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Assessing the Public Health Impacts of the Children's Food and Beverage Advertising Initiative

Research Report

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Executive Summary

The Children’s Food and Beverage Advertising Initiative (CFBAI) is a voluntary industry initiative in which companies commit to feature only foods meeting specific nutrition criteria in advertising directed primarily to children under age 12. New criteria that were announced in 2018 and went into effect in 2020 strengthened the nutrition standards and changed the criteria for total sugars to added sugars for consistency with the new Nutrition Facts label. Prior studies have not yet estimated the relative importance of Children’s Food and Beverage Advertising Initiative (CFBAI)–listed products in children’s diets, which is necessary to understand the potential for the criteria to have a public health impact. In addition, with the recent change in the criteria, the potential for improvements in the children’s diets based on current purchase and consumption patterns can be assessed.

Our study focused on linking household-based scanner data with nutrition label data to determine the extent to which U.S. households with children from 0 to 8 years purchase CFBAI-listed foods and to simulate the potential effects of reformulation as a result of changes to the nutrition criteria. Furthermore, we assessed the relative importance of products on the list compared with substitute products produced by the same manufacturers by comparing product prices and purchase volumes.

Key findings of the study are as follows:

- The number of products on the CFBAI list is relatively limited and includes an estimated 696 unique products (i.e., Universal Product Codes [UPCs] in 2017). These products accounted for about 1% of calories, 0.5% of saturated fat, 1.3% of added sugars, 1.0% of sodium, and 1.6% of dietary fiber in purchases by households with children 0 to 8 years of age based on average consumption amounts from “What We Eat in America.” Differences across income groups and race and ethnicity were relatively minor.
- About 21% of products on the list as of 2017 would have needed to be reformulated to meet the new criteria in effect in 2020 for calories, saturated fat, added sugars, or sodium. If companies had been using the 2020 criteria in 2017, reformulation of these products would have resulted in reductions of 2.4% for added sugars, 0.8% for calories, and 1.2% for sodium in purchases of foods by households with young children. Because the products comprise a relatively small portion of purchases, the public health significance is somewhat limited.
- An estimated 818 substitute products produced by the same manufacturers—but comprising different types, flavors, or varieties than CFBAI-listed products—were identified for the analysis. These products comprise an important share of manufacturers’ product portfolios across all demographic groups, but we detected no substantial differences in product pricing between CFBAI-listed and substitute products.
- A loophole that allows companies to advertise some products but not others within a brand family is a real concern because it is difficult to discern whether some individual UPCs are listed products, particularly because there is no indication of listed products on product labels or shelf tags.

The results of this study indicate the need to ensure that the design of voluntary industry initiatives will result in a positive public health impact. Purchase, sales, or consumption data

can be used to calculate the baseline contribution of targeted foods and beverages to calories or specific nutrients and to assess the potential changes that could occur under various scenarios. Then it would be possible to assess whether the changes would have a meaningful effect on dietary quality and thus public health.

1. Introduction

The Children’s Food and Beverage Advertising Initiative (CFBAI) is a voluntary industry initiative in which companies commit to feature only foods meeting specific nutrition criteria in advertising directed primarily to children under age 12. Child-directed advertising is defined as programming with an audience of 30% or more (January 1, 2020, definition) children on television, radio, print, Internet, influencer communications, and other types of media. Foods and beverages that meet the criteria are included on the list of products that can be advertised to children, although not all products that meet the criteria are listed if manufacturers do not engage in child-directed advertising of those products.

Throughout this report, we refer to the criteria established in 2011 and in effect in 2013 as the “2013 criteria” and the criteria established in 2018 and in effect in 2020 as the “2020 criteria.”

Uniform criteria across participating companies were established in 2011 and went into effect in 2013 and set limits for calories, saturated fat, sodium, and total sugars per listed serving size across 10 product categories such as juices, dairy products, and mixed dishes. In addition, requirements for nutrition components to encourage (e.g., fruits, vegetables, whole grains, Vitamin D, and calcium) were also established. New criteria that were announced in 2018 and went into effect in 2020 strengthened the nutrition standards and changed the criteria for sugars to be for added sugars instead of total sugars for consistency with the new Nutrition Facts label.

Several studies have assessed whether food and beverage products advertised to children, including products on the CFBAI list, are considered healthy or meet specific nutrition criteria (Federal Trade Commission [FTC], 2012; Harris et al., 2017; Hingle et al., 2015; Kunkel et al., 2015; Paek et al., 2014; Powell et al., 2013; Reat et al., 2019). Studies have also compared products on the CFBAI list to other standards such as those of the U.S. Department of Agriculture (USDA) Smart Snacks program, the World Health Organization, the Interagency Working Group on Food Marketed to Children (2011), and the Special Supplemental Nutrition Program for Women, Infants, and Children (Harris et al., 2017; Schermbeck et al., 2015; Vaala & Ritter, 2020; Wootan et al., 2019).

Prior studies have not yet estimated the relative importance of CFBAI-listed products in children’s diets, which is necessary to understand the potential for the criteria to have a public health impact. With the recent change in the criteria, we can determine the potential for improvements in children’s diets based on current purchase and consumption patterns. Assessing the relative market shares of CFBAI-listed products compared with substitutes in the same brand family can indicate whether the potential benefits associated with CFBAI-listed products might be offset by the availability of similar substitute products. The purpose of this study is to fill these gaps in the literature and provide information that could help guide changes in how the criteria are applied under the initiative. The results of this study

are timely because adherence to the new CFBAI criteria recently went into effect (on January 1, 2020).

2. The Issue

The CFBAI was launched as an industry self-regulation program by the Council of Better Business Bureaus and 10 leading U.S. food and beverage companies and quick-service restaurants in 2006 (Kolish, 2014). The primary focus is on limiting advertising of unhealthy foods directed to children younger than 12 years. An interagency working group made up of members from the FTC, Centers for Disease Control and Prevention, the Food and Drug Administration (FDA), and the USDA drafted guidelines for the nutritional quality of foods that were most heavily marketed to children in 2011 (Dietz, 2013). In addition, the Healthy Eating Research (HER) (2015) program convened a panel of experts to develop recommendations for responsible food marketing to children. However, no federal regulations to restrict advertising of unhealthy foods to children were subsequently developed; thus, advertising is limited only through the industry's self-regulation (Abbasi, 2017). Initially, the companies in the CFBAI established company-specific nutrition criteria to identify foods that could be advertised to children (Kolish, 2014). However, in July 2011, the CFBAI established category-specific nutrition criteria that became uniform across the then 17 participating companies at the end of 2013 (Kolish, 2014). The uniform criteria were developed by the CFBAI, nutritionists, and food scientists from the participating companies and were based on a review of the 2010 Dietary Guidelines for Americans.

The criteria that were established in 2011 and went into effect in January 2013 (i.e., the 2013 criteria) were recently criticized for not meeting the World Health Organization's nutrient profile standard (Wootan et al., 2019), and HER's recent evaluation of nutrition standards for better-for-you foods rated the CFBAI criteria among the lowest (Fox & Corbett, 2018). Using the 2013 criteria, Harris et al. (2017) assessed and compared the nutritional quality of CFBAI-listed products versus additional products sold under the same brands, including comparing them against the USDA Smart Snacks nutrition standards for products that can be sold to children in schools and the Nutrient Profiling Index (NPI) scores used to identify products that can be advertised to children in the United Kingdom. Of the 319 products identified as CFBAI-listed products, they found that many, with the exception of yogurt products, did not have healthy NPI scores or meet Smart Snacks standards (Harris et al., 2017). They also identified 386 products produced in the same brand family as those on the CFBAI list. Many product categories had more nonlisted than listed products within the same brand family, and most of the unlisted products did not meet the CFBAI or other nutrition standards.

