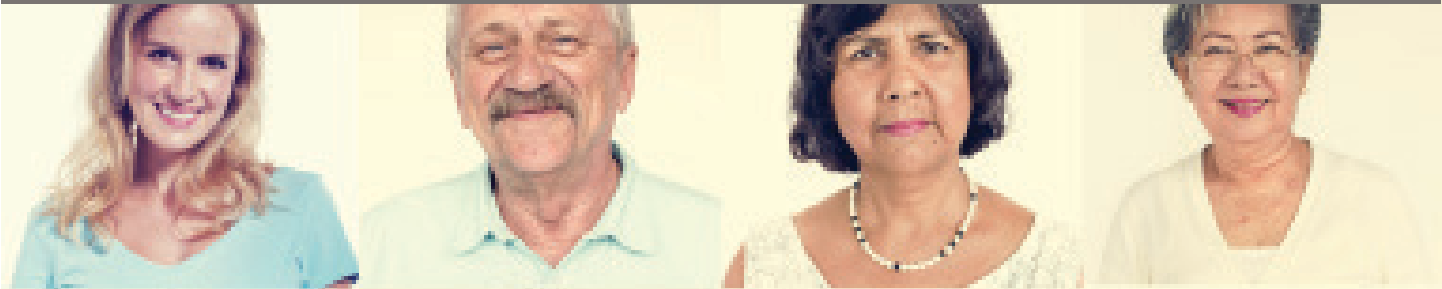


# Health of Boston

# 2016-2017



Martin J. Walsh, Mayor, City of Boston

Francis J. Doyle, Esq., Chair  
Board of the Boston Public Health Commission

Monica Valdes Lupi, JD, MPH, Executive Director  
Boston Public Health Commission



Building a Healthy Boston

# Health of Boston 2016-2017

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Boston Public Health Commission  
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2016-2017



**CITY OF BOSTON • MASSACHUSETTS**  
**OFFICE OF THE MAYOR**  
**MARTIN J. WALSH**

Dear Readers:

Welcome to the Boston Public Health Commission's 2017 Health of Boston Report. Throughout history, the City of Boston has been on the forefront of public health policy and practice- dating all the way back to the work of the city's first commissioner of health, Paul Revere.

From ongoing efforts to address trauma and build resiliency in our neighborhoods affected by community violence, to innovative initiatives that will support healing and recovery for Boston residents feeling the impact of the national opioid epidemic, the Boston Public Health Commission, with support from community partners, continually strives to achieve its mission to promote, protect and preserve the health of all Boston residents - particularly the most vulnerable.

The data and analysis in the Health of Boston Report, produced by the Boston Public Health Commission, provides residents with critical information on a range of health topics that affect our city, creating opportunity to improve health outcomes for many of our most vulnerable residents.

This report serves as a roadmap to drive and prioritize our public health efforts by not only describing the health challenges we face as a city, but also offering real world perspectives and solutions.

We encourage you to read, discover and act on the valuable data and analysis included in this report.

Sincerely,

Martin J. Walsh  
Mayor of Boston



Dear Friends:

Welcome to the Boston Public Health Commission's biennial Health of Boston report. The purpose of this report is to provide useful data on the health of Boston residents in an easy to understand and accessible format. This year, we are excited to share a new version of the report which builds on the data and analysis that we have provided before. We have included points of view from local leaders in the field of public health, as well as points of view from residents who are directly impacted by these health topics. It is our hope that these added components will provide a greater depth in understanding the broad challenges we face in our City to achieve optimal health for all.

We are grateful for the efforts of our staff and programs to address health issues, and the ongoing commitment and support that we receive from our community partners in our efforts to strengthen our public health services. The data and points of view included within the report serve to guide our work, inform our strategic priorities, and increase our capacity to address these challenges through targeted partnerships and collaboration.

As the oldest health department in the country, the Boston Public Health Commission has long been a leader in the field of public health. From our on-going efforts to advance health equity, to our nationally recognized work preventing and treating opioid use, we have always been at the forefront of public health innovation and served on the front lines as chief health strategists.

Many challenges remain ahead of us: inequities in health outcomes persist for racial and ethnic minorities, the opioid epidemic continues to take a toll on our communities, and the public health enterprise will need to be nimble and adapt to the uncertainty around future federal policies. The Boston Public Health Commission stands ready to confront these challenges and through this report, we hope to provide a roadmap that allows for the implementation of evidence-based policies and practice based on sound data and research.

Sincerely yours,

A handwritten signature in black ink, appearing to read "Monica Valdes Lupi". The signature is fluid and cursive, with a long horizontal stroke at the end.

Monica Valdes Lupi, JD, MPH  
Executive Director

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# Introduction

*Welcome to Health of Boston 2016-2017!*

This report provides a broad picture of the overall health experience of our city, describes many of the contextual factors that influence the health of Boston residents, and identifies groups of individuals and communities at greatest risk for poor health outcomes. *Health of Boston 2016-2017* provides information to help build knowledge and stimulate discussion among individuals that live in our communities. Data sources include the U.S. census, birth and death registries, hospital emergency department and inpatient discharge databases, sexually transmitted and infectious disease surveillance data, surveys that describe individual behaviors or community demographics and assets, geographical data, and environmental monitoring data from local and state agencies. Data from this report aim to provide a foundation for discussion and further planning. This year's report focuses attention on the determinants that influence the health of Boston residents and communities. Determinants of health are the realities of one's life that often make a person healthy or not. They include the social and economic environment, the physical environment, and personal behaviors related to health and wellness. Determinants impact an individual's health and the collective health experience of a population in both direct and indirect ways.

Understanding the social and economic makeup of a person's life is critical to understanding an individual's health experiences and, collectively, the differences in health experiences and outcomes experienced by population groups. Examples of social and economic determinants include perceived safety, level of educational attainment, exposure to environmental hazards, and the availability of resources necessary to meet daily needs. In addition to these social and economic determinants, lifelong exposure to varying forms of racism and discrimination may cause prolonged stress, which can also adversely impact health outcomes. Data in this report show that Black and Latino residents collectively experience higher levels of poor health outcomes, chronic disease, and mortality in comparison with White residents overall. Similar racial/ethnic differences in income, education, and employment status are observed as well.

The physical or built environment in which people live is widely recognized as a determinant that influences mental and physical health. Access to green spaces for exercise or relaxation, grocery stores and restaurants with affordable healthy foods, and safe housing are all important for maintaining good health. Neighborhoods serve as the physical and social environments of our daily lives. For this reason, we present data stratified by neighborhood that show how health experiences vary dramatically by location. In other words, place matters.

Individual characteristics and behaviors also play an important role in health outcomes. Positive changes in individual behavior related to diet and exercise can reduce the risk of developing a chronic disease. It is important, however, to acknowledge that individual behaviors are inextricably linked to the social and economic context of an individual's life. For this reason, we present health behavior data stratified by selected indicators addressing socioeconomic status.

In order to present a comprehensive picture of the health of Boston residents, *Health of Boston 2016-2017* begins with demographic characteristics of the diverse population living in Boston. Next, the report focuses on social determinants of health, showing that determinants such as education, employment, income and poverty, housing, and bias and racism are unevenly distributed within our city among those of differing races and ethnicities, socioeconomic status, and geographic locations. Next, the report summarizes community assets and environmental health among Boston residents. Community assets are the collective resources that make it easier for people to make healthy choices, and may be considered as community-level social determinants. The environment (e.g. particular aspects of the natural and built environment that may affect human health) is also a determinant of health. Environmental health indicators addressing outdoor air quality, indoor environmental quality, and climate change are included in this year's report as well. The remaining chapters focus on health care access and a wide variety of health conditions, disease burdens, and risk behaviors to describe health status. For many of the health indicators, trends over time are highlighted, as well as differences across neighborhoods and between racial and ethnic groups and subgroups of other determinants (e.g. employment, education, and housing).

We hope you enjoy the report and find the information presented here useful in your own efforts to educate, inspire, advocate, and intervene in the interest of optimal health for all Boston residents.

# Executive Summary

*Health of Boston 2016-2017* presents the current state of health of Boston residents. We use a broad public health framework for understanding health as a whole-person experience that is shaped by individual as well as socio-economic, societal, and environmental influences.

Data presented here demonstrate improvements in population health across the age spectrum. Declines in infant mortality, consistently low prevalences of elevated blood lead levels among children under age 6, and declines in adolescent pregnancy, cigarette smoking and binge drinking among youth, chlamydia incidence, hepatitis C incidence, homicide, and cancer mortality are among the public health successes identified through our population surveillance activities. In addition, declines in asthma emergency department (ED) visits and heart disease hospitalization rates may represent measurable impact of the decade-long health care reform effort in Massachusetts. These welcome signs of progress serve to highlight the importance of an active and functional local public health system and the system's continued commitment to achieving optimal health for all.

While it is important to draw attention to progress, it is equally necessary to highlight new and continued challenges. Fueled by fentanyl, the opioid epidemic is claiming lives at a historically high rate. Chronic disease prevalence rates remain stubbornly high, and fewer adults are getting physical exercise. About one in five adults experience persistent anxiety, and one in ten adults experience persistent sadness. In addition to these overall indicators, our data continue to show stark differences in health experience across population groups. Black and Latino residents continue to experience higher rates of preterm birth, asthma, hypertension, obesity, and a host of other conditions compared with their White counterparts. Asian residents had higher rates of low birthweight births and tuberculosis than White residents. White residents had higher rates of mortality due to substance use than Asian, Black, and Latino residents. In addition to persistent racial and ethnic inequities, the report highlights differences in health outcomes between men and women, between residents of public housing and homeowners, between low income and higher income residents, and several other groups that may be at increased risk for poor health. Identifying these challenges and differences in health experience allows us to develop policy, systems, and environmental strategies that strive to optimize health for all.

## Health of Boston: Public Health Progress

Population health data allow us insight into the progress of public health efforts over time and current health status of residents. These data help identify areas of health improvement and areas where progress is needed. Below is a summary of the current status and trends in access, outcomes, and utilization that reflect improvements in population health status and conditions for optimal health.

- The percentage of Boston residents without health insurance was 4% in 2015.
- The percentage of adults with dental insurance increased from 61% in 2003 to 71% in 2015.
- From 2011-2015, the birth rate for Boston females ages 15-17 decreased 57% from 14.5 to 5.8 births per 1,000 females.
  - *Over the same time period, a decrease in the birth rate was observed for Black and Latino females ages 15-17, 68% and 55%, respectively.*
- From 2011-2015, the birth rate for Boston females ages 18-19 decreased 38% from 15.5 to 10.2 births per 1,000 females
  - *Over the same time period, a decrease in the birth rate was observed for Black, Latino, and White females ages 18-19, 46%, 27%, and 57%, respectively.*
- From 2006-2015, infant deaths among Black infants decreased by 36% (from 14.5 infant deaths per 1,000 births to 8.1).
- The percentage of Boston public high school students who reported having smoked cigarettes in the past 30 days decreased from 8% in 2007 to 5% in 2015.
- The percentage of Boston public high school students who reported binge drinking during the past 30 days decreased from 19% in 2007 to 11% in 2015.
- From 2011-2015, the rate of asthma ED visits decreased by 4% for Boston residents overall.
  - *The rate for Black residents decreased by 6% during the same time period.*
- From 2011-2015, the rate of asthma hospitalizations for Boston residents overall decreased by 31%.
  - *Over the same time period, the rate decreased by 29% for Asian residents, 26% for Black residents, 39% for Latino residents, and 38% for White residents.*



- From 2011-2015, the rate of heart disease hospitalizations for Boston residents overall decreased by 9%.
  - *The rate decreased by 8% for Black residents, 22% for Latino residents, and 5% for White residents over the same time period.*
- From 2011 to 2015, the cancer mortality rate decreased by 12% for Boston residents overall.
  - *During the same time period, the rate decreased by 16% for male residents and by 18% for Black residents.*
- Between 2011 and 2015, the incidence rate of hepatitis C infection among Boston residents decreased by 22%.
- The chlamydia incidence rate decreased by 10% between 2014 and 2015.
- The gonorrhea incidence rate decreased by 21% between 2014 and 2015.
- Between 2011 and 2015, the rate of newly diagnosed HIV cases among Boston residents decreased by 25%.
  - *During the same time period, the incidence rate decreased for both Black and White residents, 27% and 34%, respectively.*
- Between 2006 and 2015, the homicide rate decreased by 37%.



## Health Equity

Using a variety of health indicators, Health of Boston 2016-2017 tracks progress toward the goal of health equity, where no one is disadvantaged from achieving their health potential because of socially determined circumstances. Historically in Boston there have been lower life expectancy and poorer health outcomes for individuals of color compared with White residents. Although some gains have been made over time, there remains much to accomplish. Reconciling these differences necessitates that all individuals have the individual, social, and environmental resources necessary to successfully live healthy lives.

This year's report depicts persistently different health outcomes and behaviors between racial and ethnic groups. Throughout the report, Asian, Black, and Latino residents are compared with their White counterparts across a variety of health outcomes and behaviors.

- Asian residents, compared with White residents, experience higher rates of low birthweight births, hepatitis B, and tuberculosis. A lower percentage of Asian Boston public high school students reported being physically active compared with White students. Asian residents also have lower percentages of having pap tests, mammograms, and sigmoidoscopy/colonoscopy done in the recommended timeframe compared with White residents.
- Black residents experience a disproportionate burden of morbidity and mortality from common conditions. Compared with White residents, Black residents experience higher rates of preterm births, low birthweight births, infant mortality, asthma emergency department (ED) visits, obesity, hypertension, hepatitis B, tuberculosis, influenza, HIV infection, diabetes hospitalizations and deaths, heart disease hospitalizations, and assault-related ED discharges. They also have lower percentages of having pap tests done in the recommended timeframe compared with White residents.
- Latino residents experience higher rates, compared with White residents, of preterm births, low birthweight births, infant mortality, tuberculosis, HIV infection, influenza, asthma ED visits, obesity, hypertension, diabetes hospitalizations, and assault-related ED discharges.

## Demographics

Boston's population was estimated to be 667,137 in 2015. From 2000-2015, the percentage of Asian and Latino residents increased, while the percentage of Black and White residents decreased.

In 2015, the majority of residents were non-White and nearly 30% of the population was foreign-born, which was higher than both national and state percentages. Among limited-English-speaking households in Boston, Spanish and Asian languages were the most commonly spoken languages other than English. The increasing racial/ethnic diversity of Boston's population can be seen among children less than 18 years of age, who made up approximately 17% of all Boston residents in 2015. This age group was comprised predominantly of Black and Latino children.

## Social Determinants of Health

### **Along with individual physiology and health-**

related behaviors, there are other economic, environmental, and social factors that influence health. We refer to these as social determinants of health. Social determinants are societal influences that describe circumstances in which people are born, grow up, live, work, and age (1). Social determinants of health are uniquely experienced by individuals, differentially impacting health experiences, and ultimately contributing to health inequities (2). Research has identified a wide range of social factors that are associated with differences in health outcomes, which are listed below (2).

### *Educational Attainment and Health*

- Seventy-two percent of Boston Public School students who entered grade 9 in the fall of 2012 graduated in four years.
  - Seventy-seven percent of female students graduated in 4 years compared with 68% of male students.
  - Four-year graduation rates were highest for Asian students (88%) and lowest for Latino students (67%).
- In 2015, the median earnings for Boston residents ages 25 and older with earnings varied by educational attainment and sex.
  - For males and females, median earnings increased with higher educational attainment.
  - Females at all levels of educational attainment, except some college or associate's degree, had lower median earnings when compared with their male counterparts.

- In 2015, 84% of Boston residents had access to a laptop, desktop, or notebook computer. A lower percentage of Black (80%) and Latino (71%) residents had computer access compared with White residents (91%).
- In 2015, 91% of residents had internet access at home. A lower percentage of Black (89%) and Latino (88%) residents had internet access compared with White residents (92%).
- After adjustment for differences in age, race/ethnicity, and sex, a higher percentage of adults with less than a high school diploma had asthma and persistent sadness compared with adults with at least some college education. A higher percentage of adults with a high school diploma had diabetes, hypertension, obesity, and persistent sadness compared with adults with at least some college education.

### *Employment Status and Health*

- In 2015, the unemployment rate dropped to a 5-year low of 7%. However, the rate was higher for Black (11%) and Latino (9%) residents compared with White residents (4%).
- After adjusting for differences in age, race/ethnicity, and sex, a higher percentage of Boston residents who were out of work had diabetes, persistent anxiety, and persistent sadness compared with those who were employed.



### ***Income/Poverty and Health***

- In 2015, the median household income for Boston residents was \$58,263. Asian (\$33,185), Black (\$41,465), and Latino (\$30,687) households had lower median household incomes compared with White households (\$86,194) in 2015.
- In 2015, a higher percentage of Boston residents ages 5 and older lived below the poverty level (20%) compared with Massachusetts residents (11%).
- After adjusting for differences in age, race/ethnicity, and sex, the prevalence of health conditions tends to decrease as household income level increases. Boston residents with a household income less than \$25,000 were more likely to have diabetes, hypertension, persistent anxiety, and persistent sadness, and were more likely to be obese compared with residents with a household income of \$50,000 or greater. Residents with a household income of \$25,000 to \$49,999 were more likely to have diabetes, hypertension, and persistent sadness compared with those with a household income of \$50,000 or more.

### ***Housing Status and Health***

- In 2015, 66% of Boston residents lived in renter-occupied housing units. Compared with White residents (57%), a higher percentage of Asian (76%), Black (70%), and Latino (83%) residents lived in renter-occupied units.
- In 2015, 26% of Boston residents paid 50% or more of their household income in rent. For 28% of Boston residents, rent was 30-49.9% of their household income.
- After adjusting for differences in age, race/ethnicity, and sex, a higher percentage of Boston Housing Authority residents and renters receiving rental assistance had asthma, diabetes, hypertension, obesity, persistent anxiety, and persistent sadness compared with homeowners. Renters who did not receive assistance were more likely to have persistent anxiety and persistent sadness compared with homeowners.

### ***Bias and Racism***

- In 2015, a higher percentage of Black and Latino residents reported that they felt they were stopped by the police just because of their race or ethnic background compared with White residents.
- After adjusting for differences in age, race/ethnicity, and sex, those who felt they were stopped by the police just because of their race or ethnic background were more likely to report persistent anxiety and persistent sadness compared with those who did not feel they were stopped by the police for these reasons.

## Health Indicators

This report uses standard domains in population health to define well-being, disease, and death in context of both personal characteristics and social environments. As health is multi-dimensional, each health trend and association should be considered in light of the environments and circumstances that set the stage for exposures and opportunities.



## Environmental Health

The environment is everything around us – the weather, the air we breathe, the water we drink and use, and the food we consume. It's also the chemicals, radiation, microbes, and physical forces with which we come into contact. Environmental health includes the assessment and control of environmental factors that can potentially affect health. It is targeted towards preventing disease and creating healthy environments.

### Climate change and health

- In 2015, the cold-related illness emergency department (ED) visit rate during the months of November to March was 37.7 per 100,000 residents. The rate of cold-related illness emergency department visits increased significantly by 151% from 2011 to 2015.
- In 2012-2015, the cold-related illness ED visit rate during the months of November to March was 26.5 per 100,000 residents. Fifty-one percent of all cold-related illness ED visits during this time period indicated that the patient was homeless.

### Outdoor air quality

- Outdoor air quality monitoring data for Boston indicates that annual and daily fine particulate matter pollution levels in 2015 were lower than the standards set forth by the United States Environmental Protection Agency.

### Indoor air quality

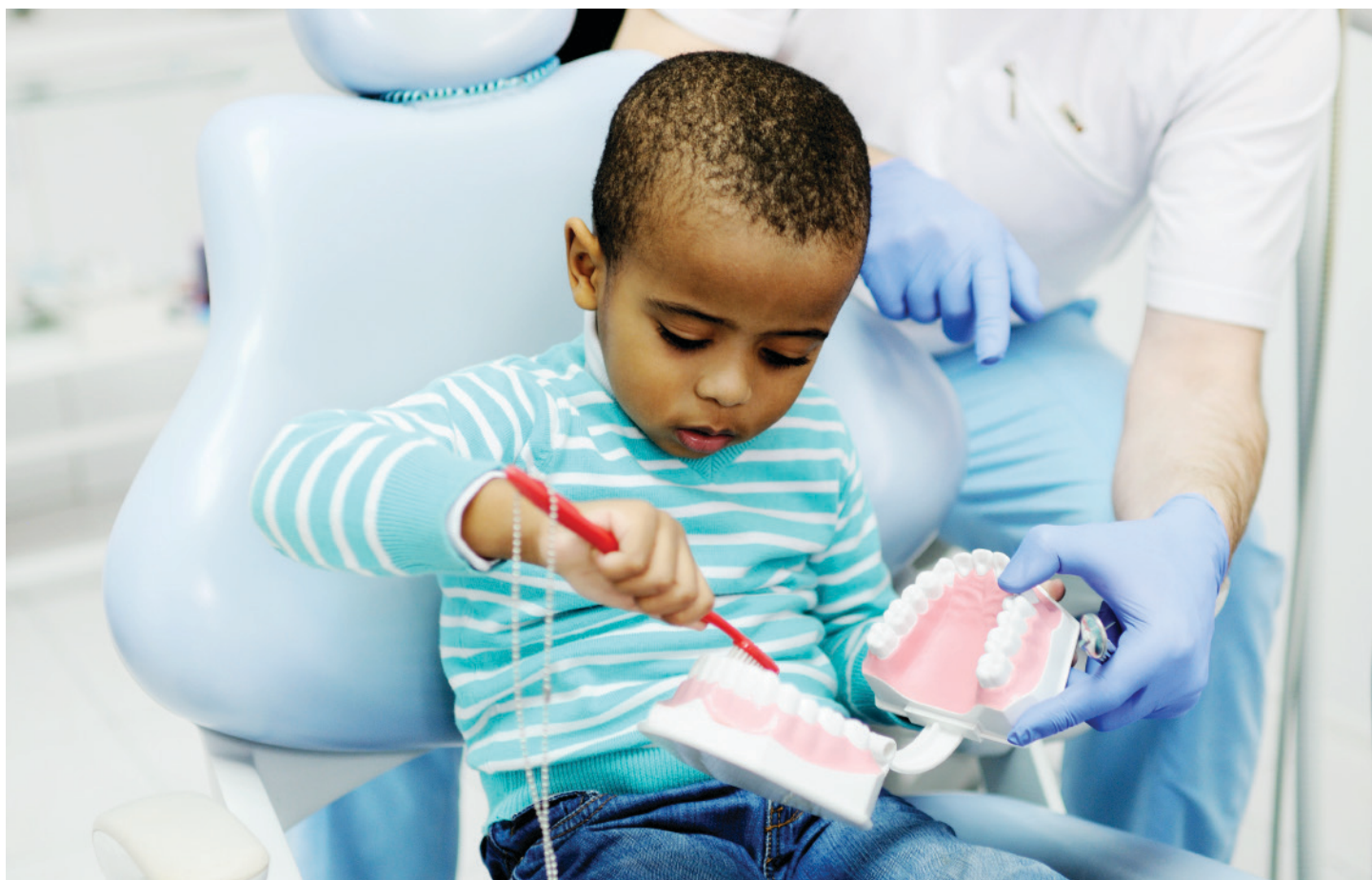
- The percentage of adults who reported exposure to environmental tobacco smoke at home decreased between 2005 (17%) and 2015 (11%).
- In 2015, the rate of ED visits for confirmed carbon monoxide poisonings in Boston was 13.8 visits per 100,000 residents. Between 2011 and 2015, the rate decreased by 26%.



## Access to Care

In measuring access to medical care and resources, the report considers insurance coverage, access to a regular place of care, and the frequency with which individuals actually utilize medical care on a preventative and emergency basis. Preventative care at every stage of life helps all Americans stay healthy, avoid or delay the onset of disease, keep diseases they already have from becoming worse or debilitating, lead productive lives, and reduce costs.

- The percentage of residents lacking health insurance in 2015 was 4% for Boston and 9% for the U.S. overall. For Boston, there were no significant differences by race/ethnicity in the percentage of the population without health insurance.
- In 2015, residents with household incomes less than \$25,000 or \$25,000-\$49,000 had higher percentages of being uninsured compared with those with an income of \$50,000 or more.
- In 2015, 71% of Boston adult residents had insurance coverage for routine dental care.



## Maternal and Child Health

Birth rates, infant mortality rates (IMR), and infant characteristics of birthweight and gestational age provide important measures for the well-being of infants and pregnant women, and are often viewed as a reflection of the health status of a community.

- From 2011-2015, the birth rate decreased by 57% among Boston females ages 15-17, and decreased 38% among females ages 18-19.
- Of the Boston females ages 15-19 who gave birth in 2015, 13% had given birth previously.
- In 2015, 9% of all infants were born with low birthweight (weighing less than 5 pounds 8 ounces). From 2011-2015, the percentage of low birthweight births in Boston did not significantly change.
- In 2015, 10% of babies in Boston were born preterm (before 37 weeks gestation). There was no significant change in the percentage of preterm births to Boston females from 2011-2015.
- In 2015, the IMR in Boston was 5.4 infant deaths per 1,000 live births. From 2006-2015, the IMR for Black infants decreased by 36%. There was no significant change from 2006-2015 in the rate for Latino or White infants, or for Boston overall. However, in 2015, the IMR for Black infants (8.1) and Latino infants (9.8) were higher than that of White infants (1.7).



## Health-Related Behaviors

Personal health behaviors contribute to a person's risk for disease and to one's overall quality of life and well-being. Behaviors such as smoking, excessive alcohol use, and intake of excess calories including sugar-sweetened beverages, contribute to cancers, obesity, cardiovascular disease, hypertension, diabetes, and premature death. Conversely, physical activity and fruit and vegetable intake are protective against each one of those poor health outcomes (3, 4).

- In 2015, a higher percentage of Black (53%) and Latino (58%) Boston public high school students reported low vegetable consumption compared with White students (40%).
- In 2015, 24% of Boston adult residents reported consuming vegetables less than once per day over the past month.



- In 2015, a higher percentage of adults with some college education met the CDC guidelines for weekly physical activity compared with those with a high school education or less.
- In 2015, 40% of public high school students reported having one or more sugar-sweetened beverages daily over the past week.
- In 2013 and 2015 combined, lower percentages of Asian (6%) and Black (8%) public high school students reported binge drinking compared with White students (22%).
- In 2015, the percentage of adult residents who reported binge drinking was lower for Asian (9%), Black (18%), and Latino (18%) adults compared with White adults (32%).
- The percentage of students who reported having used marijuana in the past 30 days increased between 2007 (17%) and 2015 (22%).



## Chronic Disease

Chronic diseases, such as asthma, diabetes, heart disease, and hypertension, increase medical costs for individuals and communities. The burden of these diseases falls heavily on communities of color.

### Asthma

- In 2015, 12% of Boston adult residents reported having asthma. There was no significant change in the percentage of adults with asthma between 2006 and 2015.
- From 2011-2015, the rate of asthma emergency department (ED) visits decreased by 4% for Boston overall. The rate decreased by 6% for Black residents during the same time period.
  - *From 2011-2015, the asthma ED visit rate for Boston residents decreased by 14% for residents age 18-44, 12% for residents ages 45-64, and 15% for residents ages 65 and older. Residents ages 3-5 experienced a 15% increase in the rate of ED visits over the same time period.*
- From 2011-2015, the rate of asthma hospitalizations decreased for residents of all race/ethnicities and age groups except those ages 3-5. Despite these decreases, the rates for Black (40.2 hospitalizations per 10,000 residents) and Latino (28.8) residents in 2015 were approximately 4 times and 3 times the rate for White residents (9.6), respectively.

### Diabetes

- In 2015, 8% of Boston adults reported having diabetes. There was a significant increase in the percentage of adults with diabetes between 2006 and 2015.
- For 2013 and 2015 combined, higher percentages of Black (15%) and Latino (11%) adults reported having diabetes compared with White adults (5%).
- In 2015, there were 20.3 deaths per 100,000 Boston residents due to diabetes. Between 2011 and 2015, the diabetes mortality rate increased by 90% for Latino residents.
- In 2015, the diabetes mortality rate was 92% higher for Black residents (34.4) compared with White residents (17.9).



### Heart Disease

- In 2015, the rate of heart disease hospitalizations in Boston was 86.5 per 10,000 residents.
- From 2011-2015, the rate decreased by 9%. The rate also decreased by 8% for Black residents, 22% for Latino residents, and 5% for White residents over the same time period.
- From 2011 to 2015, there was no significant change in the heart disease mortality rate for Boston residents. However, the rate increased by 57% among Asian residents during this time period. There were no changes in the heart disease mortality rate for Black, Latino, or White residents.

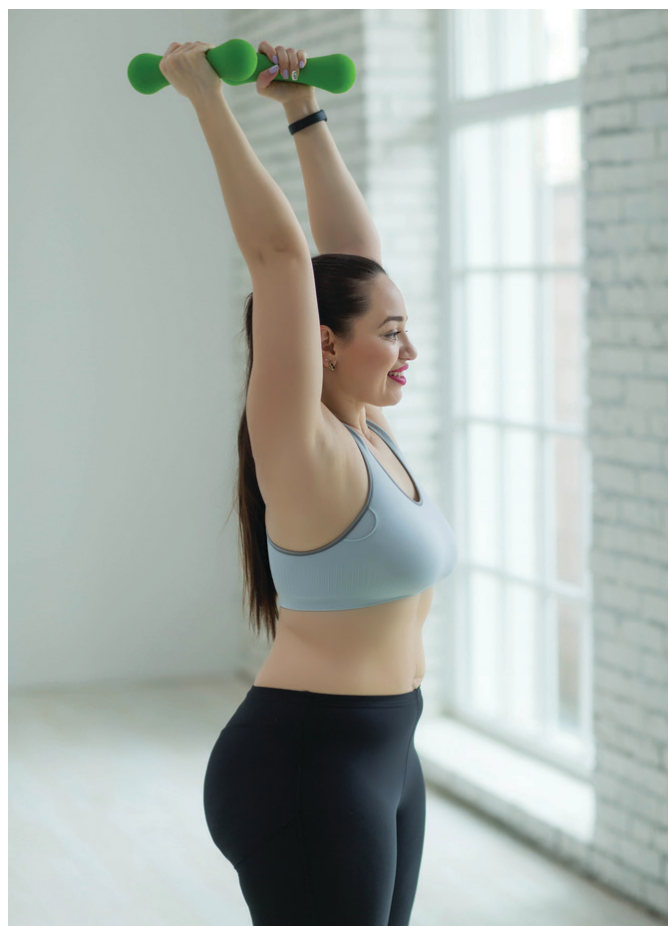
### Hypertension

- In 2015, 25% of Boston adults reported they had hypertension (high blood pressure). There was no significant change in the percentage of adults with hypertension between 2006 and 2015.



### Obesity

- In 2015, 15% of Boston public high school students were obese. There was no significant change in the percentage of students who were obese between 2007 and 2015.
  - A higher percentage of Black students were obese (17%) compared with White students (10%).
- In 2015, 22% of Boston adult residents were obese. There was no significant change in the percentage of adults who were obese between 2006 and 2015.
  - For 2013 and 2015 combined, a higher percentage of Black (32%) and Latino (30%) adults were obese than White adults (17%).

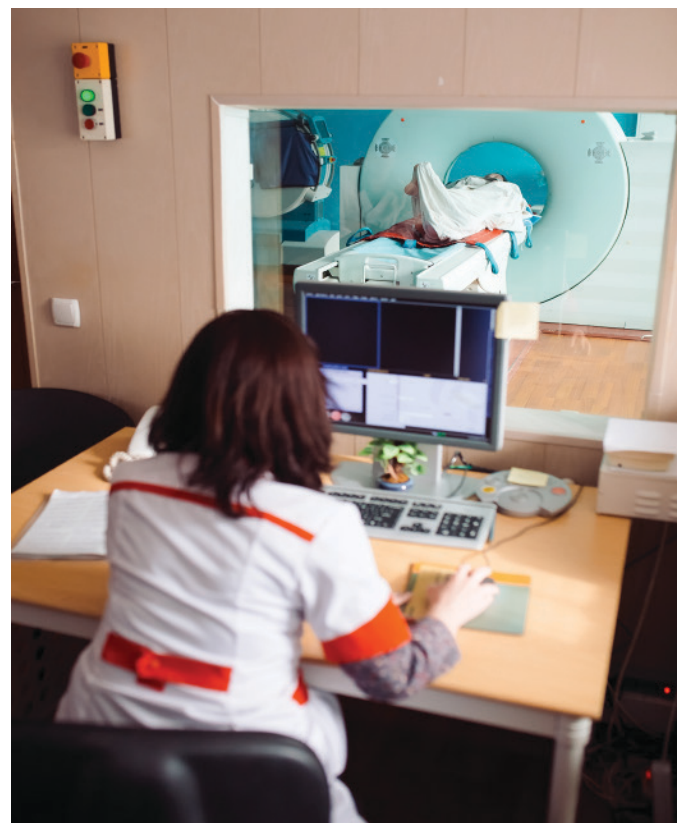




## Cancer

Cancer is currently the leading cause of death for Boston residents ages 45 and older, and ranks behind injuries as the second leading cause of death for those ages 25-44. Prevention efforts and targeted screening remain essential strategies for preventing many unnecessary premature deaths.

- From 2011 to 2015, the cancer mortality rate decreased by 12% among Boston residents overall and by 18% among Black residents.
- From 2011 to 2015, the cancer mortality rate decreased by 16% for male residents. There was no change in the rate for female residents over the same time period.
- In 2015, compared with White residents, the cancer mortality rate was 30% lower for Asian residents and 35% lower for Latino residents.
- In 2015, the cancer mortality rate for females was 29% lower than the rate for males.
- The most preventable cancer, lung cancer, claimed more lives than any other cancer across all four racial/ethnic groups in Boston from 2011-2015.



## Infectious Disease

Infectious diseases present a unique health threat to Boston residents as new microbes emerge and spread, and many pathogens become drug-resistant. Prevention of infection through targeted vaccination and prevention among high-risk groups is essential. In our report, tuberculosis, hepatitis B and C, salmonella, and influenza (the flu) are used to represent trends in infectious diseases.

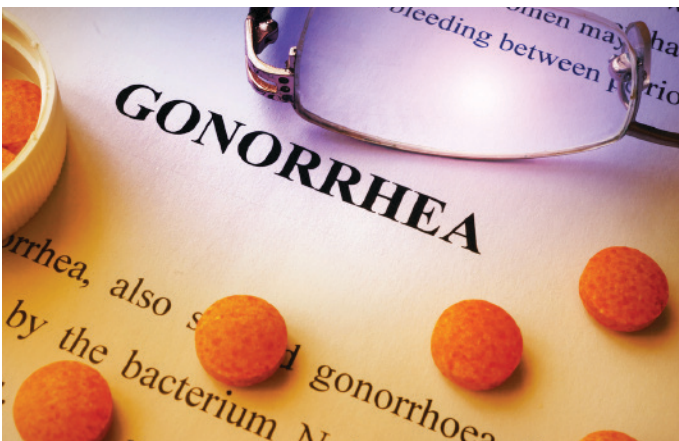
- In 2015, the incidence rate of hepatitis B infections was 50.2 new cases per 100,000 residents. Between 2011 and 2015, the hepatitis B incidence rate decreased 14%.  
— *The hepatitis B incidence rate for Asian residents (234.1) was almost 17 times the rate for White residents (14.1).*
- In 2015, the incidence rate of hepatitis C infections among Boston residents was 126.9 new cases per 100,000 residents. Between 2011 and 2015, the hepatitis C incidence rate decreased by 22%.
- During the 2015-2016 influenza season, the rate of influenza was higher among residents of Dorchester (zip codes 02121, 02125), Dorchester (zip codes 02122, 02124), Hyde Park, Mattapan, and Roxbury compared with the rest of Boston. The rate of influenza was lower among residents of Allston/Brighton, Back Bay, and Fenway compared with the rest of Boston.
- In 2015, the salmonella incidence rate was 22.1 new cases per 100,000 Boston residents. Between 2011 and 2015, the salmonella incidence rate increased by 25%.



## Sexual Health

Sexual health is an integral part of personal and relational well-being. Every Boston resident deserves to live free of the risk of sexually transmitted infections (STIs) and enjoy safe, health-promoting relationships. Symptoms of many STIs can be non-existent or difficult to detect, making prevention for high-risk groups especially important.

- From 2007-2015, the percentage of sexually active Boston public high school students who reported using a condom when they last had sex decreased from 71% to 65%.
- In 2015, the chlamydia incidence rate was 585.3 new cases per 100,000 Boston residents ages 13 and older. The chlamydia incidence rate was 10% lower in 2015 compared with 2014.
- In 2015, the gonorrhea incidence rate was 130.2 new cases per 100,000 Boston residents ages 13 and older. The incidence rate was 21% lower in 2015 compared with 2014.
- In 2015, the HIV incidence rate (rate of newly diagnosed HIV cases) was 22.3 per 100,000 Boston residents. Between 2011 and 2015, the incidence rate decreased by 25% for Boston residents overall.
  - *During the same time period, the incidence rate decreased for both Black and White residents, 27% and 34%, respectively.*



## Injury and Exposure to Violence

There are two types of injury, intentional and unintentional. Intentional injuries include all forms of violence (the use of physical force with the intention of causing death, disability, injury, or harm)(4). Unintentional injuries, historically called “accidents,” are the result of unplanned events such as overdosing of medication (poisoning), motor vehicle accidents, falls, and fires (5).

Violence is damaging to all of those who encounter it, whether individuals are directly or indirectly victimized by being exposed. The impact of violence in communities has far-reaching economic and health consequences that are further multiplied by the existing economic vulnerabilities of these communities. Our data show the incidents of severe non-fatal acts of violence and of homicide primarily occur in communities of color in Boston, where sustained change is needed to break the cycle of violence and ultimately provide safety to all Boston residents.

- In 2015, 56% of Boston adult residents felt their neighborhood was either somewhat safe or not safe.
  - *The percentage of residents who felt their neighborhood was unsafe was higher for Black (70%) and Latino (69%) adults compared with White adults (51%).*
- For 2013 and 2015 combined, 11% of Boston adult residents reported having experienced physical or sexual violence within their lifetime.



- For 2013 and 2015 combined, 2% of Boston adult residents reported having experienced physical or sexual violence within the past twelve months.
- In 2015, 7% of Boston adult residents reported having been sexually assaulted within their lifetime.
  - *A higher percentage of females (11%) reported having been sexually assaulted within their lifetime compared with males (3%).*
- In 2015, 15% of Boston public high school students reported having been bullied, either at school or electronically, within the past 12 months.
- Between 2006 and 2015, the accidental falls mortality rate for the elderly (residents ages 65 and older) increased by 50%.
- Between 2006 and 2015, the Boston resident homicide rate decreased by 37%. However, for 2011-2015, the Black (18.7 deaths per 100,000 residents) and Latino (8.3) homicide rates were approximately 14 times and 6 times the rate of White residents (1.4), respectively.

## Mental Health

Mental health is an essential element of well-being, allowing individuals to participate in their own lives and within relationships to the fullest extent. Less than optimal mental health spans from slight disruptions in mood to full-blown incapacity, and may impair an individual's ability to rationalize, make important decisions about their health habits, and develop steady relationships and employment opportunities.

- In 2015, 12% of Boston adult residents reported feeling persistent sadness. Between 2006 and 2015, the percentage of adults with persistent sadness did not change significantly.
  - For 2013 and 2015 combined, a higher percentage of adults who were out of work (25%) compared with adults who were employed (8%) reported feeling persistent sadness in 2015.
- The percentage of adults with persistent anxiety increased from 18% in 2006 to 22% in 2015.
  - The percentage of adults with persistent anxiety was higher for renters who received public rental assistance (32%) and adults who rented but did not receive rental assistance (24%) compared with homeowners (17%).
- In 2015, compared with White residents (97.8 hospitalizations per 10,000 residents), the mental health hospitalization rate was lower for Asian (19.9), Black (79.4), and Latino (49.8) residents.
- From 2011 to 2015, the rate of suicide among Boston residents did not change significantly.
  - In 2015, the rate was 66% lower for females (3.1 deaths per 100,000 residents) compared with males (9.1).
  - In 2015, there was no significant difference between the rates for Black and White residents.



## Substance Use Disorders

Substance misuse involves the excessive use of alcohol or the use of drugs in a non-prescribed manner to achieve an altered physiological state. Misuse of alcohol or other drugs over time can lead to physical and/or psychological dependence on these substances and increased risk of morbidity and death.

- In 2016, alcohol was cited most often as a primary, secondary, or tertiary drug of misuse among unique-person treatment admissions in Boston, with a rate of 71.3 admissions per 10,000 residents ages 12 and older.
  - *Between 2012 and 2016, drug-specific unique-person treatment admissions rates decreased by 25% for alcohol, 29% for cocaine, 17% for marijuana, and 26% for prescription drugs.*
  - *There was no change in the rate of heroin treatment admissions.*
- In 2015, the rate of hospital patient encounters involving substance misuse-related unintentional overdoses/poisonings was 26.6 encounters per 10,000 residents ages 12 and older.
  - *From 2011 to 2015, the rate increased by 13%.*
  - *The rate for drug-related unintentional overdoses/poisonings increased by 40%, while the rate for alcohol-related overdoses/poisonings decreased by 68%.*



- By drug type, the rates of hospital patient encounters for unintentional overdoses/poisonings in 2015 were 18.1 per 10,000 residents ages 12 and older for opioids, 2.1 for cocaine, and 3.1 for benzodiazepines.  
— *From 2011 to 2015, the opioid overdose rate increased by 94% and the cocaine overdose rate decreased by 21%.*
- In 2015, the substance misuse mortality rate in Boston was 39.8 deaths per 100,000 residents ages 12 and older. From 2011 to 2015, the rate increased 54% for Boston overall.  
— *Rates also increased by 83% for Black residents, 73% for Latino residents, and 42% for White residents during this same time period.*
- From 2011 to 2015, the overall substance misuse, alcohol misuse, and drug misuse mortality rates increased by 54%, 49%, and 71%, respectively.  
— *When excluding deaths related to fentanyl use, there was no change in the substance misuse mortality rate overall or by type of substance used (e.g., drug or alcohol).*
- In 2015, the opioid (including heroin) and cocaine unintentional overdose mortality rates were 25.8 and 11.4 per 100,000 residents ages 12 and older, respectively.  
— *From 2011 to 2015, the overdose mortality rates for all drugs, opioids, and cocaine increased by 108%, 130%, and 130%, respectively, but when excluding deaths related to fentanyl use, there was no significant change over this time period for any of these three substances.*
- In 2015, the rate of unintentional overdose mortality due to fentanyl use alone or in combination with other drugs was 16.2 deaths per 100,000 residents ages 12 and older compared with 1.1 in 2011. From 2011 to 2015, the rate increased more than 40 times.



## Deaths

As death is related to aging, the death data in this report are age-adjusted in order to account for differences in age distributions of underlying population groups (e.g. Boston Latinos as a group are younger than Boston non-Latino residents). Of major concern are the factors that contribute to or cause premature death (death before age 65), which rob our city of many individuals and their potential contributions well before what should have been their time.

- The average life expectancy in Boston is 80 years of age, and is higher for females (83) than males (74).
- The 2015 life expectancy data show that Asian and Latino individuals, on average, have higher life expectancies than both Black and White individuals.
- In 2015, the premature mortality rate for Black residents (267.5 deaths per 100,000 residents under age 65) was 31% higher than the rate for White residents (204.1). The rates for Asian (81.1) and for Latino (172.8) residents were 60% and 15% lower, respectively, compared with the rate for White residents.
- For 2011-2015, cancer was the leading cause of premature mortality (death under age 65) for females and males of all racial/ethnic groups.
  - Heart disease was the second leading cause of premature mortality for Black and Latino females, and for Asian, Black, and White males.
  - Accidents, which includes unintentional overdose deaths, was the second leading cause of premature mortality for White females and Latino males.
- In 2015, unintentional opioid overdoses accounted for 71% of deaths due to accidents for residents under age 65 and would rank third if explicitly specified within the ranking scheme.
- From 2011 to 2015, the top two leading causes of mortality in Boston were cancer and heart disease.







# Summary Tables



## Social Determinants of Health

### Social Determinants of Health – Education Comparisons within Racial/Ethnic Group and Sex

	Asian	Black	Latino	White	Female	Male
Educational Attainment, Less than High School Diploma, 2015	↑	↑	↑	ref		
Median Earnings by Educational Attainment, Less than High School Diploma, 2015					↓	ref
Population Living Below Poverty Level by Educational Attainment, Less than High School Diploma, 2015					↑	ref
Computer Access, 2015	↔	↓	↓	ref		
Internet Access, 2015	↔	↓	↓	ref		

ref = reference group  
 ↑ higher than reference group  
 ↓ lower than reference group  
 ↔ similar to reference group

### Social Determinants of Health – Employment Comparisons within Racial/Ethnic Group and Sex

	Asian	Black	Latino	White	Female	Male
Unemployment Rate, 2015	↔	↑	↑	ref	↓	ref
Labor Force Participation Rate, 2015	↓	↓	↓	ref	↓	ref
Full-Time Employment Status, 2015					↓	ref

ref = reference group  
 ↑ higher than reference group  
 ↓ lower than reference group  
 ↔ similar to reference group

### Social Determinants of Health – Income and Poverty Comparisons within Racial/Ethnic Group and Sex

	Asian	Black	Latino	White	Female	Male
Median Household Income, 2015	↓	↓	↓	ref		
Poverty Living Below Poverty Level, 2015	↑	↑	↑	ref	↑	ref
SNAP Benefits in the Past 12 Months, 2015	↑	↑	↑	ref		

ref = reference group  
 ↑ higher than reference group  
 ↓ lower than reference group

## Social Determinants of Health

### Social Determinants of Health – Housing Comparisons within Racial/Ethnic Group and Sex

	Asian	Black	Latino	White	Female	Male
Renter-Occupied Housing Tenure, 2015	↑	↑	↑	ref		
Gross Monthly Rent (Paid \$2,000 or More in Rent per Month), 2015	↓	↓	↓	ref		

ref = reference group  
 ↑ higher than reference group  
 ↓ lower than reference group

### Social Determinants of Health – Bias and Racism Comparisons within Racial/Ethnic Group and Sex

	Asian	Black	Latino	White	Female	Male
Adults Who Felt Emotionally Upset by Perceived Race-Related Treatment in the Past 30 Days, 2015	↑	↑	↑	ref		
Adults Who Experienced Physical Symptoms Based on Perceived Race-Related Treatment in the Past 30 Days, 2015	↑	↑	↑	ref		
Adults who Felt They Were Stopped by Police Based on Their Race/Ethnicity, 2015	‡	↑	↑	ref		

‡ Data not presented due to insufficient sample size  
 ref = reference group  
 ↑ higher than reference group

## Environmental Health

### Environmental Health Comparisons within Racial/Ethnic Group and Sex

	Asian	Black	Latino	White	Female	Male
Heat-Related Illness ED Visits From May to September, 2012-2015	↔	↔	↔	ref	↓	ref
Cold-Related Illness ED Visits During Cold-Weather Months, 2012-2015	↓	↑	↓	ref	↓	ref
Asthma ED Visits Among 5- to 17-Year-Olds, 2015	↓	↑	↑	ref	↓	ref
Asthma Hospitalizations Among 5- to 17-Year-Olds, 2015	‡	↑	↑	ref	↓	ref
Adults Who Reported Environmental Tobacco Smoke Exposure at Home, 2013 and 2015 Combined	↑	↑	↔	ref	↔	ref
Carbon Monoxide Poisoning ED Visits, 2012-2015	↔	↑	↔	ref	↑	ref

‡ Rates not presented due to a small number of cases

ref = reference group

↑ higher than reference group

↓ lower than reference group

↔ similar to reference group

### Environmental Health Change Over Time

	Boston	Asian	Black	Latino	White	Female	Male
Heat-Related Illness ED Visits From May to September, 2011-2015	↔						
Cold-Related Illness ED Visits During Cold-Weather Months, 2011-2015	↑						
Asthma ED Visits Among 5- to 17-Year-Olds, 2011-2015	↑	↔	↔	↔	↑	↔	↑
Asthma Hospitalizations Among 5- to 17-Year-Olds, 2011-2015	↓	‡	↔	↓	↔	↓	↓
Adults Exposed to Environmental Tobacco Smoke at Home, 2005-2015	↓						
Carbon Monoxide Poisoning ED Visits, 2011-2015	↓						

‡ Rates not presented due to a small number of cases

↑ increase over time

↓ decrease over time

↔ no change over time

## Access to Care

Access to Care Comparisons within Racial/Ethnic Group and Sex						
	Asian	Black	Latino	White	Female	Male
Uninsured, 2011-2015	↔	↔	↔	ref	↓	ref
Could Not Afford to See Doctor in the Past 12 Months, 2013 and 2015 Combined	↔	↑	↑	ref	↔	ref
Has Personal Doctor or Health Care Provider, 2013 and 2015 Combined	↓	↔	↓	ref	↑	ref
No Usual Place for Health Care, 2015	↔	↔	↔	ref	↓	ref
Dental Insurance, 2015	↓	↔	↓	ref	↔	ref
Loss of One or More Teeth, 2015	↔	↑	↑	ref	↔	ref

ref = reference group  
 ↑ higher than reference group  
 ↓ lower than reference group  
 ↔ similar to reference group

Access to Care Change Over Time	
	Boston
Dental Insurance, 2003-2015	↑

↑ increase over time

# Maternal and Child Health

Maternal and Child Health Comparisons within Racial/Ethnic Group and Sex				
	Asian	Black	Latino	White
Birth Rate, 2015	↑	↑	↑	ref
Adolescent Births, Ages 15-17, 2015	‡	↔	↔	ref
Adolescent Births, Ages 18-19, 2015	‡	↑	↑	ref
Low Birthweight Births, 2015	↑	↑	↑	ref
Preterm Births, 2015	↔	↑	↑	ref
Infant Mortality, 2015	‡	↑	↑	ref

‡ Rates not presented due to a small number of cases  
 ref = reference group  
 ↑ higher than reference group  
 ↓ lower than reference group  
 ↔ similar to reference group

Maternal and Child Health Change Over Time					
	Boston	Asian	Black	Latino	White
Birth Rate, 2011-2015	↓	↔	↓	↓	↓
Adolescent Births, Ages 15-17, 2011-2015	↓	‡	↓	↓	↔
Adolescent Births, Ages 18-19, 2011-2015	↓	‡	↓	↓	↓
Repeat Adolescent Births, Ages 15-19, 2011-2015	↔	‡	↔	↔	‡
Low Birthweight Births, 2011-2015	↔	↔	↔	↔	↔
Preterm Births, 2011-2015	↔	↔	↔	↔	↔
Infant Mortality, 2006-2015	↔	‡	↓	↔	↔
Neonatal Infant Mortality, 2006-2015	↔				
Postneonatal Infant Mortality, 2006-2015	↔				

‡ Rates not presented due to a small number of cases  
 ↑ increase over time  
 ↓ decrease over time  
 ↔ no change over time

## Health-Related Behaviors

Health-Related Behaviors Comparisons within Racial/Ethnic Group and Sex						
	Asian	Black	Latino	White	Female	Male
Public HS Students Who Consumed Fruit Less Than Once per Day, 2015	↔	↔	↑	ref	↑	ref
Adults Who Consumed Fruit Less Than Once per Day, 2015	↔	↑	↑	ref	↔	ref
Public HS Students Who Consumed Vegetables Less Than Once per Day, 2015	↔	↑	↑	ref	↔	ref
Adults Who Consumed Vegetables Less Than Once Per Day, 2015	↑	↑	↑	ref	↓	ref
Public HS Students Who Engaged in Regular Physical Activity, 2015	↓	↔	↔	ref	↓	ref
Adults Who Met CDC Guidelines for Physical Activity, 2015	↔	↔	↓	ref	↔	ref
Daily Consumption of 1 or 1+ Sugar-Sweetened Beverages Among Public HS Students, 2015	↓	↔	↔	ref	↓	ref
Daily Consumption of 1 or 1+ Sugar-Sweetened Beverages Among Adults, 2015	↔	↑	↑	ref	↓	ref
Public HS Students Who Smoked Cigarettes, 2011, 2013, and 2015 Combined	↓	↓	↓	ref	↓	ref
Adults Who Smoked Cigarettes, 2015	↔	↔	↔	ref	↓	ref
Binge Drinking Among Public HS Students, 2013 and 2015 Combined	↓	↓	↔	ref	↔	ref
Binge Drinking Among Adults, 2015	↓	↓	↓	ref	↓	ref
Marijuana Use in Past 30 Days Among Public HS Students, 2015	↓	↔	↔	ref	↔	ref
Non-Medical Marijuana Use Among Adults, 2015	‡	↔	↓	ref	↓	ref

‡ Data not presented due to insufficient sample size  
 ref = reference group  
 ↑ higher than reference group  
 ↓ lower than reference group  
 ↔ similar to reference group

Health-Related Behaviors Change Over Time	
	Boston
Public HS Students Who Consumed Fruit Less Than Once per Day, 2009- 2015	↔
Adults Who Consumed Fruit Less Than Once per Day, 2013-2015	↑
Public HS Students Who Consumed Vegetables Less Than Once per Day, 2009-2015	↔
Adults Who Consumed Vegetables Less Than Once per Day, 2013-2015	↔
Public HS Students Who Engaged in Regular Physical Activity, 2007-2015	↔
Adults Who Met CDC Guidelines for Physical Activity, 2013-2015	↓
Daily Consumption of 1 or 1+ Sugar-Sweetened Beverages Among Adults, 2013-2015	↔
Public HS Students Who Smoked Cigarettes, 2007-2015	↓
Adults Who Smoked Cigarettes, 2006-2015	↔
Binge Drinking Among Public HS Students, 2007-2015	↓
Binge Drinking Among Adults, 2006-2015	↔
Marijuana Use in Past 30 Days Among Public HS Students, 2007-2015	↑

↑ increase over time  
 ↓ decrease over time  
 ↔ no change over time

## Chronic Disease

Chronic Disease Comparisons within Racial/Ethnic Group and Sex						
	Asian	Black	Latino	White	Female	Male
Asthma Among Public High School Students, 2013	↔	↔	↔	ref	↔	ref
Asthma Among Adults, 2013 and 2015 Combined	↓	↑	↑	ref	↑	ref
Asthma ED Visits, 2015	↓	↑	↑	ref	↓	ref
Asthma ED Visits Among 3- to 5-Year-Olds, 2015	↔	↑	↑	ref		
Asthma Hospitalizations, 2015	↔	↑	↑	ref	↔	ref
Diabetes Among Adults, 2013 and 2015 Combined	↔	↑	↑	ref	↔	ref
Diabetes Hospitalizations, 2015	↓	↑	↑	ref	↓	ref
Diabetes Mortality, 2015	‡	↑	↔	ref	↔	ref
Heart Disease Hospitalizations, 2015	↓	↑	↔	ref	↓	ref
Heart Disease Mortality, 2015	↓	↔	↓	ref	↓	ref
Hypertension Among Adults, 2015	↔	↑	↑	ref	↔	ref
Obesity Among Public HS Students, 2015	↔	↑	↔	ref	↓	ref
Obesity Among Adults, 2015	↓	↑	↑	ref	↑	ref

‡ Rates not presented due to a small number of cases  
 ref = reference group  
 ↑ higher than reference group  
 ↓ lower than reference group  
 ↔ similar to reference group

Chronic Disease Change Over Time							
	Boston	Asian	Black	Latino	White	Female	Male
Asthma Among Public HS Students, 2005-2013	↔						
Asthma Among Adults, 2006-2015	↔						
Asthma ED Visits, 2011-2015	↓	↔	↓	↔	↔	↓	↔
Asthma ED Visits Among 3- to 5-Year-Olds, 2011-2015	↑	↔	↔	↔	↑		
Asthma Hospitalizations, 2011-2015	↓	↓	↓	↓	↓	↓	↓
Asthma Hospitalization Among 3- to 5-Year-Olds, 2011-2015	↔	‡	↔	↓	‡		
Diabetes Among Adults, 2006-2015	↑						
Diabetes Hospitalizations, 2011-2015	↔	↔	↔	↓	↔		
Diabetes Mortality, 2011-2015	↔	‡	↔	↑	↔	↔	↔
Heart Disease Hospitalizations, 2011-2015	↓	↔	↓	↓	↓		
Heart Disease Mortality, 2011-2015	↔	↑	↔	↔	↔	↔	↔
Hypertension Among Adults, 2006-2015	↔						
Obesity Among Public HS Students, 2007-2015	↔						
Obesity Among Adults, 2006-2015	↔						

‡ Rates not presented due to a small number of cases  
 ↑ increase over time  
 ↓ decrease over time  
 ↔ no change over time



# Cancer

Cancer Comparisons within Racial/Ethnic Group and Sex						
	Asian	Black	Latino	White	Female	Male
Mammogram in Past 2 Years, Ages 40-74, 2010, 2013, and 2015 Combined	↓	↑	↔	ref		
Pap Test in Past 3 Years, Ages 21-65, 2013 and 2015 Combined	↓	↓	↔	ref		
Sigmoidoscopy or Colonoscopy in Past 5 Years, Ages 50-75, 2013 and 2015 Combined	↓	↔	↔	ref	↔	ref
Cancer Mortality, 2015	↓	↔	↓	ref	↓	ref

ref = reference group  
 ↑ higher than reference group  
 ↓ lower than reference group  
 ↔ similar to reference group

Cancer Change Over Time							
	Boston	Asian	Black	Latino	White	Female	Male
Cancer Mortality, 2011-2015	↓	↔	↓	↔	↔	↔	↓

↑ increase over time  
 ↓ decrease over time  
 ↔ no change over time

## Infectious Disease

Infectious Disease Comparisons within Racial/Ethnic Group and Sex						
	Asian	Black	Latino	White	Female	Male
Hepatitis B Incidence, 2015	↑	↑	↔	ref	↓	ref
Hepatitis C Incidence, 2015	↓	↔	↓	ref	↓	ref
Influenza Incidence, 2015-2016 Season	↓	↑	↑	ref	↑	ref
Salmonella Incidence, 2015	↔	↔	↔	ref	↔	ref
Tuberculosis Incidence, 2014 and 2015 Combined	↑	↑	↑	ref	↔	ref

ref = reference group  
 ↑ higher than reference group  
 ↓ lower than reference group  
 ↔ similar to reference group

Infectious Disease Change Over Time	
	Boston
Hepatitis B Incidence, 2011-2015	↓
Hepatitis C Incidence, 2011-2015	↓
Influenza Incidence by Annual Season, 2013-2016	↔
Salmonella Incidence, 2011-2015	↑
Tuberculosis Incidence, 2011-2015	↔

↑ increase over time  
 ↓ decrease over time  
 ↔ no change over time

## Sexual Health

Sexual Health Comparisons within Racial/Ethnic Group and Sex						
	Asian	Black	Latino	White	Female	Male
Public HS Students Who Ever Had Sex, 2015	↔	↑	↑	ref		
Chlamydia, 2015	↔	↑	↑	ref	↑	ref
Gonorrhea, 2015	↓	↑	↑	ref	↓	ref
Newly Diagnosed Cases of HIV Infection, 2015	‡	↑	↑	ref	↓	ref
People Living with HIV/AIDS, 2015	‡	↑	↑	ref	↓	ref

‡ Rates not presented due to a small number of cases  
 ref = reference group  
 ↑ higher than reference group  
 ↓ lower than reference group  
 ↔ similar to reference group

Sexual Health Change Over Time							
	Boston	Asian	Black	Latino	White	Female	Male
Public HS Students Who Ever Had Sex, 2007-2015	↓	↔	↓	↓	↔		
Condom Use During Last Sex Among Public HS Students, 2007-2015	↓						
Chlamydia, 2014-2015	↓						
Gonorrhea, 2014-2015	↓						
Newly Diagnosed Cases of HIV Infection, 2011-2015	↓	‡	↓	↔	↓	↔	↓
People Living with HIV/AIDS, 2011-2015	↑	‡	↑	↔	↑	↔	↑

‡ Rates not presented due to a small number of cases  
 ↑ increase over time  
 ↓ decrease over time  
 ↔ no change over time

## Injury and Exposure to Violence

Injury and Exposure to Violence Comparisons within Racial/Ethnic Group and Sex						
	Asian	Black	Latino	White	Female	Male
Adults Who Thought Their Neighborhood Was Not Safe, 2015	↓	↑	↑	ref	↔	ref
Adults Who Experienced Physical or Sexual Violence in Their Lifetime, 2013 and 2015 Combined	↓	↔	↔	ref	↑	ref
Adults Who Were Sexually Assaulted in Their Lifetime, 2015	‡	↔	↓	ref	↑	ref
Bullied at School or Electronically in the Past 12 Months, 2015	↓	↔	↔	ref	↑	ref
All Injury ED Discharges, 2015	↓	↑	↑	ref	↓	ref
All Injury Mortality, 2014-2015	↓	↔	↓	ref	↓	ref
Unintentional Injury ED Discharges, 2015	↓	↑	↑	ref	↓	ref
Unintentional Injury Mortality, 2015	↓	↓	↓	ref	↓	ref
Elderly Fall ED Discharges, 2015	↓	↓	↓	ref	↑	ref
Elderly Fall Mortality, 2011-2015	↔	↓	↓	ref	↔	ref
Intentional Injury ED Discharges, 2014-2015	↓	↑	↑	ref	↓	ref
Intentional Injury Mortality, 2012-2015	↔	↑	↔	ref	↓	ref
Assault Injury ED Discharges, 2014-2015	↓	↑	↑	ref	↓	ref
Homicide Mortality, 2011-2015	‡	↑	↑	ref	↓	ref

‡ Data not presented due to insufficient sample size or due to a small number of cases  
 ref = reference group  
 ↑ higher than reference group  
 ↓ lower than reference group  
 ↔ similar to reference group

Injury and Exposure to Violence Change Over Time	
	Boston
All Injury ED Discharges, 2006-2015	↓
All Injury Mortality, 2006-2015	↔
Unintentional Injury ED Discharges, 2006-2015	↓
Unintentional Injury Mortality, 2006-2015	↔
Elderly Fall ED Discharges, 2006-2015	↓
Elderly Fall Mortality, 2006-2015	↑
Intentional Injury ED Discharges, 2006-2015	↓
Intentional Injury Mortality, 2006-2015	↓
Assault Injury ED Discharges, 2006-2015	↓
Homicide Mortality, 2006-2015	↓

