San Francisco Sugary Drinks Distributor Tax Advisory Committee

August 2019 Data Report

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Background

In November of 2016, the voters of San Francisco approved the passage of Proposition V. Proposition V established a 1 cent per ounce fee on the initial distribution of a bottled sugar-sweetened beverage, syrup, or powder, within the City and County of San Francisco.[1] The legislation defines a sugary drink, or sugary-sweetened beverage (SSB), as follows:

> *A sugar-sweetened beverage (SSB) means any non-alcoholic beverage intended for human consumption that contains caloric sweetener and contains 25 or more calories per 12 fluid ounces of beverage, including but not limited to all drinks and beverages commonly referred to "soda," "pop," "cola,'' soft drinks" "sports drinks," "energy drinks'' "sweetened iced teas" or any other similar names.*

Proposition V established the Sugary Drinks Distributor Tax Advisory Committee (Committee) whose powers and duties are to make recommendations to the Mayor and the Board of Supervisors on the effectiveness of the Sugary Drinks Distributor Tax (SDDT) and to submit a report that evaluates the impact of the SDDT on beverage prices, consumer purchasing behavior, and public health. The Committee also provides recommendations regarding the potential establishment and/or funding of programs to reduce the consumption of sugar-sweetened beverages and to otherwise address diet-sensitive diseases in San Francisco.

Commented [KM2]: Can we add anything here re addressing diet sensitive disease in a broader way (vis funding)

Report Requirements and Process

Starting in 2018, by March 1, of each year, the Committee shall submit to the Board of Supervisors and the Mayor a report that evaluates the impact of the SDDT on beverage prices, consumer purchasing behavior, and public health. The Committee in their report shall make recommendations regarding the potential establishment and/or funding of programs to reduce the consumption of sugar-sweetened beverages in San Francisco. This data report fulfils the requirement to evaluate the impact of the Sugary Drinks Distributor Tax.

Annual Report Timeline

Data Report Complete — Sept
Evaluation Report of Funded Programs Complete — Nov
Full Report Due to Board of Supervisors & Mayor — Mar

Apr   May   Jun   Jul   Aug   Sept   Oct   Nov   Dec   Jan   Feb   Mar

Relationship Between Sugar-sweetened Beverage Consumption, Health, and Health Equity

A large body of evidence exists indicating that sugar-sweetened beverage consumption increases risk for cavities, overweight/obesity, type 2 diabetes, hypertension and heart disease.[2–5] Although sugar-sweetened beverages can contain hundreds of calories in a serving, they do not signal "fullness" to the brain and thus facilitate overconsumption.[6] sugar-sweetened beverages are the leading source of sugar in the American diet, contributing 36% of the added sugar Americans consume.[7]

Numerous organizations and agencies, including the American Heart Association, American Diabetes Association, American Academy of Pediatrics, Institute of Medicine of the National Academies, American Medical Association, and the Centers for Disease Control, recommend limiting intake of added sugar and sugar-sweetened beverages to improve health. Studies show that sugar-sweetened beverages flood the liver with high amounts of sugar in a short amount of time and that this "sugar rush" over time leads to fat deposits and metabolic disturbances that are associated with the

development of type 2 diabetes, cardiovascular disease, and other serious health problems.[4] Of note, every additional sugar-sweetened beverage consumed daily can increase a child's risk for obesity by 60%[9] and the risk of developing type 2 diabetes by 26%.[5]

Diseases connected to sugar-sweetened beverages are also found to disproportionately impact ethnic minority and low-income communities – the very communities that are found to consume higher amounts of sugar-sweetened beverages. Diabetes hospitalizations are approximately three times as high in low-income communities as compared with higher income communities. African American death rates from diabetes are two times higher than San Francisco's overall rate. In San Francisco, approximately 41% of adults are estimated to be obese or overweight, including 63% of Latinx and 61% of Black residents. With respect to oral health, the data indicate that Asian and Pacific Islander children suffer from cavities at a higher rate than other populations; but Latinx and African American children also have a higher prevalence than the average for cavities.

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The Sugary Drinks Distributor Tax is intended to discourage the distribution and consumption of sugar-sweetened beverages in San Francisco by taxing their distribution. Mexico, where an average of 163 liters of sugar-sweetened beverages are consumed per person each year, enacted an excise tax on sugar-sweetened beverages in 2014, with the result that the purchase of taxed sugar-sweetened beverages declined by 12% generally and by 17% among low-income Mexicans by December 2014.[8,9] The Mexico data indicate that, when people cut back on sugar-sweetened beverages, to a significant extent they choose lower-caloric or non-caloric alternatives. Studies have projected that a 10% reduction in sugar-sweetened beverage consumption in Mexico would result in about 189,300 fewer incident type 2 diabetes cases, 20,400 fewer incident strokes and myocardial infarctions, and 18,900 fewer deaths occurring from 2013 to 2022. This modeling predicts the sugar-sweetened beverages tax could save Mexico $983 million international dollars.[10] Following the implementation of Berkeley, California's sugar-sweetened beverage tax, the first in the nation, there was a 50% decline in sugar-sweetened beverage consumption among diverse adults over the first 3 years of the tax. [11] Modeling suggests that a national sugar-sweetened beverage tax that reduced consumption by just 20% would avert 101,000 disability-adjusted life-years; gain 871,000 quality-adjusted life-years; and result in $23.6 billion in healthcare cost savings over just 5 years. The tax is further estimated to generate $12.5 billion in annual revenue. This body of research demonstrates that taxation can provide a powerful incentive for individuals to reduce their consumption of sugar-sweetened beverages, which in turn can reduce the burden of chronic disease.

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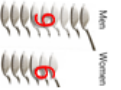## History of Sugar-sweetened beverage Interventions in San Francisco

In evaluating the impact of the SDDT, it is important to recognize the previous efforts made to curb sugar-sweetened beverage consumption and subsequent health effects as consumption may have been affected and continue to be affected by these efforts. Below is a timeline of Sugar-sweetened beverage Interventions over the past 10+ years.

SUGARY DRINK INTERVENTIONS IN SAN FRANCISCO 2009-2018

2008
- SF declares a SFS with the Bay Area Nutrition & Physical Activity Collaborative.
- SUSF sends 40K SFS brochures through SF Unified School District, summer lunch sites, worksites, clinics, and community partners.
- SFDPH implements healthy food policy for a nexus study to assess feasibility of local sugary drink legislation.

2009
- SFS in San Francisco.
- 25K "Drink Water!" Said the Otter books were distributed to SF pre-k and kindergarten classes.
- American Heart Association releases guidelines on sugar intake.
- CCPHA releases *Bubbling Over* report, scientifically linking soda consumption to overweight & obesity.
- SFDPH releases nexus study examining feasibility of SSB legislation in SF.
- Organizations implementing Soda Free Policies: Boys and Girls Club, Junior Giants, Sunday Streets.

2010
- SFPUC starts installing tap stations throughout city
- SFS in San Francisco.
- SFDPH runs NYC's Pouring on the Pounds campaign on MUNI buses.
- Mayor Newsom signs Executive Directives: Healthy & Sustainable Foods and Healthy Vending.
- Healthy Meals Ordinance passes.
- Organizations implementing Soda Free Policies SF Recreation and Parks, Bay Area SCORES, Kai Ming Head Start.

2011
- SFS in San Francisco
- *Potter the Otter, A Tale About Water* launches.

2012
- SFS in San Francisco.
- SUSF supports youth-serving organizations to develop healthy beverage policies.
- *Nature* publishes paper that argues sugar is addictive & linked to diseases associated with metabolic syndrome.
- *Mother Jones* publishes exposé on sugar industry and its parallels to big tobacco.
- *Canzilla* is born!

2013
- SFS in San Francisco.
- SUSF convenes Rethink Your Drink Workgroup.
- Senator Monning introduces SB-622 to establish statewide soda tax and create a Children's Health Promotion fund.
- SF Public Utilities Commission convenes Water Hearing.
- Mayor Lee and 17 other mayors urge congressional leaders to ban use of food stamps to buy sugary drinks.
- Organizations implementing Soda Free Policies YMCA of SF, Bayview Hunters Point Foundation, Children's Council of SF.
- SUSF secures $250K to run campaign.
- SUSF funds The Bigger Picture to develop sugary drink PSAs.
- SF Board of Supes unanimously pass resolution to support SB-622.
- BVHZ implements "Water Week" at Carver Elementary to celebrate new tap station.
- California hosts its 1st Healthy Beverage Summit.

2014
- SUSF launches Choose Healthy Drinks Campaign with Alameda, Sonoma, & San Mateo counties.
- SUSF launches Sugar Science trainings to educate people about health impacts of sugary drinks and Big Soda tactics.
- TBP launches *Canzilla* campaign.
- 56% of SF voters supported a tax on sugary drink distributors.
- Over 123K San Franciscans voted yes, more than any other city in the world.
- Berkeley becomes 1st city in US to pass a voter approved soda tax.
- UCSF launches www.SugarScience.org

2015
- Shape Up SF and partners launch Open Truth Campaign.
- SF policymakers approve policies to eliminate use of public dollars for sugary drinks purchase and require warning labels on ads for sugary drinks.
- SFGH and UCSF campuses become sugary drinks free.
- California Healthcare Foundation and A Small Planet fund transcreation of Open Truth into Spanish.
- The California Endowment gifts San Francisco a Canzilla for community outreach.
- Open Truth support SFSU Real Food Challenge students to keep SFSU from entering into pouring rights contract.
- SFDPH issues policy prohibiting sugary drinks at any event led by DPH, or at DPH facility, or to be paid for with DPH funding.
- In partnership with SFHIP, support health equity coalition SSB outreach and education.

2016
- USDA Guidelines recommend limiting sugar consumption to 12 tsp a day for adults.
- SF defends sugary drinks warning label law against the American Beverage Association.
- Open Truth Campaign materials are translated into Spanish and Chinese.
- SF policymakers adopt legislation requiring healthy vending machine standards and prohibit sales of drinks with added sugars.
- SF, Oakland and Albany voters pass soda taxes!

2017
- SFUSD eliminated chocolate milk from School Lunch Program at elementary and middle schools

2018
- SFUSD eliminated chocolate milk from School Lunch Program at high schools
- San Francisco Sugary Drink Distributor tax went into effect as of Jan 1, 2018.
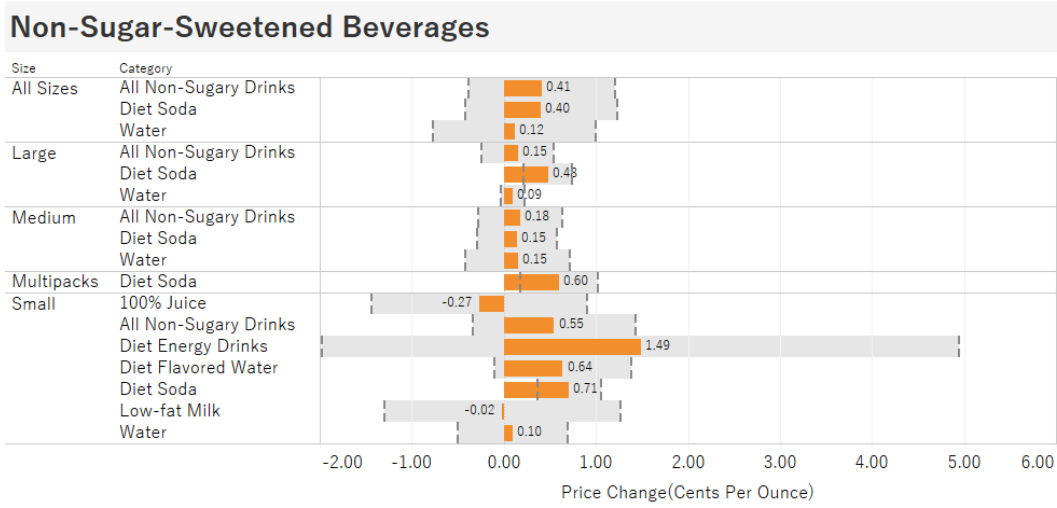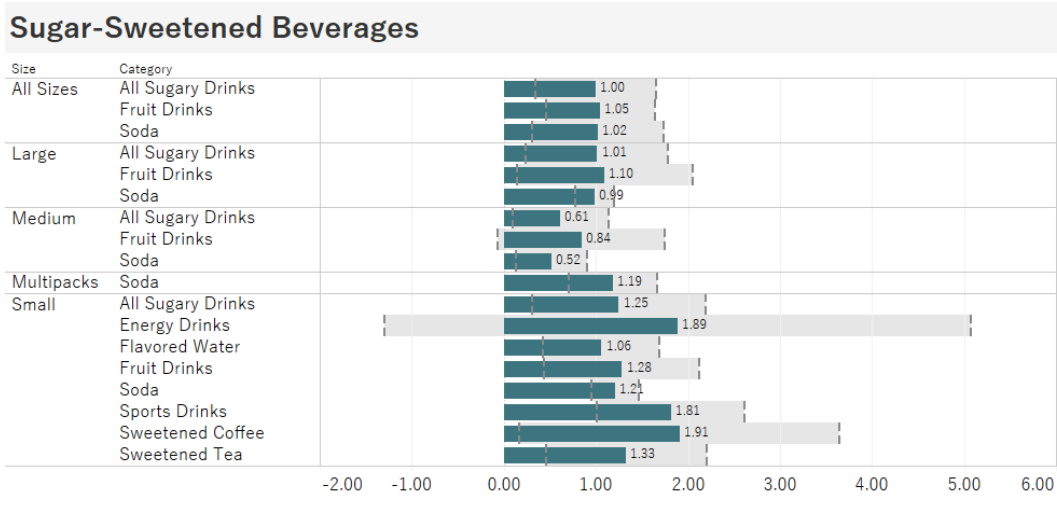
Source: Adopted and updated from …

Sugar-sweetened Beverage Price, Sales, and Consumption

Sugar-sweetened Beverage Prices

Between April-June 2017 and April-June 2018, "single serving" (<33.8oz) sugar-sweetened beverages averaged a 1.25 cent per ounce increase (95% confidence interval: 0.30 –2.19), medium sized (between 33.8oz and 46oz) sugar-sweetened beverages averaged a 0.61 cent per ounce increase (95% CI: 0.09, 1.14), and large sized (≥ 46oz) sugar-sweetened beverages averaged a 1.01 cent per ounce increase (95% CI: 0.24– 1.79) (figure x). Sports drinks (1.81 cents/oz, 95% CI: 1.01–2.62) and coffee (1.91 cents/oz, 95% CI: 0.17– 3.65) single serving drinks appeared to display the greatest price increase. The price of non-sugar-sweetened beverages did not increase except for diet soda; the price of single serving, large size, and multi packs of diet sodas increased by 0.71 cents/oz (95% CI: 0.36-1.06), 0.48 cents/oz (95% CI: 0.22-0.74), and 0.60 cents/oz (95% CI: 0.18–1.02), respectively.

Price Changes per ounce for sugar-sweetened beverages and non-sugar-sweetned beverages, April-June 2017 to April-June 2018.

Price Changes per ounce for sugar-sweetened beverages and non-sugar-sweetned beverages, April-June 2017 to April-June 2018.

Sugar-Sweetened Beverages

Size	Category	Price Change
All Sizes	All Sugary Drinks	1.00
	Fruit Drinks	1.05
	Soda	1.02
Large	All Sugary Drinks	1.01
	Fruit Drinks	1.10
	Soda	0.99
Medium	All Sugary Drinks	0.61
	Fruit Drinks	0.84
	Soda	0.52
Multipacks	Soda	1.19
Small	All Sugary Drinks	1.25
	Energy Drinks	1.89
	Flavored Water	1.06
	Fruit Drinks	1.28
	Soda	1.21
	Sports Drinks	1.81
	Sweetened Coffee	1.91
	Sweetened Tea	1.33

-2.00 -1.00 0.00 1.00 2.00 3.00 4.00 5.00 6.00

Non-Sugar-Sweetened Beverages

Size	Category	Price Change
All Sizes	All Non-Sugary Drinks	0.41
	Diet Soda	0.40
	Water	0.12
Large	All Non-Sugary Drinks	0.15
	Diet Soda	0.43
	Water	0.09
Medium	All Non-Sugary Drinks	0.18
	Diet Soda	0.15
	Water	0.15
Multipacks	Diet Soda	0.60
Small	100% Juice	-0.27
	All Non-Sugary Drinks	0.55
	Diet Energy Drinks	1.49
	Diet Flavored Water	0.64
	Diet Soda	0.71
	Low-fat Milk	-0.02
	Water	0.10

-2.00 -1.00 0.00 1.00 2.00 3.00 4.00 5.00 6.00

Price Change(Cents Per Ounce)

Source: University of California, Berkeley Madsen Group Pricing Study

Sugar-sweetened Beverage Sales

Beverage sales data are available through IRI market research data. At this time, beverages sales data for San Francisco are only available for 2015 through 2017 and use IRI product categories which generally do not align with the beverage designations in the SDDT; analyses presented here are preliminary and baseline regarding the implementation of the SDDT which occurred on January 1, 2018. It must be noted that a true baseline of consumption prior to SDDT influence would be more accurately reflected in data from 2013 from before the initial 2014 sugary beverage tax ballot initiative that raised public awareness about the harms of sugary beverages and the merits of a sugary beverage tax. This 2014 campaign may have influenced decreased consumption which was a trend seen in Berkeley; consumption decreased following the local ordinance even before tax collection had begun. (Ref) See the IRI Methods and Limitations section of this report for more information.

