US Food Industry Progress During the National Salt Reduction Initiative: 2009–2014

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Objectives. To assess the US packaged food industry's progress from 2009 to 2014, when the National Salt Reduction Initiative had voluntary, category-specific sodium targets with the goal of reducing sodium in packaged and restaurant foods by 25% over 5 years.

Methods. Using the National Salt Reduction Initiative Packaged Food Database, we assessed target achievement and change in sales-weighted mean sodium density in top-selling products in 61 food categories in 2009 (n = 6336), 2012 (n = 6898), and 2014 (n = 7396).

Results. In 2009, when the targets were established, no categories met National Salt Reduction Initiative 2012 or 2014 targets. By 2014, 26% of categories met 2012 targets and 3% met 2014 targets. From 2009 to 2014, the sales-weighted mean sodium density declined significantly in almost half of all food categories (43%; 26/61 categories). Overall, sales-weighted mean sodium density declined significantly (by 6.8%; $P < .001$).

Conclusions. National target setting with monitoring through a partnership of local, state, and national health organizations proved feasible, but industry progress was modest.

Public Health Implications. The US Food and Drug Administration's proposed voluntary targets will be an important step in achieving more substantial sodium reductions. (*Am J Public Health.* Published online ahead of print August 23, 2016: e1–e5. doi:10.2105/AJPH.2016.303397)

The National Salt Reduction Initiative (NSRI), a national coalition led by the New York City Department of Health and Mental Hygiene, was the first US effort to engage industry in lowering population sodium intake through targeted food supply sodium reductions. High sodium intake increases risk for cardiovascular disease via effects on blood pressure.[1] Daily intake is above recommended limits for most US adults and children[2] and has increased since the early 1970s.[3] More than three quarters of dietary sodium comes from packaged and restaurant foods and is already in the food when purchased.[4] A wide range of food types contribute to sodium intake, including bread and rolls, cold cuts, pizza, and poultry.[5] It is therefore difficult for individuals to lower intake, because additions made while cooking or at the table are comparatively small.[4] Although substituting whole foods for processed foods can help reduce intake, a tested population-based approach relies on incremental sodium reduction in processed foods by industry.

The World Health Organization has asked member states to commit to a 30% reduction in mean population intake by 2025, with a target of approximately 2000 milligrams per day.[6] Toward this end, more than 70 countries now have a salt reduction strategy, with examples of both mandatory and voluntary initiatives influencing food industry action and resulting in reductions in sodium intake.[7] Internationally, strategies are often multipronged and include consumer education, along with industry engagement and monitoring. National sodium reduction efforts in Finland and the United Kingdom informed the creation of the NSRI. Finland instituted mandatory high-sodium labels in 1993 on packaged foods as part of a comprehensive cardiovascular disease prevention effort, which resulted in food companies reformulating products to lower the sodium content.[8] The United Kingdom set voluntary sodium targets starting in 2006 with strong central government support. From 2006 to 2011, a reduction in the sales-weighted sodium in UK foods of about 6% was observed.[9]

The NSRI is not run by the US federal government. Instead, it is a coalition of more than 100 national health organizations and state and local health authorities throughout the United States. The goal of this coalition is to reduce population sodium intake by 20%, through a reduction in sodium in US packaged and restaurant foods by 25% by 2014. Mean adult sodium intake in the United States is more than 3400 milligrams.[10] The NSRI's goal of a 20% reduction in sodium intake would bring the US population intake about halfway to the recommended limit of 2300 milligrams per day.[11] The NSRI was initiated in 2009 because the US Food and Drug Administration (FDA), the regulatory body responsible for the safety of our national food supply, had been nonresponsive to appeals to act by consumer advocates.[12] The 2010 Institute of Medicine report *Strategies to Reduce Sodium Intake in the United States* called for the FDA to mandate sodium targets, if voluntary efforts were unsuccessful, specifically citing the NSRI.[3] On June 1, 2016, the FDA

