Sodium Values in Popular Family-Style Restaurant Food Items

Melissa Nickle, Pamela Pehrsson, Kristine Patterson, Mona Kahn, and Linda Lemar

USDA, Agricultural Research Service, Human Nutrition Research Center, Nutrient Data Laboratory, Beltsville, MD

Abstract

Excessive sodium intake is of public health concern in the U.S., with 77 percent of intake contributed by processed, packaged and restaurant foods. According to WWEIA, the mean sodium intake in 2005-2006 was 3,434 mg/day, exceeding the Dietary Guidelines for Americans recommendation of 2,300 mg/day. Numerous health organizations recommend substantial reductions in sodium levels in these foods over the coming decade. Under the USDA Nutrient Data Laboratory's monitoring program, high-consumption restaurant foods that are substantial contributors of sodium in the American diet have been sampled and analyzed. In 2008, six high-consumption foods from four popular nationwide family-style restaurants chains were collected in 12 locations. Samples of French fries, fried shrimp, mozzarella sticks, sirloin steak and children's macaroni and cheese and chicken tenders were composited using USDA National Food and Nutrient Analysis Program protocols. Composites and quality control materials were analyzed by USDA-approved laboratories using the ICP method; serving size weights were determined. Sodium values in French fries (n=23) ranged from 46-521 mg/100g (mean=654mg/208g serving) and in sirloin steak (n=23) from 134-549 mg/100g (mean=442mg/144g serving). Fried shrimp (n=23; 685-1136 mg/100g; mean=1152mg/135g serving) and mozzarella sticks (n=18; 656-933 mg/100g; mean=1842mg/232g serving) had the highest levels. The levels in the children's menu items were consistent among restaurants; chicken tenders (n=17) ranged from 524-684 mg/100g (mean=664mg/113g serving) and macaroni and cheese (n=23), 317-417 mg/100g (mean=832mg/226g serving). These observations provide a baseline value for sodium monitoring in several high-consumption restaurant foods and current, accurate data on restaurant foods for USDA databases. USDA and NIH, Agreement No. Y1CN5010.

Introduction

Excess intake of sodium is a major public health concern. Sodium from processed packaged and restaurant foods contributes approximately 77 percent of the sodium intake in the American diet. According to What We Eat in America 2005-2006, the mean sodium intake for Americans was on average 3,434mg/day, exceeding the 2005 Dietary Guidelines for Americans of 2,300mg/day. Excessive sodium consumption has caused numerous health organizations to recommend a substantial reduction in sodium levels in these foods over the coming decade. Under the USDA Nutrient Data Laboratory's (NDL) monitoring program, high-consumption family-style restaurant foods that may be substantial contributors of sodium in the American diet were sampled and analyzed.

The foods sampled included

- French fries
- fried shrimp
- mozzarella sticks
- sirloin steak
- two children's menu items (macaroni and cheese, and chicken tenders).

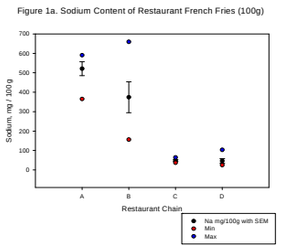
Methods

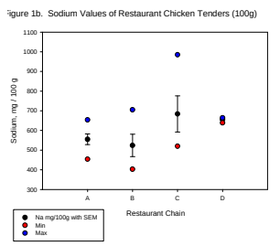
Sampling: In December 2008, sample units were collected from four popular nationwide family-style restaurant chains in 12 statistically selected locations in the 48 conterminous states. The family-style restaurant chains were identified using a multistage, stratified sampling plan developed for the National Food and Nutrient Analysis Program (NFNAP) [1, 2].

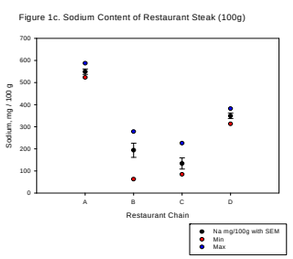
Analyses: The sample units were randomly grouped into 6 subgroups of 2 each and composited according to previously developed protocols for NFNAP. Values for sodium were determined by a USDA-approved commercial laboratory using ICP methodology. Serving size weights on individual sample units were determined prior to compositing.

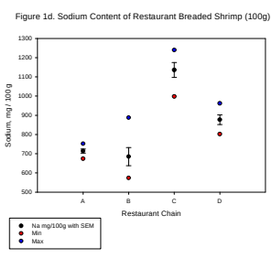
Quality Control: Analytical quality assurance was monitored through the use of appropriate standard reference materials (SRM) and in-house control materials.

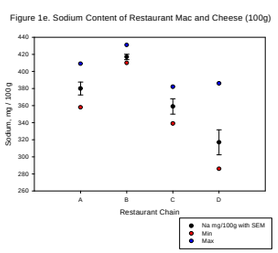
Statistics: mean, SEM using Sigma-Plot.