Beverage sales data are collected from 108 stores in San Francisco representing about x% of all stores selling sugar-sweetened beverages in San Francisco. Sales of regular soda are almost 2 times higher than diet soda and 7 times higher than energy drinks (data for other drink categories not currently available). From 2015 to 2017, there was a small, but statistically significant, decreasing trend in sales for both soda (monthly sales by -.14%) and diet soda (monthly sales by .2%).

Table x. Beverage sales trends, by beverage category, 2015-2017

Trends in Total Ounces

	Month trend (standard error)	Constant (standard error)	Mean of Dependent Variable	Number of Observations	R squared
Diet Soda	-7,640.07 (1,883.73)***	3,883,729 (44,317.65)***	3,727,107.37	40	0.302
Energy Drinks	-151.48 (1,613.14)	1,370,851 (37,591.64)***	1,367,745.94	40	0.000
Soda	14,554.20 (7,103.51)**	10,920,264 (167,121.34)***	10,621,902.52	40	0.099

Trends in Average Over All Zip Codes

Diet Soda	-90.95 (22.43)***	46,234.87 (527.59)***	44,370.33	40	0.302
Energy Drinks	-1.80 (19.20)	16,319.66 (451.80)***	16,282.69	40	0.000
Soda	-173.26 (84.57)**	130,003.14 (1,989.54)***	126,451.22	40	0.099

Statistical significance: * denotes significance at $p < 0.10$, ** at $p < 0.05$, and *** at $p < 0.01$.
The mean of dependent variable is the mean for total or average ounces sold by month in a beverage category.

Sugar-sweetened Beverage Consumption

Sugar-sweetened beverage Consumption Among SFUSD students

The most recent data available from the Youth Behavioral Risk Survey (YRBS), collected prior to Sugary Drink Distributor Tax implementation, shows that nearly half of SFUSD middle school students report consuming any sugar-sweetened beverages the day prior and 13% of high school students report consuming sugar-sweetened beverages within the week prior (Figure). The percentage of students reporting any consumption was 17% (F value 9.79; Pr= 0.002) and 30% (F value 6.32; Pr= 0.013) higher in 2017 than in 2015 for both middle and high school students, respectively. The increase was seen among male students but not female students.

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Commented [KM8R7]: Include breakdown by zip code and types of stores

Commented [KM9R7]: Get more data on breakdown of stores in the sample-number per zip code. Type of stores included or excluded

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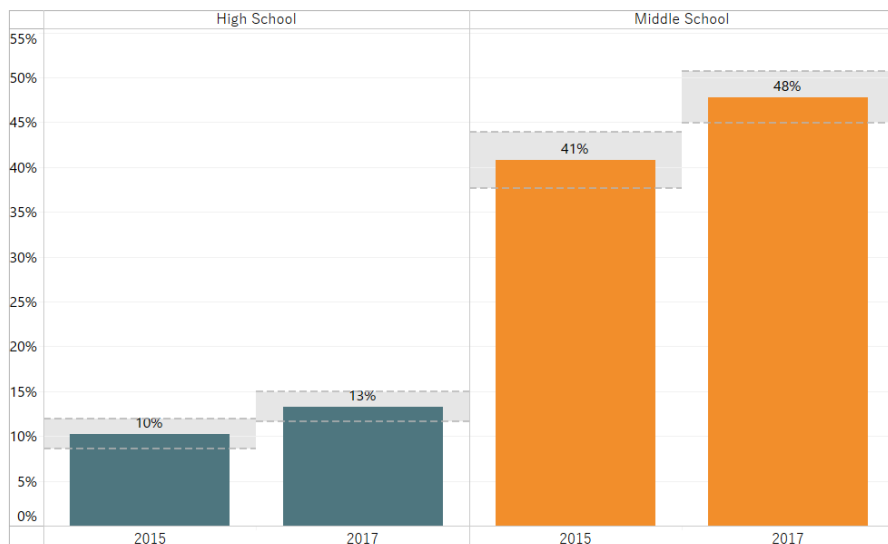
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Percentage of SFUSD students consuming any sugar-sweetened beverages

High school students were asked about consumption in last 7 days while middle school students were asked about consumption in previous day.
Source: YRBS

While the YRBS data indicate that many students are drinking some sugar-sweetened beverages, the School Health Survey which is also conducted among SFUSD middle and high school students, found that overall sugar-sweetened beverage consumption declined significantly among students in all grades, of all genders, and of all race/ethnic groups from 2015 through 2017. In 2017 the average frequency of consumption was 0.8 times per day compared to 1.1 times per day in 2015. Consumption remained low in 2018 and was similar to that of 2017 (figure).
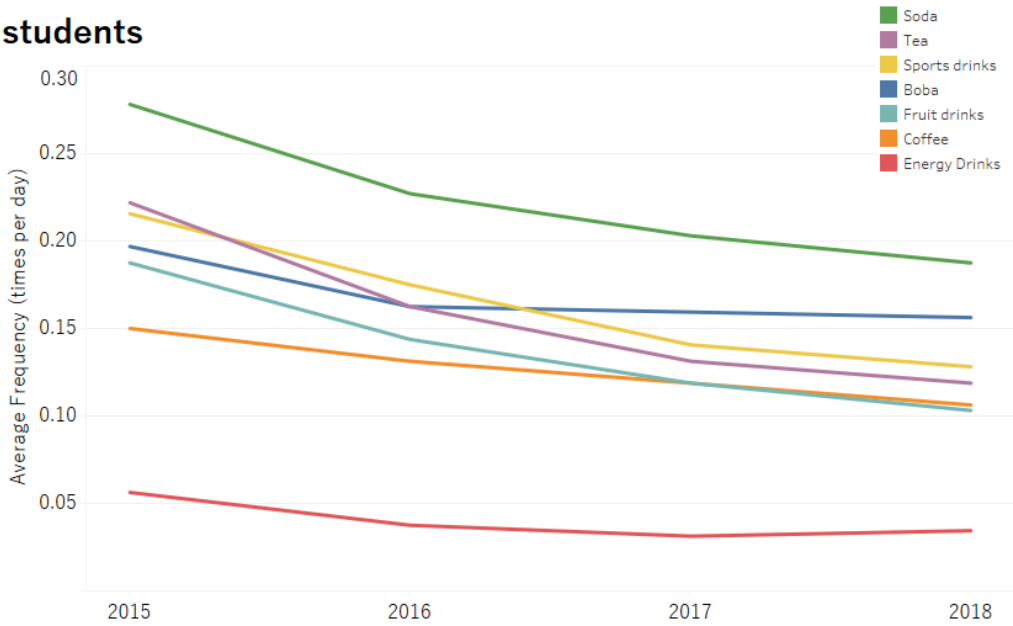
Overall sugar-sweetened beverages consumption among SFUSD students
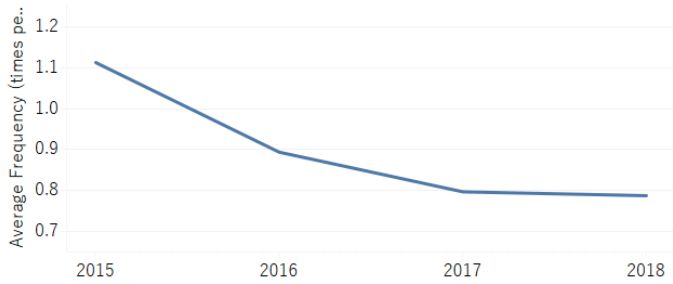
Source: SFUSD School Health Survey

Between 2015 and 2018, consumption decreased significantly for all categories of sugar-sweetened beverage with the steepest declines seen for fruit drinks, sports drinks, and sweet teas (figure). At the same, except for water and unflavored milk, the consumption of non-sugar-sweetened beverages also declined (figure). A slight decline in unflavored milk consumption appears after 2015, however the difference is statistically significant only in 2017. Consumption of water increased significantly.
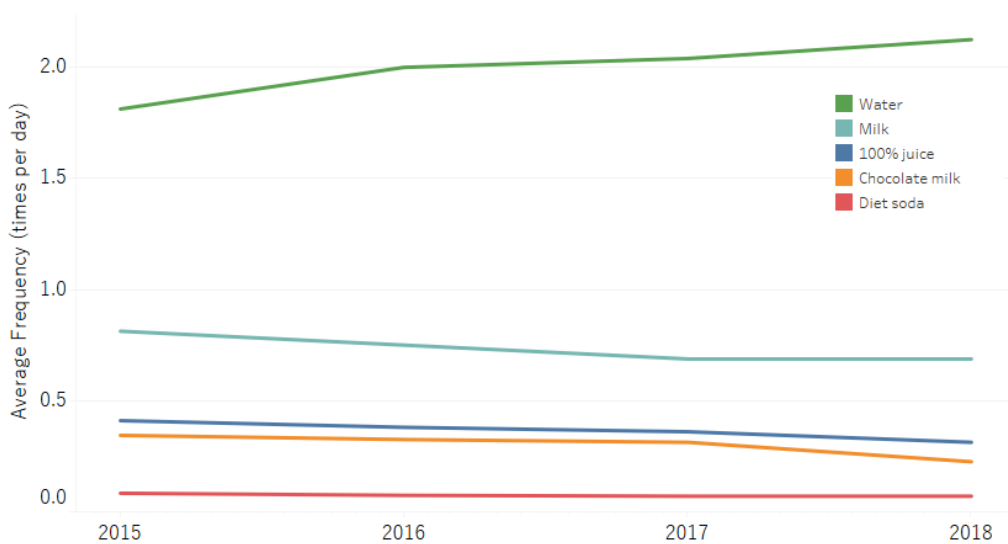
Consumption of sugar-sweetened beverages amoung SFUSD students

Legend:
- Soda
- Tea
- Sports drinks
- Boba
- Fruit drinks
- Coffee
- Energy Drinks

Y-axis: Average Frequency (times per day)

X-axis: 2015, 2016, 2017, 2018

Source: SFUSD School Health Survey

Consumption of various non-sugar-sweetened beverages among SFUSD students

Source: SFUSD School Health Survey

Disparities in sugar-sweetened beverage consumption among SFUSD students

Consistent with national trends, San Francisco SFUSD male students and students of ethnic minority backgrounds are most likely to consume sugar-sweetened beverages[12,13]. Additionally, local data suggest that middle school students consume more sugar-sweetened beverages than high school students.
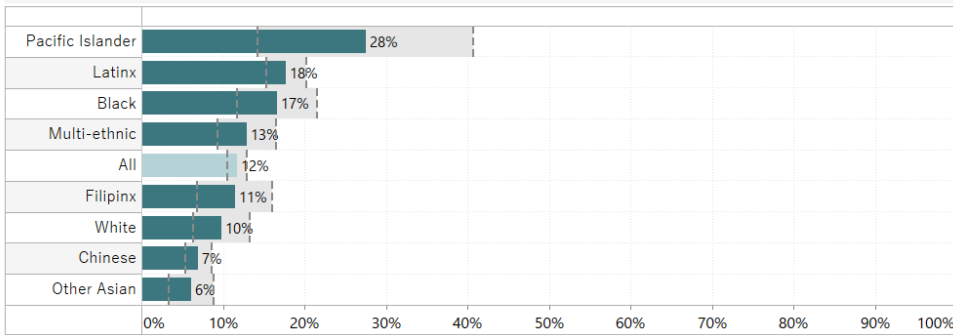
Pacific Islander students are the most likely to report consuming sugar-sweetened beverages and rates are 3 time higher among high school students and 1.3 times higher among middle school students as compared to Chinese and White classmates who are the least likely to consume[14] (Figure) Consumption rates for Black, Latinx, and Filipinx students are 0.66 to 1.6 times higher than Asian or White students[14]. While data were largely insufficient to examine changes overtime for each race/ethnicity, data for Chinese high school students do show a statistically significant increase between 2015 and 2017 (5% to 9% (F value 4.22; Pr= 0.0419))[14].

Among SFUSD students, Chinese and White students have the lowest reported consumption of sugar-sweetened beverages. (Figure) Pacific Islander students report the highest consumption with rates among high school students 3 times higher and rates among middle school students 1.3 times higher than those of their Chinese and White classmates, respectively. Consumption rates for Black, Latinx, and Filipinx students are .66 to 1.6 times higher than the students with the lowest rates. While data were largely insufficient to examine changes overtime for each
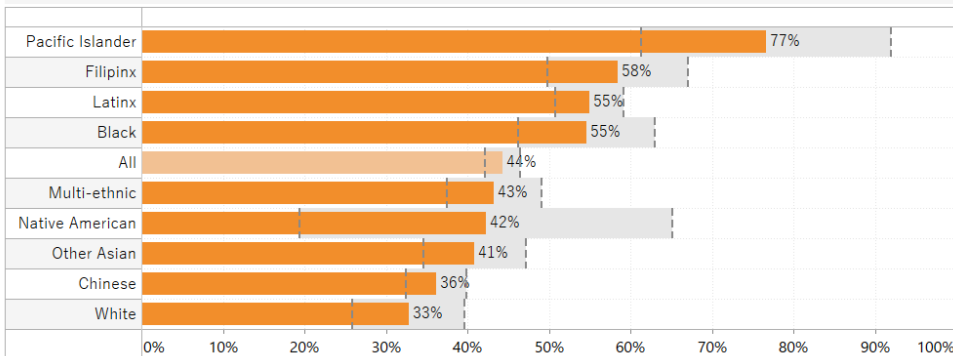
race/ethnicity, data for Chinese high school students did show a statistically significant increase between 2015 and 2017 (5% to 9% (F value 4.22; Pr= 0.0419)).

Percentage of SFUSD students consuming any sugar-sweeted beverages by race/ethnicity

High School, 2015 & 2017

Race/Ethnicity	Percentage
Pacific Islander	28%
Latinx	18%
Black	17%
Multi-ethnic	13%
All	12%
Filipinx	11%
White	10%
Chinese	7%
Other Asian	6%

Middle School, 2014 & 2016

Race/Ethnicity	Percentage
Pacific Islander	77%
Filipinx	58%
Latinx	55%
Black	55%
All	44%
Multi-ethnic	43%
Native American	42%
Other Asian	41%
Chinese	36%
White	33%

High school students were asked about consumption in last 7 days while middle school students were asked about consumption in previous day.
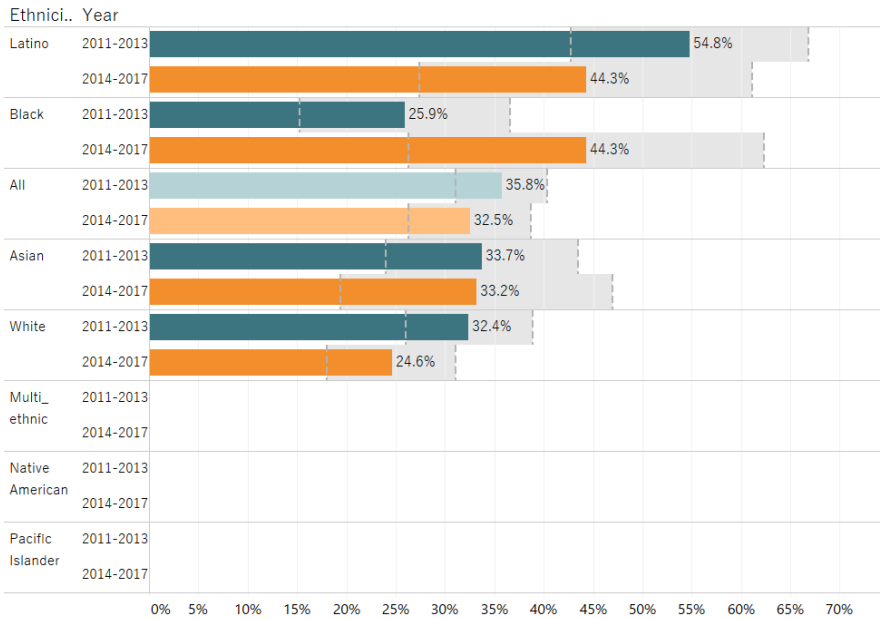Source: YRBS

Sugar-sweetened beverage Consumption Among Adults
The available data on adult sugary beverage consumption is limited to soda, which is just one type of sugar-sweetened beverage. However, sugar-sweetened beverage sales data indicate that sodas account for the largest proportion of weekly sugar-sweetened beverage sales at about 5 oz/capita[ref-nielsen?] and therefore sodas remain an important source of added sugars in the diet.

Among adults in San Francisco, approximately 32% report drinking soda at least once per week. Males are about 50% more likely than women to report consuming any soda (40% vs 26%). Among those for whom data is available, Latinx and Black residents are more likely that White residents to consume any soda. (Figure) Younger adults are more likely to consume soda; more than 50% of adults 18 to 24 consume any soda at least once per week.

