



Sugary Drink Legislation in Massachusetts

Introduction

It was the fall of 2016. With the January 20, 2017, deadline to file bills fast approaching, Senator Jason Lewis was contemplating the details of a sugary drink legislative proposal in the Commonwealth of Massachusetts (MA). As the Senate Chair of the Joint Committee on Public Health and co-founder and co-chair of the legislature's Prevention for Health Caucus, Senator Lewis had a particular interest in leading efforts in the state legislature to contain healthcare costs and prevent chronic disease through prevention and wellness efforts. Senator Lewis currently represented the 5th Middlesex District of MA, having been elected to the MA State Senate in 2014 following five years serving in the MA House of Representatives. As an experienced legislator, Senator Lewis knew he was facing a tough battle, and wanted to take an approach that would give the bill the best chance of succeeding.

Sugary drinks, defined as beverages made for human consumption (as opposed to medical use) that contain added caloric sweeteners, include: sodas, fruit juices, fruit drinks, sports drinks, energy and vitamin water drinks, sweetened iced tea and lemonade, shakes, and tea and coffee drinks made with added sugars or syrup.^{1, 2} See Exhibit 1. Sugary drinks are readily available in increasing and large portions,^{3, 4} provide little to no nutritional value,⁵⁻⁸ and are the primary source of added sugars⁹ and a leading source of caloric intake¹⁰ in Americans' diet. Given the rising levels of sugary drink consumption and associated conditions (e.g., obesity, diabetes, dental caries) in MA and nationwide,¹¹ Senator Lewis felt very strongly that the Commonwealth needed to focus on this issue. He explained,

Massachusetts should be leading the legislative effort to reduce sugary drink consumption in the Northeast. This is a priority initiative since sugary drinks are a uniquely toxic food. Significant opposition from the beverage industry is expected, but we have a real chance of making progress at the local and state levels.

Sugary Drink Consumption, Associated Morbidities, and Costs

Over the past decade, soda intake has actually decreased whereas overall sugary drink intake has increased in the U.S., particularly among youth.¹¹ Sugary drink intake among youth overall averages 224 kcal/day (comprising 11% of total caloric intake),⁹ and the majority of youth (50%-85%) consume at least 1 sugary drink on a typical day.^{12, 13} Sugary drink intake among low SES and racial/ethnic minority children is even higher. Low-income children are more likely to be heavy sugary drink consumers (defined as ≥ 500 kcal/day) than high-income children.^{14, 15}

Latino and black children have higher sugary drink intake than white children,¹⁶ with black children more likely to be heavy fruit drink and non-soda sugary drink consumers than whites.¹⁴ See Exhibits 2A and 2B on data from the 2015 Youth Risk Behavior Surveillance survey for trends in beverage consumption patterns among high school youth in the U.S. and in Boston, MA.¹⁷

Studies have shown a clear dose-response association between sugary drink intake and obesity risk among children and adults, with each additional serving associated with increase in body weight and obesity risk.¹⁸⁻²¹ Changing beverage behaviors (i.e., limiting sugary drinks) can translate to 8-11% in energy savings (205-235 kcals/day saved) among youth.²² Additionally, results from meta-analyses found that consumption of sugary drinks is linked type 2 diabetes, even after controlling for adiposity,²³ as well as dental caries (22% increase for each additional sugary drink serving), even after adjusting for socioeconomic status (SES).²⁴

In MA, nearly a quarter (24.6%) of adults had obesity (BMI ≥ 30.0 kg/m²) in 2015 based on self-reported data,²⁵ though the prevalence of obesity is likely higher (closer to 29%), as individuals tend to underestimate their weight.²⁶ See Exhibits 3A-3D for obesity trends across sex, age, and racial/ethnic groups in the U.S. and Exhibits 4-5 for trends specific to MA. At the national level, obesity costs were estimated at \$116 billion/year in 2013, with severe obesity (BMI ≥ 35.0 kg/m²) health care costs estimated at \$69 billion.²⁷ Senator Lewis noted,

The costs of obesity are staggering, not to mention the loss of productivity, absenteeism, and worsened quality of life. There is a real need in our state to promote legislation to contain healthcare costs and prevent chronic disease through prevention and wellness efforts, which would also yield economic and fiscal benefits.

Sugary Drink Legislation: Gathering Momentum

In the past five years, the push to reduce population-level consumption of sugary drinks through policy interventions had resulted in notable successes as well as failures. In June 2012, New York City Mayor Michael Bloomberg proposed an initiative banning food-service establishments from selling sugary drinks in containers larger than 16 oz. The “super-sized” sugary drink ban proposal was rejected by the state’s Court of Appeals in March 2013 and again after Bloomberg appealed in June 2014.²¹ Although the proposed policy was supported by a strong body of evidence demonstrating a dose-response relationship between sugary drink consumption and risk for obesity and diabetes,^{2, 21, 28, 29} libertarians and the beverage industry alike immediately opposed it. Media coverage often labeled this approach as a “nanny state” move as the government was perceived as overstepping its jurisdiction by trying to regulate the behaviors of citizens.³⁰ This ban sparked several debates on the role of public health legislation vs. the autonomy of individual purchasing decisions. At the time of the initial proposal, Bloomberg remarked,

This is the single biggest step any city, I think, has ever taken to curb obesity. It’s certainly not the last step that lots of cities are going to take, and we believe it will help save lives.

Since then, legislation to reduce sugary drink purchasing and consumption, specifically excise taxes on sugary drinks, has had greater success in other U.S. cities and counties. Berkeley, CA was the first U.S. city to pass a “penny-per-ounce” tax in November 2014, despite \$2 billion spent by the beverage industry in opposition to the fiscal measure. A study published in the *American Journal of Public Health*³¹ found that implementation of the tax was associated with a 21% decrease in Berkeley residents’ self-reported sugary drink consumption compared with that of residents in San Francisco, which did not have a sugary drink tax in place during the study time frame.³² Dr. Kristine Madsen, senior author on the study, explained,

“A 20% reduction in consumption of sugar-sweetened beverages would be enough to reduce rates of obesity and Type 2 diabetes in years to come. This would have a huge public health impact if it were sustained.”

