

What are the implications for nutrient intakes when modifying the quantities of the Grains group within the Healthy U.S.-Style Dietary Pattern? What are the implications for nutrient intakes when specific individual staple grains are emphasized; or when Grains are replaced with other staple carbohydrate foods (i.e., Starchy Vegetables; Beans, Peas, and Lentils; starchy Red and Orange vegetables)?: Food Pattern Modeling Protocol

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Rationale

Food pattern modeling (FPM) is a methodology used to a) illustrate how hypothetical changes to the amounts or types of foods and beverages in a dietary pattern might affect meeting nutrient needs, and b) assist in defining quantitative dietary patterns that reflect the evidence for health-promoting diets synthesized from systematic reviews, while meeting energy and nutrient needs.

The 2020 USDA Healthy U.S.-Style (HUSS) Dietary Pattern includes several food groups that include foods that could be considered staple carbohydrate foods in the various communities within the U.S.¹ Staple carbohydrate foods are considered foods eaten often, usually daily, or multiple times a day, that supply a large proportion of energy and nutrients in a dietary pattern. The Grains group, Starchy Vegetables subgroup, Beans, Peas, and Lentils subgroup, and some starchy vegetables in the Red and Orange vegetable subgroup (e.g., sweet potatoes, winter squash) are key contributors to staple carbohydrate foods. The Grains group includes important sources of staple carbohydrate foods, such as bread, rice, pasta, and tortillas. The Starchy Vegetables subgroup also includes staple carbohydrate foods such as white potatoes, cassava, and plantains. The Beans, Peas, and Lentils subgroup also includes many staple carbohydrate foods such as a wide variety of beans, such as pinto, black, and white beans, along with staples such as chickpeas, split peas, and lentils. Starchy Vegetables, Beans, Peas, and Lentils, and Red and Orange vegetables are considered subgroups of the Vegetables food group in the HUSS Dietary Pattern; however, this may not accurately reflect how they are typically consumed in some populations, communities, or cultural foodways. Additionally, certain individuals may avoid gluten containing grains due to gastrointestinal sensitivities or allergies. Starchy Vegetables and Beans, Peas, and Lentils have nutritional similarities to other vegetable subgroups as well as to other food groups, such as Grains and Protein Foods. Grains, particularly Whole Grains, and the Starchy Vegetables and Beans, Peas, and Lentils vegetable subgroups, along with starchy Red and Orange vegetables, are sources of complex carbohydrates, dietary fiber, and several vitamins and minerals, including potassium. Inadequate intakes of dietary fiber and potassium are both dietary components of public health concern for the general U.S. population.¹ Data from the 2015-2016 What We Eat in America (WWEIA), National Health and Nutrition Examination Survey (NHANES) showed that the range of usual consumption (5th to the 95th percentile of intakes) of the Grains food group generally fell within recommended intake ranges, however the recommendation to consume at least half of grains as whole grains was not met.² Intakes of Refined Grains exceeded recommendations and intakes of Whole Grains fell below recommendations. Additionally, the average intakes of the Starchy Vegetable, Beans, Peas, and Lentils, and Red and Orange vegetable subgroups also fell below recommendations.³

The following FPM analyses are proposed to model hypothetical modifications and implications for meeting nutrient goals using the 2020 HUSS Dietary Pattern when: 1) quantities of the Grains subgroups (i.e., Whole Grains and/or Refined Grains) are modified from a range of 0 to the current quantities recommended in the HUSS Dietary Pattern (which ranges from 1 ¾ to 10 oz eq per day), 2) the proportions of Whole Grains and Refined Grains subgroups are reduced and the proportions of Starchy Vegetables; Beans, Peas, and Lentils; and starchy Red and Orange vegetables are increased. Nutrient composition comparisons of individual grains compared to others will also be evaluated to understand nutrient intake implications of selecting certain grains over others. The nutrient intake implications of these hypothetical modifications will be examined across age groups and life stages.

These FPM analyses are supported by public request and the wide spectrum of staple carbohydrate food preferences, dietary needs, budget considerations, and cultural or religious norms across the population, which modify proportions of Whole Grains, Refined Grains, Starchy Vegetables, Beans, Peas, and Lentils, and starchy Red and Orange vegetables.⁴ Within cultures, preferences for staple carbohydrate foods can vary by individual, age, life stage, geographic location, and acculturation as well as other factors. Within certain cultures or religions, greater quantities of some subgroups may be consumed, and lesser quantities of other

subgroups may be consumed in contrast with the U.S. average intakes due to food traditions, customs, or practices. Differences in intake of staple carbohydrate foods may also be seen for individuals with certain health needs, such as those with wheat allergies and those who restrict gluten containing foods due to intolerance. These analyses aim to more equitably represent the diverse scope of population subgroup norms, preferences, and needs and will examine nutrient intake implications of hypothetical modifications across the food groups and subgroups that include staple carbohydrate foods within the 2020 HUSS Dietary Pattern.

This protocol describes a multi-phased approach for understanding if nutritional goals can be achieved when Grains food group and subgroup quantities are hypothetically modified, including with lower quantities of Grains and greater quantities of other staple carbohydrate foods than are currently recommended in the 2020 HUSS Dietary Pattern. Results from these analyses will be collectively synthesized by the Committee along with all other FPM analyses, including those modeling modifications of other food group and subgroup quantities to address intake variability at the food group and subgroup levels. As part of a separate protocol following these analyses, diet simulations will be used to examine intake variability at the individual food level. As part of the iterative FPM process, findings from these and other analyses may prompt the development of subsequent protocols to address any identified nutrient inadequacies and answer the overarching FPM question. The conclusions drawn by the Committee will inform their recommendations for the 2025 USDA Dietary Patterns in their scientific report to the Secretaries of HHS and USDA.

Introduction

To prepare for the development of the *Dietary Guidelines for Americans, 2025-2030*, the U.S. Departments of Health and Human Services (HHS) and Agriculture (USDA) identified a proposed list of scientific questions based on relevance, importance, potential impact to federal programs, and avoiding duplication, which were posted for public comment.^{1,4} The Departments appointed the 2025 Dietary Guidelines Advisory Committee (Committee) in January 2023 to review evidence on the scientific questions. Their review forms the basis of their independent, science-based advice and recommendations to HHS and USDA, which is considered as the Departments develop the next edition of the *Dietary Guidelines*. These questions were refined and prioritized by the Committee for consideration in their review of the evidence.

The Committee will be asked to answer the following question using FPM analyses:

Considering each life stage, should changes be made to the USDA Dietary Patterns (Healthy U.S.-Style, Healthy Mediterranean-Style, and/or Healthy Vegetarian); should additional Dietary Patterns be developed/proposed based on:

- Findings from systematic reviews, data analysis, and/or food pattern modeling analyses; and
- Population norms (e.g., starchy vegetables are often consumed interchangeably with grains), preferences (e.g., emphasis on one staple grain versus another), or needs (e.g., lactose intolerance or gluten intolerance) of the diverse communities and cultural foodways within the U.S. population?

Changes to Dietary Patterns may include modification to the amounts of food groups/subgroups and/or recategorization of food groups/subgroups, as well as subsequent changes to energy available for other uses, including for added sugars.

As part of that process and to address the overarching FPM question, the following questions for analysis have been identified:

What are the implications for nutrient intakes when modifying the quantities of the Grains group within the Healthy U.S.-Style Dietary Pattern?

What are the implications for nutrient intakes when specific individual staple grains are emphasized; or when Grains are replaced with other staple carbohydrate foods (i.e., Starchy Vegetables; Beans, Peas, and Lentils; starchy Red and Orange vegetables)?

The Committee will use FPM analyses to address these questions, with support from USDA's FPM methods team. This protocol will establish the methods to model hypothetical modifications of staple carbohydrate food quantities across food groups and subgroups quantities within the 2020 HUSS Dietary Pattern and implications on meeting nutritional goals.

