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A Comparison of Concentrations of Sodium and Related Nutrients (Potassium, Total Dietary Fiber, Total and Saturated Fat, and Total Sugar) in Private-Label and National Brands of Popular, Sodium-Contributing, Commercially Packaged Foods in the United States

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ABSTRACT

Background Private-label brands account for about one in four foods sold in US supermarkets. They provide value to consumers due to their low cost. We know of no US studies comparing the nutrition content of private-label products with corresponding national brand products.

Objective The objective was to compare concentrations of sodium and related nutrients (potassium, total dietary fiber, total and saturated fat, and total sugar) in popular sodium-contributing, commercially packaged foods by brand type (national or private-label brand).

Design During 2010 to 2014, the Nutrient Data Laboratory of the US Department of Agriculture obtained 1,706 samples of private-label and national brand products from up to 12 locations nationwide and chemically analyzed 937 composites for sodium and related nutrients. The samples came from 61 sodium-contributing, commercially packaged food products for which both private-label and national brands were among the top 75% to 80% of brands for US unit sales. In this post hoc comparative analysis, the authors assigned a variable brand type (national or private label) to each composite and determined mean nutrient contents by brand type overall and by food product and type.

Statistical analyses performed The authors tested for significant differences ($P<0.05$) by brand type using independent sample t tests or Mann-Whitney U tests when appropriate.

Results Overall for all foods sampled, differences between brand types were not statistically significant for any of the nutrients studied. However, differences in both directions exist for a few individual food products and food categories.

Conclusions Concentrations of sodium and related nutrients (potassium, total dietary fiber, total and saturated fat, and total sugar) do not differ systematically between private-label and national brands, suggesting that brand type is not a consideration for nutritional quality of foods in the United States. The study data provide public health officials with baseline nutrient content by brand type to help focus US sodium-reduction efforts.

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A PRIVATE-LABEL BRAND, ALSO KNOWN AS A STORE brand, is a "brand owned or sponsored by a retailer or supplier."[1] Two examples of US private-label brands are Great Value sold at Walmart, and Kirkland sold at Costco. In 2014, private-label brands accounted for almost a quarter of product units sold in US supermarkets.[2] Sales of private-label brand products have grown steadily, outpacing the increase in sales of national-brand products.

Private-label brands provide value to consumers. These brands cost about three-fourths the price of national brand products.[3] Because food prices are an important factor in food choices,[4] private-label brands can influence purchase decisions and, in turn, nutrient intakes.

The authors know of no published US studies comparing nutrient content by brand type. Selected foods in other countries have undergone limited comparisons,[5-12] and most researchers reported no differences by brand type but did observe differences for individual foods and food categories. However, these results cannot be generalized to the US food supply.

US public health officials have recently started working with food manufacturers to reduce sodium levels in

commercially processed and restaurant foods[13-16] and monitor these efforts.[17,18] As part of the monitoring program led by the US Department of Agriculture (USDA), the Nutrient Data Laboratory (NDL) of USDA is monitoring levels of sodium in popular, sodium-contributing foods through periodic nationwide sampling and chemical analyses. USDA then uses these data to update its food composition databases used for national nutrition monitoring in the United States; that is, the National Nutrient Database for Standard Reference and Food and Nutrient Database for Dietary Studies.[19] In addition to sodium, NDL monitors levels of related nutrients, including potassium, total dietary fiber (fiber), total and saturated fat, and total sugar, that may change when manufacturers and restaurants reformulate their products to reduce sodium content. The 2015-2020 Dietary Guidelines for Americans recommends decreased consumption of total and saturated fat and total sugar and increased consumption of potassium and fiber.[20] As part of the nationwide sampling of these foods, NDL selected top national and private brands for each food based on their market share for units sold.[17]

The primary aim of this study was to compare sodium and related nutrient content by brand-type for popular sodium-contributing foods where both private-label and national brands were among the top brands in the United States. A secondary aim was to provide information on the need to monitor private-label products to help streamline procedures for the federal sodium monitoring program.

METHODS

Between 2010 and 2014, NDL sampled and chemically analyzed 125 popular, sodium-contributing, commercially processed and restaurant sentinel foods containing sodium that had been added during processing or preparation. About three-fourths (92 of 125) these foods were commercially packaged foods from stores, representing several food types, including potato chips, bread, canned tomato soup and corn, frozen pizza, and chicken nuggets. Specifics on the definition of sentinel foods and on the selection, sampling, processing, and chemical analyses are detailed elsewhere.[17] Institutional review board approval was not obtained because human subjects were not involved.

NDL developed a three-stage sampling plan for each sentinel food using the most recent US Census and Nielsen sales data to ensure a nationally representative, geographically dispersed sample. Using a probability-proportional-to-size sampling plan, in stage 1, NDL selected 12 counties based on most recent US Census data available. In stage 2, NDL selected retail outlets in these counties based on Nielsen and Trade Dimensions sales data. In stage 3, NDL identified the top brands for each food product representing up to 70% to 80% of total units sold in supermarkets using Nielsen point-of-sales data. Nielsen data provide unit sales for packaged foods sold in major supermarkets throughout the United States, including private-label-brand foods, but do not identify the retail stores that sell private-label brands. The sampling plan is detailed elsewhere.[21,22]

NDL sampled both private-label and national-brand products for 61 of the 92 packaged sentinel foods because they comprised the top brands for these foods. No private brands were sampled for sentinel foods such as soy sauce or Cheerios (General Mills), hence they are not included in the study. Professional buyers purchased 1,706 samples of these 61 food products from up to 12 locations. Not all national brands were available at the selected retail outlets, and not all retail outlets sold private-label brands. For example, NDL purchased 27 samples for American cheese: two top national brands, Brand A (nine samples) and Brand B (10 samples), and eight private-label brands, including Great Value (three samples) and Kroger (two samples). The samples for national and private-label brands for each product had similar ingredients and nutrition-related attributes, such as similar fat content or sodium types. For example, for beef frankfurters, frankfurters containing any meats other than beef were excluded, as were low-fat or low-sodium products. The samples were shipped to laboratories at Virginia Tech or Texas Tech, where they were composited to conserve laboratory analysis costs. The composites generally included two randomly selected city samples of the same national or private-label-brand product or products of two different private or regional brands (brands available only in certain US regions that are not associated with a specific retail outlet). Nine hundred thirty-seven composites were shipped to commercial laboratories for chemical analysis using official methods of the Association of Analytical Chemists (documented elsewhere).[23] Blind samples of matrix-matched reference materials were included for analysis to help compare and validate the chemical analysis results of composite samples.[24] NDL analyzed sodium, total fat, and potassium content in most composites, but it measured total sugar in only one-third and fiber in only one-quarter of the foods because many foods were low in these nutrients and to save analytical costs.

For this post hoc analysis, NDL assigned a brand type—national or private—to each of the 937 composites. Regional brands were treated as national brands, and composites of samples of both national and private-label-brand products were not included in the study. Sample sizes were sodium: 876 composites for 61 foods; potassium: 886 for 61 foods; fiber: 232 for 29 foods; total sugar: 269 for 39 foods; total fat: 865 for 60 foods; and saturated fat: 448 for 44 foods. NDL grouped the food products by food categories (adapted from What We Eat in America food categories[25]) to present the data.

Statistical Analyses

NDL determined the mean, standard deviation, coefficient of variability (CV) (to represent variability among samples), and percent difference ([private-label-brand value−national brand value/national brand value]×100) for the mean nutrient estimates for individual food products and food categories and overall by brand type using SAS version 9.3.[26] (SAS Institute, Cary, NC). To mitigate the effects of heterogeneity of nutrient contents of different brands for individual food products and different foods within each category on variance estimates, reciprocal weights were incorporated. These weights were based on the reciprocal of the number of times a brand or food item appeared within a category, where weights were calculated as 1/n, with n being the number of occurrences within a category. All descriptive estimates for individual food products, food categories, and overall by brand type incorporated these weights.

NDL tested for significance of difference ($P<0.05$) using independent samples t test or Mann-Whitney U tests.

Statistical tests were not done when data were skewed, multimodal, or extremely heteroscedastic or when large differences were seen in sample sizes, sample sizes were insufficient, or the differences by brand type were lower than 7%. The latter cut-off accounts for analytical variability and was determined after a review of the variability of results from chemical analyses for all nutrients in reference materials from different laboratories since 2011. In addition, NDL excluded foods with total fat <1 g and fiber <2 g because the analytical variability was much higher for these foods. The final sample sizes for these nutrients were total fat: 715 for 51 foods and fiber: 155 for 21 foods.

RESULTS

Table 1 and Table 2 compare the content in private-label and national-brand products of nutrients that the 2015-2020 Dietary Guidelines for Americans recommended for decreased consumption. Table 3 does the same for nutrients recommended for increased consumption. Tables 4 through 9 (available online at www.andjrnl.org) provide this information for each nutrient in each food product for which NDL sampled and analyzed both types of brands.