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This article was accepted July 17, 2016.

doi: 10.2105/AJPH.2016.303397

announced draft guidance for industry on 2- and 10-year voluntary sodium targets and maxima, which are informed by sales, with an opportunity for public comment.[13]

For the NSRI, the Department of Health and Mental Hygiene created databases of top-selling foods to develop packaged and restaurant food categories that are key sources of sodium in the marketplace; to set 2012 and 2014 sodium reduction targets for each food category; and to monitor changes in sodium content over time. The development of the NSRI categories and targets involved more than 100 meetings with national industry associations, large and small food manufacturers, and food retailers. To inform the iterative discussions, the Department of Health and Mental Hygiene conducted product reviews to create rational category groupings, considered technical reformulation challenges, and assessed variation in sodium density within each category, informed by product sales. Detailed descriptions of NSRI's development and databases are published[14,15] and appear in Appendix A (available as a supplement to the online version of this article at http://www.ajph.org).

In 2009, the NSRI categories and draft targets were published and widely disseminated, with a final opportunity for industry review and comment. When final targets were published, companies were asked to meet 2012 and 2014 targets and were encouraged to publicly commit to signal their industry leadership.[16] Although many companies and their associations participated in the development of the NSRI, a relatively small number publicly committed to NSRI targets in at least 1 food category; 23 companies committed to packaged food targets, including major manufacturers such as Kraft, Heinz, and Mars, and 5 restaurant chains committed to restaurant targets.[16]

Packaged food companies were substantially more engaged in the NSRI than were restaurant companies, and packaged food contributes approximately 60% of dietary sodium[17]; as a result, packaged food changes are our focus for this analysis. We assessed US packaged food industry achievements toward meeting NSRI targets in 2012 and 2014 as well as the overall change in sodium density (amount of sodium by food weight) of packaged foods compared with the NSRI's goal of a 25% reduction in 2014.

METHODS

The NSRI Packaged Food Database combines sales and nutrition information for products in the top 80% of sales of each food category. We chose an 80% threshold to identify products in each category sold in the greatest quantities nationally, thus contributing most to population sodium intake. Approximately 5% of products on the market make up 80% of total sales in the categories examined. We did not obtain nutrition information for any private label foods (store brands) because of difficulties finding nutrition information on the basis of generic product descriptions. We created 62 packaged food categories, of which 1 did not have sales data; 2012 and 2014 sales-weighted targets were set for 61 categories.[16] We used the 2009, 2012, and 2014 NSRI Databases to evaluate change in US packaged foods. (Appendix A provides a technical description.)

Sample

We included branded products in the 61 categories (grouped into 15 metacategories) with sales, sodium content, and serving size data (6336 in 2009; 6898 in 2012; and 7396 in 2014). These data represent 84%, 86%, and 89% of branded NSRI Database products in 2009, 2012 and 2014, respectively. To assess whether the NSRI's 25% reduction goal was met and to assess metacategory-specific changes, we limited the sample to 54 categories (grouped into 14 metcategories) with consistent density metrics (mg/100 g) and unit sales data (n = 5954 in 2009; n = 6468 in 2012; n = 6937 in 2014). More information is available in Figure A (available as a supplement to the online version of this article at http://www.ajph.org).

Evaluating Sodium Reduction Progress

We had 4 measures of interest: the percentage of food categories meeting 2012 and 2014 NSRI targets; the percentage of products meeting 2012 and 2014 NSRI targets; food category– and metacategory-specific changes in sales-weighted mean (SWM) sodium densities; and overall change in SWM sodium density. We selected appropriate statistical analyses for the data type in each measure of interest. We completed all analyses with SAS version 9.2 (SAS Institute, Cary, NC) with a 2-tailed $\alpha = 0.05$.