↑ increase over time  
 ↓ decrease over time  
 ↔ no change over time

# Mental Health

## Mental Health

### Comparisons within Racial/Ethnic Group and Sex

	Asian	Black	Latino	White	Female	Male
Persistent Sadness Among Public HS Students, 2013 and 2015 Combined	↔	↔	↔	ref	↑	ref
Persistent Sadness Among Adults, 2013 and 2015 Combined	↔	↑	↑	ref	↑	ref
Persistent Anxiety Among Adults, 2015	↔	↔	↔	ref	↔	ref
Mental Health Hospitalizations, 2015	↓	↓	↓	ref	↓	ref
Suicide, 2015	‡	↔	‡	ref	↓	ref

‡ Rates not presented due to a small number of cases  
 ref = reference group  
 ↑ higher than reference group  
 ↓ lower than reference group  
 ↔ similar to reference group

## Mental Health

### Change Over Time

	Boston	Asian	Black	Latino	White	Female	Male
Persistent Sadness Among Public HS Students, 2007-2015	↔						
Persistent Sadness Among Adults, 2006-2015	↔						
Persistent Anxiety Among Adults, 2006-2015	↑						
Mental Health Hospitalizations, 2011-2015	↓	↔	↔	↔	↔		
Suicide, 2011-2015	↔	‡	↔	‡	↔	↔	↔

↑ increase over time  
 ↓ decrease over time  
 ↔ no change over time

## Substance Use Disorder

Substance Use Disorders Comparisons within Racial/Ethnic Group and Sex						
	Asian	Black	Latino	White	Female	Male
Unique-Persons Treatment Admissions, 2016	↓	↓	↓	ref		
Substance Misuse Mortality, 2015	‡	↓	↓	ref		
Unintentional Drug Overdose Mortality, All Drugs, 2015	‡	↓	↓	ref	↓	ref
Unintentional Drug Overdose Mortality, Opioids (Including Heroin), 2015	‡	↓	↓	ref	↓	ref
Unintentional Drug Overdose Mortality, Cocaine, 2015	‡	↔	↔	ref	↓	ref

‡ Rates not presented due to a small number of cases  
 ref = reference group  
 ↓ lower than reference group  
 ↔ similar to reference group

Substance Use Disorders Change Over Time					
	Boston	Asian	Black	Latino	White
Substance Misuse Treatment Admissions by Year, All Admissions, 2012-2016	↓				
Substance Misuse Treatment Admissions, Unique-Persons, 2012-2016	↓	↔	↓	↓	↓
Unintentional Overdose/Poisoning Hospital Patient Encounters, Overall, 2011-2015	↑				
Substance Misuse Mortality, Overall, 2011-2015	↑	‡	↑	↑	↑
Substance Misuse Mortality (Excluding Fentanyl), Overall, 2011-2015	↔				
Unintentional Drug Overdose Mortality, All Drugs, 2011-2015	↑				
Unintentional Drug Overdose Mortality, Opioids (Including Heroin), 2011-2015	↑				
Unintentional Drug Overdose Mortality, Cocaine, 2011-2015	↑				
Unintentional Drug Overdose Mortality (Due to Fentanyl or Other Drugs), Fentanyl (Alone or in Combination), 2011-2015	↑				
Unintentional Drug Overdose Mortality (Due to Fentanyl or Other Drugs), Other Opioids Including Heroin (Excluding Fentanyl), 2011-2015	↔				
Unintentional Drug Overdose Mortality (Due to Fentanyl or Other Drugs), Cocaine (Excluding Fentanyl), 2011-2015	↔				

↑ increase over time  
 ↓ decrease over time  
 ↔ no change over time

# Deaths

Death Comparisons within Racial/Ethnic Group and Sex						
	Asian	Black	Latino	White	Female	Male
Premature Mortality, 2015	↓	↑	↓	ref	↓	ref
All-Cause Mortality, 2015	↓	↔	↓	ref	↓	ref

ref = reference group  
 ↑ higher than reference group  
 ↓ lower than reference group  
 ↔ similar to reference group

Death Change Over Time					
	Boston	Asian	Black	Latino	White
Premature Mortality, 2011-2015	↔	↔	↔	↔	↔
All-Cause Mortality, 2011-2015	↔	↔	↔	↔	↔

↔ no change over time

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## Allston/ Brighton

<b>Table 1a Allston/Brighton</b> Comparison of Neighborhood with Boston	
	Comparison with Boston
<b>Social Determinants of Health</b>	
Educational Attainment, Less than High School Diploma, 2011-2015*	↓
Unemployment Rate, 2011-2015*	↓
Employment in Management, Business, Science, and Art Occupations, 2011-2015 *	↑
Percent of Population Living Below Poverty Level, 2011-2015 *	↑
SNAP Benefits in the Past 12 Months, 2011-2015*	↓
Renter-Occupied Housing Tenure, 2011-2015*	↑
Gross Monthly Rent (Paid \$2,000 or More in Rent per Month), 2011-2015*	↑
30% or More of Household Income Paid Toward Gross Monthly Rent, 2011-2015*	↑
<b>Environmental Health</b>	
Cold-Related Illness ED Visits During Cold-Weather Months, 2011-2015	↓
Asthma ED Visits Among 5- to 17-Year-Olds, 2014-2015	↓
Asthma Hospitalizations Among 5- to 17-Year-Olds, 2011-2015	↓
Adults Who Reported Environmental Tobacco Smoke Exposure at Home, 2010, 2013 and 2015 Combined	↔
Housing Overcrowding, 2011-2015*	↓
<b>Access to Care</b>	
Uninsured, 2011-2015*	↔
<b>Maternal and Child Health</b>	
Low Birthweight Births, 2014-2015	↔
Preterm Births, 2014-2015	↔
Infant Mortality, 2006-2015	↔
<b>Health-Related Behaviors</b>	
Adults Who Consumed Fruit Less Than Once per Day, 2013 and 2015 Combined	↔
Adults Who Consumed Vegetables Less Than Once Per Day, 2013 and 2015 Combined	↔
Adults Who Met CDC Guidelines for Physical Activity, 2013 and 2015 Combined	↔
Daily Consumption of One or More Sugar-Sweetened Beverages Among Adults, 2013 and 2015 Combined	↔
Adults Who Smoked Cigarettes, 2013 and 2015 Combined	↔
Binge Drinking Among Adults, 2013 and 2015 Combined	↑
<b>Chronic Disease</b>	
Asthma Among Adults, 2010, 2013, and 2015 Combined	↔
Asthma Emergency Department Visits Among 3- to 5-Year-Olds, 2012-2015	↓
Diabetes Among Adults, 2010, 2013, and 2015 Combined	↓
Diabetes Hospitalizations, 2015	↔
Diabetes Mortality, 2011-2015	↓
Heart Disease Hospitalizations, 2015	↓
Heart Disease Mortality, 2015	↔
Hypertension Among Adults, 2013 and 2015 Combined	↓
Obesity Among Adults, 2013 and 2015 Combined	↓
<p>* Compared to Boston overall            ↑ higher than rest of Boston            ↓ lower than rest of Boston            ↔ similar to rest of Boston</p> <p>NOTE: "Rest of Boston" refers to the combined estimate/rate for all other 14 Boston neighborhoods excluding the indicated neighborhood.</p>	

## Allston/ Brighton

**Table 1b Allston/Brighton**  
Comparison of Neighborhood with Boston

	Comparison with Boston
<b>Infectious Disease</b>	
Hepatitis B Incidence, 2011-2015	↓
Hepatitis C Incidence, 2011-2015	↓
Influenza Incidence, 2015-2016 Season	↓
Salmonella Incidence, 2011-2015	↔
<b>Sexual Health</b>	
Chlamydia Incidence, 2015	↓
Gonorrhea Incidence, 2015	↓
<b>Injury and Exposure to Violence</b>	
All Injury ED Discharges, 2015	↓
All Injury Hospitalizations, 2015	↓
All Injury Mortality, 2013-2015	↓
Unintentional Injury ED Discharges, 2015	↓
Unintentional Injury Hospitalizations, 2015	↔
Unintentional Injury Mortality, 2012-2015	↓
Elderly Fall ED Discharges, 2015	↑
Elderly Fall Hospitalizations, 2014-2015	↑
Intentional Injury ED Discharges, 2015	↓
Intentional Injury Hospitalizations, 2014-2015	↓
Assault Injury ED Discharges, 2015	↓
Assault Injury Hospitalizations, 2011-2015	↓
Homicide, 2011-2015	↓
<b>Mental Health</b>	
Persistent Sadness Among Adults, 2013 and 2015 Combined	↔
Persistent Anxiety Among Adults, 2013 and 2015 Combined	↔
Mental Health Hospitalizations, 2015	↑
Suicide, 2011-2015	↔
<b>Substance Use Disorders</b>	
Substance Misuse Mortality, 2011-2015	↓
Unintentional Opioid Overdose Mortality, 2011-2015	↓
<b>Death</b>	
Life Expectancy at Birth, 2011-2015*	↑
Premature Mortality, 2015	↓
All-Cause Mortality, 2015	↓
<p>* Compared to Boston overall            ↑ higher than rest of Boston            ↓ lower than rest of Boston            ↔ similar to rest of Boston</p> <p>NOTE: "Rest of Boston" refers to the combined estimate/rate for all other 14 Boston neighborhoods excluding the indicated neighborhood.</p>	

## Back Bay

<b>Table 2a Back Bay<sup>1</sup></b>	
Comparison of Neighborhood with Boston	
	Comparison with Boston
<b>Social Determinants of Health</b>	
Educational Attainment, Less than High School Diploma, 2011-2015*	↓
Unemployment Rate, 2011-2015*	↓
Employment in Management, Business, Science, and Art Occupations, 2011-2015 *	↑
Percent of Population Living Below Poverty Level, 2011-2015 *	↓
SNAP Benefits in the Past 12 Months, 2011-2015*	↓
Renter-Occupied Housing Tenure, 2011-2015*	↔
Gross Monthly Rent (Paid \$2,000 or More in Rent per Month), 2011-2015*	↑
30% or More of Household Income Paid Toward Gross Monthly Rent, 2011-2015*	↓
<b>Environmental Health</b>	
Cold-Related Illness ED Visits During Cold-Weather Months, 2011-2015	↔
Asthma ED Visits Among 5- to 17-Year-Olds, 2014-2015	↓
Asthma Hospitalizations Among 5- to 17-Year-Olds, 2011-2015	↓
Adults Who Reported Environmental Tobacco Smoke Exposure at Home, 2010, 2013 and 2015 Combined	↓
Housing Overcrowding, 2011-2015*	↓
<b>Access to Care</b>	
Uninsured, 2011-2015*	↓
<b>Maternal and Child Health</b>	
Low Birthweight Births, 2014-2015	↔
Preterm Births, 2014-2015	↔
Infant Mortality, 2006-2015	↓
<b>Health-Related Behaviors</b>	
Adults Who Consumed Fruit Less Than Once per Day, 2013 and 2015 Combined	↓
Adults Who Consumed Vegetables Less Than Once Per Day, 2013 and 2015 Combined	↓
Adults Who Met CDC Guidelines for Physical Activity, 2013 and 2015 Combined	↑
Daily Consumption of One or More Sugar-Sweetened Beverages Among Adults, 2013 and 2015 Combined	↓
Adults Who Smoked Cigarettes, 2013 and 2015 Combined	↓
Binge Drinking Among Adults, 2013 and 2015 Combined	↔
<b>Chronic Disease</b>	
Asthma Among Adults, 2010, 2013, and 2015 Combined	↔
Asthma Emergency Department Visits Among 3- to 5-Year-Olds, 2012-2015	↓
Diabetes Among Adults, 2010, 2013, and 2015 Combined	↓
Diabetes Hospitalizations, 2015	↓
Diabetes Mortality, 2011-2015	↓
Heart Disease Hospitalizations, 2015	↓
Heart Disease Mortality, 2015	↔
Hypertension Among Adults, 2013 and 2015 Combined	↓
Obesity Among Adults, 2013 and 2015 Combined	↓
<p><sup>1</sup> Includes the Back Bay, Beacon Hill, Downtown, the North End, and the West End</p> <p>* Compared to Boston overall</p> <p>↑ higher than rest of Boston</p> <p>↓ lower than rest of Boston</p> <p>↔ similar to rest of Boston</p> <p>NOTE: "Rest of Boston" refers to the combined estimate/rate for all other 14 Boston neighborhoods excluding the indicated neighborhood.</p>	

## Back Bay

**Table 2b Back Bay<sup>1</sup>**  
Comparison of Neighborhood with Boston

	Comparison with Boston
<b>Infectious Disease</b>	
Hepatitis B Incidence, 2011-2015	↓
Hepatitis C Incidence, 2011-2015	↓
Influenza Incidence, 2015-2016 Season	↓
Salmonella Incidence, 2011-2015	↔
<b>Sexual Health</b>	
Chlamydia Incidence, 2015	↓
Gonorrhea Incidence, 2015	↓
<b>Injury and Exposure to Violence</b>	
All Injury ED Discharges, 2015	↓
All Injury Hospitalizations, 2015	↔
All Injury Mortality, 2013-2015	↔
Unintentional Injury ED Discharges, 2015	↓
Unintentional Injury Hospitalizations, 2015	↔
Unintentional Injury Mortality, 2012-2015	↔
Elderly Fall ED Discharges, 2015	↔
Elderly Fall Hospitalizations, 2014-2015	↔
Intentional Injury ED Discharges, 2015	↓
Intentional Injury Hospitalizations, 2014-2015	↔
Assault Injury ED Discharges, 2015	↓
Assault Injury Hospitalizations, 2011-2015	↓
Homicide, 2011-2015	‡
<b>Mental Health</b>	
Persistent Sadness Among Adults, 2013 and 2015 Combined	↓
Persistent Anxiety Among Adults, 2013 and 2015 Combined	↔
Mental Health Hospitalizations, 2015	↑
Suicide, 2011-2015	↔
<b>Substance Use Disorders</b>	
Substance Misuse Mortality, 2011-2015	↓
Unintentional Opioid Overdose Mortality, 2011-2015	↔
<b>Death</b>	
Life Expectancy at Birth, 2011-2015*	↑
Premature Mortality, 2015	↓
All-Cause Mortality, 2015	↓

<sup>1</sup> Includes the Back Bay, Beacon Hill, Downtown, the North End, and the West End

\* Compared to Boston overall

‡ Data not presented due to a small number of cases or insufficient sample size

↑ higher than rest of Boston

↓ lower than rest of Boston

↔ similar to rest of Boston

NOTE: "Rest of Boston" refers to the combined estimate/rate for all other 14 Boston neighborhoods excluding the indicated neighborhood.

## Charlestown

Table 3a Charlestown Comparison of Neighborhood with Boston	
	Comparison with Boston
<b>Social Determinants of Health</b>	
Educational Attainment, Less than High School Diploma, 2011-2015*	↓
Unemployment Rate, 2011-2015*	↓
Employment in Management, Business, Science, and Art Occupations, 2011-2015 *	↑
Percent of Population Living Below Poverty Level, 2011-2015 *	↔
SNAP Benefits in the Past 12 Months, 2011-2015*	↔
Renter-Occupied Housing Tenure, 2011-2015*	↓
Gross Monthly Rent (Paid \$2,000 or More in Rent per Month), 2011-2015*	↑
30% or More of Household Income Paid Toward Gross Monthly Rent, 2011-2015*	↓
<b>Environmental Health</b>	
Cold-Related Illness ED Visits During Cold-Weather Months, 2011-2015	‡
Asthma ED Visits Among 5- to 17-Year-Olds, 2014-2015	↔
Asthma Hospitalizations Among 5- to 17-Year-Olds, 2011-2015	↔
Adults Who Reported Environmental Tobacco Smoke Exposure at Home, 2010, 2013 and 2015 Combined	↓
Housing Overcrowding, 2011-2015*	↔
<b>Access to Care</b>	
Uninsured, 2011-2015*	↓
<b>Maternal and Child Health</b>	
Low Birthweight Births, 2014-2015	↔
Preterm Births, 2014-2015	↔
Infant Mortality, 2006-2015	↔
<b>Health-Related Behaviors</b>	
Adults Who Consumed Fruit Less Than Once per Day, 2013 and 2015 Combined	↓
Adults Who Consumed Vegetables Less Than Once Per Day, 2013 and 2015 Combined	↔
Adults Who Met CDC Guidelines for Physical Activity, 2013 and 2015 Combined	↑
Daily Consumption of One or More Sugar-Sweetened Beverages Among Adults, 2013 and 2015 Combined	↓
Adults Who Smoked Cigarettes, 2013 and 2015 Combined	↓
Binge Drinking Among Adults, 2013 and 2015 Combined	↔
<b>Chronic Disease</b>	
Asthma Among Adults, 2010, 2013, and 2015 Combined	↔
Asthma Emergency Department Visits Among 3- to 5-Year-Olds, 2012-2015	↔
Diabetes Among Adults, 2010, 2013, and 2015 Combined	↓
Diabetes Hospitalizations, 2015	↓
Diabetes Mortality, 2011-2015	↔
Heart Disease Hospitalizations, 2015	↔
Heart Disease Mortality, 2015	↔
Hypertension Among Adults, 2013 and 2015 Combined	↓
Obesity Among Adults, 2013 and 2015 Combined	↔
<p>* Compared to Boston overall</p> <p>‡ Data not presented due to a small number of cases or insufficient sample size</p> <p>↑ higher than rest of Boston</p> <p>↓ lower than rest of Boston</p> <p>↔ similar to rest of Boston</p> <p>NOTE: "Rest of Boston" refers to the combined estimate/rate for all other 14 Boston neighborhoods excluding the indicated neighborhood.</p>	

## Charlestown

**Table 3b Charlestown**  
Comparison of Neighborhood with Boston

	Comparison with Boston
<b>Infectious Disease</b>	
Hepatitis B Incidence, 2011-2015	↔
Hepatitis C Incidence, 2011-2015	↑
Influenza Incidence, 2015-2016 Season	↔
Salmonella Incidence, 2011-2015	↔
<b>Sexual Health</b>	
Chlamydia Incidence, 2015	↓
Gonorrhea Incidence, 2015	↔
<b>Injury and Exposure to Violence</b>	
All Injury ED Discharges, 2015	↓
All Injury Hospitalizations, 2015	↓
All Injury Mortality, 2013-2015	↔
Unintentional Injury ED Discharges, 2015	↓
Unintentional Injury Hospitalizations, 2015	↓
Unintentional Injury Mortality, 2012-2015	↔
Elderly Fall ED Discharges, 2015	↔
Elderly Fall Hospitalizations, 2014-2015	↔
Intentional Injury ED Discharges, 2015	↓
Intentional Injury Hospitalizations, 2014-2015	↔
Assault Injury ED Discharges, 2015	↓
Assault Injury Hospitalizations, 2011-2015	↓
Homicide, 2011-2015	↔
<b>Mental Health</b>	
Persistent Sadness Among Adults, 2013 and 2015 Combined	↓
Persistent Anxiety Among Adults, 2013 and 2015 Combined	↔
Mental Health Hospitalizations, 2015	↓
Suicide, 2011-2015	‡
<b>Substance Use Disorders</b>	
Substance Misuse Mortality, 2011-2015	↑
Unintentional Opioid Overdose Mortality, 2011-2015	↔
<b>Death</b>	
Life Expectancy at Birth, 2011-2015*	↔
Premature Mortality, 2015	↔
All-Cause Mortality, 2015	↔

\* Compared to Boston overall

‡ Data not presented due to a small number of cases or insufficient sample size

↑ higher than rest of Boston

↓ lower than rest of Boston

↔ similar to rest of Boston

NOTE: "Rest of Boston" refers to the combined estimate/rate for all other 14 Boston neighborhoods excluding the indicated neighborhood.

## Dorchester (zipcodes 02121, 02125)

Table 4a Dorchester (zip codes 02121, 02125)

Comparison of Neighborhood with Boston

	Comparison with Boston
<b>Social Determinants of Health</b>	
Educational Attainment, Less than High School Diploma, 2011-2015*	↑
Unemployment Rate, 2011-2015*	↑
Employment in Management, Business, Science, and Art Occupations, 2011-2015 *	↓
Percent of Population Living Below Poverty Level, 2011-2015 *	↑
SNAP Benefits in the Past 12 Months, 2011-2015*	↑
Renter-Occupied Housing Tenure, 2011-2015*	↑
Gross Monthly Rent (Paid \$2,000 or More in Rent per Month), 2011-2015*	↓
30% or More of Household Income Paid Toward Gross Monthly Rent, 2011-2015*	↔
<b>Environmental Health</b>	
Cold-Related Illness ED Visits During Cold-Weather Months, 2011-2015	↔
Asthma ED Visits Among 5- to 17-Year-Olds, 2014-2015	↑
Asthma Hospitalizations Among 5- to 17-Year-Olds, 2011-2015	↑
Adults Who Reported Environmental Tobacco Smoke Exposure at Home, 2010, 2013 and 2015 Combined	↑
Housing Overcrowding, 2011-2015*	↔
<b>Access to Care</b>	
Uninsured, 2011-2015*	↑
<b>Maternal and Child Health</b>	
Low Birthweight Births, 2014-2015	↑
Preterm Births, 2014-2015	↔
Infant Mortality, 2006-2015	↑
<b>Health-Related Behaviors</b>	
Adults Who Consumed Fruit Less Than Once per Day, 2013 and 2015 Combined	↑
Adults Who Consumed Vegetables Less Than Once Per Day, 2013 and 2015 Combined	↔
Adults Who Met CDC Guidelines for Physical Activity, 2013 and 2015 Combined	↓
Daily Consumption of One or More Sugar-Sweetened Beverages Among Adults, 2013 and 2015 Combined	↑
Adults Who Smoked Cigarettes, 2013 and 2015 Combined	↑
Binge Drinking Among Adults, 2013 and 2015 Combined	↔
<b>Chronic Disease</b>	
Asthma Among Adults, 2010, 2013, and 2015 Combined	↑
Asthma Emergency Department Visits Among 3- to 5-Year-Olds, 2012-2015	↑
Diabetes Among Adults, 2010, 2013, and 2015 Combined	↑
Diabetes Hospitalizations, 2015	↑
Diabetes Mortality, 2011-2015	↑
Heart Disease Hospitalizations, 2015	↑
Heart Disease Mortality, 2015	↔
Hypertension Among Adults, 2013 and 2015 Combined	↑
Obesity Among Adults, 2013 and 2015 Combined	↑

\* Compared to Boston overall

↑ higher than rest of Boston

↓ lower than rest of Boston

↔ similar to rest of Boston

NOTE: "Rest of Boston" refers to the combined estimate/rate for all other 14 Boston neighborhoods excluding the indicated neighborhood.

## Dorchester (zipcodes 02121, 02125)

Table 4b Dorchester (zip codes 02121, 02125)

Comparison of Neighborhood with Boston

	Comparison with Boston
<b>Infectious Disease</b>	
Hepatitis B Incidence, 2011-2015	↑
Hepatitis C Incidence, 2011-2015	↑
Influenza Incidence, 2015-2016 Season	↑
Salmonella Incidence, 2011-2015	↓
<b>Sexual Health</b>	
Chlamydia Incidence, 2015	↑
Gonorrhea Incidence, 2015	↑
<b>Injury and Exposure to Violence</b>	
All Injury ED Discharges, 2015	↑
All Injury Hospitalizations, 2015	↔
All Injury Mortality, 2013-2015	↔
Unintentional Injury ED Discharges, 2015	↑
Unintentional Injury Hospitalizations, 2015	↔
Unintentional Injury Mortality, 2012-2015	↔
Elderly Fall ED Discharges, 2015	↓
Elderly Fall Hospitalizations, 2014-2015	↓
Intentional Injury ED Discharges, 2015	↑
Intentional Injury Hospitalizations, 2014-2015	↑
Assault Injury ED Discharges, 2015	↑
Assault Injury Hospitalizations, 2011-2015	↑
Homicide, 2011-2015	↑
<b>Mental Health</b>	
Persistent Sadness Among Adults, 2013 and 2015 Combined	↑
Persistent Anxiety Among Adults, 2013 and 2015 Combined	↔
Mental Health Hospitalizations, 2015	↓
Suicide, 2011-2015	↔
<b>Substance Use Disorders</b>	
Substance Misuse Mortality, 2011-2015	↔
Unintentional Opioid Overdose Mortality, 2011-2015	↔
<b>Death</b>	
Life Expectancy at Birth, 2011-2015*	↔
Premature Mortality, 2015	↑
All-Cause Mortality, 2015	↔

\* Compared to Boston overall

↑ higher than rest of Boston

↓ lower than rest of Boston

↔ similar to rest of Boston

NOTE: "Rest of Boston" refers to the combined estimate/rate for all other 14 Boston neighborhoods excluding the indicated neighborhood.



## Dorchester (zipcodes 02122, 02124)

**Table 5a Dorchester (zip codes 02122, 02124)**  
Comparison of Neighborhood with Boston

	Comparison with Boston
<b>Social Determinants of Health</b>	
Educational Attainment, Less than High School Diploma, 2011-2015*	↑
Unemployment Rate, 2011-2015*	↑
Employment in Management, Business, Science, and Art Occupations, 2011-2015 *	↓
Percent of Population Living Below Poverty Level, 2011-2015 *	↔
SNAP Benefits in the Past 12 Months, 2011-2015*	↑
Renter-Occupied Housing Tenure, 2011-2015*	↓
Gross Monthly Rent (Paid \$2,000 or More in Rent per Month), 2011-2015*	↓
30% or More of Household Income Paid Toward Gross Monthly Rent, 2011-2015*	↔
<b>Environmental Health</b>	
Cold-Related Illness ED Visits During Cold-Weather Months, 2011-2015	↔
Asthma ED Visits Among 5- to 17-Year-Olds, 2014-2015	↑
Asthma Hospitalizations Among 5- to 17-Year-Olds, 2011-2015	↑
Adults Who Reported Environmental Tobacco Smoke Exposure at Home, 2010, 2013 and 2015 Combined	↔
Housing Overcrowding, 2011-2015*	↔
<b>Access to Care</b>	
Uninsured, 2011-2015*	↑
<b>Maternal and Child Health</b>	
Low Birthweight Births, 2014-2015	↑
Preterm Births, 2014-2015	↑
Infant Mortality, 2006-2015	↑
<b>Health-Related Behaviors</b>	
Adults Who Consumed Fruit Less Than Once per Day, 2013 and 2015 Combined	↑
Adults Who Consumed Vegetables Less Than Once Per Day, 2013 and 2015 Combined	↑
Adults Who Met CDC Guidelines for Physical Activity, 2013 and 2015 Combined	↔
Daily Consumption of One or More Sugar-Sweetened Beverages Among Adults, 2013 and 2015 Combined	↔
Adults Who Smoked Cigarettes, 2013 and 2015 Combined	↔
Binge Drinking Among Adults, 2013 and 2015 Combined	↔
<b>Chronic Disease</b>	
Asthma Among Adults, 2010, 2013, and 2015 Combined	↔
Asthma Emergency Department Visits Among 3- to 5-Year-Olds, 2012-2015	↑
Diabetes Among Adults, 2010, 2013, and 2015 Combined	↔
Diabetes Hospitalizations, 2015	↑
Diabetes Mortality, 2011-2015	↑
Heart Disease Hospitalizations, 2015	↑
Heart Disease Mortality, 2015	↔
Hypertension Among Adults, 2013 and 2015 Combined	↑
Obesity Among Adults, 2013 and 2015 Combined	↑

\* Compared to Boston overall

↑ higher than rest of Boston

↓ lower than rest of Boston

↔ similar to rest of Boston

NOTE: "Rest of Boston" refers to the combined estimate/rate for all other 14 Boston neighborhoods excluding the indicated neighborhood.

## Dorchester (zipcodes 02122, 02124)

Table 5b Dorchester (zip codes 02122, 02124)

Comparison of Neighborhood with Boston

	Comparison with Boston
<b>Infectious Disease</b>	
Hepatitis B Incidence, 2011-2015	↑
Hepatitis C Incidence, 2011-2015	↑
Influenza Incidence, 2015-2016 Season	↑
Salmonella Incidence, 2011-2015	↔
<b>Sexual Health</b>	
Chlamydia Incidence, 2015	↑
Gonorrhea Incidence, 2015	↑
<b>Injury and Exposure to Violence</b>	
All Injury ED Discharges, 2015	↑
All Injury Hospitalizations, 2015	↑
All Injury Mortality, 2013-2015	↑
Unintentional Injury ED Discharges, 2015	↑
Unintentional Injury Hospitalizations, 2015	↔
Unintentional Injury Mortality, 2012-2015	↑
Elderly Fall ED Discharges, 2015	↔
Elderly Fall Hospitalizations, 2014-2015	↓
Intentional Injury ED Discharges, 2015	↑
Intentional Injury Hospitalizations, 2014-2015	↑
Assault Injury ED Discharges, 2015	↑
Assault Injury Hospitalizations, 2011-2015	↑
Homicide, 2011-2015	↑
<b>Mental Health</b>	
Persistent Sadness Among Adults, 2013 and 2015 Combined	↑
Persistent Anxiety Among Adults, 2013 and 2015 Combined	↔
Mental Health Hospitalizations, 2015	↔
Suicide, 2011-2015	↑
<b>Substance Use Disorders</b>	
Substance Misuse Mortality, 2011-2015	↑
Unintentional Opioid Overdose Mortality, 2011-2015	↑
<b>Death</b>	
Life Expectancy at Birth, 2011-2015*	↔
Premature Mortality, 2015	↑
All-Cause Mortality, 2015	↔

\* Compared to Boston overall

↑ higher than rest of Boston

↓ lower than rest of Boston

↔ similar to rest of Boston

NOTE: "Rest of Boston" refers to the combined estimate/rate for all other 14 Boston neighborhoods excluding the indicated neighborhood.

## East Boston

**Table 6a East Boston**  
Comparison of Neighborhood with Boston

	Comparison with Boston
<b>Social Determinants of Health</b>	
Educational Attainment, Less than High School Diploma, 2011-2015*	↑
Unemployment Rate, 2011-2015*	↔
Employment in Management, Business, Science, and Art Occupations, 2011-2015 *	↓
Percent of Population Living Below Poverty Level, 2011-2015 *	↔
SNAP Benefits in the Past 12 Months, 2011-2015*	↔
Renter-Occupied Housing Tenure, 2011-2015*	↑
Gross Monthly Rent (Paid \$2,000 or More in Rent per Month), 2011-2015*	↓
30% or More of Household Income Paid Toward Gross Monthly Rent, 2011-2015*	↔
<b>Environmental Health</b>	
Cold-Related Illness ED Visits During Cold-Weather Months, 2011-2015	↓
Asthma ED Visits Among 5- to 17-Year-Olds, 2014-2015	↓
Asthma Hospitalizations Among 5- to 17-Year-Olds, 2011-2015	↓
Adults Who Reported Environmental Tobacco Smoke Exposure at Home, 2010, 2013 and 2015 Combined	↔
Housing Overcrowding, 2011-2015*	↑
<b>Access to Care</b>	
Uninsured, 2011-2015*	↑
<b>Maternal and Child Health</b>	
Low Birthweight Births, 2014-2015	↓
Preterm Births, 2014-2015	↔
Infant Mortality, 2006-2015	↔
<b>Health-Related Behaviors</b>	
Adults Who Consumed Fruit Less Than Once per Day, 2013 and 2015 Combined	↔
Adults Who Consumed Vegetables Less Than Once Per Day, 2013 and 2015 Combined	↔
Adults Who Met CDC Guidelines for Physical Activity, 2013 and 2015 Combined	↓
Daily Consumption of One or More Sugar-Sweetened Beverages Among Adults, 2013 and 2015 Combined	↑
Adults Who Smoked Cigarettes, 2013 and 2015 Combined	↔
Binge Drinking Among Adults, 2013 and 2015 Combined	↔
<b>Chronic Disease</b>	
Asthma Among Adults, 2010, 2013, and 2015 Combined	↔
Asthma Emergency Department Visits Among 3- to 5-Year-Olds, 2012-2015	↓
Diabetes Among Adults, 2010, 2013, and 2015 Combined	↔
Diabetes Hospitalizations, 2015	↔
Diabetes Mortality, 2011-2015	↔
Heart Disease Hospitalizations, 2015	↑
Heart Disease Mortality, 2015	↑
Hypertension Among Adults, 2013 and 2015 Combined	↔
Obesity Among Adults, 2013 and 2015 Combined	↔
<p>* Compared to Boston overall            ↑ higher than rest of Boston            ↓ lower than rest of Boston            ↔ similar to rest of Boston</p>	
<p>NOTE: "Rest of Boston" refers to the combined estimate/rate for all other 14 Boston neighborhoods excluding the indicated neighborhood.</p>	

## East Boston

**Table 6b East Boston**  
Comparison of Neighborhood with Boston

	Comparison with Boston
<b>Infectious Disease</b>	
Hepatitis B Incidence, 2011-2015	↓
Hepatitis C Incidence, 2011-2015	↔
Influenza Incidence, 2015-2016 Season	↔
Salmonella Incidence, 2011-2015	↔
<b>Sexual Health</b>	
Chlamydia Incidence, 2015	↔
Gonorrhea Incidence, 2015	↓
<b>Injury and Exposure to Violence</b>	
All Injury ED Discharges, 2015	↓
All Injury Hospitalizations, 2015	↔
All Injury Mortality, 2013-2015	↔
Unintentional Injury ED Discharges, 2015	↓
Unintentional Injury Hospitalizations, 2015	↔
Unintentional Injury Mortality, 2012-2015	↔
Elderly Fall ED Discharges, 2015	↔
Elderly Fall Hospitalizations, 2014-2015	↔
Intentional Injury ED Discharges, 2015	↓
Intentional Injury Hospitalizations, 2014-2015	↓
Assault Injury ED Discharges, 2015	↓
Assault Injury Hospitalizations, 2011-2015	↓
Homicide, 2011-2015	↔
<b>Mental Health</b>	
Persistent Sadness Among Adults, 2013 and 2015 Combined	↔
Persistent Anxiety Among Adults, 2013 and 2015 Combined	↔
Mental Health Hospitalizations, 2015	↓
Suicide, 2011-2015	↔
<b>Substance Use Disorders</b>	
Substance Misuse Mortality, 2011-2015	↔
Unintentional Opioid Overdose Mortality, 2011-2015	↔
<b>Death</b>	
Life Expectancy at Birth, 2011-2015*	↔
Premature Mortality, 2015	↔
All-Cause Mortality, 2015	↔

\* Compared to Boston overall

↑ higher than rest of Boston

↓ lower than rest of Boston

↔ similar to rest of Boston

NOTE: "Rest of Boston" refers to the combined estimate/rate for all other 14 Boston neighborhoods excluding the indicated neighborhood.

## Fenway

**Table 7a Fenway**  
Comparison of Neighborhood with Boston

	Comparison with Boston
<b>Social Determinants of Health</b>	
Educational Attainment, Less than High School Diploma, 2011-2015*	↓
Unemployment Rate, 2011-2015*	↔
Employment in Management, Business, Science, and Art Occupations, 2011-2015 *	↑
Percent of Population Living Below Poverty Level, 2011-2015 *	↑
SNAP Benefits in the Past 12 Months, 2011-2015*	↓
Renter-Occupied Housing Tenure, 2011-2015*	↑
Gross Monthly Rent (Paid \$2,000 or More in Rent per Month), 2011-2015*	↑
30% or More of Household Income Paid Toward Gross Monthly Rent, 2011-2015*	↑
<b>Environmental Health</b>	
Cold-Related Illness ED Visits During Cold-Weather Months, 2011-2015	↓
Asthma ED Visits Among 5- to 17-Year-Olds, 2014-2015	↔
Asthma Hospitalizations Among 5- to 17-Year-Olds, 2011-2015	‡
Adults Who Reported Environmental Tobacco Smoke Exposure at Home, 2010, 2013 and 2015 Combined	↔
Housing Overcrowding, 2011-2015*	↔
<b>Access to Care</b>	
Uninsured, 2011-2015*	↔
<b>Maternal and Child Health</b>	
Low Birthweight Births, 2014-2015	↔
Preterm Births, 2014-2015	↔
Infant Mortality, 2006-2015	↔
<b>Health-Related Behaviors</b>	
Adults Who Consumed Fruit Less Than Once per Day, 2013 and 2015 Combined	↔
Adults Who Consumed Vegetables Less Than Once Per Day, 2013 and 2015 Combined	↔
Adults Who Met CDC Guidelines for Physical Activity, 2013 and 2015 Combined	↔
Daily Consumption of One or More Sugar-Sweetened Beverages Among Adults, 2013 and 2015 Combined	↓
Adults Who Smoked Cigarettes, 2013 and 2015 Combined	↔
Binge Drinking Among Adults, 2013 and 2015 Combined	↔
<b>Chronic Disease</b>	
Asthma Among Adults, 2010, 2013, and 2015 Combined	↓
Asthma Emergency Department Visits Among 3- to 5-Year-Olds, 2012-2015	↔
Diabetes Among Adults, 2010, 2013, and 2015 Combined	↓
Diabetes Hospitalizations, 2015	↓
Diabetes Mortality, 2011-2015	↓
Heart Disease Hospitalizations, 2015	↓
Heart Disease Mortality, 2015	↔
Hypertension Among Adults, 2013 and 2015 Combined	↓
Obesity Among Adults, 2013 and 2015 Combined	↓

\* Compared to Boston overall

‡ Data not presented due to a small number of cases or insufficient sample size

↑ higher than rest of Boston

↓ lower than rest of Boston

↔ similar to rest of Boston

NOTE: "Rest of Boston" refers to the combined estimate/rate for all other 14 Boston neighborhoods excluding the indicated neighborhood.

**Table 7b Fenway**  
Comparison of Neighborhood with Boston

	Comparison with Boston
<b>Infectious Disease</b>	
Hepatitis B Incidence, 2011-2015	↓
Hepatitis C Incidence, 2011-2015	↓
Influenza Incidence, 2015-2016 Season	↓
Salmonella Incidence, 2011-2015	↓
<b>Sexual Health</b>	
Chlamydia Incidence, 2015	↓
Gonorrhea Incidence, 2015	↓
<b>Injury and Exposure to Violence</b>	
All Injury ED Discharges, 2015	↓
All Injury Hospitalizations, 2015	↓
All Injury Mortality, 2013-2015	↓
Unintentional Injury ED Discharges, 2015	↓
Unintentional Injury Hospitalizations, 2015	↓
Unintentional Injury Mortality, 2012-2015	↓
Elderly Fall ED Discharges, 2015	↓
Elderly Fall Hospitalizations, 2014-2015	↔
Intentional Injury ED Discharges, 2015	↓
Intentional Injury Hospitalizations, 2014-2015	↓
Assault Injury ED Discharges, 2015	↓
Assault Injury Hospitalizations, 2011-2015	↓
Homicide, 2011-2015	‡
<b>Mental Health</b>	
Persistent Sadness Among Adults, 2013 and 2015 Combined	↔
Persistent Anxiety Among Adults, 2013 and 2015 Combined	↔
Mental Health Hospitalizations, 2015	↑
Suicide, 2011-2015	↔
<b>Substance Use Disorders</b>	
Substance Misuse Mortality, 2011-2015	↔
Unintentional Opioid Overdose Mortality, 2011-2015	↓
<b>Death</b>	
Life Expectancy at Birth, 2011-2015*	↔
Premature Mortality, 2015	↔
All-Cause Mortality, 2015	↓

\* Compared to Boston overall

‡ Data not presented due to a small number of cases or insufficient sample size

↑ higher than rest of Boston

↓ lower than rest of Boston

↔ similar to rest of Boston

NOTE: "Rest of Boston" refers to the combined estimate/rate for all other 14 Boston neighborhoods excluding the indicated neighborhood.

## Hyde park

<b>Table 8a Hyde Park</b> Comparison of Neighborhood with Boston	
	Comparison with Boston
<b>Social Determinants of Health</b>	
Educational Attainment, Less than High School Diploma, 2011-2015*	↓
Unemployment Rate, 2011-2015*	↔
Employment in Management, Business, Science, and Art Occupations, 2011-2015 *	↓
Percent of Population Living Below Poverty Level, 2011-2015 *	↓
SNAP Benefits in the Past 12 Months, 2011-2015*	↔
Renter-Occupied Housing Tenure, 2011-2015*	↓
Gross Monthly Rent (Paid \$2,000 or More in Rent per Month), 2011-2015*	‡
30% or More of Household Income Paid Toward Gross Monthly Rent, 2011-2015*	↔
<b>Environmental Health</b>	
Cold-Related Illness ED Visits During Cold-Weather Months, 2011-2015	↓
Asthma ED Visits Among 5- to 17-Year-Olds, 2014-2015	↓
Asthma Hospitalizations Among 5- to 17-Year-Olds, 2011-2015	↓
Adults Who Reported Environmental Tobacco Smoke Exposure at Home, 2010, 2013 and 2015 Combined	↔
Housing Overcrowding, 2011-2015*	↔
<b>Access to Care</b>	
Uninsured, 2011-2015*	↓
<b>Maternal and Child Health</b>	
Low Birthweight Births, 2014-2015	↔
Preterm Births, 2014-2015	↔
Infant Mortality, 2006-2015	↔
<b>Health-Related Behaviors</b>	
Adults Who Consumed Fruit Less Than Once per Day, 2013 and 2015 Combined	↔
Adults Who Consumed Vegetables Less Than Once Per Day, 2013 and 2015 Combined	↔
Adults Who Met CDC Guidelines for Physical Activity, 2013 and 2015 Combined	↔
Daily Consumption of One or More Sugar-Sweetened Beverages Among Adults, 2013 and 2015 Combined	↔
Adults Who Smoked Cigarettes, 2013 and 2015 Combined	↔
Binge Drinking Among Adults, 2013 and 2015 Combined	↔
<b>Chronic Disease</b>	
Asthma Among Adults, 2010, 2013, and 2015 Combined	↔
Asthma Emergency Department Visits Among 3- to 5-Year-Olds, 2012-2015	↔
Diabetes Among Adults, 2010, 2013, and 2015 Combined	↔
Diabetes Hospitalizations, 2015	↑
Diabetes Mortality, 2011-2015	↔
Heart Disease Hospitalizations, 2015	↔
Heart Disease Mortality, 2015	↔
Hypertension Among Adults, 2013 and 2015 Combined	↔
Obesity Among Adults, 2013 and 2015 Combined	↔
* Compared to Boston overall	
‡ Data not presented due to a small number of cases or insufficient sample size	
↑ higher than rest of Boston	
↓ lower than rest of Boston	
↔ similar to rest of Boston	
NOTE: "Rest of Boston" refers to the combined estimate/rate for all other 14 Boston neighborhoods excluding the indicated neighborhood.	

## Hyde Park

**Table 8b Hyde Park**  
Comparison of Neighborhood with Boston

	Comparison with Boston
<b>Infectious Disease</b>	
Hepatitis B Incidence, 2011-2015	↓
Hepatitis C Incidence, 2011-2015	↓
Influenza Incidence, 2015-2016 Season	↑
Salmonella Incidence, 2011-2015	↔
<b>Sexual Health</b>	
Chlamydia Incidence, 2015	↑
Gonorrhea Incidence, 2015	↔
<b>Injury and Exposure to Violence</b>	
All Injury ED Discharges, 2015	↑
All Injury Hospitalizations, 2015	↑
All Injury Mortality, 2013-2015	↔
Unintentional Injury ED Discharges, 2015	↑
Unintentional Injury Hospitalizations, 2015	↑
Unintentional Injury Mortality, 2012-2015	↔
Elderly Fall ED Discharges, 2015	↑
Elderly Fall Hospitalizations, 2014-2015	↔
Intentional Injury ED Discharges, 2015	↔
Intentional Injury Hospitalizations, 2014-2015	↔
Assault Injury ED Discharges, 2015	↔
Assault Injury Hospitalizations, 2011-2015	↓
Homicide, 2011-2015	↔
<b>Mental Health</b>	
Persistent Sadness Among Adults, 2013 and 2015 Combined	↔
Persistent Anxiety Among Adults, 2013 and 2015 Combined	↔
Mental Health Hospitalizations, 2015	↔
Suicide, 2011-2015	↔
<b>Substance Use Disorders</b>	
Substance Misuse Mortality, 2011-2015	↔
Unintentional Opioid Overdose Mortality, 2011-2015	↔
<b>Death</b>	
Life Expectancy at Birth, 2011-2015*	↓
Premature Mortality, 2015	↔
All-Cause Mortality, 2015	↑

\* Compared to Boston overall

↑ higher than rest of Boston

↓ lower than rest of Boston

↔ similar to rest of Boston

NOTE: "Rest of Boston" refers to the combined estimate/rate for all other 14 Boston neighborhoods excluding the indicated neighborhood.



## Jamaica Plain

**Table 9a Jamaica Plain**  
Comparison of Neighborhood with Boston

	Comparison with Boston
<b>Social Determinants of Health</b>	
Educational Attainment, Less than High School Diploma, 2011-2015*	↓
Unemployment Rate, 2011-2015*	↓
Employment in Management, Business, Science, and Art Occupations, 2011-2015 *	↑
Percent of Population Living Below Poverty Level, 2011-2015 *	↓
SNAP Benefits in the Past 12 Months, 2011-2015*	↓
Renter-Occupied Housing Tenure, 2011-2015*	↓
Gross Monthly Rent (Paid \$2,000 or More in Rent per Month), 2011-2015*	↔
30% or More of Household Income Paid Toward Gross Monthly Rent, 2011-2015*	↔
<b>Environmental Health</b>	
Cold-Related Illness ED Visits During Cold-Weather Months, 2011-2015	↓
Asthma ED Visits Among 5- to 17-Year-Olds, 2014-2015	↓
Asthma Hospitalizations Among 5- to 17-Year-Olds, 2011-2015	↓
Adults Who Reported Environmental Tobacco Smoke Exposure at Home, 2010, 2013 and 2015 Combined	↔
Housing Overcrowding, 2011-2015*	↓
<b>Access to Care</b>	
Uninsured, 2011-2015*	↓
<b>Maternal and Child Health</b>	
Low Birthweight Births, 2014-2015	↔
Preterm Births, 2014-2015	↔
Infant Mortality, 2006-2015	↓
<b>Health-Related Behaviors</b>	
Adults Who Consumed Fruit Less Than Once per Day, 2013 and 2015 Combined	↓
Adults Who Consumed Vegetables Less Than Once Per Day, 2013 and 2015 Combined	↓
Adults Who Met CDC Guidelines for Physical Activity, 2013 and 2015 Combined	↔
Daily Consumption of One or More Sugar-Sweetened Beverages Among Adults, 2013 and 2015 Combined	↓
Adults Who Smoked Cigarettes, 2013 and 2015 Combined	↔
Binge Drinking Among Adults, 2013 and 2015 Combined	↔
<b>Chronic Disease</b>	
Asthma Among Adults, 2010, 2013, and 2015 Combined	↔
Asthma Emergency Department Visits Among 3- to 5-Year-Olds, 2012-2015	↓
Diabetes Among Adults, 2010, 2013, and 2015 Combined	↓
Diabetes Hospitalizations, 2015	↔
Diabetes Mortality, 2011-2015	↔
Heart Disease Hospitalizations, 2015	↓
Heart Disease Mortality, 2015	↔
Hypertension Among Adults, 2013 and 2015 Combined	↓
Obesity Among Adults, 2013 and 2015 Combined	↓

\* Compared to Boston overall

↑ higher than rest of Boston

↓ lower than rest of Boston

↔ similar to rest of Boston

NOTE: "Rest of Boston" refers to the combined estimate/rate for all other 14 Boston neighborhoods excluding the indicated neighborhood.

## Jamaica Plain

**Table 9b Jamaica Plain**  
Comparison of Neighborhood with Boston

	Comparison with Boston
<b>Infectious Disease</b>	
Hepatitis B Incidence, 2011-2015	↓
Hepatitis C Incidence, 2011-2015	↓
Influenza Incidence, 2015-2016 Season	↔
Salmonella Incidence, 2011-2015	↑
<b>Sexual Health</b>	
Chlamydia Incidence, 2015	↓
Gonorrhea Incidence, 2015	↔
<b>Injury and Exposure to Violence</b>	
All Injury ED Discharges, 2015	↓
All Injury Hospitalizations, 2015	↔
All Injury Mortality, 2013-2015	↔
Unintentional Injury ED Discharges, 2015	↓
Unintentional Injury Hospitalizations, 2015	↔
Unintentional Injury Mortality, 2012-2015	↔
Elderly Fall ED Discharges, 2015	↔
Elderly Fall Hospitalizations, 2014-2015	↑
Intentional Injury ED Discharges, 2015	↓
Intentional Injury Hospitalizations, 2014-2015	↓
Assault Injury ED Discharges, 2015	↓
Assault Injury Hospitalizations, 2011-2015	↓
Homicide, 2011-2015	‡
<b>Mental Health</b>	
Persistent Sadness Among Adults, 2013 and 2015 Combined	↔
Persistent Anxiety Among Adults, 2013 and 2015 Combined	↔
Mental Health Hospitalizations, 2015	↔
Suicide, 2011-2015	↔
<b>Substance Use Disorders</b>	
Substance Misuse Mortality, 2011-2015	↔
Unintentional Opioid Overdose Mortality, 2011-2015	↔
<b>Death</b>	
Life Expectancy at Birth, 2011-2015*	↔
Premature Mortality, 2015	↔
All-Cause Mortality, 2015	↔

\* Compared to Boston overall

‡ Data not presented due to a small number of cases or insufficient sample size

↑ higher than rest of Boston

↓ lower than rest of Boston

↔ similar to rest of Boston

NOTE: "Rest of Boston" refers to the combined estimate/rate for all other 14 Boston neighborhoods excluding the indicated neighborhood.

## Mattapan

**Table 10a Mattapan**  
Comparison of Neighborhood with Boston

	Comparison with Boston
<b>Social Determinants of Health</b>	
Educational Attainment, Less than High School Diploma, 2011-2015*	↑
Unemployment Rate, 2011-2015*	↑
Employment in Management, Business, Science, and Art Occupations, 2011-2015 *	↓
Percent of Population Living Below Poverty Level, 2011-2015 *	↔
SNAP Benefits in the Past 12 Months, 2011-2015*	↑
Renter-Occupied Housing Tenure, 2011-2015*	↓
Gross Monthly Rent (Paid \$2,000 or More in Rent per Month), 2011-2015*	↓
30% or More of Household Income Paid Toward Gross Monthly Rent, 2011-2015*	↔
<b>Environmental Health</b>	
Cold-Related Illness ED Visits During Cold-Weather Months, 2011-2015	↔
Asthma ED Visits Among 5- to 17-Year-Olds, 2014-2015	↑
Asthma Hospitalizations Among 5- to 17-Year-Olds, 2011-2015	↔
Adults Who Reported Environmental Tobacco Smoke Exposure at Home, 2010, 2013 and 2015 Combined	↔
Housing Overcrowding, 2011-2015*	↔
<b>Access to Care</b>	
Uninsured, 2011-2015*	↔
<b>Maternal and Child Health</b>	
Low Birthweight Births, 2014-2015	↑
Preterm Births, 2014-2015	↔
Infant Mortality, 2006-2015	↔
<b>Health-Related Behaviors</b>	
Adults Who Consumed Fruit Less Than Once per Day, 2013 and 2015 Combined	↔
Adults Who Consumed Vegetables Less Than Once Per Day, 2013 and 2015 Combined	↔
Adults Who Met CDC Guidelines for Physical Activity, 2013 and 2015 Combined	↔
Daily Consumption of One or More Sugar-Sweetened Beverages Among Adults, 2013 and 2015 Combined	↑
Adults Who Smoked Cigarettes, 2013 and 2015 Combined	↔
Binge Drinking Among Adults, 2013 and 2015 Combined	↔
<b>Chronic Disease</b>	
Asthma Among Adults, 2010, 2013, and 2015 Combined	↔
Asthma Emergency Department Visits Among 3- to 5-Year-Olds, 2012-2015	↑
Diabetes Among Adults, 2010, 2013, and 2015 Combined	↑
Diabetes Hospitalizations, 2015	↑
Diabetes Mortality, 2011-2015	↑
Heart Disease Hospitalizations, 2015	↑
Heart Disease Mortality, 2015	↔
Hypertension Among Adults, 2013 and 2015 Combined	↑
Obesity Among Adults, 2013 and 2015 Combined	↑

\* Compared to Boston overall

↑ higher than rest of Boston

↓ lower than rest of Boston

↔ similar to rest of Boston

NOTE: "Rest of Boston" refers to the combined estimate/rate for all other 14 Boston neighborhoods excluding the indicated neighborhood.

## Mattapan

**Table 10b Mattapan**  
Comparison of Neighborhood with Boston

	Comparison with Boston
<b>Infectious Disease</b>	
Hepatitis B Incidence, 2011-2015	↔
Hepatitis C Incidence, 2011-2015	↔
Influenza Incidence, 2015-2016 Season	↑
Salmonella Incidence, 2011-2015	↔
<b>Sexual Health</b>	
Chlamydia Incidence, 2015	↑
Gonorrhea Incidence, 2015	↑
<b>Injury and Exposure to Violence</b>	
All Injury ED Discharges, 2015	↑
All Injury Hospitalizations, 2015	↔
All Injury Mortality, 2013-2015	↔
Unintentional Injury ED Discharges, 2015	↑
Unintentional Injury Hospitalizations, 2015	↓
Unintentional Injury Mortality, 2012-2015	↔
Elderly Fall ED Discharges, 2015	↓
Elderly Fall Hospitalizations, 2014-2015	↓
Intentional Injury ED Discharges, 2015	↑
Intentional Injury Hospitalizations, 2014-2015	↑
Assault Injury ED Discharges, 2015	↑
Assault Injury Hospitalizations, 2011-2015	↑
Homicide, 2011-2015	↑
<b>Mental Health</b>	
Persistent Sadness Among Adults, 2013 and 2015 Combined	↔
Persistent Anxiety Among Adults, 2013 and 2015 Combined	↔
Mental Health Hospitalizations, 2015	↔
Suicide, 2011-2015	‡
<b>Substance Use Disorders</b>	
Substance Misuse Mortality, 2011-2015	↔
Unintentional Opioid Overdose Mortality, 2011-2015	↔
<b>Death</b>	
Life Expectancy at Birth, 2011-2015*	↔
Premature Mortality, 2015	↑
All-Cause Mortality, 2015	↔

\* Compared to Boston overall

‡ Data not presented due to a small number of cases or insufficient sample size

↑ higher than rest of Boston

↓ lower than rest of Boston

↔ similar to rest of Boston

NOTE: "Rest of Boston" refers to the combined estimate/rate for all other 14 Boston neighborhoods excluding the indicated neighborhood.

## Roslindale

**Table 11a Roslindale**  
Comparison of Neighborhood with Boston

	Comparison with Boston
<b>Social Determinants of Health</b>	
Educational Attainment, Less than High School Diploma, 2011-2015*	↓
Unemployment Rate, 2011-2015*	↔
Employment in Management, Business, Science, and Art Occupations, 2011-2015 *	↔
Percent of Population Living Below Poverty Level, 2011-2015 *	↓
SNAP Benefits in the Past 12 Months, 2011-2015*	↓
Renter-Occupied Housing Tenure, 2011-2015*	↓
Gross Monthly Rent (Paid \$2,000 or More in Rent per Month), 2011-2015*	↓
30% or More of Household Income Paid Toward Gross Monthly Rent, 2011-2015*	↔
<b>Environmental Health</b>	
Cold-Related Illness ED Visits During Cold-Weather Months, 2011-2015	↓
Asthma ED Visits Among 5- to 17-Year-Olds, 2014-2015	↔
Asthma Hospitalizations Among 5- to 17-Year-Olds, 2011-2015	↔
Adults Who Reported Environmental Tobacco Smoke Exposure at Home, 2010, 2013 and 2015 Combined	↔
Housing Overcrowding, 2011-2015*	↔
<b>Access to Care</b>	
Uninsured, 2011-2015*	↔
<b>Maternal and Child Health</b>	
Low Birthweight Births, 2014-2015	↔
Preterm Births, 2014-2015	↔
Infant Mortality, 2006-2015	↔
<b>Health-Related Behaviors</b>	
Adults Who Consumed Fruit Less Than Once per Day, 2013 and 2015 Combined	↔
Adults Who Consumed Vegetables Less Than Once Per Day, 2013 and 2015 Combined	↔
Adults Who Met CDC Guidelines for Physical Activity, 2013 and 2015 Combined	↔
Daily Consumption of One or More Sugar-Sweetened Beverages Among Adults, 2013 and 2015 Combined	↔
Adults Who Smoked Cigarettes, 2013 and 2015 Combined	↓
Binge Drinking Among Adults, 2013 and 2015 Combined	↔
<b>Chronic Disease</b>	
Asthma Among Adults, 2010, 2013, and 2015 Combined	↔
Asthma Emergency Department Visits Among 3- to 5-Year-Olds, 2012-2015	↔
Diabetes Among Adults, 2010, 2013, and 2015 Combined	↔
Diabetes Hospitalizations, 2015	↓
Diabetes Mortality, 2011-2015	↔
Heart Disease Hospitalizations, 2015	↔
Heart Disease Mortality, 2015	↔
Hypertension Among Adults, 2013 and 2015 Combined	↔
Obesity Among Adults, 2013 and 2015 Combined	↔

\* Compared to Boston overall

↑ higher than rest of Boston

↓ lower than rest of Boston

↔ similar to rest of Boston

NOTE: "Rest of Boston" refers to the combined estimate/rate for all other 14 Boston neighborhoods excluding the indicated neighborhood.

## Roslindale

**Table 11b Roslindale**  
Comparison of Neighborhood with Boston

	Comparison with Boston
<b>Infectious Disease</b>	
Hepatitis B Incidence, 2011-2015	↓
Hepatitis C Incidence, 2011-2015	↓
Influenza Incidence, 2015-2016 Season	↔
Salmonella Incidence, 2011-2015	↔
<b>Sexual Health</b>	
Chlamydia Incidence, 2015	↔
Gonorrhea Incidence, 2015	↓
<b>Injury and Exposure to Violence</b>	
All Injury ED Discharges, 2015	↔
All Injury Hospitalizations, 2015	↔
All Injury Mortality, 2013-2015	↔
Unintentional Injury ED Discharges, 2015	↔
Unintentional Injury Hospitalizations, 2015	↔
Unintentional Injury Mortality, 2012-2015	↔
Elderly Fall ED Discharges, 2015	↑
Elderly Fall Hospitalizations, 2014-2015	↑
Intentional Injury ED Discharges, 2015	↓
Intentional Injury Hospitalizations, 2014-2015	↓
Assault Injury ED Discharges, 2015	↓
Assault Injury Hospitalizations, 2011-2015	↓
Homicide, 2011-2015	↔
<b>Mental Health</b>	
Persistent Sadness Among Adults, 2013 and 2015 Combined	↔
Persistent Anxiety Among Adults, 2013 and 2015 Combined	↔
Mental Health Hospitalizations, 2015	↓
Suicide, 2011-2015	↔
<b>Substance Use Disorders</b>	
Substance Misuse Mortality, 2011-2015	↔
Unintentional Opioid Overdose Mortality, 2011-2015	↔
<b>Death</b>	
Life Expectancy at Birth, 2011-2015*	↔
Premature Mortality, 2015	↓
All-Cause Mortality, 2015	↔

\* Compared to Boston overall

↑ higher than rest of Boston

↓ lower than rest of Boston

↔ similar to rest of Boston

NOTE: "Rest of Boston" refers to the combined estimate/rate for all other 14 Boston neighborhoods excluding the indicated neighborhood.

## Roxbury

**Table 12a Roxbury**  
Comparison of Neighborhood with Boston

	Comparison with Boston
<b>Social Determinants of Health</b>	
Educational Attainment, Less than High School Diploma, 2011-2015*	↑
Unemployment Rate, 2011-2015*	↑
Employment in Management, Business, Science, and Art Occupations, 2011-2015 *	↓
Percent of Population Living Below Poverty Level, 2011-2015 *	↑
SNAP Benefits in the Past 12 Months, 2011-2015*	↑
Renter-Occupied Housing Tenure, 2011-2015*	↑
Gross Monthly Rent (Paid \$2,000 or More in Rent per Month), 2011-2015*	↓
30% or More of Household Income Paid Toward Gross Monthly Rent, 2011-2015*	↑
<b>Environmental Health</b>	
Cold-Related Illness ED Visits During Cold-Weather Months, 2011-2015	↑
Asthma ED Visits Among 5- to 17-Year-Olds, 2014-2015	↑
Asthma Hospitalizations Among 5- to 17-Year-Olds, 2011-2015	↑
Adults Who Reported Environmental Tobacco Smoke Exposure at Home, 2010, 2013 and 2015 Combined	↑
Housing Overcrowding, 2011-2015*	↔
<b>Access to Care</b>	
Uninsured, 2011-2015*	↔
<b>Maternal and Child Health</b>	
Low Birthweight Births, 2014-2015	↔
Preterm Births, 2014-2015	↔
Infant Mortality, 2006-2015	↔
<b>Health-Related Behaviors</b>	
Adults Who Consumed Fruit Less Than Once per Day, 2013 and 2015 Combined	↔
Adults Who Consumed Vegetables Less Than Once Per Day, 2013 and 2015 Combined	↑
Adults Who Met CDC Guidelines for Physical Activity, 2013 and 2015 Combined	↔
Daily Consumption of One or More Sugar-Sweetened Beverages Among Adults, 2013 and 2015 Combined	↑
Adults Who Smoked Cigarettes, 2013 and 2015 Combined	↔
Binge Drinking Among Adults, 2013 and 2015 Combined	↓
<b>Chronic Disease</b>	
Asthma Among Adults, 2010, 2013, and 2015 Combined	↑
Asthma Emergency Department Visits Among 3- to 5-Year-Olds, 2012-2015	↑
Diabetes Among Adults, 2010, 2013, and 2015 Combined	↑
Diabetes Hospitalizations, 2015	↑
Diabetes Mortality, 2011-2015	↑
Heart Disease Hospitalizations, 2015	↑
Heart Disease Mortality, 2015	↔
Hypertension Among Adults, 2013 and 2015 Combined	↑
Obesity Among Adults, 2013 and 2015 Combined	↑

\* Compared to Boston overall

↑ higher than rest of Boston

↓ lower than rest of Boston

↔ similar to rest of Boston

NOTE: "Rest of Boston" refers to the combined estimate/rate for all other 14 Boston neighborhoods excluding the indicated neighborhood.

