Who Benefits from the Philadelphia Soda Tax?

All Philadelphians, and especially those with low-incomes

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The tax on sugar-sweetened beverages (SSBs) proposed by Mayor Kenney, also known as the "soda tax," is controversial mainly because, like other sales taxes, it takes a greater share of the income of poor families than rich ones. However, while the costs of the soda tax fall more heavily on those with low incomes, more of the benefit of the tax will go to low-income Philadelphians as well, for two reasons:

The first benefit of the tax flows from how the new revenue will be spent — on pre-K education, community schools, and parks and community recreation centers.[1] Pre-K education helps kids from low- and moderate-income families have a better start in life. Studies have shown that children who attend pre-K programs score higher on academic tests and that these benefits are greater for those whose families have lower incomes.[2] And the effects of Pre-K education are long lasting: long-term studies have shown that those who receive Pre-K education have higher IQs at age 5, have higher high school graduation rates, are more likely to own a home and have higher incomes at age 40.[3]

Recreation centers and parks not only provide benefits to individuals, young and old, but are at the center of vibrant Philadelphia neighborhoods. They provide not just fun but hope for kids. And while everyone in Philadelphia benefits from them, they are especially important to those with low- and moderate- incomes who don't have the means to use private alternatives.

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[1] "The tax proposal…funds five initiatives over five years:

- $256 million for universal pre-K, which Kenney hopes to grow by 10,000 seats by 2020. $39 million for 25 community schools, which would incorporate academic, health, and social services.
- $23 million for Council President Darrell L. Clarke's plan to retrofit city and School District buildings to make them more energy-efficient.
- $56 million to repay part of a $300 million proposed bond for rebuilding parks and recreation centers.
- $26 million to the city's pension system, which has a $5.7 billion deficit."

Julia Terruso, Tricia, L. Nadolny, and Claudia Vargas, "Kenney: Soda Tax would fund $400 M in projects," *Philadelphia Inquirer*, March 2, 2016, http://articles.philly.com/2016-03-02/news/71101864_1_soda-tax-tax-proposal-proposed-sugary-drinks-tax, accessed April 7, 2016.

[2] Henry, G., Ponder, B., Rickman, D., Mashburn, A., Henderson, L., and Gordon, C., 2004. *An Evaluation of the Implementation of Georgia's Pre-K Program: Report of the Findings from the Georgia Early Childhood Study*. Atlanta: Georgia State University, Applied Research Center and William Gormley, Jr., Deborah Phillips, and Ted Gayer, "Preschool Programs Can Boost School Readiness," *Science* 320 (June 27, 2008), pp.1723-24.

[3] L. J. Schweinhart et al., *Lifetime Effects: The High/Scope Perry Preschool Study Through Age 40* (2005).

It is true that there are other ways to fund Pre-K education and parks and recreation centers. And, given the income gap between rich and poor in Philadelphia and the United States as a whole, it could be argued that these goods should by paid for by those with higher incomes.

But the second benefit of a soda tax — the contribution it will make to the health and economic well-being of all Philadelphians, and especially those with low incomes — depends on this specific tax on sugar-sweetened drinks. Those benefits are not as obvious, but provide a critical element in the case for a soda tax.

Sugar Consumption and Health

Public health specialists and physicians have long known the harms of the overconsumption of sugar-sweetened beverages. Consumption of sugar-sweetened beverages has increased dramatically over the last 50 years largely because of the decline in their price compared to other foods.[4] While in 1977 the average American consumed 70 calories a day from SSBs, by 2000 this increased to 190 calories. SSBs account for 10% to 15% of the calories consumed by children and adolescents.[5] The growing consumption of SSBs is widely regarded as the cause of the obesity epidemic in United States. Between 1962 and 2012, obesity rates for adults and children in the United States tripled.[6]

Obesity rates tend to be higher among those with low incomes, although the relationship is stronger among women and children and among whites than men and African Americans.[7] These higher rates are likely a result of SSBs being less expensive, and higher-quality foods less available, in low-income neighborhoods. Low-income adults consume a great deal more SSBs than high-

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[4] Nielsen SJ, Popkin BM. "Changes in beverage intake between 1977 and 2001." *Am J Prev Med* 2004; 27:205-10. [Erratum, Am J Prev Med 2005; 28:413.]