Overall for all foods sampled, the differences between brand types were not statistically significant for any of the nutrients studied. Significant differences ($P<0.05$) were observed for few food categories by brand type for sodium (5 of 17 categories), total fat (1 of 17 categories), and potassium (4 of 17 categories) (Tables 1 and 3), with differences in both directions. Sodium concentrations for private-label brands were 19% to 50% higher than for national brands for cheese, grain-based mixed dishes, and plant-based protein food categories, but were 17% to 23% lower for potato and quick bread products. National brands of condiments and breakfast cereals contained almost twice as much total fat and one-third more potassium, respectively than private-label brands. Private-label plant-based protein foods, quick bread products, and sweet bakery products contained 32% to 77% more potassium (Table 3). There were no significant differences by brand type for mean saturated fat, total sugar, or fiber contents for any food category. Substantial differences were observed for some categories in both directions; however, the differences were not statistically significant at $P<0.05$. For example, total fat levels of private brands were 30% higher than of national brands for the cheese category, whereas saturated fat levels of private brands for breads, rolls, and tortillas were less than half those of national brands.

The results also showed few statistical differences in nutrient content between brand types for individual food products: sodium (13 of 61 foods), potassium (13 of 61 foods), total fat (6 of 52 foods), saturated fat (2 of 44 foods), and sugar (1 of 40 foods) (see Tables 4 through 9, available online at www.andjrnl.org). However, differences exist for individual food products in both directions. For example, the mean sodium levels of national brands of taco shells are about four times higher than of private brands, whereas the sodium levels for national brands of canned spaghetti with meatballs are about half those of private brands.

The variability of nutrient values for individual foods estimated by the CV was diverse. For example, the CV for sodium was 1% to 7% for national-brand foods and 1% to 40% for private-label brand foods. The range of CVs was wider for private-label brand products, especially for sodium, saturated fat, and fiber.

DISCUSSION

These findings offer the first comparisons of nutrient content in the same foods of different brand types in the United States. The nutrient content of private-label brand products does not vary systematically from that of national brands. For all of the foods sampled, for most food categories and many individual foods, the results showed no significant differences in levels of sodium and related nutrients by brand type. Hence, private-label brand products, due to their lower costs, have the potential to favorably influence nutrient intakes. This is especially important because most foods of high nutritional quality, such as whole-grain products, fruits, vegetables, and fish and lean meats, when measured using a price per calorie index are associated with higher costs.[4,27] Moreover, public health officials suggest that Americans reduce their expenditures on other foods to free up funds for fruits and vegetables that are currently consumed at low levels.[28]

The results showed differences in both directions in levels of nutrients for different brand types. These differences can potentially influence nutrient intakes, especially for foods with large serving sizes. For example, a single serving of one brand of spaghetti with meatballs can have 384 mg sodium[29] (16% of the Daily Value[30]) more than a serving of another brand. Furthermore, because mean nutrient contents are variable and the results showed greater variability among private-label brands, their general promotion might not be an effective nutrition education strategy. Hence, clinicians should counsel consumers and patients to read the labels of the food products they purchase to make educated food choices and disregard brand type as a factor for nutrition quality to make purchase decisions.

The results from the study provide several insights for the federal sodium monitoring project, including the need to monitor private-label brands when they account for a major proportion of the market share and when there are nutrient differences between brand types. The wide range of nutrient contents among popular brands indicates the potential for food manufacturers to reformulate their products and improve the nutrition profiles per dietary guidance while keeping the products acceptable to consumers. In addition, the results of this study provide baseline sodium and related nutrient values by brand type that public health officials can monitor as manufacturers reformulate foods in response to sodium-reduction efforts.

The results of this study are similar to those from other countries, where most researchers did not observe overall differences by brand type but did observe differences in different brands of specific foods and food categories, suggesting an absence of systematic differences between brand types. In the United Kingdom, for example, a comparison of canned tomatoes, orange juice, potatoes, sausages, and white bread from four major English supermarkets to their branded counterparts found that private-label brands are not nutritionally inferior to branded products and provide good value for money overall.[11] Similarly, a comparison of 32 frequently consumed foods in the United Kingdom by brand type found

Table 1. Mean contents in private-label and national-brand products in the United States of nutrients recommended for decreased consumption in 2015-2020 Dietary Guidelines for Americans (sodium and total sugar), overall and by food category[a]

	Sodium (mg/100 g)								Sugar (g/100 g)							
	National Brand			Private-Label Brand					National Brand			Private-Label Brand				
Food category	n	Mean± standard deviation	CV[d] (%)	n	Mean± standard deviation	CV (%)	Percent difference[b]	*P* value[c]	n	Mean± standard deviation	CV (%)	n	Mean± standard deviation	CV (%)	Percent difference[b]	*P* value[c]
Breads, rolls, tortillas	42	499±33	7	30	490±44	9	−2		19	4.03±1.19	30	15	3.88±0.56	14	−4	
Breakfast cereals	6	506±7	1	6	503±21	4	−1		3	30.01±0.22	1	3	30.62±0.97	3	2	
Cheese	76	816±95	12	40	1,227±128	10	50	<0.0001*	5	4.11±1.46	36	3	3.62±1.03	28	−12	0.223
Condiments and sauces	46	829±52	6	23	797±79	10	−4		15	6.27±3.69	59	7	6.99±4.01	57	11	0.725
Cured meats/poultry	92	1,199±107	9	34	1,175±82	7	−2		17	1.63±0.31	19	7	2.18±0.47	22	34	0.975
Grain-based mixed dishes	29	397±47	12	18	518±42	8	30	0.028*	11	2.83±0.23	8	6	2.15±0.08	4	−24	0.063
Meats	1	303		3	260±24	9	−14									
Plant-based protein foods	44	375±15	4	21	445±24	5	19	0.005*	16	8.18±0.86	11	9	7.01±0.89	13	−14	0.224
Potato products	10	425±21	5	22	325±23	7	−23	0.001*	3	0.3±0.05	15	2	0.25±0.03	13	−17	0.761
Poultry products	26	529±18	4	3	554±17	3	5		10	1.05±0.12	12	3	0.16±0.16	98	−84	0.743
Quick bread products	6	1,065±14	1	5	888±31	3	−17	0.034*	3	7.92±0.04	0	3	8.68±0.17	2	10	0.809
Salad dressings and mayonnaise	12	929±17	2	6	881±6	1	−5		4	4.91±0.29	6	2	4.57±0.1	2	−7	
Savory snacks and crackers	54	681±76	11	24	568±80	14	−17	0.096	20	1.65±0.38	23	11	1.28±0.34	27	−22	0.340
Seafood products	30	318±22	7	11	350±29	8	10	0.453	2	1.79±0.42	23	1	1.1		−38	
Soups	31	471±54	11	21	548±51	9	16	0.081	6	0.2±0.09	47	6	0.2±0.09	45	0	
Sweet bakery products	31	360±20	6	11	422±34	8	17	0.731	21	28.67±2.54	9	10	29.72±4.48	15	4	
Vegetable products	42	200±16	8	20	188±17	9	−6		14	3.53±0.41	12	10	2.98±0.35	12	−16	0.128
Overall, for all foods sampled	578	645±105	16	298	621±110	18	−4		169	6.70±3.65	55	100	6.67±3.96	59	0	

[a]Adapted from What We Eat In America Food Categories.[25] Information on the food products representing these food types is available in Tables 4 through 9 (available online at www.andjrnl.org).
[b]Percent difference=([private brand value−national brand value]/national brand value)×100.
[c]Tested for significance of difference ($P<0.05$) using sample *t* tests or Mann-Whitney *U* tests. Statistical tests were not done when data were skewed or multimodal, extremely heteroscedastic, large differences were seen in sample sizes, sample sizes were insufficient, or when the differences by brand type were <7%.
[d]CV=coefficient of variability.
*Significant difference.

Table 2. Mean contents in private-label and national-brand products in the United States of nutrients recommended for decreased consumption in 2015-2020 Dietary Guidelines for Americans (total fat and saturated fat), overall and by food category[a]

	Total Fat (g/100 g)								Saturated Fat (g/100 g)							
	National Brand			Private-Label Brand					National Brand			Private-Label Brand				
Food category	n	Mean± standard deviation	CV[d] (%)	n	Mean± standard deviation	CV (%)	Percent difference[b]	*P* value[c]	n	Mean± standard deviation	CV (%)	n	Mean± standard deviation	CV (%)	Percent difference[b]	*P* value[c]
Breads, rolls, tortillas	41	7.83±2.19	28	29	6.16±1.57	26	−21	0.689	17	2.555±3.152	123	11	1.019±1.014	99	−60	0.099
Breakfast cereals	6	4.63±0.04	1	6	4.85±0.07	1	5		3	0.793±0.044	5	3	0.758±0.099	13	−5	
Cheese	77	19.58±2.45	13	38	25.55±1.57	6	30	0.143	71	13.184±6.165	47	36	15.594±4.236	27	18	0.307
Condiments and sauces	15	6.98±0.99	14	7	3.93±0.61	15	−44	0.011*								
Cured meats/poultry	92	23.45±3.12	13	34	22.09±3.1	14	−6		46	9.333±2.039	22	15	9.047±1.85	20	−3	
Grain-based mixed dishes	29	4.22±0.29	7	18	3.45±0.22	7	−18	0.058	17	1.441±0.254	18	9	1.433±0.316	22	−1	
Meats	1	2.76		3	3.4±0.74	22	23		1	0.939		3	1.046±0.599	57	11	
Plant-based protein foods	28	15.76±6.57	42	9	26.82±7.09	26	70	0.426	27	5.836±4.629	79	14	6.519±4.265	65	12	0.967
Potato products	11	7.93±0.58	7	23	7.52±0.89	12	−5		5	1.408±0.277	20	16	1.208±0.442	37	−14	
Poultry products	26	14.9±0.54	4	3	15.36±0.49	3	3		15	2.838±0.521	18	4	3.122±0.412	13	10	0.625
Quick bread products	6	10.56±0.05	1	5	12.86±0.74	6	22	0.119	3	5.162±0.049	1	3	6.147±1.524	25	19	0.663
Salad dressings and mayonnaise	12	42.93±0.94	2	6	45.83±0.51	1	7	0.261	6	6.673±0.586	9	3	7.29±0.649	9	9	0.366
Savory snacks and crackers	54	23.15±3.21	14	24	27.29±1.98	7	18	0.097	35	4.259±4.627	109	20	4.465±3.293	74	5	
Seafood products	20	7.74±2.2	28	7	11.6±1.7	15	50	0.912	13	1.436±1.899	132	5	1.089±1.245	114	−24	0.324
Soups	12	3.51±0.62	18	12	3.43±0.52	15	−3		6	0.681±0.324	48	6	0.678±0.348	51	−1	
Sweet bakery products	31	19.62±2.19	11	11	18.98±2.16	11	−3		21	7.844±4.257	54	11	7.312±3.333	46	−7	0.999
Vegetable products	13	1.29±0.05	4	6	1.31±0.03	3	2		2	0.361±0.024	7	1	0.252		−30	
Overall, for all foods sampled	474	16.04±3.51	22	241	14.79±3.50	24	−8	0.498	288	5.766±1.595	28	160	4.974±1.601	32	−14	0.111

