Measuring the Potential Impact of New and Reformulated Bread and Breakfast Cereal Products on Nutrient Intakes

Contractor and Cooperator Report

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Abstract

Food composition databases are important tools for assessing the dietary status of consumers. Database updates are particularly challenging due to the dynamic nature of the food supply, as new products are constantly introduced to meet policy mandates, consumer demands, and health trends. Researchers responsible for maintaining and updating food composition databases may benefit from a better understanding of how foods in the food supply are changing to help assure database accuracy and adequacy. The growing popularity of whole-grain foods in response to the Dietary Guidelines for Americans 2005 has the potential to alter the nutritional contribution of two important sources of whole grains—breakfast cereals and bread products. This report integrates new product data with a national survey of dietary intake data to simulate select nutrient intakes over time, assuming new and reformulated breakfast cereals and breads fully replace available products. For most product-nutrient combinations, estimated nutrient intakes based on new products and nutrient values from USDA's Food and Nutrient Database for Dietary Studies grew closer over time or tracked similar patterns of nutrient consumption.

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Summary

What Is the Issue?

New and reformulated food and beverage products are introduced into the U.S. food system at an approximate rate of 20,000 per year. Changes in the food marketplace present issues and challenges for those who convert information on food consumption into nutrient intake data to inform food policy decisions. Updating nutrient databases requires timely analysis and compilation of nutrient information by those who maintain databases to ensure accurate nutrient intake estimates by data users, including researchers, policy makers, and health professionals.

Breakfast cereals and bread products are among the more dynamic food categories with respect to the availability of whole-grain products, with hundreds of new products introduced annually. In this report, ERS researchers and collaborators simulate the potential impact of new breakfast cereals and breads on nutrient intakes based on nutrient composition data from a private industry database of new products, the Mintel Global New Product Database (Mintel GNPD). The study compared intake estimates from 2005 to 2012 (the latest data available at the start of this project) of four key nutrients (fiber, sugar, sodium, and energy) found in grain-based products and stressed in the *Dietary Guidelines for Americans*, using the U.S. Department of Agriculture's (USDA) Food and Nutrient Database for Dietary Studies (FNDDS) as a benchmark. The comparisons provide an upper limit on potential nutrient intake differences since the study assumes that new products fully replace previously existing products, whereas FNDDS includes both new and older product formulations.

What Did the Study Find?

- Following the release of the *2005 Dietary Guidelines for Americans*—the first version of the Guidelines to make specific recommendations about whole grains—the number of new breakfast cereal products increased from 504 in 2005-06 to 665 in 2011-12. Over the same period, the number of bread products entering the market increased from 337 to 465.
- New products contained varying amounts of nutrients over time. Sugar and sodium per 100 gram serving of new and reformulated breakfast cereal products decreased from 2005 to 2012, and fiber content per 100 gram serving increased. Sugar per 100 gram serving in new bread products rose, while fiber, sodium, and calories per serving fell.
- For most product-nutrient combinations, divergence existed between estimated nutrient intakes based on Mintel GNPD and FNDDS in the early years of the study, but estimates grew closer over time. For breakfast cereals during 2005-06 to 2011-12, differences in estimates of mean nutrient intakes of individuals of all ages were less pronounced for sodium, fiber, and sugar. Differences in sodium and fiber intake estimates also were less evident for individuals under the age of 19. In the bread category, differences in estimates of mean fiber and sugar consumption were smaller for individuals of all ages over the same period.
- In several cases where nutrient intake estimates using Mintel GNPD and FNDDS did not grow closer over time, they tracked similar patterns of nutrient consumption. Both showed declining intakes of sugar from breakfast cereal from 2005-06 to 2011-12 among individuals under 19 years of age. This is significant given that cereals marketed to children have poor nutritional profiles, most notably excessive sugar. For bread products, both databases also tracked increasing levels of calorie intake from bread.
- Estimates using Mintel GNPD and FNDDS both showed increasing intakes of fiber from breakfast cereal between 2005-06 and 2011-12 for all individuals collectively and individuals under 19 years of age separately. They both also tracked increasing intake of

fiber from bread products for individuals of all ages. The FNDDS appeared to reflect the growing popularity of whole grains and associated increases in dietary fiber consumption.

- Breakfast cereals marketed to children contain more sodium compared to adult-targeted cereals. As cereals entered the market with less sodium, nutrient intake estimates using both databases showed reductions in sodium consumption from cereals among individuals under 19 years of age from 2005-06 to 2011-12.

How Was the Study Conducted?

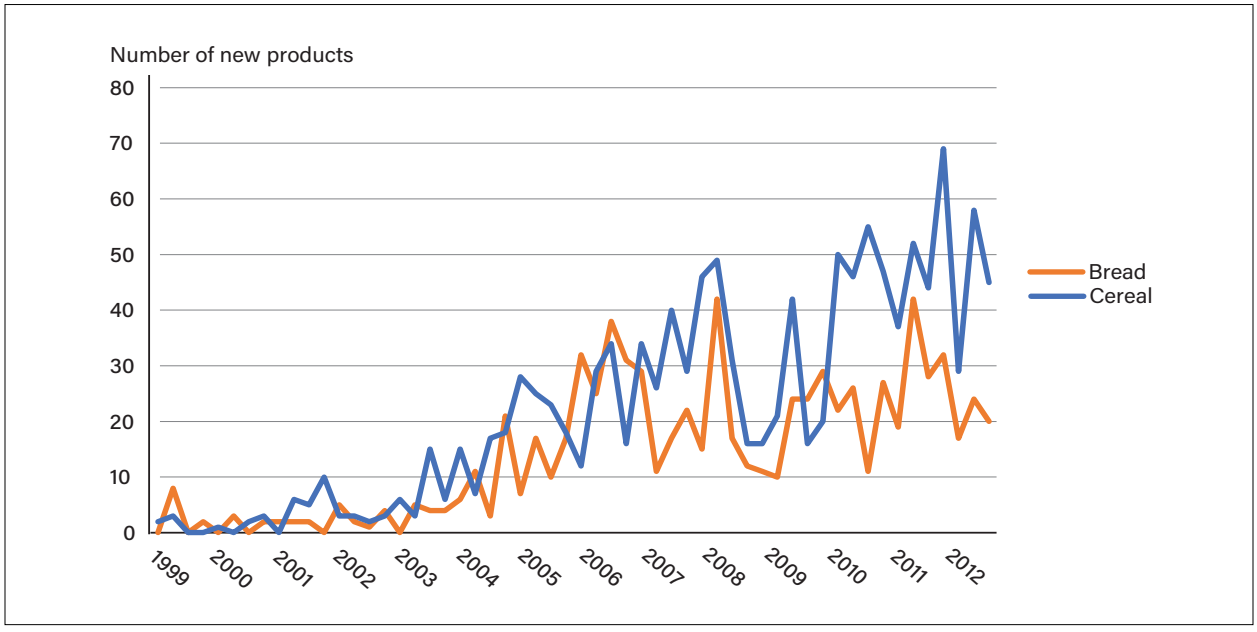
For the comparison of nutrient intake estimates, ERS researchers and collaborators used the national food survey "What We Eat in America" (WWEIA), which is the dietary intake interview component of the National Health and Nutrition Examination Survey (NHANES). WWEIA is conducted as a partnership between the USDA and the U.S. Department of Health and Human Services (DHHS). The nutrient content of new and reformulated breakfast cereals and bread products derived from Mintel GNPD were matched to consumption instances of products reported in WWEIA, NHANES during 2005-12. Nutrient intake estimates based on the new products were compared to national surveillance estimates of nutrient intakes based on the USDA's Food and Nutrient Database for Dietary Studies (FNDDS).

Grain foods are an integral part of diets in the United States. Several studies found an association between grain food consumption and greater intake of fiber, a nutrient of public health concern as identified in the 2015-20 Dietary Guidelines for Americans (Papanikolaou and Fulgoni, 2017). The 2005 Dietary Guidelines for Americans was the first version of the Guidelines to make specific recommendations about whole grains, namely that at least half of a person's daily grain intake should come from whole grains (DHHS and USDA, 2005). An early version of the 2005 Dietary Guidelines was released in August 2004 for public comment prior to publication in 2005 (Mancino et al., 2008). An upward trend in the number of new breakfast cereals and bread products with whole-grain claims shortly after the pre-release of the 2005 Dietary Guidelines is especially notable (figure 1). In the 8 weeks following the Guidelines release, consumers purchased 12 percent more pounds of whole-grain breads and 16 percent more pounds of whole-grain ready-to-eat (RTE) breakfast cereals (Mancino, 2005). This may be due, in part, to the availability of more whole-grain products.

