Sodium Content of Foods Contributing to Sodium Intake: Comparison between Selected Foods from the CDC Packaged Food Database and the USDA National Nutrient Database for Standard Reference

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Abstract

The sodium concentration (mg/100g) for 23 of 125 Sentinel Foods (e.g. white bread) were identified in the 2009 CDC Packaged Food Database (PFD) and compared with data in the USDA’s 2013 National Nutrient Database for Standard Reference (SR 26). Sentinel Foods are foods identified by USDA to be monitored as primary indicators to assess the changes in the sodium content of commercially processed foods from stores and restaurants. Overall, 937 products were evaluated in the CDC PFD, and between 3 (one brand of ready-to-eat cereal) and 126 products (white bread) were evaluated per selected food. The mean sodium concentrations of 17 of the 23 (74\%) selected foods in the CDC PFD were 90\%–110\% of the mean sodium concentrations in SR 26 and differences in sodium concentration were statistically significant for 6 Sentinel Foods. The sodium concentration of most of the Sentinel Foods, as selected in the PFD, appeared to represent the sodium concentrations of the corresponding food category. The results of our study help improve the understanding of how nutrition information compares between national analytic values and the label and whether the selected Sentinel Foods represent their corresponding food category as indicators for assessment of change of the sodium content in the food supply.

Keywords

sodium; Sentinel Foods; database; laboratory analysis

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Disclaimer

The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention or the United States Department of Agriculture.
1. Introduction

Pervasive excess sodium intake in the US population\(^1\) and the established link between high sodium consumption and high blood pressure, a leading cause of heart disease and stroke\(^2\), have led to increased efforts to reduce the sodium in the US food supply. The majority of sodium intake (77\%) is estimated to come from commercially processed and restaurant foods\(^3\), thus accurate assessment and monitoring of the sodium and related nutrient content in these foods are important components of sodium reduction efforts.\(^4,5\)

A key recommendation in the 2010 Institute of Medicine (IOM) report “Strategies to Reduce Sodium Intake in the United States” was to enhance monitoring and surveillance of sodium content of foods utilizing current and new methodologies and data sources.\(^4\) In response to this recommendation, the US Department of Agriculture (USDA), the Centers for Disease Control and Prevention (CDC), and the Food and Drug Administration (FDA) launched collaborative efforts to improve the assessment and monitoring of sodium in the US food supply. Because it would be impossible to perform laboratory analysis of the nutrient composition for every food currently available in the United States, select foods known to be major contributors of sodium in the food supply and to the average diet were identified for the Sentinel Food monitoring program.\(^6,7\) A total of 125 “Sentinel Foods” which consist primarily of commercially processed and restaurant foods, were selected for more frequent analysis and monitoring. These Sentinel Foods will serve as indicators for assessment of changes in the sodium content within broader categories in the US food supply.\(^6,7\) The USDA’s National Nutrient Database for Standard Reference (SR), is a publically available database of nutritional composition for over 8,600 foods and the Sentinel Foods are part of SR.\(^8\)

In addition to laboratory analysis, it is also possible to monitor the sodium content in commercially processed and packaged foods using the Nutrition Facts Panel (NFP) label, available through public and proprietary databases.\(^9\) To examine the nutrient composition of brand-name products, researchers at the CDC created a packaged food database combining proprietary and publicly available sales and NFP data\(^10\), similar in concept to databases created by the New York City’s National Sodium Reduction Initiative\(^11\), and in other countries.\(^12–15\) CDC is using this database to monitor the sodium content in major brands of commercially packaged food products.\(^10\) However, according to FDA regulation, the sodium value on the NFP can exceed the actual sodium content of a food by up to 20%\(^16\); therefore, the NFP may not reflect stealth reductions, if they are less than 20\% of the labeled sodium content. This may limit the usefulness of databases based on NFP to detect changes in the sodium content of the U.S. food supply.

