Higher Sugar-Sweetened Beverage Retail Prices After Excise Taxes in Oakland and San Francisco

Jennifer Falbe, ScD, MPH, Matthew M. Lee, MS, Scott Kaplan, MS, Nadia A. Rojas, MPH, Alberto M. Ortega Hinojosa, PhD, MPH, and Kristine A. Madsen, MD, MPH

Objectives. To examine how much sugar-sweetened beverage (SSB) excise taxes increased SSB retail prices in Oakland and San Francisco, California.

Methods. We collected pretax (April–May 2017) and posttax (April–May 2018) retail prices of SSBs and non-SSBs from 155 stores in Oakland, San Francisco, and comparison cities. We analyzed data using difference-in-differences high-dimensional fixed-effects regressions, weighted by regional beverage sales.

Results. Across all beverage sizes, the weighted average price of SSBs increased by 0.92 cents per ounce (95% confidence interval [CI] = 0.28, 1.56) in Oakland and 1.00 cents per ounce (95% CI = 0.35, 1.65) in San Francisco, compared with prices in untaxed cities. The tax did not significantly alter prices of water, 100% juice, or milk of any size examined. Diet soda only, among non-SSBs, exhibited a higher price increase for some sizes in taxed cities.

Conclusions. Within 4 to 10 months of implementation, Oakland's and San Francisco's SSB excise taxes significantly increased SSB retail prices by approximately the amount of the taxes, a key mechanism for reducing consumption. (*Am J Public Health.* 2020;110: 1017–1023. doi:10.2105/AJPH.2020.305602)

See also Chriqui and Powell, p. 931.

In November 2016, Oakland and San Francisco, California, became the first large cities west of Philadelphia, Pennsylvania, to pass excise taxes on sugar-sweetened beverages (SSBs). In the United States, there are now 7 cities and the Navajo Nation that have implemented SSB taxes, with more likely to follow.[1] The goals of SSB taxes are to reduce SSB consumption, chronic disease, and health care costs and raise revenues for public health, education, and other public needs.

The American Heart Association, American Academy of Pediatrics, American Public Health Association, and World Health Organization all support SSB taxes. SSBs were targeted for taxation because they are the leading source of added sugar in the diet and a major contributor to obesity and risk of type 2 diabetes, heart disease, and other conditions.[2] A national 1 cent per fluid ounce tax is projected to substantially reduce morbidity and mortality, averting 101 000 disability-adjusted life-years and gaining 871 000 quality-adjusted life-years over a decade.[3] Despite some recent declines in SSB consumption, the majority of Americans still consume SSBs daily.[4] Furthermore, regular soda consumption in California, which declined from 2011 to 2014, returned to 2011 levels by 2015 and 2016.[5]

The most well-studied mechanism through which SSB taxes reduce consumption is by raising SSB retail prices (referred to as "pass-through" in economics). SSB excise taxes are paid by SSB distributors based on volume (by oz) sold to retailers. Excise taxes raise retail prices for consumers if distributors increase the cost of SSBs to retailers and if retailers then raise SSB shelf prices. Every 20% increase in SSB prices is estimated to reduce consumption by 24%.[6] Another feature of these specific excise taxes is that they are expected to disincentivize the purchasing of large sizes of SSBs by raising prices of large SSBs by a greater percentage than prices of smaller sizes.

Oakland's and San Francisco's SSB tax ordinances passed with 61% and 62% of the vote via ballot initiative and were effective starting July 2017 and January 2018, respectively. Both ordinances levied a 1 cent per ounce specific excise tax on SSB distributors, which applies to SSBs (e.g., soda; sports, energy, and fruit-flavored drinks; sweetened coffee and tea) containing 25 or more kilocalories per 12 ounces. The taxes do not apply to milk products, infant or baby formula, beverages for medical use, 100% juice, or beverages sweetened only with artificial sweeteners (e.g., diet soda). Philadelphia's beverage tax, unlike those in other US jurisdictions, also applies to artificially sweetened beverages.

