

# Sugar-Sweetened Beverage Taxes and Public Health

## Healthy Eating Research

## Bridging the Gap

A Research Brief, July 2009

### Introduction

Obesity rates among U.S. children, adolescents and adults have increased dramatically over the past four decades.<sup>1,2</sup> Today, nearly one-third of all children and adolescents in the country—more than 23 million—are overweight or obese, and are therefore at greater risk for heart disease, type 2 diabetes and a host of other serious diseases.<sup>3,4</sup> Rising obesity rates have motivated policy-makers to implement policies that can improve access to affordable, healthy foods and increase opportunities for physical activity in schools and communities across the country.

In the past decade, states and localities also have begun to consider taxing sugar-sweetened beverages (SSBs)—including sodas, sports drinks, sweetened tea, fruit drinks and punches, and other sweetened beverages—in order to generate revenue, reduce consumption of unhealthy beverages and promote public health.<sup>5</sup>

Research has shown that relatively large increases in taxes on cigarettes and other tobacco products are the single most effective policy approach to reducing tobacco use.<sup>6,7,8,9</sup> Additionally, dedicating a portion of the revenues gained from such taxes to comprehensive tobacco control programs has led to further reductions in tobacco use among youth and adults.<sup>10,11,12</sup>

Although there are many significant differences between tobacco and SSBs, the tobacco example provides a model for how taxes can be used to promote public health. Emerging studies suggest that small taxes on SSBs are unlikely to affect obesity rates, but they can generate revenue that states can invest in improving public health. In addition, while there is only limited research on the impact of taxes on SSB consumption rates and related weight outcomes, existing research on the impact of prices on food-purchasing behaviors in general suggests that substantive taxes on SSBs could significantly affect consumption patterns and thereby have an impact on overweight and obesity rates. This brief provides an overview of the current research on the health impacts of SSB consumption, how food and beverage prices affect consumption and related weight outcomes, and the potential impact of both large and small SSB taxes.



### Key Research Results

***Substantial consumption of sugar-sweetened beverages can be detrimental to overall health and may contribute to higher obesity rates among youth.***

- A growing but mixed body of research indicates that an increase in SSB consumption is associated with increases in caloric intake, weight gain, obesity and a variety of other negative health consequences among children, teens and adults.<sup>13,14,15,16</sup>
- Increased consumption of SSBs in adults has been linked with higher rates of type 2 diabetes, and a school-based intervention that lowered SSB consumption among Native American adolescents significantly reduced plasma insulin levels, a risk factor for type 2 diabetes.<sup>17,18</sup>
- SSB intake is associated with inadequate intake of several important nutrients, including calcium, iron, folate and vitamin A.<sup>19,20,21,22</sup>

***As prices of unhealthy foods and beverages increase, consumption of them decreases.***

- Numerous studies demonstrate that changes in the relative prices of foods and beverages lead to changes in how much people consume them.<sup>23,24,25</sup> Several of these studies have estimated that a 10 percent increase in the price of SSBs could reduce consumption of them by 8 percent to 11 percent.<sup>26,27,28,29</sup>



- A few studies have concluded that, in response to changes in relative prices, some consumers will substitute a healthier beverage for an SSB. For example, a study conducted in 2004 found that increases in SSB prices resulted in small increases in consumption of whole and reduced-fat milk, juice, coffee and tea.<sup>30,31</sup>

**As relative prices of unhealthy foods increase, compared with prices of healthy foods, weight levels decrease.**

- A small but growing body of national research indicates that higher prices of unhealthy foods and beverages versus healthy ones are associated with reductions in BMI and the prevalence of overweight and obesity.<sup>32,33,34,35,36,37,38,39,40</sup>
- One of these studies found that an increase in the price of sugary foods would significantly reduce the prevalence of overweight and obesity among adults, leading the authors to conclude that taxing such foods, thereby increasing their relative cost, would likely be an effective strategy to reduce adult obesity rates.<sup>41</sup>
- Other studies show similar relationships between fast-food prices and weight.<sup>42,43,44</sup> For example, one study found that a 10 percent increase in the price of fast food was associated with a nearly 6 percent reduction in the prevalence of adolescent obesity.<sup>45</sup>