## Roxbury

**Table 12b Roxbury**  
Comparison of Neighborhood with Boston

	Comparison with Boston
<b>Infectious Disease</b>	
Hepatitis B Incidence, 2011-2015	↓
Hepatitis C Incidence, 2011-2015	↑
Influenza Incidence, 2015-2016 Season	↑
Salmonella Incidence, 2011-2015	↓
<b>Sexual Health</b>	
Chlamydia Incidence, 2015	↑
Gonorrhea Incidence, 2015	↑
<b>Injury and Exposure to Violence</b>	
All Injury ED Discharges, 2015	↑
All Injury Hospitalizations, 2015	↔
All Injury Mortality, 2013-2015	↔
Unintentional Injury ED Discharges, 2015	↑
Unintentional Injury Hospitalizations, 2015	↔
Unintentional Injury Mortality, 2012-2015	↔
Elderly Fall ED Discharges, 2015	↓
Elderly Fall Hospitalizations, 2014-2015	↓
Intentional Injury ED Discharges, 2015	↑
Intentional Injury Hospitalizations, 2014-2015	↑
Assault Injury ED Discharges, 2015	↑
Assault Injury Hospitalizations, 2011-2015	↑
Homicide, 2011-2015	↑
<b>Mental Health</b>	
Persistent Sadness Among Adults, 2013 and 2015 Combined	↔
Persistent Anxiety Among Adults, 2013 and 2015 Combined	↑
Mental Health Hospitalizations, 2015	↔
Suicide, 2011-2015	↔
<b>Substance Use Disorders</b>	
Substance Misuse Mortality, 2011-2015	↔
Unintentional Opioid Overdose Mortality, 2011-2015	↔
<b>Death</b>	
Life Expectancy at Birth, 2011-2015*	↓
Premature Mortality, 2015	↑
All-Cause Mortality, 2015	↑

\* Compared to Boston overall

↑ higher than rest of Boston

↓ lower than rest of Boston

↔ similar to rest of Boston

NOTE: "Rest of Boston" refers to the combined estimate/rate for all other 14 Boston neighborhoods excluding the indicated neighborhood.



## South Boston

**Table 13a South Boston**  
Comparison of Neighborhood with Boston

	Comparison with Boston
<b>Social Determinants of Health</b>	
Educational Attainment, Less than High School Diploma, 2011-2015*	↓
Unemployment Rate, 2011-2015*	↓
Employment in Management, Business, Science, and Art Occupations, 2011-2015 *	↑
Percent of Population Living Below Poverty Level, 2011-2015 *	↓
SNAP Benefits in the Past 12 Months, 2011-2015*	↓
Renter-Occupied Housing Tenure, 2011-2015*	↓
Gross Monthly Rent (Paid \$2,000 or More in Rent per Month), 2011-2015*	↑
30% or More of Household Income Paid Toward Gross Monthly Rent, 2011-2015*	↓
<b>Environmental Health</b>	
Cold-Related Illness ED Visits During Cold-Weather Months, 2011-2015	↓
Asthma ED Visits Among 5- to 17-Year-Olds, 2014-2015	↓
Asthma Hospitalizations Among 5- to 17-Year-Olds, 2011-2015	↓
Adults Who Reported Environmental Tobacco Smoke Exposure at Home, 2010, 2013 and 2015 Combined	↑
Housing Overcrowding, 2011-2015*	↓
<b>Access to Care</b>	
Uninsured, 2011-2015*	↓
<b>Maternal and Child Health</b>	
Low Birthweight Births, 2014-2015	↔
Preterm Births, 2014-2015	↔
Infant Mortality, 2006-2015	↔
<b>Health-Related Behaviors</b>	
Adults Who Consumed Fruit Less Than Once per Day, 2013 and 2015 Combined	↔
Adults Who Consumed Vegetables Less Than Once Per Day, 2013 and 2015 Combined	↔
Adults Who Met CDC Guidelines for Physical Activity, 2013 and 2015 Combined	↔
Daily Consumption of One or More Sugar-Sweetened Beverages Among Adults, 2013 and 2015 Combined	↔
Adults Who Smoked Cigarettes, 2013 and 2015 Combined	↔
Binge Drinking Among Adults, 2013 and 2015 Combined	↑
<b>Chronic Disease</b>	
Asthma Among Adults, 2010, 2013, and 2015 Combined	↓
Asthma Emergency Department Visits Among 3- to 5-Year-Olds, 2012-2015	↓
Diabetes Among Adults, 2010, 2013, and 2015 Combined	↓
Diabetes Hospitalizations, 2015	↔
Diabetes Mortality, 2011-2015	↔
Heart Disease Hospitalizations, 2015	↔
Heart Disease Mortality, 2015	↔
Hypertension Among Adults, 2013 and 2015 Combined	↔
Obesity Among Adults, 2013 and 2015 Combined	↑

\* Compared to Boston overall

↑ higher than rest of Boston

↓ lower than rest of Boston

↔ similar to rest of Boston

NOTE: "Rest of Boston" refers to the combined estimate/rate for all other 14 Boston neighborhoods excluding the indicated neighborhood.

## South Boston

**Table 13b South Boston**  
Comparison of Neighborhood with Boston

	Comparison with Boston
<b>Infectious Disease</b>	
Hepatitis B Incidence, 2011-2015	↓
Hepatitis C Incidence, 2011-2015	↑
Influenza Incidence, 2015-2016 Season	↔
Salmonella Incidence, 2011-2015	↔
<b>Sexual Health</b>	
Chlamydia Incidence, 2015	↓
Gonorrhea Incidence, 2015	↓
<b>Injury and Exposure to Violence</b>	
All Injury ED Discharges, 2015	↓
All Injury Hospitalizations, 2015	↔
All Injury Mortality, 2013-2015	↔
Unintentional Injury ED Discharges, 2015	↓
Unintentional Injury Hospitalizations, 2015	↔
Unintentional Injury Mortality, 2012-2015	↑
Elderly Fall ED Discharges, 2015	↔
Elderly Fall Hospitalizations, 2014-2015	↔
Intentional Injury ED Discharges, 2015	↓
Intentional Injury Hospitalizations, 2014-2015	↓
Assault Injury ED Discharges, 2015	↓
Assault Injury Hospitalizations, 2011-2015	↓
Homicide, 2011-2015	↔
<b>Mental Health</b>	
Persistent Sadness Among Adults, 2013 and 2015 Combined	↔
Persistent Anxiety Among Adults, 2013 and 2015 Combined	↔
Mental Health Hospitalizations, 2015	↓
Suicide, 2011-2015	↔
<b>Substance Use Disorders</b>	
Substance Misuse Mortality, 2011-2015	↑
Unintentional Opioid Overdose Mortality, 2011-2015	↔
<b>Death</b>	
Life Expectancy at Birth, 2011-2015*	↓
Premature Mortality, 2015	↔
All-Cause Mortality, 2015	↑

\* Compared to Boston overall

↑ higher than rest of Boston

↓ lower than rest of Boston

↔ similar to rest of Boston

NOTE: "Rest of Boston" refers to the combined estimate/rate for all other 14 Boston neighborhoods excluding the indicated neighborhood.

## South End

**Table 14a South End<sup>1</sup>**  
Comparison of Neighborhood with Boston

	Comparison with Boston
<b>Social Determinants of Health</b>	
Educational Attainment, Less than High School Diploma, 2011-2015*	↑
Unemployment Rate, 2011-2015*	↓
Employment in Management, Business, Science, and Art Occupations, 2011-2015 *	↑
Percent of Population Living Below Poverty Level, 2011-2015 *	↔
SNAP Benefits in the Past 12 Months, 2011-2015*	↑
Renter-Occupied Housing Tenure, 2011-2015*	↔
Gross Monthly Rent (Paid \$2,000 or More in Rent per Month), 2011-2015*	↑
30% or More of Household Income Paid Toward Gross Monthly Rent, 2011-2015*	↔
<b>Environmental Health</b>	
Cold-Related Illness ED Visits During Cold-Weather Months, 2011-2015	↑
Asthma ED Visits Among 5- to 17-Year-Olds, 2014-2015	↔
Asthma Hospitalizations Among 5- to 17-Year-Olds, 2011-2015	↔
Adults Who Reported Environmental Tobacco Smoke Exposure at Home, 2010, 2013 and 2015 Combined	↔
Housing Overcrowding, 2011-2015*	↔
<b>Access to Care</b>	
Uninsured, 2011-2015*	↓
<b>Maternal and Child Health</b>	
Low Birthweight Births, 2014-2015	↔
Preterm Births, 2014-2015	↔
Infant Mortality, 2006-2015	↔
<b>Health-Related Behaviors</b>	
Adults Who Consumed Fruit Less Than Once per Day, 2013 and 2015 Combined	↔
Adults Who Consumed Vegetables Less Than Once Per Day, 2013 and 2015 Combined	↔
Adults Who Met CDC Guidelines for Physical Activity, 2013 and 2015 Combined	↔
Daily Consumption of One or More Sugar-Sweetened Beverages Among Adults, 2013 and 2015 Combined	↔
Adults Who Smoked Cigarettes, 2013 and 2015 Combined	↔
Binge Drinking Among Adults, 2013 and 2015 Combined	↔
<b>Chronic Disease</b>	
Asthma Among Adults, 2010, 2013, and 2015 Combined	↓
Asthma Emergency Department Visits Among 3- to 5-Year-Olds, 2012-2015	↔
Diabetes Among Adults, 2010, 2013, and 2015 Combined	↔
Diabetes Hospitalizations, 2015	↔
Diabetes Mortality, 2011-2015	↔
Heart Disease Hospitalizations, 2015	↔
Heart Disease Mortality, 2015	↔
Hypertension Among Adults, 2013 and 2015 Combined	↔
Obesity Among Adults, 2013 and 2015 Combined	↔

<sup>1</sup> Includes the South End and Chinatown

\* Compared to Boston overall

↑ higher than rest of Boston

↓ lower than rest of Boston

↔ similar to rest of Boston

NOTE: "Rest of Boston" refers to the combined estimate/rate for all other 14 Boston neighborhoods excluding the indicated neighborhood.

## South End

**Table 14b South End<sup>1</sup>**  
Comparison of Neighborhood with Boston

	Comparison with Boston
<b>Infectious Disease</b>	
Hepatitis B Incidence, 2011-2015	↑
Hepatitis C Incidence, 2011-2015	↑
Influenza Incidence, 2015-2016 Season	↔
Salmonella Incidence, 2011-2015	↑
<b>Sexual Health</b>	
Chlamydia Incidence, 2015	↔
Gonorrhea Incidence, 2015	↑
<b>Injury and Exposure to Violence</b>	
All Injury ED Discharges, 2015	↑
All Injury Hospitalizations, 2015	↑
All Injury Mortality, 2013-2015	↔
Unintentional Injury ED Discharges, 2015	↑
Unintentional Injury Hospitalizations, 2015	↑
Unintentional Injury Mortality, 2012-2015	↔
Elderly Fall ED Discharges, 2015	↔
Elderly Fall Hospitalizations, 2014-2015	↔
Intentional Injury ED Discharges, 2015	↑
Intentional Injury Hospitalizations, 2014-2015	↑
Assault Injury ED Discharges, 2015	↑
Assault Injury Hospitalizations, 2011-2015	↑
Homicide, 2011-2015	↔
<b>Mental Health</b>	
Persistent Sadness Among Adults, 2013 and 2015 Combined	↔
Persistent Anxiety Among Adults, 2013 and 2015 Combined	↔
Mental Health Hospitalizations, 2015	↑
Suicide, 2011-2015	↔
<b>Substance Use Disorders</b>	
Substance Misuse Mortality, 2011-2015	↔
Unintentional Opioid Overdose Mortality, 2011-2015	↔
<b>Death</b>	
Life Expectancy at Birth, 2011-2015*	↔
Premature Mortality, 2015	↔
All-Cause Mortality, 2015	↔

<sup>1</sup> Includes the South End and Chinatown

\* Compared to Boston overall

↑ higher than rest of Boston

↓ lower than rest of Boston

↔ similar to rest of Boston

NOTE: "Rest of Boston" refers to the combined estimate/rate for all other 14 Boston neighborhoods excluding the indicated neighborhood.

## West Roxbury

**Table 15a West Roxbury**  
Comparison of Neighborhood with Boston

	Comparison with Boston
<b>Social Determinants of Health</b>	
Educational Attainment, Less than High School Diploma, 2011-2015*	↓
Unemployment Rate, 2011-2015*	↓
Employment in Management, Business, Science, and Art Occupations, 2011-2015 *	↑
Percent of Population Living Below Poverty Level, 2011-2015 *	↓
SNAP Benefits in the Past 12 Months, 2011-2015*	↓
Renter-Occupied Housing Tenure, 2011-2015*	↓
Gross Monthly Rent (Paid \$2,000 or More in Rent per Month), 2011-2015*	‡
30% or More of Household Income Paid Toward Gross Monthly Rent, 2011-2015*	↔
<b>Environmental Health</b>	
Cold-Related Illness ED Visits During Cold-Weather Months, 2011-2015	↓
Asthma ED Visits Among 5- to 17-Year-Olds, 2014-2015	↓
Asthma Hospitalizations Among 5- to 17-Year-Olds, 2011-2015	↓
Adults Who Reported Environmental Tobacco Smoke Exposure at Home, 2010, 2013 and 2015 Combined	↓
Housing Overcrowding, 2011-2015*	‡
<b>Access to Care</b>	
Uninsured, 2011-2015*	↓
<b>Maternal and Child Health</b>	
Low Birthweight Births, 2014-2015	↓
Preterm Births, 2014-2015	↔
Infant Mortality, 2006-2015	↓
<b>Health-Related Behaviors</b>	
Adults Who Consumed Fruit Less Than Once per Day, 2013 and 2015 Combined	↓
Adults Who Consumed Vegetables Less Than Once Per Day, 2013 and 2015 Combined	↔
Adults Who Met CDC Guidelines for Physical Activity, 2013 and 2015 Combined	↔
Daily Consumption of One or More Sugar-Sweetened Beverages Among Adults, 2013 and 2015 Combined	↓
Adults Who Smoked Cigarettes, 2013 and 2015 Combined	↔
Binge Drinking Among Adults, 2013 and 2015 Combined	↔
<b>Chronic Disease</b>	
Asthma Among Adults, 2010, 2013, and 2015 Combined	↔
Asthma Emergency Department Visits Among 3- to 5-Year-Olds, 2012-2015	↓
Diabetes Among Adults, 2010, 2013, and 2015 Combined	↔
Diabetes Hospitalizations, 2015	↓
Diabetes Mortality, 2011-2015	↔
Heart Disease Hospitalizations, 2015	↓
Heart Disease Mortality, 2015	↔
Hypertension Among Adults, 2013 and 2015 Combined	↔
Obesity Among Adults, 2013 and 2015 Combined	↔

\* Compared to Boston overall

‡ Data not presented due to a small number of cases or insufficient sample size

↑ higher than rest of Boston

↓ lower than rest of Boston

↔ similar to rest of Boston

NOTE: "Rest of Boston" refers to the combined estimate/rate for all other 14 Boston neighborhoods excluding the indicated neighborhood.

## West Roxbury

**Table 15b West Roxbury**  
Comparison of Neighborhood with Boston

	Comparison with Boston
<b>Infectious Disease</b>	
Hepatitis B Incidence, 2011-2015	↓
Hepatitis C Incidence, 2011-2015	↓
Influenza Incidence, 2015-2016 Season	↔
Salmonella Incidence, 2011-2015	↑
<b>Sexual Health</b>	
Chlamydia Incidence, 2015	↓
Gonorrhea Incidence, 2015	‡
<b>Injury and Exposure to Violence</b>	
All Injury ED Discharges, 2015	↓
All Injury Hospitalizations, 2015	↔
All Injury Mortality, 2013-2015	↔
Unintentional Injury ED Discharges, 2015	↓
Unintentional Injury Hospitalizations, 2015	↔
Unintentional Injury Mortality, 2012-2015	↔
Elderly Fall ED Discharges, 2015	↔
Elderly Fall Hospitalizations, 2014-2015	↔
Intentional Injury ED Discharges, 2015	↓
Intentional Injury Hospitalizations, 2014-2015	↓
Assault Injury ED Discharges, 2015	↓
Assault Injury Hospitalizations, 2011-2015	↓
Homicide, 2011-2015	‡
<b>Mental Health</b>	
Persistent Sadness Among Adults, 2013 and 2015 Combined	↔
Persistent Anxiety Among Adults, 2013 and 2015 Combined	↔
Mental Health Hospitalizations, 2015	↓
Suicide, 2011-2015	↔
<b>Substance Use Disorders</b>	
Substance Misuse Mortality, 2011-2015	↔
Unintentional Opioid Overdose Mortality, 2011-2015	↔
<b>Death</b>	
Life Expectancy at Birth, 2011-2015*	↔
Premature Mortality, 2015	↓
All-Cause Mortality, 2015	↔

\* Compared to Boston overall

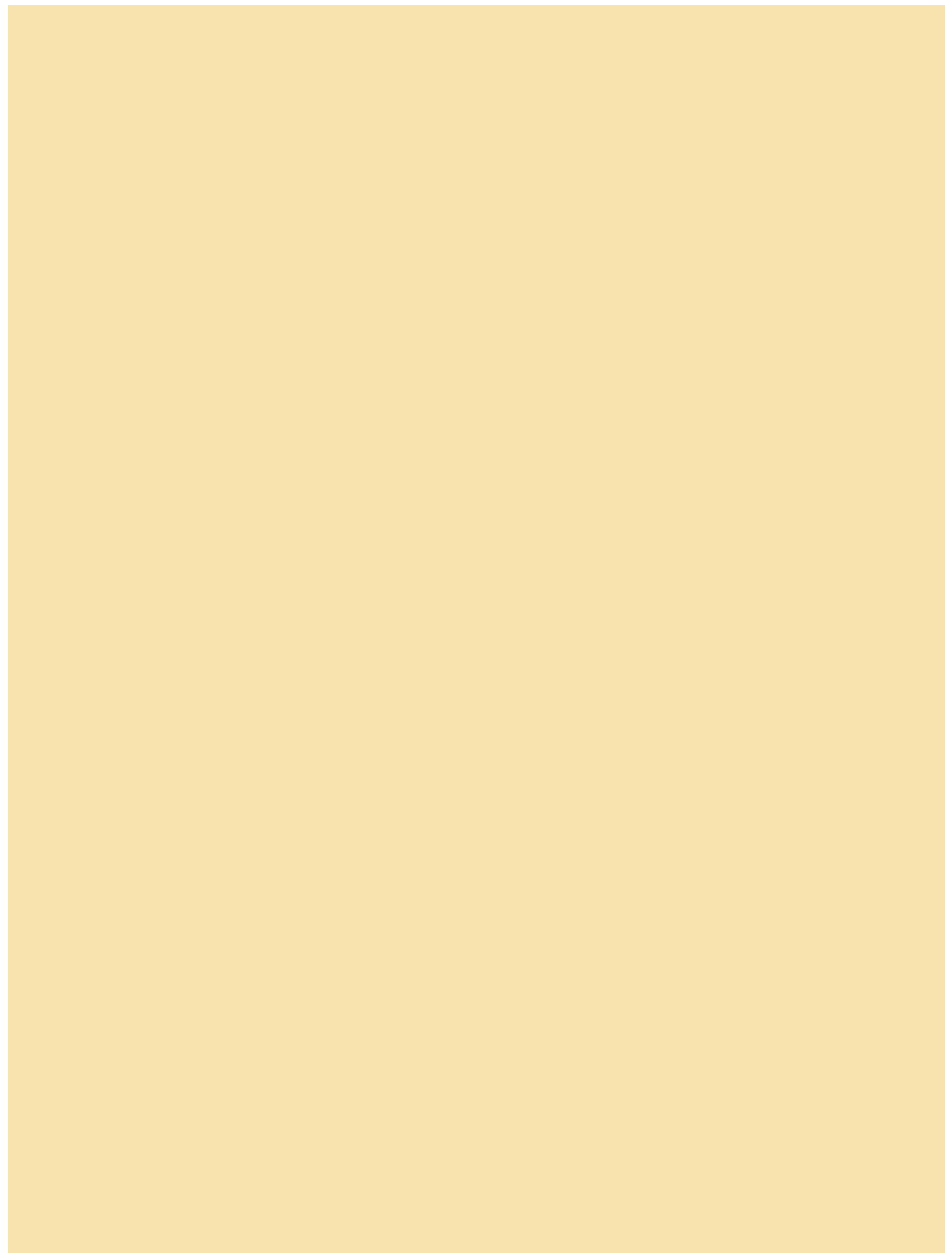
‡ Data not presented due to a small number of cases or insufficient sample size

↑ higher than rest of Boston

↓ lower than rest of Boston

↔ similar to rest of Boston

NOTE: "Rest of Boston" refers to the combined estimate/rate for all other 14 Boston neighborhoods excluding the indicated neighborhood.



# Health Equity

The concept of health equity, or equal opportunity for optimal health, captures the idea that no one should be hindered from achieving his or her full health potential due to social position or socially determined circumstances (1). Good health, which is considered the attainment of physical, mental, and social well-being and the absence of disease, is vital for individuals to fully engage in society, overcome personal adversities, and realize their full potential as human beings (2). The opportunity for every person to achieve his or her full health potential is widely recognized as a fundamental human right (2, 3).

## Health Disparities and Health Inequities

The terms “health disparities” and “health inequities” are often used interchangeably, but in fact represent two distinct concepts, which at times overlap. Health disparities are differences in the rate of disease incidence, prevalence, morbidity, mortality, or survival in certain populations compared to other populations (4). Disparities can be attributed to variations in individual biology and genetics, such as when health changes occur due to the normal course of aging, or if a genetic variation causes the onset of disease (5). For instance, we would expect a higher incidence of heart disease among older adults than among younger adults. When the underlying cause of health differences is socially produced and avoidable, the health disparities are termed health inequities due to their lacking “fairness or justice”(6). Inequities occur when unfair social policies and practices deny groups of individuals the opportunity for optimal health, either through a lack of resources that promote health or through increased exposure to risk factors for disease (7). Building a waste plant in a low-income area, for instance, places that area’s residents at increased risk of exposure to toxic environmental agents. Placing the waste plant in a low-income area rather than a more affluent area is a socially produced, modifiable, and unjust decision. Therefore, the resulting poorer health outcomes experienced by the low-income residents are examples of health inequity. The concept of health disparities, on the other hand, does not imply that differences are associated with unjust societal influences (8).





## Social Determinants of Health (SDOH)

Although individual-level choices and genetics do play a role in the health outcomes individuals experience, health is profoundly influenced by underlying structural influences that exist prior to individual choice and that may even influence individual choice. Underlying factors that consistently create variability in health status are referred to as social determinants of health. They include the presence or absence of safe environments, opportunities for high-quality education, access to nutritious and affordable foods, convenient spaces for physical activity, social support, employment opportunities, health-supporting community norms, resources for disease prevention and management, and access to quality healthcare (9). The unequal distribution of these social determinants of health can contribute to the health inequities among populations that have less access to these health-promoting resources (10).

A large body of evidence indicates that social and societal factors, based on social determinants of health, exert a major influence on population health that is greater than the combination of health behaviors, genes and biology (11, 12). We also know that the social determinants of health impact the types of health behaviors people choose (11, 12).

### Determinants of Health and Examples (11, 12)

- Genes and biology: sex, age, etc.
- Health behaviors: drinking alcohol, diet, physical activity, smoking, etc.
- Social Determinants of Health (SDOH): where someone lives, income, educational attainment, employment status, discrimination (sexism, racism, ageism), access to medical care, etc.
- Medical Care (an important SDOH): access to quality health care and having or not having insurance, etc.

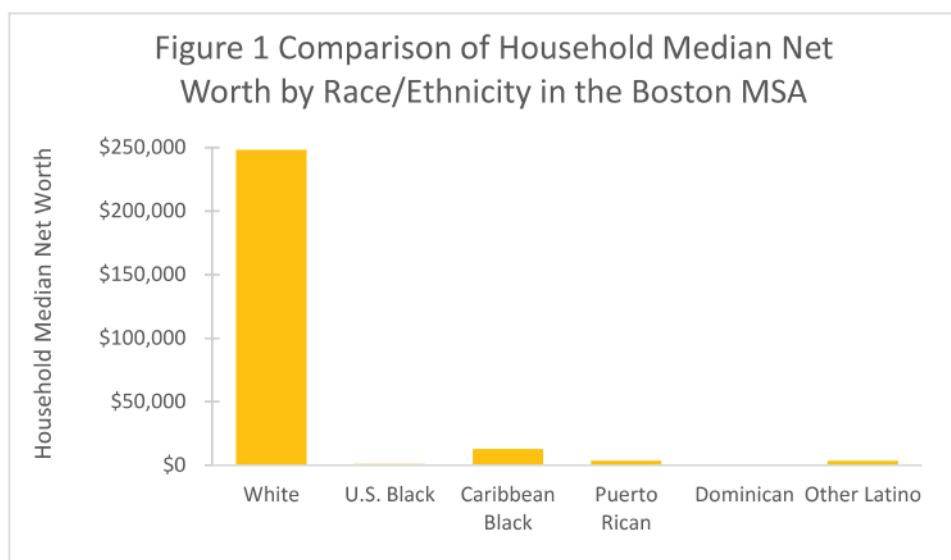
## Influence of Racism and Discrimination

The influence of racism and other exclusionary practices may contribute to an unequal distribution of critical health-promoting resources among racial/ethnic groups. Social inequities, such as poverty and a lack of educational and employment opportunities, often have origins in discriminatory laws, policies, and practices that have historically denied people of color an equal right to earn income, own property, and accumulate wealth. These types of practices have existed well after the end of slavery in the United States. For example, practices that promoted housing segregation were formalized within federal law with the establishment of the Federal Housing Administration (FHA) in 1934. The FHA was originally founded to provide affordable, long-term loans to eligible buyers to purchase property during the Great Depression. FHA's initial zoning policies reflected prevailing attitudes of racial discrimination at the time, utilizing a discriminatory rating system called "redlining" to guarantee that any residential areas housing non-White individuals would be rated "red" to designate low property worth and unstable community investments (13).

According to the first FHA Underwriter's property manual, property ratings were automatically diminished by a number of "adverse factors" including the "ingress of undesirable racial or nationality groups" (13). Subsequent FHA financing support, approved only for property in highly rated (i.e., "non-red") areas, was then selectively allocated to White individuals who were considered "worthy" investments for properties. These exclusively White, highly-rated, and well-invested areas were often built away from smoke, smog, commercial development, railroads, and high-traffic noise pollution, providing their White residents with the benefits of healthier environmental conditions in their new communities (14).

At the same time, the FHA refused to underwrite loans for individuals from communities of color whom as a consequence they considered “second-class,” propagating widespread institutional racism through property owners, real estate boards, and community associations (14, 15). Redlining denied Black Americans the opportunity to sell or purchase property through racially restricted covenants that ultimately even reduced the market value of the property that they did own. The low market values, in turn, caused the economic worth of their communities to decline sharply. Home ownership tends to be the most important form of wealth accumulation, especially for low-income individuals. For this reason, property devaluation due to institutional racism created a barrier to the accumulation of wealth for people of color. The barrier to accumulating and passing on wealth to their children meant that these racist policies affected the socioeconomic status of multiple generations of Black Americans.

After decades of legalized discriminatory housing practices, the Fair Housing Act of 1968 was enacted to prohibit discrimination in housing rental or acquisition based on race, color, or national origin (16). However, the lasting consequences of these discriminatory practices on, among other things, homeownership, the accumulation of wealth, housing safety and stability, and subsequently health, among communities of color remain evident today (15, 17). The impact of these policies can be seen in the differences in net worth between White and Non-White residents of Boston’s Metropolitan Statistical Area (MSA). Net worth, the sum of the value of total assets minus the value of debts, describes a household’s financial well-being or wealth. Prominent racial differences are evident when looking at total household wealth. White households have a median net worth of \$247,500, while Dominican, Black, and Other Latino households in the U.S. have a median net worth close to zero. Of all Non-White groups for which estimates could be made, Caribbean Black households had the highest median net worth with \$12,000, which represents only 5% as much wealth as the White household median (see Figure 1) (18, 19).



NOTE: The Boston MSA (Metropolitan Statistical Area) includes the following counties: Essex, Middlesex, Norfolk, Plymouth, and Suffolk in Massachusetts; and Rockingham and Strafford New Hampshire.

Figure adapted from Muñoz et al. National Asset Scorecard for Communities of Color (NASCC) survey, 2015 (18).

The City of Boston experiences large inequities in the distribution of wealth. Of the city's approximately 667,137 residents, 10% are Asian, 23% are Black and 20% are Latino. There are persistent differences in income and poverty rates across these groups when compared with White Boston residents (20). In 2015, a higher percentage of White residents had a household income of \$50,000 or more (76%) compared with Asian, Black and Latino residents (50%, 55%, and 42% respectively). Also in 2015, White residents had a poverty rate of 13%, while the poverty rate for Asian, Black and Latino residents was higher in comparison (30%, 21%, and 32% respectively)(21).

### Approaches to Achieving Health Equity

Health inequities will persist as long as social, economic, and environmental resources are distributed unfairly and unequally. Approaches to reducing health inequity should be built on the understanding that social, economic, and environmental inequities are root causes of health inequities. Strategies must address inequities in education, employment, income, housing, neighborhood safety, recreational opportunities, environmental hazards, healthcare, and healthy food access in order to be effective in improving the health and well-being of people of color. Strategies for change in policy, systems, and the environment should prioritize values of justice, equity, inclusion, transformation, sustainability, and integrity. Addressing the root causes of health inequities requires a long-term commitment to comprehensive multi-level and multi-sector strategies. Broad coalitions of public, private, nonprofit, and community stakeholders are required to change community structures (16). In order to do this work effectively, resident voices are essential. Residents should help to define the assets and challenges of their communities, identify the possible solutions, and participate in the implementation of those solutions (22). It is this model of building partnerships with community residents, community-based organizations, policymakers, and large institutions that is essential to promoting system and policy level changes to promote health in all of Boston's communities.



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# Methods

*Health of Boston 2016-2017* presents a wealth of data related to the health experience of Boston residents. These data provide information that describes the population, social and environmental factors that impact health (i.e. social determinants), individual health-related behaviors and risk factors, access to health care, health events including births, hospital patient encounters, and deaths, and the prevalence of common health conditions. Data were analyzed and are presented in a manner seeking to maximize their contribution towards furthering our understanding of the Boston resident health experience. Most survey and non-survey data for this report were analyzed using SAS version 9.4 statistical software. Analytical methods applied to these data often reflect adaptation of the Centers for Disease Control and Prevention National Center for Health Statistics (CDC-NCHS) methods and standards to the analysis of small population (i.e., not national or state-level) health data.

## Methods for Survey Data

### **Sources**

Adult chronic disease, health risk, and screening data from the Boston Behavioral Risk Factor Surveillance System (BBRFSS), youth health risk data from the Youth Risk Behavior Surveillance System (YRBSS), and demographic data from the American Community Survey (ACS) result from sample surveys administered approximately every other year as specified for BBRFSS and YRBS and every year for ACS. The resulting data were adjusted (i.e., weighted) to represent the entire Boston population of adults living in households (BBRFSS), the entire Boston public high school student population (YRBSS), or the entire Boston population or appropriate sub-population groups (ACS).

### **Sampling Error**

All survey data in this report present with **associated sampling error** resulting from the likely difference between the given known sample of survey respondents (i.e., residents who complete the survey) and the unknown actual population that the sample is meant to represent. Sampling error acknowledges that the resulting survey percentages coming from a collection or sample of residents (i.e., survey respondents) are estimates that likely differ from survey to survey and from the unknown measurements of the entire population. When survey respondents are selected randomly from the population, statistical methods may be applied to estimate the amount of sampling error associated with each survey result (e.g., percentage or point estimate for a population group). There are different types of expressions of the amount of error associated with a given result (e.g., "margin of error", "standard error", "relative standard error") but all are meant to give a sense of how accurate the result is considered as a measurement for the entire population. The precision or accuracy of the survey results generally improves and the sampling error decreases as the number of survey respondents (or sample size) increases. In order to gain a sense of the degree of accuracy (or how much sampling error exists for a given percentage or point estimate), 95% confidence intervals were generated to present along with the survey-based percentages or point estimates for the population.

Confidence intervals present a range of values above and below the point estimate that possess a high likelihood of containing the actual or true population percentage or rate. In this manner, confidence intervals are an expression of the sampling error. Smaller confidence intervals signify less sampling error and greater data precision than larger confidence intervals. **In the report graphs of survey data, 95% confidence intervals are shown using error bars above and below the rate or percentage point.** Though not presented, the relative standard error or RSE (i.e., ratio of the point estimate standard error to the point estimate) was calculated and used to further assess survey data precision. Consistent with CDC-NCHS methods, survey results were not presented if the RSE equaled or exceeded 30%.

### ***Comparing Confidence Intervals***

As noted above, error bars are used to show the 95% confidence intervals of survey data results within graphs in the report. As a result, rates or percentages for two groups within a graph may be compared by visually assessing whether or not their respective confidence intervals overlap. If the intervals do not overlap, the difference between the two is considered statistically significant and one group's rate or percentage is considered higher or low than the other group's rate. This method can be used to compare percentages that weren't tested as part of the routine statistical testing performed for the report (e.g., for two non-white racial/ethnic groups or for two specific years within a series of years). Comparison of confidence intervals is considered a conservative proxy for statistical testing because while these comparisons will reveal significant differences when the confidence intervals do not overlap, they do not reveal all significant differences. There are instances when comparisons of slightly overlapping confidence intervals would yield significant results if they are tested using statistical procedures.

### ***Assessing Differences between Two Population Groups***

Rate differences between two demographic groups were assessed using statistical procedures. Statistical procedures account for the sampling variation in making comparisons. For these analyses differences between demographic groups accounting for sample variation were assessed using Wald chi-square tests with logistic regression (BBRFSS, YRBSS, and ACS-PUMS survey data), as well as Z-tests (non-PUMS ACS survey data). All statistically significant population group differences are noted in the graphs and specified as either "higher than" or "lower than" the reference group rate within the interpretative text below the relevant graphs.

### ***Trend Analysis***

For BBRFSS and YRBS survey data, logistic regression with associated testing was used to assess linear odds change (increased or decreased) over time. Of note: logistic regression used complex survey procedures to accommodate BBRFSS and YRBS complex survey designs.

All statistically significant changes over time for a given population group are noted in the graphs and specified as either having "increased" or "decreased" within the interpretative text below the relevant graphs.

## Methods for Non-Survey Data

### *Sources*

Health event data (e.g. births, deaths, hospital patient encounters, treatment encounters) for an entire population within a specified time period are considered non-survey data. Usually presented as population-based rates (e.g., deaths per 100,000 residents), non-survey data are not considered estimates but true expressions of the entire population experience.

### *Random Variation*

Though non-survey data (e.g., births, deaths, hospital patient encounters) do not possess sampling error, they could be thought of as one draw of an infinite number of presentations of those data in time. In this sense, non-survey data are viewed as **possessing varying degrees of random variation**. Random variation acknowledges that repeated measurements of the same natural phenomena (e.g., infant deaths in any number of unspecified years) will likely give slightly different results and, thus, there exists a degree of randomness associated with each individual year's result (e.g., number of infant deaths in a specific year). Non-survey data rates based on small counts or rare events are considered more susceptible to consequential effects of random variation and are considered less stable as a result. **Within the report graphs, notation was used to indicate rates derived from non-survey data that were based on 20 or fewer events (e.g., patient encounters, deaths) indicating that these rates are considered unstable and should be interpreted with caution.**

### *Assessing Differences between Two Population Groups*

Rate differences between two demographic groups were assessed using statistical procedures, specifically using Wald chi-square tests with Poisson regression.

Demographic group differences were typically based on a comparison of single-year rates for the most recent data year, usually 2015, or combined years if necessary to obtain sufficient numbers of cases necessary for comparisons of rates with adequate precision. **As a rule, racial/ethnic group comparisons involved using White residents as the reference group** and assessing the difference between each non-White resident group rate (e.g. rate for Black residents) and the White resident (reference group) rate. For sex-based comparisons, males are the reference group. **Neighborhood comparisons involved assessing the difference between a given neighborhood's rate and the rate for the rest of Boston** (those residents not living in the specified neighborhood). These comparisons are considered more accurate than comparisons to Boston overall. The actual 'rest of Boston' rates are not presented in the report as they are of limited practical value.

### *Trend Analysis*

Whether rates of non-survey data increased, decreased, or did not change across the five-year time period was determined using Poisson regression, a statistical process that considers the rate at all time points when determining the magnitude and direction (i.e., increasing, decreasing, or neither increasing nor decreasing) of linear change over time. **Note: Poisson regression produces percent change over time results that most often are not equal to those obtained by calculating the simple percent difference between the first and last time point.** Percent change over time was indicated within the interpretative text if the associated tests (Wald chi-square) were statistically significant ( $p < .05$ ).



### ***Age-Adjusted Rates***

Within this report most health event rates of non-survey data, including all mortality and hospital patient encounter rates, are age-adjusted (as opposed to unadjusted or crude) to permit comparisons that mitigate the impact of differences in age distributions of their respective underlying populations. The resulting comparisons, then, allow consideration of observed differences in terms of factors other than population age differences. Mortality age-adjusted rates were scaled per 100,000 residents. Hospital patient encounter rates were typically scaled per 10,000 residents.

### ***Boston Population Estimates***

Boston population data used as denominators in the rate calculations was produced by the Boston Public Health Commission Research and Evaluation Office Boston Population Estimates Project (B-PEP). B-PEP uses 2000 and 2010 United States Census data for Boston to generate population estimates for each year between the 2000 and 2010 and for years after 2010. B-PEP apportions the age, race/ethnicity, sex, and neighborhood population change incrementally across all data years. As needed, B-PEP sums age, race/ethnicity, sex, and neighborhood population totals required for rate denominators that then account for underlying population change within specified time periods and over time. Of note, B-PEP estimates used for health data rates are different than population estimates derived from the American Community Survey (ACS) that are presented in Chapter 1: Demographics of the report.

### ***Validity***

Data representing populations have a number of limitations. In general, validity, or how accurately the data present the actual population experience, depends on how well the information is collected and how much population data (i.e., the number of cases, records, health events) are collected. Once a relevant data source is determined to be of high quality and the decision to analyze the data has been made, analytical methods and rules are applied to determine if and how to present the data. These rules are meant to safeguard against both inadvertently identifying individuals whose health data is being analyzed and against misrepresenting the population experience. Similar rules apply to both survey and non-survey data.

### ***Data Suppression***

In order to maintain confidentiality of the individuals whose data was being assessed and to promote overall reasonable levels of precision for population parameters, a number of data suppression rules were applied specific to relevant data sets:

- No birth or mortality rates were generated for population groups with fewer than five events for a given year or time period.
- No hospital patient encounter rates (including rates of hospitalizations and emergency department visits) were generated for populations groups with fewer than 11 cases.
- No survey percentages or point estimates from the BBRFSS or YRBSS surveys were generated if sample sizes were fewer than 50 or 100 respondents, respectively, or when fewer than five respondents indicated one of the response choices.
- Survey percentages or point estimates greater than 5% were not presented if the relative standard error equaled or exceeded 30% (see Sampling Error under Methods for Survey Data).

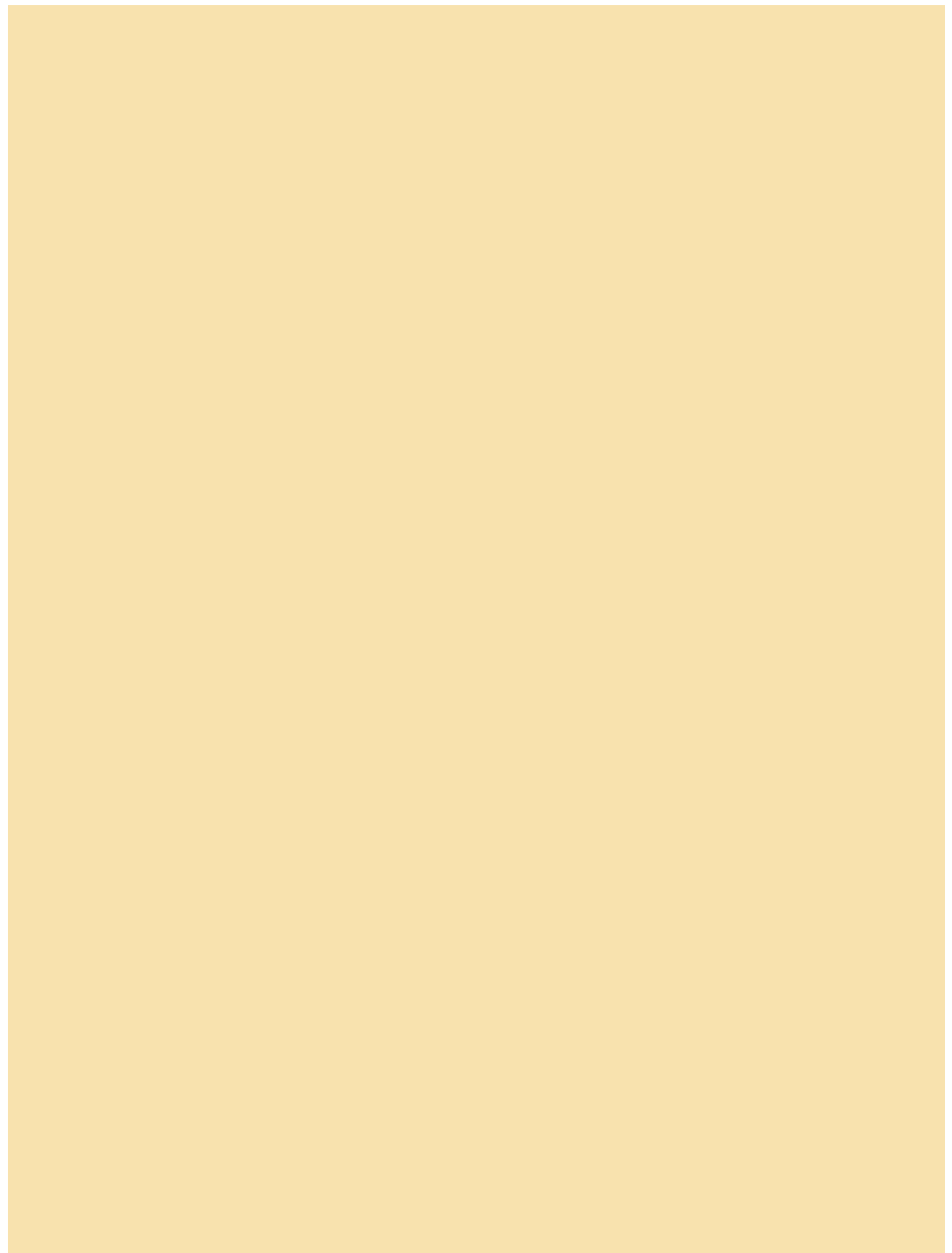
### ***Combining Data Across Multiple Years***

Combining data across multiple years in order to increase the number of cases is a commonly practiced epidemiological method for generating rates that are considered more stable (i.e. less vulnerable to the effect of random variation) than individual year rates when the number of cases or deaths is small. This is, also, a useful method for achieving the minimum count thresholds required by the data suppression rules described above. For this report, with very little exception, **data were combined across as many of five data years as necessary in order to maximize the number of population group rates presented** (e.g., to permit the computation of Asian resident rates or percentages for at least 10 neighborhoods). Resulting rates and comparisons, then, speak for the average annual experience during the combined years and likely mask specific differences for subsets of the combined or individual years.

### ***Assessing Rate Change Over Time (i.e., Trends)***

Many graphs of health indicators in the report show rates or percentages for the most recent five data years, typically from 2011 to 2015 for non-survey data and 2006-2015 or 2007-2015 for the biennial survey data. For non-survey and survey data, rate change over time for a given population group was assessed using statistical procedures. For this reason, one's visual interpretation of the data in the report charts (i.e., whether increasing or decreasing) may not reflect what is expressed by the chart notation and or in interpretative text.

For additional information regarding the analytical methods used within this report, please contact the Boston Public Health Commission Research and Evaluation Office.



# Chapter 1

## Demographics





# Demographics

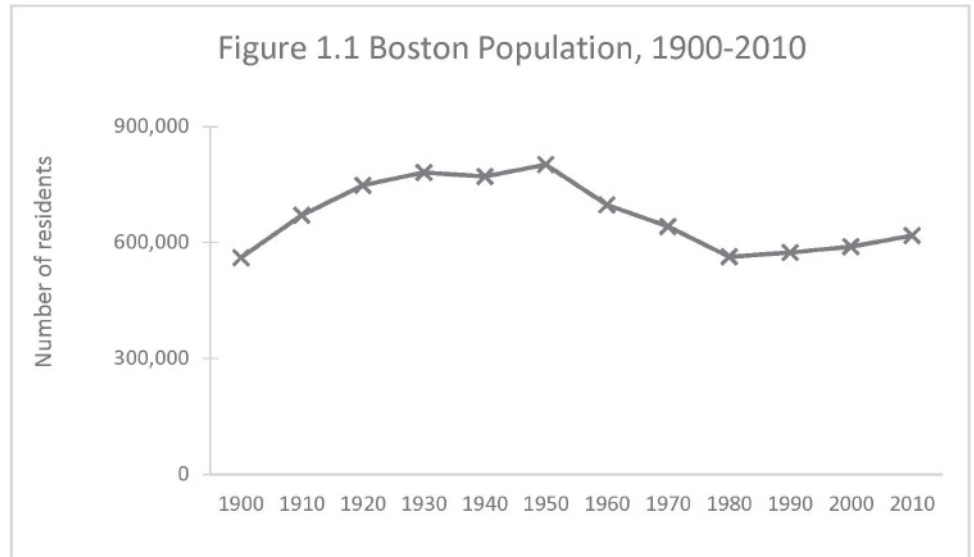
Boston's population has grown in the last decade. Much of this change can be attributed to local and state policies that have created a strong and well-balanced economy and supported neighborhood redevelopment (1). With its many colleges and universities, Boston is especially appealing to young and well-educated people from around the world. In 2015, 27% of the Boston population was foreign-born compared with only 15% of the Massachusetts population and 13% of the entire population of the United States (2).

Understanding the characteristics of Boston's population can help identify those vulnerable to poor health outcomes. For instance, it is well established that language access is crucial to providing basic human services, including health care (3). Thirteen percent of Boston households were linguistically isolated, meaning all members over the age of 14 had some difficulty speaking English (2). This group may be unable to receive needed services to stay safe and healthy. Health care and public health systems must address the language needs of vulnerable populations in order to ensure optimal health for all.

Although Boston is a racially and ethnically diverse city in which less than half of its residents are White, Boston was ranked among the top 20th percentile of highly segregated metropolitan areas in the United States in 2010, alongside Cincinnati, Ohio and Birmingham, Alabama (4). Racial residential segregation refers to the degree to which two or more racial/ethnic groups live separately from one another in a geographic area (3). Segregation affects health by creating different economic, physical, and social environments that shape the health behaviors and choices individuals make (5-7). Evidence suggests that segregation of people of color into poor, less resourced neighborhoods is associated with increased adult mortality (6, 8). In order to understand social factors that influence health, health indicators in this report are stratified by race and individual socioeconomic (SES) indicators, and presented geographically by neighborhood or census tract within maps.

Understanding the age structure of a population helps forecast social service and health care needs. In 2015, 15% of Boston residents were 60 or older; by 2030 it is projected that about 20% of Boston's population will be comprised of older adults (9). At the younger end of the age spectrum, demographic characteristics for children and adolescents differ from the rest of the Boston population. Black children make up the highest proportion of youth under the age of 18, whereas White individuals make up the largest proportion of all residents. In this report, we give special attention to the subpopulation of Boston youth for whom many of Boston's programs and policies are designed to support and protect.

In 2010, Boston had 617,591 residents, making it the most populous city in Massachusetts. Data from the decennial censuses demonstrate that the population of Boston has varied dramatically over the past 110 years, reaching a high point of 801,444 residents in 1950. The population of Boston increased 5% between 2000 and 2010.



DATA SOURCE: Decennial Censuses 1900-2010, U.S. Census Bureau

Between 2000 and 2010, the percentage of Asian and Latino residents increased while the percentage of Black and White residents decreased.



(1) Includes American Indians/Alaskan Natives and individuals who identify as some other race

DATA SOURCE: Decennial Censuses 2000 and 2010, U.S. Census Bureau



The population of Boston has become increasingly diverse over time. While 50% of Boston residents were White in 2000, this percentage fell to slightly less than a majority (45%) by 2015. Much of the diversification in the population of Boston is due to an increase in the Latino population relative to the overall population of Boston, which increased from 14% in 2000 to 20% in 2015.

Figure 1.3 Population by Race/Ethnicity and Year

Year	Not Latino					Latino (of any race)
	Asian	Black	Other race <sup>1</sup>	Two or more races	White	
2015	9.5%	22.9%	1.2%	2.3%	44.7%	19.5%
2014	9.7%	22.3%	1.5%	2.2%	45.6%	18.6%
2013	8.9%	22.0%	1.7%	2.7%	45.9%	18.8%
2012	9.1%	23.3%	1.0%	2.0%	46.0%	18.6%
2011	9.1%	22.7%	1.8%	2.1%	46.0%	18.4%
2010	8.9%	22.4%	1.8%	2.4%	47.0%	17.5%
2009	7.5%	21.7%	1.6%	1.7%	51.2%	16.3%
2008	8.2%	21.6%	1.7%	1.5%	50.8%	16.2%
2007	8.6%	21.2%	2.0%	1.5%	49.8%	16.9%
2006	8.0%	23.4%	2.1%	1.4%	50.2%	14.9%
2005	8.7%	23.5%	‡	1.2%	48.6%	14.7%
2000	7.5%	23.8%	1.7%	3.1%	49.5%	14.4%
1990	5.2%	24.0%	1.3%	<sup>2</sup>	59.1%	10.4%
1980	2.7%	21.7%	1.3%	<sup>2</sup>	67.9%	6.4%

‡ Data not presented due to insufficient sample size

<sup>1</sup> Includes American Indians/Alaskan Natives and individuals who identify as some other race

<sup>2</sup> Prior to the 2000 census, data were not collected on whether individuals identified as belonging to two or more races.

NOTE: The 2000 Census was the first to offer respondents the option of identifying as belonging to more than one race. Therefore, census data from before 2000 are not strictly comparable to census data in 2000 and beyond. Nonetheless, these data provide good estimates of the changes in the racial and ethnic composition of Boston.

In addition, verifiable data were not available

DATA SOURCE: Decennial Censuses 1980, 1990, 2000 and 2010, U.S. Census Bureau; American Community Survey, 2005-2015, U.S. Census Bureau



Between 2000 and 2010, the overall population of Boston increased by 5%.

Among neighborhoods, the South End, Roxbury, and Fenway experienced the greatest increases in population (24%, 17%, and 15%, respectively) while Dorchester (zip codes 02122, 02124), Mattapan, and Roslindale experienced the greatest decreases in population (-5%, -8%, and -8%, respectively).

Figure 1.4 Boston Population by Neighborhood,  
2000 and 2010

Neighborhood	2000	2010	% change
BOSTON	589,141	617,591	+4.8%
Allston/Brighton	66,467	66,865	+0.6%
Back Bay <sup>1</sup>	46,504	50,017	+7.6%
Charlestown	15,195	16,439	+8.2%
Dorchester (zip codes 02121, 02125)	58,675	59,273	+1.0%
Dorchester (zip codes 02122, 02124)	75,329	71,262	-5.4%
East Boston	38,413	40,508	+5.5%
Fenway	47,449	54,565	+15.0%
Hyde Park	28,392	28,488	+0.3%
Jamaica Plain	36,293	35,401	-2.5%
Mattapan	27,815	25,562	-8.1%
Roslindale	32,527	29,826	-8.3%
Roxbury	34,665	40,527	+16.9%
South Boston	30,048	33,889	+12.8%
South End <sup>2</sup>	27,311	33,881	+24.1%
West Roxbury	24,058	25,861	+7.5%

<sup>1</sup> Includes Beacon Hill, Downtown, the North End, and the West End

<sup>2</sup> Includes the zip code typically used to identify Chinatown (02111)

DATA SOURCE: Decennial Censuses 2000 and 2010, U.S. Census Bureau

Figure 1.5 Boston Population by Neighborhood and Race/Ethnicity (%), 2000 and 2010

Neighborhood	Total population		Asian		Black		Latino		White		Other race <sup>1</sup>		Two or more races	
	2000	2010	2000	2010	2000	2010	2000	2010	2000	2010	2000	2010	2000	2010
	Count	Count	%	%	%	%	%	%	%	%	%	%	%	%
BOSTON	589,141	617,591	7.5%	8.9%	23.8%	22.4%	14.4%	17.5%	49.5%	47.0%	1.7%	1.8%	3.1%	2.4%
Allston/Brighton	66,467	66,865	13.7%	15.4%	4.5%	4.6%	9.2%	10.2%	68.6%	65.8%	1.4%	1.7%	2.6%	2.4%
Back Bay <sup>2</sup>	46,504	50,017	9.2%	10.1%	5.1%	4.7%	3.8%	5.2%	80.1%	78.0%	0.4%	0.5%	1.4%	1.6%
Charlestown	15,195	16,439	5.0%	8.2%	3.6%	4.7%	11.6%	9.7%	78.6%	75.8%	0.3%	0.5%	0.9%	1.2%
Dorchester (zip codes 02121, 02125)	58,675	59,273	6.6%	6.6%	47.8%	44.0%	17.5%	22.6%	18.2%	17.1%	4.9%	5.7%	5.2%	3.8%
Dorchester (zip codes 02122, 02124)	75,329	71,262	8.3%	9.8%	46.7%	45.8%	11.8%	14.7%	25.7%	22.7%	3.0%	3.6%	4.5%	3.5%
East Boston	38,413	40,508	4.0%	3.5%	3.1%	3.2%	39.0%	52.9%	49.7%	37.2%	1.3%	1.8%	2.9%	1.5%
Fenway	47,449	54,565	13.6%	17.3%	6.7%	5.8%	8.2%	9.0%	68.1%	64.7%	0.7%	0.5%	2.7%	2.7%
Hyde Park	28,392	28,488	1.6%	1.8%	32.4%	43.3%	13.4%	22.3%	48.8%	29.5%	0.7%	1.0%	3.1%	2.1%
Jamaica Plain	36,293	35,401	5.1%	5.2%	13.9%	12.0%	24.9%	22.6%	52.9%	57.1%	0.6%	0.7%	2.5%	2.5%
Mattapan	27,815	25,562	1.0%	0.9%	81.9%	80.4%	7.1%	11.7%	4.8%	3.8%	0.7%	0.9%	4.5%	2.4%
Roslindale	32,527	29,826	2.6%	2.7%	16.5%	21.3%	20.2%	25.9%	56.8%	47.1%	0.6%	0.9%	3.3%	2.2%
Roxbury	34,665	40,527	3.1%	5.1%	51.1%	41.4%	24.4%	27.0%	13.5%	20.2%	4.0%	3.4%	4.0%	3.0%
South Boston	30,048	33,889	3.9%	4.9%	2.5%	4.6%	7.7%	9.9%	84.3%	78.8%	0.4%	0.5%	1.2%	1.2%
South End <sup>3</sup>	27,311	33,881	19.6%	21.2%	20.2%	15.8%	16.3%	15.5%	40.9%	45.0%	0.7%	0.6%	2.3%	1.9%
West Roxbury	24,058	25,861	4.1%	6.4%	2.1%	5.0%	3.5%	6.8%	88.6%	80.0%	0.4%	0.4%	1.4%	1.5%

<sup>1</sup> Includes American Indians/Alaskan Natives and individuals who identify as some other race

<sup>2</sup> Includes Beacon Hill, Downtown, the North End, and the West End

<sup>3</sup> Includes the zip code typically used to identify Chinatown (02111)

DATA SOURCE: Decennial Censuses 2000 and 2010, U.S. Census Bureau

Figure 1.6 Boston Population Counts by Neighborhood and Race/Ethnicity, 2000 and 2010

	Asian			Black			Latino			White			Other race <sup>1</sup>			Two or more races		
	2000	2010	% change	2000	2010	% change	2000	2010	% change	2000	2010	% change	2000	2010	% change	2000	2010	% change
	Count	Count		Count	Count		Count	Count		Count	Count		Count	Count		Count	Count	
BOSTON	44,280	55,028	+24.3%	140,305	138,072	-1.6%	85,089	107,917	+26.8%	291,561	290,310	-0.4%	9,732	11,305	+16.2%	18,174	14,959	-21.5%
Allston/Brighton	9,123	10,313	+13.0%	2,997	3,049	+1.7%	6,125	6,793	+10.9%	45,582	44,001	-3.5%	910	1,126	+23.7%	1,730	1,583	-9.3%
Back Bay <sup>2</sup>	4,275	5,039	+17.9%	2,381	2,350	-1.3%	1,780	2,582	+45.1%	37,232	39,014	+4.8%	187	231	+23.5%	649	801	+19.0%
Charlestown	761	1,344	+76.6%	539	764	+41.7%	1,764	1,591	-9.8%	11,946	12,458	+4.3%	46	80	+73.9%	139	202	+31.2%
Dorchester (zip codes 02121, 02125)	3,855	3,934	+2.0%	28,030	26,085	-6.9%	10,246	13,418	+31.0%	10,659	10,157	-4.7%	2843	3,401	+19.6%	3,042	2,278	-33.5%
Dorchester (zip codes 02122, 02124)	6,230	6,997	+12.3%	35,156	32,605	-7.3%	8,913	10,471	+17.5%	19,367	16,152	-16.6%	2282	2,558	+12.1%	3,381	2,479	-36.4%
East Boston	1,553	1,413	-9.0%	1,177	1,283	+9.0%	14,990	21,419	+42.9%	19,078	15,051	-21.1%	511	724	+41.7%	1,104	618	-78.6%
Fenway	6,469	9,425	+45.7%	3,177	3,176	-0.0%	3,866	4,922	+27.3%	32,332	35,313	+9.2%	326	258	-20.9%	1,279	1,471	+13.1%
Hyde Park	453	499	+10.2%	9,211	12,338	+33.9%	3,796	6,351	+67.3%	13,861	8,408	-39.3%	191	295	+54.5%	880	597	-47.4%
Jamaica Plain	1,867	1,829	-2.0%	5,052	4,253	-15.8%	9,025	7,983	-11.5%	19,205	20,209	+5.2%	225	251	+11.6%	919	876	-4.9%
Mattapan	265	218	-17.7%	22,768	20,555	-9.7%	1,985	2,978	+50.0%	1,328	959	-27.8%	205	241	+17.6%	1,264	611	-106.9%
Roslindale	853	796	-6.7%	5,360	6,342	+18.3%	6,553	7,758	+18.1%	18,473	14,034	-24.0%	204	273	+33.8%	1,084	643	-68.6%
Roxbury	1,059	2,045	+93.1%	17,705	16,785	-5.2%	8,464	10,938	+29.2%	4,681	8,202	+75.2%	1388	1,356	-2.3%	1,368	1,201	-13.9%
South Boston	1,178	1,675	+42.2%	749	1,574	+110.1%	2,298	3,354	+46.0%	25,333	26,704	+5.4%	121	176	+45.5%	369	406	+9.1%
South End <sup>3</sup>	5,358	7,188	+34.2%	5,505	5,338	-3.0%	4,451	5,255	+18.1%	11,165	15,249	+36.6%	194	195	+0.5%	638	656	+2.7%
West Roxbury	981	1,642	+67.4%	498	1,283	+157.6%	833	1,754	+110.6%	21,319	20,681	-3.0%	99	110	+11.1%	328	391	+16.1%

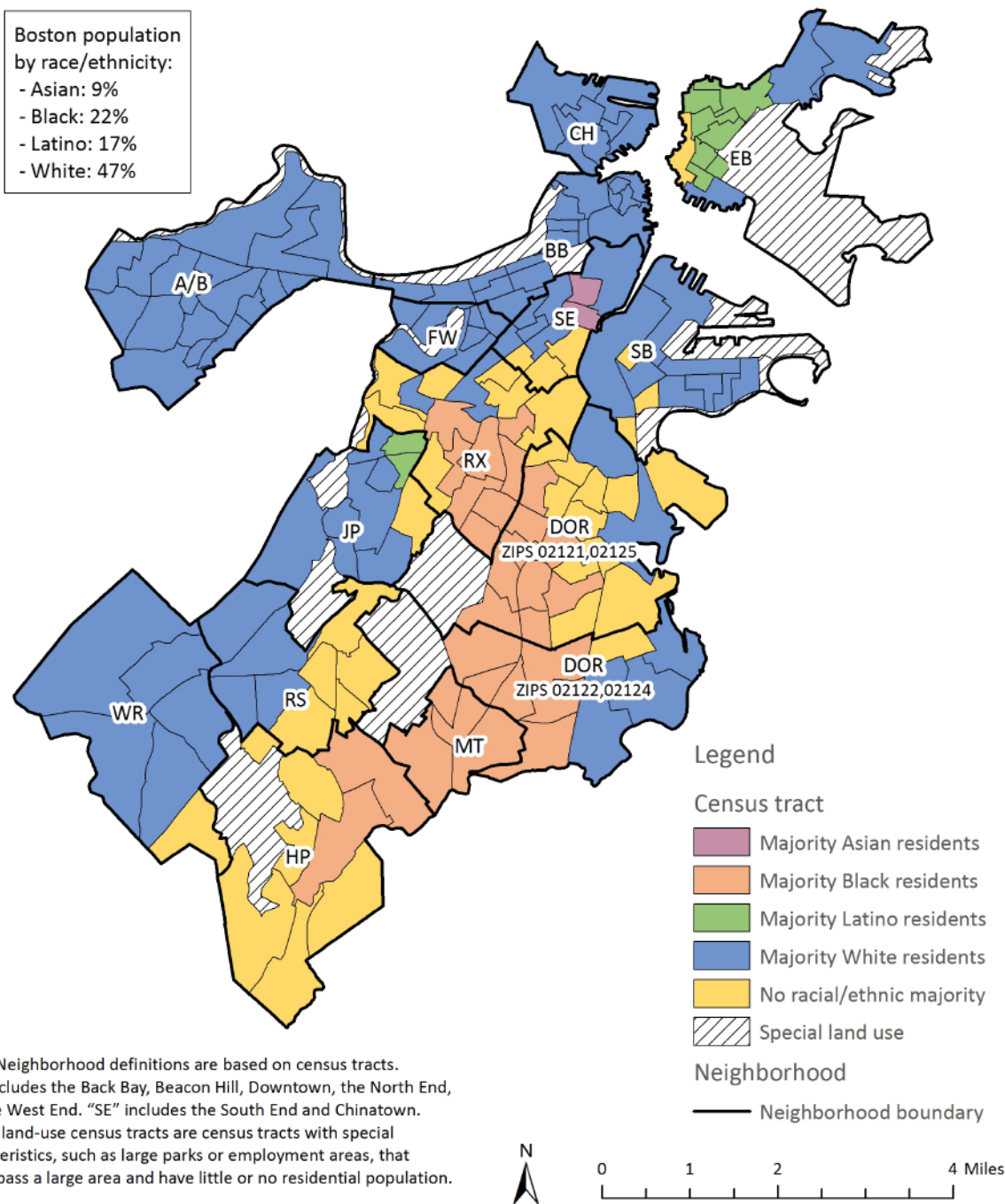
<sup>1</sup> Includes American Indians/Alaskan Natives and individuals who identify as some other race

<sup>2</sup> Includes Beacon Hill, Downtown, the North End, and the West End

<sup>3</sup> Includes the zip code typically used to identify Chinatown (02111)

DATA SOURCE: Decennial Censuses 2000 and 2010, U.S. Census Bureau

### Figure 1.7 Majority Racial/Ethnic Group by Census Tract, Boston, 2010



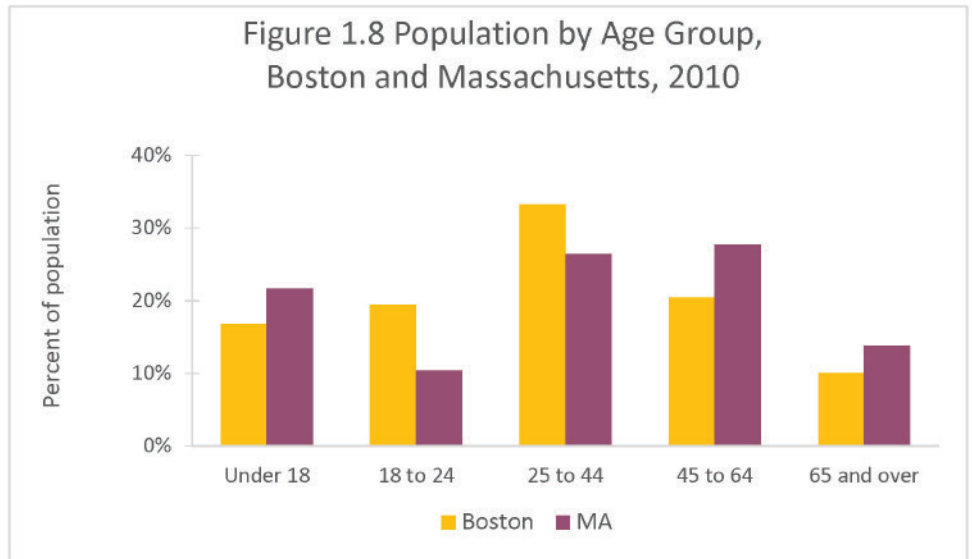
NOTE: Neighborhood definitions are based on census tracts. "BB" includes the Back Bay, Beacon Hill, Downtown, the North End, and the West End. "SE" includes the South End and Chinatown. Special land-use census tracts are census tracts with special characteristics, such as large parks or employment areas, that encompass a large area and have little or no residential population.