To assess whether each food category met its associated NSRI target, we calculated SWM sodium density by category in 2012 and 2014 and compared it with NSRI targets. We calculated the number and percentage of food categories meeting associated 2012 and 2014 NSRI targets.

To assess product-level shifts in the market, we calculated the number and percentage of packaged food products within each category meeting NSRI targets in each year by tabulating products with sodium density less than or equal to 2012 and 2014 targets overall and by the 15 metacategories. We performed a χ^2 test to examine whether changes in the number of products meeting the targets from 2009 to 2012 and from 2012 to 2014 were significant. We used NSRI targets as benchmarks for individual products, although the targets were designed for comparison against category-level SWM sodium density.

To assess food category and metacategory level change from 2009 to 2014, we calculated both the absolute and relative SWM sodium density change and we conducted a weighted *t* test. We have also reported the absolute and relative unweighted mean sodium density change from 2009 to 2014 by category and conducted a *t* test.

To assess whether the NSRI's goal of a 25% reduction in SWM sodium density was met overall, we calculated absolute and relative changes in SWM sodium density in 2009 and 2014 and conducted a weighted *t* test. In addition, we calculated absolute and relative changes in unweighted mean sodium density in 2009 and 2014 and conducted a *t* test.

RESULTS

In 2009, when the targets were established, no categories met NSRI 2012 or 2014 targets. In 2014, 16 (26%) categories met 2012 targets and 2 (3%) met 2014 targets (Table A, available as a supplement to the online version of this article at http://www.ajph.org).

The percentage of products meeting NSRI targets increased from 2009 to 2014. In

2009, one third (33%) of packaged food products met 2012 NSRI targets for their category (n = 2101/6336). The percentage of products meeting 2012 NSRI targets rose significantly from 2009 to 2012 and again from 2012 to 2014: 42% (n = 2875/6898; χ^2 (1, n = 13 234) = 102.15; $P < .001$) met in 2012 and 45% (n = 3319/7396; χ^2 (1, n = 14 294) = 14.85, $P < .001$) met in 2014 (Figure 1). Significant increases in the percentage of products meeting 2012 NSRI targets occurred across most metacategories (73%; 11 of 15 metacategories), and there were no significant decreases (Figure 1).

SWM sodium density declined significantly in 26 categories from 2009 to 2014, whereas no categories increased significantly in SWM sodium density (Table A). The breads and rolls category, which has the largest market share in the database (13% of the database sales volume, 2014), experienced significant declines in SWM sodium density from 2009 to 2014 (–9.7%; $P < .001$). When we stratified by metacategory, 10 of the 14 metacategories demonstrated significant declines in SWM sodium density from 2009 to 2014, whereas no metacategories increased significantly in SWM sodium density (Figure 2).

