intake, respectively, and between 23% and 27% met the recommendations for meats, dairy, and fruits. Only 18% met the dietary recommendation for grains.

The overall HEI score is a summary measure of the overall quality of a person's diet. The mean overall HEI score for older adults in this sample was 66.6 (Table 1). Seventeen percent of these older adults had a ''good'' quality diet, 14% had a ''poor'' diet, and 68% had a diet that ''needs improvement.''

Healthy Eating Index scores by sociodemographic and health characteristics

HEI scores varied by all of the sociodemographic and health characteristics examined. Each characteristic will be discussed separately.

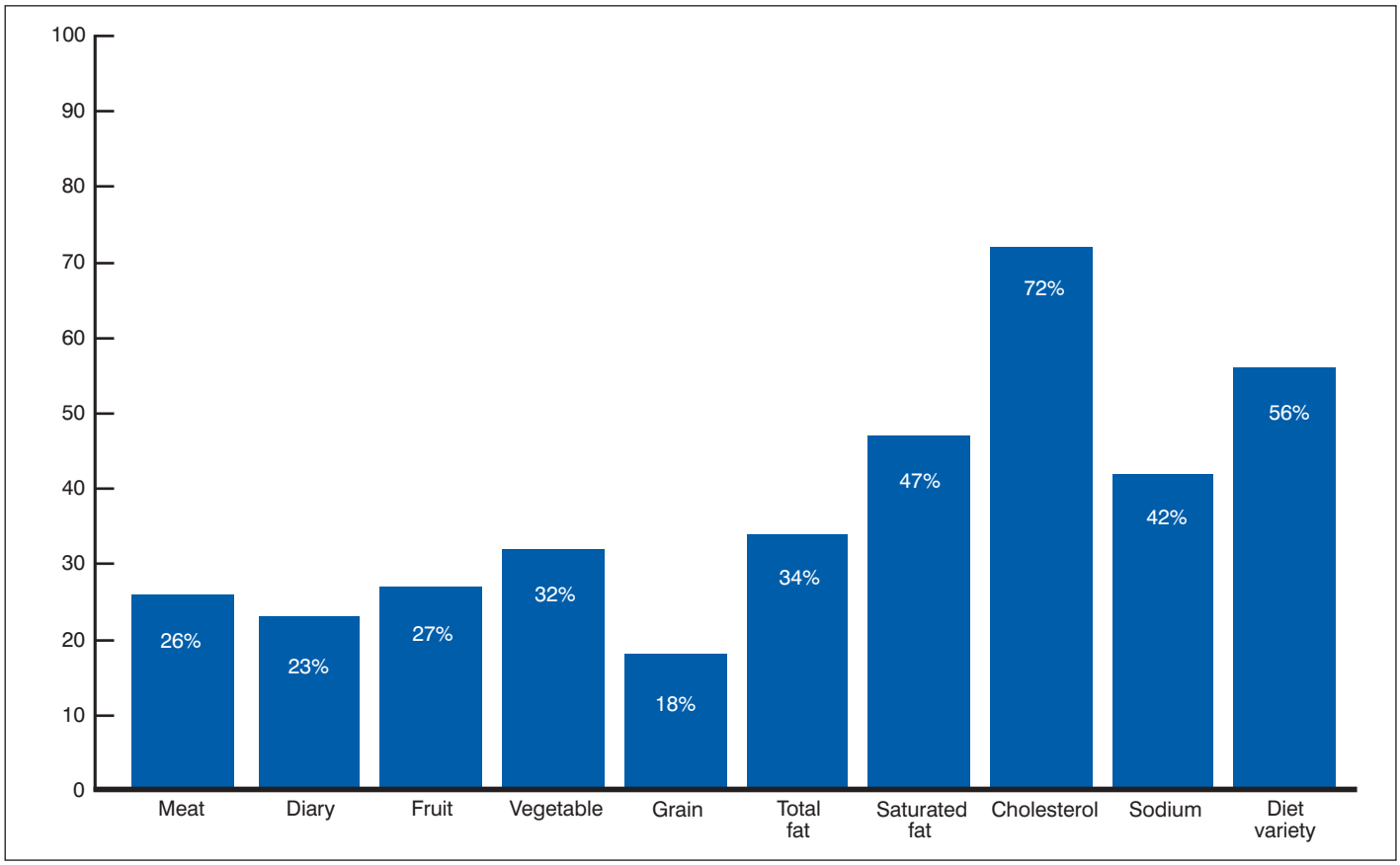

Figure 1. Percentage of adults 60 years of age and over meeting the dietary recommendations for the Healthy Eating Index components: United States, 1999–2002

Gender

- Males had higher scores than females for the meat, dairy, and diet variety components, but females had higher scores than males for the fruit, cholesterol, and sodium components, and the overall HEI score (Table 1). Because there were a number of differences by sex, the remaining results will be discussed for males and females separately.

Age

- Males and females in their sixties had higher average meat and vegetable component scores than adults 80 years of age and over (Tables 2 and 3). In addition, males in their sixties had a higher average meat score than males in their seventies (Table 2). Females 60–69 years old also had a slightly higher average diet variety score than the older two age groups (Table 3).
- In contrast, males 80 years and over and females 70 years and over had higher average sodium component scores than those 60–69 years old. Those 80 years and over also had higher average fruit component scores for males and total fat component scores for females than the same sex 60–69 years old (Tables 2 and 3).

Race and ethnicity

- Non-Hispanic white males and females had higher average dairy, fruit, vegetable, grain, and diet variety component scores and higher overall HEI scores than non-Hispanic black males and females. In addition, Non-Hispanic white males had higher average dairy, vegetable, cholesterol, and diet variety component scores than Mexican-American males (Tables 2 and 3).
- In contrast, non-Hispanic black and Mexican-American males had higher average saturated fat scores than non-Hispanic white males, but only non-Hispanic black females had a higher average saturated fat score than non-Hispanic white females. Conversely, non-Hispanic black and Mexican-American females had higher average sodium scores than non-Hispanic white females, but only Mexican-American males had a higher average sodium score than non-Hispanic white males. In addition, non-Hispanic black females had a higher average meat score than Non-Hispanic white females (Tables 2 and 3).

Education

- Males with a high school diploma or more education had higher mean grain and diet variety scores than those with less than a high school diploma. Males with more than a high school diploma had higher mean fruit and overall HEI scores than those with a high school diploma or less education. Also, those with more than a high school diploma had higher average dairy and vegetable scores than those with less than a high school diploma (Table 2).

- Females with a high school diploma or more education had higher mean dairy, fruit, vegetable, diet variety, and overall HEI scores than those with less than a high school diploma. Also, those with a high school diploma had a higher average grain score than those with less than a high school diploma (Table 3).
- In contrast, males with less than a high school education had a higher mean sodium score than those with a high school diploma or more education, while females with less than a high school education had a higher mean sodium score than those with more than a high school education (Tables 2 and 3).

Smoking status

- Males who did not currently smoke had higher mean fruit, vegetable, grain, diet variety, and overall HEI scores than males who currently smoked and females had higher mean total and saturated fat scores and the overall HEI score than females who currently smoked.
- Males who never smoked had a higher mean score for total fat than former smokers, a higher mean score for dairy than current smokers, and a higher mean score for saturated fat than both former and current smokers (Table 2). Females who never smoked had a higher mean fruit component score than current smokers, and former smokers had a higher mean diet variety score than current smokers (Table 3).

Tooth retention

- Edentulous males had a lower mean diet variety score, edentulous females had a lower mean vegetable score, and both edentulous males and females had lower mean fruit and overall HEI scores than those with any teeth. Furthermore, males with 1–20 teeth had lower fruit component and overall HEI scores than males with 21 or more teeth. This same pattern was also true for the fruit component for females (Tables 2 and 3).
- Edentulous males had lower mean vegetable scores, and edentulous females had lower mean diet variety scores than those with 21 or more teeth (Tables 2 and 3).

Self-reported health

- Older males and females whose self-reported health ranged from good to excellent had higher mean vegetable scores than those who reported their health was fair or poor. Older adults who reported their health was very good or excellent had higher mean fruit and diet variety scores than those who reported their health was fair or poor (Tables 2 and 3).
- The overall HEI score for males who reported their health was very good or excellent was higher than the HEI score for males who reported their health was good, fair, or poor (Table 2).

BMI

Associations between BMI and HEI scores were significant for females but not males.

- Females with BMIs less than 30 had higher mean total fat scores than those with BMIs of 30 or more. Those with BMIs less than 25 had higher mean dairy and overall HEI scores than those with BMIs of 30 or more while those with BMIs between 25.0 and 29.9 had a higher saturated fat score than those with BMIs of 30 or more (Table 3).
- In contrast, females with BMIs of 30 or more had a higher average meat score than those with BMIs less than 30 (Table 3).