[a]Adapted from What We Eat In America Food Categories.[25] Information on the food products representing these food types is available in Tables 4 through 9 (available online at www.andjrnl.org).

[b]Percent difference=([private brand value−national brand value]/national brand value)×100.

[c]Tested for significance of difference ($P<0.05$) using sample *t* tests or Mann-Whitney *U* tests. Statistical tests were not done when data were skewed or multimodal, extremely heteroscedastic, large differences were seen in sample sizes, sample sizes were insufficient, for foods with total fat <1 g or when the differences by brand type were lower than 7%.

[d]CV=coefficient of variability.

*Significant difference.

Table 3. Mean contents in private-label and national-brand products in the United States of nutrients recommended for increased consumption in the 2015-2020 Dietary Guidelines for Americans (potassium and fiber[a]), overall and by food category[b]

	Potassium (mg/100 g)								Fiber (g/100 g)							
	National Brand			Private-Label Brand					National Brand			Private-Label Brand				
Food category	n	Mean± standard deviation	CV[e] (%)	n	Mean± standard deviation	CV (%)	Percent difference[c]	*P* value[d]	n	Mean± standard deviation	CV (%)	n	Mean± standard deviation	CV (%)	Percent difference[c]	*P* value[d]
Breads, rolls, tortillas	42	161±17	11	30	153±12	8	−5		14	4.2±0.91	22	12	2.93±0.33	11	−30	0.409
Breakfast cereals	6	424±5	1	6	282±6	2	−34	0.005*	2	7.2±0.2	2	1	7.2		−1	
Cheese	76	147±15	10	42	183±20	11	24	0.154								
Condiments and sauces	46	186±24	13	23	199±23	12	7	0.52	3	4.6±0.8	18	3	4.1±0.4	11	−12	0.999
Cured meats/poultry	92	384±42	11	34	393±41	10	2									
Grain-based mixed dishes	29	239±17	7	18	251±28	11	5									
Meats	1	590		3	560±40	7	−5									
Plant-based protein foods	46	398±40	10	22	524±36	7	32	0.003*	22	5.3±0.7	12	11	5.9±0.8	13	11	0.688
Potato products	11	297±29	10	23	304±23	8	2		1	2.5		2	2.3±0.1	4	−7	
Poultry products	26	276±18	7	3	227±7	3	−18		7	2.4±0.1	6	2	2.2±0.1	7	−8	
Quick bread products	6	118±3	3	5	209±17	8	77	0.036*	3	3.1±0.2	5	3	2.4±0.1	4	−22	0.081
Salad dressings and mayonnaise	12	61±2	3	6	72±5	7	17	0.482								
Savory snacks and crackers	54	553±114	21	24	630±138	22	14	0.645	38	5.3±0.8	16	15	5.2±0.9	18	−2	
Seafood products	30	178±8	5	11	188±4	2	5									
Soups	31	84±20	24	21	78±18	23	−6									
Sweet bakery products	31	131±18	14	11	177±24	14	36	0.009*	7	2.6±0.1	5	4	3.1±0.4	14	18	0.999
Vegetable products	42	163±12	7	23	169±17	10	4		2	2.2±0.1	6	2	2.2±0.1	5	−3	
Overall, for all foods sampled	581	265±57	21	305	287±63	22	8	0.568	99	4.3±0.9	20	55	3.8±0.9	23	−12	0.274

[a]Total dietary fiber.

[b]Adapted from What We Eat In America Food Categories.[25] Information on the food products representing these food types is available in Tables 4 through 9 (available online at www.andjrnl.org).

[c]Percent difference=([private brand value−national brand value]/national brand value)×100.

[d]Tested for significance of difference ($P<0.05$) using sample *t* tests or Mann-Whitney *U* tests. Statistical tests were not done when data were skewed or multimodal, extremely heteroscedastic, large differences were seen in sample sizes, sample sizes were insufficient, fiber values were <2 g/100 g, or when the differences by brand type were lower than 7%.

[e]CV=coefficient of variability.

*$P<0.05$.

no differences in overall nutritional quality, although the authors did identify a few food-specific differences.[12] In Australia, a review of label values for energy, total fat, saturated fat, and sodium for more than 3,000 foods during 2006 to 2008 from 10 Australian supermarkets found significant differences between brand types in only a few food categories, but the directions of these differences were inconsistent.[5] In France, Menard and colleagues[8] reported no systematic differences in the nutrient content of cheaper discount brands than of the more expensive national brand of dairy products. However, these investigators did identify differences in some of the dairy products they reviewed. Similar results were reported by Monro and colleagues[10] in New Zealand. In contrast to these results, a comparison of sodium label levels in more than 15,000 products in 15 food categories from four supermarkets in Australia in 2013 found that private-label-brand products had 17% less sodium than national brand products ($P \leq 0.001$).[6] Furthermore, Waterlander and colleagues[9] found that national-brand products in the Netherlands had significantly lower sodium levels than private-label-brand products, but they found no significant differences in levels of energy, protein, carbohydrates, total fat, saturated fat, fiber, or added sugar. These systematic differences may be due to differential responses by food manufacturers to public health efforts to reduce sodium in these countries. An understanding of the public health strategies used in these countries could help public health efforts in the United States.

Strengths and Limitations

The strengths of this study include the selection of popular, widely consumed, commercially packaged foods that represent major contributors of sodium. The collection of nationwide samples and their subsequent chemical analysis using standardized methods allowed NDL to examine nutrients, such as potassium, not listed on the label and provided more accurate estimates of nutrient contents than product labels because the Food and Drug Administration allows labels to list up to 20% higher or lower levels than the actual amount depending on the types of nutrients.[28] NDL used market-share data to select national brands, which ensured the inclusion of top national brands of each food in the study. NDL selected private-label brands from retail outlets based on US Census and sales data, ensuring inclusion of products from high-sales retail outlets. In addition, NDL not only reviewed differences in levels of single nutrients but also in levels of a panel of nutrients that the Dietary Guidelines for Americans recommends for increased or decreased consumption. Another unique aspect of this study was the statistical review of differences after allowing for the variability of results from chemical analyses.

Limitations include the evaluation of a limited number of products relative to the number of foods in the US food supply. Because food selection was based on sodium contribution, the sample may not have been optimal for the study of other nutrients, such as fiber. Many selected foods were low in fiber, and the numbers of composites analyzed for some nutrients (fiber, saturated fat, and total sugar) was insufficient for some food products, limiting inferential testing. Although NDL presents differences in nutrient contents by food category, the selected food products may not fully represent the sodium and related nutrient content of that food category. However, Malouf and colleagues[31] reported that the sodium content of most sentinel foods was within 90% to 110% of that of their corresponding food category, based on label information. NDL did not study the nutrition-related significance of the differences by brand type by applying them to dietary intakes because this was beyond this project's scope. NDL used Nielsen market share data to select brands to sample, but Nielsen does not identify the retail stores associated with unit sales for private-label brands. Therefore, the private-label brands selected for sampling might not have been the most popular private-label brands for each product. These data are specific to the United States and the time period in which the samples were purchased because the products might have since been reformulated, because many large manufacturers, warehouse chains, and supermarket chains have committed to reducing salt and sugar in their products.[32-34]

CONCLUSIONS

The results of this study show that the concentrations of sodium and related nutrients (potassium, total dietary fiber, total and saturated fat, and total sugar) do not differ systematically between private-label and national brands, suggesting that brand type is not a consideration for nutritional quality for foods in the United States. Therefore, private-label brands could play an important role in public health due to their lower costs. These data also provide public health officials with baseline sodium and related nutrient content information on individual foods and food categories by brand type to focus sodium-reduction efforts in the United States.