Laboratory analyses, such as those provided for the sodium values of the Sentinel Foods available in the USDA SR\(^8\) are the most accurate source of sodium information and can capture a variety of nutrients for commercially processed food items including nutrients (e.g., potassium, iodine) not currently required on the NFP. However, the selected Sentinel Foods and brands representing a specific food category is a major factor in the usefulness of the sentinel food monitoring program.
To address these gaps, the objectives of this study were two-fold. First, we evaluated and compared the sodium concentration of selected Sentinel Foods contributing to sodium intake as identified in the 2009 CDC Packaged Food Database (PFD) with the sodium concentration for these foods identified in the USDA’s 2013 SR (SR 26). Second, we determined whether the selected Sentinel Foods represented adequately their corresponding food category, i.e. as indicators for assessment of change of the sodium content in the food supply.

2. Methods

2.1. CDC Packaged Food Database

To create the CDC Packaged Food Database (PFD), sales data from Nielsen ScanTrack data (The Nielsen Co, New York, NY)\(^{17}\) were combined with NFP data from Gladson LLC (Lisle, IL)\(^{18}\) and manufacturer websites. Universal Product Code (UPC) sales data for the 2009 calendar year were obtained from the Nielsen ScanTrack database, which captures all products sold in the US grocery stores with annual sales ≥ $2 million.\(^ {17}\) However, sales data from Nielsen ScanTrack do not include warehouse stores, retailers with sales less than $2 million, or non-UPC coded products.\(^ {17}\) UPC-level sodium data mainly were obtained from the 2009 Gladson nutrition database, which includes all nutrition information as it appears on the NFP, as well as packaging information such as size, product description, and brand. Both Nielsen and Gladson data include private label/store brand products, but these tend to vary by region and market, and due to the poor matching of UPCs, private label products were excluded.\(^ {10}\) The final database included complete sales and nutrition information on 7,898 commercially processed food items that comprise the top 80% in sales volume from major US grocery stores in 63 of 104 food categories. Additional details on the CDC Packaged Food Database, food categories, Gladson and Nielsen databases can be found elsewhere.\(^ {10},17–19\)

2.2. USDA National Nutrient Database for Standard Reference (SR)

The USDA SR is the major source of food composition data in the United States.\(^ {8}\) SR is the basis for many other databases in the US, including the USDA’s Food and Nutrient Database for Dietary Studies (FNDDS), which is used to analyze dietary intake data from What We Eat in America, the dietary component of the National Health And Nutrition Examination Survey (WWEIA, NHANES).\(^ {20}\) The SR and FNDDS contain brand-level information for certain food categories, such as ready-to-eat cereals and infant formulas. SR is released annually and for the purpose of this study, we used the version 26 (SR 26), released in 2013.\(^ {21}\)

2.3. Sentinel Foods

Sentinel Foods were selected using dietary intake data from WWEIA, NHANES 2007–2008, and accounted for approximately one-third of the total sodium intake of all individuals, excluding breastfed infants.\(^ {22}\) The FNDDS 4.1\(^ {23}\) was used to calculate the dietary sodium intakes for WWEIA, NHANES 2007–2008 and incorporated sodium values from SR 22.\(^ {24}\) To select the Sentinel Foods, criteria such as sodium density (mg/100 g of food or beverage), frequency of consumption by survey respondents, and percent

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contribution to sodium intake were evaluated. A total of 125 FNDDS and corresponding SR foods and beverages were selected as Sentinel Foods to be monitored as primary indicators of change for assessing the sodium content of foods and beverages in a given WWEIA Food Category. The WWEIA Food Categories group similar foods and beverages into one of about 150 mutually exclusive categories based on usage and nutrient content. The nutrient content for corresponding Sentinel Foods in the SR are based primarily on laboratory analyses of brands of foods selected using a previously developed and reported nationwide food sampling and analysis plan (NFPAP). Additional details related to the selection, sampling and analysis of Sentinel Foods selection can be found elsewhere.