DATA SOURCE: Decennial Census 2010, U.S. Census Bureau

In the neighborhoods of Allston/Brighton, Back Bay, Charlestown, Fenway, Jamaica Plain, South Boston, the South End, and West Roxbury, White residents made up more than 50% of the population in most census tracts. In Mattapan, Black residents made up more than 50% of the population in all census tracts.

Majority-Black-resident census tracts were also concentrated in the neighborhoods of Dorchester (zip codes 02121, 02125), Dorchester (zip codes 02122, 02124), and Roxbury. Latino residents made up more than 50% of the population in the majority of census tracts in East Boston. Asian residents made up more than 50% of the population in 2 census tracts in the South End.

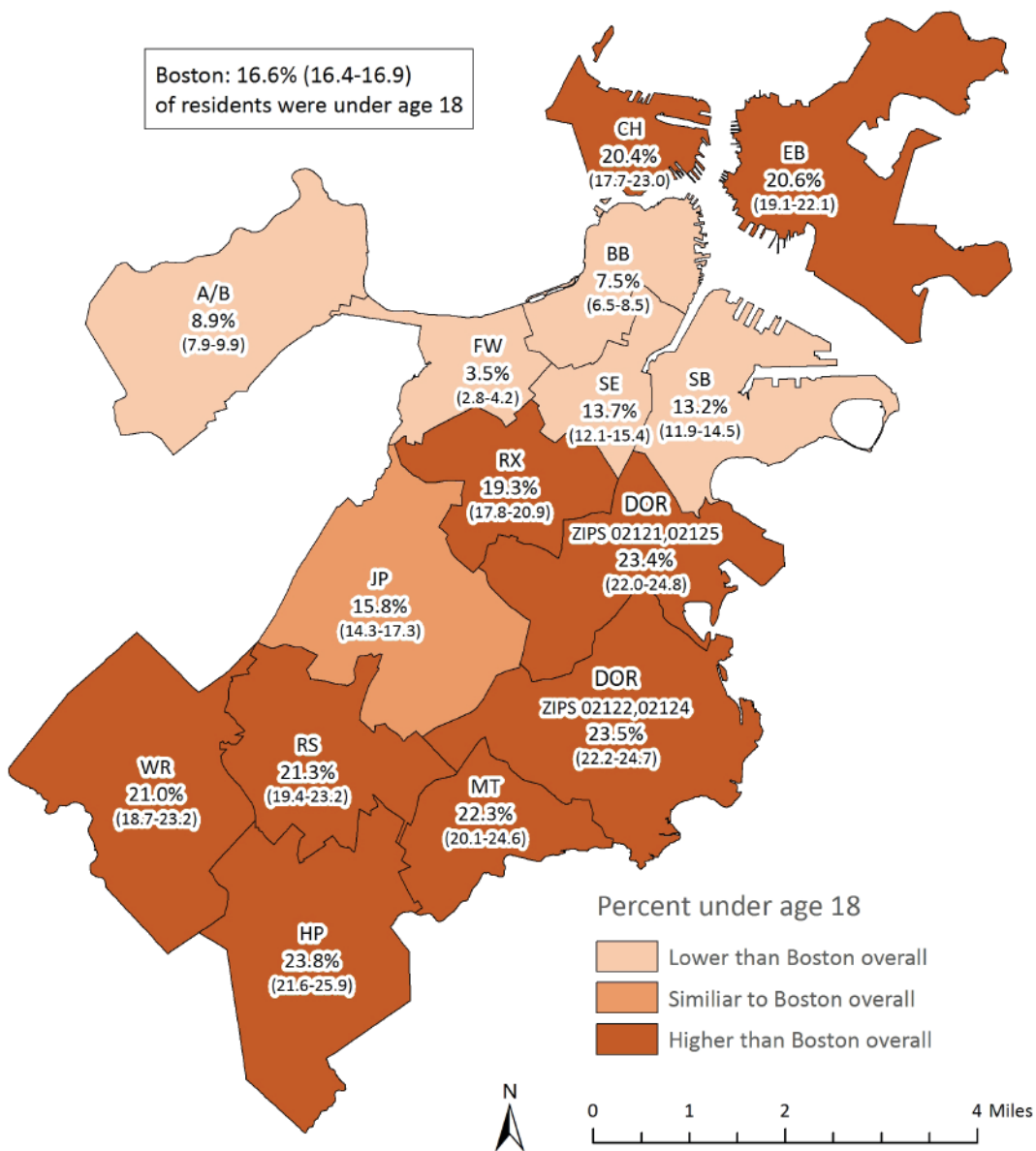
In 2010, Boston had a higher percentage of adults ages 18-24 and 25-44 compared with Massachusetts. Compared with Boston, a higher percentage of residents in Massachusetts were under age 18 or over age 44.



DATA SOURCE: Decennial Census 2010, U.S. Census Bureau



### Figure 1.9 Population Under Age 18 by Neighborhood, 2011-2015



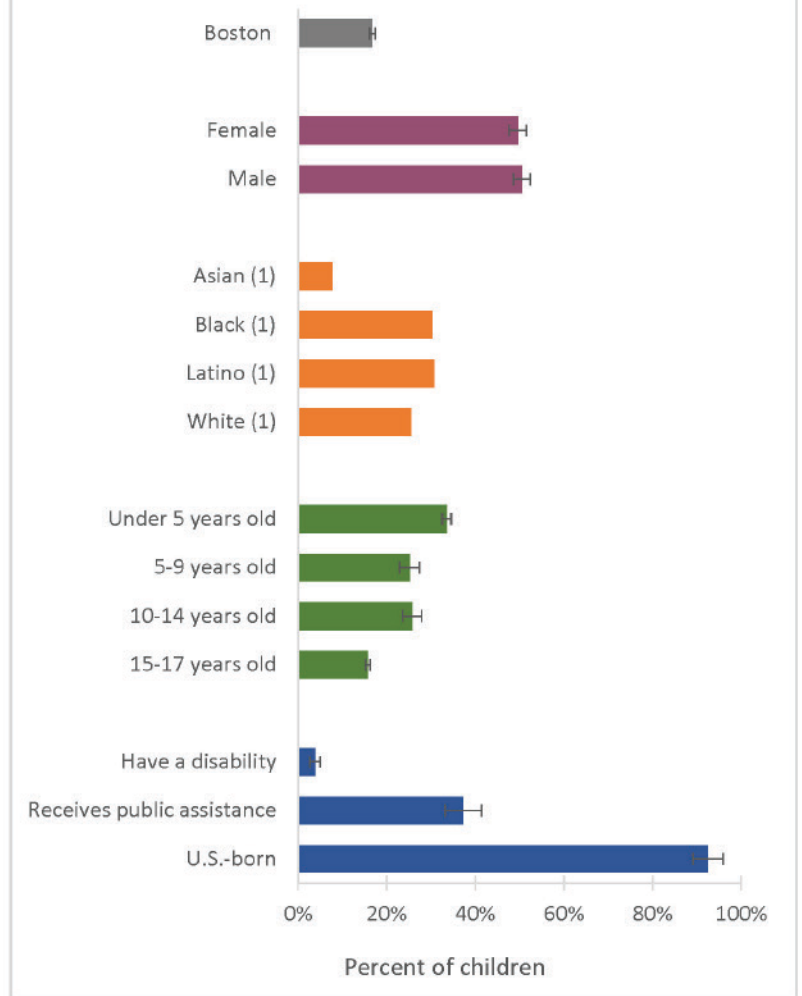
NOTE: "BB" includes the Back Bay, Beacon Hill, Downtown, the North End, and the West End. "SE" includes the South End and Chinatown.

DATA SOURCE: American Community Survey, 2011-2015, U.S. Census Bureau

During 2011-2015, 17% of Boston residents were under age 18. Compared with Boston overall, Charlestown, Dorchester (zip codes 02121, 02125), Dorchester (zip codes 02122, 02124), East Boston, Hyde Park, Mattapan, Roslindale, Roxbury, and West Roxbury had a higher percentage of residents under age 18. Allston/Brighton, Back Bay, Fenway, South Boston, and the South End had a lower percentage of residents under age 18 compared with Boston overall.

In 2015, 17% of Boston residents were younger than 18 years of age. Of the children in Boston, 31% were Latino, 30% were Black, 25% were White, and 8% were Asian. Children younger than 5 years of age made up the greatest percentage of children (34%). Regarding other indicators, 93% of Boston children were born in the United States, 37% received public assistance, and 4% had a disability.

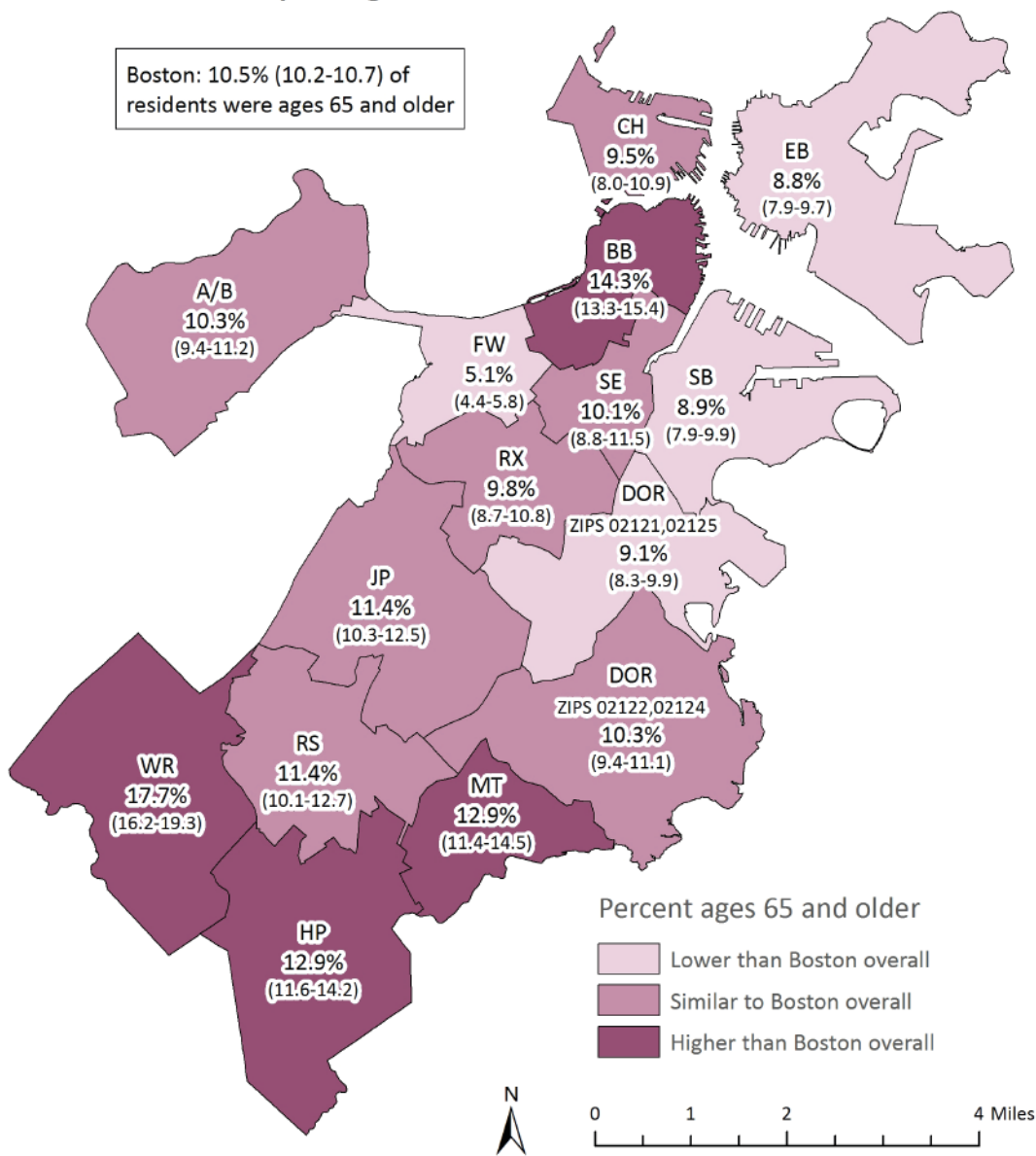
Figure 1.10 Children by Selected Indicators, 2015



(1) Due to limited information, confidence intervals for each racial/ethnic group could not be calculated and are therefore not available.

DATA SOURCE: American Community Survey, 2015, U.S. Census Bureau

### Figure 1.11 Population Ages 65 and Older by Neighborhood, 2011-2015



NOTE: "BB" includes the Back Bay, Beacon Hill, Downtown, the North End, and the West End. "SE" includes the South End and Chinatown.

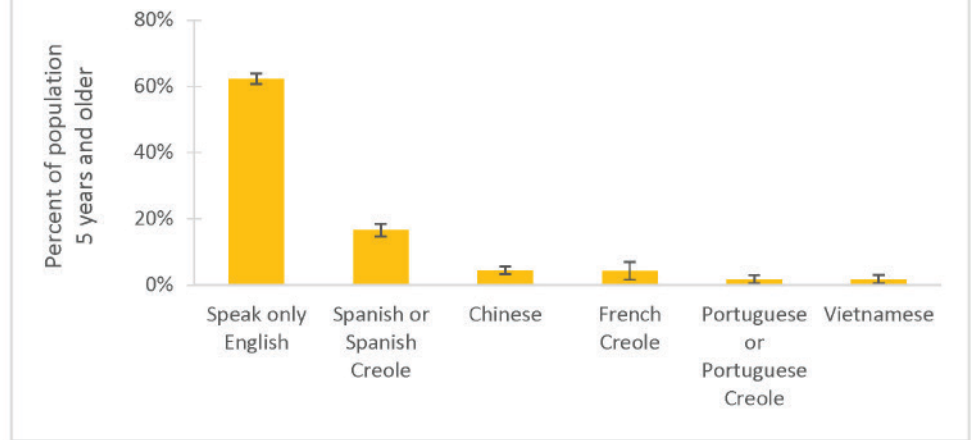
DATA SOURCE: American Community Survey, 2011-2015, U.S. Census Bureau

During 2011-2015, 11% of Boston residents were ages 65 and older. Compared with Boston overall, Back Bay, Hyde Park, Mattapan, and West Roxbury had a higher percentage of residents ages 65 and older. Dorchester (zip codes 02121, 02125), East Boston, Fenway, and South Boston had a lower percentage of residents ages 65 and older compared with Boston overall.



While English was the language most frequently spoken at home in 2015, 38% of Boston residents ages 5 and older spoke a language other than English at home (data not shown). Spanish (including Spanish Creole) was spoken at home by 17% of residents, while 5% spoke Chinese, 4% spoke French Creole, 2% spoke Vietnamese, and another 2% spoke Portuguese or Portuguese Creole.

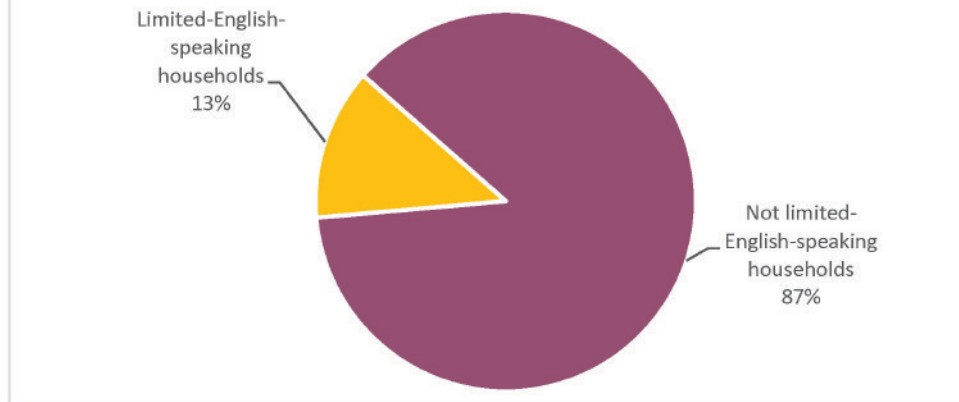
Figure 1.12 Languages Most Frequently Spoken at Home, 2015



DATA SOURCE: American Community Survey, 2015, U.S. Census Bureau

In 2015, 13% of Boston households were considered limited-English-speaking households. A limited-English-speaking household is defined as a household in which no member ages 14 and older a) speaks only English or b) speaks a non-English language and speaks English "very well." This can also be viewed as households where all members ages 14 and older have at least some difficulty with English.

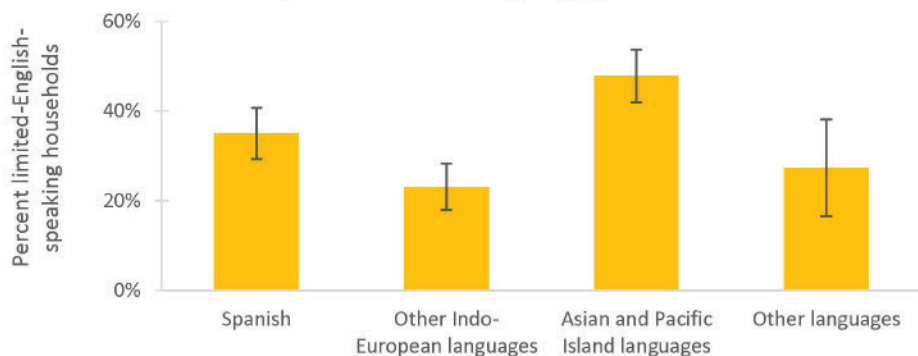
Figure 1.13 English Speaking Among Households, 2015



NOTE: See appendix for confidence intervals for point estimates.  
 DATA SOURCE: American Community Survey, 2015, U.S. Census Bureau



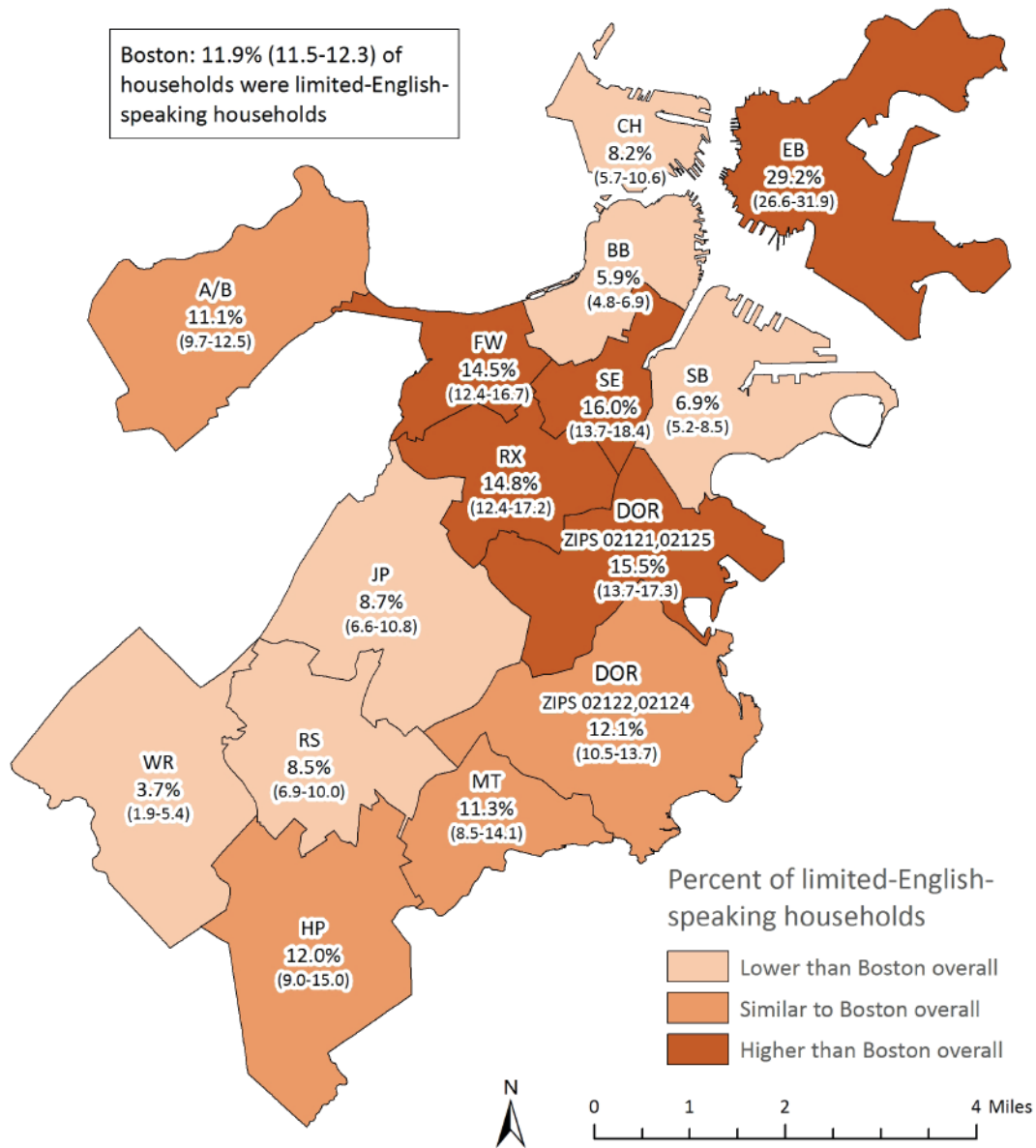
Figure 1.14 Limited-English-Speaking Households by Household Language, 2015



NOTE: Other Indo-European languages include English-based Pidgin Creole languages, Germanic, Romance (excluding Spanish), Celtic, Slavic, Baltic, Iranian, and Indic languages.  
 DATA SOURCE: American Community Survey, 2015, U.S. Census Bureau

In 2015, 35% of Spanish-speaking households were limited-English-speaking households, 23% of households that spoke other Indo-European languages were limited-English-speaking households, 48% of households that spoke Asian or Pacific Island languages were limited-English-speaking households, and 27% of households that spoke other languages were limited-English-speaking households.

Figure 1.15 Limited-English-Speaking Households by Neighborhood, 2011-2015

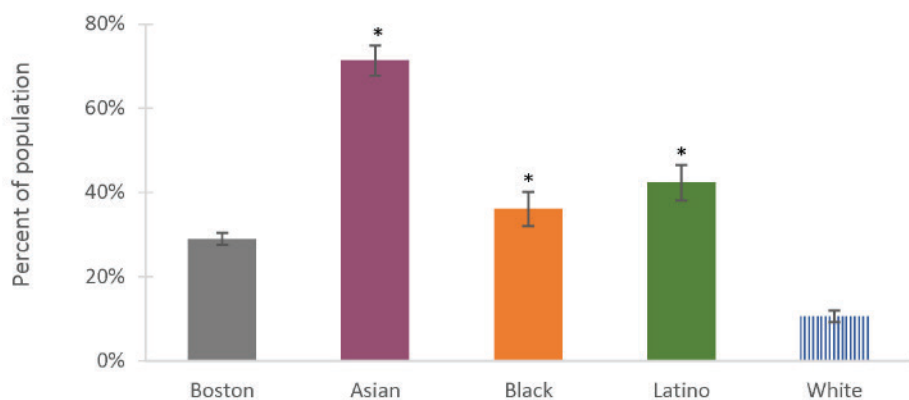


NOTE: "BB" includes the Back Bay, Beacon Hill, Downtown, the North End, and the West End. "SE" includes the South End and Chinatown.

DATA SOURCE: American Community Survey, 2011-2015, U.S. Census Bureau

During 2011-2015, 12% of Boston households were considered limited-English-speaking households. Compared with Boston overall, a higher percentage of households in Dorchester (zip codes 02121, 02125), East Boston, Fenway, Roxbury, and the South End were limited-English-speaking households. A lower percentage of households in Back Bay, Charlestown, Jamaica Plain, Roslindale, South Boston, and West Roxbury were limited-English-speaking households compared with Boston overall.

Figure 1.16 Foreign-Born Status by Race/Ethnicity, 2015



In 2015, 29% of Boston residents were foreign-born. A higher percentage of Asian (71%), Black (36%), and Latino (42%) residents were foreign-born compared with White residents (11%).

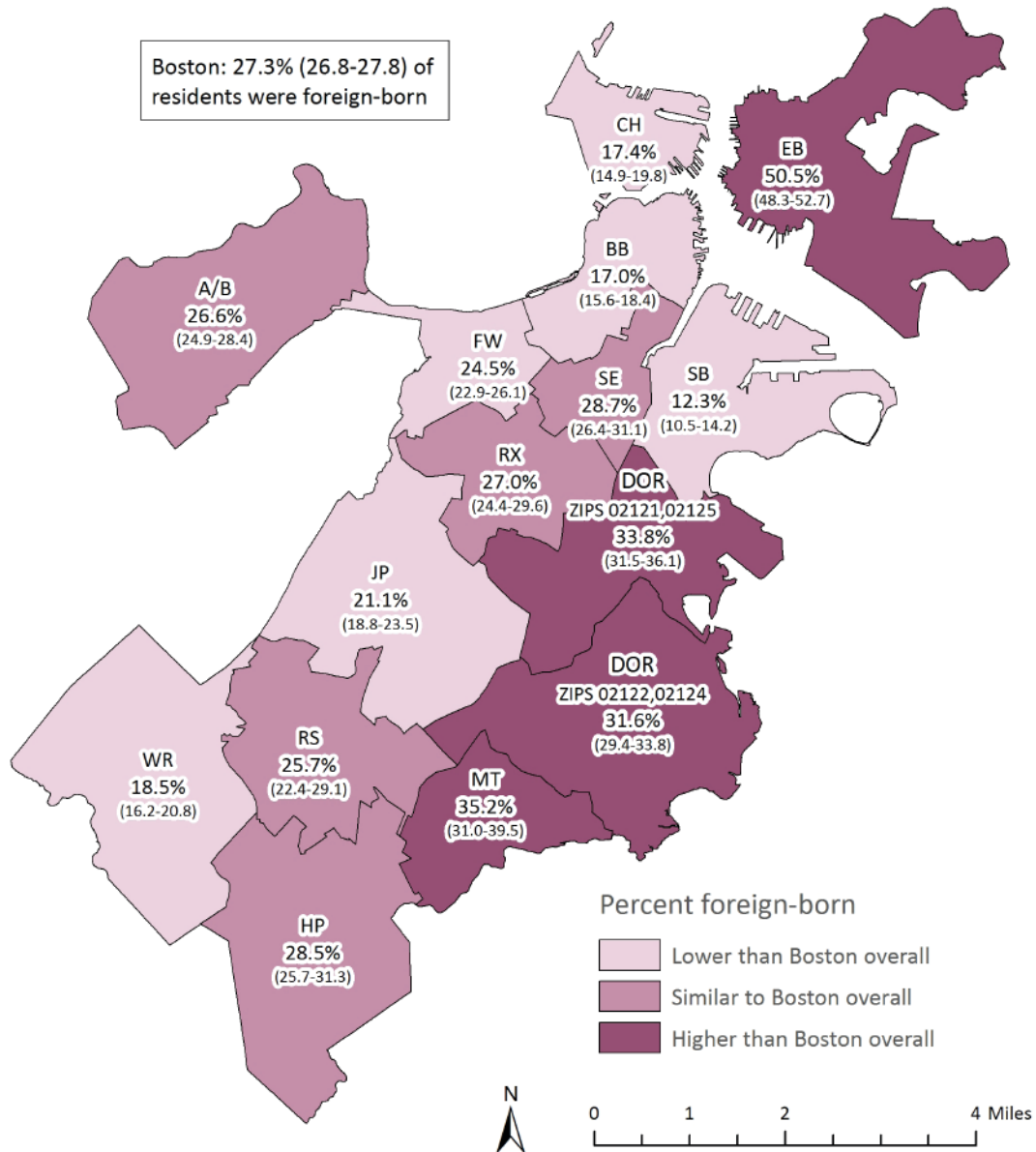
\* Statistically significant difference when comparisons are made between racial/ethnic groups

NOTE: Bars with patterns indicate the reference group within each selected indicator.

DATA SOURCE: American Community Survey Public Use Microdata Sample, 2015, U.S. Census Bureau



### Figure 1.17 Foreign-Born Status by Neighborhood, 2011-2015

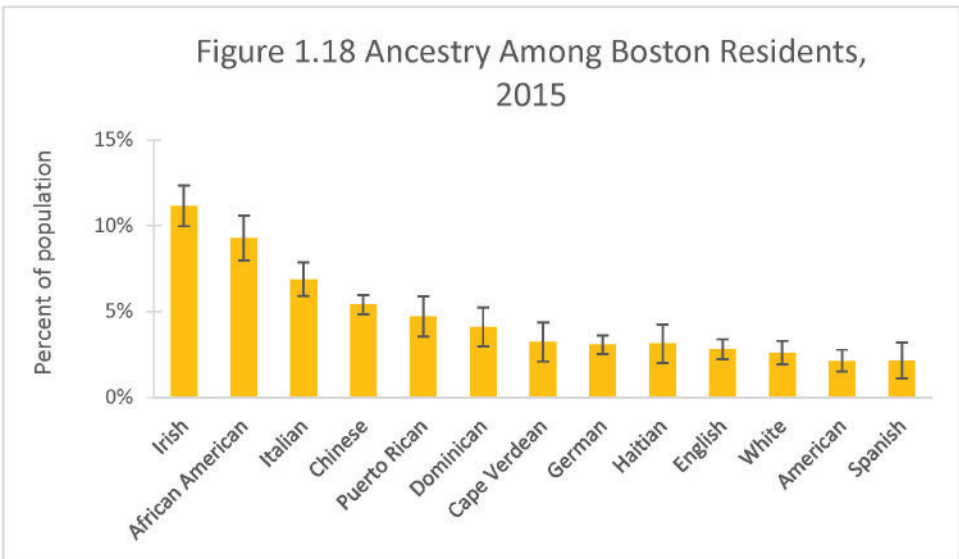


NOTE: "BB" includes the Back Bay, Beacon Hill, Downtown, the North End, and the West End. "SE" includes the South End and Chinatown.

DATA SOURCE: American Community Survey, 2011-2015, U.S. Census Bureau

During 2011-2015, 27% of Boston residents were foreign-born. Compared with Boston overall, a higher percentage of residents in Dorchester (zip codes 02121, 02125), Dorchester (zip codes 02122, 02124), East Boston, and Mattapan were foreign-born. A lower percentage of residents in Back Bay, Charlestown, Fenway, Jamaica Plain, South Boston, and West Roxbury were foreign-born compared with Boston residents overall.

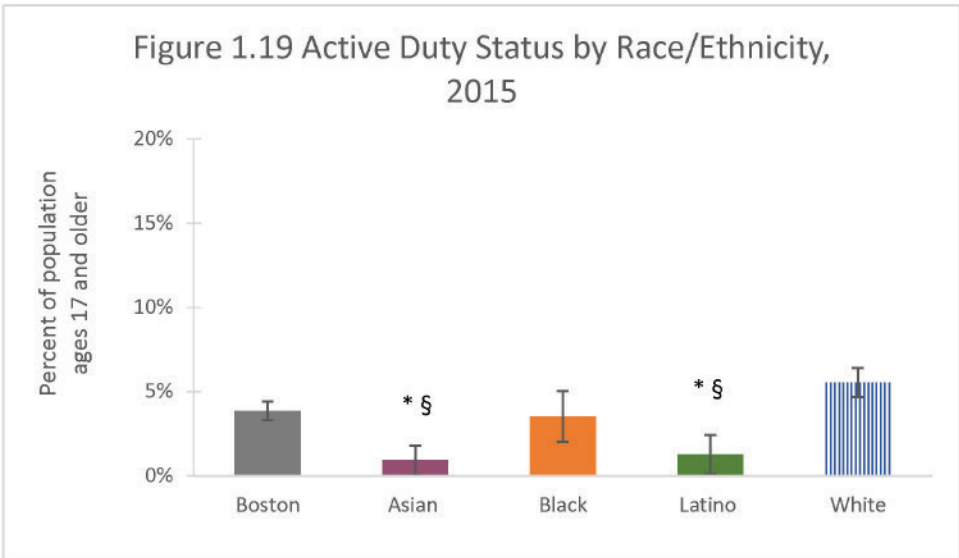
Figure 1.18 Ancestry Among Boston Residents, 2015



In 2015, the most commonly reported ancestries among Boston residents were Irish (11%), African American (9%), Italian (7%), Chinese (5%), and Puerto Rican (5%).

DATA SOURCE: American Community Survey Public Use Microdata Sample, 2015, U.S. Census Bureau

Figure 1.19 Active Duty Status by Race/Ethnicity, 2015



In 2015, 4% of Boston residents ages 17 and older reported ever serving on active duty in the military. A lower percentage of Asian (1%) and Latino (1%) residents ever served on active duty compared with White residents (6%).

\* Statistically significant difference when comparisons are made between racial/ethnic groups  
 § Estimates have a coefficient of variation greater than or equal to 30% and should be interpreted with caution.

NOTE: Bars with patterns indicate the reference group within each selected indicator.

DATA SOURCE: American Community Survey Public Use Microdata Sample, 2015, U.S. Census Bureau

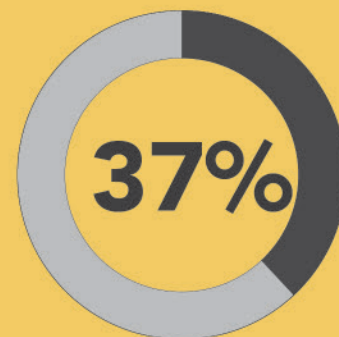
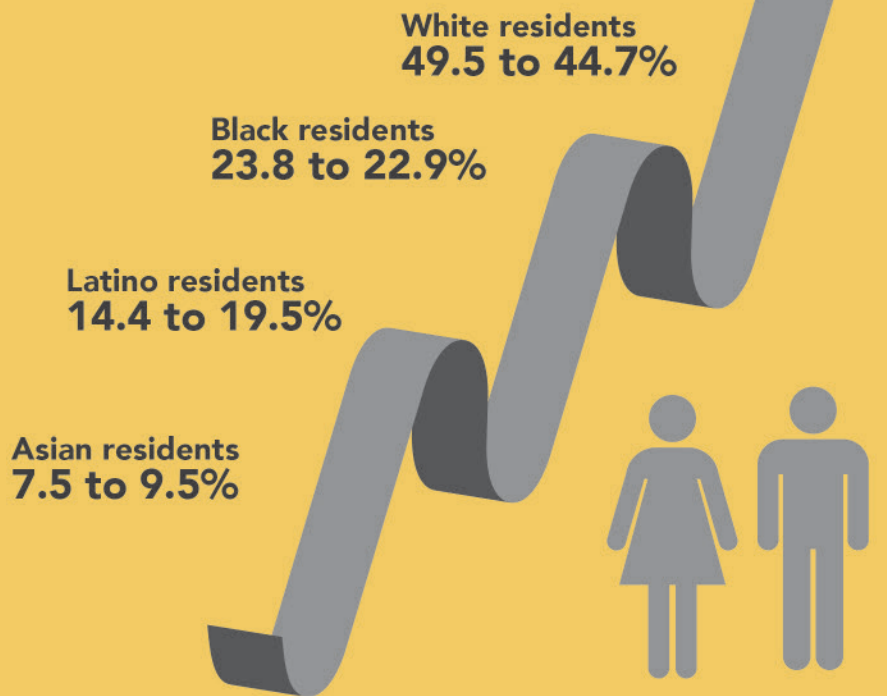
## Summary

With its many colleges and universities, it is not surprising that in 2010, Boston was home to a higher percentage of adults ages 18-44 compared with Massachusetts and the U.S. overall. However, Boston's population has both grown and diversified over time. Between 2000 and 2010, the overall population increased by 5%. Among neighborhoods, Chinatown, the South End, and Roxbury experienced the greatest increases in population growth, while Dorchester (zip codes 02122, 02124), Roslindale, and Mattapan experienced the greatest decreases. From 2000-2015, the percentage of Asian and Latino residents increased, while the percentage of Black and White residents decreased. In 2015, the majority of residents were non-White, and nearly 30% of the population was foreign-born, which was higher than the national and state percentages. Among limited-English-speaking households in Boston, Spanish and Asian languages were the most commonly spoken languages other than English. The increasing diversity of the Boston population is exemplified among children less than 18 years of age, who made up approximately 17% of all Boston residents in 2015. This age group was comprised predominantly of Black and Latino children. More than a third of children less than 18 years of age are in families that received public assistance in 2015. This percentage (37%) was higher than the national average.

Although Boston is an increasingly diverse city, it remains segregated, and differences in sociodemographic characteristics can be seen at both the neighborhood and census tract level. Majority-Black-resident census tracts were concentrated in the neighborhoods of Dorchester (zip codes 02121, 02125), Dorchester (zip codes 02122, 02124), Mattapan, and Roxbury. Latino residents made up most of the population in many census tracts in East Boston, while certain census tracts in the South End had mostly Asian residents. Compared with Boston overall, a higher percentage of households in Dorchester (zip codes 02121, 02125), East Boston, Fenway, Roxbury, and the South End were limited-English-speaking households and a higher percentage of residents in Dorchester (zip codes 02121, 02125), Dorchester (zip codes 02122, 02124), East Boston, and Mattapan were foreign-born.

# Demographics

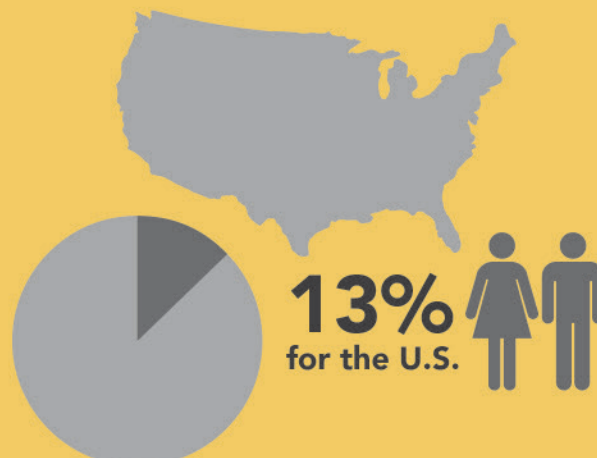
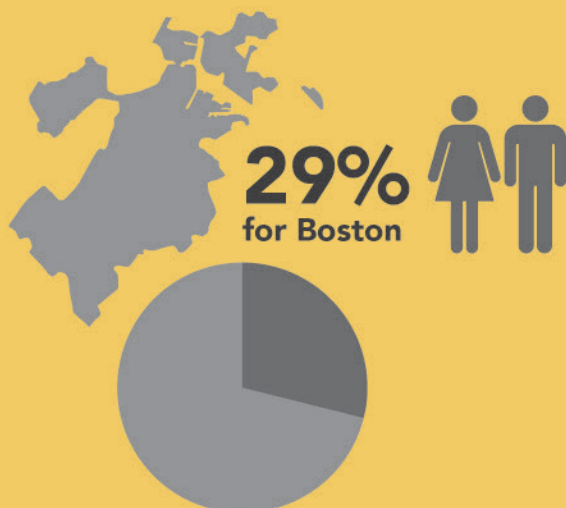
**From 2000 to 2015,  
Boston's population grew  
and diversified**



**of children  
less than  
18 years of age  
were in families  
that received  
public assistance  
in 2015**



## Foreign-born population in 2015



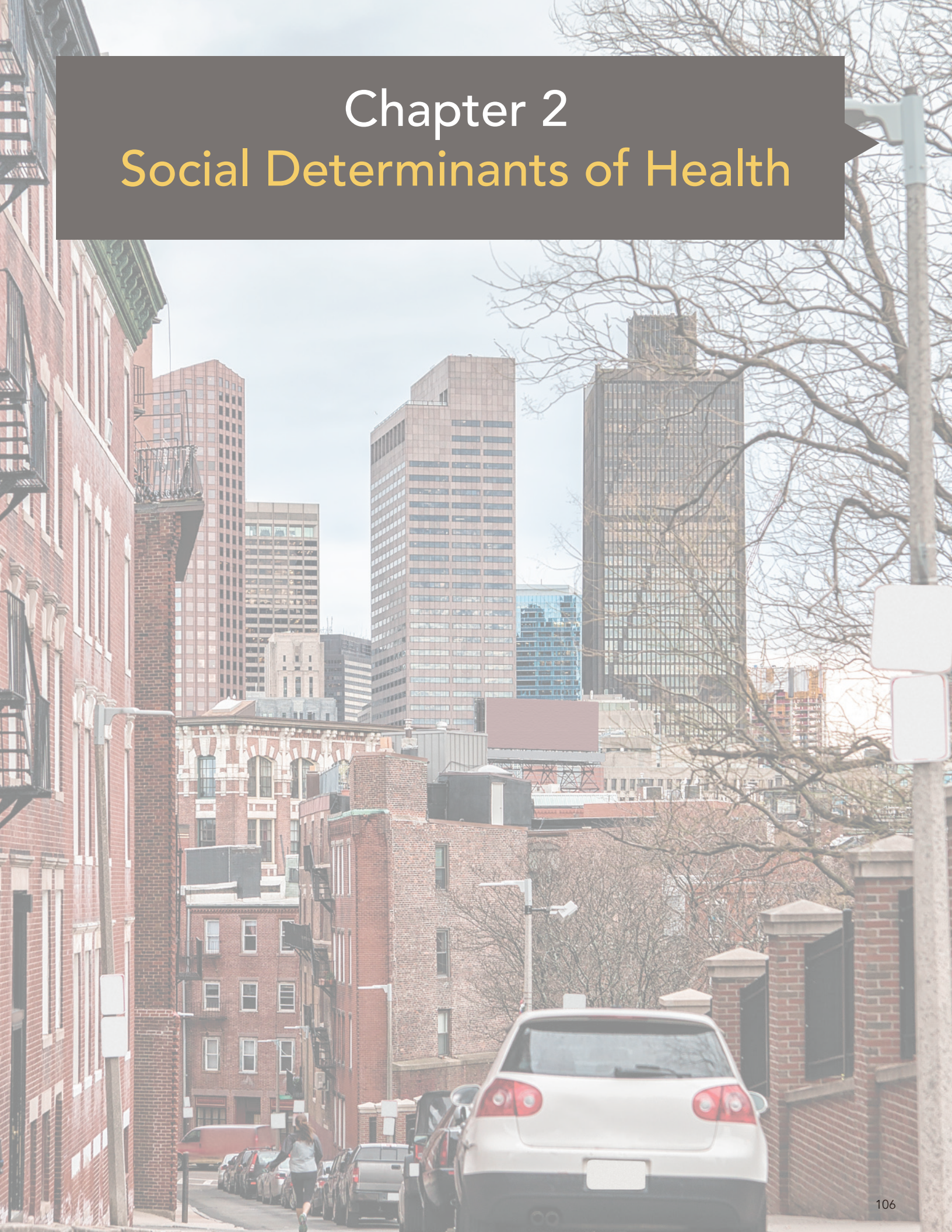


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# Chapter 2

## Social Determinants of Health





# Social Determinants of Health

Beyond individual physiology and health-related behaviors, there are economic, environmental, and social factors that influence health. Collectively, we refer to these as social determinants of health. Social determinants are societal circumstances in which people are born, grow up, live, work, and age (1). Social determinants of health are uniquely experienced by individuals, differentially impacting health experiences and ultimately contributing to health inequities (2). Research has identified a wide range of social factors that are associated with differences in health outcomes (2):

- Access to health care
- Access to health resources
- Access to healthy food
- Education
- Employment and occupational safety
- Environmental safety
- Exposure to violence
- Housing conditions
- Income
- Insurance coverage
- Racism and discrimination
- Transportation

These social determinants of health impact an individual's life in many ways, for example, shaping the quality of education available to them, their ability to find and maintain employment and the type of work available (including levels of exposure to occupational hazards), their access to safe and stable housing, and their access to health care and the quality of those services (3). The resulting life experiences, in turn, directly influence physical and mental health and contribute to health inequities. Our report describes how many health-promoting resources, such as income, employment, education, and home ownership, are unevenly distributed within our city among those of differing races and ethnicities, socioeconomic status, and geographic locations. Social determinants of health can be described in terms of three broad context areas: economic, environmental, and social.

## *Economic conditions and health*

Economic factors that influence health occur on both community and individual levels. On the community level, economic factors believed to be associated with health outcomes include income, poverty rates, employment opportunities, community investment, tax base, and spending priorities for local tax dollars (2). On an individual level, the opportunity to obtain a meaningful job with few occupational hazards, address financial needs, and remain food secure are paramount to maintaining good health. Economic resources enable health purchasing power including the ability to attain resources to manage or control disease (4). Lack of economic opportunity can create a vicious cycle where children who grow up in poverty are less able to acquire the needed resources for health and are more likely to experience mental, emotional, and behavioral disorders as a result (5).

The effects of coping with daily economic hardship can trigger a physical response, which may damage immune defense, deregulate physical processes, and accelerate aging or the onset of chronic disease (6, 7).

Quality education is widely recognized as a leading influence of acquiring higher economic position and better health. Educational attainment is associated with improved working conditions and higher income, which in turn allows for improved housing, nutrition, control of hazards and stress, as well as direct health benefits from having quality health insurance, retirement benefits, and adequate sick leave (8). Educational attainment is also closely linked to improved health knowledge, literacy, and behaviors, all of which are associated with improved health awareness and disease management (8).

### ***Environmental conditions and health***

The “built environment” or physical structures and infrastructure of communities and homes, can profoundly impact the safety and lifestyle options of its residents (9). Neighborhood safety, desirable areas for physical activity, close proximity to providers of affordable and nutrient-dense foods such as fruits and vegetables, clean air, access to formal health services, transportation options, and affordable housing are all essential to helping individuals attain full and vibrant health. Conversely, a density of retailers selling tobacco and alcohol, the presence of deserted and rundown lots, and industrial pollution serve to diminish safety and health (1, 8).

Physical inactivity, which increases the risk of diabetes, high blood pressure, and obesity, can be spurred by environmental conditions that produce fear and concern of victimization such as the presence of crime, or by a lack of well-kept sidewalks and walkability in neighborhoods (10). Children living in such physical environments are more likely to become overweight and obese (11). Communities with fewer physical assets and less desirable living conditions experience poorer overall health, including higher levels of depression, infant mortality, low birthweight, child maltreatment, and homicide rates (12). The built environment serves to mediate an individual’s perceptions about the health

opportunities available to them, their ability and likelihood of engaging in healthy behaviors, and their ability to buffer toxic and stressful exposures.

### ***Social conditions and health***

Social conditions encompass the relationships, family structure, and cultural dynamics within which defined groups of people function and interact (13, 14). The “acceptability” or “norms” for positive behaviors can also be developed within these networks, and may influence health-related behaviors (15). Social conditions also include social capital, which refers to the individual and communal time and energy available for community improvement, social networking, civic engagement, and other activities that create social bonds between individuals and groups (16). Social capital can be formed through an individual’s level of trust and sharing within communities, while dense social networks and civic engagement provide structure for social capital (17). The presence of social capital, support, trust, and reciprocity have been associated with improved overall psychological well-being and improved perceptions of personal health (18).

Social conditions also encompass perceptions of community members about their social surroundings. Crime rates, housing patterns, and law enforcement policies can all influence a person’s perceptions of the value and safety of their social environment, as well as their tendency to engage positively in their community (2). When social relationships or conditions breed an environment of fear, suspicion, discrimination, or racism, a chronic stress response may occur (19, 20). Chronic stress can create long-term elevation in stress hormones, implicated in the development of anxiety, depression, digestive problems, heart disease, sleep problems, weight gain, and problems with memory and concentration (21). Encouragingly, however, positive social ties tend to naturally reduce the negative effects of stress in a person’s life by encouraging more healthful behaviors and “buffering” stressful influences (22, 23).

## Education

Education is a very general term used to refer to the experience or result of learning undertaken primarily in institutional settings, such as schools and colleges (24). The number of years of schooling is often used as a measure of education, and is associated with income status.

Education is associated with health in many ways. Higher educational attainment is associated with improved working conditions and income, which in turn allows for improved housing, nutrition, control of hazards and stress, as well as direct health benefits, including quality health insurance, retirement benefits, and sick leave (8). Educational attainment is also closely linked to improved health knowledge, literacy, and behaviors, which are, in turn, associated with improved disease management (8). Individuals with more years of formal education tend to have healthier behaviors and better health outcomes. Education also helps promote and sustain healthy lifestyles and positive choices that support and nurture personal development, relationships, and community well-being (25). Although educational attainment is associated with adult socioeconomic status (SES), many studies suggest that schooling has an important effect on health, independent of SES (26). Additionally, parental level of educational attainment is a significant predictor of child health, with children of more highly educated parents having better overall health than children with less educated parents (27).

Access to technology has been shown to impact health as well. The internet is a popular platform for health education, and inequities in computer and internet access mirror inequities in health (28). U.S. adults from households earning less than \$30,000 a year are roughly eight times more likely than the most affluent adults to not use the internet (29). This section presents data on educational attainment and related indicators, and the association between selected health indicators and educational attainment.



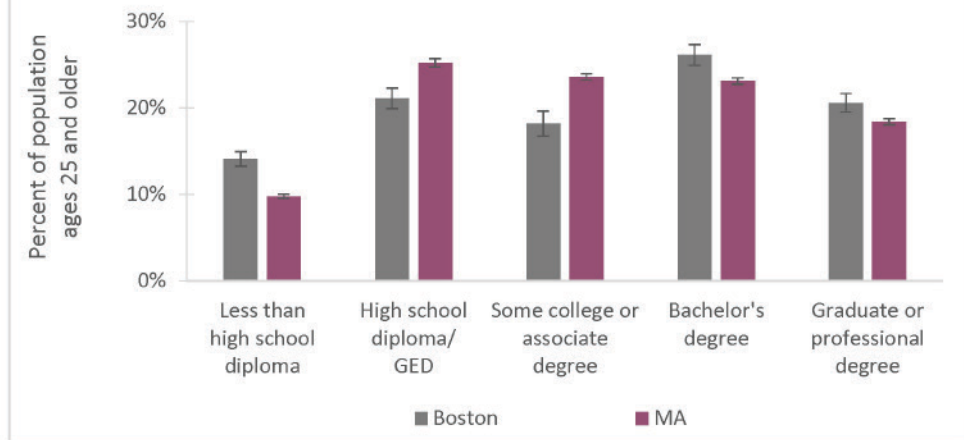
A comparison of educational attainment between Boston and Massachusetts residents ages 25 and older in 2015 demonstrates that a higher percentage of Boston residents can be found at both the high and low ends of educational attainment, while a higher percentage of Massachusetts residents can be found in the middle.

At the high end of educational attainment, 21% and 26% of Boston residents had a graduate/professional degree or a bachelor's degree, respectively, compared with 18% and 23% of Massachusetts residents. At the low end of educational attainment, 14% of Boston residents had less than a high school diploma compared with 10% of Massachusetts residents.

In the middle range of educational attainment, 24% and 25% of Massachusetts residents had some college education an associate degree or a high school diploma/GED, respectively, compared with 18% and 21% of Boston residents.

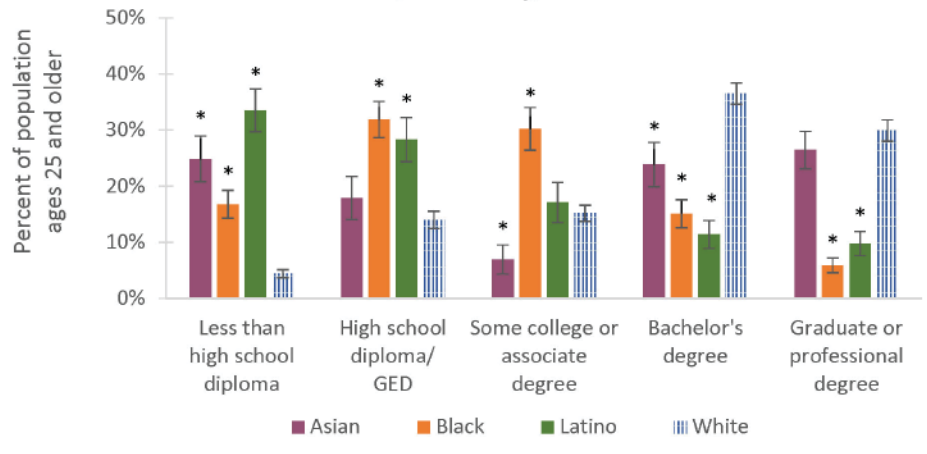
In 2015, lower percentages of Asian (24%), Black (15%), and Latino (11%) Boston residents ages 25 and older had a bachelor's degree compared with White residents (37%). Higher percentages of Asian (25%), Black (17%), and Latino (34%) residents had less than a high school diploma compared with White residents (4%).

Figure 2.1 Educational Attainment, Boston and Massachusetts, 2015



DATA SOURCE: American Community Survey, 2015, U.S. Census Bureau

Figure 2.2 Educational Attainment by Race/Ethnicity, 2015

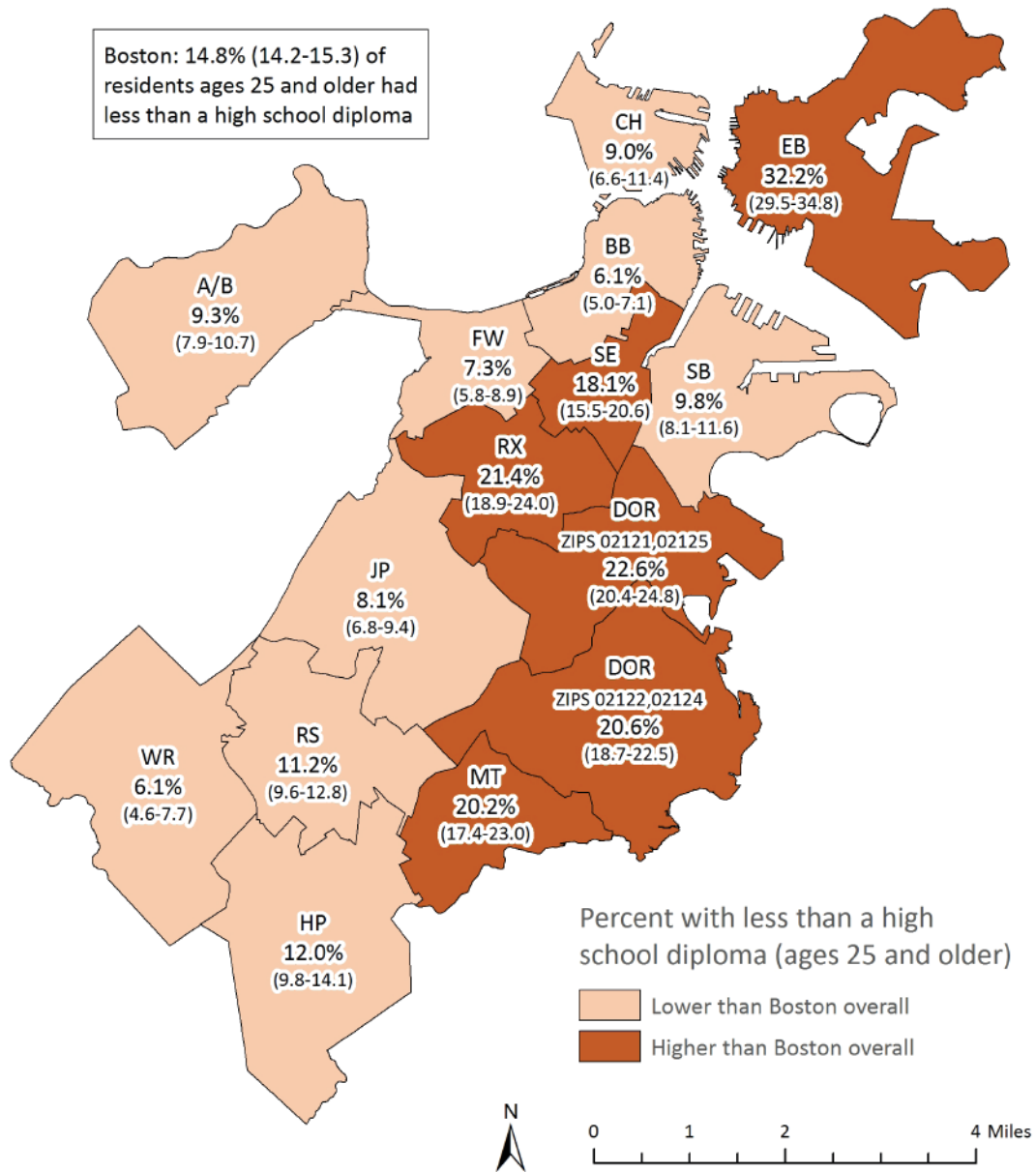


\* Statistically significant difference when compared to reference group

NOTE: Bars with patterns indicate the reference group within each selected indicator. Due to limited data availability, data for Asian residents includes individuals who identified as Latino (less than 1% of Asian residents identified as Latino).

DATA SOURCE: American Community Survey, 2015, U.S. Census Bureau

Figure 2.3 Residents With Less Than a High School Diploma by Neighborhood, 2011-2015



NOTE: "BB" includes the Back Bay, Beacon Hill, Downtown, the North End, and the West End. "SE" includes the South End and Chinatown.

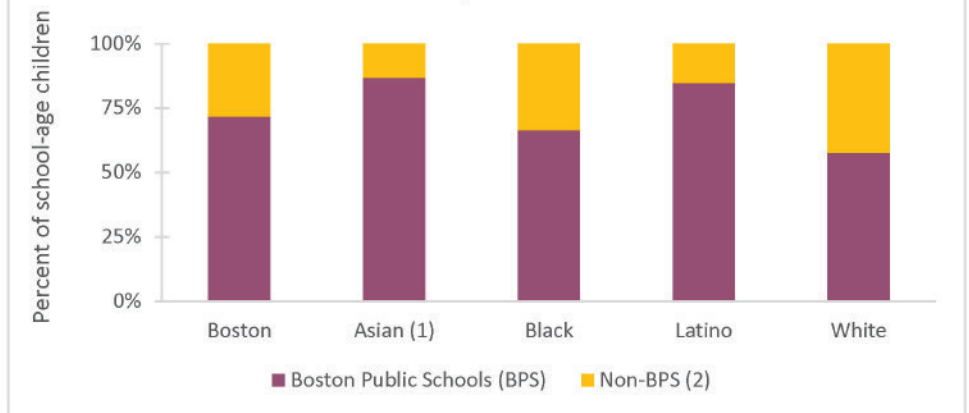
DATA SOURCE: American Community Survey, 2011-2015, U.S. Census Bureau

During 2011-2015, higher percentages of residents ages 25 and older in Dorchester (zip codes 02121, 02125), Dorchester (zip codes 02122, 02124), East Boston, Mattapan, Roxbury, and the South End had less than a high school diploma compared with Boston overall. Lower percentages of residents in Allston/Brighton, Back Bay, Charlestown, Fenway, Hyde Park, Jamaica Plain, Roslindale, South Boston, and West Roxbury had less than a high school diploma compared with Boston overall.



