

Sodium Politics:



School Nutrition Services
Raising the Grade on Food Safety

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Why reduce sodium intake?

Pros

- High sodium intake is associated with higher risk for hypertension later in life.
- High blood pressure is associated with CVD and other non-communicable diseases along with the burden increasing healthcare costs.

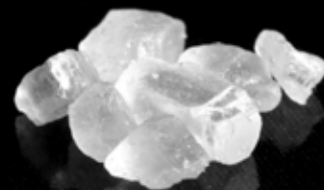
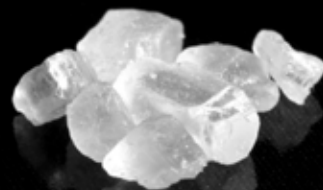
Cons

- Reducing sodium too much (i.e. to a biological level) can impact health negatively (i.e. electrolyte balance).
- Negatively affect the quality of food products in the market.



Sodium Basics & Physiological Function

- Body maintains homeostasis – conserves what body needs.
- Sodium is needed for nerve impulses and muscle contractions.
- Sodium and potassium maintain fluid.
- Add your third bullet point here.





When Sodium Levels Fall and Rise

- The body has an intricate system of checks and balances to maintain a steady amount of sodium in the fluid that bathes cells and in the bloodstream, regardless of intake.
 - Sodium needs not met:
 - The kidneys and sweat glands hold onto water.
 - This keeps sodium from leaving the body.
 - More sodium than needs:
 - The kidneys flush out the excess by making more urine.



High Sodium Levels

- Excess sodium in the blood accumulates.
- The body responds by holding onto water to dilute the sodium.
- This increases fluid surrounding cells and the volume of blood in the bloodstream.
- The heart works harder.
- More pressure on the blood vessel.
 - Over time: high blood pressure, heart attack, or stroke.



Centers for Disease Control and Prevention, 2011

- The average daily intake of sodium, ages 2 and 17 years is 2,965 – mg; 97% exceeding recommended intake of 1,500
- The average daily sodium intake ages of 2 and 17 is 2,985 with 76.2% of those exceeding <2,300 mg/day
- 75% of sodium is added to commercial foods during processing or restaurant foods
- 25% occurs naturally or is added by the consumer.




Institute of Medicine

- IOM to set mandatory targets for processed and restaurant foods. Supporting strategies are the following:
 - Improved sodium content labeling.
 - Encourage organizations to implement procurement policies that establish sodium limits for foods they distribute.



Effect of lower sodium intake on health: Systematic review and meta-analyses, 2013

- 14 cohort studies and 37 randomized-controlled trials analyzed in a meta-analysis.
- A reduction in sodium intake significantly reduced blood pressure by 0.84 mmHg (0.25-1.43) and diastolic blood pressure by 0.87 mmHg (0.14-1.60).
- The reduction in blood pressure in children was small.



Lower sodium intake reduces blood pressure in adults and children, but is not associated with a reduced risk of all CVD or all cause mortality, 2013

- Evidence shows that sodium intake may benefit those with very high intakes, but may be harmful if it is reduced too far.
- The IOM has not identified a “safe zone” for sodium intake yet. The hope is to develop a range that will be easily accommodated by most of the population.



Vital signs: Food categories contributing the most to sodium consumption – United States, 2007-2008

- The leading sources of dietary sodium
 - Bread, cold cuts, pizza, poultry, soups, sandwiches, cheese, pasta mixed dishes, meat mixed dishes, and snacks.
 - 2/3 of dietary sodium comes from convenience stores or other stores; 1/4 comes from restaurants.
 - Sustained manufacturer and restaurant reductions in sodium are recommended.
 - This could lead to the prevention of 28,000 deaths and \$7 billion in health care savings annually.



Dietary sodium reduction – Time for choice, 2012

- Challenge -widespread use of sodium in the American food supply.
- More than 75% of sodium in the average American's diet comes from packaged and restaurant foods.
- Salt and other sodium containing ingredients are added to food by manufacturers for many reasons like: flavoring, food processing, safety, cost savings, extending shelf-life, and/or altering food texture, sometimes in excess.
- In 2010, the IOM reported labeling and education bring about behavior change, but did not succeed in reducing sodium intake in the U.S. The new recommendation by the IOM is conduct widespread, but gradual reductions to sodium in the food supply.



