

# Schools Find Success in Reducing Sodium in Meals

## Healthy Eating Research

Issue Brief, September 2020

### Introduction

Schools are well-positioned to positively influence children's health and nutritional intake through the School Breakfast Program (SBP) and the National School Lunch Program (NSLP), which served 14.8 million<sup>1</sup> and 29.6 million<sup>2</sup> school-aged children, respectively, in 2019. Children who consumed school breakfast and lunch received 47% of their daily caloric intake from these meals.<sup>3</sup>

Evidence-based nutrition standards for school meals reinforce nutrition as a vital foundation of successful learning. In 2012, the U.S. Department of Agriculture (USDA) updated nutrition standards for school meals to help align children's intakes with nutrient levels recommended in the Dietary Guidelines for Americans (DGA).<sup>4</sup> Revised sodium standards were included in this update (Box 1), with a gradual reduction of sodium planned over a ten-year period to give schools and industry time to adapt. Strong science supports the link between lowering sodium intake and better health,<sup>5</sup> and lowering sodium intake beginning early in life is expected to yield substantial health and economic benefits. For example, a 9.5% reduction in sodium intake is estimated to prevent 1 million cardiac events and save over \$32 billion in direct medical costs.<sup>6</sup>

Since 2012, schools have worked hard to create meals that are both appealing to students and meet the updated USDA nutrition standards. In 2019, USDA released findings from its School Nutrition and Meal Cost Study (SNMCS), the first comprehensive, nationally representative study of the school meal programs since the updated nutrition standards went into effect.<sup>7,8,9,10</sup> Findings demonstrate that the overall healthfulness of school meals has improved significantly with students now getting more fruits, vegetables, and whole grains and fewer empty calories. Despite these improvements and the strong evidence linking sodium intake to health, there have been repeated attempts by Congress and the current Administration to weaken the sodium standards (see Box 1), citing implementation challenges for schools.

This issue brief highlights sodium intakes among America's children and SNMCS findings about sodium content of school meals.

### Key Findings

- Nine in 10 school-age children consume too much sodium, putting them at risk for high blood pressure—which already affects one in seven U.S. youths.
- In School Year (SY) 2014-2015, a majority of schools met the Target 1 sodium levels (see Box 1) for both lunch (72%) and breakfast (67%); certain types of schools were more likely to meet target levels.
- The average sodium content of school lunches and breakfasts served decreased by 19% and 23% overall, respectively, from SY 2009-2010 to SY 2014-2015.
- Implementation of the updated school meal nutrition standards was associated with improved nutritional quality of school breakfasts and lunches, driven in part by decreases in the sodium content of school meals.
- Ensuring timely school meal sodium targets that align with the DGAs is a critical step to improving the sodium intake of children across the U.S. Continued sodium reduction in school meals will encourage industry innovation and reinforce existing public health efforts to reduce sodium in the food supply and in Americans' diets.



**Box 1**

**Standards for Sodium Content of School Meals**

The Healthy, Hunger-Free Kids Act (HHFKA) of 2010 paved the way for updated nutrition standards for school meals. The updated standards, which include nutrient targets for school meals based on grade group (K-5; 6-8; 9-12), were established to align school meals with the latest nutrition science as outlined by the DGA. The standards outline three phases of increasingly lower target levels for sodium to be achieved gradually over a 10-year period culminating in SY 2022-2023 (see table below). At the time data for the SNMCS were collected (SY 2014-2015), schools were expected to meet Target 1 levels for sodium.