In June 2016, Philadelphia passed a tax on sugary drinks *and* artificially-sweetened beverages at 1.5 cents per oz. (effective as of January 1, 2017). Soon after, voters during the November 2016 election cycle approved a one cent per oz. sugary drink tax in San Francisco, Albany, CA, and Cook County, IL (including the city of Chicago), and voters in Boulder, CO approved a two cents per oz. sugary drink tax.³³ In February 2017, Seattle Mayor Ed Murray proposed a two cents per oz. sugary drink tax.

At the international level, the World Health Organization (WHO) recommended that nations adopt a sugary drink tax as a strategy to reduce consumption and prevent related morbidities and health care costs.³⁴ Denmark had imposed a 22 cent per liter tax on sugary drinks since the 1930s (estimated to bring in 60 million euros per year), though the tax was repealed in 2014.³⁵ Other countries that have adopted or are in the process of implementing a tax on soft drinks, soda, sugary drinks, or refined sugar products include France, Hungary, Ireland, Mexico, Norway, South Africa, Saudi Arabia, and the UK.

Legislation Related to Food and Beverages in MA

Currently in Massachusetts, groceries (food or non-alcoholic beverages made for human consumption and food items purchased with federal food stamps) are exempt from the 6.25% sales tax, whereas food or beverages provided by a restaurant are taxable as “meals.”³⁶ Sugary drinks currently fall under the grocery category and are tax-exempt. Alcoholic beverages are subject to a tiered tax in MA depending on the alcohol content (see Exhibit 6). Former MA Governor Deval Patrick had proposed a sales tax on sugary drinks and candy twice during his governorship (2007-2015), though the proposals were not supported by other lawmakers. Critics at the time argued that it would have been difficult to categorize specific products as having unhealthy sugar content and that the tax would be inherently regressive.

Other MA legislative strategies targeting sugary drinks included efforts led by State Representative Kay Khan. Since 2011, Khan had filed several bills aimed at reducing childhood obesity, all of which had consistently called for removing the sales tax exemption for sugary drinks and candy. In the 187th session (2011-2012), the legislation (H1697, *An Act to reduce childhood obesity by removing the state subsidy for sugared sweetened beverages and candy*)

entailed a simple removal of the sales tax exemption on sugary drinks and candy. The bill was heard by the Joint Committee on Revenue and was sent to Study Order (meaning that the Committee needed more time to review and consider the legislation). In the 188th and 189th legislative sessions (2013-2014; 2015-2016, respectively), bills H2634 and H2575 (both titled *An Act to reduce childhood obesity*) requested the tax revenue (approximately \$52 million) to be diverted to the Prevention and Wellness Trust Fund for competitive grants that public school districts would be eligible to apply for in order to fund healthy eating and physical activity programs. H2634 and H2575 were each heard by the Joint Committee on Revenue and sent to Study Order during their respective sessions. In the most recent 190th session (2016-2017), the bill (H1561, *An Act to reduce childhood obesity*) removed the sales tax exemption on sugary drinks only and directed the revenue to the Prevention and Wellness Trust Fund without specifying language for competitive grants. Thus far the most recent bill had been referred to the Joint Committee on Revenue and had not yet received a public hearing date. None of these bills have been passed or implemented to date.

Possible State Approaches to Reduce Sugary Drink Consumption and Promote Water Consumption

In October 2016, Senator Lewis and his team convened an interdisciplinary working group (Exhibit 7) of individuals representing government, academia, health care, foundations, and local non-profit organizations to discuss how to advance new sugary drink legislation approaches in MA. The group met on a monthly basis to examine possible legislative approaches to reduce sugary drink purchasing and consumption at the state level.

Interventional Approaches Seeking State Support

Tax

The first legislative approach discussed was the possibility of implementing a sugary drink excise tax (taxes paid when purchases are made on a specified good) in MA, similar to the approach successfully used in other areas. In Philadelphia, the tax was levied on distributors, meaning it was the retailers' responsibility to pass the tax through the customers by updating the retail prices of sugary drinks. This type of level pass has large implications for customer purchasing decisions, as the price hike would be immediately reflected in updated retail prices, rather than added at point of purchase as a sales tax. How the tax is implemented also has political implications, as a distributor tax is more feasible in some states than others.

Harvard T.H. Chan School researchers spearheading The Childhood Obesity Intervention Cost-Effectiveness Study (CHOICES) reviewed the evidence for the effects of an excise tax on sugary drink sales and the effects of changes in intake on obesity. Using the U.S. Census, Behavioral Risk Factor Surveillance System, NHANES, National Survey of Children's Health, and four national longitudinal studies, CHOICES investigators created a microsimulation model to project impact of a sugary drink excise tax of one cent per ounce over the next decade.³⁷ MA currently represents approximately 2.1% of the U.S. population. Scaling the CHOICES national results to MA would yield the following rough estimates of the health impact and cost-effectiveness of a 1 cent per oz. excise tax in MA: prevent approximately 12,100 cases of

childhood obesity, prevent many more cases of adult obesity, generate health care cost savings of \$31 per dollar invested in the intervention, and because of the expected lower future levels of obesity among both children and adults, yield an expected savings in health care costs of approximately \$298 million from 2017-2027. These estimates of expected savings do not take into account the yearly revenue expected in MA under a 1 cent per oz. tax, estimated by the University of Connecticut Rudd Center for Food Policy and Obesity at about \$265 million per year.³⁸

Dr. Angie Cradock, Senior Research Scientist at the Harvard T.H. Chan School of Public Health and Deputy Director of the Harvard Prevention Research Center, noted,

A major strength of this approach is that this is a type of tax that individuals are not required to pay – you only pay if you purchase sugary drinks.