2.4. Sample selection

For the purpose of this study, we selected 23 Sentinel Foods, of which 15 were from the top 10 food categories contributing the most to U.S. sodium intake (e.g., bread and cheese) in 2007–2008 (Table 1). The remaining 8 Sentinel Foods were chosen to represent foods contributing at least 3% of sodium intake among socio-demographic subgroups (e.g., frankfurters and sausages and ready-to-eat cereals consumed by 2–19 years old; tortilla and salsa consumed by Mexican-Americans) (Table 1). In close collaboration with the USDA, a nutritionist matched each selected Sentinel Food to foods in the CDC PFD using the item description and product details in the PFD. If more details related to the ingredients were needed, the nutritionist searched the manufacturer and other websites using a standardized internet search protocol. Table 1 provides details related to each selected Sentinel Food, including the number representing the food in SR and its description (NDB), the basis for the nutrient composition in SR and the corresponding WWEIA food category.

2.5. Statistical Analysis

We examined the sales-weighted mean and distribution (standard error (SE), range, and coefficient of variation (CV)) of the sodium concentration (mg/100 g) of the 23 Sentinel Foods as identified in the CDC PFD. We compared these values with the mean (SE) and range of sodium concentration of the foods (mg/100 grams) matched in SR 26. To evaluate whether the difference in mean sodium concentrations was significantly different between the two databases, we used sample t-tests, when possible (P<0.05). We also computed the percent ratio for each food equal to the mean sodium value in USDA SR 26 divided by the mean sodium value in CDC PFD, multiplied by 100. Although not all the values for Sentinel Foods in SR 26 are based on laboratory analysis, the ratio is based on analyzing compliance with FDA regulations for nutrition information on the NFP, i.e., the laboratory value divided by the label value multiple by 100. To determine how representative the sodium content of the selected Sentinel Food (e.g., chili con carne) was for its corresponding food category (meat mixed dishes), we used data from the PFD and SR 26. We determined the median and interquartile range (IQR) for sodium (mg/100g) from the PFD for each Sentinel Food, its corresponding food category, and top selling brands. SAS version 9.3 (Cary, N.C.) was used for all analyses.
3. Results

Overall, 937 products were evaluated in the CDC PFD, and between 3 (one brand of ready-to-eat (RTE) cereal) and 126 products (white bread) were evaluated per selected food (Table 2). The range of sodium concentration varied by food from 449–472 for one brand of RTE cereal to 476–1587 for ranch dressing (Table 2). The mean sodium concentrations of 17 of the 23 (74%) selected foods in the CDC PFD were 90%–110% of the mean sodium concentrations in SR 26 (Table 2). The coefficient of variation (CV) for the sodium concentration of the selected foods using the CDC PFD ranged between 2% for one type (and brand) of RTE cereal (n=3 products) to 31% for RTE chicken noodle soup (n=15 products). The sodium concentration in USDA SR26 was >110% of the CDC PFD for ham (114%), and <90% for canned spaghetti with meatballs (84%), unflavored potato and tortilla chips (76%), and two brands of RTE cereals (65% and 77%) (Table 2). The difference in mean sodium concentration (mg/100 g) was statistically significant between the CDC PFD and USDA SR for the following Sentinel Foods: American cheese (p=0.042), Spaghetti with meatballs (p=0.001), chili with meat and beans (p=0.021), white tortilla chips (p=0.001), ranch dressing (p=0.001) and beef hotdogs (p=0.036) (Table 2).

Figures 1–3 show the median and IQR (25th and 75th percentile) of sodium concentration (mg/100 g) in top-selling brands of selected Sentinel Foods using the CDC PFD compared to their corresponding food category and to the mean sodium concentration in USDA’s SR 26. The IQR of the PFD sodium concentration for white bread, cheese pizza, lasagna with meat, and unflavored potato chips overlapped with the IQR of sodium values of foods in their corresponding food categories: breads and rolls, pizza, pasta mixed dishes, and savory snacks, respectively (Figure 1). In addition, the medians of the Sentinel Foods in the PFD were within 90% to 110% of the median of their corresponding food category. However, the median sodium concentration of the top brands varied and for some was higher or lower than the median sodium concentration of the Sentinel Food in the PFD or the mean sodium concentration of the Sentinel Food in SR 26 (Figure 1).

