

# Monitoring the Sodium Content of Foods Including Grain-based Products

S.E. Gebhardt, R.G. Thomas, D.B. Haytowitz, L.E. Lemar, and B.A. Showell,  
 USDA-ARS Beltsville Human Nutrition Research Center



## ABSTRACT

The 2005 Dietary Guidelines for Americans includes the recommendation to consume less than 2,300 mg of sodium per day. For population groups at risk for hypertension, the recommendation is to consume no more than 1,500 mg of sodium per day. However, the mean sodium intake for people 2 years of age and older, based on the What We Eat in America, NHANES 2007-2008 (WWEIA), is 3,330 mg of sodium per day. Since most of the sodium in the diet comes from processed and restaurant foods, public health advocates are pushing for the voluntary reduction of sodium in these foods. In order to monitor changes in key contributors of dietary sodium, the USDA's Nutrient Data Laboratory has developed a plan to identify, rank, and monitor the sodium content of these foods. While about 3,000 foods in the USDA National Nutrient Database for Standard Reference (SR) provide the basis for the nutrient content of the 7,000 foods reported in WWEIA, 2,000 single ingredient foods (e.g., fruits, meats) can be excluded since they are not processed with the addition of salt. Sodium data for the remaining 1,000 foods and amounts consumed in the 2007-2008 WWEIA surveys were used to rank the foods by sodium contribution to the diet. Approximately 45 generic foods contributed 50% of the sodium intake from all processed foods. Some of these foods may not be particularly high in sodium content, however they rank high in sodium contribution to the diet based on the large quantities consumed. About 38% of these 45 foods are grain-based products, e.g., bread, rolls, flour tortillas, biscuits, pretzels, and tortilla chips. To maintain current and accurate sodium data in SR, plans have been made to monitor the sodium content of the top contributors based on selected analysis of foods and label claim information.

## INTRODUCTION

USDA's Nutrient Data Laboratory (NDL) has identified those foods that are major contributors of added sodium to the US diet. These foods will be monitored for sodium content so that the sodium values in the National Nutrient Database for Standard Reference (SR) are kept current as the food industry responds to requests and mandates from public health officials to lower the sodium content of packaged and restaurant foods.

## METHODS AND MATERIALS

### Steps to Identify and Rank Foods to Monitor for Sodium Content

- Over 2,800 foods from SR22 (released in 2009) were used as ingredients to estimate the nutrient values in the 7,000 foods contained in USDA's Food and Nutrient Database for Dietary Studies (FNDDS). This database was developed to calculate nutrient intakes for the What We Eat in America, National Health and Nutrition Examination Survey (NHANES).
- Commodity type items that do not contain added sodium, e.g., milk, eggs, meat, fruit, vegetables, and grain, were excluded from the list of 2,800 foods.
- The over 1,000 remaining foods containing added sodium were matched to the foods in the dietary intake files for respondents in NHANES 2007-2008.
- Percent contribution for each food was calculated by dividing the total grams consumed of the food by the total grams of sodium contributed by the foods containing added sodium.
- The list of foods was ranked in descending order to define the number and type of foods which collectively contributed 80% of added sodium.

### Sodium Analysis of White Bread

- In March 2010, white bread was sampled in 12 locations across the US from retail outlets. Locations were chosen on a multi-stage probability proportional to size sampling method.
- Samples were analyzed by an AOAC ICP method by a pre-qualified contract laboratory.

## RESULTS AND DISCUSSION

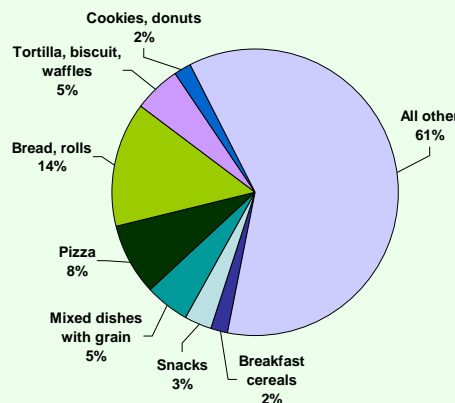
- Eighty percent of the sodium in the dietary records collected in 2007-2008 was contributed by 166 foods in SR. These foods will be monitored for changes in sodium content over the coming years.
- Foods which were the largest contributors will be monitored by analysis and those lower on the list will be monitored by label claims.
- The 13 foods that together contributed 25% of the added sodium intakes are shown in Table 1. Five of these are grain containing products. Even though the sodium content per 100 g is comparatively low, because of the large quantities consumed, bread and rolls are at the top of the list.
- Of the 166 foods to be monitored, 68 are grain containing foods. Figure 1 shows the % contribution of grain containing items based on total sodium contributed by the 166 foods.
- Other types of foods that were major contributors of sodium include cured meat, cheese, sauces, salad dressing, and french fries.