Seventy-two percent of Boston school-age children attended Boston Public Schools. Most Asian (87%) and Latino (85%) children attended Boston Public Schools. In comparison, only 58% of White children attended Boston Public Schools.

Figure 2.4 Boston School-Age Children Attending School by Type of School and Race/Ethnicity, May 2017

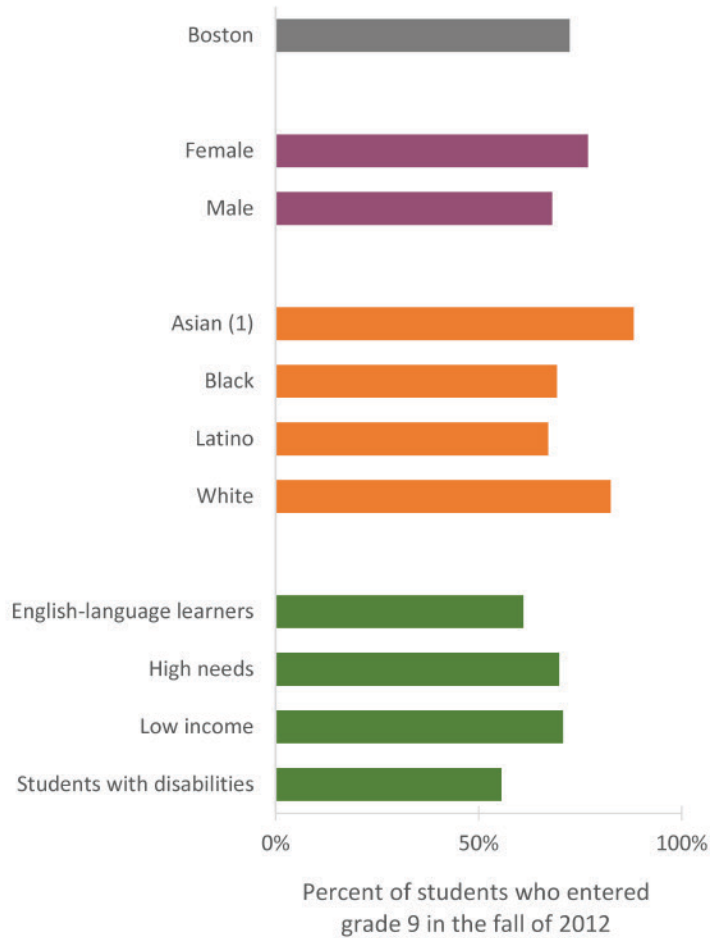


(1) Does not include Native Hawaiians/Other Pacific Islanders

(2) Includes public charter schools (not operated by BPS), parochial schools, private schools, suburban schools through Metropolitan Council for Educational Opportunity (METCO), home schooling, and placement in non-BPS schools and programs by the BPS Special Education Department

DATA SOURCE: Office of Data and Accountability, Boston Public Schools

Figure 2.5 Boston Public Schools  
Four-Year High School Graduation Rates,  
2016 Cohort



(1) Does not include Native Hawaiians/Other Pacific Islanders

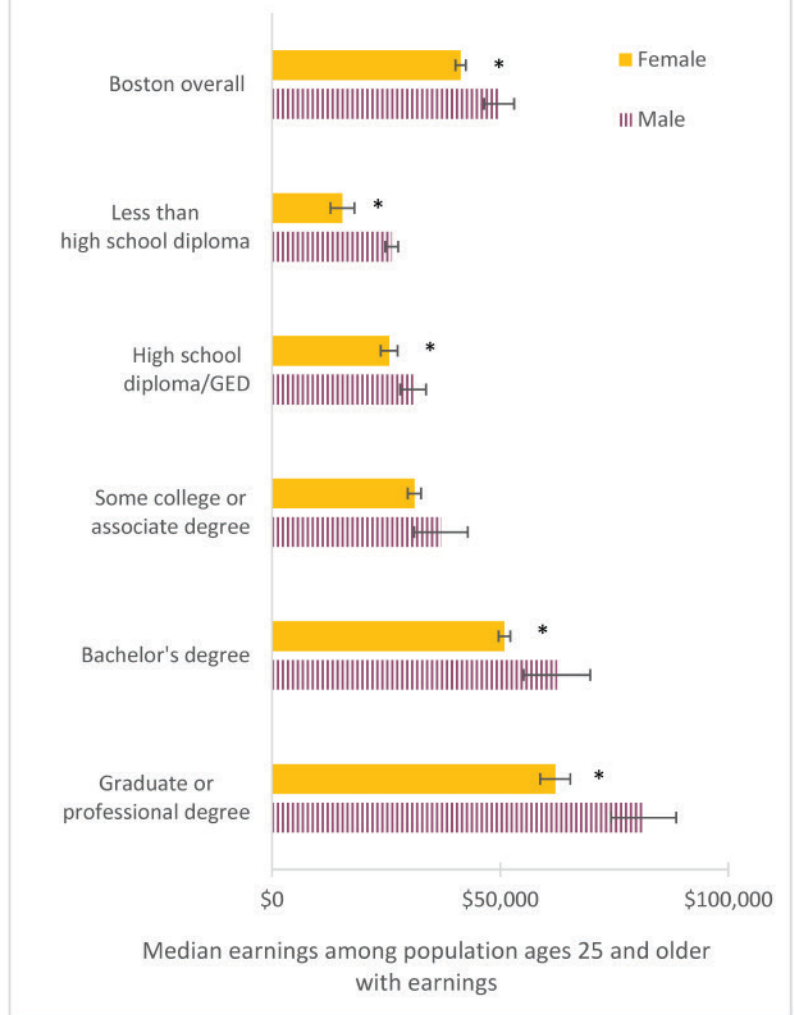
NOTE: Five-year graduation rates were unavailable.

DATA SOURCE: Office of Data and Accountability, Boston Public Schools

Seventy-two percent of students attending Boston Public Schools who entered grade 9 in the fall of 2012 graduated in four years. Seventy-seven percent of female students graduated in 4 years compared with 68% of male students. Among the racial/ethnic groups presented, 4-year graduation rates were highest for Asian students (88%) and lowest for Latino students (67%). Additionally, 61% of English-language learners, 70% of high-needs students, 71% of low-income students, and 56% of students with disabilities graduated in 4 years.

In 2015, the median earnings for Boston residents ages 25 and older varied by educational attainment and sex. For males and females, median earnings increased as the level of educational attainment increased. Females at all levels of educational attainment, except those with some college an associate degree, had lower median earnings when compared with their male counterparts. The largest discrepancy was observed among residents with graduate or professional degrees. Females with these degrees had median earnings of \$62,056 while males had median earnings of \$81,428.

Figure 2.6 Median Earnings by Educational Attainment and Sex, 2015

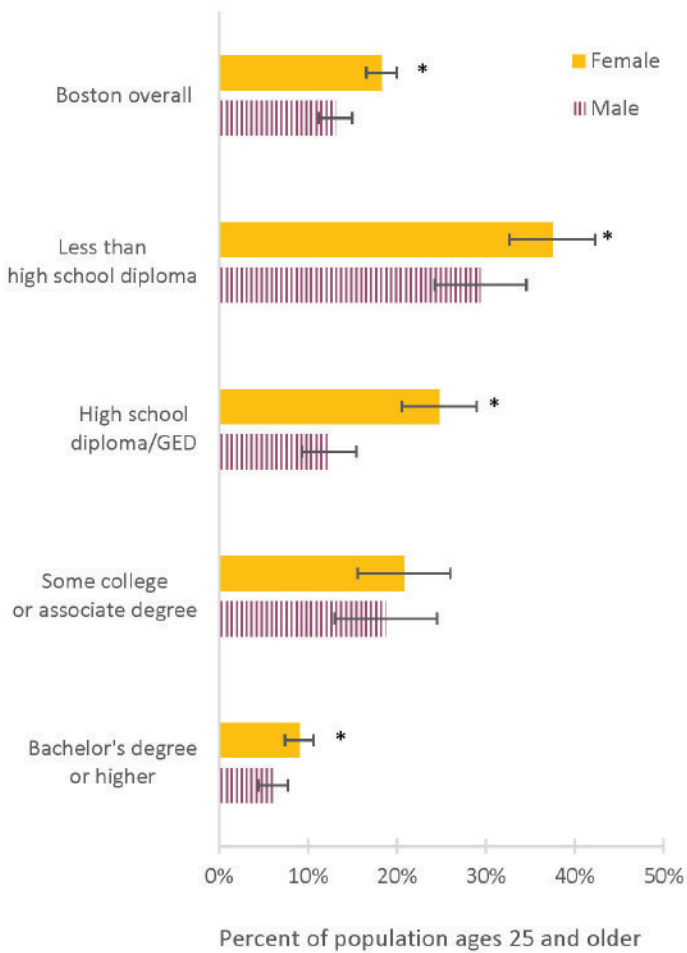


\* Statistically significant difference when compared to reference group

NOTE: Bars with patterns indicate the reference group within each selected indicator. Median earnings were for the past 12 months.

DATA SOURCE: American Community Survey, 2015, U.S. Census Bureau

Figure 2.7 Population Living Below Poverty Level by Educational Attainment and Sex, 2015



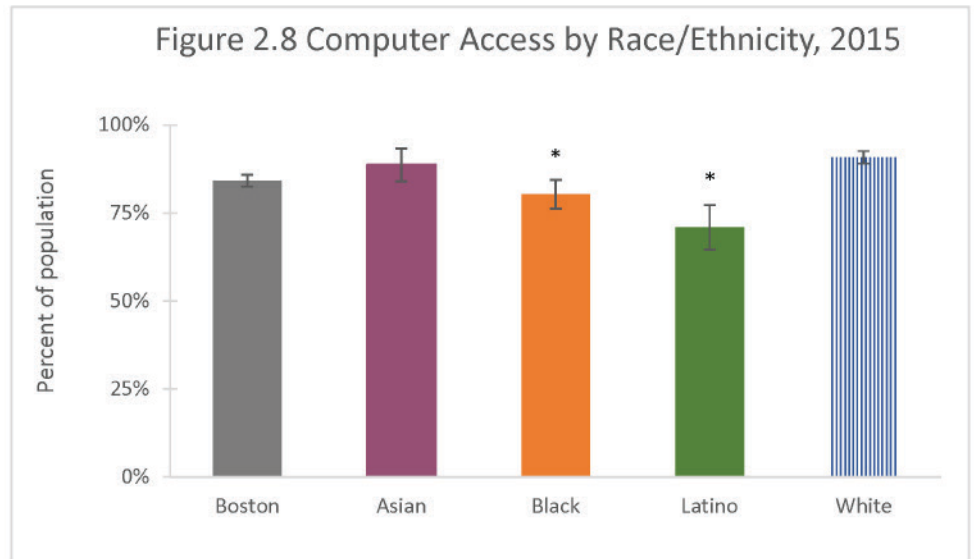
In 2015, the percentage of Boston residents ages 25 and older living below the poverty level varied by educational attainment and sex. Compared with males, higher percentages of females at all levels of educational attainment, except those with some college an associate degree, were living below the poverty level.

\* Statistically significant difference when compared to reference group

NOTE: Bars with patterns indicate the reference group within each selected indicator. Poverty status was determined for the past 12 months for all people except institutionalized people, people in military group quarters, people in college dormitories, and unrelated individuals under 15 years old.

DATA SOURCE: American Community Survey, 2015, U.S. Census Bureau

In 2015, 84% of Boston residents had access to a laptop, desktop, or notebook computer. A lower percentage of Black (80%) and Latino (71%) residents had computer access compared with White residents (91%).

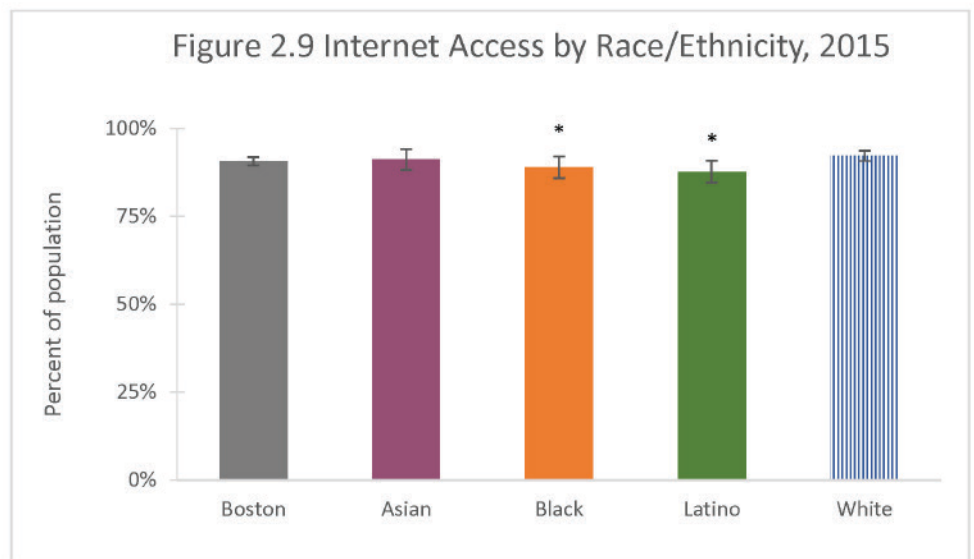


\* Statistically significant difference when comparisons are made between racial/ethnic groups

NOTE: Bars with patterns indicate the reference group within each selected indicator.

DATA SOURCE: American Community Survey Public Use Microdata Sample, 2015, U.S. Census Bureau

In 2015, 91% of residents had internet access at home. A lower percentage of Black (89%) and Latino (88%) residents had internet access compared with White residents (92%).



\* Statistically significant difference when comparisons are made between racial/ethnic groups

NOTE: Bars with patterns indicate the reference group within each selected indicator.

DATA SOURCE: American Community Survey Public Use Microdata Sample, 2015, U.S. Census Bureau

Figure 2.10 Health Indicators by Educational Attainment, 2015

	<HS diploma	HS diploma	Some college+
Asthma	19.7%* (14.3-26.4)	9.7% (7.0-13.3)	10.9% (9.1-13.1)
Diabetes	18.1%* (13.3-24.0)	10.8%* (8.6-13.4)	5.5% (4.6-6.5)
Hypertension	38.7%* (31.8-46.1)	29.5%* (25.2-34.3)	20.4% (18.4-22.5)
Obesity	32.7%* (25.6-40.7)	27.6%* (22.8-32.9)	18.2% (16.1-20.6)
Persistent anxiety	23.9% (17.7-31.3)	22.0% (17.5-27.2)	21.4% (18.8-24.3)
Persistent sadness	22.8%* (16.8-30.1)	15.0%* (11.6-19.2)	8.5% (7.0-10.3)

\* Statistically significant difference when compared to reference group (Some college+)

DATA SOURCE: Boston Behavioral Risk Factor Survey (2015), Boston Public Health Commission

This table describes select health indicators by educational attainment. A higher percentage of adults with less than a high school diploma had asthma, diabetes, hypertension, obesity and persistent sadness compared with adults with at least some college education. Percentages of asthma and persistent sadness remained higher after adjusting for age, race/ethnicity, and sex (adjusted data not shown). For diabetes, hypertension, and obesity, however, the differences were no longer evident after adjusting for age, race/ethnicity, and sex.

Similarly, a higher percentage of adults with a high school diploma had diabetes, hypertension, obesity, and persistent sadness compared with adults with some college education. These percentages remain higher even after adjusting for age, race/ethnicity, and sex (adjusted data not shown).

### ***Education Summary***

Although Boston has a reputation as an education hub, sex and racial/ethnic inequities for residents in educational attainment and related indicators exist. A higher percentage of White residents had a bachelor's degree compared with Black, Latino, and Asian residents, and a lower percentage of White residents compared with Black, Latino, and Asian residents had less than a high school diploma. At the neighborhood level, we found higher percentages of residents with less than a high school diploma in Dorchester (zip codes 02121, 02125), Dorchester (zip codes 02122, 02124), East Boston, Mattapan, Roxbury, and the South End. Inequities across categories of race/ethnicity were also reflected in the attendance and graduation rates of Boston Public Schools (BPS), and access to technology. A lower percentage of White school-age children attended Boston Public Schools (versus other types of schools) compared with Asian, Black, and Latino school-age children. A higher percentage of White and Asian BPS high school students graduated in four years compared with Black and Latino students. Black and Latino residents were also less likely to have access to a computer or to have internet access at home compared with White residents.

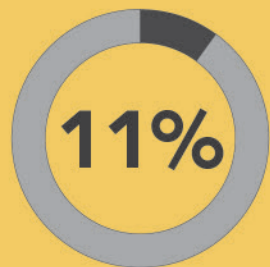
Inequities in educational attainment and related indicators across sex were found for BPS high school graduation rates, wage earnings, and income below poverty. A higher percentage of female BPS students graduated high school in four years compared with male students. Later in life, however, women's earnings were less compared with men, regardless of education. Similarly, across most categories of educational attainment, women were more likely than men to live below the poverty level.

After adjusting for age, race/ethnicity, and sex, we observed that lower educational attainment was associated with higher percentages of adverse health indicators. In comparison with adults with at least some college education, adults with less than a high school diploma had higher percentages of asthma and persistent sadness. Adult residents with a high school diploma had higher percentages of diabetes, hypertension, obesity, and persistent sadness.

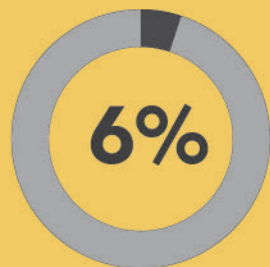
# Educational attainment and chronic conditions in 2015:



## Diabetes:



among residents with a high school (HS) diploma



among residents with at least some college

## Obesity:



28% among residents with a HS diploma



18% among residents with at least some college



## Hypertension:



30% among residents with a HS diploma



20% among residents with at least some college



## Persistent sadness:

15% among residents with a HS diploma

9% among residents with at least some college



## Employment

On average, full-time employed persons in the U.S. spend more than half of their waking hours on weekdays doing work and work-related activities (30). For millions of Americans, a stable job in safe working conditions provides benefits critical to maintaining good health, such as income, health insurance, and stability (31).

Employment is associated with income and is part of an individual's and community's socioeconomic status. Being employed makes it easier for individuals to live in healthy neighborhoods, provide quality education for their children, and secure child care services, housing, and healthy foods (31).

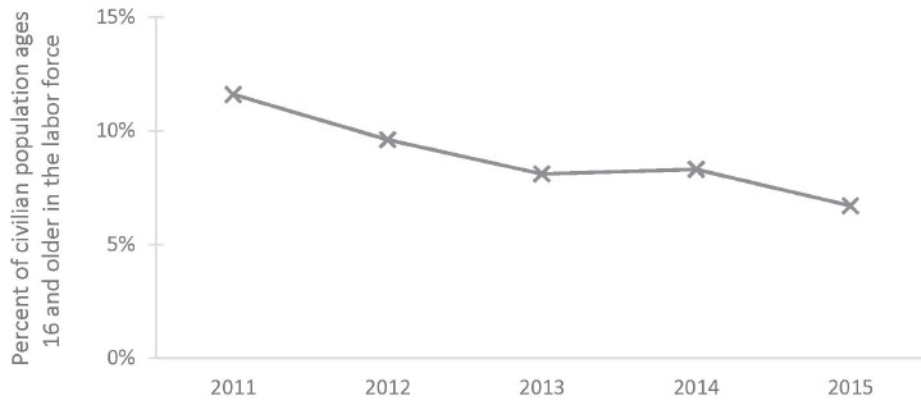
The unemployment rate is the most frequently cited employment statistic. The U.S. Census counts as unemployed those who are ages 16 and older who are not working, but are actively looking for and available to start work. Employed individuals include both those who work full-time (35 or more hours) and those who work part-time (1 to 34 hours). Unemployed Americans face numerous health challenges beyond loss of income. It has been well documented that perceived health (i.e. self-reported excellent, good, or poor health) and physical functioning decrease with age. However, research indicates that these declines are more gradual among individuals with full-time employment (32). In terms of mental health, a 2010 Gallup Poll found that unemployed Americans were more likely than employed Americans to be diagnosed with depression and report feelings of sadness and worry (31).

The unemployment rate is defined as the percentage of the labor force that is unemployed.

People who are not working and not looking for work are not part of the labor force and, therefore, are not counted in the unemployment rate. To get a full picture of the employment status of a population, one must also look at the labor force participation rate. The labor force participation rate is the proportion of the total population that is either employed or looking for work. People not in the labor force are full-time students, homemakers, and individuals above the age of 64. Included in this group are also "discouraged" individuals -- people who want to work, but have given up looking because they think no work is available, could not find work, lack the right education or training, or worry that a potential employer may discriminate against them because of their age or race/ethnicity. Although not employed, discouraged workers are not counted in the unemployment rate or the labor force because they have stopped actively looking for work. In 2016, of people in the U.S. ages 16 to 54 who were out of the labor force because they were not looking for work, 11.9% wanted to work (33). While the overall labor force participation rates nationally are similar for Black adults (62.5%) and White adults (62.9%), differences have been observed by sex, race, and age. For example, the labor force participation rate for Black youth ages 16 to 19 was 30.8%, while the labor force participation rate for White youth ages 16 to 19 was 37.5% (34).

In 2010, Boston supplied an estimated 657,669 jobs, approximately one out of every five jobs in Massachusetts and one out of every fourteen jobs in New England (35). The number of Boston-based jobs exceeded the resident labor force by more than double. This meant that many who worked in Boston did not live in the city (35). This section presents data on the employment status of Boston residents, and the association between health indicators and employment status.

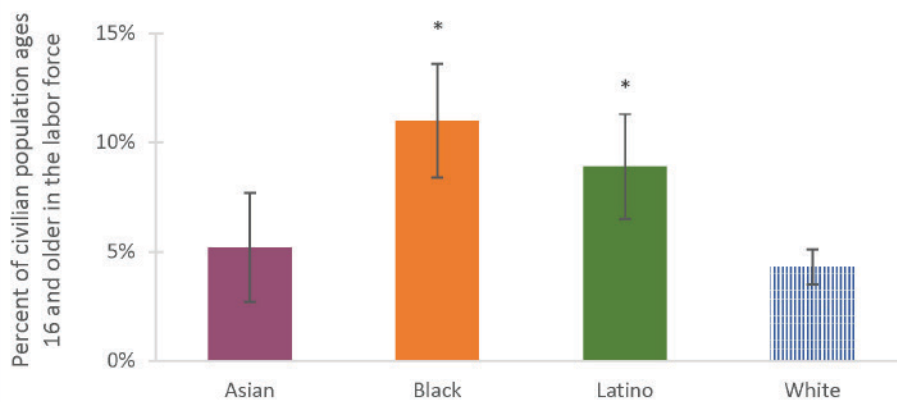
Figure 2.11 Unemployment Rate by Year



In 2015, the unemployment rate for Boston residents ages 16 and older dropped to a 5-year low of 7%.

NOTE: See appendix for confidence intervals for point estimates.  
 DATA SOURCE: American Community Survey, 2015, U.S. Census Bureau

Figure 2.12 Unemployment Rate by Race/Ethnicity, 2015

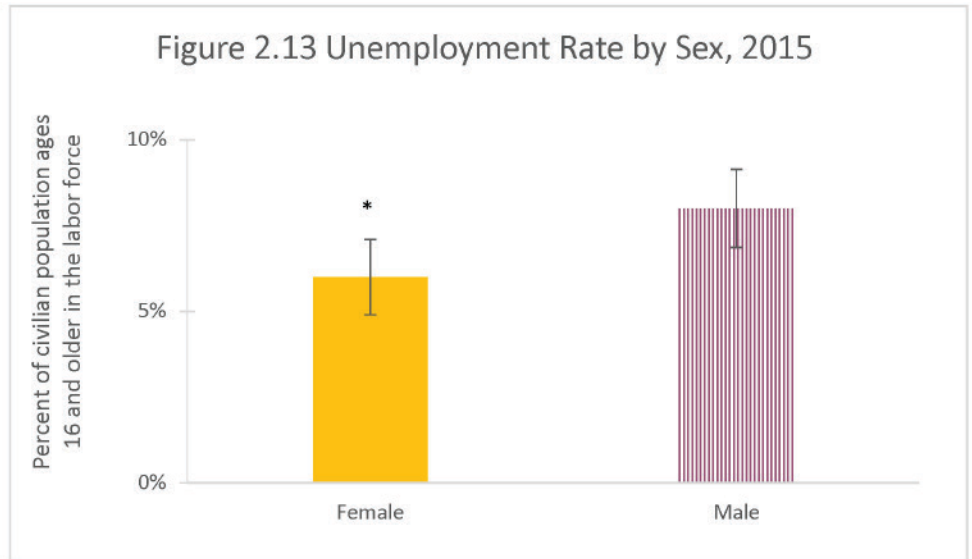


In 2015, the unemployment rate was higher for Black (11%) and Latino (9%) residents compared with White residents (4%).

\* Statistically significant difference when compared to reference group

NOTE: Bars with patterns indicate the reference group within each selected indicator. Due to limited data availability, data for Asian residents includes individuals who identified as Latino (less than 1% of Asian residents identified as Latino).  
 DATA SOURCE: American Community Survey, 2015, U.S. Census Bureau

In 2015, the unemployment rate was lower among Boston female residents (6%) compared with male residents (8%).

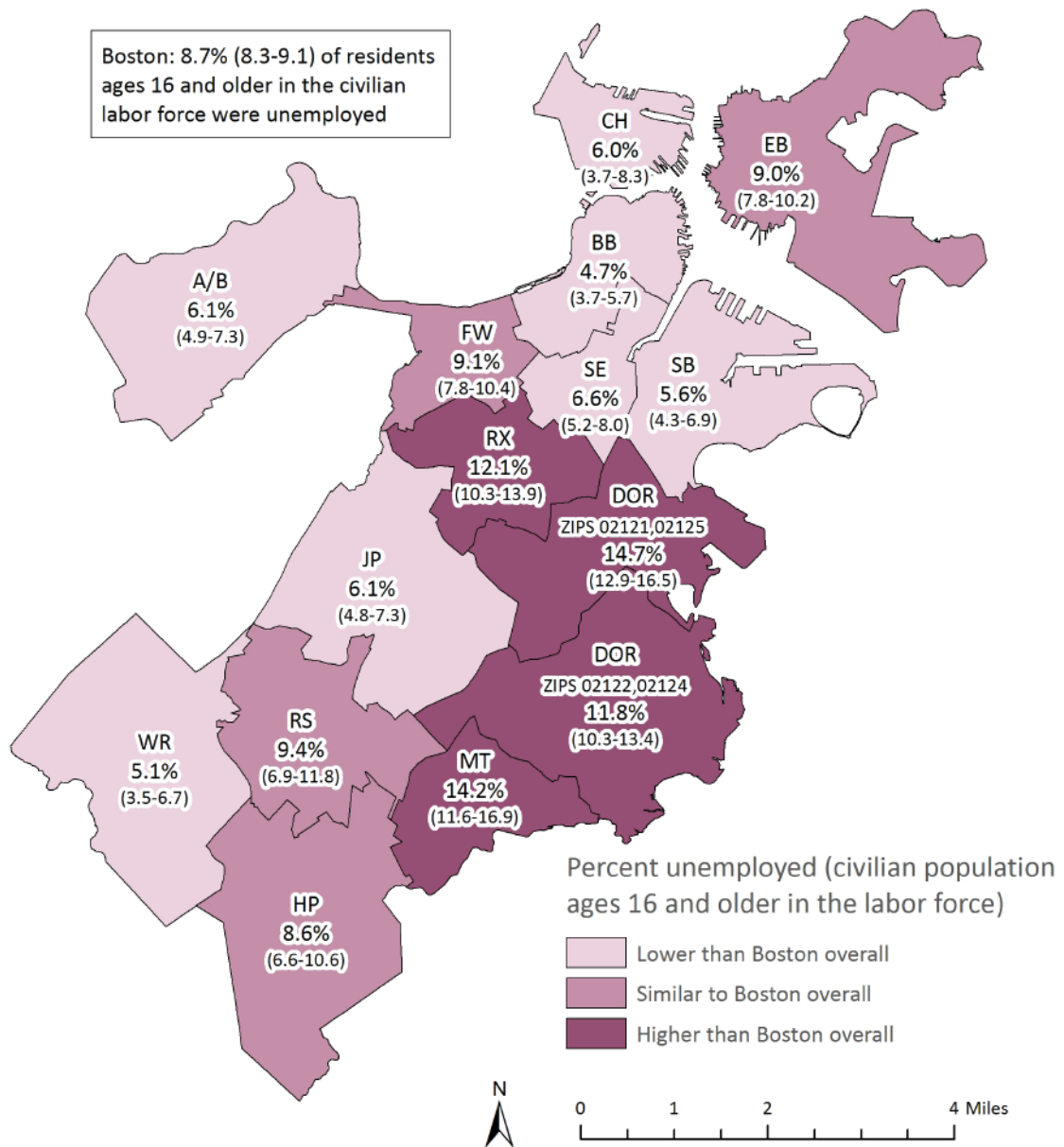


\* Statistically significant difference when compared to reference group

NOTE: Bars with patterns indicate the reference group within each selected indicator.

DATA SOURCE: American Community Survey, 2015, U.S. Census Bureau

## Figure 2.14 Unemployment Rate by Neighborhood, 2011-2015

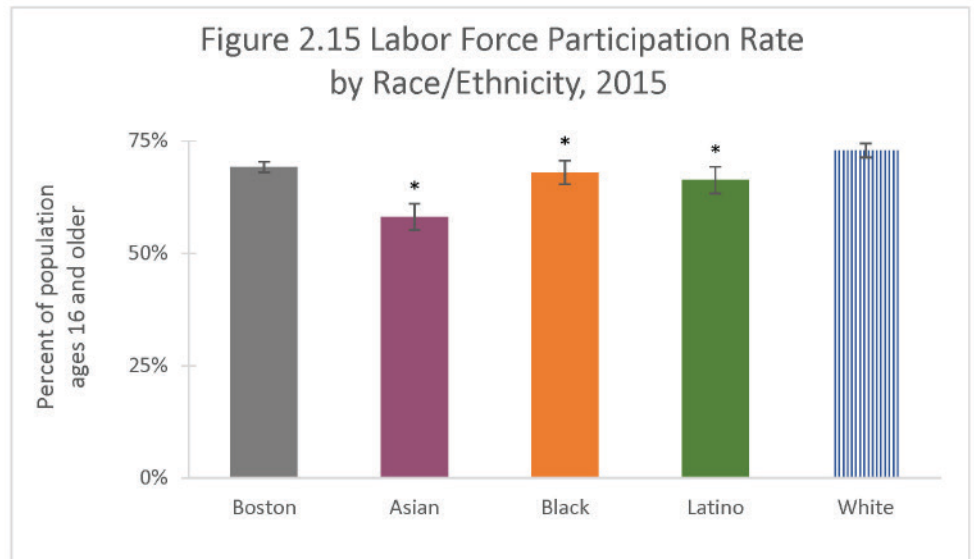


NOTE: "BB" includes the Back Bay, Beacon Hill, Downtown, the North End, and the West End.  
"SE" includes the South End and Chinatown.

DATA SOURCE: American Community Survey, 2011-2015, U.S. Census Bureau

For 2011-2015, the unemployment rate for Boston residents was higher in Dorchester (zip codes 02121, 02125), Dorchester (zip codes 02122, 02124), Mattapan, and Roxbury compared with Boston overall. The unemployment rate was lower in Allston/Brighton, Back Bay, Charlestown, Jamaica Plain, South Boston, the South End, and West Roxbury compared with Boston overall.

In 2015, the labor force participation rate for Boston residents ages 16 and older was 69%. Labor force participation was lower among Asian (58%), Black (68%), and Latino (66%) residents compared with White residents (73%).

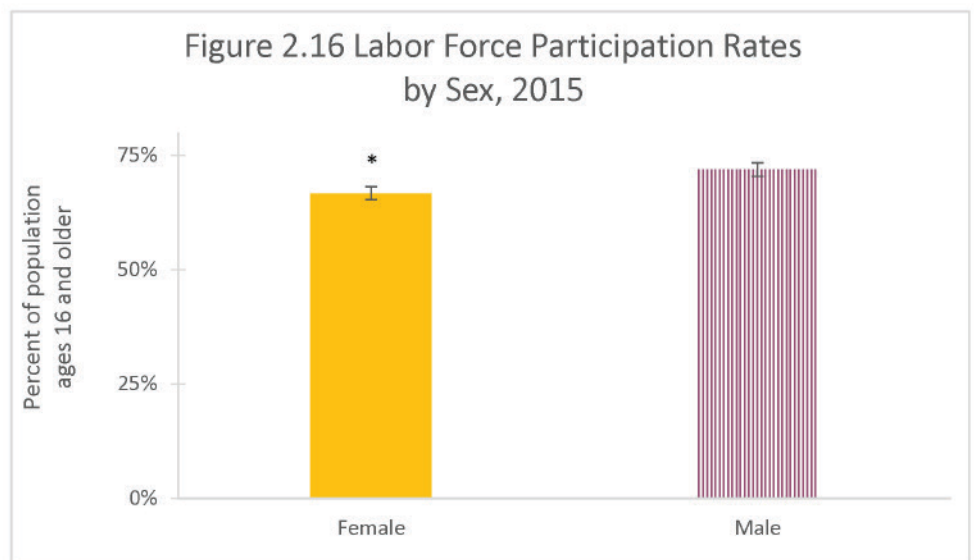


\* Statistically significant difference when comparisons are made between racial/ethnic groups

NOTE: Bars with patterns indicate the reference group within each selected indicator. Due to limited data availability, data for Asian residents includes individuals who identified as Latino (less than 1% of Asian residents identified as Latino).

DATA SOURCE: American Community Survey, 2015, U.S. Census Bureau

In 2015, the labor force participation rate was lower for Boston female residents (67%) compared with male residents (72%).

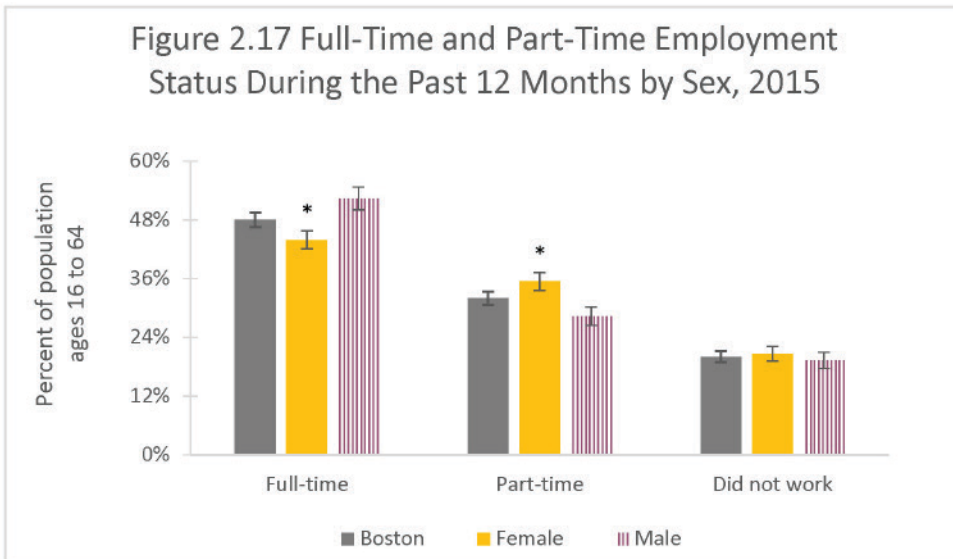


\* Statistically significant difference when compared to reference group

NOTE: Bars with patterns indicate the reference group within each selected indicator.

DATA SOURCE: American Community Survey, 2015, U.S. Census Bureau

Figure 2.17 Full-Time and Part-Time Employment Status During the Past 12 Months by Sex, 2015



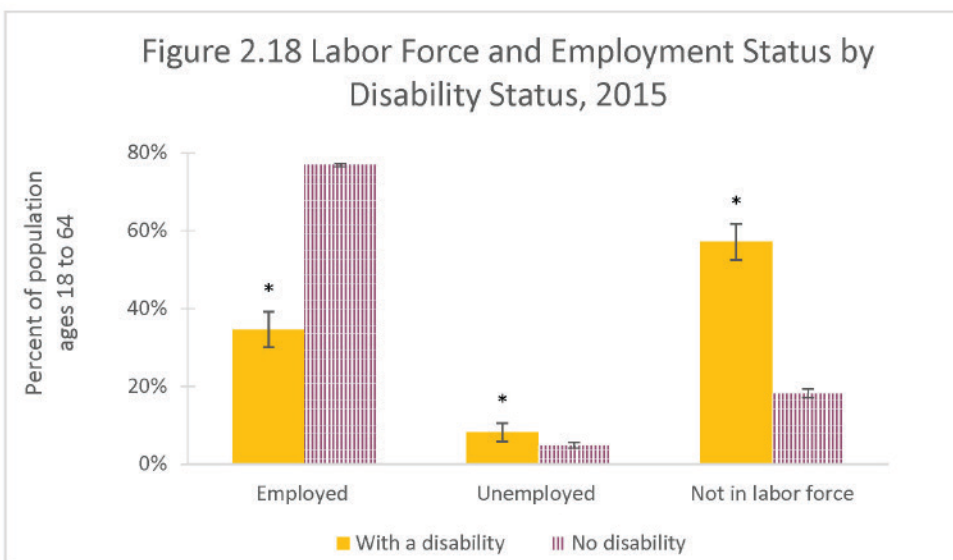
\* Statistically significant difference when comparisons are made between females and males

NOTE: Bars with patterns indicate the reference group within each selected indicator.

DATA SOURCE: American Community Survey, 2015, U.S. Census Bureau

In 2015, a lower percentage of Boston female residents (44%) worked full-time compared with male residents (52%). A higher percentage of female residents (35%) worked part-time compared with male residents (28%).

Figure 2.18 Labor Force and Employment Status by Disability Status, 2015



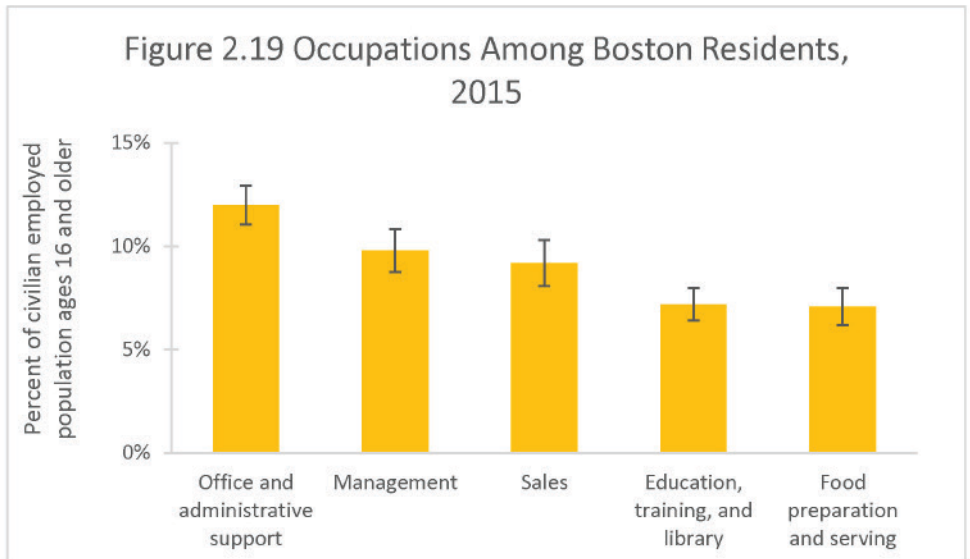
\* Statistically significant difference when compared to reference group

NOTE: Bars with patterns indicate the reference group within each selected indicator.

DATA SOURCE: American Community Survey, 2015, U.S. Census Bureau

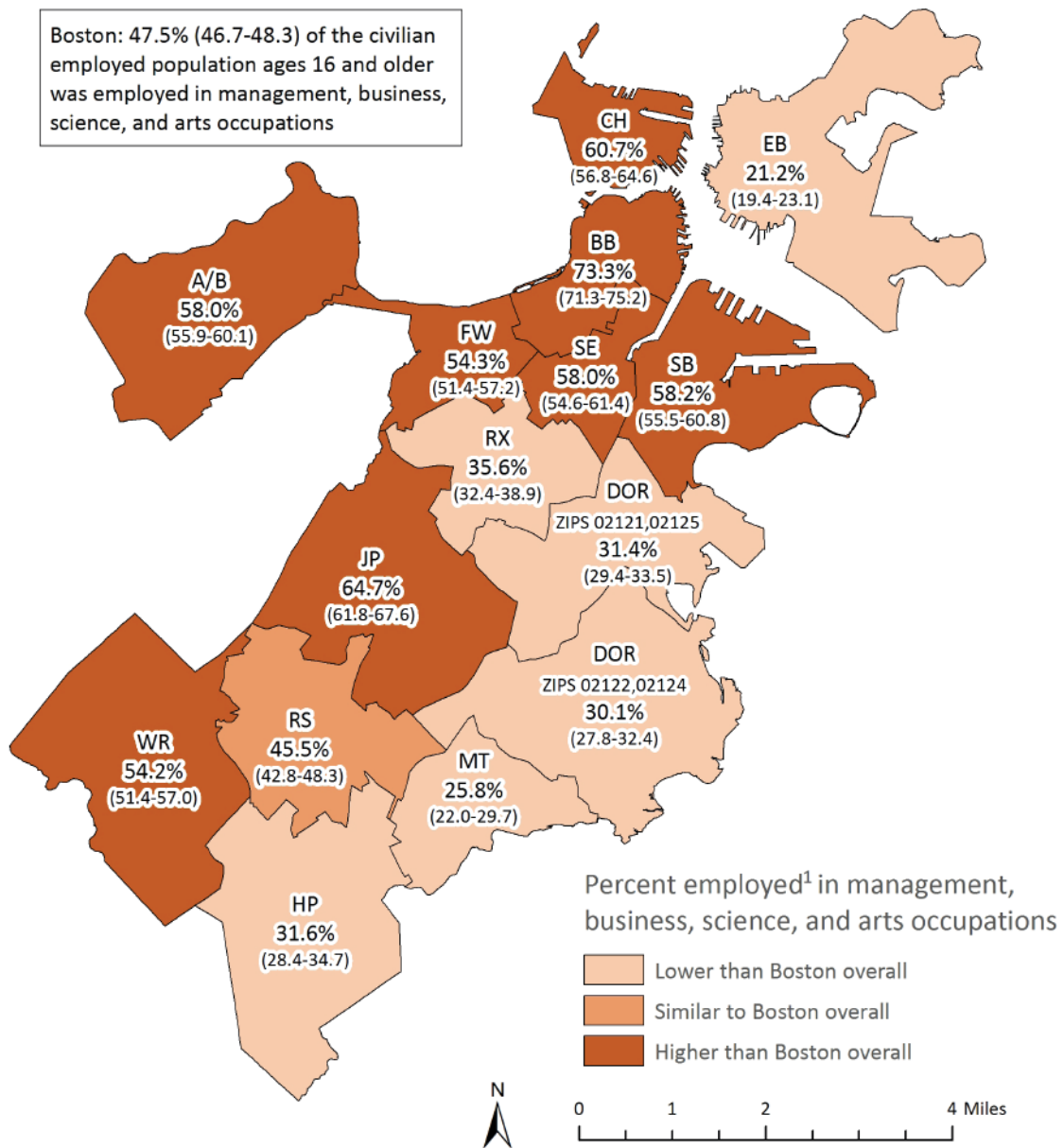
In 2015 in Boston, a higher percentage of residents ages 18-64 with a disability were unemployed (8%) or not in the labor force (57%) compared with residents with no disability, 5% and 18%, respectively. A lower percentage of residents with a disability were employed (35%) compared with residents with no disability (77%).

In 2015, the most commonly held occupations among employed residents ages 16 and older in Boston were office and administrative support occupations (12%), management occupations (10%), sales occupations (9%), education, training, and library occupations (7%), and food preparation and serving occupations (7%).



DATA SOURCE: American Community Survey Public Use Microdata Sample, 2015, U.S. Census Bureau

Figure 2.20 Employment in Management, Business, Science, and Arts Occupations by Neighborhood, 2011-2015



<sup>1</sup> Among the civilian employed population ages 16 and older

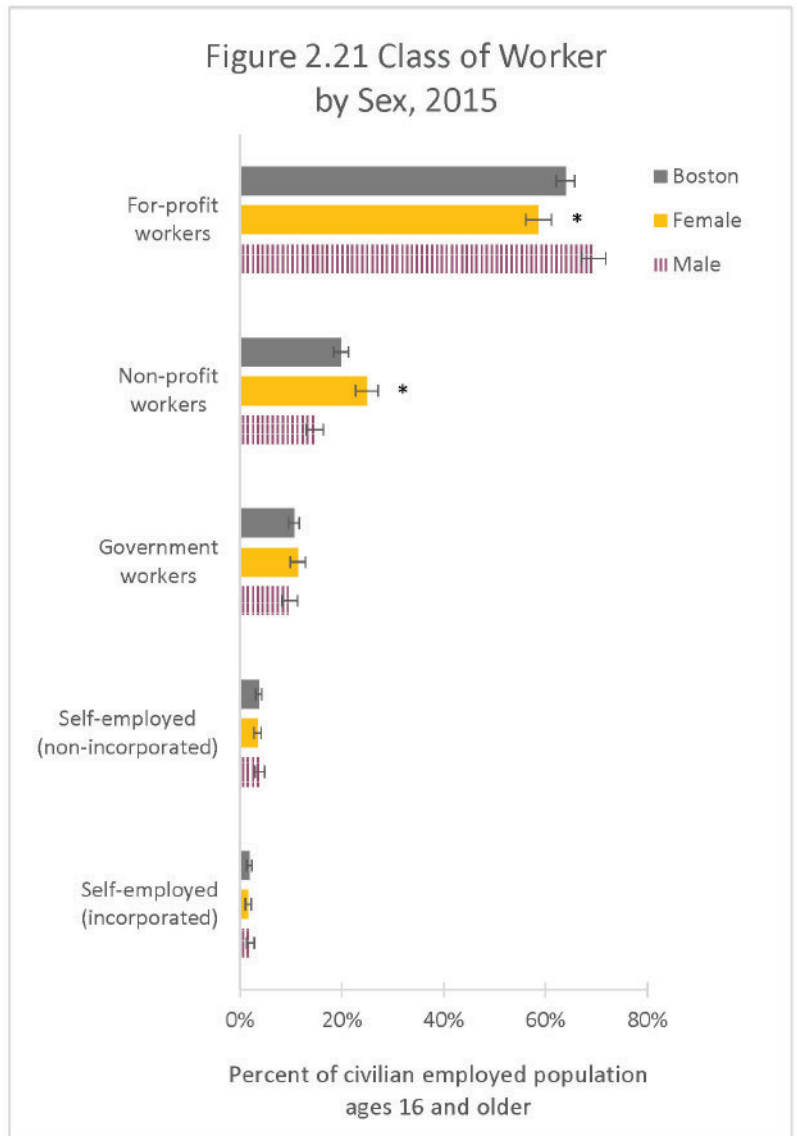
NOTE: "BB" includes the Back Bay, Beacon Hill, Downtown, the North End, and the West End. "SE" includes the South End and Chinatown.

DATA SOURCE: American Community Survey, 2011-2015, U.S. Census Bureau

During 2011-2015 combined, the largest percentage of employed residents 16 and older in Boston worked in management, business, science, and arts occupations (48%). Compared with Boston overall, a higher percentage of residents in Allston/Brighton, Back Bay, Charlestown, Fenway, Jamaica Plain, South Boston, the South End, and West Roxbury worked in management, business, science, and arts occupations while a lower percentage of residents in Dorchester (zip codes 02121, 02125), Dorchester (zip codes 02122, 02124), East Boston, Hyde Park, Mattapan, and Roxbury worked in these occupations.



In 2015, a higher percentage of female residents worked for non-profit companies (25%) compared with male residents (15%), and a lower percentage of females worked for for-profit companies (59%) compared with male residents (70%).

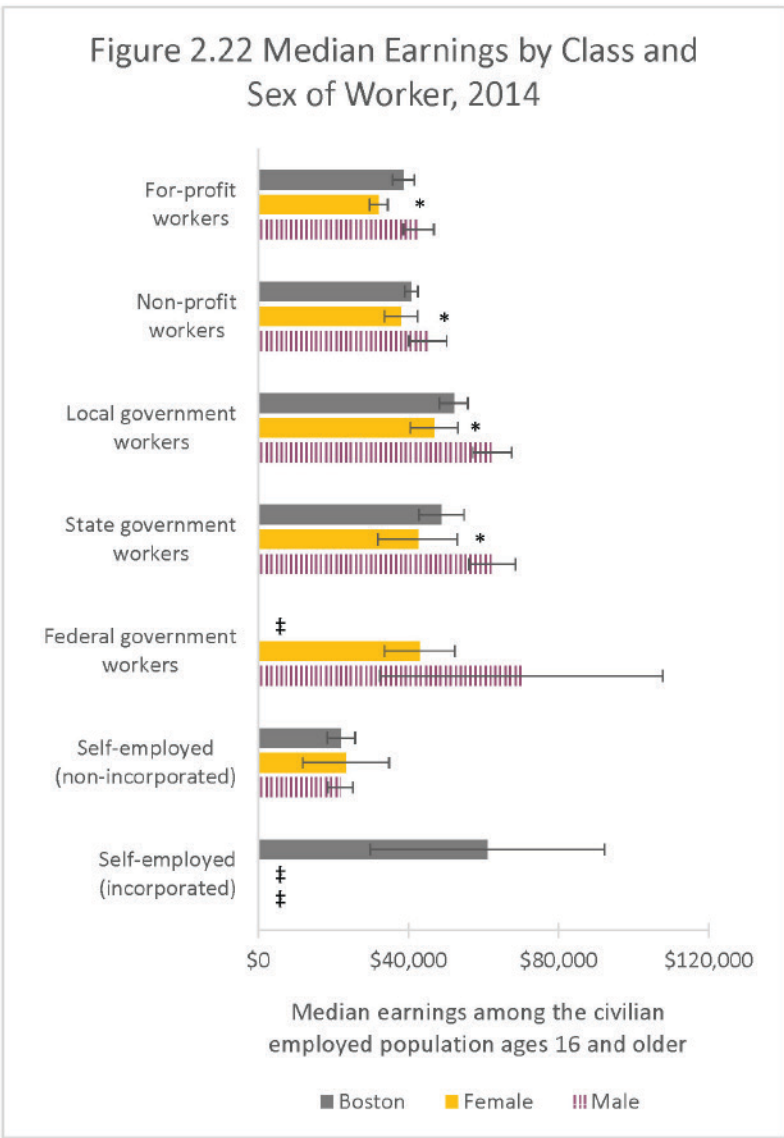


\* Statistically significant difference when comparisons are made between females and males

NOTE: Bars with patterns indicate the reference group within each selected indicator. Data not presented due to insufficient sample size for unpaid family workers.

DATA SOURCE: American Community Survey, 2015, U.S. Census Bureau

Figure 2.22 Median Earnings by Class and Sex of Worker, 2014



In 2014, median earnings were lower for Boston female residents compared with male residents in the following sectors:

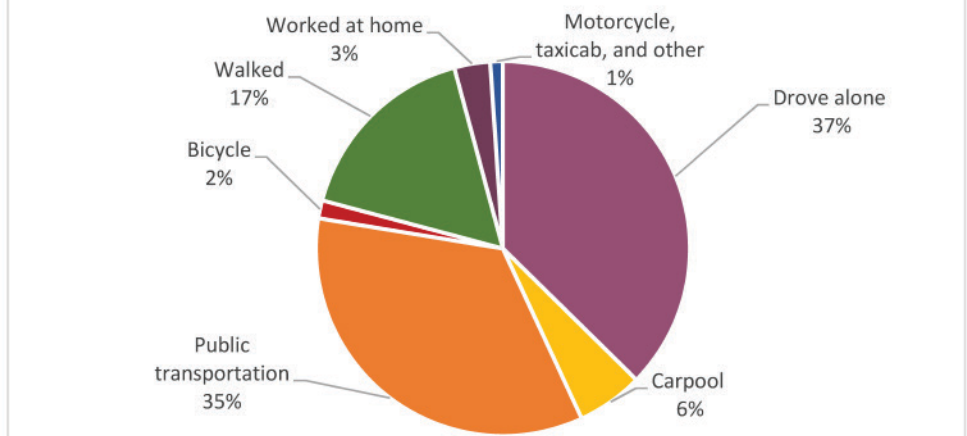
- For-profit (\$32,079 vs. \$42,706)
- Non-profit (\$37,991 vs. \$45,141)
- Local government (\$46,890 vs. \$62,357)
- State government (\$42,491 vs. \$62,344)

\* Statistically significant difference when comparisons are made between females and males  
 ‡ Data not presented due to insufficient sample size

NOTE: Bars with patterns indicate the reference group within each selected indicator. Median earnings were for the past 12 months.  
 DATA SOURCE: American Community Survey, 2014, U.S. Census Bureau

In 2015, the most popular means of transportation to work in Boston were driving alone in a car, truck, or van (37%), taking public transportation (35%), and walking (17%).

Figure 2.23 Means of Transportation to Work<sup>1</sup>, 2015



<sup>1</sup> Among workers 16 years and older

NOTE: See appendix for confidence intervals for point estimates.  
 DATA SOURCE: American Community Survey, 2015, U.S. Census Bureau

This table describes select health indicators by employment status. A higher percentage of Boston adult residents who were out of work had diabetes, hypertension, persistent anxiety, and persistent sadness compared with those who were employed. These percentages remained higher after adjusting for age, race/ethnicity, and sex (adjusted data not shown).

Figure 2.24 Health Indicators by Employment Status, 2015

	Employed	Out of work	Other <sup>1</sup>
Asthma	10.2% (8.3-12.5)	9.4% (5.4-15.8)	15.0%* (12.1-18.4)
Diabetes	4.5% (3.5-5.7)	10.5%* (6.4-16.7)	15.0%* (12.7-17.8)
Hypertension	17.8% (15.7-20.2)	28.2%* (20.0-38.4)	37.3%* (33.5-41.3)
Obesity	21.3% (18.7-24.1)	22.8% (15.6-32.1)	22.7% (19.4-26.3)
Persistent anxiety	20.5% (17.7-23.6)	36.9%* (27.1-47.9)	21.3% (17.9-25.2)
Persistent sadness	7.3% (5.8-9.2)	30.1%* (21.0-41.0)	16.7%* (13.6-20.2)

\* Statistically significant difference when compared to reference group (employed)  
<sup>1</sup>Includes homemakers, students, retirees, and those unable to work

DATA SOURCE: Boston Behavioral Risk Factor Survey (2015), Boston Public Health Commission

Similarly, a higher percentage of adult residents whose employment status was "other" had asthma, diabetes, hypertension, and persistent sadness compared with those who were employed. Percentages of asthma, diabetes, and persistent sadness remained higher after adjusting for age, race/ethnicity, and sex (adjusted data not shown). For hypertension, however, the differences were no longer evident after adjusting for age, race/ethnicity, and sex.

### *Employment Summary*

The unemployment rate for Boston residents ages 16 and older dropped to a 5-year low, from 12% in 2011 to 7% in 2015; however, the unemployment rate for Boston residents was higher for Black and Latino residents compared with White residents. We also found inequities in the unemployment rate at the neighborhood level. The unemployment rate for Boston residents was higher in Dorchester (zip codes 02121, 02125), Dorchester (zip codes 02121, 02125), Mattapan, and Roxbury compared with Boston overall. The unemployment rate was lower among Boston female residents compared with male residents. Additionally, a higher percentage of residents ages 18 to 64 with a disability in Boston were unemployed compared with residents who had no disability.

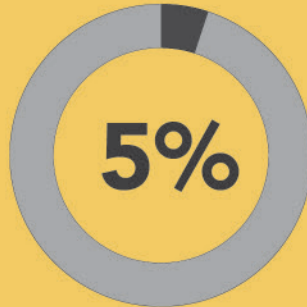
A higher percentage of female residents worked for non-profit companies compared with male residents, and a lower percentage of females worked for for-profit companies compared with male residents. A lower percentage of females worked full-time compared with males. The median income was lower for females compared with males in the for-profit and non-profit sectors, as well as in local and state government. The three most popular means of transportation to work in Boston were driving alone, taking public transportation, and walking.

Employment status impacts an individual's overall health. After adjusting for age, race/ethnicity, and sex, we observed that a higher percentage of Boston residents who were out of work had diabetes, persistent anxiety, and persistent sadness compared with those who were employed. A higher percentage of residents whose employment status was "other" (homemakers, students, retirees, and those unable to work) had asthma, diabetes, hypertension, and persistent sadness compared with those who were employed.

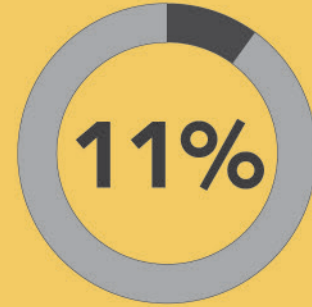
# Employment status and chronic conditions in 2015:



## Diabetes:



among employed residents



among unemployed residents



## Persistent sadness:

7% among employed residents

30% among unemployed residents



## Persistent Anxiety:

37% among unemployed residents

21% among employed residents



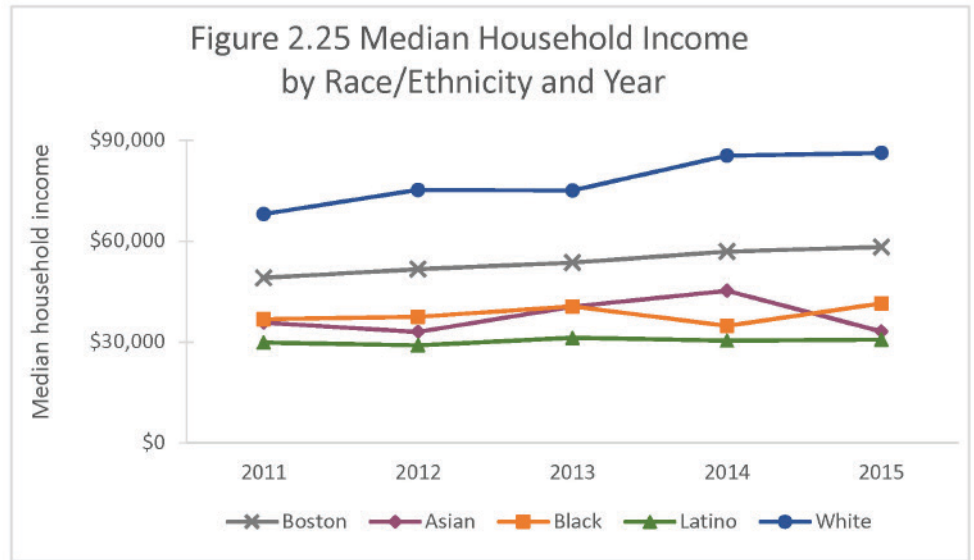
## Income & Poverty

By some measures, Boston is the most unequal city in the U.S. (36). In 2015, the poverty rate was 14% in the U.S., 11% in Massachusetts, and 21% in Boston, with significant geographic and racial/ethnic variation (see poverty charts and maps in this section) (37). Residents living at or below poverty have a difficult time making ends meet. The gap between the current minimum wage (\$11) and what is considered necessary to support a family (at least \$17) makes it difficult for Boston's lowest-earning families to enjoy the same resources and financial safety net as higher-income families (38). It should be noted that the *Health and Income: The Impact of Changes to Boston's Living Wage Ordinance on the Health of Living Wage Workers* report produced by the Boston Public Health Commission in 2016 found that the wage of \$17 per hour for 40 hours per week only covers the most basic needs for a family of four (with two adults working full-time and two children) living in the City of Boston, and does not include enough for savings, emergency expenditures, or larger one-time expenses such as car repairs or medical bills (38).

In Boston, individuals making under \$50,000 a year experience worse health outcomes than residents with higher incomes (38). The cumulative effects of poverty are powerful predictors of poor health outcomes, often explained by a combination of environmental factors, social pressures, and influences on personal behavior. Poverty leads to chronic stress, which has been associated with poor health outcomes, and may encourage adverse coping behaviors such as tobacco use and excessive alcohol consumption. Chronic diseases such as diabetes have been shown to be associated with income (39, 40). Individuals making less than \$25,000 are two and a half times more likely to develop diabetes than those with incomes over \$50,000 (38). Those living below the poverty line, especially children, are more likely to develop asthma symptoms (41). Inequities in HIV/AIDS death rates between socioeconomic groups is partly attributed to higher rates of risk behavior, depression, and impaired access to antiretroviral therapy (42, 43).

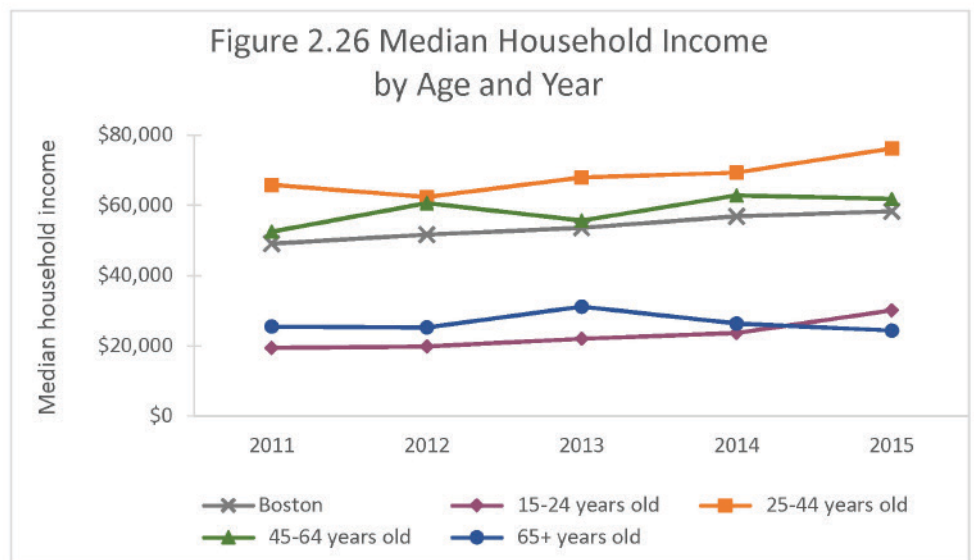
This section presents data on household income, poverty, and food insecurity in Boston, and the association between income and selected health indicators.