Taking into consideration that a proposed tax would elicit opposition from consumers, policymakers, and the beverage industry, members of the working group pondered a few questions. First, how much tax should be levied on sugary drinks? The volume tax in current U.S. cities (e.g., 1 cent per oz.) encourages the consumption of no-calorie beverages, including water, seltzers, and beverages with non-nutritive sweeteners. In contrast, the UK's sugary drink tax (effective April 2018) utilizes a tiered sugary drink tax (e.g., the amount taxed is higher for beverages with higher sugar content).³⁹ Beverages with ≤ 5 grams of sugar per 100 ml will not be taxed; beverages between 5-8 grams of sugar per 100ml will be taxed (amount to be determined), and beverages with ≥ 8 grams per 100ml will have a higher tax. Senator Lewis wondered if MA should follow suit with other U.S. cities and propose a one or two-cent per oz. tax, or follow the UK's model of a tiered sugary drink tax. Harvard Chan researchers estimated that a tiered sugary drink tax would yield approximately \$368 million in annual revenue (compared to \$265 million for a 1 cent per oz. tax) for the state. Additionally, what definition should be used to categorize products that would be subject to the tax? Would syrups and powders used to make sugary drinks be taxed? Where would milk and 100% fruit juice fall?

Third, should a sugary drink excise tax be a local option, rather than a state-wide mandate, that communities could opt into? Senator Lewis reflected,

The problem is that we don't have the county infrastructure to do a local tax in Boston. The local option also does not allow funds to be used in other communities. A state-wide excise tax could generate revenue that goes towards a general fund. Our primary goal is to reduce sugary drink consumption and associated conditions at the state level. We risk only engaging health-conscious communities and missing the higher risk communities with the opt-in approach.

Fourth, what arguments should be used to communicate the rationale for the tax to the public, policymakers, and the media? Allyson Perron Drag, Senior Director of Government Relations of the American Heart Association in MA, commented,

What's really important to voters is how the revenue is going to be used (e.g., investments in early childhood education, parks and recreation). People are not as

motivated by empirical health arguments to support a sugary drink tax. We will have to think very carefully about the messaging.

House Representative Jonathan Hecht agreed, commenting,

A sugary drink excise tax would be a good vehicle for raising awareness despite controversy and political challenges. Hospitals and insurers might be supportive if tax revenue went to a prevention and wellness fund.

Given that a sugary drink excise tax would face significant opposition and take time to implement if passed, Senator Lewis encouraged the group to consider additional intervention approaches to reduce sugary drink consumption.

Schools

The working group discussed school-level public health interventions that could be taken in collaboration with the MA Department of Elementary and Secondary Education to reduce sugary drink consumption among youth. One strategy was to encourage public school districts to implement evidence-based media and health literacy curriculum. The curriculum should specifically equip 3rd-12th grade students with skills to analyze and evaluate marketing advertisements, including food, beverages, drugs, and alcohol products.

Sugary drinks are heavily marketed to children, with beverage companies spending nearly half a billion dollars in marketing carbonated beverages to youth ages 2-17 years.⁴⁰ Youth are frequently exposed to sugary drink commercial ads through television alone (average of 277 viewings for children and 406 for adolescents each year).⁴¹ Additionally, communities of low SES were found to have disproportionately higher rates of exposure of food and beverage advertisements compared with higher SES communities.⁴² Dr. Monica Wang, Assistant Professor at the Boston University School of Public Health and Instructor at the Harvard Chan School of Public Health, commented,

Children are primary targets of sugary drink advertising, and school-age is when youth start to engage in independent purchasing habits. We might not be able to do much about advertising restrictions at the policy-level, but we can increase children's media literacy. This is a critical intervention strategy that can empower youth and facilitate behavior change.

Another school-level intervention discussed was the prohibition of food and beverage advertising within schools. Stipulations considered included *prohibiting* schools from engaging in the following activities: **1)** advertising any food or beverage that may not be sold on the school campus (including but not limited to school buildings, athletic fields, facilities, signs, scoreboards, parking lots, school buses or other vehicles, equipment, vending machines, uniforms, educational materials, or supplies) during the school day; **2)** participating in a corporate incentive program that rewards children with free or discounted foods or beverages that may not be sold on the school campus during the school day when they reach certain academic goals; and **3)** participating in corporate-sponsored programs that provide funds to

schools in exchange for consumer purchases of foods and beverages that may not be sold on the school campus during the school day.

Allyson Perron Drag commented,

It doesn't make sense for schools to prohibit sale of soda in their vending machines but to display advertising for these types of products elsewhere on school grounds. The challenge is that as funding gets tight, schools look for funding through advertising. In other states, we have looked at this at the districts-level instead of the state-level.

Even more pressing was the current political context. The Healthy Hunger Free Kids Act and Smart Snacks (a legacy of the Obama administration and Michelle Obama in particular) already restricted the sale of junk food and sugary drinks in schools. Such measures could be abandoned under the Trump administration.

Municipal Tap Water Promotion

Senator Lewis and the working group agreed that in order to successfully reduce sugary drink consumption, healthier alternatives (e.g., water) must be promoted and made accessible, convenient, attractive, and freely available. If a sugary drink tax was implemented, funds could be used to set up a municipal grant program for the creation and improvement of water fountains, improving water quality, testing for lead and copper in drinking water, and increasing safe water access in schools⁴³ and municipal parks and facilities. In April 2016, Governor Charlie Baker and State Treasurer Deb Goldberg launched a cooperative, voluntary program to assist public schools in testing for lead and copper in school drinking water. Representative Hecht remarked,

It's a real problem in 2016 that we don't have guaranteed safe drinking water in some of our communities or schools, or that we don't have working water fountains along bike paths or in parks. We could use the tax revenue to help promote safe drinking water for residents, particularly children. This could be really appealing to voters and policymakers alike.

In addition to the investing in the infrastructure work needed to remediate lead in drinking water,⁴⁴ enhancing existing water fountains would be critical to motivate water consumption. Dr. Wang discussed,

Common reasons youth report for not using water fountains at schools or community settings are that they think the water is not cold enough, is unsafe to drink, and it takes too long to fill up their water bottles. The high-speed water filtration systems you see in newer buildings address these barriers, and kids really like them. These can be readily installed in place of water fountains, with replacement filters the only maintenance that is needed.