Meals offered and served in US public schools: Do they meet nutrient standards?, 2008

- ADA concluded that future policy, practice, and research should focus on reducing levels of fat and sodium and increasing fiber in school meals.
- In the study, the top sources of sodium offered by the NSLP were milk, French fries, green salads, legumes, combinations entrees (e.g. pizza, hamburgers, etc.), breaded chicken products, desserts, and condiments/salad dressings.
- Essentially no schools in the study provided meals with less than 1/3 of the recommended maximum daily intake of sodium (767 mg/lunch...based on 2005 Dietary Guidelines).

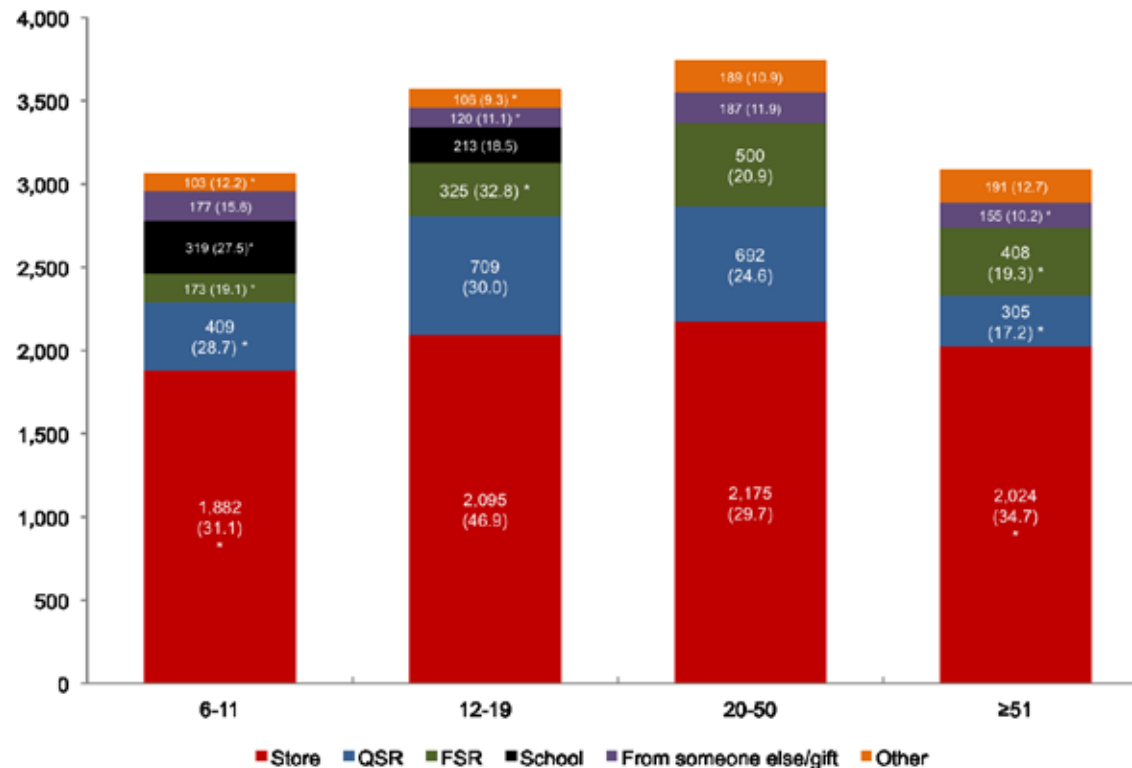


Dietary sodium: A perspective on recent sodium evidence – its interpretation and controversies, 2013

- World Health Organization (WHO) report indicated that sodium intake <2000 mg/day was associated with reduction in blood pressure. In addition, higher intakes of sodium were associated with higher risk of stroke, stroke death, and coronary heart disease death.
- The WHO renewed their recommendation to <2000 mg/day in adults, and even lower for children based on their lower energy needs.
- Two reviews, generated controversy about the dose response to sodium and increased risk of cardiovascular disease. One published by Yusuf et al. and one by the IOM.