In 2018, the CFBAI criteria were updated to strengthen the healthfulness of the criteria and align them with the nutrition information on the new Nutrition Facts label. The new criteria went into effect in January 2020 (i.e., the 2020 criteria) to coincide with the date for most

food products to comply with the new Nutrition Facts label (Enright & Eskensazi, 2018). Under the 2020 criteria, some food categories that were previously bundled were separated, the “added sugars” criteria replaced the prior “total sugars” criteria, sodium and added sugars limits were reduced, and the whole grains criteria were improved (Enright & Eskensazi, 2018). Calorie limits were not adjusted, but the reductions in total sugars could result in reduced calories. In CFBAI’s own analysis of the impact of the new criteria, they estimated that approximately 40% of the products that manufacturers listed in 2017 as meeting the 2013 criteria for advertising to children would not meet the 2020 criteria (Enright & Eskensazi, 2018).

Our study focused on linking household-based scanner data, which represent foods purchased from all types of retail stores by a panel of households, with nutrition label data to determine the extent to which households with children purchase foods on the CFBAI list and to simulate the potential effects of reformulation as a result of changes to the nutrition criteria. Furthermore, we assessed the relative importance of products on the list compared with substitute products produced by the same manufacturers but that do not meet the CFBAI criteria by comparing product prices and purchase volumes for households with children. Comparing products on the list with substitutes is important because advertising of products on the list may act to promote products in the same brand family that do not meet the criteria. Such consumer confusion may undermine the value of providing products that meet the CFBAI standards. In other words, allowing advertising of products in the same brand family that do not meet the nutrition criteria is a loophole in the standards (HER, 2015).

The CFBAI also provides a useful case study for assessing whether a voluntary industry initiative can be assumed to have a true public health impact or rather act to generate a healthfulness halo effect on a participating manufacturer’s products, encouraging consumption of both targeted and substitute products. The results of the analysis are relevant to ongoing work by public health organizations to help facilitate and evaluate voluntary industry initiatives to improve the healthiness of foods and beverages (Wiecha &

Examples of CFBAI-Listed and Similar Substitute Products

CFBAI Listed (2017)
<ul style="list-style-type: none"> ▪ Kraft Original Flavor Macaroni & Cheese Dinner ▪ Kellogg’s Eggo Frozen Homestyle Waffles ▪ Pepperidge Farm Goldfish, Cheddar ▪ Dannon Creamy Lowfat Yogurt, Strawberry ▪ General Mills Original Lucky Charms Cereal
Similar Substitutes
<ul style="list-style-type: none"> ▪ Kraft Deluxe Original Cheddar Macaroni & Cheese Dinner ▪ Kellogg’s Eggo Blueberry Waffles ▪ Pepperidge Farm Goldfish, Parmesan ▪ Dannon Lowfat Yogurt, Fruit on the Bottom, Strawberry ▪ General Mills Lucky Charms Honey Clovers Cereal

Source: Derived from the 2017 CFBAI product list and company websites.

Muth, 2021). Despite the popularity of food from full- and quick-service restaurants, food purchased at grocery and other stores for home preparation still makes up the major share of calories in the American diet (Saksena et al., 2018); this is particularly true for lower-income households. In addition to the public health community, the results of this analysis may be useful to CFBAI and participating companies to better understand the relative importance of the criteria in the diets of households with children and to help inform updates to the criteria in the future.

It is important to note that the analysis was conducted using data before the COVID-19 pandemic, which drastically altered where many people obtained their meals. With the stay-at-home orders and closures of schools, offices, and restaurants, consumption of foods purchased from stores increased substantially. In addition, many people likely increased their television viewing and exposure to other types of media. Thus, the healthiness of foods offered and advertised to children is of even greater importance.

3. Goals of the Study

The population of focus for this study was U.S. households with children from 0 to 8 years. The goals were to use household-based scanner data to (1) measure the total contribution of products on the 2017 CFBAI list to calories, fat, sugar, fiber, and sodium in foods purchased in stores; (2) calculate the change in the contributions of those products to calories and other nutrients in household food purchases if manufacturers reformulate them to meet the 2020 criteria and purchasing patterns remain unchanged; and (3) determine the relative importance of substitutes not included on the CFBAI list. Our focus is on packaged foods and beverages sold in retail stores, although the CFBAI list also includes some foods and beverages sold in quick-service restaurants.

4. Analysis Approach

To conduct the analysis, we used IRI Consumer Network household food purchase data matched with nutrition label data for 2017.¹ We focused on 2017 because it was the year before the announcement of the new standards in 2018 and, therefore, serves as a baseline for assessing the potential effects of reformulation to meet the new criteria. Our approach is similar to a prior FTC study (2012) that used data from 2009 (the period before the establishment of uniform criteria in 2011) to assess the potential effects of reformulation to meet the 2013 criteria.

IRI Consumer Network is a commercial data product derived from the National Consumer Panel, which is an operational joint venture equally owned by IRI and The Nielsen Company since 2009 (Muth et al., 2016; Muth, Okrent, et al., 2019). The data comprise weekly

¹ We obtained access to the restricted IRI Consumer Network data for use in this study through a third-party agreement with USDA's Economic Research Service and IRI.

household-level purchases recorded by the household using a handheld in-home scanning device or application that scans and records UPC codes and other information about the item purchased. Approximately 60,000 to 65,000 households that record UPC product purchases are included in the static panel datasets available each year. To align with the population of interest, we identified households with at least one child, 0 to 8 years of age (weighted estimate of 26 million households in 2017). We applied IRI's projection factors (or weights) to develop national aggregate estimates of food purchase quantities in total and by the following demographic categories: lower income (<185% of poverty line) versus higher income and non-Hispanic white, non-Hispanic black, Hispanic, and Asian and other.

From the household purchases represented in the Consumer Network data, we extracted data on the number of units purchased and total price paid by households with children 0 to 8 years for CFBAI-listed products and substitute products. The products on the list were produced by Campbell Soup Company; Conagra Brands, Inc.; Danone North America, PBC; General Mills Inc.; Kellogg Company; The Kraft Heinz Company; Nestlé USA; PepsiCo, Inc.; Post Food, LLC; and Unilever United States.² Other food and beverage manufacturers that are included on the CFBAI list but do not engage in child-directed advertising as defined by CFBAI were not included in the analysis. These include American Licorice Company; Keurig Dr Pepper, Inc.; Mars, Incorporated; and Mondelēz Global, LLC.

The list of product categories and associated criteria that were included in the analysis are shown in Table 1. The changes in the criteria shown in Table 1 were primarily for reductions in sodium and added sugars, although reductions in added sugars could also translate into reductions in calories depending on the formulation. Although most category definitions remained the same, the "other grain, fruit, and vegetable products" category under the 2013 criteria were split into the following: cereals, savory snacks, sweet snacks, and waffles and pancakes. We excluded meat, poultry, and fish products; milk and milk products; fruits and vegetables; breads; pastas (plain); and small meals from Table 1 because no products on the CFBAI list fall into those categories.

We also identified substitute products as those that households could readily substitute for CFBAI-listed products but were a different type, flavor, or variety. Although the identified substitute products are very similar to CFBAI-listed products, they do not meet the criteria because of differences in formulation. In total, we included 696 CFBAI-listed and 818 substitute products in the analysis and validated our findings against the product lists in the f.a.c.t.s. report (Harris et al., 2017; see Table 36).³ As a quality control check, we also

² Other food and beverage manufacturers that are included on the CFBAI list but do not engage in child-directed advertising are as follows: American Licorice Company; The Coca-Cola Company; Ferrero USA, Inc.; The Hershey Company; Keurig Dr Pepper, Inc.; Mars, Incorporated; and Mondelēz Global, LLC.