In 2015, the median household income for Boston residents was \$58,263. Asian (\$33,185), Black (\$41,465), and Latino (\$30,687) households had lower median household incomes compared with White households (\$86,194) in 2015.



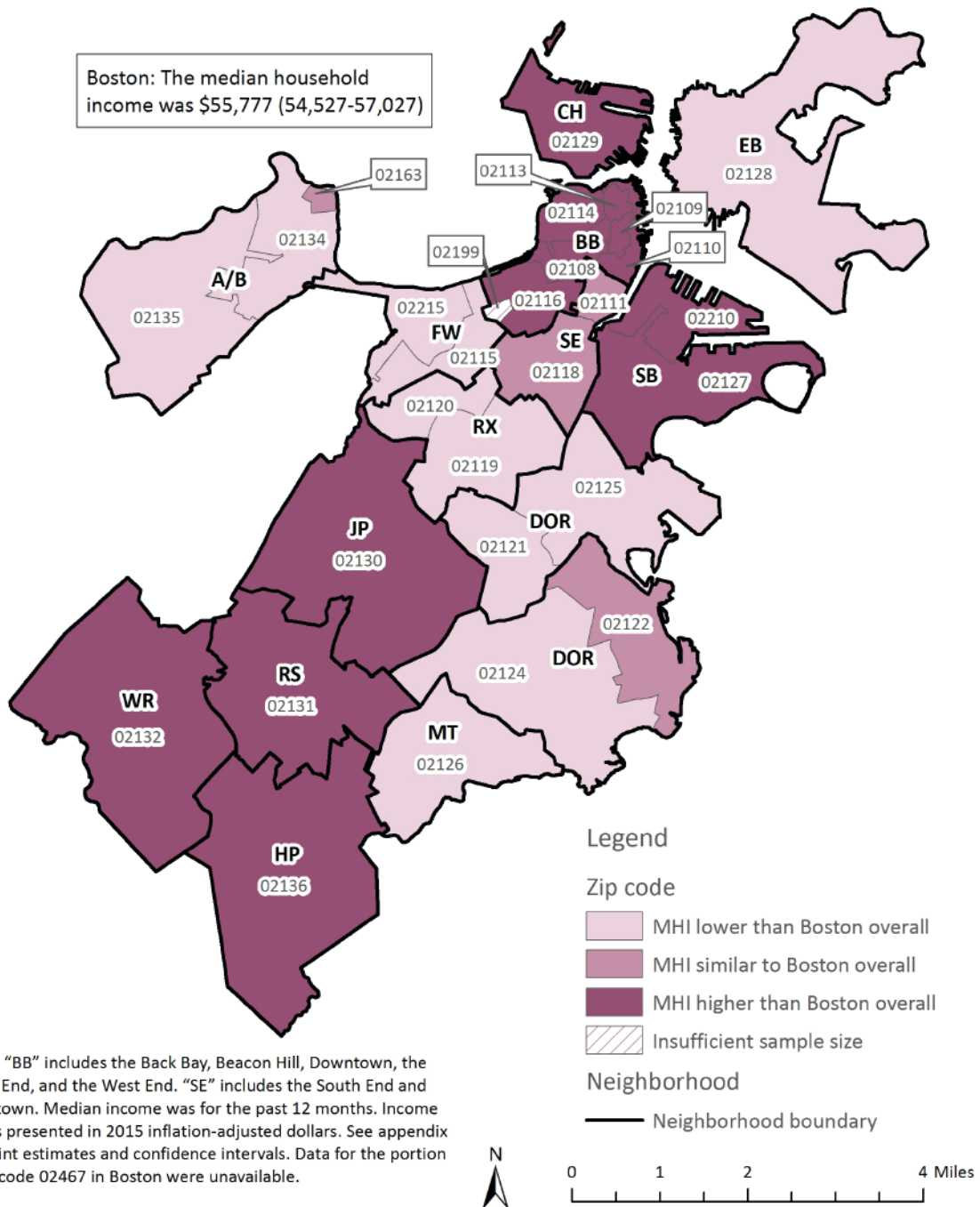
NOTE: See appendix for confidence intervals for point estimates. Due to limited data availability, data for Asian residents includes individuals who identified as Latino (less than 1% of Asian residents identified as Latino). Median income was for the past 12 months. Income data for each year is inflation-adjusted to that year's dollars.  
 DATA SOURCE: American Community Survey, 2011, 2012, 2013, 2014, 2015, U.S. Census Bureau

In 2015, compared with the median income of households in which the head of household was 25-44 years of age (\$76,162), households with the head of household ages 15-24, 45-64, and 65 years and older had a lower median household income, \$30,049, \$61,841, and \$24,311, respectively.



NOTE: See appendix for confidence intervals for point estimates. Median income was for the past 12 months. Income data for each year is inflation-adjusted to that year's dollars.  
 DATA SOURCE: American Community Survey, 2011, 2012, 2013, 2014, 2015, U.S. Census Bureau

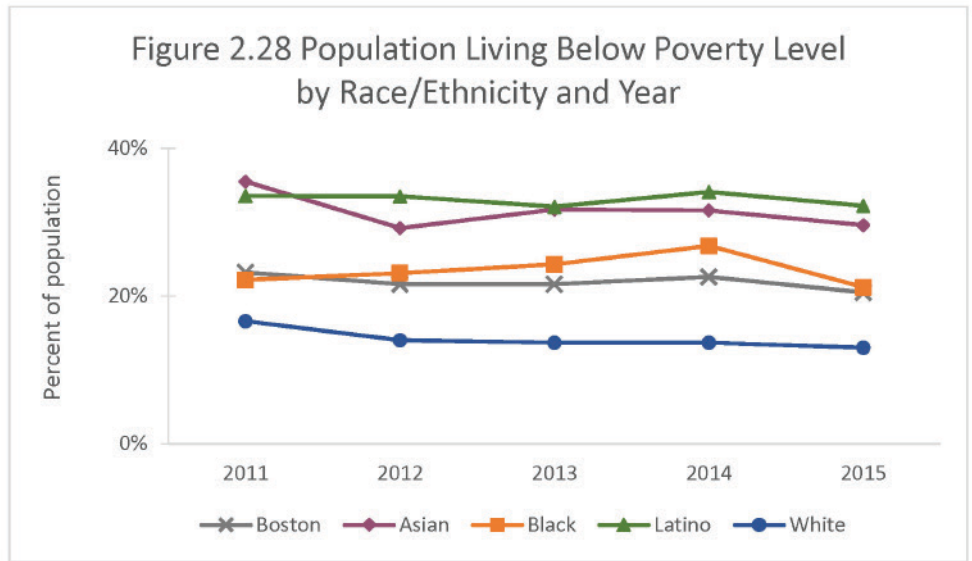
### Figure 2.27 Median Household Income (MHI) by Zip Code, 2011-2015



During 2011-2015, the median household income for Boston residents was \$55,777. Residents living in zip codes 02115, 02119, 02120, 02121, 02124, 02125, 02126, 02128, 02134, 02135, and 02215 had lower median household incomes compared with Boston overall. Residents living in zip codes 02108, 02109, 02110, 02113, 02114, 02116, 02127, 02129, 02130, 02131, 02132, 02136, and 02210 had higher median household incomes compared with Boston overall.



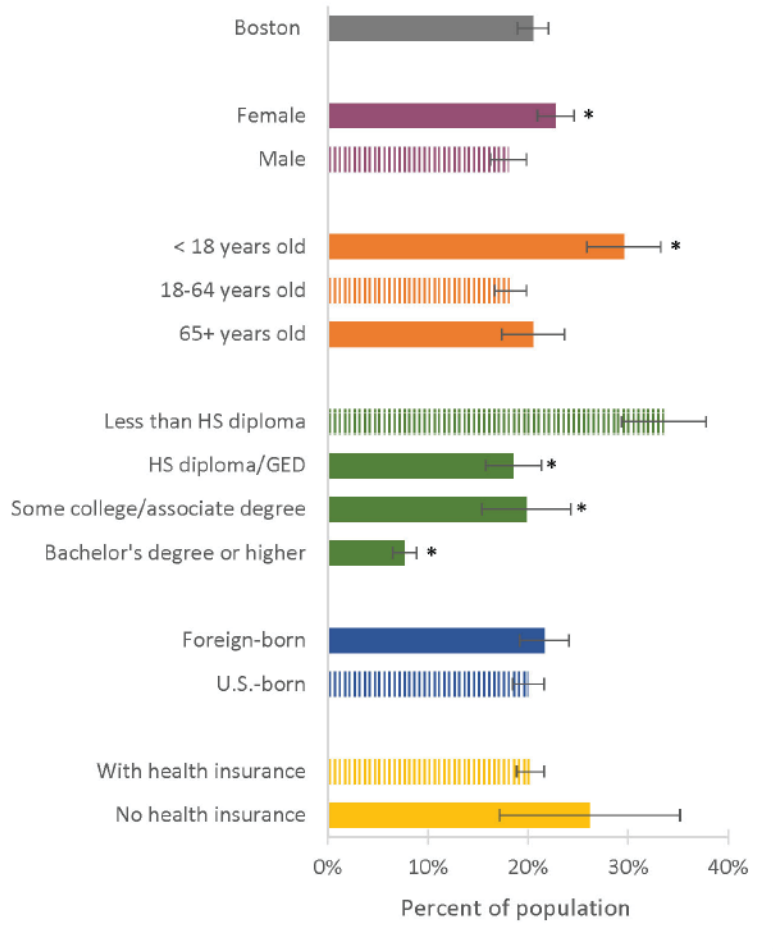
In 2015, an estimated 21% of Boston residents were living below the poverty level. The percentages of Asian (30%), Black (21%), and Latino (32%) residents living below the poverty level were higher compared with White residents (13%).



NOTE: See appendix for confidence intervals for point estimates. Due to limited data availability, data for Asian residents includes individuals who identified as Latino (less than 1% of Asian residents identified as Latino). Poverty status was determined for the past 12 months for all people except institutionalized people, people in military group quarters, people in college dormitories, and unrelated individuals under 15 years old.  
 DATA SOURCE: American Community Survey, 2011, 2012, 2013, 2014, 2015, U.S. Census Bureau



Figure 2.29 Population Living Below Poverty Level by Selected Indicators, 2015



\* Statistically significant difference when compared to reference group

NOTE: Bars with patterns indicate the reference group within each selected indicator. Education is among adults ages 25 and older. Poverty status was determined for the past 12 months for all people except institutionalized people, people in military group quarters, people in college dormitories, and unrelated individuals under 15 years old.  
 DATA SOURCE: American Community Survey, 2015, U.S. Census Bureau

In 2015, an estimated 21% of Boston residents lived below the poverty level.

A higher percentage of the following groups lived below the poverty level:

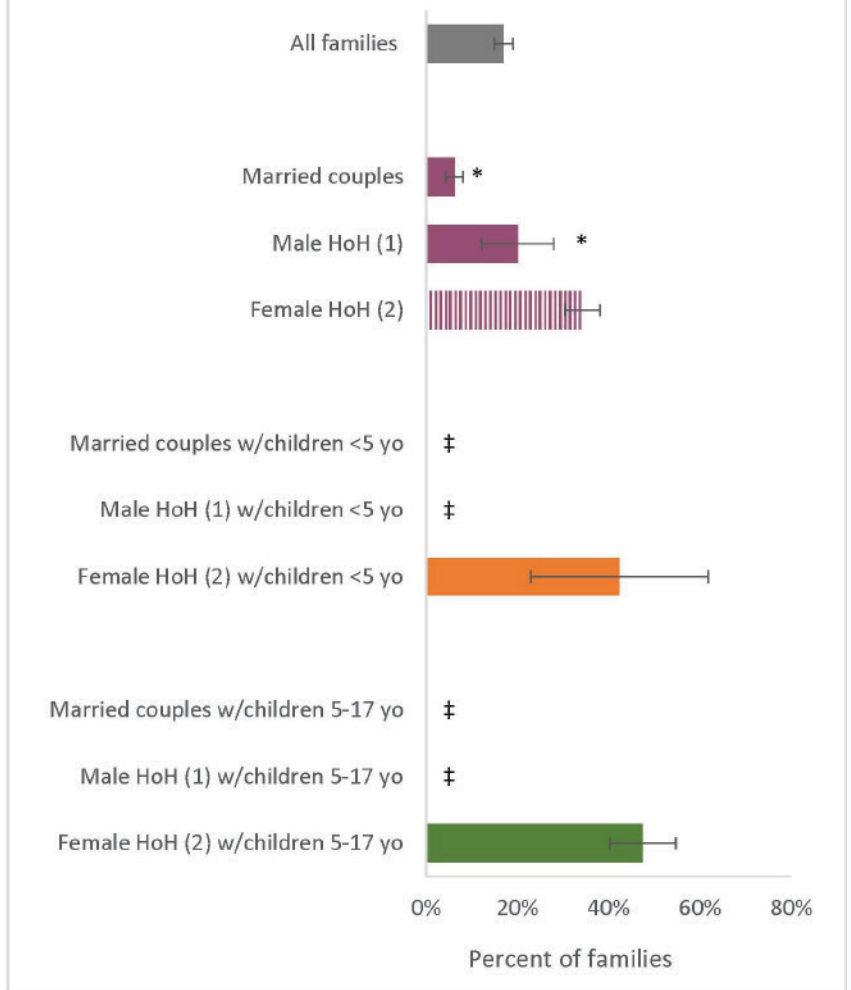
- Females (23%) compared with males (18%)
- Children under the age of 18 (30%) compared with adults ages 18-64 (18%)

A lower percentage of the following groups lived below the poverty level:

- Residents with a high school diploma or GED (19%), some college education or an associate degree (20%), or a bachelor's degree or higher (8%) compared with those with less than a high school education (34%)

In 2015, 17% of all Boston families lived below the poverty level. Compared with families with female heads of household and no husband present (34%), a lower percentage of families with married couples (6%) and male heads of household and no wife present (20%) lived below the poverty level.

Figure 2.30 Families Living Below Poverty Level by Family Type, 2015



\*Statistically significant difference when compared to reference group

‡ Data not presented due to insufficient sample size

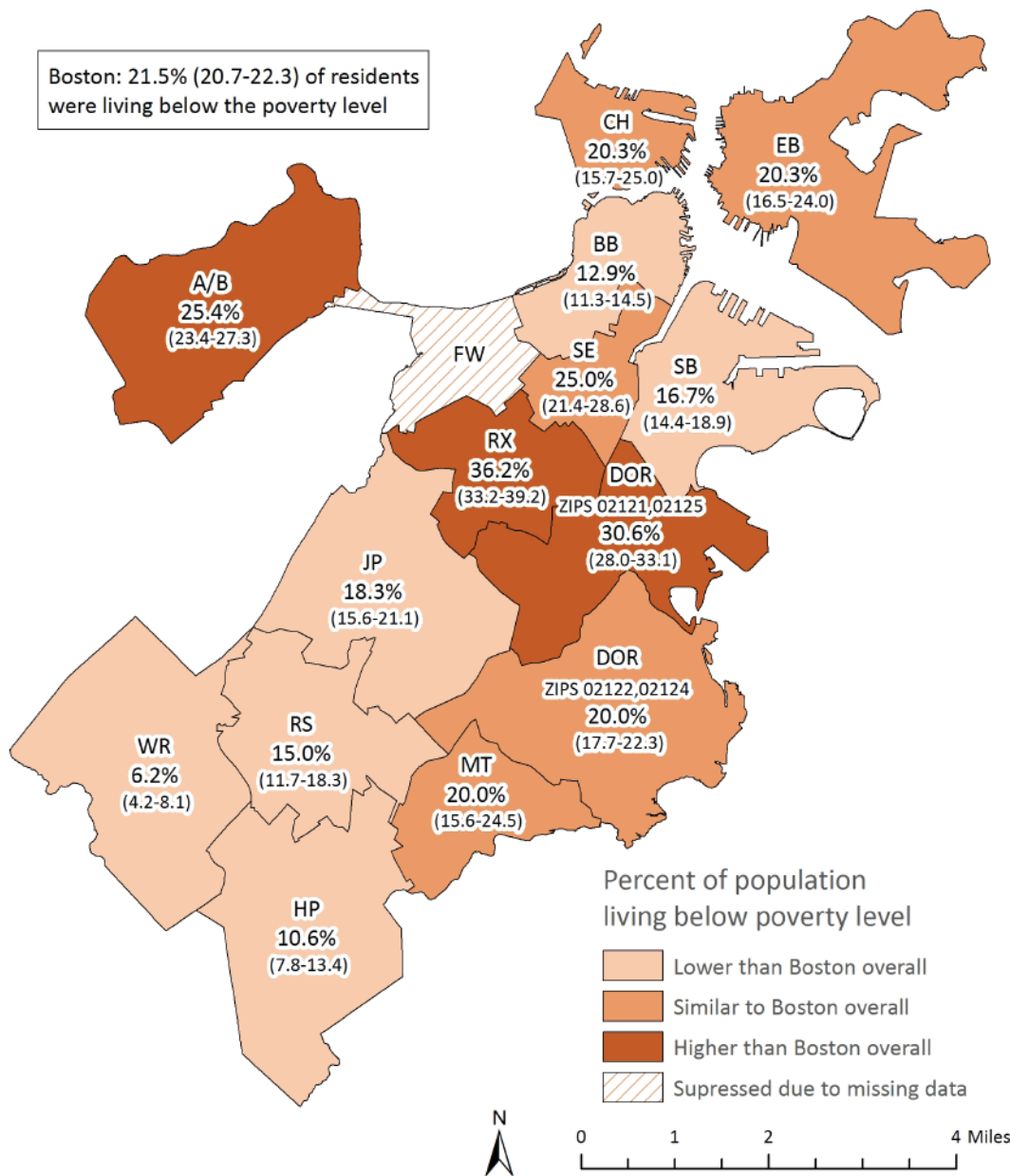
(1) Male head of household, no wife present

(2) Female head of household, no husband present

NOTE: Poverty status was determined for the past 12 months for all people except institutionalized people, people in military group quarters, people in college dormitories, and unrelated individuals under 15 years old.

DATA SOURCE: American Community Survey, 2015, U.S. Census Bureau

Figure 2.31 Percent of Population Living Below Poverty Level by Neighborhood, 2011-2015



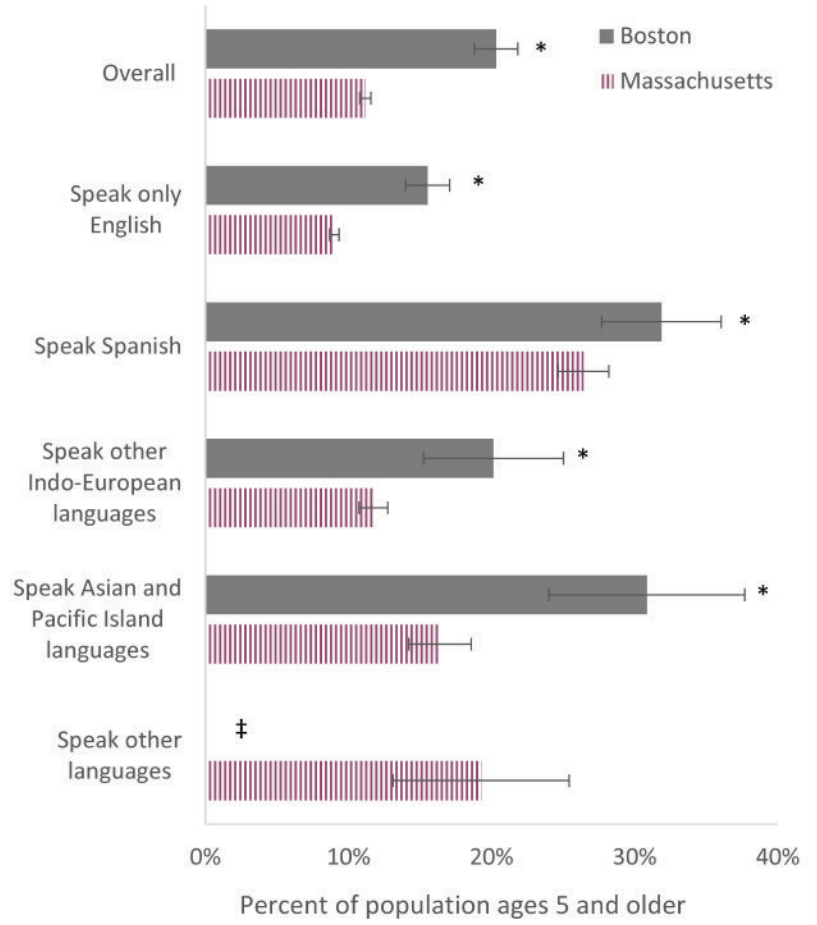
NOTE: "BB" includes the Back Bay, Beacon Hill, Downtown, the North End, and the West End. "SE" includes the South End and Chinatown. Poverty status was determined for the past 12 months for all people except institutionalized people, people in military group quarters, people in college dormitories, and unrelated individuals under 15 years old. Poverty status could not be determined for more than 20% of the population of Fenway, and therefore, a reliable estimate could not be calculated.

DATA SOURCE: American Community Survey, 2011-2015, U.S. Census Bureau

During 2011-2015 combined, Allston/Brighton, Dorchester (zip codes 02121, 02125), and Roxbury had a higher percentage of residents living below the poverty level compared with Boston overall. In the same time period, Back Bay, Hyde Park, Jamaica Plain, Roslindale, South Boston, and West Roxbury had a lower percentage of residents living below the poverty level compared with Boston overall.

In 2015, a higher percentage of Boston residents who spoke English, Spanish, other Indo-European languages, or Asian and Pacific Island languages at home lived below the poverty level compared with their counterparts in Massachusetts.

Figure 2.32 Population Living Below Poverty Level by Language Spoken at Home, Boston and Massachusetts, 2015

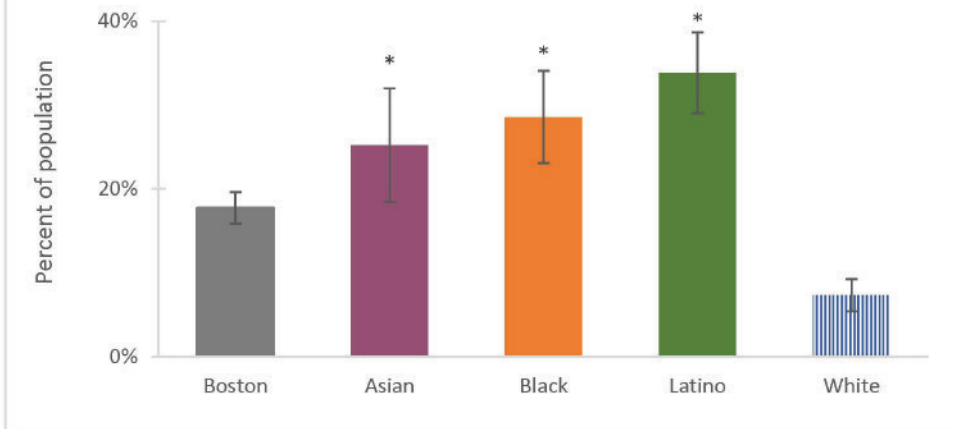


\* Statistically significant difference when compared to reference group

† Data not presented due to insufficient sample size

NOTE: Bars with patterns indicate the reference group within each selected indicator. Poverty status was determined for the past 12 months for all people except institutionalized people, people in military group quarters, people in college dormitories, and unrelated individuals under 15 years old. DATA SOURCE: American Community Survey, 2015, U.S. Census Bureau

Figure 2.33 Supplemental Nutrition Assistance Program (SNAP) Benefits in the Past 12 Months by Race/Ethnicity, 2015



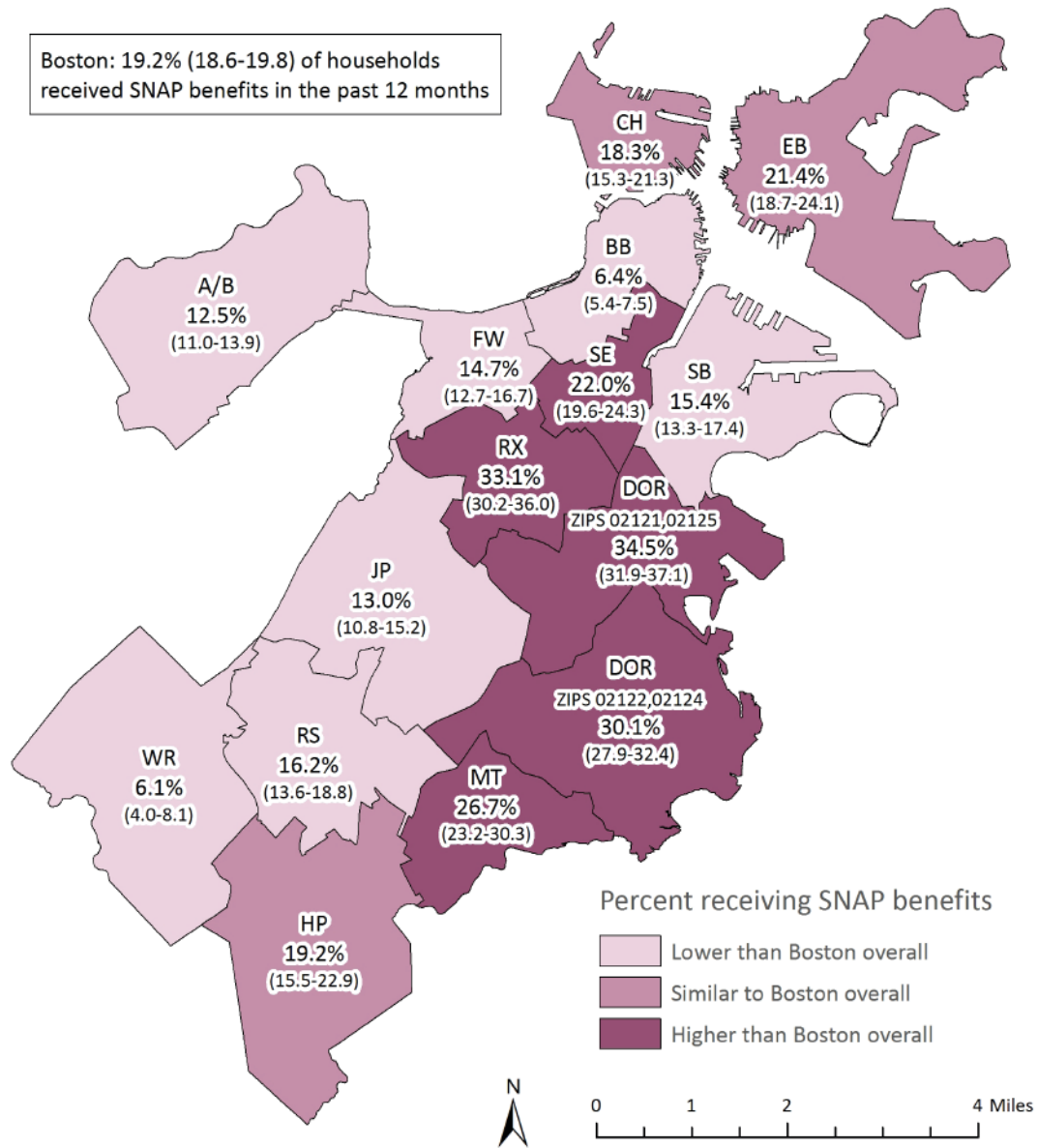
\* Statistically significant difference when comparisons are made between racial/ethnic groups

NOTE: Bars with patterns indicate the reference group within each selected indicator.

DATA SOURCE: American Community Survey Public Use Microdata Sample, 2015, U.S. Census Bureau

In 2015, 18% of Boston residents received benefits from the Supplemental Nutrition Assistance Program (SNAP) in the past 12 months. The percentage of residents receiving SNAP benefits was higher for Asian (25%), Black (29%), and Latino (34%) residents compared with White residents (7%).

### Figure 2.34 Supplemental Nutrition Assistance Program (SNAP) Benefits by Neighborhood, 2011-2015

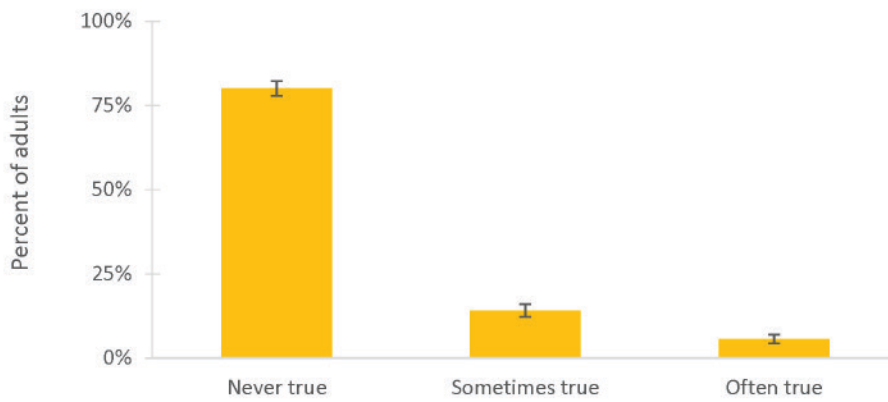


NOTE: "BB" includes the Back Bay, Beacon Hill, Downtown, the North End, and the West End.  
 "SE" includes the South End and Chinatown.

DATA SOURCE: American Community Survey, 2011-2015, U.S. Census Bureau

During 2011-2015 combined, 19% of Boston households received benefits from the Supplemental Nutrition Assistance Program (SNAP) in the past 12 months. A higher percentage of households in Dorchester (zip codes 02121, 02125), Dorchester (zip codes 02122, 02124), Mattapan, Roxbury, and the South End received SNAP benefits compared with Boston overall. A lower percentage of households in Allston/Brighton, Back Bay, Fenway, Jamaica Plain, Roslindale, South Boston, and West Roxbury received SNAP benefits compared with Boston overall.

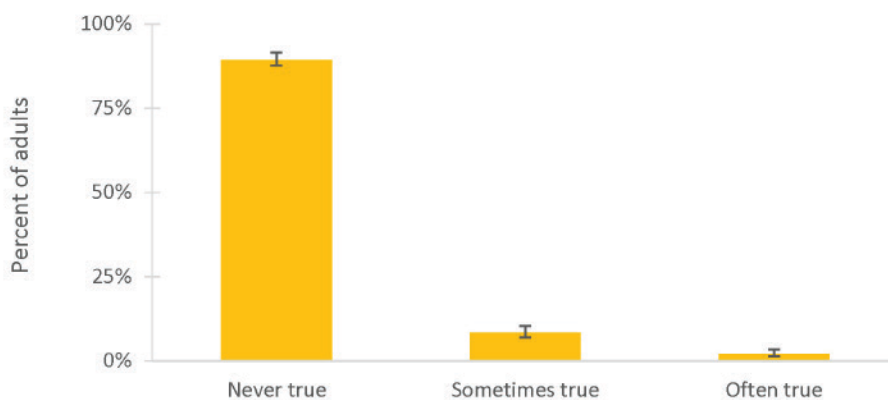
Figure 2.35 Food Purchased Did Not Last and Did Not Have Money to Get More, 2015



DATA SOURCE: Boston Behavioral Risk Factor Survey (2015), Boston Public Health Commission

For 6% of Boston adult residents in 2015, it was often true that the food they purchased did not last and they did not have money to get more. This was sometimes true for 14% of adults.

Figure 2.36 Hungry But Did Not Eat Because Could Not Afford Food, 2015



DATA SOURCE: Boston Behavioral Risk Factor Survey (2015), Boston Public Health Commission

In 2015, it was often true that 2% of Boston adult residents remained hungry because they could not afford food. This was sometimes true for 9% of adults.



This table describes select health indicators by household income. A higher percentage of Boston adult residents with a household income less than \$25,000 had asthma, diabetes, hypertension, obesity, persistent anxiety, and persistent sadness compared with those with a household income of \$50,000 or more. Percentages of diabetes, hypertension, obesity, persistent anxiety, and persistent sadness remained higher after adjusting for age, race/ethnicity, and sex (adjusted data not shown). For asthma, however, the differences were no longer evident after adjusting for age, race/ethnicity, and sex.

A higher percentage of adult residents with a household income of \$25,000-\$49,999 had diabetes, hypertension, obesity, and persistent sadness compared with those with a household income of \$50,000 or more. Percentages of diabetes, hypertension, and persistent sadness remained higher after adjusting for age, race/ethnicity, and sex (adjusted data not shown). For hypertension, however, the differences were no longer evident after adjusting for age, race/ethnicity, and sex.

Figure 2.37 Health Indicators by Household Income, 2015

	Less than \$25,000	\$25,000-\$49,999	\$50,000 or more
Asthma	16.9%* (13.3-21.2)	11.2% (7.9-15.7)	9.6% (7.5-12.2)
Diabetes	15.3%* (12.4-18.6)	9.1%* (6.5-12.6)	3.9% (3.1-4.9)
Hypertension	33.6%* (29.3-38.1)	28.2%* (23.4-33.7)	18.2% (15.9-20.7)
Obesity	30.4%* (25.8-35.3)	23.3%* (18.5-28.2)	17.2% (14.6-20.1)
Persistent anxiety	26.7%* (22.3-31.5)	21.4% (16.5-27.2)	17.8% (14.8-21.3)
Persistent sadness	20.0%* (16.4-24.2)	12.4%* (8.8-17.3)	4.7% (3.4-6.5)

\* Statistically significant difference when compared to reference group (\$50,000 or more)

DATA SOURCE: Boston Behavioral Risk Factor Survey (2015), Boston Public Health Commission

### *Income and Poverty Summary*

In 2015, there was a high level of income inequality in the city of Boston, and the city's poverty level was double that of Massachusetts. The median household income for Boston was about \$58,000 and one in five Boston residents had an income below poverty level. We observed inequities across race for both median household income and poverty level. Asian, Black, and Latino households had lower median incomes compared with White households in the city. Additionally, compared with White residents, the percentage of Asian, Black, and Latino residents living below poverty level was higher. There were also inequities in median household income and poverty level by neighborhood. We observed differences in poverty level by sex, age, and education level. Compared with male residents, the percentage of female residents living below poverty level was higher. It was also higher for residents under the age of 18 compared with those between the ages of 18-64. Residents with a high school diploma or GED, some college education or an associate degree, or a bachelor's degree or higher, had a lower poverty level compared with those with less than a high school education.

In 2015, one in five Boston residents received benefits from the Supplemental Nutrition Assistance Program (SNAP) in the past 12 months. About one in four Asian residents received SNAP benefits in the last 12 months, as did about one-third of both Black and Latino residents. There were also inequities in SNAP benefits by neighborhood. Additionally, for one in five Boston adult residents in 2015, it was sometimes true or often true that the food they purchased did not last and they did not have money to get more.

After adjusting for age, race/ethnicity, and sex, we found that a higher percentage of Boston residents with a household income less than \$25,000 had diabetes, hypertension, obesity, persistent anxiety, and persistent sadness compared with residents with a household income of \$50,000 or greater. A higher percentage of residents with a household income of \$25,000-49,999 had diabetes, hypertension, and persistent sadness compared with those with a household income of \$50,000 or more. Increasing the median household income for residents would yield more positive health outcomes for these individuals and communities.

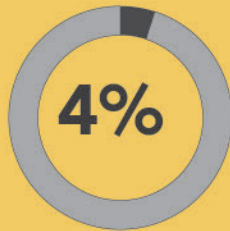
# Income and chronic conditions in 2015:



## Diabetes:



among residents with a household income **less than \$25,000**



among residents with a household income of **\$50,000 or more**

## Obesity:



**30%** among residents with a household income **less than \$25,000**



**17%** among residents with a household income of **\$50,000 or more**



## Hypertension:



**34%** among residents with a household income **less than \$25,000**



**18%** among residents with a household income of **\$50,000 or more**

## Persistent sadness:



**20%** among residents with a household income **less than \$25,000**

**5%** among residents with a household income of **\$50,000 or more**

## Persistent Anxiety:



**27%** among residents with a household income **less than \$25,000**

**18%** among residents with a household income of **\$50,000 or more**

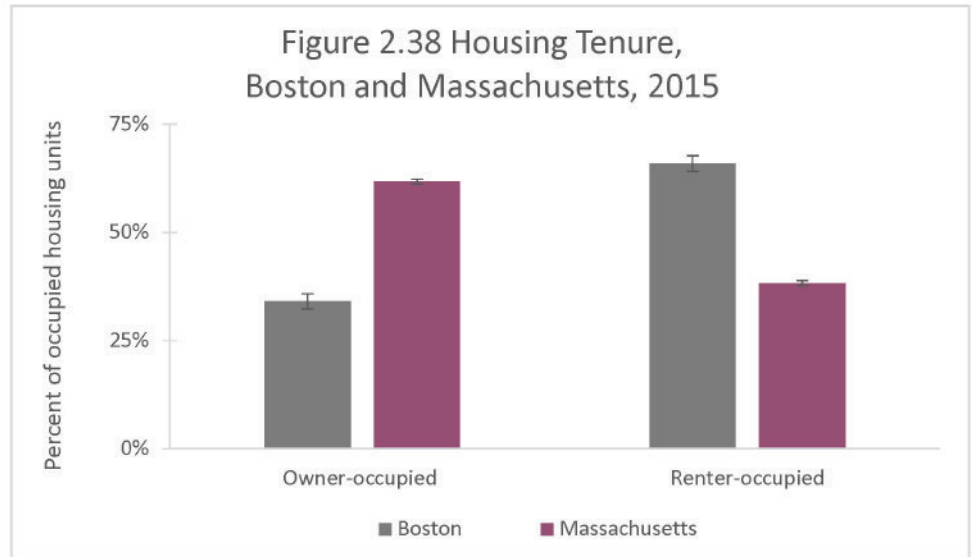
## Housing

In Boston, the median value of an owner-occupied housing unit is about \$453,000, with over 40% of homes topping over \$500,000 (44). Average rental prices in Boston are among the highest in the U.S., just behind New York, San Francisco, and Silicon Valley (38), with almost 40% of residents paying more than \$1,500 a month (45). Subsidized housing is available on a limited basis to those with incomes ranging from less than 30-80% of the city-wide median income level depending on the program (46). Programs have a wait ranging from 10 weeks to more than 5 years depending on the application and housing availability (47). Meanwhile, over half of Boston renters pay more than 30% of their income toward rent (48), meaning finances can't go to other necessities such as childcare and food (49). The benefits of home ownership, including tax deductions, cost savings over time compared to renting, and the ability to build equity, are reserved for higher-income individuals. Lower-income individuals who cannot afford home ownership often struggle with the negative impact that residential instability has on crime, mental health, and social capital (50-52).

Safe and stable housing provides personal security, reduces stress and exposure to disease, and provides a foundation for meeting basic hygienic, nutritional, and healthcare needs. Average income gains over the past decade have failed to keep pace with rising housing costs, pushing thousands of residents into unstable housing situations (53). In 2017, 6,135 individuals in Boston were homeless (Figure 2.49). Without consistent access to health care, homeless individuals are less likely to participate in preventative care and are much more likely to utilize the emergency department for non-emergencies. Such patterns of use are not only a burden on the healthcare system, but detrimental to personal health as well (54).

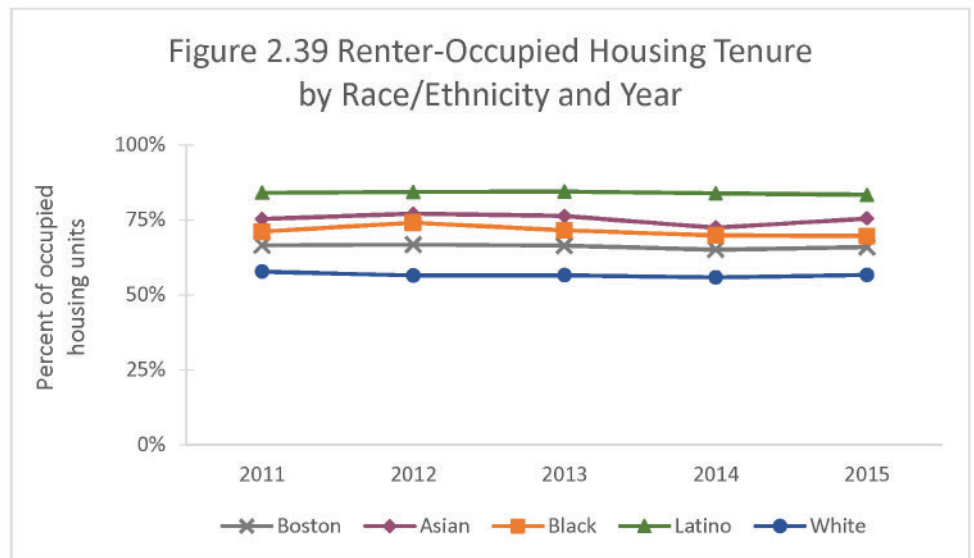
This section presents data on housing tenure, foreclosures, and homelessness, and the association between housing tenure and selected health indicators.

In 2015, 66% of housing units in Boston were occupied by renters compared with 38% in Massachusetts overall. In Boston, 34% of housing units were owner-occupied compared with 62% in Massachusetts overall.



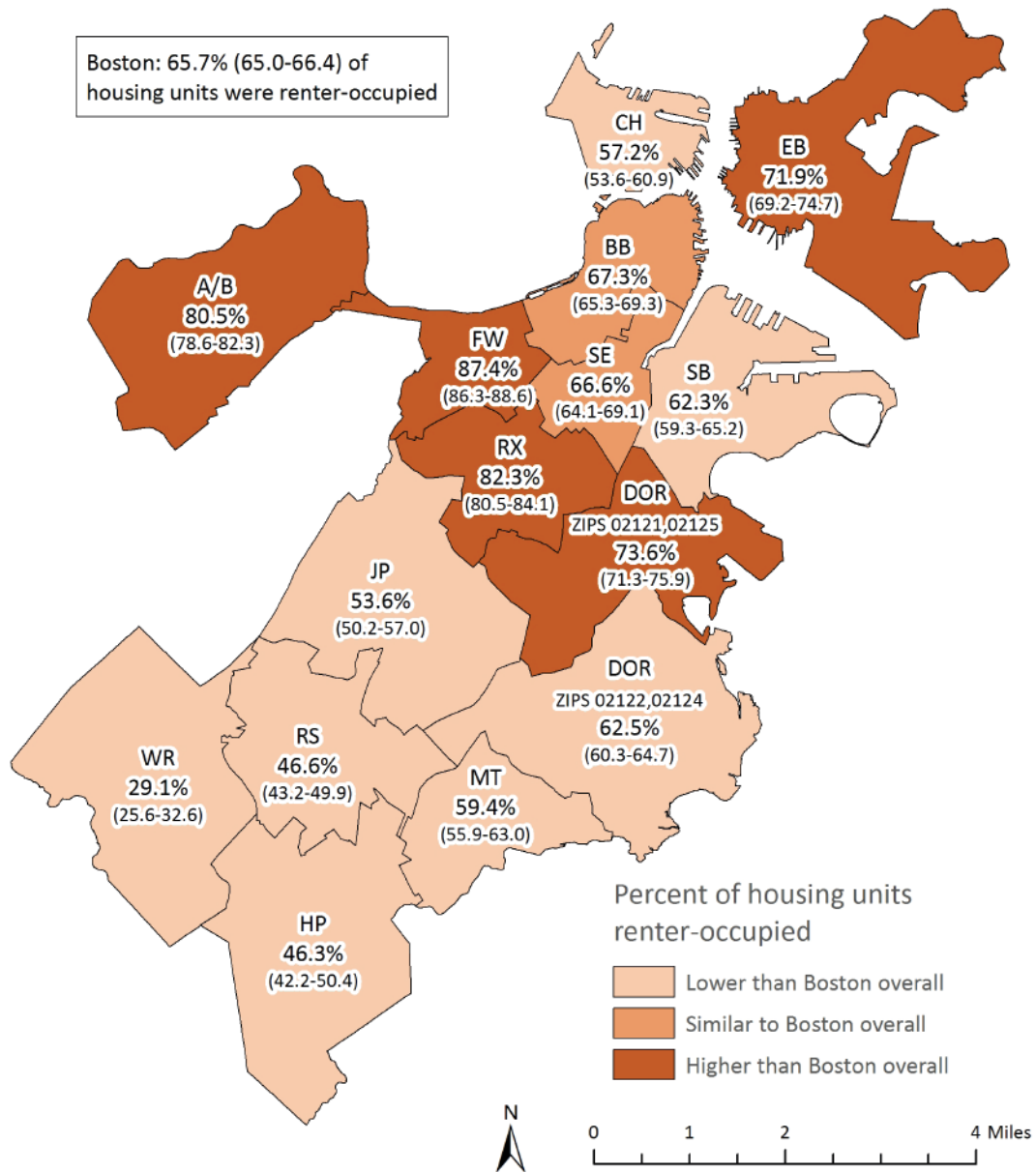
DATA SOURCE: American Community Survey, 2015, U.S. Census Bureau

In 2015, 66% of Boston residents lived in renter-occupied housing units. Compared with White residents (57%), a higher percentage of Asian (76%), Black (70%), and Latino (83%) residents lived in renter-occupied units.



NOTE: See appendix for confidence intervals for point estimates. Due to limited data availability, data for Asian residents includes individuals who identified as Latino (less than 1% of Asian residents identified as Latino).  
 DATA SOURCE: American Community Survey, 2011, 2012, 2013, 2014, 2015, U.S. Census Bureau

### Figure 2.40 Renter-Occupied Housing Tenure by Neighborhood, 2011-2015

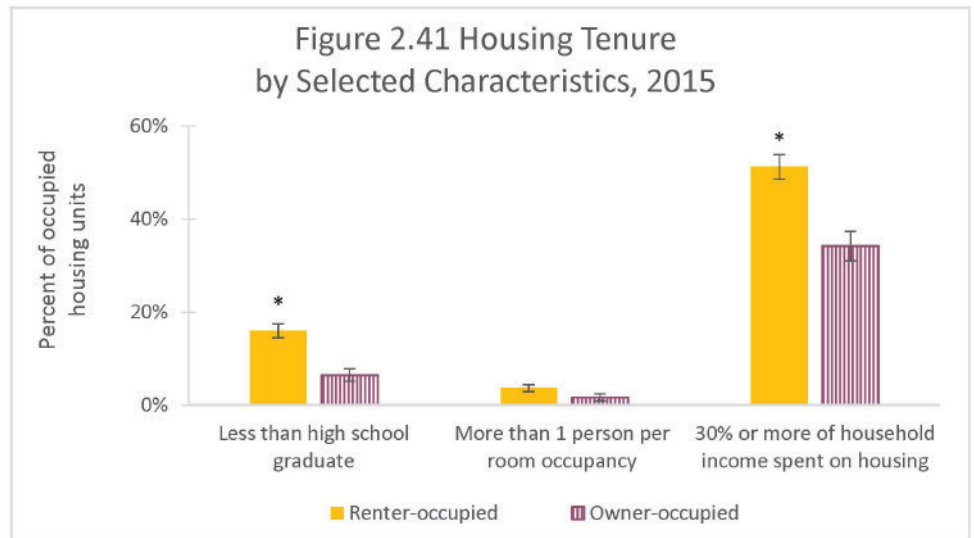


NOTE: "BB" includes the Back Bay, Beacon Hill, Downtown, the North End, and the West End. "SE" includes the South End and Chinatown.

DATA SOURCE: American Community Survey, 2011-2015, U.S. Census Bureau

During 2011-2015, a higher percentage of housing units in Allston/Brighton, Dorchester (zip codes 02121, 02125), East Boston, Fenway, and Roxbury were renter-occupied compared with Boston overall. A lower percentage of housing units were renter-occupied in Charlestown, Dorchester (zip codes 02122, 02124), Hyde Park, Jamaica Plain, Mattapan, Roslindale, South Boston, and West Roxbury compared with Boston overall.

In 2015, a higher percentage of renters in Boston had less than a high school diploma (16%) compared with those who owned their units (6%). In addition, a higher percentage of renters (51%) paid 30% or more of their income on housing compared with those who owned their units (34%).

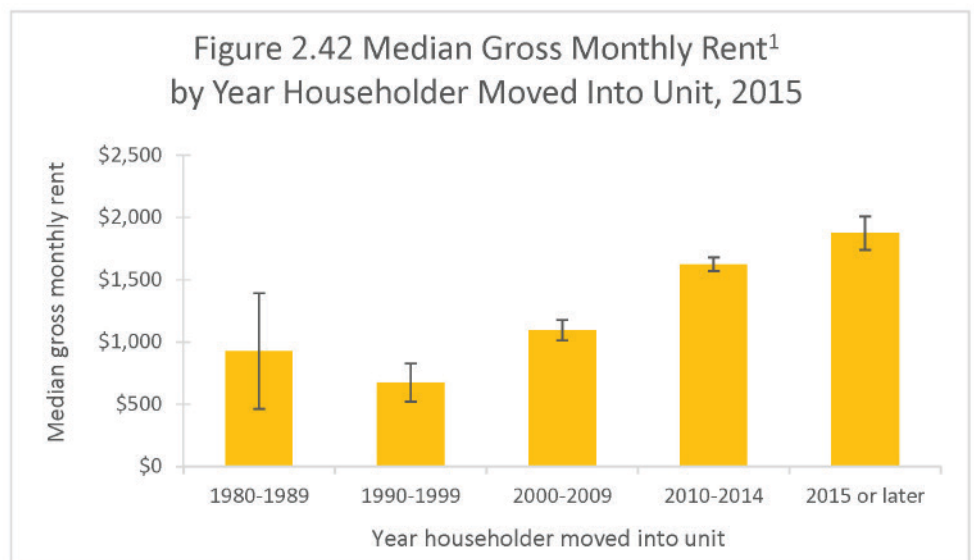


\* Statistically significant difference when compared to reference group

NOTE: Bars with patterns indicate the reference group within each selected indicator.

DATA SOURCE: American Community Survey, 2015, U.S. Census Bureau

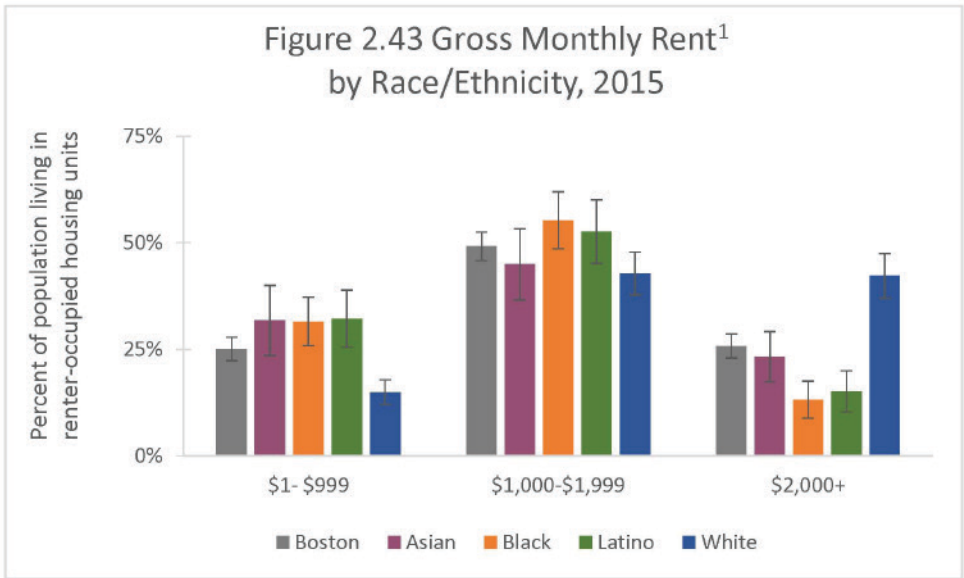
In 2015, the median gross rent for a householder moving into a unit in 2015 or later was \$1,876 compared with \$928 for householders who moved into a unit during 1980-1989.



<sup>1</sup> Includes average monthly utility costs

DATA SOURCE: American Community Survey, 2015, U.S. Census Bureau

Figure 2.43 Gross Monthly Rent<sup>1</sup>  
by Race/Ethnicity, 2015



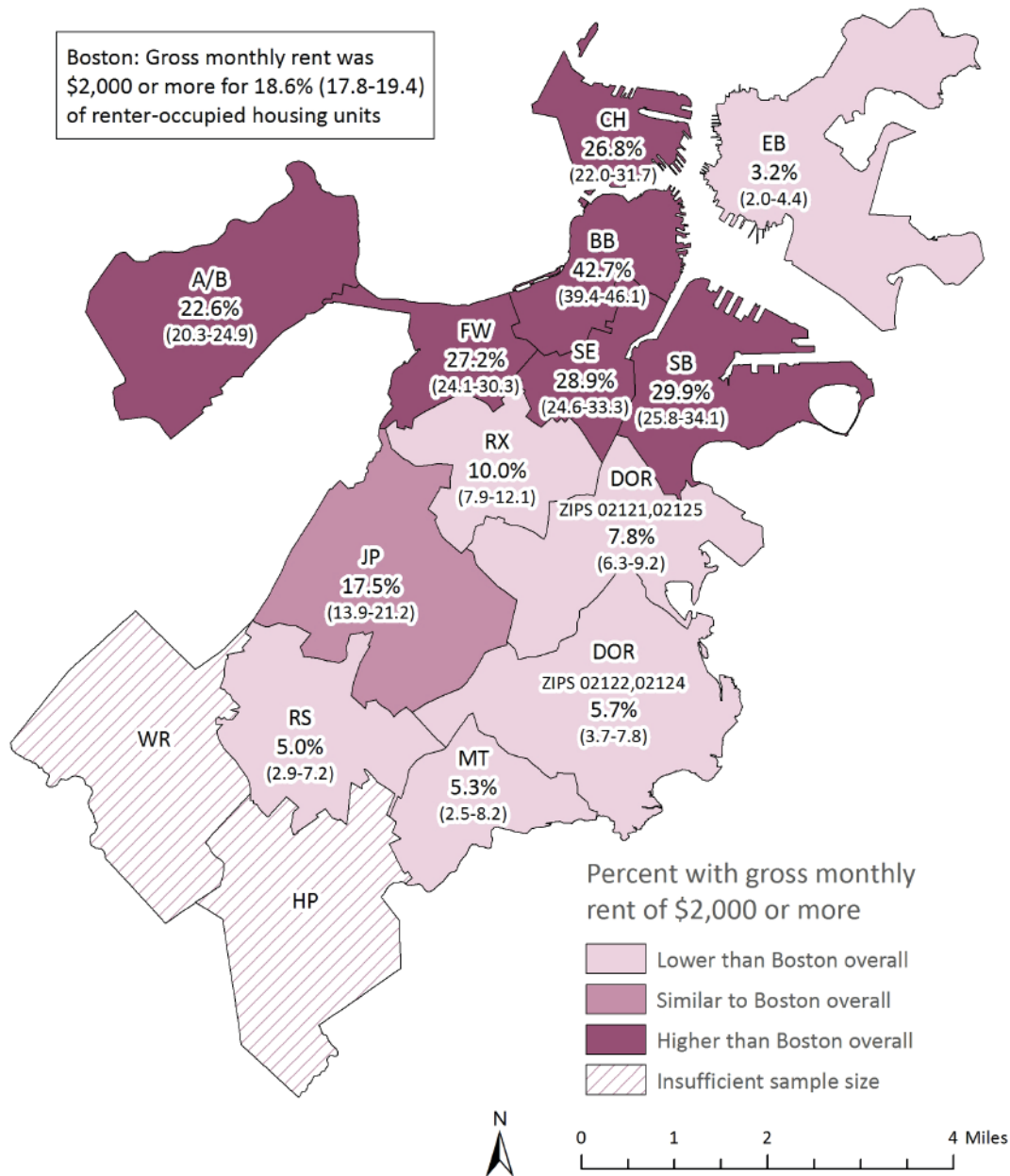
In 2015, 49% of Boston renters lived in units with gross monthly rent between \$1,000-\$1,999. Compared with White residents (42%), a lower percentage of Asian (23%), Black (13%), and Latino (15%) residents paid \$2,000 or more in rent per month.

<sup>1</sup> Includes average monthly utility costs

DATA SOURCE: American Community Survey Public Use Microdata Sample, 2015, U.S. Census Bureau



Figure 2.44 Gross Monthly Rent<sup>1</sup> of \$2,000 or More by Neighborhood, 2011-2015



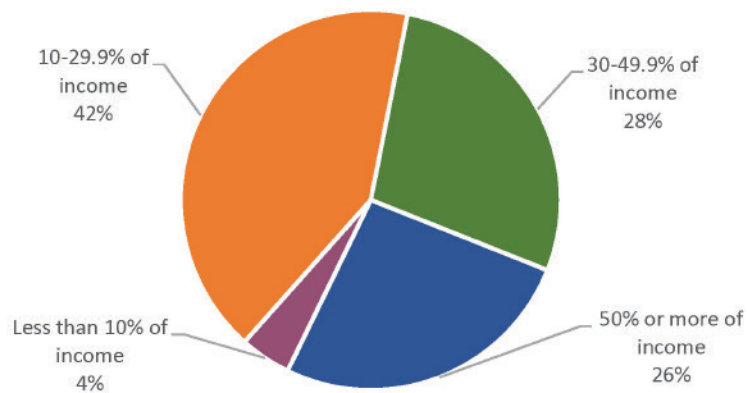
<sup>1</sup>Includes average monthly utility costs

NOTE: "BB" includes the Back Bay, Beacon Hill, Downtown, the North End, and the West End. "SE" includes the South End and Chinatown.

DATA SOURCE: American Community Survey, 2011-2015, U.S. Census Bureau

During 2011-2015 combined, 19% of households who paid rent in Boston had a gross rent of \$2,000 or more per month. Compared with Boston overall, a higher percentage of renter-occupied households in Allston/Brighton, Back Bay, Charlestown, Fenway, South Boston, and the South End paid \$2,000 or more per month in rent. A lower percentage of renter-occupied households in Dorchester (zip codes 02121, 02125), Dorchester (zip codes 02122, 02124), East Boston, Mattapan, Roslindale, and Roxbury paid \$2,000 or more per month in rent compared with Boston overall.

Figure 2.45 Gross Monthly Rent<sup>1</sup> as a Percentage of Household Income, 2015



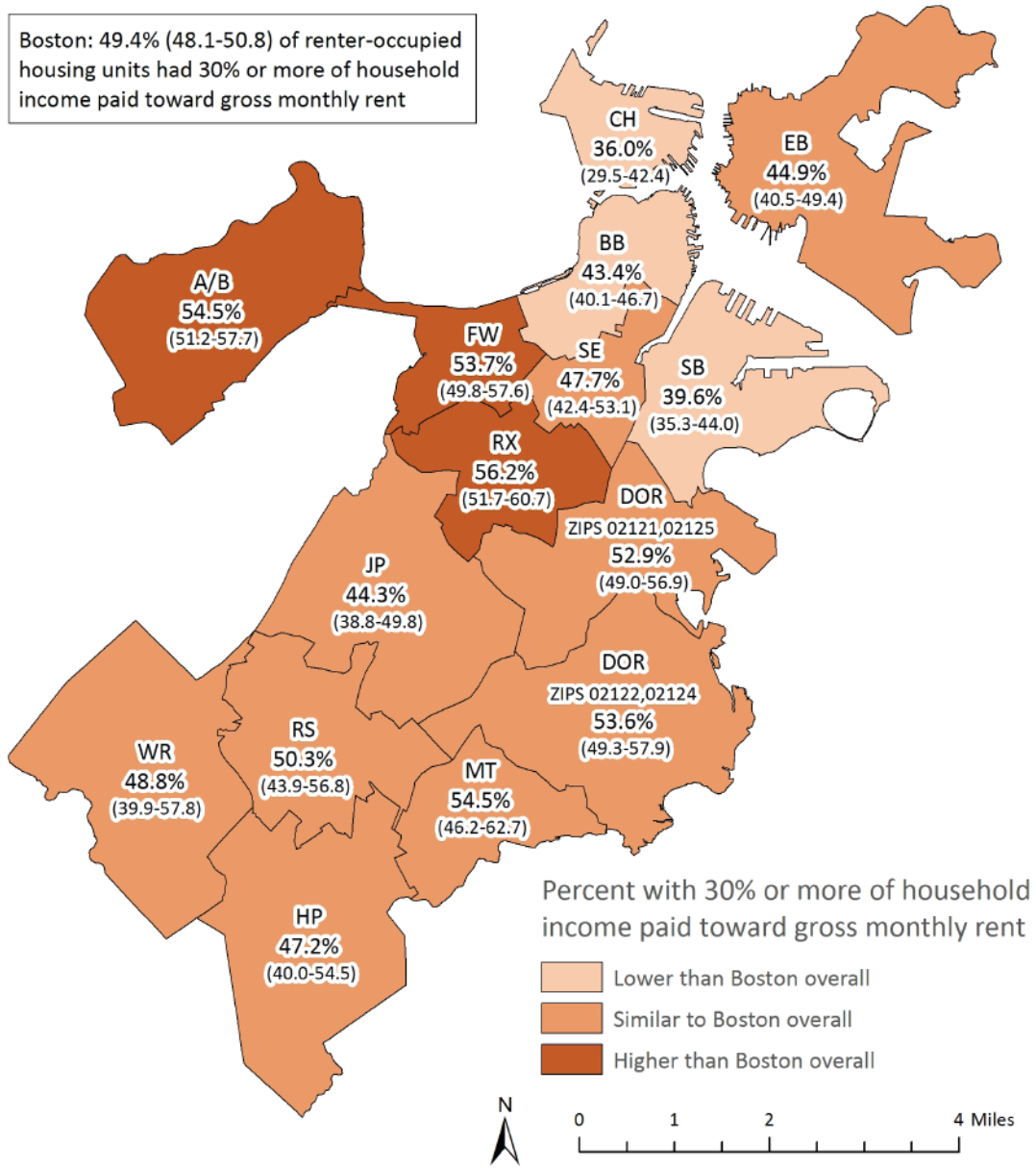
<sup>1</sup> Includes average monthly utility costs

NOTE: See appendix for confidence intervals for point estimates.

