Appendix E-3: USDA Food Patterns for Special Analyses

The 2015 DGAC identified specific questions that they felt could best be addressed through a food pattern modeling approach, using the USDA Food Patterns and the modeling process developed to address similar requests by the 2005 and 2010 DGACs. The approach used for the 2015 DGAC food pattern modeling questions is described in ***Part C*: *Methodology*.**

Seven modeling analyses requested by the Committee were completed by staff working closely with Subcommittee 1 members, and provided as reports for the full Committee to consider. The food pattern modeling analyses conducted for the 2015 DGAC are listed below. Full reports for each analysis are available online through active links within this document at www.DietaryGuidelines.gov.

E-3.1 Adequacy of USDA Food Patterns

How well do updated USDA food intake patterns meet IOM Dietary Reference Intakes and 2010 Dietary Guidelines nutrient recommendations? How do the recommended amounts of food groups compare to current distributions of usual intakes for the American population?

E-3.2 Food Group Contributions to Nutrients in USDA Food Patterns and Current Nutrient Intakes

What is the contribution of whole grain foods and fruits and vegetables to (1) total fiber intake and (2) total nutrient intake in the USDA Food Patterns? What is the contribution of fruits and vegetables to current nutrient intake (focus on nutrients of concern, including fiber)?

E-3.3 Meeting Vitamin D Recommended Intakes in USDA Food Patterns

Can vitamin D EARs and/or RDAs be met with careful food choices following recommended amounts from each food group in the USDA Food Patterns? How restricted would food choices be, and how much of the vitamin D would need to come from fortified food products?

E-3.4 USDA Food Patterns—Adequacy for Young Children

How well do the USDA Food Patterns meet the nutritional needs of children 2 to 5 years of age and how do the recommended amounts compare to their current intakes? Given the relatively small empty calorie limit for this age group, how much flexibility is possible in food choices?

E-3.5 Reducing Saturated Fats in the USDA Food Patterns

What would be the effect on food choices and overall nutrient adequacy of limiting saturated fatty acids to 6 percent of total calories by substituting mono- and polyunsaturated fatty acids?

E-3.6 Dairy Group and Alternatives

What would be the impact on the adequacy of the patterns if (1) no Dairy foods were consumed, (2) if calcium was obtained from nondairy sources (including fortified foods), and (3) if the proportions of milk and yogurt to cheese were modified?

What is the relationship between changes in types of beverages consumed (milk compared with sugar-sweetened beverages) and diet quality?

E-3.7 Developing Vegetarian and Mediterranean-style Food Patterns

Using the Food Pattern Modeling process, can healthy eating patterns for vegetarians and for those who want to follow a Mediterranean-style diet be developed? How do these patterns differ from the USDA Food Patterns previously updated for the 2015 DGAs?

Appendix E-3.1: Adequacy of USDA Food Patterns

RESEARCH QUESTION

How well do updated USDA food intake patterns meet IOM Dietary Reference Intakes and 2010 Dietary Guidelines nutrient recommendations? How do the recommended amounts of food groups compare to current distributions of usual intakes for the American population?

BACKGROUND

Overview

The USDA Food Patterns are intended to represent the types and amounts of foods that will provide nutrients sufficient to meet IOM nutrient recommendations and Dietary Guidelines for Americans recommendations. They are updated every five years during the deliberations of the Dietary Guidelines Advisory Committee, and are presented to the Committee for their assessment of the Patterns' adequacy. As part of the update, amounts recommended from each food group may be modified to reach all or most of the specified goals. In addition, the amounts from each food group are compared to usual dietary intake patterns of the U.S. population, and kept within the normal range of consumption.

History of the USDA food patterns

Food guides describe the types and amounts of food to consume. Over the past century, USDA has developed a number of different food guides to identify patterns of eating that would meet known nutrient needs and balance intake from various food groups. Many of the earlier food guides focused on nutrient adequacy only and were designed to meet known nutrient needs at the time. Beginning in the late 1970s, recommendations for dietary moderation to help prevent chronic disease were issued. A need was recognized for a food guide that made food intake suggestions for a "total diet" rather than a "foundation diet" in order to encompass goals for moderation as well as adequacy.

The first USDA Food Patterns that represented a "total diet" approach to food guides were developed in the mid-1980s and, starting in 1992, presented as the Food Guide Pyramid. From 2002 to 2005, the USDA Food Patterns underwent a major revision to meet the newly released IOM Dietary Reference Intakes and were included in the 2005 Dietary Guidelines. The patterns were also updated using the same process for the 2010 Dietary Guidelines. The current USDA Food Patterns,[1] showing recommended amounts or limits from each food group, are listed in Table E-3.1.A1.[2]

General process for developing and updating the USDA food intake patterns

The overall iterative process used to develop and update the USDA Food Patterns includes (1) identifying appropriate energy levels for the patterns, (2) identifying nutritional goals for the patterns, (3) establishing food groupings, (4) determining the amounts of nutrients that would be

[1] The patterns identified here and throughout this report as "USDA Food Patterns" are synonymous with the "Healthy US-Style Patterns" identified in Appendix E-3.7 to the 2015 DGAC Report—Developing Vegetarian and Mediterranean-style Food Patterns. These 3 patterns (Healthy US-Style, Healthy Vegetarian, and Healthy Mediterranean-style) together now comprise the "USDA Food Patterns."

[2] Tables labeled "E-3.1.A1," "E-3.1.A2," etc. are supplemental tables provided in separate documents. See list at end of report.

obtained by consuming various foods within each group, and (5) evaluating nutrient levels in each pattern against nutritional goals. Each is described briefly here.

1. **Establish Energy Levels**. IOM Dietary Reference Intakes formulas are used to calculate Estimated Energy Requirements (EER) for various age/sex groups within the population. These formulas are based on sex, age, height, weight, and physical activity level. Median heights and weights at healthy BMIs are used to calculate appropriate energy levels for the patterns. A range of energy levels from 1000 to 3200 calories was found to meet the needs of most of the population. Within this range, patterns at 12 energy levels (each 200 calorie "step") have been established. There have been no changes to the EERs since they were released in 2002, so energy levels for each age/sex group have not changed.
2. **Establish Nutritional Goals**. Specific nutritional goals for each food intake pattern are selected based on the age/sex group(s) for which it is targeted. If a food intake pattern is targeted for more than one age/sex group, the pattern is evaluated against the nutrient goals for all those groups. Goals for energy, 12 vitamins, 9 minerals, 3 macronutrients, 3 fatty acids, cholesterol, and fiber are based on IOM DRI reports released between 1997 and 2010 and on quantitative recommendations in the current Dietary Guidelines. Because the Food Patterns are designed as plans for individuals to follow, the goals are the RDA amounts for nutrients having an RDA. The lowest energy level assigned to each age/sex group (for less active/sedentary individuals) is used in evaluating the patterns against nutritional goals.
3. **Establish Food Groupings**. Food groups and subgroups are reviewed to identify where changes might be needed to reflect the current Dietary Guidelines. For example, to meet 2010 DGA recommendations for seafood intakes, subgroups within the Protein Foods group were identified in the 2010 Food Patterns. In addition, while fats are not technically considered to be food group, they are a component of the patterns. To distinguish between fats that are primarily sources of saturated fatty acids and those that are primarily sources of mono- or poly-unsaturated fatty acids, in the 2005 revision fats were separated into subcategories of "solid fats" and "oils."
4. **Identify Nutrient Contributions from Each Food Group**. A "composite" system is used to determine the expected nutrient content of each food group. Mixed foods are disaggregated into their ingredients, and similar ingredients are aggregated into item clusters (see Figures 1 and 2). The proportional intake of each item cluster within each food group or subgroup is calculated, and a nutrient-dense form of the food is selected as the representative food for each cluster. For example, the red-orange vegetable subgroup has 12 item clusters, including cooked carrots, raw carrots, cooked tomatoes, and raw tomatoes. While cooked carrots may be consumed in many forms, plain cooked carrots are selected as the representative food for this cluster. Using the nutrients in each representative food and the item cluster's proportional intake, a nutrient profile is calculated for each food group or subgroup. Nutrient profiles are also calculated for oils and solid fats using food supply data to determine proportional intakes.

Figure 1. Example of disaggregation of a mixed food into item clusters

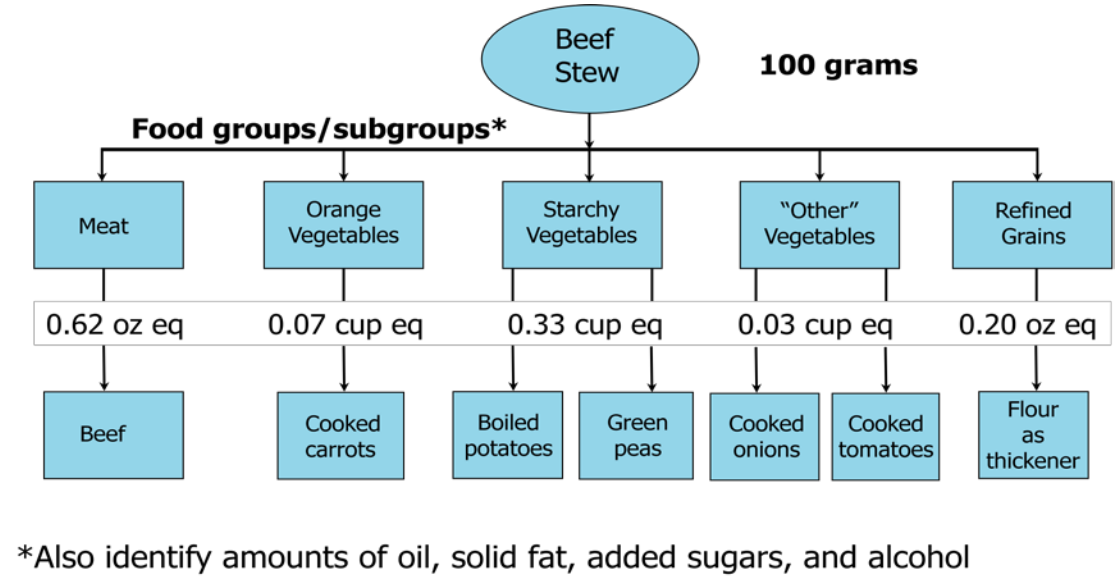
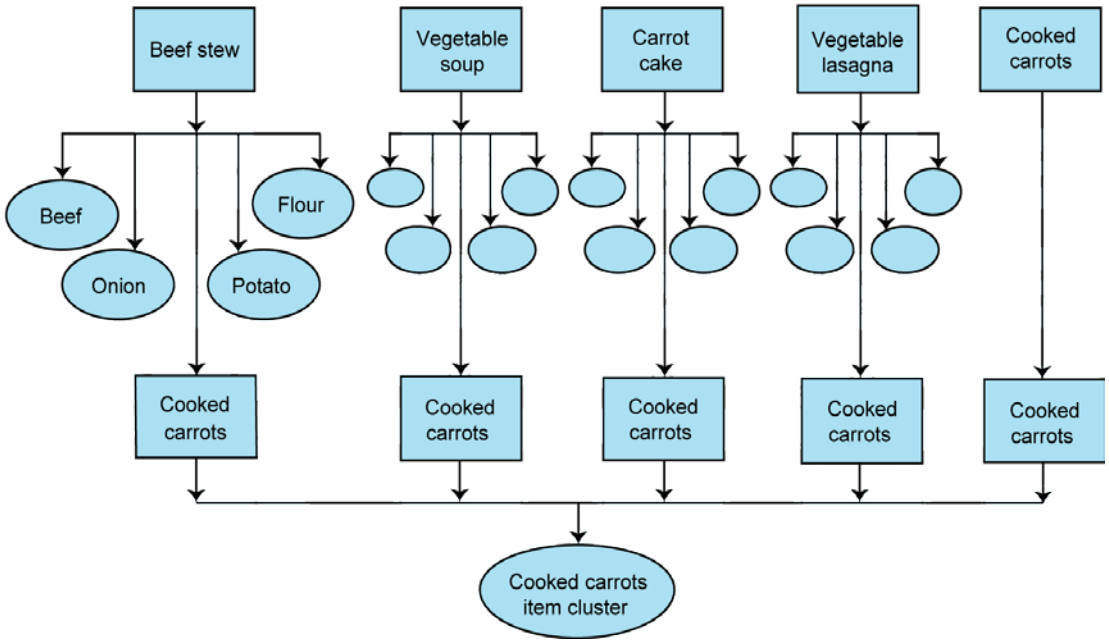


Figure 2. Example of aggregation of an item cluster from various foods



Figures 1 and 2 adapted from Marcoe et al, 2006.

5. **Determine Recommended Amounts from Each Food Group**. Using the updated nutrient profiles, the nutrients provided by currently recommended amounts from each food group (and oils) are compared to the pattern's goals. Iterative changes to food group amounts are made when needed until each pattern achieves its nutritional goals or comes within a reasonable range (usually at least 90% of the RDA or AI). Any nutrient goals that are not feasible to meet within

the structure of the food patterns are identified and potential health impacts are considered by the Dietary Guidelines Advisory Committee.

In the initial development of the food patterns, food group amounts were modified based on a judgment of which food groups could most reasonably provide the nutrients when goals were not met. All necessary increases are balanced with energy compensating decreases in other food groups. To reduce possible bias in modifying food group amounts, these amounts are now 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 and oils, termed "essential calories," are then summed and the remaining calories up to the calorie limit for the pattern are used to set a limit for calories from solid fats and added sugars.

METHODS (specific methods for this analysis)
The rationale for the current analysis is to determine if the USDA food patterns, as presented in the 2010 Dietary Guidelines, but **with updated nutrient profiles for each food group, based on more recent food consumption and nutrient composition data**, continue to meet nutritional goals for adequacy and moderation while staying within the established calorie targets.

1. **Assigned all foods reported in the What We Eat in America/National Health and Nutrition Examination Survey (WWEIA NHANES) 2009-10 to appropriate item clusters**. Item cluster assignment was based on the type of food, using the food description or recipe. Mixed dishes were disaggregated into single ingredients and each ingredient was assigned to an item cluster. Table 1 lists the number of item clusters for each food group or subgroup. Table E3.1.A2 lists all of the current item clusters and representative foods for the USDA food patterns.

Table 1. Number of item clusters in the current analysis and food pattern update, using WWEIA/NHANES 2009-10 food intake data.

Food Group	Subgroup	Number of Clusters	Number of Representative Foods
Dairy		69[1]	11
Fruits		121	85
Vegetables	Dark Green	19	18
	Red/Orange	12	11
	Starchy	14	14
	Legumes	11	10
	Other	38	37
Grains	Whole	15	14
	Refined	20	17
Protein Foods	Meats	10	10

	Poultry	3	3
	Seafood (high n3)	13	13
	Seafood (low n3)	32	29
	Eggs	1	1
	Nuts/Seeds	17	17
	Processed Soy Products	2	2

[1] The large number of clusters in the milk group was developed to provide a description of how milk products are consumed, in addition to use in calculating a nutrient profile. Many clusters are represented by the same nutrient-dense form of milk, cheese, or yogurt.

2. **Selected a representative food in a nutrient-dense form for each item cluster**. A representative food (See E3.1.A2) for each item cluster was selected from those available in the National Nutrient Database for Standard Reference, Release 26 (NDB-SR26). To the extent possible, they are forms of the foods that are lean, fat-free, or low-fat, with no added sugars or sodium. They are intended to be widely available in the marketplace. In a few cases, a food with some added salt, fat, or sugars was selected when an appropriate product low in all three was not in the database. For example, the cheeses selected as the most nutrient-dense choices are low in fat, but not necessarily low in sodium, and the ice cream selected is fat-free, but contains a small amount of added sugars. Because we wanted foods that people might realistically substitute for their typical choices, foods designed for special diets and not widely available, such as low sodium breads, were not used as representative foods. In all, of the 292 representative foods, about 13% contain some added salt and about 7% contain some added sugars. Among those with added salt, about half are bread and cereal products; others include processed and cured meats, canned fish (tuna, sardines), peanut butter, cheeses, olives, low-sodium pickles, and fat-free potato chips. Those with added sugars include some bread and cereal products, cranberry sauce, dried cranberries, and ice cream.

3. **Calculated nutrient profiles for each food group or subgroup using the nutrient data for representative foods and the proportional consumption of each item cluster from the food group composite**. Nutrient data for each representative food was obtained from NDB-SR26. Proportional consumption (Table E3.1.A2) was calculated from WWEIA/NHANES 2009-10. The updated Food Patterns Equivalent Database (FPED) was used to convert nutrients per 100 grams to nutrients per cup or ounce equivalent. The nutrient profiles for the fruit and dairy groups are calculated as a food group profile. The profiles for the vegetable, grain, and protein foods groups are calculated for subgroups within the overall food group. Subgroups are identified in Table 1. Updated nutrient profiles were also calculated for oils and solid fats using 2010 Food Availability data from ERS and nutrient data for representative oils and fats from SR26. Food supply data is used because NHANES does not specify the type of oil or solid fat for most foods, and cannot be used to determine proportional consumption. Nutrient values for granulated sugar are used for added sugars component of the food patterns—no profile is calculated. The nutrients included in the nutrient profile calculations are listed in Table 2.

Table 2. Nutrients included in food patterns analysis.

Vitamins	Minerals	Macronutrients and fatty acids	Other
Vitamin A*	Calcium	Protein	Energy
Vitamin E	Iron	Carbohydrate	Cholesterol
Vitamin D	Magnesium	Total lipid (fat)	Fiber, total dietary
Vitamin C	Manganese	– Saturated Fatty Acids	
Thiamin	Phosphorus	– Monounsaturated Fatty Acids	
Riboflavin	Potassium	– Polyunsaturated Fatty Acids	
Niacin	Sodium	– 18:2 Linoleic Acid	
Vitamin B-6	Zinc	– 18:3 Linolenic Acid	
Vitamin B-12	Copper	– EPA	
Choline	Selenium	– DHA	
Vitamin K			
Total Folate			

*Includes vitamin A precursors

4. **Compared existing recommended intake amounts for each food group and energy levels for the patterns to usual intake distributions**. One new goal for the update was to keep the amounts from all food groups and subgroups within the limits of the 5th and 95th percentiles of usual intake for each age and sex group. The amounts for each food group were compared to usual intake distributions from the NCI analysis of WEIA/NHANES 2007-10 dietary intakes. For under-consumed food groups and dietary components, recommended amounts were compared to the median and 95th percentiles of intakes. For over-consumed food groups and dietary components, recommended amounts were compared to the 5th percentile and median intake levels.

5. **Calculated calories and nutrients provided by each pattern from nutrient profiles and recommended intake amounts**. The sum of calories from the food groups and oils were considered "essential calories," and a limit for calories from solid fats and added sugars was calculated by subtracting essential calories from the caloric goal for the pattern. The calories from solid fats and added sugars were apportioned based on the proportional intakes of solid fats and added sugars in the population, using the NCI analysis of usual intakes for WWEIA/NHANES 2007-10. This partitioning allowed for calculation of the amounts and proportions of fatty acids and carbohydrates in the overall patterns, and suggested limits for solid fats and added sugars intakes.

6. **Compared nutrients in each pattern with nutrient recommendations and identified nutritional goals that were met or not met for age/sex groups at each calorie level**. Each age/sex group was assigned to an intake pattern at a specific calorie level that should meet their energy needs to maintain weight, assuming an average height and weight within the healthy weight range. Table E3.1.A3 lists the assignment of age/sex groups to food patterns. Each pattern was compared to the nutrient goals for that pattern, from the most recent DRIs or in some cases the 2010 Dietary Guidelines. Table E3.1.A4 lists the specific nutrient goals for each pattern. For this evaluation, the pattern selected was at an energy level appropriate

for sedentary (less active) individuals within the age/sex group. If this pattern met nutrient goals for adequacy, patterns at higher calorie levels (for more physically active individuals) would also meet those goals.

RESULTS

Food Group Nutrient Profiles

Nutrient profiles were developed that provide the calorie and nutrient content for a standard amount of food from each food group or subgroup. They are based on the weighted average nutrient content of a cup or ounce equivalent of all representative foods within the group. Table 3 shows the selected nutrients in each food group nutrient profile for the current patterns. Complete nutrient profiles for the 2015 patterns are shown in Table E-3.1.A5.

Table 3. Selected nutrients in 2015 food group nutrient profiles

Food Group/subgroup	Potassium (mg)	Calcium (mg)	Vitamin D (IU)	Fiber (g)	Sodium (mg)
Dairy (per cup eq)	235	295	59	0.2	202
Fruits (per cup eq)	311	19	0	2.3	4
Vegetables (per cup eq)					
Dark Green	377	75	0	3.3	46
Red/Orange	443	24	0	2.4	34
Starchy	604	17	0	3.7	74
Legumes	739	83	0	15.4	3
Other	266	38	0.5	2.6	30
Grains (per oz eq)					
Whole	94	44	6	2.4	84
Refined	33	29	1	0.8	101
Protein Foods (per oz eq)					
Meats	93	2	4	0	127
Poultry	76	4	1	0	59
Seafood (high n3)	104	8	99	0	41
Seafood (low n3)	82	14	20	0	118
Eggs	63	25	44	0	62
Nuts/seeds	96	13	0	1.2	20
Processed Soy Products	27	45	0	0.8	116
Oils (per gram)	0.01	0.01	0	0	0.18
Solid Fats (per gram)	0.07	0.06	0.3	0	1.73

The nutrient profiles of each food group have changed over time for several reasons. First, the nutrients for representative foods may have been updated by the NDL. Second, a new food may have been selected as the representative food for an item cluster if it was a more nutrient-dense choice and still was an appropriate food to represent the item cluster. Third, the Food Pattern Equivalents for the representative food may have changed, due to a new streamlined system for calculating equivalents that has been put into place. Finally, the relative consumption of various item clusters within the food group may have changed, so that more weight was given to

different foods within the group. Table 4 compares the energy content of each 2015 food group or subgroup with the energy content of comparable groups in 2005 and 2010.

Table 4. Comparison of calories in 2005, 2010, and 2015 food group nutrient profiles.

Food Group/subgroup	2005 Food Patterns	2010 Food Patterns	2015 Food Patterns
	Calories	Calories	Calories
Dairy (per cup eq)	83	81	77
Fruits (per cup eq)	118	101	98
Vegetables (per cup eq)			
Dark Green	40	36	33
Red/Orange	64 (orange)	48 (red/orange)	43 (red/orange)
Starchy	146	183	179
Legumes	228	242	243
Other	35	48	48
Grains (per oz eq)			
Whole	77	89	92
Refined	83	81	85
Protein Foods (per oz eq)	54		
Meats		49	49
Poultry		50	51
Seafood (high n3)		51	53
Seafood (low n3)		33	31
Eggs		78	78
Nuts/seeds		87	87
Processed Soy Products		49	47
Oils (per gram)		8.6	8.8
Solid fats (per gram)		8.1	8.4

Calories in the food patterns

For all food patterns, when using the nutrients and calories from representative foods that are in nutrient-dense forms, the sum of the calories from recommended amounts of each food group and oils ("essential calories") was less than the caloric goal for the pattern. The remaining calories are assigned to a maximum limit for calories from solid fats and added sugars, as shown in Table 5. Table 5 also identifies how the limit was apportioned between amounts of solid fats and added sugars, for the purpose of calculating macronutrient proportions.

The allowable calories from solid fats and added sugars are very low in patterns at lower caloric levels, and in patterns at 1200 to1600 calories even lower than the 1000 calorie pattern. The patterns at 1200 and 1400 calories level are targeted to meet the nutrient needs of children 4 to 8 years old, and include 2.5 cups from the Dairy group in order to meet their RDA for calcium. The 1600 calorie pattern contains 3 cups from the Dairy group in order to meet the RDA for calcium of children older than 8 and older adult women. In contrast, the 1000 calorie pattern contains only 2 cups from the Dairy group in order to meet the lower calcium RDA for 2 year

olds, and smaller amounts from other food groups due to other lower nutrient requirements. This is the reason for the larger allowance for solid fats and added sugars in the 1000 calorie pattern than in the 1200 to 1600 calorie patterns.

Table 5. Essential calories and limit on calories from solid fats and added sugars in each pattern and the amounts of solid fats and added sugars used in analysis of the pattern.

Calorie Level	Essential Calories[1]	Calorie Limit for solid fats and added sugars[2]	Calories assigned to Solid Fats[3]	Calories assigned to Added Sugars[3]	Grams of Solid Fats[4]	Grams of Added Sugars[4]
1000	850	152	84	68	10	17
1200	1097	107	59	48	7	12
1400	1288	111	59	52	7	13
1600	1471	123	67	56	8	14
1800	1629	168	92	76	11	19
2000	1732	271	151	120	18	30
2200	1919	279	151	128	18	32
2400	2051	349	193	156	23	39
2600	2221	382	210	172	25	43
2800	2402	398	218	180	26	45
3000	2528	472	260	212	31	53
3200	2589	612	336	276	40	69

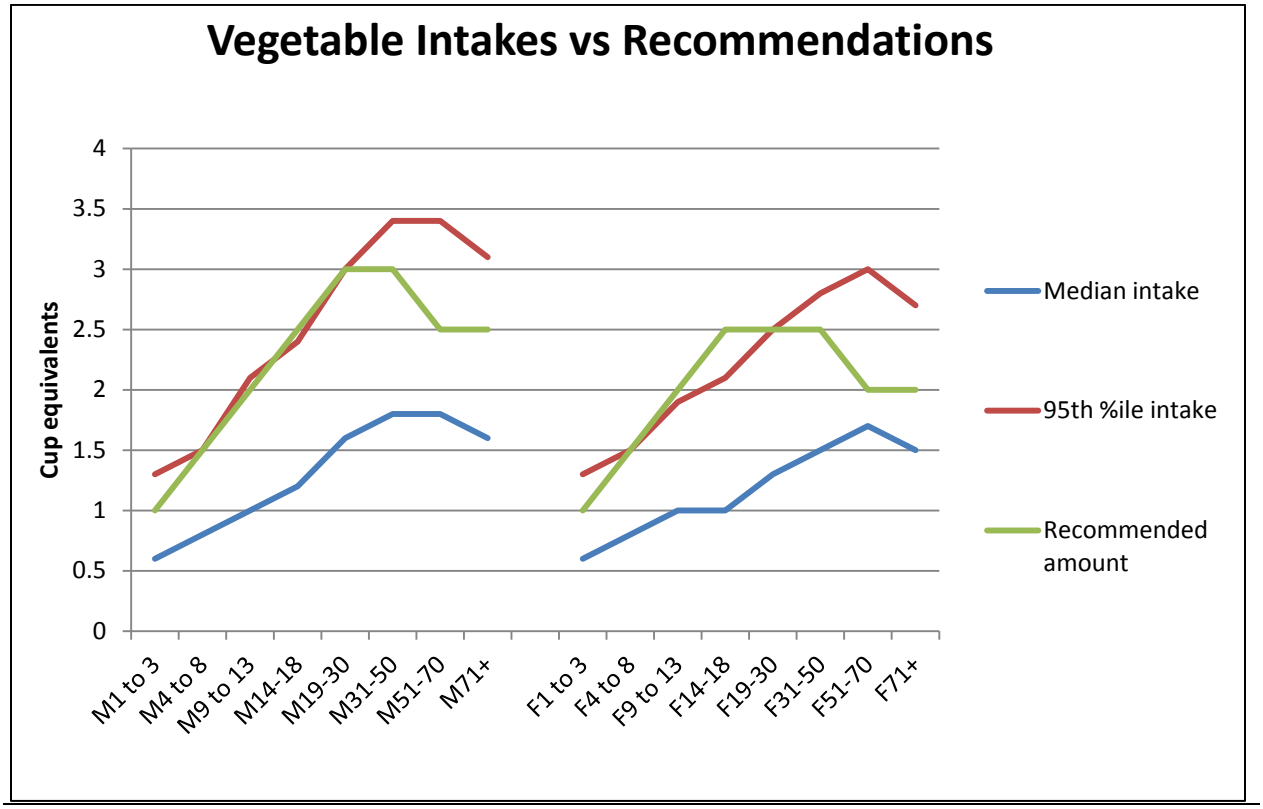
[1] Calories in pattern if all foods are consumed in nutrient-dense forms, without additional solid fats or added sugars.
[2] Calculated from pattern calorie level minus essential calories.
[3] Calculated as 55% of calories from solid fats and 45% from added sugars, based on mean population intakes (NCI Usual Intakes data for NHANES 2007-10).
[4] Calculated using caloric values of 8.4 kcal per 1 gram of solid fats and 4 kcal per gram of added sugars.

Recommended amounts in comparison to usual intake distributions

The intake amounts from each food group or subgroup and oils were compared to the median and either the 5th or 95th percentile of usual intake for WWEIA/NHANES 2007-10. For under-consumed food groups, recommended intake amounts are generally between the median and 95th percentiles of usual intake, though for some specific food groups and age/sex groups amounts may be somewhat above the 95th percentile of intake.

Figure 3 shows a sample comparison of recommendations to usual intakes for vegetables. Recommended vegetable intakes are above the 95th percentile for girls 9 to 13 and 14 to 18. Intakes for most males up to the age of 30 are at the 95th percentile. The graph shows that usual intakes of vegetables are higher in older men and women, while due to lower calorie needs the recommended amounts drop with age. In all cases, recommended intake of vegetables are above the median intake levels.

Figure 3. Recommended amounts of vegetables in the 2015 USDA Food Patterns, in comparison to usual intakes by age/sex groups in the 2007-2010 WWEIA/NHANES.



A comparison of the recommended amounts to usual intake percentiles for all food groups and subgroups were made using the recommended amounts from the Food Patterns and the usual intake distributions for WWEIA/NHANES 2007-10 from the National Cancer Institute[3]. Recommended intakes are generally between the median and the 95th percentile of intake for total vegetables, total fruit, and dairy intake. For these food groups, exceptions are that recommendations exceed the 95th percentile in these cases: vegetables for girls 9 to 18, fruits for men and women 19 to 30, and dairy for women over 30. Total protein food recommendations approximate median intakes for many age/sex groups, but are lower than the median for men 19 and older and are somewhat above the median (but below the 95th percentile) for girls 9 to 18 and women 19 to 30. Whole grain recommendations are well above the 95th percentile for all age/sex groups, and refined grain recommendations are about the 5th percentile of intake for most age/sex groups.

Recommended intake of vegetable subgroups (dark green, red/orange, starchy, beans and peas, and other) and seafood were also compared to usual intake distributions. Recommended amounts for all vegetable subgroups except other vegetables fall between the median and the 95th percentile for most age/sex groups, and exceed the 95th percentile for a few age/sex groups—most commonly for teen boys and young men. Recommendations for the other vegetable

[3] Usual intake levels, including the median, 5th and 95th percentiles of intakes for all age/sex groups are available on the National Cancer Institute website at http://appliedresearch.cancer.gov/diet/usualintakes/pop/2007-10/.

subgroup fall slightly below median intakes for men and women 51 to 70. Recommended seafood intakes are above the 95th percentile intakes for boys 4 to 18 and girls 2 to 18, and between the median and 95th percentile intakes for adults.

Recommendations for oils fall between the median and 95th percentile of intakes for all age/sex groups. Both solid fat and added sugars limits approximate the 5th percentile of intake, but are less than the 5th percentile for boys and girls 2 to 13.

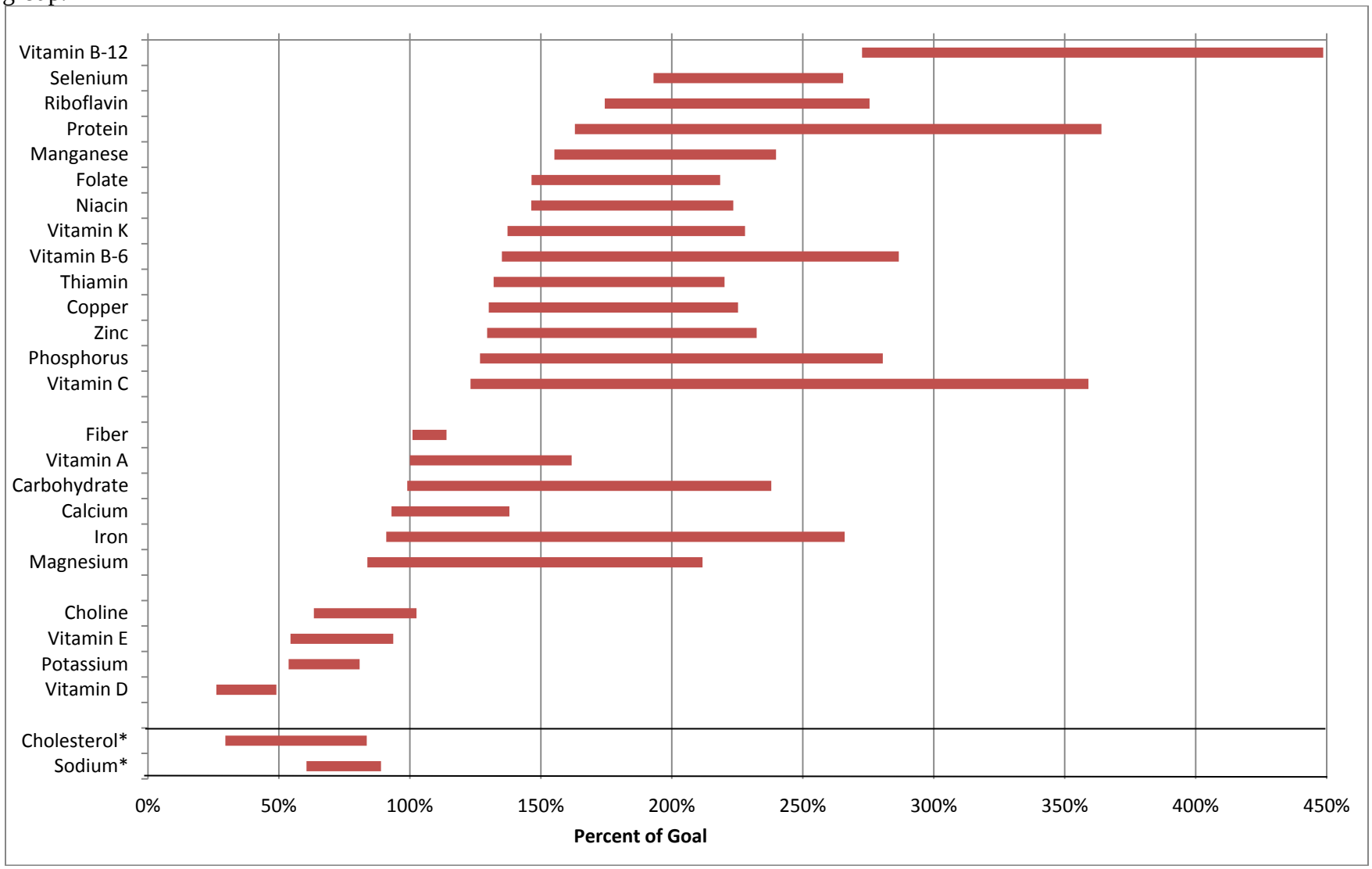
Nutrients in food patterns

The 12 USDA food patterns meet almost all of their nutritional goals for adequacy. Table 6 presents selected findings. See Figure 4 for a summary of the nutrients provided by the patterns in comparison to nutrient goals, Table E3.1.A6 for levels of all nutrients provided by each pattern, and Table E-3.1.A7 for a comparison of the nutrients in all patterns to all nutrient goals.

As shown in Figure 4, for many nutrients,, amounts of a nutrient in the patterns are well above the RDA or AI. Protein, phosphorus, zinc, copper, selenium, manganese, vitamin C, thiamin, riboflavin, niacin, vitamin K, folate, vitamin B_6, and vitamin B12are above the goal amounts for all age/sex groups.

In contrast, some nutrients are just above the RDA or AI, or marginally below (90 to 100% of goal) goal amounts for several age/sex groups. For example, amounts of calcium in the patterns are marginal for children ages 4 to 8 (98% RDA), 9 to 13 (97% RDA), and girls 14-18 (97% RDA). Amounts of iron are marginal for women 19-50 (91-93% RDA), and magnesium is marginal for girls 14-18 (94% RDA) and women over 50 (97% RDA). In addition, magnesium is low for men over 50 (84% RDA). Note that percents of the RDA shown are for the lowest calorie level assigned to these age/sex groups—the level applicable for a sedentary/less active physical activity level. In comparison to EARs, which are the appropriate targets for assessment of adequate intakes in populations, amounts in all patterns meet the EARs for calcium, iron, and magnesium. However, no patterns meet the EAR for vitamin D.

Figure 4. Range of nutrient levels in USDA Food Patterns across all age/sex groups, expressed as a percent of nutritional goal for each group. Bars show the lowest to highest percentage of the RDA or AI met by the USDA Food Patterns for each nutrient for any age/sex group.



*For cholesterol, bar shows percent of 300 mg. For sodium, the bar shows the percent of UL.

The nutrients for which adequacy goals are not met in almost all patterns are potassium, vitamin D, vitamin E, and choline. Potassium levels are less than 90% the AI in the patterns up through 2600 calories. Vitamin D amounts in the patterns range from 26% to 52% of the RDA. Vitamin E amounts are low for most age/sex groups except for active teen boys and men needing 2800 calories or more. Choline amounts range from 63% to 86% of the AI.

The nutrients that were well above, at, or marginally below, and below the RDA or AI are the same as in 2010. Due to the new higher RDA for vitamin D, amounts in the patterns are a much smaller percentage of the RDA than previously. To meet vitamin D recommendations while following the food group recommendations of the USDA Food Patterns, careful selection of specific foods within each food group would be needed, to include natural sources of D and foods fortified with D every day.

The patterns also meet almost all of their nutrient goals for moderation. The patterns at the three highest calorie levels (2800 to 3200 kcal) have more than the UL for sodium of 2300 mg (2345 to 2392 mg). In addition, all patterns are above the sodium AI for the age/sex group for which they are targeted. Only the patterns from 1000 to 1400 calories, designed for children 8 and younger, have less than 1500 mg of sodium. Saturated fat ranges from 7% to 9% of calories, with patterns at most calorie levels at 8% of calories. The 3200 calorie pattern is above the 35% of calories from fat upper boundary, with 36% of calories from fat. All other moderation goals are met. The moderation goals that were met or not met are also the same as in 2010.