Evaluations of the nation's first 2 sweetened beverage excise taxes in Berkeley, California (levied on SSBs only), and Philadelphia (levied on SSBs and artificially sweetened beverages) found that these taxes led to higher retail prices[7–11] and substantially lower consumption[12–15] and purchasing[8,11,16] of taxed beverages. However, each city has unique characteristics that could affect the implementation of the tax and how

ABOUT THE AUTHORS

Jennifer Falbe is with the Human Development and Family Studies Program, Department of Human Ecology, University of California, Davis. At the time of the study, Matthew M. Lee was with the divisions of Community Health Sciences and Epidemiology, University of California, Berkeley School of Public Health. Nadia A. Rojas and Kristine A. Madsen were with the Division of Community Health Sciences, University of California, Berkeley School of Public Health. Scott Kaplan is with the Department of Agricultural and Resource Economics, University of California, Berkeley. Alberto M. Ortega Hinojosa is with the Health Division, IMPAQ International, Oakland, CA.

Correspondence should be sent to Jennifer Falbe, 1 Shields Ave, Davis, CA 95616 (e-mail: jfalbe@ucdavis.edu). Reprints can be ordered at http://www.ajph.org by clicking the "Reprints" link.

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distributors, retailers, and customers respond. There is no published research on SSB taxes in Oakland and San Francisco, home to approximately 1.2 million people: 390 724 in Oakland and 805 235 in San Francisco (5-year American Community Survey, 2017).[17] Thus, we sought to estimate the impact of SSB taxes on beverage retail prices in Oakland and San Francisco, using nearby untaxed cities as a comparison. Furthermore, in exploratory analysis, we sought to determine whether tax-related increases in SSB retail prices differed by store type and neighborhood socioeconomic status (SES).

METHODS

Using a longitudinal design, we compared 1-year pre- to posttax beverage price changes in Oakland and San Francisco with price changes in Richmond and San Jose, California, regional nonbordering comparison cities without SSB taxes. We collected pretax beverage prices in April through May 2017 and posttax prices in April through May 2018, approximately 10 months after implementation in Oakland and 4 months after implementation in San Francisco.

We selected Richmond and San Jose because of shared sociodemographic characteristics with and geographic proximity to San Francisco and Oakland. The average race/ethnicity across taxed and comparison cities was 47% and 44% White, 28% and 27% Asian, 17% and 14% African American, and 21% and 37% Hispanic, respectively; likewise, median household income was $90 697 across the taxed cities versus $85 889 across comparison cities (5-year American Community Survey, 2017).[17]

Store Sample

Data collectors recorded beverage shelf prices in chain supermarkets, discount supermarkets, drugstores, mass merchandisers, convenience stores and independent supermarkets, corner and small grocery stores, and liquor stores (Table 1). We selected stores using stratified random sampling by type, chain (if applicable), and city from retailers identified by corporate Web sites, Google Maps, and ReferenceUSA. We further stratified sampling of supermarkets, corner stores, and liquor stores by tertile of census tract median household income (5-year American Community Survey, 2015)[17] to ensure representation across neighborhood SES: we sampled 2 stores from each supermarket chain and 2 independent supermarkets per city, evenly divided between lowest and highest tertile of census tract median income, and 15 corner stores and 3 liquor stores per city, evenly divided across the 3 income tertiles.

To assign census tract median household income, we geocoded store addresses using StreetMap Premium USA Geocoder 2017 (Environmental Systems Research Institute, Redlands, CA) and spatially intersected them with the cities' census tracts. If an insufficient number of stores existed in a tertile or city, we sampled stores from the next tertile or city (by taxation status), respectively. We reclassified some store types based on in-person visits. Of 171 stores sampled, 9 refused and 7 closed, leaving a final sample of 155 stores (91%).

Beverage Sample and Data Collection

We collected prices for more than 30 nationally top-selling[7] and regionally prevalent brands (Table A, available as a supplement to the online version of this article at http://www.ajph.org) representing SSB (regular soda; regular sports, energy, and fruit-flavored drinks; flavored water; and sweetened tea and coffee) and non-SSB categories (diet or artificially sweetened soda, energy drinks, and flavored water; water; 100% orange juice; and milk). We included "single-serving" (< 33.8 oz) sizes for all beverages; "medium" (33.8–< 42 oz) for soda, a fruit-flavored drink, and water; "large" (≥ 46 oz) for soda, fruit-flavored drinks, and water; and multipacks for soda. If prices were not posted, researchers asked cashiers for prices. If cashiers did not provide prices, we purchased beverages and obtained prices from receipts.

