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Update of the Healthy Eating Index: HEI-2010

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Abstract

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The Healthy Eating Index (HEI) is a measure of diet quality in terms of conformance with federal dietary guidance. Publication of the *Dietary Guidelines for Americans, 2010* prompted an interagency working group to update the HEI. The HEI-2010 retains several features of the 2005 version: (1) it has 12 components, many unchanged, including 9 adequacy and 3 moderation components; (2) it uses a density approach to set standards, e.g., per 1000 calories or as a percent of calories; and (3) it employs least-restrictive standards, i.e., those that are easiest to achieve among recommendations that vary by energy level, sex, and/or age. Changes to the index include: (1) Greens and Beans replaces Dark Green and Orange Vegetables and Legumes; (2) Seafood and Plant Proteins has been added to capture specific choices from the protein group; (3) Fatty Acids, a ratio of poly- and mono-unsaturated to saturated fatty acids, replaces Oils and Saturated Fat to acknowledge the recommendation to replace saturated fat with mono- and polyunsaturated fatty acids; and (4) a moderation component, Refined Grains, replaces the adequacy component, Total Grains, to assess over-consumption. The HEI-2010 captures the key recommendations of the 2010 Dietary Guidelines and, like earlier versions, will be used to assess the diet quality of the U.S. population and subpopulations, in evaluating interventions, in dietary patterns research, and to evaluate various aspects of the food environment.

Keywords

Healthy Eating Index; diet quality; diet assessment tool

Introduction

The Healthy Eating Index (HEI) is a measure of diet quality in terms of conformance to the Dietary Guidelines for Americans, which are the basis of nutrition policy for the United States government and the foundation of all federal nutrition guidance. The accompanying U.S. Department of Agriculture (USDA) Food Patterns translate key recommendations of the Dietary Guidelines into specific, quantified recommendations for types and amounts of foods to consume at 12 calorie levels with limits on calories from solid fats and added sugars.¹ The USDA Food Patterns are used to set the scoring standards for the HEI. In addition to the USDA Food Patterns, the 2005 and the 2010 editions of the Dietary Guidelines included the Dietary Approaches to Stop Hypertension (DASH) Eating Plan as another example of a dietary pattern that illustrates eating according to the Dietary Guidelines. Compared to typical food consumption patterns in the U.S., both the USDA Food Patterns and the DASH Eating Plan include more vegetables, fruits, whole grains, and low-fat dairy products and less refined grains, saturated fatty acids, and added sugars.^{1, 2}

The Dietary Guidelines are issued every 5 years by the USDA and U.S. Department of Health and Human Services. The HEI was last revised to reflect the 2005 edition of the Dietary Guidelines.^{3,4} The release of the 2010 Dietary Guidelines and revised USDA Food Patterns necessitated an update to the HEI-2005 to capture key changes, such as the addition of recommendations for seafood (fish and shellfish) and limitations on refined grains.¹ However, key features of the HEI-2005, described elsewhere,³ were maintained in the HEI-2010: (1) diet quality is assessed from two perspectives: adequacy (dietary components to increase) and moderation (dietary components to decrease); (2) the scoring standards are density-based such that the relative mix of foods is evaluated; and (3) the standards for the maximum scores are the least-restrictive (easiest to achieve) recommendations among those that vary by energy level, sex, and/or age. For the adequacy components, this means that increasing levels of intake receive increasingly higher scores; whereas for the moderation components, increasing levels of intake receive decreasingly lower scores. In other words, for all components, higher scores indicate closer conformance with dietary guidance.

The purpose of this paper is to describe the process and rationale for updating the HEI to reflect the key diet-related recommendations of the 2010 Dietary Guidelines and the resulting components and scoring standards. The evaluation of the HEI-2010 will be described in a separate report.

Process for Updating the HEI

The USDA Center for Nutrition Policy and Promotion (CNPP) convened a group of federal users of the HEI and the Dietary Guidelines to discuss the process and content for the update. This meeting and subsequent discussions of a working group of staff from CNPP and the National Cancer Institute led to the development of guiding principles for the update (Figure 1). Drawing upon these principles, the working group subsequently reviewed the HEI-2005 in relation to the 2010 Dietary Guidelines and the USDA Food Patterns, discussed potential strategies to address key changes in the guidance, and made the decisions presented here. The wider group commented on the changes to the HEI and reviewed this manuscript prior to publication.

HEI-2010 Components

A list of the HEI-2010 and HEI-2005 components along with their point values and scoring standards are found in Table 1. Figure 2 maps the key dietary recommendations found in the 2010 Dietary Guidelines to the components of the HEI-2010. Like its predecessor, the HEI-2010 is made up of 12 components, 9 adequacy components and 3 moderation components (Table 1), and Figure 3 illustrates how the USDA Food Patterns and the nutrients considered in the HEI-2010 relate to the HEI-2010 components. Total Fruit, Whole Fruit, Total Vegetables, Total Grains, and Sodium were carried forward from the HEI-2005. Milk and Meat and Beans were also carried forward but have been renamed Dairy and Total Protein Foods, respectively, for consistency with the 2010 USDA Food Patterns.