Table 6. Selected nutrients in selected food patterns and comparison to goals for targeted age/sex group.

Calorie Level of Pattern	1000	1200	1800	1600	2000	2400
Target age/sex group	M/F 2-3	F 4-8	F 14-18	F 51-70	F 19-30	M 19-30
Macronutrients						
Protein	44g	59 g	87g	83 g	91 g	106 g
% of RDA	337%	311%	190%	180%	198%	189%
% of calories	18%	20%	19%	21%	18%	18%
Total lipid (fat)	37g	41 g	61g	55 g	72 g	87g
% of calories	33%	31%	31%	31%	33%	33%
Carbohydrate	129g	155 g	233g	201 g	256 g	310 g
% of RDA	99%	119%	179%	154%	197%	238%
% of calories	51%	52%	52%	50%	51%	52%
Fiber, total dietary	14g	18 g	29g	25 g	31 g	37 g
% of goal (14 g/1000 kcal)	101%	107%	114%	113%	109%	111%
Minerals						
Calcium	768mg	975 mg	1260mg	1215 mg	1274 mg	1377 mg
% of RDA	110%	98%	97%	101%	127%	138%
Iron	8 mg	10 mg	16 mg	14 mg	17 mg	21 mg
% of RDA	110%	104%	109%	180%	93%	265%
Magnesium	169 mg	223 mg	337 mg	311 mg	352 mg	420 mg
% of RDA	212%	172%	94%	97%	114%	105%
Potassium	1611mg	2102 mg	3149mg	2863 mg	3348 mg	3798 mg
% of AI	54%	55%	67%	61%	71%	81%

Sodium	921mg	1221 mg	1729mg	1602 mg	1787 mg	2089 mg
% of UL	61%	64%	75%	70%	78%	91%
Vitamins						
Vitamin A (in µg RAE)*	469 µg	599 µg	872 µg	793 µg	898 µg	1023 µg
% of RDA	156%	150%	125%	113%	128%	114%
Vitamin E (in mg AT)	5.0mg	5.9 mg	9.1mg	8.2 mg	10.2 mg	12.0 mg
% of RDA	83%	84%	61%	54%	68%	80%
Vitamin C	54mg	64 mg	100mg	92 mg	117 mg	128 mg
% of RDA	359%	258%	154%	123%	155%	142%
Vitamin D (in IU)	157IU	203 IU	269 IU	267 IU	274 IU	295 IU
% of AI	26%	34%	45%	44%	46%	49%
Folate (in µg DFE)	274 µg	363 µg	572 µg	491 µg	586 µg	746 µg
% of RDA	183%	181%	143%	123%	146%	187%
Choline	160 mg	216 mg	326mg	311 mg	349 mg	402 mg
% of AI	80%	87%	81%	73%	82%	73%
Fats and Fatty Acids						
Cholesterol	88mg	121 mg	192mg	190 mg	215 mg	251 mg
% of goal (<300mg/day)	29%	40%	64%	63%	72%	84%
Saturated fatty acids	9.7g	10.1 g	15.0g	13.1 g	18.7 g	22.6 g
% of calories	9%	8%	8%	7%	8%	8%

*Includes vitamin A precursors

Note: Results for all nutrients at all calorie levels are provided in Appendix Tables E-3.1.A6 and E-3.1.A7.

SUMMARY

The USDA Food Patterns have been updated using the most current food composition and food intake data available, and have been compared to current nutrient standards for adequacy and moderation. The USDA food patterns at 12 calorie levels meet almost all of their nutritional goals for adequacy. The nutrients for which adequacy goals are not met are potassium, vitamin D, vitamin E, and choline in almost all patterns. The patterns also meet almost all of their nutrient goals for moderation. Recommended amounts for all food groups and components fall, in general, within the 5^{th} and 95^{th} percentiles of usual intake distributions.

Additional tables available through Appendix E-3:

E-3.1.A1 USDA Healthy US-Style Food Patterns—Recommended Daily Intake Amounts.
E-3.1.A2 USDA Food Patterns---Item Clusters, Representative Foods, and Percent of Consumption
E-3.1.A3 Energy levels used for assignment of individuals to USDA Food Patterns
E-3.1.A4 Nutritional goals for each age/sex group used in assessing adequacy of USDA Food Patterns at various calorie levels
E-3.1.A5 2015 Nutrient Profiles for USDA Food Patterns
E-3.1.A6 Nutrients in the USDA Healthy US-Style Food Patterns at each calorie level
E-3.1.A7 Comparison of nutrient content of each USDA Healthy US-style Food Pattern to the nutritional goals for that pattern.

Data sources for update of USDA Food Patterns

Energy requirements and nutritional goals:

Institute of Medicine. *Dietary Reference Intakes for Energy, Carbohydrate, Fiber, Fat, Fatty Acids, Cholesterol, Protein, and Amino Acids.* Washington, DC: The National Academies Press; 2002.

Institute of Medicine. *The Essential Guide to Nutrient Requirements.* Washington, DC: The National Academies Press; 2006.

Institute of Medicine. *Dietary Reference Intakes for Calcium and Vitamin D.* Washington, DC: The National Academies Press; 2011.

Nutrient data:

USDA National Nutrient Database for Standard Reference, Release 26. Available at http://ndb.nal.usda.gov/

Food intake data:

What We Eat in America (WWEIA), National Health and Nutrition Examination Survey 2009-10. Available at http://seprl.ars.usda.gov/Services/docs.htm?docid=13793

Food Group data:

Food patterns equivalents database (FPED) for WWEIA 2009-10: Available at http://seprl.ars.usda.gov/Services/docs.htm?docid=23869

Usual Intake distributions:

Usual Dietary Intakes: Food Intakes, US Population, 2007-10, National Cancer Institute. Available at http://appliedresearch.cancer.gov/diet/usualintakes/pop/2007-10/

Food availability data:

Food Availability Data System, USDA Economic Research Service. Available at http://www.ers.usda.gov/data-products/food-availability-(per-capita)-data-system.aspx

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Britten, P., Lyon, J., Weaver, C.M., Kris-Etherton, P.M., Nicklas, T.A., Weber, J.A., Davis, C.A. MyPyramid Food Intake Pattern Modeling for the Dietary Guidelines Advisory Committee. (2006) *J Nutr Educ Behav*, 38 (6 SUPPL.):S143-S152.

Britten, P, Cleveland, L, Koegel, K, Kuczynski, K, Nichols-Richardson, S. Updated USDA Food Patterns Meet Goals of the 2010 Dietary Guidelines. *J Acad Nutr Diet.* 2012:112(10):1648-1665.

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Dietary Guidelines Advisory Committee. *Report of the Dietary Guidelines Advisory Committee on the Dietary Guidelines for Americans, 2005*. Washington DC: U.S. Department of Agriculture, Agricultural Research Service, August 2004, Appendix G-2.

Dietary Guidelines Advisory Committee. *Report of the Dietary Guidelines Advisory Committee on the Dietary Guidelines for Americans, 2010*. Washington DC: U.S. Department of Agriculture, Agricultural Research Service, May 2010, online Appendix E-3.

U.S. Department of Health and Human Services and U.S. Department of Agriculture. *Dietary Guidelines for Americans, 2005*. Washington DC: U.S. Department of Health and Human Services and U.S. Department of Agriculture, January 2005.

U.S. Department of Agriculture and Department of Health and Human Services. *Dietary Guidelines for Americans, 2010*. Washington DC: and U.S. Department of Agriculture and U.S. Department of Health and Human Services, December 2010.

Table E3.1.A1. USDA Healthy US-Style Food Patterns—recommended daily intake amounts.

Calorie level of Pattern	1,000	1,200	1,400	1,600	1,800	2,000	2,200	2,400	2,600	2,800	3,000	3,200
Food Group	**Daily Amount**[b] of Food From Each Group (vegetable and protein foods subgroup amounts are per week)											
Fruits	**1 c**	**1 c**	**1½ c**	**1½ c**	**1½ c**	**2 c**	**2 c**	**2 c**	**2 c**	**2½ c**	**2½ c**	**2½ c**
Vegetables	**1 c**	**1½ c**	**1½ c**	**2 c**	**2½ c**	**2½ c**	**3 c**	**3 c**	**3½ c**	**3½ c**	**4 c**	**4 c**
Dark green veg (c/wk)	½	1	1	1½	1½	1½	2	2	2½	2½	2½	2½
Red/Orange veg (c/wk)	2½	3	3	4	5½	5½	6	6	7	7	7½	7½
Beans and peas (c/wk)	½	½	½	1	1½	1½	2	2	2½	2½	3	3
Starchy veg (c/wk)	2	3½	3½	4	5	5	6	6	7	7	8	8
Other veg (c/wk)	1½	2½	2½	3½	4	4	5	5	5½	5½	7	7
Grains	**3 oz eq**	**4 oz eq**	**5 oz eq**	**5 oz eq**	**6 oz eq**	**6 oz eq**	**7 oz eq**	**8 oz eq**	**9 oz eq**	**10 oz eq**	**10 oz eq**	**10 oz eq**
Whole grains	1½ oz eq	2 oz eq	2½ oz eq	3 oz eq	3 oz eq	3 oz eq	3½ oz eq	4 oz eq	4½ oz eq	5 oz eq	5 oz eq	5 oz eq
Other grains	1½ oz eq	2 oz eq	2½ oz eq	2 oz eq	3 oz eq	3 oz eq	3½ oz eq	4 oz eq	4½ oz eq	5 oz eq	5 oz eq	5 oz eq
Protein Foods	**2 oz eq**	**3 oz eq**	**4 oz eq**	**5 oz eq**	**5 oz eq**	**5½ oz eq**	**6 oz eq**	**6½ oz eq**	**6½ oz eq**	**7 oz eq**	**7 oz eq**	**7 oz eq**
Meat, poultry, eggs (oz eq/wk)	10	14	19	23	23	26	28	31	31	33	33	33
Seafood (oz eq/wk)	3	4	6	8	8	8	9	10	10	10	10	10
Nuts seeds, soy (oz eq/wk)	2	2	3	4	4	5	5	5	5	6	6	6
Dairy	**2 c**	**2½ c**	**2½ c**	**3 c**	**3 c**	**3 c**	**3 c**	**3 c**	**3 c**	**3 c**	**3 c**	**3 c**
Oils	**15 g**	**17 g**	**17 g**	**22 g**	**24 g**	**27 g**	**29 g**	**31 g**	**34 g**	**36 g**	**44 g**	**51g**
Limits for solid fats and added sugars												
Solid fats	10g	7g	7g	8g	11g	18g	18g	23g	25g	26g	31g	40g
Added Sugars	17g	12g	13g	14g	19g	30g	32g	39g	43g	45g	53g	69g

a. Food intake patterns at 1000, 1200, and 1400 calories are designed to meet the nutritional needs of 2- to 8-year-old children. Patterns from 1600 to 3200 calories are designed to meet the nutritional needs of children 9 and older and adults. If a child 4 to 8 years of age needs more calories and, therefore, is following a pattern at 1600 calories or more, his recommended amount from the milk group should be 2.5 cups per day. Children 9 and older and adults should not use the 1000, 1200, or 1400 calorie patterns.

b. Food group amounts shown in cup (c) or ounce equivalents (oz eq). Oils, solid fats, and added sugars are shown in grams (g).
Quantity equivalents for each food group are:

- Grains, 1 ounce equivalent is: ½ cup cooked rice, pasta, or cooked cereal; 1 ounce dry pasta or rice; 1 slice bread; 1 cup RTE cereal flakes.
- Fruits and vegetables, 1 cup equivalent is: 1 cup raw or cooked fruit or vegetable, 1 cup fruit or vegetable juice, 2 cups leafy salad greens.
- Protein Foods**,** 1 ounce equivalent is: 1 ounce lean meat, poultry, or seafood; 1 egg; ¼ cup cooked beans or tofu; 1 Tbsp peanut butter; ½ ounce nuts/seeds.
- Dairy, 1 cup equivalent is: 1 cup milk or yogurt, 1½ ounces natural cheese such as Cheddar cheese or 2 ounces of processed cheese.

Table E3.1.A2. USDA Food Patterns--Item Clusters, Representative Foods, and Percent of Consumption

Subgroup and Item Clusters	% food group*	% food subgroup**	Representative Food (used to represent nutrient value of the item cluster)
FRUIT GROUP			
Whole fruit	**69.5**		
Apples, cooked or canned	0.8	1.1	Applesauce, canned, unsweetened, without vitamin C
Apples, dried	0.1	0.1	Apple, dried, sulfured, uncooked
Apples, raw	18.5	26.7	Apple, raw, with skin
Applesauce	1.0	1.4	Applesauce, canned, unsweetened, without vitamin C
Apricot, cooked or canned	0.0	0.0	Apricot, canned, water pack
Apricot, dried	0.0	0.1	Apricot, dried, sulfured, uncooked
Apricot, raw	0.1	0.1	Apricots, raw
Bananas, cooked or canned (Incl. red)	0.1	0.2	Bananas, raw
Bananas, dried	0.0	0.1	Bananas, dehydrated
Bananas, raw (Incl. white, red, Chinese, apple types)	12.8	18.5	Bananas, raw
Blackberries, cooked or canned	0.0	0.0	Blackberries, raw
Blackberries, raw	0.3	0.4	Blackberries, raw
Blueberries, cooked or canned	0.2	0.4	Blueberries, raw
Blueberries, dried	0.0	0.0	Blueberries, raw
Blueberries, raw	1.5	2.2	Blueberries, raw
Boysenberries, raw	0.0	0.0	Boysenberries, frozen, unsweetened
Cantaloupe, raw	2.0	2.9	Melons, cantaloupe, raw
Casaba Melon, raw	0.0	0.0	Melons, casaba, raw
Cherries, cooked or canned (Incl. maraschino)	0.1	0.1	Cherries, sour, red, canned, water pack
Cherries, raw	0.0	0.0	Cherries, sweet, raw
Cranberries, cooked or canned	0.1	0.2	Cranberries, canned, sweetened
Cranberries, dried	0.4	0.6	Cranberries, dried, sweetened
Cranberries, raw	0.0	0.0	Cranberries, raw
Dates, raw and cooked	0.1	0.1	Dates, deglet noor
Dewberries, raw	0.0	0.0	Blackberries, raw
Figs, cooked or canned	0.0	0.1	Figs, canned, water pack
Figs, dried	0.0	0.0	Figs, dried, uncooked
Figs, raw	0.0	0.0	Figs, raw
Grapefruit, cooked or canned	0.0	0.0	Grapefruit sections, canned, water pack
Grapefruit, raw	0.6	0.9	Grapefruit, raw, pink, red, and white
Grapes, cooked or canned	0.0	0.0	Grapes, canned, Thompson seedless, water pack
Grapes, raw	3.8	5.5	Grapes, red/green (European type), raw
Guava, cooked or canned	0.0	0.0	Guavas, common, raw
Guava, raw	0.0	0.0	Guavas, common, raw
Honeydew Melon, raw	0.4	0.5	Melons, honeydew, raw
Huckleberries, raw	0.0	0.0	Huckleberries, raw
Japanese Pears, raw	0.1	0.1	Pears, asian, raw
Juneberry, raw	0.0	0.0	Blackberries, raw
Kiwifruit, raw	0.1	0.2	Kiwifruit, green, raw
Kumquat, cooked or canned	0.0	0.0	Kumquats, raw
Kumquat, raw	0.0	0.0	Kumquats, raw
Lemons, raw or cooked (Incl. lemon peel & citron)	0.0	0.0	Lemons, raw, without peel
Lime, raw (Incl. calamondin)	0.0	0.0	Limes, raw

Table E3.1.A2. USDA Food Patterns--Item Clusters, Representative Foods, and Percent of Consumption

Subgroup and Item Clusters	% food group*	% food subgroup**	Representative Food (used to represent nutrient value of the item cluster)
Whole fruit, cont'd.			
Loganberries, raw	0.0	0.0	Loganberries, frozen
Lychee, cooked or canned	0.0	0.0	Litchis, raw
Lychee, raw	0.0	0.0	Litchis, raw
Lychee, dried	0.0	0.0	Litchis, raw
Mango, cooked or canned	0.0	0.0	Mangos, raw
Mango, dried	0.1	0.1	Mangos, raw
Mango, raw	0.8	1.2	Mangos, raw
Mixed Other Fruit (NOT citrus)	0.0	0.0	Applesauce, canned, unsweetened, without vitamin C
Mulberries, raw	0.0	0.0	Mulberries, raw
Nectarine, cooked or canned	0.0	0.0	Peaches, canned, water pack
Nectarine, raw	0.5	0.8	Nectarines, raw
Oranges, cooked or canned	0.0	0.0	Tangerines, mandarin oranges, canned , juice pack
Oranges, raw (Incl. orange peel)	3.5	5.0	Oranges, raw, all varities
Papaya, cooked or canned (Incl. green)	0.0	0.0	Papayas, raw
Papaya, dried	0.0	0.0	Papayas, raw
Papaya, raw	0.2	0.2	Papayas, raw
Passion Fruit, raw	0.0	0.0	Passion-fruit, (granadilla), purple, raw
Peaches, cooked or canned	0.6	0.9	Peaches, canned, water pack
Peaches, dried	0.0	0.0	Peach, dried, sufured, uncooked
Peaches, raw	2.2	3.2	Peaches, raw
Pears, cooked or canned	0.4	0.6	Pears, canned, water pack
Pears, dried	0.0	0.0	Pears, dried, sulfured, uncooked
Pears, raw	1.5	2.2	Pears, raw
Persimmons, raw	0.2	0.3	Persimmons, native, raw
Pineapple, cooked or canned	0.4	0.6	Pineapples, canned, water pack
Pineapple, dried	0.0	0.0	Pineapples, raw, all varieties
Pineapple, raw	1.2	1.7	Pineapples, raw, all varieties
Plums, dried (include dried prunes)	0.1	0.2	Plums, dried (prines), uncooked
Plums, raw	0.4	0.5	Plums, raw
Plums/Prunes, cooked or canned	0.0	0.0	Plums, canned, purple, water pack
Pomegranate, raw	0.1	0.1	Pomegranates, raw
Raisins, cooked or canned	0.4	0.6	Raisins, seedless
Raisins, raw (Incl. raw & dried currants)	1.4	2.0	Raisins, seedless
Raspberries, cooked or canned	0.0	0.0	Raspberries, raw
Raspberries, raw (incl. black & red)	0.2	0.3	Raspberries, raw
Rhubarb, cooked or canned	0.0	0.0	Rhubarb, raw
Rhubarb, raw	0.0	0.0	Rhubarb, raw
Star Fruit (Carambola), cooked	0.0	0.0	Carambola (starfruit), raw
Star Fruit (Carambola), raw	0.0	0.0	Carambola (starfruit), raw
Strawberries, cooked, canned, dried	0.2	0.3	Strawberries, frozen, unsweetened
Strawberries, raw	3.6	5.1	Strawberries, raw
Tamarind, dried	0.0	0.0	Tamarinds, raw
Tamarind, raw or cooked	0.0	0.0	Tamarinds, raw
Tangerine, raw or canned/cooked	0.9	1.3	Tangerines (mandarin oranges), raw
Unknown Citrus Fruit	0.4	0.5	Strawberries,raw
Unknown Other Fruit	1.6	2.2	Applesauce, canned, unsweetened, without vitamin C
Watermelon, raw	5.2	7.5	Watermelon, raw
Youngberries, raw	0.0	0.0	Blackberries, raw

Table E3.1.A2. USDA Food Patterns--Item Clusters, Representative Foods, and Percent of Consumption

Subgroup and Item Clusters	% food group*	% food subgroup**	Representative Food (used to represent nutrient value of the item cluster)
Fruit Juice	**29.6**		
Apple Juice	5.4	18.3	Apple juice, canned/bottled, unsweetened, without vitamin C
Apricot Juice/Nectar	0.0	0.0	Apricot nectar, canned, without vitamin C
Banana Juice/Nectar	0.0	0.0	Bananas, raw
Blackberry Juice	0.0	0.0	Blackberry juice, canned
Cantaloupe Juice/Nectar	0.0	0.0	Melons, cantaloupe, raw
Cherry Juice	0.0	0.0	Cherries, sweet, raw (Queen Anne, Bing)
Cranberry Juice	0.4	1.3	Cranberry juice,unsweetened
Grape Juice	1.2	4.1	Grape juice, canned, unsweetened, without vitamin C
Grapefruit Juice	0.5	1.7	Grapefruit juice, white, canned, unsweetened
Guava Juice/Nectar	0.0	0.1	Guava nectar, canned
Lemon Juice	0.4	1.5	Lemon juice, canned or bottled
Lime Juice	0.1	0.5	Lime juice, canned or bottled, unsweetened
Mango Juice/Nectar	0.1	0.3	Mango nectar, canned
Mixed Fruit Juice (Citrus)	0.0	0.0	Orange juice, chilled, including from concentrate
Mixed Fruit Juice (NOT citrus)	0.4	1.3	Apple juice, canned/bottled, unsweetened, without vitamin C
Orange Juice (Incl. tangerine & acerola)	17.2	58.2	Orange juice, chilled, including from concentrate
Papaya Juice/Nectar	0.1	0.2	Papaya nectar, canned
Passion Fruit Juice/Nectar	0.0	0.1	Passion fruit juice, yellow, raw
Peach Juice/Nectar	0.0	0.0	Peach nectar, canned, without vitamin C
Pear Juice/Nectar	0.0	0.0	Baby food, juice, pear
Pineapple Juice	0.4	1.4	Pineapple juice, canned, unsweetened, without vitamin C
Plum Juice	0.0	0.0	Prune juice, canned
Pomegranate Juice	0.2	0.6	Pomegranate juice, bottled
Prune Juice	0.1	0.4	Prune juice, canned
Raspberry Juice	0.0	0.0	Blackberry juice, canned
Soursop Juice/Nectar	0.0	0.0	Guanabana nectar, canned
Strawberry Juice	0.0	0.1	Blackberry juice, canned
Unknown Citrus Fruit Juice	1.2	4.2	Orange juice, chilled, including from concentrate
Unknown Other Fruit Juice	1.6	5.5	Apple juice, canned/bottled, unsweetened, without vitamin C
Watermelon Juice	0.0	0.1	Watermelon, raw

Table E3.1.A2. USDA Food Patterns--Item Clusters, Representative Foods, and Percent of Consumption

Subgroup and Item Clusters	% food group*	% food subgroup**	Representative Food (used to represent nutrient value of the item cluster)
Vegetable Group			
Dark Green Vegetables	**7.5**		
Arugula Lettuce	0.1	0.8	Arugula, raw
Bak Choy (Chinese Cabbage)	0.2	2.3	Cabbage, Chinese (pak-choi), cooked, without salt
Broccoli, cooked	2.4	32.5	Broccoli, cooked, boiled, without salt
Broccoli, raw	0.5	6.8	Broccoli, raw
Butterhead Lettuce (Boston, Bibb)	0.0	0.0	Lettuce, butterhead (Bibb and Boston), raw
Chard, cooked (Incl. cooked escarole)	0.0	0.5	Chard, swiss, cooked, boiled, without salt
Cilantro, raw and ckd	0.1	0.9	Coriander leaves (Cilantro), raw
Collard Greens	0.3	4.1	Collards, cooked, boiled, without salt
Grape Leaves	0.0	0.1	Grape leaves, raw
Kale (Incl. lambsquarters, mustard cabbage, beet greens, bitter melon, horseradish, and jute leaves)	0.1	1.4	Kale, cooked, boiled, without salt
Mixed Dark Leafy Greens, raw (incl. Romaine, Chicory, Escarole, and Endive)	1.9	25.0	Lettuce, cos or romaine, raw
Mustard Greens (Incl. dandelion and poke greens)	0.1	1.0	Mustard greens, cooked, boiled, without salt
Parsley (Incl. epazote)	0.0	0.6	Parsley, raw
Seaweed (Laver), high in Vit. A	0.0	0.0	Seaweed, laver, raw
Spinach, cooked (Incl. taro leaves)	0.6	7.8	Spinach, cooked, boiled, without salt
Spinach, raw	1.1	15.2	Spinach, raw
Turnip Greens	0.1	1.1	Turnip greens, cooked, boiled, without salt
Unknown dark green veg.	0.0	0.0	Parsley, raw
Watercress (Incl. thistle leaves)	0.0	0.1	Watercress, raw
Beans and Peas (legumes)	**6.0**		
Black beans	0.5	8.1	Beans, black, cooked, boiled, without salt
Chickpeas	0.3	4.8	Chickpeas, cooked, boiled, without salt
Cowpeas	0.0	0.2	Cowpeas, common, cooked, boiled, without salt
Kidney Beans	0.8	13.9	Beans, kidney, cooked, boiled, without salt
Lentils	0.4	6.3	Lentils, cooked, boiled, without salt
Lima beans, mature (Incl. fava and mung beans)	0.1	1.9	Lima beans, large, cooked, boiled, without salt
Pinto beans (Incl. pink beans)	2.3	37.8	Beans, pinto, cooked, boiled, without salt
Soybeans/Edamame	0.0	0.8	Soybeans, mature cooked, boiled, without salt
Split Peas	0.1	1.4	Peas, split, cooked, boiled, without salt
Unknown legume	0.0	0.2	Beans, small white, cooked, boiled, without salt
White beans (Incl. navy and pea beans)	1.5	24.7	Beans, small white, cooked, boiled, without salt

Table E3.1.A2. USDA Food Patterns--Item Clusters, Representative Foods, and Percent of Consumption

Subgroup and Item Clusters	% food group*	% food subgroup**	Representative Food (used to represent nutrient value of the item cluster)
Red and Orange Vegetables	**23.6**		
Carrot Juice	0.0	0.0	Carrot juice, canned
Carrots, cooked	2.4	10.2	Carrots, cooked, boiled, drained, without salt
Carrots, raw	1.8	7.7	Carrots, raw
Chili Pepper, hot, red, (Incl. color NS)	0.5	2.1	Peppers, hot chili, red, raw
Ckd Sweet Potatoes/orange yams	0.6	2.4	Sweet potato, cooked, baked in skin, without salt
Ckd Winter Squash	0.2	0.7	Squash, winter, all varieties, baked, without salt
Pumpkin	0.1	0.6	Pumpkin, canned, without salt
Red Peppers, sweet, bell (Incl.	0.2	0.7	Peppers, sweet, red, cooked, boiled, without salt
Tomato Juice	1.2	5.1	Tomato juice, canned, without salt added
Tomatoes, cooked	11.2	47.5	Tomatoes, canned, puree, without salt added
Tomatoes, raw	5.4	23.0	Tomatoes, red, ripe, raw
Unknown red/orange veg.	0.0	0.0	Carrots, cooked, boiled, without salt
Starchy Vegetables	**26.8**		
Cassava (Incl. taro, burdock root, and white yam)	0.1	0.5	Cassava, raw
Corn, white (Incl. hominy)	0.5	1.8	Corn, sweet, white, cooked, boiled, without salt
Corn, yellow	2.6	9.8	Corn, sweet, yellow, cooked, boiled, without salt
Cowpeas, Field Peas, Blackeye Peas, not dried (Incl. pigeon peas)	0.1	0.2	Cowpeas, immature, cooked, boiled, without salt
French Fries	4.0	14.9	Potatoes, french fried, frozen, without salt, oven heated
Green Peas	1.4	5.3	Peas, green, cooked, boiled, without salt
Home Fries/Hash Browns	2.6	9.7	Potatoes, hashed brown, frozen, plain, prepared
Lima Beans, immature	0.3	1.1	Lima beans, immature, cooked, boiled, without salt
Plantains	0.3	1.1	Plantains, cooked
Potato Chips/Puffs/Sticks	4.7	17.4	Potato chips, fat free, salted
Potatoes, baked	3.5	13.2	Potatoes, white, flesh and skin, baked
Potatoes, boiled (Incl. breadfruit)	6.6	24.5	Potatoes, boiled, flesh, cooked without skin or salt
Vegetable starches	0.1	0.2	Potato Flour
Waterchestnuts (Incl. lotus root)	0.1	0.3	Waterchestnuts, chinese, canned
Other Vegetables	36.1		
Artichoke	0.1	0.2	Artichokes, cooked, boiled, drained, without salt
Asparagus	0.4	1.0	Asparagus, cooked, boiled, drained
Avocado	1.1	2.9	Avocados, raw, all commercial varieties
Bamboo Shoots	0.3	0.8	Bamboo shoots, cooked, drained, without salt
Beets	0.2	0.5	Beets, cooked, boiled, drained
Brussels Sprouts	0.2	0.7	Brussels sprouts, cooked, boiled, drained, without salt
Cactus (Nopales)	0.1	0.1	Nopales, cooked, without salt
Cauliflower (Incl. broccoflower)	0.5	1.4	Cauliflower, cooked, boiled, drained, without salt
Celery, cooked	1.2	3.3	Celery, cooked, boiled, drained, without salt
Celery, raw	0.9	2.4	Celery, raw
Chili Pepper, hot, green, ckd and raw (Incl. serrano and dwarf green)	0.1	0.2	Peppers, hot chili, green, raw
Chives	0.0	0.0	Chives, raw
Cucumber (Incl. flowers of sesbania, squash, lily, pumpkin)	2.3	6.4	Cucumber, peeled,raw

Table E3.1.A2. USDA Food Patterns--Item Clusters, Representative Foods, and Percent of Consumption

Subgroup and Item Clusters	% food group*	% food subgroup**	Representative Food (used to represent nutrient value of the item cluster)
Other Vegetables, cont'd.			
Cucumber Pickles (Incl. relish and capers)	1.3	3.6	Pickles, cucumber, dill, low sodium
Edible-pod Green Peas (Incl. snowpeas, fern shoots)	0.3	0.7	Peas, edible-podded, boiled, drained, without salt
Eggplant (Incl. hearts of palm)	0.5	1.4	Eggplant, cooked, boiled, drained, without salt
Garlic	0.5	1.4	Garlic, raw
Green Beans (Incl. snap and yellow beans)	3.8	10.5	Beans, snap, green, cooked, boiled, drained, without salt
Green Cabbage, cooked	0.7	2.0	Cabbage, cooked, boiled, drained, without salt
Green Cabbage, raw (Incl. savoy cabbage)	0.9	2.4	Cabbage, raw
Green Peppers, cooked, sweet, bell	1.1	2.9	Peppers, sweet, green, cooked, boiled, drained, without salt
Green Peppers, raw, sweet, bell (Incl. color NS)	0.7	2.0	Pepper, sweet, green, raw
Horseradish (Incl. ginger root)	0.1	0.2	Horseradish
Lettuce (Incl. Iceberg, manoa)	8.1	22.3	Lettuce, iceberg, raw
Miscellaneous Other Vegetables	0.0	0.1	Seaweed, wakame, raw
Mungbeans Sprouts (Incl. alfalfa and buckwheat sprouts)	0.5	1.4	Mung beans, mature seeds, sprouted, cooked, boiled, drained, without salt
Mushrooms (Incl. shiitake)	1.4	3.8	Mushrooms, cooked, boiled, drained, without salt
Okra (Incl. horseradish pods)	0.1	0.3	Okra, cooked, boiled, drained, without salt
Olives	0.4	1.2	Olives, ripe, canned (small-extra large)
Onions, mature, cooked (includes Leeks)	4.0	11.2	Onions, cooked, boiled, drained, without salt
Onions, mature, raw	1.8	4.8	Onions, raw
Radishes	0.1	0.3	Radish, raw
Red Cabbage (Incl. radicchio)	0.1	0.4	Cabbage, red, raw
Spring Onions/Scallions	0.5	1.5	Onions, spring or scallions (includes tops and bulb), raw
Summer Squash, yellow and zucchini (Incl. spaghetti squash, chayote, bitter and winter melons)	1.0	2.9	Squash, summer, all varieties, cooked, boiled, drained, without salt
Tomatillos	0.2	0.4	Tomatillos, raw
Turnips (Incl. rutabaga, jicama, kohlrabi, celeriac, fennel bulb)	0.2	0.6	Turnips, cooked, boiled, drained, without salt
Unknown other vegetable	0.6	1.8	Onions, cooked, boiled, drained, without salt

Table E3.1.A2. USDA Food Patterns--Item Clusters, Representative Foods, and Percent of Consumption

Subgroup and Item Clusters	% food group*	% food subgroup**	Representative Food (used to represent nutrient value of the item cluster)
Grain Group			
WHOLE GRAINS	**11.8**		
Brown rice	0.8	6.4	Brown rice, long-grain, cooked
Oatmeal and other cooked cereals	1.5	12.9	Oats, regular, quick, and instant, unenriched, cooked without salt
Popcorn	1.0	8.2	Popcorn, air-popped
Rye bread	0.0	0.2	Bread, rye
Snack bars containing whole grains	0.3	2.8	Crackers, whole wheat, reduced fat
Whole grain bagels & Eng. muffins	0.4	3.8	English muffins, whole-wheat
Whole Grain Corn RTE Cereals	0.4	3.6	Cereals ready-to-eat, Kix
Whole grain pasta	0.2	1.4	Spaghetti, whole wheat, cooked
Whole grain rolls (not sweet)	0.1	1.2	Rolls, dinner, whole wheat
Whole Grains in other foods, incl desserts	0.1	0.7	Oats, regular, quick, and instant, unenriched, dry
Whole Oat RTE cereals	1.2	10.6	Cereals ready-to-eat, Cheerios
Whole Wheat Bread	3.6	30.8	Oats, regular, quick, and instant, unenriched, dry
Whole wheat crackers	0.6	4.7	Crackers, whole wheat, reduced fat
Whole wheat quick bread	0.2	1.8	Pancakes, whole-wheat, dry mix, incomplete, prepared
Whole Wheat RTE Cereals	1.3	11.1	Cereals,RTE, wheat, shreded, plain, sugar and salt free
REFINED GRAINS	**88.2**		
Bagels and English Muffins	3.7	4.2	Bagels, plain, enriched
Biscuits	1.8	2.0	Biscuits, plain or buttermilk, refrigerated dough, lower fat, baked
Breadings and Stuffings/Dressings	4.0	4.6	Bread, white, commerically prepared
Cooked Cereal	0.3	0.3	Cereals, corn grits, white, regular and quick, enriched, cooked without salt
Corn Tortilla	7.6	8.7	Tortillas, ready-to-bake or -fry, corn
Flour Tortilla	5.4	6.2	Tortillas, ready-to-bake or -fry, flour
Flour-based Desserts (cakes, cookies, etc)	7.8	8.9	Cookies, animal crackers
French Bread	2.2	2.5	Bread, french or vienna
Other Foods Containing Refined Grains	0.1	0.1	Rice, white, long-grain, regular, cooked
Pasta and noodles	9.8	11.1	Spaghetti, cooked, enriched, without salt
Pie and Pastry Crusts	1.7	1.9	Pie crust, standard-type, frozen, ready-to-bake, enriched
Pizza Crust	8.4	9.5	Bread, pita, white, enriched
Pretzels and Crackers	4.1	4.6	Pretzels, hard, plain, made with enriched flour, unsalted
Quick Breads	2.5	2.9	Pancakes, plain, frozen, ready-to-heat
Refined Grain as Thickener	0.5	0.5	Wheat flour, white, all-purpose, enriched, bleached
Refined grain RTE Cereal	1.9	2.1	Cereals ready-to-eat, Corn Flakes
Snack Bars containing refined grains	0.2	0.2	Cookies, animal crackers
White Bread	11.5	13.0	Bread, white, commerically prepared
White Rice	5.7	6.5	Rice, white, long-grain, regular, cooked
White Rolls and Buns	9.1	10.3	Rolls, hamburger or hotdog, plain

Table E3.1.A2. USDA Food Patterns--Item Clusters, Representative Foods, and Percent of Consumption

Subgroup and Item Clusters	% food group*	% food subgroup**	Representative Food (used to represent nutrient value of the item cluster)
Dairy			
MILK	**51.0**		
Unflavored cow milks, whole	6.6	13.0	Milk, nonfat, fluid, added vitamin A and D
Unflavored cow milks, 2%	12.3	24.0	Milk, nonfat, fluid, added vitamin A and D
Unflavored cow milks, 1%	5.9	11.6	Milk, nonfat, fluid, added vitamin A and D
Unflavored cow milks, fat-free	6.9	13.6	Milk, nonfat, fluid, added vitamin A and D
Low lactose, calcium-fortified, acidopholus, buttermilk, goat's milk & imitation milks, whole and NFS	0.2	0.4	Milk, nonfat, fluid, added vitamin A and D
Low lactose, calcium-fortified, acidopholus, buttermilk, goat's milk & imitation milks, 2%	0.1	0.2	Milk, nonfat, fluid, added vitamin A and D
Low lactose, calcium-fortified, acidopholus, buttermilk, goat's milk & imitation milks, 1% and fat-free	0.2	0.4	Milk, nonfat, fluid, added vitamin A and D
Dry & evaporated milks, whole, reduced fat, and NFS	0.1	0.2	Milk, dry, nonfat, instant, added vitamin A and D
Dry & evaporated milks, 1% and fat-free	0.0	0.0	Milk, dry, nonfat, instant, added vitamin A and D
Milk NFS	0.3	0.6	Milk, nonfat, fluid, added vitamin A and D
Flavored milks (chocolate, cocoa), whole	1.0	1.9	Milk, nonfat, fluid, added vitamin A and D
Flavored milks (chocolate, cocoa), 2%	1.4	2.7	Milk, nonfat, fluid, added vitamin A and D
Flavored milks (chocolate, cocoa), 1%	1.0	2.1	Milk, nonfat, fluid, added vitamin A and D
Flavored milks (chocolate, cocoa), fat-free	0.3	0.6	Milk, nonfat, fluid, added vitamin A and D
Flavored milks (chocolate, cocoa), NFS	0.6	1.1	Milk, nonfat, fluid, added vitamin A and D
Milk in coffee drinks, lattes, etc.	1.5	2.9	Milk, nonfat, fluid, added vitamin A and D
Skim milk in coffee drinks, lattes, etc.	0.0	0.0	Milk, nonfat, fluid, added vitamin A and D
Milk shakes, malted milk drinks, fruit-milk drinks/smoothies, fat-free	0.0	0.0	Milk, nonfat, fluid, added vitamin A and D
Milk shakes, malted milk drinks, fruit-milk drinks/smoothies, NFS	0.9	1.8	Milk, nonfat, fluid, added vitamin A and D
Meal supplements/replacements/diet drinks	0.3	0.6	Milk, dry, nonfat, instant, added vitamin A and D
Milk powder drinks, eggnog, other bev.	0.1	0.3	Milk, dry, nonfat, instant, added vitamin A and D
Milk in soups	0.5	1.0	Milk, nonfat, fluid, added vitamin A and D
Milk in casseroles, mixturesbatters, frozen meals, man & other dishes	3.7	7.3	Milk, nonfat, fluid, added vitamin A and D
Milk in scrambled eggs/omelets	1.7	3.3	Milk, nonfat, fluid, added vitamin A and D