**School Meal Sodium Reduction Timeline and Limits**

Age/Grade Group	BREAKFAST			LUNCH		
	Target 1: SY+ 2014-2015	Target 2: SY 2017-2018*	Target 3: SY 2022-2023*	Target 1: SY 2014-2015	Target 2: SY 2017-2018*	Target 3: SY 2022-2023*
K-5	≤540 mg	≤485 mg	≤430 mg	≤1,230 mg	≤935 mg	≤640 mg
6-8	≤600 mg	≤535 mg	≤470 mg	≤1,360 mg	≤1,035 mg	≤710 mg
9-12	≤640 mg	≤570 mg	≤500 mg	≤1,420 mg	≤1,080 mg	≤740 mg

+ SY = School Year; mg = milligrams

\* In 2018, USDA delayed the original deadline for Target 2 by seven years and eliminated Target 3, leaving a final sodium goal of Target 2 to be achieved by the 2024-2025 school year. While Target 2 levels represent a substantial sodium reduction in school meals (when compared to baseline data), they are not aligned with levels recommended by the DGA. In April 2020, a federal court struck down USDA's attempt to weaken the sodium standards on the grounds that the administration violated the Administrative Procedure Act. This was considered a major win by school nutrition advocates; however, more research will be needed to evaluate further changes in sodium levels, as repeated attempts to weaken the nutrition standards continue to be a focus of the current administration.

**Current Sodium Intakes of School-Age Children**

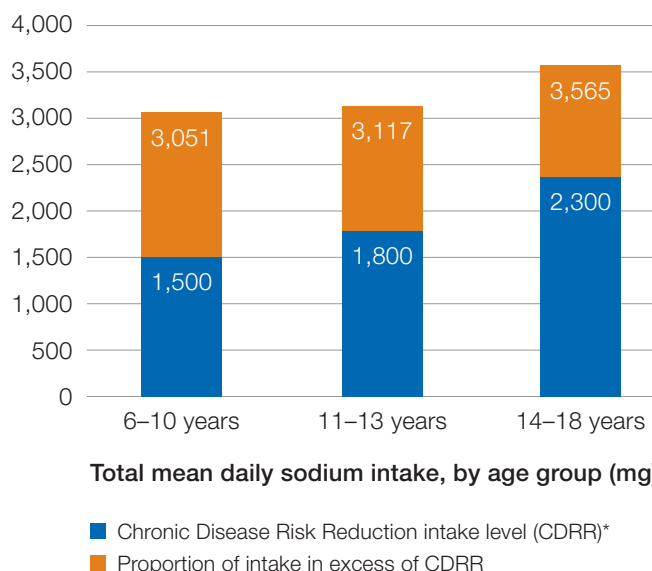
Nine in 10 school-age children consume excess sodium,<sup>11</sup> putting them at risk for high blood pressure—which already affects one in seven U.S. youths<sup>12</sup>—and other health problems. According to an analysis of National Health and Nutrition Examination Survey (NHANES) data collected in 2011-2012 (Figure 1), mean sodium intakes among school-age children are well above target levels. For example, the Chronic Disease Risk Reduction intake (CDRR) levels as established by the National Academies of Sciences, Engineering, and Medicine recommend that children ages 14-18 reduce intakes if above 2,300 mg/day;<sup>13</sup> average daily sodium intake in this age group was 3,565 mg in 2011-2012.

**Sodium Content of School Meals**

The SNMCS examined sodium levels in school meals based on data from nationally representative samples of public school food authorities (SFAs), schools, and students in SY 2014-2015. School Nutrition Managers (SNMs) in sampled schools or other SFA staff completed a web-based Menu Survey that collected detailed information about the foods prepared for and served in school meals during one school week. SFA directors and SNMs also completed brief web surveys that collected information about program operations. Sampled students completed an in-person dietary recall interview to provide information about foods and beverages consumed during a 24-hour period. Trained interviewers used USDA's

