United States Department of Agriculture

Added Sugars: Food Pattern Modeling Exercise 1

2020 Dietary Guidelines Advisory Committee

Food Pattern Modeling Report

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The food pattern modeling exercises were conducted by the 2020 Dietary Guidelines Advisory Committee in collaboration with the food pattern modeling team at the Center for Nutrition Policy and Promotion, Food and Nutrition Service, U.S. Department of Agriculture (USDA). All Food Pattern Modeling reports from the 2020 Advisory Committee Project are available at: https://www.dietaryguidelines.gov/2020-advisory-committee-report/food-pattern-modeling/FPM-added-sugars.

The food pattern modeling analyses help explain how changes to food-based dietary recommendations could potentially affect Americans' ability to meet their nutrient needs. The exercises help inform USDA's development of relevant dietary patterns for the American population that reflect health-promoting patterns identified in systematic reviews and meet nutrient recommendations. The results should not be interpreted as dietary guidance. This report provides the documentation for Added Sugars Food Pattern Modeling Exercise 2 of 3. To view the results in the context of the 2020 Advisory Committee's Scientific Report visit: https://www.dietaryguidelines.gov/2020-advisory-committee-report.

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INTRODUCTION

This report describes the results the *Added Sugars Food Pattern Modeling Exercise 1: Estimating the number of calories in the USDA Food Patterns that could be used for intakes of added sugars*. This exercise was conducted by the 2020 Dietary Guidelines Advisory Committee, supported by USDA's food pattern modeling team, to help answer the following question:

- How much added sugars can be accommodated in a healthy diet while still meeting food group and nutrient needs?

The Added Sugars Food Pattern Modeling Exercises 2 and 3 provided additional information to help answer the question. To access the results of these exercises, visit: https://www.dietaryguidelines.gov/2020-advisory-committee-report/food-pattern-modeling/FPM-added-sugars.

The food pattern modeling exercises were conducted by the 2020 Dietary Guidelines Advisory Committee with support from the food pattern modeling team. The food pattern modeling team included nutrition scientists and data analysts on the Nutrition and Economic Analysis Team at the USDA Center for Nutrition Policy and Promotion within the Food and Nutrition Service. To answer the food pattern modeling questions, the Committee, with support from Federal staff, developed a protocol, or plan, that described the food pattern exercises that would be used to answer the question. The protocol included an *analytic framework* that described the overall scope and the approach used to answer the question and an *analytic plan* that described the data and subsequent analyses to be considered.

More information about the 2020 Dietary Guidelines Advisory Committee is available at the following website: https://www.DietaryGuidelines.gov.

The Committee developed conclusion statements for each question answered using food pattern modeling. The conclusion statements describe the results of the analyses used to answer the specific question examined. The conclusion statements are available in the 2020 Dietary Guidelines Advisory Committee's Scientific Report, available at: https://www.dietaryguidelines.gov/2020-advisory-committee-report.

METHODS

The Added Sugars Food Pattern Modeling Exercise 1 relied on data from the U.S. Department of Agriculture Food and Nutrient Database for Dietary Studies (FNDDS) 2015-2016. The Food Patterns Equivalents Database (FPED) 2015-2016 and the National Nutrient Database for Standard Reference, Release 28 (2016 version) provided supporting data. The U.S. population ages 2 years and older, including women who are pregnant or lactating, was considered. The following are key definitions for this exercise:

- **USDA Food Pattern:** A pattern of consumption designed to articulate the evidence on the relationship between diet and health and meet the known nutrient needs of targeted age-sex groups within calorie constraints. A pattern includes the recommended amounts to eat from 5 major food groups—Fruits, Vegetables, Grains, Protein Foods, and Dairy. The recommendations for Vegetables and Grains are further defined by subgroups. The USDA Food Patterns do not account for beverages that are not constituents of food groups or subgroups such as soft drinks and coffee or tea.
- **Item Cluster:** An identified grouping of the same or similar foods within each food group and subgroup. Item clusters are used to calculate the composite nutrient profile for each food group and subgroup used to define a USDA Food Pattern.
- **Nutrient Profile:** The anticipated nutrient content for each food group and subgroup that could be obtained by eating a variety of foods from that group/subgroup in nutrient-dense forms. The nutrient profiles are based on a weighted average of nutrient-dense forms of foods. The weighted average calculation considers a range of American food choices, but in nutrient-dense forms, and results in a food pattern that can be adapted to fit an individual's preferences.
- **Nutrient-Dense Representative Food:** The food within an item cluster with the least amount of added sugars, sodium, and solid fats. For some item clusters, the nutrient-dense representative food contains some added sugars, solid fats, and/or sodium.
- **Essential Calories:** the energy associated with the foods and beverages ingested to meet nutritional goals through choices that align with the USDA Food Patterns in forms with the least amounts of saturated fat, added sugars and sodium.