Bread products and breakfast cereals are now the leading product categories using the Whole Grain Stamp, with 18 percent of products using the stamp in both categories (Whole Grains Council, 2018). The Whole Grain Stamp is a packaging symbol created by the Whole Grains Council—a nonprofit consumer advocacy group—to help consumers identify real whole-grain products. In addition, according to the Whole Grain Council's 2015 Whole Grains Consumer Insights Survey, 37 percent of fiber-rich whole grains were consumed at breakfast, compared to 27 percent at dinner and 22 percent at lunch. Bread and cereal were the two foods U.S. consumers most likely ate in whole-grain form.

Figure 1

New whole-grain cereals and bread products, quarterly, 1999-2021



Source: Mintel Global New Products Database.

In dynamic product categories, new and reformulated products may have an important impact on the nutrient content of the food supply and corresponding dietary nutrient intake. Rahkovsky et al., (2012) found that food manufacturers reformulated many of their products to reduce trans fats. Reformulation followed U.S. Federal Government dietary advice to limit trans fats intake and a Federal requirement that food labels include trans fats content. Correspondingly, Restrepo (2017) documented an average 52.5 percent decline in plasma trans fatty acid levels among adults residing in the United States aged 20 years and older between 1999-2000 and 2009-10. Griffith et al., (2017) apportioned a recent decline in salt intake in the United Kingdom to product reformulations, new and discontinued products, and consumers choosing less salty foods. They concluded the decline was due entirely to product reformulations. Spiteri

and Soler (2018) used a similar approach for key nutrients in four food categories in France. They also found reformulations led to improvements in the nutritional quality of food purchases, as opposed to consumers switching to healthier products, while results related to new and disappearing products were ambiguous.

In the breakfast cereal category, Martinez and Levin (2017) found small increases in fiber content of breakfast cereals in 2008-12 and gradual reductions in sodium as products enter and exit the market. Wang et al., (2015) found the nutritional quality of cereal products with respect to sodium, fiber, and sugar declined from 1988 to 2001, but the quality has since improved. Thomas et al., (2013) found statistically significant increases in fiber content of RTE breakfast cereals between 2005 and 2011.

Other studies compared nutrient intake estimates based on U.S. Department of Agriculture (USDA) food composition data to estimates based on commercial sources of Nutrition Facts Panel (NFP) data that capture new and reformulated foods. Taylor et al., (2017) found the introduction of Greek-style yogurt products led to increased protein consumption from yogurt. Given prior evidence of significant cookie reformulations following U.S. trans fats labeling regulations, Taylor et al., (2018) found lower average sodium consumption and higher saturated fat and cholesterol consumption from new and reformulated cookies. Slining et al., (2015) documented statistically significant differences in mean energy, sodium, and total sugar intake for beverages, cheeses, and yogurts depending on whether USDA or commercial nutrition data sources were used.

The primary objective of this report was to simulate the potential effects of new and reformulated ready-to-eat breakfast cereals and bread on fiber, sugar, sodium, and energy consumption in the United States. We assessed how intakes of these nutrients would differ if consumers had chosen only new or reformulated products. Nutrient intakes based on nutrient composition data from a private industry database of new products, Mintel Global New Product Database (Mintel GNPD), were compared to nutrient consumption patterns based on USDA's Food and Nutrient Database for Dietary Studies (FNDDS). By using data between 2005-12, we could evaluate the growing popularity of whole grain products on consumer diets in the commonly consumed bread and cereal categories.

Data Sources

We relied primarily on three data sources, What We Eat in America (WWEIA), the Food and Nutrient Database for Dietary Studies (FNDDS), and Mintel Global New Products Database (Mintel GNPD). WWEIA is the dietary intake interview component of the National Health and Nutrition Examination Survey (NHANES). USDA's Agricultural Research Service (ARS) developed the USDA National Nutrient Database for Standard Reference (SR). SR was the source of nutrient values for versions of FNDDS used in this study.[1] FNDDS is another ARS database that provides the nutrient profiles for foods and beverages reported in WWEIA, NHANES (hereafter abbreviated as WWEIA). A nutrient composition database is important in converting information on food intake into nutrient intake data to inform food policy decisions. Applying the information in these databases permits comparison of reported dietary intakes to standards, such as the Dietary Reference Intakes, or to food guidelines, such as MyPyramid.

What We Eat in America

WWEIA is a national food survey conducted as a partnership between the U.S. Department of Health and Human Services (DHHS) and the USDA. WWEIA represents the integration of two nationwide surveys—USDA's Continuing Survey of Food Intakes by Individuals and DHHS's NHANES. DHHS is responsible for the sample design and data collection. USDA is responsible for the survey's dietary data collection methodology, development, and maintenance of the food and nutrient databases used to code and process the data, as well as data review. Data are released every two years as one dataset.

WWEIA participants recall their dietary intake over 2 nonconsecutive days, using 24-hour recalls. The day 1 interview is conducted in person in the Mobile Examination Center (MEC). After completing the in-person interview, an appointment is set for the day 2 interview. The day 2 interview is conducted by telephone 3-10 days following the MEC interview, but not on the same day of the week as the MEC interview.

WWEIA data are collected using USDA's dietary collection instrument, the Automated Multiple-Pass Method (AMPM). The AMPM is a fully computerized method for collecting interviewer-administered 24-hour dietary recalls either in person or by telephone. In the multiple-pass method, information is collected using five standardized steps to enhance complete and accurate food recall and reduce respondent burden. These steps include: 1) collecting a list of foods and beverages consumed the previous day; 2) probing for foods forgotten in step 1; 3) collecting time and eating occasion for each food; 4) collecting detailed descriptions, amounts, and additions for each food; and 5) conducting a final probe for anything else participants consumed.

Maintenance and Updating of FNDDS

FNDDS is released every two years in conjunction with the WWEIA dietary data release. For each new version of FNDDS, USDA's Food Surveys Research Group (FSRG) reviewed and updated foods and beverages, portions, and nutrient values. Foods and beverages were added based on changes in consumption and the marketplace, and new or updated nutrients were provided in new versions of SR. For example, FSRG updated FNDDS 2011-12 with SR, Release 26 nutrient values and corresponding with the release of the WWEIA 2011-12 dietary intakes.

USDA's Nutrient Data Laboratory (NDL) compiled the SR data from published and unpublished sources (USDA-ARS, 2012). Published data sources included scientific literature. Unpublished data included data obtained from the food industry, other government agencies, and research conducted under contracts initiated by ARS. Data from the food industry included the nutrient content of a specific food or food product at the time the data was sent to NDL. The values may change due to reformulations or other

[1]SR Legacy, released in April 2018, was the final release of this data type and will no longer be updated. For more recent data, users should search other data types in FoodData Central, an integrated data system that provides expanded nutrient profile data and links to related agricultural and experimental research managed by the Agricultural Research Service's Beltsville Human Nutrition Research Center (USDA-ARS, 2019).

processing changes by companies between each release of the database. Values in the database may be based on the results of laboratory analyses or calculated by using appropriate algorithms, factors, or recipes. Two releases of SR, Release 25 and Release 26, included additional information about breakfast cereals (see box, "Notes on Breakfast Cereals").

Notes on Breakfast Cereals

The USDA National Nutrient Database for Standard Reference (SR), Release 25 and SR, Release 26 included additional information about the breakfast cereal category. It listed most breakfast cereals by brand name and included the majority of the major brand breakfast cereals, accounting for over 80 percent of the retail market (USDA-ARS, 2012; USDA-ARS, 2013).

USDA's Nutrient Data Laboratory (NDL) derived nutrient data for breakfast cereals from cereal manufacturers, food labels, lab analyses, formulation, and other estimations (USDA-ARS, 2012; USDA-ARS, 2013). Due to the frequency of breakfast cereal reformulations and the brand name specificity of most of these products, the NDL relied heavily on the cereal industry to provide current nutrient data in SR (USDA-ARS, 2012). Kellogg and General Mills, which represented nearly two-thirds of the ready-to-eat (RTE) breakfast cereal market, typically supplied data each year, while Quaker, Post, and others contributed data some years (USDA-ARS, 2013). NDL derived some nutrient values from the product's nutrition facts label. Beginning in 2002 and every few years thereafter, various RTE breakfast cereals with a high market share were selected for statistically representative nationwide sampling and nutrient analysis as part of the USDA National Food and Nutrient Analysis Program (USDA-ARS, 2012).