**Figure 1**

**Mean sodium intake of school-aged children by age (NHANES 2011-2012)**



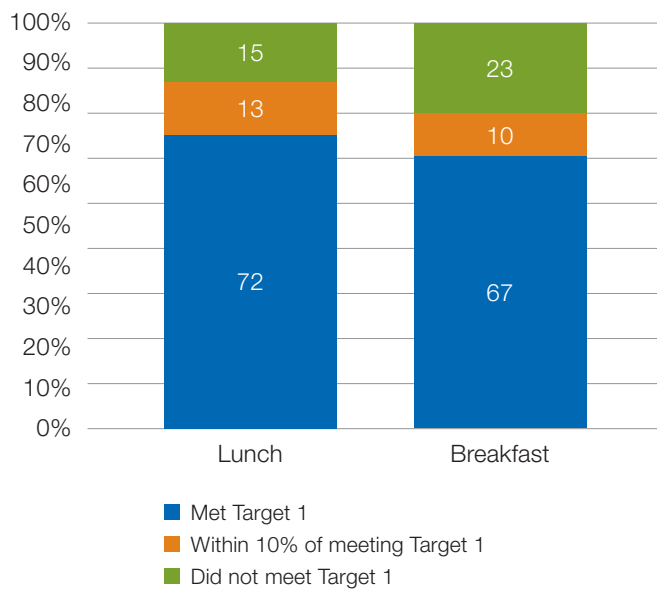
\*For children, Chronic Disease Risk Reduction Intake (CDRR) levels are set for the following age groups: 4-8 years, 9-13 years, and 14-18 years. The 6-10 year age group in this figure has overlap with two different CDRR levels; the level for ages 4-8 years is marked on this figure. Source: Quader ZS, Gillespie C, Sliwa SS, Ahuja JKC, Burd G, Moshfegh A, Pehrsson PR, Gunn JP, Mugavero K, Cogswell ME. Sodium intake among US school-aged children: National Health and Nutrition Examination Survey, 2011-2012. J Acad Nutr Diet 2017;117(1): 39-47.e5

Automated Multiple-Pass Method (AMPM) to collect the data. All 24-hour recalls covered intakes on school days. USDA's Survey Net (version 4.2) and Food and Nutrient Database for Dietary Studies (version 2011-2012) were used to process menu and dietary recall data.

### Schools are making significant progress in reducing sodium

- In SY 2014-2015, a majority of schools met Target 1 sodium levels for both lunch (72%) and breakfast (67%) (Figure 2), and another 13% and 10% of schools were within 10% of the Target 1 levels for lunch and breakfast, respectively.
- In SY 2014-2015, lunches consumed by NSLP participants provided significantly less sodium than lunches consumed by matched nonparticipants; no significant differences existed in breakfast sodium levels consumed by SBP participants versus nonparticipants.
- These findings indicate major progress in reducing the sodium content of school meals. The average sodium content of lunches and breakfasts served decreased by 19% and 23% overall, respectively, from SY 2009-2010 to SY 2014-2015. By SY 2014-2015, the sodium content of the average school breakfast was already below Target 2 levels for all three grade levels and was very close to Target 3 levels. Most (78%) (SFA) directors rated the new nutrition standards as “very helpful” or “somewhat helpful” in decreasing children’s sodium intake.

**Figure 2**  
**Percentage of all schools that met, nearly met, or did not meet Target 1 sodium levels**



Source: U.S. Department of Agriculture, Food and Nutrition Service, Office of Policy Support, School Nutrition and MealCost Study, Final Report Volume 2: Nutritional Characteristics of School Meals by Elizabeth Gearan, Mary Kay Fox, Katherine Niland, Dallas Dotter, Liana Washburn, Patricia Connor, Lauren Olsho, and Tara Wommak. Project Officer: John Endahl. Alexandria, VA: April 2019. Lunch: Table C.14; breakfast: Table E.14