The HEI-2005 component Calories from Solid Fats, Alcoholic Beverages, and Added Sugars has been modified slightly as described below and renamed Empty Calories, a more concise term used to convey this concept to consumers.⁵ A number of components were changed from the 2005 version: Greens and Beans replaced Dark Green and Orange Vegetables and Legumes; Seafood and Plant Proteins, which represents selected subgroups of protein foods, was introduced; Fatty Acids replaced two components, Saturated Fat and Oils; Refined Grains was added; and Total Grains was eliminated. These new components are described further below. Additional details regarding the differences between the 2005 and 2010 versions, including differences in maximum point values of the components and scoring standards are found in Table 1.

Greens and Beans

Of the five vegetable subgroups found in the 2010 USDA Food Patterns, dark green vegetables and beans and peas (also known as legumes) are the subgroups for which intakes are furthest from recommended levels.^{6, 7} The HEI-2010 captures these two subgroups as a single component called Greens and Beans. Orange vegetables were included in the vegetable subgroup component of the HEI-2005 (known as Dark Green and Orange Vegetables and Legumes) because they also were among those subgroups of vegetables for which average intakes were furthest from recommended levels. However, when the USDA Food Patterns were updated to reflect the 2010 Dietary Guidelines, the red vegetables were removed from the “other vegetables” subgroup and combined with the orange vegetables to create a new “red-orange” subgroup. Because tomatoes are so frequently consumed, intake of the new red-orange vegetable subgroup is not far from recommended levels; therefore, this subgroup is not included in the HEI-2010.

The standard for the maximum score of the Greens and Beans component is the sum of the least restrictive daily recommendations for those two subgroups of vegetables found in the USDA Food Patterns, expressed on a per 1,000 calorie basis. Any combination of dark green vegetables and beans and peas counts toward meeting the standard. However, when the Total Protein Foods standard is otherwise not met, beans and peas are first counted as protein foods; and only those beans and peas that are not needed to meet the Total Protein Foods standard are then counted toward Greens and Beans (and Total Vegetables) as illustrated in Figure 3. The reason for this is that although the USDA Food Patterns include beans and peas as part of both the vegetable and protein foods groups, they stipulate that they be counted in only one or the other of these groups.^{1, 8}

Seafood and Plant Proteins

The 2010 Dietary Guidelines includes a new recommendation for seafood because of the many benefits it provides, including, but not limited to, its *n*-3 fatty acid content.¹ It is recommended that seafood consumption be increased by replacing some meat and poultry. The Dietary Guidelines also highlight the benefits of vegetarian diets and, for the first time, include lacto-ovo vegetarian and vegan adaptations of the USDA Food Patterns. Both vegetarian diets and consumption of seafood are associated with reduced cardiovascular-related risks;¹ therefore, plant proteins and seafood were combined into one component of the HEI-2010. The combination is consistent with the key feature of the HEI that no one food or commodity is required for a perfect score (Figure 1); if a component assessed seafood alone, it would prohibit vegetarian diets from earning a perfect score.

The standard for the maximum score of the Seafood and Plant Proteins component is the sum of the daily recommendations in the USDA Food Patterns for three subgroups of protein foods: seafood, nuts and seeds, and soy products, expressed on a per 1,000 calorie basis (see Figure 3). All seafood, nuts and seeds, and processed soy products (other than soy beverages, which are counted toward the Dairy component) count toward Seafood and Plant Proteins. In addition, any beans and peas that are counted toward the Total Protein Foods standard are counted toward the Seafood and Plant Proteins component.

Fatty Acids

The 2010 Dietary Guidelines state that the type of fat is more important than the total amount of fat and call for replacing saturated fatty acids with monounsaturated and polyunsaturated fatty acids. In the HEI-2010, the ratio of unsaturated fatty acids to saturated fatty acids is used to capture the concept of replacement and the relative balance of the two. This ratio has been used as part of another diet quality score.⁹

The Fatty Acids component is classified as an adequacy component to reflect the health benefits of poly- and monounsaturated fatty acids. In the USDA Food Patterns, the values of this ratio range from 2.5 to 2.6 among the various calorie levels.^{6, 10} The least restrictive value of 2.5 was chosen as the standard for the maximum score. The approach for setting the minimum score is described below. Because the Dietary Guidelines also include the DASH Eating Plan as an illustrative dietary pattern, the ratio of unsaturated to saturated fatty acids in the various diets used in the DASH trials was also reviewed. The achieved diets had ratios of 2.4 to 3.1, suggesting that 2.5 is a reasonable standard.^{11, 12}

Refined Grains

Refined Grains is considered a moderation component because the 2010 Dietary Guidelines emphasize that consumption levels are too high. More than 95% of Americans age 2 and older consume more than the amounts recommended in the USDA

Food Patterns.⁷ The least restrictive of these recommendations, expressed per 1,000 calories, was selected as the standard for the maximum score of 10.