**Children and adolescents, lower-income populations and those already overweight are potentially most responsive to changes in the relative prices of foods and beverages.**

- Emerging research on the impact of food prices on weight and obesity indicates that weight levels for youths, lower-income populations and those who already have elevated BMIs are more strongly associated with food and beverage prices than are those of older, healthier-weight and higher-income populations.<sup>46,47,48,49,50</sup>
- For example, one study found that the BMI of children living below the federal poverty level was about 50 percent more sensitive to fruit and vegetable pricing than was the BMI of higher-income children. The same study also found that, among children who already had a BMI above the healthy range, BMI was 39 percent more sensitive to these prices than was BMI for their healthy-weight peers.<sup>51</sup>
- Two recent studies examined the link between state SSB taxes and weight, providing only weak evidence that existing, relatively modest taxes (the average for all states is currently just 3.4 percent) are associated with adolescent and adult weight levels.<sup>52,53</sup> These findings are consistent with the growing research on food

prices and weight that suggests that sizable changes in the relative prices of healthier foods compared with less healthy ones are required to significantly change BMI levels and the prevalence of overweight and obesity.<sup>54,55,56,57,58,59</sup>

- One recent study examining state taxation of soft drinks, candy, chips and other snack foods found that, while few states impose excise taxes on these products, many “disfavor” them under their sales tax system by taxing them at a higher rate than other food products.<sup>60,1</sup> As of January 1, 2009, 33 states applied a sales tax to soft drinks, at an average rate of 5.2 percent. The average sales tax on soft drinks for all states, including those that do not tax them, was 3.4 percent, more than triple the 1.0 percent average applied to foods and beverages generally (see Figure 1).<sup>61</sup>

**Conclusions & Implications**

The effectiveness of increased tobacco taxes in reducing tobacco use has stimulated interest in taxes as a policy tool for helping to reverse the national rise in obesity rates.<sup>62</sup> Taxes on SSBs are of particular interest given the research linking consumption of such beverages to weight gain and obesity among children, adolescents and adults. The potential of significant SSB taxes to reduce obesity rates is supported by a number of studies showing that soft drink consumption falls when soft drink prices rise and that changes in the relative prices of healthier foods and beverages compared with less healthy products are associated with changes in weight. However, additional research is needed to fully determine the net impact of changes in SSB prices on overall caloric intake.

While many states currently tax SSBs, mostly by disfavoring them under their sales tax systems, limited recent research suggests these modest taxes, which average only 5.2 percent among states that do apply such taxes, have had little impact on weight. However, emerging research suggests that significant differences in the relative prices of healthier foods and beverages compared with those that are less healthy could help to reduce BMI and the prevalence of overweight and obesity, particularly for the young and lower-income populations that are most at risk for obesity. This suggests that raising SSB taxes to levels that would result in substantially higher SSB prices, either through an excise tax or increased sales taxes, could be a potent policy tool for curbing obesity rates by leading consumers to reduce their SSB consumption.