As WWEIA dietary intakes were processed and the reported foods and amounts were coded, the FNDDS descriptions and portion weights underwent continual review by FSRG. New items and new portion sizes were added by FSRG as needed. In addition to the monitoring of information reported by WWEIA respondents, FSRG conducted regular planned data reviews. Before FNDDS was updated, FSRG selected specific categories of products for comprehensive review. The selection of these categories was based on criteria such as frequency of use by ethnicity and age, changes in the marketplace, date of last review, and changes in SR. The purpose of these FSRG reviews was to ensure FNDDS reflected the current marketplace.

Breakfast Cereal and Bread Updates in FNDDS and Corresponding Standard Reference

FNDDS 3.0 (2005-06) and SR, Release 20. RTE breakfast cereals were among the food categories reviewed for FNDDS 3.0 (USDA, ARS, 2008) by FSRG. Major changes included the addition of new food codes and descriptions to account for new RTE breakfast cereal introductions. FSRG revised nutrient values for 35 RTE breakfast cereals to account for updates in SR, Release 20 (USDA-ARS, 2008).

FNDDS 4.1 (2007-08) and SR, Release 22. RTE breakfast cereals were among the food categories reviewed for FNDDS 4.1 (USDA, ARS, 2010) by FSRG. The release added food codes and descriptions for new RTE breakfast cereals and discontinued certain brands of RTE cereals no longer on the market. For FNDDS bread products, FSRG revised SR items selected to determine nutrient values based on updates to composites of whole wheat bread to reflect market share data. NDL added 12 new breakfast cereals to the SR, Release 21 database using data generated by USDA through the National Food and Nutrient Analysis Program (NFNAP) or submitted by the food industry (USDA, ARS, 2008). Major changes in SR, Release 22 included updates and expansion of nutrient data for RTE breakfast cereals (USDA, ARS, 2009).

FNDDS 5.0 (2009-10) and SR, Release 24. RTE breakfast cereals were among the food categories FSRG reviewed for FNDDS 5.0 (USDA, ARS, 2012). FSRG added food codes and descriptions for new RTE breakfast cereals, while they discontinued brands that exited the market. FSRG also revised nutrient values based on updated nutrient values from SR, Release 24. Major changes to SR, Release 24 included up-

dates and expansion of nutrient data for RTE breakfast cereals from several major manufacturers (USDA, ARS, 2011). This came at the request of the FSRG to support future releases of the FNDDS. Major updates to the previous version (SR, Release 23) included new products and nutrient profiles for a variety of new breakfast cereals using data generated by USDA through the NFNAP or submitted by the food industry (USDA, ARS, September 2010).

For bread products, major changes between FNDDS 4.1 and FNDDS 5.0 included revisions to nutrient values based on updates from SR, Release 24. FSRG revised SR items used to determine nutrient values for FNDDS breads based on updates to composites for wheat bread to reflect market share data. Major changes in SR, Release 24 included the addition of new garlic breads and nutrient profiles using data generated by USDA through the NFNAP or submitted by the food industry. A major focus of this effort was to add foods that were major contributors of sodium to the diet, as well as to provide data on formulated foods.

FNDDS 2011-12 and SR, Release 26. In FNDDS 5.0 RTE, 28 breakfast cereal codes were dropped in the FNDDS 2011-12 version, and 22 bread codes were discontinued between FNDDS 5.0 and FNDDS 2011-12 (USDA, ARS, 2014). Also, 10 of the bread codes were dropped, and 12 were consolidated under a new or existing code NDL added or updated breakfast cereals as part of the major changes to SR, Release 26 compared to SR, Release 25 (USDA, ARS, 2013). NDL staff removed breakfast cereals no longer on the market or without current data as part of the major updates to SR, Release 25 and SR, Release 26 (USDA, ARS, 2013; USDA, ARS, 2012). NDL also added or updated whole wheat bread items as part of major changes in SR, Release 26.

Mintel Global New Products Database

We gathered information on new and reformulated products from 2005 to 2012 using Mintel Global New Products Database (Mintel GNPD), a proprietary database containing detailed information on new consumer packaged goods.[2] These include new products, new formulations, new variety/range extensions, new packaging, and relaunches (Mintel Group Ltd., 2010). Contracted shoppers collect the products in Mintel GNPD. Shoppers receive a list of stores to target for new products and shop on a weekly basis (Mintel Group Ltd., 2010). Distribution channels monitored include supermarkets, mass merchants, drug stores, natural food stores, convenience stores, club stores, specialty stores, mail order/Internet, and some direct-to-consumer outlets.

The shoppers then ship these products to Mintel's headquarters in London, where they go through a data entry process by Mintel's in-house data team. The data team tracks and adds to the database everything listed on the package, including nutrient content from the Nutrition Facts label, product claims (e.g., low/no/reduced claims, whole grain, added calcium, added fiber), and ingredients and package type. Product records are fully searchable and include a publication date indicating when the product was added into the Mintel GNPD (Mintel Group Ltd., 2017).

While few studies validate the overall accuracy of Mintel GNPD product records, we inherently assumed the accuracy of the nutrient composition data was reflected in the accuracy of food ingredient data. Tennant and Bruyninckx (2018) evaluated the usefulness of Mintel GNPD food additive data for assessing European consumers' dietary exposure to additives (e.g., benzoates, sorbates, chlorophylls). Among seven market research organizations, including Mintel, Canadean, Euromonitor, Nielsen, GfK, TNS-BMRB, and XTC, Mintel GNPD was found to be the most suitable for identifying the importance of additives in food products. In addition, the European Food Safety Authority recognizes Mintel GNPD as a source of food label information (European Food Safety Authority, 2016).

[2] Mintel is a privately owned, London-based market research firm.

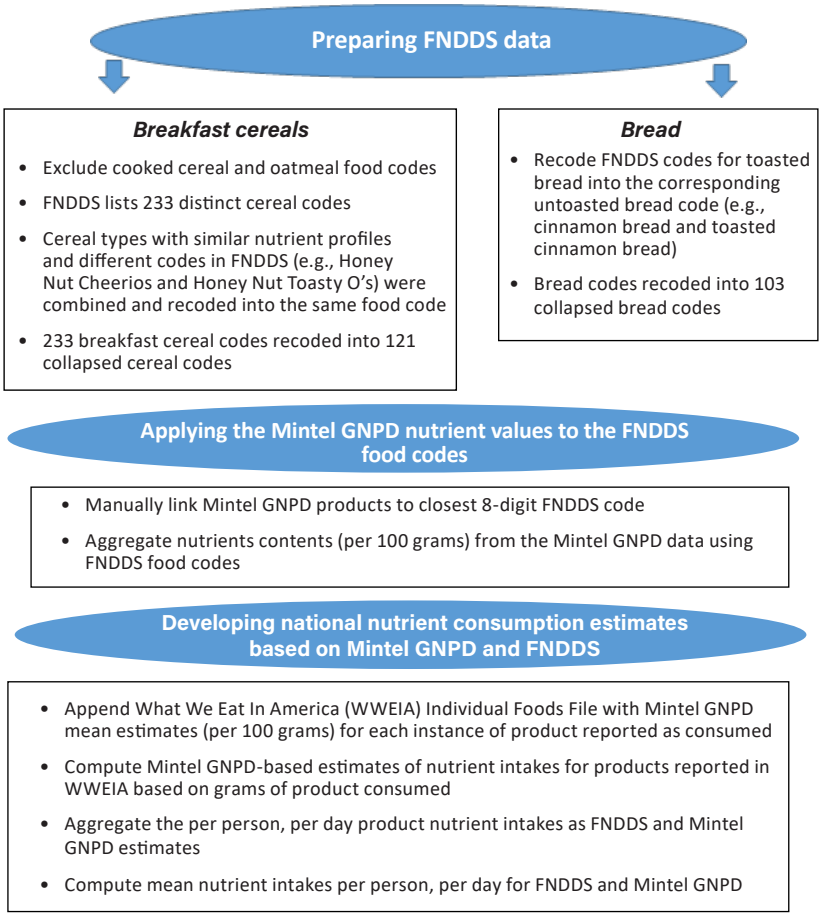
Methods

Nutrient intakes derived from daily diets based on new and reformulated foods and FNDDS were compared to estimate the potential effects of product reformulations on consumer diets. Nutrient intakes were calculated using FNDDS to process each release of WWEIA dietary intake data from 2005 to 2012. Foods in those daily diets were then replaced with new and reformulated alternatives using a revised food composition table based on the Mintel GNPD to estimate nutrient intakes from new and reformulated products.