Table E3.1.A2. USDA Food Patterns--Item Clusters, Representative Foods, and Percent of Consumption

Subgroup and Item Clusters	% food group*	% food subgroup**	Representative Food (used to represent nutrient value of the item cluster)
MILK , cont'd.			
Milk in mashed potatoes, creamed veg., sauces, gravies, salad dressings	0.7	1.4	Milk, nonfat, fluid, added vitamin A and D
Milk in puddings custards, desserts, sweetened condensed milk	0.6	1.1	Milk, nonfat, fluid, added vitamin A and D
Milk in candies and bars and cookies	1.1	2.2	Milk, dry, nonfat, instant, added vitamin A and D
Milk in bread, baked products, cereals	0.8	1.6	Milk, nonfat, fluid, added vitamin A and D
Ice cream, light and fat-free	0.4	0.8	Ice creams, vanilla, fat-free
Ice cream, regular and rich	1.5	2.9	Ice creams, vanilla, fat-free
Ice cream sundaes, cones, sticks/bars/novelties, light and lowfat	0.2	0.3	Ice creams, vanilla, fat-free
Ice cream sundaes, cones, sticks/bars/novelties, regular, rich, NFS	0.2	0.4	Ice creams, vanilla, fat-free
YOGURT	**2.6**		
Frozen yogurt and sherbet, regular, lowfat, fat-free, and NFS	0.3	10.9	Frozen yogurts, choc, nonfat milk, sweetened w/o sugar
Unflavored Yogurts, whole and NFS	0.1	2.2	Yogurt, plain, skim milk, 13 grams protein per 8 oz
Unflavored Yogurts, lowfat	0.1	4.4	Yogurt, plain, skim milk, 13 grams protein per 8 oz
Unflavored Yogurts, fat-free	0.1	4.1	Yogurt, plain, skim milk, 13 grams protein per 8 oz
Flavored Yogurts (caloric sweeteners), lowfat	0.2	7.1	Yogurt, vanilla or lemon, nonfat milk, low calorie sweetener, fortified with vitamin D
Flavored Yogurts (caloric sweeteners), fat-free	0.1	2.7	Yogurt, vanilla or lemon, nonfat milk, low calorie sweetener, fortified with vitamin D
Flavored Yogurts (caloric sweeteners), NFS	0.1	2.7	Yogurt, vanilla or lemon, nonfat milk, low calorie sweetener, fortified with vitamin D
Flavored Yogurts (low calorie sweeteners), fat-free	0.1	3.2	Yogurt, vanilla or lemon, nonfat milk, low calorie sweetener, fortified with vitamin D
Flavored Yogurts (low calorie sweeteners), lowfat	0.1	5.2	Yogurt, vanilla or lemon, nonfat milk, low calorie sweetener, fortified with vitamin D
Fruit Yogurts (caloric sweeteners) incl.yogurt NS, whole	0.1	5.7	Yogurt, vanilla or lemon, nonfat milk, low calorie sweetener, fortified with vitamin D
Fruit Yogurts (caloric sweeteners) incl.yogurt NS, lowfat	0.7	26.6	Yogurt, vanilla or lemon, nonfat milk, low calorie sweetener, fortified with vitamin D
Fruit Yogurts (caloric sweeteners) incl.yogurt NS, fat-free	0.2	7.2	Yogurt, vanilla or lemon, nonfat milk, low calorie sweetener, fortified with vitamin D
Fruit Yogurts (caloric sweeteners) incl.yogurt NS, fat NFS	0.2	8.1	Yogurt, vanilla or lemon, nonfat milk, low calorie sweetener, fortified with vitamin D
Fruit Yogurts (low calorie sweeteners), fat-free	0.3	9.7	Yogurt, vanilla or lemon, nonfat milk, low calorie sweetener, fortified with vitamin D
Yogurt in other foods	0.0	0.4	Yogurt, vanilla or lemon, nonfat milk, low calorie sweetener, fortified with vitamin D

Table E3.1.A2. USDA Food Patterns--Item Clusters, Representative Foods, and Percent of Consumption

Subgroup and Item Clusters	% food group*	% food subgroup**	Representative Food (used to represent nutrient value of the item cluster)
CHEESE	**44.8**		
Natural cheeses (incl low sodium cheeses), regular	7.5	16.7	Cheese, mozzarella, nonfat or fat free
Natural cheeses (incl low sodium cheeses), reduced-fat	1.7	3.8	Cheese, mozzarella, nonfat or fat free
Natural cheeses (incl low sodium cheeses), lowfat and fat-free	0.2	0.5	Cheese, mozzarella, nonfat or fat free
Natural cheeses (incl low sodium cheeses), fat NFS	0.9	2.1	Cheese, mozzarella, nonfat or fat free
Cottage cheeses, regular	0.1	0.3	Cheese, cottage, lowfat, (1% milkfat) no sodium added
Cottage cheeses, lowfat and fat NFS	0.1	0.3	Cheese, cottage, lowfat, (1% milkfat) no sodium added
Processed cheeses (incl low sodium cheeses), regular	4.1	9.0	Cheese, pasturized processed, American, lowfat
Processed cheeses (incl low sodium cheeses), reduced-fat	0.1	0.1	Cheese, pasturized processed, American, lowfat
Processed cheeses (incl low sodium cheeses), lowfat and fat-free	0.2	0.5	Cheese, pasturized processed, American, lowfat
Cheese spreads, dips, sauces, soups	0.9	2.1	Cheese, pasturized processed, American, lowfat
Cheese on sandwiches	1.9	4.3	Cheese, pasturized processed, American, lowfat
Cheese in grains products, snacks (incl breads and cereals), desserts/sweets, regular and NFS	0.4	0.8	Cheese, pasturized processed, American, lowfat
Cheese in grains products (incl fried cheese, gnocchi), desserts/sweets, reduced fat, lowfat, nonfat	0.3	0.6	Cheese, mozzarella, nonfat or fat free
Cheese in Mexican dishes	1.7	3.8	Cheese, Mexican, blend, reduced fat
Cheese in egg or meat dishes and frozen meals	2.0	4.5	Cheese, Mexican, blend, reduced fat
Cheese on pizza and calzone, regular	8.0	17.9	cheese, mozzarella, nonfat or fat free
Cheese on pizza and calzone, reduced-fat and lowfat	8.2	18.3	cheese, mozzarella, nonfat or fat free
Cheese in pasta and Italian dishes, regular and NFS	2.3	5.1	Cheese, Mexican, blend, reduced fat
Cheese in pasta and Italian dishes, reduced fat, lowfat, and nonfat	0.3	0.6	Cheese, Mexican, blend, reduced fat
Cheese on vegetables (cheese sauce), in salads & dressings	0.8	1.8	Cheese, pasturized processed, American, lowfat
Cheese NFS	3.0	6.7	Cheese, Mexican, blend, reduced fat
SOYMILK	**1.5**		
Soymilk	1.5	100.0	Soymilk (all flavors), unsweetened, added calcium, vitamins A and D

Table E3.1.A2. USDA Food Patterns--Item Clusters, Representative Foods, and Percent of Consumption

Subgroup and Item Clusters	% food group*	% food subgroup**	Representative Food (used to represent nutrient value of the item cluster)
PROTEIN FOODS			
Eggs	**7.31**		
Eggs	7.31	100.00	Egg, whole, cooked, hard-boiled
High omega-3 fish	**2.23**		
Anchovy	0.01	0.31	Anchovy, European, canned in oil, drained
Herring	0.07	3.16	Herring, Atlantic, cooked, dry heat
Mackerel	0.01	0.35	Mackerel, Atlantic, cooked, dry heat
Salmon	1.36	61.08	Fish, salmon, Atlantic, farmed, cooked, dry heat
Sardines	0.05	2.23	Sardine, Atlantic, canned in oil, drained with bone
Sea bass	0.09	3.89	Sea bass, mixed species, cooked, dry heat
Swordfish	0.04	1.80	Swordfish, cooked, dry heat
Trout	0.17	7.34	Trout, rainbow, farmed, cooked, dry heat
Roe	0.00	0.00	Roe, mixed species, cooked dry heat
Mussels	0.02	0.79	Mussel, blue, cooked, moist heat
Tuna-high Omega 3	0.42	19.05	Tuna, white, canned in water, drained solids
Shark	0.00	0.00	Shark, mixed species, raw
Smelt	0.00	0.00	Smelt, rainbow, cooked, dry heat
Low omega-3 fish	**8.09**		
Shrimp	1.75	21.60	Shrimp, cooked, moist heat
Unknown Fish	0.52	6.39	Fish, pollock, Atlantic, cooked, dry heat
Fish sticks	0.21	2.55	Fish, pollock, Atlantic, cooked, dry heat
Restructured fish	0.02	0.30	Fish, pollock, Atlantic, cooked, dry heat
Carp	0.00	0.02	Carp, cooked, dry heat
Catfish	0.25	3.15	Catfish, channel, farmed, cooked, dry heat
Cod	0.70	8.61	Cod, Pacific, cooked, dry heat
Croaker	0.07	0.84	Croaker, Atlantic, raw
Tilapia	0.52	6.40	Tilapia, cooked, dry heat
Flounder	0.49	6.11	Flatfish (flounder and sole), cooked, dry heat
Haddock	0.13	1.58	Haddock, cooked, dry heat
Mullet	0.00	0.00	Mullet, striped, cooked, dry heat
Perch	0.24	2.99	Ocean perch, Atlantic, cooked, dry heat
Pike	0.08	1.03	Pike, northern, cooked, dry heat
Pompano	0.13	1.60	Pompano, Florida, cooked, dry heat
Porgy	0.04	0.46	sheepshead, cooked, dry heat
Tuna-low 0mega3	1.42	17.51	Tuna, light, canned in water, drained solids
Whiting	0.11	1.36	Fish, whiting, mixed species, cooked, dry heat
Frog	0.00	0.00	Frog legs, raw
Octopus/squid	0.15	1.91	Octopus, common, cooked, moist heat
Clams	0.16	1.92	Clams, mixed species, cooked, moist heat
Crab	0.49	6.05	Crab, blue, cooked, moist heat
Lobster	0.09	1.15	Lobster, northern, cooked, moist heat
Oysters	0.22	2.66	Mollusks, oyster, Pacific, cooked, moist heat
Scallops	0.09	1.09	Scallops (bay and sea), cooked, steamed
Snapper	0.08	0.95	Snapper, mixed species, cooked, dry heat
Halibut	0.10	1.22	Halibut, Atlantic and Pacific, cooked, dry heat
Eel	0.00	0.00	Eel, mixed species, cooked, dry heat
Turtle/terrapin	0.00	0.00	Turtle, green, raw
Crayfish	0.05	0.57	Crayfish, mixed species, wild, cooked, moist heat
Snails	0.00	0.00	Snail, raw
Turbot	0.00	0.00	Flatfish (flounder and sole), cooked, dry heat

Table E3.1.A2. USDA Food Patterns--Item Clusters, Representative Foods, and Percent of Consumption

Subgroup and Item Clusters	% food group*	% food subgroup**	Representative Food (used to represent nutrient value of the item cluster)
Nuts & Seeds	**10.35**		
Almonds	1.63	15.75	Almonds, dry roasted, without salt
Brazil nuts	0.00	0.03	Brazilnuts, dried, unblanched
Cashew nuts	0.59	5.74	Cashew nuts, dry roasted, without salt
Chestnuts	0.02	0.20	Chestnuts, European, roasted
Filberts/hazelnuts	0.02	0.22	Hazelnuts or filberts
Flax seeds	0.10	1.01	Flaxseed
Macadamia nuts	0.00	0.01	Macadamia nuts, dry roasted, without salt
Mixed nuts	1.07	10.33	Mixed nuts, dry roasted, with peanuts, without salt
Peanut butter	2.65	25.64	Peanut butter, smooth style, with salt
Peanuts	2.56	24.71	Peanuts, all types, dry-roasted, without salt
Pecans	0.17	1.65	Pecans
Pine nuts	0.04	0.42	Pine nuts, dried
Pistachio nuts	0.28	2.67	Pistachio nuts, dry roasted, without salt
Pumpkin/squash seed kernels	0.11	1.07	Pumpkin and squash seed kernels,roasted, without salt
Sesame seeds	0.06	0.54	Sesame seed kernels, toasted, without salt (decorticated)
Sunflower seeds	0.48	4.68	Sunflower seed kernels, dry roasted, without salt
Walnuts	0.55	5.33	Walnuts, English
Poultry	**30.43**		
Luncheon meats, poultry	3.72	12.24	Chicken roll, light meat
Chicken	25.09	82.45	Chicken, meat only, roasted
Turkey	1.62	5.31	Turkey, meat only, roasted
Red meats	**40.56**		
Beef	10.97	27.06	Beef, round, eye of round, separable lean only, roasted
Beef, ground	10.85	26.76	Ground beef, 95% lean, patty, pan-broiled
Game meat	0.21	0.52	Deer, loin, lean only, steak, brld
Lamb	0.28	0.68	Lamb, domestic, leg, separable lean only, choice, roasted
Liver	0.21	0.51	Beef, liver, pan-fried
Luncheon meats, beef	4.33	10.67	Frankfurter, beef, low fat
Luncheon meats, pork	5.25	12.95	Ham, sliced, extra lean
Pork, cured	3.19	7.88	Pork, cured, ham, whole, separable lean only, roasted
Pork, fresh	4.81	11.86	Pork, fresh, sirloin chops, boneless, lean, broiled
Sausage	0.45	1.10	Turkey sausage, reduced fat, brown and serve, cooked
Processed Soy Products	**1.07**		
Tofu	0.21	19.64	Tofu, firm, prepared with calcium sulfate and magnesium chloride
Processed Soy	0.86	80.36	Soy protein isolate

Table E3.1.A2. USDA Food Patterns--Item Clusters, Representative Foods, and Percent of Consumption

Subgroup and Item Clusters	% food group*	% food subgroup**	Representative Food (used to represent nutrient value of the item cluster)
Oils and Solid Fats			
	Estimated %*		
Oils			
Unhydrogenated soy oil	53%		Oil, soybean, salad or cooking
Canola oil	22%		Oil, canola
Olive oil	4%		Oil, olive, salad or cooking
Corn oil	10%		Oil, corn, industrial and retail, all purpose salad or cooking
Sunflower oil	3%		Oil, sunflower, linoleic (approx. 65%)
Cottonseed oil	4%		Oil, cottonseed, salad or cooking
Peanut oil	1%		Oil, peanut, salad or cooking
Safflower oil	0%		Oil, safflower, salad or cooking, high oleic
Margarine (1/2 total)	3%		Margarine-like, veg. oil spread, 60% fat, tub, with salt, without vit. D
Solid Fats			
Palm oil	8%		Palm oil
Palm Kernel oil	3%		Palm kernel oil
Coconut oil	4%		Coconut oil
Dairy fat (incl. butter)	24%		Butter, salted
Pork fat (incl. lard)	7%		Lard
Vegetable shortening	19%		Vegetable shortening,household,composite
Beef fat (incl. tallow)	18%		Beef fat (tallow)
Hydrogentated soy oil	15%		Soy oil, hydrogenated
Margarine (1/2 total)	3%		60% fat stick margarine, without Vit. D

*Percent used in estimating the nutrient profiles for oils or solid fats.

Estimates calculated from Economic Research Service Food Availability and Loss-Adjusted Food Availability tables for fats and oils (added), 2010.

(http://www.ers.usda.gov/data-products/food-availability-(per-capita)-data-system/.aspx#26715)

Additional data on fat content of beef, pork, and dairy foods from CNPP's Nutrient content of the food supply, 2010.

Table E3.1.A3. Energy levels used for assignment of individuals to USDA Food Patterns.

MALES				FEMALES			
AGE	Sedentary[1]	Moderately Active[2]	Active[3]	AGE	Sedentary[1]	Moderately Active[2]	Active[3]
2	1000	1000	1000	2	1000	1000	1000
3	1000	1400	1400	3	1000	1200	1400
4	1200	1400	1600	4	1200	1400	1400
5	1200	1400	1600	5	1200	1400	1600
6	1400	1600	1800	6	1200	1400	1600
7	1400	1600	1800	7	1200	1600	1800
8	1400	1600	2000	8	1400	1600	1800
9	1600	1800	2000	9	1400	1600	1800
10	1600	1800	2200	10	1400	1800	2000
11	1800	2000	2200	11	1600	1800	2000
12	1800	2200	2400	12	1600	2000	2200
13	2000	2200	2600	13	1600	2000	2200
14	2000	2400	2800	14	1800	2000	2400
15	2200	2600	3000	15	1800	2000	2400
16	2400	2800	3200	16	1800	2000	2400
17	2400	2800	3200	17	1800	2000	2400
18	2400	2800	3200	18	1800	2000	2400
19-20	2600	2800	3000	19-20	2000	2200	2400
21-25	2400	2800	3000	21-25	2000	2200	2400
26-30	2400	2600	3000	26-30	1800	2000	2400
31-35	2400	2600	3000	31-35	1800	2000	2200
36-40	2400	2600	2800	36-40	1800	2000	2200
41-45	2200	2600	2800	41-45	1800	2000	2200
46-50	2200	2400	2800	46-50	1800	2000	2200
51-55	2200	2400	2800	51-55	1600	1800	2200
56-60	2200	2400	2600	56-60	1600	1800	2200
61-65	2000	2400	2600	61-65	1600	1800	2000
66-70	2000	2200	2600	66-70	1600	1800	2000
71-75	2000	2200	2600	71-75	1600	1800	2000
76 and up	2000	2200	2400	76 and up	1600	1800	2000

[1]Sedentary means a lifestyle that includes only the physical activity of independent living.

[2]Moderately Active means a lifestyle that includes physical activity equivalent to walking about 1.5 to 3 miles per day at 3 to 4 miles per hour, in addition to the activities of independent living.

[3]Active means a lifestyle that includes physical activity equivalent to walking more than 3 miles per day at 3 to 4 miles per hour, in addition to the activities of independent living.

Table E3.1.A4. Nutritional goals for each age/sex group used in assessing adequacy of USDA Food Patterns at various calorie levels

	Source of goal*	child 1 - 3	female 4 - 8	male 4 - 8	female 9--13	male 9--13	female 14-18	male 14-18	female 19-30	male 19-30	female 31-50	male 31-50	female 51+	male 51+
Calorie level(s) assessed		1000	1200	1400, 1600	1600	1800	1800	2200, 2800, 3200	2000	2400, 2600, 3000	1800	2200	1600	2000
Macronutrients														
Protein, g	RDA	13	19	19	34	34	46	52	46	56	46	56	46	56
Protein, % kcal	AMDR	5--20	10--30	10--30	10--30	10--30	10--30	10--30	10--35	10--35	10--35	10--35	10--35	10--35
Carbohydrate, g	RDA	130	130	130	130	130	130	130	130	130	130	130	130	130
Carbohydrate, %kcal	AMDR	45--65	45--65	45--65	45--65	45--65	45--65	45--65	45--65	45--65	45--65	45--65	45--65	45--65
Dietary Fiber, g	14g/1000kcal	14	16.8	19.6	22.4	25.2	25.2	30.8	28	33.6	25.2	30.8	22.4	28
Total fat, %kcal	AMDR	30-40	25-35	25-35	25-35	25-35	25-35	25-35	20-35	20-35	20-35	20-35	20-35	20-35
Saturated fat, %kcal	DG	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%
Linoleic acid, g	AI	7	10	10	10	12	11	16	12	17	12	17	11	14
Linolenic acid, g	AI	0.7	0.9	0.9	1	1.2	1.1	1.6	1.1	1.6	1.1	1.6	1.1	1.6
Minerals														
Calcium, mg	RDA	700	1000	1000	1300	1300	1300	1300	1000	1000	1000	1000	1200	1200
Iron, mg	RDA	7	10	10	8	8	15	11	18	8	18	8	8	8
Magnesium, mg	RDA	80	130	130	240	240	360	410	310	400	320	420	320	420
Phosphorus, mg	RDA	460	500	500	1250	1250	1250	1250	700	700	700	700	700	700
Potassium, mg	AI	3000	3800	3800	4500	4500	4700	4700	4700	4700	4700	4700	4700	4700
Sodium, mg	UL	1500	1900	1900	2200	2200	2300	2300	2300	2300	2300	2300	2300	2300
Zinc, mg	RDA	3	5	5	8	8	9	11	8	11	8	11	8	11
Copper, mg	RDA	0.34	0.44	0.44	0.7	0.7	0.89	0.89	0.9	0.9	0.9	0.9	0.9	0.9
Manganese, mg	AI	1.2	1.5	1.5	1.6	1.9	1.6	2.2	1.8	2.3	1.8	2.3	1.8	2.3
Selenium, mg	RDA	20	30	30	40	40	55	55	55	55	55	55	55	55
Vitamins														
Vitamin A, mg_RAE	RDA	300	400	400	600	600	700	900	700	900	700	900	700	900
Vitamin E, mg AT	RDA	6	7	7	11	11	15	15	15	15	15	15	15	15
Vitamin D, IU	RDA	600	600	600	600	600	600	600	600	600	600	600	600	600
Vitamin C, mg	RDA	15	25	25	45	45	65	75	75	90	75	90	75	90
Thiamin, mg	RDA	0.5	0.6	0.6	0.9	0.9	1	1.2	1.1	1.2	1.1	1.2	1.1	1.2
Riboflavin, mg	RDA	0.5	0.6	0.6	0.9	0.9	1	1.3	1.1	1.3	1.1	1.3	1.1	1.3
Niacin, mg	RDA	6	8	8	12	12	14	16	14	16	14	16	14	16
Vitamin B-6, mg	RDA	0.5	0.6	0.6	1	1	1.2	1.3	1.3	1.3	1.3	1.3	1.5	1.7
Vitamin B-12, mg	RDA	0.9	1.2	1.2	1.8	1.8	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4
Choline, mg	AI	200	250	250	375	375	400	550	425	550	425	550	425	550
Vitamin K, mg	AI	30	55	55	60	60	75	75	90	120	90	120	90	120
Folate, mg_DFE	RDA	150	200	200	300	300	400	400	400	400	400	400	400	400

* RDA- Recommended Dietary Allowance, AI= Adequate Intake, UL = Tolerable Upper Intake Level, AMDR = Acceptable Macronutrient Distribution Range,

DG = 2010 and 2015 Dietary Guidelines recommended limit; 14g fiber per 1000 kcal = basis for AI for fiber.

Table E3.1.A5. Nutrient Profiles for 2015 USDA Food Patterns

Consumption-weighted average nutrient content of a group or subgroup for a standardized amount from each group.

Based on NHANES 2009-10 consumption data, 2 days of food intake, SR26 nutrient data

Food Groups	FRUIT	VEGETABLES					GRAINS		PROTEIN FOODS							DAIRY			
Subgroups		Dark Green	Red-Orange	Beans & Peas	Starchy	Other	Whole grains	Refined grains	Meats	Poultry	Fish- Hi n3	Fish-Lo n3	Eggs	Soy prdts	Nuts/ Seeds		Oils	Solid fats	Added Sugars
Amount	1 cup eq	1 cup eq	1 cup eq	1 cup eq	1 cup eq	1 cup eq	1 oz eq	1 oz eq	1 oz eq	1 oz eq	1 oz eq	1 oz eq	1 oz eq	1 oz eq	1 oz eq	1 cup eq	1 gram	1 gram	1 gram
Macronutrients																			
Calories , kcal	98	33	43	243	179	48	92	85	49	51	53	31	78	47	87	77	9	8	4
Protein, g	1.1	2.7	1.6	15.7	4.0	1.9	3.3	2.4	7.1	7.8	6.5	6.1	6.3	10.2	3.1	8.7	0.0	0.0	0.0
Carbohydrate, g	24.6	6.4	10.1	43.5	34.8	9.2	17.4	15.9	0.1	0.2	0.0	0.2	0.6	1.0	3.2	8.4	0.0	0.0	1.0
Fiber, dietary, g	2.3	3.3	2.4	15.4	3.7	2.6	2.4	0.7	0.0	0.0	0.0	0.0	0.0	0.7	1.2	0.2	0.0	0.0	0.0
Total lipid (fat), g	0.3	0.4	0.3	1.3	3.2	1.1	1.3	1.2	2.0	1.9	2.8	0.5	5.3	0.9	7.5	0.9	1.0	0.9	0.0
Trans fatty acids, g	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.00
Saturated fats, g	0.06	0.07	0.04	0.25	0.42	0.16	0.27	0.28	0.76	0.52	0.58	0.14	1.63	0.15	1.08	0.55	0.14	0.41	0.00
Monounsat fats, g	0.04	0.03	0.03	0.22	1.81	0.56	0.34	0.44	0.87	0.70	0.98	0.13	2.04	0.22	3.67	0.25	0.34	0.34	0.00
Polyunsat fats, g	0.09	0.18	0.11	0.58	0.63	0.21	0.56	0.37	0.12	0.44	0.96	0.15	0.71	0.41	2.43	0.07	0.48	0.14	0.00
Linoleic acid, g	0.07	0.05	0.11	0.36	0.54	0.16	0.52	0.34	0.10	0.35	0.16	0.03	0.59	0.36	2.31	0.04	0.42	0.13	0.00
Linolenic acid, g	0.03	0.13	0.01	0.22	0.08	0.05	0.03	0.03	0.01	0.02	0.03	0.00	0.02	0.04	0.11	0.01	0.06	0.01	0.00
EPA, g	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.16	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00
DHA, g	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.33	0.05	0.02	0.00	0.00	0.00	0.00	0.00	0.00
Stearic Acid, g	0.00	0.01	0.01	0.02	0.14	0.01	0.04	0.10	0.26	0.12	0.08	0.03	0.41	0.04	0.22	0.10	0.03	0.10	0.00
Cholesterol, mg	0	0	0	0	0	0	1	0	20	24	18	28	187	0	0	7	0	1	0
Minerals																			
Calcium, mg	19	75	24	83	17	38	44	29	2	4	8	14	25	45	13	295	0	0	0
Iron, mg	0.4	1.5	1.3	4.3	1.0	0.7	2.2	1.1	0.5	0.3	0.2	0.3	0.6	1.9	0.4	0.1	0.0	0.0	0.0
Magnesium, mg	20	38	22	95	37	18	31	8	6	7	9	10	5	9	29	20	0	0	0
Phosphorus, mg	28	62	44	269	100	46	91	39	65	60	73	74	86	103	65	232	0	0	0
Potassium, mg	311	377	443	739	604	266	94	33	93	76	104	82	63	27	96	235	0	0	0
Sodium, mg	4	46	34	3	74	30	84	101	127	59	41	118	62	116	20	202	0	2	0
Zinc, mg	0.2	0.5	0.3	1.9	0.6	0.4	1.4	0.3	1.2	0.6	0.2	0.6	0.5	0.6	0.5	1.1	0.0	0.0	0.0
Copper, mg	0.1	0.1	0.2	0.4	0.2	0.1	0.1	0.0	0.0	0.0	0.0	0.1	0.0	0.2	0.1	0.0	0.0	0.0	0.0
Manganese, mg	0.20	0.41	0.21	0.87	0.25	0.23	0.69	0.16	0.00	0.01	0.02	0.02	0.01	0.25	0.29	0.01	0.00	0.00	0.00
Selenium, µg	0.5	1.4	0.5	6.0	1.3	1.6	6.2	6.4	8.2	6.1	13.4	14.6	15.4	1.3	1.4	6.6	0.0	0.0	0.0

Table E3.1.A5. Nutrient Profiles for 2015 USDA Food Patterns

Consumption-weighted average nutrient content of a group or subgroup for a standardized amount from each group.

Based on NHANES 2009-10 consumption data, 2 days of food intake, SR26 nutrient data

Food Groups	FRUIT	VEGETABLES					GRAINS		PROTEIN FOODS							DAIRY			
Subgroups		Dark Green	Red-Orange	Beans & Peas	Starchy	Other	Whole grains	Refined grains	Meats	Poultry	Fish- Hi n3	Fish-Lo n3	Eggs	Soy prdts	Nuts/ Seeds		Oils	Solid fats	Added Sugars
Amount	1 cup eq	1 cup eq	1 cup eq	1 cup eq	1 cup eq	1 cup eq	1 oz eq	1 oz eq	1 oz eq	1 oz eq	1 oz eq	1 oz eq	1 oz eq	1 oz eq	1 oz eq	1 cup eq	1 gram	1 gram	1 gram
Vitamins																			
Vitamin A, µg_RAE	16	324	284	0	7	20	43	10	11.45	3.83	4.20	10.42	74.50	0.00	0.08	98	0	2	0
Vitamin E, mg AT	0.34	1.44	1.56	0.69	0.38	0.36	0.30	0.06	0.09	0.07	0.15	0.27	0.52	0.00	1.36	0.04	0.14	0.05	0.00
Vitamin D, IU	0.0	0.0	0.0	0.0	0.0	0.5	6.0	1.0	4.14	1.40	98.69	19.50	43.50	0.00	0.00	59.3	0.0	0.3	0.0
Vitamin C, mg	33.5	47.5	20.0	1.1	11.9	17.0	1.3	0.2	0.04	0.00	0.74	0.34	0.00	0.02	0.05	0.1	0.0	0.0	0.0
Thiamin, mg	0.07	0.08	0.05	0.35	0.23	0.07	0.14	0.14	0.06	0.02	0.07	0.02	0.03	0.03	0.04	0.07	0.00	0.00	0.00
Riboflavin, mg	0.06	0.15	0.07	0.11	0.06	0.08	0.10	0.08	0.06	0.05	0.04	0.03	0.26	0.02	0.04	0.29	0.00	0.00	0.00
Niacin, mg	0.55	0.61	1.36	0.75	2.62	0.73	1.84	1.24	1.66	2.59	2.03	1.17	0.03	0.18	1.27	0.15	0.00	0.00	0.00
Vitamin B-6, mg	0.16	0.20	0.17	0.29	0.33	0.15	0.18	0.05	0.11	0.13	0.15	0.07	0.06	0.02	0.06	0.06	0.00	0.00	0.00
Vitamin B-12, µg	0.00	0.00	0.00	0.00	0.00	0.00	0.29	0.09	0.60	0.10	0.91	1.57	0.56	0.00	0.00	0.83	0.00	0.00	0.00
Choline, mg	10	31	16	41	24	14	8	4	26	22	5	19	147	25	7	24	0	0	0
Vitamin K, µg	3	285	9	5	7	29	1	0	0	1	0	0	0	0	0	0	1	0	0

Table E3.1.A6. Nutrients in the USDA Healthy US-Style Food Patterns at each calorie level.

Calorie Level	1000*	1200**	1400**	1600**	1600***	1800	2000	2200	2400	2600	2800	3000	3200
Macronutrients													
Calories , kcal	1002	1204	1399	1556	1594	1797	2003	2198	2400	2603	2800	3000	3200
Protein, g	44	59	69	78	83	87	91	100	106	111	118	120	120
Carbohydrate, g	129	155	186	197	201	233	256	286	310	341	372	391	407
Fiber, total dietary, g	14	18	21	25	25	29	31	35	37	42	45	48	48
Total lipid (fat), g	37	41	45	54	55	61	72	78	87	94	99	113	128
Trans fatty acids, g	0.5	0.4	0.4	0.4	0.4	0.6	0.8	0.9	1.1	1.1	1.2	1.4	1.8
Saturated fats, g	9.7	10.1	11.0	12.9	13.1	15.0	18.7	19.7	22.6	24.2	25.5	28.8	33.4
Monounsaturated fats, g	13.1	14.8	16.3	19.6	19.7	22.2	26.2	28.2	31.6	34.0	35.9	40.8	46.2
Polyunsaturated fats, g	11.6	13.4	14.4	17.7	17.8	19.7	22.5	24.3	26.8	29.1	31.0	35.7	40.3
Linoleic acid (18:2), g	10.2	11.7	12.6	15.4	15.4	17.2	19.6	21.2	22.7	25.5	27.1	31.3	35.4
Linolenic acid (18:3), g	1.2	1.4	1.5	1.8	1.8	2.0	2.3	2.5	2.7	3.0	3.2	3.7	4.2
EPA (20:5 n-3), g	0.03	0.04	0.05	0.07	0.07	0.07	0.07	0.08	0.33	0.09	0.09	0.09	0.09
DHA (22:6 n-3), g	0.05	0.08	0.11	0.15	0.15	0.15	0.15	0.17	0.18	0.18	0.20	0.20	0.20
Stearic Acid (18:0), g	2.39	2.48	2.73	3.16	3.22	3.72	4.65	4.90	5.64	6.05	6.38	7.20	8.37
Cholesterol, mg	88	121	153	186	190	192	215	232	251	253	271	275	282
Minerals													
Calcium, mg	768	975	1030	1068	1215	1260	1274	1336	1377	1433	1483	1502	1502
Iron, mg	8	10	13	14	14	16	17	19	21	24	26	26	26
Magnesium, mg	169	223	262	301	311	337	352	395	420	459	493	510	510
Phosphorus, mg	900	1184	1331	1469	1585	1670	1717	1863	1964	2077	2188	2235	2236
Potassium, mg	1611	2102	2407	2745	2863	3149	3348	3691	3798	4113	4373	4600	4601
Sodium, mg	921	1221	1404	1502	1602	1729	1787	1943	2089	2207	2345	2375	2392
Zinc, mg	7	9	11	13	13	14	14	16	17	18	19	20	20
Copper, mg	0.6	0.8	1.0	1.2	1.2	1.3	1.4	1.6	1.7	1.8	1.9	2.0	2.0
Manganese, mg	2	2	3	4	4	4	4	5	5	6	6	6	6
Selenium, mg	51	70	86	95	99	106	110	122	132	140	151	152	152
Vitamins													
Vitamin A, mg_RAE	469	599	646	744	793	872	898	982	1023	1119	1163	1198	1215
Vitamin E, mg AT	5.0	5.9	6.6	8.1	8.2	9.1	10.2	11.2	12.0	13.1	13.9	15.6	17.0
Vitamin D, IU	157	203	219	237	267	269	274	284	295	299	310	311	314
Vitamin C, mg	54	64	82	92	92	100	117	127	128	138	155	162	162
Thiamin, mg	0.8	1.1	1.3	1.4	1.5	1.7	1.7	2.0	2.1	2.4	2.6	2.6	2.6
Riboflavin, mg	1.1	1.5	1.7	1.8	1.9	2.0	2.1	2.3	2.4	2.5	2.7	2.7	2.7
Niacin, mg	10	14	18	20	20	22	24	27	29	31	34	35	35
Vitamin B-6, mg	1.1	1.4	1.7	2.0	2.0	2.2	2.3	2.6	2.8	3.0	3.3	3.4	3.4
Vitamin B-12, mg	3.4	4.6	5.3	6.1	6.5	6.6	6.8	7.3	7.8	8.0	8.5	8.5	8.5
Choline, mg	160	216	257	299	311	326	349	382	402	420	447	458	460
Vitamin K, mg	59	88	90	123	124	132	139	171	175	205	210	228	238
Folate, mg_DFE	274	363	437	487	491	572	586	686	746	842	913	945	945

*Includes 2 cup eq Dairy; **Includes 2.5 cup eq of Dairy; ***Includes 3 cup eq Dairy; All patterns at 1800 or more calories include 3 cup eq of Dairy

Table E3.1.A7. Comparison of nutrient content of each USDA Healthy US-style Food Pattern to the nutritional goals for that pattern.