Historical perspectives

The 2020 HUSS Dietary Pattern is designed to reflect health promoting dietary patterns and meet the known nutrient needs of the age-sex groups for which they are targeted, within calorie constraints. The HUSS Dietary Pattern includes recommended amounts to eat from five major food groups, one of which is the Grains food group. The Grains group includes subgroups for Whole Grains and Refined Grains. Other food subgroups within the HUSS Dietary Pattern that contribute to staple carbohydrate foods and may be used similarly in meals include the Starchy Vegetables and Beans, Peas, and Lentils subgroups, which are two of five subgroups within the Vegetables food group, as well as starchy vegetables from the Red and Orange vegetable subgroup (i.e., calabaza, pumpkin, winter squash, and sweet potatoes).¹ The 2020 HUSS Dietary Pattern for ages 2 and older includes suggested quantities to consume of total Grains (ranging from 3 to 10 ounce equivalents (oz eq) per day), Whole Grains (ranging from 1 ½ to 5 oz eq per day); Refined Grains (ranging from 1 ½ to 5 oz eq per day); Starchy Vegetables (ranging from 2 to 8 cup equivalents (cup eq) per week); Beans, Peas, and Lentils (ranging from ½ to 3 cup eq per week); and total Red and Orange vegetables, (ranging from 2 ½ to 7 ½ cup eq per week). However, within the Red and Orange vegetables subgroup, starchy Red and Orange vegetables are not distinguished from other Red and Orange vegetables within the recommended quantities.

Grains have been a core food group component of USDA Dietary Patterns since the earliest food guides published nearly 100 years ago. The 2005 Dietary Guidelines recommendations included the statement that “at least half” of grains be whole grains.⁵ The FPM analyses in this protocol expands and complements the work of the 2010 Dietary Guidelines Advisory Committee (2010 Committee), which pursued FPM analyses to examine the nutrient intake implications if Refined Grains were replaced with Whole Grains.⁶ The results indicated that consumption of all grains as whole grains, without any additional amount consumed as fortified grain products, would lower the folate and iron intake levels to less than the adequate amounts for individuals in population groups that may be at high risk for inadequate intakes of these nutrients. Since 2010, the USDA Dietary Patterns, including the 2020 HUSS Dietary Pattern have maintained a 50:50 ratio of Refined Grains to Whole Grains for ages 2 and older.^{1,7,8} The Dietary Patterns established for ages 12 through 23 months include a greater proportion of Whole Grains, approximately ¾ of total Grains, in part due to nutrient requirements at this age as well as the proportions of dietary intake in these age groups, which informed the development of specific nutrient profiles for their respective Whole Grains subgroups.¹

In the 2020 HUSS Dietary Pattern, the Grains food group includes foods made of cereals and products made of corn (see **Table 1**). In other food guides, such as the American Diabetes Association food guide, carbohydrate foods include grains as well as starchy vegetables, beans and legumes, fruits, yogurt, milk, and soy milk.⁹ The 2010 Committee conducted FPM analyses to examine nutrient intake implications if the pattern was hypothetically modified to use Starchy Vegetables (see **Table 2**) as a replacement for some Grains rather than as a subgroup of the Vegetables food group.¹⁰ In the 2010 analyses, one cup eq of Starchy Vegetables was found to be similar in energy and nutrients to 2 oz eq of Grains.¹ Beans, Peas, and Lentils (see **Table 3**) were not a part of the modifications previously examined. The recommended quantity of Starchy Vegetables (as a daily amount) was divided equally to replace an equivalent amount of Refined Grains and Whole Grains.

Nutrient intake implications were minimal when amounts of other Vegetable subgroups (i.e., Dark Green, Red and Orange, and Other Vegetables) were increased, however the increased amounts of other Vegetables subgroups created patterns further away from usual intakes and were not recommended by the 2010 Committee to be implemented in the *2010 Dietary Guidelines for Americans*.¹¹

Evidence from systematic reviews generally include whole grains, vegetables, and beans, peas, and lentils as part of a dietary pattern associated with reduced risk for various diet-related health outcomes.¹² Several systematic reviews from past Committees found strong or moderate evidence that consuming a dietary pattern with more whole grains and limited refined grains, is associated with reduced risk of overweight/obesity,¹³ cardiovascular diseases,¹⁴ type 2 diabetes,¹⁵ postmenopausal breast cancer,¹⁶ and all-cause mortality in adults and older adults.^{17,18} Moderate evidence indicated that dietary patterns that were higher in nutrient-dense foods, including whole grains and legumes, were associated with favorable bone health outcomes and lower risk of colon and rectal cancer in adults; whereas, dietary patterns with French fries and potatoes were associated with a greater colon and rectal cancer risk.¹⁶ During childhood, limited evidence suggested that dietary patterns with lower whole grains and higher refined grains, and fried potatoes were associated with higher fat-mass index and body mass index later in adolescence. Similarly, limited evidence suggested that dietary patterns in children and adolescents characterized by higher intakes of whole grains and legumes were associated with lower blood pressure and blood lipid levels later in life.

In addition to this protocol and other FPM analyses, the 2025 Committee will continue to build on the evidence that the past Committees have examined. The 2025 Committee is planning several systematic reviews to examine the relationship between dietary patterns and various health outcomes, the results of which may or may not include whole grains, refined grains, starchy vegetables, beans, peas, and lentils, and/or starchy red and orange vegetables.¹⁹ These systematic review results will be considered when the Committee synthesizes the full body of evidence to determine its overall advice on potential dietary pattern changes and/or newly recommended dietary patterns.

Current perspectives

The *Dietary Guidelines for Americans, 2020-2025*, highlighted the concern around Grain intake.¹ Specifically, more than 50% met or exceeded the Grains food group recommendation, while 74% exceeded limits for Refined Grains of those in the U.S. ages 1 year and older. At the same time, 98% fell below Whole Grain intake recommendations. Additionally, more than 80% had dietary patterns low in Vegetables overall, with more than 80% also falling below specific recommendations for Starchy Vegetables, Beans, Peas, and Lentils, and Red and Orange vegetables.

Staple carbohydrate foods found in the Whole Grains, Refined Grains, Starchy Vegetables, and Beans, Peas, and Lentils subgroups, as well as starchy Red and Orange vegetables, may have nutritional similarities and may be used similarly in meal preparation across foodways. Examples of staple carbohydrate foods important to many cultural foodways include foods such as bread, rice, pasta, tortillas, cornmeal, white potatoes, cassava, pinto beans, black beans, chickpeas, split peas, lentils, pumpkin, and sweet potatoes, among others. The specific types of staple carbohydrate foods found in these subgroups are shown below in **Table 1**, **Table 2**, **Table 3**, and **Table 4**. However, it has been noted that the current grouping of subgroups in the 2020 USDA Dietary Patterns may not accurately reflect how staple carbohydrate foods are typically consumed in some populations, communities, or cultural foodways. Within cultures, preferences for staple carbohydrate foods can vary by individual, age, life stage, geographic location, and acculturation as well as other factors. Within certain cultures or religions, greater quantities of some subgroups may be consumed, and lesser quantities of other subgroups may be consumed in contrast with the U.S. average intakes due to food traditions, customs, or practices. For example, Whole Grain consumption may be lower when compared to Starchy Vegetables; Beans, Peas, and Lentils; and/or starchy Red and Orange vegetables for certain cultural groups in which Whole Grains are not commonly available staple foods. Additional health considerations may mean certain

individuals may avoid specific grains. Understanding the flexibilities that may be available to individuals while still meeting nutrient goals is at the core of these analyses.