Discussion

According to the Third Scientific Report on Nutrition Monitoring, food consumption and nutrient intake are determined not only by the foods available from the food supply but also by sociocultural, demographic, educational, environmental, physiological, and behavioral influences (20). In this report we examined the relationships between selected sociodemographic factors or health characteristics and the HEI component and overall scores for adults 60 years of age and over. Nearly three out of four older adults were meeting the National Research Council's recommendation to consume less than 300 milligrams of cholesterol daily (2). The reason so many of them were meeting this goal may be because they are following a low cholesterol diet prescribed by a health professional. It may also be a side effect of the decline in meat intake with advancing age (discussed later). Less than one-third of these older adults were meeting the HEI recommendations for meats, dairy, fruits, vegetables, and grains. These foods are good sources of vitamins, minerals, fiber, and other substances that are important for good health. The overall HEI score measures overall diet quality. Five out of six older adults in this survey had diets that were rated as poor or needed improvement.

Gender, age, race and ethnicity, education, smoking status, tooth retention, health status, and BMI were all associated with the HEI component scores and the overall HEI score. There was no consistent pattern of differences across the 10 HEI component scores and the overall HEI score by gender or age. Males were closer to the recommended intakes for the meat and dairy components than females and had better dietary variety; but females were closer to the recommended amounts for fruits, cholesterol, and sodium, and had a better dietary quality than males.

Males and females 60–69 years of age were closer to meeting the Dietary Guidelines' recommendations for meat and vegetables, and females 60–69 years of age ate a wider variety of foods than those in the older age groups, especially those 80 years of age and over. The decline in meat intake with age did not appear to be linked to dentition status since there were no significant differences in meat scores based on tooth retention for either sex.

In contrast, males 80 years of age and over and females 70 of age and over were closer to meeting the recommendation for sodium intake than those 60–69 years old. Also, males 80 years of age and over were closer to meeting the recommendation for fruit and females 80 years of age and over were closer to meeting the recommendation for total fat than their counterparts 60–69 years old. Although males in the oldest age group consumed

more servings of fruits than those in their sixties, they may not have been eating a wider variety of fruits since their dietary variety score did not improve with age. However, the dietary variety score is based on the total number of different foods an individual ate in a day, not just the fruit component. The improvement in fat and sodium scores with age could be the result of dietary restrictions due to health issues in this age group.

There were significant differences in nearly all the HEI component scores by race and ethnicity. Non-Hispanic white persons were closer to meeting the recommendations for dairy, fruit, vegetable, grain, and dietary variety and achieved higher diet quality scores than non-Hispanic black persons. Also, Non-Hispanic white males were closer to meeting the recommendations for dairy, vegetable, cholesterol, and dietary variety than Mexican-American males. On the other hand, non-Hispanic black or Mexican-American persons were closer to meeting the recommendations for saturated fat and sodium than non-Hispanic white persons, and non-Hispanic black females were closer to meeting the meat component recommendation than non-Hispanic white females.

Lactose intolerance is common in the black, Asian, and Middle Eastern populations (21) and may explain why non-Hispanic black persons consumed fewer servings of dairy products than non-Hispanic white persons. The differences seen among these racial and ethnic groups are likely due to a wide array of sociocultural, educational, environmental, and behavioral influences.

Generally, those individuals completing more years of education had higher food component, diet variety, and overall HEI scores than those with less than a high school diploma. However, those with less than a high school education fared better on the sodium component than those with more than a high school education and for males they also fared better than those with a high school diploma.

Smoking had a broader impact on HEI scores for males than females. Smoking status was associated with the fruit, total and saturated fat, and diet variety components and the overall HEI score for both sexes, but it was also associated with the dairy, vegetable, and grain components for males. Except for the total fat intake of males, never smokers were closer to meeting the HEI recommendations than current smokers. The difference in total fat intake between never and current smokers was not significant.

Tooth retention and self-reported health were both associated with fruit, vegetable and dietary variety scores, and overall dietary quality. As expected older adults with some remaining natural teeth, especially those with 21 or more teeth, ate more servings of fruits and vegetables, ate a wider variety of foods, and had better overall dietary quality than edentulous adults. Likewise, older adults who rated their health more positively consumed more fruits and vegetables and had more variety in their diets and older males had a better overall dietary quality than those who rated their health more negatively.

BMI was associated with HEI scores for females but not males. In general, females with a BMI of 30 or higher ate fewer servings of dairy products, consumed a higher percentage of calories from total and saturated fat, and had a lower overall quality diet than those whose BMI was less than 30, especially those with a BMI less than 25. In contrast, females with a BMI of 30 or higher were closer to meeting the recommended number of servings of meat per day than those with a BMI of less than 30.

Generally our results were consistent with other analyses of nationally representative data for older adults or the total population. Juan et al (10) examined adults 65 years of age and over in NHANES 1999–2000 and reported a similar overall HEI score compared with our results (67.6 versus 66.6, respectively) and similar percentages for the overall diet quality ratings (good, needs improvement, or poor). For example, 19%–20% of older adults in their sample had a good quality diet versus 17% in our sample. Our results for the highest and lowest mean component scores and the fact that less than one-third of the older adults were meeting the recommendations for meat, dairy, fruit, vegetable, and grains matched results from USDA for the total population 2 years of age and over in 1994–1996 and 1999–2000 as well as results from Juan et al for older adults (9,10,22).

Our results corresponded with the differences in HEI scores by demographic and socioeconomic characteristics reported by the USDA researchers who examined either the total population 2 years of age and over (9,22) or the main meal planners or preparers (23). They showed that females had higher overall HEI scores than males and whites had higher overall HEI scores than blacks (9,22–23). Bowmen et al (22) and Basiotis et al (9) reported that blacks had lower milk scores than whites, and Basiotis et al (9) found they had lower vegetable scores than whites. In contrast to our results, Bowman et al (22) found that blacks had lower fat component scores than whites, and Basiotis et al (9) reported that Mexican Americans had higher average fruit and sodium component scores and an overall HEI score than other race or ethnicity groups. Bowman et al (22) and Basiotis et al (9) both reported that HEI scores increased with increasing levels of education and income. Juan et al (10) reported that older people not in poverty had higher cholesterol component scores and were more likely to have a good quality diet than older people in poverty. Variyam et al (23) found that smokers had lower overall HEI scores than nonsmokers, which was similar to our results; and Bowman et al (22) found that males and females with better quality diets (higher overall HEI scores) had lower BMIs, although we only observed these results for females.

Using data for main meal planners/preparers from the sample households in USDA's 1989–90 Continuing Survey of Food Intakes by Individuals (CSFII) and the companion Diet and Health Knowledge Survey (DHKS), Variyam et al (23) examined the effect of nutrition information on overall dietary quality as measured by the overall HEI score. They found that nutrition information affected overall dietary quality even after controlling for an extensive set of

personal and household characteristics that influence both nutrition information and the HEI. Individuals with greater income or education tended to acquire more nutrition information and used it to improve the quality of their diets.

Informational differences also explained the effects of gender, race and ethnicity, and employment status on dietary quality. Women tended to have a higher stock of nutrition information than men and this was reflected in a higher average HEI score than men. Conversely, blacks and Hispanics were handicapped by relatively low levels of nutrition information, which reduced their ability to choose a better quality diet (23).

In contrast, the effects of age, body mass, and smoking were almost entirely due to the different tastes and preferences associated with these characteristics and not due to any informational differences. Dietary quality tended to improve with age, but decline with increasing BMI. Also, smokers tended to prefer a less healthful diet than nonsmokers and, as a result, had a lower HEI score than nonsmokers (23).

A few other studies have examined the effect of dentition status on food intake. Sayhoun et al (24) found that older adults with impaired dentition had lower overall diet quality scores and consumed fewer servings of fruit than those with 5–8 posterior occluding pairs of teeth. Sheiham and Steele (25) found that older people with fewer teeth reported more difficulty eating or could not eat foods like crusty bread, toast, tomatoes, raw carrots, sliced cooked meats and well-done steaks, apples, and nuts than those with 21 or more teeth.

Other factors more commonly seen in older adults that could influence food intake and nutritional status include:

- Oral health problems, including difficulties chewing and swallowing, loose or decayed teeth, poorly fitting dentures or failure to wear dentures, decreased saliva flow, changes in taste and smell perception.
- Medical problems impeding eating.
- Increased use of medications that can adversely affect nutrition, appetite, hydration, or oral health.
- Difficulty shopping for and preparing food or feeding oneself.
- Limited income.
- Loss of appetite or depression (7,26).

The Healthy Eating Index provides an overall picture of the type and quantity of foods people eat, their compliance with specific dietary recommendations, and the variety in their diets (9). Our results indicate that many older Americans consume diets that need improvement. Age, gender, race and ethnicity, educational attainment, smoking status, tooth retention, self-reported health status, and BMI were all associated with how successful they were at eating a healthy diet. By understanding the factors that shape dietary patterns, educators can better target interventions to those whose diets need improvement.