Percentage of adults reporting any soda consumption, by race/ethnicity

Ethnici..	Year	
Latino	2011-2013	54.8%
	2014-2017	44.3%
Black	2011-2013	25.9%
	2014-2017	44.3%
All	2011-2013	35.8%
	2014-2017	32.5%
Asian	2011-2013	33.7%
	2014-2017	33.2%
White	2011-2013	32.4%
	2014-2017	24.6%
Multi_ethnic	2011-2013	
	2014-2017	
Native American	2011-2013	
	2014-2017	
Pacific Islander	2011-2013	
	2014-2017	

0% 5% 10% 15% 20% 25% 30% 35% 40% 45% 50% 55% 60% 65% 70%

Data for Multi-ethnic, Native American, and Pacific Islander populations are unstable.
Source: CHIS

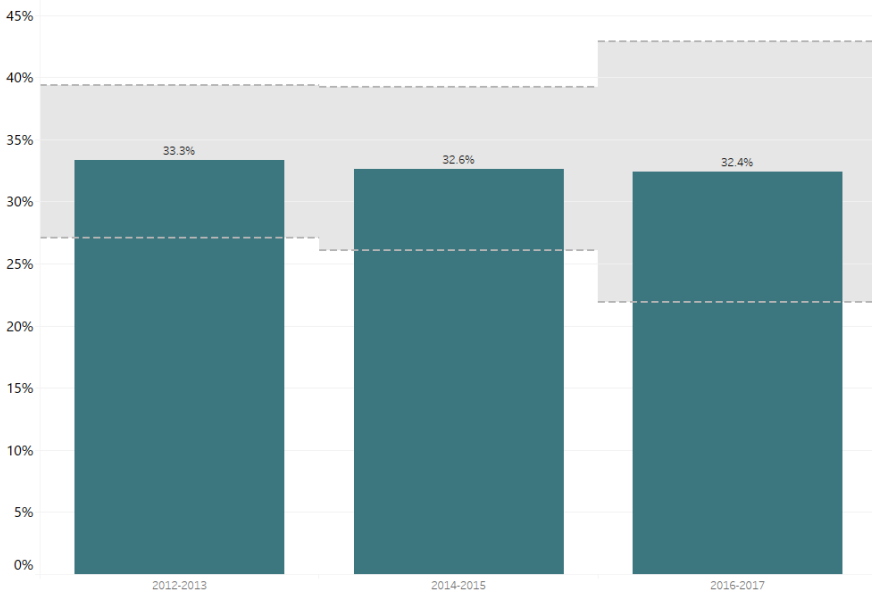**Percentage of adults reporting any soda consumption, by age**
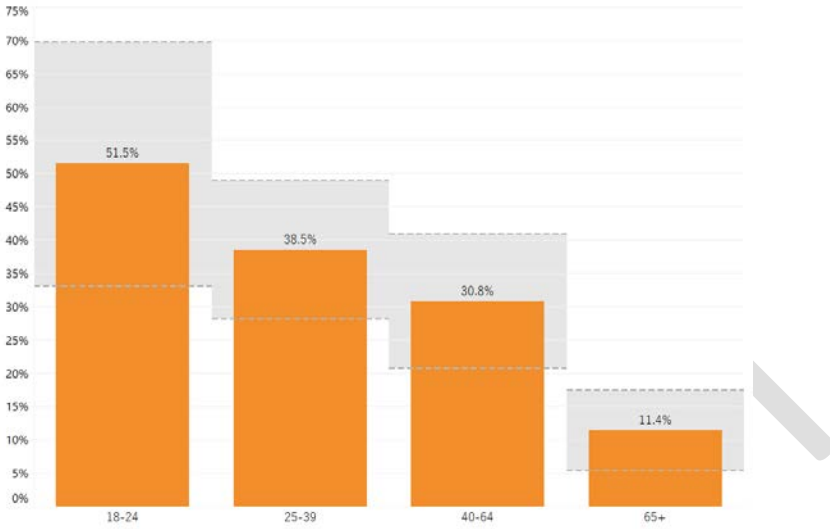
Source: California Health Interview Survey

Overall, data ranging from 2011 through 2017 indicate that the percentage of adults drinking any soda has not changed over time (figure). However, rates were not static for all subgroups. From 2011-13 to 2014-17, the percentage of Black residents drinking soda increased from 26% to 44% while the percentage of white residents decreased from 32% to 25% (Figure). While residents in households earning less than 300% of the federal poverty level are more likely to consume soda than wealthier ones, 38% vs, 29%, the percentage of poorer residents reporting soda consumption decreased from 45% in 2011-13 to 29% in 2014-17 (Figure).

Percentage of adults reporting any soda consumption

Source: Caliofornia Health Interview Survey

Percentage of adults reporting any soda consumption, by poverty level

Source: California Health Interview Survey

Current State of Food Security, Food & Drink Environment, and Nutrition in San Francisco

Food security

Food security is the ability, at all times, to obtain and consume enough nutritious food to support an active, healthy life.(REF to FSTF report) Food insecurity exists when the ability to obtain and prepare nutritious food is uncertain or not possible. Food insecurity can have far reaching impact throughout the life course that helps establish and perpetuate health disparities; fetal development in utero is impacted by maternal food security and that impact on early development can increase unborn babies' lifetime risk of obesity and diabetes. Children who are food insecure are more likely to have behavioral issues and worse school performance as well as more hospitalizations – all of which can limit socioeconomic advancement and lay the foundations for developing chronic disease as adults. In adults, food insecurity increases the risk of multiple chronic conditions including type 2 diabetes, heart disease, and hypertension, and exacerbates existing physical and mental health conditions. The San Francisco Food Security Task Force, frames food security as an issue of:

1. Food Resources: the ability to secure enough financial resources to purchase enough nutritious food to support a healthy diet on a consistent basis

2. Food Access: the ability to obtain affordable, nutritious, and culturally appropriate foods safely and conveniently

3. Food Consumption: the ability to prepare and store healthy meals, and the knowledge of basic nutrition, food safety, and cooking

The City does not currently have data infrastructure to fully assess food security in San Francisco. However, we do know that a primary driver of food security is inadequate resources to purchase food. In this regard, data on poverty rates and the Self Sufficiency Standard reveal that 54% of Black/African American residents, 36% of Latinx residents, and 30% of Asian residents are living at less than 200% FPL compared to 16% of White residents. Overall, approximately 25%, or 1 in 4 San Franciscans, are living at less than 200% FPL.[15] Data from the 2015-17 California Health Interview Survey revealed that 50% of San Franciscans surveyed who earned less than 200% FPL were food insecure, which increased from 44% in 2013-14. Additionally, we have some data on the food security status of some specific vulnerable groups including:

- Pregnant women: Data from the Maternal and Infant Health Assessment (MIHA) survey indicate that approximately one quarter of all pregnant women in San Francisco are food insecure, including 26.5% Latinx and 19.5% Black/African American women.

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Food insecurity among pregnant women in San Francisco

26.5% among Latinx women

19.5% among Black/African American women

6.6% among Asian and Pacific Islander women

Almost no White women in San Francisco report food insecurity during pregnancy.

- Low income families with young children: Data from a sample of 803 low-income families in San Francisco participating in the Special Supplemental Program for Women, Infants and Children (WIC) program revealed that 53-60% of these families were food insecure.

- Immigrants: National research indicates that the risk for food insecurity among households with immigrants is higher than households with members who are all US born, and immigrant families with young children experience disparities in their ability to afford food.[16,17] Although food insecurity rates among immigrants living in San Francisco are not available, 34% of children in San Francisco living in households headed by two immigrant parents live below 200% of FPL, compared to only 5% of children living with two US born parents.[18]

- People without homes: During the 2019 San Francisco homeless survey, 59% of respondents indicated that they had experienced a food shortage in the past four weeks.[19] In 2017 52% reported food insecurity. It is estimated that over 8,000 people without homes live in San Francisco.

- Residents of Single Room Occupancy Hotels: Approximately 500 SRO hotels in San Francisco provide housing for over 19,000 people. Most were constructed in the years immediately following the 1906 earthquake and have limited or no cooking facilities. In a study of over 600 adult residents of single-room occupancy (SRO) hotels in San Francisco conducted by the FSTF, 84% reported food insecurity even with high utilization of community food resources.

- Transitional aged youth and college students: There is growing awareness of high rates of food insecurity among youth and young adults in San Francisco. According to the 2016 National College Health Assessment data for San Francisco State University, 35% of students surveyed were food insecure. A recent assessment of 1,088 students at City College of San Francisco found that 41% were food insecure.

- **Seniors and people with disabilities:** An estimated one-third of low-income seniors in San Francisco are reportedly unable to afford enough food.[20] In San Francisco, program data from the Department of Aging and
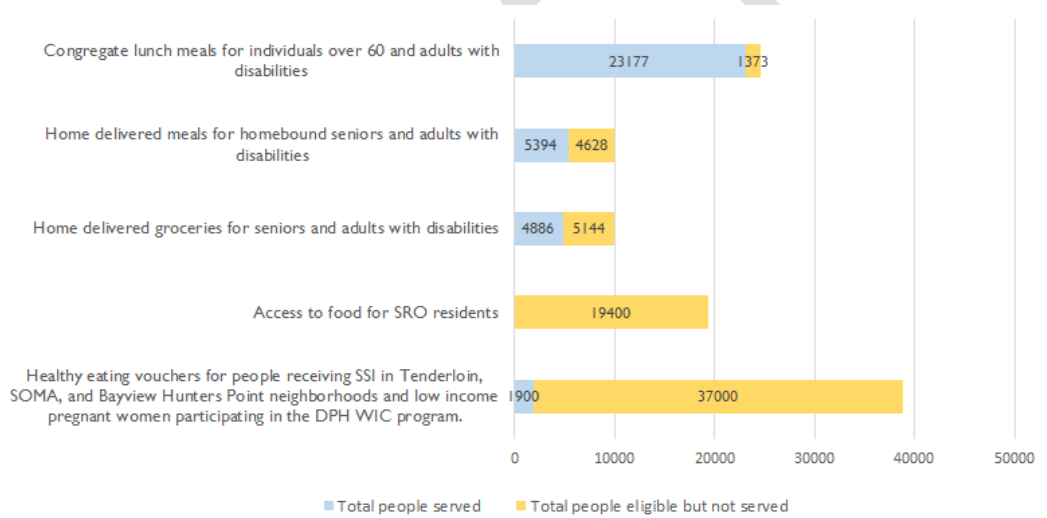
Adult Services indicate that 78% of the adults with disabilities (18-59 years) seeking home delivered meal and congregate meals were food insecure.[25]

Despite the high level of need for food support among many communities in San Francisco, the food safety net is both impacted and not fully utilized. In 2016, 65.6% of eligible San Franciscans were enrolled in CalFresh, compared to a national average of 85% eligible enrollment. In contrast, congregate and home-delivered meal programs and many food pantries often have waiting lists of individuals who need food support.

Number of Food Insecure Individuals Who Were Eligible for Meal Programs or Eating Vouchers in San Francisco in 2017—2018 by Whether or Not They Were Served

Data Source: San Francisco Food Security Task Force FY 2017-18 & FY 2019-20 Funding Request. https://www.sfdph.org/dph/files/mtgsGrps/FoodSecTaskFrc/docs/FSTE-Budget-Request-FY-18-19.pdf Accessed 8-24-18

Food Environment

Although research supports the primary role of income in healthy eating, the food retail environment is also an important component of equity and the equitable distribution of resources.[21] In several areas throughout San Francisco, there are concentrations of corner/ convenience stores paired with a paucity of full-service grocery stores, most often found in low-income neighborhoods. Fresh produce and a variety of healthier food items can then be more inconvenient for low-income residents to access, requiring increased travel time and expenses. Whether or not a food retail environment facilitates food security and promotes health is dependent on several factors beyond the type of food retail

establishments available in a given neighborhood (i.e. corner/convenience store, fast-food restaurant, grocery store, etc.). These include: the convenience, quality, affordability, and cultural acceptability of healthy foods offered within the food retail store; the transportation infrastructure that affects accessibility; the acceptance of federal nutrition programs and local food purchasing supplements; the accessibility of online ordering options; and the food sourcing practices of the food retail establishment (i.e. production, distribution, and procurement of foods from local farms).

Nutrition

Breastfeeding

Breast milk is the optimal source of nutrition for most infants and is associated with health benefits for both the mother and infant. Mothers who do not breastfeed are at higher risk of several diet-sensitive chronic diseases such as diabetes mellitus, hyperlipidemia, hypertension, heart disease, and obesity as well as breast and ovarian cancer.[22] Breastfeeding is consistently associated with a modest reduction in the risk of later overweight and obesity in childhood and adulthood.[23] Thus good, optimal nutrition in the early months of life can set the stage for health outcomes in adulthood. Breastfeeding also reduces risk of pediatric infections and death in the first year of life, promotes infant brain development and is associated with improved intelligence by about 2 IQ points.[24]

Breastfeeding has dose-dependent effects, such that both the duration and exclusivity of breastfeeding are associated with positive health benefits.[25] Annually, in the US, billions of dollars could be saved by reducing hypertension and heart attacks, and more than 4,000 infant deaths could be prevented, if 90% of U.S. mothers were able to breastfeed for one year after every birth.[22]

In San Francisco, rates of exclusive breastfeeding at 1 month and 3 months varied by mother's age, race-ethnicity, education, income level, and parity. Less than one in three Asian/Pacific Islander, Black/African American, and Latinx women exclusively breastfed at 3 months, compared to 50% of White women. The proportion of women with a college degree who exclusively breastfed at 3 months was about triple that of women with less than a high school degree and double that of women with some college coursework but no completed degree. Almost half of women with an income over 200% of the Federal Poverty Level exclusively breastfed their infant at 3 months, compared to about 15% of women with lower income.

Among women who intended to exclusively breastfeed before birth, the rate of exclusive breastfeeding at 1 month did not differ markedly between groups. Rates were not significantly higher for White vs. Black/African American women, higher income vs lower income, or women with private vs public health insurance. However, after 1 month, rates of exclusive breastfeeding dropped significantly faster for younger, non-White, and lower income groups than for older, White, and higher income groups. The proportion of women with an income below 100% of the Federal Poverty Level, who intended to exclusively breastfeed before birth and did so for the 1st month, decreased by 67% between 1 and 3 months postpartum. The corresponding decrease among women with an income above 200% of the Federal Poverty Level was 30%.

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Commented [KM21]: Data can be dropped in from last report if desired. Dropping in old data can be aesy but does require work to reformat etc. For this reason not all old data has been added.

Commented [KM22R21]: Variables in old report: Food deserts, number of fast food restaurants, number of full service restaurants, vendors accepting snap, and hydration stations. food deserts, vendors accepting snap and hydration stations may be more important for inclusion. If no work being done on restaurants and other similar food access should fast food and full service restaurants be included?
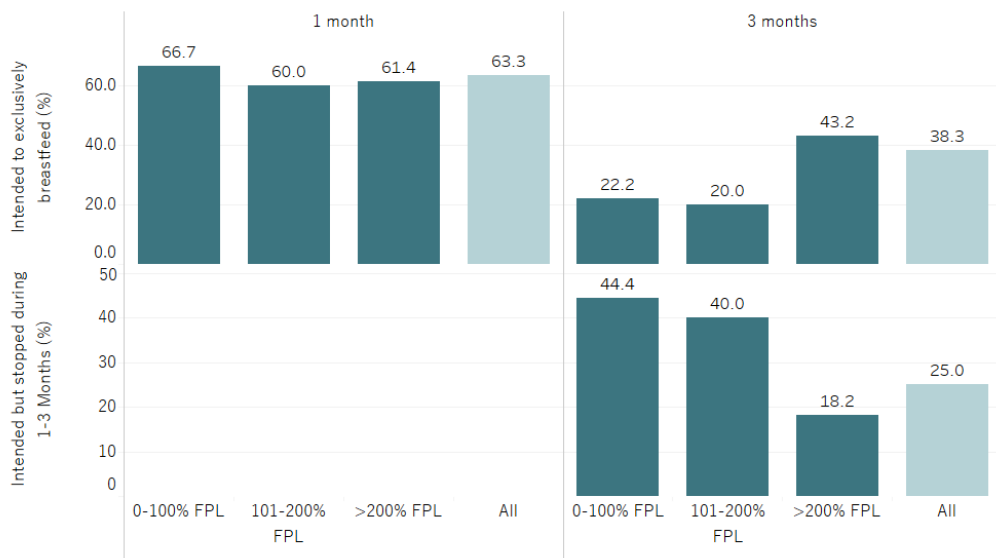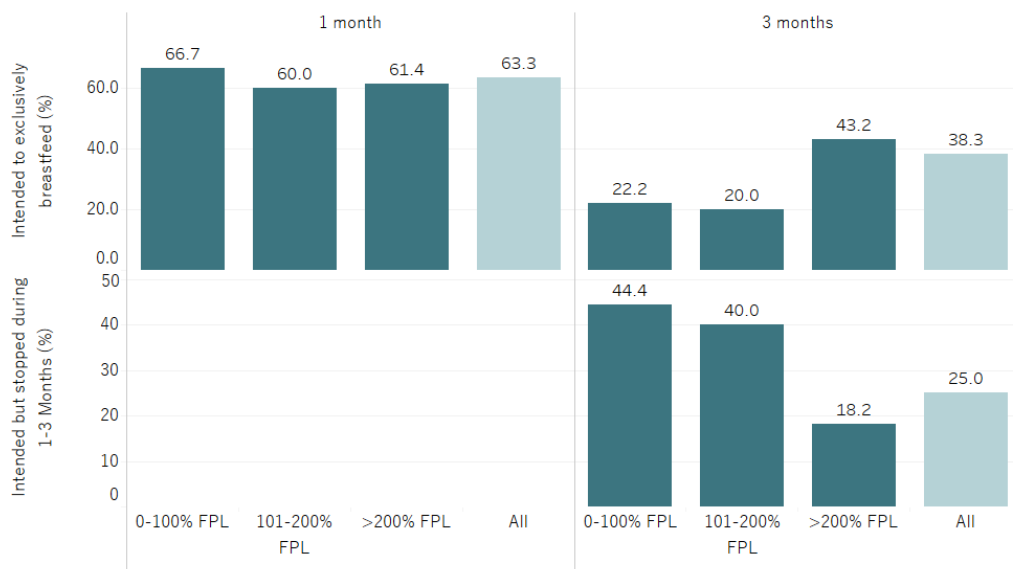
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Exclusive Breastfeeding at 1 and 3 Months by Income Level, San Francisco, 2013-2015

Exclusive Breastfeeding at 1 and 3 Months by Income Level, San Francisco, 2013-2015

Healthy Food Consumption

Promoting health and reducing chronic disease risk through the consumption of healthful food and drink is a national priority. Good nutrition is critical for growth, development, physical and cognitive function, reproduction, mental health, immunity, and long-term health. An estimated 45% of all heart disease, stroke, and type 2 diabetes deaths are associated with poor nutritional intake of 10 dietary factors (low intake of vegetables, fruits, seafood, whole grains, nuts/seeds, polyunsaturated fats and high intake of sodium, red meats, processed meats, sugary beverages).