Table 1. List of foods included in the Grains Food Group²⁰

| Grains Subgroups | Foods Included |
|-------------------------|---|
| Whole Grains | Amaranth |
| | Barley, whole |
| | Barley flour (from whole barley) |
| | Barley meal |
| | Brown rice |
| | Brown rice flour |
| | Buckwheat groats |
| | Bulgur |
| | Corn, whole grain |
| | Corn meal or flour (whole grain) |
| | Millett |
| | Oats |
| | Oat flour |
| | Oatmeal |
| | Popcorn |
| | Quinoa |
| | Rye, whole grain |
| | Rye flour (dark) |
| | Triticale |
| | Wheat |
| | Whole wheat flour |
| | Whole grain cracked |
| | Wheat |
| Wild rice | |
| Refined Grains | Barley, pearled |
| | Barley, pearled, flour |
| | Barley malt flour |
| | Bran (all grains) |
| | Corn flour or meal, degermed |
| | Corn grits |
| | Cream of wheat |
| | Couscous |
| | Farina |
| | Masa |
| | Oat flour, debranned |
| | Rice (milled, not whole grain) |
| | Rice, milled, flour |
| | Rye flour (light and medium) |
| | Semolina |
| | Wheat flour and cracked wheat (not whole grain) |
| Wheat germ | |

Table 2. List of foods included in the Starchy Vegetables subgroup²⁰

| Starchy Vegetable Subcategories | Foods Included |
|--|--|
| Potatoes | White potatoes White potato flour White potato flakes |
| Other Starchy Vegetables | Breadfruit Burdock Cassava (Yuca blanca) Corn, sweet (raw) Dasheen Green bananas Hominy Jicama (Yam beans) Lima beans, immature Lotus root Parsnips Immature peas (e.g., immature cowpeas, blackeye peas, green peas, pigeon peas) Plantains Salsify Tannier Tapioca Taro Water chestnuts Yams |

Table 3. List of Foods Included in Beans, Peas, and Lentils subgroup²⁰

| Beans, Peas, and Lentils Includes All Mature Beans, Peas, and Lentils Such As: |
|---|
| Black beans |
| Blackeye peas |
| Brown beans |
| Bayo beans |
| Calico beans |
| Carob |
| Chickpeas (Garbanzo beans) |
| Cowpeas |
| Fava beans |
| Kidney beans |
| Lentils |
| Mature lima beans |
| Mung beans |
| Navy beans |
| Pink beans |
| Pinto beans |
| Red Mexican beans |
| Soybeans* (raw) |
| Split peas |
| White beans |

Table 4. List of foods included in the Red and Orange Vegetables subgroup ^{a,20}

| Red and Orange Vegetable Subcategories | Foods Included |
|---|---|
| Tomatoes | Tomatoes (canned, cooked, raw, stewed) Tomatoes, dried Tomato juice Tomato paste Tomato puree Tomato sauce |
| Other Red and Orange Vegetables | Calabaza (Spanish pumpkin) Carrots Carrot juice Red colored bell, and nonbell peppers Pimiento Pumpkin Squash (most winter varieties) Sweet potatoes |

^a Only the Red and Orange Vegetables **bolded** will be used in these analyses.

One way that USDA Child Nutrition Program regulations accommodate cultural food preferences, product availability, and cost concerns is by providing flexibility for schools in outlying areas to serve vegetables in place of grains in school meals. Under current regulations, schools in American Samoa, Puerto Rico, and the U.S. Virgin Islands may serve vegetables to meet the grains component in school meals.²¹ This provision allows any vegetable to be served to meet the grains component, including vegetables that reflect cultural food preferences such as plantains, sweet potatoes, and yams. Earlier this year, USDA published a proposed rule, *Child Nutrition Programs: Revisions to Meal Patterns Consistent with the 2020 Dietary Guidelines for Americans*, which included a proposal to expand this flexibility to schools in Guam and Hawaii. Additionally, USDA also proposed to allow this flexibility for tribally operated schools, schools operated by the Bureau of Indian Education, and schools that serve primarily American Indian or Alaska Native children on the mainland.²² Under the proposed rule, these schools would be permitted to serve any vegetable, including traditional Indigenous vegetables such as prairie turnips, to meet the grains component. Evaluating the possibility of building these flexibilities into future editions of the *Dietary Guidelines for Americans* which underpin federal nutrition policy is an important goal of these analyses.

Due to diverse foodways and dietary preferences and needs of population groups in the U.S. and the varying use of staple carbohydrate foods across food groups and subgroups, these analyses will examine nutrient intake implications of hypothetical modifications to the Grains food group, including replacement of Whole Grains and Refined Grains with other staple grains, along with analyses that reduce Grains and increase Starchy Vegetables; Beans, Peas, and Lentils; and starchy Red and Orange vegetables as main staple carbohydrate food sources in the 2020 HUSS Dietary Pattern in order to examine nutrient intake implications, the ability to achieve nutrient goals, and assess the potential for the addition of flexibilities in USDA Dietary Patterns.

Methods

This section presents an overview of the methods, or the process, that will be used by the Committee to answer these questions:

What are the implications for nutrient intakes when modifying the quantities of the Grains group within the Healthy U.S.-Style Dietary Pattern?

What are the implications for nutrient intakes when specific individual staple grains are emphasized; or when Grains are replaced with other staple carbohydrate foods (i.e., Starchy Vegetables; Beans, Peas, and Lentils; starchy Red and Orange vegetables)?

Develop a protocol

A FPM protocol is the plan for how USDA's FPM methodology will be used to conduct specific FPM analyses. The protocol is established by the Committee before the analysis is conducted. The protocol describes the components of the FPM process, including the analytic framework, analytic plan, analysis synthesis, conclusion development, and future research recommendations. It is developed through Committee discussion of the strengths and limitations for various analysis types and exercises to identify the most appropriate and relevant methods to answer each FPM question. FPM is an iterative process; thus, results from initial analyses may inform refinement of this protocol or subsequent protocols for other research questions.

When reviewing questions or topics addressed by prior Committees, the Committee uses the previous analytic framework, plan, and protocol to inform and refine their current approaches. Any changes to this protocol will be described in **Table 10. Protocol amendments**.

Develop an analytic framework

An analytic framework represents the overall scope of the FPM analyses, including the population, type of analyses, and data sources identified to answer the question. It also includes the definitions of key terms.

Questions:

What are the implications for nutrient intakes when modifying the quantities of the Grains group within the Healthy U.S.-Style Dietary Pattern?

What are the implications for nutrient intakes when specific individual staple grains are emphasized; or when Grains are replaced with other staple carbohydrate foods (i.e., Starchy Vegetables; Beans, Peas, and Lentils; starchy Red and Orange vegetables)?

Population:

The nutrient profiles modeled in these FPM analyses are based on dietary intake data among the U.S. population ages 12 months and older. The contribution of complimentary foods and beverages consumed by infants less than 12 months will not be included in the calculation of nutrient profiles.

The nutrient profiles examined in these FPM analyses will be applied to the 2020 HUSS Dietary Patterns published for ages 12 through 23 months, who are no longer consuming human milk or infant formula, and for ages 2 and older.¹ Around 12 months a dietary pattern that no longer includes infant or toddler formula or human milk may be established; however, consumption of human milk in the second year of life is common. The USDA Dietary Patterns are tailored for infants ages 12 through 23 months who are no longer receiving infant or toddler formula or human milk.

Types of analyses:

The overall FPM methodology used to develop and update the USDA Dietary Patterns includes six steps: **(1)** identifying appropriate energy levels for the patterns; **(2)** identifying nutritional goals for the patterns; **(3)** establishing food groupings and food group amounts; **(4)** determining the amounts of energy and nutrients that would be provided by consuming various foods within each food group or subgroup; **(5)** evaluating nutrient

levels in each pattern against nutritional goals; and **(6)** adjusting and re-evaluating the patterns to align with current or potential recommendations.

These analysis questions will focus on step 3 (establishing food groupings and food group amounts) and assess the implications of changes to step 3 throughout subsequent steps 4, 5, and 6. Initial analyses will use existing food groups and subgroups identified in the 2020 USDA HUSS Dietary Pattern, published in the *Dietary Guidelines for Americans, 2020-2025*.¹ Nutrient profiles that underlie the pattern will be updated based on the 2025 Committee’s analyses in answering the question: “*Should foods and beverages with lower nutrient density (i.e., those with added sugars, saturated fat, and sodium) contribute to item clusters, representative foods, and therefore the nutrient profiles for each food group and subgroup used in modeling the USDA Dietary Patterns? View the protocol developed by the 2025 Committee to answer that question.*”²³

Subsequent analyses will model nutrient intake implications of modifications to starchy carbohydrate foods within the 2020 HUSS Dietary Pattern. Specifically, analyses will examine hypothetical modifications that reduce the quantity of Grains within the pattern, while increasing the proportion of other starchy carbohydrate foods (i.e., Starchy Vegetables; Beans, Peas, and Lentils; starchy Red and Orange vegetables), and the implications on meeting nutritional goals across the lifespan.