³ These counts include all consumer package sizes and therefore are greater than the number of products in the f.a.c.t.s. report, which also used 2017 data and identified 319 listed products and 386 substitute products.

verified that products we identified as CFBAI-listed products appeared to meet the criteria in effect in 2017.

Table 1. CFBAI Criteria in Effect in 2017 and in 2020 for Product Categories and Nutrients Included in the Analysis

Category and Food Component	Criteria in Effect	
	2017	2020
Exempt beverages^a		
Serving size	Reference amount customarily consumed	Same
Calories	Meets FDA's definition for "low calorie" (≤ 40)	Same
Saturated fat	Not applicable	Not applicable
Sodium	Meets FDA's definition for "very low sodium" (≤ 35 g)	Same
Added sugars	≤ 10 g added sugars	≤ 5 g added sugars
Juices		
Serving size	As labeled	As labeled (max 8 oz total or max 6 oz if 100% juice)
Calories	≤ 160	Not applicable
Saturated fat	0 g	Same
Sodium	≤ 140 mg	≤ 105 mg
Added sugars	No added sugars	Same
Milks and milk substitutes		
Serving size	8 fluid oz	Same
Calories	≤ 150	Same
Saturated fat	≤ 2 g	Same
Sodium	≤ 200 mg	Same
Total (2017) and added (2020) sugars	≤ 24 g	≤ 10 g
Yogurt and yogurt-type products		
Serving size	6 oz	Same
Calories	≤ 170	Same

(continued)

Table 1. CFBAI Criteria in Effect in 2017 and in 2020 for Product Categories and Nutrients Included in the Analysis (continued)

Category and Food Component	Criteria in Effect	
	2017	2020
Saturated fat	≤2 g	Same
Sodium	≤140 mg	Same
Total (2017) and added (2020) sugars	≤23 g	≤18 g
Cheese and cheese products		
Serving size	As labeled	As labeled
Calories	≤80	Same
Saturated fat	≤3 g	Same
Sodium	≤290 mg	≤240 mg
Total (2017) and added (2020) sugars/serving	≤2 g	Same
Other grain, fruit, and vegetable products		
Serving size	As labeled	} Split into categories below
Calories	Tier 1: ≤150 Tier 2: 151–200	
Saturated fat	Tier 1: ≤1.5 g Tier 2: ≤2 g	
Sodium	Tier 1: ≤290 mg Tier 2: ≤360 mg	
Total (2017) and added (2020) sugars	Tier 1: ≤10 g Tier 2: ≤12 g	
Cereals (previously Tier 2)		
Serving size		As labeled
Calories		≤200
Saturated fat		≤1.5 g
Sodium		≤290 mg
Total (2017) and added (2020) sugars		≤12 g
Savory snacks^b (previously Tier 1)		
Serving size		As labeled
Calories		≤150
Saturated fat		≤1.5 g
Sodium		≤260 mg
Total (2017) and added (2020) sugars		≤4 g

(continued)

Table 1. CFBAI Criteria in Effect in 2017 and in 2020 for Product Categories and Nutrients Included in the Analysis (continued)

Category and Food Component	Criteria in Effect	
	2017	2020
Sweet snacks^b (previously Tier 1)		
Serving size		As labeled
Calories		≤150
Saturated fat		≤1.5 g
Sodium		≤200 mg
Total (2017) and added (2020) sugars		≤9 g
Waffles and pancakes (previously Tier 2)		
Serving size		As labeled
Calories		≤200
Saturated fat		≤2 g
Sodium		≤360 mg
Total (2017) and added (2020) sugars		≤10 g
Soups and meal sauces^c		
Serving size	As labeled	As labeled
Calories	≤200	Same
Saturated fat	≤2 g	Same
Sodium	≤480 mg	≤470 mg
Total (2017) and added (2020) sugars	≤6 g	≤4 g
Seeds, nuts, and nut butters and spreads		
Serving size	1 oz or 2 Tbsp	Same
Calories	≤220	Same
Saturated fat	≤3.5 g	Same
Sodium	≤240 mg	≤230 mg
Total (2017) and added (2020) sugars	≤4 g	Same

(continued)

Table 1. CFBAI Criteria in Effect in 2017 and in 2020 for Product Categories and Nutrients Included in the Analysis (continued)

Category and Food Component	Criteria in Effect	
	2017	2020
Mixed dishes		
Serving size	As labeled	As labeled
Calories	≤280	Same
Saturated fat	≤2.5 g	Same
Sodium	≤540 mg	≤515 mg
Total (2017) and added (2020) sugars	≤10 g	≤7 g
Main dishes and entrees^d		
Serving size	As labeled	As labeled
Calories	≤350	Same
Saturated fat	≤10% of kcal	Same
Sodium	≤600 mg	≤570 mg
Total (2017) and added (2020) sugars	≤15 g	≤9 g
Meals^c		
Serving size	Meal	Meal
Calories	≤600	Same
Saturated fat	≤10% of kcal	Same
Sodium	≤740 mg	≤700 mg
Total (2017) and added (2020) sugars	≤20 g	≤15 g

^a Exempt beverages are those that meet FDA regulations for "low calorie" (≤40 calories per Reference Amounts Customarily Consumed [RACC]) and "very low sodium" and are designated as exempt from the CFBAI criteria (Enright & Eskensazi, 2018).

^b For savory snacks and sweet snacks, if nuts or dairy is listed as the first ingredient, calories are limited to 200 and saturated fat to 2.5 g (nuts) or 2 g (dairy). This exception does not appear to apply to any products on the list.

^c For soups and meal sauces, tomato-based products are allowed to have up to 7 g of added sugars.

^d For main dishes and entrees and meals, if the nuts, nut butter, or dairy is listed as the first ingredient, saturated fat is limited to less than 15% of kcal. This exception does not appear to apply to any products on the list.

In addition to purchase data, the analysis required data on the listed serving size and calories, saturated fat, sodium, and total sugars, as stated on each product's label.⁴ We obtained the majority of nutrition label data from the product dictionary provided with the IRI data. Because nutrition data are not provided for all products in the product dictionary

⁴ We also calculated the level of dietary fiber in CFBAI-listed products but not the change in dietary fiber because it is not explicitly listed but is instead represented in whole grain requirements.

and because the product dictionary was missing sugar values, we supplemented the information with data provided by the Rudd Center. For some products that were not listed in either data source, we used USDA's Branded Food Products Database and Internet searches to obtain nutrient values. Because the labels in 2017 listed "total sugars," but the new CFBAI criteria are stated in terms of "added sugars" to align with the new Nutrition Facts label, we converted the total sugars values to added sugars using the algorithms shown in Appendix A.

Finally, we also used average consumption amounts by gender and age from "What We Eat in America" (USDA, ARS, 2018) to calculate adult-equivalent annual consumption estimates by nutrient based on household composition in the IRI Consumer Network data. We used these amounts to calculate the estimated relative contributions of the CFBAI-listed products to estimated consumption. The Consumer Network household scanner data include all purchases made for the household; therefore, we calculated consumption estimates for all members of the household and converted the estimates to a per-person basis.