Local consumption of fruit and vegetables is below recommendations for the majority of adolescents and adults. Only 13% of SFUSD high school students report eating the recommended 5 or more servings of fruit or vegetables daily. The Behavioral Risk Factor Surveillance System (BRFSS) asks similar questions about adult vegetable consumption which revealed that 14% of residents in the metropolitan statistical area including San Francisco reported not eating any vegetables.[26]

Among high school students, the odds of reporting 5 or more servings of fruit and vegetables per day does not vary by race-ethnicity (Figure x). In 2013-2017, 16% of Black/African American and White students and 12% of Chinese and Latinx students reported eating 5 or more servings of fruit and vegetables per day.

Percent of High School Students Reporting 5+ Servings of Fruits/Vegetables per Day by Race/Ethnicity, San Francisco, 2013-2017
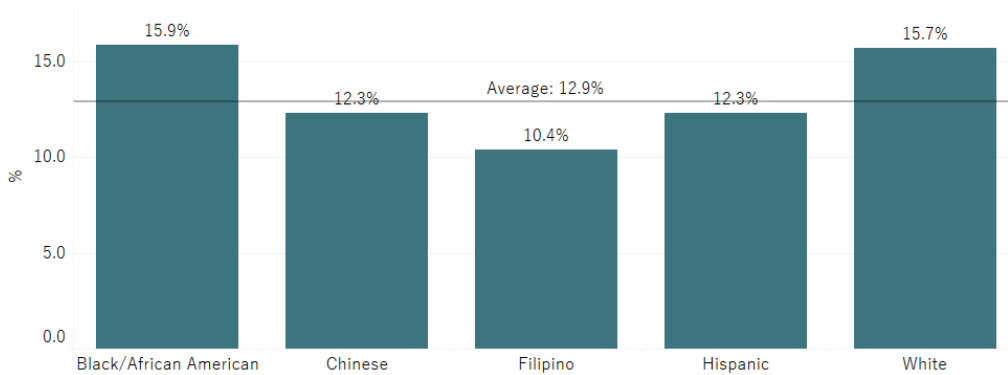

Source: Youth Risk Behavoir Survey

In contrast, consumption of fast food is in excess of recommendations. Data from 2014 to 2016 show that 44% of San Franciscans reported eating fast food at least weekly. Younger adults and males were over two times more likely to report eating a fast food meal in the past 7 days; 54% of adults between the ages 25 to 44 years reported eating fast food at least weekly compared to 19% of adults aged 65 or older. Half of the men who responded to the California Health Interview Survey reported eating fast food weekly compared to 37% of the women surveyed.

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**Percent of Adults Who Reported Eating Fast Food Weekly by Age Group, San Francisco, 2014-2016**
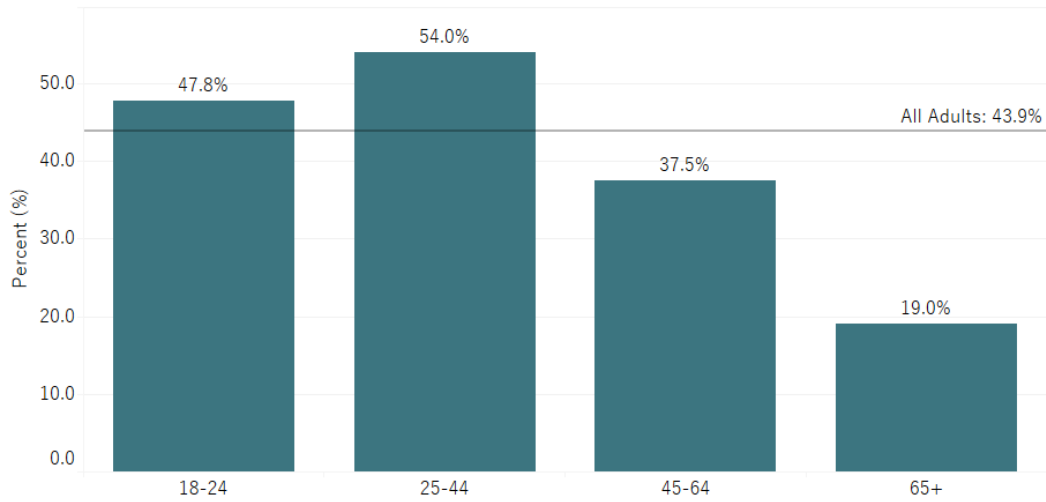
Data Source: California Health Interview Survey (CHIS), UCLA Center for Health Policy Research, 2014-2016.

Among adults, the odds of reporting fast food varies by race-ethnicity. Two times more Latinx adults reported eating fast food at least weekly than White adults.

Percent of Adults Who Reported Eating Fast Food Weekly by Race/Ethnicity, San Francisco, 2014-2016
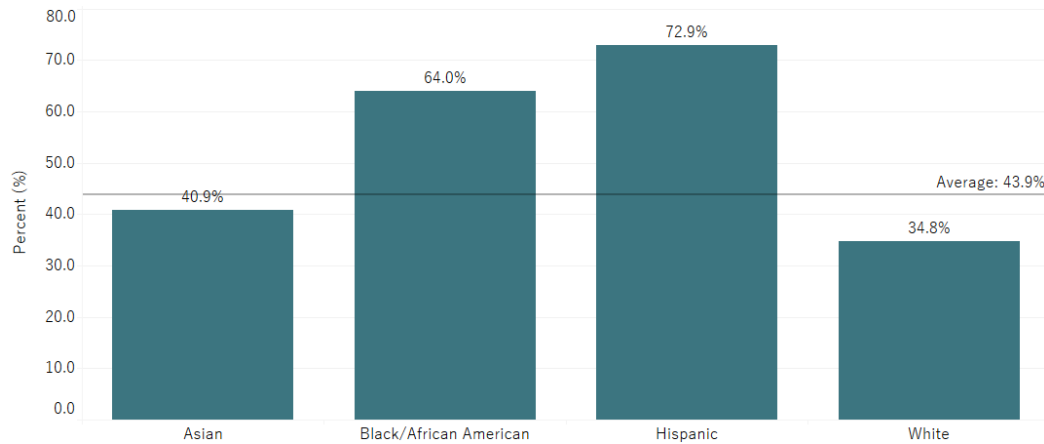
Data Source: California Health Interview Survey

Current State of Physical Activity and Built Environment in San Francisco

Physical activity is defined as any bodily movement that requires energy expenditure. The Centers for Disease Control and Prevention (CDC) recommends that children and adolescents, age 5 to 17 years, should do at least 60 minutes of moderate -to-vigorous physical activity daily, while adults, age 18 years and above, should do at least 150 minutes of moderate-intensity physical activity, 75 minutes of vigorous-intensity physical activity, or an equivalent combination of moderate and vigorous activity throughout the week.[27] The National Association for Sport and Physical Education set physical activity guidelines for infants to children 5 years old at a minimum of 120 min of daily in the form of 60 min of structured activity and 60 minutes of unstructured activity.[28]

Regular physical activity can help people live longer, healthier lives. According to WHO, physical inactivity has been identified as the fourth-leading risk factor (after hypertension, tobacco use, and high blood sugar) for mortality, causing an estimated 3.2 million deaths globally.[29] Physical activity protects against many chronic health conditions including obesity, cardiovascular disease, type 2 diabetes, metabolic syndrome, and cancer (breast and colon). Through the release of serotonin, exercise can help reduce stress, anxiety, and depression.[30]

Beyond physical and mental health, physical activity has been found to be vital to the success of students. It supports learning by improving concentration and cognitive functioning, and has been shown to have a positive influence on students' academic performance.[31] California uses the FitnessGram® to assess physical fitness of 5th, 7th and 9th graders. On average, California students who achieve more fitness standards perform better on standardized tests.[32]

Despite health advantages of physical activity, a 2009 summary by the Robert Wood Johnson Active Living Research Program revealed that less than 50 percent of children and adolescents as well as less than 10 percent of adults in the U.S. achieve public health recommended goals of 30 to 60 minutes per day of moderate to vigorous physical activity on five or more days per week.(REF)

The environments in which we live can have significant impact on our level of physical activity. Institutional policies and practices, living conditions, especially physical and social environments, and individual factors interact to promote or

inhibit physical activity.[33,34] Land use and transportation policies determine the location and design of infrastructure and activities.[45] Neighborhood features such as parks, sidewalks, bicycle trails, recreational facilities, nearby shops, and public transportation stops promote leisurely physical activity, sports, and active transportation.[35,36]

Although 95% of San Francisco's population lives within one half mile of a public recreation facility (defined as athletic fields, meeting spaces/activity centers, performance spaces, and recreational centers/pools run by the San Francisco Recreation and Park Department), Treasure Island currently has no recreation facilities, and only 32% of Mission Bay and 41% of Financial District/South Beach residents are within one half mile of a facility. Potrero Hill and western neighborhoods (including Sunset/Parkside, Inner Sunset, and Lakeshore) also have 10% or more of residents living more than a half mile away from a recreation facility.

Figure x. Percent of Residents living within 1/2 mile of a public recreation facility, by analysis neighborhood, 2017
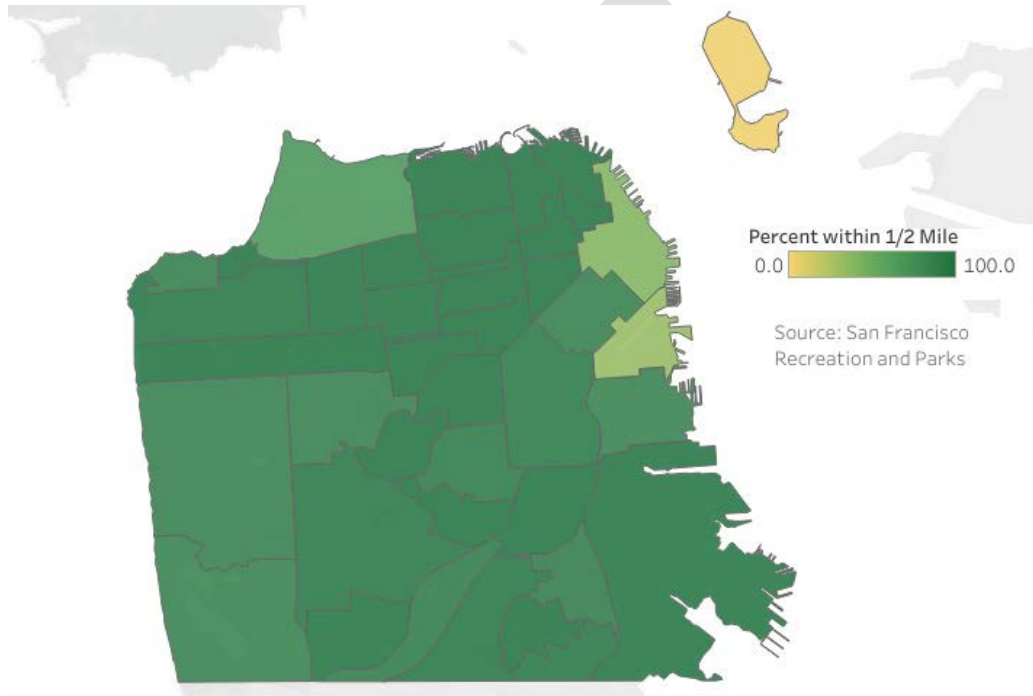
However, existence of infrastructure alone is insufficient. Barriers to use of facilities and physical activity include costs, poor access to facilities, and perceived unsafe environments.[48-50] Institutional policies, including those in the workplace and school and childcare, also affect health. Policies including transportation vouchers, on-location gyms, safe routes to school, recess, physical education, and after-hours availability of the school yard for play can boost physical activity among children and adults.[51] Additionally, social support is instrumental in starting and maintaining a physically active lifestyle. Persons who receive encouragement, support or companionship from family and friends are more likely to form positive views of physical activity and to begin and continue being physically active.[44, 45, 49, 52] At the individual level, interest in and ability to do physical activity vary. Individuals may have physical or emotional blocks to doing physical

activity. Examples include a lack of skills or confidence; a functional limitation associated with a disability, a chronic disease, or increased age; habits such as cigarette smoking or drinking alcohol; as well as a dislike for physical activity.[44, 53, 54] Additional personal barriers which are commonly cited are competing priorities, limited discretionary time and/or money, lack of childcare, and a lack of culturally-appropriate activities.

Walking or biking for utilitarian trips, sometimes referred to as active transportation, is an opportunity to incorporate routine physical activity into daily living. In San Francisco, 50% of adults age 18 and older reporting walking for transportation or leisure for at least 150 minutes in one week in 2014 which is significantly higher than the 33% of adults statewide who walked for at least 150 minutes.[34]

According to the California State Board of Education's standardized FitnessGram® which tests students in grades 5, 7, and 9 on six measures of fitness, 45-58% of 5th, 7th and 9th grade SFUSD students are not physically fit - defined as being in five or six out of six Healthy Fitness Zones (figure). San Francisco students perform worse than California students overall. Children from economically disadvantaged households perform worse than students from families who are not economically disadvantaged. While 58-60% of Asian and White 5th grade students score within five or six zones, less than 40% of Black/African American, Latinx, and less than 30% of grade students do the same.

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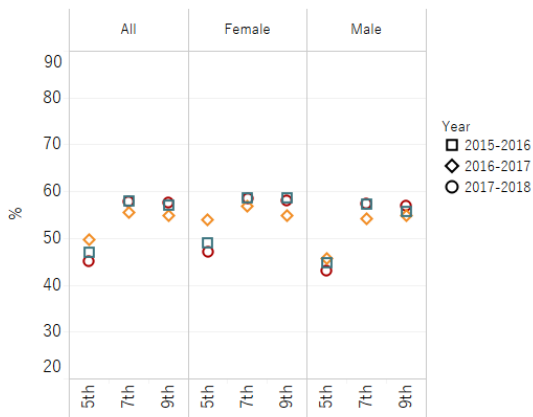
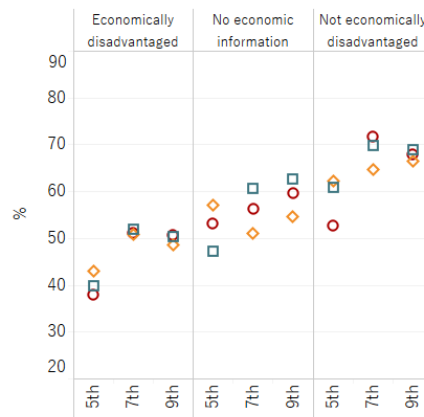## Percentage of students meeting 5 or 6 out of 6 fitness goals

Race/Ethnicity
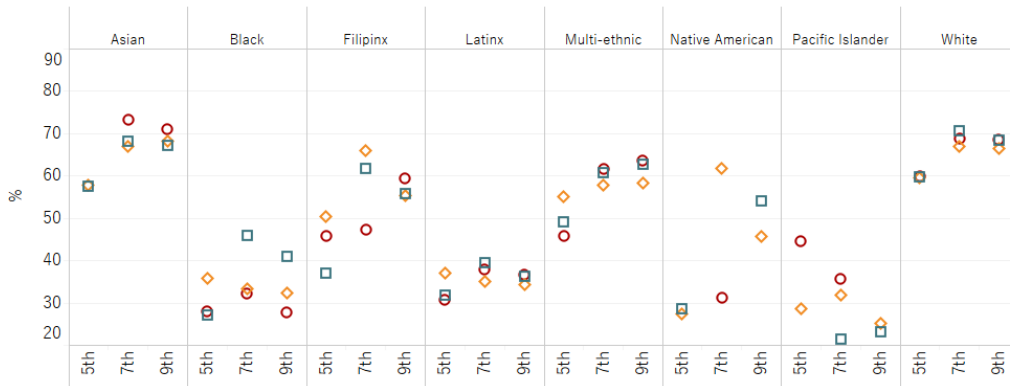

Sex

Economic Status

Fitnessgram testing includes six fitness areas-aerobic capacity, body composition, abdominal strength, trunk extension strength, upper body strength, and flexibility.