We found 2,207 breakfast cereal items (after excluding cooked cereal and oatmeal) and 1,434 bread products (after excluding quick breads, soft pretzels, pie and pizza crust, and bagel chips) were introduced from January 1, 2005, to December 31, 2012. Product description and nutrient composition data were downloaded for these products from the Mintel GNPD. When nutrition data for reformulated products were incomplete or not entered, information from the NFP was used to fill in the missing data elements. Records from the database were reviewed to correct typographic errors and complete missing fields. Missing and outlier values for nutritional content were confirmed from product packaging images provided by Mintel when available. Multipack cereal products were disaggregated into discreet lines of nutritional content data for each individual product. For standardization across different package and serving sizes, nutritional content per 100 grams of products was used.

In figure 2, we summarized the data processing methods for analyzing the potential impacts of new and reformulated breakfast cereal and bread products on nutrient intake. Van Raaij et al., (2008) delineated a similar approach, while Taylor et al., (2017) and Taylor (2018) used the same basic procedure to estimate nutrient intakes based on new and reformulated yogurt and cookie products, respectively.

Figure 2
Procedures for national nutrient intake comparisons based on nutrient content of new products in the Mintel Global New Products Database (Mintel GNPD) and nutrient values in the Food and Nutrient Database for Dietary Studies (FNDDS), 2005-12



Source: USDA, Economic Research Service.

Linking Mintel GNPD Products to FNDDS Food Codes

After excluding cooked cereal and oatmeal, FNDDS food codes were condensed to a smaller number of categories for a more streamlined analysis. Cereal codes were condensed from 233 codes into 121 codes by combining cereal types with similar nutrients (e.g., Honey Nut Cheerios and Honey Nut Toasty O's). Toasted bread products were re-coded into the corresponding untoasted bread category, which resulted in 103 distinct FNDDS bread codes.[3]

Two research dietitians manually matched the 2,207 new breakfast cereals and 1,434 new bread products to the FNDDS food codes. When Mintel GNPD data was insufficient for classification into a discrete cereal or bread group, the research dietitians reviewed ingredients and product images to identify specific product categorizations. We then aggregated the energy and nutrient contents (per 100 grams) and reported as mean, minimum, and maximum nutritional content per discrete product group. We computed the estimates across 2-year groupings corresponding to each release of the WWEIA data (2005-06, 2007-08, 2009-10, and 2011-12), allowing for changes in energy and nutrient content based on when the products were introduced.

We illustrate the linking of Mintel GNPD products to FNDDS food codes using calories for those codes having more new and reformulated products in table 1. For example, 105 individual Mintel GNPD products pooled over all years were linked to the FNDDS food code 51000200 "roll, not specified as to major flour." If there were few (or no) innovations, we defaulted to FNDDS values, and the estimate for FNDDS and Mintel GNPD would be the same.

Estimating National Nutrient Intakes from Cereals and Breads Based on Mintel GNPD and FNDDS

The WWEIA dietary intake files from the dietary recalls collected during the MEC visits were assessed to identify unique breakfast cereal and bread consumption occurrences between 2005 and 2012. To develop national nutrient intake estimates, the relevant FNDDS version was used over the 4 WWEIA 2-year cycles of data from 2005-06 to 2011-12.

To simulate the potential impact of new and reformulated products on nutrient consumption, Mintel GNPD-based estimates of mean nutritional composition (per 100 grams) were automatically linked to the recoded breakfast cereals and breads reported in the WWEIA individual foods file. Data were merged across the recoded food groups (121 breakfast cereals and 103 bread products) and linked to the corresponding 2-year WWEIA release cycle. For example, the mean estimates of the nutrient composition of new and reformulated products in 2005-06 were matched to cereal and bread products consumed in WWEIA 2005-06. The WWEIA consumption data were not altered in any way—only nutrient composition over the recoded breakfast cereal and bread categories were revised based on new product launches.

Data were aggregated across all breakfast cereal and bread product consumption per-person, per-day to obtain the Mintel GNPD and FNDDS-based energy and nutrient and intake estimates. Mean per capita energy and nutrient intake estimates from breakfast cereals and bread products using Mintel GNPD and FNDDS were compared across each 2-year release of WWEIA data. National consumption estimates were weighted with the day-1 dietary weights to create nationally representative estimates and account for the complex sampling methodology employed by WWEIA. Given concerns about the nutritional quality of cereal products marketed to children, we also focused on the segment of the population younger than 19 years of age (Harris et al., 2012).

[3]Toasted and untoasted breads have different nutrient values per 100 grams because a slice of bread weighs less after it is toasted. The grams of toast reported in the WWEIA food intake files can be multiplied by 1.12 to convert the toasted bread to untoasted bread before combining the toasted and untoasted codes. This change would require identifying all toasted consumption occasions and then assuming the conversion factor is appropriate for all types of bread (for example, it is an average based on water content but likely varies across wheat and white breads). This would replace one assumption with another that is equally uncertain.

Table 1

Calories (per 100 gram serving) distribution after linking Mintel GNPD new products to individual FNDDS commonly used food codes

FNDDS code	Description	New products (Number)	Mean	Minimum	Maximum
Bread					
51000200	Roll, NS as to major flour	105	278.1	60.5	400.0
51300110	Bread, whole wheat, other than 100% or NS as to 100%	78	242.0	27.9	319.1
52215200	Tortilla, flour (wheat)	70	283.9	169.8	423.3
51180010	Bagel	68	275.1	147.5	1,240.4
51121010	Bread, garlic	57	307.3	201.8	440.0
51121040	Bread, garlic, toasted (includes Texas toast)	52	344.3	150.0	459.5
51101000	Bread, white	51	260.0	194.0	357.1
51601020	Bread, multigrain	49	276.0	194.0	1,372.1
51201010	Bread, 100% whole wheat	46	244.1	192.3	282.2
52215000	Tortilla, NFS	46	254.5	105.3	384.6
52215100	Tortilla, corn	39	343.0	159.1	1,173.9
52215300	Taco shell, corn	39	468.9	392.9	606.1
51186010	Muffin, English (includes sour dough)	38	227.3	175.4	543.9
51320500	Roll, whole wheat, NS as to 100%	36	258.8	153.8	325.6
51107010	Bread, French or Vienna	31	268.8	210.5	461.5
51122000	Bread, reduced calorie/high fiber	30	211.0	160.7	280.7
Cereal					
57227000	Granola, NFS	270	441.8	121.4	4,600.0
57417000	Shredded Wheat, 100%	43	351.2	323.5	400
57213000	Froot Loops	42	386.2	366.7	433.3
57123000	Cheerios	41	367.3	343.8	476.2
57214000	Frosted Mini-Wheats (includes all flavors)	39	349.2	321.4	384.6
57329000	Raisin Bran, NFS	39	351.0	309.1	651.0
57308190	Muesli with raisins, dates, and almonds	34	369.7	309.1	442.0
57305100	Lucky Charms	32	405.8	387.8	407.4
57241000	Honey Nut Cheerios	30	391.6	360.0	392.9
57348000	Frosted Corn Flakes, NFS	28	381.6	320.0	400.0
57344000	Special K	27	376.2	344.8	519.5

NS = Not specified. NFS = Not further specified.

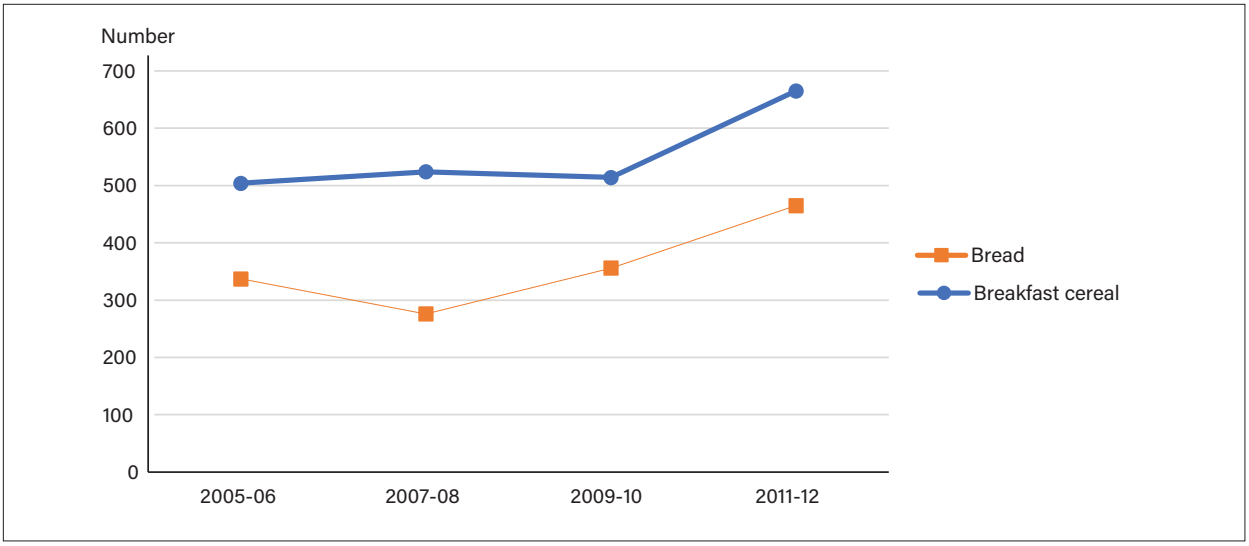
Source: Derivations based on Mintel Global New Products Database and Food and Nutrient Database for Dietary Studies.

