

# Evidence on the Impacts of the Seattle Sweetened Beverage Tax

Lisa M. Powell, PhD

Distinguished Professor and Director  
Health Policy and Administration  
School of Public Health  
University of Illinois Chicago

University of Washington and City of Seattle  
Seattle, WA

September 22, 2022



# Impact of the Seattle SBT on Prices: Tax Pass-through

## Tax Impact on Beverage Prices and Related Tax Pass-through

	Year 1 Post-tax	Year 2 Post-Tax
Change in prices (¢/oz)	1.03 (0.99, 1.08)	1.04 (0.99, 1.10)
Tax Pass-through	59%	59%

### Tax pass-through:

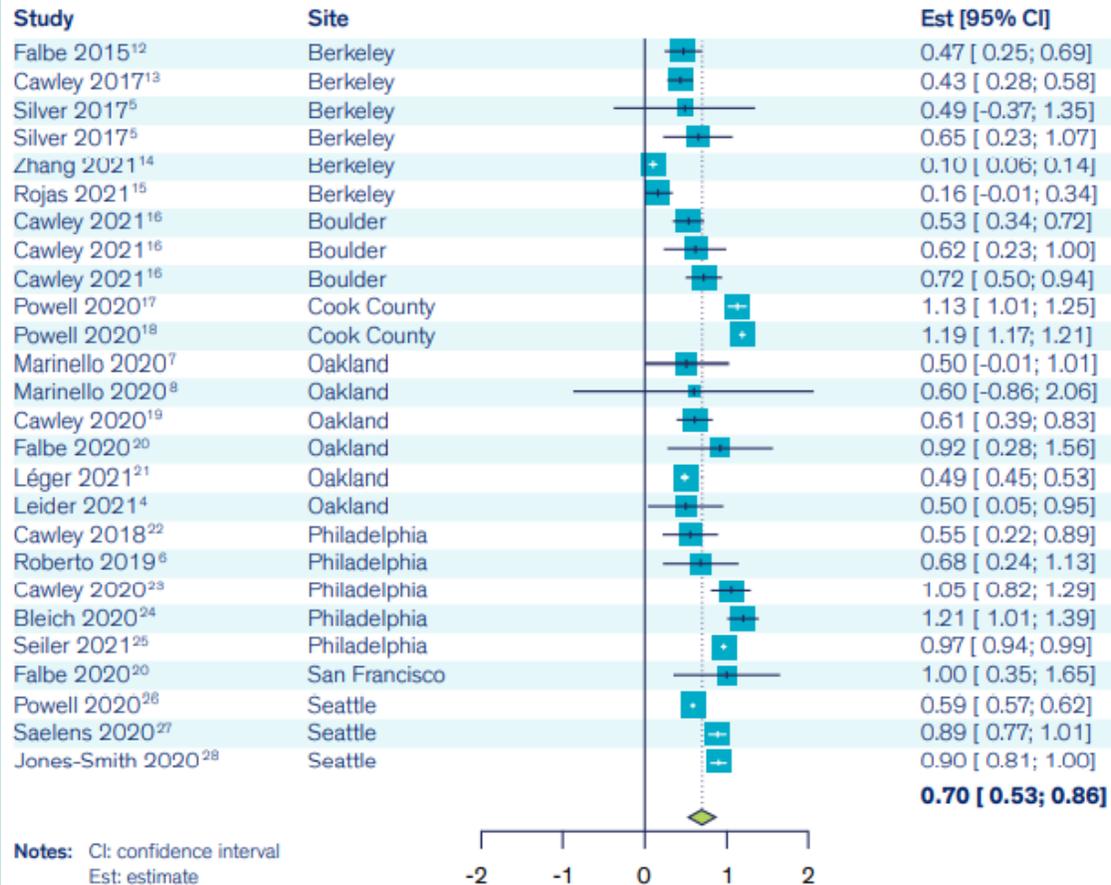
- Following the implementation of the Seattle SBT, the price of taxed beverages rose, on average, by 1.03-1.04 cents per ounce at one-year and two-years post-tax.
- This corresponded to a 59% tax pass-through rate; and, based on pre-tax mean prices, a 20% increase in the price of taxed beverages.

Sources: Powell LM & Leider J. (2020). The impact of Seattle's sweetened beverage tax on beverage prices and volume sold. *Economics and Human Biology*. 37:100856 Available online: <https://doi.org/10.1016/j.ehb.2020.100856>

Powell, L.M. and Leider, J., (2021). Impact of a sugar-sweetened beverage tax two-year post-tax implementation in Seattle, Washington, United States. *Journal of Public Health Policy*, 42:574-588. Available online: <https://doi.org/10.1057/s41271-021-00308-8>

# Comparison with SSB Tax Pass-through in U.S.

FIGURE 1 Tax Pass-through Estimates and Meta-analysis Results



## SSB taxes increase prices:

On average, tax pass-through of local U.S. SSB taxes has been 70%, although there has been substantial heterogeneity across studies.

- Estimates of tax pass-through were similar, on average, in jurisdictions with lower (i.e., 1¢/oz) compared to higher (i.e., > 1¢/oz) tax rates.

Source: Powell LM, Marinello S, Leider J. *A Review and Meta-analysis of Tax Pass-through of Local Sugar-Sweetened Beverage Taxes in the United States*. Research Brief No. 120.