*Greater data variability from year to year for Native American and Pacific Islander students due to the small number of students.
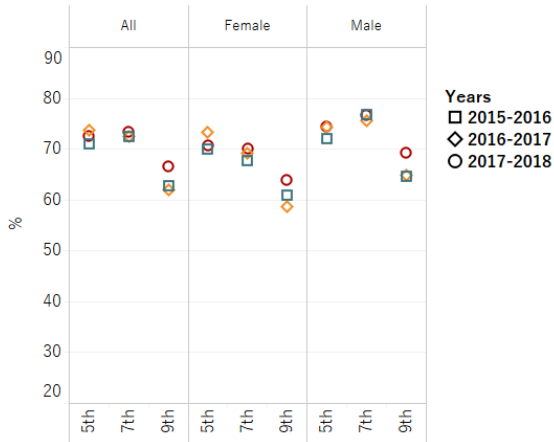
Source: California Department of Education

One of the most potent measures of physical fitness from the FitnessGram® test is aerobic capacity because of its relationship to cardiovascular and metabolic health. In San Francisco, about 73% of 5th and 7th graders meet the standard for aerobic capacity. About 67% of 9th graders meet the standard. When examined by income, the percentage of 9TH Graders identified as not economically disadvantaged who met the aerobic standard was more than 10 percentage points higher than those identified as economically disadvantaged. By ethnicity, around 80% of White and Asian students meet aerobic standards in 5th and 7th grade while only 45-65% of Black/African American and Latinx students do the same. In 9th grade those rates for White students drop to around 75%, while for Black/African American they drop to 37% and for Latinx students to 48%.

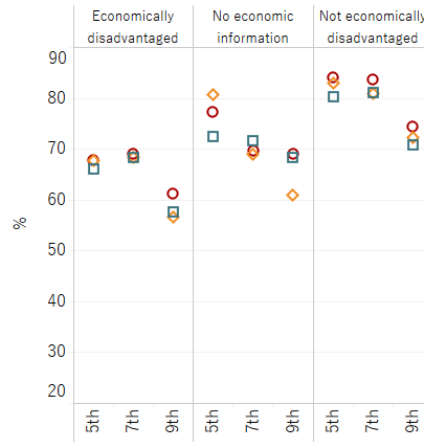**Percentage of students with aerobic capacity in the Healthy Fitness Zone**

Race/Ethnicity
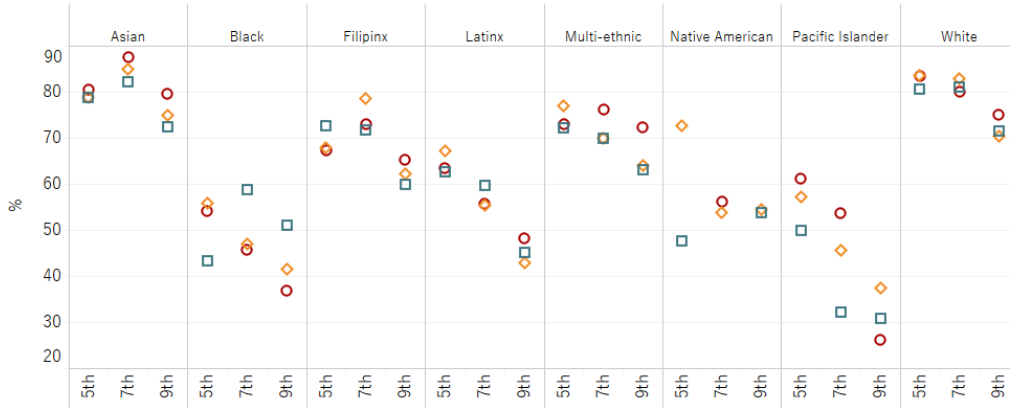
Sex

Economic Status

*Greater data variability from year to year for Native American and Pacific Islander students due to the small number of students.
Source: California Department of Education

Current State of Diet Sensitive Disease

Oral Health

Oral health is essential to general health and quality of life. It is a state of being free from mouth and facial pain, oral and throat cancer, oral infection and sores, periodontal (gum) disease, tooth decay, tooth loss, and other diseases and disorders that limit an individual's capacity in biting, chewing, smiling, speaking, and psychosocial well-being. [http://www.who.int/oral_health/en/] Sugar-sweetened beverage consumption is associated with increased tooth decay and cavities. [4, 5]

Children's oral health

Tooth decay is the most common chronic disease of childhood and the leading cause for missed school days. Poor oral health can cause pain, dysfunction, school or work absences, difficulty concentrating, and poor appearance—problems that greatly affect quality of life and ability to interact with others. Children who experience dental decay miss more school, have lower academic achievement, and have an increased risk for a lifetime of dental problems. California students are estimated to miss 874,000 days of school [2,3] each due to dental problems, costing schools over $29 million in funding based on reductions in the average daily attendance rate. Poor oral health can reflect systemic inflammation, which over time may [4] limit growth and development, as well as increase risk of adverse health outcomes, including hypertension, cardiovascular disease, and cancer. [5]

Routine preventive dental care including daily oral hygiene, fluoride treatments and dental sealants, and reduction of sugars in the diet can prevent tooth decay. Fluoride varnish applications reduce decayed/missing/filled tooth surfaces by 43% in permanent teeth and by 37% in primary teeth.[6] Dental sealants can prevent up to 80% of tooth decay in children and adolescents. [7]

Despite steady decreases in caries (i.e. tooth decay or cavities) prevalence in San Francisco over the past 10 years, tooth decay remains a prevalent local health problem. In 2017-18, 32% of SFUSD kindergarteners had experienced caries and 17% had untreated caries. As treatment of decay is alone insufficient and children who do not receive adequate treatment-- fluoride treatments, dental sealants, ongoing care of cavity fillings—and reduce sugars in the diet are at higher risk for the development of further caries, the initial development of caries signals the beginning of a lifetime of otherwise preventable dental procedures. National and state data show that 52% to 71% of all third graders have caries.[9]

## Percentage of SFUSD kindergartenders with caries or untreated caries
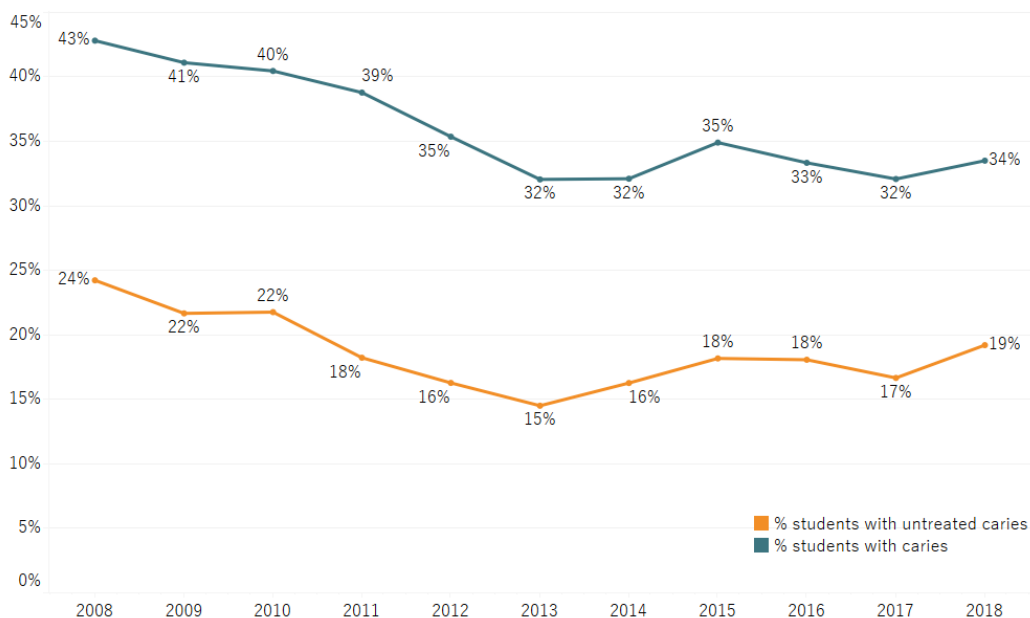
Dates shown indicate the first year of the school year (i.e. 2008 is is the 2008-2009 school year).,
Data for 2018-2019 school year are preliminary.
Source: San Francisco Unified School District-San Francisco Department of Public Health Dental Services Kindergarten Oral Health
Screening Program

Consistent with nationwide patterns and trends, disparities in oral health persist in San Francisco. Low-income and minority children have higher tooth decay rates. In San Francisco, Black/African American, Latinx, and Asian kindergarteners two times more likely to experience dental decay as White kindergarteners (figure). Pacific Islander kindergarteners are almost three times more likely than White kindergarteners to have caries. Disparities are similar for *untreated* caries with Black/African American, Latinx, and Asian kindergarteners are more likely to experience untreated caries. Dental caries and the untreated dental caries rates among kindergarteners at the lowest income schools are more than 50% higher than rates at the highest income schools.

Percentage of SFUSD kindergartenders with caries or untreated caries, by race/ethnicity
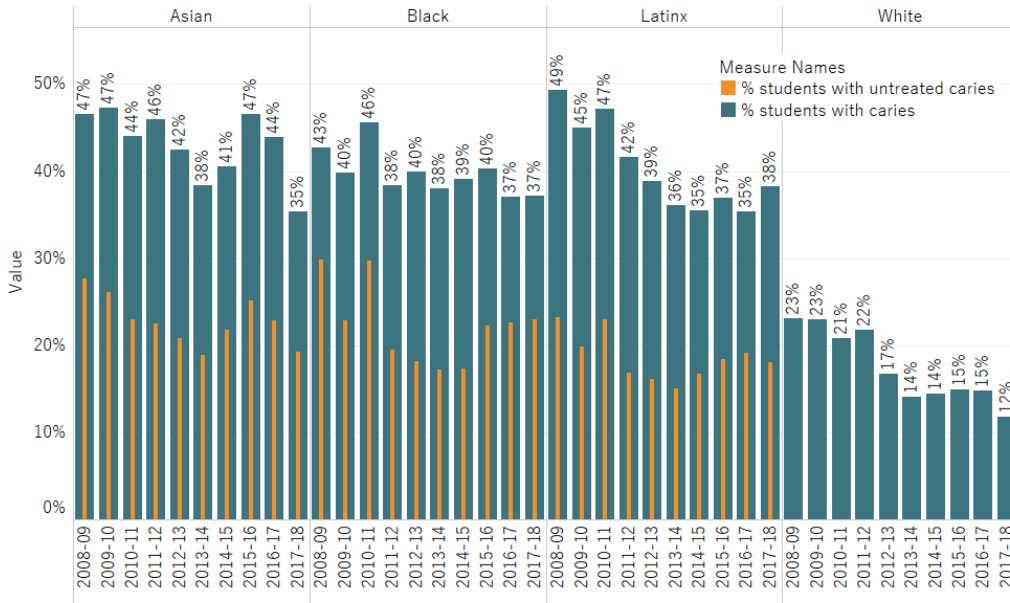
Too few white students were found to have untreated caries to report data; however, data for 2013-2017 show that 7% of white students have untreated caries.

Source: San Francisco Unified School District-San Francisco Department of Public Health Dental Services Kindergarten Oral Health Screening Program

Rates of caries experience vary among Asians subpopulations in San Francisco. Asian Indian, Cambodian, Hmong, Japanese, Korean, and Laotian collectively have lower rates of caries prevalence (20%) compared to Chinese, Vietnamese, and Filipinx (37-45%).

Caries experience varies by neighborhood. Children in Chinatown, North Beach, Nob Hill/Russian Hill/Polk, Tenderloin, SOMA, Bayview/Hunters Points, Visitacion Valley, Excelsior, and Portola consistently experience more caries than children in other San Francisco neighborhoods. The most affected neighborhoods coincide with those with high proportions of Latinx, African American, Asian, and low-income residents.

adult oral health

Overweight and Obesity

Sugar-sweetened beverage consumption is associated with overweight and obesity. (1, 2) Overweight and obesity reflect excess body weight relative to height. Overweight and obesity are associated with greater risk of chronic disease, pain, disability, anxiety, depression, mental illness, and lower quality of life. Obesity [1011] increases risk of chronic

conditions, including high blood pressure, high cholesterol, heart disease, type 2 diabetes, osteoarthritis, breast and colon cancers, sleep apnea, and gynecological problems.63 Obesity is associated with all-cause mortality, and is a leading cause of preventable death. Obese adults age 20 to 39 have an estimated six years of life lost.(63) That being said, overweight and obesity are not absolutely predictive of negative health outcomes for a given individual whose personal risk of disease can be equivalent or less than that of a normal weight individual depending on their genetics, diet, and level of physical activity.

For adults, overweight is defined as a body mass index (BMI) of 25.0 to 29.9 kg/m2 and obesity as a BMI of $\geq$ 30 kg/m2.

For infants and toddlers up to two years of age, excess weight is identified as a [13] weight-for-length greater than or equal to the 98th percentile. For children and adolescents, the CDC[14] defines overweight as a body mass index (BMI) percentile over the 85th percentile for age and sex. [15]

FitnessGram® data for youth in San Francisco describe students as having body compositions either being within or outside the "healthy fitness zone" which is comprised of BMI and a measure of percent body fat. For pregnant women, excess weight gain is defined as a gain of more than 40 pounds if the mother is underweight before pregnancy, more than 35 pounds if she is normal weight before pregnancy, more than 25 pounds if she is overweight before pregnancy, and more than 20 pounds if she is obese before pregnancy.[16]

Risk of overweight and obesity begins during pregnancy and tracks throughout the life course. Excess maternal weight gain during pregnancy programs the unborn fetus for a lifetime of exaggerated response to insulin and stress hormones, and increased susceptibility to weight gain. [,,,,,,] Excess weight gain during pregnancy is associated with excess infant weight at birth, excess weight gain before age five, and childhood and adult obesity. Overweight children are more likely to become overweight adolescents who in turn have a 70% chance of becoming an overweight or obese adult. Prevention and early [24] [25] intervention are very important, because obesity is difficult to treat once established. [26]
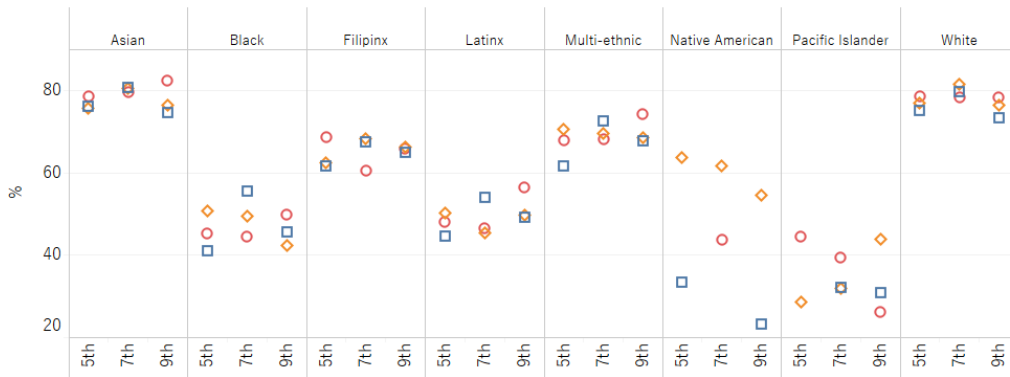
YOUTH – Overweight and Obesity
Nationally, childhood obesity has more than doubled in children and tripled in adolescents in the past 30 years; in 2010, more than one-third of children and adolescents were overweight or obese.[27]

SFUSD assesses students for body mass index (BMI) and other fitness measures annually in grades 5, 7, and 9 (the Fitness Gram®). In school year 2017-2018, 65% of 5th grade students, 66% of 7th graders, and 71% of 9th graders had a measured body composition inside the healthy fitness zone.

A lower proportion of racial minority, economically disadvantaged, and male students have a body composition inside of the healthy fitness zone (figure). Asian and white students are 73-215% more likely than Pacific Islander students, 65-86% more likely than Black or Latinx students, and 15-37% more likely than Filipinx students to have a healthy body composition. Similarly, economically disadvantaged students (58-67%) are less likely to have a measured body composition outside the healthy fitness zone than not economically disadvantaged students (75-77%). These trends among people of color those at an economic disadvantage are mirrored in the adult population., however; unlike among adults, female students (70-73%) appear to be more likely to be within the healthy fitness zone as compared to males (62-70%).