Nutrient Content of New Products

The number of new breakfast cereals increased by 161 (32 percent) from 2005-06 to 2011-12, while the number of new bread products increased by 128 (38 percent) (figure 3). The 2-year groupings correspond to the National Health and Nutrition Examination Survey cycle.

Figure 3

Number of new breakfest cereal and bread products

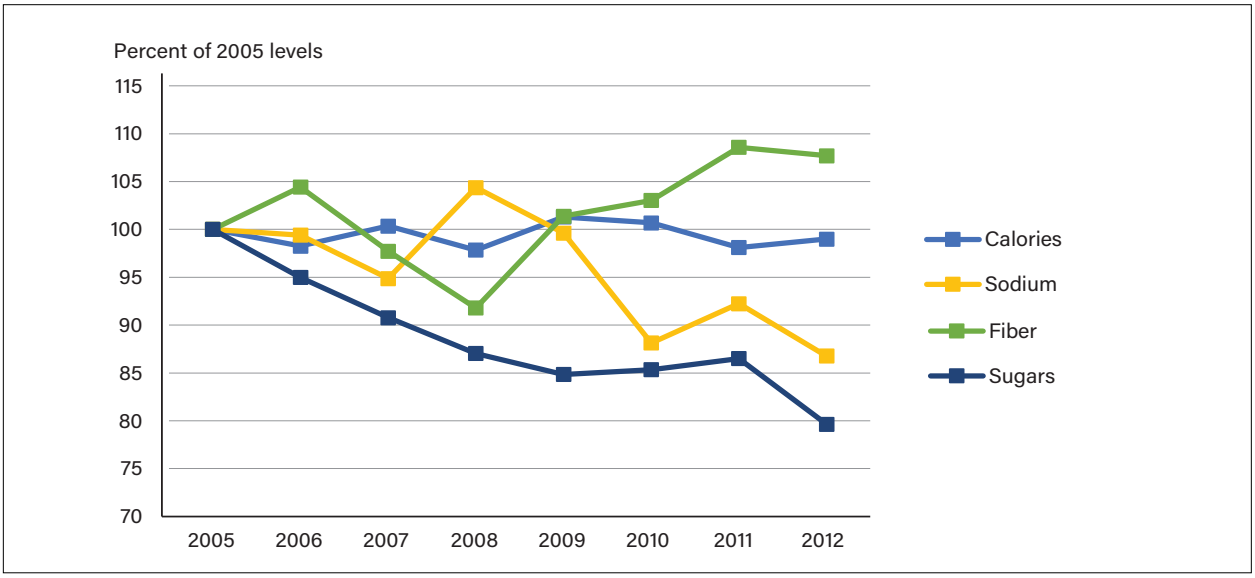


Source: Mintel Global New Products Database.

Changes in new product nutrient content provide evidence of the degree of potential changes in the food supply. Figure 4 displays the average energy and nutrient content of new breakfast cereal products as a percentage of 2005 levels from 2005 to 2012. With respect to sodium and sugar, cereal manufacturers appear to be making nutritional improvements in their products. Sugar and sodium content per 100 grams or milligrams of product fell by 20 percentage points (5.8 grams) and 13 percentage points (55.4 milligrams), respectively, while smaller increases were found in fiber content (8 percent or 0.6 grams).

Figure 4

Average calorie and nutrient content of new breakfast cereal products per 100 grams of product, 2005-12



Source: Mintel Global New Products Database.

These results are consistent with several studies conducted on the breakfast cereal category, including Martinez and Levin (2017), Wang et al., (2015), and Thomas et al., (2013). For new cereal products with a whole-grain claim, Martinez and Levin (2017) found statistically significant decreases in sugar and sodium than new cereal products without the claim. Product reformulations do not appear to be targeting calories.

In table 2, we compared the mean nutrient content of new breakfast cereals for 2009-12 to mean nutrient values of products that are not new or reformulated (i.e., existing products), as derived by Martinez and Levin (2017). Breakfast cereal products were introduced with higher levels of fiber in each year compared to the 2009-12 average fiber content of existing brand name products. Consequently, the fiber content of the breakfast cereal category as a whole may have increased.[4] Breakfast cereals introduced in 2009 contained more sodium on average than the 2009-12 average of brand name products already on the market. After 2009, the sodium content of new products was lower in each year compared to the average of existing products in 2009-12. Given the wide range of each nutrient (minimum and maximum values), brand loyalty to a cereal or bread product could result in larger effects on estimates of national nutrient consumption.

Table 2

Nutritional characteristics of new and existing breakfast cereal products per 100 grams of product, 2009-12

	Nutrient			
	Energy (Kcal)	Sodium (Milligrams)	Fiber (Grams)	Sugar (Grams)
Mean nutrient content of existing breakfast cereal products, 2009-12	376	408	7.2	22.3
Nutritional characteristics of new breakfast cereal products				
2009				
Mean	385	417	8.0	24.0
Minimum	87	0	0	0
Maximum	749	1,206	46.7	55.6
2010				
Mean	383	369	8.2	24.1
Minimum	0	0	0	0
Maximum	714	1,206	42.2	58.3
2011				
Mean	373	386	8.6	24.5
Minimum	75	0	0	0
Maximum	554	1,107	46.7	55.6
2012				
Mean	376	363	8.5	22.5
Minimum	66	0	0	0
Maximum	536	1,214	46.7	53.1

Sources: Mintel Global New Products Database and Martinez and Levin (2017).

[4]The average nutritional quality of breakfast cereals would also depend on the average nutritional quality of breakfast cereals that exit the market (Martinez and Levin, 2017).

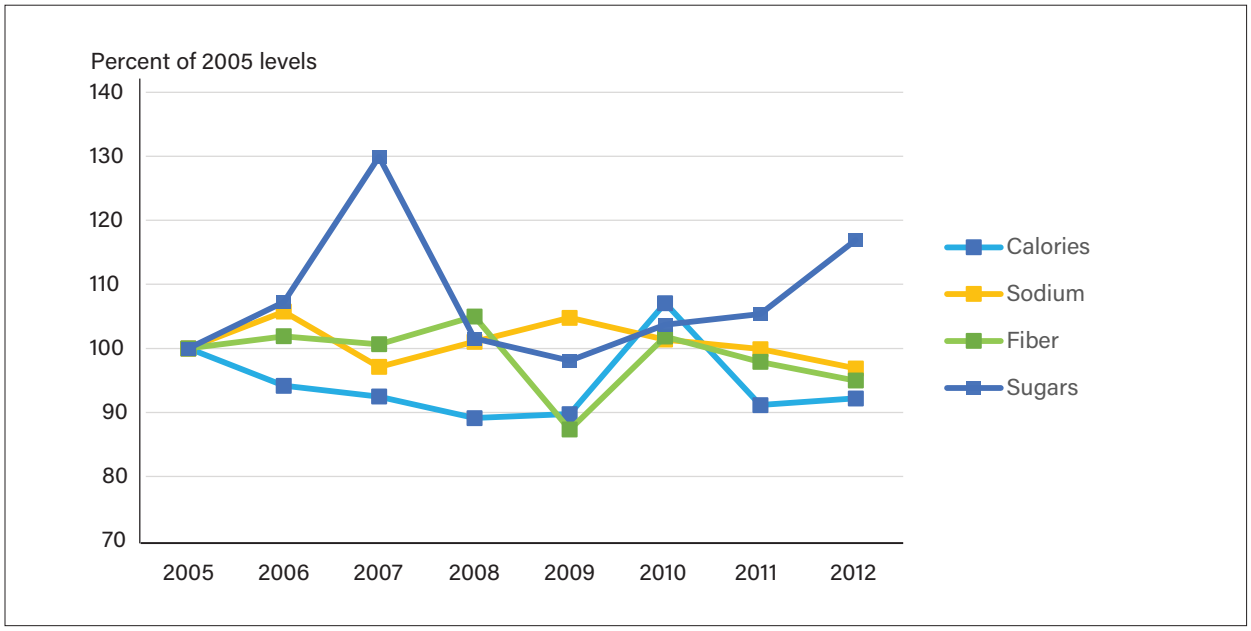
Caloric content per 100 grams of new bread products was reduced by 8 percent (23.3 kilocalories) from 2005-12 (figure 5). Although the increase in sugar content was relatively larger (17 percent), the absolute change was less than 1 gram (0.8 grams). Smaller percentage reductions were found in fiber (5 percent or 0.3 grams) and sodium (3 percent or 15 milligrams). Sugar content per 100 grams of product displayed wide variation, while sodium was relatively stable compared to other nutrients.

