

# Reducing Sodium Consumption in

## Most Americans consume too much sodium

# Iowa

*Sodium consumption has increased by more than half from a generation ago.*

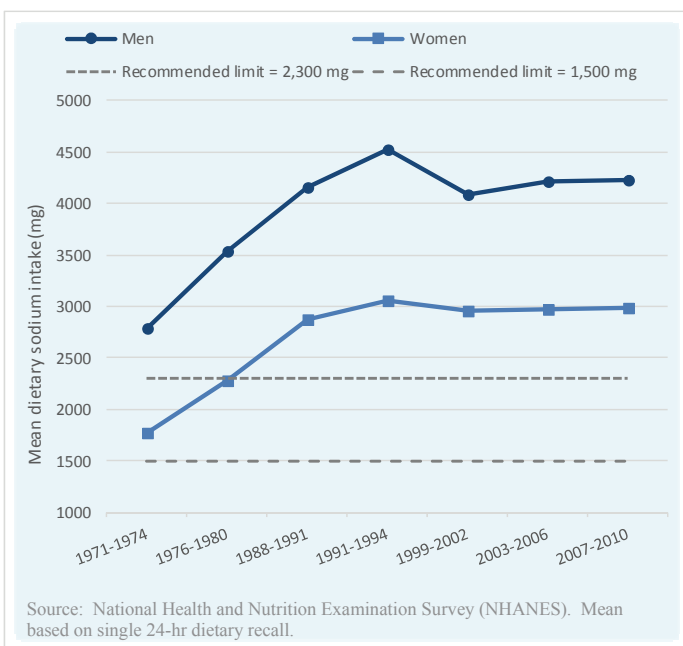
Most people in the United States consume much higher amounts of sodium than they should. Average daily sodium consumption during 2007–2008 was 3,266 mg among persons 2 years and older, well above the current *Dietary Guidelines for Americans* recommendations of less than 2,300 mg a day. Some high risk individuals should consume only 1,500 mg a day; about half of the population are part of this group, which includes individuals who are 51 years and older and those of any age, including children, who are African American or have high blood pressure, diabetes, or chronic kidney disease.<sup>1</sup>

The words salt and sodium are not exactly the same, yet these words are often used in place of each other. For example, the Nutrition Facts food label uses “sodium,” whereas the front of the package may say “low salt.”<sup>2</sup> Ninety percent of the sodium we consume is in the form of salt.<sup>3</sup> Excess dietary sodium (salt) can increase blood pressure and lead to heart disease, stroke, and kidney complications.<sup>4</sup>

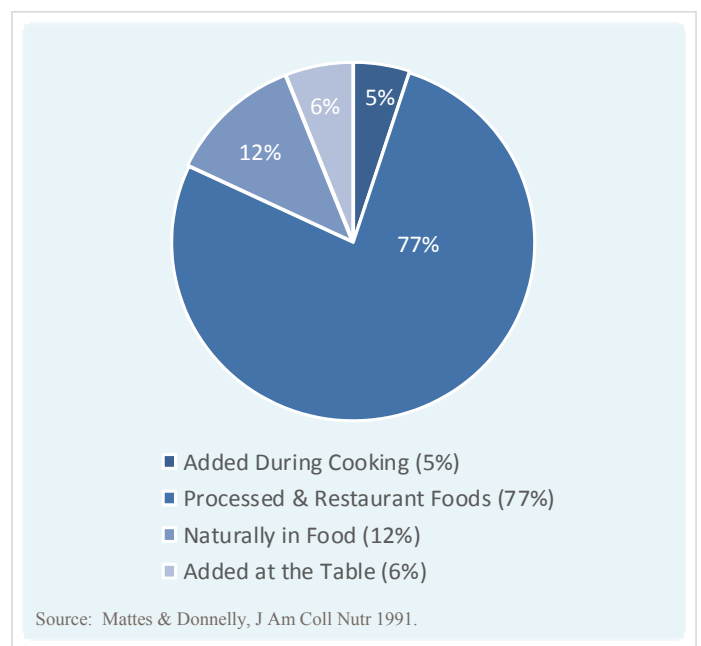
Over the past 30 years, sodium consumption in the population has increased dramatically. Americans consume approximately 55% more sodium today than they did a generation ago (Figure 1).<sup>5</sup> Presently, most of the sodium that Americans consume comes from processed and restaurant foods (Figure 2).<sup>6</sup> Over the past 25 years, Americans have increased the number of meals they eat away from home, making restaurant foods an important source of dietary sodium.<sup>7</sup> Frequently, consumers are not provided with information about sodium content for menu items in restaurants, and will typically underestimate the amount of sodium that is contained in a variety of restaurant foods.<sup>8</sup> Even when sodium information is provided, it may be difficult for consumers to make sense of the information. In addition, lower calorie meals or food options can sometimes be misleading as low calorie foods, processed or at restaurants, are frequently high in sodium. Although public health messages regarding fat intake and high-energy diets are more widespread, the harmful effects of excess sodium consumption have received considerably less attention.<sup>9</sup>