Percentage of students with a body composition inside the healty fitness zone
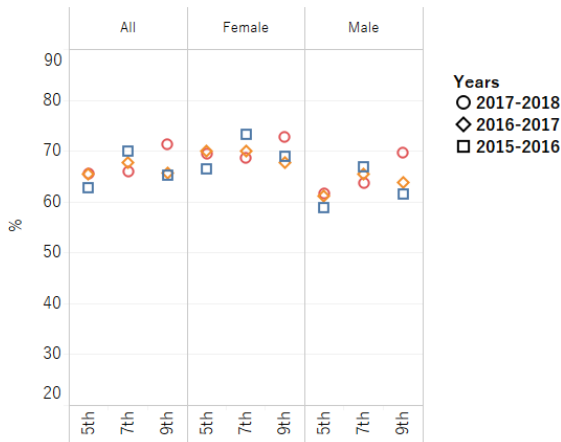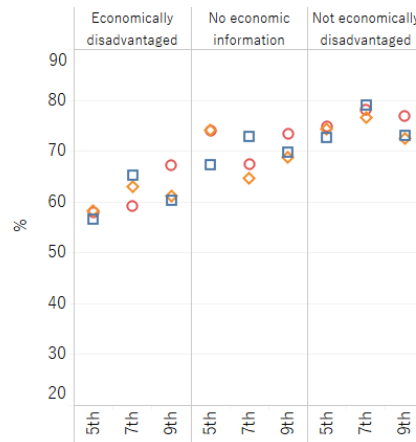
Race/Ethnicity

Sex

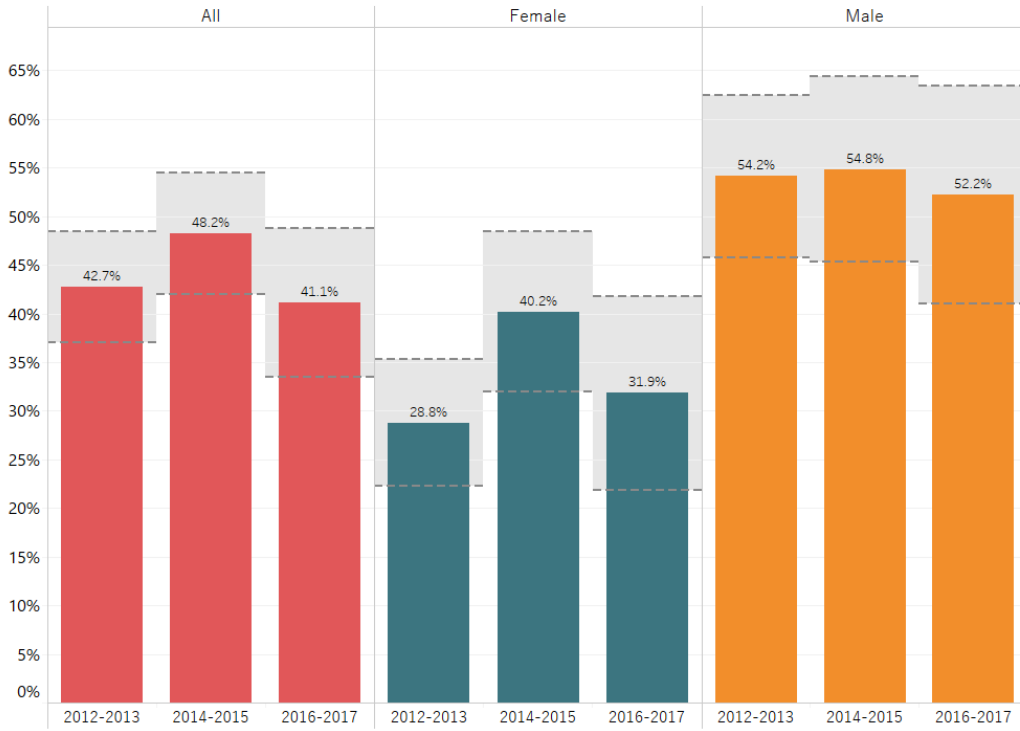**Economic Status**

Years
○ 2017-2018
◇ 2016-2017
□ 2015-2016

*Greater data variability from year to year for Native American and Pacific Islander students due to the small number of students.
Source: California Department of Education

ADULTS – Overweight and Obesity

Overweight and obesity (which includes BMI ≥ 25) among adults has remained relatively stable since 2011. In 2016-2017, 41% of San Francisco adults reported a height and weight consistent with the overweight/obesity (Figure). [28] More men, 52%, and older adults report experiencing overweight or obesity than do women, 40%, and younger adults (figures). More than 50% of adults older than 40 years in San Francisco are overweight or obese compared to 25% of adults 18 to 24 years.

Percentage of adults overweight or obese, by gender

All	Female	Male

All
- 2012-2013: 42.7%
- 2014-2015: 48.2%
- 2016-2017: 41.1%

Female
- 2012-2013: 28.8%
- 2014-2015: 40.2%
- 2016-2017: 31.9%

Male
- 2012-2013: 54.2%
- 2014-2015: 54.8%
- 2016-2017: 52.2%

Source: California Health Interview Survey

Percentage of adults overweight or obese, by age

	18-24	25-39	40-64	65-79	80+

Bar chart data (by age group, 2011-2013 and 2014-2017):

- 18-24: 2011-2013 = 23.3%, 2014-2017 = 25.4%
- 25-39: 2011-2013 = 36.0%, 2014-2017 = 37.3%
- 40-64: 2011-2013 = 48.2%, 2014-2017 = 58.6%
- 65-79: 2011-2013 = 60.2%, 2014-2017 = 46.5%
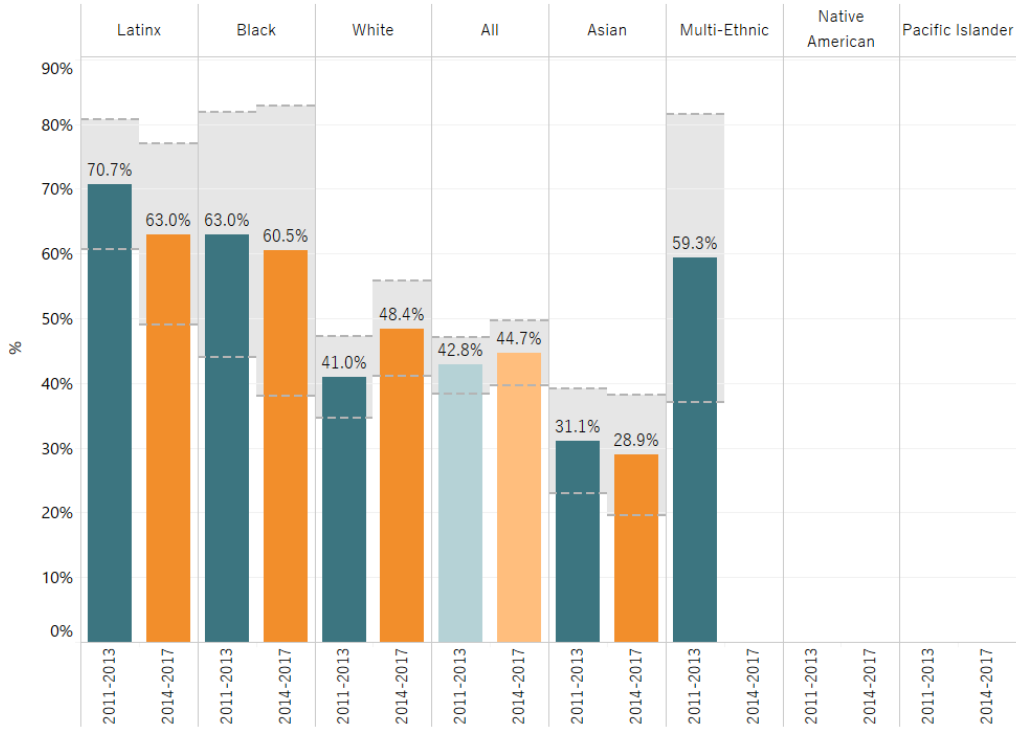- 80+: 2011-2013 = 53.4%, 2014-2017 = 32.7%
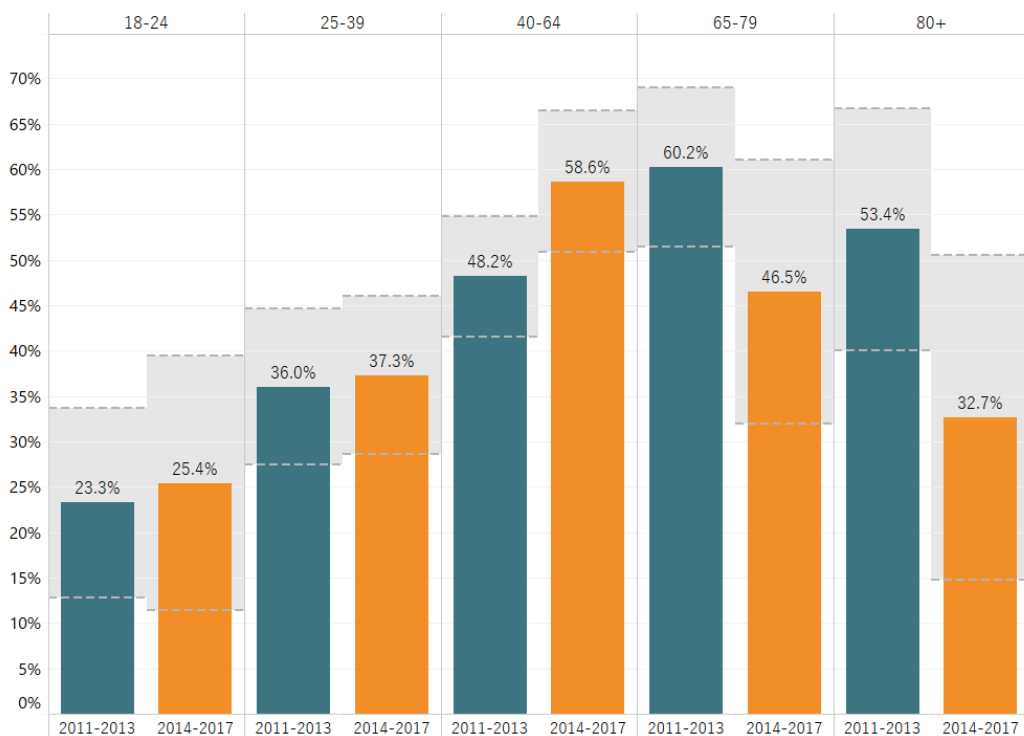
Source: California Health Interview Survey

Consistent with national obesity disparities, locally, the rates of overweight and obesity vary by income, race/ethnicity, and zip code. Data from the California Health Interview Survey indicates that Black/African Americans (61%), Latinx (63%), and Whites (48%) have higher prevalence of overweight/obesity than Asians (29%), who have the lowest rate of overweight and obesity in San Francisco (Figure). Residents in households earning less than 300% of the federal poverty level are 38% more likely to experience overweight or obesity as compared to those at 300% or above (figure).

**Commented [MK34]:** Add note on case definition issues among Asians (potentially look at WHO definition

Percentage of adults being overweight or obese, by race/ethnicity

	Latinx	Black	White	All	Asian	Multi-Ethnic	Native American	Pacific Islander

Latinx 2011-2013: 70.7%
Latinx 2014-2017: 63.0%
Black 2011-2013: 63.0%
Black 2014-2017: 60.5%
White 2011-2013: 41.0%
White 2014-2017: 48.4%
All 2011-2013: 42.8%
All 2014-2017: 44.7%
Asian 2011-2013: 31.1%
Asian 2014-2017: 28.9%
Multi-Ethnic 2011-2013: 59.3%

Source: California Health Interview Survey

Percentage of adults overweight or obese, by poverty level, 2017
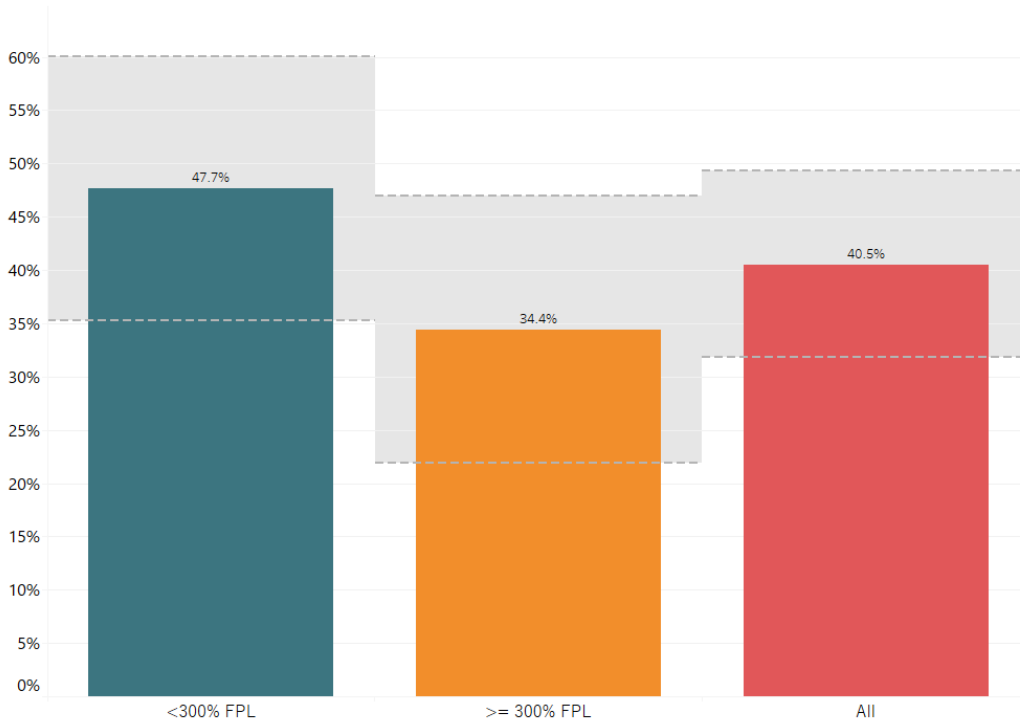
Source: California Health Interview Survey

The CDC's modeling of obesity suggests that it is concentrated in parts of Bayview Hunters Point, Tenderloin, Western Addition, Hayes Valley, Visitacion Valley, and McLaren Park, coinciding with concentrations of populations at higher risk.

Commented [KM35]: Not new can add previous500 cities map

More than one third of women (37%) gained excess weight during pregnancy in San Francisco in 2016. Approximately twice as many women who are overweight or obese before pregnancy gain excess weight during pregnancy compared to women who are normal weight before pregnancy. Although, since 2007, [31] there has generally been a decline in excess weight gain during pregnancy, disparities remain. Black/African American are more than 1.5 times as likely as Asian women to gain excess weight during pregnancy compared to Asian women (50% vs. 29%).

The disparity gap in excess weight gain during pregnancy between mothers with private versus public insurance has narrowed in recent years from 2012 when there was a 10 percentage point difference between private and publicly insured women to a 3.2 percentage gap in 2016. [31]

Commented [KM36]: Waiting on updated data

Diabetes

Diabetes is a condition in which the body does not properly process food for use as energy, leading to increased levels of glucose in the blood which can cause damage to tissues and organs throughout the body. The two main types of diabetes are type 1 diabetes and type 2 diabetes. Type 1 diabetes, previously called insulin-dependent diabetes mellitus or juvenile onset diabetes, accounts for five to 10% of all cases of diabetes and is considered primarily a genetic disease whose onset is not particularly influenced by diet or the environment.[37] In contrast, Type 2 diabetes, previously called non-insulin-dependent diabetes mellitus or adult-onset diabetes, accounts for about 90 to 95% of all diagnosed cases of diabetes. Sugar-sweetened beverage consumption is associated with increased risk of developing Type 2 diabetes (REF). A third type, gestational diabetes, develops only during pregnancy. Babies born to mothers with gestational diabetes may suffer from excessive birth weight, preterm birth, respiratory distress syndrome, low blood sugar, and type 2 diabetes later in life. Women who have gestational diabetes during pregnancy have a 7.5-fold increased risk for the development of type 2 diabetes after delivery. This increased risk persists for their lifetime, even if the diabetes does not develop immediately following pregnancy. Risk factors for Type 2 diabetes and gestational diabetes include older age, obesity, family history of diabetes, prior history of gestational diabetes, impaired glucose tolerance, unhealthy diet, physical inactivity, and race/ethnicity.[38]

Prediabetes, also referred to as impaired glucose tolerance or impaired fasting glucose, is a condition in which blood glucose levels are higher than normal but not high enough for a diagnosis of diabetes. People with prediabetes have a much higher risk of developing type 2 diabetes, as well as an increased risk for cardiovascular disease. Without intervention, up to 30 % of people with prediabetes will develop type 2 diabetes within five years, and up to 70 % will develop diabetes within their lifetime.[39,40] According to modeled prevalence estimates by the UCLA Center for Health Policy Research, approximately 44% of San Franciscans have pre-diabetes.[40]

Type 2 Diabetes can be prevented or delayed through moderate weight loss, exercise and improved nutrition, yet, type 2 diabetes impacts health and health spending significantly.[5,41] Diabetes is the eighth leading cause of death in San Francisco which is an underestimate since heart disease, the leading killer, is often worsened by having concurrent diabetes. (REF) It is also the leading cause of kidney failure and the need for dialysis and can cause other serious health complications including blindness and lower-extremity amputations.[42,43] Diabetes reduced the lifespan of San Franciscans by approximately eight years and as estimated by San Francisco's Budget and Legislative Analyst Office, the City and County of San Francisco pays over $87 million for direct and indirect diabetes care costs.[44]

Diabetes Prevalence

Approximately 6% of surveyed San Franciscans reported ever being diagnosed with diabetes on the CHIS survey. However nationally, nearly 1 in 4 people living with diabetes are undiagnosed thus the true prevalence of type 2 diabetes in San Francisco is likely higher. The CDC has modeled diabetes prevalence in San Francisco and estimates the prevalence to be closer to 8.5%.[45,46] Nationally and Locally, diabetes affects poorer residents to a greater extent[47]; San Francisco residents living in household which earn less than 300% of the federal poverty level, or about $75,300 for a family of four[48], are more than 2 times as likely to have diabetes (figure).