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STATEMENT OF POTENTIAL CONFLICT OF INTEREST

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Table 4. Mean sodium content in private-label and national-brand products in the United States, sorted by food category[a]

		Sodium (mg/100 g)							
		National Brand			Private-Label Brand				
Description in SR[b]	NDB_no.[c]	n	Mean±standard deviation	CV[f] (%)	n	Mean±standard deviation	CV (%)	Percent difference[d]	*P* value[e]
Breads, rolls, tortillas									
Bagels, plain, enriched, with calcium propionate (includes onion, poppy, and sesame)	18001	10	421±14	3	2	413±10	2	−2	
Bread, wheat	18064	7	539±17	3	7	499±12	2	−7	0.160
Bread, white, commercially prepared (includes soft bread crumbs)	18069	8	502±7	1	11	487±10	2	−3	
Taco shells, baked	18360	11	431±28	7	3	101±40	40	−77	0.020*
Tortillas, ready-to-bake or -fry, flour, refrigerated	18364	6	711±19	3	7	664±17	3	−7	0.284
Breakfast cereals									
Cereals, oats, instant, fortified, with maple and brown sugar, dry	08680	6	506±7	1	6	503±21	4	−1	
Cheese									
Cheese product, pasteurized process, American, vitamin-D fortified	01252	10	1,312±17	1	8	1,366±13	1	4	
Cheese, cheddar	01009	23	644±7	1	18	663±7	1	3	
Cheese, cottage, low-fat, 2% milkfat	01015	11	320±14	4	1	334		4	
Cheese, mozzarella, part skim milk, low moisture	01029	27	696±12	2	8	677±12	2	−3	
Cheese, parmesan, grated	01032	5	1,550±31	2	5	1,997±113	6	29	0.075
Condiments and sauces									
Catsup	11935	12	921±7	1	6	868±7	1	−6	
Dip, salsa con queso, cheese and salsa-medium	27052	9	785±38	5	1	772		−2	
Mustard, prepared, yellow	02046	6	1,062±11	1	6	1,153±32	3	9	0.171
Pickles, cucumber, dill or kosher dill	11937	12	864±51	6	6	615±18	3	−29	0.025*
Tomato products, canned, sauce	11549	7	575±24	4	4	417±5	1	−28	0.154
Cured meats/poultry									
Bologna, meat and poultry	07971	16	1,201±81	7	2	1,645±108	7	37	0.292
Frankfurter, beef, unheated	07022	12	1,001±27	3	6	1,110±17	2	11	0.055
Frankfurter, meat and poultry, unheated	07962	13	860±30	3	5	1,030±16	2	20	0.008*
Ham, sliced, packaged (96% fat free, water added)	07028	3	1,350±101	7	2	1,115±136	12	−17	0.387
Kielbasa, fully cooked, grilled	07968	12	1,054±37	4	3	1,095±34	3	4	
Pork sausage, link/patty, cooked, pan-fried	07064	9	754±34	4	6	859±13	2	14	0.052
Pork, cured, bacon, presliced, cooked, pan-fried	10862	12	1,773±21	1	6	1,607±37	2	−9	0.027*
Salami, dry or hard, pork, beef	07072	9	1,847±32	2	3	1,467±63	4	−21	0.027*
Turkey breast, sliced, prepackaged	07081	6	964±85	9	1	887		−8	

(*continued on next page*)

Table 4. Mean sodium content in private-label and national-brand products in the United States, sorted by food category[a] (*continued*)

		Sodium (mg/100 g)							
		National Brand			Private-Label Brand				
Description in SR[b]	NDB_no.[c]	n	Mean±standard deviation	CV[f] (%)	n	Mean±standard deviation	CV (%)	Percent difference[d]	*P* value[e]
Grain-based mixed dishes									
Macaroni and cheese dinner with dry sauce mix, boxed, uncooked	22959	6	678±5	1	6	686±331	5	1	
Ravioli, meat-filled, with tomato sauce or meat sauce, canned	22900	11	334±20	6	6	389±10	3	16	0.450
Spaghetti, with meatballs in tomato sauce, canned	22912	12	248±9	4	6	404±6	1	63	0.001*
Meats									
Pork, fresh, enhanced, loin, top loin (chops), boneless, separable lean only, raw	10948	1	303		3	260±24	9	−14	
Plant-based protein foods									
Beans, baked, canned, with pork and sweet sauce	16010	15	361±21	6	2	390±4	1	8	0.709
Peanut butter, smooth style, with salt	16098	12	427±3	1	6	435±7	2	2	
Peanuts, all types, dry-roasted, with salt	16090	5	339±9	3	9	498±27	5	47	0.005*
Refried beans, canned, traditional style (includes US Department of Agriculture commodity)	16103	12	363±9	2	4	348±19	6	−4	
Potato products									
Potato puffs, frozen, unprepared	11398	6	458±10	2	5	331±23	7	−28	0.022*
Potato salad with egg	22971	1	292		9	333±25	8	14	
Potatoes, french fried, all types, salt added in processing, frozen, home-prepared, oven heated	11403	3	406±23	6	8	312±22	7	−23	0.126
Poultry products									
Chicken tenders, breaded, frozen, prepared	22978	11	499±21	4	1	511		2	
Chicken, nuggets, dark and white meat, precooked, frozen, not reheated	22974	15	560±13	2	2	584±19	3	4	
Quick bread products									
Biscuits, plain or buttermilk, refrigerated dough, higher fat, baked	18015	6	1,065±14	1	5	888±31	3	−17	0.034*
Salad dressings and mayonnaise									
Salad dressing, ranch dressing, commercial, regular	04639	12	929±17	2	6	881±6	1	−5	
Savory snacks and crackers									
Popcorn, microwave, regular (butter) flavor, made with palm oil	25026	6	657±27	4	2	891±80	9	36	0.134
Snacks, potato chips, barbecue-flavor	19042	7	512±9	2	5	652±52	8	27	0.104

(*continued on next page*)

Table 4. Mean sodium content in private-label and national-brand products in the United States, sorted by food category[a] (*continued*)

		Sodium (mg/100 g)							
		National Brand			Private-Label Brand				
Description in SR[b]	NDB_no.[c]	n	Mean±standard deviation	CV[f] (%)	n	Mean±standard deviation	CV (%)	Percent difference[d]	*P* value[e]
Snacks, pretzels, hard, plain, salted	19047	20	1,104±34	3	1	1,640		49	
Snacks, tortilla chips, plain, white corn, salted	19056	6	326±7	2	5	326±37	11	0	0.714
Snacks, tortilla chips, nacho cheese	19057	7	671±21	3	4	591±25	4	−12	0.156
Snacks, potato chips, plain, salted	19411	8	518±31	6	7	428±27	6	−17	0.165
Seafood products									
Fish, fish sticks, frozen, prepared	15027	12	401±16	4	6	425±26	6	6	
Fish, tuna, light, canned in water, drained solids	15121	18	248±12	5	5	237±14	6	−4	
Soups									
Soup, chicken broth, ready-to-serve	06194	9	359±5	1	5	398±9	2	11	0.016*
Soup, chicken noodle, canned, condensed	06019	6	683±4	1	6	665±31	5	−3	
Soup, chunky vegetable, canned, ready-to-serve	06067	10	266±2	1	4	287±10	4	8	0.322
Soup, cream of mushroom, canned, condensed	06043	6	697±10	1	6	685±23	3	−2	
Sweet bakery products									
Cinnamon buns, frosted (includes honey buns)	18964	8	309±4	1	1	292		−6	
Cookies, chocolate sandwich, with creme filling, regular	18166	7	393±11	3	4	469±14	3	19	0.018*
Doughnuts, cake-type, plain (includes unsugared and old fashioned)	18248	3	459±3	1	2	505±13	3	10	0.139
Toaster pastries, fruit, frosted (include apples, blueberry, cherry, and strawberry)	18938	13	312±5	1	4	267±2	1	−14	0.004*
Vegetable products									
Beans, snap, green, canned, regular pack, drained solids	11056	2	240±23	10	1	215		−10	
Corn, sweet, yellow, canned, whole kernel, drained solids	11172	14	210±10	5	6	198±5	3	−6	
Tomato juice, canned, with salt added	11540	6	278±5	2	6	230±4	2	−17	0.005*
Tomatoes, red, ripe, canned, packed in tomato juice	11531	10	136±8	6	6	89±9	10	−34	0.058
Vegetable juice cocktail, canned	11578	10	165±2	1	1	233		41	

[a]Adapted from What We Eat In America Food Categories.[25]
[b]SR=US Department of Agriculture National Nutrient Database for Standard Reference.
[c]Nutrient Databank Number. A five-digit number that uniquely identifies a food item in SR and represents the Sentinel Food. Current and previous releases of the SR can be downloaded from https://www.ars.usda.gov/Services/docs.htm?docid=8964.
[d]Percent difference=([private brand value−national brand value]/national brand value)×100.
[e]Tested for significance of difference ($P<0.05$) using sample *t* tests or Mann-Whitney *U* tests. Statistical tests were not done when data were skewed or multimodal, extremely heteroscedastic, large differences were seen in sample sizes, sample sizes were insufficient, or when the differences by brand type were lower than ±7%.
[f]CV=coefficient of variability.
*Significant difference.