**Figure 1. Average dietary sodium intake among US men and women ages 18-74**



**Figure 2. Sources of sodium in the US diet**



# Health and economic consequences of excess sodium consumption

*The cost of sodium can be measured in both dollars and in life lost.*

In the U.S., the burden of hypertension is considerable. The residual lifetime risks of developing hypertension for middle-aged adults (ages 55 to 65 years) is nearly 85%. Additionally, the lifetime likelihood of receiving anti-hypertension medications for individuals ages 55 years and older is approximately 60%.<sup>10</sup>

**The total cost of cardiovascular diseases in the US in 2009 is estimated to be \$313 billion.**

American Heart Association

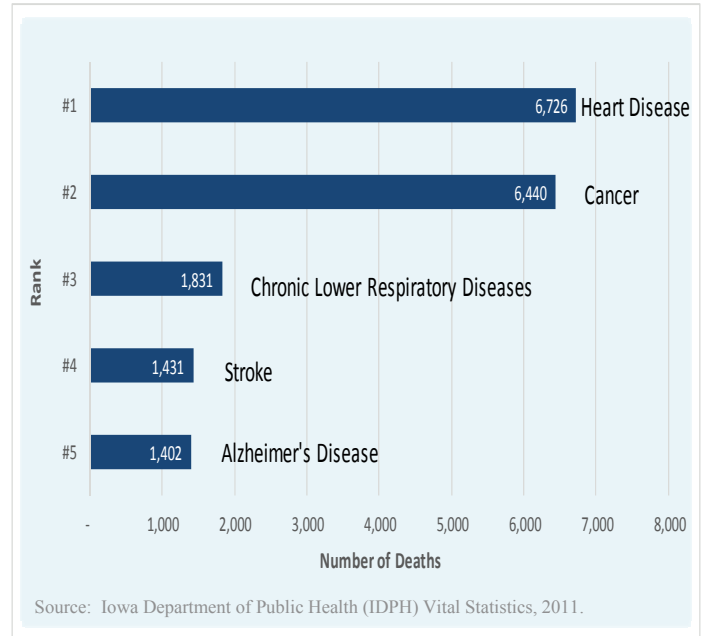
blood pressure reading) among children ages 8 to 17 years has increased by 1.4 mm Hg, with greater increases seen among Hispanic and African American children.<sup>12</sup>

Hypertension has significant health and economic consequences. This chronic condition greatly increases the risk of medical

compared with whites, African Americans experience higher rates of hypertension. In this group, the condition often begins at an earlier age and is usually more severe.<sup>11</sup> Elevated blood pressure is increasingly becoming a problem among children. From 1993 to 2003, the average systolic blood pressure (the top number of a

complications and death from cardiovascular and kidney diseases, such as heart attack, stroke, heart failure, and end-stage kidney failure.<sup>13</sup> Cardiovascular diseases are costly to society; direct and indirect costs of cardiovascular diseases in the U.S. are estimated to be approximately \$313 billion per year.<sup>14</sup>