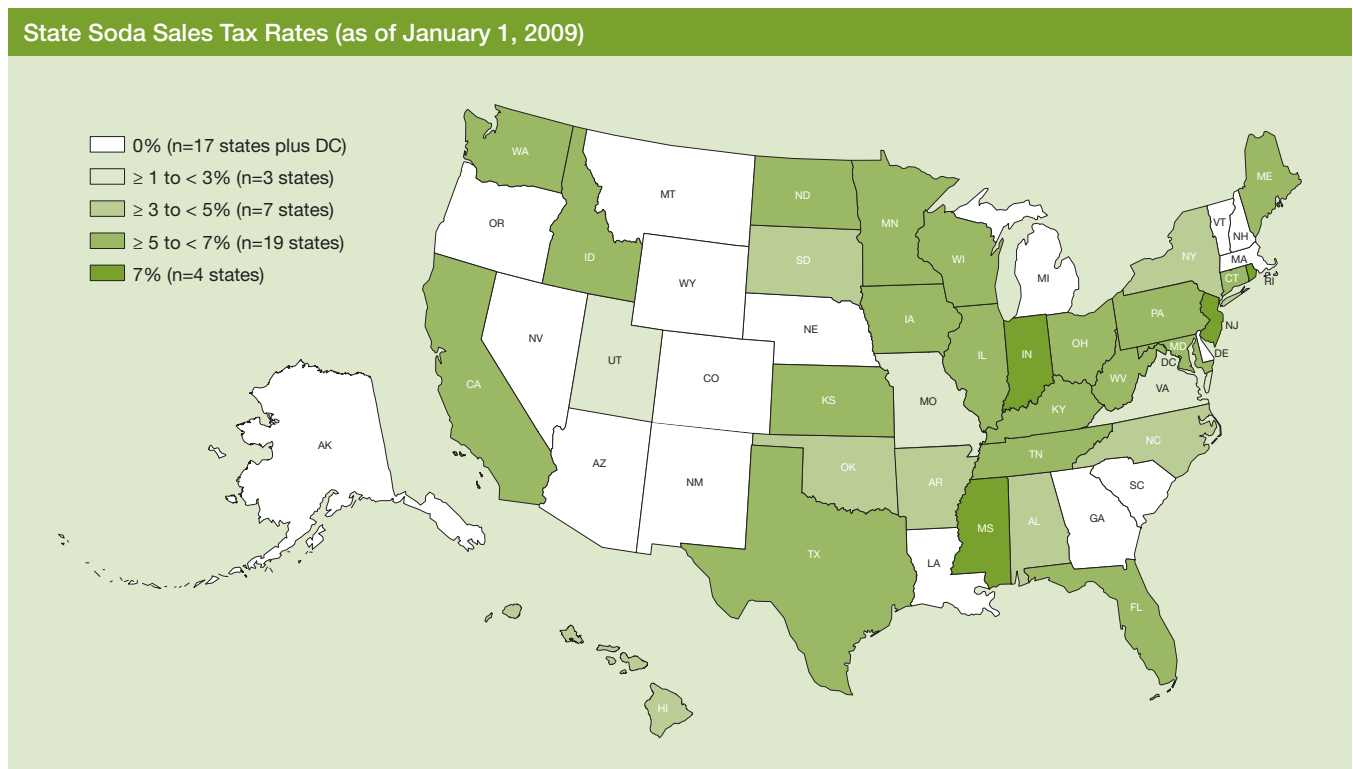
<sup>1</sup> Excise taxes are taxes imposed on selected products, often at the producer, wholesaler or distributor level, and can be specific (e.g., based on quantity, weight or volume) or *ad valorem* (based on price). In contrast, sales taxes are taxes imposed on a broad range of goods and services and are generally assessed at the point of sale to consumers and as a percentage of price.

Such policy efforts could achieve an even greater impact if they allocated some of the revenues from these taxes to the support of other obesity-reduction and -prevention efforts. There is a critical need for more research to answer these questions, and much can be learned by assessing the potential impact of large SSB taxes yet to be adopted in states and communities that are currently considering them.

*This brief was prepared by:*

- *Frank J. Chaloupka, Ph.D., co-director, Bridging the Gap, distinguished professor of economics and public health, University of Illinois at Chicago*
- *Lisa M. Powell, Ph.D., research professor and senior research scientist, University of Illinois at Chicago*
- *Jamie F. Chriqui, Ph.D., M.H.S., senior research scientist, University of Illinois at Chicago*

*Peer review was provided by Tatiana Andreyeva, Ph.D., Yale University; Eric A. Finkelstein, Ph.D., RTI International; and Roland Sturm, Ph.D., RAND Corporation.*



Source: Bridging the Gap Program, Health Policy Center, University of Illinois at Chicago with data compiled by The MayaTech Corporation. In addition to sales taxes, the following states currently apply excise taxes to bottles, syrups, and/or powders/mixes at the manufacturer, distributor or retail level: Alabama, Arkansas, Rhode Island, Tennessee, Virginia, Washington, and West Virginia.