As described in more detail in Appendix B, we conducted the following analyses:

1. **Measured the baseline contribution of CFBAI-listed products to key nutrients in household food purchases.** After linking purchase data to nutrition data from product labels in 2017, we calculated the total calories, saturated fat, sugar, sodium, and fiber in products purchased by households with children (0 to 8 years) by multiplying the total units purchased by the total nutrient levels in each product (number of servings times nutrient levels per serving) and scaling the estimates up to a national basis using the projection factors (weights) in the dataset. These calculations are similar to equation 2 in Muth, Karns et al. (2019). We calculated the estimates in total and by income group and by race/ethnicity. We then calculated the total contribution of these foods to consumption of each nutrient on a per-adult-equivalent basis using estimates from "What We Eat in America," which are derived from National Health and Nutrition Examination Survey dietary recall data. The results of these calculations allowed us to assess the baseline relative importance of the products in the CFBAI list to overall diets across income groups and race/ethnicity for households with children (0 to 8 years).
2. **Simulated the change in the contribution of CFBAI-listed products to key nutrients in household food purchases under the new criteria.** Using the change in the criteria noted in Table 1, we calculated the change in per-serving calories and nutrients, assuming that any products that do not meet the new criteria will be reformulated. Although the criteria for calories did not change, we calculated an implied change in calories based on the change in added sugars, assuming 4 calories per gram. We then multiplied the change in nutrient levels by the total units purchased and scaled up to a national basis using the projection factors in the dataset. The results of these calculations allowed us to assess whether the change in the criteria could have a substantial effect on overall diet quality holding household purchases constant.
3. **Assessed the relative importance of substitute products to listed CFBAI products in household food purchases and in manufacturer portfolios.** In the last step, we calculated the relative purchase volumes in terms of number of units purchased and price of purchases for CFBAI-listed products versus substitutes by

product category. We also calculated the price per serving by dividing the total price of purchases by the total number of units purchased. The results of these calculations allowed us to assess the relative importance and costs of CFBAI-listed versus substitute products in household food purchases and food manufacturer product portfolios.

5. Key Findings

Below, we present our key findings for each of the analyses for CFBAI-listed and substitute products. We compare baseline 2017 estimates versus simulated changes due to reformulation and compare CFBAI-listed with substitute products.

5.1 Baseline Contributions of CFBAI-Listed Products to Key Nutrients

Table 2 shows the percentage contributions of CFBAI-listed products to the overall diet for calories, saturated fat, added sugars, sodium, and dietary fiber for families with children 0 to 8 years old. Although there are some differences in the contributions by income and race and ethnicity, the percentages fall within a relatively small range. For a fairly limited number of products overall, CFBAI-listed products comprised a discernible portion of household purchases of food.

Table 2. Summary of Percentage Contributions of CFBAI-Listed Products to the Overall Diet , 2017

For a fairly small number of products, the contribution of CFBAI-listed products is relatively substantial, but the potential benefits of reformulation on diet quality are limited given the baseline contributions.

Nutrient or Component	% Contribution to Average Diet	
	All Households	Range Across Demographic Groups
Calories	1.1%	0.9% to 1.2%
Saturated fat	0.5%	0.4% to 0.6%
Added sugars	1.3%	1.1% to 1.4%
Sodium	1.0%	0.8% to 1.1%
Dietary fiber	1.6%	1.3% to 1.7%

Source: Authors’ calculations using IRI Consumer Network household scanner data for households with children 0 to 8 years old.

Table 3 shows the per-person baseline calories, saturated fat, added sugars, and sodium per person for households with children 0 to 8 years old for CFBAI-listed products. The baseline levels across all households are relatively modest at about 22.0 calories, 0.1 g of saturated fat, 1.4 g of added sugars, and 32.6 mg of sodium per person. The change in the criteria did not directly affect dietary fiber and therefore are not shown in Table 3, but the requirements for whole grains could have had an indirect effect. Given the estimates shown

Table 3. Per-Person Nutrients in Purchased CFBAI-Listed Products: Baseline Values versus Potential Improvements from Reformulation by Demographic Group

Reformulation of products on the 2017 CFBAI list to meet the new criteria would result in appreciable percentage reductions in added sugars, calories, and sodium in purchased products, but the changes are relative to a small baseline.

	All Households	Lower Income (<185% of Poverty Line)	Higher Income (>185% of Poverty Line)	Non-Hispanic White	Non-Hispanic Black	Hispanic	Asian and Other
Calories (number per person per day)							
2017 baseline	22.016	21.098	22.656	23.486	19.419	20.438	17.945
Reformulated to meet new criteria	21.836	20.943	22.457	23.289	19.266	20.272	17.824
Absolute change	-0.180	-0.155	-0.198	-0.197	-0.154	-0.167	-0.120
% change	-0.820%	-0.735%	-0.875%	-0.839%	-0.791%	-0.815%	-0.671%
Saturated fat (grams per person per day)							
2017 baseline	0.1364	0.1365	0.1362	0.1459	0.1261	0.1223	0.1104
Reformulated to meet new criteria	0.1361	0.1364	0.1360	0.1457	0.1258	0.1220	0.1103
Absolute change	-0.0002	-0.0001	-0.0003	-0.0002	-0.0002	-0.0003	-0.0002
% change	-0.162%	-0.093%	-0.210%	-0.149%	-0.175%	-0.208%	-0.142%
Added sugars (grams per person per day)							
2017 baseline	1.410	1.355	1.448	1.455	1.328	1.402	1.181
Reformulated to meet new criteria	1.377	1.326	1.412	1.418	1.303	1.372	1.160
Absolute change	-0.033	-0.029	-0.036	-0.037	-0.026	-0.029	-0.021
% change	-2.346%	-2.148%	-2.475%	-2.550%	-1.927%	-2.097%	-1.756%
Sodium (milligrams per person per day)							
2017 baseline	32.597	31.446	33.398	34.707	29.497	30.055	26.597
Reformulated to meet new criteria	32.204	31.052	33.005	34.272	29.151	29.718	26.319
Absolute change	-0.393	-0.394	-0.393	-0.434	-0.346	-0.337	-0.278
% change	-1.207%	-1.253%	-1.176%	-1.251%	-1.173%	-1.120%	-1.044%

Note: Per-person values were calculated as adult equivalents assuming 2,000 calories per person per day. This calculation assumes an equal distribution of consumption of products across household members.

Source: Authors' calculations using IRI Consumer Network household scanner data for households with children 0 to 8 years old, IRI nutrition data, and nutrition data provided by the Rudd Center.

in Tables 2 and 3, it appears that the potential effects of reformulation of CFBAI-listed products on diet quality are expected to be limited.

5.2 Simulated Changes in Contributions of CFBAI-Listed Products if Reformulated to Meet the New Criteria

In addition to the baseline values, Table 3 shows the potential improvements if CFBAI-listed products in 2017 that did not meet the 2020 criteria were reformulated. We identified 149 products (21%) that would need to be reformulated to reduce calories, saturated fat, sodium, or added sugars. Reformulation of these products would have appreciable effects on a percentage basis with the largest effects across all households for added sugars with a 2.4% decrease, calories with a 0.8% decrease, and sodium with a 1.2% decrease. Most of the reduction in calories was driven by changes in yogurt products, exempt beverages, and sweet snacks. Across the nutrients shown, the effects are appreciable relative to the baseline for CFBAI-listed products but are extremely small relative to an average daily diet. Note that because the change in the CFBAI criteria did not affect the limits for calories per serving, the changes in calories shown in Table 3 are derived from the reductions in added sugars. Differences across demographic groups were relatively minor but show greater improvements for higher-income and non-Hispanic white households than for other groups.⁵

5.3 Comparison of CFBAI-Listed to Substitute Products

Figures 1a, 1b, 2a, and 2b provide context regarding purchases of CFBAI-listed products relative to identified substitute products by income and race/ethnicity group. The differences across demographic groups are relatively minor, thus indicating that the products included in the analysis are commonly consumed products across the population.