Table 5. Mean total fat contents in private-label and national brand products in the United States, sorted by food category[a]

		Total Fat (g/100 g)							
		National Brand			Private-Label Brand				
Description in SR[b]	NDB_no.[c]	n	Mean±standard deviation	CV[f] (%)	n	Mean±standard deviation	CV (%)	Percent difference[d]	*P* value[e]
Breads, rolls, tortillas									
Bagels, plain, enriched, with calcium propionate (includes onion, poppy, sesame)	18001	9	1.43±0.08	6	1	1.28		−11	
Bread, wheat	18064	7	3.64±0.07	2	7	3.24±0.08	2	−11	0.046*
Bread, white, commercially prepared (includes soft bread crumbs)	18069	8	3.56±0.34	9	11	3.09±0.13	4	−13	0.901
Taco shells, baked	18360	11	20.77±0.72	3	3	22.18±0.36	2	7	0.533
Tortillas, ready-to-bake or -fry, flour, refrigerated	18364	6	6.70±0.34	5	7	6.70±0.48	7	0	
Breakfast cereals									
Cereals, oats, instant, fortified, with maple and brown sugar, dry	08680	6	4.63±0.04	1	6	4.85±0.07	1	5	
Cheese									
Cheese, cheddar	01009	24	34.42±0.23	1	18	33.31±0.12	0	−3	
Cheese, cottage, low-fat, 2% milkfat	01015	11	2.23±0.05	2	1	2.72		22	
Cheese, mozzarella, part skim milk, low moisture	01029	27	20.63±0.10	1	9	19.47±0.16	1	−6	
Cheese, parmesan, grated	01032	5	29.05±0.30	1	5	26.79±1.60	6	−8	0.144
Cheese product, pasteurized process, American, vitamin-D fortified	01252	10	22.45±0.10	0	5	24.00±0.39	2	7	0.014*
Condiments and sauces									
Mustard, prepared, yellow	02046	6	3.36±0.11	3	6	3.07±0.05	2	−8	0.093
Dip, salsa con queso, cheese and salsa-medium	27052	9	8.99±0.68	8	1	8.20		−9	
Cured meats/poultry									
Frankfurter, beef, unheated	07022	12	28.34±0.24	1	6	26.73±0.21	1	−6	
Ham, sliced, packaged (96% fat free, water added)	07028	3	4.01±0.17	4	2	2.95±0.15	5	−27	
Pork sausage, link/patty, cooked, pan-fried	07064	9	28.97±0.81	3	6	25.75±0.71	3	−11	0.087
Salami, dry or hard, pork, beef	07072	9	32.95±0.67	2	3	29.28±2.97	10	−11	0.579
Turkey breast, sliced, prepackaged	07081	6	2.34±0.26	11	1	1.94		−17	
Frankfurter, meat and poultry, unheated	07962	13	26.26±0.62	2	5	22.93±0.31	1	−13	0.018*
Kielbasa, fully cooked, grilled	07968	12	30.08±1.08	4	3	28.09±0.87	3	−7	0.516
Bologna, meat and poultry	07971	16	24.19±0.60	2	2	23.45±0.05	0	−3	
Pork, cured, bacon, presliced, cooked, pan-fried	10862	12	35.57±0.54	2	6	34.57±1.02	3	−3	0.673

(*continued on next page*)

Table 5. Mean total fat contents in private-label and national brand products in the United States, sorted by food category[a] (*continued*)

		Total Fat (g/100 g)							
		National Brand			Private-Label Brand				
Description in SR[b]	NDB_no.[c]	n	Mean±standard deviation	CV[f] (%)	n	Mean±standard deviation	CV (%)	Percent difference[d]	*P* value[e]
Grain-based mixed dishes									
Ravioli, meat-filled, with tomato sauce or meat sauce, canned	22900	11	3.66±0.07	2	6	2.93±0.05	2	−20	0.001*
Spaghetti, with meatballs in tomato sauce, canned	22912	12	3.77±0.19	5	6	4.69±0.11	2	24	0.044*
Macaroni and cheese dinner with dry sauce mix, boxed, uncooked	22959	6	5.54±0.38	7	6	2.98±0.11	4	−46	0.005*
Meats									
Pork, fresh, enhanced, loin, top loin (chops), boneless, separable lean only, raw	10948	1	2.76		3	3.40±0.74	22	23	
Plant-based protein foods									
Beans, baked, canned, with pork and sweet sauce	16010	5	1.20±0.05	4	1	1.24		3	
Peanut butter, smooth style, with salt	16098	12	51.10±0.23	0	6	51.14±0.22	0	0	
Refried beans, canned, traditional style (includes US Department of Agriculture commodity)	16103	11	2.25±0.10	5	2	1.83±0.23	13	−19	
Potato products									
Potato puffs, frozen, unprepared	11398	6	8.69±0.32	4	5	8.82±0.33	4	1	
Potatoes, french fried, all types, salt added in processing, frozen, home-prepared, oven heated	11403	4	5.70±0.34	6	9	4.41±0.17	4	−23	0.076
Potato salad with egg	22971	1	10.60		9	9.27±0.92	10	−13	
Poultry products									
Chicken, nuggets, dark and white meat, precooked, frozen, not reheated	22974	15	16.06±0.53	3	2	16.67±0.06	0	4	
Chicken tenders, breaded, frozen, prepared	22978	11	13.78±0.32	2	1	13.52		−2	
Quick bread products									
Biscuits, plain or buttermilk, refrigerated dough, higher fat, baked	18015	6	10.56±0.05	1	5	12.86±0.74	6	22	0.120
Salad dressings and mayonnaise									
Salad dressing, ranch dressing, commercial, regular	04639	12	42.92±0.94	2	6	45.83±0.51	1	7	0.261
Savory snacks and crackers									
Snacks, potato chips, barbecue-flavor	19042	7	31.33±0.42	1	5	29.39±0.61	2	−6	
Snacks, pretzels, hard, plain, salted	19047	20	3.58±0.15	4	1	1.90		−47	
Snacks, tortilla chips, plain, white corn, salted	19056	6	20.97±0.34	2	5	20.77±0.56	3	−1	

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Table 5. Mean total fat contents in private-label and national brand products in the United States, sorted by food category[a] (*continued*)

		Total Fat (g/100 g)							
		National Brand			Private-Label Brand				
Description in SR[b]	NDB_no.[c]	n	Mean±standard deviation	CV[f] (%)	n	Mean±standard deviation	CV (%)	Percent difference[d]	*P* value[e]
Snacks, tortilla chips, nacho cheese	19057	7	27.26±0.44	2	4	25.89±0.86	3	−5	
Snacks, potato chips, plain, salted	19411	8	34.04±0.48	1	7	34.95±0.69	2	3	
Popcorn, microwave, regular (butter) flavor, made with palm oil	25026	6	32.02±0.75	2	2	28.25±1.48	5	−12	
Seafood products									
Fish, fish sticks, frozen, prepared	15027	12	16.55±0.31	2	6	15.12±0.41	3	−9	0.122
Fish, tuna, light, canned in water, drained solids	15121	8	1.13±0.03	3	1	1.01		−11	
Soups									
Soup, chicken noodle, canned, condensed	06019	6	1.53±0.05	4	6	1.75±0.07	4	15	0.173
Soup, cream of mushroom, canned, condensed	06043	6	5.50±0.24	4	6	5.10±0.19	4	−7	0.423
Sweet bakery products									
Cookies, chocolate sandwich, with creme filling, regular	18166	7	19.21±0.13	1	4	18.09±0.44	3	−6	
Doughnuts, cake-type, plain (includes unsugared and old fashioned)	18248	3	24.83±0.06	0	2	25.11±0.11	0	1	
Toaster pastries, fruit, frosted (include apples, blueberry, cherry, and strawberry)	18938	13	8.96±0.16	2	4	7.97±0.16	2	−11	0.062
Cinnamon buns, frosted (includes honey buns)	18964	8	25.58±1.13	4	1	23.20		−9	
Vegetable products									
Corn, sweet, yellow, canned, whole kernel, drained solids	11172	13	1.29±0.05	4	6	1.31±0.03	3	2	

[a]Adapted from What We Eat In America Food Categories.[25]
[b]SR=US Department of Agriculture National Nutrient Database for Standard Reference.
[c]Nutrient Databank Number. A five-digit number that uniquely identifies a food item in SR and represents the Sentinel Food. Current and previous releases of the SR can be downloaded from https://www.ars.usda.gov/Services/docs.htm?docid=8964.
[d]Percent difference=([private brand value−national brand value]/national brand value)×100.
[e]Tested for significance of difference ($P<0.05$) using sample *t* tests or Mann-Whitney *U* tests. Statistical tests were not done when data were skewed or multimodal, extremely heteroscedastic, large differences were seen in sample sizes, sample sizes were insufficient, or when the differences by brand type were lower than ±7%.
[f]CV=coefficient of variability.
*Significant difference.