Figure 4. Leading causes of death in Iowa, 2011

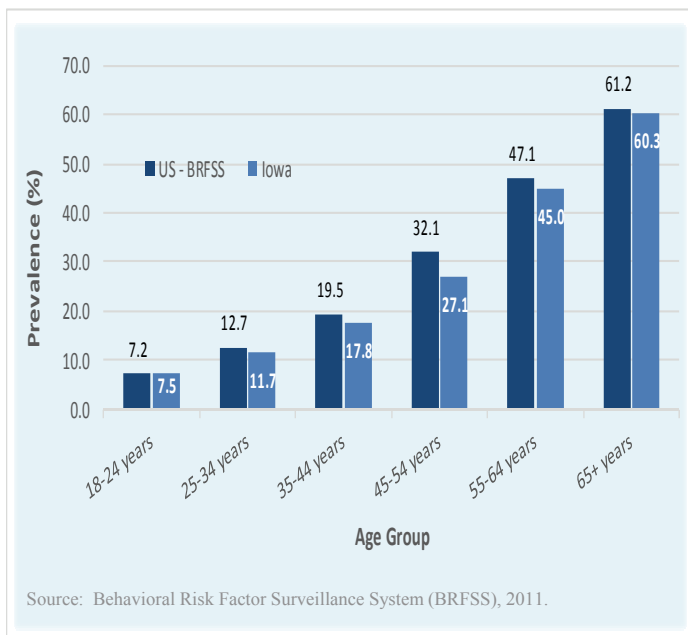


In Iowa, the prevalence of hypertension mirrors the general US population. Nearly a third of Iowans have hypertension, including 27% of Iowans age 45-54 years and 45% age 55-64 years. (Figure 3). Hypertension-related health conditions accounted for 139,773 in 2011, a 32% increase from 2002.<sup>15</sup> Despite advances in medical technology and treatment, heart disease and stroke remain the 1st and 4th leading causes of death in Iowa. (Figure 4). As a result of these two leading causes of death, 32,300 years of potential life were lost.<sup>16</sup>

Risk of death only shows part of the picture. Beyond those who lose their lives each year, another 174,000 live with cardiovascular disease with 77% of those with hypertension reporting being on medication to lower their blood pressure.<sup>17</sup> One in three persons with hypertension are uncontrolled, including a third of those currently taking anti-hypertensive medications. Heart disease and stroke are leading causes of disability among the US workforce.

**Even a modest, long-term reduction in sodium consumption can have a beneficial impact on blood pressure control and can lead to the reduction in preventable cardiovascular events.<sup>18</sup> Reducing sodium consumption in the population to 2,300 mg per day as recommended by the *Dietary Guidelines for Americans*, could reduce the number of hypertension cases in the U.S. by 11 million and save \$18 billion in health care costs.<sup>19</sup>**

Figure 3. Prevalence of hypertension by age group



# National, state, and local strategies

*Public and private partnerships can work together to lower sodium.*

Activities at the national, state, and local levels can play an important role in reducing the population's sodium consumption. For example, food retailers, governments, businesses, institutions, and other large-scale organizations that purchase or distribute food can establish food policies that specify sodium limits for the foods they purchase and/or the food service operations they oversee.<sup>4</sup>

**National:** Policymakers can work nationally to reduce the amount of sodium in the food supply. More specifically, policymakers can work to reduce the amount of sodium found in processed and restaurant foods, since over 75% of the sodium consumed by Americans is found in these sources. Policymakers should:

- Support the national collaborative effort, the NSRI, to engage food manufacturers and restaurants in voluntarily reducing the amount of sodium in their products.<sup>20</sup>
- Support the removal of sodium and other sodium-containing compounds from the Generally Regarded As Safe (GRAS) list or restriction of sodium's GRAS status in a step-wise manner. This will allow for the Food and Drug Administration (FDA) to set limits on the amount of sodium food manufacturers can add to the food supply.<sup>4</sup>

**State/Local:** Several strategies can be implemented at the state and local levels to complement national sodium reduction efforts.<sup>20,21,22</sup> Local action can help increase consumer demand for low sodium products from food manufacturers by:

- Increasing awareness through public education about the recommended daily sodium limit and the health benefits of lowering sodium consumption.
- Implementing venue-based or venue-specific food policies that set nutrition standards, including sodium limits, on all food purchased, served, or sold by an institution or employer. These policies could help drive product reformulation, given the purchasing power of many states, counties, cities, and large businesses.<sup>23</sup>
- Taking advantage of funding to support sodium reduction efforts. For example, the sodium reduction media campaign developed by the Iowa Department of Public Health utilized funding from the CDC Heart Disease and Stroke Prevention grant that specifically highlighted sodium reduction as a potential avenue for population intervention. The Iowa Heart Disease and Stroke Prevention (HDSP) program also developed and purchased patient and public education fact sheets and brochures aimed at increasing sodium awareness and encouraging the selection of low or lower sodium food choices. Such education and outreach materials were provided to physicians, health clinics, public health agencies and disease management and education programs through the Collaborative Healthcare Provider Network developed by HDSP.

## Sodium Reduction Task Force and State Procurement Work Group

Representatives from the Iowa Department of Public Health's Bureau of Nutrition and Health Promotion and Chronic Disease Prevention and Management, recognizing the role that excess sodium plays in cardiovascular health, worked together to develop a Sodium Reduction Task Force. The Task Force includes partners from state agencies, food service entities, nutrition counsels, and others that are vested in the production, supply, and provision of food items across the state.

The Task Force works together to determine ways in which reduced sodium products can be incorporated into foodservice, increasing the options that Iowans have readily available to them to make lower-sodium choices. One success has been in the coordination with the Iowa Department of the Blind who regulates all vending food services in public locations, such as the Capitol Complex and in roadside rest stops. Now, in many vending locations, up to 30% of the vending items are lower-sodium, more healthy options, adding to the healthy variety available for Iowans.

In addition to the work of the Sodium Reduction Task Force, Governor Terry E. Brandstad has approved, in keeping with his desire for Iowa to be the healthiest state in the nation, the creation of a work group of state agencies, including the Department of Public Health and Department of Administrative Services. The work group is charged with developing plans to include nutrition guidelines as part of the contract language for contractors who wish to bid to provide food services, cafeteria foods, and catering, to state employees and their guests. Work to develop phase-in plans to ensure the successful implementation of nutrition standards will also be the responsibility of the work group.



Table 1. Potential Decrease in Cases of Hypertension and Annual Savings in Hypertension Treatment Costs in Iowa from Reducing Sodium Consumption.

Scenario: Percent Reduction in Population Sodium Consumption (decrease in sodium intake in mg) <sup>a</sup>	Average Systolic Blood Pressure Reduction (mm Hg) <sup>b</sup>	Percent Decrease in the Frequency of Hypertension <sup>c</sup>	Decrease in the Number of Cases of Hypertension <sup>d</sup>	Potential Annual Cost Savings [in 2010 dollars] (\$) <sup>e</sup>
10% (337 mg)	0.68	1.7%	11,791	\$22,815,643
20% (674 mg)	1.35	2.8%	19,421	\$37,578,706
30% (1,011 mg)	2.03	4.2%	29,131	\$56,368,059
40% (1,348 mg)	2.71	5.3%	36,760	\$71,131,122
50% (1,685 mg)	3.39	6.8%	47,164	\$91,262,572

Note: For key formulas used, please see page 5.