For some foods, the median sodium concentration of the Sentinel Foods in the PFD were either >110% or <90% of the median sodium concentration for foods within their corresponding food category (Figure 2). The IQR of the sodium concentration in the PFD overlapped with the IQR of the corresponding food category except for unflavored tortilla chips (Figure 2). Similar to other Sentinel Foods, high variability in the sodium concentrations between brands was observed (Figure 2). Figure 3 compares the sodium concentration of the Sentinel Foods cheddar cheese and American cheese and their corresponding food category, cheese. The median sodium concentration in the PFD for American cheese is at the high end of IQR for the food category, cheese, whereas the median sodium concentration for cheddar cheese is below the lower end of the IQR for cheese (Figure 3). The median sodium concentration of the top selling brands of cheddar and American cheese didn’t vary much and was similar to the mean sodium concentration of the corresponding Sentinel Food in SR26 (Figure 3).
4. Discussion

This study compared the sodium concentration of selected foods contributing to sodium intake as identified in the 2009 CDC PFD and the sodium concentration for these foods identified in the USDA’s 2013 SR 26. Whereas, the mean sodium concentrations of most of the selected Sentinel Foods evaluated in these two databases were similar, some differed. The differences in sodium concentrations of some foods as determined in the PFD versus SR 26 might be due to one or more of the following factors: the sodium concentration was under- or over-reported on nutrition facts labels; the sodium concentration of the food changed over time (from 2009 to 2013) and/or the sodium concentrations of foods selected in SR 26 differed from the foods in the PFD, e.g., different brands (e.g., due to changes in market share), or private label vs major brands. For example, the Sentinel Food ham in the PFD only included branded name products whereas ham in the SR 26 also included private label/store brand products.

The wide range and high CV of some of the selected Sentinel Foods in the PFD (e.g. ready-to-eat chicken noodle soup or chicken nuggets) suggests the potential for sodium reduction due to the variability of sodium concentrations among these commercial food products as well as the need for monitoring changes in market share of specific brands over time. The sodium concentration of most of the Sentinel Foods, as selected in the PFD, appeared to represent the sodium concentrations of the corresponding food category. For some foods with a wide range of sodium concentration within the category, like cheese, selection of more than one sentinel food, e.g., American cheese and cheddar cheese, covered the range of sodium concentrations within the category. For others, one sentinel food may be sufficient to represent the category, e.g., the sodium concentration of unflavored potato chips was close to the sodium concentration of the category of savory snacks, whereas the sodium concentration of unflavored tortilla chips was below the interquartile range of sodium concentration for savory snacks. In these cases, other considerations may lead to the selection of more than one food, e.g., differences in consumption of specific foods within a category by socio-demographic subgroups.

Our findings cannot be directly compared to previous studies due to methodological differences in data collection, time frame and different databases used but our results add to the findings of previous studies. Two studies have also shown high variability in the sodium concentration within and between brands of cheese and boxed macaroni and cheese. The analytical sodium value was below the label value in both studies. This may be due to the fact that some food manufacturers have voluntarily pledged to reduce sodium levels in their products.