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Table 1. Mean Healthy Eating Index component and overall scores for adults 60 years of age and over, by sociodemographic and health characteristics: United States, 1999–2002

Characteristic	Sample size	Meat	Dairy	Fruits	Vegetables	Grains	Total fat	Saturated fat	Cholesterol	Sodium	Dietary variety	Overall HEI
		Mean and standard error	Mean and standard error	Mean and standard error	Mean and standard error	Mean and standard error	Mean and standard error	Mean and standard error	Mean and standard error	Mean and standard error	Mean and standard error	Mean and standard error
Total[1]	3,060	6.5 (0.1)	5.4 (0.1)	5.2 (0.1)	6.4 (0.1)	6.4 (0.1)	6.6 (0.1)	7.0 (0.1)	8.0 (0.1)	7.2 (0.1)	7.8 (0.1)	66.6 (0.4)
Gender												
Male	1,512	7.1 (0.1)[a]	5.7 (0.1)[a]	4.7 (0.2)[a]	6.5 (0.1)[a]	6.5 (0.1)[a]	6.5 (0.1)[a]	6.9 (0.1)[a]	7.4 (0.1)[a]	6.0 (0.2)[a]	8.1 (0.1)[a]	65.3 (0.5)[a]
Female	1,548	6.0 (0.1)[b]	5.1 (0.1)[b]	5.7 (0.2)[b]	6.4 (0.1)[a]	6.4 (0.1)[a]	6.7 (0.1)[a]	7.2 (0.1)[a]	8.5 (0.1)[b]	8.0 (0.1)[b]	7.6 (0.1)[b]	67.6 (0.5)[b]
Age												
60–69 years	1,396	7.0 (0.1)[a]	5.2 (0.1)[a]	5.0 (0.1)[a]	6.7 (0.1)[a]	6.6 (0.1)[a]	6.3 (0.1)[a]	6.9 (0.1)[a]	7.6 (0.2)[a]	6.7 (0.1)[a]	8.0 (0.1)[a]	66.1 (0.4)[a]
70–79 years	1,003	6.3 (0.1)[b]	5.6 (0.1)[a]	5.3 (0.2)[a,b]	6.2 (0.1)[b]	6.3 (0.1)[a,b]	6.8 (0.1)[a,b]	7.1 (0.1)[a]	8.4 (0.1)[b]	7.5 (0.1)[b]	7.7 (0.1)[a]	67.1 (0.7)[a]
80 years and over	661	5.7 (0.1)[c]	5.3 (0.1)[a]	5.8 (0.2)[b]	6.1 (0.2)[b]	6.2 (0.1)[b]	7.0 (0.2)[b]	7.2 (0.2)[a]	8.3 (0.2)[b]	7.8 (0.1)[b]	7.8 (0.2)[a]	67.3 (0.7)[a]
Race and ethnicity												
Non-Hispanic white	1,708	6.5 (0.1)[a]	5.7 (0.1)[a]	5.4 (0.1)[a]	6.6 (0.1)[a]	6.5 (0.1)[a]	6.4 (0.1)[a]	6.9 (0.1)[a]	8.0 (0.1)[a]	7.0 (0.1)[a]	8.0 (0.1)[a]	67.0 (0.5)[a]
Non-Hispanic black	522	6.9 (0.2)[b]	3.3 (0.2)[b]	4.4 (0.2)[b]	5.6 (0.1)[b]	5.4 (0.1)[b]	6.9 (0.2)[a]	7.6 (0.2)[b]	7.7 (0.2)[a,b]	7.9 (0.1)[b]	6.6 (0.2)[b]	62.3 (0.8)[b]
Mexican American	648	6.7 (0.1)[a,b]	4.6 (0.3)[c]	4.7 (0.2)[b]	6.0 (0.2)[b]	6.6 (0.2)[a]	6.9 (0.2)[a]	7.4 (0.2)[a,b]	7.3 (0.2)[b]	7.9 (0.2)[b]	7.5 (0.2)[a]	65.5 (1.0)[a]
Education												
Less than high school	1,345	6.4 (0.1)[a]	4.7 (0.1)[a]	4.3 (0.2)[a]	5.7 (0.2)[a]	6.0 (0.1)[a]	6.7 (0.2)[a]	7.0 (0.2)[a]	8.0 (0.1)[a]	7.7 (0.1)[a]	6.9 (0.1)[a]	63.3 (0.7)[a]
High school diploma or GED[2]	692	6.4 (0.1)[a]	5.4 (0.2)[b]	5.4 (0.2)[b]	6.5 (0.2)[b]	6.7 (0.1)[b]	6.4 (0.1)[a]	6.9 (0.2)[a]	8.1 (0.1)[a]	7.2 (0.2)[a,b]	7.9 (0.2)[b]	66.9 (0.7)[b]
More than high school	1,011	6.7 (0.1)[a]	5.9 (0.1)[c]	5.9 (0.2)[b]	7.0 (0.1)[c]	6.6 (0.1)[b]	6.7 (0.2)[a]	7.2 (0.2)[a]	7.9 (0.1)[a]	6.8 (0.1)[b]	8.5 (0.1)[c]	69.2 (0.6)[c]
Smoking status												
Never	1,451	6.2 (0.1)[a]	5.3 (0.1)[a]	5.8 (0.1)[a]	6.5 (0.1)[a]	6.5 (0.1)[a]	7.0 (0.1)[a]	7.4 (0.1)[a]	8.3 (0.1)[a]	7.5 (0.1)[a]	7.9 (0.1)[a]	68.5 (0.5)[a]
Former	1,227	6.8 (0.1)[b]	5.6 (0.1)[a]	4.9 (0.2)[b]	6.5 (0.2)[a]	6.6 (0.1)[a]	6.4 (0.1)[b]	7.0 (0.1)[a]	7.8 (0.1)[b]	6.7 (0.2)[b]	8.1 (0.1)[a]	66.4 (0.5)[b]
Current	376	6.7 (0.2)[a,b]	5.1 (0.3)[a]	3.9 (0.3)[c]	5.7 (0.2)[b]	5.8 (0.2)[b]	5.6 (0.3)[c]	5.9 (0.3)[b]	7.6 (0.3)[b]	7.4 (0.2)[a]	6.7 (0.2)[b]	60.4 (0.9)[c]
Tooth retention												
Edentulous	670	6.2 (0.1)[a]	5.0 (0.2)[a]	4.4 (0.2)[a]	5.6 (0.2)[a]	6.2 (0.2)[a]	6.4 (0.2)[a]	6.8 (0.2)[a]	8.1 (0.1)[a]	7.6 (0.3)[a]	7.1 (0.2)[a]	63.4 (0.7)[a]
1–20 teeth	1,072	6.5 (0.1)[a,b]	5.4 (0.1)[a,b]	5.1 (0.2)[b]	6.6 (0.1)[b]	6.4 (0.1)[a]	6.6 (0.1)[a]	7.0 (0.1)[a]	7.9 (0.2)[a]	7.2 (0.1)[a]	7.9 (0.1)[b]	66.5 (0.5)[b]
21 or more teeth	1,144	6.7 (0.1)[b]	5.6 (0.1)[b]	5.9 (0.1)[c]	6.7 (0.1)[b]	6.6 (0.1)[a]	6.7 (0.2)[a]	7.3 (0.2)[a]	8.1 (0.1)[a]	6.9 (0.1)[a]	8.3 (0.1)[c]	68.9 (0.6)[c]
Self-reported health												
Excellent or very good	1,085	6.4 (0.1)[a]	5.6 (0.1)[a]	5.6 (0.2)[a]	5.7 (0.2)[a]	6.8 (0.1)[a]	6.7 (0.1)[a]	7.2 (0.2)[a]	8.1 (0.1)[a]	7.0 (0.1)[a]	8.2 (0.1)[a]	68.1 (0.5)[a]
Good	978	6.6 (0.1)[a]	5.3 (0.1)[a]	5.2 (0.2)[a]	6.5 (0.2)[b]	6.5 (0.2)[a]	6.4 (0.1)[a]	6.8 (0.1)[a]	8.0 (0.2)[a]	7.1 (0.2)[a,b]	7.8 (0.1)[b]	66.2 (0.6)[b]
Fair or poor	994	6.5 (0.1)[a]	5.1 (0.2)[a]	4.7 (0.2)[b]	7.0 (0.1)[c]	5.7 (0.1)[b]	6.8 (0.2)[a]	7.1 (0.1)[a]	7.9 (0.2)[a]	7.5 (0.1)[b]	7.3 (0.1)[c]	65.0 (0.6)[b]
BMI[3]												
Less than 25	827	6.2 (0.1)[a]	5.7 (0.1)[a]	5.7 (0.2)[a]	6.6 (0.1)[a]	6.5 (0.1)[a]	7.0 (0.1)[a]	7.1 (0.1)[a]	8.3 (0.1)[a]	7.4 (0.1)[a]	8.0 (0.1)[a]	68.6 (0.5)[a]
25.0–29.9	1,146	6.5 (0.1)[a]	5.5 (0.1)[a,b]	5.2 (0.2)[a,b]	6.3 (0.1)[a]	6.5 (0.1)[a]	6.7 (0.2)[a]	7.2 (0.1)[a]	8.1 (0.2)[a,b]	7.0 (0.1)[a]	7.9 (0.1)[a]	66.9 (0.7)[a,b]
30 or more	899	6.9 (0.1)[b]	5.1 (0.1)[b]	5.0 (0.2)[b]	6.5 (0.1)[a]	6.4 (0.1)[a]	6.1 (0.2)[b]	6.8 (0.2)[a]	7.6 (0.2)[b]	7.0 (0.2)[a]	7.8 (0.1)[a]	65.2 (0.6)[b]

p value < .05. The Bonferroni method of adjusting for the family of pairwise comparisons was used when a characteristic was composed of three levels. Means with different letters are significantly different from each other.