## Endnotes

1. Ogden C, Carroll M, Curtin L, et al. "Prevalence of Overweight and Obesity in the United States, 1999–2004." *Journal of the American Medical Association*, 295(13): 1549–1555, April 2006.
2. Ogden C, Carroll M, Flegal K. "High Body Mass Index for Age Among US Children and Adolescents, 2003–2006." *Journal of the American Medical Association*, 299(20): 2401–2405, May 2008.
3. Ibid.
4. Online report: *Statistical Abstract of the United States: 2006*. Washington, DC: U.S. Census Bureau, December 2005. www.census.gov/prod/2005pubs/06statab/pop.pdf (accessed May 2009).
5. Jacobson M and Brownell K. "Small Taxes on Soft Drinks and Snack Foods to Promote Health." *American Journal of Public Health*, 90(6): 854–857, June 2000.
6. *WHO Report on the Global Tobacco Epidemic, 2008: The MPOWER Package*. Geneva: World Health Organization, 2008.
7. Chaloupka, F (in press). "State and Local Policies – Lessons Learned." In *Lighting a Fuse for Public Health: Tobacco Control Lessons Learned*, LA Haviland (ed.) Boston: JSI and American Legacy Foundation.
8. *Reducing Tobacco Use: A Report of the Surgeon General*. Atlanta, Georgia: U.S. Department of Health and Human Services, Public Health Service, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health, 2000.
9. *Curbing the Epidemic: Governments and the Economics of Tobacco Control*. Washington, DC: The International Bank for Reconstruction and Development/The World Bank, 1999.
10. Farrelly M, Pechacek T, Thomas K, et al. "The Impact of Tobacco Control Programs on Adult Smoking." *American Journal of Public Health*, 98(2): 304–309, February 2008.
11. Tauras J, Chaloupka F, Farrelly M, et al. "State Tobacco Control Spending and Youth Smoking." *American Journal of Public Health*, 95(2): 338–344, February 2005.
12. Farrelly M, Pechacek T, Chaloupka F. "The Impact of Tobacco Control Program Expenditures on Aggregate Cigarette Sales: 1981–2000." *Journal of Health Economics*, 22(4): 843–859, September 2003.
13. Gortmaker S, Long, Wang C (in press). *The Negative Impact of Sugar-sweetened Beverages on Children's Health*. Cambridge, MA: Harvard University, 2009.
14. Forshee R, Anderson P, Storey M. "Sugar-sweetened Beverages and Body Mass Index in Children and Adolescents: a Meta-Analysis." *American Journal of Clinical Nutrition*, 87(6): 1662–1671, June 2008.
15. Vartanian L, Schwartz M, Brownell K. "Effects of Soft Drink Consumption on Nutrition and Health: a Systematic Review and Meta-Analysis." *American Journal of Public Health*, 97(4): 667–675, April 2007.
16. Malik V, Schulze M, Hu F. "Intake of Sugar-sweetened Beverages and Weight Gain: a Systematic Review." *American Journal of Clinical Nutrition*, 84(2): 274–288, August 2006.
17. Schulze M, Manson J, Ludwig D, et al. "Sugar-sweetened Beverages, Weight Gain, and Incidence of Type 2 Diabetes in Young and Middle-aged Women." *Journal of the American Medical Association*, 292(8): 927–934, August 2004.
18. Ritenbaugh C, Teufel-Shone N, Aickin M, et al. "A Lifestyle Intervention Improves Plasma Insulin Levels Among Native American High School Youth." *Preventive Medicine*, 36(3): 309–319, March 2003.
19. Frary C, Johnson R, Wang M. "Children and Adolescents' Choices of Foods and Beverages High in Added Sugars are Associated with Intakes of Key Nutrients and Food Groups." *Journal of Adolescent Health*, 34(1): 56–63, January 2004.
20. Ballew C, Kuester S, Gillespie C. "Beverage Choices Affect Adequacy of Children's Nutrient Intakes." *Archives of Pediatrics & Adolescent Medicine*, 154(11): 1148–1152, November 2000.
