Chapter 5

Diet Quality Of Americans

Healthy Eating Index

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The Healthy Eating Index (HEI), developed by the Center for Nutrition Policy and Promotion of the U.S. Department of Agriculture, provides a single summary measure of the overall nutritional quality of the American diet. While the average HEI increased from 61.5 in 1989-90 to 63.8 in 1994-96, most individuals (70 percent) had diets defined as "needing improvement" (HEI scores between 51 and 80); only about 12 percent of individuals had diets that could be classified as "good" (HEI score above 80). The 10 components that make up the HEI provide insights into the types of dietary changes needed to improve American eating patterns and call attention to the fact that Americans need to do more than reduce their fat intake to attain healthier diets.

Introduction

As the focus of nutritional concerns in the United States has changed over the past decades, with nutritional deficiencies giving way to health problems associated with nutritional excesses, measures of

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diet quality have also changed. Early measures of diet quality focused on evaluating intake levels of specific dietary components, such as the percentage of Recommended Dietary Allowances achieved (Guthrie and Scheer, 1981). The emergence of dietary guidelines in the late 1970's—focusing on reducing consumer intakes of fat, saturated fat, cholesterol, sodium, and sugar, and increasing consumption of foods high in fiber and complex carbohydrates—became the basis for the development of new indexes of diet quality. Even these, however, have been selective in their components, typically limiting themselves to measuring intake of total fat and/or saturated fat, cholesterol, and sodium (Patterson, Haines, and Popkin, 1994). Few instruments have been developed to assess overall dietary quality—even though most American diets fall short of the recommendations in more than one aspect (see chapters 3, 4, and 6).

In an effort to measure how well American diets conform to recommended healthy eating patterns, and to provide a single summary measure of overall diet quality, the Center for Nutrition Policy and Promotion of the U.S. Department of Agriculture (USDA) developed the Healthy Eating Index (HEI) (USDA, CNPP, 1995; Kennedy and others, 1995). The HEI provides a picture of the types of foods people are eating, the variety in their diet, and the degree to which they comply with specific recommendations in the *Dietary Guidelines for Americans* (USDA and DHHS, 1995) and the *Food Guide Pyramid* (USDA, 1992). As such, the HEI can serve as a report card on the overall nutritional quality of the American diet. The American Dietetic Association (1995) has described the HEI as "the most accurate measurement to date on how Americans eat."

Components of the Index

The Healthy Eating Index (HEI) was designed to reflect the sum of 10 components of a healthful diet, where each component is assigned equal weight (for additional details on the HEI see Bowman and others, 1998; USDA, CNPP, 1995; Kennedy and others, 1995).

Components 1-5 measure the degree to which a person's diet conforms to the *Food Guide Pyramid*'s serving recommendations for the five major food groups: grains group (bread, cereal, rice, and pasta; vegetables group; fruits group; milk group (milk, yogurt, and cheese); and the meat group (meat, poultry, fish, dry beans, eggs, and nuts). The number of recommended servings for each food group

Table 1—Recommended number of USDA Food Guide Pyramid servings per day by age/gender categories

Age/gender	Energy[1]	Grains	Vegetables	Fruits	Milk	Meat[2]
	Kilocalories	*Recommended number of daily servings*				
Children 2-3[3]	1,300	6	3	2	2	2
R	*1,600*	*6*	*3*	*2*	*2*	*2*
Children 4-6	1,800	7	3.3	2.3	2	2.1
Females 51+	1,900	7.4	3.5	2.5	2	2.2
Children 7-10	2,000	7.8	3.7	2.7	2	2.3
Females 11-24	2,200	9	4	3	3	2.4
R	*2,200*	*9*	*4*	*3*	*2*	*2.4*
Females 25-50	2,200	9	4	3	2	2.4
Males 51+	2,300	9.1	4.2	3.2	2	2.5
Males 11-14	2,500	9.9	4.5	3.5	3	2.6
R	*2,800*	*11*	*5*	*4*	*2*	*2.8*
Males 19-24	2,900	11	5	4	3	2.8
Males 25-50	2,900	11	5	4	2	2.8
Males 15-18	3,000	11	5	4	3	2.8

[1] Recommended Energy Allowances from National Research Council, Food and Nutrition Board. *Recommended Dietary Allowances*, 10th ed., Washington, DC: National Academy Press 1989b.

[2] One serving of meat equals 2.5 ounces of lean meat.

[3] Portion sizes were reduced to two-thirds of the adult serving size except for milk.