FPM analyses planned to answer this question include:

- Identifying the nutritional composition and contribution of starchy carbohydrate foods within the 2020 HUSS Dietary Pattern goals.
 - Comparing the nutritional composition of specific Grains (see **Table 1.**) across subgroups (i.e., Whole Grains; Refined Grains) and by fortification/enrichment levels. This comparison is proposed to understand the nutrient intake implications of consuming various grains over others in relation to the nutrient profile of the Grains food group overall.
 - Comparing the nutrient profiles of the Grains food group to the nutrient profiles of the Starchy Vegetable subgroup; the Beans, Peas, and Lentils subgroup; and starchy vegetables from the Red and Orange vegetable subgroup. Based on 2010 FPM analyses, comparisons will begin by analyzing nutrient profiles at 2 oz eq of Grains vs. 1 cup eq of Starchy Vegetables; or 1 cup eq of Beans, Peas, and Lentils; or 1 cup eq of starchy Red and Orange vegetables.¹⁰ Subsequent analyses may adjust quantities to examine potential equivalencies between these food groups and subgroups. These comparisons are proposed to understand the nutrient intake implications of selecting more or less of one group over others.
- Evaluating implications on meeting nutritional goals when the Grains subgroup quantities in the 2020 HUSS Dietary Pattern are reduced by ¼ oz eq increments for the 700 to 1,400 calorie levels and by ½ oz eq increments for the 1,600 to 3,200 calorie levels, starting with the current quantity for a given calorie level in the pattern and reducing it to 0. The nutritional composition and contributions of the Grains food group in the HUSS Dietary Pattern will be examined.
- Evaluating implications on meeting nutritional goals when the proportions of Grains subgroups (i.e., Whole Grains; Refined Grains) in the 2020 HUSS Dietary Pattern are reduced by ½ or 1 oz eq increments and the proportions of other staple carbohydrate foods (i.e., Starchy Vegetables; Beans, Peas, and Lentils; starchy Red and Orange vegetables) are increased by ¼ cup eq increments for the 700 to 1,400 calorie levels and by ½ cup eq increments for the 1,600 to 3,200 calorie levels. The process will model various subgroup proportions to represent potential levels of consumption. The nutritional composition and contributions of the modifications of staple carbohydrate foods will be examined.

Results from these analyses will contribute to the evidence that will be used to answer the overarching FPM question: Should foods and beverages with lower nutrient density (i.e., those with added sugars, saturated fat,

and sodium) contribute to item clusters, representative foods, and therefore the nutrient profiles for each food group and subgroup used in modeling the USDA Dietary Patterns?

This process will include:

- Synthesizing the above analyses with all other food group and subgroup modification analyses to determine if changes should be made to the USDA Dietary Patterns or if additional Dietary Patterns should be proposed based on population norms, preferences, and needs.
- Examining modified or new dietary patterns for meeting nutritional goals compared to the DRIs, current *Dietary Guidelines for Americans, 2020-2025* recommendations, potential recommendations of the 2025 Committee, and simulated diet analyses.
- Developing conclusion statements based on all FPM analyses informing the overarching FPM question and in consideration of related systematic review conclusions and data analysis findings.
- Making research recommendations to inform future work on this topic.

Data Sources:

- What We Eat in America, NHANES 2017-2018, individuals 1 years and over, days 1 and 2, weighted to produce nationally representative estimates. Available: ars.usda.gov/nea/bhnrc/fsrg
- FNDDS 2017-2018: U.S. Department of Agriculture, Agricultural Research Service. 2020. *USDA Food and Nutrient Database for Dietary Studies 2017-2018*. Available: ars.usda.gov/nea/bhnrc/fsrg
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- Fryar CD, Carroll MD, Gu Q, Afful J, Ogden CL. Anthropometric reference data for children and adults: United States, 2015–2018. National Center for Health Statistics. *Vital Health Stat* 3(46). 2021. Available: [cdc.gov/nchs/nhanes](https://www.cdc.gov/nchs/nhanes)

Key definitions:

Note: Key definitions in this protocol include existing definitions used by the 2020 Dietary Guidelines Advisory Committee and/or published in the *Dietary Guidelines for Americans, 2020-2025*. The 2025 Dietary Guidelines Advisory Committee will continue to consider terminology and implications of terms related to representation of population subgroups and/or communication to the public. Future revisions to existing definitions will be noted and new working definitions for 2025 will be noted.

Food Groups and Subgroups in the Healthy U.S.-Style (HUSS) Dietary Pattern: USDA's HUSS Dietary Pattern provides amounts of five major food groups and *subgroups* including:

- Fruits
- Vegetables:
 - *Dark-Green; Red and Orange; Beans, Peas, and Lentils**; *Starchy***; and *Other*
- Dairy and Fortified Soy Alternatives
- Grains:
 - *Whole Grains and Refined Grains*
- Protein Foods:
 - *Meats, Poultry, and Eggs; Seafood; Nuts, Seeds, and Soy Products*

*For this protocol, Beans, Peas, and Lentils will only be modeled in the Vegetables food group.

**For this protocol, Starchy Vegetables may be modeled with and without starchy Red and Orange vegetables.

Oils: Oils are sources of essential fatty acids and include canola, corn, olive, peanut, safflower, soybean, and sunflower oils. Oils also are naturally present in nuts, seeds, seafood, olives, and avocados. The fat in some tropical plants, such as coconut oil, palm kernel oil, and palm oil, are not included in the oils category because they contain a higher percentage of saturated fat than do other oils.

Added sugars: Added sugars are either added during the processing of foods or are packaged as sweeteners (e.g., a bag of table sugar). Added sugars include sugars (free, mono- and disaccharides), sugars from syrups and honey, and sugars from concentrated fruit or vegetable juices that are in excess of what would be expected from the same volume of 100 percent fruit or vegetable juice of the same type.²⁴ Naturally occurring sugars, such as those in fruit or milk, are not defined as added sugars. Specific examples of added sugars that can be listed as an ingredient include brown sugar, corn sweetener, corn syrup, dextrose, fructose, glucose, high-fructose corn syrup, honey, invert sugar, lactose, malt syrup, maltose, molasses, raw sugar, sucrose, trehalose, and turbinado sugar.

Limits on calories for other uses (as defined in the HUSS Pattern)^{1,12}: Foods are assumed to be in nutrient-dense forms, which are lean or low-fat and prepared with minimal added saturated fat, added sugars, refined starches, or sodium. If all food choices to meet food group recommendations are in nutrient-dense forms, a small number of calories remain within the overall limit of the pattern (i.e., limit on calories for other uses). The amount of calories depends on the total calorie level of the pattern and the amounts of food from each food group required to meet nutritional goals. Calories up to the specified limit can be used for added

sugars, refined starches, saturated fat, and/or alcohol (for nonpregnant adults of legal drinking age only), or to eat more than the recommended amount of food in a food group.

Item Clusters: Identified groupings of the same or similar foods or beverages that make up each food group and subgroup. Item clusters are used to calculate the weighted average consumption for use in calculating a nutrient profile for each food group and subgroup used in USDA FPM.

Nutrient-Dense Representative Foods: For the purpose of USDA's FPM, each item cluster is assigned a nutrient-dense representative food which are those foods or beverages that represent the forms with the least amounts of added sugars, sodium, and saturated fats. The nutrient composition of the nutrient-dense representative food is used to represent the nutrient composition of the entire item cluster when calculating the nutrient profile for a food group or subgroup.