DATA SOURCE: American Community Survey, 2015, U.S. Census Bureau

In 2015, 26% of Boston residents paid 50% or more of their household income in rent. For 28% of Boston residents, rent was 30-49.9% of their household income.

### Figure 2.46 30% or More of Household Income Paid Toward Gross Monthly Rent<sup>1</sup> by Neighborhood, 2011-2015



<sup>1</sup>Includes average monthly utility costs

NOTE: "BB" includes the Back Bay, Beacon Hill, Downtown, the North End, and the West End.  
 "SE" includes the South End and Chinatown.

DATA SOURCE: American Community Survey, 2011-2015, U.S. Census Bureau

During 2011-2015, 49% of households who paid rent in Boston paid at least 30% of their income toward gross rent. Compared with Boston overall, a higher percentage of renter-occupied households in Allston/Brighton, Fenway, and Roxbury paid at least 30% of their income toward rent. A lower percentage of renter-occupied households in Back Bay, Charlestown, and South Boston paid at least 30% of their income toward rent.

Figure 2.47 Foreclosure Petitions by Neighborhood, 2012-2016

	2012	2013	2014	2015	2016	Average 2012-2016	% decrease from 2012-2016
Boston	890	232	322	500	533	495	40%
Allston/Brighton	31	7	13	14	18	17	42%
Back Bay <sup>1</sup>	37	5	8	18	24	18	35%
Charlestown	11	1	5	6	3	5	73%
Dorchester (zip codes 02121, 02125)	108	24	43	69	74	64	31%
Dorchester (zip codes 02122, 02124)	177	55	91	110	115	110	35%
East Boston	61	14	8	14	26	25	57%
Fenway	13	2	2	4	8	6	38%
Hyde Park	103	32	32	61	51	56	50%
Jamaica Plain	29	9	16	15	22	18	24%
Mattapan	90	26	32	56	51	51	43%
Roslindale	58	13	20	29	30	30	48%
Roxbury	54	12	15	45	36	32	33%
South Boston	45	8	19	24	31	25	31%
South End <sup>2</sup>	23	7	5	10	13	12	43%
West Roxbury	50	17	13	25	31	27	38%

<sup>1</sup> Includes Beacon Hill, Downtown, the North End, and the West End

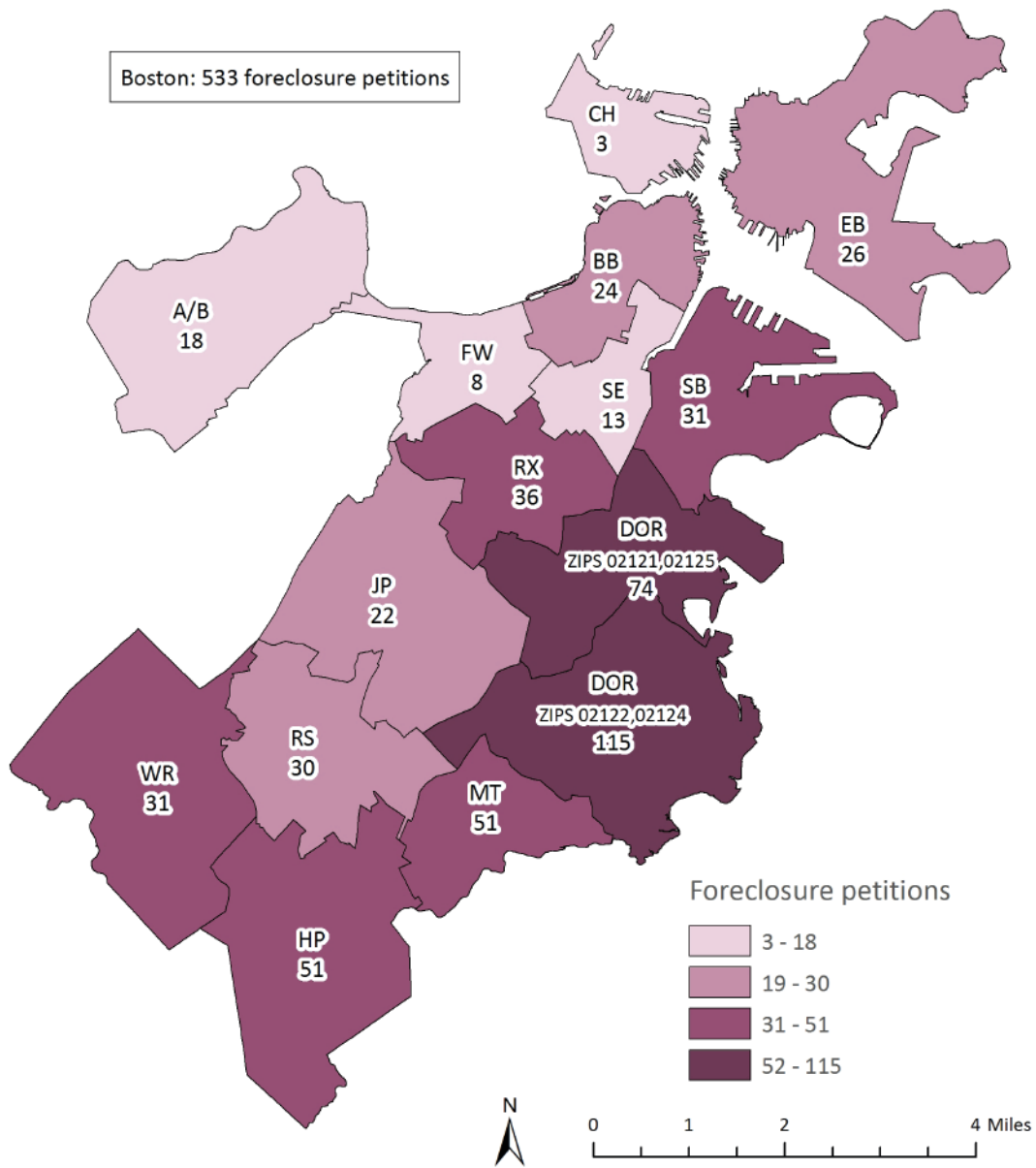
<sup>2</sup> Includes Chinatown

DATA SOURCE: Residential foreclosure petitions, Warren Group

DATA ANALYSIS: Department of Neighborhood Development, City of Boston

A foreclosure petition is the first step in the foreclosure process of a home. In Boston in 2016, there were 533 foreclosure petitions, a decrease of 40% from 2012. Foreclosure petitions decreased in all neighborhoods from 2012 to 2016.

Figure 2.48 Foreclosure Petitions, 2016

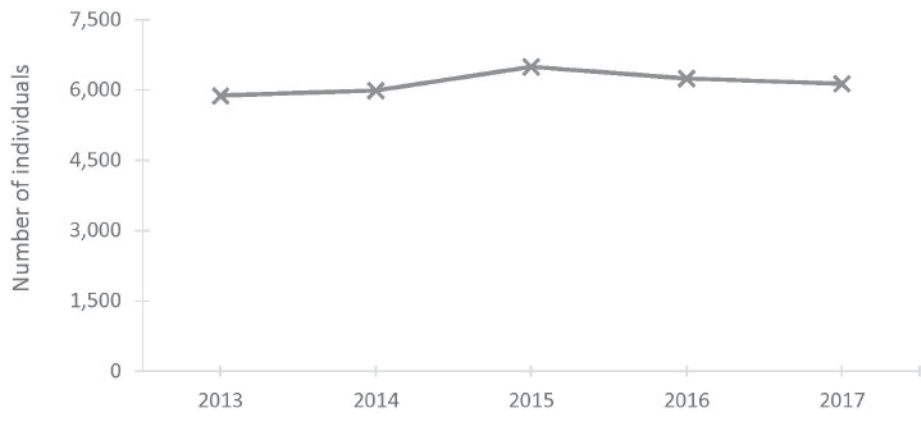


NOTE: "BB" includes the Back Bay, Beacon Hill, Downtown, the North End, and the West End.  
 "SE" includes the South End and Chinatown.

DATA SOURCE: Residential foreclosure petitions, Warren Group  
 DATA ANALYSIS: Department of Neighborhood Development, City of Boston

A foreclosure petition is the first step in the foreclosure process of a home. In 2016, there were 533 foreclosure petitions in Boston. Dorchester (zip codes 02122, 02124) had the highest number of foreclosure petitions (115), while Charlestown had the lowest number (3).

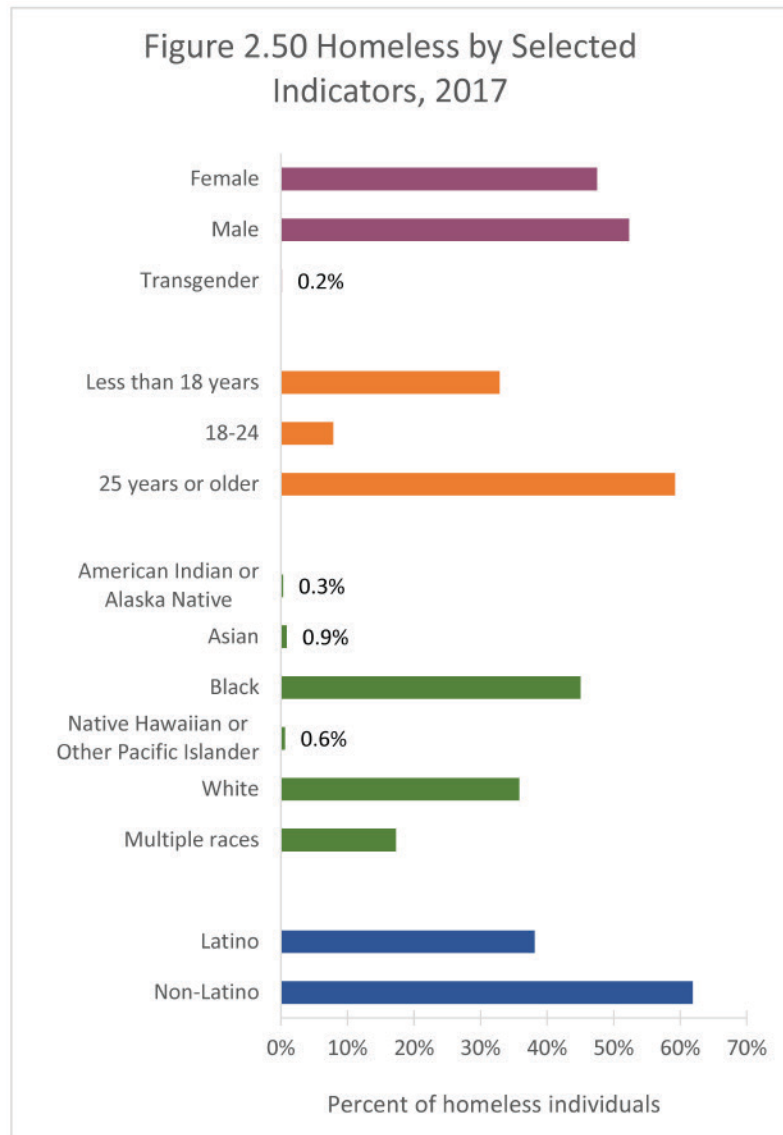
Figure 2.49 Homeless Count by Year



DATA SOURCE: Boston Continuum of Care (CoC) Homeless Assistance Programs Dashboard Reports, 2013-2017, U.S. Department of Housing and Urban Development

In 2013, 5,881 homeless individuals were counted in Boston during the annual homeless census, while in 2017, there were 6,135 homeless individuals counted.

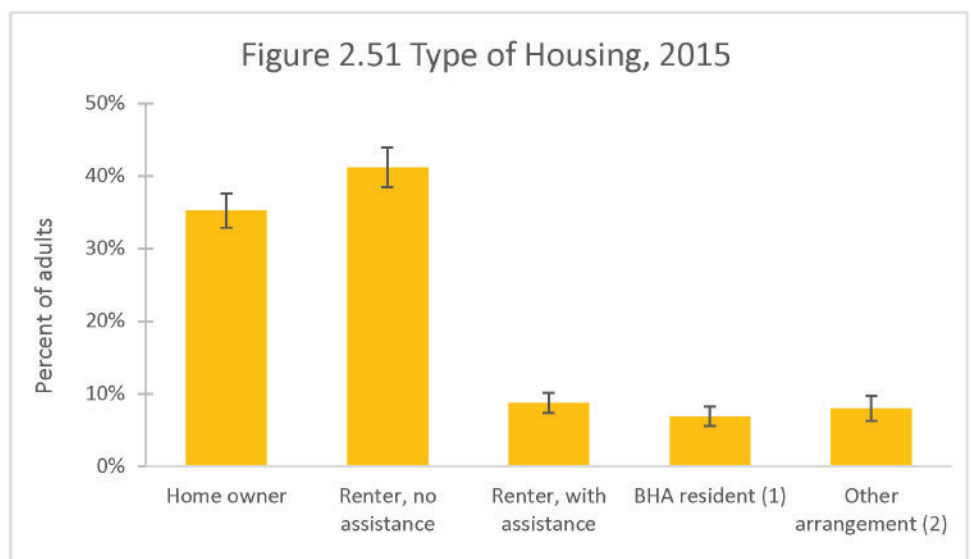
In 2017, 6,135 homeless individuals were counted on the night of January 25th, 2017 during the annual homeless census. Forty-eight percent were female, 33% were under the age of 18, 17% identified as more than one race, and 38% identified as Latino.



NOTE: Racial (American Indian or Alaska Native, Asian, etc.) and ethnic (Latino/non-Latino) indicators are not mutually exclusive.

DATA SOURCE: Boston Continuum of Care (CoC) Homeless Assistance Programs Dashboard Reports, 2017, U.S. Department of Housing and Urban Development

In 2015, 35% of Boston residents were homeowners, 41% rented their homes without rental assistance, 9% rented with rental assistance, 7% were BHA residents, and 8% had some other housing arrangement.



(1) Boston Housing Authority resident

(2) "Other arrangement" may include a group home, staying with friends or family without paying rent, or other housing status.

DATA SOURCE: Boston Behavioral Risk Factor Survey (2015), Boston Public Health Commission

Figure 2.52 Health Indicators by Housing Status,  
2013 and 2015 Combined

	Boston Housing Authority resident	Renter, with assistance	Renter, no assistance	Other arrangement	Home owner
Asthma	20.1%* (15.6-25.5)	21.4%* (17.1-26.5)	10.4% (8.8-12.3)	11.8% (7.4-18.2)	9.1% (7.7-10.7)
Diabetes	17.7%* (13.8-22.5)	15.6%* (12.7-18.9)	6.2%* (5.2-7.4)	5.6% (3.2-9.7)	8.4% (7.4-9.5)
Hypertension	38.2%* (32.6-44.2)	37.5%* (32.7-42.6)	17.5%* (15.7-19.5)	17.3%* (12.8-23.1)	28.3% (26.3-30.4)
Obesity	33.9%* (28.3-40.0)	35.4%* (30.6-40.6)	18.6% (16.6-20.8)	21.6% (15.9-28.8)	20.5% (18.6-22.6)
Persistent anxiety	22.2%* (17.6-27.7)	35.4%* (30.6-40.6)	23.4%* (20.8-26.2)	19.2% (14.1-25.7)	15.9% (14.0-17.9)
Persistent sadness	20.7%* (16.2-26.0)	25.7%* (21.1-30.9)	12.5%* (10.6-14.6)	12.2%* (8.3-17.6)	5.7% (4.9-6.8)

\* Statistically significant difference when compared to reference group (home owner)

DATA SOURCE: Boston Behavioral Risk Factor Survey (2013, 2015), Boston Public Health Commission

This table describes select health indicators by housing status. Compared with homeowners, higher percentages of Boston Housing Authority residents and renters receiving rental assistance had asthma, diabetes, hypertension, obesity, persistent anxiety, and persistent sadness. These percentages remained higher after adjusting for age, race/ethnicity, and sex (adjusted data not shown).

Compared with homeowners, a higher percentage of renters who did not receive rental assistance had persistent anxiety and persistent sadness. These percentages remained higher after adjusting for age, race/ethnicity, and sex (adjusted data not shown). Conversely, a lower percentage of renters who did not receive rental assistance had diabetes and hypertension compared with homeowners, but these differences were no longer evident after adjusting for age, race/ethnicity, and sex (adjusted data not shown).

A higher percentage of those who had other housing arrangements had persistent sadness and a lower percentage had hypertension compared with homeowners. These differences remained after adjusting for age, race/ethnicity, and sex (adjusted data not shown).



## ***Housing Summary***

In 2015, two-thirds of housing units in Boston were occupied by renters, and one-third were occupied by owners. Boston has a higher percentage of renter-occupied units and a lower percentage of owner-occupied housing units compared with Massachusetts overall. We identified differences in housing occupancy by race/ethnicity, neighborhood, and education level. Compared with White residents, a higher percentage of Asian, Black, and Latino residents lived in renter-occupied units. During 2011-2015, a higher percentage of housing units in Allston/Brighton, Dorchester (zip codes 02121, 02125), East Boston, Fenway, and Roxbury were renter-occupied compared with Boston overall, while a lower percentage of housing units were renter-occupied in Charlestown, Dorchester (zip codes 02122, 02124), Hyde Park, Jamaica Plain, Mattapan, Roslindale, South Boston, and West Roxbury compared with Boston overall. In 2015, a higher percentage of Boston residents living in renter-occupied units had less than a high school education and a higher percentage paid about one-third of their income towards housing compared with residents in owner-occupied units. Those putting more than 30% of their income towards housing are considered “cost burdened” by the U.S. Department of Housing and Urban Development, and may have difficulty affording necessities such as food, clothing, and transportation.

In 2015, the median gross rent for a householder moving into a unit in 2015 or later was \$1,876, about double what it was if a householder moved into a unit between 1980-1989. We found inequities in what residents are paying for rent by race/ethnicity and neighborhood. Compared with White residents who rent, a lower percentage of Asian, Black, and Latino residents who rented paid \$2,000 or more in rent per month. In 2015, about a quarter of Boston residents paid 50% or more of their household income in rent. During 2011-2015, half of Boston residents living in renter-occupied housing units paid at least 30% of their income towards rent. Compared with Boston overall, a higher percentage of residents in Allston/Brighton, Fenway, and Roxbury paid at least 30% of their income towards rent. A lower percentage of residents in Back Bay, Charlestown, and South Boston paid at least 30% of their income towards rent.

We also looked at health indicators by housing status. In 2015, 35% were homeowners, 41% rented their homes without rental assistance, 9% rented with rental assistance, 7% were Boston Housing Authority (BHA) residents, and 8% had some other housing arrangement. After adjusting for differences in age, race/ethnicity, and sex, we found differences in several health outcomes by housing status. Compared with homeowners, a higher percentage of BHA residents and renters receiving rental assistance had asthma, diabetes, hypertension, obesity, persistent anxiety, and persistent sadness. A higher percentage of renters who did not receive assistance had persistent anxiety and persistent sadness than homeowners. Lastly, a higher percentage of those who had housing arrangements other than renting (with and without rental assistance), being a homeowner, or being a BHA resident, had hypertension and persistent sadness than homeowners.

# Housing status and chronic conditions in 2013 and 2015 combined:



**Boston Housing Authority (BHA) residents**



**Renters who received rental assistance**



**Homeowners**



**Asthma**

**20%**

**21%**

**9%**



**Diabetes**

**18%**

**16%**

**8%**



**Hypertension**

**38%**

**38%**

**28%**



**Obesity**

**34%**

**35%**

**21%**



**Persistent anxiety**

**22%**

**35%**

**16%**



**Persistent sadness**

**21%**

**26%**

**6%**

## Bias and Racism

Just as the social determinants of health impact a person's environment and behavior, racism impacts the social determinants of health (55). Differences in health outcomes are not generally caused by race but by racism, and specifically how racism impacts the social determinants of health (56).

Racism can take many forms, ranging from interpersonal interactions to institutional/structural policies and practices. Although the expression of outright discrimination has declined in recent decades, the residual effects from historically discriminatory policies now shape subtler, unconscious, and nuanced forms of racism at the structural, institutional, interpersonal, and internalized levels. Decades of research indicate that systemic racism negatively affects health in the U.S. (57). Understanding the many pathways through which racism permeates our community will enable us to address racial inequities in health outcomes that are apparent today.

At the *structural level*, racism can be perpetuated through a system of selectively allocated social privilege. A commonly cited example of structural racism is evident in the interaction between Black individuals and the criminal justice system (58). Although White individuals are more likely to use drugs compared with Black individuals, Black individuals are more likely to enter the criminal justice system for drug-related offenses—an inequity which has lifelong consequences for the individual, family, and community (59). A study found that White individuals with a recent criminal record fared better in the New York City job market than Black individuals who had the same resumes but no criminal record (58).

Economic and employment opportunities, access to resources such as housing and education, and social capital are a few examples of necessities that become virtually inaccessible once an individual interacts with the criminal justice system. Lack of access to these necessities, in turn, may exacerbate health inequities.

At the *institutional level*, organizational policies and practices affect access to goods, services, and opportunities. Within the healthcare system, studies have demonstrated that Black patients are less likely to receive the appropriate care compared with White patients. In one study, Black and White actors portrayed patients with coronary heart disease (60). Physicians were less likely to recommend standard cardiac catheterization for Black patients as compared with Whites patients (60). Other studies have found that Black patients are less likely to receive transplants than Whites patients. One group of researchers have reasoned that physicians possess “subconscious bias” when delivering care (61).

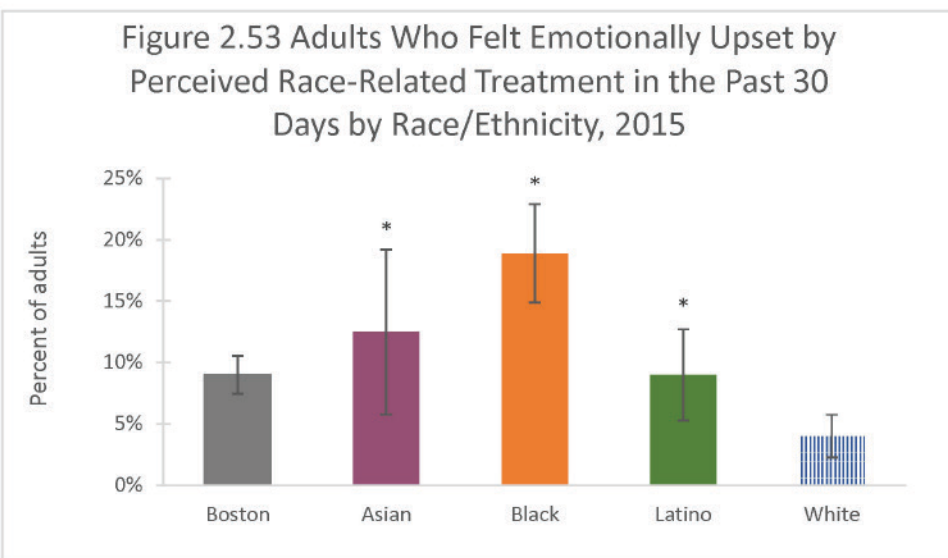
At the *interpersonal level*, prejudice, discrimination, and bias can affect the way people of all races/ethnicities perceive and interact with each other, both intentionally and unintentionally. For example, within the patient-provider relationship, perceived racism is associated with less positive interactions and decreased ease of conversation over the course of care (62).

*Internalized racism* occurs when individuals begin to absorb the discriminatory messages they are often bombarded with. This can lead to feelings of inferiority and low self-esteem (63). In the late 1930s and early 1940s, a well-known study found that when a child as young as age 3 was presented with two identical dolls, except one had white skin and blond hair and the other had brown skin and black hair, both Black and White children had more positive attitudes towards the white doll when asked questions such as, “Which is the nice doll?”, “Which one has the nicer color?”, and “Which doll looks bad?” (64). When replicated in 2005, this study produced similar results to the original study. Again, the majority of children, both Black and White, preferred the white doll (65).

Perpetual exposure to racism and discrimination increase stress hormones that lead to increases in blood pressure and heart rate (66-68). The combination of chronic stress with other social disadvantages, such as low income, can contribute to many health conditions, including heart disease, depression, hypertension, obesity, and elevated blood sugar (66-68). Negative coping mechanisms related to marginalization or discrimination further impact health. Behaviors reportedly used to reduce feelings of stress include the use of tobacco, alcohol, and other harmful substances, as well as poor eating or sleeping patterns (66, 67).

Racism at the structural, institutional, interpersonal, and internalized levels influence health experiences, behaviors, and outcomes for individuals and communities. Efforts to address racial/ethnic health inequities must include mechanisms to dismantle racism at every level and to counteract its impact on health.

This section presents data on individuals who experienced emotional and physical symptoms as a result of being treated differently because of their race as well as health indicators related to these issues.



\* Statistically significant difference when comparisons are made between racial/ethnic groups

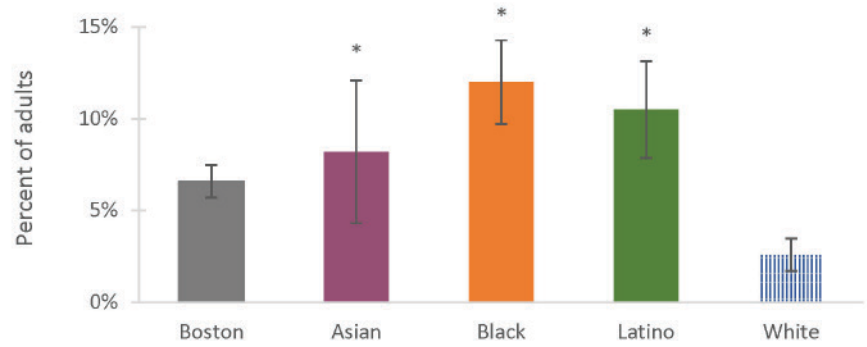
NOTE: Bars with patterns indicate the reference group within each selected indicator.

DATA SOURCE: Boston Behavioral Risk Factor Survey (2015), Boston Public Health Commission

In 2015, 9% of Boston adult residents felt emotionally upset because of how they were treated based on their race in the past 30 days. A higher percentage of Asian, Black, and Latino residents were emotionally upset in the past 30 days, 13%, 19% and 9%, respectively, compared with White residents, 4%.

During 2013 and 2015 combined, 7% of Boston adult residents experienced physical symptoms in the past 30 days as a result of how they were treated based on their race. Compared with White residents (3%), a higher percentage of Asian (8%), Black (12%), and Latino (11%) residents reported experiencing physical symptoms in the past 30 days.

Figure 2.54 Adults Who Experienced Physical Symptoms Based on Perceived Race-Related Treatment in the Past 30 Days by Race/Ethnicity, 2013 and 2015 Combined



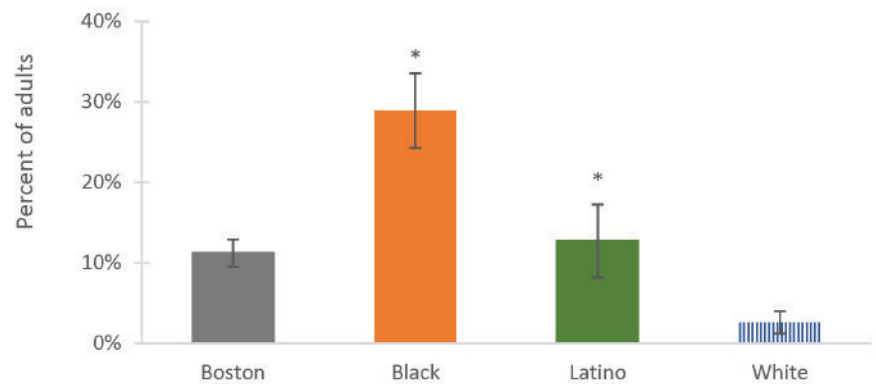
\* Statistically significant difference when comparisons are made between racial/ethnic groups

NOTE: Bars with patterns indicate the reference group within each selected indicator.

DATA SOURCE: Boston Behavioral Risk Factor Survey (2013, 2015), Boston Public Health Commission

In 2015, 11% of Boston adult residents felt they were stopped by the police just because of their race or ethnic background. Compared with White residents (3%), a higher percentage of Black and Latino residents, 29% and 13% respectively, reported they felt they were stopped by the police just because of their race or ethnic background.

Figure 2.55 Adults Who Ever Felt They Were Stopped by the Police Based on Their Racial/Ethnic Background by Race/Ethnicity, 2015



\* Statistically significant difference when comparisons are made between racial/ethnic groups

NOTE: Bars with patterns indicate the reference group within each selected indicator. Data not presented due to insufficient sample size for Asian residents.

DATA SOURCE: Boston Behavioral Risk Factor Survey (2015), Boston Public Health Commission

Figure 2.56 Health Indicators Among Adults Who Felt Emotionally Upset by Perceived Race-Related Treatment in the Past 30 Days, 2015

Health Indicator	Among those who were emotionally upset within past 30 days	Among those who were not emotionally upset within past 30 days
Asthma	14.8% (9.8-21.7)	11.8% (10.1-13.7)
Diabetes	10.7% (7.0-16.1)	8.0% (6.9-9.2)
Hypertension	24.7% (18.6-32.1)	24.9% (22.9-27.0)
Obesity	21.2% (15.1-28.8)	22.0% (19.9-24.3)
Persistent anxiety	39.1%* (30.8-47.9)	20.8% (18.4-23.3)
Persistent sadness	30.0%* (22.5-38.8)	10.2% (8.7-12.0)

\* Statistically significant difference

DATA SOURCE: Boston Behavioral Risk Factor Survey (2015), Boston Public Health Commission

This table describes select health indicators by whether an individual felt emotionally upset as a result of how they were treated based on their race. A higher percentage of adult residents who felt emotionally upset within the past 30 days by perceived race-related treatment had persistent anxiety and persistent sadness compared with those who did not feel emotionally upset. These percentages remained higher after adjusting for age, race/ethnicity, and sex (adjusted data not shown).

Figure 2.57 Health Indicators Among Adults Who Experienced Physical Symptoms Based on Perceived Race-Related Treatment in the Past 30 Days, 2015

Health Indicator	Among those who experienced physical symptoms within past 30 days	Among those who did not experience physical symptoms within past 30 Days
Asthma	12.2% (7.5-19.3)	11.9% (10.3-13.8)
Diabetes	10.4% (6.2-17.0)	8.1% (7.1-9.3)
Hypertension	26.8% (19.0-36.5)	24.6% (22.7-26.7)
Obesity	24.5% (16.4-34.9)	21.7% (19.6-24.0)
Persistent anxiety	26.5%* (17.7-37.7)	11.0% (9.4-12.7)
Persistent sadness	36.0%* (25.9-47.6)	21.4% (19.2-23.9)

\* Statistically significant difference

DATA SOURCE: Boston Behavioral Risk Factor Survey (2015), Boston Public Health Commission

This table describes select health indicators by whether an individual experienced physical symptoms as a result of how they were treated based on their race. A higher percentage of adult residents who experienced physical symptoms within the past 30 days had persistent anxiety and persistent sadness compared with those who did not experience physical symptoms. These percentages remained higher after adjusting for age, race/ethnicity, and sex (adjusted data not shown).

This table describes select health indicators by whether an individual felt they were stopped by the police just because of their race or ethnic background. A higher percentage of adult residents who felt they were stopped by the police just because of their race or ethnic background had persistent anxiety and persistent sadness compared with those who did not feel they were stopped by the police for these reasons. These percentages remained higher after adjusting for age, race/ethnicity, and sex (adjusted data not shown).

Figure 2.58 Health Indicators Among Adults Who Ever Felt They Were Stopped by the Police Based on Their Racial/Ethnic Background, 2015

Health Indicator	Among those who felt they were stopped by police based on their racial/ethnic background	Among those who did not feel they were stopped by police based on their racial/ethnic background
Asthma	14.9% (10.4-20.9)	11.8% (10.0-13.7)
Diabetes	9.8% (6.6-14.2)	7.9% (6.8-9.1)
Hypertension	28.1% (21.9-35.2)	24.5% (22.4-26.6)
Obesity	24.2% (18.6-30.7)	21.7% (19.5-24.1)
Persistent anxiety	33.3%* (25.9-41.5)	20.8% (18.5-23.3)
Persistent sadness	25.3%* (18.5-33.6)	10.1% (8.6-11.7)

\* Statistically significant difference

DATA SOURCE: Boston Behavioral Risk Factor Survey (2015), Boston Public Health Commission

### Racism Summary

The racism experienced at the structural, institutional, interpersonal, and internalized levels influences a person’s behaviors, and therefore their health. This impacts their personal health outcomes and those of their community. In 2015, a higher percentage of Asian, Black, and Latino residents were emotionally upset and experienced physical symptoms in the past 30 days because of how they were treated based on their race compared with White residents.

Additionally, compared with White residents, a higher percentage of Black and Latino residents reported they felt they were stopped by the police just because of their race or ethnic background. After adjusting for differences in age, race/ethnicity, and sex, a higher percentage of those who felt they were stopped by the police just because of their race or ethnic background had persistent anxiety and persistent sadness compared with those who did not feel they were stopped by the police because of their race or ethnic background. To end racial/ethnic health inequities, efforts must include ways to eliminate racism at all levels.



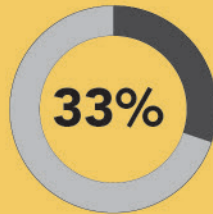
# Racial bias and health in 2015:



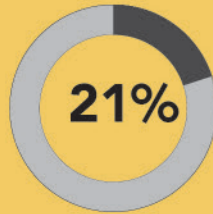
**10 times as many Black residents reported they felt they were stopped by the police just because of their race or ethnic background compared to White residents**



## Persistent anxiety:



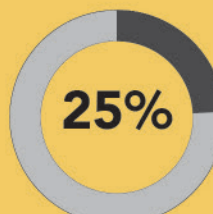
among residents who felt they were stopped by the police based on their racial/ethnic background



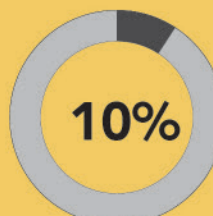
among residents who did not feel they were stopped by the police based on their racial/ethnic background



## Persistent sadness:



among residents who felt they were stopped by the police based on their racial/ethnic background



among residents who did not feel they were stopped by the police based on their racial/ethnic background



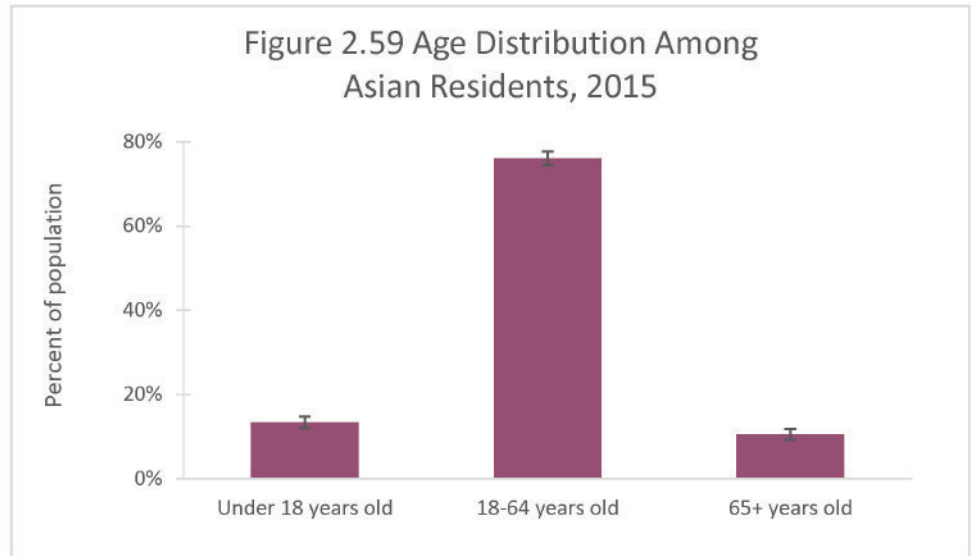


# Social Determinants of Health by Race/Ethnicity

This section shows demographic data and the social determinants of health (such as education, employment, income, and housing) by race/ethnicity for Boston residents.

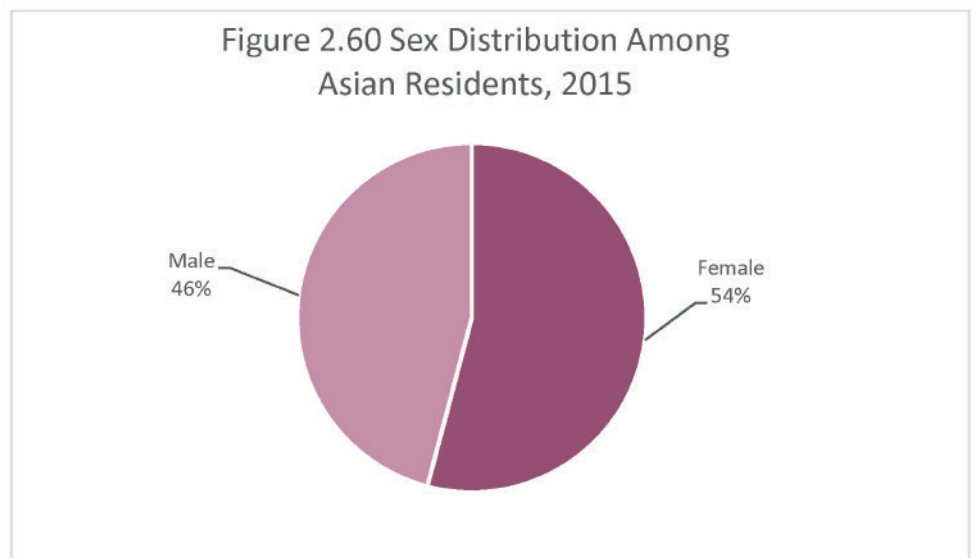
## Asian Residents

In 2015, 13% of Asian residents were under 18, 76% were ages 18-64, and 11% were ages 65 and older.



DATA SOURCE: American Community Survey Public Use Microdata Sample, 2015, U.S. Census Bureau

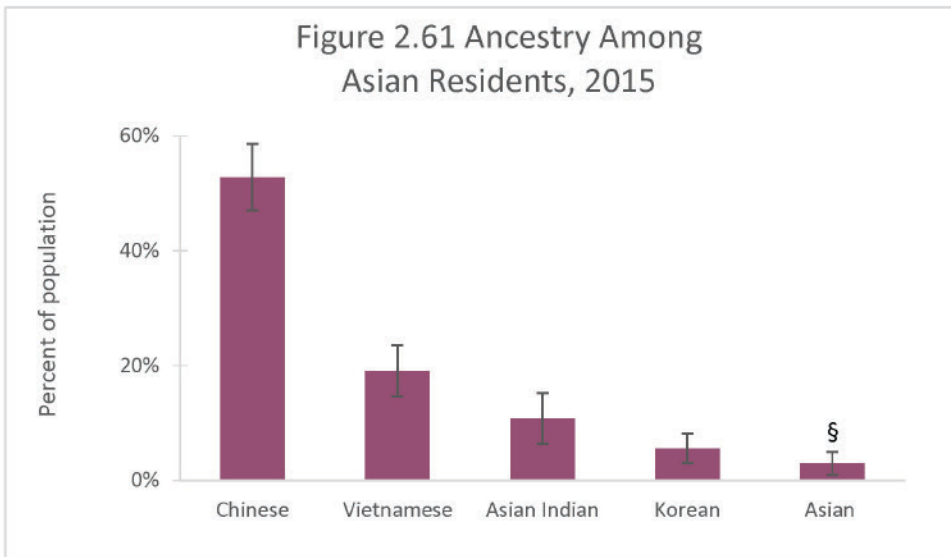
In 2015, 54% of Asian residents were female and 46% were male.



NOTE: See appendix for confidence intervals for point estimates.

DATA SOURCE: American Community Survey Public Use Microdata Sample, 2015, U.S. Census Bureau

Figure 2.61 Ancestry Among Asian Residents, 2015

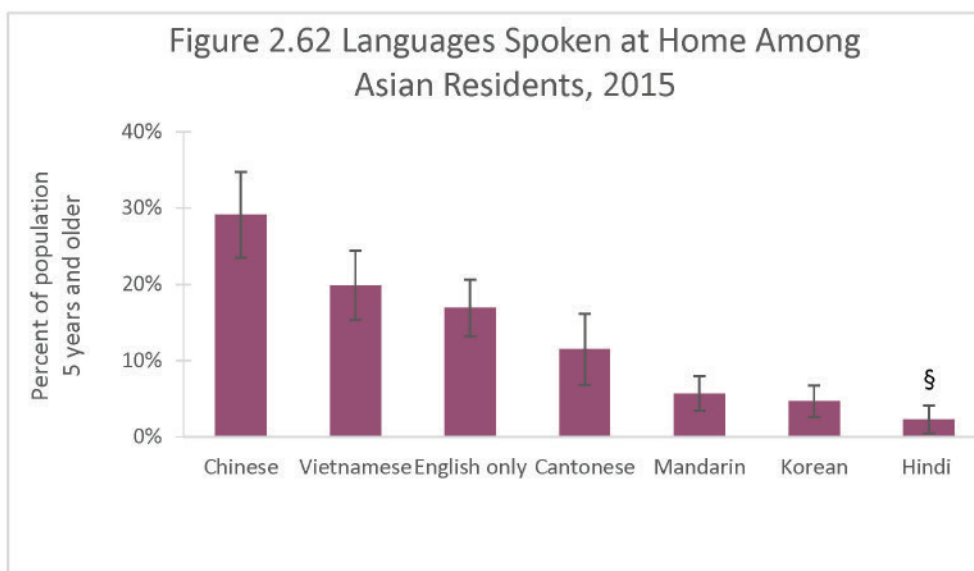


§ Estimates have a coefficient of variation greater than 30% and should be interpreted with caution.

DATA SOURCE: American Community Survey Public Use Microdata Sample, 2015, U.S. Census Bureau

In 2015, a majority of Asian residents were of Chinese ancestry (53%). Other reported ancestries included Vietnamese (19%), Asian Indian (11%), Korean (6%), and Asian (3%).

Figure 2.62 Languages Spoken at Home Among Asian Residents, 2015



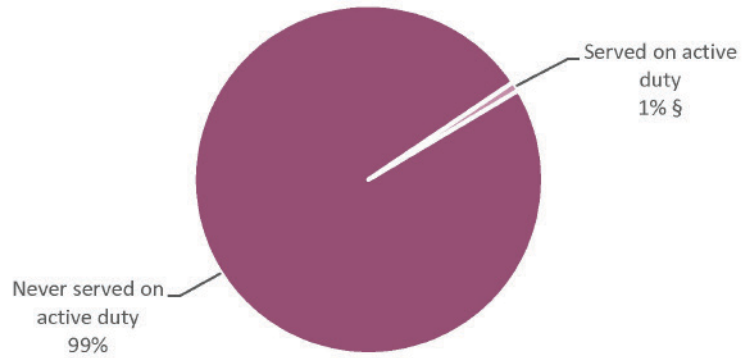
§ Estimates have a coefficient of variation greater than 30% and should be interpreted with caution.

DATA SOURCE: American Community Survey Public Use Microdata Sample, 2015, U.S. Census Bureau

Chinese (29%) was the language most frequently spoken at home among Asian residents ages 5 and older. Vietnamese was spoken at home by 20% of Asian residents, while 17% spoke English only, 12% spoke Cantonese, 6% spoke Mandarin, 5% spoke Korean, and 2% spoke Hindi.

In 2015, approximately 1% of Asian residents ages 17 and older had ever served on active duty in the military.

Figure 2.63 Active Duty Status Among Asian Residents<sup>1</sup>, 2015



§ Estimates have a coefficient of variation greater than 30% and should be interpreted with caution.

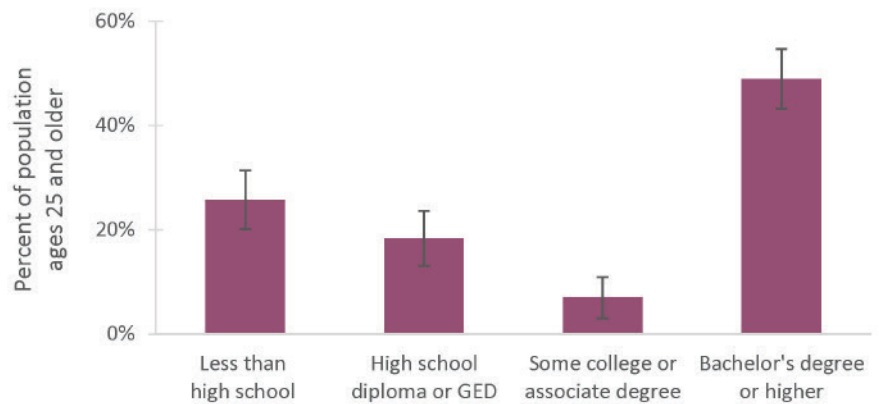
<sup>1</sup> Population ages 17 and older

NOTE: See appendix for confidence intervals for point estimates.

DATA SOURCE: American Community Survey Public Use Microdata Sample, 2015, U.S. Census Bureau

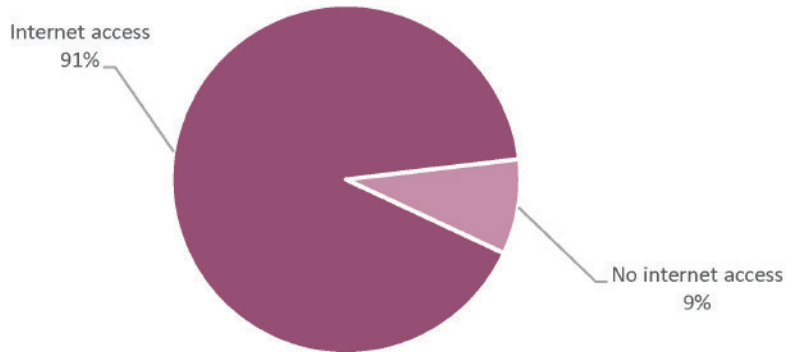
In 2015, 26% of Asian residents ages 25 and older had less than a high school diploma, 18% had a high school diploma or GED, 7% had some college education or an associate degree, and 49% had a bachelor's degree or higher.

Figure 2.64 Educational Attainment Among Asian Residents, 2015



DATA SOURCE: American Community Survey Public Use Microdata Sample, 2015, U.S. Census Bureau

Figure 2.65 Internet Access Among Asian Residents, 2015

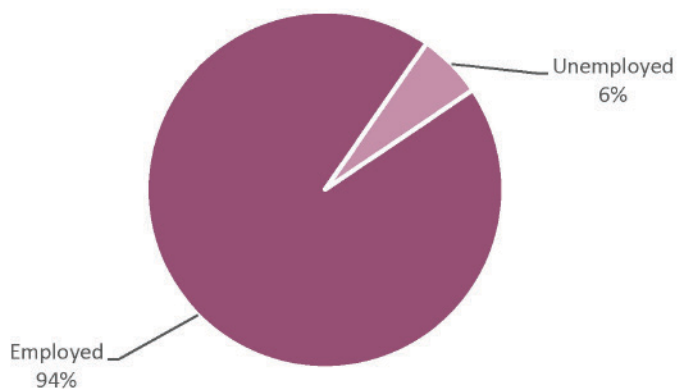


NOTE: See appendix for confidence intervals for point estimates.

DATA SOURCE: American Community Survey Public Use Microdata Sample, 2015, U.S. Census Bureau

In 2015, 91% of Asian residents had access to the internet at home.

Figure 2.66 Employment Among Asian Residents<sup>1</sup>, 2015



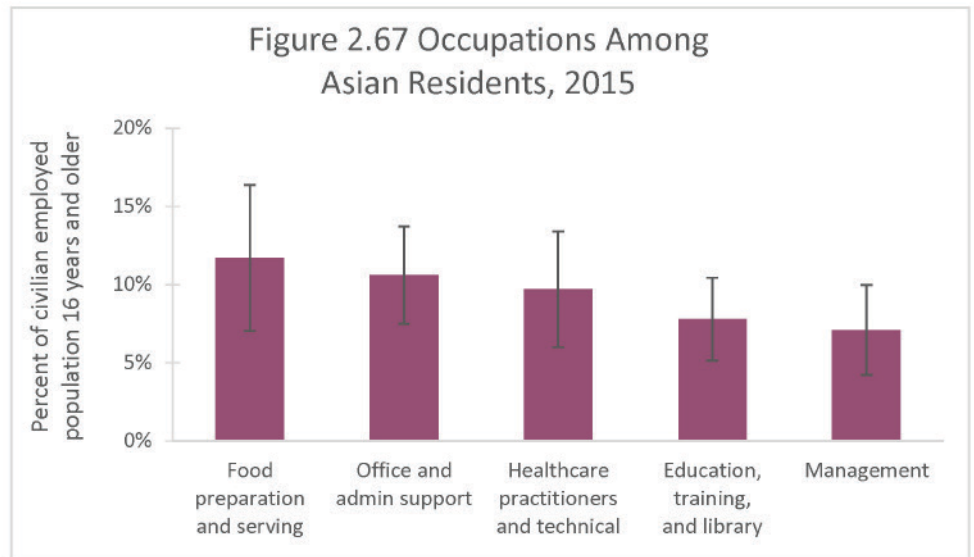
<sup>1</sup> Civilian population ages 16 and older in the labor force

NOTE: See appendix for confidence intervals for point estimates.

DATA SOURCE: American Community Survey Public Use Microdata Sample, 2015, U.S. Census Bureau

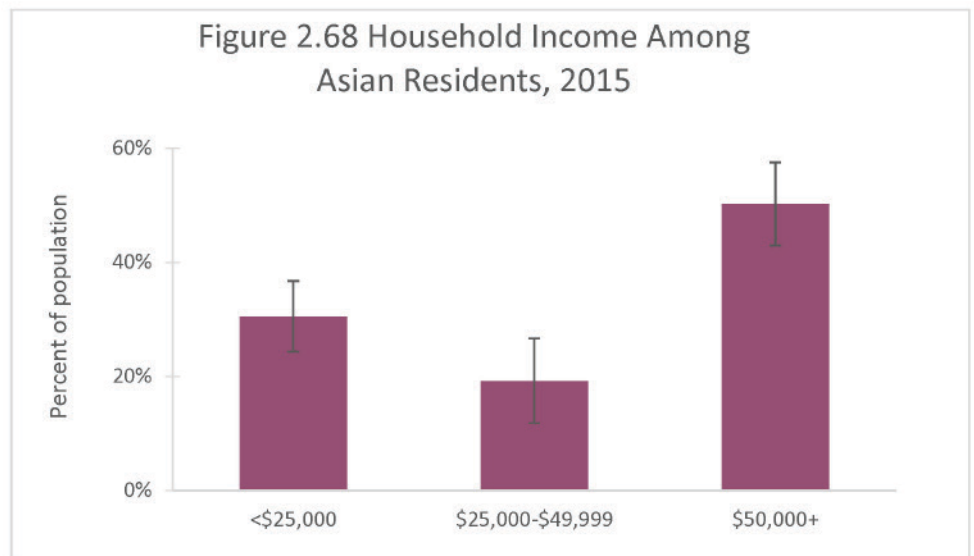
In 2015, 6% of Asian residents ages 16 and older were unemployed.

In 2015, the most commonly held occupations among employed Asian residents ages 16 and older were food preparation and serving (12%), office and administrative support (11%), healthcare practitioners and technical occupations (10%), education, training, and library (8%), and management (7%).



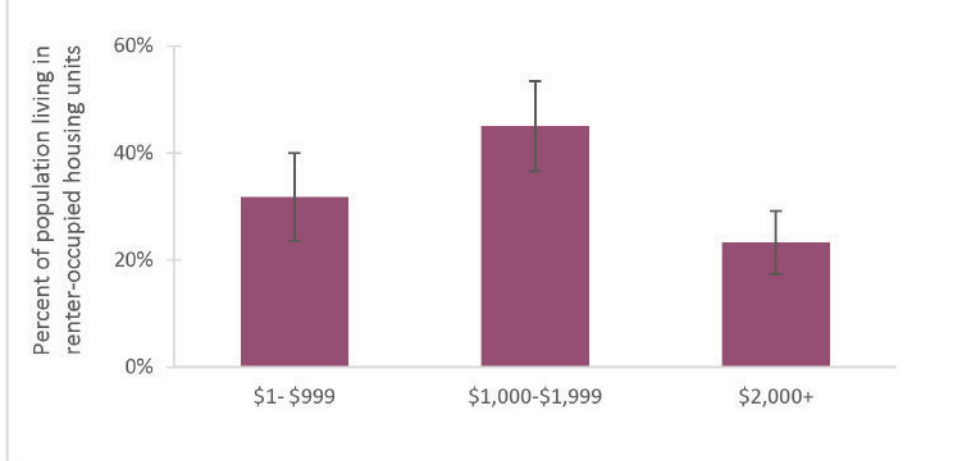
DATA SOURCE: American Community Survey Public Use Microdata Sample, 2015, U.S. Census Bureau

In 2015, 50% of Asian residents in Boston had a household income of \$50,000 or more. Thirty-one percent had a household income of less than \$25,000 and 19% had a household income of \$25,000-\$49,999.



DATA SOURCE: American Community Survey Public Use Microdata Sample, 2015, U.S. Census Bureau

Figure 2.69 Gross Monthly Rent Among Asian Residents<sup>1</sup>, 2015



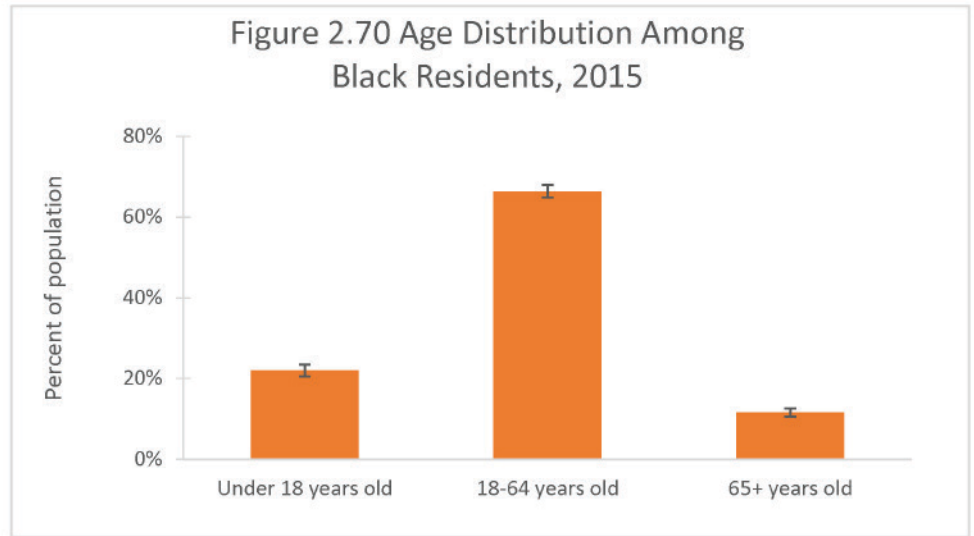
<sup>1</sup> Includes residents receiving governmental rental assistance

DATA SOURCE: American Community Survey Public Use Microdata Sample, 2015, U.S. Census Bureau

In 2015, 45% of Asian residents living in renter-occupied housing units paid \$1,000-\$1,999 in gross monthly rent. Thirty-two percent paid \$1-\$999 in gross monthly rent and 23% paid \$2,000 or more in gross monthly rent.

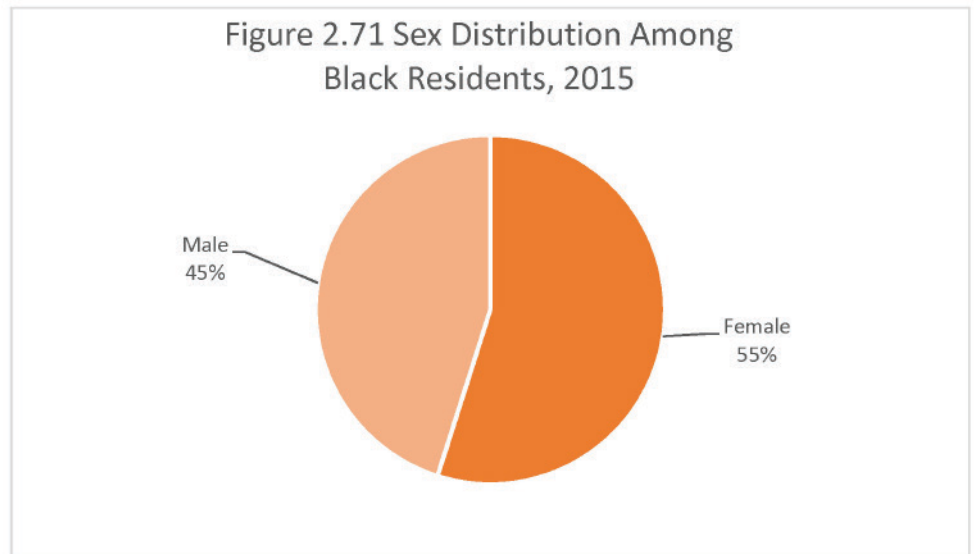
## Black Residents

In 2015, 22% of Black residents were under 18, 66% were ages 18-64, and 12% were ages 65 and older.



DATA SOURCE: American Community Survey Public Use Microdata Sample, 2015, U.S. Census Bureau

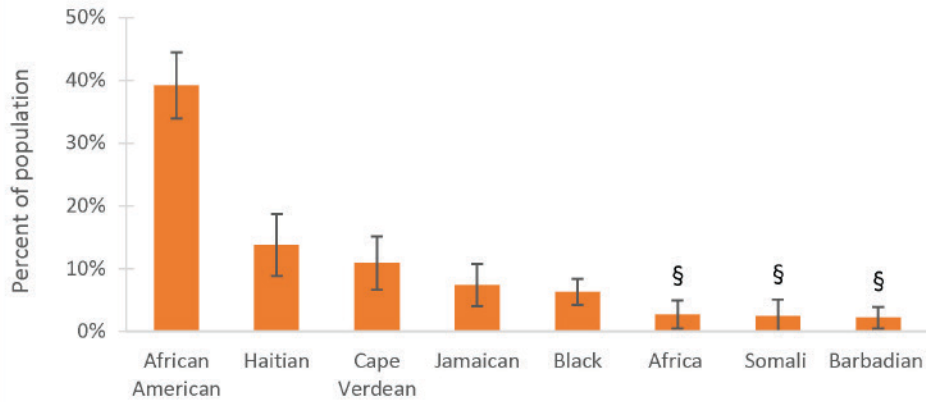
In 2015, 55% of Black residents were female and 45% were male.



NOTE: See appendix for confidence intervals for point estimates.

DATA SOURCE: American Community Survey Public Use Microdata Sample, 2015, U.S. Census Bureau

Figure 2.72 Ancestry Among Black Residents, 2015

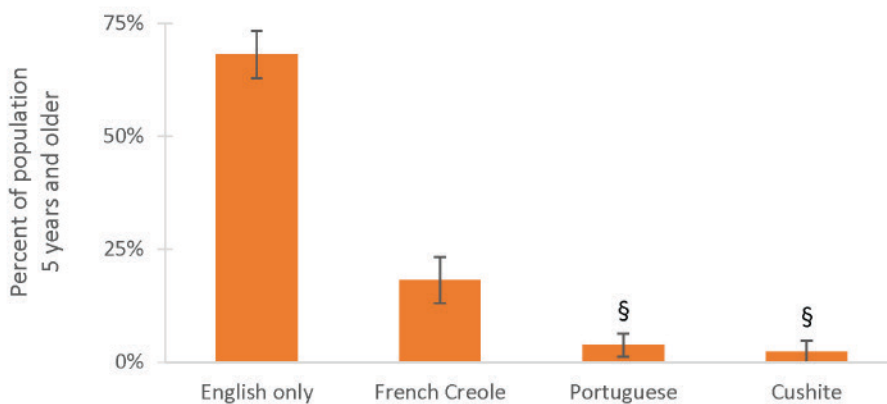


In 2015, 39% of Black residents were of African-American ancestry. Additional reported ancestries included Haitian (14%), Cape Verdean (11%), Jamaican (7%), Black (6%), Africa (3%), Somali (3%), and Barbadian (2%).

§ Estimates have a coefficient of variation greater than 30% and should be interpreted with caution.

DATA SOURCE: American Community Survey Public Use Microdata Sample, 2015, U.S. Census Bureau

Figure 2.73 Languages Spoken at Home Among Black Residents, 2015



English (68%) was the language most frequently spoken at home among Black residents ages 5 and older. Creole was spoken at home by 18% of residents, 4% spoke Portuguese, and 2% spoke Cushite.

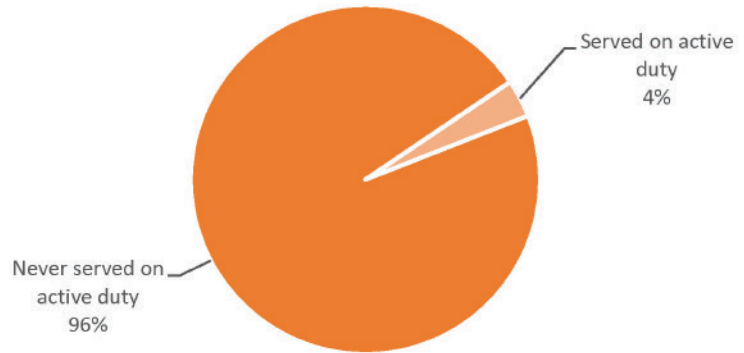
§ Estimates have a coefficient of variation greater than 30% and should be interpreted with caution.

DATA SOURCE: American Community Survey Public Use Microdata Sample, 2015, U.S. Census Bureau



In 2015, approximately 4% of Black residents ages 17 and older had ever served on active duty in the military.