The reduction in bread fiber occurred despite an upward trend in products with whole-grain claims. One possible explanation is that some food companies may have added whole-grain claims despite their products having more refined white flour than whole grain.[5] Many products bearing whole grains claims are only partially whole grain, and the amount can vary from a small fraction to 100 percent. This is likely the main reason for the apparent paradox in fiber reduction. The Center for Science in the Public Interest's website documents several cases of misleading whole-grain claims on bread labels from 2005 to 2012. For example, labels for Thomas' Hearty Grains English Muffins claimed that the bread is "made with the goodness of whole grain" and "made with whole grains." Yet the primary ingredient is "unbleached enriched wheat flour" or refined white flour.

Another possibility is that products with whole-grain claims accounted for a smaller percentage of all new bread products (22 percent) over the 2005-12 period compared to new breakfast cereals (44 percent). The fiber content of new bread products without a whole-grain claim fell by 13 percent (0.6 grams) over the same period, compared to a 22 percent (1.4 grams) increase for new bread products with the claim.[6]

Figure 5

Average calorie and nutrient content of new bread products per 100 grams of product, 2005-12



Source: Mintel Global New Products Database

[5] In 2006, the U.S. Food and Drug Administration (FDA) issued draft guidance concerning whole grain label statements, but it is not legally enforceable (U.S. Department of Health and Human Services, 2006). Instead, it describes FDA "recommendations." For example, manufacturers can make factual statements about whole grains on product labels, such as "10 grams of whole grains," provided they are not false or misleading and do not imply a particular level of the ingredient (i.e., "high" or "excellent source"). However, the draft guidance was not finalized (Watson, 2018).

[6] Some new products may have qualified for whole-grain claims in earlier years but did not make the claim. If a claim was then made in later years, it would appear in Mintel GNPD as a relaunched product carrying a whole-grain claim.

Potential Effects of New Products on Nutrient Intakes

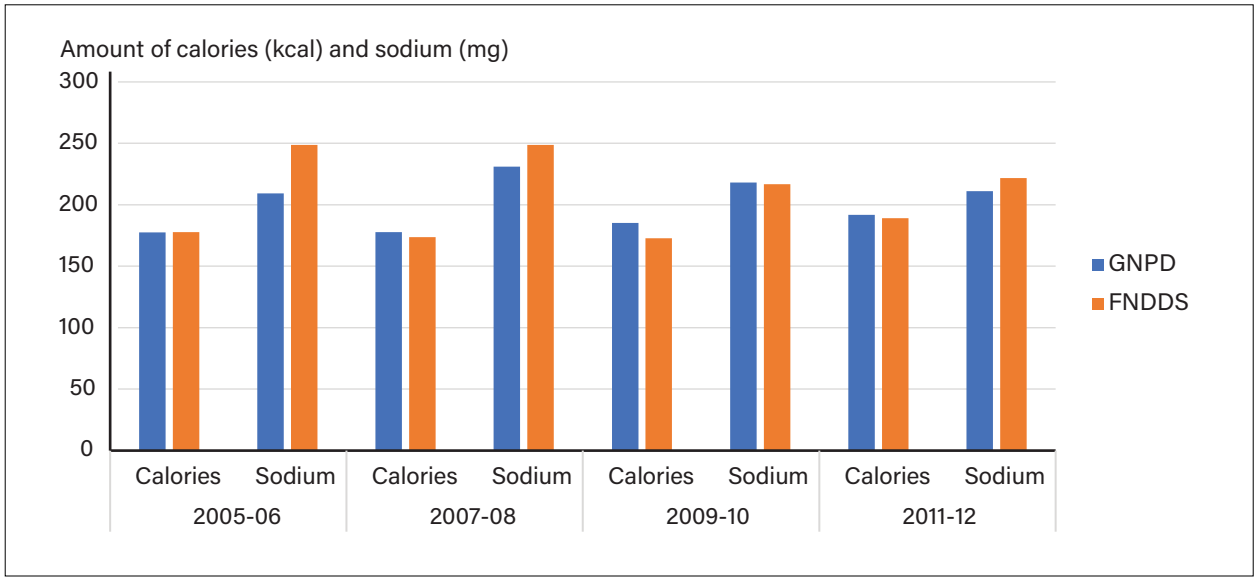
Estimates of nutrient intakes based on the FNDDS were compared to estimates using the Mintel GNPD. These comparisons provided a measure of potential differences in nutrient intake estimates due to the consumption of reformulated products that FNDDS may not include. The results may help set priorities for monitoring food innovations and updating nutrient composition data.

Breakfast Cereals

Mean energy and sodium intake estimates from RTE breakfast cereals based on Mintel GNPD and FNDDS are presented in figure 6. Energy consumption was similar, based on both databases, with little variation over time. Reductions in the sodium content of new and reformulated breakfast cereals (figure 4) did not translate to relatively healthier diets with respect to this nutrient over time. The FNDDS-based estimate of sodium consumption decreased from 2005-06, while the Mintel GNPD-based estimate increased by a small amount, but both estimates were closer together in 2011-12 than 2005-06.

Figure 6

Estimated mean energy and sodium intakes from breakfast cereals based on Global New Products Database (GNPD) and Food and Nutrient Database for Dietary Studies (FNDDS)-based estimates of nutrient consumption



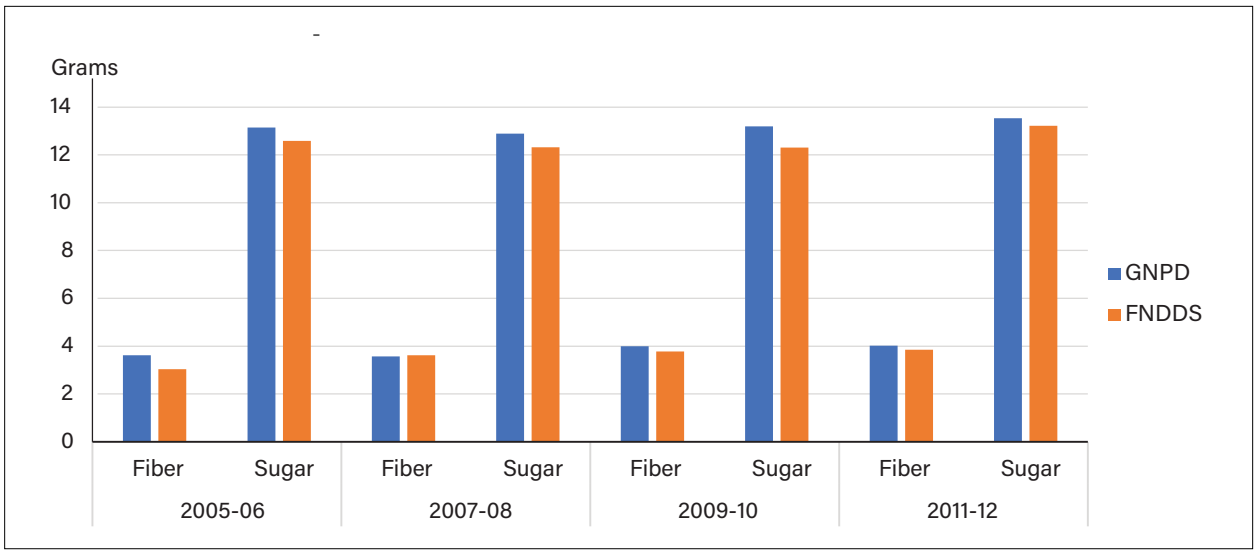
Note: Sample size = 9,569.

Source: USDA, Economic Research Service derivations based on What We Eat in America, Mintel Global New Products Database, and Food and Nutrient Database for Dietary Studies.