Table 6. Mean saturated fat contents in private-label and national brand products in the United States, sorted by food category[a]

		Saturated Fat (g/100 g)							
		National Brand			Private-Label Brand				
Description in SR[b]	NDB_no.[c]	n	Mean±standard deviation	CV[f] (%)	n	Mean±standard deviation	CV (%)	Percent difference[d]	*P* value[e]
Breads, rolls, tortillas									
Bread, wheat	18064	3	0.855±0.026	3	4	0.764±0.021	3	−11	0.052
Bread, white, commercially prepared (includes soft bread crumbs)	18069	8	0.752±0.212	28	6	0.681±0.098	15	−9	0.949
Taco shells, baked	18360	6	5.809±3.478	60	1	4.065		−30	
Breakfast cereals									
Cereals, oats, instant, fortified, with maple and brown sugar, dry	08680	3	0.793±0.044	5	3	0.758±0.099	13	−4	
Cheese									
Cheese, cheddar	01009	24	19.584±0.680	3	19	18.883±0.597	3	−4	
Cheese, cottage, low-fat, 2% milkfat	01015	11	1.261±0.114	9	1	1.375		9	0.403
Cheese, mozzarella, part skim milk, low moisture	01029	27	11.795±0.494	4	9	11.198±0.495	4	−5	
Cheese, parmesan, grated	01032	5	16.151±0.320	2	5	14.710±2.489	17	−9	0.144
Cheese product, pasteurized process, American, vitamin-D fortified	01252	4	13.237±0.124	1	2	13.442±0.281	2	2	
Cured meats/poultry									
Bologna, meat and poultry	07971	16	7.559±0.937	12	2	7.314±0.011	0	−3	
Frankfurter, meat and poultry, unheated	07962	6	8.288±0.897	11	3	7.176±0.191	3	−13	0.053
Kielbasa, fully cooked, grilled	07968	7	9.986±1.426	14	3	9.677±0.782	8	−3	
Pork sausage, link/patty, cooked, pan-fried	07064	6	9.404±1.074	11	3	8.244±0.568	7	−12	0.156
Pork, cured, bacon, presliced, cooked, pan-fried	10862	6	12.597±1.106	9	3	11.389±1.283	11	−10	0.245
Salami, dry or hard, pork, beef	07072	5	11.345±0.647	6	1	11.616		2	
Grain-based mixed dishes									
Ravioli, meat-filled, with tomato sauce or meat sauce, canned	22900	11	1.522±0.101	7	6	1.252±0.103	8	−18	0.002*
Spaghetti, with meatballs in tomato sauce, canned	22912	6	1.291±0.381	30	3	1.795±0.281	16	39	0.156
Meats									
Pork, fresh, enhanced, loin, top loin (chops), boneless, separable lean only, raw	10948	1	0.940		3	1.046±0.599	57	11	
Plant-based protein foods									
Beans, baked, canned, with pork and sweet sauce	16010	6	0.224±0.042	19	2	0.159±0.069	43	−29	0.243
Peanut butter, smooth style, with salt	16098	12	10.071±0.270	3	6	10.141±0.266	3	1	
Peanuts, all types, dry-roasted, with salt	16090	4	7.946±1.082	14	4	7.291±0.485	7	−8	0.471
Refried beans, canned, traditional style (includes US Department of Agriculture commodity)	16103	5	0.720±0.139	19	2	0.467±0.455	98	−35	0.561

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Table 6. Mean saturated fat contents in private-label and national brand products in the United States, sorted by food category[a] (*continued*)

		Saturated Fat (g/100 g)							
		National Brand			Private-Label Brand				
Description in SR[b]	NDB_no.[c]	n	Mean±standard deviation	CV[f] (%)	n	Mean±standard deviation	CV (%)	Percent difference[d]	*P* value[e]
Potato products									
Potato puffs, frozen, unprepared	11398	3	1.445±0.056	4	2	1.250±0.111	9	−13	
Potatoes, french fried, all types, salt added in processing, frozen, home-prepared, oven heated	11403	1	0.973		5	0.839±0.261	31	−14	
Potato salad with egg	22971	1	1.734		9	1.404±0.449	32	−19	
Poultry products									
Chicken, nuggets, dark and white meat, precooked, frozen, not reheated	22974	9	3.131±0.471	15	3	3.326±0.078	2	6	
Chicken tenders, breaded, frozen, prepared	22978	6	2.399±0.140	6	1	2.512		5	
Quick bread products									
Biscuits, plain or buttermilk, refrigerated dough, higher fat, baked	18015	3	5.162±0.049	1	3	6.147±1.524	25	19	0.663
Salad dressings and mayonnaise									
Salad dressing, ranch dressing, commercial, regular	04639	6	6.673±0.586	9	3	7.290±0.649	9	9	0.366
Savory snacks and crackers									
Popcorn, microwave, regular (butter) flavor, made with palm oil	25026	4	15.564±1.307	8	2	13.227±1.541	12	−15	0.247
Snacks, potato chips, barbecue-flavor	19042	7	3.989±1.915	48	5	3.633±0.438	12	−9	0.516
Snacks, potato chips, plain, salted	19411	5	4.636±2.884	62	4	4.654±1.188	26	0	
Snacks, pretzels, hard, plain, salted	19047	10	0.503±0.151	30	1	0.296		−41	
Snacks, tortilla chips, nacho cheese	19057	3	3.878±0.276	7	3	3.806±0.562	15	−2	
Snacks, tortilla chips, plain, white corn, salted	19056	6	3.172±1.107	35	5	2.870±1.537	54	−10	0.523
Seafood products									
Fish, fish sticks, frozen, prepared	15027	4	4.147±0.521	13	2	2.445±0.258	11	−41	
Fish, tuna, light, canned in water, drained solids	15121	9	0.231±0.040	17	3	0.185±0.024	13	−20	0.149
Soups									
Soup, chicken noodle, canned, condensed	06019	3	0.388±0.020	5	3	0.401±0.002	1	3	
Soup, cream of mushroom, canned, condensed	06043	3	0.974±0.068	7	3	0.954±0.271	28	−2	

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Table 6. Mean saturated fat contents in private-label and national brand products in the United States, sorted by food category[a] (*continued*)

		Saturated Fat (g/100 g)							
		National Brand			Private-Label Brand				
Description in SR[b]	NDB_no.[c]	n	Mean±standard deviation	CV[f] (%)	n	Mean±standard deviation	CV (%)	Percent difference[d]	*P* value[e]
Sweet bakery products									
Cinnamon buns, frosted (includes honey buns)	18964	8	12.354±0.964	8	1	12.354		0	
Cookies, chocolate sandwich, with creme filling, regular	18166	4	5.716±0.302	5	4	6.991±0.833	12	22	0.031*
Doughnuts, cake-type, plain (includes unsugared and old fashioned)	18248	2	10.650±0.605	6	2	11.858±0.705	6	11	0.245
Toaster pastries, fruit, frosted (include apples, blueberry, cherry, strawberry)	18938	7	3.105±0.500	16	4	4.099±0.134	3	32	0.072
Vegetable products									
Corn, sweet, yellow, canned, whole kernel, drained solids	11172	2	0.361±0.024	7	1	0.252		−30	

[a]Adapted from What We Eat In America Food Categories.[25]
[b]SR=US Department of Agriculture National Nutrient Database for Standard Reference.
[c]Nutrient Databank Number. A five-digit number that uniquely identifies a food item in SR and represents the Sentinel Food. Current and previous releases of the SR can be downloaded from https://www.ars.usda.gov/Services/docs.htm?docid=8964.
[d]Percent difference=([private brand value−national brand value]/national brand value)×100.
[e]Tested for significance of difference ($P<0.05$) using sample *t* tests or Mann-Whitney *U* tests. Statistical tests were not done when data were skewed or multi-modal, extremely heteroscedastic, large differences were seen in sample sizes, sample sizes were insufficient, or when the differences by brand type were lower than ±7%.
[f]CV=coefficient of variability.
*Significant difference.

Table 7. Mean total sugar content in private-label and national brand products in the United States, sorted by food category[a]

		Total Sugar (g/100 g)							
		National Brand			Private-Label Brand				
Description in SR[b]	NDB_no.[c]	n	Mean±standard deviation	CV[f] (%)	n	Mean±standard deviation	CV (%)	Percent difference[d]	*P* value[e]
Breads, rolls, tortillas									
Bread, wheat	18064	7	6.40±0.14	2	7	5.76±0.27	5	−10	0.074
Taco shells, baked	18360	6	1.43±0.04	3	1	1.50		5	
Tortillas, ready-to-bake or -fry, flour, refrigerated	18364	6	6.30±1.71	27	7	2.76±0.34	12	−56	0.353
Breakfast cereals									
Cereals, oats, instant, fortified, with maple and brown sugar, dry	08680	3	30.02±0.22	1	3	30.62±0.97	3	2	
Cheese									
Cheese, mozzarella, part skim milk, low moisture	01029	1	0.99		1	2.33		134	
Cheese product, pasteurized process, American, vitamin D fortified	01252	4	6.44±0.13	2	2	5.57±0.16	3	−14	0.105
Condiments and sauces									
Catsup	11935	6	20.87±0.35	2	3	21.52±0.12	1	3	
Mustard, prepared, yellow	02046	2	0.75±0.01	1	1	0.81		8	
Pickles, cucumber, dill or kosher dill	11937	4	1.07±0.03	3	1	1.06		−1	
Tomato products, canned, sauce	11549	3	3.09±0.05	2	2	2.98±0.19	6	−3	
Cured meats/poultry									
Bologna, meat and poultry	07971	2	1.60±0.16	10	1	2.40		50	
Frankfurter, beef, unheated	07022	6	1.34±0.04	3	3	1.23±0.04	3	−8	0.299
Frankfurter, meat and poultry, unheated	07962	2	2.05±0.37	18	1	3.20		56	
Kielbasa, fully cooked, grilled	07968	5	2.15±0.35	16	1	3.60		67	
Pork sausage, link/patty, cooked, pan-fried	07064	2	0.90±0.33	36	1	1.20		33	
Grain-based mixed dishes									
Ravioli, meat-filled, with tomato sauce or meat sauce, canned	22900	5	2.67±0.36	13	3	1.96±0.03	2	−27	
Spaghetti, with meatballs in tomato sauce, canned	22912	6	2.98±0.04	1	3	2.36±0.03	1	−21	
Plant-based protein foods									
Beans, baked, canned, with pork and sweet sauce	16010	6	8.04±0.59	7	2	7.76±0.31	4	−3	
Peanut butter, smooth style, with salt	16098	6	10.70±0.07	1	3	10.05±0.24	2	−6	
Peanuts, all types, dry-roasted, with salt	16090	4	5.03±0.10	2	4	4.61±0.10	2	−8	0.112
Potato products									
Potato puffs, frozen, unprepared	11398	3	0.30±0.04	15	2	0.25±0.03	13	−17	0.761
Poultry products									
Chicken tenders, breaded, frozen, prepared	22978	1	1.40		1	0.00		−100	
Chicken, nuggets, dark and white meat, precooked, frozen, not reheated	22974	9	0.84±0.07	8	2	0.62±0.03	4	−26	