CALORIE LEVEL		**1000***	**1200****	**1400****	**1600****	**1600*****	**1600*****	**1800**	**1800**	**1800**	**2000**	**2000**	**2200**	**2200**	**2400**	**2600**	**2800**	**3000**	**3200**
Age/sex group for		M/F	M/F	M/F	M/F	F	F	M	F	F	M	F	M	M	M	M	M	M	M
comparison		1 to 3	4 to 8	4 to 8	4 to 8	9 to 13	51-70	9 to 13	14-18	31-50	51-70	19-30	14-18	31-50	19-30	19-30	14-18	19-30	14-18
Macronutrients																			
Energy	%goal	100%	100%	100%	97%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Protein	%RDA	337%	311%	364%	413%	243%	180%	257%	190%	190%	163%	198%	192%	178%	189%	198%	227%	214%	231%
Protein	%kcal	18%	20%	20%	20%	21%	21%	19%	19%	19%	18%	18%	18%	18%	18%	17%	17%	16%	15%
Carbohydrate	%RDA	99%	119%	143%	151%	154%	154%	179%	179%	179%	197%	197%	220%	220%	238%	262%	286%	301%	313%
Carbohydrate	%kcal	51%	52%	53%	51%	50%	50%	52%	52%	52%	51%	51%	52%	52%	52%	52%	53%	52%	51%
Dietary fiber	%AI	101%	107%	109%	112%	113%	113%	114%	114%	114%	109%	109%	114%	114%	111%	115%	115%	114%	108%
Total fat	%kcal	33%	31%	29%	31%	31%	31%	31%	31%	31%	33%	33%	32%	32%	33%	32%	32%	34%	36%
Trans fat	%kcal	0.4%	0.3%	0.2%	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%	1%
Saturated fat	%kcal	9%	8%	7%	7%	7%	7%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	9%	9%
Monounsat. fat	%kcal	12%	11%	11%	11%	11%	11%	11%	11%	11%	12%	12%	12%	12%	12%	12%	12%	12%	13%
Polyunsat. fat	%kcal	10%	10%	9%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	11%	11%
Linoleic acid	%AI	146%	117%	126%	154%	154%	140%	143%	156%	143%	140%	163%	133%	125%	134%	150%	170%	184%	196%
Linolenic acid	%AI	174%	155%	162%	203%	183%	166%	170%	185%	185%	144%	210%	157%	157%	170%	187%	198%	233%	233%
Minerals																			
Calcium	%RDA	110%	98%	103%	107%	93%	101%	97%	97%	126%	106%	127%	103%	134%	138%	143%	114%	150%	116%
Iron	%RDA	110%	104%	126%	144%	180%	180%	204%	109%	91%	209%	93%	176%	242%	265%	296%	234%	330%	240%
Magnesium	%RDA	212%	172%	202%	231%	130%	97%	141%	94%	105%	84%	114%	96%	94%	105%	115%	120%	128%	124%
Phosphorus	%RDA	196%	237%	266%	294%	127%	226%	134%	134%	239%	245%	245%	149%	266%	281%	297%	175%	319%	179%
Potassium	%AI	54%	55%	63%	72%	64%	61%	70%	67%	67%	71%	71%	79%	79%	81%	88%	93%	98%	98%
Sodium	%UL	61%	64%	74%	79%	73%	70%	79%	75%	75%	78%	78%	84%	84%	91%	96%	102%	103%	104%
Zinc	%RDA	232%	186%	219%	251%	164%	164%	171%	152%	171%	129%	177%	143%	143%	154%	164%	176%	179%	179%
Copper	%RDA	183%	188%	225%	262%	167%	130%	187%	147%	146%	153%	153%	175%	173%	184%	201%	218%	226%	228%
Manganese	%AI	155%	164%	202%	234%	220%	195%	202%	240%	213%	172%	220%	208%	199%	219%	245%	281%	276%	288%
Selenium	%RDA	257%	234%	285%	318%	247%	180%	265%	193%	193%	200%	200%	221%	221%	241%	254%	274%	276%	276%
Vitamins																			
Vitamin A	%RDA	156%	150%	161%	186%	132%	113%	145%	125%	125%	100%	128%	109%	109%	114%	124%	129%	133%	135%
Vitamin E	%RDA	83%	84%	94%	116%	74%	54%	83%	61%	61%	68%	68%	74%	74%	80%	88%	93%	104%	113%
Vitamin D	%RDA	26%	34%	36%	40%	44%	44%	45%	45%	45%	46%	46%	47%	47%	49%	50%	52%	52%	52%
Vitamin C	%RDA	359%	258%	329%	369%	205%	123%	222%	154%	133%	130%	155%	169%	141%	142%	153%	207%	180%	216%
Thiamin	%RDA	167%	187%	222%	239%	163%	134%	188%	169%	153%	145%	158%	165%	165%	179%	197%	213%	220%	220%
Riboflavin	%RDA	226%	245%	276%	296%	213%	175%	226%	203%	185%	162%	191%	175%	175%	184%	194%	206%	209%	209%
Niacin	%RDA	171%	179%	223%	255%	170%	146%	187%	160%	160%	148%	169%	166%	166%	181%	195%	212%	216%	216%
Vitamin B-6	%RDA	213%	238%	287%	333%	203%	135%	219%	183%	169%	137%	179%	201%	201%	213%	231%	250%	260%	260%
Vitamin B-12	%RDA	379%	382%	445%	506%	361%	270%	366%	274%	274%	284%	284%	304%	304%	325%	333%	352%	353%	355%
Choline	%AI	80%	87%	103%	119%	83%	73%	87%	81%	77%	63%	82%	69%	69%	73%	76%	81%	83%	84%
Vitamin K	%AI	195%	160%	164%	224%	206%	137%	220%	176%	147%	116%	154%	228%	142%	146%	171%	280%	190%	318%
Folate	%RDA	183%	181%	218%	243%	164%	123%	191%	143%	143%	146%	146%	172%	172%	187%	210%	228%	236%	236%

*Includes 2 cup eq Dairy; **Includes 2.5 cup eq of Dairy; ***Includes 3 cup eq Dairy; All patterns at 1800 or more calories include 3 cup eq of Dairy

Appendix E-3.2: Food Group Contributions to Nutrients in USDA Food Patterns and Current Nutrient Intakes

RESEARCH QUESTIONS

(1)What is the contribution of whole grain foods, fruits and vegetables, and other food groups to (a) total fiber intake and (b) total nutrient intake in the USDA Food Patterns?

(2) What is the contribution of fruits and vegetables to current nutrient intake (focus on nutrients of concern, including fiber)?

BACKGROUND

Note: Please see DGAC Report Appendix E3.1, *Modeling Analysis: Adequacy of USDA Food Patterns* for more background information about development of the USDA food patterns.

The USDA Food Patterns are intended to represent the types and amounts of foods that will provide sufficient nutrients to meet IOM nutrient recommendations and Dietary Guidelines for Americans recommendations, within calorie needs. They are updated every five years during the deliberations of the Dietary Guidelines Advisory Committee, and are presented to the Committee for their assessment of how well the Patterns meet their goals. As part of the update, amounts recommended from each food group may be modified to reach all or most of the specified goals.

Food Patterns are created at 12 energy levels. Each level is assigned nutrient goals for one or more age-gender groups, for whom the energy level is appropriate, based on IOM Estimated Energy Requirement equations.

The patterns do not reflect actual intakes of Americans from each food group. Amounts recommended from each food group may be more or less than are typically consumed, so that the overall patterns reach nutrient and other goals. However, the recommended amounts from each food group are compared to usual dietary intake patterns of Americans, and kept within the broad range of consumption for Americans (between the 5^{th} and 95^{th} percentiles of consumption).

In addition, the patterns do not reflect the form in which foods are typically consumed. In each group, food choices are represented by nutrient-dense forms of the foods, such as fat-free milk for all fluid milk, leanest beef cuts for all beef, and ready-to-eat cereals low in added sugars for all ready-to-eat cereals.

METHODS

1. **Identify the amount of each nutrient analyzed for the overall patterns that comes from each food group and subgroup.**
   The nutrients included in the analysis of the USDA Food Patterns for adequacy are listed in Table 1. For the purposes of this report, a subset of nutrients of interest to the DGAC were selected for evaluation. These include total dietary fiber, calcium, vitamin D, potassium, sodium, saturated fatty acids, and energy.

Table 1. Nutrients included in food patterns analysis.

Vitamins	Minerals	Macronutrients	Fats & Fatty Acids
Vitamin A*	Calcium	Energy	Cholesterol
Vitamin E	Iron	Protein	Saturated Fatty Acids
Vitamin D	Magnesium	Total lipid (fat)	
Vitamin C	Manganese	Carbohydrate	Monounsaturated Fatty Acids
Thiamin	Phosphorus	Fiber, total dietary	
Riboflavin	Potassium		Polyunsaturated Fatty Acids
Niacin	Sodium		
Vitamin B-6	Zinc		18:2 Linoleic Acid
Vitamin B-12	Copper		18:3 Linolenic Acid
Choline	Selenium		EPA
Vitamin K			DHA
Total Folate**			

*Includes provitamin A carotenoids, measured in µg RAE
** measured in µg DFE

The amount of each nutrient from each food group in each of the 12 patterns was calculated. This amount was then divided by the total amount of that nutrient in each pattern, to identify the percent of the total nutrient amount attributable to each food group or subgroup. Food groups and subgroups in the patterns are listed in table 2.

Table 2. Food groups, subgroups, and additional components in the USDA Food Patterns.

Food Group	Subgroups
Dairy	
Fruits	
Vegetables	Dark Green, Red/Orange, Starchy, Beans and Peas, Other
Grains	Whole, Refined
Protein Foods	Meats, Poultry, Seafood high in N-3 fatty acids, Seafood low in n-3 fatty acids, Eggs, Nuts and Seeds, Soy Products (including tofu)
Oils	
Solid Fats	
Added sugars	

Summarize data and note differences across patterns

The percents of the total intake from each food group, subgroup, and food pattern component (i.e., oils, solid fats, added sugars) for selected nutrients at all 12 calorie levels were

averaged. The average percent contribution to each nutrient total from each food group was calculated and for some, specific food sources by item cluster were identified and reported.

2. **Calculate intakes of fruits and vegetables as a percent of recommendations.**
   To answer the second question, the actual intake of fruits and vegetables as a percent of the recommended intake level for each age/sex group was calculated. This provided a proportion to use in estimating nutrient intakes from consumption amounts.

3. **Estimate amount of fiber and potassium in amounts of fruits and vegetables consumed. Compare estimated amounts from fruits and vegetables with the total intake of the nutrient to find the percent contribution.**
   Use the proportion actual to recommended fruit and vegetable intake to estimate the contributions of fiber and potassium from fruits and vegetables in amounts consumed. Fruits and vegetables contribute little to calcium and vitamin D intakes, even when consumed in recommended amounts (see Table 3). Therefore, only potassium and fiber were included in this calculation.

RESULTS

Contributions of nutrients by each food group in the USDA Food Patterns

Most nutrients (e.g., dietary fiber, potassium, and sodium) are provided in substantial amounts by multiple food groups, while for other nutrients (e.g., calcium and vitamin D), multiple food groups are sources, but there is one food group that is the predominant source. The contribution of each food group and food pattern component (i.e., oils, solid fats, added sugars) to the overall amount of energy and selected nutrients in the patterns, averaged across the 12 energy levels, is shown in Table 3. Contribution from each subgroup within the Vegetable and Protein Foods Groups is shown in Table 4.

The percent contribution for each nutrient is a function of (1) the amount of the nutrient in the foods within the group, and (2) the amount of the food group in the patterns. Food groups and subgroups included in the patterns in larger amounts are likely to contribute more than those included in smaller amounts. This is also true for contributions of individual foods (item clusters) within each group. Item clusters that represent a larger proportion of the food group, because they are more commonly consumed, may contribute more of a nutrient than those that are a smaller proportion of the group average due to limited consumption. The proportional composition of each food group by item cluster is not presented here, but is available as Table E3.1.A2 in the additional materials for to the Adequacy of the USDA Food Patterns modeling report (DGAC Report Appendix E3.1).

Table 3. Percent contribution of each food group and food component to selected nutrient totals in the USDA Food Patterns. Nutrients include nutrients of public health concern, shortfall nutrients, and additional nutrients of interest. Shown as percent of the total amount in the pattern, averaged across patterns at all calorie levels.

Food Group	Energy	Dietary Fiber	Calcium	Vitamin D	Potas-sium	Sodium	Satur-ated Fat	Protein	Iron	Folate	Magne-sium	Vita min A*	MUFA**	PUFA**
	% total	% total	% total	% total	% total	% total	% total	% total	% total	% total	% total	% total	% total	% total
Fruits	9%	16%	3%	0%	17%	0%	1%	2%	4%	6%	10%	3%	0%	1%
Vegetables	13%	38%	7%	0%	36%	6%	3%	10%	19%	23%	23%	34%	7%	4%
Whole Grains	15%	32%	12%	8%	10%	16%	5%	12%	42%	35%	29%	16%	4%	8%
Refined Grains	13%	9%	7%	1%	3%	18%	5%	9%	20%	27%	7%	4%	5%	5%
Protein Foods	14%	3%	3%	25%	13%	24%	20%	38%	13%	5%	14%	7%	22%	13%
Dairy	11%	2%	67%	64%	21%	33%	9%	28%	2%	4%	17%	32%	3%	1%
Oils	12%	0%	0%	0%	0%	0%	21%	0%	0%	0%	0%	1%	36%	58%
Solid Fats	7%	0%	0%	2%	0%	2%	36%	0%	0%	0%	0%	3%	21%	10%
Added sugars	6%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

*Includes provitamin A carotenoids;

**MUFA = monounsaturated fatty acids; PUFA = polyunsaturated fatty acids

Table 4. Percent contribution of Vegetable and Protein Foods subgroups to selected nutrient totals in the USDA Food Patterns. Shown as percent of the total amount in the pattern, averaged across patterns at all calorie levels.

Food Group	Energy	Dietary Fiber	Calcium	Vitamin D	Potassium	Sodium	Saturated Fat
	% total	% total	% total	% total	% total	% total	% total
Vegetables:	**13%**	**38%**	**7%**	**0%**	**36%**	**6%**	**3%**
-Dark Green	0%	3%	1%	0%	3%	1%	0%
-Red and Orange	2%	7%	1%	0%	10%	1%	0%
-Beans and Peas	3%	12%	1%	0%	5%	0%	0%
-Starchy	7%	10%	1%	0%	13%	3%	2%
-Other	1%	6%	2%	0%	5%	1%	1%
Protein Foods:	**14%**	**3%**	**3%**	**25%**	**13%**	**24%**	**20%**
-Meat	4%	0%	0%	2%	5%	10%	7%
-Poultry	4%	0%	0%	1%	3%	5%	4%
-Seafood	2%	0%	1%	16%	3%	6%	1%
-Nuts/seeds	2%	3%	1%	0%	2%	1%	3%
-Eggs	2%	0%	1%	6%	1%	1%	4%
-Soy Products	0%	0%	0%	2%	0%	0%	0%

Dietary Fiber: Vegetables (38%) and Whole Grains (32%) provide the largest amounts of fiber in the USDA Food Patterns. Within the Vegetable Group, the bean and pea and starchy vegetable subgroups provide the largest amounts of fiber, 12% and 10% of total fiber, respectively. Fruits (16%) also contribute a substantial amount of fiber, and Refined Grains provide close to 10% of the total fiber in the patterns. The small amount of fiber contributed by the Dairy Group (2%) comes from ingredients used in ice cream and cheese production, probably gums. The small amount attributable to Protein Foods (3%) is from nuts and seeds.

Calcium: As would be expected, the majority of calcium in the patterns comes from the Dairy Group (67%). Whole Grains (12%), Refined Grains (7%), and Vegetables (7%) also contribute to the total calcium in the patterns, while Fruits and Protein Foods each provide a small percent of the total (3%). The calcium in Whole Grains comes from a variety of sources (data not shown): ready-to-eat cereals fortified with calcium (Cheerios, corn puffs), non-fortified cooked oatmeal and ready-to-eat cereals (shredded wheat), whole wheat quick breads (pancakes), commercial whole wheat breads, and whole wheat English muffins. The quick breads, breads, and muffins may include milk as an ingredient. See the note on calcium at the end of this document for more details about calcium sources in the vegetables group.

Vitamin D: Again, the majority of vitamin D in the patterns is from the Dairy Group (64%), with most of the rest from Protein Foods. Seafood accounts for 16% of the total vitamin D, eggs (6%) and other Protein Foods subgroups provide small amounts. Whole and Refined Grains also contribute small amounts from fortified ready-to-eat cereals.

Potassium: Most food groups contribute to the total potassium in the patterns. Vegetables provide the largest percent (36%), then Dairy (21%), Fruit (17%), Protein Foods (13%), and Whole Grains (10%). In the Protein Foods and Whole Grain Groups, small amounts of potassium are contributed by many subgroups or individual foods.

Sodium: The food patterns are constructed from nutrient-dense forms of foods. Foods prepared without added salt are considered nutrient-dense for this purpose, and the patterns are much lower in sodium than if they included foods in their typically consumed (salted) forms.* For example, the total sodium in the 2000 calorie patterns is about 1750 mg. Therefore, the sodium in the current food patterns comes mostly from foods with intrinsic sodium, Dairy (33%) and Protein Foods (24%), and foods in which the added salt is a necessary component of the product, such as breads and baked goods in the Refined (18%) and Whole (16%) Grain Groups. While vegetables in their nutrient dense forms contribute only 6% of the total sodium, in typically consumed forms vegetables are likely to be much higher in sodium. For example, beans and peas in these patterns contain only 3 mg of sodium per cup (cooked), but beans and peas as typically consumed may contain over 600 mg per cup.

*****(See the 2010 Dietary Guidelines Advisory Committee report, Appendix E-3, for the sodium amounts from a Food Pattern modeling analysis "Typical Choices" Food Patterns, which selected foods in their most-consumed forms.)

Saturated Fat: As with sodium, the saturated fat in the patterns is much lower than typical intakes. In each food group, foods are selected in their lowest-fat or leanest form. Therefore, the majority of saturated fat in the patterns is from solid fats (36%) and oils (21%). Protein Foods contribute 20% of the saturated fat, with 7% from meats, 4% each from eggs and poultry, 3% from nuts and seeds, and 1% from seafood. Dairy contributes 9%, and Whole and Refined Grains 5% each. Solid fats are not considered essential in the patterns. They are included to balance calories and allow some added fats or food group choices in higher fat forms. The oils category is considered essential, as it provides the majority of the essential fatty acids and vitamin E in the patterns.

Contributions of nutrients by fruits and vegetables in amounts actually consumed

The mean intakes of fruits and vegetables by each age/sex group were identified from WWEIA 2007-10. The percent that this intake represents of the recommended intake in the USDA Food Patterns were calculated. These percents, shown in Table 6, range from 43% (males 14 to 18) to 90% (females 51 to 70) of vegetable recommended intakes, and from 45% (males and females 19 to 30) to 150% (males and females 1 to 3) of recommended fruit intakes.

Table 5. Mean intakes of fruits and vegetables by age/sex group, from WWEIA NHANES 2007-10, amount in USDA Food Patterns appropriate for each age/sex group, and intakes as a percent of amounts in the Food Patterns.

Age/sex group	Food Pattern	Mean intake vegetables	Amount of vegetables in Food Pattern	Intake of vegetables as % of Food Pattern amount	Mean intake of fruit	Amount of fruit in Food Pattern	Intake of fruit as % of Food Pattern amount
		cup eq	cup eq	%	cup eq	cup eq	%
MALES							
1 to 3	1000	0.7	1	70%	1.5	1	150%
4 to 8	1400	0.8	1.5	53%	1.2	1.5	80%
9 to 13	1800	1.1	2.5	44%	1.1	1.5	73%
14 to 18	2200	1.3	3	43%	1	2	50%
19 to 30	2400	1.7	3	57%	0.9	2	45%
31 to 50	2200	1.9	3	63%	0.9	2	45%
51 to 70	2000	1.9	2.5	76%	1.2	2	60%
71+	2000	1.7	2.5	68%	1.4	2	70%
FEMALES							
1 to 3	1000	0.7	1	70%	1.5	1	150%
4 to 8	1200	0.8	1.5	53%	1.2	1	120%
9 to 13	1600	1	2	50%	1.1	1.5	73%
14 to 18	1800	1.1	2.5	44%	0.8	1.5	53%
19 to 30	2000	1.4	2.5	56%	0.9	2	45%
31 to 50	1800	1.6	2.5	64%	0.9	1.5	60%
51 to 70	1600	1.8	2	90%	1.2	1.5	80%
71+	1600	1.5	2	75%	1.3	1.5	87%

The fiber and potassium content and contribution from actual intakes of fruits and vegetables were then estimated using this percent of the recommended intakes.

Tables 6 and 7 show the fiber and potassium content of recommended amounts of fruits and vegetables in each Food Pattern, the mean total intake by each age/sex group, the estimated amounts from fruits and vegetables, and the estimated percent of total fiber and potassium intake from fruits and vegetables. Estimated intake of fiber from fruits and vegetables ranged from 5.4 (males and females 4 to 8) to 10.3 (males 51 to 70) grams per day. These intakes represent about 42% (males 4 to 8) to 65% (females 1 to 3) of total fiber intake. Estimated intakes of potassium from fruits and vegetables ranged from 743 (males and females 4 to 8) to 1262 (males 51 to 70) milligrams per day. These intakes represent about 33% (males 4 to 8) to 48% (females 51+) of total potassium intake.

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Table 6—Fiber from fruits and vegetables in USDA Food Patterns and estimated intakes of fiber from fruits and vegetables.

Age/sex group	Fiber from vegetables in USDA Food Patterns	Fiber from fruit in USDA Food Patterns	Mean actual fiber intake (NHANES 2007-10)	Estimated intake of fiber from vegetables*	Estimated intake of fiber from fruit*	Estimated intake of fiber from fruit + vegetables	% of total fiber intake from fruits + vegetables
	g/day	g/day	g/day	g/day	g/day	g/day	%
MALES							
1 to 3	4	2.3	10.3	3	3.5	6.3	61%
4 to 8	5	3.4	12.8	3	2.7	5.4	42%
9 to 13	10	3.4	14.5	4	2.5	6.9	48%
14 to 18	12	4.5	15.5	5	2.3	7.5	48%
19 to 30	12	4.5	17.3	7	2.0	8.8	51%
31 to 50	12	4.5	19	8	2.0	9.6	51%
51 to 70	10	4.5	18.3	8	2.7	10.3	56%
71+	10	4.5	17	7	3.2	10.0	59%
FEMALES							
1 to 3	4	2.3	9.6	3	3.5	6.3	65%
4 to 8	5	2.3	12.2	3	2.8	5.4	44%
9 to 13	8	3.4	13.5	4	2.5	6.5	48%
14 to 18	10	3.4	12.6	4	1.8	6.2	49%
19 to 30	10	4.5	13.4	6	2.0	7.6	57%
31 to 50	10	3.4	14.9	6	2.0	8.4	57%
51 to 70	8	3.4	15.8	7	2.7	9.9	63%
71+	8	3.4	14.5	6	2.9	8.9	62%

*Intake of fruit or vegetables as percent of recommendation x g fiber from recommended amount of fruit or vegetables in Food Patterns

Source: What We Eat in America, NHANES 2007-10

Table 7—Potassium from fruits and vegetables in USDA Food Patterns and estimated intakes of potassium from fruits and vegetables.

Age/sex group	Potassium from vegetables in USDA Food Patterns	Potassium from fruit in USDA Food Patterns	Mean actual potassium intake (NHANES 2007-10)	Estimated intake of potassium from vegetables*	Estimated intake of potassium from fruit*	Estimated intake of potassium from fruit + vegetables	% of total potassium intake from fruits + vegetables
	mg/day	mg/day	mg/day	mg/day	mg/day	mg/day	%
MALES							
1 to 3	468	311	2039	328	467	794	39%
4 to 8	693	467	2108	370	374	743	35%
9 to 13	1169	467	2335	514	342	857	37%
14 to 18	1407	623	2756	610	312	921	33%
19 to 30	1407	623	2925	797	280	1078	37%
31 to 50	407	623	3240	891	280	1171	36%
51 to 70	1169	623	3135	888	374	1262	40%
71+	1169	623	2750	795	436	1231	45%
FEMALES							
1 to 3	468	311	1964	328	467	794	40%
4 to 8	693	311	1985	370	373	743	37%
9 to 13	916	467	2042	458	342	800	39%
14 to 18	1169	467	1927	514	249	763	40%
19 to 30	1169	623	2132	655	280	935	44%
31 to 50	1169	467	2358	748	280	1028	44%
51 to 70	916	467	2493	824	374	1198	48%
71+	916	467	2252	687	405	1092	48%

*Intake of fruit or vegetables as percent of recommendation x mg potassium from recommended amount of fruit or vegetables in Food Patterns.

Source: What We Eat in America, NHANES 2007-10

Estimates of the intakes of fiber and potassium from fruits and vegetables indicate that substantial proportions of the total intakes of both come from fruit and vegetable intakes. About 40% to 65% all fiber intake and about one-third to half of total potassium intake comes from fruits and vegetables combined. However, these proportions are based on overall low intake levels. For both fiber and potassium, total intakes are far below amounts in the USDA Food Patterns. Table 8 shows the intake of fiber and potassium from fruits and vegetables as a percent of the recommended intakes for these nutrients.

Table 8. Estimated intakes of fiber and potassium from fruits and vegetables as a percent of recommended intake amounts, by age/sex groups.

Age/sex group	Estimated intake of fiber from fruits and vegetables as a percent of recommended intake	Estimated intake of potassium from fruits and vegetables as a percent of recommended intake
MALES		
1 to 3	45%	26%
4 to 8	27%	20%
9 to 13	28%	19%
14 to 18	24%	20%
19 to 30	26%	23%
31 to 50	31%	25%
51 to 70	37%	27%
71+	36%	26%
FEMALES		
1 to 3	45%	26%
4 to 8	32%	20%
9 to 13	30%	18%
14 to 18	25%	16%
19 to 30	27%	20%
31 to 50	34%	22%
51 to 70	45%	25%
71+	41%	23%

SUMMARY:

In the USDA Food Patterns each food group contributes to a range of nutrients in varying amounts. The percent of the total contributed for each nutrient is a function of the amount of the nutrient in the foods within the group, and the amount of these foods in the patterns. Food groups with larger amounts in the patterns, as well as those with higher levels of the nutrient within the group, are likely to contribute more than those with smaller amounts in the patterns. The largest percent of total fiber comes from Vegetables (38%) and Whole Grains (32%). The majority of calcium (67%) and vitamin D (64%) are from the Dairy group, with much smaller amounts from other food groups. Potassium is found in all food groups, with most coming from Vegetables (36%), Dairy (21%), and Fruit (17%) Groups. The largest amount of sodium in the patterns comes from the Dairy (33%) and Protein Foods (24%) Groups, because these food groups have the most intrinsic sodium. The majority of saturated fat is from solid fats (36%) and oils (21%), because the foods representing each food group are in nutrient-dense (lean or low-fat) forms.

Estimates of the intakes of fiber and potassium from fruits and vegetables indicate that substantial proportions of the total intakes of both come from fruit and vegetable intakes.

However, these proportions are based on overall low intake levels. For both fiber and potassium, total intakes are far below amounts in the USDA Food Patterns.

NOTE--Calcium in the Vegetables Group:

The best vegetables sources of calcium per cup equivalent are cactus (245 mg per cup eq), garlic (245 mg per cup eq), cowpeas (245 mg per cup eq), turnip greens (217 mg per cup eq), cooked spinach (203 mg per cup eq), collard greens (183 mg per cup eq), and soybeans (179 mg per cup eq). The contribution of a specific vegetable to the calcium in the USDA Food Patterns depends not only on its calcium content, but also the proportion of a subgroup it represents, and the amount of the subgroup included in the a pattern. On that basis, the largest contributors to the calcium in the 2000-calorie Pattern, from within the vegetable group, are cooked tomatoes (7.5 mg) white beans (6.6 mg), pinto beans (6.4 mg), cooked broccoli (4.3 mg), cooked spinach (3.4 mg), cooked green beans (3.3 mg), and cooked carrots (3.2 mg). Other vegetables with a higher calcium content per cup do not contribute as much because they are consumed in relatively lower amounts, and therefore contribute less to the overall nutrient profiles of their respective vegetable subgroup. The total amount of calcium in the 2000-calorie Pattern that comes from all vegetables is 86 mg of the total of 1274 mg of calcium in this pattern.

Appendix E-3.3: Meeting Vitamin D Recommended Intakes in USDA Food Patterns

RESEARCH QUESTION

Can vitamin D EARs and/or RDAs be met with careful food choices following recommended amounts from each food group in the USDA Food Patterns? How restricted would food choices be, and how much of the vitamin D would need to come from fortified food products?

BACKGROUND

Note: Please see DGAC Report Appendix E3.1, *Modeling Analysis: Adequacy of USDA Food Patterns* for more background information about development of the USDA food patterns.

The USDA Food Patterns are intended to represent the types and amounts of foods that will provide sufficient nutrients to meet IOM nutrient recommendations and Dietary Guidelines for Americans recommendations, within calorie needs. They are updated every five years during the deliberations of the Dietary Guidelines Advisory Committee, and are presented to the Committee for their assessment of how well the Patterns meet their goals. As part of the update, amounts recommended from each food group may be modified to reach all or most of the specified goals.

Food Patterns are created at 12 energy levels. Each level is assigned nutrient goals for one or more age-gender groups, for whom the energy level is appropriate, based on IOM Estimated Energy Requirement equations. See the food pattern modeling report on Adequacy of the USDA Food Patterns for detailed information on the development and evaluation of the overall USDA Food Patterns.

Vitamin D presents a unique case for the USDA Food Patterns, because it is not present in most of the foods commonly consumed by Americans. Most intake in the U.S. is from fortified foods and supplements. Sunlight exposure can contribute vitamin D via the conversion of pre-vitamin D in the skin to vitamin D from ultraviolet radiation. However, the IOM Estimated Average Intake (EAR) of 400 IU (10 μg) and Recommended Dietary Allowance (RDA) of 600 IU (15 μg) for most individuals assumes little or no sunlight exposure due to the relatively little skin exposure in certain geographical regions, especially in winter.

METHODS

1. Identify amounts of Vitamin D in USDA Food Patterns at each calorie level, and how much of this amount is contributed by each food group or food.
2. Using the 2000-calorie Pattern as an example, identify food choices that could provide the additional amounts needed of naturally occurring and/or fortified vitamin D to meet the EAR or RDA.

   a. Include a larger proportion of vitamin D-fortified Dairy products (fluid milk, yogurt, and soymilk) in the Patterns, replacing some non-fortified Dairy products (cheese, frozen dairy desserts).
   b. Include vitamin D-fortified fruit juice for ¾ cup per day of the fruit in the Pattern
   c. Include vitamin D from all grains that can be fortified under current regulations, at their maximum level of fortification.
   d. Include only seafood with higher amounts of vitamin D in the Pattern
3. Assess the impact on flexibility in food choices if trying to meet the EAR or RDA through naturally occurring and fortified food sources alone.

RESULTS

Amounts in the USDA Food Patterns and food group sources in the Patterns

The amounts of vitamin D in the USDA Food Patterns at each calorie level are identified in Table 1. Amounts in the Patterns range from 157 IU in the 1000-calorie Pattern up to 313 IU in the 3200-calorie Pattern. At 2000 calories, amount is 274 IU. In no Pattern does the amount of vitamin D meet the RDA or the EAR.

Table 1. Amount of Vitamin D in current USDA Food Patterns, in IU

USDA Food Pattern	Vitamin D in Pattern
(calorie level)	(IU)
1000	157
1200	202
1400	218
1600	266
1800	268
2000	274
2200	283
2400	294
2600	298
2800	309
3000	310
3200	313

Source: DGAC Report Appendix E3.1, *Modeling Analysis: Adequacy of USDA Food Patterns*, Table E3.1.A7

Table 2 shows the amount of vitamin D in the nutrient profile for each food group or subgroup in the Patterns, and the amount of vitamin D from each group in the 2000-calorie Pattern. The nutrient profile amount is a weighted average of the vitamin D content of the foods in each group, based on relative consumption of each food. It is used as the reference amount for calculating the total amount of a nutrient expected from each group when a variety of food choices within the group are made. The amount of vitamin D in the nutrient profile for the Dairy

group is based on about half of consumption coming from fortified fluid milk, yogurt, and soymilk, and the remaining half from cheese and other non-fortified dairy products, such as frozen dairy desserts.

Dairy products contribute the majority of the Vitamin D in the Food Patterns, about 65% in the 2000-calorie Pattern. The percent of vitamin D from Dairy ranges from 57% in the 3200-calorie Pattern up to 76% in the 1000-calorie Pattern.

Protein foods, mostly seafood and eggs, contribute most of the rest, ranging from 16% to 29% of the total vitamin D in the Patterns, with 25% in the 2000-calorie Pattern. Grains contribute lower amounts, about 6 to 10% (from fortified RTE cereals), and vegetables (mushrooms) contribute about 0.1 to 0.2 % of the vitamin D in the Patterns. Solid fats (butter) also contribute very small amounts of vitamin D.

Table 2. Vitamin D in the nutrient profile for each food group/subgroup and amount in the 2000-calorie Pattern from each food group/subgroup

Food group	Nutrient Profile reference amount	vitamin D in nutrient profile (IU)	Amount in 2000-calorie Pattern	Vitamin D contributed to 2000-calorie Pattern (IU)
Fruit	1 cup eq	0	2 cup eq	0
Vegetables				
--Dark green	1 cup eq	0	.21 cup eq	0
--Red-orange	1 cup eq	0	.79 cup eq	0
--Beans & Peas	1 cup eq	0	.21 cup eq	0
--Starchy	1 cup eq	0	.71 cup eq	0
--Other	1 cup eq	0.5	.57 cup eq	.3
Grains				
--Whole grains	1 ounce eq	6	3 ounce eq	18
--Refined grains	1 ounce eq	1	3 ounce eq	3
Protein Foods				
--Meats	1 ounce eq	4	1.80 ounce eq	7
--Poultry	1 ounce eq	1	1.49 ounce eq	2
--Seafood—high omega-3	1 ounce eq	99	.26 ounce eq	25
--Seafood—low omega-3	1 ounce eq	20	.90 ounce eq	18
--Eggs	1 ounce eq	44	.41 ounce eq	18
--Soy Products	1 ounce eq	0	.06 ounce eq	0
--Nuts and Seeds	1 ounce eq	0	.59 ounce eq	0
Dairy	1 cup eq	59	3 cup eq	178
Oils	1 gram	0	27 g	0
Solid Fats	1 gram	.3	18 g	5
Added Sugars	1 gram	0	30 g	0

Source: DGAC Report Appendix E3.1, *Modeling Analysis: Adequacy of USDA Food Patterns*, Tables E3.1.A1, E3.1.A5.

Food sources and options for increasing amounts of vitamin D:

The amount of vitamin D per 100 grams of various foods was compiled from the Nutrient Database for Standard Reverence, Release 26 (SR26). These amounts were converted to the amount per cup or ounce equivalent using the Food Pattern Equivalents Database (FPED) for NHANES 2009-10. Seafood sources of vitamin D (cooked forms only) and major fortified food sources of vitamin D are listed in Table 3.

Table 3. Food sources and amounts of vitamin D.

Food	Portion size	Vitamin D content*
Fortified dairy products		
--Milk	1 cup eq	115 IU
--Yogurt (fortified)	1 cup eq	115 IU
Other fortified foods		
--Orange juice	1 cup eq	100 IU
--RTE cereals (Cheerios)	1 oz eq (28 g)	38 IU
--RTE cereals (Total)	1 oz eq (30 g)	100 IU
Eggs	1 oz eq (1 egg)	44 IU
Seafood		
--Salmon, sockeye, canned	1 oz eq	238 - 243 IU
--Trout, rainbow, cooked	1 oz eq	224 IU
--Swordfish, cooked	1 oz eq	204 IU
--Salmon, pink, canned	1 oz eq	159 – 164 IU
--Salmon, sockeye, cooked	1 oz eq	149 IU
--Salmon, pink, cooked	1 oz eq	148 IU
--Sturgeon, cooked	1 oz eq	146 IU
--Mackerel, cooked	1 oz eq	131 IU
--Salmon, coho, cooked	1 oz eq	128 IU
--Salmon, chum, canned	1 oz eq	109 IU
--Mackerel, canned	1 oz eq	83 IU
--Tuna, light, canned in oil	1 oz eq	78 IU
--Salmon, Atlantic, farmed, cooked	1 oz eq	77 IU**
--Herring, cooked	1 oz eq	62 IU
--Sardines, canned in oil	1 oz eq	56 IU
--Tilapia, cooked	1 oz eq	42 IU
--Tuna, white, canned in water	1 oz eq	23 IU
--Tuna, light, canned in water	1 oz eq	13 IU

*Calculated from data per 100 g from NDL, SR26, converted to cup or ounce eqs using FPED for 2009-10.
**Data from Canadian government database, per Nutrient Data Laboratory staff.

Several options were explored to increase the amount of vitamin D in the Food Patterns to the EAR or RDA level. The 2000-calorie Pattern was used as an example.

1. The proportion of Dairy consumed from a fortified product was increased from about half to ¾ of total Dairy intake.
2. Fortified fruit juice was included for ¾ cup of fruit intake per day.
3. Grain products that are allowed under current regulations to be fortified with vitamin D were included at the maximum levels now allowed. See Table A1 (end of document) for products and calculations.
4. Options 1, 2, and 3 together.

The change in the Dairy nutrient profile would limit but not eliminate the amount of cheese and other non-fortified products (e.g., ice cream) that could be included in the Pattern. Based on current consumption proportions, cheese now accounts for about 1.5 cup eqs, or 2.25 ounces, per day in the 2000-calorie Pattern. This change would reduce it to .75 cup eqs, or about 1 ounce of cheese per day.

Fruit juice now accounts for about .6 cup eqs of the 2 cup eqs of total fruit in the 2000-calorie Pattern. Therefore, incorporation of ¾ cup of fortified juice would require only a minor change in whole fruit consumption.

The current patterns include only a few grain products that are fortified with vitamin D. These are ready-to-eat (RTE) cereals, for which the most common consumer choices are now fortified. For this analysis, the nutrient profiles of the whole and refined grain groups were altered to assume that all grain products allowed to be fortified under current FDA regulations would be fortified. These products include all enriched pasta, rice, and cornmeal; and all RTE and cooked cereals (Table A1, at end of document). However, it is important to note that very few of these products in the marketplace today are fortified with vitamin D.

The results of the options above on levels of vitamin D in the Pattern are presented in Table 4.

Table 4. Vitamin D in the 2000-calorie Food Pattern with increased vitamin D-fortified food in the Dairy, Fruit, and Grain groups.

Food Group or component	Current 2000 calorie Pattern	Pattern with Fortified Dairy at 75% total	Pattern with Fortified fruit juice at ¾ cup per day	Pattern with Fortified grain products	Pattern with All 3 Modifications
	Vit D (IU)	Vit D (IU)	Vit D (IU)	Vit D (IU)	Vit D (IU)
Fruit	0	0	75	0	75
Vegetables*	0.3	0.3	0.3	0.3	.3
Whole grains	18	18	18	63	63
Refined grains	3	3	3	63	63
Meat	7	7	7	7	7
Poultry	2	2	2	2	2
Seafood--high n3	25	25	25	25	25
Seafood--low n3	18	18	18	18	18
Eggs	17	17	17	17	17
Dairy	178	259	178	178	259
Solid fats	5	5	5	5	5
TOTAL	**274**	**354**	**348**	**378**	**534**

*mushrooms

With an increase in the proportion of Dairy foods that are fortified, the addition of fortified fruit juice, and the assumption that all allowed grains were fortified with vitamin D, the 2000-calorie Food Pattern would contain 534 IU of vitamin D, much closer to the RDA of 600 IU..