Empty Calories

The 2010 USDA Food Patterns include limits on calories from solid fats and added sugars but do not specifically mention limits on calories from alcohol. The Dietary Guidelines, on the other hand, note that calories from alcohol reduce the calories from solid fats and added sugars that can be accommodated; however, they also acknowledge that moderate drinking has beneficial effects. Therefore, in the HEI-2010, calories from alcohol are considered to be empty calories, but only when alcohol is consumed beyond moderate amounts. The least restrictive of the two levels defined as moderate drinking in the Dietary Guidelines, 2 drinks per day (converted to 28 grams of ethanol), was used to set the threshold for counting alcohol as empty calories. The same value that was used to energy-adjust sodium (2150 calories)^{3, 13}, as described below, was used to energy-adjust the alcohol threshold. Because 28 g ethanol/2150 calories equals 13 g ethanol/1000 calories, up to 13 g of ethanol/1000 calories are not counted towards Empty Calories.

Scoring and Weighting

Assigning HEI-2010 scores to a set of foods requires translating them into amounts of food groups that are consistent with the USDA Food Patterns.⁶ Mixed foods are disaggregated (i.e., broken down into their ingredients), and any solid fats and added sugars are counted separately.

As noted above, the standards for assigning maximum scores are the least-restrictive recommendations among those that vary by energy level, sex and/or age group. For adequacy components, intakes at the level of the standard or higher receive the maximum number of points. For all adequacy components except Fatty Acids, zero intakes receive a score of zero (Table 1). The 15th percentile of the 2001–2002 population distribution of 1-day intakes was used to set the minimum score of zero for Fatty Acids, the only nutrient-based adequacy component. This was necessary because clear evidence on the level of intake that warrants a score of zero is not available. The methods and dataset used to estimate the 15th percentile are described in detail elsewhere.^{3, 14} Scores for intakes between the minimum and maximum standards are scored proportionately.

For the three moderation components, intakes at the level of the standard or lower receive the maximum number of points (Table 1). For sodium, the maximum score is assigned to diets that have less than 1,100 mg of sodium per 1,000 calories. This standard is based on the least restrictive of the two levels recommended in the Dietary Guidelines—2,300 mg and 1,500 mg—and was derived using the energy-adjustment factor of 2,300 mg of sodium per 2,150 calories. That standard was employed by the Institute of Medicine to set the Tolerable Upper Intake Levels for children and was based on the estimated median energy intake by adults.¹³

Compared to the food-based adequacy components, assigning a score of zero for the moderation components is more complicated for two reasons: (1) they are reverse scored, that is, higher intakes receive lower scores, and (2) no scientific evidence clearly specifies how high an intake deserves a score of zero. Consistent with the approach for the HEI-2005, a value at approximately the 85th percentile of the 2001–2002 population distribution of 1-day intakes is used for the minimum score of zero for these components (Table 1). The methods and dataset used to estimate the 85th percentile for each component are described in detail elsewhere.^{3, 14} As with the food-based adequacy components, scores for intakes between the minimum and maximum standards are scored proportionately.

The HEI-2010 components can be considered as a set of scores, each of which measures compliance with a different aspect of the Dietary Guidelines, and the component scores can be summed to derive a total score. The maximum number of points allocated to each component (Table 1) serves as a weighting factor when the component scores are summed. Most components are weighted equally at 10 points. Fruits, vegetables, and protein foods have two components (total and a subgroup) that are allotted 5 points each. Empty Calories is allotted 20 points because the added sugars, solid fats, and alcoholic beverages that make up this component contribute excess calories and may displace nutrient-dense foods from the diet.¹

Estimating HEI-2010 Scores

Whether assessing diets or some aspect of the food environment, the basic steps for deriving HEI-2010 scores are the same: (1) identify the set of foods under consideration; (2) determine the amount of each relevant food group, subgroup, and nutrient in the set of foods; (3) derive the pertinent ratios; and (4) score each component using the appropriate standard.¹⁵ However, the ratios and scores can be estimated several ways, depending on the research question and type of data available.