[1]Total includes other race and ethnic groups not shown separately and missing or unknown responses for education, smoking status, tooth retention, self-reported health, and BMI.

[2]GED is General Education Development high school equivalency degree.

[3]Body mass index (BMI) is calculated as follows: BMI = weight(kilograms)/height(meters^2).

Table 2. Mean Healthy Eating Index component and overall scores for adult males 60 years of age and over, by sociodemographic and health characteristics: United States, 1999–2002

Characteristic	Sample size	Meat	Dairy	Fruits	Vegetables	Grains	Total fat	Saturated fat	Cholesterol	Sodium	Dietary variety	Overall HEI
		Mean and standard error	Mean and standard error	Mean and standard error	Mean and standard error	Mean and standard error	Mean and standard error	Mean and standard error	Mean and standard error	Mean and standard error	Mean and standard error	Mean and standard error
Age												
60–69 years	682	7.6 (0.1)[a]	5.4 (0.2)[a]	4.4 (0.2)[a]	6.7 (0.2)[a]	6.6 (0.2)[a]	6.3 (0.1)[a]	6.9 (0.2)[a]	7.1 (0.2)[a]	5.5 (0.2)[a]	8.1 (0.1)[a]	64.6 (0.6)[a]
70–79 years	522	6.8 (0.2)[b]	6.0 (0.2)[a]	4.8 (0.2)[a,b]	6.4 (0.2)[a,b]	6.5 (0.1)[a]	6.7 (0.2)[a]	6.8 (0.2)[a]	7.8 (0.2)[a]	6.3 (0.2)[a,b]	8.1 (0.2)[a]	66.2 (0.7)[a]
80 years and over	308	6.4 (0.2)[b]	5.7 (0.2)[a]	5.4 (0.3)[b]	5.9 (0.2)[b]	6.1 (0.2)[a]	6.7 (0.2)[a]	6.7 (0.3)[a]	7.8 (0.3)[a]	7.0 (0.2)[b]	8.2 (0.2)[a]	65.9 (0.9)[a]
Race and ethnicity												
Non-Hispanic white	856	7.1 (0.1)[a]	6.0 (0.1)[a]	4.7 (0.2)[a]	6.6 (0.1)[a]	6.6 (0.1)[a]	6.3 (0.1)[a]	6.7 (0.1)[a]	7.5 (0.2)[a]	5.9 (0.2)[a]	8.3 (0.1)[a]	65.7 (0.5)[a]
Non-Hispanic black	254	7.3 (0.2)[a]	3.3 (0.3)[b]	3.9 (0.3)[b]	5.3 (0.2)[b]	5.4 (0.2)[b]	6.9 (0.2)[a]	7.4 (0.2)[b]	7.1 (0.2)[a,b]	6.7 (0.2)[a,b]	6.6 (0.2)[b]	59.8 (0.8)[b]
Mexican American	319	7.5 (0.2)[a]	4.5 (0.3)[c]	4.1 (0.2)[a,b]	5.7 (0.2)[b]	6.6 (0.2)[a]	6.7 (0.3)[a]	7.4 (0.2)[b]	6.3 (0.4)[b]	7.3 (0.2)[b]	7.7 (0.2)[c]	63.8 (1.0)[a]
Education												
Less than high school	682	7.0 (0.2)[a]	5.1 (0.2)[a]	3.7 (0.3)[a]	5.8 (0.2)[a]	6.1 (0.1)[a]	6.3 (0.2)[a]	6.5 (0.2)[a]	7.1 (0.3)[a]	6.6 (0.3)[a]	7.1 (0.2)[a]	61.4 (0.8)[a]
High school diploma or GED[1]	301	7.3 (0.1)[a]	5.3 (0.3)[a,b]	4.6 (0.2)[a]	6.3 (0.2)[a,b]	6.6 (0.2)[b]	6.4 (0.2)[a]	7.0 (0.2)[a]	7.4 (0.3)[a]	5.7 (0.2)[b]	8.2 (0.2)[b]	64.9 (0.9)[b]
More than high school	523	7.2 (0.1)[a]	6.2 (0.2)[b]	5.4 (0.2)[b]	7.0 (0.2)[b]	6.7 (0.1)[b]	6.7 (0.2)[a]	7.1 (0.2)[a]	7.6 (0.2)[a]	5.7 (0.2)[b]	8.8 (0.1)[b]	68.4 (0.7)[c]
Smoking status												
Never	490	7.0 (0.2)[a]	5.9 (0.2)[a]	5.7 (0.2)[a]	6.9 (0.2)[a]	6.7 (0.1)[a]	7.1 (0.2)[a]	7.5 (0.2)[a]	7.6 (0.2)[a]	5.9 (0.2)[a]	8.5 (0.1)[a]	68.6 (0.7)[a]
Former	792	7.2 (0.1)[a]	5.7 (0.1)[a,b]	4.5 (0.2)[b]	6.5 (0.2)[a]	6.6 (0.1)[a]	6.3 (0.1)[b]	6.8 (0.2)[b]	7.3 (0.2)[a]	5.9 (0.2)[a]	8.3 (0.1)[a]	65.3 (0.5)[b]
Current	227	7.2 (0.2)[a]	4.8 (0.3)[b]	3.2 (0.4)[c]	5.4 (0.2)[b]	5.5 (0.3)[b]	5.8 (0.5)[a,b]	5.8 (0.5)[b]	7.4 (0.5)[a]	6.6 (0.4)[a]	6.5 (0.4)[b]	58.3 (1.7)[c]
Tooth retention												
Edentulous	302	6.9 (0.2)[a]	5.4 (0.3)[a]	3.5 (0.2)[a]	5.8 (0.2)[a]	6.2 (0.2)[a]	6.3 (0.3)[a]	6.7 (0.3)[a]	7.5 (0.3)[a]	6.5 (0.4)[a]	7.2 (0.2)[a]	61.8 (0.7)[a]
1–20 teeth	530	7.2 (0.2)[a]	5.6 (0.2)[a]	4.5 (0.2)[b]	6.5 (0.1)[a,b]	6.4 (0.1)[a]	6.5 (0.1)[a]	6.5 (0.2)[a]	7.2 (0.3)[a]	6.2 (0.2)[a]	8.1 (0.1)[b]	64.6 (0.6)[b]
21 or more teeth	604	7.2 (0.1)[a]	5.9 (0.2)[a]	5.4 (0.2)[c]	6.7 (0.2)[b]	6.8 (0.2)[a]	6.6 (0.2)[a]	7.3 (0.2)[a]	7.7 (0.2)[a]	5.7 (0.2)[a]	8.6 (0.1)[b]	67.8 (0.7)[c]
Self-reported health												
Excellent or very good	556	7.1 (0.1)[a]	6.0 (0.2)[a]	5.1 (0.2)[a]	6.9 (0.1)[a]	6.6 (0.1)[a]	6.6 (0.2)[a]	7.0 (0.2)[a]	7.8 (0.2)[a]	5.8 (0.2)[a]	8.5 (0.1)[a]	67.5 (0.7)[a]
Good	473	7.2 (0.2)[a]	5.5 (0.2)[a]	4.5 (0.2)[a,b]	6.5 (0.2)[a]	6.5 (0.1)[a]	6.2 (0.2)[a]	6.7 (0.2)[a]	7.1 (0.3)[a]	5.9 (0.3)[a]	8.1 (0.2)[a,b]	64.2 (0.7)[b]
Fair or poor	481	7.2 (0.2)[a]	5.3 (0.2)[a]	4.3 (0.3)[b]	5.7 (0.2)[b]	6.3 (0.2)[a]	6.5 (0.2)[a]	6.9 (0.2)[a]	7.1 (0.3)[a]	6.5 (0.3)[a]	7.5 (0.2)[b]	63.3 (0.8)[b]
BMI[2]												
Less than 25	398	7.0 (0.2)[a]	6.0 (0.2)[a]	5.1 (0.3)[a]	6.7 (0.2)[a]	6.5 (0.2)[a]	6.9 (0.2)[a]	6.8 (0.2)[a]	7.8 (0.2)[a]	6.2 (0.2)[a]	8.1 (0.2)[a]	67.0 (0.7)[a]
25.0–29.9	636	7.2 (0.1)[a]	5.6 (0.2)[a]	4.7 (0.2)[a]	6.4 (0.1)[a]	6.6 (0.2)[a]	6.5 (0.2)[a]	6.8 (0.2)[a]	7.6 (0.2)[a]	5.8 (0.2)[a]	8.2 (0.1)[a]	65.5 (0.9)[a]
30 or more	383	7.4 (0.2)[a]	5.6 (0.2)[a]	4.4 (0.2)[a]	6.5 (0.2)[a]	6.4 (0.2)[a]	6.2 (0.3)[a]	6.9 (0.3)[a]	6.9 (0.3)[a]	5.8 (0.3)[a]	8.1 (0.2)[a]	64.1 (1.0)[a]

p value < .05. The Bonferroni method of adjusting for the family of pairwise comparisons was used when a characteristic was composed of three levels. Means with different letters are significantly different from each other.