# Impact of Seattle SBT on Demand: Evidence on Volume Sold

FIGURE 1 Volume Sold of Taxed Beverages in Seattle, Washington, and Portland, Oregon, Two-Years Pre- and Post-Tax Implementation<sup>12</sup>



Note: First published in the *Journal of Public Health Policy*, 2021, <https://doi.org/10.1057/s41271-021-00308-8> by Springer Nature.

FIGURE 2 Volume Sold of Family-Size and Individual-Size Taxed Beverages in Seattle, Washington, and Portland, Oregon, Two-Years Pre- and Post-Tax Implementation<sup>12</sup>



Notes: Individual-size beverages: single items at most 1 liter in volume. Family-size beverages: single items greater than 1 liter or multi-packs of any size. First published in the *Journal of Public Health Policy*, 2021, <https://doi.org/10.1057/s41271-021-00308-8> by Springer Nature.

## Changes in Volume Sold:

- Immediate, **sustained 22% reduction** in taxed beverage volume sold up to 2-years post-tax.
- Estimated price elasticity of demand was -1.1.
- Sustained 29-31% decline in volume sold of family-size taxed beverages and 10% decline in volume sold of individual-size taxed beverages up to 2-years post-tax.
- The largest decline was in volume sold of family-size taxed soda, which fell by 36% at 1- and 2-years post-tax relative to the pre-tax period.

Sources: Powell LM & Leider J. (2020). The impact of Seattle's sweetened beverage tax on beverage prices and volume sold. *Economics and Human Biology*. 37:100856 Available online: <https://doi.org/10.1016/j.ehb.2020.100856>

<https://doi.org/10.1016/j.ehb.2020.100856>

Powell, L.M. and Leider, J., (2021). Impact of a sugar-sweetened beverage tax two-year post-tax implementation in Seattle, Washington, United States. *Journal of Public Health Policy*, 42:574-588.

Available online: <https://doi.org/10.1057/s41271-021-00308-8>

# Impact of Seattle SBT on Cross-border Shopping: Evidence on Volume Sold

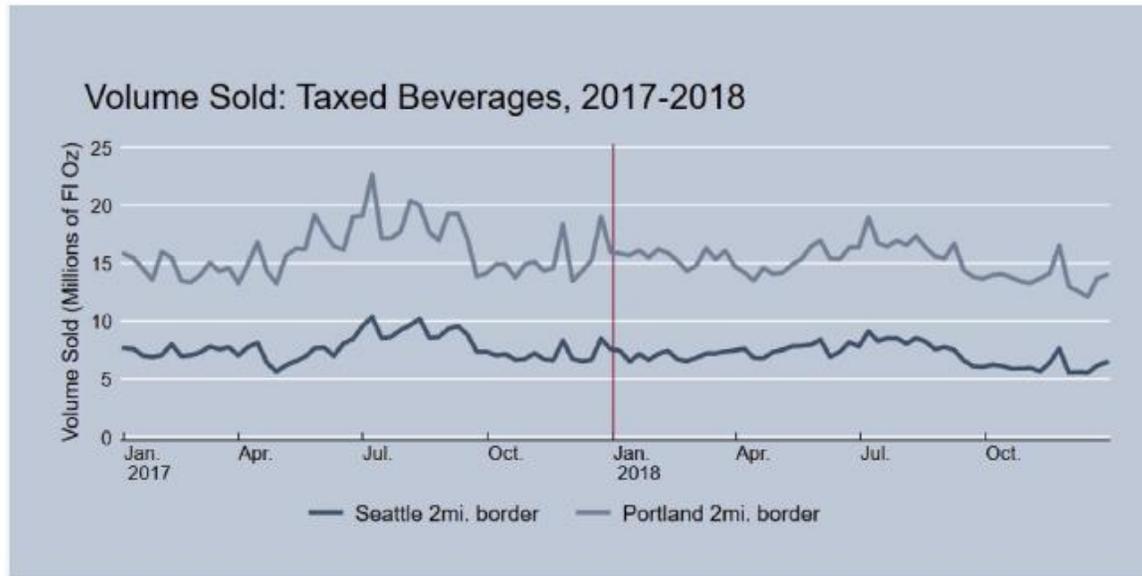


Fig. 3. Volume Sold of Taxed Beverages in the 2-mile Border Area of Seattle, WA, and Portland, OR, One-year Before and After Tax Implementation.