### The nutritional quality of school meals has improved

- Implementation of the updated nutrition standards overall was associated with improved nutritional quality of school breakfasts and lunches, indicated by increases in mean total Healthy Eating Index (HEI) (Box 2) scores between SY 2009-2010 and SY 2014-2015. Over this period:
  - Mean total HEI scores increased from 57.9 to 81.5 for lunches and from 49.6 to 71.3 (out of a possible 100) for breakfasts.
  - Meeting the Target 1 sodium level was associated with significantly higher total HEI scores for both breakfasts and lunches.
  - Increases in the scores for the sodium component of the HEI helped drive the increases in mean total HEI scores. Sodium scores increased for lunches (from 10 to 27 out of 100) and breakfasts (from 72 to 93 out of 100), indicating that the concentration of sodium in school meals decreased over time.
- Despite the significant increase in the HEI score for sodium in lunches, the SY 2014-2015 score of 27 out of 100 indicates that more progress is needed to meet the DGA recommendations.
- The SY 2014-2015 sodium HEI score for breakfasts was 93% of the maximum score, indicating that the concentration of sodium levels in these meals was consistent with the DGA recommendation.
- Higher nutritional quality was associated with higher participation; average NSLP participation rate for schools with lunches having high HEI scores was 60% compared to 50% for schools with lunches with low HEI scores.

#### Healthy Eating Index

The Healthy Eating Index (HEI) is a measure of diet quality that assesses how well a set of foods aligns with DGA recommendations. The overall HEI score comprises a number of components that reflect the food groups and key recommendations in the DGA. HEI scores range from 0 to 100. A higher total HEI score indicates better alignment with DGA recommendations. Because there are recommended limits for sodium consumption, a higher score for the sodium component reflects lower sodium intakes, which is more desirable than higher intakes.

## Schools encounter some challenges to reducing sodium

Because sodium is consumed throughout the day from multiple food sources and environments, targeting a few food items isn't enough; reduction is needed across a wide range of foods.

- SFA directors rated the availability of appropriate foods, including lower-sodium products, as the second most challenging issue to fully implementing or maintaining compliance with nutrition standards overall.
- The cost of foods was rated as the most challenging issue to fully implementing or maintaining compliance with the new nutrition standards. Although meal costs are influenced by a variety of components such as amounts of fruits and vegetables served, no significant differences were found between the per-meal costs of breakfasts or lunches that met Target 1 sodium levels and those that did not meet the target levels.

## Disparities in meeting Target 1 sodium levels

- Though the majority of schools (72%) met Target 1 sodium levels, certain types of schools were less likely to do so and may need additional technical assistance or other resources. For example, based on average weekly lunch menus:
  - High schools were less likely (65%) than elementary (72%) schools, and significantly less likely than middle schools (76%), to meet Target 1 levels.
  - Small schools were significantly less likely (61%) than medium- (82%) or large-sized schools (79%) to meet Target 1 levels.\*
  - Rural schools were significantly less likely (56%) than urban (84%) or suburban schools (78%) to meet Target 1 levels.\*\*
- For breakfast menus:
  - Differences in the percentage of average weekly menus that met Target 1 sodium levels were not statistically significant across elementary, middle, and high schools.
  - Small schools were less likely (62%) than medium-sized schools (73%) to meet Target 1 levels.
  - Rural schools were less likely (57%) than urban (77%) or suburban (69%) schools to meet Target 1 levels.

\* Small = <500 students, medium = 500-999 students, large = >1,000 students. (Volume 2, page 47).

\*\* Data on SFA urbanicity are from the U.S. Department of Education's Common Core of Data (CCD) 2011-2012, which uses classifications based on standard urban and rural designations defined by the U.S. Census Bureau.

## Conclusions

Schools are an important setting for introducing and reinforcing the benefits of healthy eating. School meals provide an opportunity to help shape children's taste preferences as they expose children to an array of foods aligned with the DGA. The foods and beverages available in schools should measure up to the evidence-based standards in the DGA. Sodium levels in school meals have decreased as most schools have met Target 1 levels, and continued sodium reduction to meet Target 2 levels will strengthen the overall nutritional quality of school meals. Further reductions beyond Target 2 will achieve alignment with the DGA; furthermore, data indicate that gradual reductions in foods' sodium content can shift people's preferences away from salty foods without loss of taste enjoyment.<sup>14</sup> Schools' success in decreasing sodium from SY 2009-2010 to SY 2014-2015 highlights their ability to adapt and rise to the challenge; their continued progress and investment in promoting children's health should be encouraged.