For more information about the food pattern modeling definitions, visit: https://www.dietaryguidelines.gov/2020-advisory-committee-report/food-pattern-modeling/FPM-2-and-older.

The base USDA Food Pattern, the Healthy U.S. Style Pattern, was used to estimate the number of calories that could come from added sugars while staying within energy limits for individuals ages 2 years and older. First, the amount of essential calories in the base USDA Food Pattern was calculated using nutrient-dense representative foods across the 12 calorie levels. The essential calories from all food groups and oils in the base USDA Food Pattern were summed, with the remaining calories considered as the amount available for other uses, specifically, for the consumption of solid fats or added sugars, alcohol, or additional consumption of nutrient-dense foods beyond food group needs.

In table 1 these remaining calories were assigned exclusively to solid fats and added sugars based on the proportional, population-level intake of these nutrients: 55 percent solid fats; 45 percent added sugars (to view the food group intake distributions, visit: https://www.dietaryguidelines.gov/2020-advisory-committee-report/data-analysis). The percent of calories available for added sugars consumption beyond the small amounts inherent to some nutrient-dense foods that comprise the USDA Food Pattern, were also calculated for each of the 12 calorie levels.

In table 2 these remaining calories at the 2000 calorie level were assigned to varied ratios of added sugars to solid fat using sample foods to represent the hypothetical intake amount.

Table 3 identifies the essential and remaining calories when the base USDA Food Patterns are calculated using the nutrient-profiles across life stages.

For additional information on the USDA Food Pattern methods, visit: https://www.dietaryguidelines.gov/2020-advisory-committee-report/food-pattern-modeling/FPM-2-and-older.

LIST OF TABLES AND FIGURES

TABLE 1: ESSENTIAL CALORIES AND LIMIT ON SOLID FATS AND ADDED SUGARS ACROSS CALORIE LEVELS IN THE HEALTHY U.S.-STYLE PATTERN FOR AGES 2 YEARS AND OLDER

Calorie	Essential Calories[1]	Percent 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]	Percent Calories Added Sugars
Level		% kcal	kcal	kcal	kcal	g	g	%
1,000[5]	868	87	132	72	59	9	15	6
1,200	1120	93	80	44	36	5	9	3
1,400	1310	94	90	49	40	6	10	3
1,600	1496	94	104	57	47	7	12	3
1,800	1657	92	143	79	65	9	16	4
2,000	1759	88	241	133	109	16	27	5
2,200	1947	88	253	139	114	17	29	5
2,400	2079	87	321	176	144	21	36	6
2,600	2251	87	349	192	157	23	39	6
2,800	2431	87	369	203	166	24	41	6
3,000	2559	85	441	243	199	29	50	7
3,200	2620	82	580	319	261	38	65	8

[1] The energy associated with the foods and beverages ingested to meet nutritional goals through choices that align with the USDA Food Patterns in forms with the least amounts of saturated fat, added sugars and sodium.

[2] Calculated from pattern calorie level minus essential calories.

[3] Calculated as 55 percent of calories from solid fats and 45 percent from added sugars, based on mean population intakes (NCI Usual Intakes data for NHANES 2013-2016).

[4] Calculated using caloric values of 8.4 kcal per 1 gram of solid fats and 4 kcal per 1 gram of added sugars.