## Changes in Volume Sold in the border area:

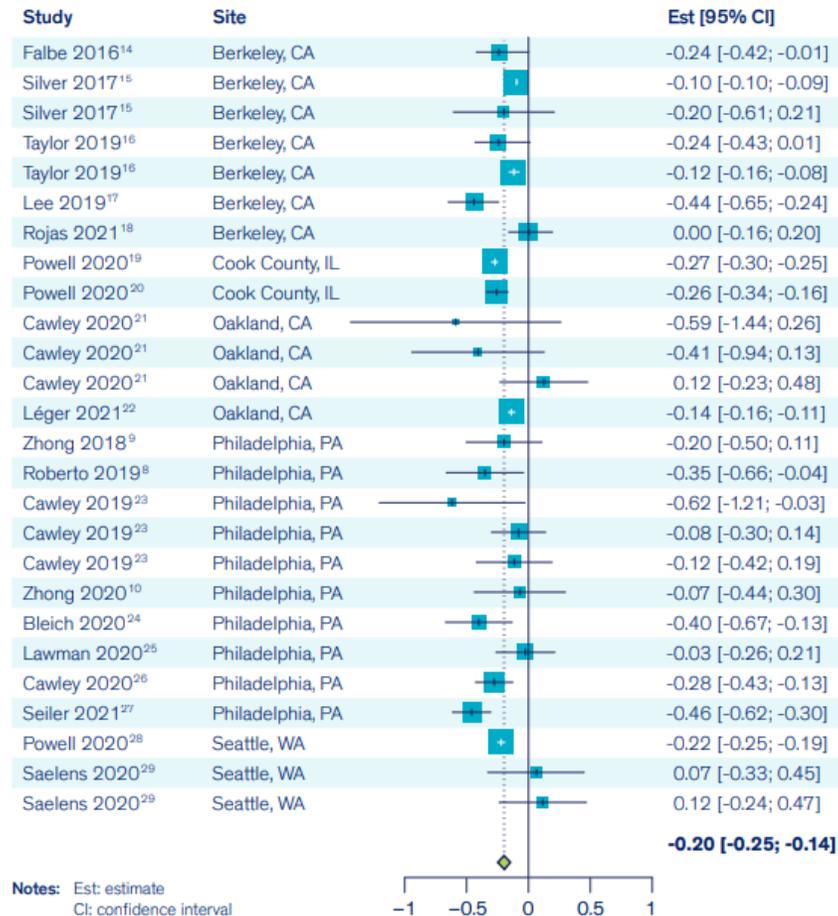
- No evidence of cross-border shopping following the implementation of the Seattle SBT through 2-years post-tax.

Sources: Powell LM & Leider J. (2020). The impact of Seattle's sweetened beverage tax on beverage prices and volume sold. *Economics and Human Biology*. 37:100856 Available online: <https://doi.org/10.1016/j.ehb.2020.100856>

Powell, L.M. and Leider, J., (2021). Impact of a sugar-sweetened beverage tax two-year post-tax implementation in Seattle, Washington, United States. *Journal of Public Health Policy*, 42:574-588. Available online: <https://doi.org/10.1057/s41271-021-00308-8>

# Comparison with Impact of SSB Taxes Demand in the U.S.: Evidence on Consumption, Purchases and Volume Sold

FIGURE 1 Change in Demand Estimates and Meta-analysis Results

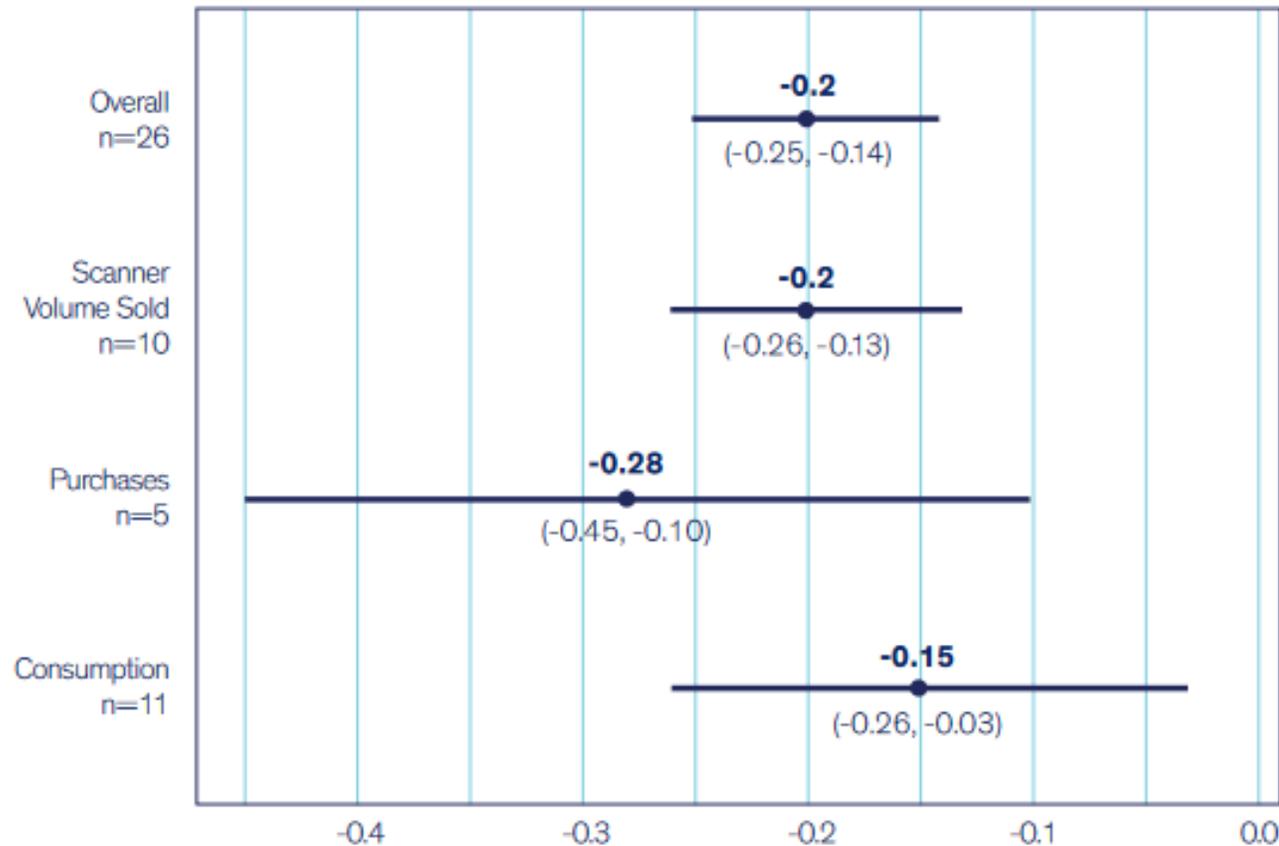


## SSB taxes reduce demand:

On average, following the implementation of local U.S. SSB taxes, demand for SSBs fell by 20%, with substantial heterogeneity across studies.