For many applications, an estimate of the *mean score* for a population, subpopulation, or group is appropriate; and the population ratio method (i.e., the weighted ratio of means, rather than the weighted mean ratio) can be used.¹⁶ Major advances have been made in the development of statistical methods for estimating the *distribution of scores* at the population level for nutrition monitoring purposes and for determining the relationships between a multi-component dietary quality measure and health outcomes.^{17–22} Guidance on how to use the HEI-2010 in research, including SAS code and macros, is available online.²³

Considerations for Interpretation of HEI-2010 Scores

This section describes several considerations relevant to the interpretation of HEI-2010 scores. These include nuances of design that relate to measurement issues, considerations of appropriateness for various groups, characteristics of some components that impact the meaning of scores, and relationships between diet quality and nutrient adequacy.

Density standards are useful not only because they allow common standards to be used, but also because they are independent of an individual's energy requirement, which is difficult to measure with a reasonable degree of accuracy.³ The use of the least-restrictive standards results in the error being in the same direction (i.e., liberal or highest possible scores), which is advantageous for interpretation. Further, except for Total Protein Foods, very high component scores are rare in the United States, so choosing the least restrictive standard does not limit the range of scores appreciably.

The HEI-2010 is appropriate for all segments of the U.S. population to which the USDA Food Patterns apply, including women who are pregnant or lactating. It does not apply to children younger than 2 years of age or to older children who are consuming breast milk or infant formula.³ The HEI-2010 scoring system reflects the vegetarian and vegan versions of the USDA Foods Pattern as well as the omnivore version. Although the validity of the HEI-2010 has not been specifically determined for ethnic and cultural groups, it can be assumed to be valid for assessing the diets of subpopulations for which the Dietary Guidelines are appropriate because the mixed dishes and sauces that distinguish ethnic and cultural diets would be disaggregated into their ingredients and assigned to food groups which are generally culturally neutral.

The USDA Food Patterns note that beans and peas are considered both protein foods and vegetables and stipulate that they may be counted as only one or the other.¹ Like the HEI-2005, the HEI-2010 counts only as many beans and peas toward Total Protein Foods as are needed to meet the standard. The HEI-2010 also counts this amount of beans and peas as Seafood and Plant Proteins. Any amount remaining after the Total Protein Foods standard is met is counted toward Total Vegetables (and Greens and Beans) (see Figure 3). Therefore, diets which include some beans and peas, but meet the Total Protein Foods standard without counting all of them, are likely to receive lower scores for Seafood and Plant Proteins than they would if all the beans and peas had been counted towards this component. Likewise, diets for which at least some beans and peas are used to meet the Total Protein Foods standard are likely to receive lower scores for Total Vegetables and Greens and Beans than they would if all beans and peas had been counted as vegetables.

The HEI-2010 considers alcohol above a threshold level indicative of moderate drinking as empty calories. This approach does not directly address other potential positive and negative biological effects of alcohol, nor does it account for specific questions related to frequency of consumption and amounts consumed on drinking occasions. When using the HEI-2010 to examine relationships between diet quality and health outcomes, additional considerations regarding alcohol may be warranted.²²

The HEI-2010 is a measure of diet quality and does not address the appropriateness of energy intake and levels of physical activity, which together determine energy balance. Nonetheless, energy balance is a major focus of the 2010 Dietary Guidelines, and researchers are encouraged to use measures of energy balance and physical activity in conjunction with the HEI-2010.

For children over the age of 8 and adults, diets that have fewer than 1600 calories are less likely than higher calorie diets to be nutritionally adequate even if perfect scores are achieved on the adequacy components of the HEI-2010. The USDA Food Patterns are not designed to ensure nutrient adequacy for individuals over the age of 8 who have energy requirements below 1600 calories because it is difficult to meet their Recommended Dietary Allowances (RDAs) at such low energy levels.⁶ Furthermore, the USDA Food Patterns do not meet RDAs for vitamins D and E or Adequate Intakes for potassium and choline, so a perfect score on the HEI-2010 may not represent adequate intake of these nutrients to the same degree it does for other nutrients. On the other hand, the nutrient standards for USDA Food Patterns are based on the RDAs and Adequate Intakes, which are too high for assessment purposes.²⁴ This limitation cannot be remedied until Estimated Average Requirements are available for all nutrients of concern.³

The sodium recommendations found in the Dietary Guidelines do not vary with energy intake level;¹ but, consistent with other components, the HEI-2010 sodium scoring standard is energy-adjusted. This standard (1.1 g/1000 calories) is more difficult to meet at lower energy levels than is the absolute limit (2300 mg) on which it is based. An energy-adjusted approach has been used by the Institute of Medicine,¹³ as mentioned above; and the sodium levels of the diets in the DASH trials were deliberately energy-adjusted,^{25, 26} lending support to this method.