Percentage of adults reporting having diabetes, by poverty level, 2013-2017
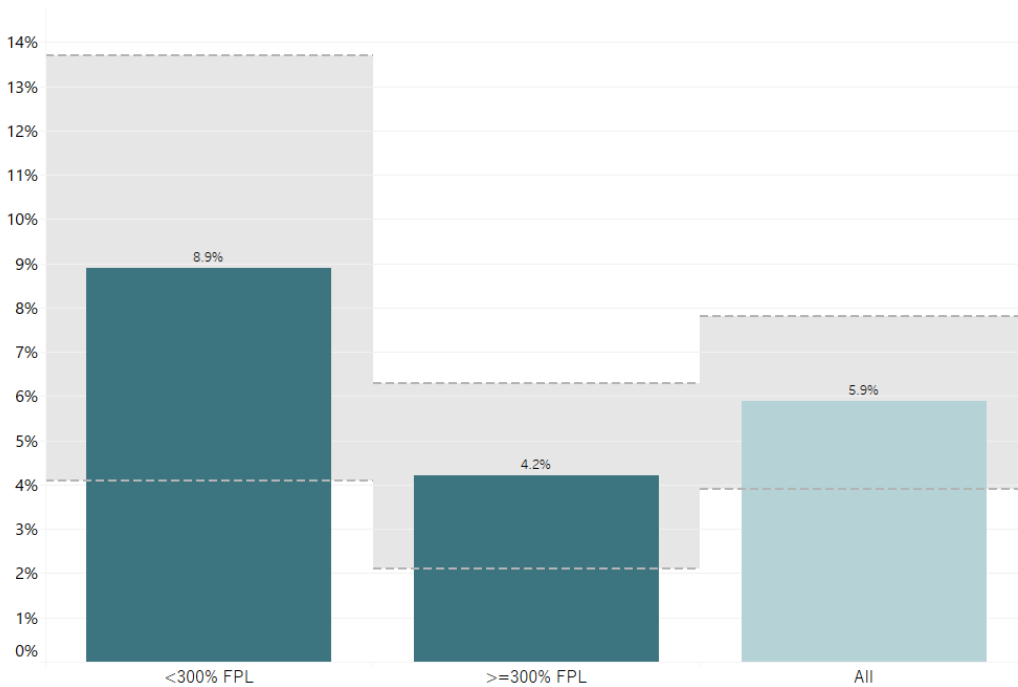
Source: California Health Interview Survey

Gestational Diabetes

Hypertension

Hypertension, also called high blood pressure, is a condition in which the force of blood pushing against the vessel walls is higher than normal. This increased pressure damages blood vessel walls and can lead to complications such as cardiovascular disease (including heart attack and stroke), kidney disease, and blindness. Hypertension is the second leading cause of kidney failure. Along with diabetes, hypertension is the major risk factor and contributor to

cardiovascular disease which is the leading cause of death in San Francisco and nationally.[49] Diet, physical activity, smoking, stress, family history, and genetics all contribute to the development and management of hypertension.

Approximately 24% surveyed San Franciscans reported ever being diagnosed with hypertension on the CHIS survey. However, nationally, nearly a fifth of people living with hypertension are undiagnosed thus the true prevalence of hypertension in San Francisco is likely higher[50]. As with other chronic disease, disparities are seen across income, ethnicity, and geography [can reference old report or drop in]. More than a third of Black residents are hypertensive, 50% more than the next highest group: Latinx (23%) (figure).

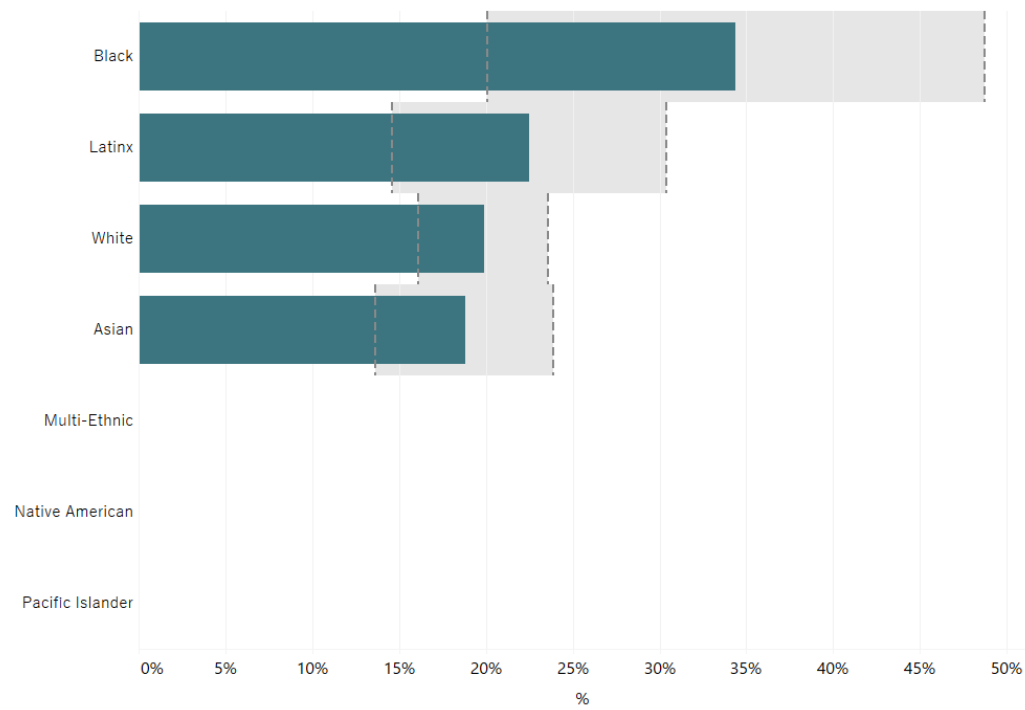## Percentage of adults reporting having hypertension, by poverty level
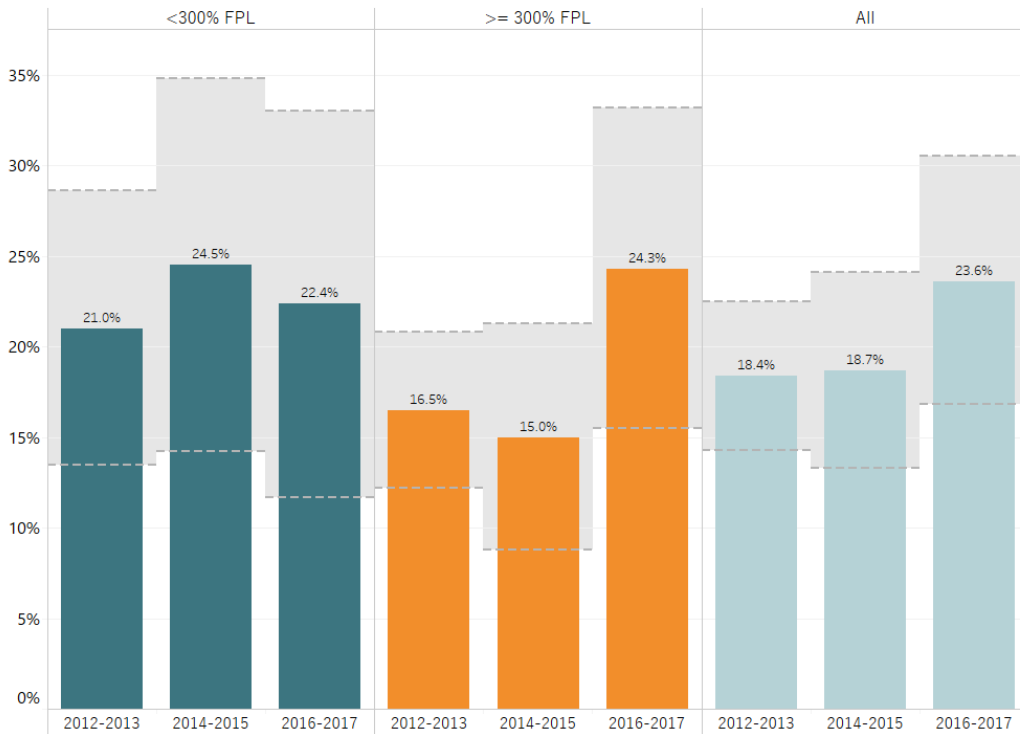
Source: California Health Interview Survey

Percentage of adults hypertensive, by gender
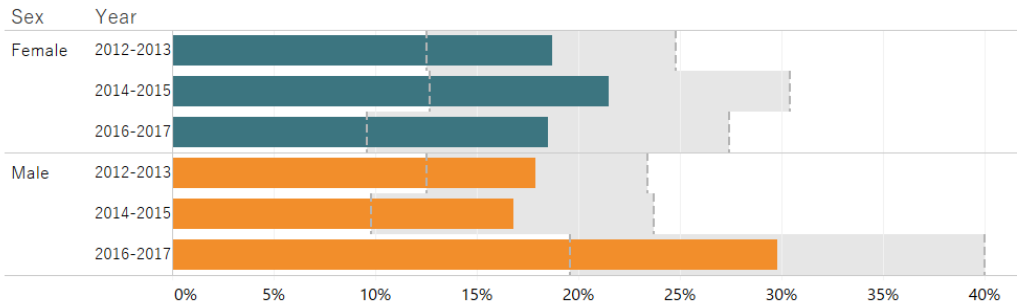
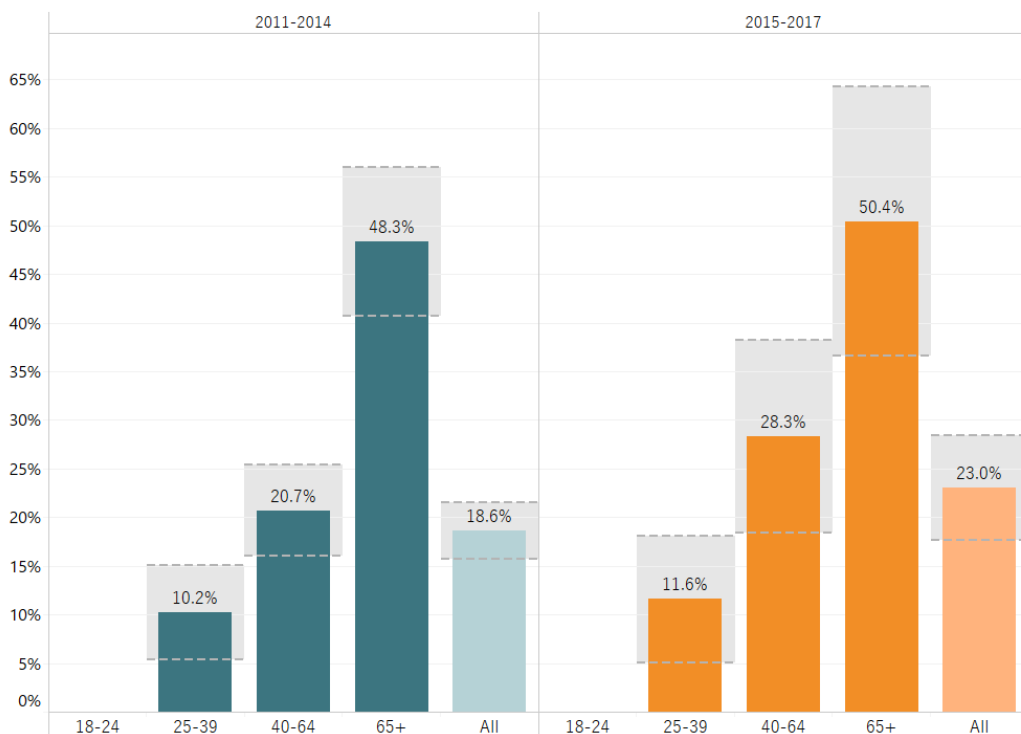
Source: California Health Interview Survey

Percentage of adults hypertensive, by race/ethnicity, 2011-2017

Source: California Health Interview Survey

Percentage of adults hypertensive, by age

	2011-2014		2015-2017

Values shown in chart:

2011-2014:
- 25-39: 10.2%
- 40-64: 20.7%
- 65+: 48.3%
- All: 18.6%

2015-2017:
- 25-39: 11.6%
- 40-64: 28.3%
- 65+: 50.4%
- All: 23.0%

Source: California Health Interview Survey

Cardiovascular disease

Cardiovascular disease refers to a class of diseases that involve the heart and blood vessels and is the leading cause of death in San Francisco and nationally. Many of these diseases are attributed to atherosclerosis, a condition where excess plaque builds up in the inner walls of the arteries. This buildup narrows the arteries and constricts blood flow. Diet, physical inactivity, being overweight/obese, cigarette smoking, diabetes, stress, and hypertension all contribute to cardiovascular disease.[51] Common types of [53] cardiovascular diseases include:

- Coronary heart disease which can lead to heart attack (when blood flow to the heart is blocked)
- Heart failure which is when the heart is not functioning at its full potential and the body is not receiving all of the blood and oxygen it requires.
- Stroke which occurs when not enough blood is getting to the brain which can be due to a blocked blood vessel or a burst blood vessel.

In 2014 –17, 5.2% of adults living in San Francisco reported being told that they had any kind of heart disease. Hospitalization rates due to heart failure are highest among Black/African Americans. In 2016, Black/African American hospitalization rate (104 per 10,000 residents) for heart failure was more than four times higher than White San Franciscans (19 per 10,000 residents). Hospitalization rates due to heart failure among Latinx (26 per 10,000 residents) was approximately 1.4 times that of White San Franciscans.[55]

Mortality (no new data)

Methods and Limitations

University of California, Berkeley Madsen Group Pricing Study

In April-June of 2017 and 2018, beverage retail prices were collected from stores in San Francisco and the comparison cities of Richmond and San Jose, which do not have SSB taxes.[52] Stores were selected for price collection using stratified random sampling. First, a list of all stores in these cities classified by the following NAICS codes were obtained: supermarket and other grocery (445110); convenience store (445120); beer, wine or liquor store (445310); pharmacies and drug stores (446110); and gasoline stations (4471) from the ReferenceUSA database. Additional stores were identified through corporate websites and Google Maps. All stores were classified as chain supermarket, independent supermarket, discount supermarket, mass merchandiser, small grocery, drugstore, convenience store, and liquor store based in NAICS code or name recognition. Stores were geocoded and assigned census tract median income. Within each city, store category, and chain (where applicable), retailers were randomly sampled. Sampling was further stratified by tertile of census tract median income for non-chain stores and supermarkets, to ensure representation across neighborhood SES. Specialty (e.g., "natural grocery") chains and chain liquor stores were not included. Data collection is expected to continue through 2020.

The final sample of stores includes 39 stores in San Francisco, 30 stores in Richmond, and 45 stores in San Jose. Across all cities, 11.28% are chain convenience stores, 39.13% are corner stores, 5.22% are discount supermarkets, 6.08% are drugstores, 6.83% are independent supermarkets, 8.70% are liquor stores, 13.05% are chain supermarkets, and 8.70% are mass merchandizers.

Price data are collected for the following categories of sugar-sweetened beverages: soda, energy drinks, sport drinks, sweetened water, presweetened tea, presweetened coffee, and fruit-flavored drinks.[53] Brands were selected based on industry reports of top-selling sugar-sweetened beverages in the United States and researcher observations of drinks commonly sold in the San Francisco Bay Area. Prices are also collected for the following untaxed drinks: diet versions, reduced fat milk, water, and 100% orange juice brands from top selling soda producers. Prices of "single serving" (<33.8 fl oz) sizes were collected for all beverages. Prices of larger sizes were also collected for beverages as available for soda (e.g., 1L, 2L, multipacks), fruit-flavored drinks (e.g., 65 fl oz) and water (1 gal). Data collectors gathered prices either by directly recording visible price tags or by asking store staff when price tags were not available. In cases where prices could not be provided by store staff, beverages were purchased, and prices recorded from receipts. Both regular and lowest promotional prices were collected. When available, promotional prices were used in the analyses to reflect price actually paid.

Price changes were assessed using a longitudinal design, contrasting relative changes in pre-tax (April-June 2017) versus post-tax (April-June 2018) beverage prices in San Francisco to changes in Richmond and San Jose (which have no beverage tax) over the same time period to adjust for non-tax factors that might affect price changes. Prices for each beverage (in cents per ounce) were used to estimate category-level (i.e. regular soda, diet soda, sports drinks, etc.) and

SSB level (i.e. SSB and non-SSB) price changes. Category-level price changes were weighted by the popularity of each component beverage in terms of the number of ounces of that beverage sold in 2017 in the San Francisco Bay Area compared to the total number of ounces sold across study beverages in that beverage and size category, using data from Nielsen. Large numbers of missing brands in Nielsen for water and milk, however, precluded weighted analyses for these groups. SSB-level price changes were weighted by the popularity, in terms of ounces sold, of each component beverage and size category across all beverages in Nielsen for 2017. The data were fit to a linear fixed-effects regression model,

including a binary indicator for period (pre-tax or post-tax), a binary indicator for San Francisco, their interaction, and fixed effects for each store.

IRI

To evaluate the effects of the SDDT on drink prices in San Francisco, retail scanner data are obtained from Information Resources, Inc. (IRI), a market research company. IRI collects the average price during the period (a weighted quantity), dollar sales, unit sales, and volume sales in ounces for products with UPC codes from a sample of 108 stores. While the store names are masked,

Table x. Stores included, zip codes represented, and total number of UPC codes included in the IRI dataset, 2015-2017

	Total	San Francisco	Oakland	Los Angeles	Richmond
Number of Stores	519	124	102	264	29
City Proper	358	108	42	201	7
Neighboring areas	161	16	60	63	22
Number of zip codes	124	27	23	67	7
City proper	95	24	13	55	3
Neighboring areas	29	3	10	12	4
Number of UPCs	20,187				
Drink items	13,643				
Food items	6,554				

*No Stores from zip codes 94129 (Presidio), 94130 (Treasure Island), and 94158 (parts of Mission Bay & Potrero Hill) are included in the sample for San Francisco

the 5-digit zip code in which a store resides is available. Stores included in the sample are predominately chain stores and include groceries, pharmacies and mass merchandizers. Not included in the sample are corner stores, convenience stores, and warehouses. Data, going back to 2015, are aggregated to 4-week periods which are denoted as months. While data will be obtained through 2020, as of the writing of this report data through 2017 are available.