R = Recommended number of servings per day at food energy levels specified in the Food Guide Pyramid (USDA, 1992).

Source: Bowman and others, 1998.

varies with the individual's age, gender, physiological status (such as being pregnant or breastfeeding), and energy requirement (table 1). The decision to use food groups rather than nutrients for the first five components was based on the notion that people eat foods, not nutrients, and this would provide an easier standard against which people could judge their diets. Furthermore, it is thought that there may be as yet unknown nutrients in foods.

Four of the other five components are based on nutrients specifically mentioned in the *Dietary Guidelines*. Component 6 measures total fat as a percentage of total energy intake, component 7 measures saturated fat intake as a percentage of total energy intake, component 8 measures cholesterol intake, and component 9 measures sodium intake. The final component addresses the variety in a person's diet—one of the key recommendations in the *Dietary Guidelines*.

Table 2—Components of the Healthy Eating Index

Component	Range of score	Criteria for perfect score of 10[1]	Criteria for score of 0
Food group			
1. Grains	0 to 10	6-11 servings	0 servings
2. Vegetables	0 to 10	3-5 servings	0 servings
3. Fruits	0 to 10	2-4 servings	0 servings
4. Milk	0 to 10	2-3 servings	0 servings
5. Meat	0 to 10	2-3 servings	0 servings
Dietary guidelines			
6. Total fat	0 to 10	30% or less calories	45% more calories
7. Saturated fat	0 to 10	< 10% calories	15% or more calories
8. Cholesterol	0 to 10	300 mg or less	450 mg or more
9. Sodium	0 to 10	2,400 mg or less	4,800 mg or more
10. Variety	0 to 10	8 or more different items in a day	3 or fewer food items in a day

[1] Persons with component scores between the maximum and minimum cutoff points were assigned scores proportionately. Recommended servings depend on recommended energy intake and age (see table 1).

Source: Bowman and others, 1998.

Each of the 10 components can be scored from 0 to 10, resulting in a total HEI range of 0 to 100. For components 1-5, individuals who consume at least the daily recommended number of servings in each food group receive a maximum score of 10; individuals who consume no item in a particular food group receive a score of 0 (table 2). Intermediate scores are calculated proportionately. For example, if the serving recommendation for a food group was four, and the person consumed two servings, the person would receive a component score of 5 for that food group; if three servings were consumed, the score would be 7.5. If five servings were consumed, the person would receive the maximum score of 10, since additional servings receive no additional credits nor deductions.

Components 6-10 are scored differently. Index scores for total fat and saturated fat (components 6 and 7) are examined in proportion to total food energy intake; cholesterol and sodium (components 8 and 9) are based on milligrams consumed. Variety (component 10) is assessed by totaling the number of "different" foods eaten by an individual in amounts sufficient to contribute at least one-half serving of the relevant food group. Identical food items eaten on separate occasions were aggregated before imposing the one-half-serving constraint. Foods that were similar—such as two different forms of

white bread—or that differed only in preparation methods—such as baked, fried, and boiled potatoes—were grouped together and counted as one type of food. Different types of a food—for example, different types of fish, such as tuna, mackerel, and trout—were grouped separately. Food mixtures were broken down into their component parts and assigned to the relevant food groups. For example, lasagna might contribute to both the grains and the meat groups.

The 1994-96 HEI

The Continuing Survey of Food Intakes by Individuals (CSFII) by the U.S. Department of Agriculture provides information on the consumption of foods and nutrients by individuals. It also provides extensive data about personal and socioeconomic characteristics. Although the HEI was first computed using the 1989-90 CSFII (USDA, CNPP, 1995; Kennedy and others, 1995), it has recently been updated using the most recent CSFII data available, the 1994-96 CSFII, which collected dietary intake data for 2 nonconsecutive days (Bowman and others, 1998). For the HEI analysis, however, only the first day's intake data were used. Further, the sample was made up of individuals 2 years and older except pregnant and lactating women. Sample sizes were approximately 5,200 individuals in 1994, 4,900 individuals in 1995, and 4,800 individuals in 1996.