[5] Brownell, Kelly D, Frieden, Thomas R. "Sugar Sweetened Ounces of Prevention -- The Public Policy Case for Taxes on Sugared Beverages," *The New England Journal of Medicine* 2009; 360.18: 1805-8.

[6] Fryar, Cheryl D., Carroll, Margaret D. H., and Ogden, Cynthia L. National Center Health Statistics, Prevalence of Overweight, Obesity, and Extreme Obesity Among Adults: United States, 1960–1962 Through 2011–2012, National Center Health Statistics, http://www.cdc.gov/nchs/data/hestat/obesity_adult_11_12/obesity_adult_11_12.htm, accessed April 12, 2016 and Fryar, Cheryl D., Carroll, Margaret D. H., and Ogden, Cynthia L. Prevalence of Overweight and Obesity Among Children and Adolescents: United States, 1963–1965 Through 2011–2012 National Center Health Statistics http://www.cdc.gov/nchs/data/hestat/obesity_child_11_12/obesity_child_11_12.htm, accessed April 12, 2016 Some experts have predicted that this will rise to 42% of all adults by 2030. Finkelstein, E.A., Khavjou, O.A., Thompson, H., Trogdon, J.G., Pan, L., Sherry, B., Dietz, W. "Obesity and severe obesity forecasts through 2030." *American Journal of Preventive Medicine* 2012; 42:563–570. According to the Philadelphia Department of Health, 32% of Adults and 25.4% of Children are obese. Philadelphia Department of Health, Overview of Chronic Disease and Healthy Eating and Active Living Indicators for Philadelphia Adults and Children May 5, 2011, http://www.phila.gov/health/pdfs/Philadelphia_obesity_chronic_disease812.pdf, accessed April 5, 2016.

[7] A good overview with links to some of the research can be found at Food Research Action Center (FRAC), "Relationship Between Poverty and Obesity," http://frac.org/initiatives/hunger-and-obesity/are-low-income-people-at-greater-risk-for-overweight-or-obesity/ Accessed, April 12, 2016.

income adults, although among children there is some evidence that those with high-incomes tend to consume slightly more than those with low-incomes.[8]

Consumption of sugar-sweetened beverages has been linked to a variety of health problems including heart disease, diabetes, gall bladder disease, osteoarthritis and some cancers.[9] The over-consumption of sugar doesn't just harm us by adding pounds, although there is a clear link between obesity and heart disease and diabetes. It can directly lead to diabetes and, some think, to fatty liver disease, and some cancers. Those who drink one or more sugar-sweetened drinks a day become diabetic 83-98% more frequently than those who drink less than one a month. [10]

These health issues are found everywhere in the United States and are especially problematic in Philadelphia. According to the Philadelphia Department of Health, in 2009, "among counties containing one of the ten largest cities, Philadelphia had the highest prevalence of hypertension (34.5%) and heart disease (4.5%) the second highest prevalence of diabetes (10.7%) and obesity (29.3%)." Rates of diabetes increased by over a third from 2000 to 2010 in Philadelphia and of hypertension by over 10% during the same period.[11]

Academic studies have shown that a reduction in the consumption of sugar reduces obesity and makes us healthier. So any public policy that leads to a dramatic reduction in sugar consumption is likely to be enormously beneficial to public health and well-being. And that, in turn, reduces the cost of health care. Fifty percent of health care costs are generated by the treatment of five chronic diseases and related conditions; three of them—coronary artery disease, hypertension, and diabetes—are closely linked to the overconsumption of sugar.[12]

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[8] Sturm R., Powell, L.M., Chriqui, J.F., Chaloupka, F.J. "Soda Taxes, soft drink consumption, and children's body mass index." *Health Affairs* 2010 29:1052-8 found that a soda tax reduced consumption relatively more for those who are heavier, have lower incomes, and are African American. On the other hand, Lin, Biing-Hwan, Smith, Travis A, Lee, Jonq-Ying. "Measuring weight outcomes for obesity intervention strategies: The case of a sugar-sweetened beverage tax." *Economics and Human Biology* 2011 8:329-341 finds that while low-income adults reduce their consumption of SSBs more than high respond high-income adults, among children, there is slightly more pronounced effect among those with high incomes.