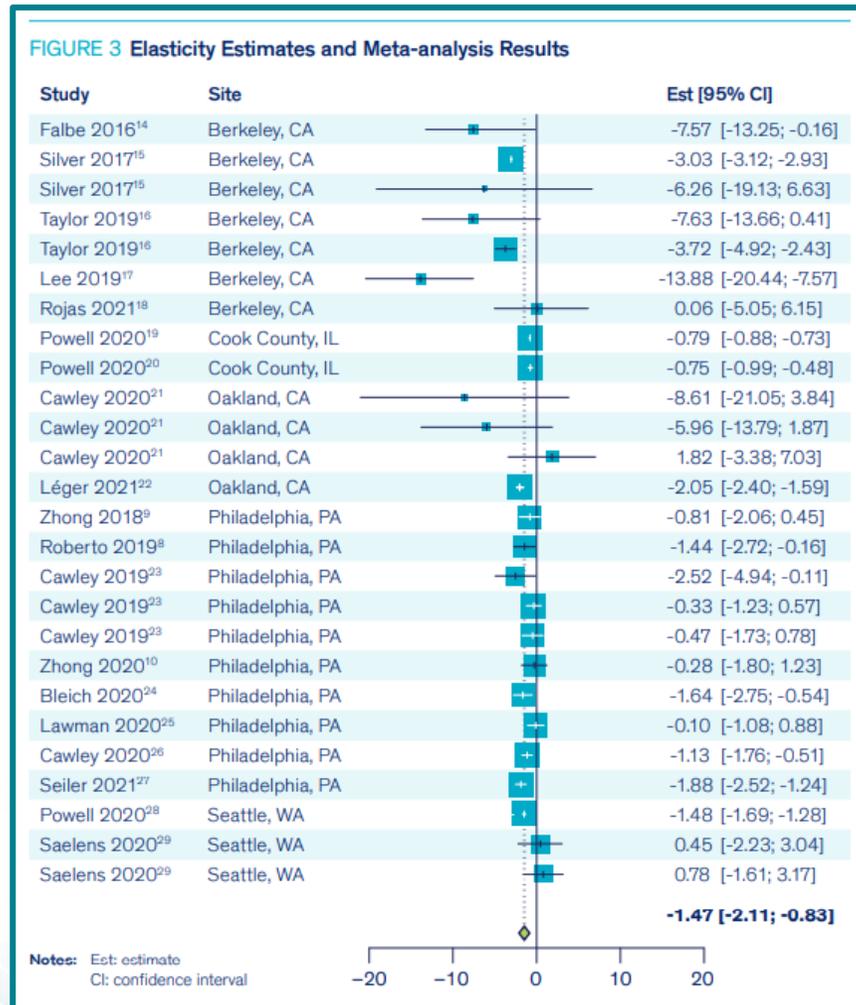
# Impact on Demand: Evidence on Consumption, Purchases and Volume Sold

FIGURE 2 Demand Meta-analysis Results by Study Measure



Source: Powell LM, Marinello S, Leider J, Andreyeva T. [A Review and Meta-analysis of the Impact of Local U.S. Sugar-sweetened Beverage Taxes on Demand](#). Research Brief No. 121.

# Impact of SSB Taxes on Demand in the U.S.: Estimates of Price Elasticity of Demand



## SSB taxes reduce demand:

- On average, estimated price elasticity of demand based on evaluations of local U.S. SSB taxes is -1.47.
  - A tax that raises SSB prices by 25%, for example, is expected to reduce demand for SSBs by 37%.
- Based on a subset of 5 studies, one quarter of the estimated reduction in demand was offset by cross-border shopping. After accounting for cross-border shopping, the average estimated price elasticity of demand was -1.1

# Evidence on Substitution to Untaxed Beverages

## Seattle SBT Impact on Volume Sold of Untaxed Beverages, 2-years post-tax

	Overall beverages	Individual-size beverages	Family-size beverages
Untaxed	<b>+5%</b>	+2%	<b>+6%</b>
Water	<b>+9%</b>	-7%	<b>+12%</b>
Unsweet milk	+1%	<b>+7%</b>	+1%
Sweetened Milk	+6%	<b>+9%</b>	+6%
Unsweet Juice	-2%	-1%	-2%
Juice Drink	<b>+7%</b>	<b>+16%</b>	-9%
Soda	<b>+5%</b>	<b>+9%</b>	+5%
Sports Drink	+6%	+5%	IS
Energy Drink	0%	0%	IS
Tea/Coffee	+5%	+4%	IS

## Substitution to Untaxed Beverages:

- There was moderate substitution to untaxed beverages of 4-5% in Seattle.
- Mixed results across jurisdictions; e.g., no change in Cook County and mixed for Philadelphia.