Children's Meals

Another legislative strategy discussed was the creation and enforcement of restaurant guidelines for children's meals. Restaurants could be subject to a limitation that the default beverage for

children's meals may only include the following: water, sparkling water, or flavored water, with no added natural or artificial sweeteners; nonfat or 1% or non-dairy milk alternative containing no more than 130 calories per serving; or 100% juice, with no added sweeteners, in a serving size of no more than eight oz. The MA Department of Public Health and local boards of health would implement, administer and enforce this regulation. Restaurants in violation of this section for the first offence would be punished by a fine of not more than \$100; and for any subsequent offense would be punished by a fine of not less than \$100 and not more than \$500. Perron Drag remarked,

This type of approach fits within the children's health promotion theme. We risk not passing the sugary drink tax by adding in non-tax options, but at the very least we can engage the media, and raise awareness. The awareness alone will help to start shifting norms and behaviors around sugary drinks."

Community Health Programs

The working group also discussed a variety of less controversial community health programs and initiatives to address sugary drink and water intake, such as improving and creating public parks, providing nutrition education to consumers at the point of sale, developing and promoting educational materials with the intent of educating citizens about the health effects of sugary drinks and to promote consumption of tap water, and hiring a state nutritionist to provide technical assistance to municipalities schools, and community-based organizations and institutions. However, they needed to consider the evidence (if any) for effectiveness of these types of programs. How much would the programs cost, and where would funding for these initiatives come from, if not from a sugary drink tax?

Next Steps

Part of the challenge for passing and sustaining any type of sugary drink legislation is that this approach is relatively new and will undoubtedly face industry and consumer opposition. Senator Lewis pondered which policy strategy to pursue and considered the evidence for efficacy and effectiveness, ease of implementation, political feasibility, and funding required. Senator Lewis commented,

Politically nothing is easy, but a sugary drink excise tax is the single most effective policy that we could implement. We will raise awareness even if it does not pass. However, we also want a comprehensive bill so we can ultimately implement other programs or initiatives if certain elements of the bill are not passed. The linkage between the tax revenue and other interventions of interest must be very clear.

A sugary drink excise tax would be most appealing in terms of reducing sugary drink purchasing and consumption based on prior studies and would generate funds for the Commonwealth. The question was, would it pass? How could the group prepare for strong opposition from retailers and the beverage industry? Would regional jobs be in jeopardy as industry claimed, or were these claims overstated, as concluded in by Powell et al. in an American Journal of Public Health study?⁴⁵ Representative Hecht wondered,

Should we have two bills – an omnibus bill that includes the sugary drink tax and a variety of intervention strategies and a bill without the tax? We might end up with more champions that way.

The workgroup's discussion continued through November and December 2016 and into January 2017 following the highly charged outcome of the 2016 U.S. presidential election. Workgroup members pondered the uncertainty of federal funding given the Trump administration's pledge to cut federal funding for sanctuary cities, including several in MA, that provide refuge for undocumented immigrants. Might a sugary drink tax be perceived as more appealing as a revenue generator at this point in time? Would public health legislation be viewed as a priority in the midst of all the controversies surrounding immigration, deportation, education, and international relations? Dr. Wang reflected,

We have a lot of leverage to advance public health at the local level. Creating change can and often starts in our own backyard – that's what we're here to do.

Exhibit 1: Definitions Relevant for Sugary Drink Legislation

Beverage for medical use	Beverage suitable for human consumption and manufactured for use as an oral nutritional therapy for persons who cannot absorb or metabolize dietary nutrients from food or beverages, or for use as oral rehydration electrolyte solution for infants and children formulated to prevent or treat dehydration due to illness. "Beverage for medical use" shall not include drinks commonly referred to as "sports drinks" or any other common names that are derivations thereof.
Bottle	Any closed or sealed container regardless of size or shape, including, without limitation, those made of glass, metal, paper, plastic, or any other material or combination of materials
Caloric sweetener	Any caloric substance suitable for human consumption that humans perceive as sweet and includes, without limitation, sucrose, fructose, glucose, fruit juice concentrate or other sugars. "Caloric sweeteners" exclude non-caloric sweeteners.
Children's meals	A combination of food item(s) and a beverage, sold together at a single price, primarily intended for consumption by children.
Commonwealth	The Commonwealth of Massachusetts
Consumer	Person who purchases a beverage for consumption and not for sale to another.
Default beverage	Beverage that is automatically included as part of a Children's Meal, absent a specific request by the purchaser of the children's meal for an alternative beverage.
Distributor	Any person, including manufacturers and wholesale dealers, who receives, stores, manufacturers, bottles, and/or distributes sugar-sweetened beverages, syrups, or powders, for sale to retailers doing business in the commonwealth, whether or not that person also sells such products to consumers.
Non-caloric sweetener	Any non-caloric substance suitable for human consumption that humans perceive as sweet and includes, without limitation, aspartame, acesulfame-K, neotame, saccharin, sucralose, and stevia. For the purposes of this definition, "non-caloric" means a substance that contains fewer than 5 calories per serving.
Person	Any natural person, partnership, cooperative association, limited liability company, corporation, personal representative, receiver, trustee, assignee, or any other legal entity.
Place of business	Any place where sugar-sweetened beverages, syrups, or powders are manufacturer or received for sale in the commonwealth.
Restaurant	Retail food establishment that prepares, serves, and vends food directly to the consumer.
Retailer	Any person who sells or otherwise dispenses in the commonwealth a sugar-sweetened beverage to a consumer whether or not that person is also a distributor as defined in this section.
Sale	Transfer of title or possession for valuable consideration regardless of the manner by which the transfer is completed.
Sugar-sweetened beverage	Any non-alcoholic beverage, carbonated or noncarbonated, which is intended for human consumption and contains any added caloric sweetener. As used in this definition, "non-alcoholic beverage" means any beverage that contains less than one-half of one percent alcohol per volume.
Syrup	Liquid mixture of ingredients used in making, mixing, or compounding sugar-sweetened beverages using one or more of the following ingredients, including, without limitation, water, ice, a powder, simple syrup, fruits, vegetables, fruit juice, vegetable juice, carbonation, or other gas.
Water	Plain (non-flavored) or flavored water with "natural fruit essence" (with no calories), or "natural flavor." The source of the water may be: artesian, mineral, spring, or well. The type may also include carbonated (sparkling, club, seltzer), still, distilled, or purified (distilled, demineralized, deionized, reverse osmosis).