Based on previous observations (J Falbe, AH Grummon, NA Rojas et al., unpublished), we purchased 1 soda and fruit drink from independent retailers in taxed cities to determine whether they added a surcharge for taxed beverages at the register, instead of programming higher prices into their point-of-sale system (e.g., if a 20-oz SSB costs $1.80 before the tax, after the tax, retailers might add a $0.20 surcharge at the register instead of ringing the item up at $2.00). We asked retailers that added a surcharge (n = 8) which drinks were surcharged. Posttax prices in our data included any surcharges. If a beverage was on sale, we used the sale price in the analysis to reflect the price a customer would see when making a beverage selection. Of 9021 total prices, 1202 (13%) were sale prices. We excluded price changes that were less than the 0.5 percentile or greater than the 99.5 percentile.

We weighted beverage category prices (e.g., regular soda) by product sales volume for the local area from July 2016 through June 2017, calculated based on data from the Nielsen Company (US), LLC and marketing databases provided by the Kilts Center for Marketing Data Center at the University of Chicago Booth School of Business. We weighted aggregated SSB prices by volume sold of each beverage category (e.g., regular soda) and size category (e.g., < 33.8 oz) compared with the total SSB volume sold in Nielsen. We weighted aggregate non-SSB prices in the same manner.

Statistical Analysis

To determine whether changes in beverage retail price (cents/oz) differed between taxed and untaxed cities, we used a difference-in-differences approach. We fit the data to a linear high-dimensional fixed-effects regression model,[18] regressing price on binary indicators for period (after vs before tax) and treatment city, the interaction of these indicators, and fixed effects for each store. We clustered SEs at the store level. If an item was on sale (13% of beverages), we used the sale price in the primary analysis. We conducted a sensitivity analysis using regular prices only.

In an exploratory analysis, we combined Oakland and San Francisco into a single treatment group to examine whether the impact of the tax on retail prices of SSBs and non-SSBs differed by (1) store type and (2) tertile of census tract median income. To examine differences by store type, we stratified the regression model by type of store. To determine whether the tax led to differences in overall SSB and non-SSB price changes by tertile of census tract median household

TABLE 1—Analytic Sample of Retailers in Cities From Which Beverage Prices Were Collected Before (April–May 2017) and After (April–May 2018) Sugar-Sweetened Beverage (SSB) Excise Taxes

	Taxed Cities		Taxed Cities Combined, No. Retailers				Untaxed Cities		Untaxed Cities Combined, No. Retailers			
Store Type	Oakland, No. Retailers	San Francisco, No. Retailers	Income Tertile[a] 1	Income Tertile[a] 2	Income Tertile[a] 3	Total	Richmond, No. Retailers	San Jose, No. Retailers	Income Tertile[a] 1	Income Tertile[a] 2	Income Tertile[a] 3	Total
Corner store/ small grocery	16	14	10	13	7	30	15	16	12	13	6	31
Chain supermarket	8	6	5	5	4	14	2	7	4	2	3	9
Chain convenience store	5	5	4	4	2	10	4	4	3	4	1	8
Liquor store	4	3	2	2	3	7	3	4	3	3	1	7
Mass merchandiser	1	3	2	1	1	4	3	4	3	3	1	7
Drugstore	4	2	3	0	3	6	2	3	1	4	0	5
Independent supermarket	1	3	2	0	2	4	0	5	2	0	3	5
Chain discount supermarket	2	3	3	2	0	5	1	2	1	1	1	3
Total	41	39	31	27	22	80	30	45	29	30	16	75

Note. The sampling strategy was as follows: for chain convenience stores (5 most prevalent), drug stores, and mass merchandisers, we randomly sampled 1 store from each chain per city. We sampled 2 stores from each supermarket chain and 2 independent supermarkets, evenly divided between lowest and highest tertile of census tract median income. We sampled 15 corner stores and 3 liquor stores in each city, evenly divided across income tertiles. If no stores of a particular type existed in a tertile, we sampled stores from the next tertile. We did the same if an insufficient number of stores by type were available in a city (by taxation status). We reclassified some store types based on in-person visits (e.g., from corner store to independent supermarket) and replaced them with a new store in that category.