## Policy Recommendations

The findings highlighted in this brief indicate potential actions that USDA, state agencies, and school districts can take to support continued sodium reduction in school meals, particularly lunch.

### Provide additional resources for school food service

Additional technical assistance will help schools maintain progress toward serving meals with sodium levels that are closer to the DGA recommendations. For example, technical assistance can help SFA personnel identify leading sodium contributors in their menus and suggest modifications or substitutions for those products.

### Re-establish school meal sodium targets that are aligned with the DGA

Strong nutrition standards for school meals, consistent with evidence-based recommendations, position children for optimal health and wellbeing. Attempts to weaken any of the standards (as has occurred for sodium) compromises the health and well-being of children across the country.<sup>15,16</sup> Furthermore, such attempts open the door to erosion of other areas of the nutrition standards.

### Continued product reformulation and industry innovation are needed

Findings from the SNMCS highlight the positive efforts school food professionals have made across the country to reduce sodium in school meals, yet HEI scores for sodium remain relatively low, indicating ample room for improvement. The food industry has developed new products and reformulated existing products to contain less sodium, giving schools more options to meet the standards.<sup>17</sup> Furthermore, FDA has issued voluntary sodium targets for various food categories, as well as food labeling guidance for an ingredient that is used to reduce sodium in foods, which are expected to support continued industry efforts in this area.<sup>18</sup>

## Acronyms

- HEI – Healthy Eating Index
- HHFKA – Healthy, Hunger-Free Kids Act of 2010
- NHANES – National Health and Nutrition Examination Survey
- NSLP – National School Lunch Program
- SBP – School Breakfast Program
- SFA – school food authority
- SNMCS – School Nutrition Meal Cost Study
- SY – school year
- USDA – U.S. Department of Agriculture