To meet the RDA, a change in seafood choices was examined. The amount of vitamin D per ounce of seafood that would be needed to meet the RDA was calculated, based on the current Patterns and the modified Patterns shown in Table 4.

The USDA Food Patterns include at least 8 ounces a week of seafood for all children over 9, adolescents, and adults. This translates to a daily average of 1.14 oz eq in the 2000-calorie Pattern. The nutrient profiles for seafood include both those high in omega-3 fatty acids and those lower in omega-3 fatty acids, in proportions now consumed. The amount of vitamin D per day and per oz eq of seafood that would bring the 2000-calorie Pattern to the RDA was calculated.

For the current 2000-calorie Pattern, the amount of vitamin D from seafood per day needed to meet the RDA is 369 IU (Table 5). For the modified Pattern it is 109 IU per day. Therefore, seafood would need to contain at least 323 IU of vitamin D per oz eq to meet the RDA in the 2000-calorie Pattern, if this were the only change made. No seafood listed in SR26 meets this requirement. For the modified Patterns, the seafood choices would need to contain at least 96 IU

per ounce equivalent. As shown in Table 3, a few seafood choices contain this amount of vitamin D. Several types of salmon, rainbow trout, swordfish, and mackerel contain at least this amount of vitamin D. Note that the most commonly consumed types of seafood are tuna, shrimp, salmon, cod, tilapia, "unknown", flounder, crab, and catfish. Of these, only some but not all types of salmon would meet the level of vitamin D calculated to meet the RDA, when combined with the other modifications.

Table 5. Amounts of Vitamin D in 2000-calorie USDA Food Pattern needed to meet RDA

	Current USDA 2000 calorie Pattern	Modified USDA 2000 calorie Pattern
	Vitamin D (IU)	Vitamin D (IU)
Total in Pattern	274	534
Amount from Seafood	43	43
Deficit from RDA (600 IU) without seafood contribution	369	109
Amount of seafood per day in Pattern	1.14 oz eq	1.14 oz eq
Vitamin D needed per 1 ounce eq of seafood to make up deficit	323	96

SUMMARY

Amounts of vitamin D in the USDA Food Patterns do not currently meet wither the RDAs or the EARs for vitamin D. Several options were explored to increase levels of vitamin D to the RDA, without changing the overall amounts of food recommended from a food group or subgroup. Increased amounts of fortified Dairy products (Milk, yogurt) and use of fortified fruit juice would bring the amount of vitamin D in the 2000-calorie Pattern to the EAR level. Based on the assumption that additional Grain products could be fortified with vitamin D under current FDA regulations, the including these products at the maximum level of fortification raised the amount of vitamin D in the 2000-calorie Pattern closer to, but still not meeting, the RDA. Finally, encouraging seafood choices with the highest amounts of vitamin D, combined with the changes in Dairy and fruit juice choices, and potential fortification of additional Grain products, would bring the amounts of vitamin D in the 2,000-calorie USDA Food Pattern to the RDA level. However, this would limit seafood choices to a small number of types of seafood, which do not include most of those that are widely consumed.

Data sources

Nutrient data:

USDA National Nutrient Database for Standard Reference, Release 26. Available at http://ndb.nal.usda.gov/

Food intake data:

What We Eat in America (WWEIA), National Health and Nutrition Examination Survey 2009-10. Available at http://seprl.ars.usda.gov/Services/docs.htm?docid=13793

Food Group data:

Food patterns equivalents database (FPED) for WWEIA 2009-10: Available at http://seprl.ars.usda.gov/Services/docs.htm?docid=23869

Usual Intake distributions:

Usual Dietary Intakes: Food Intakes, US Population, 2007-10, National Cancer Institute. Available at http://appliedresearch.cancer.gov/diet/usualintakes/pop/2007-10/

Food availability data:

Food Availability Data System, USDA Economic Research Service. Available at http://www.ers.usda.gov/data-products/food-availability-(per-capita)-data-system.aspx

Table A1

Allowable vitamin D fortification (from FDA):

Addition of vitamin D is optional in foods with Standards of Identity (SI), except for nonfat dry milk fortified with vitamins A and D (21 CFR 131.127) and evaporated milk (21 CFR 131.130).

Vitamin D is also affirmed GRAS under 21 CFR 184.1950 and has strict limitations with respect to the categories of food, functional use, and level of use.

Furthermore, vitamin D is also an approved food additive under 21 CFR 172.379 (vitamin D2), and 172.380 (vitamin D3).

Foods	***CFR §***		***Levels***
Fluid Milk	131.110 SI*	Optional unless milk is fortified	400 IU/quart (or 42 IU/ 100 g) within limits of good manufacturing practices (GMP)
Acidified milk	131.111 –SI	Optional	400 IU/quart
Cultured milk	131.112 – SI	Optional	400 IU/quart
Concentrated milk	131.115 – SI	Optional	400 IU/quart
Nonfat dry milk, fortified with vitamin A and D	131.127 – SI	Required	400 IU/quart
Evaporated milk	131.130 – SI	Required	25 IU/ounce
Dry whole milk	131.147 – SI	Optional	400 IU/quart (reconstituted product)
Yogurt *Low-fat yogurt Nonfat yogurt*	131.200 131.203 131.206 SI	Optional	400 IU/quart
*Milk products***	GRAS 184.1950	Optional	89 IU/100 grams maximum level
Enriched corn meal	137.260 SI	Optional	Not < than 250 USP units/lb and not > than 1,000 USP units/lb

Enriched rice	137.350 SI	Optional	Not < than 250 USP units/lb and not > than 1,000 USP units/lb
Enriched macaroni products	139.115 SI	Optional	Not < than 250 USP units/lb and not > than 1,000 USP units/lb
Enriched noodle products	139.155 SI	Optional	Not < than 250 USP units/lb and not > than1,000 USP units/lb
Grain products and Pasta[#]	GRAS 184.1950	Optional	90 IU/ 100 g maximum level
Enriched farina	137.305 SI	Optional	Not < than 250 USP units/lb 350 IU/100g (maximum based on GRAS 184.1950)
Breakfast cereal[&]	GRAS 184.1950	Optional	350 IU/100 g maximum level
Margarine	166.110 SI	Optional	Not < than 1500 IU/ lb
Olestra	172.867 (food additive)	Required	12 IU /g of Olestra[%]
Calcium fortified juices and drinks[$]	172.380 (food additive)	Optional	Not to exceed100 IU / per 240 ml in 100 % fruit juices or fruit drinks[!]
Cheese and cheese products[€]	172.380 (food additive)	Optional	Not to exceed 81 IU / per 30 grams in cheese and cheese products
Meal replacement bar	172.380 (food additive)	Optional	Not to exceed 100 IU / per 40 grams in meal replacement bars or other type of bars that are represented for special dietary use in reducing or maintaining body weight
Soy protein based meal replacement beverages	172.380 (food additive)	Optional	Not to exceed 140 IU / per 240 ml (prepared beverage)

Soy beverage	172.379 (food additive)	Optional	50 IU/100 g maximum levels in food
Soy beverage products	172.379 (food additive)	Optional	89 IU/100 g maximum levels in food
Soy butter substitute spreads	172.379 (food additive)	Optional	330 IU/100 g maximum levels in food
Soy based cheese substitutes and soy-based cheese substitute products	172.379 (food additive)	Optional	270 IU/ 100 g maximum levels in food

*SI = standards of identity

@ See the FDA document (subject: recommended levels of vitamins A and D in milk products)

**Milk products (those that are not covered under standards of identity) including flavored milks and milk drinks, dry milks, toppings, snack dips, spreads, weight control milk beverages, and other milk origin products.

Grain products and pastas (those that are not covered under standards of identity) including macaroni and noodle products, rice dishes, and frozen multi-course meals, without meat or vegetables.

&Breakfast cereals (GRAS # 184.1950) including ready to eat and instant and regular hot cereals.

% To compensate for any interference with absorption of fat-soluble vitamin, vitamin D shall be added to foods containing olestra

$Excluding fruit juice and drinks formulated for infants (see below).

! Fruit juices are fortified ≥ 33% or ≥ 10% of the RDI of calcium per 240 ml of 100 % fruit juice or fruit drinks, respectively.

€Cheeses, including curd, and whey cheeses, cream, natural, grating, processed, spread, dip and miscellaneous cheeses. Except cottage cheese, ricotta cheese and hard grating cheeses such as Parmesan and Romano.

Appendix E-3.4: USDA Food Patterns—Adequacy for Young Children

RESEARCH QUESTION

How well do the USDA Food Patterns meet the nutritional needs of children 2 to 5 years of age and how do the recommended amounts compare to their current intakes? Given the relatively small empty calorie limit for this age group, how much flexibility is possible in food choices?

BACKGROUND

Note: Please see DGAC Report Appendix E3.1, *Modeling Analysis: Adequacy of USDA Food Patterns* for more background information about development of the USDA food patterns.

The USDA Food Patterns are intended to represent the types and amounts of foods that will provide sufficient nutrients to meet IOM nutrient recommendations and Dietary Guidelines for Americans recommendations, within calorie needs, for all age/sex groups 2 years of age and older. They are updated every five years during the deliberations of the Dietary Guidelines Advisory Committee, and are presented to the Committee for their assessment of how well the Patterns meet their goals. As part of the update, amounts recommended from each food group may be modified to reach all or most of the specified goals.

Food Patterns are created at 12 energy levels. Each level is assigned nutrient goals for one or more age/sex groups, for whom the energy level is appropriate, based on IOM Estimated Energy Requirement equations. See the food pattern modeling report on Adequacy of the USDA Food Patterns for detailed information on the development and evaluation of the overall USDA Food Patterns.

The nutritional needs and the diets of young children are different in some important ways from the nutritional needs and diets of older children and adults. This modeling analysis focuses on the adequacy of the Patterns for young children, given these differences.

METHODS

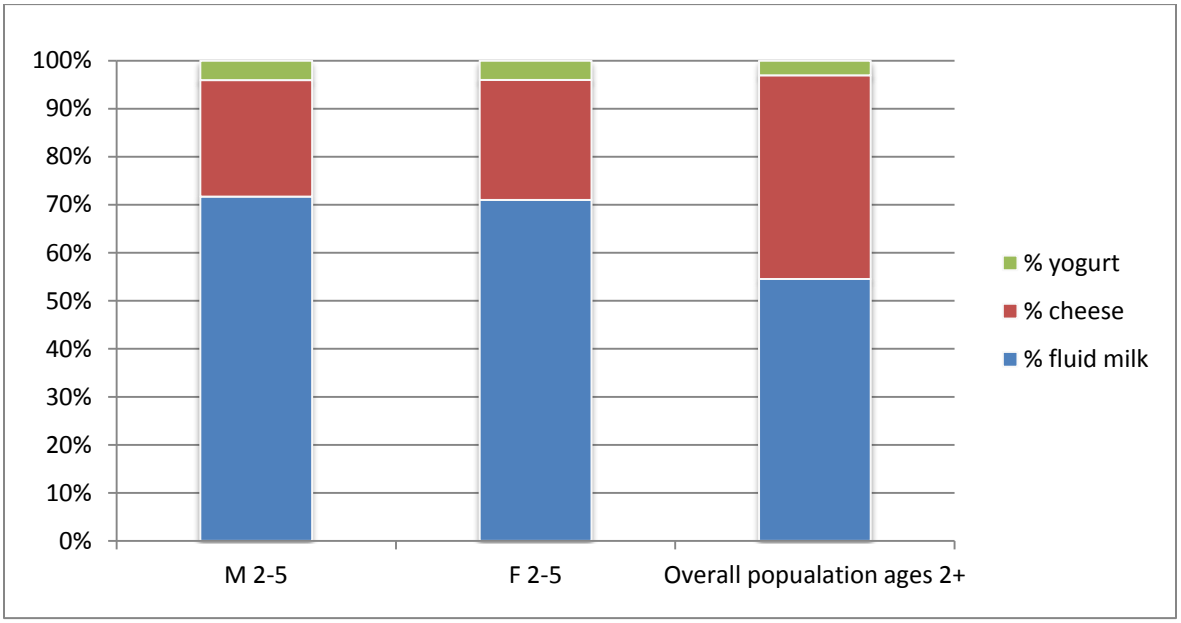
1. Adjusted the nutrient profiles of food groups where choices of young children differ in a substantial way from the choices of older children and adults. The vegetables, protein foods, and grain food groups already have separate nutrient profiles for subgroups within each group. However, the fruit and dairy food groups have a single nutrient profile. Therefore, the Dairy and Fruit group nutrient profiles were targeted for modification.
2. Used these adjusted nutrient profiles to determine adequacy of the patterns in meeting nutritional goals for children 2 to 5 years old. Adjusted energy allotted to solid fats and added sugars as needed.
3. Compared recommended intake levels for each food group and subgroup in the patterns to the actual range of intakes for this age group.
4. Estimated the flexibility possible in food choices using the allowance for solid fats and added sugars.

RESULTS

Food Group Nutrient Profiles

In the base USDA Food Patterns, the nutrient profiles for each food group take into consideration the proportion of each subgroup consumed among the entire population ages 2 and older. Children 2 to 5 years old comprise only 9.5% of this population. To determine how different the subgroup choices by young children were from average intakes of the entire population ages 2 and older, mean intakes for all subgroups within each food group of 2 to 5 year old boys and girls were compared with the mean intakes for the overall population. Mean intakes from each subgroup as a percent of total food group intake for all food groups are presented in Figures 1 to 5 (Figures 3, 4, and 5 are at end of report). The Dairy and Fruit food groups have a single nutrient profile, and there are substantial differences in the mean intakes of young children in comparison to the overall population. Therefore, the Dairy and Fruit group nutrient profiles were adjusted to reflect proportionate consumption by 2 to 5 year olds.

Figure 1. Proportion of consumption from Dairy Subgroups by children 2 to 5 years of age in comparison to the overall population ages 2 years and older.

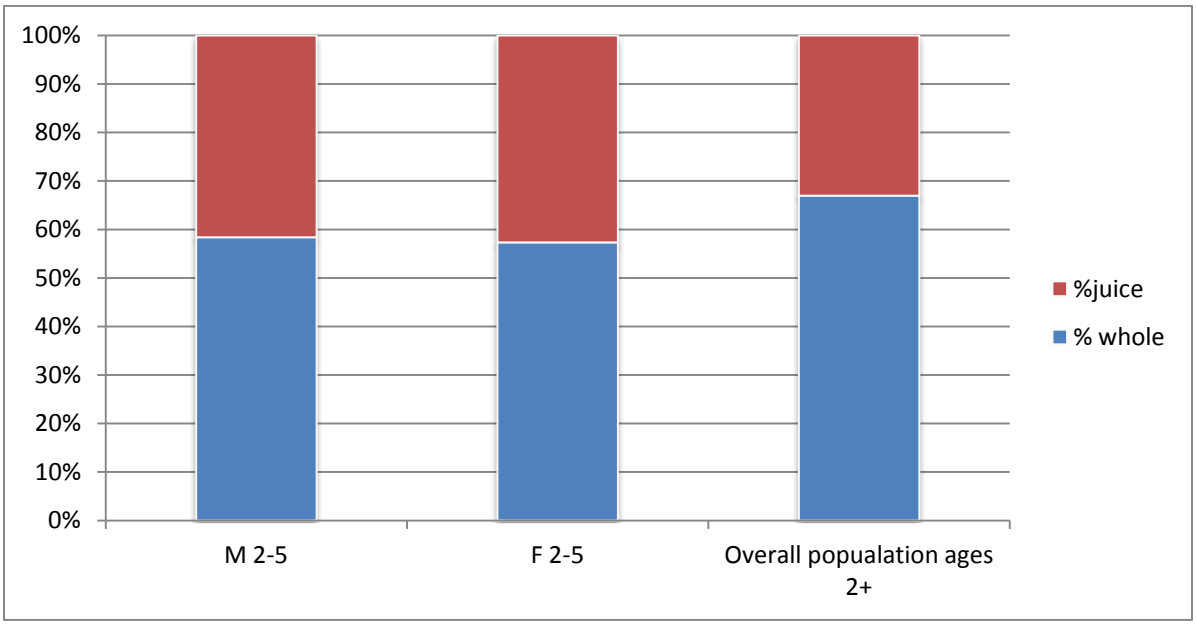


In the Dairy group, the proportion of milk to cheese consumed is higher in this age group than in the overall population, and the amount of yogurt as a proportion of Dairy intake is slightly higher (Figure 1). The adjusted Dairy group nutrient profile for young children is based on 70% fluid milk, 25% cheese, 3.5% yogurt, and 1.5% soymilk. In contrast, the profile for the overall population is based on 51% fluid milk, 45% cheese, 2.5% yogurt, and 1.5% soymilk.

Milk intake recommendations for this age group are for low-fat or fat-free milk, and assume a transition from the whole milk recommended for children until they reach the age of 2 years.

Therefore, to accommodate this transition period, nutrient values for low-fat (1%) milk rather than fat-free milk were used in calculating the fluid milk portion nutrient profile.

Figure 2. Proportion of consumption from Fruit Subgroups by children 2 to 5 years of age in comparison to the overall population ages 2 years and older.



In the Fruit group, the proportion of juice to whole fruit consumed is higher in this age group than in the overall population (Figure 2). The adjusted Fruit group nutrient profile for young children is based on 42% fruit juice and 58% whole fruit. In contrast, overall population intake is about 1/3 juice and 2/3 whole fruit.

These adjustments resulted in changes in the nutrient profiles per cup equivalent of the Dairy and Fruit groups (Table 1). Compared to the Dairy group nutrient profile for the overall population, the Dairy group profile for young children contains more energy, carbohydrate, potassium, vitamin A, and vitamin D, and less total and saturated fat, and sodium. Compared to the Fruit group nutrient profile for the overall population, the Fruit group profile for young children contains more energy, carbohydrate, sodium, potassium, folate, and vitamin C, and less fiber and vitamin A.

Table 1. Nutrient profiles for the Dairy and Fruit Groups (per cup equivalent) modified for young children in comparison to the overall nutrient profiles for these food groups.

Nutrient amount per cup equivalent	Dairy group overall	Dairy group young children	Fruit group overall	Fruit group young children
Energy (kcal)	77	96*	98	102
Protein (g)	8.7	8.5	1.1	1.0
Total Carbohydrates (g)	8.4	11.2	24.6	25.4
Fiber (g)	.2	.2	2.3	2.0
Total fat (g)	.9	2.0	.3	.3
Saturated Fat (g)	.6	1.3	.1	.1
Calcium (mg)	295	302	19	20
Potassium (mg)	235	297	311	323
Sodium (mg)	202	164	4	5
Vitamin D (IU)	59	80	0	0
Vitamin C (g)	.1	.1	34	38
Vitamin A** (μg RAE)	98	117	16	14
Folate (μg DFE)	9	11	22	23

*Higher calorie levels are due to using 1% milk and a larger proportion of fluid milk in the profile.
**Includes pro vitamin A carotenoids

While some differences are apparent in the Vegetable, Protein Foods, and Grain food groups, these food groups have separate nutrient profiles for the subgroups within each group. There is no overall food group nutrient profile to be adjusted for these groups. Differences in the patterns of subgroup consumption within each group are shown in figures 3, 4, and 5 (at the end of the report). Within the Vegetable group, the combined intakes of dark green, red and orange vegetables, and legumes are approximately the same for young children as for the overall population. The proportions of starchy and other vegetables vary, with young children consuming proportionately less other vegetables and more starchy vegetables than the overall population. Within the Protein Foods group, the proportion of intake from meats and processed meats combined is similar to the overall population, but young children consume relatively less meat and more processed meat. Within the Grains group, young children, especially boys, consume a somewhat larger proportion of grains as whole grains.

Energy and Nutrients in the Adjusted Patterns

The adjusted nutrient profiles were used to determine the adequacy of the Patterns at the 1000, 1200, and 1400 calorie levels for children 2 to 5 years of age. The young children's nutrient profiles were higher in energy, resulting in 43 to 55 additional calories in the Patterns, so the amount of calories that could be allowed from solid fats and added sugars was adjusted down to keep the patterns isocaloric. The adequacy of the patterns did not change, but the following nutrient levels did change slightly:

- Potassium was higher by 4 to 5% of goal amount
- Sodium was lower by 5 to 6% of goal amount
- Vitamin D was higher by 7 to 9% of goal amount
- Vitamin A, Vitamin C, and folate were also higher in the adjusted patterns.

See table 2 for nutrient levels in the patterns and comparison to goals.

Table 2. Selected nutrients in USDA Food Patterns at 1000, 1200, and 1400 calorie levels, with nutrient profiles modified for young children, and comparison to goals.

Calorie Level of Pattern	**1000**	**1200**	**1400**
Target age/gender group	**M/F 2-3**	**F 4-8**	**M 4-8**
Energy	1005 kcal	1198 kcal	1403 kcal
Macronutrients			
Protein	44g	59 g	69g
% of RDA	335%	309%	362%
% of calories	17%	20%	20%
Total lipid (fat)	36g	40g	45g
% of calories	33%	30%	29%
Carbohydrate	130g	157g	187g
% of RDA	100%	120%	144%
% of calories	52%	52%	53%
Fiber, total dietary	14g	18 g	21g
% of goal (14 g/1000 kcal)	98%	105%	106%
Minerals			
Calcium	784mg	995mg	1051mg
% of RDA	112%	100%	105%
Iron	8mg	10 mg	13mg
% of RDA	110%	104%	126%
Magnesium	178mg	233 mg	273mg
% of RDA	222%	179%	210%
Potassium	1746mg	2267 mg	2578mg
% of AI	58%	60%	68%
Sodium	828mg	1100 mg	1278mg
% of UL	55%	58%	67%
Vitamins			
Vitamin A (in µg RAE)*	499 µg	638 µg	685 µg
% of RDA	166%	159%	171%
Vitamin E (in mg AT)	4.8 mg	5.7mg	6.4 mg
% of RDA	80%	81%	91%
Vitamin C	58mg	69 mg	88mg
% of RDA	386%	274%	353%
Vitamin D (in IU)	198 IU	254 IU	270 IU
% of AI	33%	42%	45%
Folate (in µg DFE)	279 µg	369 µg	444 µg
% of RDA	186%	184%	222%
Choline	178mg	240 mg	280mg
% of AI	89%	96%	112%

Fats and Fatty Acids			
Cholesterol	94 mg	127 mg	161 mg
% of goal (<300mg/day)	31%	42%	54%
Saturated fatty acids	9.9 g	10.3 g	11.7 g
% of calories	9%	8%	7%

*Includes vitamin A precursors

Recommended Amounts in the Patterns Compared to Usual Intakes

The recommended intake levels in each Pattern were compared to the range of usual intakes for each age/sex group as part of DGAC Report Appendix E3.1, *Modeling Analysis: Adequacy of USDA Food Patterns*. The complete tables and graphs are in supplemental materials for that report: E3.1.A6, Recommended intakes compared to usual intake distributions. Results specific to young children include the following:

- Fruit recommendations in the 1000, 1200, and 1400 calorie Patterns of 1 or 1.5 cups per day are all between the median (0.7 cups) and 95th percentile (1.8 to 1.9 cups) intakes for males and females 1-3 and 4-8 years of age.
- Dairy recommendations in the 1000 calorie Pattern (2 cups per day) are slightly less than median intakes for 1 to 3 year olds of 2.4 (males) and 2.3 (females) cups per day. Dairy recommendations in the 1200 and 1400 calorie Patterns (2.5 cups per day) are above the median intakes for 1-3 year olds and 4 to 8 year olds of 2.1 to 2.4 (males) and 2.0 to 2.3 (females) cups per day. Recommendations are well below 95th percentile intakes for these age groups of 3.8 to 4.2 cups per day.
- Total vegetable recommendations in the 1000 calorie pattern (1 cup per day) are above the median, and below the 95th percentile of intakes for 1 to 3 year olds. Recommended amounts in the 1200 and 1400 calorie patterns (1.5 cups per day) are at the 95th percentile of intake for 4 to 8 year olds, and above the 95th percentile of intake for 1 to 3 year olds (1.3 cups). Recommended amounts of the dark green and red and orange subgroups are close the 95th percentile of intakes, while for starchy, other vegetables and legumes, recommended amounts are above median intakes but less than the 95th percentiles of intake.
- Protein Foods recommendations approximate median intakes in the 1200 and 1400 calorie patterns, and are slightly less than median intakes in the 1000 calorie pattern.
- Whole grain recommendations are above the 95th percentile of intake, as is the case for the entire population. Refined grain recommendations approximate but are slightly below the 5th percentile of intakes.

Flexibility of Food Choices in the USDA Food Patterns for Young Children

The additional calories in the Dairy and Fruit nutrient profile for young children reduced the number of calories that could be allowed for food choices with solid fats and/or added sugars to very small amounts, as described below. This reduces the flexibility of the overall Patterns.

Therefore, the amounts recommended from some other food groups was explored, to determine if—for these age groups—modifications could be made to reduce recommended amounts and provide for added flexibility in food choices.

The allowance for calories from solid fats and added sugars was adjusted down in these Patterns, to account for the higher calories in the modified Dairy and Fruit nutrient profiles.
In the 1000 calorie pattern, the modified allowance for calories from solid fats and added sugars is 106 calories, in comparison to 149 in the original patterns. In the 1200 and 1400 calorie patterns, the modified allowances are even lower—49 and 56 calories, respectively, in comparison to 102 and 111 in the original patterns. The lower allowances in the 1200 and 1400 calorie patterns in comparison to the 1000 calorie Pattern are the result of a larger amount of the Dairy group in these patterns, which is targeted for children 4 and older who have a higher calcium RDA. For 2 and 3 year olds, the allowance for solid fats and added sugars in these Patterns would be about roughly 100 calories. The small allowances for calories from solid fats and added sugars in all 3 Patterns would result in quite limited food choices.

Therefore, we explored options to determine if a lower intake from one of the other food groups would allow for more flexibility. For most food groups, at least one nutrient is just at the target level or is marginal. Therefore lowering the amount recommended is not feasible. For the Protein Foods group, a slightly lower amount would not result in any nutrient intakes less than the target level for this age group. A decrease of ½ ounce per day in intake would result in an allowance for calories from solid fats and added sugars from about 75 calories for 4 and 5 year olds, and up to 130 calories for 2 and 3 year olds. Another alternative to allow for more flexibility in food choices would be to reduce the fat level of the milk from 1% to fat-free milk as the child ages from 2 to 5 years old. This would allow almost 50 additional calories in the solid fats and added sugars allowance for 4 and 5 year olds, bringing their allowance to about 100 calories.

SUMMARY

The USDA Food Patterns at appropriate calorie levels meet the nutrient needs of young children. Nutrients for which the RDAs are not met are the same as for older children and adults. The amounts recommended in the Patterns fall within the broad range of usual intakes by this age group for most food groups and subgroups. The Patterns have limited flexibility to allow for calories from solid fats or added sugars.

Figure 3. Proportion of consumption from Vegetable Subgroups by children 2 to 5 years of age in comparison to the overall population ages 2 years and older.

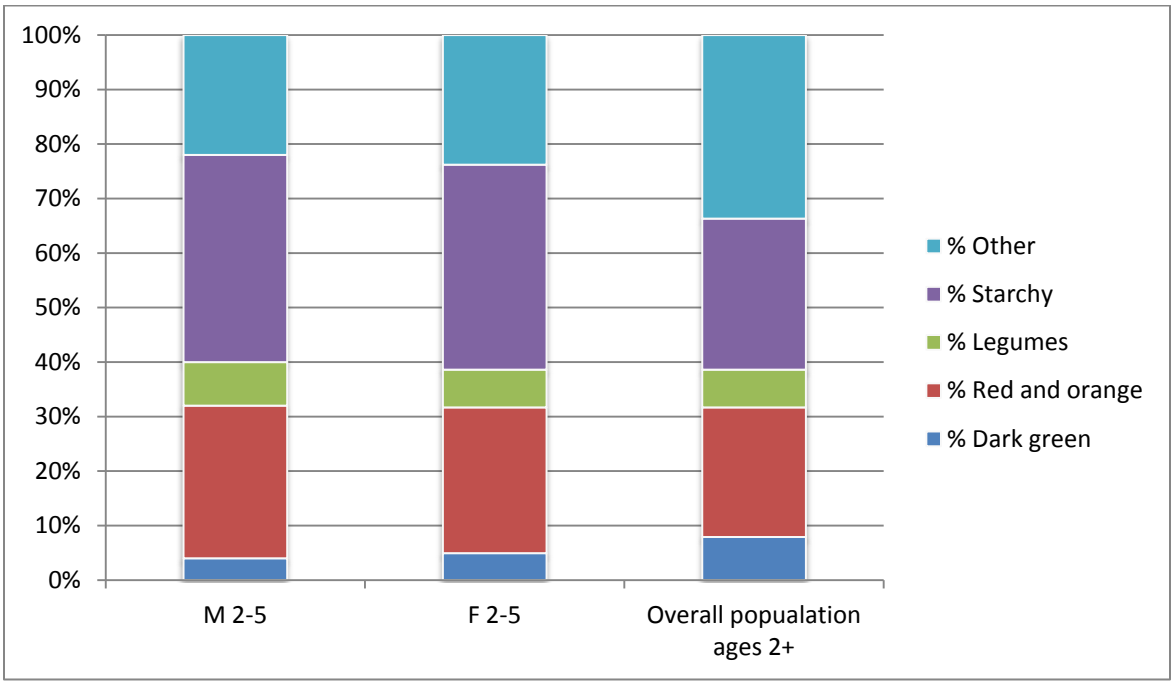


Figure 4. Proportion of consumption from Protein Foods Subgroups by children 2 to 5 years of age in comparison to the overall population ages 2 years and older.

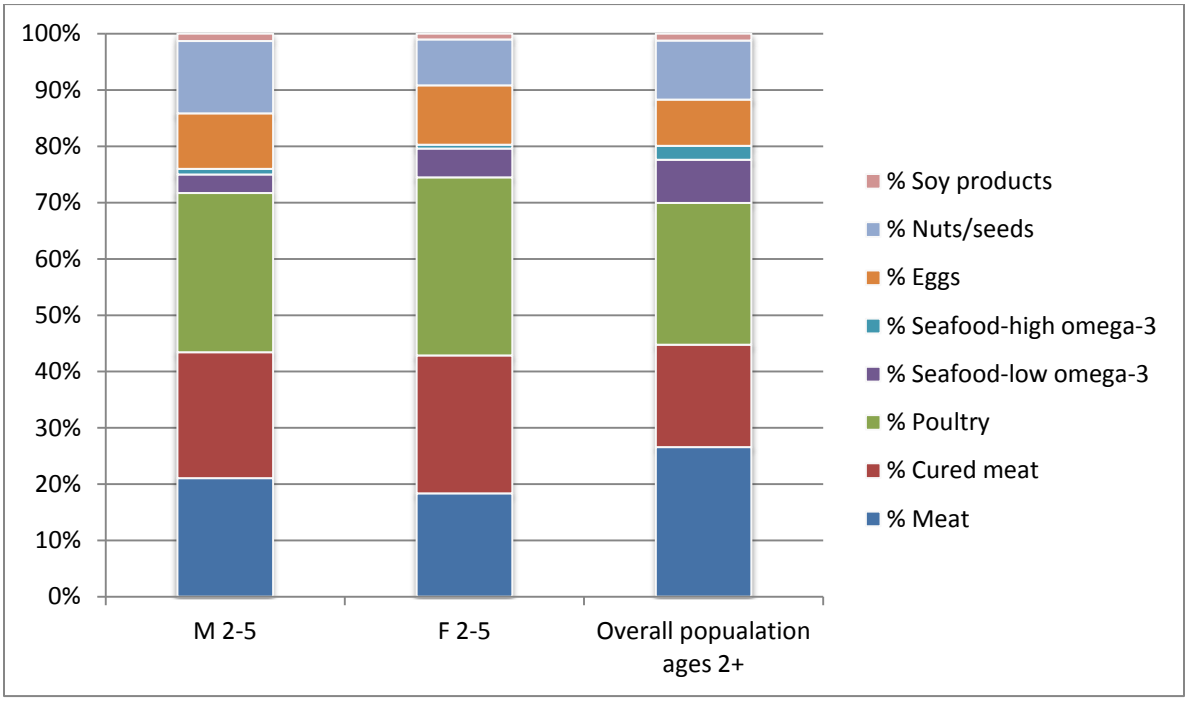
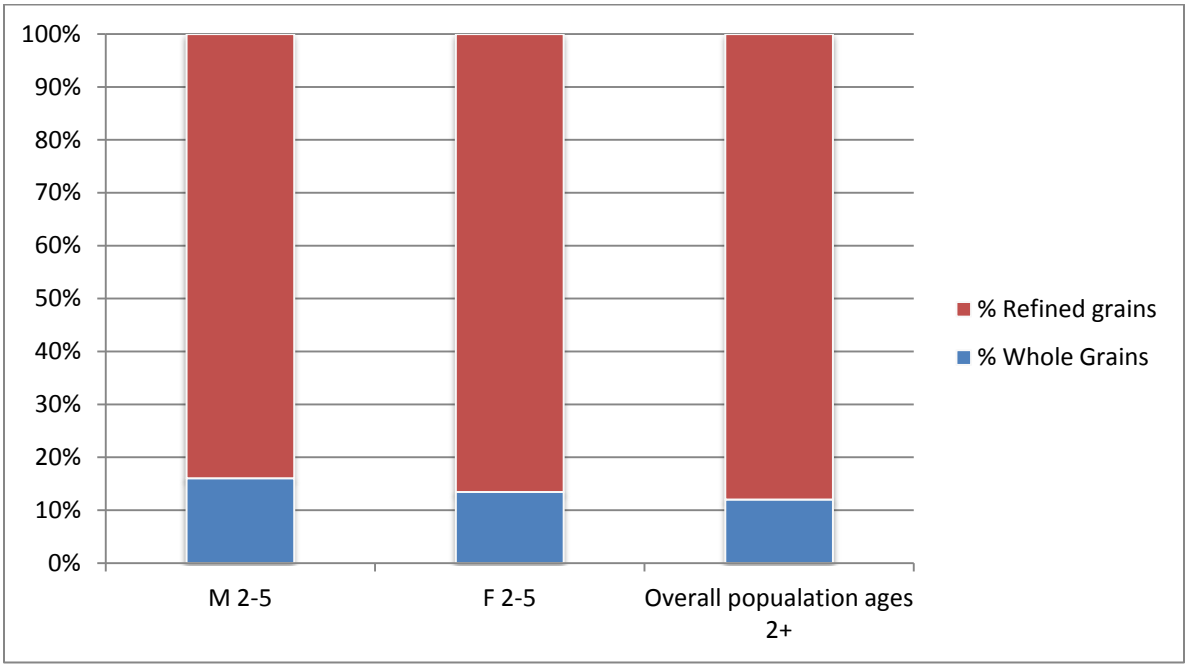


Figure 5. Proportion of consumption from Grains Subgroups by children 2 to 5 years of age in comparison to the overall population ages 2 years and older.



Data sources for update of USDA Food Patterns

Nutrient data:

USDA National Nutrient Database for Standard Reference, Release 26. Available at http://ndb.nal.usda.gov/

Food intake data:

What We Eat in America (WWEIA), National Health and Nutrition Examination Survey 2009-10. Available at http://seprl.ars.usda.gov/Services/docs.htm?docid=13793

Food Group data:

Food patterns equivalents database (FPED) for WWEIA 2009-10: Available at http://seprl.ars.usda.gov/Services/docs.htm?docid=23869

Usual Intake distributions:

Usual Dietary Intakes: Food Intakes, US Population, 2007-10, National Cancer Institute. Available at http://appliedresearch.cancer.gov/diet/usualintakes/pop/2007-10/

Food availability data:

Food Availability Data System, USDA Economic Research Service. Available at http://www.ers.usda.gov/data-products/food-availability-(per-capita)-data-system.aspx

Appendix E-3.5: Reducing Saturated Fats in the USDA Food Patterns

RESEARCH QUESTION

What would be the effect on food choices and overall nutrient adequacy of limiting saturated fatty acids to 6% of total calories by substituting mono- and polyunsaturated fatty acids?

BACKGROUND

Note: Please see DGAC Report Appendix E3.1, *Modeling Analysis: Adequacy of USDA Food Patterns* for more background information about development of the USDA food patterns.

The USDA Food Patterns are intended to represent the types and amounts of foods that will provide sufficient nutrients to meet Institute of Medicine (IOM) nutrient recommendations and Dietary Guidelines for Americans recommendations, within calorie needs. They are updated every five years during the deliberations of the Dietary Guidelines Advisory Committee, and are presented to the Committee for their assessment of how well the Patterns meet their goals. As part of the update, amounts recommended from each food group may be modified to reach all or most of the specified goals.

Food Patterns are created at 12 energy levels. Each level is assigned nutrient goals for one or more age-gender groups, for whom the energy level is appropriate, based on IOM Estimated Energy Requirement equations.

The patterns do not reflect actual intakes of Americans from each food group. Amounts recommended from each food group may be more or less than are typically consumed, so that the overall patterns reach nutrient and other goals. However, the recommended amounts from each food group are compared to usual dietary intake patterns of the U.S. population, and kept within the broad range of consumption for Americans (between the 5^{th} and 95^{th} percentiles of consumption).

The patterns also do not reflect the form in which foods are typically consumed. In each group, food choices are represented by nutrient-dense forms of the foods, such as fat-free milk for all fluid milk, leanest beef cuts for all beef, and ready-to-eat cereals low in added sugars for all ready-to-eat cereals.

In addition to the major food groups, the USDA Food Patterns include recommended amounts or limits for oils, solid fats, and added sugars. Oils are included in the patterns as an essential food component, because they are the major source of linoleic acid, linolenic acid, and vitamin E.