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Table 7. Mean total sugar content in private-label and national brand products in the United States, sorted by food category[a] (*continued*)

		Total Sugar (g/100 g)							
		National Brand			Private-Label Brand				
Description in SR[b]	NDB_no.[c]	n	Mean±standard deviation	CV[f] (%)	n	Mean±standard deviation	CV (%)	Percent difference[d]	*P* value[e]
Quick bread products									
Biscuits, plain or buttermilk, refrigerated dough, higher fat, baked	18015	3	7.92±0.04	1	3	8.68±0.17	2	10	0.081
Salad dressings and mayonnaise									
Salad dressing, ranch dressing, commercial, regular	04639	4	4.91±0.29	6	2	4.57±0.10	2	−7	0.999
Savory snacks and crackers									
Snacks, potato chips, plain, salted	19411	5	0.32±0.01	5	4	0.35±0.02	5	9	
Snacks, pretzels, hard, plain, salted	19047	8	2.52±0.15	6	1	1.7		−33	
Snacks, tortilla chips, nacho cheese	19057	3	2.60±0.01	0	3	2.41±0.14	6	−7	
Snacks, tortilla chips, plain, white corn, salted	19056	4	0.77±0.02	2	3	0.83±0.04	5	8	
Seafood products									
Fish, fish sticks, frozen, prepared	15027	2	1.79±0.42	23	1	1.09		−38	
Soups									
Soup, chicken noodle, canned, condensed	06019	3	0.00±0		3	0.00±0			
Soup, cream of mushroom, canned, condensed	06043	3	0.40±0.04	10	3	0.4	0	0	
Sweet bakery products									
Cinnamon buns, frosted (includes honey buns)	18964	8	25.62±0.32	1	1	23.76		−7	
Cookies, chocolate sandwich, with creme filling, regular	18166	4	39.45±0.94	2	3	44.01±0.99	2	12	0.052
Doughnuts, cake-type, plain (includes unsugared and old fashioned)	18248	2	18.97±0.07	1	2	16.79±1.06	6	−11	0.245
Toaster pastries, fruit, frosted (include apples, blueberry, cherry, and strawberry)	18938	7	30.87±0.37	1	4	32.46±0.10	0	5	
Vegetable products									
Corn, sweet, yellow, canned, whole kernel, drained solids	11172	6	5.01±0.13	3	4	4.12±0.33	8	−18	0.198
Tomato juice, canned, with salt added	11540	3	2.64±0.02	1	3	2.53±0.07	3	−4	
Tomatoes, red, ripe, canned, packed in tomato juice	11531	5	2.83±0.08	3	3	2.35±0.05	2	−17	0.037*

[a]Adapted from What We Eat In America Food Categories.[25]
[b]SR=US Department of Agriculture National Nutrient Database for Standard Reference.
[c]Nutrient Databank Number. A five-digit number that uniquely identifies a food item in SR and represents the Sentinel Food. Current and previous releases of the SR can be downloaded from https://www.ars.usda.gov/Services/docs.htm?docid=8964.
[d]Percent difference=([private brand value−national brand value]/national brand value)×100.
[e]Tested for significance of difference ($P<0.05$) using sample *t* tests or Mann-Whitney *U* tests. Statistical tests were not done when data were skewed or multi-modal, extremely heteroscedastic, large differences were seen in sample sizes, sample sizes were insufficient, or when the differences by brand type were lower than ±7%.
[f]CV=coefficient of variability.
*Significant difference.

Table 8. Mean potassium contents in private-label and national brand products in the United States, sorted by food category[a]

		Potassium (mg/100 g)							
		National Brand			Private-Label Brand				
Description in SR[b]	NDB_no.[c]	n	Mean±standard deviation	CV[f] (%)	n	Mean±standard deviation	CV (%)	Percent difference[d]	*P* value[e]
Breads, rolls, tortillas									
Bagels, plain, enriched, with calcium propionate (includes onion, poppy, sesame)	18001	10	106±8	7	2	116±7	6	9	
Bread, wheat	18064	7	197±9	5	7	166±8	5	−15	0.084
Bread, white, commercially prepared (includes soft bread crumbs)	18069	8	104±3	3	11	118±4	3	13	0.099
Taco shells, baked	18360	11	237±7	3	3	221±8	4	−7	0.275
Tortillas, ready-to-bake or -fry, flour, refrigerated	18364	6	143±18	12	7	162±14	9	13	0.567
Breakfast cereals									
Cereals, oats, instant, fortified, with maple and brown sugar, dry	08680	6	424±5	1	6	282±5	2	−34	0.005*
Cheese									
Cheese product, pasteurized process, American, vitamin D fortified	01252	10	262±5	2	8	314±11	3	20	0.009*
Cheese, cheddar	01009	23	77±2	2	19	76±1	1	0	
Cheese, cottage, low-fat, 2% milkfat	01015	11	120±6	5	1	143		19	
Cheese, mozzarella, part skim milk, low moisture	01029	27	106±6	6	9	182±16	9	73	0.021*
Cheese, parmesan, grated	01032	5	211±9	4	5	169±9	5	−20	0.060
Condiments and sauces									
Catsup	11935	12	281±6	2	6	292±8	3	4	
Dip, salsa con queso, cheese and salsa- medium	27052	9	100±13	13	1	96		−5	
Mustard, prepared, yellow	02046	6	159±7	4	6	149±5	3	−6	
Pickles, cucumber, dill or kosher dill	11937	12	119±3	3	6	109±3	3	−9	0.110
Tomato products, canned, sauce	11549	7	298±9	3	4	294±6	2	−1	
Cured meats/poultry									
Bologna, meat and poultry	07971	16	312±23	7	2	285±46	16	−9	0.725
Frankfurter, beef, unheated	07022	12	293±32	11	6	286±27	10	−2	
Frankfurter, meat and poultry, unheated	07962	13	394±29	7	5	354±22	6	−10	0.324
Ham, sliced, packaged (96% fat free, water added)	07028	3	479±123	26	2	619±22	3	29	0.773
Kielbasa, fully cooked, grilled	07968	12	306±39	13	3	309±27	9	1	
Pork sausage, link/patty, cooked, pan-fried	07064	9	442±49	11	6	266±4	2	−40	0.125
Pork, cured, bacon, presliced, cooked, pan-fried	10862	12	500±9	2	6	512±11	2	2	
Salami, dry or hard, pork, beef	07072	9	378±11	3	3	290±12	4	−23	0.042*
Turkey breast, sliced, prepackaged	07081	6	401±84	21	1	537		34	

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Table 8. Mean potassium contents in private-label and national brand products in the United States, sorted by food category[a] (*continued*)

		Potassium (mg/100 g)							
		National Brand			Private-Label Brand				
Description in SR[b]	NDB_no.[c]	n	Mean±standard deviation	CV[f] (%)	n	Mean±standard deviation	CV (%)	Percent difference[d]	*P* value[e]
Grain-based mixed dishes									
Macaroni and cheese dinner with dry sauce mix, boxed, uncooked	22959	6	337±2	1	6	373±7	2	11	0.013*
Ravioli, meat-filled, with tomato sauce or meat sauce, canned	22900	11	174±2	1	6	161±1	1	−8	0.016*
Spaghetti, with meatballs in tomato sauce, canned	22912	12	230±4	2	6	165±2	1	−28	0.001*
Meats									
Pork, fresh, enhanced, loin, top loin (chops), boneless, separable lean only, raw	10948	1	590		3	560±40	7	−5	
Plant-based protein foods									
Beans, baked, canned, with pork and sweet sauce	16010	15	247±9	4	2	201±8	4	−19	0.117
Peanut butter, smooth style, with salt	16098	12	557±5	1	6	577±3	1	4	
Peanuts, all types, dry-roasted, with salt	16090	7	640±6	1	10	630±4	1	−2	
Refried beans, canned, traditional style (includes US Department of Agriculture commodity)	16103	12	301±11	4	4	355±14	4	18	0.089
Potato products									
Potato puffs, frozen, unprepared	11398	6	238±10	4	5	282±13	5	19	0.121
Potato salad with egg	22971	1	259		9	240±5	2	−7	
Potatoes, french fried, all types, salt added in processing, frozen, home-prepared, oven heated	11403	4	414±23	6	9	402±10	2	−3	
Poultry products									
Chicken tenders, breaded, frozen, prepared	22978	11	330±14	4	1	252		−24	
Chicken, nuggets, dark and white meat, precooked, frozen, not reheated	22974	15	220±7	3	2	210±1	1	−5	
Quick bread products									
Biscuits, plain or buttermilk, refrigerated dough, higher fat, baked	18015	6	118±3	2	5	209±17	8	77	0.036*