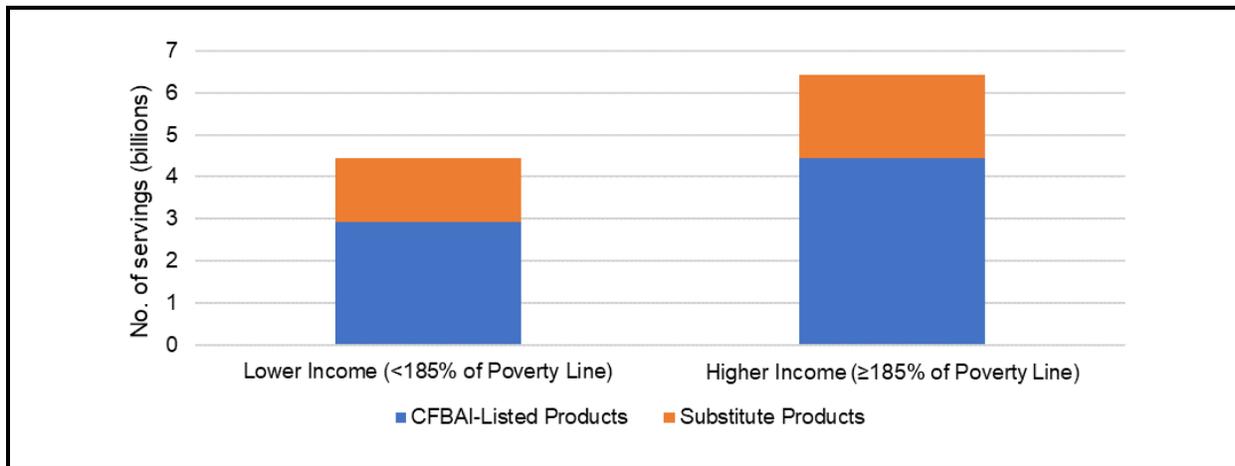
Higher-income households purchased more servings of CFBAI-listed and substitute products than lower-income households, as would be expected because they comprise 61% of households in the population (Figure 1a). However, the relative proportion of servings of CFBAI-listed to substitute products (about 68%) is similar for both income groups. Figure 1b shows the same calculations applied to the dollar value of purchases. As in Figure 1a, higher-income households spent more in total and had similar relative proportions of dollars spent on CFBAI-listed compared with substitute products. However, both higher-income and lower-income households spent a smaller proportion of dollars (about 48%) on CFBAI-listed products than the proportion of servings shown in Figure 1b, thus suggesting that the CFBAI-listed products purchased by households generally cost less than substitute products on an average per-serving basis.

⁵ Throughout this report, tests for statistical significance of differences were not conducted because the format of the data precluded calculation of standard errors. Therefore, any noted differences across demographic groups or product categories should be interpreted with caution.

By race and ethnicity, differences in the numbers of servings of products purchased across racial and ethnic groups also follow the distribution of these groups in the weighted population (Figure 2a). The proportion of CFBAI-listed products relative to substitutes was also similar across groups except that non-Hispanic black households purchased a slightly lower proportion of CFBAI-listed products. In terms of dollar value, Asian and other households spent more on CFBAI-listed products than on substitutes, while non-Hispanic whites and non-Hispanic blacks spent less and Hispanic households spent approximately equal amounts (Figure 2b).

Figure 1a. Estimated U.S. Number of Servings Purchased by Income Group: CFBAI-Listed versus Substitute Products (billions), 2017

Differences in the numbers of servings of products purchased across income groups follow the distribution of these groups in the weighted population. Lower- and higher-income households purchased similar proportions of CFBAI-listed versus substitute products.

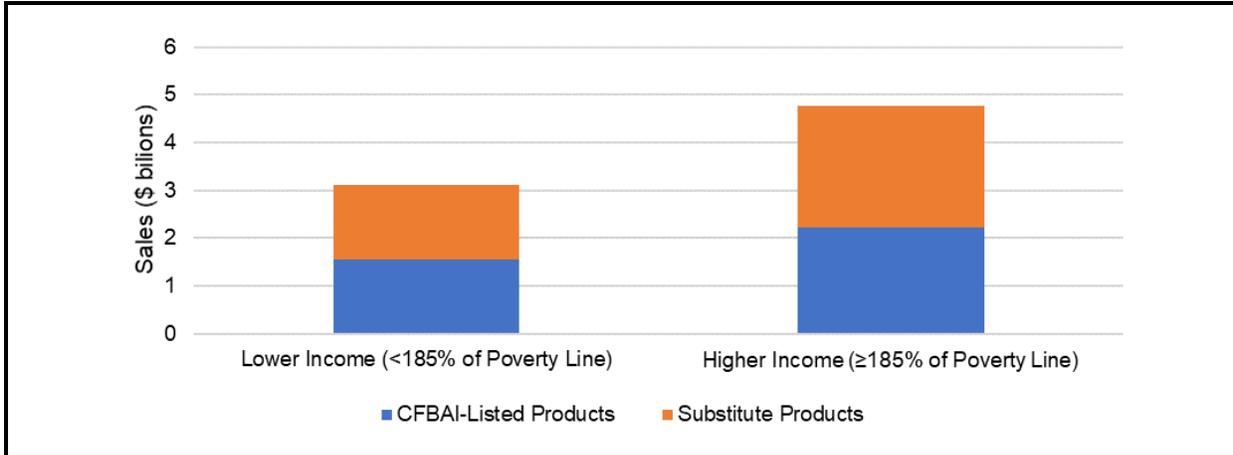


Note: Higher-income households accounted for 61% of the weighted national estimate.

Source: Authors’ calculations using IRI Consumer Network household scanner data for households with children 0 to 8 years old.

Figure 1b. Estimated U.S. Sales by Income Group (\$ billions): CFBAI-Listed versus Substitute Products, 2017

Higher-income households spent relatively more on substitute products compared with CFBAI-listed products, and lower-income households spent approximately the same.

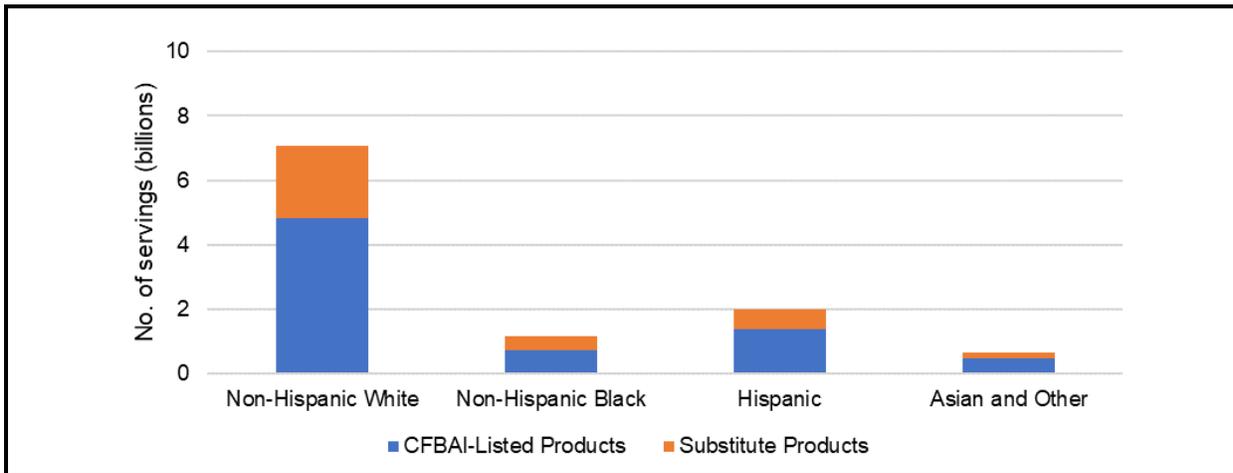


Note: Higher-income households accounted for 61% of the weighted national estimate.