[a]Tertiles of census tract household median income (5-y American Community Survey, 2015) across the 4 cities: tertile 1 (low): ≤ $62 652 per year; tertile 2 (medium): > $62 652 and ≤ $95 449 per year; tertile 3 (high): > $95 449 per year.

income, we implemented a generalized linear model, regressing price on indicators and all 3- and 2-way interaction terms for period (after vs before tax), treatment group, and income tertile. We conducted analyses in Stata/SE version 15 (StataCorp LP, College Station, TX).

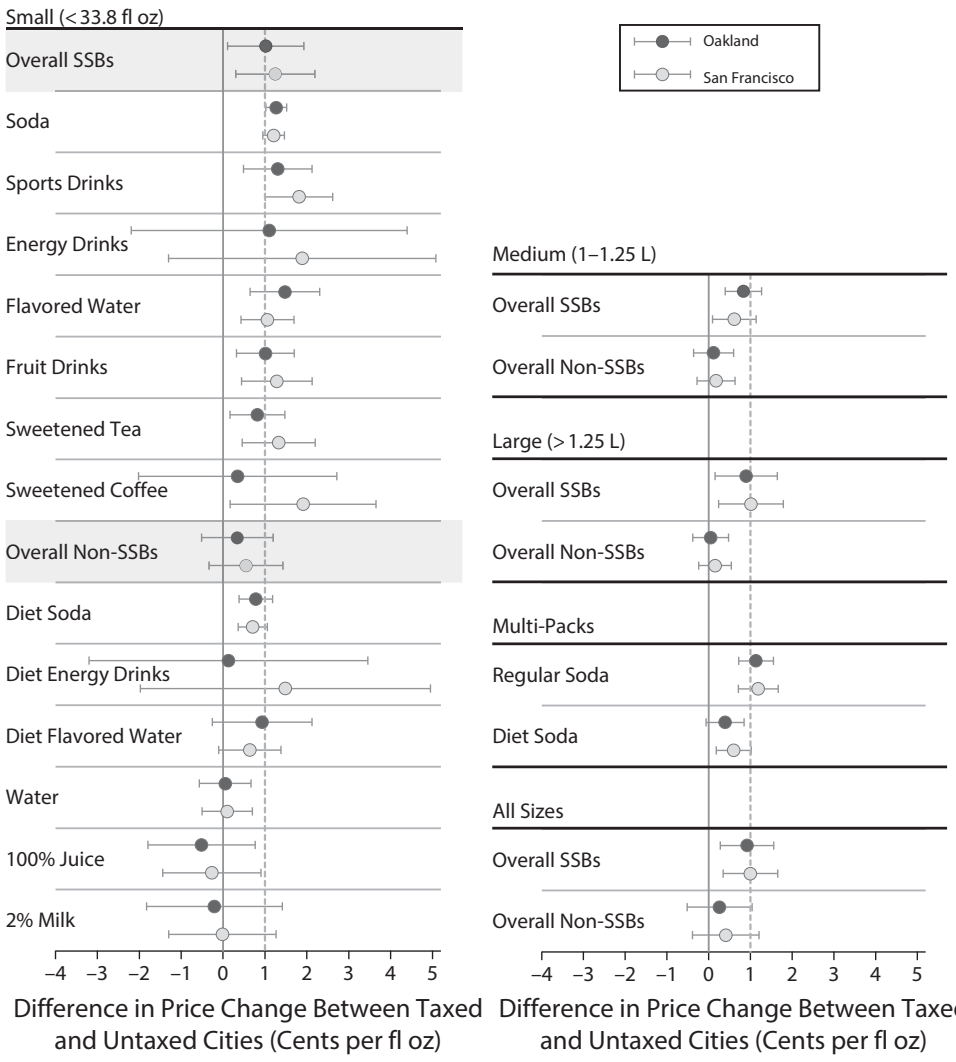
RESULTS

Figure 1 and Table B (available as a supplement to the online version of this article at http://www.ajph.org) show weighted pre- to posttax price changes (i.e., pass-through) by beverage type and size for taxed cities compared with untaxed cities. Table B additionally shows weighted prices by city.