Conclusions

The HEI-2010 is an updated tool for assessing diet quality as specified by the 2010 Dietary Guidelines for Americans. Like the HEI-2005, the HEI-2010 can be used to assess changes in diet quality over time;²⁷ to examine the relationship between diet cost and diet quality;^{28, 29} to evaluate the diets of subpopulations,^{30–38} food environments,^{15, 39}

menus,^{4, 40} foods provided through USDA nutrition assistance programs,⁴¹ and the efficacy of nutrition interventions;⁴² and to validate other tools.^{43–45} It can also be used in research to better understand relationships between nutrients, foods, and/or dietary patterns and health-related outcomes.^{46–67}

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Key features of the Healthy Eating Index	
Feature	Rationale
Assesses diet quality with regard to recommendations of the Dietary Guidelines for Americans	- The Dietary Guidelines are the nutrition policy of the U.S. government and are evidence based
Assesses diet—foods and beverages and nutrients from them—and not supplement intake	- Is consistent with fundamental premise of Dietary Guidelines to meet nutrient needs primarily from foods and beverages
Captures balance among food groups, including foods to encourage and foods to reduce	- Reflects Dietary Guidelines - Considers gaps between intakes and recommendations
Uncouples dietary quality from quantity, employing a density-based approach	- Indicates appropriate mix of, or balance among, food groups - Overcomes limitations of diet and physical activity data, which do not adequately capture energy intake and expenditure, respectively - Enables application to various levels, including groups of people, environments, food supply
Employs a least restrictive approach to setting standards for maximum scores by using the recommendations that are easiest to achieve among those that vary by age and sex	- Results in highest possible scores - Potential error is in the same direction for everyone; however, because very high scores for most components are rare among the U.S. population, the score is optimized for sensitivity to improvement
Requires no single food or commodity to be indispensable to a perfect score	- Accommodates a variety of eating patterns, reflecting cultural, ethnic, traditional and personal preferences and tolerances and food costs and availability
Guiding principles for the 2010 update to the Healthy Eating Index	
Principle	Rationale
Focus on key recommendations of the Dietary Guidelines for Americans, making only changes to the index that have a strong rationale	- Stability of the HEI should reflect consistency of recommendations over time - Unsubstantiated changes in the HEI may imply emergence of new evidence that does not exist
Limit the number of components	- Each component should assess a critical aspect of diet quality
Avoid an unduly complex algorithm	- The index should be transparent and straightforward to explain and apply

Figure 1.
Key features of the Healthy Eating Index and guiding principles for the 2010 update

Key recommendation ²	HEI-2010 component	Comment
Vegetables and Fruit		
Increase vegetable and fruit intake. “The majority of the fruit recommended should come from whole fruits, including fresh, canned, frozen, and dried forms, rather than from juice.”	Total Vegetables Total Fruit Whole Fruit	
Eat a variety of vegetables, especially dark-green and red and orange vegetables and beans and peas.	Greens and Beans	Dark green vegetables and beans and peas were selected because intakes were farthest from recommendations.
Grains		
Limit the consumption of foods that contain refined grains, especially refined-grain foods that contain solid fats, added sugars, and sodium. “When consumed beyond recommended levels, they commonly provide excess calories, especially because many refined grain products also are high in solid fats and added sugars.”	Refined Grains Sodium Empty Calories	
Consume at least half of all grains as whole grains. Increase whole-grain intake by replacing refined grains with whole grains.	Whole Grains Refined Grains	
Dairy		
Increase intake of fat-free or low-fat milk and milk products, such as milk, yogurt, cheese, or fortified soy beverages.	Dairy Fatty Acids Empty Calories	Saturated fatty acids and solid fats from Dairy foods are accounted for in the Fatty Acids and Empty Calories components, respectively.
Protein Foods		
Choose a variety of protein foods, which include seafood, lean meat and poultry, eggs, beans and peas, soy products, and unsalted nuts and seeds.	Total Protein Foods Seafood and Plant Proteins	Like the 2010 Dietary Guidelines, the HEI-2010 allows for flexibility in food choices. In principle, lack of any one commodity should not prohibit a perfect score. The Seafood and