Sources: Powell LM & Leider J. (2020). The impact of Seattle's sweetened beverage tax on beverage prices and volume sold. *Economics and Human Biology*. 37:100856 Available online: <https://doi.org/10.1016/j.ehb.2020.100856>

Powell, L.M. and Leider, J., (2021). Impact of a sugar-sweetened beverage tax two-year post-tax implementation in Seattle, Washington, United States. *Journal of Public Health Policy*, 42:574-588. Available online: <https://doi.org/10.1057/s41271-021-00308-8>

Leider J, Oddo VM, Powell LM. *A Review of the Effects of U.S. Local Sugar-Sweetened Beverage Taxes on Substitution to Untaxed Beverages and Food Items*. Research Brief No. 123.

# Impact of Seattle SBT on Substitution to Food

## SBT Impact on Substitution to Foods

	Year 1 Post-tax	Year 2 Post-Tax
Change in sales of sweets	+4%	+6%
Change in calories sold of sweets	+3%	+4%
Change in sales of snacks	0%	0%

### Substitution to Foods:

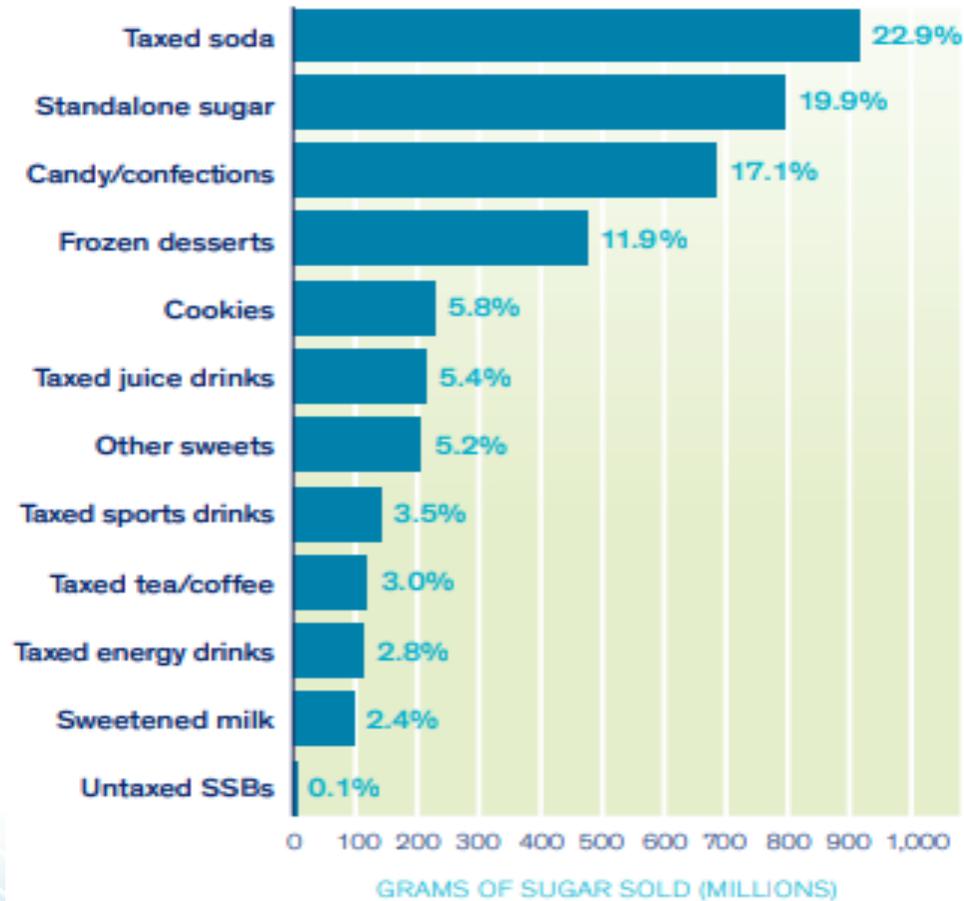
- Substitution to sweets but not salty snacks.
- By comparison, no substitution to sweets or salty snacks in Philadelphia

Sources: Oddo V, Leider J, Powell LM. (2021). The impact of Seattle's sugar-sweetened beverage tax on substitution to sweets and salty snacks. *Journal of Nutrition*. 151(10): 3232–3239. Available online: <https://doi.org/10.1093/jn/nxab194>

Leider J, Oddo VM, Powell LM. [A Review of the Effects of U.S. Local Sugar-Sweetened Beverage Taxes on Substitution to Untaxed Beverages and Food Items](#). Research Brief No. 123.