[5] The higher calorie limit for solid fats and added sugars at the 1,000-calorie pattern is attributed to a lower amount of dairy compared to the 1,200-, 1,400- and 1,600-calorie patterns that are designed for older children and adult women with a higher Recommended Dietary Allowance (RDA) for calcium.

TABLE 2: EXAMPLE DISTRIBUTIONS OF SOLID FATS AND ADDED SUGARS WITH SAMPLE FOOD AMOUNTS IN THE 2000 CALORIE LEVEL IN THE HEALTHY U.S.-STYLE PATTERN

Calorie	**Calorie Limit for Solid Fats and Added Sugars[1,2]**	**Calories Assigned to Solid Fats[3]**	**Calories Assigned to Added Sugars[3]**	**Grams of Solid Fats[4]**	**Sample food equivalent (Butter)**	**Grams of Added Sugars[4]**	**Sample food equivalent (Regular soda)**	**Percent Calories Added Sugars**
Level	kcal	kcal (%)	kcal (%)	g	Tbsp	g	~ Fluid oz.	%
2,000	241	0 (0)	241 (100)	0	N/A	60	Soda: 20	12
2,000	241	60 (25)	181 (75)	7	Butter: 0.5	45	Soda: 16	9
2,000	241	109 (45)	133 (55)	12	Butter: 1.1	33	Soda: 12	6
2,000[5]	241	133 (55)	109 (45)	16	Butter: 1.2	27	Soda: 9	5
2,000	241	181 (75)	60 (25)	20	Butter: 1.7	15	Soda: 5	3
2,000	241	241 (100)	0 (0)	27	Butter: 2.4	0	N/A	0

[1] Calculated from pattern calorie level minus essential calories

[2] The calorie limit for solid fats and added sugars assumes consumption of nutrient-dense foods that meet nutritional goals through choices that align with the USDA Food Patterns in forms with the least amounts of saturated fat, added sugars and sodium.

[3] Based on mean population intakes (NCI Usual Intakes data for NHANES 2013-2016)

[4] Calculated using caloric values of 8.4 kcal per 1 gram of solid fats and 4 kcal per 1 gram of added sugars

[5] As shown in table D 12.2, the remaining energy for added sugars and solid fats is assigned in a 55:45 ratio based on mean population-level intakes

TABLE 3: ESSENTIAL AND REMAINING CALORIES ACROSS LIFESTAGE CALORIE LEVELS IN THE HEALTHY U.S.-STYLE PATTERN FOR AGES 2 YEARS AND OLDER

Calorie Level	*Age 2 years and older*		*Age 2 to 3 years*		*Age 4 to 18 years*		*Age 19 to 70 years*		*Age 71 years and older*	
	Essential Calories[1]	Remaining Calories[2]	Essential Calories[1]	Remaining Calories[2]	Essential Calories[1]	Remaining Calories[2]	Essential Calories[1]	Remaining Calories[2]	Essential Calories[1]	Remaining Calories[2]
1000[3]	868	132	883	117	858	142	869	131	899	101
1200	1120	80	1139	61	1108	92	1121	79	1156	44
1400	1310	90	1336	64	1297	103	1312	88	1349	51
1600	1496	104	1524	76	1481	119	1499	101	1538	62
1800	1657	143	1688	112	1641	159	1659	141	1701	99
2000	1759	241	1792	208	1742	258	1761	239	1803	197
2200	1947	253	1986	214	1930	270	1949	251	1990	210
2400	2079	321	2124	276	2062	338	2082	318	2125	275
2600	2251	349	2301	299	2233	367	2254	346	2295	305
2800	2431	369	2489	311	2411	389	2435	365	2478	322
3000	2559	441	2617	383	2539	461	2562	438	2603	397

[1] The energy associated with the foods and beverages ingested to meet nutritional goals through choices that align with the USDA Food Patterns in forms with the least amounts of saturated fat, added sugars and sodium.

[2] Calculated from pattern calorie level minus essential calories.

[3] The higher calorie limit for solid fats and added sugars at the 1,000-calorie pattern is attributed to a lower amount of dairy compared to the 1,200-, 1,400- and 1,600-calorie patterns that are designed for older children and adult women with a higher Recommended Dietary Allowance (RDA) for calcium.