Source: Authors' calculations using IRI Consumer Network household scanner data for households with children, 0–8 years old.

Figure 2a. Estimated U.S. Number of Servings Purchased by Race and Ethnicity (billions): CFBAI-Listed versus Substitute Products, 2017

Differences in the numbers of servings of products purchased across racial and ethnic groups follow the distribution of these groups in the weighted population. The proportion of CFBAI-listed products relative to substitutes was relatively similar across groups except that Hispanic households purchased a higher proportion of CFBAI-listed products.

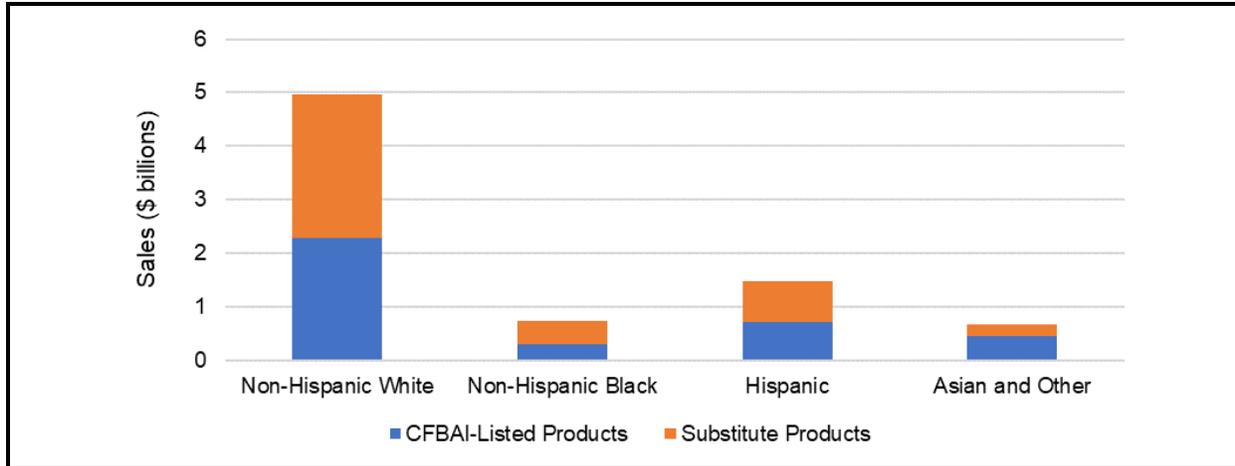


Note: Non-Hispanic white households accounted for 62%, non-Hispanic black households for 11%, Hispanic households for 19%, and Asian and other households for 8% of the weighted national estimate.

Source: Authors' calculations using IRI Consumer Network household scanner data for households with children 0 to 8 years old.

Figure 2b. Estimated U.S. Sales by Race and Ethnicity (\$ billions): CFBAI-Listed versus Substitute Products, 2017

Non-Hispanic white and non-Hispanic black households spent relatively more on substitute products compared with CFBAI-listed products, while Hispanic households spent approximately equal amounts, and Asian and other households spent less.



Note: Non-Hispanic white households accounted for 62%, non-Hispanic black households for 11%, Hispanic households for 19%, and Asian and other households for 8% of the weighted national estimate.

Source: Authors’ calculations using IRI Consumer Network household scanner data for households with children 0 to 8 years old.

To compare CFBAI-listed with substitute products, Table 4 shows the number of unique products (i.e., UPCs, also referred to as barcodes), units purchased, and value of purchases by product category. Overall, substitute products comprise a larger percentage of UPCs, units purchased, and value of purchases than CFBAI-listed products, thus indicating their relatively greater importance in manufacturer product portfolios. For some categories—breakfast cereals, cheese and cheese products, savory snacks, and sweet snacks—units purchased and value of purchases for CFBAI-listed products were a higher proportion compared with substitute products than would be expected based on the proportion of UPCs. However, units purchased and value of purchases were more in line with the proportion of UPCs for the majority of products.

Table 4. Comparison of Number of Products, Purchases Volume, and Sales Values for Selected CFBAI-Listed Products versus Substitutes, 2017

Overall, we identified more substitutes than CFBAI-listed products; CFBAI-listed products accounted for a somewhat higher proportion of sales units but lower proportion of sales dollars relative to their proportion of products. Results by product category varied substantially.

	UPCs		Units		Value of Purchases	
	No.	Percent	No. Purchased (millions)	Percent	\$ millions	Percent
Breakfast cereals						
CFBAI	179	66.1%	237.2	85.0%	1,548.3	87.8%
Substitutes	92	33.9%	41.7	15.0%	215.1	12.2%
Cheese and cheese products						
CFBAI	26	74.3%	30.8	90.6%	161.8	87.9%
Substitutes	9	25.7%	3.2	9.4%	22.3	12.1%
Exempt beverages^a						
CFBAI	22	34.4%	13.8	14.1%	70.0	25.9%
Substitutes	42	65.6%	84.2	85.9%	200.0	74.1%
Juice drinks						
CFBAI	10	27.0%	4.3	13.6%	27.3	13.7%
Substitutes	27	73.0%	27.5	86.4%	172.3	86.3%
Mixed dishes						
CFBAI	27	25.0%	21.2	17.5%	81.6	15.1%
Substitutes	81	75.0%	99.5	82.5%	458.3	84.9%
Savory snacks						
CFBAI	90	78.9%	90.7	88.8%	409.8	88.8%
Substitutes	24	21.1%	11.5	11.2%	51.5	11.2%
Seeds and nuts						
CFBAI	18	85.7%	4.9	83.8%	26.9	87.5%
Substitutes	3	14.3%	0.9	16.2%	3.8	12.5%
Sweet snacks						
CFBAI	59	53.6%	33.7	61.1%	197.5	66.7%
Substitutes	51	46.4%	21.4	38.9%	98.8	33.3%
Yogurt products						
CFBAI	246	39.0%	190.4	34.3%	943.7	40.0%
Substitutes	385	61.0%	365.4	65.7%	1,417.5	60.0%
Other products						
CFBAI	19	33.3%	54.7	33.3%	317.4	18.0%
Substitutes	104	66.7%	258.7	66.7%	1,448.8	82.0%
All products						
CFBAI	696	46.0%	681.7	42.7%	3,784.3	48.1%
Substitutes	818	54.0%	914.0	57.3%	4,088.5	51.9%

^a Exempt beverages are those that meet FDA regulations for "low calorie" (≤ 40 calories per RACC) and "very low sodium" and are designated as exempt from the CFBAI criteria (Enright & Eskensazi, 2018).