Exhibit 2A: Percentage of U.S. high school students who drink soda, milk, and juice daily by sex, grade, race/ethnicity, and free/reduced price lunch eligibility — National Youth Risk Behavior Surveys, United States, 2007–2015

Characteristic	2007	2009	2011	2013	2015	Linear change	Quadratic change 2007–2015*	
						2007–2015 [§]	(2007–2011)	(2011–2015)
SODA [†]								
Overall	33.8	29.2	27.8	27.0	20.4	Decreased	No change	No change
School grade								
9	35.6	30.5	29.7	29.3	19.4	Decreased	Decreased	Decreased
10	33.2	29.2	27.3	25.4	20.8	Decreased	No change	No change
11	32.8	28.5	26.6	26.9	20.5	Decreased	No change	No change
12	33.1	28.3	27.0	26.0	21.0	Decreased	No change	No change
Sex								
Female	29.0	23.3	24.0	24.1	16.4	Decreased	No change	No change
Male	38.6	34.6	31.4	29.9	24.3	Decreased	No change	No change
Race/Ethnicity								
White, non-Hispanic	34.0	29.0	28.8	29.0	19.7	Decreased	No change	No change
Black, non-Hispanic	37.6	33.7	28.0	30.2	22.7	Decreased	No change	No change
Hispanic	33.4	28.1	27.0	22.6	21.7	Decreased	No change	No change
School-level FRPL eligibility [§]								
Low	27.0	24.3	24.9	21.0	15.6	Decreased	No change	Decreased
Mid	39.8	31.7	29.5	29.4	26.0	Decreased	No change	No change
High	38.3	37.8	35.4	33.2	24.5	Decreased	No change	No change
MILK [‡]								
Overall	43.1	43.9	44.4	40.3	37.5	Decreased	No change	Decreased
School grade								
9	45.4	45.9	46.8	42.1	38.6	Decreased	No change	Decreased
10	44.8	46.4	47.1	42.7	39.6	Decreased	No change	Decreased
11	40.3	41.7	42.5	37.5	35.8	Decreased	No change	Decreased
12	40.9	40.9	40.2	38.1	35.2	No change	No change	No change
Sex								
Female	35.0	34.2	34.8	31.7	28.2	Decreased	No change	Decreased
Male	51.1	52.8	53.4	49.0	46.2	Decreased	No change	Decreased
Race/Ethnicity								
White, non-Hispanic	47.8	49.9	48.8	44.5	41.2	Decreased	No change	Decreased
Black, non-Hispanic	28.1	26.0	29.0	26.2	25.1	No change	No change	No change
Hispanic	40.4	40.4	40.7	38.9	36.2	Decreased	No change	No change
School-level FRPL eligibility [§]								
Low	47.6	46.3	45.0	44.1	39.2	Decreased	No change	No change
Mid	41.5	41.3	43.4	38.8	34.3	Decreased	No change	Decreased
High	35.6	37.6	41.1	38.7	34.8	No change	No change	Decreased

JUICE[†]								
Overall	28.6	28.4	28.2	24.6	21.6	Decreased	No change	Decreased
School grade								
9	29.4	29.1	27.7	25.1	22.5	Decreased	No change	Decreased
10	30.1	29.1	30.6	23.9	21.3	Decreased	No change	Decreased
11	26.6	27.4	27.4	25.5	21.9	Decreased	No change	Decreased
12	27.3	27.3	26.9	23.6	20.5	Decreased	No change	Decreased
Sex								
Female	24.3	24.3	23.9	20.9	17.7	Decreased	No change	Decreased
Male	32.7	32.0	32.2	28.3	25.3	Decreased	No change	Decreased
Race/Ethnicity								
White, non-Hispanic	25.6	26.9	26.3	21.0	19.0	Decreased	No change	Decreased
Black, non-Hispanic	35.0	33.3	33.2	32.8	27.6	Decreased	No change	Decreased
Hispanic	31.2	28.4	30.0	28.0	23.9	Decreased	No change	Decreased
School-level FRPL eligibility[§]								
Low	28.4	27.7	28.2	22.5	20.7	Decreased	No change	Decreased
Mid	27.4	29.0	26.5	26.3	20.1	Decreased	No change	Decreased
High	31.2	28.4	29.1	26.8	25.3	Decreased	No change	No change

Abbreviation: FRPL = free/reduced price lunch.

* Based on linear and quadratic trend analyses using logistic regression models controlling for grade, sex, race/ethnicity, and FRPL p <0.05.

[†] Non-diet soda (soda) or 100% fruit juice (juice) one or more times per day.

[§] The percentage of students eligible for enrollment in FRPL program in each school was divided into tertiles based on the overall distribution from http://www.schooldata.com/pdfs/MDR_Ed_catalog.pdf. FRPL categories were low = 0%–29%, medium = 30%–52%, and high = 53%–100%.

[¶] One or more glasses of milk per day.

Source: Miller G, Merlo C, Demissie Z, Sliwa S, Park S. Trends in Beverage Consumption Among High School Students — United States, 2007–2015. MMWR Morb Mortal Wkly Rep 2017;66:112–116. DOI: <http://dx.doi.org/10.15585/mmwr.mm6604a5>

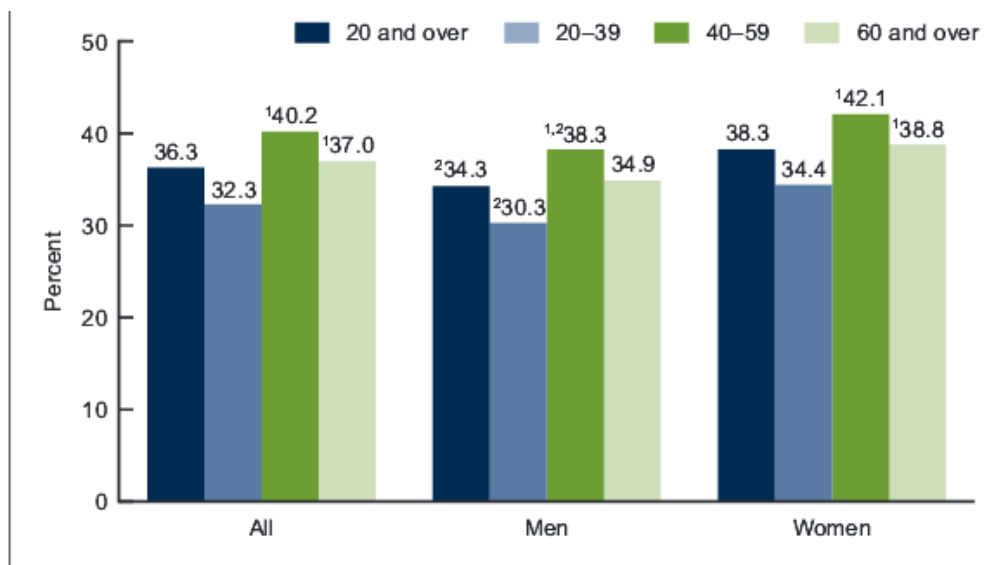
Exhibit 2B: Beverage Consumption Patterns among Boston High School Youth — Boston, MA,
High School Youth Risk Behavior Survey, 2015