# Distribution of Sugar Sold in Seattle

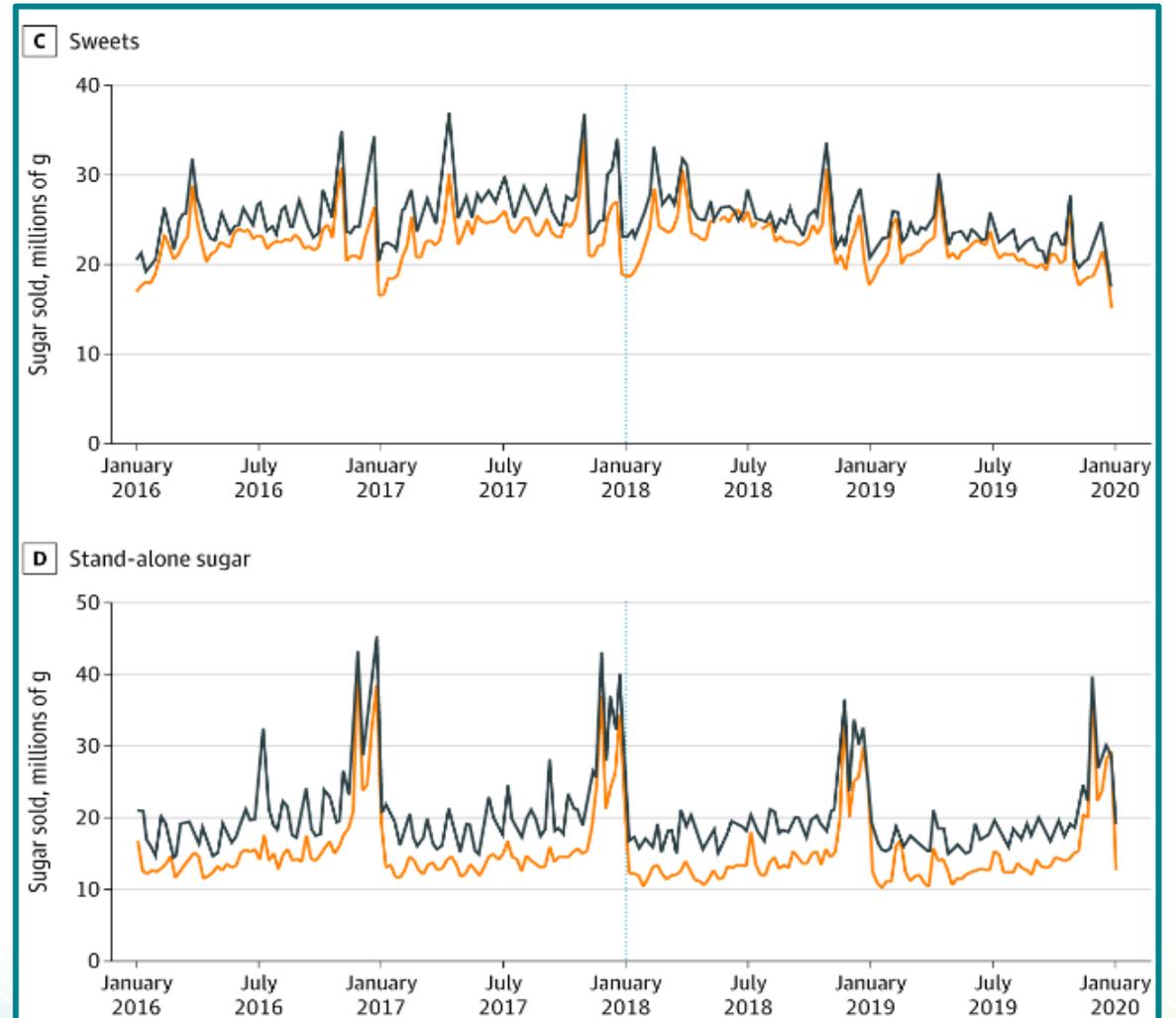
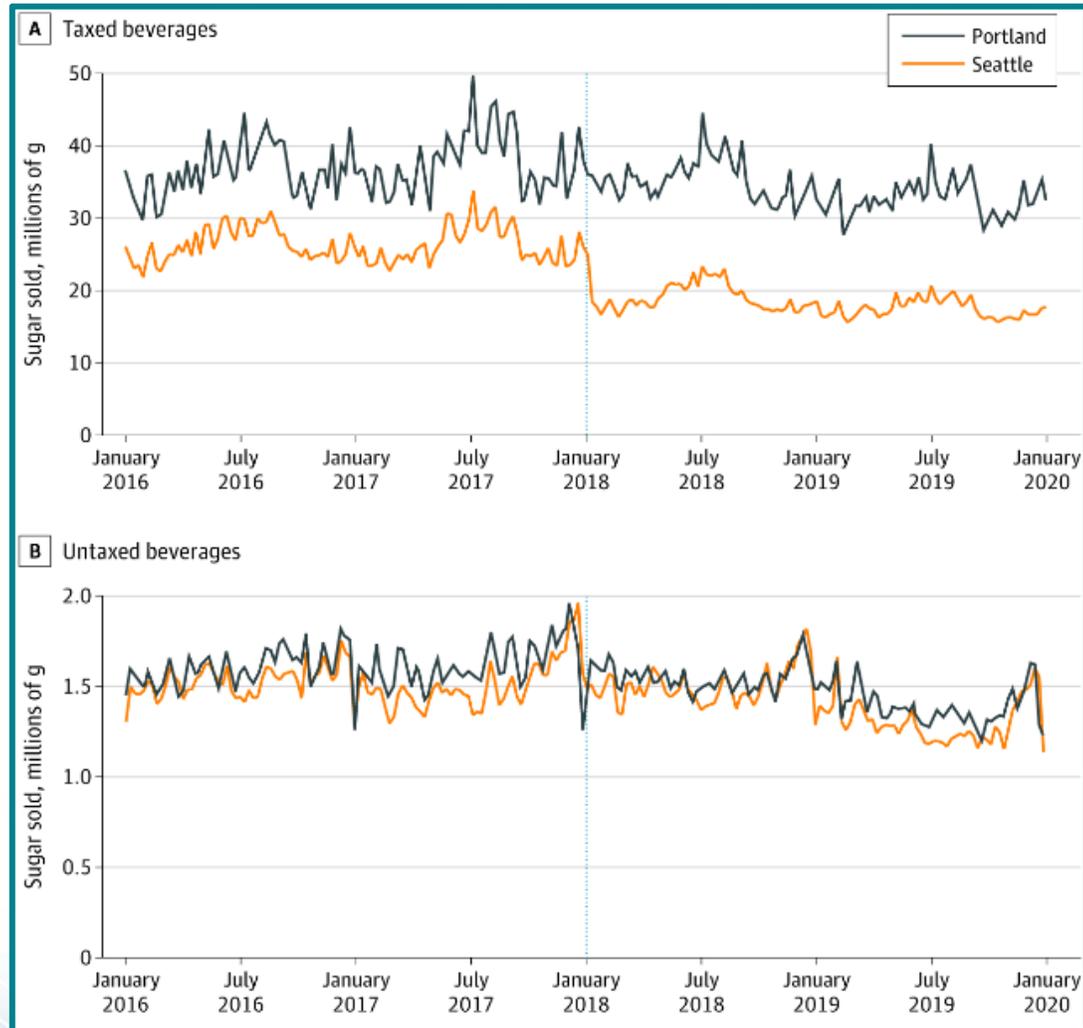
FIGURE 3 Sources of Sugar in Seattle, Washington, One-Year Pre-Tax Implementation<sup>14</sup>