When all sizes were combined, the weighted price of SSBs overall increased by 0.92 cents per ounce (95% confidence interval [CI] = 0.28, 1.56; $P < .01$) in Oakland and 1.00 cents per ounce (95% CI = 0.35, 1.65; $P < .01$) in San Francisco, compared with untaxed cities, equivalent to 92% and 100% pass-through and a 14% and 15% increase in retail price, respectively. Single-serving prices of SSBs overall increased by 1.02 cents per ounce (95% CI = 0.11, 1.93; $P = .03$) in Oakland and 1.25 cents per ounce (95% CI = 0.30, 2.19; $P = .01$) in San Francisco relative to comparison cities, equivalent to a 10% and 12%, respectively, increase in the retail price of single-serving SSBs. Pass-through to single-serving sizes of soda, sports drinks, sweetened water, and fruit-flavored drinks all exceeded 100% of the tax in both cities. Pass-through for soda varied by size and ranged from 52% to 127% of the tax; we observed the highest pass-through rates for soda for single serving and multipacks. However, the percentage increase in total retail price was lowest for small sizes of soda and highest for large sizes (e.g., 13% for single serving vs 35% for multipacks in San Francisco).

There were no significant differences in price change for water, 100% juice, or milk between taxed and untaxed cities. Diet sodas, in some sizes, were the only nontaxable products to exhibit a statistically significantly higher price increase in taxed cities than in comparison cities (Table B).

In sensitivity analyses using regular (and not sale) prices for all beverages, pass-through was modestly lower (Table C, available as a supplement to the online version of this article at http://www.ajph.org) for SSBs overall: 80% (95% CI = 14%, 145%) in Oakland and 81% (95% CI = 15%, 147%) in San Francisco because of slightly lower price increases in taxed cities (–0.04 and –0.09 cents/oz) and slightly higher price increases in comparison cities (+0.08 cents/oz). Only the pass-through estimate for single-serving SSBs in Oakland was no longer statistically significant, but the magnitude (86%; 95% CI = –6%, 178%) was still considerable.



Note. The dotted line indicates a 1 cent/oz increase in price (i.e., 100% pass-through for SSBs), and error bars indicate 95% confidence intervals. Estimates are from high-dimensional fixed-effects linear regression models, where we defined mean beverage price per oz as a function of a binary indicator for period, a binary indicator for San Francisco or Oakland, and their interaction. We clustered SEs at the store level. We weighted models for beverage categories (e.g., soda) by sales volume of each product (e.g., Coke 20 oz) across study beverages in that category using Nielsen data for the region. We weighted models for overall SSBs by volume sales of each type and size of SSB (e.g., small regular sodas) across all SSBs in Nielsen data for the region. We weighted models for overall non-SSBs in the same manner. Taxed cities included Oakland and San Francisco, and untaxed comparison cities included Richmond and San Jose, CA. We collected April–June 2018 prices approximately 10 mo after the tax implementation in Oakland (July 1, 2017) and 4 mo after the tax implementation in San Francisco (January 1, 2018).

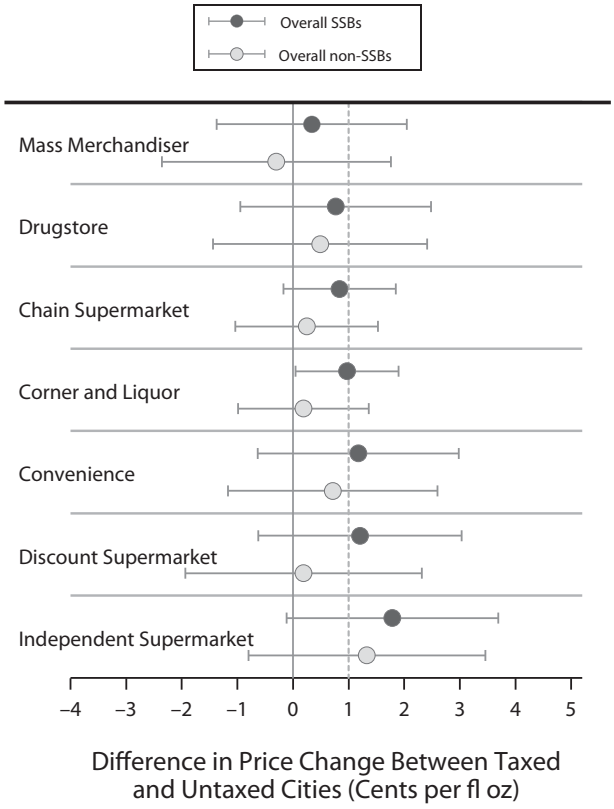
FIGURE 1—Differences in Price Changes Between Taxed and Comparison Cities Before (April–May 2017) and After (April–May 2018) Sugar-Sweetened Beverage (SSB) Excise Taxes: Oakland and San Francisco, CA