Solid fats include fats naturally present in dairy products, meat, poultry, and eggs; lard; hydrogenated or partially hydrogenated fats and shortenings; cocoa butter; coconut oil; and palm oil. For analysis purposes, the fats in stick and tub margarines and margarine spreads are considered an equal mix of Oils and Solid Fats. Solid fats are generally solid at room temperature. They are not considered essential in the USDA Food Patterns, but are included to bring the calorie levels of each Pattern to the estimated energy requirement level for each age/sex group. This allows for some added fats or food group choices in higher fat forms in all Patterns. For example, the allowance for solid fats could be used to add butter to vegetables or bread, or to select whole milk rather than fat-free milk, regular cheese rather than reduced or low-fat cheese, regular ground beef rather than 95% lean ground beef, or chicken with skin rather than chicken without skin.

See the food pattern modeling report on Adequacy of the USDA Food Patterns for detailed information on the development and evaluation of the overall USDA Food Patterns.

METHODS

1. Identify the amounts and sources of saturated fats in the USDA Food Patterns.
2. Explore options for modifying the Food Patterns, based on sources of saturated fat in the patterns, and nutrient profiles of food pattern components.
   a. Remove all solid fats from the patterns and substitute iso-calorically with additional oils.
   b. Make additional modifications if needed to reach 6% of calories from saturated fat.
3. Determine the amount of saturated fat in patterns with oils substituted for solid fats.
4. Assess how the modification(s) would affect flexibility in food choices.
5. Determine how the level of saturated fat in the modified patterns compares to usual intake distributions. (Is this level of saturated fat within the broad range (5^{th} to 95^{th} percentiles) of usual intake?)

RESULTS

Amounts and sources of saturated fats in the USDA Food Patterns

The amounts of saturated fats in the Patterns were identified as part of the modeling analysis on Adequacy of the USDA Food Patterns. The amount, in grams and as a percent of calories, for the patterns at each calorie level, is shown in Table 1

Table 1. Amount of saturated fat in the USDA Food Patterns at each calorie level

Calorie level (goal)	Energy (actual)	Saturated fat (g)	Saturated fat (% of kcal)
1000	1003	9.7	8.7%
1200	1204	10.1	7.5%
1400	1399	11.1	7.1%
1600	1595	13.2	7.4%
1800	1798	15.0	7.5%
2000	2003	18.7	8.4%
2200	2198	19.7	8.1%
2400	2401	22.7	8.5%
2600	2604	24.3	8.4%
2800	2801	25.6	8.2%
3000	3001	28.8	8.6%
3200	3201	33.5	9.4%

Source: DGAC Report Appendix E3.1, *Modeling Analysis: Adequacy of USDA Food Patterns*, Tables E3.1.A7 and E3.1.A8

The sources of saturated fats in the Patterns were identified as part of the modeling analysis on Contributions of Food Groups to Nutrient Levels. As shown in Table 2, the major sources were identified as the solid fats and oils components. This is because foods used as representative nutrient-dense foods for each food group are those that are lean or low in fat. Therefore, Dairy and Protein Foods groups represent less saturated fat than would be expected with typical food choices.

Table 2. Percent contribution of each food group and food component to energy and saturated fat in the USDA Food Patterns

Food Group	Energy	Saturated Fat
	Percent of total, averaged across patterns	Percent of total, averaged across patterns
Fruits	9%	1%
Vegetables-Total	13%	3%
-Dark Green	0%	0%
-Red and Orange	2%	0%
-Beans and Peas	3%	0%
-Starchy	7%	2%
-Other	1%	1%
Whole Grains	15%	5%
Refined Grains	13%	5%
Protein Foods-Total	14%	20%
-Meat	4%	7%
-Poultry	4%	4%
-Seafood	2%	1%
-Nuts/seeds	2%	3%
-Eggs	2%	4%
-Soy Products	0%	0%
Dairy	11%	9%
Oils	12%	21%
Solid Fats	7%	36%
Added sugars	6%	0%

Source: Table E3.5.A1 Saturated fat sources in the USDA Food Patterns

Options for modifying the Patterns to reduce saturated fat

The first step selected for lowering the total saturated fat in the patterns was to remove solid fats from the patterns, because solid fats provide more than one-third of the saturated fat in the patterns, but also because solid fats are not considered essential so removing them would not affect nutrient adequacy of the patterns.

Because the modeling request was to substitute with mono- and polyunsaturated fats (MUFAs and PUFAs), oils were substituted. Oils are the major source in the patterns of MUFAs (36%--data not shown) and PUFAs (58%--data not shown). Because the patterns already contain oils, additional oils to substitute for solid fats were added to the amount already in each pattern.

The nutrient profiles for solid fat and oils in the USDA Food Patterns are a weighted average of the nutrient profiles of fats and oils in the U.S. food supply. Updated nutrient profiles for oils and solid fats used 2010 Food Availability data from USDA's Economic Research Service (ERS) and nutrient data for representative oils and fats from USDA's National Nutrient Database for Standard Reference 26 (SR26). Food supply data are used because NHANES does not specify the type of oil or solid fat for most foods, and therefore those data cannot be used to determine proportional consumption. The fats and oils represented in the nutrient profiles and their relative proportions are listed in table 3.

Table 3. Fats and oils included in the USDA Food Pattern analyses

Type of fat or oil	Percent* of the oils or solid fat profile
OILS	
Unhydrogenated soy oil	53%
Canola oil	22%
Olive oil	4%
Corn oil	10%
Sunflower oil	3%
Cottonseed oil	4%
Peanut oil	1%
Safflower oil	0%
Margarine (1/2 total)	3%
SOLID FATS	
Palm oil	8%
Palm Kernel oil	3%
Coconut oil	4%
Dairy fat (incl. butter)	24%
Pork fat (incl. lard)	7%
Vegetable shortening	19%
Beef fat (incl. tallow)	18%
Hydrogenated soy oil	15%
Margarine (1/2 total)	3%

* Estimates calculated from Economic Research Service Food Availability and Loss-Adjusted Food Availability tables for fats and oils (added), 2010. (http://www.ers.usda.gov/data-products/food-availability-(per-capita)-data-system/.aspx#26715) Additional data on fat content of beef, pork, and dairy foods from CNPP's Nutrient Content of the Food Supply, 2010.

All fats and oils are a combination of various fatty acids, but proportions differ between various types. Solid fats tend to have a higher percentage of saturated fats than do oils. This is true in the solid fats and oils composites for the Food Patterns. As shown in Table 4, saturated fatty

acids make up 41% of the total fatty acids in the solid fats profile, while they make up only about 14% of the total fatty acids in oils. Because oils contain so much less saturated fat than do solid fats, substitution of oils for solid fats should substantially lower the total amount of saturated fat in the patterns.

Table 4. Fatty acid profiles of solid fats and oils included in the USDA Food Pattern analyses

Type of fat or oil	% Saturated Fatty Acids	% Monounsaturated Fatty Acids	% Polyunsaturated Fatty Acids
OILS	13.6%	34.2%	47.7%
SOLID FATS	41.0%	34.2%	14.4%

Substitution of solid fats with oils

Solid fats represent from 59 to 336 total calories in the USDA Food Patterns. To substitute oils for these calories, all solid fats were removed from the patterns, and a corresponding amount of oil was added to the already existing amount of oil in each pattern, as shown in Table 5. This resulted in from 24 to 89 grams of oil in the patterns.

Table 5. Amounts of solid fats and oils in USDA Food Patterns and in Modified Patterns when oils are substituted for solid fats

Calorie level of pattern	Solid fats in USDA Food Pattern (kcal)	Oils in USDA Food Pattern (kcal)	Solid fats in Modified Pattern (kcal)	Oils in Modified Pattern (kcal)	Oils in Modified Pattern (g)
1000	84	131	0	215	25
1200	59	149	0	208	24
1400	59	149	0	208	24
1600	67	193	0	260	30
1800	92	210	0	302	35
2000	151	236	0	387	44
2200	151	254	0	405	46
2400	193	271	0	464	53
2600	210	298	0	508	58
2800	218	315	0	533	61
3000	260	385	0	645	74
3200	336	446	0	782	89

Saturated fat levels in Patterns when oils are substituted for solid fats

In the modified patterns with no solid fats and additional oil, the saturated fat levels meet or are close to 6% of calories (Table 6).

Table 6. Saturated fats in original and modified USDA Food Patterns

Calorie level of pattern	Saturated fat in USDA Food Patterns (% of kcal)	Saturated fat in Modified Patterns (% of kcal)
1000	8.7%	6.2%
1200	7.5%	6.1%
1400	7.1%	5.9%
1600	7.4%	6.2%
1800	7.5%	6.0%
2000	8.4%	6.2%
2200	8.1%	6.0%
2400	8.5%	6.1%
2600	8.4%	6.0%
2800	8.2%	5.9%
3000	8.6%	6.1%
3200	9.4%	6.3%

How would the proposed change affect overall nutrient adequacy of the patterns?
Eliminating solid fats from the patterns and substituting with oils has no negative effect on overall nutrient adequacy. The nutrients for which the solid fats and oils nutrient profiles differed the most were: sodium, choline, cholesterol, vitamin D, vitamin A (oils with smaller amounts than solid fats), and vitamin E (oils with larger amounts than solid fats). Only in the case of vitamin E did the substitution change the adequacy of the patterns. The vitamin E amounts in Patterns at 4 calorie levels that had been less than 90% of the RDA rose to at least 90% of the RDA.

How would the proposed modification affect flexibility in food choices?
This proposed change would have major impacts on the food choices allowed while following the Patterns. Representative foods used in this analysis are in their leanest or lowest-fat forms Some examples of food choices with zero solid fat are listed in Table 7, first column. In the current Food Patterns, individuals can choose a food with a higher fat content and still meet the Pattern guidelines by using some of their allowance for solid fats. Examples of foods with some solid fat are shown in Table 7, column 3, and the amount of solid fat they contain in column 4. If the allowance for solid fat is removed, individuals would no longer have the option to select a higher fat form of a food and stay within the Pattern guidelines. Because most food choices in the Dairy and Protein Foods groups contain some amount of solid fat, they would not be allowed in any amount in the modified Patterns and choices would be quite limited. For example, 1%

milk contains 1 gram of solid fat per cup, and therefore would not meet the guidelines of modified Food Patterns with 6% of calories from saturated fat.

Table 7. Examples of nutrient-dense foods with no or low solid fat content and similar foods with higher solid fat content

Foods in most nutrient-dense form	Solid fat in nutrient-dense form	Foods with some solid fat	Additional solid fat in alternate food choice
Fat-free milk	0	Low-fat (1%) milk	1 g per cup
		Reduced-fat (2%) milk	3 g per cup
Fat-free yogurt	0	Low-fat yogurt	2 g per cup
Fat-free mozzarella cheese	0	Part-skim mozzarella cheese	7 g per 1.5 ounces
95% lean ground beef	0	85%-89% lean ground beef	5 g per 3 ounces
Broiled beef steak, lean only eaten	0	Broiled beef steak, lean and fat eaten	5 g per 3 ounces
Roast chicken without skin	0	Roast chicken with skin	4 g per 3 ounces
Egg white	0	Hard cooked egg	2 g per egg

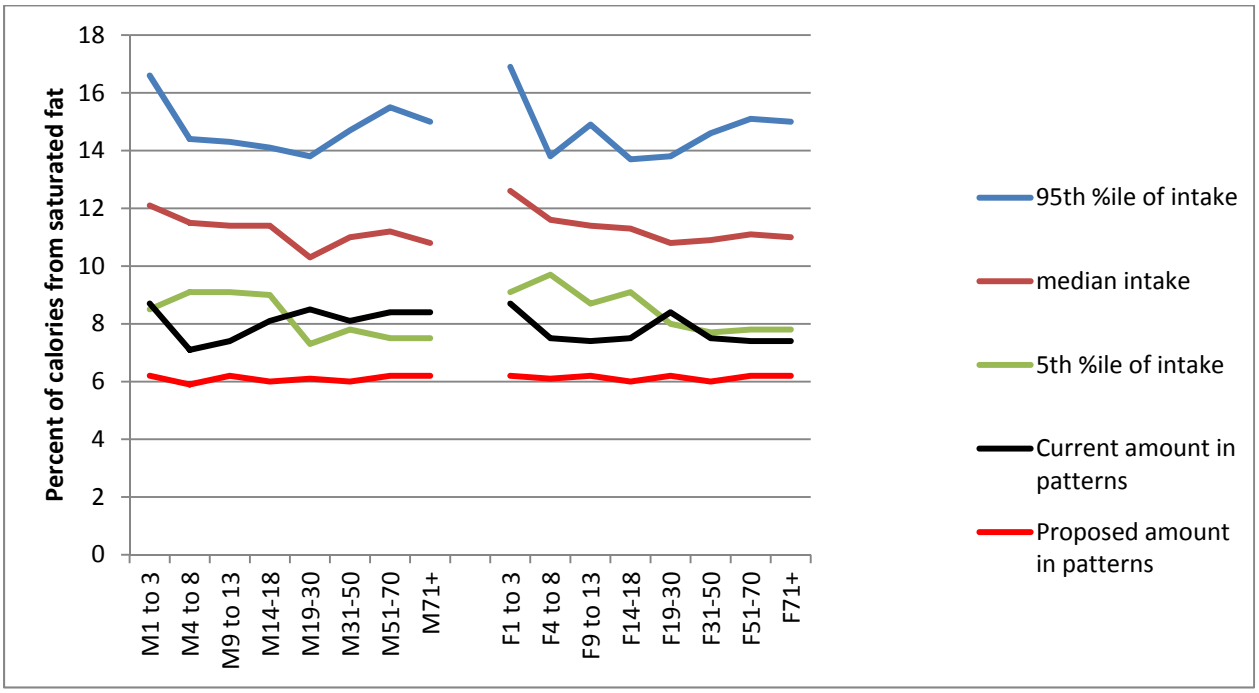
In addition to limiting food choices in the Dairy and Protein Foods groups, the high amount of oils in the Patterns might be challenging to incorporate into daily food choices. While for some uses of solid fats, oils can be readily substituted, there are other food choices or food preparation methods where the substitution might be challenging. Using oils to prepare (sauté, stir-fry) and season meats and vegetables is one way to include more oils in the diet. Using oil-based salad dressings is another. However, many consumers prefer butter or margarine to oils as a spread on bread and rolls, and would not consider making a change to oils on their bread. Also, most fat-free cheeses do not have the melting characteristics of regular cheese and would not be considered an acceptable substitute. Lowfat yogurt and milk are also considered more acceptable by many than the fat-free versions.

Comparison of saturated fat in modified patterns with distribution of usual intakes of saturated fat

A goal for the USDA Food Patterns is to keep recommended amounts to within the broad range of usual intakes. This broad range is defined as within the 5th to the 95th percentiles of intake, as determined based on data from the National Health and Nutrition Examination Survey (NHANES). Note that the amounts of whole grains in the patterns do exceed the 95th percentile of intake, violating this goal. For nutrients over-consumed by Americans, this means that recommended amounts should not be substantially less than the amounts now consumed by the 5% of the population with lowest intakes. The 5th percentile of intake for saturated fat for the overall population is now 7.9%, approximately the level of saturated fat intake in the Food

Patterns. The lower goal of 6% of calories from saturated fat is less than the 5th percentile of intake for all age-sex groups, as shown in Figure 1.

Figure 1. Comparison of saturated fat in current and proposed USDA Food Patterns to Usual Intake levels, NHANES 2007-10



SUMMARY

The major source of saturated fat in the USDA Food Patterns is a small allowance for solid fat, which may be used to consume foods naturally containing solid fats (such as Dairy products, Meats, Poultry, and Eggs) or to consume foods that have solid fats added in processing or preparation. The amount of saturated fats in the USDA Food Patterns can be decreased from the current 7.9% to approximately 6% of calories by substituting oils, a source of MUFAs and PUFAs, for the allowance for solid fats in the patterns. This change, while feasible in theory, would result in substantial limitations on selections of foods, especially in the Dairy and Protein Foods groups. It also might be challenging for many consumers to learn how to incorporate the additional amount of oils needed for the iso-caloric substitution into their diets. The current USDA Food Patterns contain a level of saturated fat that is approximately at the 5th percentile of intake in the U.S. The proposed revision would lower that level to below the 5th percentile of intake. It is not known how many individuals consume about 6% of calories from saturated fat.

Data sources for update of USDA Food Patterns

Nutrient data:

USDA National Nutrient Database for Standard Reference, Release 26. Available at http://ndb.nal.usda.gov/

Food intake data:

What We Eat in America (WWEIA), National Health and Nutrition Examination Survey 2009-10. Available at http://seprl.ars.usda.gov/Services/docs.htm?docid=13793

Food Group data:

Food patterns equivalents database (FPED) for WWEIA 2009-10: Available at http://seprl.ars.usda.gov/Services/docs.htm?docid=23869

Usual Intake distributions:

Usual Dietary Intakes: Food Intakes, US Population, 2007-10, National Cancer Institute. Available at http://appliedresearch.cancer.gov/diet/usualintakes/pop/2007-10/

Food availability data:

Food Availability Data System, USDA Economic Research Service. Available at http://www.ers.usda.gov/data-products/food-availability-(per-capita)-data-system.aspx

Table E3.5.A1 Saturated fat sources in the USDA Food Patterns

CALORIE LEVEL OF PATTERN	1000	1200	1400	1600	1800	2000	2200	2400	2600	2800	3000	3200
	g	g	g	g	g	g	g	g	g	g	g	g
FRUITS	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
VEGETABLES	0.2	0.3	0.3	0.4	0.5	0.5	0.6	0.6	0.7	0.7	0.8	0.8
Dark-green	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Orange	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Legumes	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Starchy	0.1	0.2	0.2	0.2	0.3	0.3	0.4	0.4	0.4	0.4	0.5	0.5
Other veg.	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2
GRAINS	0.8	1.1	1.4	1.4	1.6	1.6	1.9	2.2	2.5	2.7	2.7	2.7
Whole grains	0.4	0.5	0.7	0.8	0.8	0.8	0.9	1.1	1.2	1.3	1.3	1.3
Other grains	0.4	0.6	0.7	0.6	0.9	0.9	1.0	1.1	1.3	1.4	1.4	1.4
PROTEIN FOODS	1.4	2.1	2.7	3.4	3.4	3.8	4.1	4.4	4.4	4.8	4.8	4.8
Meats	0.5	0.8	1.0	1.2	1.2	1.4	1.5	1.7	1.7	1.8	1.8	1.8
Poultry	0.3	0.4	0.6	0.7	0.7	0.8	0.8	0.9	0.9	1.0	1.0	1.0
Fish-Hi n3	0.0	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.2	0.2
Fish-Lo n3	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2
Eggs	0.3	0.4	0.5	0.6	0.6	0.7	0.7	0.8	0.8	0.9	0.9	0.9
Soy products	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Nuts & Seeds	0.2	0.3	0.5	0.6	0.6	0.6	0.7	0.8	0.8	0.8	0.8	0.8
DAIRY	1.1	1.4	1.4	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
Oils	2.0	2.3	2.3	3.0	3.3	3.7	3.9	4.2	4.6	4.9	6.0	6.9
Solid fats	4.1	2.9	2.9	3.3	4.5	7.4	7.4	9.4	10.2	10.6	12.7	16.4
Added Sugars	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Saturated fat (g):	9.7	10.1	11.1	13.2	15.0	18.7	19.7	22.7	24.3	25.6	28.8	33.5
Total calories in pattern	1003	1204	1399	1595	1798	2003	2198	2401	2604	2801	3001	3201

Table continues on next page

Table E3.5.A1 Saturated fat sources in the USDA Food Patterns, continued

CALORIE LEVEL OF PATTERN	1000	1200	1400	1600	1800	2000	2200	2400	2600	2800	3000	3200
Percent of calories from saturated fat:												
In total pattern	8.7%	7.5%	7.1%	7.4%	7.5%	8.4%	8.1%	8.5%	8.4%	8.2%	8.6%	9.4%
From food groups	3.2%	3.7%	3.8%	3.9%	3.6%	3.5%	3.4%	3.4%	3.3%	3.2%	3.0%	2.9%
From oils	1.8%	1.7%	1.5%	1.7%	1.6%	1.6%	1.6%	1.6%	1.6%	1.6%	1.8%	1.9%
From solid fats	3.7%	2.1%	1.8%	1.8%	2.3%	3.3%	3.0%	3.5%	3.5%	3.4%	3.8%	4.6%

Appendix E-3.6: Dairy Group and Alternatives

RESEARCH QUESTIONS

- What would be the impact on the adequacy of the patterns if (1) no Dairy foods were consumed, (2) if calcium was obtained from nondairy sources (including fortified foods), and (3) if the proportions of milk and yogurt to cheese were modified?
- What is the relationship between changes in types of beverages consumed (milk compared with sugar-sweetened beverages) and diet quality?

BACKGROUND

Note: Please see DGAC Report Appendix E3.1, *Modeling Analysis: Adequacy of USDA Food Patterns* for more background information about development of the USDA food patterns.

The USDA Food Patterns are designed to meet the known nutrient needs of the age/gender groups for which they are targeted within calorie constraints. The patterns include recommended amounts to eat from five major food groups, one of which is the Dairy Group. The Dairy Group includes fluid milks, soymilk, cheeses, yogurt, and other foods that contain these dairy products, such as milk-based meal replacements, ice cream, and other frozen desserts. Other plant-based "milks" such as almond milk and rice drinks are currently not included in the Dairy group. Traditionally, the Dairy Group has been identified as a separate food group because it is the primary source of calcium, a nutrient of public health concern in American diets. In addition, dairy products are a major source of other nutrients of concern—potassium and vitamin D, and shortfall nutrients, including magnesium, and vitamin A. In the U.S., 42% of individuals 1 year and over have calcium intakes below the EAR, and 94% have intakes of vitamin D below the EAR (1). According to 2010 food supply data, 71.8 percent of the calcium consumed by Americans is from milk and milk products (2).

Over time, the mix of products consumed within the Dairy Group has shifted, with less fluid milk and more cheese being consumed. Much of the increase in cheese consumption has come from mixed dishes including cheese, such as pizza, burgers, pasta dishes, and other grain-based dishes. The nutrient content of cheese differs somewhat from that of milk. Therefore, the USDA Food Patterns have created a nutrient profile for the Dairy Group that contains cheese, yogurt, and soymilk in addition to milk, to reflect the nutrients that would be obtained from consuming a typical mix of foods from this group, in nutrient-dense forms.

The USDA Food Patterns include 3 cup equivalents of dairy products per day in patterns that are targeted to preteens, teens, and adults. The amounts included for younger children are 2 cups for 2 and 3 year olds, and 2 ½ cups for 4 to 8 years olds. For various reasons, some individuals do not consume dairy products. Therefore, the 2010 Dietary Guidelines for Americans (p. 38) noted:

"Milk and milk products contribute many nutrients, such as calcium, vitamin D (for products fortified with vitamin D), and potassium, to the diet. Moderate evidence shows that intake of milk and milk products is linked to improved bone health, especially in children and adolescents.

Moderate evidence also indicates that intake of milk and milk products is associated with a reduced risk of cardiovascular disease and type 2 diabetes and with lower blood pressure in adults."

"It is especially important to establish the habit of drinking milk in young children, as those who consume milk at an early age are more likely to do so as adults. For individuals who are lactose-intolerant, low-lactose and lactose-free milk products are available."

This analysis was conducted to examine the nutritional consequences of not consuming milk and milk products, to explore possible food alternatives to fill the nutrient gaps left in the diet if milk and milk products are not consumed, to examine any potential benefits of shifting amounts consumed within the Dairy Group from cheese to more fluid milk, and to examine the differences in diet quality when substituting sugar-sweetened beverages (soft drinks, fruit drinks, sports beverages, etc.) for milk.

METHODS

1. For each nutrient assessed in the food intake patterns, identified the amounts and proportions of the nutrient contributed by the Dairy Group in the current patterns.

2. Removed Dairy Group recommended intakes from the patterns and identified the nutrients that were less than goal amounts at each calorie level.

3. Identified the amount of non-dairy sources of calcium that would be needed to bring calcium to adequate amounts, and identified their other nutrient contributions if used as alternatives to dairy products.

4. Calculated changes in nutrient levels in each pattern, and the most feasible ways to compensate through alternative food selections, without exceeding the caloric level of the pattern, if no dairy products were consumed.

5. Identified changes in the nutrients provided by the Dairy Group with varying proportions of low fat or fat-free fluid milk and cheese:
    a. Current intake proportions (roughly 52% fluid milk, 45% cheese)
    b. All fluid fat-free milk
    c. 2 cup equivalents fluid fat-free milk and 1 cup equivalent lowfat cheese (67%, 33%)

6. Identified changes in the nutrients provided in each pattern if fluid milk was replaced in the pattern with sugar sweetened beverages.

RESULTS

Nutrient Contribution of Dairy Group in USDA Food Patterns

The USDA Food Patterns at 1600 – 3200 calories include 3 cup equivalents from the Dairy Group, which contributes 7 to 14 percent of the calories in the patterns. As shown in Table 1, the

Dairy Group is a proportionately greater contributor to levels of protein, calcium, magnesium, phosphorus, potassium, zinc, selenium, vitamin A, vitamin D, riboflavin, vitamin B-12, and choline than to calories in the patterns. In the 2000 calorie pattern, the Dairy Group contributes only 12 percent of the calories, but almost 70 percent of the calcium and 65 percent of the vitamin D; 33-42 percent of the phosphorus, vitamin A, riboflavin, and vitamin B-12; and 21-29 percent of the protein, potassium, zinc, and choline. The Dairy group also contributes considerable amounts of sodium to the patterns, with the majority of this being from cheese. Of the 35% of sodium from the Dairy group (Table 1), almost 25% comes from cheese and just over 10% from milk, yogurt, and soymilk.

Table 1. Amount and Proportion of Selected Nutrients in USDA Food Patterns Contributed by the Dairy Group.

	Nutrient Amount in 2000 calorie Pattern*	Proportion from Dairy Group in the 2000 calorie Pattern	Proportion from Dairy Group—Range in Patterns from 1600 to 3200 calories*
Energy (kcal)	231 kcal	12%	7-14%
Macronutrients			
Protein	26 g	29%	22-31%
Total Lipid (Fat)	2.8 g	4%	2-5%
Carbohydrate	25.3 g	10%	6-13%
Minerals			
Calcium	884 mg	69%	59-73%
Iron	0.3 mg	2%	1-2%
Magnesium	60 mg	17%	12-19%
Phosphorus	696 mg	41%	31-44%
Potassium	706 mg	21%	15-25%
Sodium	605 mg	35%	26-39%
Zinc	3.4 mg	24%	17-26%
Vitamins			
Vitamin A (in µg RAE)	295 µg	33%	24-37%
Vitamin E (in mg AT)	0.1 mg	1%	1-2%
Vitamin D	178 IU	65%	57-67%
Riboflavin	0.9 mg	42%	32-46%
Vitamin B-12	2.5 µg	36%	29-38%
Choline	73 mg	21%	16-24%
Fats and Fatty Acids			
Cholesterol	20 mg	10%	7-11%
Saturated Fatty Acids	1.6 g	9%	5-13%
Monounsaturated Fatty Acids	0.8 g	3%	2-4%
Polyunsaturated Fatty Acids	0.2 g	1%	1%

* Patterns include 3 cup equivalents from the Dairy Group.

Data sources: NHANES 2009-2010 and NDB-SR26

Since some nutrients are provided in ample amounts in the USDA Food Patterns, an additional analysis was conducted to determine which nutrient levels would fall below goal amounts if the Dairy Group was eliminated from the patterns. Table 2 shows summarized results of nutrient levels as actual amounts and percent of nutrient goals in the base USDA Food Patterns and patterns from which the Dairy Group has been removed. When the Dairy Group is removed, levels of calcium, magnesium, iron, vitamin A, and riboflavin drop below 100 percent of goals in some or all patterns. In addition, levels of potassium, Vitamin D, and choline, which are below goals in the base patterns, drop substantially lower in patterns with no Dairy Group. Shortfalls relative to goals when the Dairy Group is removed are largest for calcium, vitamin D, potassium, and choline. Removing the Dairy Group lower calcium levels by 68-88%, placing all age/gender groups well below recommended levels, bring vitamin A levels to 67% and 71% of recommended levels for older males and females respectively, lower vitamin D levels on all age/gender groups by 20-30%, lower potassium levels 15% across all age/gender groups, and lower magnesium to 69% of recommended levels for older men. (See all data in Table A1 and end of document).

Table 2. Comparison of Selected Nutrient Levels (Amounts and % of Goal) in Food Patterns at Selected Calorie Levels with Dairy Group Included (3 Milk) and Excluded (0 Milk).

Calorie Level	**1600**	**1600**	**2000**	**2000**	**2400**	**2400**
Target age/sex group	**F 51-70**	**F 51-70**	**F 19-30**	**F 19-30**	**M 19-30**	**M 19-30**
Dairy Group Cup eqs	3 Milk	0 Milk	3 Milk	0 Milk	3 Milk	0 Milk
Energy (kcal)	1595	1364	2003	1773	2401	2171
Macronutrients						
Protein	83 g	57g	91 g	65 g	106 g	80 g
% of RDA	180%	123%	198%	142%	189%	143%
% of calories	21%	17%	18%	15%	18%	15%
Total Lipid (Fat)	55 g	52 g	72 g	70 g	87 g	84 g
% of calories	31%	34%	33%	35%	33%	35%
Carbohydrate	201 g	176 g	256 g	231 g	310 g	284 g
% of RDA	155%	135%	197%	178%	238%	219%
% of calories	50%	51%	51%	52%	52%	52%
Minerals						
Calcium	1215 mg	331 mg	1274 mg	390 mg	1377 mg	493 mg
% of RDA	101%	28%	127%	39%	138%	49%
Iron	14 mg	14 mg	17 mg	16 mg	21 mg	21 mg
% of RDA	181%	177%	93%	91%	266%	262%
Magnesium	311 mg	251 mg	352 mg	292 mg	420 mg	360 mg
% of RDA	97%	78%	114%	94%	105%	90%
Phosphorus	1585 mg	889 mg	1717 mg	1021 mg	1964 mg	1268 mg

% of RDA	226%	127%	245%	146%	281%	181%
Potassium	2863 mg	2157 mg	3348 mg	2642 mg	3799 mg	3093 mg
% of AI	61%	46%	71%	56%	81%	66%
Sodium	1570 mg	965 mg	1751 mg	1146 mg	2047 mg	1442 mg
% of UL	68%	42%	76%	50%	89%	63%
Zinc	13 mg	10 mg	14 mg	11 mg	17 mg	14 mg
% of RDA	165%	122%	178%	135%	155%	124%
Vitamins						
Vitamin A (in µg RAE)	794 µg	499 µg	900 µg	605 µg	1025 µg	730 µg
% of RDA	113%	71%	129%	86%	114%	81%
Vitamin E (in mg AT)	8.2 mg	8.0 mg	10.2 mg	10.1 mg	12.0 mg	11.9 mg
% of RDA	54%	54%	68%	67%	80%	79%
Vitamin D	266 IU	88 IU	274 IU	96 IU	294 IU	116 IU
% of RDA	44%	15%	46%	16%	49%	19%
Riboflavin	1.9 mg	1.0 mg	2.1 mg	1.2 mg	2.4 mg	1.5 mg
% of RDA	174%	95%	191%	111%	184%	116%
Vitamin B-12	6.5 µg	4.1 µg	6.9 µg	4.4 µg	7.9 µg	5.4 µg
% of RDA	273%	169%	287%	183%	327%	224%
Choline	311 mg	237 mg	348 mg	275 mg	402 mg	329 mg
% of RDA	73%	56%	82%	65%	73%	60%
Fats and Fatty Acids						
Cholesterol	190 mg	170 mg	215 mg	195 mg	251 mg	231 mg
% of goal (<300 mg/day)	63%	57%	72%	65%	84%	77%
Saturated Fatty Acids	13.2 g	11.5 g	18.7 g	17.1 g	22.7 g	21.0 g
% of calories	7%	8%	8%	9%	8%	9%
Monounsaturated Fatty Acids	19.8 g	19.0 g	26.3 g	25.5 g	31.6 g	30.8 g
% of calories	11%	13%	12%	13%	12%	13%
Polyunsaturated Fatty Acids	17.8 g	17.6 g	22.5 g	22.2 g	26.7 g	26.5 g
% of calories	10%	12%	10%	11%	10%	11%

Data sources: NHANES 2009-2010 and NDB-SR26

Non-dairy alternatives to milk

A number of food sources of calcium, including non-dairy sources, were listed in the 2005 and 2010 Dietary Guidelines for Americans. To determine if any of these non-dairy calcium sources were comparable to the Dairy Group, the nutrient levels in non-dairy food sources were examined for all nutrients provided in substantial amounts by the Dairy Group. Only food sources with complete USDA nutrient data were considered in this analysis. Their nutrient levels were considered in two ways: First, the amounts of these nutrients in a standard amount of the food, such as 1 cup, ½ cup, or 3 ounces, which can be considered to be a typical portion size (Table 3). Second, the amounts of the foods that provided 300 mg of calcium, the amount in 1

cup equivalent from the Dairy Group, were calculated and levels of the other nutrients identified (Table 4).

Non-dairy foods that provide a similar amount of calcium to milk within a typical portion size include calcium-fortified almond milk, calcium-fortified rice drink, calcium-fortified orange juice, and canned sardines with bones. All of these also provide ample amounts of magnesium in comparison to milk. Almond milk and rice drinks that are fortified with vitamins A and D in addition to calcium also provide ample amounts of those nutrients although are both low in potassium and protein when compared to milk. Fortified orange juice and sardines also provide potassium and vitamin D, but much less vitamin A. Some types of tofu provide calcium in amounts similar to milk, but the amount of calcium varies widely based on the firmness of the product and the salt (eg. calcium sulfate, magnesium chloride, calcium chloride) used to precipitate the tofu. All tofu provides at least some protein and potassium, but not vitamins A or D. In addition, all of the potential Dairy Group alternatives contain more calories than fat-free milk in a common portion except the soft tofu and dark green vegetables (collards, spinach, kale, and broccoli).

Table 3. Calcium and Selected Other Nutrients in Standard Amounts of the Dairy group and selected foods in the group, compared to and Non-Dairy Calcium Sources.

	Std Amt	Energy kcal	Protein g	Calcium mg	Magne-sium mg	Potas-sium mg	Vitamin A µg RAE	Vitamin D IU
Dairy Group Profile	1 cup equiv	77	8.7	295	20	235	98	59
Selected foods in Dairy Group:								
Fat-free milk	1 cup	83	8.3	299	27	382	149	116
Fat-free flavored yogurt (w/ low calorie sweetener)	8 ounces	97	8.8	324	29	401	5	107
Fat-free mozzarella cheese	1½ ounces	60	13.5	408	14	45	54	0
Soymilk, unswtnd, w/ added Ca, vit A & D*	1 cup	80	6.95	301	39	292	134	119
Non-Dairy calcium sources:								
Almond milk, chocolate	1 cup	120	1.51	451	29	180	151	101
Rice Drink, unswtnd, w/ added Ca, vit A & D	1 cup	113	0.67	283	26	65	151	101
Tofu, raw, regular, prep w/ Ca sulfate	1/2 cup	94	10.02	434	37	150	5	0
Tofu, soft "silken", made with calcium chloride	1/2 cup	76	8.12	138	33	149	0	0
Tofu, extra firm, prep w/ nigari (MgCl)	1/2 cup	113	12.26	217	66	164	0	0
Tofu, firm, prep w/ Ca sulfate & MgCl	1/2 cup	88	10.32	253	47	186	0	0

Orange Juice, fortified w/ Ca and vit D	1 cup	117	1.69	349	27	443	5	100
Collards, frozen, ckd	1/2 cup	31	2.52	178	26	213	489	0
Spinach, frozen, ckd	1/2 cup	32	3.81	145	78	287	573	0
Kale, frozen, ckd	1/2 cup	20	1.85	90	12	209	478	0
Broccoli, frozen, ckd	1/2 cup	26	2.85	30	12	131	47	0
Soybeans, green, ckd	1/2 cup	127	11.12	130	54	485	7	0
White beans, cnd	1/2 cup	149	9.51	96	67	595	0	0
Almonds, dry roasted	1 oz	170	5.94	76	79	202	0	0
Sardines, cnd, w/bone	3 oz	177	20.94	325	33	338	27	164
Salmon, cnd, w/bone	3 oz	120	18.22	212	26	255	15	328

* Soymilk is part of Dairy Group. It is included in the table for comparison to other plant-based "milks."
Data Source: USDA National Nutrient Database for Standard Reference, Release 26.

The second way in which these nondairy calcium alternatives were considered was in a portion that contained about 300 mg of calcium (Table 4). Amounts of almond milk, rice drink, and orange juice had similar amounts of calcium to milk in a portion size of 1 cup or less. The portion of tofu made with calcium sulfate was about 1/3 cup, sardines and salmon about 3 to 4 ounces, and cooked dark green vegetables from about 1 cup up to 5 cups. Almonds and white beans also had relatively large portion sizes. All of the alternatives except sweetened vanilla/chocolate almond milk, tofu made with calcium sulfate, orange juice, and the dark green leafy vegetables had energy content greater than that for fat-free milk in portions with similar calcium content. Vitamin D amounts were low in all alternatives except the fish with bones and vitamin D-fortified products. Vitamin A was low in all but the dark green vegetables and the vitamin A-fortified products. Potassium was equal to or higher than the amount in milk in all but the almond milk, rice drink, and some tofu.

Table 4. Amount of Non-Dairy Calcium Sources with Calcium Equivalent to 1 Cup Milk and Amount of Selected Other Nutrients in that Amount.