Note: First published in JAMA Network Open, 2021, <https://doi.org/10.1001/jamanetworkopen.2021.32271>.

Source: Powell, L.M., Leider, J. and Oddo, V.M., (2021). Evaluation of changes in grams of sugar sold after the implementation of the Seattle sweetened beverage tax. JAMA Network Open, 4(11), pp. e2132271-e2132271. Available online: <https://doi.org/10.1001/jamanetworkopen.2021.32271>

# Evidence of Seattle SBT on Changes in Grams of Sugar Sold



Source: Powell, L.M., Leider, J. and Oddo, V.M., (2021). Evaluation of changes in grams of sugar sold after the implementation of the Seattle sweetened beverage tax. JAMA Network Open, 4(11), pp. e2132271-e2132271. Available online: <https://doi.org/10.1001/jamanetworkopen.2021.32271>

# Evidence on Impact of Changes in Sugar Sold from SSBs

## Seattle SBT Impacts

	Year 1 Post-tax	Year 2 Post-Tax
Change in grams of sugar sold from taxed SSBs	<b>-23%</b>	<b>-23%</b>
Change in grams of sugar sold from untaxed beverages	<b>+4%</b>	0%
Change in grams of sugar sold from sweets	<b>+4%</b>	<b>+4%</b>
Change in grams of sugar sold from stand alone sugar	0%	4%
Net change in grams of sugar sold from SSBs accounting for substitution	<b>-18%</b>	<b>-19%</b>

### Impact on Sugar sold from SSBs:

- 19% net reduction 2-years post-tax in sugar sold from taxed SSBs after accounting for substitution to sweets as well as standalone sugar and untaxed beverages.

# Evidence on Substitution to Alcohol

## Seattle SBT Impact on Volume Sold of Alcohol

	Year 1 Post-tax	Year 2 Post-Tax
Beer	+5%	+7%
Wine	0%	-3%
Alcohol	+4%	+5%

### Substitution to Alcohol:

- In Seattle, volume sold of beer increased by 7% at 2-years post-tax implementation while volume sold of wine decreased by 3%, with overall alcohol volume sold increasing by 5%.
- By comparison, for example, in Philadelphia, no change was found in volume sold of wine or spirits up to 1-year post-tax; beer was not evaluated.

Source: Powell LM. & Leider J. (2022). Impact of the Seattle sweetened beverage tax on substitution to alcoholic beverages. *Plos One*, 17(1): e0262578. Available online: <https://doi.org/10.1371/journal.pone.0262578>

# Summary of Seattle SBT Impacts

Seattle SBT Impacts		
	Year 1 Post-tax	Year 2 Post-Tax
Change in prices (¢/oz)	1.03	1.04
Tax pass-through rate	59%	59%
Change in volume sold of taxed beverages	-22%	-22%
Change in volume sold of untaxed beverages	+4%	+5%
Change in sales of sweets	+4%	+6%
Change in calories sold of sweets	+3%	+4%
Change in sales of snacks	0%	0%
Change in grams of sugar sold from SSBs (gross, net)	-23%, -18%	-23%, -19%
Change in volume sold of beer	+5%	+7%
Change in volume sold of wine	0%	-3%

# Overview of UIC Study Findings on SSB Tax Impacts for Seattle



## An Overview of the Impact of the Seattle, Washington, Sweetened Beverage Tax on Prices, Demand, Substitution, and Sugar Sold

LISA M. POWELL<sup>1,2</sup> AND JULIEN LEIDER<sup>2</sup>

### Key Findings

- Tax pass-through of the Seattle, Washington, Sweetened Beverage Tax (SBT) was 59% corresponding, on average, to a 20% increase in the price of taxed beverages.
- The Seattle SBT led to a sustained 22% decline in volume sold of taxed beverages up to two-years post-tax.
- There was no evidence of cross-border shopping in response to the tax at either one- or two-years post-tax.
- The tax led to moderate substitution to untaxed beverages (4-5% at one-year and two-years post-tax) and calories sold of sweets (3-4%).
- Accounting for substitution to untaxed beverages and sweets, the tax led to net reductions in grams of sugar sold from taxed beverages of 18% at one-year and 19% at two-years post-tax.