Exploratory analysis (Figure 2) suggested heterogeneity in pass-through by store type, but the analysis was underpowered: the relative increase in overall SSB retail price for all sizes combined appeared highest in independent supermarkets (1.79 cents/oz; 95% CI = –0.11, 3.69), discount supermarkets (1.20 cents/oz; 95% CI = –0.62, 3.03), and chain convenience stores (1.17 cents/oz; 95% CI = –0.63, 2.98) and lowest in mass merchandisers (0.34 cents/oz; 95% CI = –1.37, 2.05) and drugstores (0.77 cents/oz; 95% CI = –0.95, 2.48; *P* values > .05). The pass-through estimate for chain supermarkets was 0.84 cents per ounce (95% CI = –0.17, 1.85; *P* = .10), and for corner and liquor stores combined, it was 0.97 cents per ounce (95% CI = 0.05, 1.99; *P* = .04).

Census tract median household income was not significantly associated with differences in price change for SSBs or non-SSBs overall between taxed and untaxed cities (Table D, available as a supplement to the online version of this article at http://www.ajph.org).

DISCUSSION

Oakland's and San Francisco's 1 cent per ounce SSB excise taxes significantly increased SSB retail prices by approximately the full amount of the tax. Prices of water, 100% juice, and milk did not increase



Note. The dotted line indicates a 1 cent/oz increase in price (i.e., 100% pass-through for SSBs), and error bars indicate 95% confidence intervals. Estimates are from high-dimensional fixed-effects linear regression models stratified by store type, where we defined mean beverage price per oz as a function of a binary indicator for period, a binary indicator for San Francisco and Oakland combined, and their interaction. We clustered SEs at the store level. We weighted models for overall SSBs by volume sales of each type and size of SSB (e.g., small regular sodas) across all SSBs in Nielsen data for the region. We weighted models for overall non-SSBs in the same manner. Taxed cities included Oakland and San Francisco and untaxed comparison cities included Richmond and San Jose, CA. We collected April–June 2018 prices approximately 10 mo after the tax implementation in Oakland (July 1, 2017) and 4 mo after the tax implementation in San Francisco (January 1, 2018).

FIGURE 2—Differences in Price Changes by Store Type Between Taxed and Comparison Cities Before (April–May 2017) and After (April–May 2018) Sugar-Sweetened Beverage (SSB) Excise Taxes: Oakland and San Francisco, CA

because of the tax. Some sizes of diet soda were the only non-SSB products to exhibit a greater price increase in taxed cities than in comparison cities. To our knowledge, this is the first analysis of the impact of SSB taxes on beverage retail prices in 2 of the largest US cities with these taxes. Because higher SSB prices dissuade consumption,[19] understanding the extent to which SSB excise taxes raise SSB retail prices is critical for putting into context any changes (or lack thereof) in SSB consumption after the tax. This information is also important for informing future policy development and implementation, especially given the growing interest in municipal and statewide SSB taxes.[1]

Our estimates from Oakland and San Francisco are higher than previous estimates of early pass-through in neighboring Berkeley, which ranged from 43% to 47% approximately 3 months after implementation[9,12] but were similar to longer-term estimates from Berkeley supermarkets 1 year after implementation (81%)[8] and some early estimates from Philadelphia.[10,20] We found evidence of heterogeneity in SSB prices by store type in Oakland and San Francisco. The lowest SSB price increases were in mass merchandisers and drugstores, and the highest SSB price increases were in independent and discount supermarkets and chain convenience stores. These differences by store type are consistent with previous studies of SSB prices in Berkeley, which also found lower SSB price increases in drugstores than in chain supermarkets and convenience stores.[7,8]

Our results differ, however, from those in Philadelphia, where chain drugstores exhibited the highest beverage price increases, followed by mass merchandisers and supermarkets,[11] possibly reflecting differences in tax structures or in chains present and how they responded to SSB taxes. Although our analysis stratified by store type was underpowered, our estimated variances were likely conservative because chains tend to engage in uniform pricing within a city.