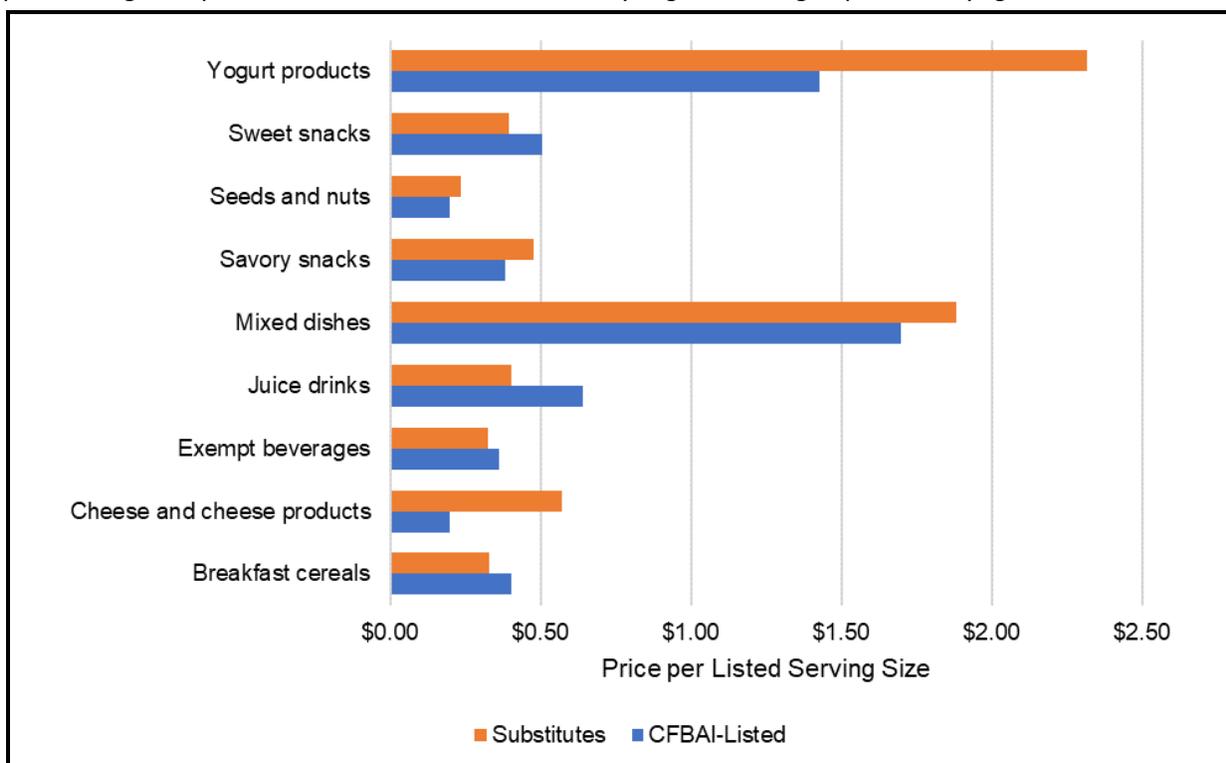
Note: Product categories with at least 10 CFBAI-listed products are listed separately.

Source: Authors' calculations using IRI Consumer Network household scanner data for households with children 0 to 8 years old.

Lastly, Figure 3 compares the average price per serving for CFBAI-listed versus substitute products. The results show no general pattern across categories in whether CFBAI-listed or substitute products have higher average prices per serving than substitutes. Prices for most categories were relatively similar with the exception of yogurt products for which substitutes had a substantially higher average price per serving. In general, these results suggest that manufacturers did not have any particular pricing strategy for CFBAI-listed versus substitute products.

Figure 3. Comparison of Average Price per Serving for Selected CFBAI-Listed Versus Substitute Products, 2017

We found no general pattern in whether CFBAI-listed or substitute products had higher average prices per serving except that substitutes had substantially higher averages prices for yogurt.



Note: Average price per serving is calculated by dividing the total number of servings purchased by the total value of purchases.

Source: Authors’ calculations using IRI Consumer Network household purchase data for households with children 0 to 8 years old.

6. Study Limitations

The analysis was subject to limitations arising from the data available for the analysis. First, the analysis focused only on purchases of food from stores for consumption at home and did not include food away from home (e.g., Burger King and McDonalds, which also have items on the CFBAI list). Second, we only identified products on the list that were purchased by

households in the IRI Consumer Network panel. It is possible that more products were sold in 2017 but not purchased by the household panel; however, it is likely not a significant number of products given the size of the panel. Third, households are known to underreport their purchases. Based on a study conducted using 2012 data, the amount of underreporting is less for packaged foods like CFBAI products (see Sweitzer et al., 2017). Fourth, our analysis focused only on food purchases, and we were not able to determine who in the household consumed the food. Finally, the method of selecting substitute products produced by the same manufacturers was somewhat subjective and could potentially miss relevant products or include irrelevant products.

7. Conclusion

Our results show that the number of products on the CFBAI list is not substantial and accounts for only about 1% of calories purchased by households with children 0 to 8 years of age. Thus, most foods purchased by households with children are not covered by the CFBAI criteria. Differences in purchases across income groups and race and ethnicity are relatively minor. Reformulation of products on the list as of 2017 to meet the new criteria in effect in 2020 would have resulted in discernible changes in calories, added sugars, and sodium in each product. However, because the products comprise a relatively small portion of purchases, the public health significance is limited. Expanding the list of products, particularly to include more products within brand families included on the list, would increase the potential health benefits of the criteria.

Our analysis shows that the loophole that allows companies to advertise some products but not others within a brand family is a real concern. Advertising and promotion of products within a brand family that meet the criteria could spill over and affect purchase decisions for other products that do not meet the criteria. Furthermore, the CFBAI is designed to guide company rather than consumer behavior; therefore, there is no indication to consumers about whether individual products are listed products. Products that are on the CFBAI list are not noted as such on product labels or shelf tags. Prior research has shown that creating clearer signals for consumers indicating a nutritionally improved product can be effective (Rahkovsky et al., 2013).

The results of this study also indicate the need for organizations that broker voluntary industry agreements to ensure that the design of new agreements will result in a positive public health impact (Wiecha & Muth, 2021). For example, it would be useful for future agreements to use purchase, sales, or consumption data to calculate the baseline contribution of foods and beverages included in the agreement to calories or specific nutrients and to assess the potential changes that could occur under various scenarios. The results of this type of analysis could be used to guide the choice of specific targets to ensure that the changes would have a meaningful effect on dietary quality and thus public health. The results could also be of interest to CFBAI and the participating companies as they

consider future updates in the criteria, including whether all products in a brand family are required to meet the criteria. Finally, the results may be of interest to the FTC because it previously analyzed the impacts of the CFBAI, before the CFBAI established uniform criteria in 2011, as part of its efforts to examine marketing of food to children (FTC, 2012). The FTC can encourage companies to strengthen their policies to ensure that the products they advertise to children promote a healthy diet and increase consumer awareness regarding practices used to market food to children.

Future analyses could focus on more fully evaluating manufacturer product portfolio choices. For example, using nutrition data for substitutes, one could estimate how much improvement could occur if all products within a brand family were reformulated to meet the CFBAI standards. Similarly, analyses could assess for which products reformulation would have the greatest effects on improving diet quality. However, the feasibility of reformulation would need to be considered, and manufacturers would likely be concerned about loss of product sales if sensory characteristics of products were diminished.

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Appendix A: Calculating Added Sugars Values for Products in 2017

The CFBAI criteria in 2017 were based on total sugars because that was the nutrient shown on the Nutrition Facts label at that time. To compare products in 2017 with the criteria in 2020, which are based on added sugars, we needed to estimate the amount of added sugars in products in 2017. Table B-1 shows the rules we used to determine the amount of added sugars based on label data for 2017.