[1]GED is General Education Development high school equivalency degree.

[2]Body mass index (BMI) is calculated as follows: BMI = weight(kilograms)/height(meters^2).

Table 3. Mean Healthy Eating Index component and overall scores for adult females 60 years of age and over, by sociodemographic and health characteristics: United States, 1999–2002

Characteristic	Sample size	Meat	Dairy	Fruits	Vegetables	Grains	Total fat	Saturated fat	Cholesterol	Sodium	Dietary variety	Overall HEI
		Mean and standard error	Mean and standard error	Mean and standard error	Mean and standard error	Mean and standard error	Mean and standard error	Mean and standard error	Mean and standard error	Mean and standard error	Mean and standard error	Mean and standard error
Age												
60–69 years	714	6.5 (0.1)[a]	5.1 (0.1)[a]	5.5 (0.2)[a]	6.7 (0.2)[a]	6.6 (0.1)[a]	6.4 (0.2)[a]	6.9 (0.2)[a]	8.1 (0.2)[a]	7.7 (0.1)[a]	7.9 (0.2)[a]	67.4 (0.5)[a]
70–79 years	481	5.9 (0.2)[a,b]	5.3 (0.2)[a]	5.6 (0.3)[a]	6.1 (0.2)[a,b]	6.2 (0.2)[a]	6.8 (0.2)[a,b]	7.3 (0.2)[a]	8.8 (0.2)[a]	8.3 (0.1)[b]	7.3 (0.2)[b]	67.7 (0.9)[a]
80 years and over	353	5.3 (0.1)[b]	5.1 (0.2)[a]	6.0 (0.2)[a]	6.2 (0.3)[b]	6.2 (0.2)[a]	7.2 (0.2)[b]	7.5 (0.2)[a]	8.6 (0.2)[a]	8.3 (0.2)[b]	7.5 (0.2)[b]	68.0 (0.8)[a]
Race and ethnicity												
Non-Hispanic white	852	6.0 (0.1)[a]	5.5 (0.1)[a]	5.8 (0.2)[a]	6.6 (0.1)[a]	6.5 (0.1)[a]	6.5 (0.1)[a]	7.0 (0.1)[a]	8.4 (0.1)[a]	7.9 (0.1)[a]	7.8 (0.2)[a]	68.0 (0.6)[a]
Non-Hispanic black	268	6.6 (0.2)[b]	3.2 (0.2)[b]	4.7 (0.3)[b]	5.8 (0.2)[b]	5.4 (0.2)[b]	6.9 (0.3)[a]	7.7 (0.2)[b]	8.1 (0.2)[a]	8.8 (0.1)[b]	6.6 (0.2)[b]	63.9 (1.0)[b]
Mexican American	329	6.1 (0.2)[a,b]	4.7 (0.3)[a]	5.1 (0.3)[a,b]	6.2 (0.2)[a,b]	6.5 (0.3)[a]	7.1 (0.3)[a]	7.4 (0.2)[a,b]	8.1 (0.2)[a]	8.5 (0.2)[b]	7.4 (0.3)[a,b]	67.0 (1.3)[a,b]
Education												
Less than high school	663	5.9 (0.2)[a]	4.4 (0.2)[a]	4.7 (0.2)[a]	5.7 (0.2)[a]	5.9 (0.2)[a]	6.3 (0.2)[a]	7.3 (0.2)[a]	8.7 (0.2)[a]	8.4 (0.2)[a]	6.7 (0.2)[a]	64.7 (0.8)[a]
High school diploma or GED[1]	391	5.9 (0.2)[a]	5.4 (0.2)[b]	5.9 (0.2)[b]	6.5 (0.2)[b]	6.7 (0.2)[b]	6.4 (0.2)[a]	6.9 (0.2)[a]	8.5 (0.2)[a]	8.0 (0.2)[a,b]	7.8 (0.2)[b]	68.0 (0.8)[b]
More than high school	488	6.3 (0.1)[a]	5.6 (0.2)[b]	6.3 (0.2)[b]	7.0 (0.1)[b]	6.5 (0.1)[a,b]	6.7 (0.2)[a]	7.3 (0.2)[a]	8.2 (0.2)[a]	7.8 (0.2)[b]	8.3 (0.1)[b]	69.9 (0.7)[b]
Smoking status												
Never	961	5.9 (0.1)[a]	5.0 (0.1)[a]	5.9 (0.2)[a]	6.4 (0.1)[a]	6.4 (0.1)[a]	7.0 (0.1)[a]	7.3 (0.1)[a]	8.6 (0.1)[a]	8.2 (0.1)[a]	7.6 (0.2)[a,b]	68.4 (0.5)[a]
Former	435	6.2 (0.2)[a]	5.3 (0.2)[a]	5.5 (0.2)[a,b]	6.6 (0.2)[a]	6.5 (0.2)[a]	6.6 (0.2)[a]	7.3 (0.2)[a]	8.4 (0.2)[a]	7.8 (0.2)[a]	7.8 (0.2)[a]	67.9 (0.7)[a]
Current	149	6.2 (0.3)[a]	5.4 (0.3)[a]	4.6 (0.5)[b]	6.0 (0.3)[a]	6.1 (0.3)[a]	5.4 (0.4)[b]	5.9 (0.4)[b]	7.8 (0.4)[a]	8.1 (0.2)[a]	7.0 (0.3)[b]	62.4 (1.2)[b]
Tooth retention												
Edentulous	368	5.8 (0.2)[a]	4.8 (0.2)[a]	4.9 (0.2)[a]	5.6 (0.3)[a]	6.2 (0.2)[a]	6.5 (0.2)[a]	6.9 (0.3)[a]	8.5 (0.2)[a]	8.2 (0.3)[a]	7.0 (0.3)[a]	64.4 (0.9)[a]
1–20 teeth	542	5.9 (0.1)[a]	5.3 (0.2)[a]	5.6 (0.2)[b]	6.7 (0.1)[b]	6.4 (0.2)[a]	6.7 (0.2)[a]	7.3 (0.2)[a]	8.5 (0.2)[a]	8.0 (0.2)[a]	7.7 (0.2)[a,b]	68.0 (0.7)[b]
21 or more teeth	540	6.4 (0.2)[a]	5.4 (0.2)[a]	6.3 (0.2)[c]	6.8 (0.2)[b]	6.5 (0.1)[a]	6.8 (0.2)[a]	7.3 (0.2)[a]	8.5 (0.2)[a]	7.9 (0.2)[a]	8.1 (0.2)[b]	70.0 (0.6)[b]
Self-reported health												
Excellent or very good	529	5.9 (0.2)[a]	5.2 (0.2)[a]	6.0 (0.2)[a]	6.8 (0.1)[a]	6.4 (0.1)[a]	6.6 (0.2)[a]	7.3 (0.2)[a]	8.3 (0.2)[a]	7.9 (0.1)[a]	7.9 (0.1)[a]	68.5 (0.6)[a]
Good	505	6.2 (0.1)[a]	5.2 (0.2)[a]	5.8 (0.2)[a,b]	6.5[a] (0.2)[a]	6.3 (0.1)[a]	6.2 (0.2)[a]	6.9 (0.2)[a]	8.6 (0.2)[a]	8.0 (0.2)[a]	7.7 (0.2)[a,b]	67.7 (0.7)[a]
Fair or poor	513	6.0 (0.2)[a]	4.9 (0.2)[a]	5.0 (0.3)[b]	5.7 (0.2)[b]	6.4 (0.2)[a]	6.5 (0.2)[a]	7.3 (0.2)[a]	8.5 (0.1)[a]	8.3 (0.2)[a]	7.2 (0.2)[b]	66.3 (0.9)[a]
BMI[2]												
Less than 25	429	5.7 (0.2)[a]	5.4 (0.2)[a]	6.1 (0.3)[a]	6.6 (0.2)[a]	6.5 (0.1)[a]	7.1 (0.2)[a]	7.4 (0.2)[a,b]	8.7 (0.2)[a]	8.1 (0.2)[a]	7.9 (0.2)[a]	69.7 (0.8)[a]
25.0–29.9	510	5.8 (0.2)[a]	5.3 (0.2)[a,b]	5.6 (0.2)[a]	6.3 (0.2)[a]	6.3 (0.2)[a]	6.9 (0.2)[a]	7.5 (0.2)[a]	8.6 (0.2)[a]	8.2 (0.1)[a]	7.6 (0.2)[a]	68.3 (0.8)[a,b]
30 or more	516	6.6 (0.1)[b]	4.7 (0.2)[b]	5.4 (0.2)[a]	6.5 (0.2)[a]	6.5 (0.1)[a]	6.1 (0.2)[b]	6.6 (0.2)[b]	8.0 (0.2)[a]	7.9 (0.2)[a]	7.6 (0.2)[a]	66.0 (0.7)[b]

p value < .05. The Bonferroni method of adjusting for the family of pairwise comparisons was used when a characteristic was composed of three levels. Means with different letters are significantly different from each other.