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## References

1. USDA Food and Nutrition Service. "Child Nutrition Tables: School Breakfast - Participation and Meals Served." Accessed July 16, 2020. <https://www.fns.usda.gov/pd/child-nutrition-tables>.
2. USDA Food and Nutrition Service. "Child Nutrition Tables: National School Lunch - Participation and Meals Served." Accessed July 16, 2020. <https://www.fns.usda.gov/pd/child-nutrition-tables>.
3. Cullen, Karen Weber, and Chen, Tzu-An. "The contribution of the USDA school breakfast and lunch program meals to student daily dietary intake." *Preventive Medicine Reports*, 2017;5:82-85. <https://www.sciencedirect.com/science/article/pii/S2211335516301516#bb0075>.
4. 77 FR 4087, January 26, 2012 <https://www.federalregister.gov/documents/2012/01/26/2012-1010/nutrition-standards-in-the-national-school-lunch-and-school-breakfast-programs>.
5. Appel, L.J., Lichtenstein, A.H., Callahan, E.A., Sinaiko, A., Van Horn, L., and Whitsel L. "Reducing sodium intake in children: A public health investment." *Journal of Clinical Hypertension*, 2015;17(9):657-662.
6. Smith-Spangler, C.M., Juusola, J.L., Enns, E.A., Owens, D.K., and Garber, A.M. "Population strategies to reduce sodium intake and the burden of cardiovascular disease." *Annals of Internal Medicine*, 2010;152:481-487.
7. U.S. Department of Agriculture, Food and Nutrition Service, Office of Policy Support, School Nutrition and Meal Cost Study, Final Report Volume 1: School Meal Program Operations and School Nutrition Environments by Sarah Forrestal, Charlotte Cabili, Dallas Dotter, Christopher W. Logan, Patricia Connor, Maria Boyle, Ayseha Enver, and Hiren Nissar. Project Officer: John Endahl. Alexandria, VA: April 2019.
8. U.S. Department of Agriculture, Food and Nutrition Service, Office of Policy Support, School Nutrition and Meal Cost Study, Final Report Volume 2: Nutritional Characteristics of School Meals by Elizabeth Gearan, Mary Kay Fox, Katherine Niland, Dallas Dotter, Liana Washburn, Patricia Connor, Lauren Olsho, and Tara Wommak. Project Officer: John Endahl. Alexandria, VA: April 2019.
9. U.S. Department of Agriculture, Food and Nutrition Service, Office of Policy Support, School Nutrition and Meal Cost Study, Final Report Volume 3: School Meal Costs and Revenues by Christopher Logan, Vinh Tran, Maria Boyle, Ayseha Enver, Matthew Zeidenberg, and Michele Mendelson. Project Officer: John Endahl. Alexandria, VA: April 2019.
10. U.S. Department of Agriculture, Food and Nutrition Service, Office of Policy Support, School Nutrition and Meal Cost Study, Final Report Volume 4: Student Participation, Satisfaction, Plate Waste, and Dietary Intakes by Mary Kay Fox, Elizabeth Gearan, Charlotte Cabili, Dallas Dotter, Katherine Niland, Liana Washburn, Nora Paxton, Lauren Olsho, Lindsay LeClair, and Vinh Tran. Project Officer: John Endahl. Alexandria, VA: April 2019.
11. Quader, Z.S., Gillespie, C., Sliwa, S.S., et al. "Sodium intake among US school-aged children: National Health and Nutrition Examination Survey, 2011–2012." *Journal of the Academy of Nutrition and Dietetics*, 2017;117(1):39–47.e5.
12. Jackson, S.L., Zhang, Z., Wiltz, J.L., et al. "Hypertension among youths — United States, 2001–2016." *Morbidity and Mortality Weekly Report*, 2018;67:758–762.
13. National Academies of Sciences, Engineering, and Medicine 2019. "Dietary Reference Intakes for Sodium and Potassium." Washington, DC: The National Academies Press.
14. Institute of Medicine, 2010. "Strategies to reduce sodium intake in the United States." Washington, DC: National Academies Press. <https://www.ncbi.nlm.nih.gov/books/NBK50956/>.
15. Fadulu, Lola. "Court Strikes Down Trump Rollback of School Nutrition Rules." *New York Times*, April 14, 2020. Accessed August 27, 2020. <https://www.nytimes.com/2020/04/14/us/politics/trump-school-nutrition-rule.html>.
16. Center for Science in the Public Interest. "Federal Court Strikes Down Trump Administration School Nutrition Rollbacks." Last updated April 13, 2020. Accessed August 27, 2020. <https://cspinet.org/news/federal-court-strikes-down-trump-administration-school-nutrition-rollbacks-20200413>.
17. National Alliance for Nutrition and Activity. "Products that easily meet sodium reduction targets for school meals." Last updated October 2019. Accessed August 27, 2020. [https://cspinet.org/sites/default/files/attachment/Sodium\\_Examples.pdf](https://cspinet.org/sites/default/files/attachment/Sodium_Examples.pdf).
18. Food and Drug Administration. "FDA In Brief: FDA issues new guidance to help consumers recognize potassium chloride as an alternative to sodium in food." Last updated May 17, 2019. Accessed August 27, 2020. <https://www.fda.gov/news-events/fda-brief/fda-brief-fda-issues-new-guidance-help-consumers-recognize-potassium-chloride-alternative-sodium>.

### About Healthy Eating Research

*Healthy Eating Research* (HER) is a national program of the Robert Wood Johnson Foundation. Technical assistance and direction are provided by Duke University under the direction of Mary Story PhD, RD, program director, and Megan Lott, MPH, RDN, deputy director. HER supports research to identify, analyze, and evaluate environmental and policy strategies that can promote healthy eating among children and prevent childhood obesity. Special emphasis is given to research projects that benefit children and adolescents and their families, especially among lower-income and racial and ethnic minority population groups that are at highest risk for poor health and well-being and nutrition related health disparities. For more information, visit [www.healthyeatingresearch.org](http://www.healthyeatingresearch.org) or follow HER on Twitter at [@HERResearch](https://twitter.com/HERResearch).

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