	Total	Male	Female
Drank a can, bottle, or glass of soda or pop (not counting diet soda or diet pop, during the 7 days before the survey)	70.4 (68.0–72.7) 1,595 [†]	67.3 (63.6–70.7) 807	73.7 (69.9–77.2) 778
Drank a can, bottle, or glass of soda or pop one or more times per day (not counting diet soda or diet pop, during the 7 days before the survey)	16.9 (15.1–19.0) 1,595	14.3 (11.5–17.6) 807	19.6 (16.9–22.7) 778
Drank a can, bottle, or glass of soda or pop two or more times per day (not counting diet soda or diet pop, during the 7 days before the survey)	11.6 (9.9–13.6) 1,595	9.8 (7.4–13.0) 807	13.4 (11.2–15.9) 778
Drank a can, bottle, or glass of soda or pop three or more times per day (not counting diet soda or diet pop, during the 7 days before the survey)	7.7 (6.3–9.4) 1,595	6.6 (4.7–9.2) 807	9.0 (7.0–11.4) 778

[†] Percentage, confidence interval, cell size

Source: U.S. Department of Health and Human Services. Centers for Disease Control and Prevention. Boston, MA, High School Youth Risk Behavior Survey, 2015.

<https://nccd.cdc.gov/youthonline/App/Results.aspx?LID=BO>

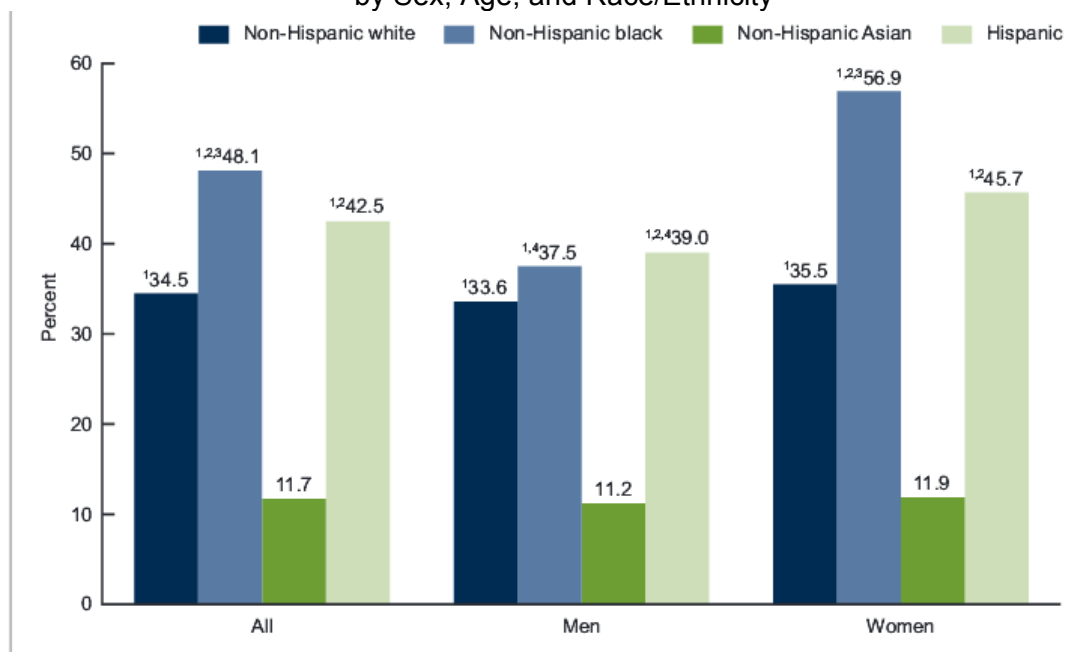
Exhibits 3A-3D: U.S. Trends in Obesity by Sex, Age, and Race/Ethnicity**3A: Prevalence of Obesity Among U.S. adults aged 20 and over (2011-2014) by Sex and Age**

¹Significantly different from those aged 20-39.

²Significantly different from women of the same age group.

NOTES: Totals were age-adjusted by the direct method to the 2000 U.S. census population using the age groups 20-39, 40-59, and 60 and over. Crude estimates are 36.5% for all, 34.5% for men, and 38.5% for women.

SOURCE: CDC/NCHS, National Health and Nutrition Examination Survey, 2011-2014.

3B: Prevalence of Obesity Among U.S. adults aged 20 and over (2011-2014) by Sex, Age, and Race/Ethnicity

¹Significantly different from non-Hispanic Asian persons.