[9] The impact of SSBs diabetes and heart disease is evaluated in Malik, V.S., Popkin, B.M., Bray, G.A., Depres, J.P, and Hu, F.B. "Sugar-sweetened beverages, obesity, type 2 diabetes mellitus, and cardiovascular disease risk." *Circulation*. 2010; 121(11):1356-64.

[10] On the connection to diabetes see Basu, Sanjay, Yoffe, Paula, Hills, Nancy, Lustig Robert H. The Relationship of Sugar to Population-Level Diabetes Prevalence: An Econometric Analysis of Repeated Cross-Sectional Data. *Plos One* February 27, 2013 http://dx.doi.org/10.1371/journal.pone.0057873 accessed April 12, 2016 and Schulze MB, Manson J,E., Ludwig D.S., Colditz G.A., Stampfer M.J., Willett W.C., et al. "Sugar-sweetened beverages, weight gain, and incidence of type 2 diabetes in young and middle-aged women." *The Journal of the American Medical Association* (*JAMA*). 2004; 292(8): 927–34.

[11] Philadelphia Department of Health, "Overview of Chronic Disease and Healthy Eating and Active Living Indicators for Philadelphia Adults and Children." May 5, 2011, http://www.phila.gov/health/pdfs/Philadelphia_obesity_chronic_disease812.pdf, accessed April 5, 2016.

[12] Stanton, Mark W. "The High Concentration of U.S. Health Care Expenditures." *Department of Health Research in Actions*, Issue 19, 2006. http://archive.ahrq.gov/research/findings/factsheets/costs/expriach/, accessed April 12, 2016

How Much Will the Proposed Tax Reduce Consumption and Improve Health?

But will a three-cent-an-ounce tax lead to a decline in the consumption of sugar-sweetened beverages? Studies of taxes of one and two cents an ounce on SSBs have shown a significant shift in consumption from sugary drinks to milk, water, and fruit juices.[13] And other studies have shown that the consumption of SSBs declines substantially as the price goes up. Two recent meta-studies have estimated that a 10% increase in price will lead to a 12% drop in consumption.[14]

A three-cents-per-ounce tax on SSBs is substantial. The prices of sugar-sweetened beverages vary a great deal depending on the type of beverage and how it is packaged. But a recent study of SSB prices that took into account consumption patterns for different types and packaging of sugar-sweetened beverages concluded that the average cost is about six cents per ounce.[15] So, a three-cent-per-ounce tax paid by the distributor, if passed on to consumers, would be a tax of 50%. Even if distributors absorb some part of the tax, the Kenney administration's claim that consumption will decline by 55% seems plausible based on the research cited above. While soda consumption on the part of all Philadelphians will decline, as we saw above, there is some evidence that those with low incomes are more sensitive to price changes in soda than those with moderate and higher incomes, so their consumption could drop even more.

What will be the impact on health of a decline in the consumption of sugar-sweetened beverages of this magnitude? One major study estimated that a one-cent-per-ounce tax would reduce SSB consumption by 15%. Even if, as most studies suggest, 40% of the calorie reduction were offset by increased consumption of other foods, this would lead to a small reduction in average weight and a 1.5% decline in obesity.[16] The reduction in obesity, together with the direct impact of a reduction

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[13] Interestingly enough, almost every study shows declines in the consumption of artificially sweetened drinks as well. No one is quite sure why, although the most likely explanation is that distributers and stores that pay the tax on SSBs raise the price on both sugar-sweetened and artificially sweetened drinks at the same time, hoping to recapture some of the tax on the former by charging more for the later. Given that there is increasing evidence that artificial sweeteners are unhealthy as well, this is a good result.