Nutrient Profiles: The proportional nutrient composition from the item clusters that represent each food group and subgroup from the variety of foods in each food group in their nutrient-dense forms. The nutrient profiles are based on a weighted average of nutrient-dense forms of foods (i.e., a composite of nutrient-dense forms of foods and beverages within a food group or subgroup). The weighted average calculation considers a range of food choices in the United States, but in nutrient-dense forms and results in a food pattern that can be adapted to fit an individual's preferences.

Staple Carbohydrate Foods (new for 2025)²⁵: Staple carbohydrate foods are considered foods eaten often, usually daily, or multiple times a day, that supply a large proportion of energy and nutrients in a dietary pattern. For the purposes of these analyses, staple carbohydrate foods include foods that contribute to the Grains food group, the Starchy Vegetables subgroup, the Beans, Peas, and Lentils vegetable subgroup, and starchy vegetables from the Red and Orange vegetable subgroup (i.e., calabaza, pumpkin, winter squash, and sweet potatoes).

Fortification (new for 2025): The addition of nutrients to a food to correct a dietary insufficiency in the target population; to restore nutrient(s) to a level(s) representative of the food prior to storage, handling, and processing; and/or to balance the vitamin, mineral and protein content in proportion to the total caloric content of the food. The terms "enriched," "fortified," or similar terms may be used interchangeably to indicate that one or more essential nutrients were added to a food unless an applicable Federal regulation requires the use of specific words or statements.²⁶

Develop an analytic plan

Establish energy levels:

Dietary Reference Intakes (DRI) formulas are used to calculate Estimated Energy Requirements (EER) for each age-sex group and for three age groups specific to pregnancy and lactation (14-18 years, 19-30 years and 31-50 years).²⁷ (See **Table 1.**) EER is based on sex, age, height, weight, level of physical activity, and life stage and, during pregnancy, gestational weeks. The EERs for pregnancy account for the energy cost of tissue accretion and deposition based on pre-pregnancy BMI category and IOM recommended rates of gestational weight gain. The EERs for lactation account for the energy cost of human milk production and mobilization of postpartum tissue stores for gradual weight loss.¹

Computed weight for a body mass index (BMI) of 22.5 kg/m² for adult males and 21.5 kg/m² for adult females (ages 19+ years) and median height are used to calculate reference energy levels for each age-sex group.¹ The computed weight based on the corresponding BMI is obtained using the following equation.

$$\text{BMI } 22.5 \text{ or } 21.5 \times (\text{median height in m})^2 = \text{computed weight in kg}$$

These BMIs correspond to the 50th percentile (median) for reference weight among 19-year old males and females based on the 2005 DRI for energy and the 2000 CDC Growth Charts.^{28,29} The EER calculations for adults follow the 2020 Committee’s approach to base reference weight on a BMI of 18.5 to <25 kg/m² but are enhanced to incorporate median heights for each age-sex group using updated NHANES data instead of using one median height for all adult males and one median height for all adult females.^{30,31} For children and adolescents ages 2-18 years, median height and the 50th percentile BMI-for-age are obtained using NHANES anthropometric data and the CDC Growth Charts.^{31,32} For young children ages 12 through 23 months, EERs from the DRI report using NHANES median weight and length are used, as these result in similar calorie levels as WHO Growth Chart data.^{27,33} These weight, height/length, and BMI assumptions for estimating energy levels in FPM align with those being used in the Committee’s data analysis work. The use of median height/length also aligns with the DRI for energy report.²⁷

A lower energy level (for inactive individuals) rounded to the nearest 200 calorie level and its associated pattern are determined for each age-sex group and used in evaluating the patterns against nutritional goals. (See step 2: **Establish nutritional goals.**) The 2020 USDA Dietary Patterns for ages 12 through 23 months are established to meet the EER for those ages. For ages 2 years and older, the 2020 Dietary Patterns generally are not age- or sex- specific. However, the 2020 Dietary Patterns at 1,000, 1,200, and 1,400 calorie levels are designed to meet the nutritional needs of children ages 2 through 8 years. Patterns from 1,600 to 3,200 calories are designed to meet the nutritional needs of children 9 years and older and adults. The 1,000 and 1,200 calorie level patterns are not intended for children 9 years and older or adults, and the 1,400-calorie level is not intended for children ages 10 years and older or adults. Individuals may require a calorie level that is higher or lower than the calorie level associated with each population-level age-sex group.

Table 5. Age-sex groups for which nutritional goals are examined in analyses

| Children (Male/Female) | Males | Females | Pregnancy (Per 1 st , 2 nd , and 3 rd Trimesters) | Lactation (Per 0-6 and 7-12 months postpartum) |
|------------------------|-------------|-------------|--|--|
| 1-3 years | | | | |
| | 4-8 years | 4-8 years | | |
| | 9-13 years | 9-13 years | | |
| | 14-18 years | 14-18 years | 14-18 years | 14-18 years |
| | 19-30 years | 19-30 years | 19-30 years | 19-30 years |
| | 31-50 years | 31-50 years | 31-50 years | 31-50 years |
| | 51+ years | 51+ years | | |

Establish nutritional goals:

Specific nutritional goal quantities for a dietary intake pattern are set according to energy intake level and based on the DRI age-sex group(s) for which the pattern is designed. Goals for total energy, fat, protein, carbohydrates, 3 fatty acids, 12 vitamins, 8 minerals, added sugars, and fiber are based on DRI reports released between 1997 and 2023 and on quantitative recommendations in the current *Dietary Guidelines for Americans, 2020-2025* (DGA).^{1,2,27,34-36} The macronutrients, fatty acids, vitamins, and minerals that are considered nutritional goals for these analyses are specified in **Table 2**. Because the dietary patterns are

designed as a framework for achieving a healthy dietary pattern, the goals are the Recommended Dietary Allowance (RDA) amounts for nutrients having an RDA. The Adequate Intake (AI) is used as the nutrient goal when an RDA is not established.

Table 6. Nutritional goals for analyses

| Food Component | Specific Nutrients (and Source of Goal ^a) |
|----------------|--|
| Energy | Energy (EER) |
| Macronutrients | Carbohydrate (AMDR/RDA), Protein (AMDR/RDA), Total Fat (AMDR) |
| Fatty Acids | Saturated Fatty Acids (DGA 2020-2025, <10% of total energy), 18:2 Linoleic Acid (AI), 18:3 Linolenic Acid (AI) |
| Vitamins | Vitamin A (RDA), Vitamin C (RDA), Vitamin D (RDA), Vitamin E (RDA), Vitamin K (AI), Thiamin (RDA), Riboflavin (RDA), Niacin (RDA), Vitamin B6 (RDA), Folate (RDA), Vitamin B12 (RDA), Choline (AI) |
| Minerals | Calcium (RDA), Copper (RDA), Iron (RDA), Magnesium (RDA), Phosphorus (RDA), Potassium (AI), Sodium (CDRR), Zinc (RDA) |
| Added Sugars | Added Sugars (DGA 2020-2025, <10% of total energy) |
| Dietary Fiber | Total Dietary Fiber (AI, 14g/1,000 calories) |

^a AI = Adequate Intake, AMDR = Acceptable Macronutrient Distribution Range, CDRR = Chronic Disease Risk Reduction Level, DGA = *Dietary Guidelines for Americans, 2020-2025*, RDA = Recommended Dietary Allowance

Establish food groupings and amounts:

Food groups and subgroups in the USDA HUSS Patterns Dietary Patterns for ages 12 through 23 months and ages 2 years and older (published in the *Dietary Guidelines for Americans, 2020-2025*) will be used in these analyses, along with the modifications outlined below, to examine their impacts on the nutritional composition and contribution within food groups and subgroups and meeting nutritional goals across the 2020 HUSS Dietary Pattern.¹

Analyses comparing nutritional composition and contribution of starchy carbohydrate foods:

- Objective 1: Identify the nutritional composition and contribution of the Grains and other staple carbohydrate foods in current dietary intakes, relative to the 2020 HUSS Dietary Pattern goals. Compare the nutritional composition of specific individual Grains (see **Table 1**) across subgroups (i.e., Whole Grains; Refined Grains) and by fortification/enrichment levels. This comparison is proposed to understand the nutrient intake implications of consuming specific individual grains over others and in relation to the nutrient profile of the Grains food group overall.
- Objective 2: Compare the nutrient profiles of the Grains food group to the nutrient profiles of the Starchy Vegetable subgroup; Beans, Peas, and Lentils subgroup; and starchy vegetables from the Red and Orange vegetable subgroup (i.e., calabaza, pumpkin, winter squash, and sweet potatoes). Based on 2010 FPM analyses showing that 2 oz eq of Grains was similar in energy and nutrients to 1 cup eq of Starchy Vegetables, comparisons will begin by analyzing nutrient profiles at 2 oz eq of Grains vs. 1 cup eq of Starchy Vegetables; or 1 cup eq of Beans, Peas, and Lentils; or 1 cup eq of starchy Red and Orange vegetables. Subsequent analyses may adjust quantities to examine potential equivalencies between these food groups and subgroups. These comparisons are proposed to understand the nutrient intake implications of selecting more or less of one group over others.

Analyses on the nutritional contribution of the food group:

- Objective 3: Evaluate implications on meeting nutritional goals when the Grains subgroups (i.e., Whole Grains; Refined Grains) quantities in the 2020 HUSS Dietary Pattern are reduced by ¼ or ½ oz eq increments, starting with the current quantity for a given calorie level in the pattern and reducing it to 0. The nutritional composition and contributions of the Grains food group in the HUSS Dietary Pattern will be examined.
 - Each Grains subgroup will be modified individually, starting with one subgroup’s current quantity, and incrementally reducing it until a quantity of 0 is reached while holding the other subgroup constant, then repeating for the other subgroup. An example is shown in **Table 7**, in which the Refined Grains subgroup is reduced from the current quantity recommended (i.e., 3 oz eq per day) in the 2020 HUSS Dietary Pattern at the 2,000 calorie level until 0 is reached.
 - Both Grains subgroups will be modified simultaneously, starting with the subgroups current quantity, and incrementally reducing both subgroups until a quantity of 0 is reached.
 - Increments of ¼ oz eq will be used for the lower calorie levels in the Dietary Patterns for ages 12 to 23 months (700, 800, 900, and 1,000 calories) and ages 2 years and older (1,000, 1,200, and 1,400 calories). Increments of ½ oz eq will be used for the higher calorie levels in the Dietary Pattern intended for ages 2 years and older (1,600 to 3,200 calories).

Table 7. Ounce equivalents (oz eq) per day of Grains subgroups to be modeled with incremental reductions of the Refined Grains subgroup within the 2,000 calorie-level of the 2020 Healthy U.S.-Style (HUSS) Dietary Pattern (Objective 3) ^a

| Scenario | Grains (oz eq per day) | Whole Grains (oz eq per day) | Whole Grains (% of total Grains) | Refined Grains (oz eq per day) | Refined Grains (% of total Grains) |
|------------------------------------|------------------------|------------------------------|----------------------------------|--------------------------------|------------------------------------|
| Current Pattern (Reference) | 6 | 3 | 50% | 3 | 50% |
| Refined Grains-1 | 5.5 | 3 | 55% | 2.5 | 45% |
| Refined Grains-2 | 5 | 3 | 60% | 2 | 40% |
| Refined Grains-3 | 4.5 | 3 | 67% | 1.5 | 33% |
| Refined Grains-4 | 4 | 3 | 75% | 1 | 25% |
| Refined Grains-5 | 3.5 | 3 | 86% | 0.5 | 14% |
| Refined Grains-6 | 3 | 3 | 100% | 0 | 0% |

^a This table shows just one example of several scenarios that will be modeled.

Analysis modifying food group and subgroup quantities and proportions:

- Objective 4: Evaluate implications on meeting nutritional goals when the proportions of Grains subgroups (i.e., Refined Grains; Whole Grains) in the 2020 HUSS Dietary Pattern are reduced by ½ or 1 oz eq increments and the proportions of other staple carbohydrate foods (i.e., Starchy Vegetables; Beans, Peas, and Lentils; starchy Red and Orange vegetables) are increased by ¼ or ½ cup eq increments. The process will model various subgroup proportions to represent potential levels of consumption. The nutritional composition and contributions of the modifications of staple carbohydrate foods will be examined.
 - Each Grains subgroup will be modified individually, starting with one subgroup’s current quantity, and incrementally reducing it until a quantity of 0 is reached. Simultaneously, three additional factors will be implemented 1) the other Grains subgroup will be held constant, 2) either Starchy Vegetables; or Beans, Peas, and Lentils; or starchy Red and Orange vegetables;

or Starchy Vegetables plus starchy Red and Orange vegetables will be held constant, and 3) either Starchy Vegetables; or Beans, Peas, and Lentils; or starchy Red and Orange vegetables; or Starchy Vegetables plus starchy Red and Orange vegetables will increase by $\frac{1}{2}$ cup eq. An example in which the Refined Grain subgroup is reduced while the Beans, Peas, and Lentils subgroup is increased, while holding all other subgroups constant is shown in **Table 8**, which shows one example of several scenarios that will be modeled.

- Additional scenarios that individually reduce Grains subgroups (Refined Grains; Whole Grains), while increasing all other staple carbohydrate groups will also be modeled. Whole Grains will be examined despite evidence supporting increased consumption to understand nutrient intake implications if whole grains are not consumed in various foodways or are not readily accessible in certain communities.
- For scenarios that increase starchy Red and Orange vegetables, modeling will begin at 0.25 cup eq based on current intake proportions of those starchy vegetables within the total Red and Orange vegetable subgroup, as shown in **Table 9**.
- Increments of $\frac{1}{2}$ oz eq of Grains and $\frac{1}{4}$ cup eq of Vegetable subgroups will be used for the lower calorie levels intended for ages 12 month to 23 months (700, 800, 900, and 1,000 calories) and ages 2 years and older (1,000, 1,200, and 1,400 calories). Increments of 1 oz eq of Grains and $\frac{1}{2}$ cup eq of Vegetable subgroups will be used for the higher calorie levels intended for ages 2 years and older (1,600 to 3,200 calories).

Table 8. Ounce or cup equivalents (oz eq or cup eq) per week of staple carbohydrate foods to be modeled with incremental reductions of the Refined Grains subgroup (RG) and increases of the Beans, Peas, and Lentils vegetable subgroup (BPL) within the 2,000-calorie level of the 2020 Healthy U.S.-Style (HUSS) Dietary Pattern (Objective 4) ^{a, b}