[1]GED is General Education Development high school equivalency degree.

[2]Body mass index (BMI) is calculated as follows: BMI = weight(kilograms)/height(meters^2).

Technical Notes

Age-adjusted estimates were calculated for the 10 components and overall HEI scores using the direct method of adjustment and the U.S. Census population estimates for the year 2000 (18). The difference between mean age-adjusted and crude component scores ranged from 0.1 to 0.7 and the difference between mean age-adjusted and crude overall HEI scores ranged from 0.1 to 1.5, but usually the difference was less than 0.4 for all of the HEI scores. Because the age-adjusted and crude scores were quite similar, the crude scores are presented in the main body of the text in Tables 1–3. However, the age-adjusted scores are presented in Tables I–III.

Table I. Age-adjusted estimates of mean Healthy Eating Index component and overall scores for adults 60 years of age and over, by sociodemographic and health characteristics: United States, 1999–2002

Characteristic	Sample size	Meat	Dairy	Fruits	Vegetables	Grains	Total fat	Saturated fat	Cholesterol	Sodium	Dietary variety	Overall HEI
		Mean and standard error	Mean and standard error	Mean and standard error	Mean and standard error	Mean and standard error	Mean and standard error	Mean and standard error	Mean and standard error	Mean and standard error	Mean and standard error	Mean and standard error
Total[1]	3,060	6.5 (0.1)	5.4 (0.1)	5.3 (0.1)	6.4 (0.1)	6.4 (0.1)	6.6 (0.1)	7.0 (0.1)	8.0 (0.1)	7.2 (0.1)	7.8 (0.1)	66.7 (0.4)
Gender												
Male	1,512	7.1 (0.1)[a]	5.7 (0.1)[a]	4.8 (0.1)[a]	6.4 (0.1)[a]	6.5 (0.1)[a]	6.5 (0.1)[a]	6.9 (0.1)[a]	7.5 (0.1)[a]	6.1 (0.2)[a]	8.1 (0.1)[a]	65.4 (0.5)[a]
Female	1,548	6.0 (0.1)[b]	5.1 (0.1)[b]	5.7 (0.2)[b]	6.4 (0.1)[a]	6.4 (0.1)[a]	6.7 (0.1)[a]	7.2 (0.1)[a]	8.5 (0.1)[b]	8.1 (0.1)[b]	7.6 (0.1)[b]	67.6 (0.5)[b]
Race and ethnicity												
Non-Hispanic white	1,708	6.5 (0.1)[a]	5.7 (0.1)[a]	5.4 (0.1)[a]	6.6 (0.1)[a]	6.5 (0.1)[a]	6.4 (0.1)[a]	6.9 (0.1)[a]	8.0 (0.1)[a]	7.0 (0.1)[a]	8.0 (0.1)[a]	67.1 (0.5)[a]
Non-Hispanic black	522	6.8 (0.2)[a]	3.2 (0.2)[b]	4.4 (0.2)[b]	5.5 (0.2)[b]	5.4 (0.1)[b]	6.9 (0.2)[a]	7.6 (0.2)[b]	7.7 (0.2)[a,b]	8.1 (0.1)[b]	6.6 (0.1)[b]	62.1 (0.8)[b]
Mexican American	648	6.6 (0.1)[a]	4.7 (0.3)[c]	4.6 (0.2)[b]	5.9 (0.2)[b]	6.5 (0.2)[a]	7.0 (0.2)[a]	7.3 (0.2)[a,b]	7.4 (0.2)[b]	8.0 (0.2)[b]	7.4 (0.2)[c]	65.4 (1.1)[a,b]
Education												
Less than high school	1,345	6.4 (0.1)[a]	4.7 (0.1)[a]	4.3 (0.2)[a]	5.8 (0.2)[a]	6.0 (0.1)[a]	6.7 (0.2)[a]	7.0 (0.2)[a]	8.0 (0.1)[a]	7.7 (0.1)[a]	6.9 (0.1)[a]	63.3 (0.7)[a]
High school diploma or GED[2]	692	6.4 (0.1)[a]	5.4 (0.2)[b]	5.4 (0.2)[b]	6.4 (0.2)[b]	6.7 (0.1)[b]	6.4 (0.1)[a]	6.9 (0.1)[a]	8.1 (0.1)[a]	7.2 (0.2)[a,b]	7.9 (0.2)[b]	67.0 (0.7)[b]
More than high school	1,011	6.6 (0.1)[a]	5.9 (0.1)[c]	6.0 (0.2)[b]	6.9 (0.1)[b]	6.5 (0.1)[b]	6.7 (0.1)[a]	7.2 (0.1)[a]	8.0 (0.1)[a]	6.9 (0.1)[b]	8.5 (0.1)[c]	69.3 (0.6)[c]
Smoking status												
Never	1,451	6.3 (0.1)[a]	5.3 (0.1)[a]	5.9 (0.1)[a]	6.5 (0.1)[a]	6.5 (0.1)[a]	7.0 (0.1)[a]	7.4 (0.1)[a]	8.3 (0.1)[a]	7.5 (0.1)[a]	7.9 (0.1)[a]	68.5 (0.5)[a]
Former	1,227	6.7 (0.1)[b]	5.6 (0.1)[a]	5.0 (0.2)[b]	6.5 (0.2)[a,b]	6.5 (0.1)[a]	6.5 (0.1)[b]	7.0 (0.1)[a]	7.8 (0.1)[b]	6.7 (0.2)[b]	8.1 (0.1)[a]	66.4 (0.5)[b]
Current	376	6.4 (0.2)[a,b]	5.1 (0.2)[a]	4.2 (0.4)[b]	5.8 (0.2)[b]	5.8 (0.2)[b]	5.9 (0.3)[b]	6.2 (0.3)[b]	7.8 (0.3)[a,b]	7.4 (0.2)[a]	6.9 (0.2)[b]	61.6 (0.9)[c]
Tooth retention												
Edentulous	670	6.3 (0.1)[a]	5.0 (0.2)[a]	4.3 (0.2)[a]	5.7 (0.2)[a]	6.2 (0.2)[a]	6.4 (0.2)[a]	6.8 (0.2)[a]	8.1 (0.1)[a]	7.5 (0.3)[a]	7.1 (0.2)[a]	63.3 (0.7)[a]
1–20 teeth	1,072	6.4 (0.1)[a]	5.4 (0.1)[a,b]	5.1 (0.2)[b]	6.6 (0.1)[b]	6.4 (0.1)[a]	6.6 (0.1)[a]	7.0 (0.1)[a]	7.9 (0.2)[a]	7.3 (0.1)[a]	7.9 (0.1)[b]	66.6 (0.5)[b]
21 or more teeth	1,144	6.7 (0.1)[a]	5.7 (0.1)[b]	6.0 (0.2)[c]	6.7 (0.1)[b]	6.6 (0.1)[a]	6.8 (0.2)[a]	7.3 (0.2)[a]	8.2 (0.1)[a]	7.0 (0.1)[a]	8.3 (0.1)[c]	69.2 (0.6)[c]
Self-reported health												
Excellent or very good	1,085	6.4 (0.1)[a]	5.6 (0.1)[a]	5.6 (0.2)[a]	6.8 (0.1)[a]	6.5 (0.1)[a]	6.7 (0.1)[a]	7.2 (0.2)[a]	8.1 (0.1)[a]	7.0 (0.1)[a]	8.1 (0.1)[a]	68.1 (0.5)[a]
Good	978	6.6 (0.1)[a]	5.3 (0.1)[a]	5.3 (0.2)[a]	6.5 (0.1)[a]	6.4 (0.1)[a]	6.4 (0.1)[a]	6.8 (0.1)[a]	8.0 (0.2)[a]	7.2 (0.1)[a,b]	7.8 (0.1)[b]	66.3 (0.6)[b]
Fair or poor	994	6.5 (0.1)[a]	5.1 (0.2)[a]	4.7 (0.2)[b]	5.7 (0.1)[b]	6.3 (0.1)[a]	6.8 (0.2)[a]	7.1 (0.1)[a]	7.9 (0.2)[a]	7.5 (0.1)[b]	7.3 (0.1)[c]	65.0 (0.6)[b]
BMI[3]												
Less than 25	827	6.2 (0.1)[a]	5.7 (0.1)[a]	5.7 (0.2)[a]	6.7 (0.1)[a]	6.5 (0.1)[a]	7.0 (0.1)[a]	7.1 (0.1)[a]	8.3 (0.1)[a]	7.3 (0.1)[a]	8.0 (0.1)[a]	68.6 (0.5)[a]
25.0–29.9	1,146	6.5 (0.1)[a,b]	5.5 (0.1)[a,b]	5.2 (0.2)[a]	6.3 (0.1)[a]	6.4 (0.1)[a]	6.7 (0.1)[a]	7.2 (0.1)[a]	8.1 (0.2)[a,b]	7.0 (0.1)[a]	7.9 (0.1)[a]	67.0 (0.7)[a,b]
30 or more	899	6.8 (0.1)[b]	5.1 (0.1)[b]	5.2 (0.2)[a]	6.5 (0.1)[a]	6.4 (0.1)[a]	6.1 (0.2)[b]	6.7 (0.2)[a]	7.6 (0.2)[b]	7.2 (0.2)[a]	7.8 (0.1)[a]	65.5 (0.7)[b]