21. Kranz S, Smicklas-Wright H, Siega-Riz A, et al. "Adverse Effect of High Added Sugar Consumption on Dietary Intake in American Preschoolers." *Journal of Pediatrics*, 146(1): 105–111, January 2005.
22. Kant A. "Consumption of Energy-dense, Nutrient-poor Foods by Adult Americans: Nutritional and Health Implications. The Third National Health and Nutrition Examination Survey, 1988–1994." *American Journal of Clinical Nutrition*, 72(4): 929–36, October 2000.
23. Andreyeva T, Long M, Brownell K (in press). "The Impact of Food Prices on Consumption: a Systematic Review of Research on Price Elasticity of Demand for Food." *American Journal of Public Health*, 2009.
24. Yen S, Lin B, Smallwood D, et al. "Demand for Non-alcoholic Beverages: the Case of Low-income Households." *Agribusiness*, 20(3): 309–321, July 2004.
25. Raper K, Wanzala M, Nayga R. "Food Expenditures and Household Demographic Composition in the US: a Demand Systems Approach." *Applied Economics*, 34(8): 981–992, May 2002.
26. Andreyeva T, (in press).
27. Bergtold J, Akobundo E, Peterson E. "The FAST Method: Estimating Unconditional Demand Elasticities for Processed Foods in the Presence of Fixed Effects." *Journal of Agricultural and Resource Economics*, 29(2): 276–295, August 2004.
28. Yen S, et al., 309–321.
29. Bahl R, Bird R, Walker M. "The Uneasy Case Against Discriminatory Excise Taxation: Soft Drink Taxes in Ireland." *Public Finance Review*, 31(5): 510–533, September 2003.
30. Yen S, et al., 309–321.
31. Uri N. "The Demand for Beverages and Interbeverage Substitution in the United States." *Bulletin of Economic Research*, 38(1):77–85, March 1986.
32. Auld M and Powell L (in press). "Economics of Food Energy Density and Adolescent Body Weight." *Economica*.
33. Powell L and Chaloupka F. "Food Prices and Obesity: Evidence and Policy Implications for Taxes and Subsidies." *The Milbank Quarterly*, 87(1): 229–257, March 2009.
34. Miljkovic D, Nganje W, de Chastenet H. "Economic Factors Affecting the Increase in Obesity in the United States: Differential Response to Price." *Food Policy*, 33(1): 48–60, February 2008.
35. Sturm R and Datar A. "Body Mass Index in Elementary School Children, Metropolitan Area Food Prices and Food Outlet Density." *Public Health*, 119(12): 1059–1068, December 2005.
36. Sturm R and Datar A. "Food Prices and Weight Gain During Elementary School: 5-year Update." *Public Health*, 122(11): 1140–1143, November 2008.
37. Powell L, Auld M, Chaloupka F, et al. "Access to Fast Food and Food Prices: Relationship with Fruit and Vegetable Consumption and Overweight Among Adolescents." *Advances in Health Economics and Health Services Research*, 17: 23–48, 2006.
38. Chou S, Grossman M, Saffer H. "An Economic Analysis of Adult Obesity: Results From the Behavioral Risk Factor Surveillance System." *Journal of Health Economics*, 23(3): 565–587, May 2004.
39. Chou S, Rashad I, Grossman M. "Fast-food Restaurant Advertising on Television and its Influence on Childhood Obesity." *National Bureau of Economic Research Working Paper Series No. 11879*, December 2005.
40. Chou S, Rashad I, Grossman M. "Fast-Food Restaurant Advertising on Television and Its Influence on Childhood Obesity." *Journal of Law and Economics*, 51(4): 599–618, November 2008.
41. Miljkovic D, et al., 48–60.
42. Auld M, et al., (in press).
43. Powell L, et al., 23–48.
44. Chou S, et al., 565–587.
45. Powell L, et al., 23–48.
46. Auld M, et al., (in press).
47. Powell L and Chaloupka F, 229–257.
48. Powell L, et al., 23–48.
49. Sturm R and Datar A, 1059–1068.
50. Chou S, et al., 565–587.
51. Sturm R and Datar A, 1059–1068.