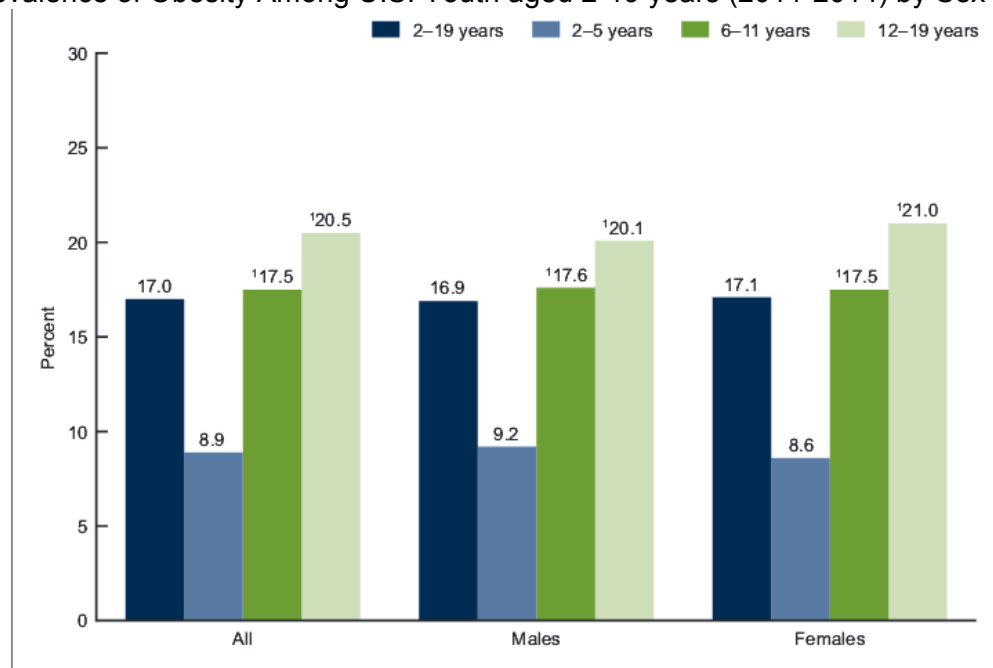
²Significantly different from non-Hispanic white persons.

³Significantly different from Hispanic persons.

⁴Significantly different from women of the same race and Hispanic origin.

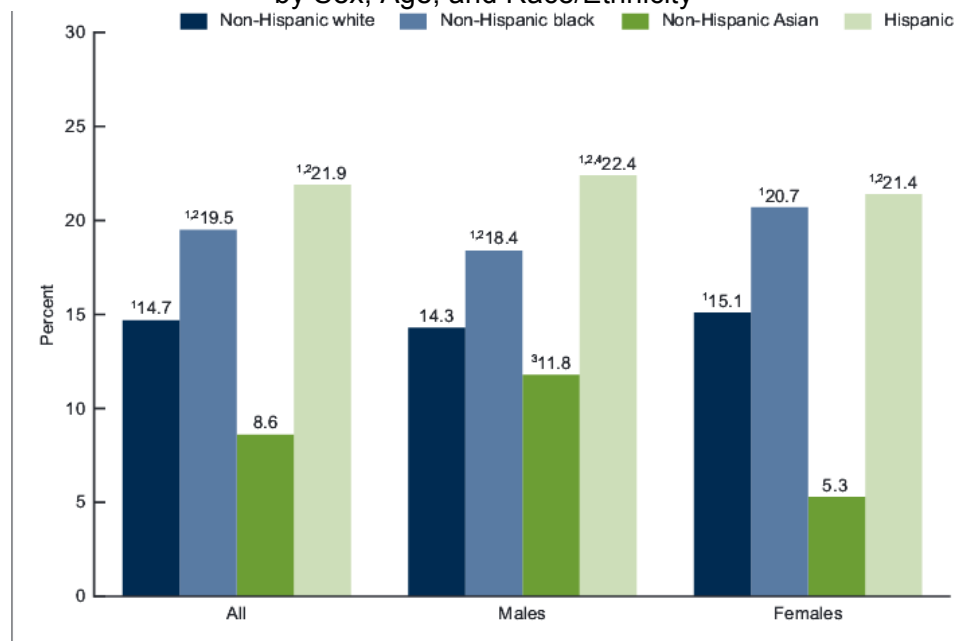
NOTE: All estimates are age-adjusted by the direct method to the 2000 U.S. census population using the age groups 20-39, 40-59, and 60 and over.

SOURCE: CDC/NCHS, National Health and Nutrition Examination Survey, 2011-2014.

3C: Prevalence of Obesity Among U.S. Youth aged 2-19 years (2011-2014) by Sex and Age

¹Significantly different from those aged 2-5 years.

SOURCE: CDC/NCHS, National Health and Nutrition Examination Survey, 2011-2014.

3D: Prevalence of Obesity Among U.S. Youth aged 2-19 years (2011-2014) by Sex, Age, and Race/Ethnicity

¹Significantly different from non-Hispanic Asian persons.

²Significantly different from non-Hispanic white persons.

³Significantly different from females of the same race and Hispanic origin.

⁴Significantly different from non-Hispanic black persons.

SOURCE: CDC/NCHS, National Health and Nutrition Examination Survey, 2011-2014.

Source: Ogden CL, Carroll MD, Fryar CD, Flegal KM. Prevalence of Obesity Among Adults and Youth: United States, 2011-2014. National Center for Health Statistics. NCHS Data Brief No. 219. November 2015.

