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.


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.
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.


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.
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Table 3. Essential and Remaining Calories Across Lifestage Calorie Levels in the Healthy U.S.-Style Pattern for Ages 2 Years and Older  pg. 10
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

<table>
<thead>
<tr>
<th>Calorie Level</th>
<th>Essential Calories</th>
<th>Percent Essential Calories</th>
<th>Calorie Limit for Solid Fats and Added Sugars</th>
<th>Calories Assigned to Solid Fats</th>
<th>Calories Assigned to Added Sugars</th>
<th>Grams of Solid Fats</th>
<th>Grams of Added Sugars</th>
<th>Percent Calories Added Sugars</th>
</tr>
</thead>
<tbody>
<tr>
<td>1,000</td>
<td>868</td>
<td>87</td>
<td>132</td>
<td>72</td>
<td>59</td>
<td>9</td>
<td>15</td>
<td>6</td>
</tr>
<tr>
<td>1,200</td>
<td>1120</td>
<td>93</td>
<td>80</td>
<td>44</td>
<td>36</td>
<td>5</td>
<td>9</td>
<td>3</td>
</tr>
<tr>
<td>1,400</td>
<td>1310</td>
<td>94</td>
<td>90</td>
<td>49</td>
<td>40</td>
<td>6</td>
<td>10</td>
<td>3</td>
</tr>
<tr>
<td>1,600</td>
<td>1496</td>
<td>94</td>
<td>104</td>
<td>57</td>
<td>47</td>
<td>7</td>
<td>12</td>
<td>3</td>
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<tr>
<td>1,800</td>
<td>1657</td>
<td>92</td>
<td>143</td>
<td>79</td>
<td>65</td>
<td>9</td>
<td>16</td>
<td>4</td>
</tr>
<tr>
<td>2,000</td>
<td>1759</td>
<td>88</td>
<td>241</td>
<td>133</td>
<td>109</td>
<td>16</td>
<td>27</td>
<td>5</td>
</tr>
<tr>
<td>2,200</td>
<td>1947</td>
<td>88</td>
<td>253</td>
<td>139</td>
<td>114</td>
<td>17</td>
<td>29</td>
<td>5</td>
</tr>
<tr>
<td>2,400</td>
<td>2079</td>
<td>87</td>
<td>321</td>
<td>176</td>
<td>144</td>
<td>21</td>
<td>36</td>
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<tr>
<td>2,600</td>
<td>2251</td>
<td>87</td>
<td>349</td>
<td>192</td>
<td>157</td>
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<td>39</td>
<td>6</td>
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<tr>
<td>2,800</td>
<td>2431</td>
<td>87</td>
<td>369</td>
<td>203</td>
<td>166</td>
<td>24</td>
<td>41</td>
<td>6</td>
</tr>
<tr>
<td>3,000</td>
<td>2559</td>
<td>85</td>
<td>441</td>
<td>243</td>
<td>199</td>
<td>29</td>
<td>50</td>
<td>7</td>
</tr>
<tr>
<td>3,200</td>
<td>2620</td>
<td>82</td>
<td>580</td>
<td>319</td>
<td>261</td>
<td>38</td>
<td>65</td>
<td>8</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Calorie Level</th>
<th>Calorie Limit for Solid Fats and Added Sugars¹,²</th>
<th>Calories Assigned to Solid Fats³</th>
<th>Calories Assigned to Added Sugars³</th>
<th>Grams of Solid Fats⁴</th>
<th>Sample food equivalent (Butter)</th>
<th>Grams of Added Sugars⁴</th>
<th>Sample food equivalent (Regular soda)</th>
<th>Percent Calories Added Sugars</th>
</tr>
</thead>
<tbody>
<tr>
<td>2,000</td>
<td>241 kcal (100)</td>
<td>241 kcal (%)</td>
<td>0 Tbsp</td>
<td>Butter: 0.5</td>
<td>45 Grams</td>
<td>60 oz.</td>
<td>Soda: 20</td>
<td>12%</td>
</tr>
<tr>
<td>2,000</td>
<td>241 kcal (100)</td>
<td>181 kcal (%)</td>
<td>7 Tbsp</td>
<td>Butter: 1.1</td>
<td>33 Grams</td>
<td>Soda: 16</td>
<td>Soda: 12</td>
<td>9%</td>
</tr>
<tr>
<td>2,000</td>
<td>241 kcal (100)</td>
<td>133 kcal (%)</td>
<td>12 Tbsp</td>
<td>Butter: 1.2</td>
<td>27 Grams</td>
<td>Soda: 9</td>
<td>Soda: 5</td>
<td>5%</td>
</tr>
<tr>
<td>2,000</td>
<td>241 kcal (100)</td>
<td>60 kcal (%)</td>
<td>20 Tbsp</td>
<td>Butter: 1.7</td>
<td>15 Grams</td>
<td>Soda: 5</td>
<td>N/A</td>
<td>3%</td>
</tr>
</tbody>
</table>

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

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

<table>
<thead>
<tr>
<th>Calorie Level</th>
<th>Age 2 years and older</th>
<th>Age 2 to 3 years</th>
<th>Age 4 to 18 years</th>
<th>Age 19 to 70 years</th>
<th>Age 71 years and older</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Essential Calories¹</td>
<td>Remaining Calories²</td>
<td>Essential Calories¹</td>
<td>Remaining Calories²</td>
<td>Essential Calories¹</td>
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<tr>
<td>1000³</td>
<td>868</td>
<td>132</td>
<td>883</td>
<td>117</td>
<td>858</td>
</tr>
<tr>
<td>1200</td>
<td>1120</td>
<td>80</td>
<td>1139</td>
<td>61</td>
<td>1108</td>
</tr>
<tr>
<td>1400</td>
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<td>64</td>
<td>1297</td>
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<td>1600</td>
<td>1496</td>
<td>104</td>
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<td>76</td>
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<tr>
<td>1800</td>
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<td>2000</td>
<td>1759</td>
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<td>1792</td>
<td>208</td>
<td>1742</td>
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<tr>
<td>2200</td>
<td>1947</td>
<td>253</td>
<td>1986</td>
<td>214</td>
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<td>3000</td>
<td>2559</td>
<td>441</td>
<td>2617</td>
<td>383</td>
<td>2539</td>
</tr>
</tbody>
</table>

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.

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