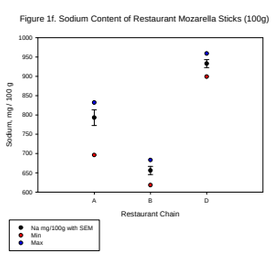




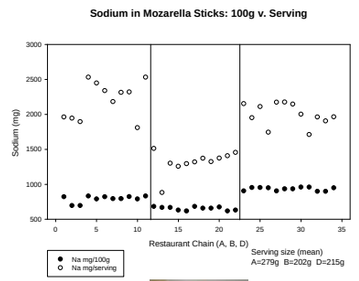


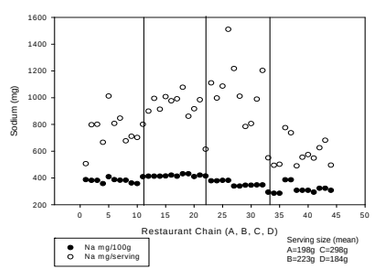






Figures 1a-f. Sodium in 100g of Restaurant Foods
(4 Chains: A, B, C, D; n=6 Restaurants/Chain)





Figures 2a-b. Sodium in 100g v. Single Serving of 3-4 Restaurant Chains (individual sample weights applied to mean sodium value of pair)

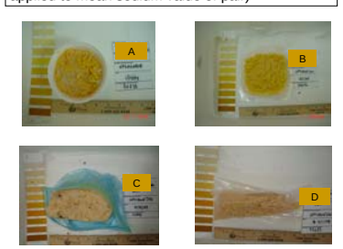


Figure 3. Variable Portion Sizes of Children's Macaroni and Cheese from 4 Restaurant Chains

Results

- Sodium values for popular entrees and side dishes varied widely across four major national restaurant chains. In some locations, foods were not available or were different enough from the proposed food that they were not included (e.g., chicken nuggets). No substitutions were made.
- Sodium values per 100g of food (mean±SE) (Fig. 1 a-f) varied widely, as did means among restaurants, and mean value/mean serving size:
  - **Sirloin steak:** 314±36mg (n=23); range 134-549mg; Average = 442mg/144g-serving.
  - **Fried shrimp:** 853±43mg (n=23); range 685-1136mg; Average = 1152mg/135g-serving.
  - **Mozzarella sticks:** 793±29mg (n=18); range 656-933mg; Average = 1842mg/232g-serving.
  - **French fries:** 314±57mg (n=23); range 46-521mg; Average = 654mg/208g-serving.
- 100-g sodium values (mean±SE) for children's items were more consistent among restaurants:
  - **Chicken tenders:** 588±38mg (n=17); range 524-684mg; Average = 664mg/113g-serving.
  - **Mac and cheese:** 369±9mg (n=23); range 317-417mg; Average = 832mg/226g-serving.
- French fries had a bimodal presentation (Fig. 1a) showing that restaurants either presalted (448mg/100g) or left unsalted (47mg/100g).
- Portion size differences caused large variation in sodium level per portion – in some cases, well over 200mg (i.e., children's macaroni and cheese and the mozzarella sticks, Fig. 2a-b). 100-g sodium levels for these two foods were relatively constant; however, sodium variability was considerable within and between restaurant chains when considering portion size (Fig. 2a-b, 3).
- Actual portion weights did not agree with restaurant Web site values, highlighting individual restaurant variability in serving sizes; variability in sodium levels within a restaurant also suggests lack of adherence to standardized recipes. Both factors contribute to imprecision when estimating sodium intakes from restaurant foods.
- These data were released in the USDA National Nutrient Database for Standard Reference SR21[3].

Conclusion

These observations provide a baseline value for sodium monitoring in several high-consumption restaurant foods and current, accurate data on restaurant foods for USDA databases. As funding permits, more popular foods from national restaurant chains will be sampled and analyzed, focusing on those considered major contributors of dietary sodium.

References

1. Pehrsson PR, Haytowitz DB, Holden JM, Perry CR, Beckler DG. National Food and Nutrient Analysis Program: food sampling. *J. Food Comp. Anal.* 2000; 13: 379-389.
2. Perry CR, Pehrsson PR, and Holden J. A Revised Sampling Plan for Obtaining Food Products for Nutrient Analysis for the USDA National Nutrient Database. 2003. Proceedings of the American Statistical Association, Section on Survey Research Methods [CD-ROM], Alexandria, VA: American Statistical Association, San Francisco, CA.
3. Nutrient Data Laboratory (NDL), Agricultural Research Service, US Department of Agriculture. 2008. USDA National Nutrient Database for Standard Reference, Release No.21. NDL Web site: http://www.ars.usda.gov/nutrient data.