Increase the amount and variety of seafood consumed by choosing seafood in place of some meat and poultry.	Seafood and Plant Proteins	Plant Proteins component allows for vegan diets to get full credit.
Fats		
Consume less than 10 percent of calories from saturated fatty acids by replacing them with monounsaturated and polyunsaturated fatty acids. “The types of fatty acids consumed are more important in influencing the risk of cardiovascular disease than is the total amount of fat in the diet. Animal fats tend to have a higher proportion of saturated fatty acids (seafood being the major exception), and plant foods tend to have a higher proportion of monounsaturated and/or polyunsaturated fatty acids (coconut oil, palm kernel oil, and palm oil being the exceptions).”	Fatty Acids	To operationalize the recommendation to replace saturated fats with unsaturated fats and to acknowledge the importance of the balance of the types of fatty acids in diet quality, the maximum standard for the Fatty Acids component is based on the ratio of monounsaturated plus polyunsaturated fatty acids to saturated fatty acids in the USDA Food Patterns.
Consume less than 300 mg per day of dietary cholesterol. “The effect of [dietary cholesterol in raising blood LDL cholesterol levels] is reduced when saturated fatty acid intake is low, and the potential negative effects of dietary cholesterol are relatively small compared to those of saturated and <i>trans</i> fatty acids.”		Cholesterol is not included in the HEI-2010 because replacing saturated fats with unsaturated fats and limiting solid fats are considered more important in the Dietary Guidelines.
Keep <i>trans</i> fatty acid consumption as low as possible by limiting foods that contain synthetic sources of <i>trans</i> fats, such as partially hydrogenated oils, and by limiting other solid fats.	Fatty Acids Empty Calories	<i>Trans</i> fatty acids theoretically would be grouped with saturated fatty acids in the denominator of the ratio for the Fatty Acids component; however, <i>trans</i> fatty acids were not included because intake data are not available. <i>Trans</i> fatty acids are reflected in solid fats in the Empty Calories component.
Reduce the intake of calories from solid fats and added sugars.	Empty Calories	

Replace protein foods that are higher in solid fats with choices that are lower in solid fats and calories and/or are sources of oils.	Fatty Acids Seafood and Plant Proteins Empty Calories	The Fatty Acids component addresses consuming oils, which are sources of unsaturated fats, in place of solid fats, which are sources of saturated fats. Seafood and Plant Proteins captures seafood, nuts, and seeds, which are sources of oils. The Empty Calories component captures calories from solid fats.
Use oils to replace solid fats where possible.	Fatty Acids Empty Calories	Using oils to replace solid fats is reflected in the Fatty Acids component where oils that are mono- and polyunsaturated fatty acids make up the numerator and saturated fatty acids make up the denominator.
Choose foods that provide more potassium, dietary fiber, calcium, and vitamin D, which are nutrients of concern in American diets. These foods include vegetables, fruits, whole grains, and milk and milk products.	Total Fruit Whole Fruit Total Vegetables Greens and Beans Whole Grains Dairy	The HEI-2010 components capture all of the food sources of the nutrients of concern. Higher scores would reflect intakes moving toward or achieving nutrient adequacy.
Sodium		
Reduce daily sodium intake to less than 2,300 mg and further reduce intake to 1,500 mg among persons who are 51 and older and those of any age who are African American or have hypertension, diabetes, or chronic kidney disease.	Sodium	
Alcohol		
If alcohol is consumed, it should be consumed in moderation—up to one drink per day for women and two drinks per day for men—and only by adults of legal drinking age. “The consumption of alcohol can have beneficial or harmful effects, depending on the amount consumed, age, and other characteristics of the person consuming the alcohol.”	Empty Calories	Alcohol is considered a source of empty calories when it is consumed beyond moderate amounts.

<p>“Alcohol consumption may have beneficial effects when consumed in moderation...However, it is not recommended that anyone begin drinking or drink more frequently on the basis of potential health benefits because moderate alcohol intake also is associated with increased risk of breast cancer, violence, drowning, and injuries from falls and motor vehicle crashes.”</p> <p>“In addition, for those who consume alcohol, the calories in these beverages need to be considered as part of total calorie intake; they reduce the allowance for calories from solid fats and added sugars that can be accommodated in an eating pattern.”</p>	
<p>Calorie balance and physical activity</p>	
<p>Prevent and/or reduce overweight and obesity through improved eating and physical activity behaviors.</p> <p>Control total calorie intake to manage body weight. For people who are overweight or obese, this will mean consuming fewer calories from foods and beverages.</p> <p>“Although total calories consumed is important for calorie balance and weight management, it is important to consider the nutrients and other healthful properties of food and beverages, as well as their calories, when selecting an eating pattern for optimal health.”</p> <p>“A healthy eating pattern focuses on nutrient-dense foods—vegetables, fruits, whole grains, fat-free or low-fat milk and milk products, lean meats and poultry, seafood, eggs, beans and peas, and nuts and seeds that are prepared without added solid fats,</p>	<p>While the HEI-2010 assesses many aspects of improved eating behaviors, it does not directly address calorie intake, calorie balance, or physical activity. Calorie balance can be assessed using measures of body weight and composition. These can be used in conjunction with the HEI-2010 as can measures of physical activity.</p>

<p>sugars, starches, and sodium. Combined into an eating pattern, these foods can provide the full range of essential nutrients and fiber, without excessive calories.”</p> <p>Maintain appropriate calorie balance during each stage of life—childhood, adolescence, adulthood, pregnancy and breastfeeding, and older age.</p>		
Eating patterns		
<p>Select an eating pattern that meets nutrient needs over time at an appropriate calorie level.</p> <p>Account for all foods and beverages consumed and assess how they fit within a total healthy eating pattern.</p>	<p>All compo- nents</p>	<p>The HEI-2010 captures the USDA Food Patterns, which are designed for nutrient adequacy, and assesses the entire eating pattern.</p>

¹The HEI-2010 is designed to measure components of diet quality that apply to all Americans age 2 and older. Some key recommendations apply only to specific sub-population groups (e.g., those related to consuming fortified foods) and are, therefore, not included, nor are the recommendations related solely to energy intake, physical activity, or food safety.