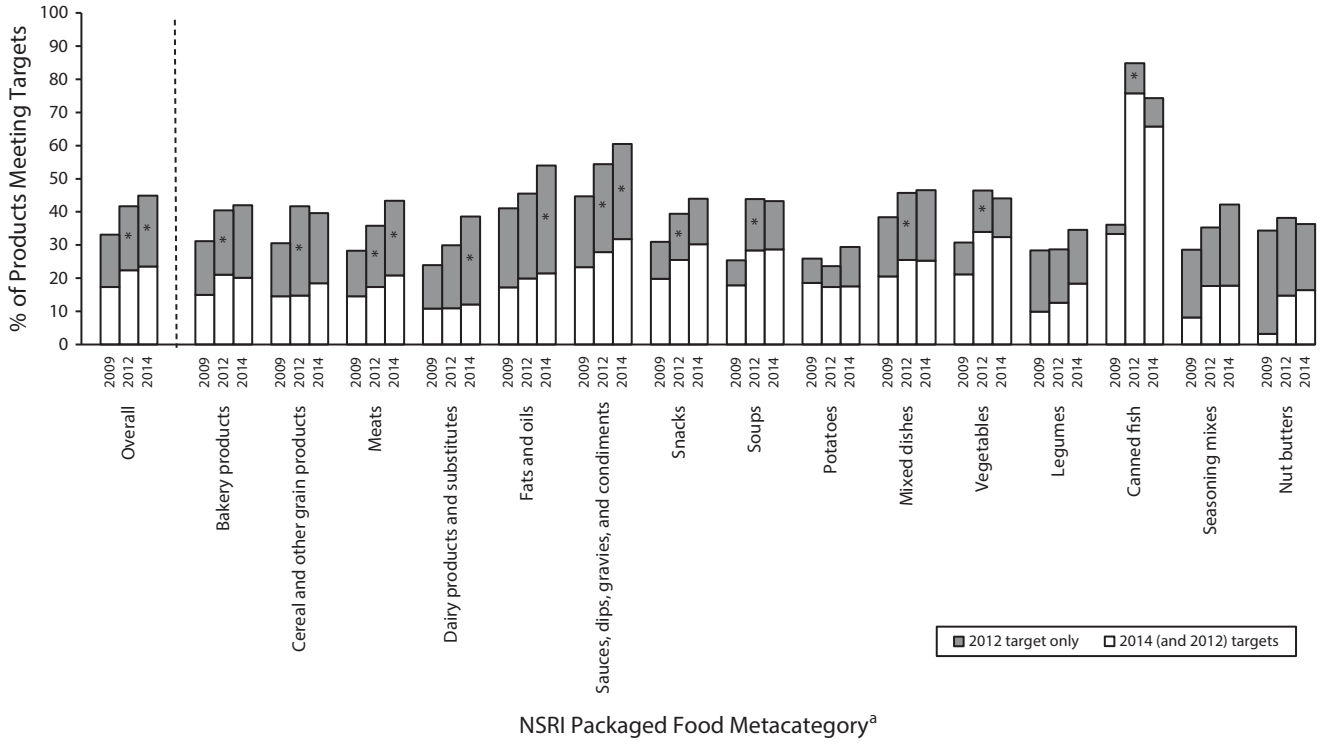
Overall, SWM sodium density declined significantly (by 6.8%; $P < .001$) from 2009 to 2014 (591 mg/100 g in 2009; 561 mg/100 g in 2012; and 551 mg/100 g in 2014), and mean sodium density unweighted by sales declined significantly (by 6.4%; $P < .001$) from 2009 to 2014 (623 mg/100 g in 2009; 589 mg/100 g in 2012; and 584/100 g in 2014).

DISCUSSION

No categories met NSRI 2012 or 2014 targets in 2009, when the NSRI was initiated. In 2014, 1 in 4 food categories met the 2012 NSRI targets, but only 2 categories met 2014 targets. Overall progress by 2014 was modest (6.8% significant decrease in SWM sodium density) compared with NSRI's 25% goal.

SWM sodium density decreased significantly in almost half of the categories from 2009 to 2014 (Table A). Many metacategories with significant reductions (e.g., bakery products, meats, dairy, and snacks) overlap with the top US dietary sodium contributors[5]; therefore, sodium reduction in these food types should have a relatively higher impact on population sodium intake because of current eating patterns. For example, products in the breads and rolls category contribute about 7.40% of daily sodium consumption.[5] We found that the sodium density of the breads and rolls category products declined by 9.70% over 5 years, equivalent to an approximate 0.72% decrease in population daily sodium intake if current eating patterns persist. Although this is a relatively small change from this single category, it suggests the cumulative impact that changes across many categories could have on intake.