p value < .05. The Bonferroni method of adjusting for the family of pairwise comparisons was used when a characteristic was composed of three levels. Means with different letters are significantly different from each other.

[1]Total includes other race and ethnic groups not shown separately and missing or unknown responses for education, smoking status, tooth retention, self-reported health, and BMI.

[2]GED is General Education Development high school equivalency degree.

[3]Body mass index (BMI) is calculated as follows: BMI = weight(kilograms)/height(meters^2).

Table II. Age-adjusted estimates of mean Healthy Eating Index component and overall scores for males 60 years of age and over, by sociodemographic and health characteristics: United States, 1999–2002

Characteristic	Sample size	Meat	Dairy	Fruits	Vegetables	Grains	Total fat	Saturated fat	Cholesterol	Sodium	Dietary variety	Overall HEI
		Mean and standard error	Mean and standard error	Mean and standard error	Mean and standard error	Mean and standard error	Mean and standard error	Mean and standard error	Mean and standard error	Mean and standard error	Mean and standard error	Mean and standard error
Race and ethnicity												
Non-Hispanic white	856	7.1 (0.1)[a]	6.0 (0.1)[a]	4.8 (0.2)[a]	6.6 (0.1)[a]	6.6 (0.1)[a]	6.3 (0.1)[a]	6.7 (0.1)[a]	7.5 (0.2)[a]	6.0 (0.2)[a]	8.3 (0.1)[a]	65.8 (0.5)[a]
Non-Hispanic black	254	7.2 (0.2)[a]	3.3 (0.3)[b]	3.9 (0.3)[b]	5.1 (0.2)[b]	5.4 (0.2)[b]	6.9 (0.2)[a]	7.5 (0.2)[b]	7.0 (0.2)[a]	6.9 (0.2)[b]	6.5 (0.2)[b]	59.7 (0.9)[b]
Mexican American	319	7.4 (0.2)[a]	4.6 (0.3)[c]	4.2 (0.3)[a,b]	5.6 (0.2)[b]	6.6 (0.2)[a]	6.8 (0.2)[a]	7.3 (0.3)[a,b]	6.4 (0.4)[a]	7.4 (0.2)[b]	7.7 (0.2)[a]	64.1 (1.1)[a]
Education												
Less than high school	682	6.9 (0.2)[a]	5.1 (0.2)[a]	3.7 (0.3)[a]	5.8 (0.2)[a]	6.1 (0.1)[a]	6.3 (0.2)[a]	6.5 (0.2)[a]	7.1 (0.3)[a]	6.7 (0.3)[a]	7.1 (0.2)[a]	61.5 (0.8)[a]
High school diploma or GED[1]	301	7.3 (0.2)[a]	5.3 (0.3)[a]	4.6 (0.2)[b]	6.3 (0.2)[a,b]	6.6 (0.2)[b]	6.5 (0.2)[a]	7.0 (0.2)[a]	7.5 (0.3)[a]	5.8 (0.2)[b]	8.2 (0.2)[b]	65.0 (0.9)[b]
More than high school	523	7.0 (0.1)[a]	6.3 (0.1)[b]	5.5 (0.2)[c]	6.9 (0.2)[b]	6.6 (0.1)[b]	6.7 (0.2)[a]	7.1 (0.2)[a]	7.7 (0.2)[a]	5.9 (0.2)[b]	8.8 (0.1)[b]	68.6 (0.6)[c]
Smoking status												
Never	490	7.0 (0.2)[a]	5.9 (0.2)[a]	5.7 (0.2)[a]	6.9 (0.2)[a]	6.7 (0.1)[a]	7.1 (0.2)[a]	7.5 (0.2)[a]	7.6 (0.2)[a]	5.9 (0.2)[a]	8.5 (0.1)[a]	68.6 (0.7)[a]
Former	792	7.1 (0.1)[a]	5.7 (0.1)[a,b]	4.6 (0.2)[b]	6.4 (0.1)[a,b]	6.6 (0.1)[a]	6.4 (0.1)[b]	6.8 (0.1)[b]	7.4 (0.2)[a]	6.0 (0.2)[a]	8.3 (0.1)[a]	65.4 (0.5)[b]
Current	227	6.9 (0.3)[a]	5.0 (0.3)[b]	3.5 (0.4)[b]	5.5 (0.3)[b]	5.7 (0.3)[b]	6.0 (0.5)[a,b]	5.9 (0.4)[b]	7.7 (0.4)[a]	6.5 (0.3)[a]	6.7 (0.3)[b]	59.4 (1.7)[c]
Tooth retention												
Edentulous	302	6.9 (0.2)[a]	5.4 (0.3)[a]	3.5 (0.2)[a]	5.8 (0.2)[a]	6.2 (0.2)[a]	6.3 (0.3)[a]	6.7 (0.3)[a]	7.5 (0.3)[a]	6.5 (0.4)[a]	7.2 (0.2)[a]	61.8 (0.8)[a]
1–20 teeth	530	7.1 (0.2)[a]	5.6 (0.2)[a]	4.5 (0.2)[b]	6.4 (0.1)[a,b]	6.3 (0.1)[a]	6.5 (0.1)[a]	6.5 (0.2)[a]	7.2 (0.3)[a]	6.3 (0.2)[a]	8.1 (0.1)[b]	64.7 (0.5)[b]
21 or more teeth	604	7.1 (0.1)[a]	6.0 (0.1)[a]	5.5 (0.2)[c]	6.7 (0.2)[b]	6.7 (0.2)[a]	6.7 (0.2)[a]	7.3 (0.2)[a]	7.8 (0.2)[a]	5.8 (0.2)[a]	8.6 (0.1)[c]	68.2 (0.7)[c]
Self-reported health												
Excellent or very good	556	7.0 (0.1)[a]	6.1 (0.2)[a]	5.2 (0.2)[a]	6.8 (0.1)[a]	6.6 (0.1)[a]	6.7 (0.2)[a]	7.0 (0.2)[a]	7.9 (0.2)[a]	5.9 (0.1)[a]	8.5 (0.1)[a]	67.7 (0.7)[a]
Good	473	7.1 (0.2)[a]	5.5 (0.2)[a,b]	4.6 (0.2)[a,b]	6.5 (0.2)[a]	6.4 (0.1)[a]	6.2 (0.2)[a]	6.6 (0.2)[a]	7.2 (0.3)[a]	6.0 (0.3)[a]	8.1 (0.2)[a,b]	64.3 (0.7)[b]
Fair or poor	481	7.1 (0.2)[a]	5.2 (0.2)[b]	4.3 (0.3)[b]	5.7 (0.2)[b]	6.3 (0.2)[a]	6.5 (0.2)[a]	6.9 (0.2)[a]	7.1 (0.3)[a]	6.6 (0.3)[a]	7.5 (0.2)[b]	63.2 (0.8)[b]
BMI[2]												
Less than 25	398	7.0 (0.2)[a]	6.0 (0.2)[a]	5.1 (0.3)[a]	6.7 (0.2)[a]	6.5 (0.2)[a]	6.9 (0.2)[a]	6.8 (0.2)[a]	7.8 (0.2)[a]	6.2 (0.2)[a]	8.1 (0.2)[a]	67.0 (0.7)[a]
25.0–29.9	636	7.2 (0.1)[a]	5.6 (0.2)[a]	4.8 (0.2)[a]	6.4 (0.1)[a]	6.5 (0.2)[a]	6.5 (0.2)[a]	6.8 (0.2)[a]	7.6 (0.2)[a]	5.9 (0.2)[a]	8.3 (0.1)[a]	65.6 (0.8)[a]
30 or more	383	7.2 (0.2)[a]	5.6 (0.2)[a]	4.6 (0.3)[a]	6.4 (0.2)[a]	6.3 (0.2)[a]	6.1 (0.3)[a]	6.6 (0.3)[a]	7.0 (0.3)[a]	6.0 (0.3)[a]	8.0 (0.2)[a]	63.9 (1.2)[a]

p value < 05. The Bonferroni method of adjusting for the family of pairwise comparisons was used when a characteristic was composed of three levels. Means with different letters are significantly different from each other.
[1]GED is General Education Development high school equivalency degree.
[2]Body mass index (BMI) is calculated as follows: BMI = weight(kilograms)/height(meters^2).