There are several limitations and challenges related to monitoring sodium in the food supply in general and to this study in specific. First, the identification of the selected Sentinel foods from the CDC PFD was resource and time intensive because the search had to be done manually. We limited the selected Sentinel Foods to major national brand commercially processed and packaged store foods because the 2009 CDC PFD does not include prepared food (e.g. potato salad from retail), restaurant foods (e.g. cheeseburger, fast foods), raw food (e.g. chicken) or private label/store brands.
Publicly available databases, like the USDA’s SR and FNDDS, can facilitate the monitoring of the sodium content in the food supply. However, due to limited resources, the sodium content of foods in the databases are updated biennially, are not necessarily brand-specific, and thus may not reflect all changes in the marketplace, given that more than 85,000 “uniquely formulated foods” are currently available in the US. Further, proprietary nutrition and sales databases are costly and also have their own limitations. First, these databases rely on the NFP and the enforcement laboratory analyses can exceed the sodium content on the label by up to 20% according to current FDA regulation. Therefore, the NFP may not accurately reflect the nutrient composition of products, particularly if the manufacturer gradually reduces the sodium content without changing the label. Second, timeliness is an issue due to the passive data collection in some of the proprietary nutrition databases. In the 2009 Gladson database, “77% of the products were entered or updated between 2008 and 2010 and the remaining 23% were entered or updated prior to 2008”. The data acquisition for nutrition information of products with sales data in Nielsen that did not match nutrition information in Gladson was resource intensive and missing data had to be manually extracted from manufacturers’ or other websites, which might not be regularly updated and could be inaccurate. On the other hand, laboratory analyses are also resource intensive, expensive, and not feasible for monitoring large numbers of foods. The cost of nationwide sampling and the nutrient analysis of one food is approximately $17–20,000 depending on the number of nutrients analyzed per food. In this study, a total of 937 products were evaluated using the CDC PFD (range: 3–126 products/food) compared to 272 products using the USDA’s SR 26 (range: 2–36 products/food). Therefore, nutrition databases based on the label provide a valuable less expensive method for monitoring brand-level commercially processed food items in the US food supply. The USDA uses sales data to prioritize the sampling of foods for laboratory analyses. Combining sources of nutrition information may be the best approach to monitor the sodium content of foods, with use of laboratory analyses to identify potential real time changes in the food supply or evaluate the accuracy of the sodium content of foods observed in brand-specific nutrient databases.

The results of our study helped improve the understanding of how nutrition information compares between analytic values and the label. While the mean sodium concentrations of most of the selected Sentinel Foods evaluated in these two databases were similar, some differed. These and future results will also help determine how well the Sentinel Foods represent their corresponding food categories, and inform decisions about modifying the list of Sentinel Foods, to maintain its relevance to the dynamic US food supply. The variability in sodium concentration between top brands of specific foods indicates sodium reduction is feasible. Reducing the sodium content in commercially processed and packaged foods that are most commonly purchased by consumers can contribute to reducing the overall sodium intake in the US, which could avert thousands of deaths every year and save billions in health care dollars.

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Fig.1. 
Median (mg/100g) and interquartile range of sodium concentration in white bread, cheese pizza, lasagna with meat, and unflavored potato chips compared to their corresponding food category using CDC packaged food database
*Horizontal dashed line indicates the mean sodium (mg/100g) of the Sentinel Food in SR 26
Fig. 2.
Median (mg/100g) and interquartile range of sodium concentration in Ham, chili with meat and beans, tortilla chips, and ranch dressing compared to their corresponding food category using CDC packaged food database.

*Horizontal dashed line indicates the mean sodium (mg/100g) of the Sentinel Food in SR 26.
Fig. 3.
Median (mg/100g) and interquartile range of sodium concentration in American and cheddar cheese compared to their corresponding food category using CDC packaged food database.

*Horizontal dashed line indicates the mean sodium (mg/100g) of the Sentinel Food in SR 26
Table 1
Sentinel Foods description, basis for the SR data and the corresponding WWEIA food category