| Scenario | Refined Grains (oz eq) | Refined Grains (% of total Grains) | Whole Grains (oz eq) | Whole Grains (% of total Grains) | Starchy Vegetables (cup eq) | Starchy Vegetables (% of total Vegetables) | Beans, Peas, and Lentils (cup eq) | Beans, Peas, and Lentils (% of total Vegetables) | Starchy Red and Orange Vegetables ^b (cup eq) | Starchy Red and Orange Vegetables (% of total Vegetables) |
|------------------------------------|------------------------|------------------------------------|----------------------|----------------------------------|-----------------------------|--|-----------------------------------|--|---|---|
| Current Pattern (Reference) | 21 | 50% | 21 | 50% | 5 | 29% | 1.5 | 9% | 0.25 | 1.4% |
| RG-1/BPL+1 | 20 | 49% | 21 | 51% | 5 | 28% | 2 | 11% | 0.25 | 1.4% |
| RG-2/BPL+2 | 19 | 48% | 21 | 53% | 5 | 27% | 2.5 | 14% | 0.25 | 1.4% |
| RG-3/BPL+3 | 18 | 46% | 21 | 54% | 5 | 26% | 3 | 16% | 0.25 | 1.3% |
| RG-4/BPL+4 | 17 | 45% | 21 | 55% | 5 | 26% | 3.5 | 18% | 0.25 | 1.3% |
| RG-5/BPL+5 | 16 | 43% | 21 | 57% | 5 | 25% | 4 | 20% | 0.25 | 1.3% |
| RG-6/BPL+6 | 15 | 42% | 21 | 58% | 5 | 24% | 4.5 | 22% | 0.25 | 1.2% |
| RG-7/BPL+7 | 14 | 40% | 21 | 60% | 5 | 24% | 5 | 24% | 0.25 | 1.2% |
| RG-8/BPL+8 | 13 | 38% | 21 | 62% | 5 | 23% | 5.5 | 26% | 0.25 | 1.2% |
| RG-9/BPL+9 | 12 | 36% | 21 | 64% | 5 | 23% | 6 | 27% | 0.25 | 1.1% |
| RG-10/BPL+10 | 11 | 34% | 21 | 66% | 5 | 22% | 6.5 | 29% | 0.25 | 1.1% |
| RG-11/BPL+11 | 10 | 32% | 21 | 68% | 5 | 22% | 7 | 30% | 0.25 | 1.1% |
| RG-12/BPL+12 | 9 | 30% | 21 | 70% | 5 | 21% | 7.5 | 32% | 0.25 | 1.1% |
| RG-13/BPL+13 | 8 | 28% | 21 | 72% | 5 | 21% | 8 | 33% | 0.25 | 1.0% |
| RG-14/BPL+14 | 7 | 25% | 21 | 75% | 5 | 20% | 8.5 | 35% | 0.25 | 1.0% |
| RG-15/BPL+15 | 6 | 22% | 21 | 78% | 5 | 20% | 9 | 36% | 0.25 | 1.0% |
| RG-16/BPL+16 | 5 | 19% | 21 | 81% | 5 | 20% | 9.5 | 37% | 0.25 | 1.0% |
| RG-17/BPL+17 | 4 | 16% | 21 | 84% | 5 | 19% | 10 | 38% | 0.25 | 1.0% |
| RG-18/BPL+18 | 3 | 13% | 21 | 88% | 5 | 19% | 10.5 | 40% | 0.25 | 0.9% |
| RG-19/BPL+19 | 2 | 9% | 21 | 91% | 5 | 19% | 11 | 41% | 0.25 | 0.9% |
| RG-20/BPL+20 | 1 | 5% | 21 | 95% | 5 | 18% | 11.5 | 42% | 0.25 | 0.9% |
| RG-21/BPL+21 | 0 | 0% | 21 | 100% | 5 | 18% | 12 | 43% | 0.25 | 0.9% |

^a This table shows just one example of several scenarios that will be modeled.

^b For this scenario the starchy red and orange vegetables in the Red and Orange vegetable subgroup has been separated from the rest of the red and orange vegetables and will be held constant at 0.25 cup eq based on current intake proportions of starchy red and orange vegetables.

Table 9. Ounce or cup equivalents (oz eq or cup eq) per week of staple carbohydrate foods to be modeled with incremental reductions of the Refined Grain subgroup (RG) and increases of starchy Red and Orange vegetables (SRO) within the 2,000-calorie level of the 2020 Healthy U.S.-Style (HUSS) Dietary Pattern (Objective 5) ^{a, b}

| Scenario | Refined Grains (oz eq) | Refined Grains (% of total Grains) | Whole Grains (oz eq) | Whole Grains (% of total Grains) | Starchy Vegetables (cup eq) | Starchy Vegetables (% of total Vegetables) | Beans, Peas, and Lentils (cup eq) | Beans, Peas, and Lentils (% of total Vegetables) | Starchy Red and Orange Vegetables ^b (cup eq) | Starchy Red and Orange Vegetables (% of total Vegetables) |
|-----------------------------|------------------------|------------------------------------|----------------------|----------------------------------|-----------------------------|--|-----------------------------------|--|---|---|
| Current Pattern (Reference) | 21 | 50% | 21 | 50% | 5 | 29% | 1.5 | 8.6% | 0.25 | 1% |
| RG-1/SRO+1 | 20 | 49% | 21 | 51% | 5 | 28% | 1.5 | 8.3% | 0.75 | 4% |
| RG-2/SRO+2 | 19 | 48% | 21 | 53% | 5 | 27% | 1.5 | 8.1% | 1.25 | 7% |
| RG-3/SRO +3 | 18 | 46% | 21 | 54% | 5 | 26% | 1.5 | 7.9% | 1.75 | 9% |
| RG-4/SRO +4 | 17 | 45% | 21 | 55% | 5 | 26% | 1.5 | 7.7% | 2.25 | 12% |
| RG-5/SRO +5 | 16 | 43% | 21 | 57% | 5 | 25% | 1.5 | 7.5% | 2.75 | 14% |
| RG-6/SRO +6 | 15 | 42% | 21 | 58% | 5 | 24% | 1.5 | 7.3% | 3.25 | 16% |
| RG-7/SRO +7 | 14 | 40% | 21 | 60% | 5 | 24% | 1.5 | 7.1% | 3.75 | 18% |
| RG-8/SRO +8 | 13 | 38% | 21 | 62% | 5 | 23% | 1.5 | 7.0% | 4.25 | 20% |
| RG-9/SRO +9 | 12 | 36% | 21 | 64% | 5 | 23% | 1.5 | 6.8% | 4.75 | 22% |
| RG-10/SRO +10 | 11 | 34% | 21 | 66% | 5 | 22% | 1.5 | 6.7% | 5.25 | 23% |
| RG-11/SRO +11 | 10 | 32% | 21 | 68% | 5 | 22% | 1.5 | 6.5% | 5.75 | 25% |
| RG-12/SRO +12 | 9 | 30% | 21 | 70% | 5 | 21% | 1.5 | 6.4% | 6.25 | 27% |
| RG-13/SRO +13 | 8 | 28% | 21 | 72% | 5 | 21% | 1.5 | 6.3% | 6.75 | 28% |
| RG-14/SRO +14 | 7 | 25% | 21 | 75% | 5 | 20% | 1.5 | 6.1% | 7.25 | 30% |
| RG-15/SRO +15 | 6 | 22% | 21 | 78% | 5 | 20% | 1.5 | 6.0% | 7.75 | 31% |
| RG-16/SRO +16 | 5 | 19% | 21 | 81% | 5 | 20% | 1.5 | 5.9% | 8.25 | 32% |
| RG-17/SRO +17 | 4 | 16% | 21 | 84% | 5 | 19% | 1.5 | 5.8% | 8.75 | 34% |
| RG-18/SRO +18 | 3 | 13% | 21 | 88% | 5 | 19% | 1.5 | 5.7% | 9.25 | 35% |
| RG-19/SRO +19 | 2 | 9% | 21 | 91% | 5 | 19% | 1.5 | 5.6% | 9.75 | 36% |
| RG-20/SRO +20 | 1 | 5% | 21 | 95% | 5 | 18% | 1.5 | 5.5% | 10.25 | 37% |
| RG-21/SRO +21 | 0 | 0% | 21 | 100% | 5 | 18% | 1.5 | 5.4% | 10.75 | 38% |

^a This table shows just one example of several scenarios that will be modeled.

^b For this scenario the starchy Red and Orange vegetables in the Red and Orange vegetable subgroup has been separated from the rest of the Red and Orange vegetables which will begin modeling at the 0.25 cup eq level based on current intake proportions.