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Table 8. Mean potassium contents in private-label and national brand products in the United States, sorted by food category[a] (*continued*)

		Potassium (mg/100 g)							
		National Brand			Private-Label Brand				
Description in SR[b]	NDB_no.[c]	n	Mean±standard deviation	CV[f] (%)	n	Mean±standard deviation	CV (%)	Percent difference[d]	*P* value[e]
Salad dressings and mayonnaise									
Salad dressing, ranch dressing, commercial, regular	04639	12	61±2	3	6	72±5	7	17	0.482
Savory snacks and crackers									
Popcorn, microwave, regular (butter) flavor, made with palm oil	25026	6	471±39	8	2	312±34	11	−34	0.131
Snacks, potato chips, barbecue-flavor	19042	7	1,195±52	4	5	1,119±48	4	−6	
Snacks, potato chips, plain, salted	19411	8	1,178±26	2	7	1,166±26	2	−1	
Snacks, pretzels, hard, plain, salted	19047	20	301±24	8	1	181		−40	
Snacks, tortilla chips, nacho cheese	19057	7	235±10	4	4	227±6	3	−3	
Snacks, tortilla chips, plain, white corn, salted	19056	6	181±3	2	5	174±5	3	−3	
Seafood products									
Fish, fish sticks, frozen, prepared	15027	12	177±13	8	6	196±5	2	11	1.000
Fish, tuna, light, canned in water, drained solids	15121	18	180±3	1	5	175±2	1	−3	
Soups									
Soup, chicken broth, ready-to-serve	06194	9	14±2	16	5	27±9	34	93	0.894
Soup, chicken noodle, canned, condensed	06019	6	44	1	6	82±21	26	87	1.000
Soup, chunky vegetable, canned, ready-to-serve	06067	10	185±11	6	4	167±15	9	−10	0.777
Soup, cream of mushroom, canned, condensed	06043	6	67±1	2	6	60±1	1	−10	0.030*
Sweet bakery products									
Cinnamon buns, frosted (includes honey buns)	18964	8	102±2	2	1	83		−19	
Cookies, chocolate sandwich, with creme filling, regular	18166	7	227±13	6	4	278±4	1	23	0.073
Doughnuts, cake-type, plain (includes unsugared and old fashioned)	18248	3	132±4	3	2	137±6	4	3	
Toaster pastries, fruit, frosted (include apples, blueberry, cherry, and strawberry)	18938	13	83±4	5	4	134±3	2	61	0.011*
Vegetable products									
Beans, snap, green, canned, regular pack, drained solids	11056	2	98±11	11	2	99±4	4	1	
Corn, sweet, yellow, canned, whole kernel, drained solids	11172	14	123±3	3	8	137±1	1	11	0.032*
Tomato juice, canned, with salt added	11540	6	191±7	3	6	241±9	4	27	0.025*

(*continued on next page*)

Table 8. Mean potassium contents in private-label and national brand products in the United States, sorted by food category[a] (*continued*)

		Potassium (mg/100 g)							
		National Brand			Private-Label Brand				
Description in SR[b]	NDB_no.[c]	n	Mean±standard deviation	CV[f] (%)	n	Mean±standard deviation	CV (%)	Percent difference[d]	*P* value[e]
Tomatoes, red, ripe, canned, packed in tomato juice	11531	10	199±1	1	6	185±2	1	−7	0.015*
Vegetable juice cocktail, canned	11578	10	188±3	2	1	224		19	

[a]Adapted from What We Eat In America Food Categories.[25]
[b]SR=US Department of Agriculture National Nutrient Database for Standard Reference.
[c]Nutrient Databank Number. A five-digit number that uniquely identifies a food item in SR and represents the Sentinel Food. Current and previous releases of the SR can be downloaded from https://www.ars.usda.gov/Services/docs.htm?docid=8964.
[d]Percent difference=([private brand value−national brand value]/national brand value)×100.
[e]Tested for significance of difference ($P<0.05$) using sample *t* tests or Mann-Whitney *U* tests. Statistical tests were not done when data were skewed or multimodal, extremely heteroscedastic, large differences were seen in sample sizes, sample sizes were insufficient, or when the differences by brand type were lower than ±7%.
[f]CV=coefficient of variability.
*Significant difference.

Table 9. Mean total dietary fiber content in private-label and national brand products in the United States, sorted by food category[a]

		Total Dietary Fiber (g/100g)							
		National Brand			Private-Label Brand				
Description in SR[b]	NDB_no[c]	n	Mean±standard deviation	CV[f] (%)	n	Mean±standard deviation	CV (%)	Percent difference[d]	*P* value[e]
Breads, rolls, tortillas									
Bread, wheat	18064	6	4.4±0.3	6	4	4.0±0.3	9	−9	0.521
Bread, white, commercially prepared (includes soft bread crumbs)	18069	5	5.0±1.5	29	2	2.3±0.1	4	−55	
Tortillas, ready-to-bake or -fry, flour, refrigerated	18364	3	2.2±0.1	4	6	2.6±0.2	8	20	0.233
Breakfast cereals									
Cereals, oats, instant, fortified, with maple and brown sugar, dry	08680	2	7.2±0.2	2	1	7.2		0	
Condiments and sauces									
Mustard, prepared, yellow	02046	3	4.6±0.8	18	3	4.1±0.4	11	−11	1.0
Plant-based protein foods									
Beans, baked, canned, with pork and sweet sauce	16010	6	4.4±0.1	1	2	4.1±0.2	4	−8	
Peanut butter, smooth style, with salt	16098	6	5.0±0.3	5	3	4.4±0.2	5	−12	0.245
Peanuts, all types, dry-roasted, with salt	16090	4	8.4±0.8	9	4	8.4±0.3	4	0	
Refried beans, canned, traditional style (includes US Department of Agriculture commodity)	16103	6	4.3±0.4	8	2	4.6±0.4	9	8	
Potato products									
Potatoes, french fried, all types, salt added in processing, frozen, home-prepared, oven heated	11403	1	2.5		2	2.3±0.1	4	−7	
Poultry products									
Chicken, nuggets, dark and white meat, precooked, frozen, not reheated	22974	3	2.2	1	1	2		−8	
Chicken tenders, breaded, frozen, prepared	22978	4	2.6±0.1	4	1	2.4		−6	
Quick bread products									
Biscuits, plain or buttermilk, refrigerated dough, higher fat, baked	18015	3	3.1±0.2	5	3	2.4±0.1	4	−22	0.081
Savory snacks and crackers									
Snacks, potato chips, barbecue-flavor	19042	3	4.4±0.7	16	2	3.2±0.2	6	−28	
Snacks, pretzels, hard, plain, salted	19047	17	3.3±0.1	4	1	3.4		1	
Snacks, tortilla chips, plain, white corn, salted	19056	4	5.2±0.1	3	3	6.3±0.8	13	21	0.860
Snacks, tortilla chips, nacho cheese	19057	3	5.1	1	3	5.4±0.4	7	7	

(*continued on next page*)

Table 9. Mean total dietary fiber content in private-label and national brand products in the United States, sorted by food category[a] (*continued*)

		Total Dietary Fiber (g/100g)							
		National Brand			Private-Label Brand				
Description in SR[b]	NDB_no[c]	n	Mean±standard deviation	CV[f] (%)	n	Mean±standard deviation	CV (%)	Percent difference[d]	*P* value[e]
Snacks, potato chips, plain, salted	19411	5	3.1±0.1	2	4	3.0±0.2	6	−3	
Popcorn, microwave, regular (butter) flavor, made with palm oil	25026	6	10.1±0.2	2	2	10.1±0	0	0	
Sweet bakery products									
Cookies, chocolate sandwich, with creme filling, regular	18166	4	2.9±0.1	2	4	3.1±0.4	14	6	
Toaster pastries, fruit, frosted (include apples, blueberry, cherry, and strawberry)	18938	3	2.5±0.1	2	6	2.6±0.2	8	5	
Vegetable products									
Corn, sweet, yellow, canned, whole kernel, drained solids	11172	2	2.2±0.1	6	2	2.2±0.1	5	−2	

[a]Adapted from What We Eat In America Food Categories.[25]
[b]SR=US Department of Agriculture National Nutrient Database for Standard Reference.
[c]Nutrient Databank Number. A five-digit number that uniquely identifies a food item in SR and represents the Sentinel Food. Current and previous releases of the SR can be downloaded from https://www.ars.usda.gov/Services/docs.htm?docid=8964.
[d]Percent difference=([private brand value−national brand value)/ national brand value)]100.
[e]Tested for significance of difference ($P<0.05$) using sample *t* tests or Mann-Whitney *U* tests. Statistical tests were not done when data were skewed or multimodal, extremely heteroscedastic, large differences were seen in sample sizes, sample sizes were insufficient, fiber values <2 g/100 g or when the differences by brand type were lower than ±7%.
[f]CV=coefficient of variability.