| Sentinel Food               | NDB #  | Description                                                                 | Basis for SR 26 data                                                                 | WWEIA Food Category                  |
|-----------------------------|--------|------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|--------------------------------------|
| White bread                 | 18069  | Bread, white, commercially prepared (includes soft bread crumbs)             | Analytical data, 2011; NFP review in 2012 – no change                                 | Yeast breads and rolls               |
| Hamburger roll              | 18350  | Rolls, hamburger or hotdog, plain                                            | Analytical data, 2011; NFP review in 2012 – no change                                 | Yeast breads and rolls               |
| Ham, packaged and deli       | 07028  | Ham, sliced, prepackaged (96% fat free, water added)                          | Analytical data, 2013                                                               | Cold cuts and cured meats            |
| Cheese pizza, thin crust,   | 21505  | Pizza, cheese topping, thin crust, frozen                                    | Analytical data, 2012                                                               | Pizza                                |
| Chicken nuggets, frozen     | 22974  | Chicken nuggets, frozen, cooked                                              | Analytical data, 2013                                                               | Poultry                              |
| Chicken noodle soup, RTE    | 06018  | Soup, chunky chicken noodle, canned, ready-to-serve                           | Analytical data, 2011                                                               | Soups                                |
| Chicken Noodle Soup,        | 06019  | Soup, chicken noodle, canned, condensed                                       | Manufacturer’s analytical; partial documentation, 2013                             | Soups                                |
| Corn dog, frozen            | 22973  | Corn dogs, frozen, prepared                                                  | Analytical data, 2013                                                               | Sandwiches                           |
| American cheese             | 01252  | Cheese product, pasteurized process, American, vitamin D fortified           | Analytical data, 2011                                                               | Cheese                               |
| Cheddar cheese              | 01009  | Cheese, cheddar                                                               | Analytical data, 1976; last analyzed in 2011-no change                              | Cheese                               |
| Spaghetti with meatballs,   | 22912  | Spaghetti, with meatballs in tomato sauce, canned                            | Analytical data, 2012                                                               | Pasta mixed dishes, excludes macaroni and cheese |
| Lasagna with meat, frozen   | 22916  | Lasagna with meat and sauce, frozen entree                                   | Analytical data, 2012                                                               | Pasta mixed dishes, excludes macaroni and cheese |
| Chili with meat and beans,  | 22904  | Chili con carne with beans, canned entree                                    | Analytical data, 2011                                                               | Meat mixed dishes                    |
| Potato chips, unflavored     | 19411  | Snacks, potato chips, plain, salted                                          | Analytical data, 2013                                                               | Savory Snacks                        |
| Tortilla chips, unflavored  | 19056  | Snacks, tortilla chips, plain, white corn, salted                            | Analytical data, 2013                                                               | Savory Snacks                        |
| Marinara sauce, ready to    | 06931  | Sauce, pasta, spaghetti/marinara                                              | Analytical data, 2011                                                               | Pasta Sauce, tomato based           |
| Ranch dressing              | 04639  | Salad dressing, ranch dressing, commercial, regular                          | Analytical data, 2013                                                               | Salad dressings and vegetable oils   |
| Beef hotdog                 | 07022  | Frankfurter or hot dog, beef                                                  | Analytical data, 2013                                                               | Frankfurters                         |
| Flour tortilla              | 18364  | Tortillas, ready-to-bake or -fry, flour, refrigerated                         | Analytical data, 2011                                                               | Tortilla                             |
| Biscuits, refrigerated dough| 18014  | Biscuits, plain or buttermilk, refrigerated dough, higher fat                | Calculated by manufacturer, 2012                                                   | Biscuits, muffins, quick breads      |
| Cheerios                    | 08013  | Cereals ready-to-eat, General Mills, Cheerios                                | Calculated by manufacturer, 2013                                                   | Ready-to-eat cereal                  |
| Frosted flakes              | 08069  | Cereals ready-to-eat, Kellogg’s, Frosted Flakes                              | from analytical, 2012                                                              | Ready-to-eat cereal                  |
| Raisin bran                 | 08060  | Cereals ready-to-eat, Kellogg’s, Raisin Bran                                 | Calculated by manufacturer, 2012                                                   | Ready-to-eat cereal                  |

Abbreviations: SR 26: National Nutrient Database for Standard Reference, version 26, 2013; NDB#: The five-digit Nutrient Databank number uniquely representing the food in SR; WWEIA: What We Eat in America; NFP: Nutrition Facts Panel
### Table 2