### AUTHOR AFFILIATIONS

1. Health Policy and Administration, School of Public Health, University of Illinois Chicago, Chicago, IL
2. Institute for Health Research and Policy, University of Illinois Chicago, Chicago, IL

Sugar-sweetened beverage (SSB) consumption is associated with chronic health problems<sup>1-3</sup> and is the leading source of added sugars intake in the U.S.<sup>4,5</sup> Among Seattle, Washington, adults, in 2017, 80.2% consumed SSBs at least once a month, with 23.2% consuming SSBs daily, and SSBs contributed 44% of total daily added sugars intake.<sup>6</sup> Further, in 2018, 19.8% of Seattle adults were obese and 7.1% had diabetes,<sup>7</sup> both conditions associated with SSB consumption.<sup>1,2</sup> Children are also affected: among 8th, 10th, and 12th grade Seattle children in 2018, 11.4% consumed SSBs daily, and 10.7% were obese.<sup>7</sup>

SSB taxes have been recognized by both national and international organizations as a potential means to reduce SSB consumption and associated health conditions.<sup>8,9</sup> SSB taxes (which may also apply to artificially sweetened beverages) are currently implemented in more than 40 countries and 7 U.S. cities.<sup>10</sup> Effective January 1, 2018, Seattle implemented its 1.75 cent per ounce Sweetened Beverage Tax (SBT) on SSBs with at least 40 calories per 12 ounces. Like other local U.S. taxes, the tax exempted milk, including flavored/sweetened milk, as well as 100% juice.

The effectiveness of SSB taxes depends on the extent to which they are passed through to prices faced by consumers and the extent to which this leads to decreases in demand. It also hinges on the extent to which substitution to untaxed beverages or foods, which may also be unhealthy and high in sugar, offsets the impact of the tax. This brief summarizes the results of four studies which used Nielsen retail scanner data to analyze the impact of the Seattle SBT on beverage prices and volume sold, substitution to untaxed beverages, sweets, and salty snacks, and net changes in grams of sugar sold from taxed beverages up to two-years post-tax, based on difference-in-differences analyses with Portland, Oregon, as a comparison site.<sup>11-14</sup>

In this brief, we summarize the study findings on the impact of the Seattle SBT. Table 1 summarizes the empirical results from two studies that examined the respective one-<sup>11</sup> and two-year<sup>12</sup> post-tax impacts of the SBT on tax pass-through, volume sold of taxed and untaxed beverages and cross-border shopping and a study<sup>13</sup> that examined substitution to sweets and salty snacks. Figure 1 shows the changes in volume sold of taxed beverages in Seattle compared to the comparison site of Portland; and, Figure 2 shows these changes by beverage size. Finally, Figure 3 shows the distribution of total grams of sugar sold pre-tax in Seattle by beverage and sweet category and for standalone sugar.<sup>14</sup> And, we summarize study<sup>14</sup> findings that examined the impact of the SBT on changes in grams of sugar sold from taxed SSBs, untaxed beverages, sweets and from standalone sugar itself, which may be added to foods and beverages. This provides evidence on the net tax impact on reducing sugar sold from SSBs, after accounting for potential substitution to other key sources of added sugars.

Powell LM, Leider J. [An Overview of the Impact of the Seattle, Washington, Sweetened Beverage Tax on Prices, Demand, Substitution, and Sugar Sold.](#) Research Brief No. 124.

Available from: <https://p3rc.uic.edu/resources/p3rc-publications-by-type/>

# Further Information on SSB Tax Impacts Across the U.S.

**Lisa M. Powell, PhD**

**powell@uic.edu**

1. Chriqui JF, Pipito AA, Asada Y, Powell LM. [Lessons learned from the adoption and implementation of sweetened beverage taxes in the United States: A narrative review.](#) Research Brief No. 119.
2. Powell LM, Marinello S, Leider J. [A Review and Meta-analysis of Tax Pass-through of Local Sugar-Sweetened Beverage Taxes in the United States.](#) Research Brief No. 120.
3. Powell LM, Marinello S, Leider J, Andreyeva T. [A Review and Meta-analysis of the Impact of Local U.S. Sugar-sweetened Beverage Taxes on Demand.](#) Research Brief No. 121.
4. Marinello S, Powell LM. [A Review of the Labor Market Impacts of Local Sugar-Sweetened Beverage Taxes in the United States.](#) Research Brief No. 122.
5. Leider J, Oddo VM, Powell LM. [A Review of the Effects of U.S. Local Sugar-Sweetened Beverage Taxes on Substitution to Untaxed Beverages and Food Items.](#) Research Brief No. 123.

Available from: <https://p3rc.uic.edu/resources/p3rc-publications-by-type/>