[14] Andreyeva, Tatiana, Chaloupka, Fank J., Brownell, Kelly D., "Estimating the potential of taxes on sugar-sweetened beverages to reduce consumption and generate revenue." *Preventive Medicine*, 52 (2011) 413-416. Cabreara Escboar, Maria A., Veerman, J. Lennert, Tollman, Stephen M., Bertram, Melanie Y. and Hofman, Karen J., "Evidence that a tax on sugar sweetened beverages reduces the obesity rate: a meta-analysis." *BMC Public Health* 2013, 13:1072 http://www.biomedcentral.com/1471-2458/13/1072, accessed April 5, 2016.

[15] Powell, L.M., Isgor, Z., Rimkus, L., and Chaloupka, F.J. *Sugar-Sweetened Beverage Prices: Estimates from a National Sample of Food Outlets.* Chicago, IL: Bridging the Gap Program, Health Policy Center, Institute for Health Research and Policy, University of Illinois at Chicago, 2014. http://www.bridgingthegapresearch.org/_asset/ww9rpz/btg_SSB_price_brief_FINAL_Jan_2014.pdf accessed April 8, 2016.

[16] Wang Y. Claire, Coxson, Pamela, Shen, Yu-Ming, Goldman, Lee, and Bibbins-Domingo, Kirsten. "A Penny-Per-Once Tax on Sugar-Sweetened Beverages Would Cut Health and Cost Burdens of Diabetes." *Health Affairs* 2012 31:199-207. Wang, et. al.'s estimates of the impact of a reduction in SSB consumption on weight is roughly similar to that found in Finkelstein, E.A., Zhen, C. J. Nonnemaker, J., J.E. Todd, J.E. "Impact of targeted beverage taxes on higher- and lower-income households." *Archives of Internal Medicine* 2010 170: 2028–2034 and Lin, Biing-Hwan, Smith, Travis A, Lee, Jonq-Ying. "Measuring weight outcomes for obesity intervention strategies: The case of a sugar-sweetened beverage tax." *Economics and Human Biology* 2011 8:329-341. Wang, et. al. assume that 40% of the calories consumed in SSBs would be replaced by other foods.

in sugar consumption, would lead to a substantial reduction in the incidence of diabetes, coronary heart disease, heart attacks, strokes and death over 10 years.

These results can be used to estimate the consequences of Mayor Kenney's proposal for the health of Philadelphians.[17] The results of our projection in Table 1 shows that that a three-cents-per-ounce tax on SSBs would prevent the premature death of between 261 and 391 Philadelphians over 10 years and would keep roughly 3,500 to 5,600 people from suffering serious illness during the same period. It cannot be said with any precision what share of these health benefits will flow to low- versus high-income Philadelphians. But given that those with low incomes consume more SSBs, are more likely to be dissuaded from doing so by a tax, and are already more likely to be obese, it seems reasonable to assume that more of the health benefit will accrue to them.

Table 1

Projection of the Health Effects of a Three Cents Per Ounce Tax on SSBs

	Reduction Over 10 Years	
	Low Estimate	High Estimate
Diabetes person-years	2385	3578
Incidence of coronary heart disease	953	1430
Myocardial infarctions (heart attacks)	301	452
Strokes	80	120
Deaths	261	391

Source: PBPC projection based on date from Y. Claire Wang, et. al. "A Penny-Per-Ounce Tax on Sugar-Sweetened Beverages Would Cut Health and Cost Burdens of Diabetes." *Health Affairs* 2012 31:199-207

Health Benefits Will Generate Financial Benefits

The improvement in health that would result from a soda tax has financial benefits for Philadelphians as well. The same national projections can be used to estimate the reduction in health care spending that would result from a three-cent-per-ounce tax on SSBs.[18] Table 2 shows

[17] We constructed these estimates by initially assuming that the rate of reduction in death and disease will be same in Philadelphia as has been projected for the United States as a whole. Our procedure likely understates the impact of a soda tax on the health of Philadelphians because the rates of poverty and health issues in Philadelphia are higher than in the nation as a whole, the same rate of reduction in the consumptions of SSBs will bring greater benefits to residents of the city. Because we are not not certain that the health benefits related to SSB consumption increase at a constant rate as consumption declines, we have given a range of benefits rather than simply extrapolating from the Wang study. So, although the Philadelphia tax is triple what has been studied, a range of potential health benefits is likely. So, although the Philadelphia tax is triple what has been studied, we give range of potential health benefits. The low estimate doubles the benefit extrapolated from the Wang study while while the high estimate triples it..