²Additional text from the Dietary Guidelines for Americans, 2010 that contributes substantial context for the mapping of the HEI-2010 components is included in quotes below the key recommendations.

Figure 2.
Healthy Eating Index-2010 (HEI-2010) components mapped to the key dietary
recommendations of the Dietary Guidelines for Americans, 2010¹

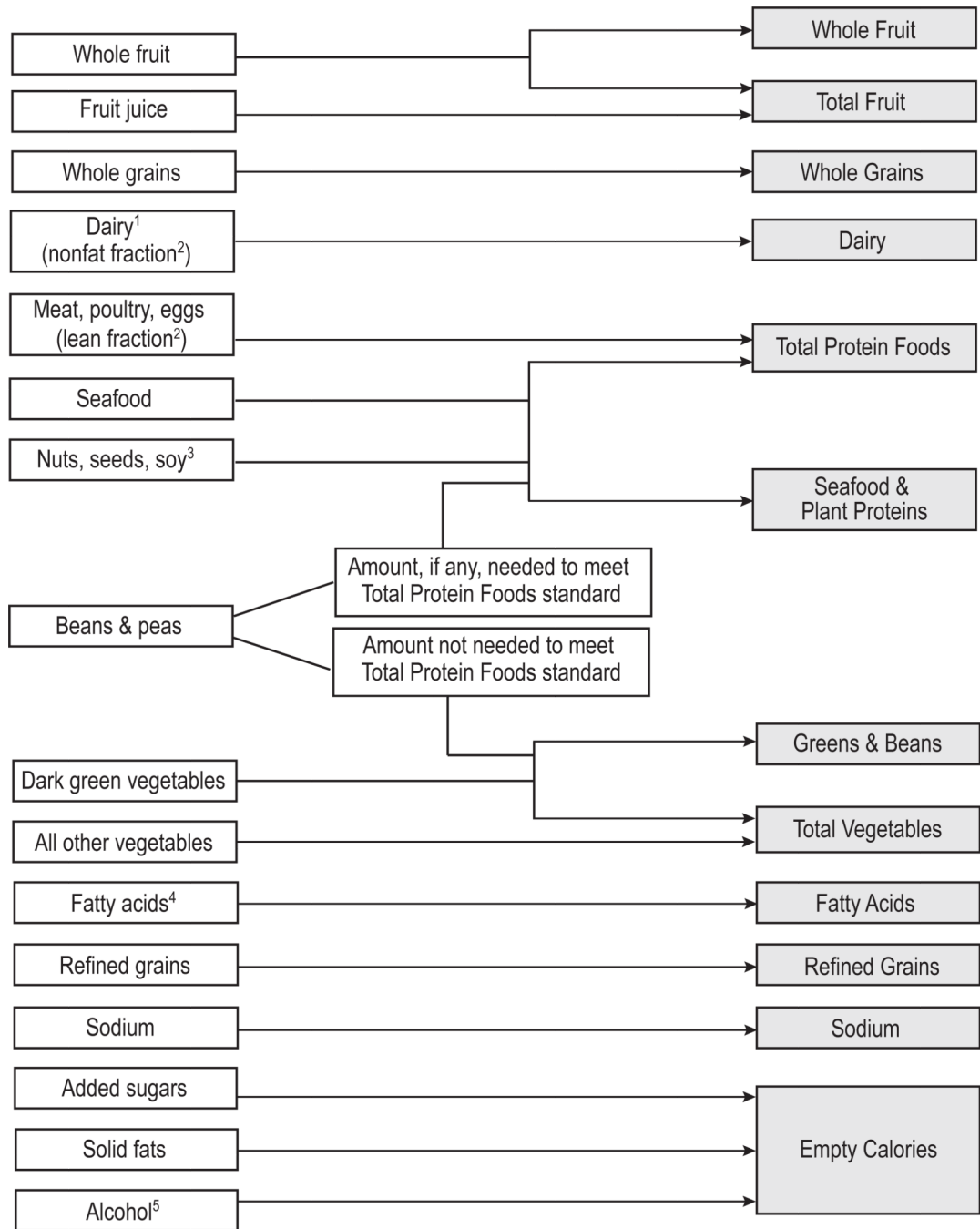


Figure 3.