	Std Amt	Energy kcal	Protein g	Calcium mg	Magne-sium mg	Potas-sium mg	Vitamin A µg RAE	Vitamin D IU
Dairy Group Profile	**1 cup equiv**	**77**	**8.7**	**295**	**20**	**235**	**98**	**59**
Almond milk, chocolate	~2/3 cup	80	1.01	300	19	120	101	67
Rice Drink, unswtnd, w/ added Ca, vit A & D	1 cup	113	0.67	283	26	65	151	101
Tofu, raw, regular, prep w/ Ca sulfate	~1/3 cup	65	6.91	299	26	104	3	0
Tofu, soft "silken", made with calcium chloride	~ 1 cup	165	17.71	300	73	324	0	0
Tofu, extra firm, prep w/ nigari (MgCl)	~2/3 cup	156	16.91	299	91	226	0	0

Tofu, firm, prep w/ Ca sulfate & MgCl	~5/8 cup	105	12.28	301	55	222	0	0
Orange Juice, fortified w/ Ca and vit D	~7/8 cup	101	1.46	300	24	382	4	86
Collards, frozen, ckd	~7/8 cup	51	4.22	298	43	356	816	0
Spinach, frozen, ckd	1 cup	65	7.62	291	156	574	1146	0
Kale, frozen, ckd	1-2/3 cup	65	6.17	300	39	697	1596	0
Broccoli, frozen, ckd	5 cup	258	28.52	304	120	1306	469	0
Soybeans, green, ckd	1.1 cup	279	24.45	287	119	1067	16	0
White beans, cnd	1.6 cup	478	30.43	306	214	1903	0	0
Almonds, dry roasted	4 oz	678	23.77	304	316	809	0	0
Sardines, cnd, w/bone	2.8 oz	165	19.54	303	31	315	25	153
Salmon, cnd, w/bone	4.2 oz	168	25.5	296	36	357	21	459

* Soymilk is part of Dairy Group. It is included in the table for comparison to other plant-based "milks."
Data Source: USDA National Nutrient Database for Standard Reference, Release 26.

Considering that 3 cup equivalents from the Dairy Group is recommended for all individuals 9 and older, the amount of many potential alternatives to provide sufficient calcium would provide too many calories and/or be a large amount to consume daily. In addition, the question of bioavailability of the calcium in vegetable products has not been addressed and could pose a concern. However, there are several calcium- and vitamin D-fortified beverages that may be suitable alternatives to milk. Of these, the product most similar to milk is calcium–fortified soymilk which is identified as part of the Dairy Group. Calcium-fortified almond milk, rice drink, or orange juice are also alternatives to consider for calcium and some other nutrients, but they differ from milk in some potentially important nutrients (See Figure). Tofu made with calcium sulfate is also an option that offers many of the nutrients in milk, but not vitamins A or D. While it would not be typical for most American to consume sufficient sardines or canned salmon with bones on a regular basis to provide all the calcium needed, they do offer the advantage of also providing vitamin D in ample amounts. Some consumers could replace milk with a combination of these alternatives, for example, selecting a combination of calcium-fortified orange juice, collard greens, and canned salmon with bones.

Effect of altering the composition of the Dairy Group to include more milk and less cheese

The Dairy Group in current patterns is composed of nutrient-dense forms of milk, yogurt, and cheese in the same relative proportions as they appear in the average American diet: 53 percent milk, 45 percent cheese, and 2 percent yogurt. On a cup equivalent basis, milk is richer than cheese in a number of nutrients for which the Dairy Group is an important contributor. Thus, this analysis explored the effect on nutrient levels in the food patterns of increasing the proportion of milk relative to cheese. Current patterns were compared to patterns in which cheese was limited to 1 ounce per day, about 23% of the total Dairy recommendation in Patterns

with 3 cup equivalents of Dairy. (A cup-equivalent of cheese is 1.5 ounces, so 1 ounce is 2/3 of a cup equivalent.) Proportions of milk, yogurt, and soymilk were all increased to 67%, 5%, and 5% respectively (Table 5).

Increasing the proportion of fat-free milk consumed to meet Dairy Group recommendations would increase levels of magnesium, potassium, vitamin A, vitamin D, and choline in the patterns, and decrease amounts of sodium, cholesterol and saturated fatty acids. It especially boosts levels of potassium and vitamin D, nutrients that are below intake goals in all patterns.

Table 5. Comparison of Selected Nutrient Levels (% of Goal and % of Calories) in USDA Food Patterns with less cheese and more milk, yogurt, and soymilk in the Dairy Group .

Nutrient (Goal)	1800 kcal Base Pattern[1]	1800 kcal Pattern with Less cheese[2]	1600 kcal Base Pattern[1]	1600 kcal Pattern with Less cheese[2]
	% of goal for F 14-18	% of goal for F 13-18	% of goal for F 51-70	% of goal for F 51-70
Energy (kcal level)	100	101	100	101
Protein (≥ RDA)	190	189	180	179
Calcium (≥ RDA)	97	98	101	102
Magnesium (≥ RDA)	94	98	97	101
Potassium ≥ AI)	67	72	61	66
Vitamin A (≥ RDA)	125	134	113	123
Vitamin D (≥ RDA)	45	56	44	56
Choline (≥ AI)	81	87	73	78
Sodium (< UL)	74	72	68	62
Cholesterol (<300 mg/day)	64	63	63	62
	% kcal	% kcal	% kcal	% kcal
Protein	18.2	19	21	20
Carbohydrate	51.2	53	50	52
Total Lipid	32.6	30	31	30
Saturated Fatty Acids	8	7	7	7

[1] Base Pattern Dairy Group composition is 53% fat-free milk, 45% lowfat cheese, and 2% yogurt.
[2] Less Cheese Dairy Group composition is 67% fat-free milk and 23% lowfat cheese, 5% yogurt, and 5% soymilk.
Data sources: NHANES 2009-2010 and NDB-SR26

Effect of substituting milk with sugar sweetened beverages on diet quality

The Dairy Group contributes to meeting many nutrients leading to higher diet quality. Table 6 illustrates how diet quality would be affected if one was to eliminate milk from the diet and replace it with soft drinks, fruit drinks, sports beverages, and other sugar sweetened beverages.

Table 6. Comparison of Selected Nutrient Levels (% of Goal and % of Calories) in Base USDA Food Pattern and Pattern Replacing Fluid Milk with Added Sugars

Nutrient (Goal)	1800 kcal Base Pattern[1]	1800 kcal Pattern with no fluid milk[2]	1600 kcal Base Pattern[1]	1600 kcal Pattern with no fluid milk[2]
	% of goal for F 14-18	% of goal for F 13-18	% of goal for F 51-70	% of goal for F 51-70
Energy (1800, 2000 kcal)	100%	100%	100%	100%
Protein (≥ RDA)	190%	163%	180%	152%
Calcium (≥ RDA)	97%	61%	101%	62%
Magnesium (≥ RDA)	94%	82%	97%	83%
Potassium ≥ AI)	70%	54%	61%	48%
Vitamin A (≥ RDA)	125%	104%	113%	78%
Vitamin D (≥ RDA)	45%	16%	44%	16%
Choline (≥ AI)	81%	70%	73%	59%
Sodium (< UL)	74%	69%	68%	61%
Cholesterol (<300 mg/day)	64%	62%	63%	61%
	% kcal	% kcal	% kcal	% kcal
Protein	19%	17%	21%	18%
Carbohydrate	52%	55%	50%	54%
Total Lipid	31%	30%	31%	31%
Saturated Fatty Acids	8%	8%	7%	7%

[1] Base Pattern Dairy Group composition is 53% fat-free milk, 45% lowfat cheese, and 2% nonfat yogurt.
[2] Replacing fluid milk with added sugars from sugar sweetened beverages.
Data sources: NHANES 2009-2010 and NDB-SR26

Lower intakes of calcium magnesium, potassium, Vitamin A, Vitamin D, choline and higher intakes of added sugars would decrease diet quality and place one further away from reaching nutrient recommendations.

SUMMARY

The Dairy Group is a key contributor of calcium, vitamin D, phosphorus, vitamin A, riboflavin, vitamin B-12, potassium, and choline in the food patterns. If no milk products or alternative choices are consumed, calcium, magnesium, phosphorus, vitamin A, vitamin D, potassium, and choline are negatively impacted. Shortfalls relative to goals are largest for calcium, vitamin D, potassium, and choline. None of the alternatives to milk and milk products provide a similar enough nutrient profile in terms of these impacted nutrients to be considered for inclusion in the Dairy Group. However, alternative calcium choices could be selected in combinations that together provide the range of nutrients needed.

While all foods in the Dairy group provide calcium and the other nutrients of interest, some tend to have lower levels of desired nutrients and/or higher levels of sodium and saturated fat.

Selecting more of the recommended 3 cup equivalents per day from fluid lowfat or fat-free milk than the current proportions consumed, and less from cheese, would provide more potassium, vitamin A, vitamin D, and choline in the patterns, and decrease amounts of sodium, cholesterol and saturated fatty acids.

Substituting sugar-sweetened beverages for the amounts of fluid milk in the patterns would lead to decreased diet quality and leave one further from meeting nutrient recommendations.

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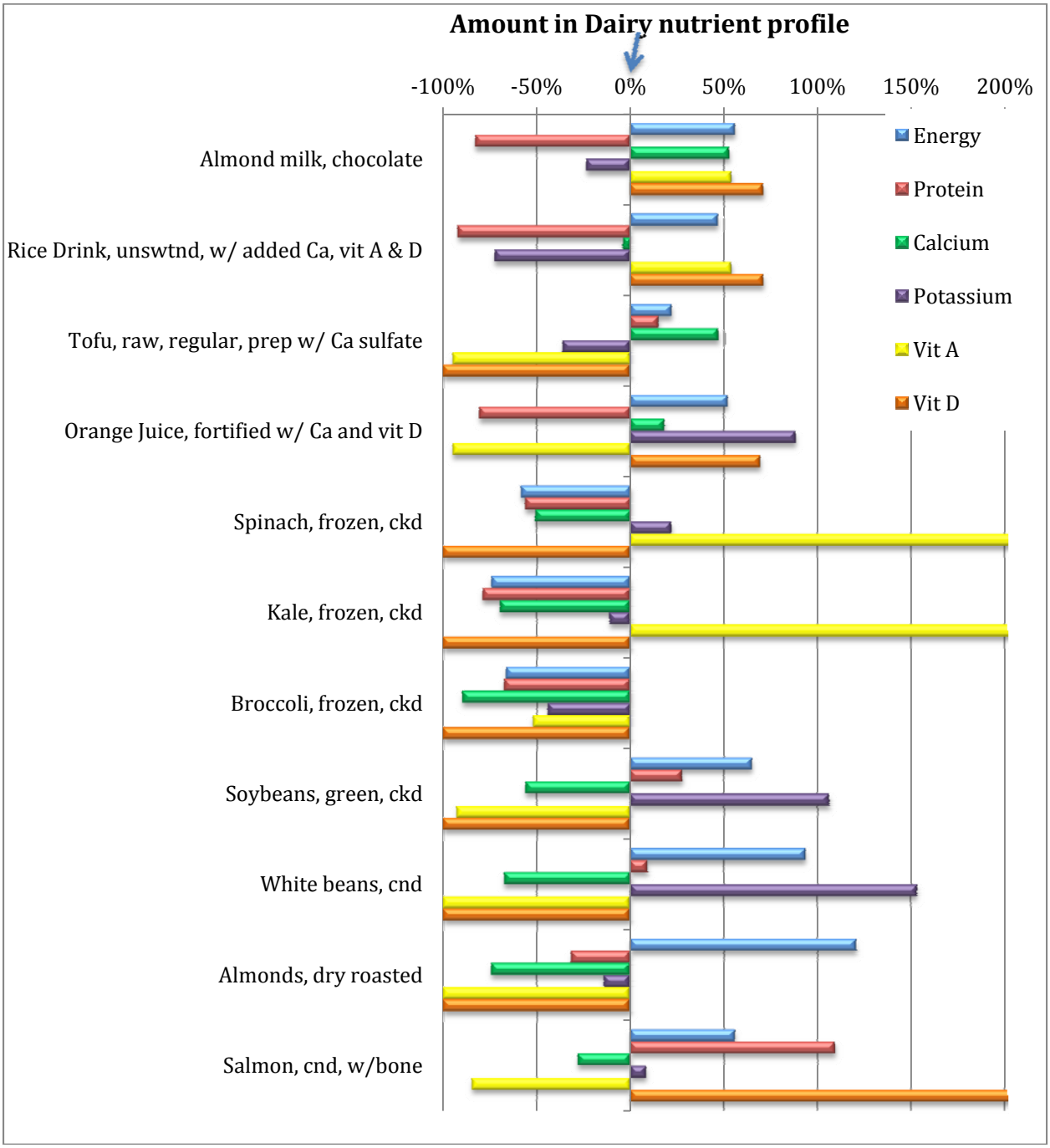
2. Center for Nutrition Policy and Promotion (2014). Nutrient Content of the U.S. Food Supply, 1909-2010. Available from Center for Nutrition Policy and Promotion Web site: http://www.cnpp.usda.gov/USFoodSupply-1909-2010.

3. U.S. Department of Agriculture and U.S. Department of Health and Human Services. Dietary Guidelines for Americans, 2010. 7th Edition, Washington, DC: U.S. Government Printing Office, December 2010.

Figure. Percent difference from Dairy nutrient profile in selected nutrient amounts for some potential calcium alternatives. Nutrient amounts are in a standard portion size, as listed on Table 3. The 0% line reflects amount in Dairy nutrient profile. Negative percents indicate amounts less than in the Dairy profile, positive percents amounts greater than the Dairy profile. (Graph is truncated at 200%.)



NOTE: Nutrient levels in the base USDA Food Patterns are in the Adequacy of the USDA Food Patterns modeling report, additional materials, Tables E3.1.A7 and E3.1.A8.

Table A1. Nutrient Levels in USDA Food Patterns with Milk Group Removed, compared to goals for each pattern.

CALORIE LEVEL	% of Rec for:	Energy kcal	Protein g	Total lipid (fat) % kcal	Carbohydrate g	Fiber, total dietary g	Calcium, Ca mg	Iron, Fe mg	Magnesium, Mg mg	Phosphorus, P mg	Potassium, K mg	Sodium, Na mg	Zinc, Zn mg	Copper, Cu mg
Goal/Rec			**RDA**	**AMDR**	**RDA**	**14g/1000kcal**	**AI**	**RDA**	**RDA**	**RDA**	**AI**	**UL[d]**	**RDA**	**RDA**
1000 2m	1 to 3	84.9%	204%	37%	86%	95%	25%	107%	162%	95%	38%	34%	157%	166%
1200 2.5m	4 to 8	84.3%	197%	34%	103%	101%	24%	101%	133%	121%	40%	37%	130%	171%
1400 2.5m	4 to 8	86.2%	250%	32%	127%	104%	29%	124%	163%	150%	48%	46%	163%	208%
1600 2.5m	4 to 8	85.3%	298%	34%	135%	107%	33%	142%	193%	178%	57%	51%	195%	246%
1600 3m	M/F 9 to 13	85.3%	167%	34%	135%	107%	25%	177%	104%	71%	48%	44%	122%	155%
	F 51 to 70	85.3%	123%	34%	135%	107%	28%	177%	78%	127%	46%	42%	122%	120%
1800 2.5m	4 to 8	87.1%	323%	34%	159%	110%	38%	160%	213%	195%	64%	57%	207%	279%
1800 3m	M/F 9 to 13	87.1%	180%	34%	159%	110%	29%	200%	116%	78%	54%	50%	129%	175%
1800 3m	F 14-18	87.1%	133%	34%	159%	110%	29%	107%	77%	78%	52%	47%	115%	138%
1800 3m	F 31-50	87.1%	133%	34%	159%	110%	38%	89%	87%	139%	52%	47%	129%	136%
2000 2.5m	4 to 8	88.6%	343%	35%	178%	105%	39%	165%	224%	204%	70%	60%	217%	295%
2000 3m	M 51-70	88.6%	116%	35%	178%	105%	32%	206%	69%	146%	56%	50%	98%	144%
2000 3m	F19-30	88.6%	142%	35%	178%	105%	39%	91%	94%	146%	56%	50%	135%	144%
2200 3m	M 14-18	89.4%	142%	34%	200%	110%	35%	173%	82%	93%	64%	56%	112%	166%
2200 3m	M 31-50	89.4%	131%	34%	200%	110%	45%	238%	80%	167%	64%	56%	112%	164%
2400 3m	M 19-30	90.4%	143%	35%	219%	107%	49%	262%	90%	181%	66%	63%	124%	174%
2600 3m	M 19-30	91.3%	152%	35%	243%	112%	55%	292%	100%	197%	72%	68%	134%	192%
2800 3m	M 14-18	91.8%	176%	34%	267%	112%	46%	231%	105%	119%	78%	74%	146%	209%
3000 3m	M 19-30	92.3%	168%	36%	281%	111%	62%	327%	112%	220%	83%	75%	149%	216%
3200 3m	M 14-18	92.8%	181%	38%	294%	105%	48%	238%	110%	123%	83%	76%	149%	219%

Appendix A. Nutrient Levels in USDA Food Patterns with Milk Group Removed, compared to goals for each pattern. (continued)

CALORIE LEVEL Goal/Rec	% of Rec for:	Manganese mg AI	Selenium, Se mcg RDA	Vitamin A, RAE mcg_RAE RDA[b]	Vitamin E mg AT RDA	Vitamin D IU RDA	Vitamin C mg RDA	Thiamin mg RDA	Riboflavin mg RDA	Niacin mg RDA	Vitamin B-6 mg RDA	Vitamin B-12 mcg RDA	Choline, total mg AI	Vitamin K mcg AI
1000 2m	1 to 3	154%	191%	91%	82%	6%	358%	139%	109%	167%	188%	197%	55%	193%
1200 2.5m	4 to 8	163%	179%	88%	83%	9%	257%	157%	123%	175%	212%	212%	62%	158%
1400 2.5m	4 to 8	201%	230%	100%	92%	12%	328%	192%	154%	219%	261%	276%	78%	163%
1600 2.5m	4 to 8	233%	263%	125%	115%	15%	368%	208%	173%	251%	307%	338%	95%	223%
1600 3m	M/F 9 to 13	219%	198%	83%	73%	15%	205%	139%	116%	167%	184%	225%	63%	204%
	F 51 to 70	194%	144%	71%	54%	15%	123%	114%	95%	143%	123%	169%	56%	136%
1800 2.5m	4 to 8	255%	288%	144%	128%	15%	398%	245%	192%	276%	334%	346%	101%	238%
1800 3m	M/F 9 to 13	201%	216%	96%	82%	15%	221%	163%	128%	184%	200%	231%	67%	219%
1800 3m	F 14-18	239%	157%	83%	60%	15%	153%	147%	115%	158%	167%	173%	63%	175%
1800 3m	F 31-50	212%	157%	83%	60%	15%	133%	134%	105%	158%	154%	173%	59%	146%
2000 2.5m	4 to 8	263%	302%	151%	144%	16%	465%	253%	204%	290%	356%	366%	110%	250%
2000 3m	M 51-70	171%	165%	67%	67%	16%	129%	127%	94%	145%	126%	183%	50%	115%
2000 3m	F19-30	219%	165%	86%	67%	16%	155%	138%	111%	166%	164%	183%	65%	153%
2200 3m	M 14-18	208%	186%	76%	74%	17%	169%	146%	107%	164%	186%	203%	56%	226%
2200 3m	M 31-50	198%	186%	76%	74%	17%	141%	146%	107%	164%	186%	203%	56%	142%
2400 3m	M 19-30	218%	205%	81%	79%	19%	142%	160%	116%	179%	199%	224%	60%	145%
2600 3m	M 19-30	244%	218%	92%	87%	20%	153%	178%	126%	193%	217%	232%	63%	170%
2800 3m	M 14-18	280%	238%	97%	92%	22%	207%	194%	138%	210%	236%	252%	68%	278%
3000 3m	M 19-30	275%	240%	101%	103%	22%	180%	201%	141%	214%	245%	253%	70%	189%
3200 3m	M 14-18	287%	240%	102%	112%	22%	216%	201%	141%	214%	245%	254%	70%	316%

Appendix A. Nutrient Levels in USDA Food Patterns with Milk Group Removed, compared to goals for each pattern. (continued)

CALORIE LEVEL Goal/Rec	% of Rec for:	Folate, DFE mcg_DFE RDA	Cholesterol mg DG	Trans fatty acids % of kcal	Fatty acids, total saturated % of kcal DG[g]	Fatty acids, total monounsaturated % of kcal	Fatty acids, total polyunsaturated % of kcal
1000 2m	1 to 3	171%	25%	0.5%	9%	13%	12%
1200 2.5m	4 to 8	170%	35%	0.3%	8%	13%	12%
1400 2.5m	4 to 8	207%	46%	0.3%	7%	12%	11%
1600 2.5m	4 to 8	232%	57%	0.3%	8%	13%	12%
1600 3m	M/F 9 to 13	155%	57%	0.3%	8%	13%	12%
	F 51 to 70	116%	57%	0.3%	8%	13%	12%
1800 2.5m	4 to 8	273%	57%	0.3%	8%	12%	11%
1800 3m	M/F 9 to 13	182%	57%	0.3%	8%	12%	11%
1800 3m	F 14-18	136%	57%	0.3%	8%	12%	11%
1800 3m	F 31-50	136%	57%	0.3%	8%	12%	11%
2000 2.5m	4 to 8	280%	65%	0.4%	9%	13%	11%
2000 3m	M 51-70	140%	65%	0.4%	9%	13%	11%
2000 3m	F19-30	140%	65%	0.4%	9%	13%	11%
2200 3m	M 14-18	165%	71%	0.4%	8%	13%	11%
2200 3m	M 31-50	165%	71%	0.4%	8%	13%	11%
2400 3m	M 19-30	180%	77%	0.4%	9%	13%	11%
2600 3m	M 19-30	204%	78%	0.4%	9%	13%	11%
2800 3m	M 14-18	222%	84%	0.4%	8%	12%	11%
3000 3m	M 19-30	230%	85%	0.5%	9%	13%	12%
3200 3m	M 14-18	230%	87%	0.5%	10%	14%	12%

Developing Vegetarian and Mediterranean-style Food Patterns

RESEARCH QUESTION

Using the Food Pattern Modeling process, can healthy eating patterns for vegetarians and for those who want to follow a Mediterranean-style diet be developed? How do these patterns differ from the USDA Food Patterns previously updated for the 2015 DGAs?

BACKGROUND

Over time, the USDA Food Patterns have represented the types and amounts of foods that will provide sufficient nutrients to meet IOM nutrient recommendations and Dietary Guidelines for Americans recommendations, within calorie needs, for all age/sex groups 2 years of age and older. They are updated every five years during the deliberations of the Dietary Guidelines Advisory Committee, and are presented to the Committee for their assessment of how well the Patterns meet their goals. As part of the update, amounts recommended from each food group may be modified to reach all or most of the specified goals. See the food pattern modeling report Adequacy of the USDA Food Patterns (Appendix E3.1 of the 2015 Dietary Guidelines Advisory Committee Report) for detailed information on the development and evaluation of the overall USDA Food Patterns.

In 2010, vegetarian adaptations of the Patterns were developed at the request of the DGAC and included in the 2010 DGA policy document. These did not modify the underlying structure of the patterns, but rather substituted plant-based foods for animal-based foods at the same overall intake level for each food group.

For 2015 an emphasis of the DGAC has been on identifying evidence-based dietary patterns. The 2010 DGA stated that there is more than one way in which to consume a healthful diet, and the evidence to support this message has expanded with time. In keeping with this growing emphasis in the DGA, the recommended food patterns should illustrate more than one approach to consuming a healthful diet. The dietary patterns reviewed by the 2015 DGAC, including those identified in the NEL Dietary Patterns Systematic Review Project, has indicated evidence for health benefits of following a Mediterranean-style diet (Med-style) and for following a vegetarian diet, in addition to following a Healthy US-style pattern typified by the DASH diet and the USDA Food Patterns (Nutrition Evidence Library, 2014). The 2015 DGAC has explored quantitative information about the food group content of the Med-style and vegetarian patterns, making it feasible, for the first time, to use that information as the basis of food patterns that reflect Vegetarian and Med-style diets.

Plan for Food Pattern Modeling Analysis

Therefore, this modeling analysis will identify Vegetarian and Med-style eating patterns and use them as the basis for 2 new Patterns related to but different from the original USDA Food Patterns (the Healthy US-style Patterns): Healthy Vegetarian Patterns, and Healthy Med-style Patterns. All 3 patterns are considered to be USDA Food Patterns

1. Healthy U.S.-style Patterns. The existing USDA Food Patterns are very similar to DASH diets, which have been studied extensively in the U.S. The current USDA Food Patterns will be called "Healthy U.S.-style Patterns" to more clearly identify them. They are similar to evidence-based diets and have been shown to meet almost all nutrient recommendations. They are based on nutrient-dense versions of current consumption patterns in the US, and recommendations for food group intake remain within the broad distribution of current consumption.

2. Healthy Vegetarian Patterns. Vegetarian diets have been documented to provide health benefits, but are often described by what is not consumed, and so it has been difficult to identify what actually is consumed. Recent analysis of self-identified (SI) vegetarians in NHANES allows us to build a vegetarian food pattern based on evidence rather than conjecture. These Patterns will build on reported intakes of vegetarians in NHANES rather than on descriptions from research studies considered by the DGAC. As such, these specific intake levels have not been identified as having health benefits. Therefore, adequacy of the Healthy Vegetarian Patterns will be based on meeting the same nutrient standards met by the Healthy US-style Patterns.

3. Healthy Med-style Patterns. The diets characterized by research as "Mediterranean" have some similarities to the Healthy US-style Patterns but some notable differences as well. These Patterns will be based on studies that have reported estimates of food group intake from population groups scoring high on Mediterranean-diet (Med-diet) indexes. While nutrient levels will be calculated, determining the adequacy of the Med-style Patterns will primarily be based on similarity to food group intakes of the population groups with positive health outcomes.

METHODS

The types of information about food group intakes by vegetarians and those following a Med-style diet differ, so the approaches to creating these patterns will be presented separately.

Healthy Vegetarian Food Patterns

- Review data on food group intakes from analysis of SI vegetarian's diets, from NHANES 2007-10, to select foods to include/exclude in Vegetarian Patterns (Juan et al., 2014). Select the types of foods to include and exclude based on the most typical choices of SI vegetarians. Identify how the average amounts consumed of each food group or subgroup differ from the non-vegetarians in the NHANES sample.

- Using an iterative process and the information above, determine amounts from each food category that could be included to meet nutrient goals in the Food Patterns at 12 calorie levels. Balance calories by adjusting amounts of oils, solid fats, and added sugars as appropriate.

- Assess nutrient adequacy of the Food Patterns in comparison to Dietary Reference Intakes and 2010 Dietary Guidelines recommendations.

Med-Style Food Patterns

- Review data from Dietary Patterns Composition project on food group intakes for studies assessing diets with a Med-diet index. Compare range of food group intakes to the food group amounts in the Healthy US-Style Food Patterns.

- Select food groups for modification and the range of amounts of each food group to include in initial analysis. Using an iterative process, adjust the amounts to provide smooth transitions across calorie levels Determine the calories and nutrients in the Patterns at 12 calorie levels with varying amounts from each food group. Balance calories by adjusting amounts of oils, solid fats, and added sugars as appropriate.

- Compare nutrients in the Food Patterns to Dietary Reference Intakes and 2010 Dietary Guidelines. Working with the DGAC, determine to what extent nutrient standards for Patterns may be modified for Med-Style patterns.

RESULTS

Development of the Healthy Vegetarian Patterns

Over 90% of SI vegetarians consumed dairy products on the day of the NHANES survey, and 65% of them consumed eggs. Dairy and egg quantities consumed did not differ significantly between SI vegetarians and non-vegetarians. As such, a lacto-ovo vegetarian pattern was modeled. Much smaller percentages reported consuming other animal products, and those who did report consumption ate significantly less than non-vegetarians (Juan et al., 2014) Food group intake of SI vegetarians from NHANES 2007-10, in comparison to non-vegetarians and amounts in the USDA Food Patterns, is shown in table 1 and figure 1.

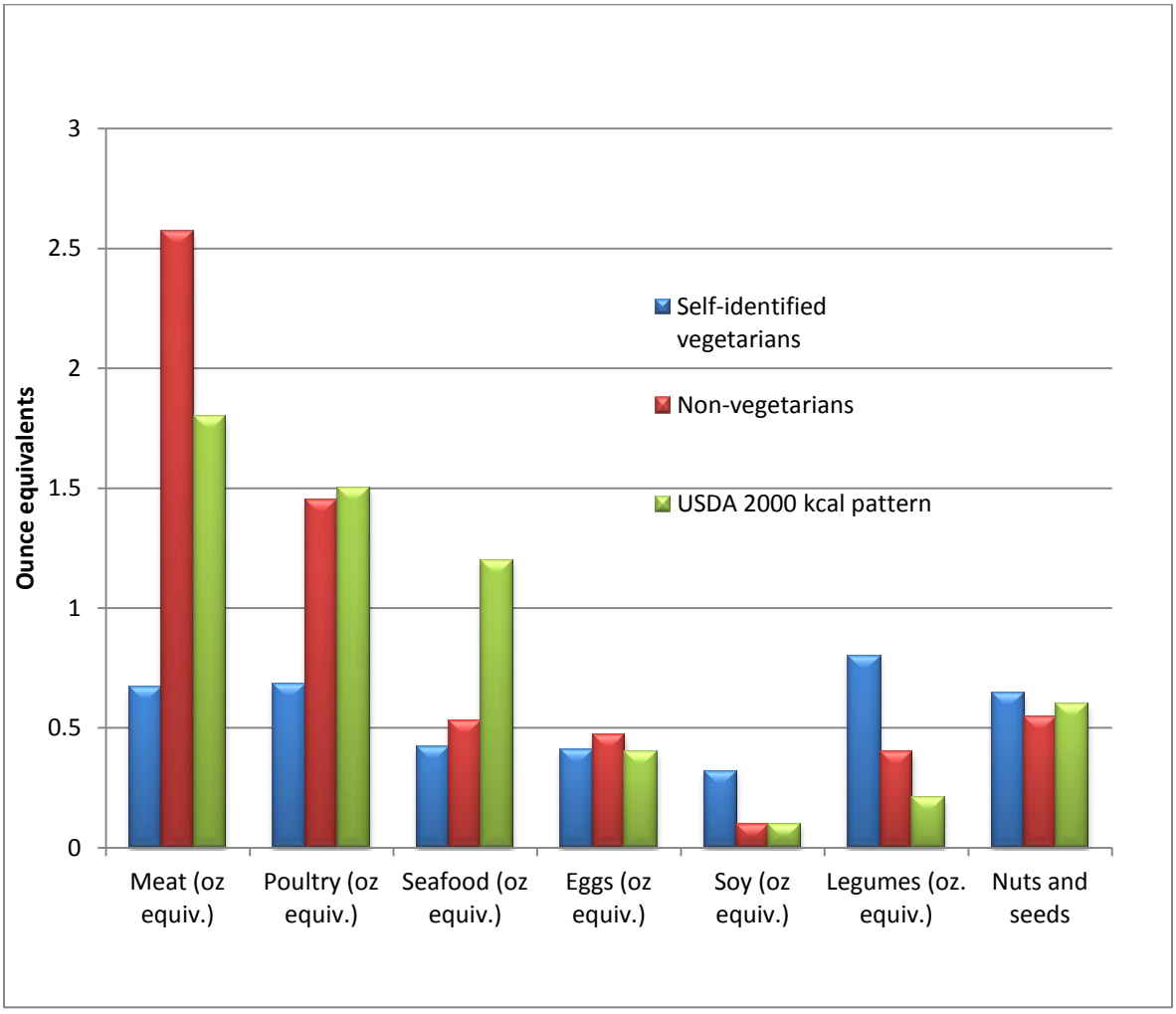
Table 1. Reported food group intake by SI vegetarians and non-vegetarians, from NHANES 2007-10, in comparison to amounts in USDA Food Pattern at 2000 calories. (Juan et al., 2014)

Food groups and subgroups (unit)	% of SI vegetarians reporting food from group	Amounts reported by SI vegetarians	Amounts reported by Non-vegetarians	Amount in USDA 2000 kcal pattern
Meat (oz equiv.)	27%	0.67*	2.57	1.8
Poultry (oz equiv.)	21%	0.68*	1.45	1.5
Seafood (oz equiv.)	18%	0.42	0.53	1.2
Eggs (oz equiv.)	65%	0.41	0.47	0.4
Dairy (cup equiv.)	93%	1.65	1.79	3
Fruits (cup equiv.)		1.21	1.05	2

Vegetables (cup equiv.)	1.49	1.4	2.5
Legumes (cup equiv.)	0.2*	0.1	0.21
Soy (oz equiv.)	0.32*	0.1	0.1
Nuts and Seeds	0.64	0.55	0.6
Grains (oz equiv.)	7.05	6.43	6
Whole grains (oz equiv.)	1.23*	0.7	3
Solid fats (grams)	28.9*	38.13	18
Added sugars (grams)	63.2*	76.9	30

*Significantly different from non-vegetarians p< 0.05

Figure 1. Mean reported intake from Protein Foods subgroups by SI vegetarians in comparison to non-vegetarians (Juan et al., 2014)



Although SI vegetarians did report consuming some meat, poultry, and seafood, these foods were not included in the Patterns. SI vegetarians consumed significantly more soy products and legumes than non-vegetarians. Amounts of these foods were increased substantially. They also reported slightly more nuts and seeds, and whole and total grains, so amounts in the Patterns were increased to a lesser extent. Amounts of fruits, vegetables, and dairy consumed by SI

vegetarians were only slightly different from non-vegetarians, and amounts in the Patterns were already considerably higher than amounts reported by SI vegetarians, and so were not changed.

In the soy foods subgroup, most consumption by non-vegetarians is from processed soy products, such as soy protein isolate, incorporated into a wide variety of manufactured foods. For the Vegetarian Patterns, increased consumption of tofu was used to increase the total amount of soy products in the Patterns, rather than increasing the processed soy component.

Development of the Med-style Patterns

Quantitative data on food group consumption from studies using a Mediterranean dietary index score was available for 7 cohorts and 2 interventions, almost all in Europe. For use in the Dietary Patterns Composition analysis, consumption data was selected for the groups with a high Med-diet index score and positive health outcomes. These data were converted into grams of food group intake per 1000 calories, to standardize them. For most food groups, the range of intakes was wide. Table 2 presents the range of intakes and the median intake for each food group from the studies that assessed dietary patterns using a Med-diet index. It also shows the amounts in USDA Food Patterns for adults, also converted to grams per 1000 calories, for comparison.

Table 2. Reported food group intake by populations with positive health outcomes, from studies using Med-Diet indexes to assess intake, in comparison to amounts in USDA Food Pattern, in grams per 1000 calories.

Food groups and subgroups	Range of intakes across studies	Median intake in studies	Amounts in USDA Food Pattern
	g/1000 kcal	g/1000 kcal	g/1000 kcal
Vegetables (incl. legumes)	121-195	161	156-174
Fruits	88-185	156	96-125
Grains/ cereals	20-135	80	89-101
Red/processed meat	41-89	56	25-28
Fish and seafood	22-49	32	16-20
Total dairy	99-214	152	194-258
Oils	10-24	12	13-14

Amounts of fruit, seafood and red/processed meats are notably higher in the diets with high Med diet scores than in the USDA Patterns. Amounts of dairy are notably lower. While grains are somewhat lower, there is little consistency in what may have been included in this category among the studied diets. Therefore, this food group was not considered for change. Also, the red and processed meat category intakes are notably higher than in the current USDA Patterns, but these were not considered for change. The saturated fat and sodium (in processed meats) in the US make this category inappropriate to increase. However, because of the increase in seafood, the overall amount of Protein Foods was increased in the Med-Style Patterns. In

contrast, the total amount of Protein Foods in the Vegetarian Patterns was substantially less than in the other Patterns.

Healthy Vegetarian and Healthy Med-style Patterns

Using the information summarized above, Healthy Vegetarian and Healthy Med-style Patterns were developed at 12 calorie levels. These Patterns, and the Healthy US Style Patterns, reflect three different approaches to consuming a healthy diet. The food group composition of these Patterns at the 2000 calorie level are shown in Table 3. The composition of the Patterns at all calorie levels are provided in additional Tables E3.7.A1 and E3.7.A2.

Table 3. Composition of the Healthy Vegetarian and Healthy Med-style Patterns, and Healthy US Patterns, at the 2000 calorie level. Food group amounts per day, unless noted per week.

Food Group/subgroup (units)	Healthy US Patterns	Healthy Vegetarian Patterns	Healthy Med-style Patterns
Fruits (cup eq)	2	2	2.5
Vegetables (cup eq)	2.5	2.5	2.5
Dark Green	1.5/wk	1.5/wk	1.5/wk
Red/Orange	5.5/wk	5.5/wk	5.5/wk
Starchy	5/wk	5/wk	5/wk
Legumes	1.5/wk	3/wk*	1.5/wk
Other	4/wk	4/wk	4/wk
Grains (oz eq)	6	6.5	6
Whole	3	3.5	3
Refined	3	3	3
Dairy (cup eq)	3	3	2
Protein Foods (oz eq)	5.5	3.5	6.5
Meats (red and processed)	12.5/wk	--	12.5/wk
Poultry	10.5/wk	--	10.5/wk
Seafood	8/wk	--	15/wk
Eggs	3/wk	3/wk	3/wk
Nuts/seeds	4/wk	7/wk	4/wk
Processed Soy (incl. tofu)	0.5/wk	8/wk	0.5/wk
Oils (grams)	27	27	27
Solid fats limit (grams)	18	21	17
Added sugars limit (grams)	30	36	29

*Total amount, includes amount counted toward protein foods.

The nutrient content of these Patterns at the 2000 calorie level is presented in table 4. Nutrient content of the Patterns at all calorie levels are in additional Tables E3.7.B1 and E3.7.B2. For many nutrients, the amounts in all three Patterns are similar and meet nutritional recommendations. The comparison of the nutrients to goals and limits for each calorie level are in additional Tables E3.7.C1 and E3.7.C2.