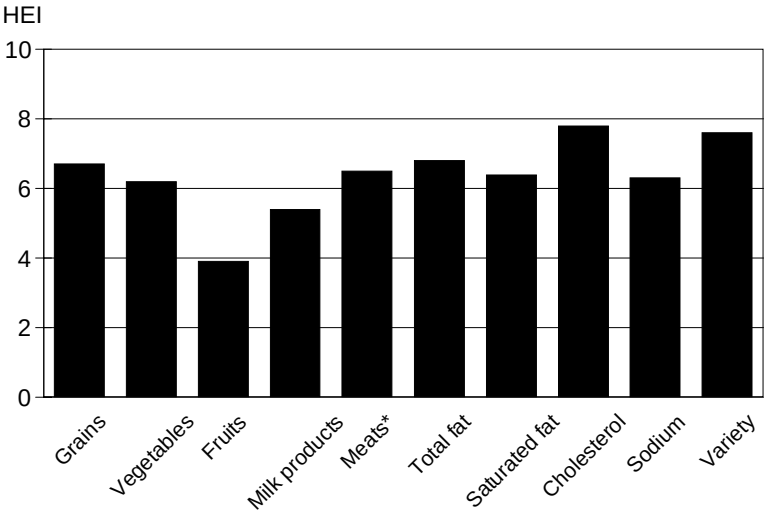
The HEI scores averaged 63.6 in 1994, 63.5 in 1995, and 63.8 in 1996. Most individuals (70 percent) fell in the middle range, with a score between 51 and 80, defined as a diet that "needs improvement." Only about 12 percent had scores above 80 ("good diets"), while 18 percent had diets classified as "poor" (scores below 51).

Scores for the individual components of the index varied considerably, ranging from 3.9 for consumption of fruits to 7.8 for cholesterol (fig. 1). The variety component accounted for the second highest score—7.6. High component scores indicate intakes close to recommended levels, while low component scores indicate less compliance with recommended levels.

Fewer than half the individuals obtained the maximum score of 10 in any of the component categories, with the exception of the cholesterol and variety components (fig. 2). Less than 20 percent of the sample had the recommended number of servings of fruits, less than a third consumed the recommended number of servings from the

Figure 1

Healthy Eating Index component mean scores, 1994-96



* Meats include eggs, nuts, and some legumes.

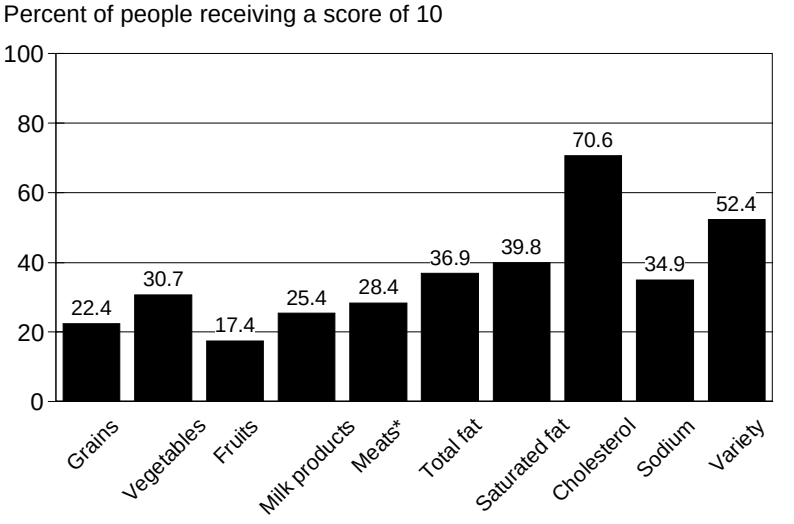
Source: Bowman and others, 1998.

grains, vegetables, milk, or meat groups, and less than 40 percent met the dietary recommendations for total fat, saturated fat, or sodium. Only for the cholesterol and variety components did a majority of individuals (71 percent and 52 percent) achieve a perfect score.

The HEI varied with some economic and demographic factors (table 3). Females had slightly higher scores than males; and persons in the younger and older age groups scored higher than other individuals. Children age 2-3 had the highest average HEI score (74), while older children had lower HEI scores than younger children. Some of the score differences may be related to the lower caloric intake of females relative to males, and of younger children and older adults relative to teenagers and young adults, since individuals who eat fewer calories likely consume less cholesterol and sodium, and therefore would have higher scores for those components. However, children age 2-3 scored particularly higher on the fruit and milk components of the HEI than older children, suggesting that changes in dietary habits may play an important role. For example, children age 2-3 had an average fruit score of 7 compared with 3.5 for males age

Figure 2

Percentage of people meeting the dietary recommendations for the Healthy Eating Index component mean scores, 1994-96



* Meats include eggs, nuts, and some legumes.
Source: Bowman and others, 1998.