## Reduce sodium consumption

*There is much that can be done to reduce sodium in our foods.*

Reduction in sodium consumption can be accomplished with minimal impact on taste. Research suggests that most people would adapt to or not detect a decrease in sodium content in food when accomplished gradually over time. Reducing sodium consumption at the population level is possible. Many countries, including the United Kingdom and Finland, have ongoing national programs that address this public health problem and have effectively reduced the sodium content in their food supply. The United Kingdom has used a complementary, multi-strategy approach to:

- Increase the percentage of people who are aware of the recommended daily sodium limit.
- Increase the percentage of people trying to lower their daily sodium intake.
- Reduce the amount of sodium in most processed foods by 20% to 30%.<sup>18</sup>

In 2008, a coalition of health organizations and public health agencies led by the New York City Department of Health and Mental Hygiene, established the National Salt Reduction Initiative (NSRI) and began exploring strategies for reducing population sodium consumption in the U.S. This has launched discussions with food industry leaders to develop a voluntary framework for substantive, gradual reductions in sodium content across a range of foods.<sup>20</sup> Concurrently, several public health departments, including the Iowa Department of Public Health, have expressed support for state and local interventions (e.g., food purchasing policies) to augment the national effort.

## Sodium Reduction Media Campaign in Iowa

In February 2013, the Iowa Department of Public Health, Heart Disease and Stroke Prevention Program debuted a sodium reduction media campaign targeted at Iowa’s general population.

The public health awareness ads were developed based on materials from the New York City and Massachusetts Departments of Public Health and aim to educate the public on the health risks of excess sodium. The campaign highlights the hidden sources of dietary sodium and promotes label comparison on processed products to choose the one with less salt.

Media signage was in the form of posters, bus banners, and billboards on display in Central Iowa, including Des Moines, Indianola, Newton, and Ames. Posters were also distributed to all 99 local county public health agencies. The creative images for all signage was made available at no cost for expanded use if local agencies wanted to print additional copies of posters or wished to sponsor billboards, bus signage or online messaging in their own areas.

The hope of the messaging is that Iowans will increasingly recognize the impact of excess dietary sodium and will choose to “Compare labels. Choose less sodium.”



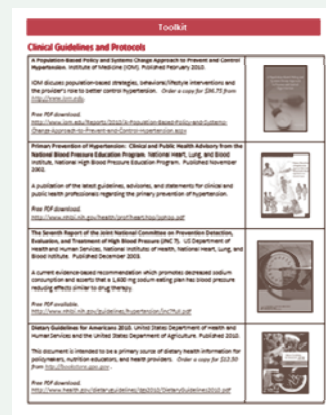
## Sodium Reduction Toolkit

The Heart Disease and Stroke Prevention Program developed a Sodium/Salt Reduction Toolkit aimed at providing healthcare providers, community workers, and others with easy connection with all the best resources available to aid in understanding and educating about the need for lowering population sodium intake and personal choices that can help reduce individual and family sodium consumption.

The toolkit includes:

- clinical guidelines and protocols
- education materials designed for providers
- patient education materials, and
- additional resources in media, journal articles, and in news.

This toolkit developed in Iowa has received national recognition and, with approval from IDPH, has been adopted by the Hawaii Department of Public Health as their official toolkit for sodium/salt reduction.



Visit the IDPH HDSP webpage at [http://www.idph.state.ia.us/hpcdp/hdsp\\_home.asp](http://www.idph.state.ia.us/hpcdp/hdsp_home.asp) to view the toolkit.

## Nutritional Environment Measures Survey—Vending

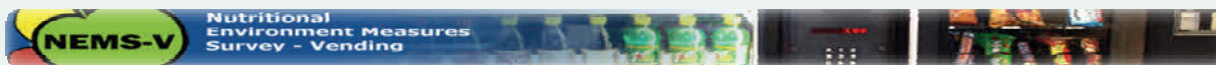
Nutrition Environment Measures Survey-Vending (NEMS-V) was developed to evaluate the worksite vending machine environment, building upon the nationally recognized Nutrition Environment Measurement Survey (NEMS) tools from Emory University, that measure the availability of healthy food and beverage choices in the grocery store, convenience store or restaurant. NEMS-V is based on Institute of Medicine (IOM) Nutrition Standards for Foods in Schools with some modification of standards to meet the Iowa Healthy Kids Act (2008) and adjusted for adult (age 18+) consumers. Sodium content is a distinct measure of NEMS-V and goes into the calculation in scoring for nutritional color coding. In order to classify as a **YELLOW** or **GREEN** option, sodium content must be less than or equal to 400mg per package portion.<sup>24</sup>



The food and beverage standards are divided into color codes based on their nutrition profiles.