Food groups and subgroups of the USDA Food Patterns, alcohol, and nutrients that contribute to the components of the Healthy Eating Index-2010. ¹Includes all milk products, such as fluid milk, yogurt, and cheese, and fortified soy beverages. ²Fat is counted as solid fat. ³Includes nuts, seeds, and soy products (other than beverages). ⁴Included as a ratio of poly- and monounsaturated fatty acids to saturated fatty acids. ⁵Only alcohol beyond a moderate amount is considered to be empty calories.

Table 1

Healthy Eating Index-2010 and Healthy Eating Index-2005 components and standards for scoring

Component	Maximum points	Standard for maximum score	Standard for minimum score of zero
HEI-2010¹			
<i>Adequacy:</i>			
Total Fruit ²	5	0.8 cup equiv. per 1,000 kcal	No Fruit
Whole Fruit ³	5	0.4 cup equiv. per 1,000 kcal	No Whole Fruit
Total Vegetables ⁴	5	1.1 cup equiv. per 1,000 kcal	No Vegetables
Greens and Beans ⁴	5	0.2 cup equiv. per 1,000 kcal	No Dark Green Vegetables or Beans and Peas
Whole Grains	10	1.5 oz equiv. per 1,000 kcal	No Whole Grains
Dairy ⁵	10	1.3 cup equiv. per 1,000 kcal	No Dairy
Total Protein Foods ⁶	5	2.5 oz equiv. per 1,000 kcal	No Protein Foods
Seafood and Plant Proteins ^{6,7}	5	0.8 oz equiv. per 1,000 kcal	No Seafood or Plant Proteins
Fatty Acids ⁸	10	(PUFAs + MUFAs)/SFAs 2.5	(PUFAs + MUFAs)/SFAs 1.2
<i>Moderation:</i>			
Refined Grains	10	1.8 oz equiv. per 1,000 kcal	4.3 oz equiv. per 1,000 kcal
Sodium	10	1.1 gram per 1,000 kcal	2.0 grams per 1,000 kcal
Empty Calories ⁹	20	19% of energy	50% of energy
HEI-2005¹⁰			
<i>Adequacy:</i>			
Total Fruit ²	5	0.8 cup equiv. per 1	No Fruit
Whole Fruit ³	5	0.4 cup equiv. per 1	No Whole Fruit
Total Vegetables ⁴	5	1.1 cup equiv. per 1	No Vegetables
Dark Green and Orange Vegetables and Legumes ⁴	5	0.4 cup equiv. per 1	No Dark Green or Orange Vegetables or Legumes
Total Grains	5	3.0 oz equiv. per 1	No Grains
Whole Grains	5	1.5 oz equiv. per 1	No Whole Grains
Milk ⁵	10	1.3 cup equiv. per 1	No Milk
Meat and Beans ⁶	10	2.5 oz equiv. per 1	No Meat or Beans
Oils ¹¹	10	12 grams per 1	No Oil
<i>Moderation:</i>			
Saturated Fat	10	7% of energy ¹²	15% of energy
Sodium	10	0.7 gram per 1,000 kcal ¹²	2.0 grams per 1,000 kcal
Calories from SoFAAS ¹³	20	20% of energy	50% of energy

¹Intakes between the minimum and maximum standards are scored proportionately.

²Includes fruit juice.

³Includes all forms except juice.

⁴Includes any beans and peas (called legumes in HEI-2005) not counted as Total Protein Foods (called Meat and Beans in HEI-2005).

⁵Includes all milk products, such as fluid milk, yogurt, and cheese, and fortified soy beverages.

⁶Beans and peas are included here (and not with vegetables) when the Total Protein Foods (called Meat and Beans in HEI-2005) standard is otherwise not met.

⁷Includes seafood, nuts, seeds, soy products (other than beverages) as well as beans and peas counted as Total Protein Foods.

⁸Ratio of poly- and monounsaturated fatty acids to saturated fatty acids.

⁹Calories from solid fats, alcohol, and added sugars; threshold for counting alcohol is >13 grams/1000 kcal.

¹⁰Intakes between the minimum and maximum standards are scored proportionately, except for Saturated Fat and Sodium (see note 12).

¹¹Includes non-hydrogenated vegetable oils and oils in fish, nuts, and seeds.

¹²Saturated Fat and Sodium get a score of 8 for the intake levels that reflect the 2005 Dietary Guidelines, <10% of calories from saturated fat and 1.1 grams of sodium/1,000 kcal, respectively. Intakes between the standards for scores of 0 and 8 and between 8 and 10 are scored proportionately.

¹³Calories from solid fats, alcoholic beverages, and added sugars.