11-14, and an average milk group score of 7.3 compared with 5.2 for females age 11-14 (Bowman and others, 1998).

HEI scores generally improved with increasing household income. Individuals in higher income households did better on the saturated fat and sodium components of the HEI than did people in lower income households.

Education level was positively associated with a better diet. In 1994-96, the average HEI score was 61 for those with a high school diploma or less, 66 for those with 4 years of college, and 68 for those with more than 4 years of college. Education may be a predictor of people's ability to translate nutrition guidance information into better dietary practices.

Among adults 19 and older, those with better diets had lower body mass indexes (BMI, a measure, based on weight and height, of

Table 3—Healthy Eating Index scores by sociodemographic characteristics, 1994-96

Characteristic	1994	1995	1996	1994-96
			HEI	
Gender:				
Male	63.0	63.0	62.6	62.9
Female	64.2	64.0	65.0	64.4
Age/gender:				
Children 2-3	74.4	74.0	73.2	73.9
Children 4-6	66.4	68.8	68.0	67.7
Children 7-10	66.9	67.1	65.9	66.6
Females 11-14	63.1	63.5	64.0	63.5
Females 15-18	61.4	58.4	62.5	60.8
Females 19-50	61.8	61.2	62.7	61.9
Females 51+	67.1	67.6	67.5	67.4
Males 11-14	62.4	63.2	61.2	62.3
Males 15-18	60.4	61.4	60.2	60.7
Males 19-50	61.2	60.6	60.6	60.8
Males 51+	64.0	64.0	65.2	64.4
Education level:				
4 years of high school or less	60.8	60.6	61.0	60.8
Some college	63.5	63.0	63.2	63.2
4 years of college	66.6	65.4	67.1	66.4
More than 4 years of college	67.6	68.1	68.4	68.0
Income as percentage of poverty level:				
0-50	58.8	61.2	60.7	60.2
51-100	60.5	61.4	60.5	60.8
101-130	61.5	61.6	61.6	61.6
131-200	62.8	61.4	63.7	62.6
201-299	63.8	63.6	63.6	63.7
300+	65.0	64.9	65.0	65.0
Region:				
Northeast	65.3	65.0	65.8	65.4
Midwest	64.1	64.0	65.2	64.4
South	61.7	61.7	61.3	61.6
West	64.5	64.6	64.7	64.6

Source: Bowman and others, 1998.

Table 4—Mean body mass index for adults, by HEI, 1994-96

Adults	Good diet	Diet needs improvement	Poor diet
Female	25.1	25.6	26.2
Male	25.6	26.4	26.6

Source: Bowman and others, 1988.

appropriate body weight), suggesting a connection between diet quality and their BMI (table 4).

How Does the HEI Correlate With Other Measures of Diet Quality?

The usefulness of the HEI depends partly on the degree to which it correlates with other conventional measures of diet quality. The 1989-90 HEI, computed using data from the 1989-90 CSFII (USDA, CNPP, 1995; Kennedy and others, 1995), was shown to correlate well with the Recommended Dietary Allowances (RDA's) for a number of nutrients, with the likelihood of falling below 75 percent of the RDA decreasing as the mean score on the HEI increased.

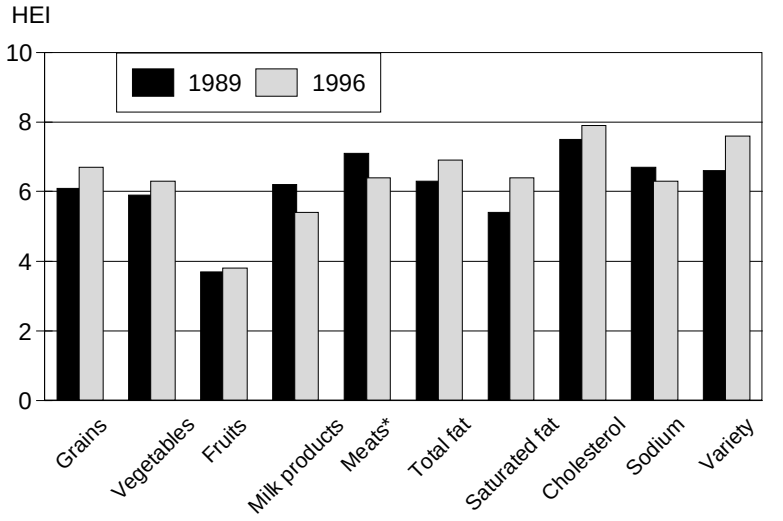
In addition, for those individuals 18 and older for whom the information was available, the HEI score was compared with individuals' self-rating of their diets. Persons who rated their diets as excellent had a significantly higher HEI (67.6) than individuals who rated their diets as good (63.2), fair (59.9), or poor (55.8). Only 16.3 percent of the study subjects self-rated their diets as excellent (see chapter 15 for a comparison of subjects' perception of the cholesterol content of their diets and their actual cholesterol intake). Unfortunately, this comparison could not be performed with the 1994-96 CSFII, which did not collect information on how individuals rated their diets.