[18] Again we have extrapolated the national projections by Wang to Philadelphia and, for the same reasons, our estimates likely understate the benefit for Philadelphia. We adjusted these estimates for the higher health care costs in Philadelphia which we estimated by using the average cost of Medicaid per person in Pennsylvania compared to the average cost for the entire country. Because health care costs in Philadelphia are higher than the average for the state, our estimate understates the likely savings in health care costs.

that over a 10-year period a three-cent-per-ounce tax on SSBs could be expected to save between $230 million and $345 million in health care costs. Some of those savings would benefit Philadelphians as individuals, either by reducing the costs of health insurance or out of pocket costs for health care. Some part of the savings will also flow to the city's treasury by reducing the costs of providing care in health centers. In addition to savings in health care costs, a reduction in the rates at which people suffer from diabetes and cardiovascular disease would lead to a reduction in wages lost due to illness. Both the reduction in health-care costs and in lost wages will flow more to low-income rather than high-income Philadelphians, although that difference cannot easily be quantified.

Table 2

Projection of 10-Year Savings in Health Care Costs (in millions)		
	Low Estimate	High Estimate
Diabetes	$129	$194
Cardiovascular Disease	$100	$150
Total	$230	$345

Source: PBPC projection based on date from Y. Claire Wang, et. al. "A Penny-Per-Ounce Tax on Sugar-Sweetened Beverages Would Cut Health and Cost Burdens of Diabetes."

These estimates of the health and economic impact of Mayor Kenny's proposed sugar tax are based on analyses of current consumption. It should be noted that the institution of a sugar tax is one element in a larger strategy to make people aware of the dangers of excessive consumption of SSBs. Indeed, just as a combination of taxes and public education dramatically reduced smoking in the United States, the institution of a soda tax, and a vigorous debate about its consequences for health, could help push forward the long-term cultural change in our eating habits that could create even greater health and economic benefits.

Conclusion – On Net, the Sugar Tax Would Benefit Philadelphia and Philadelphians

In summary, we conclude that, even though the soda tax proposed by Mayor Kenny does fall more heavily on those with low incomes than high incomes, benefits of the tax flow to the same group. Low- and moderate-income Philadelphians will reap greater benefits than high-income residents of the city from the expansion of pre-K, from the improvement in community recreation centers and parks, and from both the health and financial benefits of a reduction in the consumption of sugar-sweetened beverages. And the costs of the soda tax will not be huge. The average American drinks 44 gallons of soda a year, so the proposed tax would cost $42 per year. Unlike other taxes, this is one that Philadelphians can choose to avoid by changing what they consume. If the consumption of SSBs falls by half, the tax would drop to $21 a year.

Some opponents have argued that as soda consumption declines, the tax will not generate the funds to pay the costs of pre-K education over the long term. It is, however, not unusual to supplement revenues dedicated to a start-up programs with additional sources of revenue later. And, over the long term, the sugar tax will generate more revenues for the city. It will give

Philadelphia a better-educated workforce that generates jobs, economic growth, and higher tax revenue in the city. It will also reduce the costs of health care in city's health centers.

Other opponents point to the costs to the small shopkeepers and supermarkets that sell sugar-sweetened drinks, the truckers who transport them, and the distributors who sell them. But at least for the first two groups, the costs should be relatively small. Mayor Kenney has proposed a tax on soda, not on thirst. The research on the impact of taxes on SSBs cited above shows that consumers shift consumption from sugar-sweetened drinks to other drinks. Small shopkeepers and supermarkets will sell more milk, bottled water, and fruit juice. And the tax could create an incentive for those that do not currently stock healthy beverages to do so. Truckers will transport those healthier drinks. Distributors of healthier drinks will sell more of them.

Overall, the tax would provide great benefits to all Philadelphians and, especially to those with low incomes, at very low costs to the residents and businesses of the city.