Because price changes for SSBs and non-SSBs did not differ by census tract median income, these taxes appear to have had equitable impacts on price by neighborhood SES. This presents an opportunity to study whether change in purchasing after a given price increase (i.e., price elasticity) differs by SES. Evidence from Mexico shows 3 times the reduction in the purchasing of SSBs among low-SES households compared with high-SES households 2 years after implementation of its SSB tax,[21] suggesting SSB taxes can reduce nutritional disparities.

Counterintuitively, the price of some sizes of nontaxable diet soda increased in Oakland and San Francisco, although to a lesser extent than regular soda. Reasons may include inconsistent retailer awareness of taxable beverages, as we initially observed in Berkeley, or a conscious decision by some retailers or distributors to increase prices of all sodas to offset declining sales of regular soda or to make the price increase of regular soda less conspicuous by also raising diet prices of the same brand. Future research on retailer and distributor motivations for pricing strategies would shed light on this issue.

The increase in retail prices of SSBs overall translated to a 14% and 15% increase in total SSB retail price in Oakland and San Francisco, respectively. Although this increase is less than the World Health Organization's recommended 20% price increase,[22] it is similar to or exceeds percentage price increases in Berkeley, Philadelphia, and Mexico,[7–11,23] where evaluations have shown meaningful decreases in purchasing or consumption of taxed beverages (e.g., 38% decrease in purchasing in Philadelphia and 52% decrease in consumption in Berkeley's low-income

neighborhoods).[8,11–15,21,24] Although we observed modestly attenuated pass-through estimates when we considered only regular (and not sale) prices, these estimates—80% and 81%—were still on par or higher than pass-through rates for taxed beverages in Berkeley and Philadelphia. However, we expect our primary analysis using sale price (if a beverage was on sale) to be more valid because it reflects the price customers expect to pay when making their beverage selection.

The enactment of SSB excise taxes is a relatively new occurrence, thus there have not been long-term evaluations using health outcomes. However, it has been projected that a national 1 cent per ounce SSB excise tax would avert a large number of cardiometabolic- and cancer-related events and deaths in the United States,[3,25,26] save $45 billion in health care costs,[25] and generate $12.5 billion per year in revenue.[3]

As expected, we observed higher percentage price increases for larger sizes of soda than for smaller sizes: prices of multipack sodas increased by 35% (or $1.71), whereas prices of single-serving sodas increased by 13% ($0.24) in San Francisco. This occurred because specific SSB excise taxes are levied by volume, and the prices of larger sizes tends to be cheaper per ounce than prices of smaller sizes. Thus Oakland's and San Francisco's SSB excise taxes have disincentivized the purchase of larger SSBs.

Instead of enacting excise taxes, some jurisdictions have enacted SSB sales taxes,[1,27] which may incentivize the purchase of larger sizes. That is because large sizes tend to be cheaper per ounce, and sales taxes are set as a percentage of total price. A sales tax is also less likely than an excise tax to reduce SSB consumption because a sales tax appears on the receipt after a consumer already decided what to purchase.[28] By contrast, excise taxes increase SSB shelf prices at the customer's point of decision. Furthermore, some states cap total sales tax, so that they are too small to affect consumption. Therefore, SSB excise taxes are recommended over sales taxes.

Thus far, all SSB excise taxes in the United States have been volumetric (i.e., levied per oz), but researchers have estimated that an SSB excise tax levied per gram of sugar would have a larger impact on sugar and calorie consumption. One study estimated that a sugar-based SSB tax would increase the economic and public health benefits of an SSB tax by 30%, compared with a volumetric tax.[29] Such a tax might shift consumption from high-sugar to low-sugar SSBs and more strongly incentivize manufacturers to reformulate beverages to contain less sugar. The mechanics of calculating a tax on sugar content should be similar to that of volumetric taxes but may require importing data from product nutrition facts.[29]

Several countries—Mauritius, South Africa, and Sri Lanka—have implemented SSB taxes levied per gram of sugar in SSBs, and the United Kingdom has a tiered SSB tax based on sugar. Early evaluations of South Africa's and the United Kingdom's taxes show posttax reformulation of beverages to contain less sugar.[30,31] Counterintuitively, though, South Africa's excise tax led to similarly higher retail prices for low-sugar and high-sugar SSBs, despite the low-sugar SSBs being taxed at an effective rate of 0.[30] Future evaluations of these sugar-based taxes will be needed to determine whether they result in higher price increases for high-sugar SSBs than low-sugar SSBs.