Trends in the HEI: 1989 vs. 1996

A comparison of the 1996 HEI with the HEI using the first day's intake from the 1989 CSFII suggests that, on average, diets have improved since 1989, although most people's diets still need improvement.

Figure 3

Healthy Eating Index component mean scores, 1989 and 1996



* Meats include eggs, nuts, and some legumes.
Source: Bowman and others, 1998.

The increase in average HEI score between 1989 and 1996, from 61.5 to 63.8, is the result of higher scores in 7 of the 10 HEI components (fig. 3). Gains in HEI component scores are particularly noticeable for the saturated fat and variety components. The three components for which scores did not increase were milk, meat, and sodium. In the past several years, consumption of milk has declined as consumption of carbonated soft drinks has increased (Putnam and Gerrior, 1997). The decrease in the sodium component may be related to the increase in the grains score, since grain products contribute large amounts of dietary sodium (Saltos and Bowman, 1997).

The increase in the average HEI since 1989 may be due to several factors, including the implementation of the Nutrition Labeling and Education Act, and various nutrition campaigns emphasizing the health benefits of better diets.

Implications for Nutrition Promotion and Public Policy

The data from the Healthy Eating Index show that although diet quality has improved over the past few years, the diets of most Americans need improvement in several aspects. In 1996, only 12 percent of those 2 and older had a diet that could be considered "good."

Although component scores have typically increased, the vast majority of Americans are still not consuming the recommended number of servings from the five major food groups in the Food Guide Pyramid. In addition, less than 40 percent of the individuals had diets that conformed to the quantitative recommendations for total fat or saturated fat in the *Dietary Guidelines*.

Although the HEI for most people needs improvement, some individuals are more at risk of consuming a poor diet than others. Persons from low-income households, individuals with less education, and persons age 15-50 were most likely to have lower average scores.

The Healthy Eating Index reflects the complexity of dietary patterns. Doing well on one component of the index—say, total fat—does not ensure a high score on the overall HEI. Overall diet quality is reflected in the total index score and is not determined by any individual component score.

The results of the HEI are useful in designing and targeting nutrition education and health promotion activities. The HEI provides insights into the types of dietary changes needed to improve American eating patterns. In particular, the HEI calls attention to the fact that there are a number of problems with current dietary patterns, and that Americans need to do more than reduce their fat intake to attain healthier diets.

A two-tiered approach appears warranted. First, nutrition promotion activities that address the nutritional needs of all Americans are needed. For example, consumption of fruit was low across all population groups.

Second, additional strategies for nutrition promotion targeted at certain groups are needed. Results from these analyses suggest that individuals from low-income households and less-educated people are more likely to have lower HEI scores. Nutrition promotion interventions need to take into consideration these special constraints.

Efforts are already underway within USDA to integrate nutrition education into all of the food assistance programs. In addition, the USDA Center for Nutrition Policy and Promotion plans to develop a consumer-oriented, self-assessment guide to allow consumers to evaluate the quality of their own diet.

The HEI also provides a useful instrument for monitoring trends in U.S. consumption patterns and in the overall healthfulness of the American diet. USDA's Center for Nutrition Policy and Promotion plans to continue to update and publish the Index as nationally representative dietary survey data become available.

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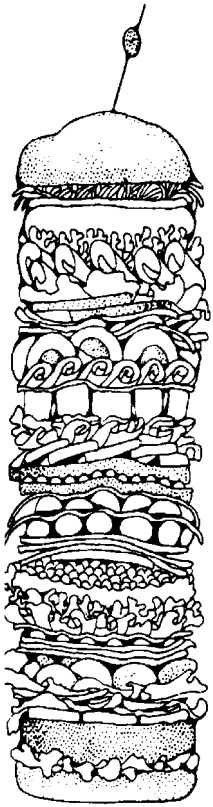

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