52. Powell L, Chriqui J, Chaloupka F (in press). "Associations Between State-level Soda Taxes and Adolescent Body Mass Index." *Journal of Adolescent Health*, 2009.
53. Kim D, Kawachi I. "Food Taxation and Pricing Strategies to "Thin Out" the Obesity Epidemic." *American Journal of Preventive Medicine*, 30(5): 430–437, May 2006.
54. Auld M, et al., (in press).
55. Powell L and Chaloupka F, 229–257.
56. Sturm R and Datar A, 1059–1068.
57. Sturm R and Datar A, 1140–1143.
58. Powell L, et al., 23–48.
59. Chou S, et al., 565–587.
60. Chriqui J, Eidson S, Bates H, et al. "State Sales Tax Rates for Soft Drinks and Snacks Sold Through Grocery Stores and Vending Machines, 2007." *Journal of Public Health Policy*, 29(2): 227–249, July 2008.
61. Online report: *State Soda Sales Tax Rates as of January 1, 2009*. Chicago: Bridging the Gap Program, 2009. [www.impactteen.org/obesitystatedata.htm](http://www.impactteen.org/obesitystatedata.htm). (accessed May 2009)
62. Brownell K, Frieden T. "Ounces of Prevention – The Public Policy Case for Taxes on Sugared Beverages." *The New England Journal of Medicine*, 360(18): 1805–1808, April 2009.

### **About Healthy Eating Research**

*Healthy Eating Research* is a national program of the Robert Wood Johnson Foundation. Technical assistance and direction are provided by the University of Minnesota School of Public Health under the direction of Mary Story, Ph.D., R.D., program director, and Karen M. Kaphingst, M.P.H., deputy director. The Healthy Eating Research program 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 in low-income and racial/ethnic populations at highest risk for obesity. For more information, visit [www.healthyeatingresearch.org](http://www.healthyeatingresearch.org).

University of Minnesota, School of Public Health  
1300 South 2nd St., Suite 300  
Minneapolis, MN 55454  
[www.healthyeatingresearch.org](http://www.healthyeatingresearch.org)

### **About Bridging the Gap**

*Bridging the Gap* is a nationally recognized research program of the Robert Wood Johnson Foundation dedicated to improving the understanding of how policies and environmental factors affect diet, physical activity and obesity among youth, as well as youth tobacco use. The program identifies and tracks information at the state, community and school levels; measures change over time; and shares findings that will help advance effective solutions for reversing the childhood obesity epidemic and preventing young people from smoking. Bridging the Gap is a joint project of the University of Illinois at Chicago's Institute for Health Research and Policy and the University of Michigan's Institute for Social Research. For more information, visit [www.bridgingthegapresearch.org](http://www.bridgingthegapresearch.org).

### **About the Robert Wood Johnson Foundation**

The Robert Wood Johnson Foundation focuses on the pressing health and health care issues facing our country. As the nation's largest philanthropy devoted exclusively to improving the health and health care of all Americans, the Foundation works with a diverse group of organizations and individuals to identify solutions and achieve comprehensive, meaningful and timely change.

For more than 35 years the Foundation has brought experience, commitment, and a rigorous, balanced approach to the problems that affect the health and health care of those it serves. When it comes to helping Americans lead healthier lives and get the care they need, the Foundation expects to make a difference in your lifetime. For more information, visit [www.rwjf.org](http://www.rwjf.org).

Route 1 and College Road East  
P.O. Box 2316  
Princeton, NJ 08543-2316  
[www.rwjf.org](http://www.rwjf.org)



Robert Wood Johnson Foundation