Strengths and Limitations

We collected prices on beverage brands and sizes from a variety of store types, including supermarkets, mass merchandisers, drugstores, and small stores that are more common in lower-income neighborhoods but not represented in retail scanner data.[32] Furthermore, we collected prices from regional comparison cities without SSB taxes, which allowed us to determine the increase in beverage price exogenous to factors unrelated to the tax. Another strength is that we took measurements at a 1-year interval, reducing the influence of seasonality.

Limitations of this research are the inclusion of only 2 measurement occasions and the collection of prices from a subset of the total universe of all possible brands, beverage sizes, and stores. Another limitation is that we collected posttax prices within less than a year from implementation in Oakland and San Francisco, and it is possible that SSB distributors and retailers will alter their pricing in the future. Thus, research should continue to monitor the long-term impact on beverage retail prices.

Public Health Implications

In Oakland and San Francisco, retail prices of SSBs increased by approximately the full amount of the SSB excise taxes. These taxes did not result in higher prices of water, milk, or 100% juice but did raise prices of some sizes of diet soda. Also, the taxes appear to have had equitable impacts on SSB prices by neighborhood SES.

Higher SSB retail prices are a primary mechanism through which SSB taxes reduce consumption. Modeling studies based on the approximate price increase we observed in this study estimate that Oakland's and San Francisco's SSB taxes would prevent nearly 5890 cases of obesity and save nearly $54 million in health care costs over 10 years.[33,34] SSB taxes can improve public health by raising awareness of the health harms of SSBs and by funding health, education, and equity programs. Oakland's and San Francisco's SSB taxes have raised more than $30 million by 2019; revenues have been allocated to health promotion, nutrition, physical activity, parks, food and water access, and community projects, with a focus on equity.[35] Similarly, revenues from SSB taxes in Berkeley; Albany, New York; Seattle, Washington; Boulder, Colorado; Philadelphia; and the Navajo Nation have been allocated for health, nutrition, physical activity, equity, education, and universal prekindergarten.

Although SSB taxes garner higher public support when they are designated for health or education, SSB tax proponents in California opted against an earmark because California state law requires a supermajority (67%) to pass earmarked taxes. Instead, tax proponents in Oakland, San Francisco, and Berkeley included provisions in the ordinances requiring expert advisory commissions to recommend revenue allocations. These advisory commissions, which comprise community voices and health expertise, have resulted in funding programs and services consistent with the intent of the SSB tax ordinances.[35]

Conclusions

Existing research suggests that SSB excise taxes reduce consumption and purchasing or sales of SSBs. Increases in SSB prices are a major driver of reduced consumption, and we have documented significantly higher SSB

prices in Oakland and San Francisco following implementation of SSB excise taxes. Modeling studies predict appreciable reductions in obesity and health care costs resulting from these price increases. However, because every jurisdiction is unique, and industry may change their response to SSB taxes over time, future research is needed to determine the impact of Oakland's and San Francisco's SSB taxes on SSB consumption and sales. Just as important is the need to study the impacts of tax revenues on health, equity, and community well-being. AJPH

CONTRIBUTORS

J. Falbe designed the study and analysis and led the writing. J. Falbe and K. A. Madsen conceptualized and supervised the study. M. M. Lee supervised data collection and completed the analysis. S. Kaplan, A. M. Ortega Hinjosa, and K. A. Madsen contributed to analysis. N. A. Rojas supervised data collection. K. A. Madsen contributed to design. All authors contributed to writing the article.

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CONFLICTS OF INTEREST

The authors have no conflicts of interest to disclose.

HUMAN PARTICIPANT PROTECTION

The study was approved as exempt from review by the UC Berkeley Committee for Protection of Human Subjects.

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