Both Mintel GNPD and FNDDS tracked small increases in sugar and fiber consumption, which more closely approximated each other in 2011-12 (figure 7). A small increase in fiber consumption based on Mintel GNPD from 2005-06 to 2011-12 corresponds to an 8-percentage point increase in the fiber content of new products (figure 4). However, a larger increase in the FNDDS-based fiber intake estimate led to a closer approximation to the Mintel GNPD-based estimate. Both estimates indicated reductions in sugar content of new and reformulated products did not result in sugar intake reductions. These results were consistent with Wang et al., (2015), who found consumers favored less healthy cereals, despite the availability of healthier alternatives. The gap between estimates was lower in 2011-12 than 2005-06, suggesting a reduction in potential differences due to reformulated products.

Figure 7

Estimated mean fiber and sugar intakes from breakfast cereals based on Global New Products Database (GNPD) and Food and Nutrient Database for Dietary Studies (FNDDS)-based estimates of nutrient consumption

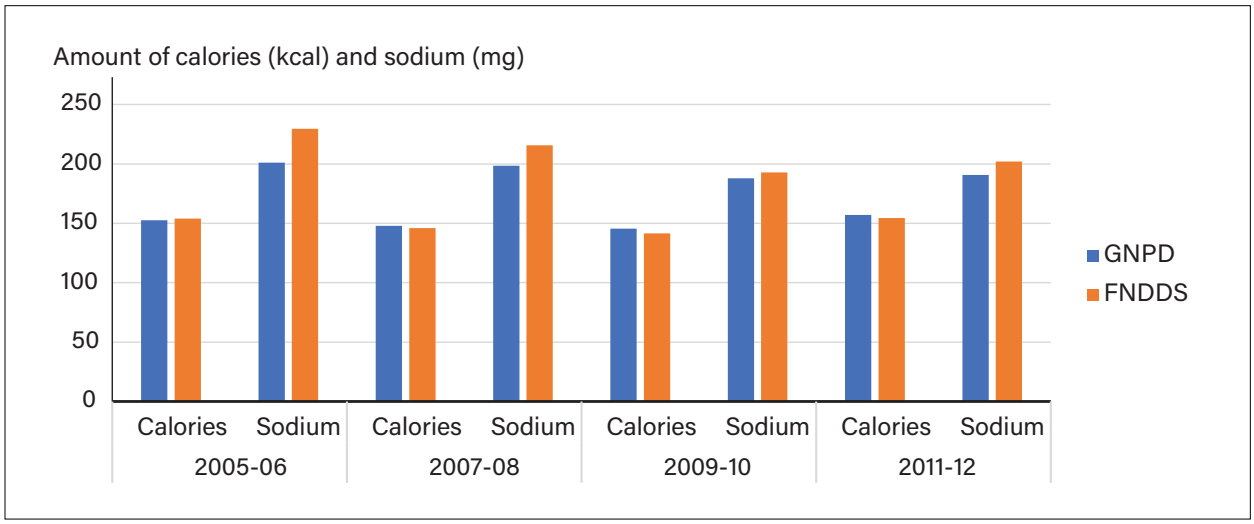


Note: Sample size = 9,569.

Source: USDA, Economic Research Service derivations based on What We Eat in America, Mintel Global New Products Database, and Food and Nutrient Database for Dietary Studies.

Figure 8

Estimated mean energy and sodium intakes from breakfast cereals based on Food and Nutrient Database for Dietary Studies (FNDDS) and Global New Product Database (GNPD) estimates of nutritional composition, less than 19 years of age



Note: Sample size = 5,433.

Source: USDA, Economic Research Service derivations based on What We Eat in America, Mintel Global New Products Database, and Food an Nutrient Database for Dietary Studies.

Nutrients Consumed from Breakfast Cereals by Children

Average daily per capita intakes of energy, sugar, sodium, and fiber from breakfast cereal products were estimated separately for the 57 percent of the population less than 19 years of age (n = 5,433 compared to n = 9,569). Breakfast cereals are among the product categories most heavily marketed to children (Federal Trade Commission, 2012). A report by the Rudd Center for Food Policy and Obesity found that while cereal companies improved the nutrition of most cereals marketed to children from 2009 to 2012, they contained more sugar and sodium and less fiber compared to adult-targeted cereals (Harris et al., 2012).

Estimates using Mintel GNPD and FNDDS both indicated smaller intakes of sodium over time (figure 8). The larger difference in sodium intake in 2005-06 was associated with a mean sodium intake of 229.6 milligrams based on FNDDS compared to 201.1 milligrams of sodium consumed based on Mintel GNPD. From 2005-06 to 2011-12, FNDDS-based sodium consumption fell by 27.6 milligrams compared to a reduction of 10.3 milligrams based on Mintel GNPD. This led to a narrower difference in estimates by 2011-12.

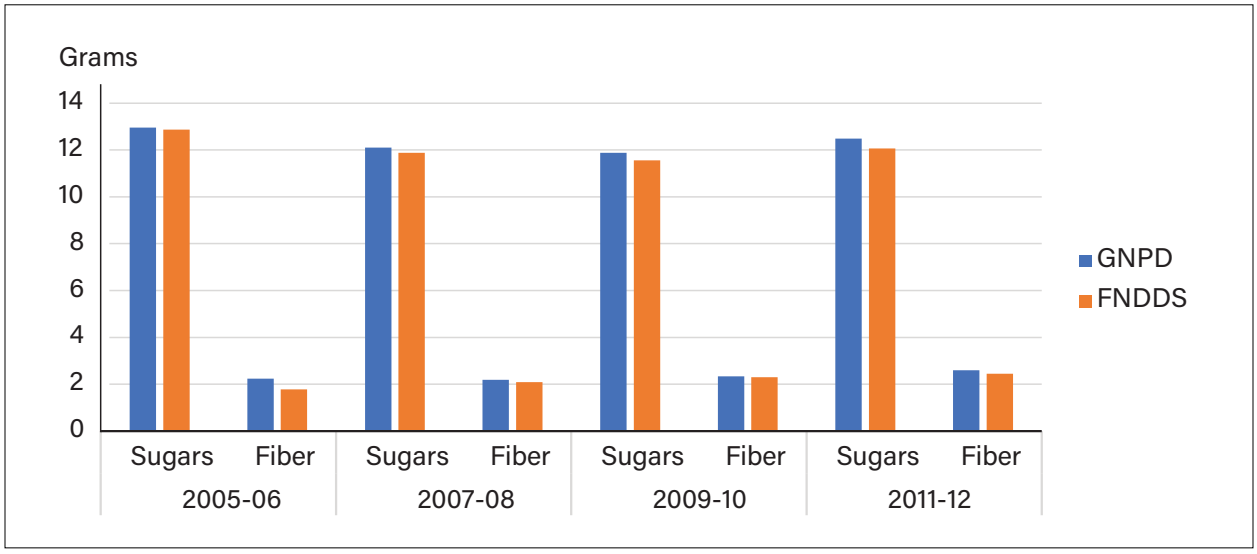
Estimates using Mintel GNPD and FNDDS both tracked small reductions in sugar intake from 2005-06 to 2011-12 (figure 9), with very small differences in estimates, suggesting little impact from new and reformulated products. In addition, these results were consistent with studies that found limited progress in the nutrition and marketing of children's cereals (Harris et al., 2012). Adult cereals tend to contain less sugar, and cereals marketed directly to children contain higher levels of added sugar (Environmental Working Group, 2014).

Bread Products

Estimates of energy intake from bread based on Mintel GNPD and FNDDS showed greater caloric intake from 2005-06 to 2011-12 (figure 10), with only a slight difference in estimates. The difference in estimates of sodium intake actually increased from 2005-06 to 2009-10 before narrowing in 2011-12, though still slightly larger than in 2005-06.

Estimates based on Mintel GNPD and FNDDS both captured increasing levels of average fiber and sugar consumption over 2005-06 to 2011-12 (figure 11). The FNDDS-based fiber estimate increased by a larger amount, leading to a narrower gap between the estimates in 2011-12. Differences in estimates of sugar intake did not narrow over time, with estimates based on Mintel GNPD consistently higher than those based on FNDDS.