Comparison of sodium concentration (mg/100 g) of Sentinel Foods between CDC packaged food database and USDA National Nutrient Database for Standard Reference (SR 26)

| Sentinel Food                          | CDC Packaged food database | USDA SR26 | Statistics |
|----------------------------------------|----------------------------|-----------|------------|
|                                        | n  | Range  | Sodium mean± SE mg/100 g | CV SD/Mean *100 | n  | Range  | Sodium mean± SE mg/100 g | % Ratio* | P value** |
| White bread                            | 126| 320–857| 512±6  | 13% | 19 | 410–555 | 491±10 | 96%| 0.088 |
| Hamburger roll                         | 45 | 384–808| 519±9  | 11% | 12 | 451–580 | 500±10 | 96%| 0.174 |
| Ham, packaged and deli                  | 52 | 811–1450| 1157±19 | 12% | 5  | 1090–1480| 1314±150 | 114%| 0.356 |
| Cheese pizza, thin crust, frozen       | 21 | 382–689| 479±16 | 16% | 12 | 446–503 | 471±5  | 98%| 0.644 |
| Chicken nuggets, frozen                | 16 | 303–860| 541±34 | 25% | 17 | 496–719 | 552±8 | 102%| 0.758 |
| Chicken noodle soup, ready-to-eat      | 15 | 156–541| 279±22 | 31% | 10 | 272–338 | 306±8 | 110%| 0.274 |
| Chicken noodle soup, condensed         | 9  | 344–730| 635±49 | 23% | 0† | N/A    | 677    | 107%| NA |
| Corn dog, frozen                       | 13 | 397–742| 680±24 | 13% | 12 | 495–790 | 628±27 | 92%| 0.161 |
| American cheese                        | 29 | 1223–1640| 1329±22 | 9% | 10 | 1230–1450| 1272±16 | 96%| 0.042 |
| Cheddar cheese                         | 93 | 571–705| 629±10 | 4%  | 24 | N/A    | 621±21 | 99%| 0.802 |
| Spaghetti with meatballs, canned       | 26 | 242–477| 377±15 | 20% | 18 | 203–435 | 315±5 | 84%| 0.001 |
| Lasagna with meat, frozen              | 20 | 212–423| 350±11 | 14% | 12 | 326–392 | 354±3 | 101%| 0.733 |
| Chili with meat and beans, canned      | 19 | 323–597| 506±19 | 17% | 11 | 442–500 | 449±6 | 90%| 0.021 |
| Potato chips, unflavored               | 31 | 194–1164| 593±17 | 16% | 5  | 342–575 | 450±94 | 76% | 0.204 |
| Tortilla chips, unflavored             | 41 | 23–821 | 427±10 | 16% | 12 | 184–515 | 325±22 | 76%| 0.001 |
| Marmara sauce, ready to serve          | 85 | 179–675| 449±10 | 21% | 36 | 336–590 | 419±11 | 93%| 0.052 |
| Ranch dressing                         | 53 | 476–1587| 987±23 | 17% | 18 | 810–1040| 901±7 | 91%| 0.001 |
| Beef hotdog                            | 68 | 683–1651| 955±14 | 12% | 18 | 860–1190| 992±10 | 104%| 0.036 |
| Flour tortilla                         | 63 | 463–952| 733±21 | 23% | 13 | 590–818 | 686±18 | 94%| 0.096 |
| Biscuit, refrigerated dough            | 100| 806–1059| 979±10 | 5%  | 2  | 943–1011| 977    | 100%| NA |
| Cheerios                               | 3  | 571–670| 648±24 | 6%  | 0† | N/A    | 497    | 77%| NA |
| Frosted flakes                         | 4  | 449–472| 463±3  | 2%  | 6  | 424–490 | 468±12 | 101%| 0.714 |
| Raisin bran                            | 5  | 407–617| 546±39 | 16% | 0† | N/A    | 356    | 65%| NA |

Total 937  272
Abbreviations: SE: standard error; CV: coefficient of variation; SD: standard deviation; N/A: not available

% Ratio: (sodium value in SR/sodium value in Packaged food database)*100

P-value based on T-test of the difference in mean sodium concentration between the specified food in the CDC Packaged food database versus USDA SR 26. P ≤ 0.05 was considered statistically significant.

Sodium value not based on analytical data

*Sodium value not based on analytical data