Sodium Intakes of US Children and Adults

Figure 1. Location of dietary sodium (mg) by age group (year), NHANES 2003–2008.



Values in parentheses represent standard errors of the age-adjusted survey-weighted mean. Asterisk (*) indicates value significantly different than value observed for 20–50 year age group.

Top 10 Sodium Sources People Aged 2–19 Years

1. Pizza
2. Breads & Rolls
3. Poultry
4. Cold cuts & Cured meats
5. Sandwiches
6. Savory Snacks
7. Soups
8. Cheese
9. Mixed Pasta Dishes
10. Frankfurters & Sausage





AVERAGE DAILY INTAKE OF SODIUM

- 2,300 mg/day recommendation for general population
- 2307 mg/day ages 2-5 actual intake
- 3,260 mg/day ages 8-12 actual intake
- 3,486 mg/day ages 3-18 actual intake



Special Grouping

- 1,500 mg/day recommendation for African American children and children with TTN, Diabetes, Chronic Kidney Disease.



Sodium intake and blood pressure among US children and adolescents, 2011

- High blood pressure in childhood increases risk for hypertension in adulthood, which is associated with early development of CVD
- Obesity/overweight, and high sodium intake are risk factors for childhood hypertension.
- This study on children and adolescents between 8 and 18 years (n = 6,235) showed that usual sodium intake was positively associated with systolic blood pressure and risk for pre-high and high blood pressure in US children.
- Data from this study indicates a positive relationship between sodium intake and weight status on risk for hypertension. The study subjects consumed an average of 3387 mg/day of sodium.



Do school based food and nutrition policies improve diet and reduce obesity? 2008

- Some current school policies have been effective in improving the food environment and dietary intake in schools, but overall current evidence on effectiveness is limited. Schools seem to be the logical strategic setting for implementing nutrition policies and aiming at promotion of healthy diet.



Sodium and potassium intakes among US infants and preschool children, 2003-2010, 2013

- Addressing the younger population, a study has found that most US preschoolers consume too much sodium and not nearly enough potassium.



Sodium intake and blood pressure in children, 2013

- HTN is increasing.
- Focus on the adoption of healthy dietary patterns and lifestyles in children.
- Dietary habits are developed in childhood, so a high-sodium diet should be avoided at this stage of life (as a preventative measure).
- Prevention of the development of preference for high sodium foods.
- This article suggests family education, consumer-friendly nutritional labeling, and efforts to lower sodium in processed food.



Balanced Dietary Habits

- The most current evidence and research supports that there is a link between eating habits earlier in life and long-term health. The link between sodium consumption earlier in life and hypertension later in life.
- Overall, in lieu of increasing prevalence of chronic diseases, it would be beneficial to focus on developing balanced dietary patterns in schools to create long-term, lifestyle changes that will positively impact the health of our future generations to come.



Resource:

- *Also take a look at:
<http://www.hsph.harvard.edu/nutritionsource/lower-sodium-and-salt/>





WHAT DOES IT MEAN FOR THE MANUFACTURER?





Manufacturer's Facts

Sodium levels naturally occurring in the food items on school menus under new planning guidelines:

Low Fat Milk	125 mg
Reduced Fat, low sodium whole grain <i>conservative</i>	175 mg
USDA Foods Fruits	0-5 mg
USDA Foods low sodium vegetables	<u>140 mg</u>
Total	440 mg – 445 mg

Remaining for Center of Plate Entrée: (K-5)

Target 1	780-785 mg of 1230 mg total meal	effective SY 14-15
Target 2	490-495 mg of 935 mg total meal	effective SY 17-18
Target 3	195-200 mg of 640 mg total meal	effective SY 22-23



What does this mean for Manufacturers?