- **RED** food and beverages are not as healthy and fall outside the Dietary Guidelines for Americans.
- **YELLOW** food and beverages are healthy foods that meet the Dietary Guidelines, but do not provide a serving of fruit, vegetable, low-fat dairy or whole grain. Sodium content is  $\leq 400$ mg.
- **GREEN** food and beverages are considered the healthiest, are consistent with the Dietary Guidelines for Americans and provide a serving of fruit, vegetable, low-fat dairy or whole grain. Sodium content is  $\leq 400$ mg.

More information on NEMS-V, including promotion materials, is available at <http://nems-v.com/Index.html>.



### Key Formulas Used in Analysis

- Formula 1: Change in the amount of sodium consumed per day = targeted percent reduction x average daily sodium consumption in the US (3,372 mg from 2007-2008 NHANES).<sup>1</sup>
- Formula 2\*: Average systolic blood pressure (SBP) reduction = decrease in SBP among proportion of population with normal BP + decrease in SBP among proportion of population with hypertension = [(decrease in population sodium intake in mg / 2,300 mg) x 3.6 mm Hg x proportion of population with normal BP] + [(decrease in population sodium intake in mg / 2,300 mg) x 7.2 mm Hg x proportion of population with hypertension].

\* According to data from a meta-analysis of 31 long-running clinical trials, a 2,300 mg reduction in sodium consumption per day is associated with a 3.6 mm Hg decrease in SBP among individuals with normal blood pressure and a 7.2 mm Hg decrease in SBP among individuals with hypertension.<sup>2</sup> The proportions of the population with and without hypertension used in the calculations were based on Iowa 2011 BRFSS data.

- Formula 3§: The estimated percent decrease in the frequency of hypertension for each scenario was based on extrapolations of published data and accounts for the number of individuals who would no longer be considered hypertensive if the reduction in sodium consumption occurred at the population level beginning in 2005.

§ These extrapolations assumed that hypertensive individuals were not taking antihypertensive medications for the long-term.<sup>3</sup>



## Key Formulas Used in Analysis, continued...

d. Formula 4: Decrease in the number of cases of hypertension = percent decrease in hypertension frequency (Formula 3) x population in Iowa with hypertension, based on data from BRFSS (2011).

e. Formula 5: Annual savings in treatment costs = Formula 4 x \$1,935 per person per year (using 2010 dollars).<sup>4, \*\*</sup>

\*\* Treatment costs of hypertension were derived from published data in Trogdon et al.<sup>4</sup> In the study, the estimated treatment costs for hypertension were estimated to be \$1,958 per person per year (in 2005 dollars); for the 2013 estimate, the present analysis adjusted for inflation using the Medical Care Consumer Price Index. Hypertension treatment costs included prescription expenditures and a portion of the costs attributed to treatment of hypertension-related chronic diseases.