Table III. Age-adjusted estimates of mean Healthy Eating Index component and overall scores for females 60 years of age and over, by sociodemographic and health characteristics: United States, 1999–2002

Characteristic	Sample size	Meat	Dairy	Fruits	Vegetables	Grains	Total fat	Saturated fat	Cholesterol	Sodium	Dietary variety	Overall HEI
		Mean and standard error	Mean and standard error	Mean and standard error	Mean and standard error	Mean and standard error	Mean and standard error	Mean and standard error	Mean and standard error	Mean and standard error	Mean and standard error	Mean and standard error
Race and ethnicity												
Non-Hispanic white	852	6.0 (0.1)[a]	5.5 (0.1)[a]	5.8 (0.2)[a]	6.6 (0.1)[a]	6.5 (0.1)[a]	6.5 (0.1)[a]	7.0 (0.1)[a]	8.4 (0.1)[a]	7.9 (0.1)[a]	7.8 (0.2)[a]	68.0 (0.6)[a]
Non-Hispanic black	268	6.5 (0.2)[a]	3.2 (0.2)[b]	4.7 (0.2)[b]	5.7 (0.2)[b]	5.3 (0.2)[b]	7.0 (0.2)[a]	7.7 (0.2)[b]	8.1 (0.2)[a]	8.8 (0.1)[b]	6.6 (0.2)[b]	63.7 (0.9)[b]
Mexican American	329	5.9 (0.2)[a]	4.7 (0.3)[a]	5.0 (0.3)[b]	6.0 (0.2)[a,b]	6.5 (0.3)[a]	7.1 (0.2)[a]	7.3 (0.2)[a,b]	8.2 (0.2)[a]	8.6 (0.2)[b]	7.1 (0.2)[a,b]	66.4 (1.4)[a,b]
Education												
Less than high school	663	5.9 (0.2)[a]	4.3 (0.2)[a]	4.7 (0.2)[a]	5.7 (0.2)[a]	5.9 (0.2)[a]	7.0 (0.2)[a]	7.3 (0.2)[a]	8.7 (0.2)[a]	8.4 (0.2)[a]	6.8 (0.2)[a]	64.7 (0.8)[a]
High school diploma or GED[1]	391	5.9 (0.2)[a]	5.4 (0.2)[b]	5.9 (0.2)[b]	6.5 (0.2)[b]	6.7 (0.2)[b]	6.4 (0.2)[a]	6.9 (0.2)[a]	8.5 (0.2)[a]	8.0 (0.2)[a,b]	7.8 (0.2)[b]	68.0 (0.8)[b]
More than high school	488	6.3 (0.1)[a]	5.6 (0.2)[b]	6.4 (0.2)[b]	6.9 (0.1)[b]	6.5 (0.1)[a,b]	6.7 (0.2)[a]	7.3 (0.2)[a]	8.3 (0.2)[a]	7.8 (0.2)[b]	8.2 (0.1)[b]	70.0 (0.7)[b]
Smoking status												
Never	961	6.0 (0.1)[a]	5.0 (0.1)[a]	5.9 (0.2)[a]	6.4 (0.1)[a]	6.4 (0.1)[a]	7.0 (0.1)[a]	7.3 (0.1)[a]	8.6 (0.1)[a]	8.2 (0.1)[a]	7.6 (0.2)[a]	68.4 (0.5)[a]
Former	435	6.2 (0.2)[a]	5.3 (0.2)[a]	5.6 (0.2)[a]	6.6 (0.2)[a]	6.5 (0.2)[a]	6.6 (0.2)[a,b]	7.3 (0.2)[a]	8.4 (0.2)[a]	7.8 (0.2)[a]	7.8 (0.2)[a]	67.9 (0.7)[a]
Current	149	6.0 (0.3)[a]	5.4 (0.4)[a]	4.8 (0.5)[a]	6.0 (0.4)[a]	5.9 (0.2)[a]	5.8 (0.3)[b]	6.5 (0.4)[a]	8.0 (0.4)[a]	8.2 (0.3)[a]	7.2 (0.3)[a]	63.9 (1.2)[b]
Tooth retention												
Edentulous	368	5.9 (0.2)[a]	4.8 (0.2)[a]	4.8 (0.2)[a]	5.6 (0.3)[a]	6.3 (0.2)[a]	6.4 (0.2)[a]	6.8 (0.2)[a]	8.5 (0.2)[a]	8.1 (0.3)[a]	7.0 (0.2)[a]	64.2 (0.9)[a]
1–20 teeth	542	5.9 (0.1)[a]	5.3 (0.2)[a]	5.6 (0.2)[b]	6.7 (0.1)[b]	6.4 (0.2)[a]	6.7 (0.2)[a]	7.3 (0.2)[a]	8.5 (0.2)[a]	8.0 (0.2)[a]	7.6 (0.2)[a,b]	68.0 (0.7)[b]
21 or more teeth	540	6.3 (0.2)[a]	5.4 (0.2)[a]	6.4 (0.2)[c]	6.8 (0.2)[b]	6.5 (0.1)[a]	6.8 (0.2)[a]	7.3 (0.2)[a]	8.6 (0.2)[a]	8.0 (0.2)[a]	8.1 (0.2)[b]	70.1 (0.7)[b]
Self-reported health												
Excellent or very good	529	5.9 (0.1)[a]	5.2 (0.2)[a]	6.0 (0.2)[a]	6.8 (0.1)[a]	6.4 (0.1)[a]	6.7 (0.2)[a]	7.3 (0.2)[a]	8.3 (0.2)[a]	8.0 (0.1)[a]	7.8 (0.1)[a]	68.5 (0.6)[a]
Good	505	6.2 (0.1)[a]	5.2 (0.2)[a]	5.8 (0.2)[a,b]	6.5 (0.2)[a]	6.3 (0.1)[a]	6.5 (0.2)[a]	6.9 (0.2)[a]	8.6 (0.2)[a]	8.0 (0.2)[a]	7.7 (0.2)[a,b]	67.6 (0.7)[a]
Fair or poor	513	6.0 (0.2)[a]	4.9 (0.2)[a]	5.0 (0.3)[b]	5.7 (0.2)[b]	6.4 (0.2)[a]	7.0 (0.2)[a]	7.3 (0.2)[a]	8.5 (0.2)[a]	8.2 (0.2)[a]	7.2 (0.2)[b]	66.3 (0.9)[a]
BMI[2]												
Less than 25	429	5.7 (0.2)[a]	5.5 (0.2)[a]	6.1 (0.3)[a]	6.7 (0.2)[a]	6.6 (0.1)[a]	7.1 (0.2)[a]	7.4 (0.2)[a,b]	8.7 (0.2)[a]	8.1 (0.2)[a]	8.0 (0.2)[a]	69.7 (0.8)[a]
25.0–29.9	510	5.8 (0.2)[a]	5.3 (0.2)[a]	5.7 (0.2)[a]	6.3 (0.2)[a]	6.3 (0.2)[a]	6.9 (0.2)[a]	7.5 (0.2)[a]	8.6 (0.2)[a]	8.1 (0.1)[a]	7.6 (0.2)[a]	68.3 (0.8)[a,b]
30 or more	516	6.6 (0.2)[b]	4.8 (0.2)[a]	5.6 (0.2)[a]	6.6 (0.2)[a]	6.4 (0.1)[a]	6.1 (0.2)[b]	6.7 (0.2)[b]	8.0 (0.2)[a]	7.9 (0.2)[a]	7.6 (0.2)[a]	66.4 (0.7)[b]

p value < .05. The Bonferroni method of adjusting for the family of pairwise comparisons was used when a characteristic was composed of three levels. Means with different letters are significantly different from each other.

[1]GED is General Education Development high school equivalency degree.

[2]Body mass index (BMI) is calculated as follows: BMI = weight(kilograms)/height(meters^2).

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