Table 4. Selected nutrients in the Healthy Vegetarian, Healthy Med-Style, and Healthy US-Style Patterns, at the 2000 calorie level as a percent of the RDA for a female 19-50 years of age.

Pattern	Healthy Vegetarian	Healthy Med-style	Healthy US-style
Macronutrients			
Protein	71g	89 g	91 g
% of RDA	155%	194%	198%
% of calories	14%	18%	18%
Total lipid (fat)	75 g	72 g	72 g
% of calories	34%	32%	33%
Carbohydrate	274g	259 g	256 g
% of RDA	211%	199%	197%
% of calories	55%	52%	51%
Fiber, total dietary	35g	31 g	31 g
% of goal (14 g/1000 kcal)	126%	112%	109%
Minerals			
Calcium	1333mg	1001 mg	1274 mg
% of RDA	133%	100%	127%
Iron	17 mg	17 mg	17 mg
% of RDA	96%	95%	93%
Magnesium	374mg	352 mg	352 mg
% of RDA	121%	113%	114%
Potassium	3311 mg	3353 mg	3348 mg
% of AI	70%	71%	71%
Sodium	1405 mg	1685 mg	1787 mg
% of UL	61%	73%	78%
Vitamins			
Vitamin A (in µg RAE)*	869 µg	815 µg	898 µg
% of RDA	124%	116%	128%
Vitamin E (in mg AT)	10.8mg	10.5 mg	10.2 mg
% of RDA	72%	70%	68%
Vitamin C	116mg	134 mg	117 mg
% of RDA	155%	178%	155%
Vitamin D (in IU)	223 IU	251 IU	274 IU
% of RDA	37%	42%	46%
Folate (in µg DFE)	667 µg	592 µg	586 µg
% of RDA	167%	148%	146%
Choline	283 mg	345 mg	349 mg
% of AI	66%	81%	82%
Fatty Acids			
Saturated fatty acids	18.6 g	18.0 g	18.7 g
% of calories	8%	8%	8%

*Includes vitamin A precursors

Note: Results for all nutrients at all calorie levels are provided in additional Tables E3.7.B1, E3.7.B2, E3.7.C1, and E3.7.C2.

In the Healthy Vegetarian Pattern at 2000 calories, amounts of protein, vitamin D, sodium, cholesterol, and choline are lower than the Healthy US Pattern, while fiber and folate are higher, mainly due to the increased amount of legumes. Calcium is also somewhat higher in the Vegetarian Pattern. This is because in addition to the calcium from dairy and other food groups, the nutrient profile for processed soy products reflects an increased amount of tofu, which is often precipitated with a calcium salt. The increased amounts of calcium are not large, however. The calcium level in Healthy Vegetarian Patterns for adolescent girls is from 96% to 100% of the RDA, and for women over 50, 104% of the RDA. If Dairy intake had been lowered in the Vegetarian Patterns, the calcium levels would be below RDA standards.

In the Med-Style Pattern at 2000 calories, amounts of calcium are lower, and vitamin A, vitamin D, and sodium are somewhat lower than the Healthy US Style Patterns. This reflects the lower amount of Dairy in the Med-Style Pattern. Vitamin C is higher, reflecting the higher amount of fruit in the Pattern. Cholesterol is also somewhat higher, due to the higher amount of seafood in the Patterns.

Note that the Med-Style Pattern at 2000 calories does meet the calcium RDA for a woman 19 to 50, but it would not meet the higher RDA for an adolescent 9 to 18 or an adult over the age of 50, whose RDA is higher. For adolescents, the amount of calcium in the Med-Style Patterns, depending on the specific calorie level required, ranges from 71% to 82% of their RDA, and for adults over the age of 50, calcium levels range from 77% to 83% of their RDA. (See additional Tables E3.7.B2 and E3.7.C2 for all results.) The USDA Food Patterns have traditionally used meeting RDA and other nutrition goals as their standard; the Med-Style Patterns do not fully meet the RDAs. However, these diets have been shown to have health benefits, and the entire dietary pattern may modify requirements for specific nutrients.

SUMMARY

The 2015 DGAC placed an emphasis on identifying and describing evidence-based healthful dietary patterns, and identified evidence for health benefits of following a Med-style diet and a vegetarian diet, in addition to following a Healthy US-style pattern typified by the DASH diet and the 2010 USDA Food Patterns. The 2015 DGAC also explored quantitative information about the food group content of the Med-style and vegetarian patterns, making it feasible, for the first time, to use that information as the basis of USDA Food Patterns that reflect Vegetarian and Med-style diets.

The 2010 DGA stated that there is more than one way in which to consume a healthful diet, and the evidence to support this message has expanded with time. In keeping with this growing emphasis, the USDA Food Patterns have been modified to illustrate more than one approach to consuming a healthful diet. Based on the work of the 2015 DGAC, the USDA Food Patterns have been expanded to include three different approaches to consuming a healthful diet: Healthy

US-Style Patterns, Healthy Vegetarian Patterns, and Healthy Med-Style Patterns. In comparison to the Healthy US-Style Patterns, the Healthy Vegetarian Patterns include more legumes, processed soy products, nuts and seeds, and whole grains. They contain no meat, poultry, or seafood, and are identical to the Healthy US-Style Patterns (the original USDA Food Patterns) in amounts of all other food groups. The Healthy Med-Style Patterns contain more fruit and seafood and less dairy than the Healthy US-Style Patterns.

All of the Patterns meet nutritional goals for almost all nutrients with some notable exceptions. With a few exceptions, the nutrient goals not met are the same as for the original USDA Food Patterns. Levels of calcium are highest in the Vegetarian Patterns, because in addition to Dairy they contain larger amounts of tofu, which is often precipitated with a calcium salt, although amounts of calcium vary widely across tofu types. Levels of calcium are lowest in the Healthy Med-Style Patterns, because the amounts of Dairy in those patterns have been decreased.

References:

Juan, WY, Yamini, S, Britten, P. Food Intake Patterns of Self-Identified Vegetarians among the U.S. Population, 2007-2010. Presentation at National Nutrient Databank meeting, May 14-17, 2014, Portland OR.

Institute of Medicine. *Dietary reference intakes for calcium, phosphorus, magnesium, vitamin d, and fluoride.* Washington DC: National Academies Press, 1997.

Nutrition Evidence Library. *A series of systematic reviews on the relationship between dietary patterns and health outcomes.* Alexandria, VA: U.S. Department of Agriculture, Center for Nutrition Policy and Promotion, March 2014. Available at [URL]

Additional Tables available as Resources on Dietary Guidelines 2015 website (http://www.health.gov/dietaryguidelines/2015.asp):

E3.7.A1 Food group amounts in USDA Healthy Vegetarian Patterns at all Calorie levels

E3.7.A2 Food group amounts in USDA Healthy Mediterranean-style Patterns at all Calorie levels

E3.7.B1 Nutrients in USDA Healthy Vegetarian Patterns at all Calorie levels

E3.7.B2 Nutrients in USDA Healthy Mediterranean-style Patterns at all Calorie levels

E3.7.C1 Comparison of nutrient content of each USDA Healthy Vegetarian Pattern to the nutritional goals for that pattern.

E3.7.C2 Comparison of nutrient content of each USDA Healthy Mediterranean-Style Pattern to the nutritional goals for that pattern.

Table A1. USDA Food Patterns: Healthy Vegetarian Patterns—recommended intake amounts.

Calorie Level of Pattern[a]	1,000	1,200	1,400	1,600	1,800	2,000	2,200	2,400	2,600	2,800	3,000	3,200
Food Group	**Daily Amount**[b] of Food From Each Group (vegetable and protein foods subgroup amounts are per week)											
Fruits	1 c	1 c	1½ c	1½ c	1½ c	2 c	2 c	2 c	2 c	2½ c	2½ c	2½ c
Vegetables	1 c	1½ c	1½ c	2 c	2½ c	2½ c	3 c	3 c	3½ c	3½ c	4 c	4 c
Dark green veg (c/wk)	½	1	1	1½	1½	1½	2	2	2½	2½	2½	2½
Red/Orange veg (c/wk)	2½	3	3	4	5½	5½	6	6	7	7	7½	7½
Beans and peas (c/wk)	½	½	½	1	1½	1½	2	2	2½	2½	3	3
Starchy veg (c/wk)	2	3½	3½	4	5	5	6	6	7	7	8	8
Other veg (c/wk)	1½	2½	2½	3½	4	4	5	5	5½	5½	7	7
Grains	3 oz eq	4 oz eq	5 oz eq	5½ oz eq	6½ oz eq	6½ oz eq	7½ oz eq	8½ oz eq	9½ oz eq	10½ oz eq	10½ oz eq	10½ oz eq
Whole grains	1½ oz eq	2 oz eq	2½ oz eq	3½ oz eq	3½ oz eq	3½ oz eq	4 oz eq	4½ oz eq	5 oz eq	5½ oz eq	5½ oz eq	5½ oz eq
Other grains	1½ oz eq	2 oz eq	2½ oz eq	2 oz eq	3 oz eq	3 oz eq	3½ oz eq	4 oz eq	4½ oz eq	5 oz eq	5 oz eq	5 oz eq
Protein Foods	1½ oz eq	1½ oz eq	2 oz eq	2½ oz eq	3 oz eq	3½ oz eq	4 oz eq	4 oz eq	5 oz eq	5 oz eq	5½ oz eq	5½ oz eq
Beans and peas (oz eq/wk)[c]	2	2	4	4	6	6	8	8	10	10	12	12
Eggs (oz eq/wk)	1	2	2	3	3	3	3	3	3	4	4	4
Nuts and seeds (oz eq/wk)	3	3	4	5	6	7	8	9	10	11	12	13
Tofu/processed soy (oz eq/wk)	3	3	4	5	6	7	8	9	10	11	12	13
Dairy	2 c	2.5 c	2.5 c	3 c	3 c	3 c	3 c	3 c	3 c	3 c	3 c	3 c
Oils (g)	15	17	17	22	24	27	29	31	34	36	44	51
Limits for solid fats and added sugars												
Solid fats (g)	11	11	12	12	12	19	19	23	23	23	27	34
Added Sugars (g)	19	19	20	21	20	32	32	39	40	40	46	59

a. Food intake patterns at 1000, 1200, and 1400 calories are designed to meet the nutritional needs of 2- to 8-year-old children. Patterns from 1600 to 3200 calories are designed to meet the nutritional needs of children 9 and older and adults. If a child 4 to 8 years of age needs more calories and, therefore, is following a pattern at 1600 calories or more, his recommended amount from the milk group should be 2.5 cups per day. Children 9 and older and adults should not use the 1000, 1200, or 1400 calorie patterns.

b. Food group amounts shown in cup (c) or ounce equivalents (oz eq). Oils, solid fats, and asdded sugars are shown in grams (g).

Quantity equivalents for each food group are:

- Grains, 1 ounce equivalent is: ½ cup cooked rice, pasta, or cooked cereal; 1 ounce dry pasta or rice; 1 slice bread; 1 cup RTE cereal flakes.
- Fruits and vegetables, 1 cup equivalent is: 1 cup raw or cooked fruit or vegetable, 1 cup fruit or vegetable juice, 2 cups leafy salad greens.
- Protein Foods**,** 1 ounce eq.is: 1 oz lean meat, poultry, seafood; 1 egg; ¼ cup cooked beans or tofu; 1 Tbsp peanut butter; ½ ounce nuts/seeds.
- Dairy, 1 cup equivalent is: 1 cup milk or yogurt, 1½ ounces natural cheese (e.g. Cheddar cheese) or 2 ounces of processed cheese.

c. About half of total beans and peas are shown as vegetables, in cup eqs, and half as protein foods, in ounce eqs. Total beans and peas in cup eq is amount in vegetables plus the amount in protein foods/4:

	1,000	1,200	1,400	1,600	1,800	2,000	2,200	2,400	2,600	2,800	3,000	3,200
Total beans/peas (c eq/ wk)	1	1	1½	2	3	3	4	4	5	5	6	6

Table A2. USDA Food Patterns: Healthy Mediterranean-Style Patterns—recommended intake amounts.

Calorie Level of Pattern[a]	1,000	1,200	1,400	1,600	1,800	2,000	2,200	2,400	2,600	2,800	3,000	3,200
Food Group	**Daily Amount**[b] of Food From Each Group (vegetable and protein foods subgroup amounts are per week)											
Fruits	**1 c**	**1 c**	**1½ c**	**1½ c**	**2 c**	**2½ c**	**2½ c**	**2½ c**	**2½ c**	**3 c**	**3 c**	**3 c**
Vegetables	**1 c**	**1½ c**	**1½ c**	**2 c**	**2½ c**	**2½ c**	**3 c**	**3 c**	**3½ c**	**3½ c**	**4 c**	**4 c**
Dark green veg (c/wk)	½	1	1	1½	1½	1½	2	2	2½	2½	2½	2½
Red/Orange veg (c/wk)	2½	3	3	4	5½	5½	6	6	7	7	7½	7½
Beans and peas (c/wk)	½	½	½	1	1½	1½	2	2	2½	2½	3	3
Starchy veg (c/wk)	2	3½	3½	4	5	5	6	6	7	7	8	8
Other veg (c/wk)	1½	2½	2½	3½	4	4	5	5	5½	5½	7	7
Grains	**3 oz eq**	**4 oz eq**	**5 oz eq**	**5 oz eq**	**6 oz eq**	**6 oz eq**	**7 oz eq**	**8 oz eq**	**9 oz eq**	**10 oz eq**	**10 oz eq**	**10 oz eq**
Whole grains	1½ oz eq	2 oz eq	2½ oz eq	3 oz eq	3 oz eq	3 oz eq	3½ oz eq	4 oz eq	4½ oz eq	5 oz eq	5 oz eq	5 oz eq
Other grains	1½ oz eq	2 oz eq	2½ oz eq	2 oz eq	3 oz eq	3 oz eq	3½ oz eq	4 oz eq	4½ oz eq	5 oz eq	5 oz eq	5 oz eq
Protein Foods	**2 oz eq**	**3 oz eq**	**4 oz eq**	**5½ oz eq**	**6 oz eq**	**6½ oz eq**	**7 oz eq**	**7½ oz eq**	**7½ oz eq**	**8 oz eq**	**8 oz eq**	**8 oz eq**
Meat, poultry, eggs (oz eq/wk)	10	14	19	23	23	26	28	31	31	33	33	33
Seafood (oz eq/wk)	4	4	6	11	15	15	16	16	17	17	17	17
Nuts seeds, soy (oz eq/wk)	2	2	3	4	4	5	5	5	5	6	6	6
Dairy	**2 c**	**2½ c**	**2½ c**	**2 c**	**2 c**	**2 c**	**2 c**	**2 c**	**2½ c**	**2½ c**	**2½ c**	**2½ c**
Oils (g)	**15**	**17**	**17**	**22**	**24**	**27**	**29**	**31**	**34**	**36**	**44**	**51**
Limits for solid fats and added sugars												
Solid fats (g)	9	7	7	12	11	17	18	20	22	23	28	37
Added Sugars (g)	16	12	12	21	18	29	31	34	37	40	48	64

a. Food intake patterns at 1000, 1200, and 1400 calories are designed to meet the nutritional needs of 2- to 8-year-old children. Patterns from 1600 to 3200 calories are designed to meet the nutritional needs of children 9 and older and adults. If a child 4 to 8 years of age needs more calories and, therefore, is following a pattern at 1600 calories or more, his recommended amount from the milk group should be 2.5 cups per day. Children 9 and older and adults should not use the 1000, 1200, or 1400 calorie patterns.

b. Food group amounts shown in cup (c) or ounce equivalents (oz eq). Oils, solid fats, and added sugars are shown in grams (g).
Quantity equivalents for each food group are:

- Grains, 1 ounce equivalent is: ½ cup cooked rice, pasta, or cooked cereal; 1 ounce dry pasta or rice; 1 slice bread; 1 cup RTE cereal flakes.
- Fruits and vegetables, 1 cup equivalent is: 1 cup raw or cooked fruit or vegetable, 1 cup fruit or vegetable juice, 2 cups leafy salad greens.
- Protein Foods**,** 1 ounce equivalent is: 1 ounce lean meat, poultry, or seafood; 1 egg; ¼ cup cooked beans or tofu; 1 Tbsp peanut butter; ½ ounce nuts/seeds.
- Dairy, 1 cup equivalent is: 1 cup milk or yogurt, 1½ ounces natural cheese such as Cheddar cheese or 2 ounces of processed cheese.

Table B1 . Nutrients in the USDA Healthy Vegetarian Pattern at each calorie level.

Calorie level	1000*	1200**	1400**	1600**	1600***	1800	2000	2200	2400	2600	2800	3000	3200
Macronutrients													
Calories , kcal	997	1202	1404	1561	1600	1797	1999	2202	2401	2602	2799	2996	3201
Protein, g	36	47	53	58	62	68	71	76	82	89	95	100	102
Carbohydrate, g	135	166	199	215	220	250	274	306	332	363	393	413	427
Fiber, total dietary, g	15	19	24	28	28	33	35	40	43	49	53	56	58
Total lipid (fat), g	38	42	48	57	57	64	75	82	90	96	103	115	131
Trans fatty acids, g	0.5	0.5	0.5	0.7	0.7	0.7	0.9	1.0	1.2	1.2	1.2	1.3	2
Saturated fats, g	10.0	10.8	12.0	14.1	14.4	15.1	18.6	20.5	22.6	23.8	24.7	27.2	31.4
Monounsaturated fats, g	13.4	15.0	17.1	20.4	20.5	22.9	26.9	29.4	32.4	34.8	37.1	41.6	47.4
Polyunsaturated fats, g	12.0	13.7	15.8	18.8	18.9	21.6	24.6	26.6	29.5	31.7	34.6	38.8	44.2
Linoleic acid (18:2), g	10.7	12.2	14.0	16.8	16.8	19.2	21.9	23.7	25.5	28.3	30.8	34.6	39.4
Linolenic acid (18:3), g	1.27	1.46	1.68	1.98	1.99	2.30	2.60	2.82	3.10	3.34	3.64	4.11	4.7
EPA (20:5 n-3), g	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
DHA (22:6 n-3), g	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Stearic Acid (18:0), g	2.43	2.62	2.90	3.38	3.43	3.63	4.50	4.97	5.50	5.81	6.01	6.63	7.67
Cholesterol, mg	78	107	109	111	115	114	120	122	125	126	152	154	160
Minerals													
Calcium, mg	781	995	1057	1105	1253	1306	1333	1391	1443	1513	1575	1607	1621
Iron, mg	8	10	13	14	14	17	17	20	22	25	27	28	28
Magnesium, mg	169	221	264	307	317	355	374	413	446	496	536	568	579
Phosphorus, mg	842	1092	1210	1320	1437	1551	1596	1710	1815	1959	2079	2164	2196
Potassium, mg	1551	2013	2315	2633	2751	3105	3311	3613	3760	4135	4420	4718	4778
Sodium, mg	786	1017	1122	1153	1254	1377	1405	1524	1631	1755	1865	1901	1923
Zinc, mg	6	8	9	10	11	12	12	13	14	15	17	17	17
Copper, mg	0.6	0.8	1.0	1.2	1.3	1.5	1.6	1.7	1.9	2.1	2.3	2.5	2.5
Manganese, mg	2.0	2.6	3.3	3.9	3.9	4.3	4.6	5.2	5.7	6.5	7.1	7.4	7.5
Selenium, µg	40	53	61	63	67	71	76	83	91	99	108	110	111
Vitamins													
Vitamin A, µg_RAE	469	601	638	727	776	800	869	951	984	1079	1124	1155	1169
Vitamin E, mg AT	5	6	7	8	8	10	11	12	13	14	15	17	18
Vitamin D, IU	145	184	188	191	221	192	223	228	232	236	245	246	248
Vitamin C, mg	54	64	82	92	92	100	116	127	127	138	155	162	162
Thiamin, mg	0.8	1.1	1.3	1.4	1.4	1.6	1.7	1.9	2.1	2.4	2.6	2.7	2.7
Riboflavin, mg	1.1	1.4	1.6	1.6	1.8	1.8	2.0	2.1	2.2	2.3	2.5	2.6	2.6
Niacin, mg	7	10	12	13	13	16	16	18	20	23	25	26	26
Vitamin B-6, mg	0.9	1.2	1.4	1.6	1.7	1.8	2.0	2.2	2.3	2.6	2.8	3.0	3.0
Vitamin B-12, µg	2.4	3.1	3.3	3.4	3.8	3.5	4.0	4.2	4.4	4.6	4.8	4.9	4.9
Choline, mg	150	202	219	240	252	258	283	301	313	336	372	389	395
Vitamin K, µg	59	88	94	125	125	136	142	175	180	209	216	233	244
Folate, µg_DFE	290	391	484	539	544	642	667	765	846	958	1044	1093	1108

*Includes 2 cup eq Dairy; **Includes 2.5 cup eq of Dairy; ***Includes 3 cup eq Dairy; All patterns at 1800 or more calories include 3 cup eq of Dairy

Table B2 . Nutrients in the USDA Healthy Mediterrean-Style Patterns at each calorie level.

CALORIE LEVEL	1000*	1200**	1400**	1600**	1600*	1800*	2000*	2200*	2400**	2600**	2800**	3000**	3200**
Macronutrients													
Calories , kcal	996	1202	1395	1634	1595	1802	1998	2203	2399	2602	2800	2999	3200
Protein, g	45	59	69	81	77	86	89	98	108	114	120	122	122
Carbohydrate, g	128	155	185	204	199	236	259	289	313	343	376	394	410
Fiber, total dietary, g	14	18	21	25	25	30	31	36	38	43	46	49	49
Total lipid (fat), g	36	41	45	58	58	62	72	78	85	92	97	111	126
Trans fatty acids, g	0.42	0.37	0.38	0.59	0.59	0.57	0.81	0.86	0.95	1.04	1.09	1.31	1.67
Saturated fats, g	9.3	10.0	11.1	14.6	14.3	14.7	18.0	19.4	21.4	23.0	24.3	27.5	32.2
Monounsaturated fats, g	12.8	14.8	16.3	21.1	21.0	22.3	26.0	28.3	30.7	33.2	35.1	39.9	45.4
Polyunsaturated fats, g	11.5	13.3	14.4	18.5	18.4	20.0	22.6	24.7	26.6	29.0	30.9	35.6	40.2
Linoleic acid (18:2), g	10.1	11.7	12.6	16.0	15.9	17.2	19.5	21.3	22.5	25.2	26.8	31.0	35.1
Linolenic acid (18:3), g	1.2	1.4	1.5	1.9	1.9	2.0	2.3	2.5	2.7	3.0	3.2	3.7	4.2
EPA (20:5 n-3), g	0.04	0.04	0.05	0.10	0.10	0.13	0.13	0.14	0.35	0.15	0.15	0.15	0.15
DHA (22:6 n-3), g	0.07	0.08	0.11	0.20	0.20	0.26	0.27	0.28	0.29	0.30	0.30	0.30	0.30
Stearic Acid (18:0), g	2.29	2.48	2.73	3.59	3.54	3.66	4.48	4.84	5.32	5.73	6.06	6.88	8.05
Cholesterol, mg	92	120	154	201	198	212	232	251	268	274	289	293	300
Minerals													
Calcium, mg	770	975	1030	1074	926	988	1001	1064	1250	1309	1358	1376	1376
Iron, mg	8	10	13	15	14	17	17	20	22	24	26	27	27
Magnesium, mg	171	223	262	305	295	337	352	396	429	469	502	519	520
Phosphorus, mg	912	1179	1332	1503	1387	1528	1572	1722	1929	2053	2157	2204	2204
Potassium, mg	1625	2097	2409	2785	2667	3158	3353	3701	3916	4242	4494	4721	4722
Sodium, mg	935	1215	1405	1555	1455	1634	1685	1847	2078	2210	2339	2368	2385
Zinc, mg	7	9	11	13	12	13	14	15	17	18	19	20	20
Copper, mg	0.63	0.82	0.99	1.18	1.17	1.39	1.46	1.64	1.74	1.90	2.03	2.12	2.12
Manganese, mg	2	2	3	4	4	4	4	5	5	6	6	6	6
Selenium, µg	54	70	86	102	99	114	118	130	143	152	161	162	162
Vitamins													
Vitamin A, µg_RAE	468	599	646	754	705	790	815	901	985	1083	1125	1161	1177
Vitamin E, mg AT	5.0	5.9	6.6	8.5	8.4	9.5	10.5	11.5	12.2	13.4	14.2	15.8	17.2
Vitamin D, IU	163	200	219	254	225	246	251	263	299	308	314	316	318
Vitamin C, mg	54	64	82	92	92	117	134	144	145	155	172	179	179
Thiamin, mg	0.8	1.1	1.3	1.4	1.4	1.7	1.7	2.0	2.2	2.4	2.6	2.7	2.7
Riboflavin, mg	1.1	1.5	1.7	1.8	1.6	1.8	1.9	2.0	2.3	2.4	2.6	2.6	2.6
Niacin, mg	11	14	18	21	21	24	25	28	30	33	35	36	36
Vitamin B-6, mg	1.1	1.4	1.7	2.0	2.0	2.3	2.4	2.7	2.9	3.1	3.4	3.5	3.5
Vitamin B-12, µg	3.6	4.5	5.4	6.7	6.3	7.2	7.4	7.9	8.7	9.1	9.4	9.4	9.5
Choline, mg	162	215	257	307	295	323	345	379	409	429	454	466	468
Vitamin K, µg	58	88	90	124	124	134	140	172	176	206	211	229	239
Folate, µg_DFE	275	363	437	489	484	579	592	693	757	853	924	956	956

***Includes 2 cup eq Dairy; **Includes 2.5 cup eq of Dairy**

Table C1. Comparison of nutrient content of each USDA Healthy Vegetarian Pattern to the nutritional goals for that pattern.

CALORIE LEVEL		**1000***	**1200****	**1400****	**1600****	**1600*****	**1600*****	**1800**	**1800**	**1800**	**2000**	**2000**	**2200**	**2200**	**2400**	**2600**	**2800**	**3000**	**3200**
Age/sex group for comparison		M/F 1 to 3	M/F 4 to 8	M/F 4 to 8	M/F 4 to 8	F 9 to 13	F 51-70	M 9 to 13	F 14-18	F 31-50	M 51-70	F 19-30	M 14-18	M 31-50	M 19-30	M 19-30	M 14-18	M 19-30	M 14-18
Macronutrients																			
Energy	%goal	100%	100%	100%	98%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Protein	%RDA	275%	246%	277%	305%	183%	135%	201%	149%	149%	127%	155%	147%	136%	146%	159%	183%	178%	195%
Protein	%kcal	14%	16%	15%	15%	16%	16%	15%	15%	15%	14%	14%	14%	14%	14%	14%	14%	13%	13%
Carbohydrate	%RDA	104%	127%	153%	166%	169%	169%	192%	192%	192%	211%	211%	235%	235%	256%	279%	303%	317%	328%
Carbohydrate	%kcal	54%	55%	57%	55%	55%	55%	56%	56%	56%	55%	55%	56%	56%	55%	56%	56%	55%	53%
Dietary fiber	%AI	107%	115%	122%	125%	126%	126%	132%	132%	132%	126%	126%	129%	129%	128%	133%	134%	134%	129%
Total fat	%kcal	34%	32%	31%	33%	32%	32%	32%	32%	32%	34%	34%	33%	33%	34%	33%	33%	34%	37%
Trans fat	%kcal	0.5%	0.4%	0.3%	0.4%	0.4%	0.4%	0.3%	0.3%	0.3%	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%	0%
Saturated fat	%kcal	9%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	9%
Monounsat. fat	%kcal	12%	11%	11%	12%	12%	12%	11%	11%	11%	12%	12%	12%	12%	12%	12%	12%	13%	13%
Polyunsat. fat	%kcal	11%	10%	10%	11%	11%	11%	11%	11%	11%	11%	11%	11%	11%	11%	11%	11%	12%	12%
Linoleic acid	%AI	152%	122%	140%	168%	168%	153%	160%	174%	160%	157%	183%	148%	140%	150%	166%	192%	204%	216%
Linolenic acid	%AI	181%	163%	186%	220%	199%	181%	192%	209%	209%	163%	237%	177%	177%	194%	209%	228%	257%	257%
Minerals																			
Calcium	%RDA	112%	100%	106%	111%	96%	104%	100%	100%	131%	111%	133%	107%	139%	144%	151%	121%	161%	125%
Iron	%RDA	109%	102%	126%	144%	180%	180%	208%	111%	93%	216%	96%	179%	246%	273%	308%	245%	351%	259%
Magnesium	%RDA	212%	170%	203%	236%	132%	99%	148%	98%	111%	89%	121%	101%	98%	112%	124%	131%	142%	141%
Phosphorus	%RDA	183%	218%	242%	264%	115%	205%	124%	124%	222%	228%	228%	137%	244%	259%	280%	166%	309%	176%
Potassium	%AI	52%	53%	61%	69%	61%	59%	69%	66%	66%	70%	70%	77%	77%	80%	88%	94%	100%	102%
Sodium	%UL	52%	54%	59%	61%	57%	55%	63%	60%	60%	61%	61%	66%	66%	71%	76%	81%	83%	84%
Zinc	%RDA	199%	156%	180%	203%	134%	134%	144%	128%	144%	107%	147%	118%	118%	128%	140%	151%	156%	158%
Copper	%RDA	189%	191%	234%	284%	181%	140%	208%	164%	162%	176%	176%	195%	193%	209%	234%	257%	273%	284%
Manganese	%AI	165%	175%	220%	260%	244%	217%	228%	270%	240%	198%	253%	235%	224%	249%	280%	322%	322%	342%
Selenium	%RDA	201%	178%	203%	211%	166%	121%	186%	135%	135%	138%	138%	151%	151%	165%	179%	197%	201%	202%
Vitamins																			
Vitamin A	%RDA	156%	150%	160%	182%	129%	111%	141%	121%	121%	97%	124%	106%	106%	109%	120%	125%	128%	130%
Vitamin E	%RDA	85%	85%	98%	119%	76%	56%	88%	64%	64%	72%	72%	78%	78%	85%	93%	100%	111%	123%
Vitamin D	%RDA	24%	31%	31%	32%	37%	37%	37%	37%	37%	37%	37%	38%	38%	39%	39%	41%	41%	41%
Vitamin C	%RDA	358%	257%	328%	368%	205%	123%	221%	153%	133%	129%	155%	169%	141%	142%	153%	207%	180%	216%
Thiamin	%RDA	162%	180%	215%	230%	157%	129%	185%	166%	151%	143%	156%	162%	162%	177%	197%	214%	223%	225%
Riboflavin	%RDA	219%	236%	259%	272%	198%	162%	212%	191%	174%	150%	178%	161%	161%	169%	180%	194%	198%	199%
Niacin	%RDA	124%	124%	150%	166%	111%	95%	130%	112%	112%	101%	115%	115%	115%	126%	142%	155%	161%	163%
Vitamin B-6	%RDA	183%	200%	238%	272%	166%	111%	186%	155%	143%	115%	151%	168%	168%	180%	200%	217%	229%	231%
Vitamin B-12	%RDA	271%	260%	277%	286%	214%	160%	219%	164%	164%	165%	165%	173%	173%	181%	190%	201%	202%	203%
Choline	%AI	75%	81%	88%	96%	67%	59%	72%	68%	64%	51%	66%	55%	55%	57%	61%	68%	71%	72%
Vitamin K	%AI	196%	161%	171%	227%	208%	139%	226%	181%	151%	119%	158%	233%	146%	150%	174%	289%	194%	325%
Folate	%RDA	194%	195%	242%	270%	181%	136%	215%	162%	162%	167%	167%	191%	191%	212%	239%	261%	273%	277%

*Includes 2 cup eq Dairy; **Includes 2.5 cup eq of Dairy; ***Includes 3 cup eq Dairy; All patterns at 1800 or more calories include 3 cup eq of Dairy

Table C2. Comparison of nutrient content of each USDA Healthy Mediterranean-Style Pattern to the nutritional goals for that pattern.

CALORIE LEVEL		**1000***	**1200****	**1400****	**1600****	**1600***	**1600***	**1800***	**1800***	**1800***	**2000***	**2000***	**2200***	**2200***	**2400****	**2600****	**2800****	**3000****	**3200****
Age/sex group for		M/F	M/F	M/F	M/F	F	F	M	F	F	M	F	M	M	M	M	M	M	M
comparison		1 to 3	4 to 8	4 to 8	4 to 8	9 to 13	51-70	9 to 13	14-18	31-50	51-70	19-30	14-18	31-50	19-30	19-30	14-18	19-30	14-18
Macronutrients																			
Energy	%goal	100%	100%	100%	102%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Protein	%RDA	345%	309%	365%	428%	226%	167%	252%	186%	186%	159%	194%	188%	175%	193%	203%	231%	218%	235%
Protein	%kcal	18%	20%	20%	20%	19%	19%	19%	19%	19%	18%	18%	18%	18%	18%	18%	17%	16%	15%
Carbohydrate	%RDA	98%	119%	142%	157%	153%	153%	181%	181%	181%	199%	199%	222%	222%	241%	264%	289%	303%	316%
Carbohydrate	%kcal	51%	52%	53%	50%	50%	50%	52%	52%	52%	52%	52%	52%	52%	52%	53%	54%	53%	51%
Dietary fiber	%AI	100%	107%	109%	113%	112%	112%	118%	118%	118%	112%	112%	117%	117%	114%	118%	118%	117%	110%
Total fat	%kcal	33%	31%	29%	32%	33%	33%	31%	31%	31%	32%	32%	32%	32%	32%	32%	31%	33%	35%
Trans fat	%kcal	0.4%	0.3%	0.2%	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%	0.4%	0.4%	0.3%	0.3%	0.4%	0.4%	0.3%	0.4%	0.5%
Saturated fat	%kcal	8%	8%	7%	8%	8%	8%	7%	7%	7%	8%	8%	8%	8%	8%	8%	8%	8%	9%
Monounsat. fat	%kcal	12%	11%	11%	12%	12%	12%	11%	11%	11%	12%	12%	12%	12%	12%	11%	11%	12%	13%
Polyunsat. fat	%kcal	10%	10%	9%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	11%	11%
Linoleic acid	%AI	144%	117%	126%	160%	159%	145%	143%	156%	143%	139%	163%	133%	125%	132%	148%	167%	182%	193%
Linolenic acid	%AI	173%	155%	162%	208%	187%	170%	171%	186%	186%	144%	210%	158%	158%	169%	186%	197%	232%	232%
Minerals																			
Calcium	%RDA	110%	97%	103%	107%	71%	77%	76%	76%	99%	83%	100%	82%	106%	125%	131%	104%	138%	106%
Iron	%RDA	111%	103%	126%	145%	181%	181%	208%	111%	93%	214%	95%	179%	246%	270%	301%	237%	335%	244%
Magnesium	%RDA	214%	171%	202%	235%	123%	92%	141%	94%	105%	84%	113%	96%	94%	107%	117%	122%	130%	127%
Phosphorus	%RDA	198%	236%	266%	301%	111%	198%	122%	122%	218%	225%	225%	138%	246%	276%	293%	173%	315%	176%
Potassium	%AI	54%	55%	63%	73%	59%	57%	70%	67%	67%	71%	71%	79%	79%	83%	90%	96%	100%	100%
Sodium	%UL	62%	64%	74%	82%	66%	63%	74%	71%	71%	73%	73%	80%	80%	90%	96%	102%	103%	104%
Zinc	%RDA	234%	186%	220%	256%	153%	153%	164%	146%	164%	124%	170%	138%	138%	153%	165%	176%	179%	179%
Copper	%RDA	185%	187%	225%	269%	167%	130%	199%	156%	154%	162%	162%	184%	182%	193%	212%	228%	236%	238%
Manganese	%AI	155%	164%	202%	235%	220%	196%	208%	247%	220%	177%	227%	214%	204%	224%	250%	286%	281%	294%
Selenium	%RDA	269%	232%	286%	340%	247%	180%	286%	208%	208%	214%	214%	237%	237%	259%	276%	293%	295%	295%
Vitamins																			
Vitamin A	%RDA	156%	150%	161%	189%	118%	101%	132%	113%	113%	91%	116%	100%	100%	109%	120%	125%	129%	131%
Vitamin E	%RDA	83%	84%	94%	121%	77%	56%	86%	63%	63%	70%	70%	77%	77%	82%	89%	95%	105%	115%
Vitamin D	%RDA	27%	33%	37%	42%	37%	37%	41%	41%	41%	42%	42%	44%	44%	50%	51%	52%	53%	53%
Vitamin C	%RDA	360%	258%	329%	370%	205%	123%	260%	180%	156%	149%	178%	192%	160%	161%	172%	230%	199%	239%
Thiamin	%RDA	168%	187%	223%	241%	157%	129%	187%	168%	153%	144%	157%	164%	164%	181%	199%	215%	222%	222%
Riboflavin	%RDA	227%	244%	276%	298%	182%	149%	200%	180%	164%	144%	170%	157%	157%	177%	188%	199%	202%	202%
Niacin	%RDA	175%	178%	223%	262%	174%	149%	200%	171%	171%	157%	179%	176%	176%	190%	206%	221%	226%	226%
Vitamin B-6	%RDA	215%	237%	287%	339%	200%	134%	230%	191%	177%	143%	187%	209%	209%	223%	242%	260%	269%	270%
Vitamin B-12	%RDA	403%	375%	447%	561%	351%	263%	402%	301%	301%	308%	308%	331%	331%	362%	378%	392%	393%	394%
Choline	%AI	81%	86%	103%	123%	79%	69%	86%	81%	76%	63%	81%	69%	69%	74%	78%	83%	85%	85%
Vitamin K	%AI	195%	160%	164%	226%	206%	138%	223%	178%	148%	117%	155%	230%	144%	147%	171%	281%	191%	319%
Folate	%RDA	183%	181%	218%	244%	161%	121%	193%	145%	145%	148%	148%	173%	173%	189%	213%	231%	239%	239%

***Includes 2 cup eq Dairy; **Includes 2.5 cup eq of Dairy**