Table 1. Foods in SR22 contributing 25% of sodium intake in U.S.\*

Food	Na, mg/100g	Cumulative % Contribution
Rolls, hamburger or hotdog	479	3.01
Bread, white	681	5.80
Cheese food, pasteurized process, american	1265	8.38
Tortillas, flour	636	10.46
Soy sauce	5637	12.50
Frankfurter, beef	1140	14.44
Fast food, pizza, cheese, thin crust	581	16.11
Catsup	1114	17.73
Chicken tenders	857	19.30
Cheese, cheddar	621	20.87
Sauce, spaghetti	410	22.28
Pork, cured, ham	1278	23.67
Bread, wheat	521	25.03

\*Grain-based foods are highlighted in yellow.

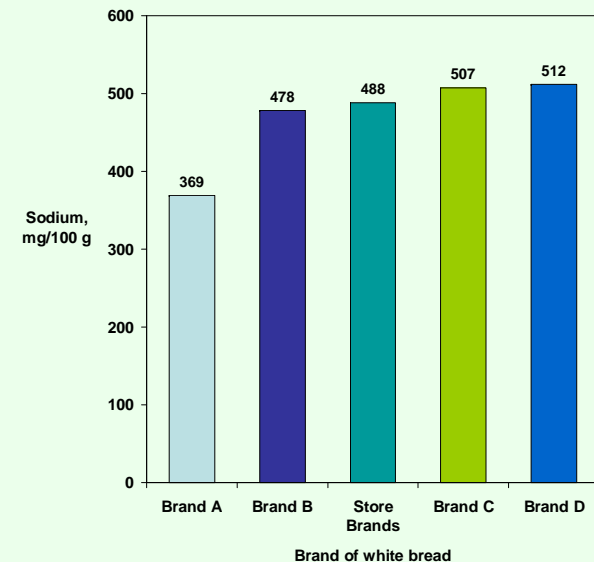
Figure 1. Percent contribution of sodium from foods representing 80% of U.S. intake



## Sodium Monitoring of White Bread

- In 1999, white bread was sampled nationwide as part of USDA's National Food and Nutrient Analysis Program (NFNAP). The mean value per 100 g was 681 ± 24 mg (n=8); as a result the sodium value for SR16 was changed to 681 mg/100 g.
- For SR23, the sodium value for white bread was reduced to 511 mg/100 g based on label claims for store and brand name breads.
- In 2010, white bread was again sampled nationwide using NFNAP methodology. Results are presented in Figure 2. Average for all brands is 482 ± 54 mg/100 g (n=21); the average for all store brand breads was 488 mg/100 mg, while the four brand name breads sampled had averages ranging from 369 to 512 mg/100 g.
- The company for Brand A announced in August 2010 that it had reformulated white bread while the company for Brand D announced it would be reformulating white bread in 2011. Based on label information, store brands have been fairly stable while brand name companies are reformulating more frequently.
- White bread will be sampled and analyzed again in about 2 years.

Figure 2. Sodium levels in white bread sampled in 2010



## CONCLUSION

Many grain-based foods rank high on NDL's list for monitoring sodium content. The rank is a function of the level of consumption by participants in NHANES as well as the amount of sodium in the food. The food industry is responding to health concerns about the amount of sodium in the US diet and is in the process of reformulating food products to reduce the sodium content. It is thus necessary to continuously monitor these foods to keep up with the changes.

In addition to white bread, other high sodium contributors (hot dog rolls, flour tortillas, and frankfurters) were analyzed earlier this year. Sampling is now underway for cheese and pepperoni pizza, macaroni and cheese, American cheese, and canned vegetables. The results of these analyses will be included in SR24.