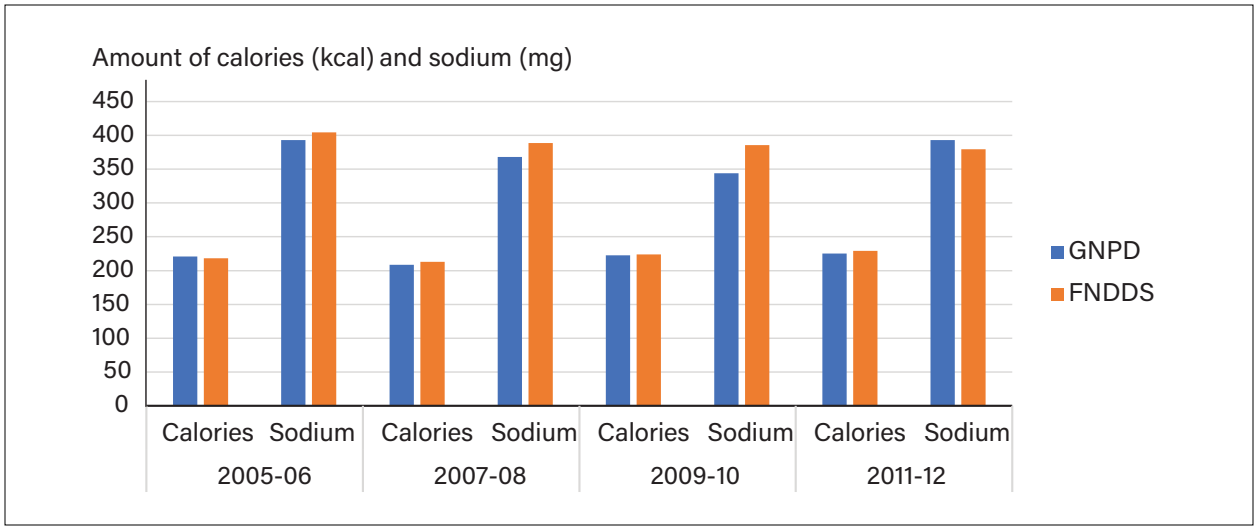
Figure 9
Estimated mean fiber and sugar intakes from breakfast cereals based on Food and Nutrient Database for Dietary Studies (FNDDS) and Global New Product Database (GNPD) estimates of nutritional composition, less than 19 years of age



Note: Sample size = 20,504.
Source: USDA, Economic Research Service derivations based on What We Eat in America, Mintel Global New Products Database, and Food and Nutrient Database for Dietary Studies.

Figure 10

Estimated mean energy and sodium intakes from bread products based on Food and Nutrient Database for Dietary Studies (FNDDS) and Global New Products Database (GNPD) estimates of nutritional composition

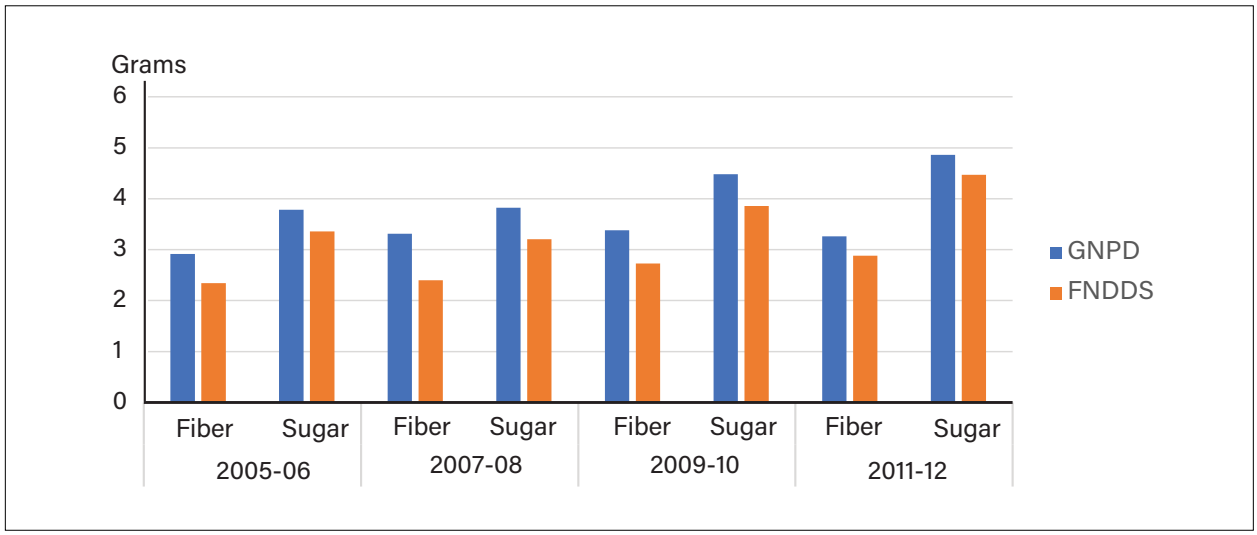


Note: Sample size = 20,504.

Source: USDA, Economic Research Service derivations based on What We Eat in America, Mintel Global New Products Database, and Food and Nutrient Database for Dietary Studies.

Figure 11

Estimated mean fiber and sugar intakes from bread products based on Food and Nutrient Database for Dietary Studies (FNDDS) and Global New Products Database (GNPD) estimates of nutritional composition



Note: Sample size = 20,504.

Source: USDA, Economic Research Service derivations based on What We Eat in America, Mintel Global New Products Database, and Food and Nutrient Database for Dietary Studies.

Limitations of Analysis

The comparisons reported here represent an upper limit on the potential gap between nutrient intake based on new and reformulated foods and nutrient intake as estimated, given available nutrient composition data. Analytical methods used for nutrient databases may be imperfect at capturing whether a reported food consumed is the newest formulation of a given product. Future research on the adoption and retention of new foods in the marketplace would assist in monitoring the nutrient composition of foods and evaluate the impact of reformulations more precisely (Pennington et al., 2007). This could be accomplished by linking new market brands to sales data to provide further insight on whether new products are purchased.

Another important consideration concerns the underlying sources of nutrient databases. Mintel GNPD data is based on the NFP, whereas nutrient values in SR/FNDDS were potentially based on different methods, including information from food manufacturers, NFP, or chemical analysis by the USDA, Agricultural Research Service. U.S. Food and Drug Administration (FDA) regulations allow for over-and under-declarations based on the class of nutrients (DHHS, FDA, 1998). For calories, sugars, and sodium, the NFP is in compliance if the nutrient content of the product obtained by laboratory analysis is less than 20 percent above the value declared on the NFP. Dietary fiber must be present at 80 percent or more of the value declared on the NFP. Furthermore, there may be issues of accuracy of the NFP. Ahuja et al., (2019) found that 18 percent of bread labels and 10 percent of cereal labels were over 20 percent more or over 20 percent less than their corresponding laboratory values for sodium.

Conclusions

To ensure analyses of nutrient intake patterns are meaningful, the food composition databases used for these analyses may require frequent updates to incorporate the latest information about foods eaten by U.S. consumers. This report describes a comparison between nutrient intakes based on Mintel's Global New Product Database (GNPD) and the USDA Food and Nutrient Database for Dietary Studies (FNDDS) for breakfast cereals and bread products from 2005 to 2012. New food product introductions point to ways food prepared and eaten at home are changing. Over time, mean nutrient intakes from Mintel GNPD more closely matched the estimates obtained from FNDDS. We conclude that the food industry wasn't reformulating products as aggressively later in the study period, or the FNDDS was increasingly accurate in capturing changes in the food supply.

Potential changes in food consumption patterns as new and reformulated products are introduced could reinforce trends toward healthier nationally representative diets or counteract such trends. There appears to be some evidence of the latter in the case of sugar in breakfast cereal and calories in breakfast cereal and bread. The average sugar content of new breakfast cereals fell, as did the average caloric content of new breakfast cereals and breads, which is evidence of reformulations consistent with the *Dietary Guidelines for Americans*. However, we did not observe healthier dietary intakes with respect to these nutrients.

Periodic monitoring of the nutrient content of new foods can help identify foods and food categories that need more frequent and comprehensive updating to support the accuracy of food composition databases. The comparisons in this study support other efforts to address rapid changes in the food supply, such as FoodData Central (FDC)—a new, integrated, and expanded USDA food and nutrient data system. Several USDA food composition databases that provide data on nutrients and other food components, including the FNDDS, SR Legacy, and the USDA Branded Food Products Database, have transitioned to FDC, which also includes two new data types; Foundation Foods and Experimental Foods (USDA, ARS, 2019). Each of these five data types, managed by ARS's Beltsville Human Nutrition Research Center, has a unique purpose and unique attributes. For example, the USDA Branded Food Products Database—a product of a public-private partnership—provides nutrient values in branded and private label foods that appear on the product label. The database enhances the timeliness of food intake and nutrient composition linkages to better inform dietary pattern recommendations (Kretser et al., 2017).

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