Table A-1. Assumptions for Calculating Added Sugars Based on 2017 Label Data

Category	Added Sugars Assumption	Rationale	Difference in CFBAI Criteria for Total and Added Sugars
Exempt beverages ^a	Added sugars = total sugars	Most products include little or no juice, which would be the only source of natural sugars.	5 g
Juices	Added sugars = 0	CFBAI criteria required that listed juices be 100% fruit juice.	0 g
Milks and milk substitutes (8 oz)	Calculate added sugars as the difference in total sugars between flavored and unflavored varieties. In FNDDS, average natural sugar in 8 oz is 12.5 g.	Can establish the typical amount of natural sugars from unflavored varieties.	14 g
Yogurt and yogurt-type products (6 oz)	Calculate added sugars as the difference in total sugars between flavored and unflavored varieties. In FNDDS, average natural sugar in 6 oz is 8 g for whole regular; 12 g for low-fat regular; 13 g for nonfat regular; 7 g for whole Greek, 6 g for low-fat Greek; 5.5 g for nonfat Greek.	Can establish the typical amount of natural sugars from unflavored varieties.	5 g
Cheese and cheese products	Added sugars = 0	Sugar is rarely added to cheese products.	0 g
Cereals	Added sugars = total sugars	CFBAI white paper says all sugars in cereals can be considered added sugars.	0 g

(continued)

Table A-1. Assumptions for Calculating Added Sugars Based on 2017 Label Data (continued)

Category	Added Sugars Assumption	Rationale	Difference in CFBAI Criteria for Total and Added Sugars
Savory snacks ^b	Added sugars = total sugars	CFBAI white paper says all sugars in snacks can be considered added sugars.	6 g
Sweet snacks ^b	Added sugars = total sugars	CFBAI white paper says all sugars in snacks can be considered added sugars.	1 g
Waffles and pancakes	Added sugars = total sugars	CFBAI white paper says all sugars in waffles and pancakes can be considered added sugars.	2 g
Soups and meal sauces ^c	Use 2020 added sugars value for each product (even if no longer on list).	Suggested by HER advisory group.	2 g
Seeds, nuts, and nut butters and spreads (1 oz or 2 tablespoons)	Calculate added sugars as the difference in total sugars between "natural" products and varieties. In FNDDS, peanut butter has 2 g in lower sugar varieties.	Can estimate the typical amount of natural sugars from "natural" varieties.	0 g
Mixed dishes	Use 2020 added sugars value for each product (even if no longer on list).	Suggested by HER advisory group.	3 g
Main dishes and entrees ^d	Use 2020 added sugars value for each product (even if no longer on list).	Suggested by HER advisory group.	6 g
Meals ^d	Use 2020 added sugars value for each product (even if no longer on list).	Suggested by HER advisory group.	5 g

FNDDS = Food and Nutrient Database for Dietary Studies

^a Exempt beverages are those that meet FDA regulations for "low calorie" (≤ 40 calories per RACC) and "very low sodium" and are designated as exempt from the CFBAI criteria (Enright & Eskensazi, 2018).

^b For savory snacks and sweet snacks, if nuts or dairy is listed as the first ingredient, calories are limited to 200 and saturated fat to 2.5 g (nuts) or 2 g (dairy). This exception does not appear to apply to any products on the list.

^c For soups and meal sauces, tomato-based products are allowed to have up to 7 g of added sugars.

^d For main dishes and entrees and meals, if the nuts, nut butter, or dairy is listed as the first ingredient, saturated fat is limited to less than 15% of kcals. This exception does not appear to apply to any products on the list.

Appendix B: Study Methodology

B.1 Data Used in the Analyses

The primary data source used in the analysis was the IRI Consumer Network household purchase data, which we restricted to households with children 0 to 8 years of age. We used data for all 12 months of 2017 as our baseline before the announcement of the change in the CFBAI criteria.

Nutrients: Total calories, saturated fat, sodium, sugar, fiber

Demographic groups: Lower income (<185% of poverty line), higher income; non-Hispanic white, non-Hispanic black, Hispanic, Asian and other

For each product on the 2017 CFBAI list, we used these variables:

- serving size
- number of servings per package
- per-serving calories—no change in criteria but can calculate amount of implied change from added sugars
- per-serving saturated fat (g)—no change in criteria so can only include in Aims 1 and 3
- per-serving sugar or added sugar (g)
- per-serving sodium (mg)
- per-serving fiber (g)—can only include in Aims 1 and 3 because criteria are set for whole grains rather than fiber for selected product categories
- number of units purchased by household demographic
- price paid = total dollars/total units
- for CFBAI products: required changes in per-serving values to meet the 2020 criteria for calories, fat, sugars or added sugars, sodium

For substitute products, we used the serving size, number of servings per package, number of units purchased, and price paid variables.

We also used average intake values by gender and age from “What We Eat in America” (USDA, ARS, 2018) to calculate adult-equivalent annual consumption estimates by nutrient based on household composition in the IRI Consumer Network data. We used these values to calculate the estimated relative contributions of the CFBAI-listed products to estimated consumption.

B.2 Analysis Approach

We describe the analysis approach for each aim below.

Aim 1. Measure baseline contribution of CFBAI-listed products to key nutrients in household purchases.

For each nutrient k , we calculated total nutrients in household food purchases for all N products on the CFBAI list in 2017 in total and by demographic group as follows:

$$TOT_NUT_k = \sum_{t=1}^T \sum_{i=1}^N W_h \cdot Units_{i,t} \cdot Servings_i \cdot NUT_{i,k}$$

where W_h is the projection factor or weight for household h , $Units_{i,t}$ is the number of units of product i purchased on trip t , $Servings_i$ is the number of servings in product i , and $NUT_{i,k}$ is the level of nutrient k in product i .

Then, to determine the contribution of CFBAI products to total intake, we first calculated the total consumption of nutrient k from "What We Eat in America" as:

$$TOT_CON_k = \sum_{g=1}^G \left(AVG_{NUT_{k,g}} \cdot 365 \cdot \sum_{h=1}^H W_h \cdot POP_{h,g} \right)$$

where $AVG_{NUT_{k,g}}$ is the average daily intake of nutrient k by age and gender group g from "What We Eat in America" and $POP_{h,g}$ is the number of individuals in household h in age and gender group g in the household panel.

Then, we calculated the relative proportion of the quantity of each nutrient in household purchases of CFBAI-listed products compared with total consumption on a national basis:

$$\%TOT_NUT_k = \frac{TOT_NUT_k}{TOT_CON_k}$$

Aim 2. Simulate the change in contribution of CFBAI-listed products to key nutrients in household food purchases under the new criteria.

We repeated the calculations in Aim 1 but replaced $NUT_{i,k}$ with the required value to meet the new criteria $NUT'_{i,k}$ under the assumption that the product formulation would still be feasible from a technological, food safety, and sensory perspective. If product i already meets the criteria for nutrient k , then $NUT'_{i,k} = NUT_{i,k}$.

For products that must reduce added sugars, we calculated the implied reduction in calories due to the reduction in added sugars assuming 4 calories per gram.

Aim 3. Determine relative importance of substitute products to CFBAI-listed products in household food purchases and in manufacturer portfolios.

We calculated the relative proportion of CFBAI products compared with substitute products based on the dollar value of purchases where the dollar value of the sales volume (SV) was calculated as:

$$TOT_SV = \sum_{t=1}^T \sum_{i=1}^N W_h \cdot Units_{i,t} \cdot Price_{i,t}$$

And the proportion was calculated as:

$$\frac{TOT_SV}{TOT_SV + TOT_SV^S}$$

We calculated the average price per serving for CFBAI products versus substitutes (overall, not separated by demographic group):

$$\bar{P} = \frac{\sum_{t=1}^T \sum_{i=1}^N W_h \cdot Units_{i,t} \cdot Price_{i,t}}{\sum_{t=1}^T \sum_{i=1}^N W_h \cdot Units_{i,t} \cdot Servings_i}$$

that is, total purchase value divided by total number of servings. We grouped like products for the calculations (e.g., yogurt, breakfast cereal, juice drinks, mixed dishes).