<https://www.cdc.gov/nchs/data/databriefs/db219.pdf>

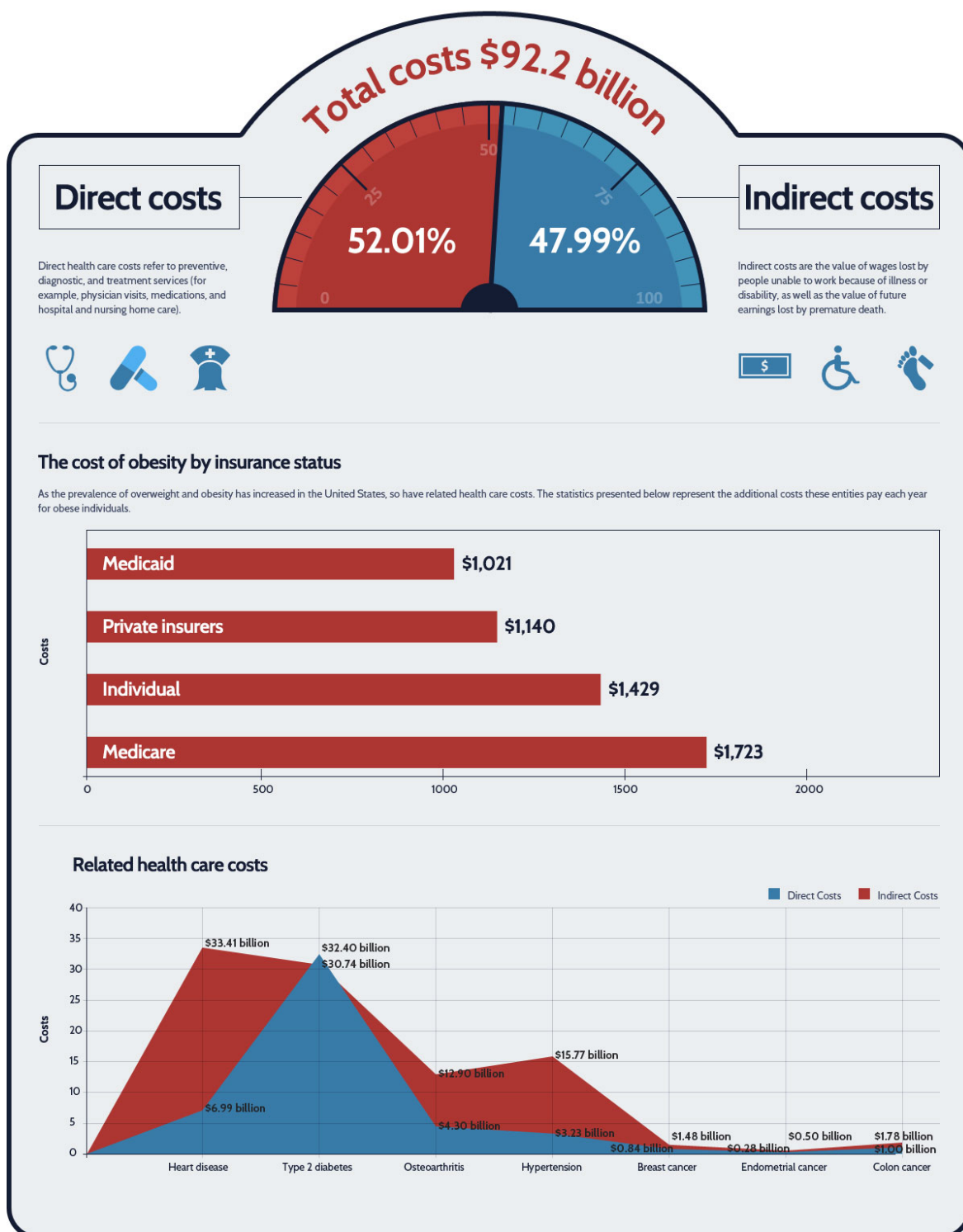
Exhibit 4: Prevalence of Overweight, Obesity, and Associated Conditions and Costs in Massachusetts

	2015 Obesity* Prevalence	2015 Diabetes Prevalence
MA adults	24.6%	8.9%
MA 2-4 year olds enrolled in the Special Supplemental Nutrition Program for Women, Infants, and Children	16.6%	--
MA school-age youth (estimates obtained from students in grades 1, 4, 7, and 10 in MA)	15.3% (16.0% were overweight)	--
Projected Cases of Diabetes in MA by 2030	Projected Cases of Heart Disease in MA by 2030	Projected Cases of Obesity-Related Cancers in MA by 2030
745,248	1,792,732	266,466
Medical Expenditures Attributable to Obesity in MA in 2014		
\$2.6 billion		

* Obesity is defined as a BMI ≥ 30.0 kg/m² for adults and a BMI $\geq 95^{\text{th}}$ percentile (age and sex-adjusted) for youth. Overweight is defined as a BMI between 25.0-29.9 kg/m² for adults and a BMI between the 85th-94th percentile (age and sex-adjusted) for youth.

Sources:

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3. Wang YC, Pamplin J, Long MW, Ward ZJ, Gortmaker SL, Andreyeva T. Severe Obesity In Adults Cost State Medicaid Programs Nearly \$8 Billion In 2013. *Health Aff (Millwood)*. Nov 2015;34(11):1923-1931.

Exhibit 5: Economic Costs Related to Obesity in the U.S. (2015)

Sources: Cedars-Sinai Marina Del Rey Hospital. 2015.

<http://win.niddk.nih.gov/statistics/index.htm>

<https://www.marinahospital.com/infographics/costs>

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Exhibit 6: Massachusetts Tax Rates for Alcoholic Beverages as of January 1, 2016

Measure	Rate
Malt (31-gal. bbl.)	\$3.30
Cider 3%-6% (wine gal.)	\$0.03
Still wine, including vermouth (wine gal.)	\$0.55
Sparkling wine (wine gal.)	\$0.70
Alcoholic beverages 15% or less (wine gal.)	\$1.10
Alcoholic beverages more than 15%-50% (wine gal.)	\$4.05
Alcoholic beverages more than 50% of alcohol (proof gal.)	\$4.05

Source: Massachusetts Department of Revenue. Massachusetts Tax Rates. 2017. <http://www.mass.gov/dor/all-taxes/tax-rate-table.html>

Exhibit 7: Massachusetts Sugary Drink Legislation Working Group Members

Primary Affiliation	Member*	Role
MA State Senate	Jason Lewis • Zachary Crowley • Dennis Burke • Abigail Armstrong	State Senator • Chief of Staff • Legislative Director • Constituent Services Director & Legislative Aide
	Harriett Chandler • Bryan Barash	State Senator • Legislative Director
MA House of Representatives	Jonathan Hecht • Samuel Feigenbaum	State House Representative • Legislative Aide
	Kay Kahn • Caroline Medina	State House Representative • Legislative Director
American Diabetes Association	Stephen Habbe	Associate Director, State Government Affairs
American Heart Association, MA Chapter	Allyson Perron	Senior Director of Government Relations
Boston University School of Public Health; Harvard T.H. Chan School of Public Health	Monica Wang, ScD, MS	Assistant Professor; Instructor
The Boston Foundation	Mira Kahn, MPH	Program Associate
	Keith Mahoney	VP of Communications
Joslin Diabetes Center	Lynn Wickwire	Leadership Council Member
MA Dental Society	Keith Monteiro	Director of Government Affairs
MA Health Council	David Martin	Executive Director
MA Health and Hospital Association	Adam Delmolino	Director, State Government Advocacy

*Bullet points indicate team members and roles who work with the primary individual listed

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