- Wait until SY 2014?
- Make new products for SY14-15, then again SY 17-18 and then again for SY22-23?
- How much does R&D cost to make multiple products?
- What will new ingredients cost?
- What will new labels cost?
- What do new formulations do to the nutritionals?
- Is it possible to make these products?
- What will the new products taste like?
- How much will the new products cost?

 Why did Salt get added to Food?

PRESERVATION

TASTE

FERMENTATION



There's Salt (Sodium Chloride) and then there's all the other kinds of Sodium

- Salt – sodium chloride
 - Fermentation: draws water out of food allowing lactic acid bacteria to grow and cause fermentation (FAT TOM)
 - Increased lactic acid reduces ph (ph is measured 1-14; with 1 being more acidic)
 - Cucumbers to pickles
 - Cabbage to sauerkraut
 - Beef to pastrami
 - Preservation: adding salt reduces the growth of pathogen causing bacteria (FAT TOM)
 - Reduction in water activity (FAT TOM) salt binds with water; therefore microorganisms do not have moisture to grow
 - Causes osmotic shock (FAT TOM) loss of water from cells causes cell death or retarded growth
 - Taste: even the smallest amount of salt enhances the flavors of food, without making food salty



Sodium Compounds Used in Foods

SOURCE: Doyle et al., 2001.

Compound Name	Food to Which the Compound Is Added
Disodium ethylenediaminetetraacetic acid (EDTA)	Salad dressing, mayonnaise, canned seafood, fruit fillings
Sodium acetate	Baked goods, seafood
Sodium ascorbate	Meat products
Sodium benzoate	Beverages, fermented vegetables, jams, fruit fillings, salad dressings
Sodium dehydroacetate	Squash
Sodium diacetate	Condiments
Sodium erythorbate	Meat, soft drinks
Sodium lactate	Meat products
Sodium nitrate	Cured meats
Sodium nitrite	Cured meats
Sodium phosphates	Meat products, cheese, puddings or custards
Sodium propionate	Cheese, baked goods
Sodium sulfite	Fruit and vegetable products, seafood



What do these Sodium Compounds do?

- **Sodium Benzoate:** preservative preventing growth of yeasts and bacteria; used in fruit juices, jams, relishes and beverages
- **Sodium Bicarbonate (baking soda):** used as a leavening agent to release carbon dioxide in baked goods to produce increased volume and tenderness
- **Sodium Caseinate:** used as a thickener and binder in processed meats and desserts
- **Sodium Citrate:** controls acidity, stability, aids in emulsification and improves rehydration
- **Sodium Erythorbate:** antioxidant used to prevent color and flavor changes



What do these Sodium Compounds do?

- **Sodium Propionate:** preservative and mold inhibitor in baked goods; cheese; confections; frostings, gelatin, pudding, jams, jellies, meat products and soft candy
- **Sodium Saccharin:** artificial sweetener, aka SACCHARIN
- **Sodium Nitrate/Nitrite:** a curing agent used to preserve food and prevent the growth of bacteria
- **Sodium Sulfite (bisulfite, metabisulfite)** prevents fruit from darkening and losing flavor and vitamins while being dried
- **Sodium Phosphates:** used as emulsifiers and stabilizers in processed cheese; and to improve texture in processed meats
- **Sodium Lactate and diacetate:** prevent growth of harmful bacteria in particular *Listeria monocytogenes* in cured, ready to eat meats



What can be used instead?

- **Potassium Chloride**
 - Replaces salt as an ingredient up to 30%; any more than that and food becomes bitter
- **Ammonium Chloride**
 - Can give the salty taste but too much provides a bad odor
- **Sucrose and other sweeteners**
 - Added with other compounds to reduce eliminate bitterness
- **Herbs and spices**
 - Enhance flavor but do not contribute to preservation
- **Sea Salts: combinations of other chloride compounds reducing sodium levels**



What happens when we remove the sodium?

- Less moist
- Shorter holding time
- Less tender
- Shorter shelf life
- Product separation
- Taste suffers, acceptability goes down



QUESTIONS?



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