IRI classifies UPCs into product categories. Beverage categories include-- regular soda, diet soda, sports drinks, energy drinks, juice and juice drinks, bottled water, club soda, milk, and teas and coffees. Additionally, the categories or cookies and donuts will be analyzed as potential food substitutes. All analyses included in this report rely on IRI's product classification scheme and should be treated as preliminary. IRI categories are not based on the added sugar of a beverage and therefore preliminary analysis are not available for the following categories which combine sugar-

Soda

800

sweetened and non-sugar-sweetened beverages-juice and juice drinks, and teas and coffees. For future analysis nutrition facts panels and lists of ingredients for each UPC will be examined to determine whether each meets the definition of a taxable SSB under the municipal tax ordinances (Section 552 for San Francisco, Section 4.52.020 for Oakland).

Once post SDDT implementation data are available, a difference-in-differences study design will be employed to evaluate changes in drink and food sales. We will compare the change in ounces sold of different beverage categories over time in tax-affected cities (San Francisco and Oakland) and tax-unaffected comparator cities (Richmond and Los Angeles).

Difference-in-differences designs rely on an assumption that unmeasured factors do not vary between groups (in this case between tax-affected and tax-unaffected cities). While this assumption is not directly testable, it is commonly inferred by testing whether pre-existing trends in outcomes for each group are parallel. Using data from 2015 through 2017, the linear trends in ounces sold in San Francisco and Oakland were visualized and tested to see if they were similar (Figures x and y). Tests for differences in pre-existing trends in outcomes by group did not reveal large differences in trends supporting the assumption that there were parallel trends between tax-affected and tax-unaffected cities prior to the implementation of the tax (Table x).

Pre-existing trends in average monthly ounces sold per store, by beverage category, 2015-2017
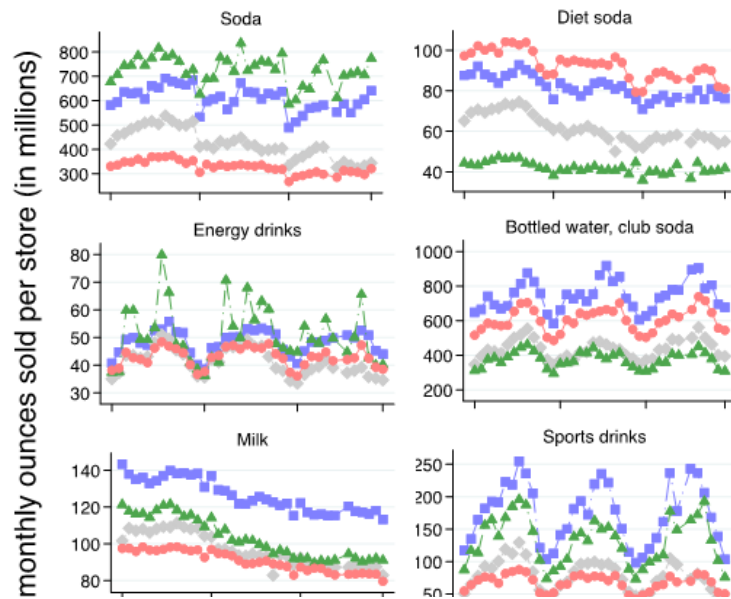
Note: This figure shows IRI data from 2015 through 2017, restricted to stores found within the city proper of each metro area. UPCs are sorted into beverage categories based on IRI's classification scheme, not based on final classification currently underway. Oakland's SSB tax went into effect in July 2017. San Francisco's SSB tax went into effect in January 2018.

The primary model will look at the pre- vs. post-tax change in ounces sold of taxed beverage product categories. Estimated on month-by-product category data, the model will include an indicator for after-tax implementation, an indicator for city, and an interaction between the two. The coefficient on the latter is an estimate of the difference-in-differences effect. Models will adjust for fixed effects (i.e., indicator variables) for store, thereby accounting for all fixed store characteristics (including store type, location, chain), and fixed effects for month of

Table x. Test of pre-existing trends in volume sold, by beverage category

	Tax-affected city × t`21 (standard error)	Constant (standard error)	Mean Dependent Variable
Soda	-0.25 (0.91)	489.51 (8.34) ***	616.8
Energy Drinks	-0.04 (0.07)	39.26 (0.78) ***	48.4
Sports Drinks	0.33 (0.20)*	89.93 (7.05) ***	169.1
Diet Soda	-0.09 (0.12)	87.10 (1.57) ***	81.1
Water/Club Soda	-0.79 (1.02)	566.98 (9.99) ***	722.2
Milk	0.29 (0.19)	124.12 (1.94) ***	127.4

This table shows a test of the linear time trend by group (tax-affected vs. tax-unaffected cities) during the pre-tax period, denoted by the coefficient in the first row of the table. The dependent variable is total ounces sold per month in a store, in millions, by beverage category. The model adjusts for store and week fixed effects. For each category there were 11,456 observations and 95 clusters. Robust standard errors, clustered by zip code, are in parentheses. Statistical significance: * denotes significance at $p < 0.10$, ** at $p < 0.05$, and *** at $p < 0.01$. The mean of the dependent variable is the mean for control areas (Los Angeles and Richmond) during the pre-tax period.

purchase, thereby accounting for period-specific events (including seasonality trends). In sensitivity analyses, we will also adjust for a group-specific linear time trend that relaxes the standard parallel trends assumption for difference-in-differences models.

Building on the primary model, we will assess month-by-month tax effects on ounces sold of taxed products in an event study framework. This will accomplish several things: 1) testing whether tax-affected and tax-unaffected areas had observed differences in sales of taxed products during the pre-tax period (a test of the "parallel trends"); 2) examining whether there the tax induced anticipatory responses from consumers; and 3) examining how the effects of the SSB taxes varied over time. For example, it would be plausible for the effect to grow over time as consumers learn about new prices or adjust their ingrained consumption habits, or it is possible that the effect shrunk over time as the tax becomes less salient to consumers over time.

We will also look separately at pre-post changes in ounces sold for several taxed product categories: regular soft drinks, fruit drinks and juices with sugar added, energy drinks, sports drinks, and coffee and tea products with sugar added.

In a secondary analyses, we will examine dollar sales, substitution to selected untaxed beverage and food categories, spillover effects in nearby areas, and heterogeneous effects by area-level characteristics (at the zip code level).

Our substitution analysis will assess changes in ounces sold of all untaxed product categories as well as separate analyses for the following untaxed product categories: diet soft drinks, 100% fruit juice, (flavored) water and club soda, and milk without added sugars. Moreover, we will examine substitution to two untaxed food categories: cookies and doughnuts. The food categories were selected to be representative, plausible substitutes, namely ones that are high in sugar and potential impulse purchases.

Our spillover analysis will determine whether consumers shift purchases of taxed beverages to neighboring cities (negative spillovers) or whether people in untaxed neighboring areas reduce consumption of taxed products in response

to media exposure from tax campaigns (positive spillovers). We will use stores within an approximately 10-mile radius of a tax city to compare changes in ounces sold of taxed products in neighboring jurisdictions in tax-affected cities versus tax-unaffected comparator cities. In San Francisco, the neighboring jurisdictions are: Daly City, San Bruno, and South San Francisco.

Our analysis of area-level characteristics will focus on differences by zip code in the effect of SSB taxes. Area-level characteristics will include factors such as population, household income, educational attainment, and race and ethnicity.

Youth Risk Behavior Surveillance Survey

The Youth Risk Behavior Surveillance Survey (YRBSS) is a national biennial survey that asks students a range of health-related questions. With respect to sugar-sweetened beverage consumption the survey asks two questions, "How many times did you drink a can, bottle, or glass of soda or pop, such as Coke, Pepsi, or Sprite? (Do not count diet soda or diet pop.)", and "How many times did you drink a can, bottle, or glass of a sugar-sweetened beverage such as a soda, sports drink, energy drink, lemonade, sweetened tea or coffee drink, or flavored milk?" High school students are asked about their consumption during the past 7 days while middle school students reflect only upon the prior day.

SFUSD School Health Survey

Since 2015, University of California, Berkeley and the Nutrition Policy Institute in partnership with SFUSD have been administering the School Health Survey to 7th to 10th grade students each spring. The survey includes a modified beverage frequency questionnaire, which asks students how often (calculated as times per day) they drink various sugar-sweetened beverages (e.g., soda, energy drinks, coffees and teas) and other beverages (including water, milk and diet soda) (See Appendix x for full survey).

California Health Interview Survey

The California Health Interview Survey (CHIS) is an annual telephone survey that uses a random-digit-dial technique to landlines and cell-phones and asks respondents to answer health-related questions. In San Francisco, CHIS samples about 400 adults, which provides data for the county, but does not allow annual stratification across different demographic categories for all variables.

While CHIS asks a number of drink associated questions to children and teens, the sample size is insufficient to get stable estimates in San Francisco. Sample sizes are sufficient among adults to get overall one-year estimates and multiple year pool estimate by poverty, race/ethnicity and gender. Among adults, CHIS asks, "[During the past month,] how often did you drink regular soda or pop that contains sugar? Do not include diet soda." Results are converted to and presented as the soda consumption for an average week."

CHIS also included questions on respondents known chronic diseases. To ascertain diabetes status the question, "Has a doctor ever told you that you have diabetes or sugar diabetes?" is asked. For hypertension the survey asks, "Has a doctor ever told you that you have high blood pressure?". Additional questions on heart failure, stroke, and prediabetes do not have enough power to produce stable estimates for San Francisco.

To assess food security, CHIS asks persons with incomes less than 200% of the federal poverty level to answer a series of questions. In San Francisco and Alameda Counties these questions are extended to persons earning under 300% of the federal poverty level. Questions asked are 1) "The food that {I/we} bought just didn't last, and {I/we} didn't have money to get more."--Was that often true, sometimes true, or never true for you and your household in the last 12 months?; 2)

"{I/We} couldn't afford to eat balanced meals."-- Was that often true, sometimes true, or never true for you and your household in the last 12 months?; 3) - Please tell me yes or no. In the last 12 months, did you or other adults in your household ever cut the size of your meals or skip meals because there wasn't enough money for food? - How often did this happen -- almost every month, some months but not every month, or only in 1 or 2 months? 4) In the last 12 months, did you ever eat less than you felt you should because there wasn't enough money to buy food?; and 5) - In the last 12 months, were you ever hungry but didn't eat because you couldn't afford enough food?

SFUSD FitnessGram

Measure of fitness and weight among San Francisco youth are captured by the FitnessGram® which SFUSD measures annually in grades 5, 7, and 9. The FitnessGram® assesses students in 6 areas-aerobic capacity, body composition, abdominal strength, trunk extension strength, upper body strength and flexibility. For each students are determined to be in the "Healthy Fitness Zone" or not. Body composition within the "Healthy Fitness Zone" is determined by BMI and a measure of body fat. Aerobic capacity testing includes the pacer, one mile run and the walk test.

Maternal and Infant Health Assessment

The Maternal and Infant Health Assessment (MIHA), is an annual, statewide-representative survey of women with a recent live birth in California. MIHA questions on mother's intention to breastfeed, food security during pregnancy, and more.

Birth Statistical Master File, California Department of Public Health (CDPH)

The birth statistical mater file contains birth certificate data for all births. This data provides insights on the health of new mothers and babies born and includes data on gestational diabetes and weight gain during pregnancy.

California Office of Statewide Health Planning and Development (OSHPD).

> **Commented [KM43]:** Add if oshpd data added

Kindergarten Oral Health Screening Program

The San Francisco Unified School District (SFUSD) and the San Francisco Department of Public Health (SFDPH) Dental Services jointly run the Kindergarten Oral Health Screening Program which assesses all SFUSD kindergarteners for the current or past experience of caries and treated caries.

Sugar-sweetened beverage Intervention Timelines for Comparison Cities

> **Commented [KM44]:** Need details and reformatting

Date	Oakland	Berkeley	Richmond	Los Angeles
2012			2012 Soda Tax Initiative Failed	
2013				
2014		11/4/14 Ballot initiative passed		
2015		March 1, 2015: Tax Implemented		
2016	11/18/16 Ballot initiative passed			
2017	July 1: Tax Implemented			
2018				
2019				

Contributor Biographies:

Kristine Madsen, MD, MPH

Dr. Madsen is an Associate Professor of Public Health Nutrition in the School of Public Health and faculty director of the Berkeley Food Institute at UC Berkeley. She is a pediatrician and research scientist with expertise in the design and evaluation of interventions related to pediatric obesity, cardiovascular risk, and health disparities. She has partnered with schools, health departments, and cities to expand the reach of school and community programs that promote health, and her team recently conducted the first study to examine the impact of Berkeley's soda tax on sugar-sweetened beverage consumption in low-income neighborhoods in Berkeley.

Jennifer Falbe, ScD, MPH

Dr. Falbe's research focuses on studying programmatic, policy, and environmental interventions to prevent chronic disease and reduce health disparities. Dr. Falbe led an evaluation of the nation's first soda tax in Berkeley, California. She has also examined primary care obesity interventions for underserved youth, healthy retail programs, multi-sector community interventions to address childhood obesity, and the impact of screen time on adolescent sleep and health. Dr. Falbe's research employs quantitative and qualitative methods and experimental and observational designs.

Christina Goette

> **Commented [KM45]:** May need

Ana Ibarra, BA

Ana Ibarra worked as a Research Associate with Dr. Kris Madsen and her research team for 3 years at UC Berkeley School of Public Health. She coordinated data collection for several studies and provided data collection support for the soda tax evaluation. Ana is passionate about leveraging technology to improve food systems as well as advancing social justice and equity.

Michelle Kirian, MPH

Michelle Kirian, MPH, REHS, is a Senior Epidemiologist with the San Francisco Department of Public Health (SFDPH). She is currently dedicated to understanding the impacts of the Sugary Drinks Distributor Tax and more generally in determining the status of chronic diseases in San Francisco and the impacts of interventions to reduce their burden. Over the more than 10 years she has worked with SFDPH she has been a key contributor on many divergent projects. As the lead epidemiologist of the Community Health Assessment and Impact Unit, she and her team provided data supporting population health policies, programs, and funding through health assessment, data access, and knowledge integration. She has also led or contributed to outbreak investigations, communicable disease surveillance, and regulatory design for onsite non-potable water re-use systems.

Matthew Lee, MS

Matthew Lee is a research associate with the Madsen research group and holds a Master of Science degree in Epidemiology from the UC Berkeley School of Public Health. He has helped support the design, management, and analysis of the Bay Area soda tax evaluation and is interested in examining long-term health trajectories related to nutrition policies at the state and federal levels, with a focus on quantitative epidemiologic methods.

Rita Nguyen, MD

> **Commented [KM46]:** need

Julian Ponce, BA

Julian Ponce's experiences growing up in a rural, low-income, farm-working household has taught him the importance of culture, food, and nutrition in health outcomes. Moreover, as a Mexican-American son of immigrants he witnessed firsthand the contributions of immigrant communities to the food system in the United States. Julian earned a public health (B.A) degree from UC Berkeley where he conducted research on sugar-sweetened beverage consumption in schools and Latinx communities with non-potable tap water. His recent work as a research associate with Professor Kristine Madsen at the UC Berkeley School of Public Health builds on his past research by evaluating the Berkeley soda tax's effect on beverage consumption, price, and businesses.

Jodi Stookey, PhD

Jodi Stookey is currently a Senior Epidemiologist at San Francisco Department of Public Health, Maternal, Child & Adolescent Health. She has a PhD in Nutrition Epidemiology from the School of Public Health, UNC Chapel Hill, and was a postdoctoral fellow at Duke University Center for the Study of Aging and Human Development and the Stanford Prevention Research Center. As Assistant Staff Scientist at Children's Hospital Oakland Research Institute, she was the Principal Investigator on outpatient interventions to promote drinking water for weight management among adolescents and improve fruit, vegetable intake of lower income children. Over the past 20 years, she has worked on a variety of projects, including different population groups, social, behavioral, and biological risk factors, and short- and longer-term health outcomes. She has worked with data from randomized clinical studies as well as population-based surveys.

Justin White, PhD

Justin White, Ph.D., is Assistant Professor of Health Economics in the UCSF School of Medicine, with joint appointments in the Philip R. Lee Institute for Health Policy Studies and the Department of Epidemiology and Biostatistics. Dr. White studies how monetary and non-monetary incentives can be used to promote healthy behavior, informed by research from the field of behavioral economics. His main research focus is chronic disease prevention, notably smoking cessation. He is currently testing several incentive-based interventions using randomized designs. This work is being undertaken in several countries, including Thailand, Indonesia, and the US. In other recent and ongoing projects, he is evaluating the health impacts of economic and social policies, including: sin taxes, cash and food assistance programs, and poverty alleviation programs.

Sophia Villa-Boas

Sofia Berto Villas-Boas is a professor in the Department of Agricultural and Resource Economics at U C Berkeley. Born in Portugal in 1971 she received her Ph.D. in Economics from U. C. Berkeley in May 2002. Her research interests include industrial organization, consumer behavior, food policy, and environmental regulation. Her recent empirical work estimates the effects of policies on consumer behavior, such a bottled water tax, a plastic bag ban, and a soda tax campaign and its implementation. Other published work has focused on the economics behind wholesale price discrimination banning legislation, contractual relationships along a vertical supply chain, and identifying the role of those contracts in explaining pass-through of cost shocks along the supply chain into retail prices that consumers face. She has published in top economics and field journals such as Review of Economic Studies, Rand Journal of Economics, American Journal of Agricultural Economics, Journal of Environmental Economics and Management, Marketing Science, Management Science, and Review of Economics and Statistics.

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Data Tables

All data in this report are available online at: <mark>xxxx</mark>