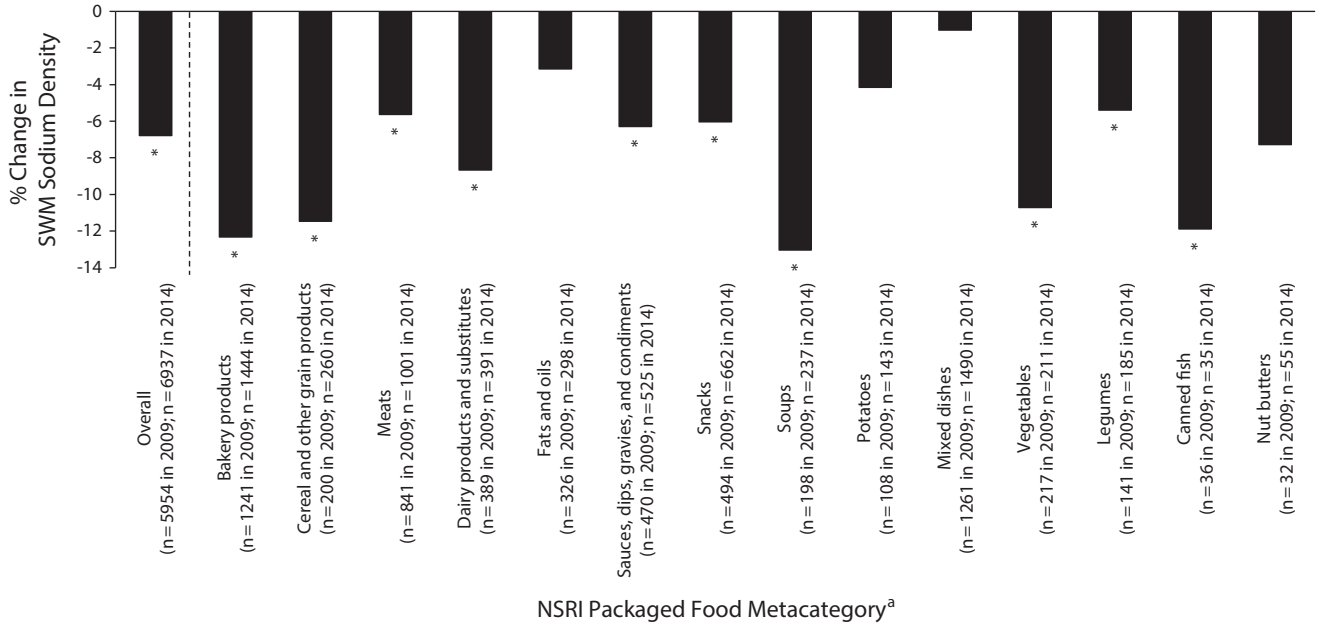
There was considerable industry participation in the development of NSRI categories and targets, and a small group of



[a]Sample includes 61 categories grouped into 15 metacategories.

*Significant difference ($P < .05$) in the number of products meeting 2012 NSRI targets between years 2009 and 2012 (in 2012 column) or 2012 and 2014 (in 2014 column).

FIGURE 1—Percentage of Products Meeting Sodium Reduction Targets by the National Salt Reduction Initiative (NSRI) Metacategory: United States, 2009, 2012, and 2014



[a]Sample includes categories with consistent density metrics (mg/100 g) and unit sales data (54 categories grouped into 14 metacategories).
*Significant difference ($P < .05$) in sales-weighted-mean sodium density between 2009 and 2014.

FIGURE 2—Change in Sales-Weighted Mean (SWM) Sodium Density (mg/100 g) by the National Salt Reduction Initiative (NSRI) Metacategory: United States, 2009–2014

companies led the way by publicly committing to targets in a wide range of product categories (e.g., meats; dairy products and substitutes; sauces, dips, gravies, and condiments). Although almost all the committed companies achieved their respective NSRI targets,[16] we also observed decreases in sodium density in categories for which no public commitments were made, suggesting that companies responded to the call to action even without a formal public commitment to do so. Changes occurred across many product types (Figure 2), with the percentage of products meeting targets increasing significantly in 11 of the 15 metacategories (Figure 1). The 5 food metacategories that had the largest increase in the percentage of products meeting the targets, all with increases of at least 15%, were meats; dairy products and substitutes; sauces, dips, gravies, and condiments; soups; and canned fish. Future research should focus on the strategies employed by companies that successfully achieved overall lower sodium density across varied product lines.