1. US Department of Health and Human Services, US Department of Agriculture. Dietary guidelines for Americans, 2010. 7th ed. Washington DC: US Department of Health and Human Services, US Department of Agriculture; 2011. Available at <http://health.gov/dietaryguidelines/2010.asp>. Accessed December 5, 2011.
2. Office of the Federal Register. Food labeling; mandatory status of nutrition labeling and nutrient content revision. Final rule. 58 CFR 2079 (1993).
3. U.S. Department of Agriculture and U.S. Department of Health and Human Services. Dietary guidelines for Americans, 2010. 7th edition. Washington DC: U.S. Government Printing Office; 2010.
4. Institute of Medicine. (2010). *Strategies to reduce sodium intake in the United States*. Washington, DC: The National Academies Press.
5. National Center for Health Statistics. (2005). *The National Health and Nutrition Examination Survey (NHANES)*. National data from 1971-2006.
6. Mattes, RD and Donnelly, D. (1991). Relative contributions of dietary sodium sources. *Journal of the American College of Nutrition*, 10(4), 282-93.
7. Briefel, RR and Johnson, CL. (2004). Secular trends in dietary intake in the United States. *Annual Review of Nutrition*, 24, 401-31.
8. Burton, S, Creyer, EH, Kees, J, and Huggins, K. (2006). Attacking the obesity epidemic: the potential health benefits of providing nutrition information in restaurants. *American Journal of Public Health*, 96(9), 1669-75.
9. Grimes, CA, Riddell, LJ, and Nowson, CA. (2009). Consumer knowledge and attitudes to salt intake and labeled salt information. *Appetite*, 53(2), 189-94.
10. Vasan, RS, Beiser, A, Seshadri, S, Larson, MG, Kannal, WB, D'Agostino, RB, et al. (2002). Residual lifetime risk for developing hypertension in middle-aged women and men. The Framingham Heart Study. *JAMA*, 287(8), 1003-10.
11. National Heart Lung and Blood Institute. (2009). *Your Guide to Lowering High Blood Pressure*. Retrieved November 2009 from [www.nhlbi.nih.gov/hbp](http://www.nhlbi.nih.gov/hbp).
12. Muntner, P, He, J, Cutler, JA, Wildman, RP, and Whelton, PK. (2004). Trends in blood pressure among children and adolescents. *JAMA*, 291(17), 2107-13.
13. Whelton, PK, He, J, Appel, LJ, Cutler, JA, Havas, S, Kotchen, TA, Roccella, EJ, Stout, R, Vallbona, C, Winston, MC, and Karimbakas, J. (2002). Primary prevention of hypertension: Clinical and public health advisory from the National High Blood Pressure Education Program. *JAMA*, 288(15), 1882-8.
14. American Heart Association. (2013). *Heart Disease and Stroke Statistics—2013 Update*. Dallas, TX: American Heart Association.
15. HCUP State Inpatient Databases (SID). Healthcare Cost and Utilization Project (HCUP). 2011. Agency for Healthcare Research and Quality, Rockville, MD. [www.hcup-us.ahrq.gov/sidoverview.jsp](http://www.hcup-us.ahrq.gov/sidoverview.jsp)
16. Centers for Disease Control and Prevention, National Centers for Injury Prevention and Control. Web-based Injury Statistics Query and Reporting System (WISQARS) [online]. (2012). *Years of Potential Life Lost (YPLL) Reports, 1999-2010*. {cited 2013 Mar 18}. Available from <http://webappa.cdc.gov/sasweb/ncipc/ypll10.html>
17. Behavioral Risk Factor Surveillance System (BRFSS), 2011.
18. He, FJ, McGregor, GA (2009). A comprehensive review on salt and health and current experience of worldwide salt reduction programmes. *Journal of Human Hypertension*, 23(6), 363-84.
19. Palar, K and Sturm, R. (2009). Potential societal savings from reduced sodium consumption in the US adult population. *American Journal of Health Promotion*, 24(1), 49-57.
20. New York City Department of Health and Mental Hygiene. (2010, April). Cut the Salt. Get the Facts. New York, NY: New York City. Retrieved May 2010 from <http://www.nyc.gov/html.doh.downloads/pdf/cardio/cardio-salt-nsri-faq.pdf>
21. Story, M, Kaphingst, KM, Robinson-O'Brien, R, and Glanz, K. (2008). Creating healthy food and eating environments: Policy and environmental approaches. *Annual Review of Public Health*, 29, 253-72.
22. Glanz, K, Resnicow, K, Seymour, J, Hoy, K, Stewart, H, Lyons, M, et al. (2007). How major restaurant chains plan their menus: the role of profit, demand, and health. *American Journal of Preventive Medicine*, 32(5), 383-8.
23. Halloran, JM, and Archer, DW. (2008). External economic drivers and US agricultural production systems. *Renewable Agriculture and Food Systems*, 23(4), 296-303.
24. Nutritional Environmental Measures Survey—Vending. Color coding foods criteria. Nutritional Environmental Measures Survey—Vending. Available at <http://nems-v.com/NEMS-VCriteriaforCodingFoods.html>. Accessed June 14, 2013.



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