- Objective 5: Evaluate implications on meeting nutritional goals when both Grains subgroups (i.e., Whole Grains; Refined Grains) in the 2020 HUSS Dietary Pattern are reduced by 1 or 2 oz eq increments and the proportions of other staple carbohydrate foods (i.e., Starchy Vegetables; Beans, Peas, and Lentils; starchy Red and Orange vegetables; Starchy Vegetables plus starchy Red and Orange vegetables) are increased by ½ to 1 cup eq increments. The process will model various subgroup proportions to represent potential levels of consumption. The nutritional composition and contributions of the modifications to the Grains and Vegetables food groups will be examined.
 - Each Grains subgroup will be modified together, incrementally reducing both subgroups equally until a quantity of 0 is reached for total Grains. Simultaneously, one of the vegetable subgroups will increase, while the others are held constant. An example in which Beans, Peas, and Lentils increases as total Grains decrease is shown in **Table 10**.
 - Additional scenarios that simultaneously reduce Grains subgroups (Refined Grains; Whole Grains) equally, while increasing all other staple carbohydrate groups will also be modeled.
 - Increments of 1 oz eq of Grains and ½ cup eq of Vegetable subgroups will be used for the lower calorie levels intended for ages 12 month to 23 months (700, 800, 900, and 1,000 calories) and ages 2 years and older (1,000, 1,200, and 1,400 calories). Increments of 2 oz eq of Grains and 1 cup eq of Vegetable subgroups will be used for the higher calorie levels intended for ages 2 years and older (1,600 to 3,200 calories).

Table 10. Ounce or cup equivalents (oz eq or cup eq) per week of staple carbohydrate foods to be modeled with incremental reductions of the Grains (G) food group and increases of the Beans, Peas, and Lentils (BPL) subgroup within the 2,000-calorie level of the 2020 Healthy U.S.-Style (HUSS) Dietary Pattern (Objective 5) ^a

| Scenario | Refined Grains (oz eq) | Whole Grains (oz eq) | Starchy Vegetables (cup eq) | Beans, Peas, and Lentils (cup eq) | Starchy Red and Orange (cup eq) |
|-----------------------------|------------------------|----------------------|-----------------------------|-----------------------------------|---------------------------------|
| Current Pattern (Reference) | 21 | 21 | 5 | 1.5 | 0.25 |
| G-2/BPL+1 | 20 | 20 | 5 | 2.5 | 0.25 |
| G-4/BPL+2 | 19 | 19 | 5 | 3.5 | 0.25 |
| G-6/BPL+3 | 18 | 18 | 5 | 4.5 | 0.25 |
| G-8/BPL+4 | 17 | 17 | 5 | 5.5 | 0.25 |
| G-10/BPL+5 | 16 | 16 | 5 | 6.5 | 0.25 |
| G-12/BPL+6 | 15 | 15 | 5 | 7.5 | 0.25 |
| G-14/BPL+7 | 14 | 14 | 5 | 8.5 | 0.25 |
| G-16/BPL+8 | 13 | 13 | 5 | 9.5 | 0.25 |
| G-18/BPL+9 | 12 | 12 | 5 | 10.5 | 0.25 |
| G-20/BPL+10 | 11 | 11 | 5 | 11.5 | 0.25 |
| G-22/BPL+11 | 10 | 10 | 5 | 12.5 | 0.25 |
| G-24/BPL+12 | 9 | 9 | 5 | 13.5 | 0.25 |
| G-26/BPL+13 | 8 | 8 | 5 | 14.5 | 0.25 |
| G-28/BPL+14 | 7 | 7 | 5 | 15.5 | 0.25 |
| G-30/BPL+15 | 6 | 6 | 5 | 16.5 | 0.25 |
| G-32/BPL+16 | 5 | 5 | 5 | 17.5 | 0.25 |
| G-34/BPL+17 | 4 | 4 | 5 | 18.5 | 0.25 |
| G-36/BPL+18 | 3 | 3 | 5 | 19.5 | 0.25 |

| | | | | | |
|--------------------|---|---|---|------|------|
| G-38/BPL+19 | 2 | 2 | 5 | 20.5 | 0.25 |
| G-40/BPL+20 | 1 | 1 | 5 | 21.5 | 0.25 |
| G-42/BPL+21 | 0 | 0 | 5 | 22.5 | 0.25 |

^a This table shows just one example of several scenarios that will be modeled.

Determine the amounts of nutrients that would be obtained by consuming various foods within each group:

The anticipated energy and nutrient content, or nutrient profile of each food group and subgroup will be determined based on the synthesis of results of the planned 2025 analyses to answer the question:

“Should foods and beverages with lower nutrient density (i.e., those with added sugars, saturated fat, and sodium) contribute to item clusters, representative foods, and therefore the nutrient profiles for each food group and subgroup used in modeling the USDA Dietary Patterns?”

The results of those analyses will determine if a “composite” system will be used to determine the nutrient profiles, or if a revised approach will be used which removes foods and beverages lower in nutrient density from contributing to the development of healthy dietary patterns.

For more information on the work planned for this question, view the protocol developed by the 2025 Committee and posted on [DietaryGuidelines.gov](https://www.dietaryguidelines.gov).²³

Evaluate nutrient level in each pattern against nutritional goals:

Using the revised nutrient profiles that apply to young children less than 2 years and the population 2 years and older, the nutrients provided by amounts recommended in the *Dietary Guidelines for Americans, 2020-2025* from each food group (and oils) are compared to the age, sex, and life stage-specific goals (usually at least 90% of the RDA or AI).

Iteration and re-evaluation:

Any nutrient goals that were not feasible to meet within the structure of the dietary patterns will be identified and potential health impacts will be considered by the Committee. Food group amounts and modifications will be based on expert judgement of which food groups could most reasonably provide the nutrients when goals were not met. New food groups and subgroups may be modeled to aim towards achieving a potential recommendation reflected in the systematic reviews. All modifications to food groups or subgroups will be balanced within energy constraints. To reduce possible bias in modifying food group amounts, food group and subgroup amounts in the patterns will be evaluated against usual intake distributions and limited to amounts between median and 95th percentiles of usual intakes, or in the case of overconsumed components, between the median and the 5th percentiles of usual intake. Calories from all food groups, subgroups, and oils, termed “essential calories,” will then be summed and the remaining calories up to the calorie limit for the pattern will be used to set limits on calories for other uses.

Conduct analyses

The USDA FPM methods team, in collaboration with the Committee, will use the analytic framework and analytic plan as a guide for conducting analyses and preparing tables and reports describing the analytic results for each analysis.

The first level of analysis will be by population with results described for each age-sex group and life stage (e.g., pregnancy and lactation). Depending on the available data, subsequent analyses may be based on population subgroups, race and/or ethnicity, and/or socioeconomic position.

Synthesize analyses

The Committee will describe, compare, and combine the evidence from all FPM analyses conducted to answer these FPM questions. Synthesis of the analyses will involve summarizing results with particular emphasis on implications for each life stage: infants, children, adolescents, adults, older adults, and individuals who are pregnant or lactating. Implications for each of the existing USDA Dietary Patterns or rationale for new pattern development, including energy levels, will also be included.

The analyses related to each individual protocol, along with the results of simulated diet analyses, related systematic review evidence, and related data analysis findings will be considered together in answering the primary question.

Develop conclusion

The Committee will review and discuss the synthesis of the analyses to develop conclusion statements for each FPM question. Conclusions from this protocol will be used along with conclusions from all other FPM protocols, the graded conclusions of any related systematic review, and related data analysis findings to collectively inform the Committee's advice on the development or refinement of healthy dietary patterns.

Recommend future research

The Committee will identify and document research gaps and methodological limitations throughout the FPM process. These gaps and limitations will be used to develop research recommendations that describe the research, data, and methodological advances that are needed to strengthen the process to model and develop healthy dietary patterns. Rationales for the necessity of additional or stronger research may also be provided with the research recommendations.

Protocol amendments

The first version of this protocol was published in October 2023. This revised version was published in February 2024. Amendments listing protocol changes are documented below in **Table 10**.

Table 10. Protocol amendments

| Date | Protocol change | Description |
|---------------|-----------------|---|
| February 2024 | Introduction | Table names for Tables 1-4 were updated to reflect that types of foods and beverages that count towards meeting food group goals. |
| February 2024 | Analytic Plan | The analytic plan was revised to establish energy levels based on the updated Estimated Energy Requirement (EER) equations from the Dietary Reference Intakes for Energy report published by the National Academies of Sciences, Engineering, and Medicine in 2023. ²⁷ |

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