National sodium reduction programs are in place in many countries, many with demonstrated impact. In the United Kingdom, an approximate 10% decrease in sodium intake since 2004 is credited to a national, voluntary target approach that is complemented by consumer education campaigns.[18] Although the NSRI uses national sales and nutrition information to capture the change in the amount of sodium sold in key packaged food categories, the Department of Health and Mental Hygiene also conducted the first representative population-based assessment of adult New Yorkers' sodium intake using 24-hour urine analysis in 2009.[19] A planned follow-up will be useful as an overall evaluation of the population impact of New York City's multipronged sodium reduction effort and will complement these findings on the change in sodium density of packaged foods.

Limitations

There are analysis limitations that affect the generalizability of our results. Our data did not include all US packaged food sales. Nielsen ScanTrack sales data excluded Walmart, warehouse-style retailers (e.g., Costco), military commissaries, and grocery chains with sales of less than $2 million annually.[20] Sodium and serving size data were incomplete for some branded products and for all private label products, limiting interpretability for that sector.

We did not include products in the lowest 20% of sales in each category. Small sample sizes led to a lack of power in categories in which a few products dominate the market (e.g., salted butter, cream cheese). Nutrition information is from Nutrition Facts labels, and the FDA allows labeled nutrition content to differ from actual nutrition content by up to 20%.[21] Our analysis of change in the overall sample does not include all categories.

Public Health Implications

Although the observed sodium density reduction did not meet the NSRI's goal of a 25% decrease, industry progress suggests that a framework of food category targets combined with a robust monitoring system is a feasible approach for engaging industry and monitoring reductions in sodium density in the US packaged food supply.

The FDA's recent announcement outlining proposed short- and long-term voluntary sodium density targets, which take

sales into consideration, is an important and precedent-setting step forward. Establishing voluntary federal targets is consistent with the Institute of Medicine recommendation for federal action on sodium reduction,[3] could help level the playing field for food companies so that all are held to the same standard, and would benefit consumers. In fact, companies such as Nestlé and Mars recently applauded the FDA for releasing draft voluntary targets for sodium reduction.[22,23] Because of our findings from the NSRI and evidence from other countries that have adopted similar reformulation approaches to sodium reduction, we strongly encourage the FDA to finalize guidance in a timely manner. Federal action to set meaningful yet achievable sodium density targets, establish a public branded-food database, and monitor industry progress will be critical to success. AJPH

CONTRIBUTORS

C. J. Curtis had primary responsibility for final article content. C. J. Curtis, J. Clapp, and S. W. Ng designed the research. C. J. Curtis and S. A. Niederman drafted the article. C. J. Curtis and S. Y. Angell conceptualized the initiative. S. A. Niederman conducted the research. S. A. Niederman and S. W. Ng analyzed and interpreted the data. All authors revised the article and approved the final version.

ACKNOWLEDGMENTS

Funding for the National Salt Reduction Initiative (NSRI) Packaged Food Database was supported in part through cooperative agreements with the Centers for Disease Control and Prevention (1U58DP002418-01, 1U58DP003689-01, 5U58DP003689-0, 5U58DP003689-03, 1U58DP005465-01). The authors were supported by the Department of Health and Mental Hygiene (DOHMH).

The more than 100 members of the NSRI have been instrumental in demonstrating support for sodium reduction nationally over the past 6 years. The NSRI Database would not be possible without the dedication of Elizabeth Leonard, MPH, and many New York City DOHMH interns.

Note. The findings and conclusions in this article are those of the authors and do not necessarily represent the views of the Centers for Disease Control and Prevention.

HUMAN PARTICIPANT PROTECTION

Institutional review board approval was not needed because human participants were not involved in this study.

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