Figure 2.74 Active Duty Status Among Black Residents<sup>1</sup>, 2015



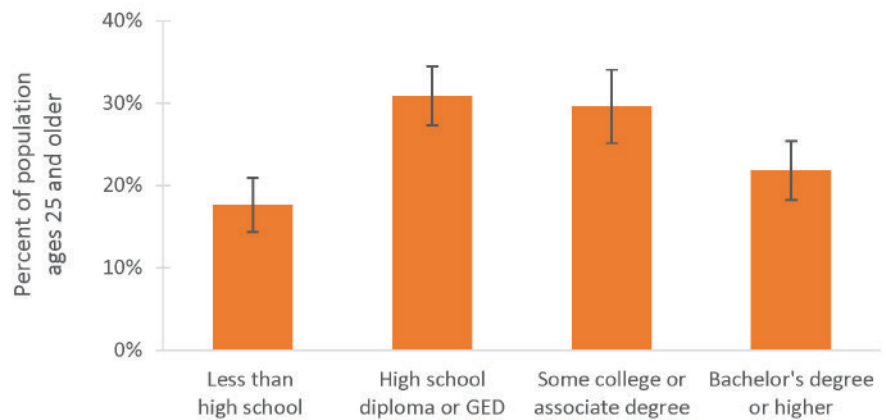
<sup>1</sup> Population ages 17 and older

NOTE: See appendix for confidence intervals for point estimates.

DATA SOURCE: American Community Survey Public Use Microdata Sample, 2015, U.S. Census Bureau

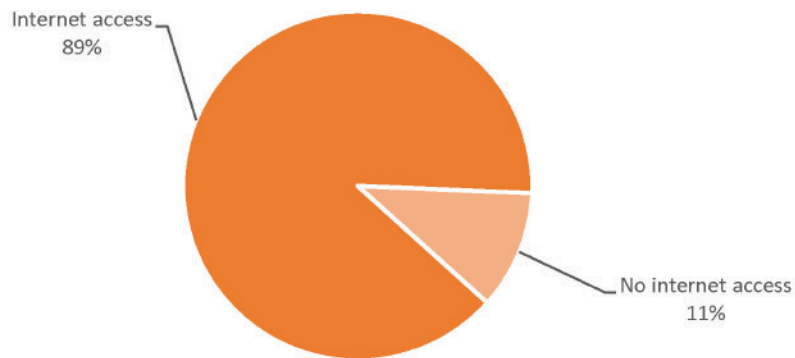
In 2015, 18% of Black residents ages 25 and older had less than a high school diploma, 31% had a high school diploma or GED, 30% had some college education or an associate degree, and 22% had a bachelor's degree or higher.

Figure 2.75 Educational Attainment Among Black Residents, 2015



DATA SOURCE: American Community Survey Public Use Microdata Sample, 2015, U.S. Census Bureau

Figure 2.76 Internet Access Among Black Residents, 2015

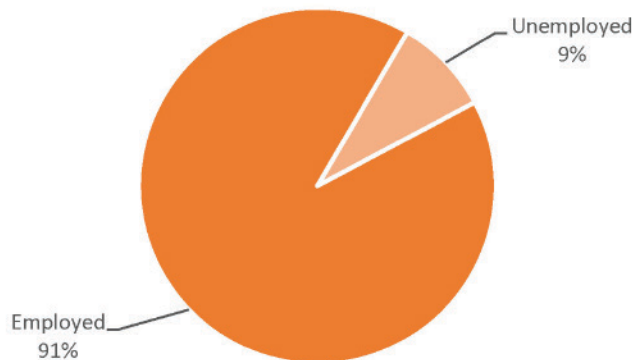


NOTE: See appendix for confidence intervals for point estimates.

DATA SOURCE: American Community Survey Public Use Microdata Sample, 2015, U.S. Census Bureau

In 2015, 89% of Black residents had access to the internet at home.

Figure 2.77 Employment Among Black Residents<sup>1</sup>, 2015



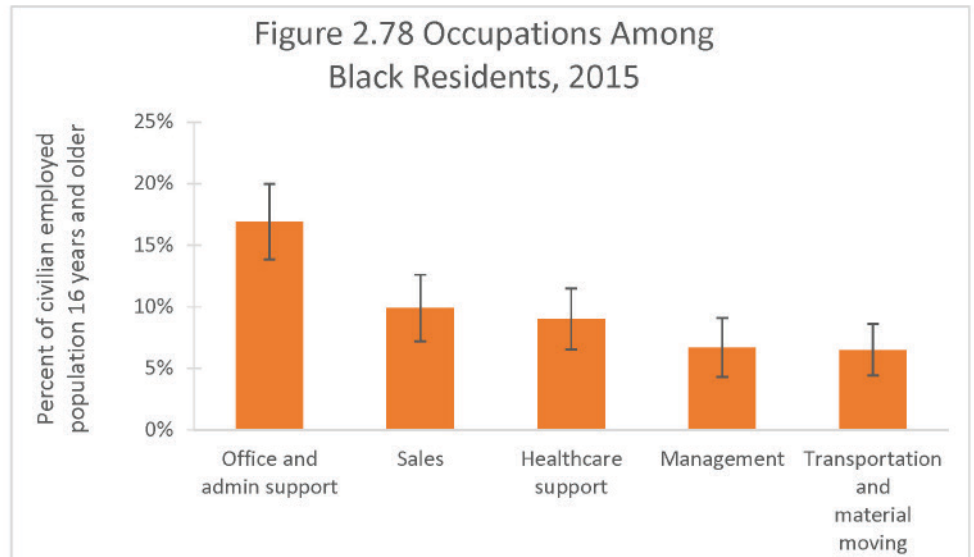
<sup>1</sup> Civilian population ages 16 and older in the labor force

NOTE: See appendix for confidence intervals for point estimates.

DATA SOURCE: American Community Survey Public Use Microdata Sample, 2015, U.S. Census Bureau

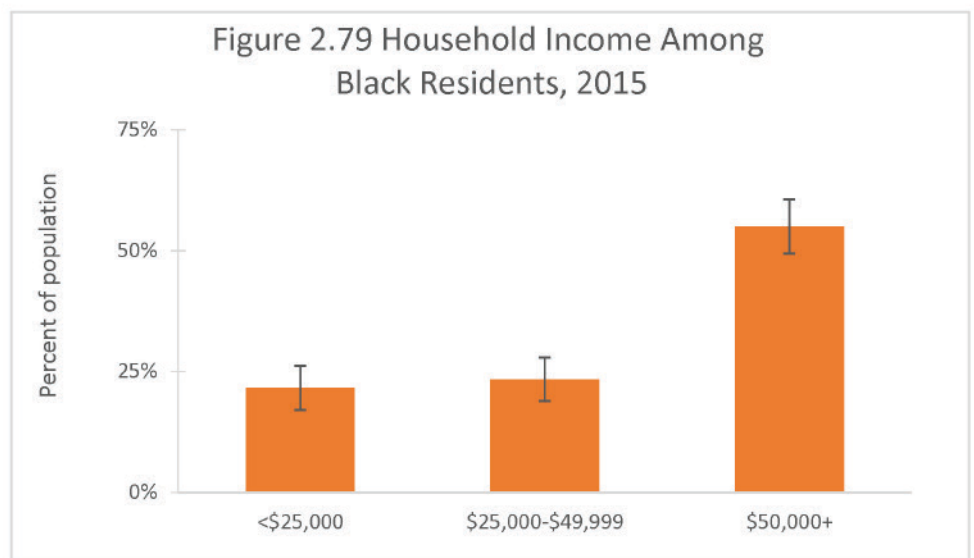
In 2015, 9% of Black residents ages 16 and older were unemployed.

In 2015, the most commonly held occupations among employed Black residents ages 16 and older were office and administrative support (17%), sales (10%), healthcare support (9%), management (7%), and transportation and material moving (7%).



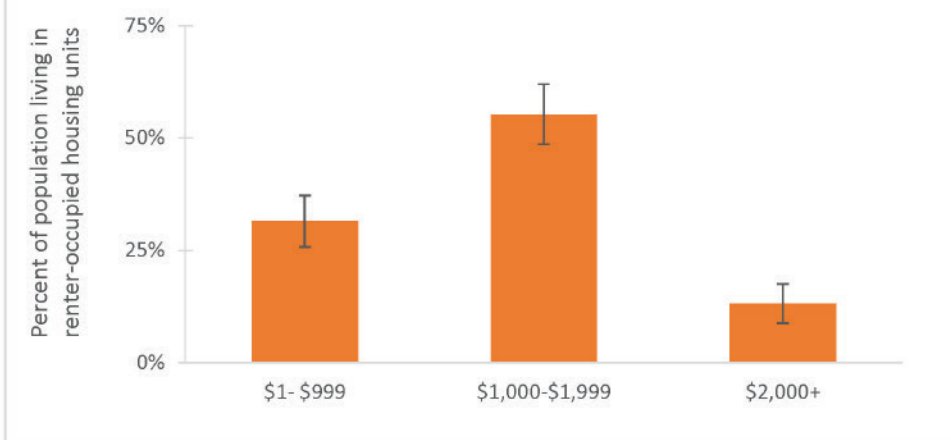
DATA SOURCE: American Community Survey Public Use Microdata Sample, 2015, U.S. Census Bureau

In 2015, 55% of Black residents in Boston had a household income of \$50,000 or more. Twenty-three percent had a household income of \$25,000-\$49,999 and 22% had a household income of less than \$25,000.



DATA SOURCE: American Community Survey Public Use Microdata Sample, 2015, U.S. Census Bureau

Figure 2.80 Gross Monthly Rent Among Black Residents<sup>1</sup>, 2015



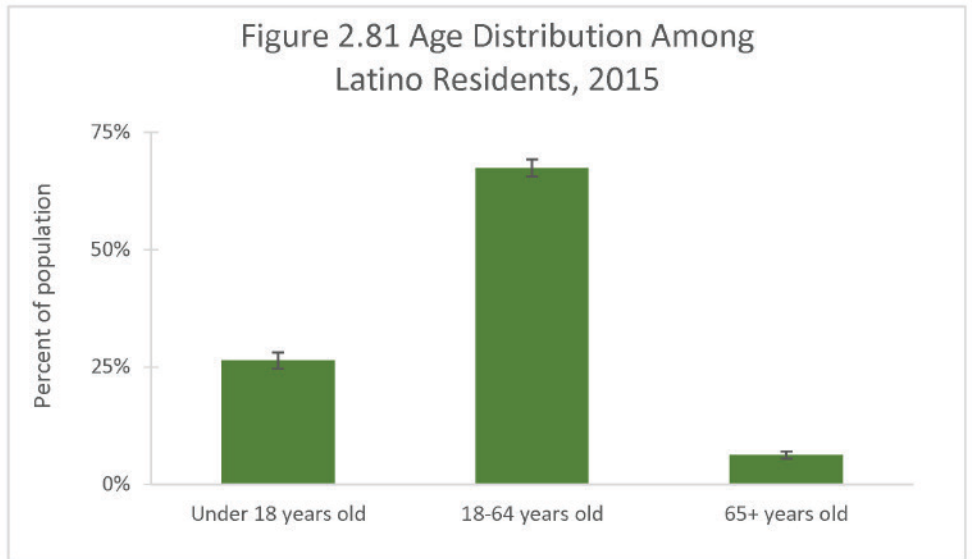
<sup>1</sup> Includes residents receiving governmental rental assistance

DATA SOURCE: American Community Survey Public Use Microdata Sample, 2015, U.S. Census Bureau

In 2015, 55% of Black residents living in renter-occupied housing units paid \$1,000-\$1,999 in gross monthly rent. Thirty-two percent paid \$1-\$999 in gross monthly rent and 13% paid \$2,000 or more in gross monthly rent.

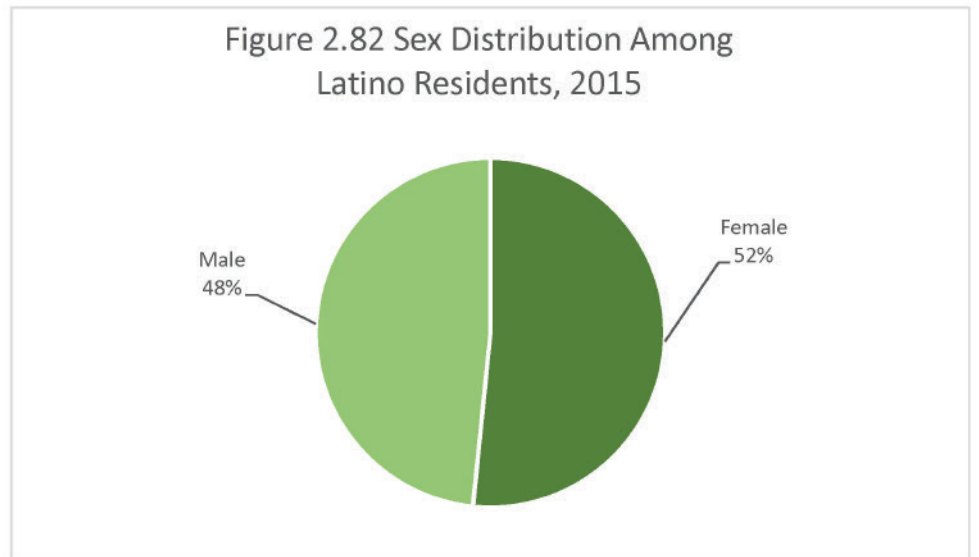
# Latino Residents

In 2015, 26% of Latino residents were under 18, 67% were ages 18-64, and 6% were ages 65 and older.



DATA SOURCE: American Community Survey Public Use Microdata Sample, 2015, U.S. Census Bureau

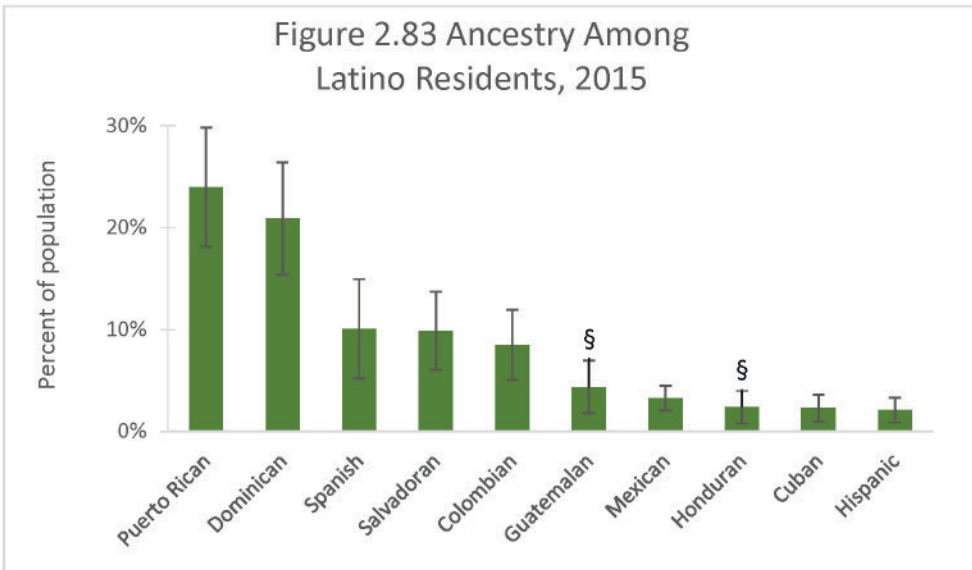
In 2015, 52% of Latino residents were female and 48% were male.



NOTE: See appendix for confidence intervals for point estimates.

DATA SOURCE: American Community Survey Public Use Microdata Sample, 2015, U.S. Census Bureau

Figure 2.83 Ancestry Among Latino Residents, 2015

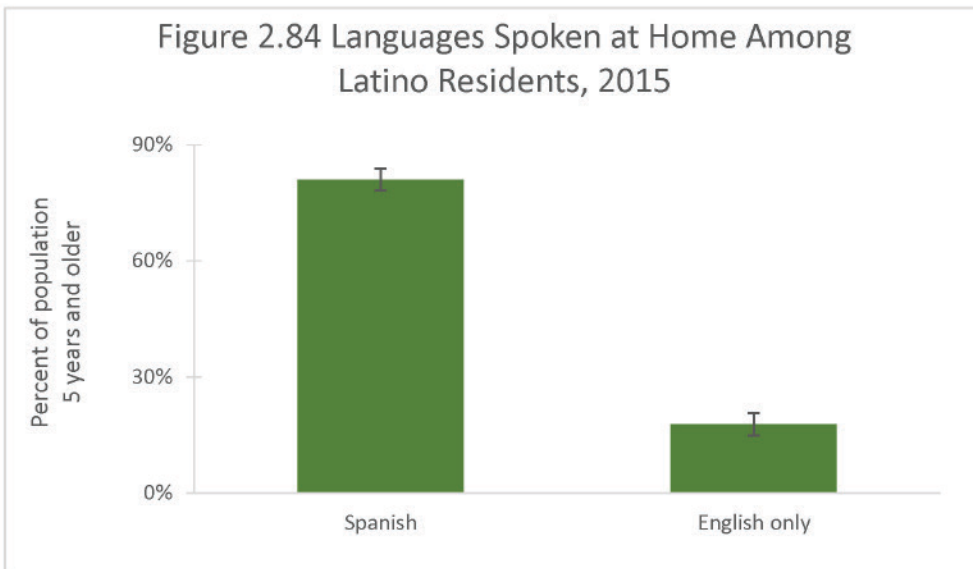


In 2015, 24% of Latino residents were of Puerto Rican ancestry and 21% were of Dominican ancestry. Other reported ancestries included Spanish (10%), Salvadoran (10%), Colombian (9%), Guatemalan (4%), Mexican (3%), Honduran (2%), Cuban (2%), and Hispanic (2%).

§ Estimates have a coefficient of variation greater than 30% and should be interpreted with caution.

DATA SOURCE: American Community Survey Public Use Microdata Sample, 2015, U.S. Census Bureau

Figure 2.84 Languages Spoken at Home Among Latino Residents, 2015

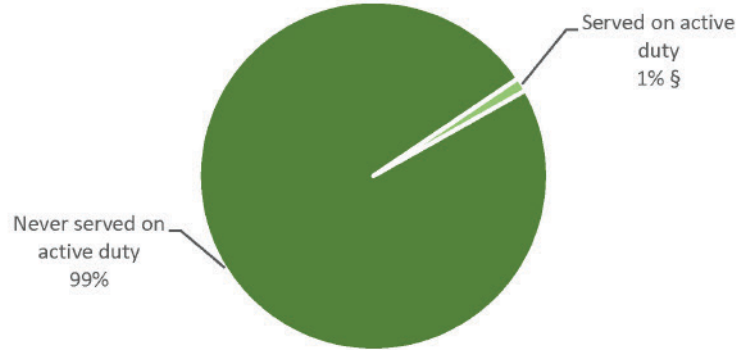


Spanish (81%) was the language most frequently spoken at home among Latino residents ages 5 and older. Eighteen percent of Latino residents spoke only English at home.

DATA SOURCE: American Community Survey Public Use Microdata Sample, 2015, U.S. Census Bureau

In 2015, approximately 1% of Latino residents ages 17 and older had ever served on active duty in the military.

Figure 2.85 Active Duty Status Among Latino Residents<sup>1</sup>, 2015



§ Estimates have a coefficient of variation greater than 30% and should be interpreted with caution.

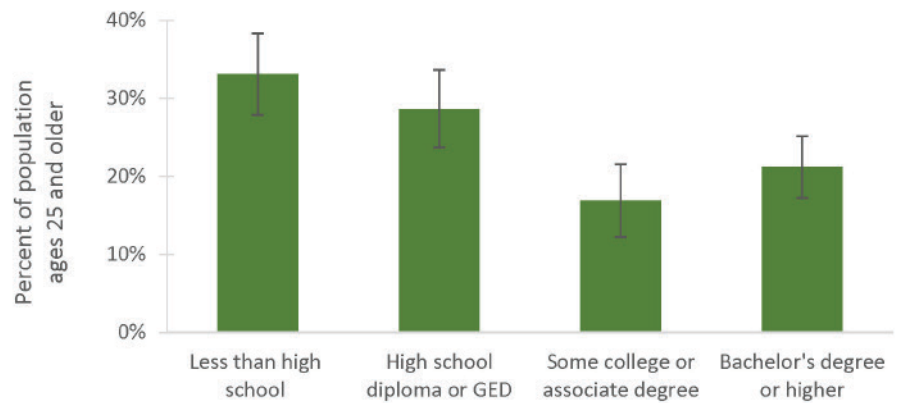
<sup>1</sup> Population ages 17 and older

NOTE: See appendix for confidence intervals for point estimates.

DATA SOURCE: American Community Survey Public Use Microdata Sample, 2015, U.S. Census Bureau

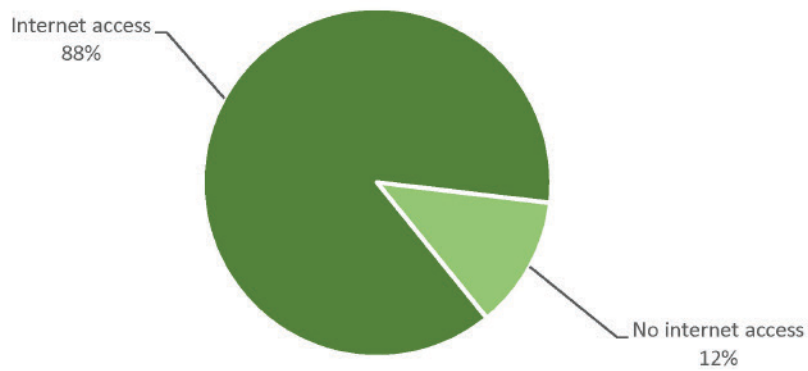
In 2015, 33% of Latino residents ages 25 and older had less than a high school diploma, 29% had a high school diploma or GED, 17% had some college education or an associate degree, and 21% had a bachelor's degree or higher.

Figure 2.86 Educational Attainment Among Latino Residents, 2015



DATA SOURCE: American Community Survey Public Use Microdata Sample, 2015, U.S. Census Bureau

Figure 2.87 Internet Access Among Latino Residents, 2015

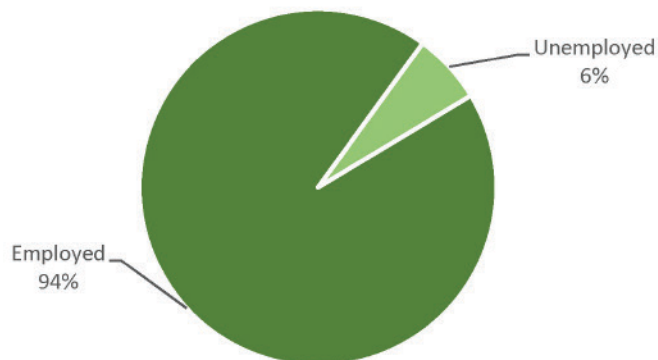


In 2015, 88% of Latino residents had access to the internet at home.

NOTE: See appendix for confidence intervals for point estimates.

DATA SOURCE: American Community Survey Public Use Microdata Sample, 2015, U.S. Census Bureau

Figure 2.88 Employment Among Latino Residents<sup>1</sup>, 2015



In 2015, 6% of Latino residents ages 16 and older were unemployed.

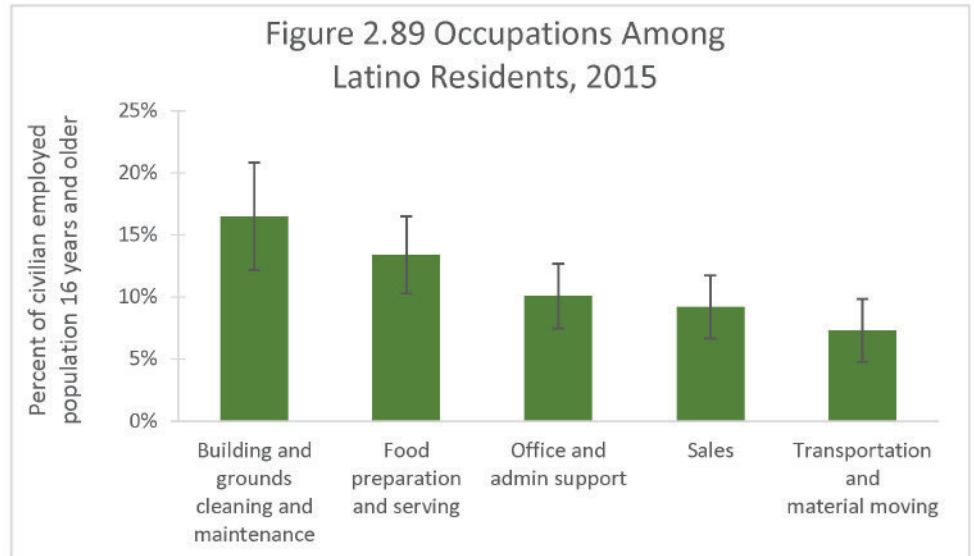
<sup>1</sup> Civilian population ages 16 and older in the labor force

NOTE: See appendix for confidence intervals for point estimates.

DATA SOURCE: American Community Survey Public Use Microdata Sample, 2015, U.S. Census Bureau

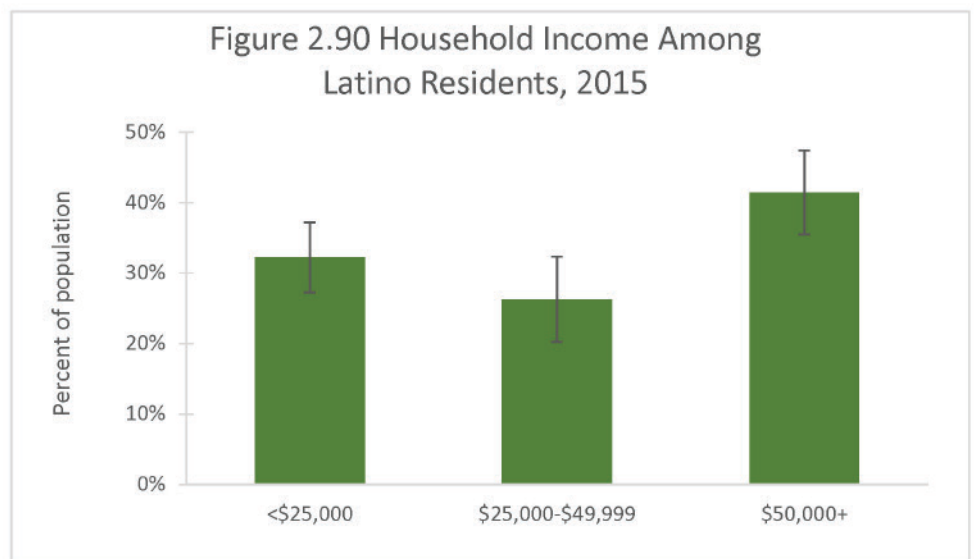


In 2015, the most commonly held occupations among employed Latino residents ages 16 and older were building and grounds cleaning and maintenance (17%), food preparation and serving (13%), office and administrative support (10%), sales (9%), and transportation and material moving (7%).



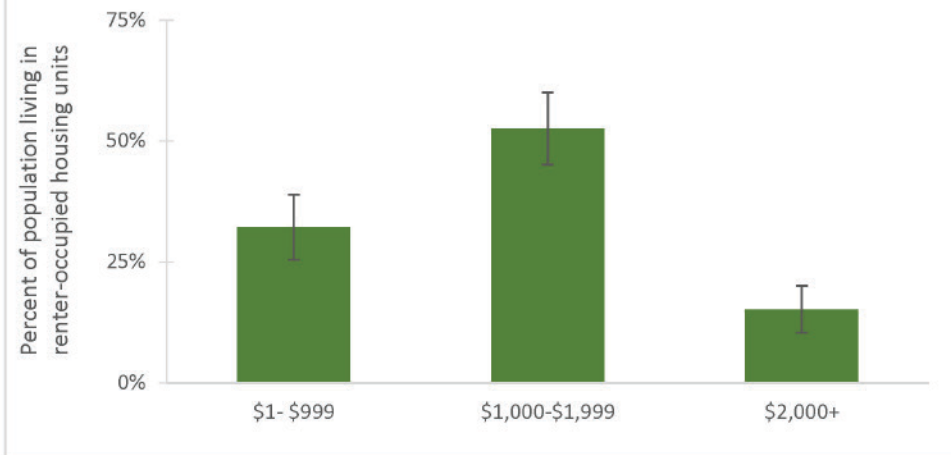
DATA SOURCE: American Community Survey Public Use Microdata Sample, 2015, U.S. Census Bureau

In 2015, 42% of Latino residents in Boston had a household income of \$50,000 or more. Thirty-two percent had a household income of less than \$25,000 and 26% had a household income of \$25,000-\$49,999.



DATA SOURCE: American Community Survey Public Use Microdata Sample, 2015, U.S. Census Bureau

Figure 2.91 Gross Monthly Rent Among Latino Residents<sup>1</sup>, 2015



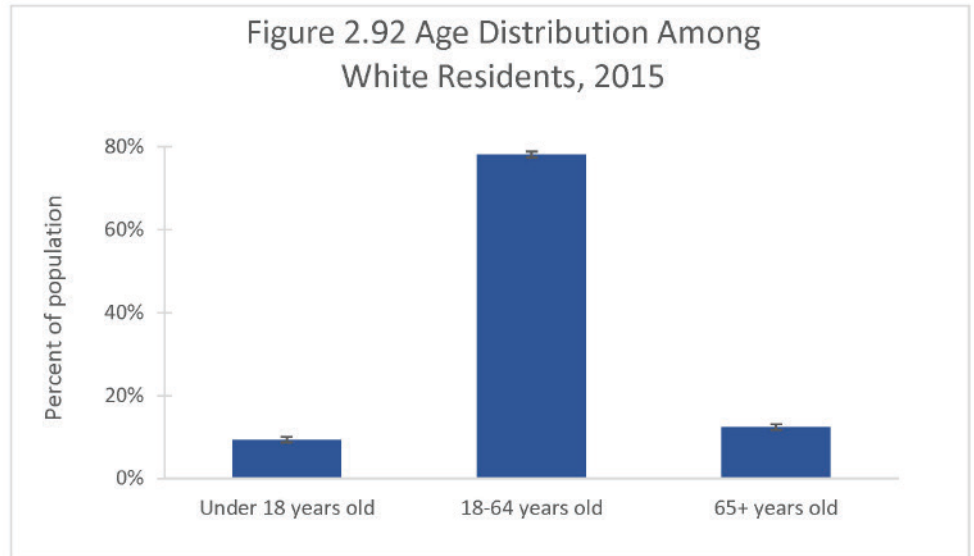
<sup>1</sup> Includes residents receiving governmental rental assistance

DATA SOURCE: American Community Survey Public Use Microdata Sample, 2015, U.S. Census Bureau

In 2015, 53% of Latino residents living in renter-occupied housing units paid \$1,000-\$1,999 in gross monthly rent. Thirty-two percent paid \$1-\$999 in gross monthly rent and 15% paid \$2,000 or more in gross monthly rent.

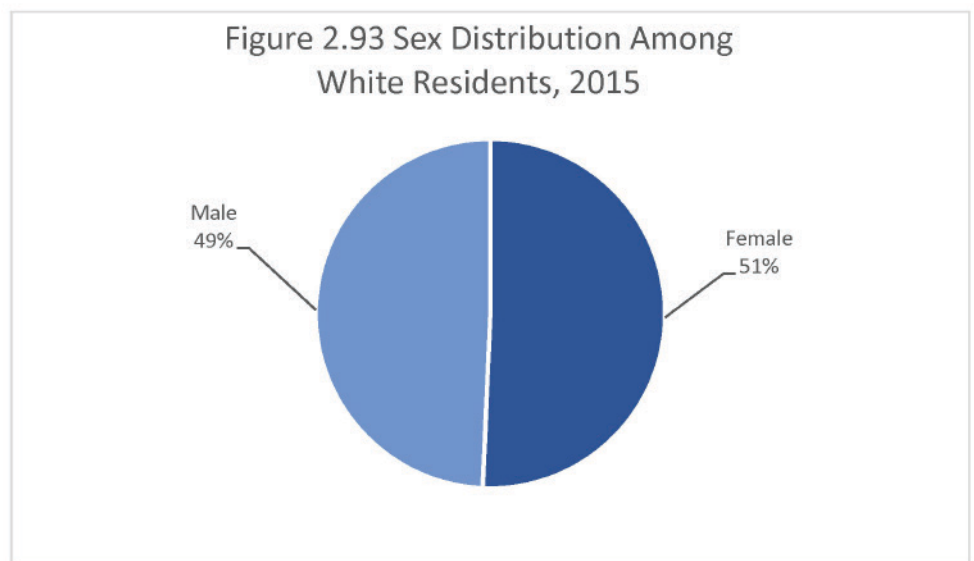
# White Residents

In 2015, 9% of White residents were under 18, 78% were ages 18-64, and 12% were ages 65 and older.



DATA SOURCE: American Community Survey Public Use Microdata Sample, 2015, U.S. Census Bureau

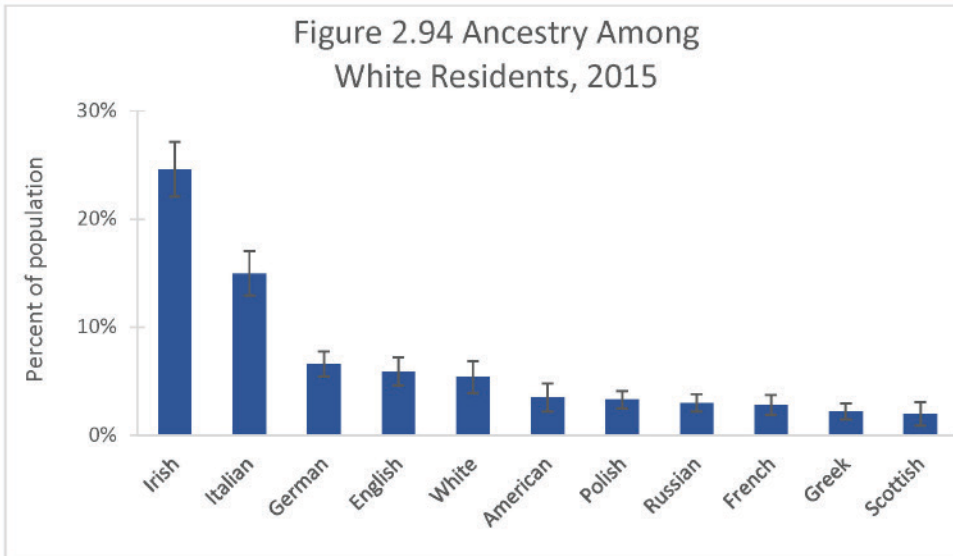
In 2015, 51% of White residents were female and 49% were male.



NOTE: See appendix for confidence intervals for point estimates.

DATA SOURCE: American Community Survey Public Use Microdata Sample, 2015, U.S. Census Bureau

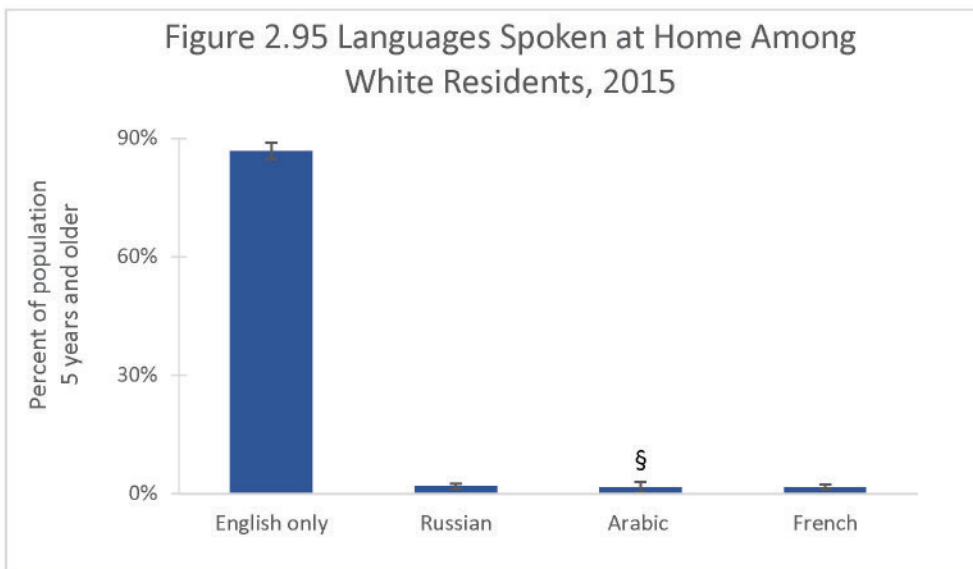
Figure 2.94 Ancestry Among White Residents, 2015



DATA SOURCE: American Community Survey Public Use Microdata Sample, 2015, U.S. Census Bureau

In 2015, 25% of White residents were of Irish ancestry. Additional reported ancestries included Italian (15%), German (7%), English (6%), White (5%), American (4%), Polish (3%), Russian (3%), French (3%), Greek (2%), and Scottish (2%).

Figure 2.95 Languages Spoken at Home Among White Residents, 2015



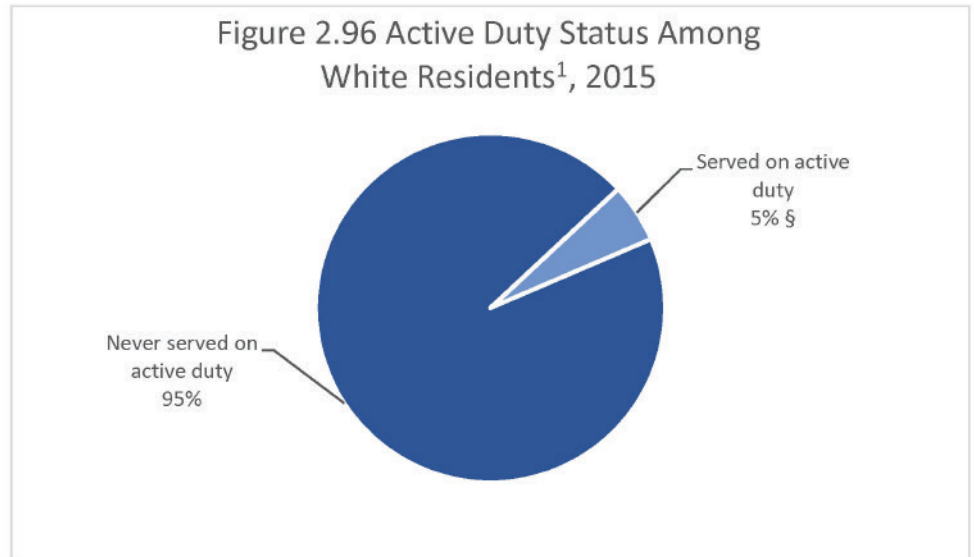
§ Estimates have a coefficient of variation greater than 30% and should be interpreted with caution.

DATA SOURCE: American Community Survey Public Use Microdata Sample, 2015, U.S. Census Bureau

English (87%) was the language most frequently spoken at home among White residents ages 5 and older. Russian, Arabic, and French were each spoken at home by 2% of residents.

In 2015, approximately 5% of White residents ages 17 and older had ever served on active duty in the military.

Figure 2.96 Active Duty Status Among White Residents<sup>1</sup>, 2015



§ Estimates have a coefficient of variation greater than 30% and should be interpreted with caution.

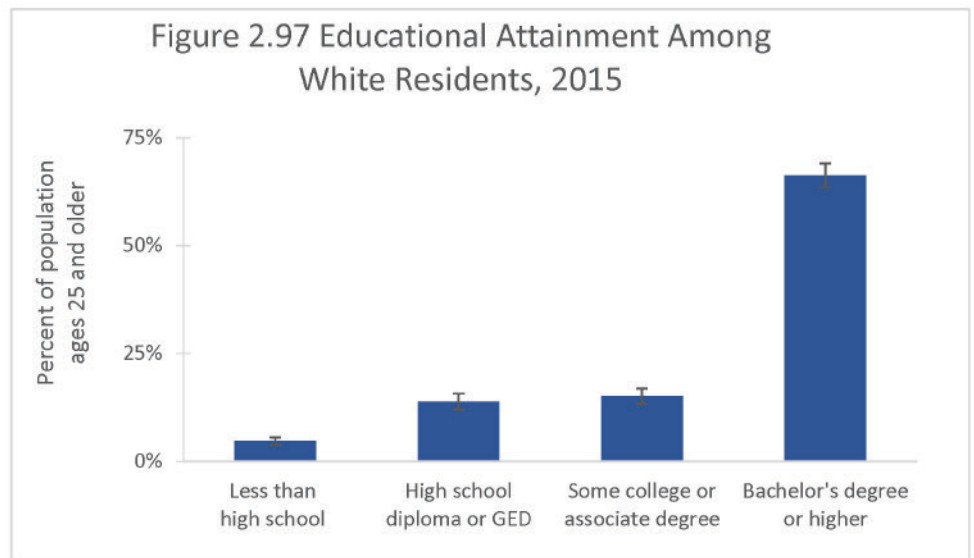
<sup>1</sup> Population ages 17 and older

NOTE: See appendix for confidence intervals for point estimates.

DATA SOURCE: American Community Survey Public Use Microdata Sample, 2015, U.S. Census Bureau

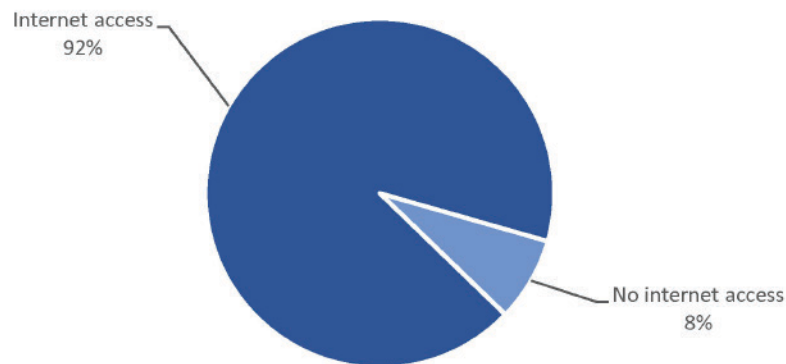
In 2015, 5% of White residents ages 25 and older had less than a high school diploma, 14% had a high school diploma or GED, 15% had some college education or an associate degree, and 66% had a bachelor's degree or higher.

Figure 2.97 Educational Attainment Among White Residents, 2015



DATA SOURCE: American Community Survey Public Use Microdata Sample, 2015, U.S. Census Bureau

Figure 2.98 Internet Access Among White Residents, 2015

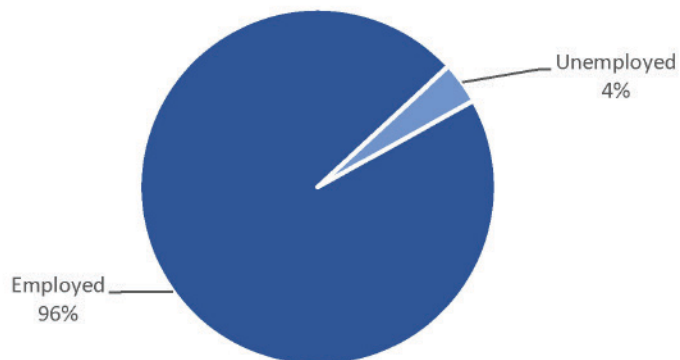


NOTE: See appendix for confidence intervals for point estimates.

DATA SOURCE: American Community Survey Public Use Microdata Sample, 2015, U.S. Census Bureau

In 2015, 92% of White residents had access to the internet at home.

Figure 2.99 Employment Among White Residents<sup>1</sup>, 2015



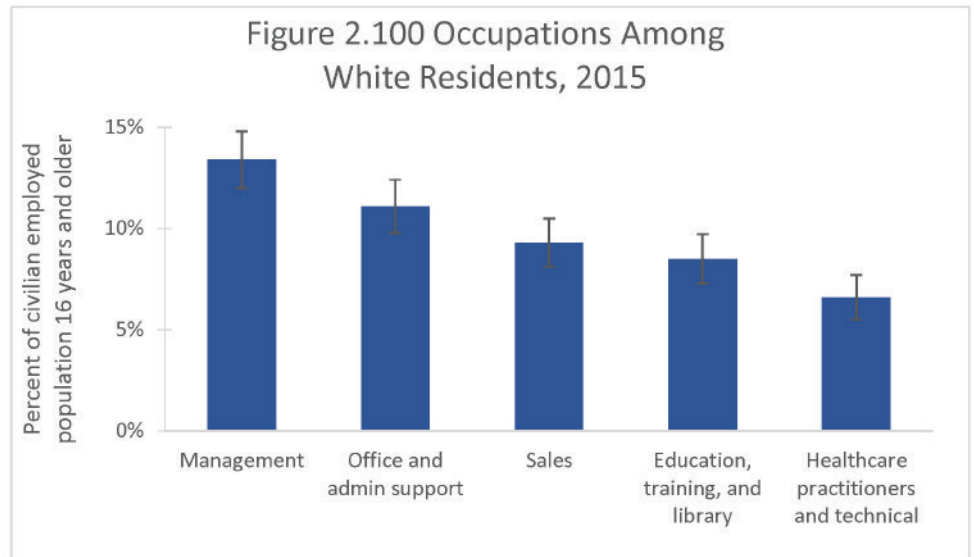
<sup>1</sup> Civilian population ages 16 and older in the labor force

NOTE: See appendix for confidence intervals for point estimates.

DATA SOURCE: American Community Survey Public Use Microdata Sample, 2015, U.S. Census Bureau

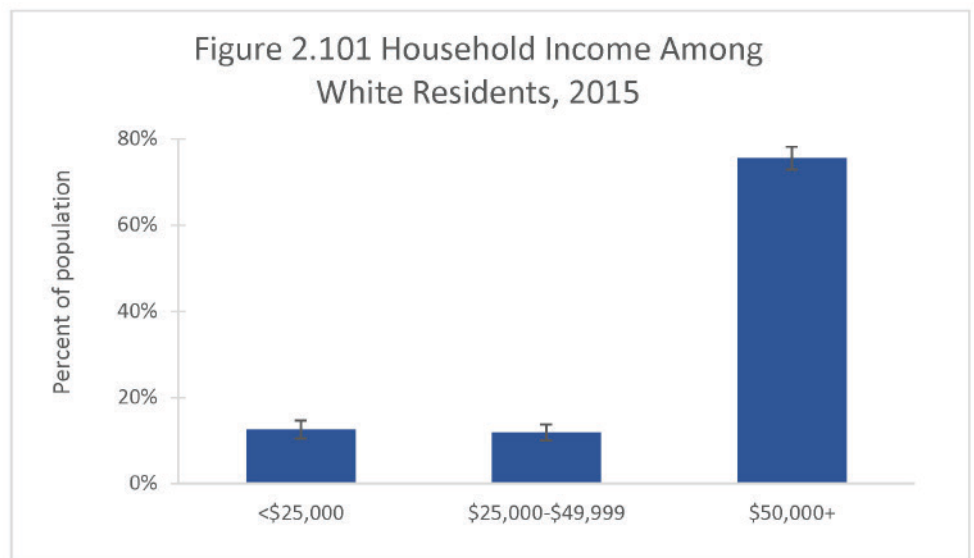
In 2015, 4% of White residents ages 16 and older were unemployed.

In 2015, the most commonly held occupations among employed White residents ages 16 and older were management (13%), office and administrative support (11%), sales (9%), education, training, and library (9%), and healthcare practitioners and technical occupations (7%).



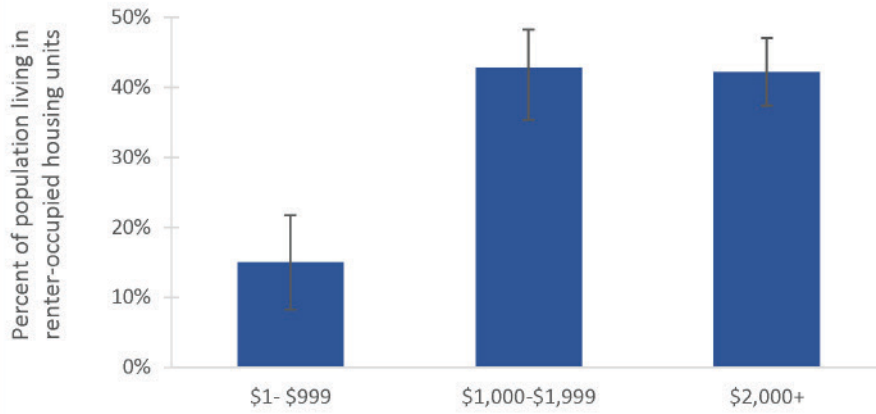
DATA SOURCE: American Community Survey Public Use Microdata Sample, 2015, U.S. Census Bureau

In 2015, 76% of White residents in Boston had a household income of \$50,000 or more. Thirteen percent had a household income of less than \$25,000 and 12% had a household income of \$25,000-\$49,999.



DATA SOURCE: American Community Survey Public Use Microdata Sample, 2015, U.S. Census Bureau

Figure 2.102 Gross Monthly Rent Among White Residents<sup>1</sup>, 2015



<sup>1</sup> Includes residents receiving governmental rental assistance

DATA SOURCE: American Community Survey Public Use Microdata Sample, 2015, U.S. Census Bureau

In 2015, 43% of White households living in renter-occupied housing units paid \$1,000-\$1,999 in gross monthly rent. Forty-two percent paid \$2,000 or more in gross monthly rent and 15% paid \$1-\$999 in gross monthly rent.



## Overall Social Determinants of Health Summary

This chapter highlights how the social determinants of health influence specific health outcomes and provides an in-depth look at the social determinants of health by race/ethnicity. Many inequities emerge when we look at the social determinants of health by race/ethnicity, including educational attainment, employment status, household income, and housing. Poorer health outcomes are not a result of one's race/ethnicity. Rather, contrast, such outcomes have been linked to the impact of the social determinants of health. Social determinants influence our lives and experiences, and contribute to health inequities. Improvements to education quality and affordability, good paying jobs, and affordable housing, as well as eliminating racism's impact on these social determinants would narrow the health inequities and improve health outcomes for all residents.

# Our Point of View: Thoughts from public health

## Healthy and Affordable Housing is Essential for Good Health

By Margaret Reid  
 Director, Office of Health Equity  
 Boston Public Health Commission  
 And  
 Lourdes D. Lopez  
 Community Outreach Manager  
 Renew Boston Residential Energy Efficiency Program

The year 2016 brought us the news of the down side of Boston's booming economy and housing market: Boston is first in the country for income inequities<sup>1</sup> and third for rental costs<sup>2</sup>. Low incomes and housing challenges aren't affecting all of Boston's residents equally. In 2015, the median household income for Asian, Black, and Latino Boston residents was less than \$42,000, compared with White residents whose median household income was more than \$85,000.<sup>3</sup> Boston residents of color are also a higher percentage of renters, and bear a disproportionate burden of chronic disease.

Housing that is safe, healthy, and affordable is essential to good health. Affordability for the occupant can be more complex than rental or mortgage cost. Heating, transportation, and food costs contribute to a person's ability to stay in Boston. With older housing stock, heating costs can add up quickly and there is research demonstrating the relationship between housing insecurity, energy insecurity, and food insecurity, creating a perfect storm for poor health and homelessness.<sup>4</sup> Medical costs related to chronic health conditions can further exacerbate the situation.

*Health in All Policies* is a comprehensive approach to public policy that takes into account the health implications of decisions in all sectors in order to improve population health and health equity. A great example of this synergy is how the City of Boston Office of Environment, Energy and Open Space (EEOS) has prioritized energy efficiency in Boston's lower and middle income neighborhoods, many of which have a higher percentage of rental units and residents of color. Through its Renew Boston Program, the EEOS works closely with Mass Save, Eversource, National Grid, and ABCD to give financial incentives to owners and resources to renters to improve energy efficiency in their homes. Through multi-lingual mailings and community workshops, EEOS actively promotes these services to Boston residents who will benefit the most.

As policy makers, we need to embrace the *Health in All Policies* approach in any public policies that impact health. Health equity may not be the first thing on the minds of policy makers as they make difficult decisions about public transportation, neighborhood development, affordability requirements, or energy investments – but it should be high on the list.

<sup>1</sup> Berube A, Holmes N. City and metropolitan inequality on the rise driven by declining incomes. The Brookings Institution 1/14/2016. <https://www.brookings.edu/research/city-and-metropolitan-inequality-on-the-rise-driven-by-declining-incomes/> accessed 1/20/2017.

<sup>2</sup> Glink Y. Top 10 priciest U.S. cities to rent and apartment. CBS News. 7/15/2013. <http://www.cbsnews.com/media/top-10-priciest-us-cities-to-rent-an-apartment/> accessed on 1/20/2017.

<sup>3</sup> American Community Survey. 1 Year estimates, 2015. Median household income. U.S. Census Bureau.

<sup>4</sup> Hernandez D. Energy insecurity: a framework for understanding energy, the build environment, and health among vulnerable populations in the context of climate change. *Am J Public Health*. 2013 April. 103(4): e32-e34.

## Our Point of View: Thoughts from a community resident

### I Am an Advocate for Change

By Juell Frazier

Juell Frazier grew up in Roxbury and lives in Dorchester

My name is Juell. (Pronounced like a Jewel!) I have lived in Boston my whole life, grew up in Roxbury and now live in Dorchester with my two daughters. I am an advocate for change!

We have a Section 8 certificate. It took a really long time to get an apartment and I almost lost my certificate due to how long it took. Even with the certificate, I still have housing costs. I pay for gas for heat and our electricity and had to buy a refrigerator when we moved in. We go out to do the laundry.

My daughter is allergic to wheat, eggs, peanuts, and tree nuts. Gluten-free and wheat-free foods cost more. Her bread costs much more than bread with wheat in it. I have to go to multiple stores to buy healthy food and food she can eat. I used to live in Roxbury and was right near Dudley. It was much easier to get around. Everything was closer and I lived near the Orange Line and Dudley Station. If I don't have enough money, sometimes my girls and I have to do our grocery shopping and everything on foot. This is all starting to weigh on my own health.

I get discouraged, but I am a member of Witness to Hunger and it gave me support and the tools to tell my story. I started being able to advocate for myself and now I advocate for others; I testify and tell my story. I am trying to do the right thing for my children, myself and others in our situation.

Witness to Hunger is an advocacy organization. We go to monthly meetings and decide which issues we want to tackle. We work on federal policy issues and are starting to do more work in Boston and Massachusetts. We are working on changes with Department of Transitional Assistance and holding landlords accountable for safe and sanitary housing. I want to see change. I want to see people play fair for good working citizens. We should all be treated fairly.

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# Chapter 3

## Community Assets







Draw  
away

# Community Assets

Social determinants of health are socioeconomic, environmental, and social resources that lay the foundation for health during childhood and may have lasting effects through adulthood (1). The previous chapter presented data on socioeconomic determinants of health such as educational attainment, employment, income, and housing status and the association of these factors with specific health outcomes. This chapter will focus on community-level social determinants of health referred to as “community assets.” Broadly speaking, community assets are the collective resources that make it easier for people to make healthy choices. An asset-based approach recognizes the importance of social, cultural, and physical resources that exist within the community (2).

Community assets increase an individual’s opportunity to engage in activities that improve health and well-being (3). Anything that improves the quality of community life may be considered a community asset (4) including:

- Community programs such as community gardens and farmer’s markets
- Local businesses such as grocery stores and restaurants
- Natural resources such as rivers, trees, and green space
- Built environment such as parks, playgrounds, and walking paths
- Neighborhood groups such as community advisory and crime watch groups
- Municipal services such as police, fire, and recreation services
- Public institutions such as schools, churches, and libraries
- Resources promoting civic engagement such as call services for reporting non-emergency issues to local officials (e.g. Boston 311)

Access to healthy foods, active living environments, opportunities that give individuals a voice in the political process, and good municipal services may contribute to the health of residents (5-10). Although all communities have assets that contribute to health, their distribution varies considerably. Research demonstrates that communities of color and low-income populations are less likely to have resources such as grocery stores, parks, and recreational programs that promote health (11-13). Since community assets play a significant role in the health and well-being of residents, recognizing and building upon existing community assets, and building assets where needed, are essential ingredients in increasing health equity. This chapter outlines some of the community asset indicators of civic engagement and the built environment which exist in Boston neighborhoods.

## Civic Engagement

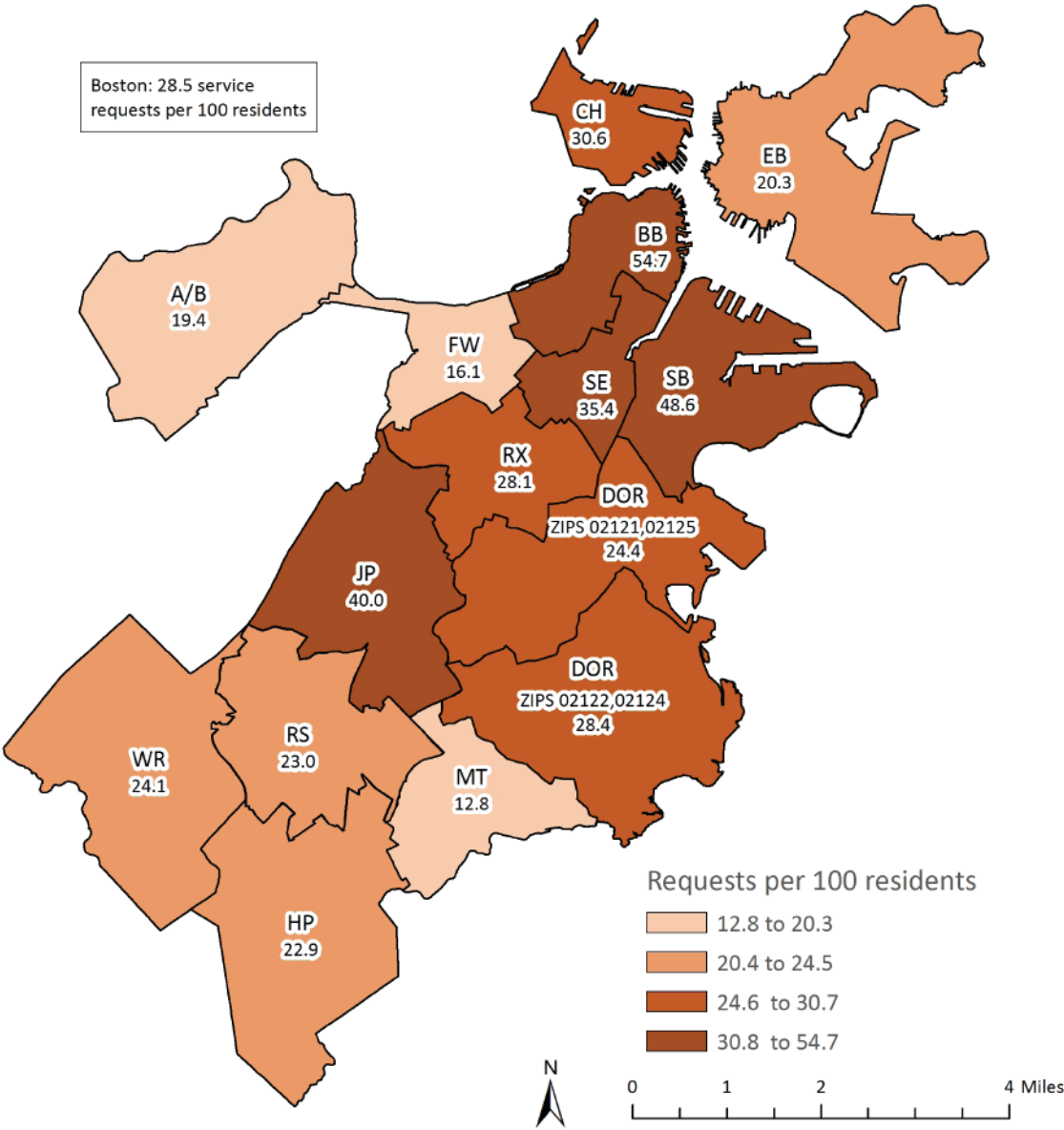
Civic engagement creates healthier communities through an engaged population aiming to improve quality of life. Voting and volunteering are among the many measures of an engaged population. In both cases, people's actions show they care about the outcomes of their community or their nation, and they want to cultivate positive change (14).

Resources that promote civic engagement, such as voting, may influence health and well-being in the population by providing vehicles of increased involvement and responsibility of residents in their communities (15-21). Organizations like Main Street Districts and Community Development Corporations provide residents with an opportunity to shape the design of their neighborhoods. Municipal governments can encourage residents to be involved in their community by listening to and responding quickly to community concerns. Boston 311 is a city service provided to residents for reporting non-emergency issues (e.g. reporting a street lamp is out) and requesting city services and information through phone calls, the online self-service form, Twitter, and the mobile application. Digitally connected reporting systems such as Boston 311 increase civic engagement by providing an easy way for residents to request and hold government accountable for delivering non-emergency services like street cleaning, snow plowing, and pothole repair (15). Voting and participation in voluntary social associations have been associated with better self-reported health (16-18). Active engagement in one's community has been associated with a range of positive health outcomes including improved physical and psychological health, increased psychosocial well-being, and reduced mortality rates (19-21).

In this section of the report, we summarize indicators of civic engagement including Boston 311 service requests and voter turnout rates.



### Figure 3.1 Constituent-Initiated 311 Service Requests<sup>1</sup> by Neighborhood, 2016



<sup>1</sup>Rate per 100 residents

NOTE: "BB" includes the Back Bay, Beacon Hill, Downtown, the North End, and the West End. "SE" includes the South End and Chinatown. Data includes 311 service requests by phone, online, and through the mobile application. Voting precinct was used to identify neighborhood location. When a precinct was split across neighborhoods, the number of service requests was allocated proportionally by area size. Density calculations were based on the 2010 Census population. Does not include Harbor Islands.

DATA SOURCE: 311 Service Requests, City of Boston; Decennial Census 2010, U.S. Census Bureau

Boston 311 is a service provided for residents to report non-emergency issues and request city services and information. In 2016, Boston residents made over 174,000 Boston 311 reports and service requests (about 28.5 requests per 100 residents) through phone calls, the online self-service form, and the mobile application. Back Bay (55 per 100 residents) and South Boston (49 per 100 residents) had the highest number of service requests, while Mattapan (13 per 100 residents) and Fenway (16 per 100 residents) had among the lowest number of service requests.

In 2016, there were over 181,000 Boston 311 reports and service requests made by Boston residents. Of those, the highest number requests were made for parking enforcement with 25,701 requests. Other leading types of service requests included requests for street cleaning, scheduling a bulk item pickup for garbage or recycling, missed trash or recycling item, and improper trash storage.

Figure 3.2 Leading Types of 311 Service Requests, 2016

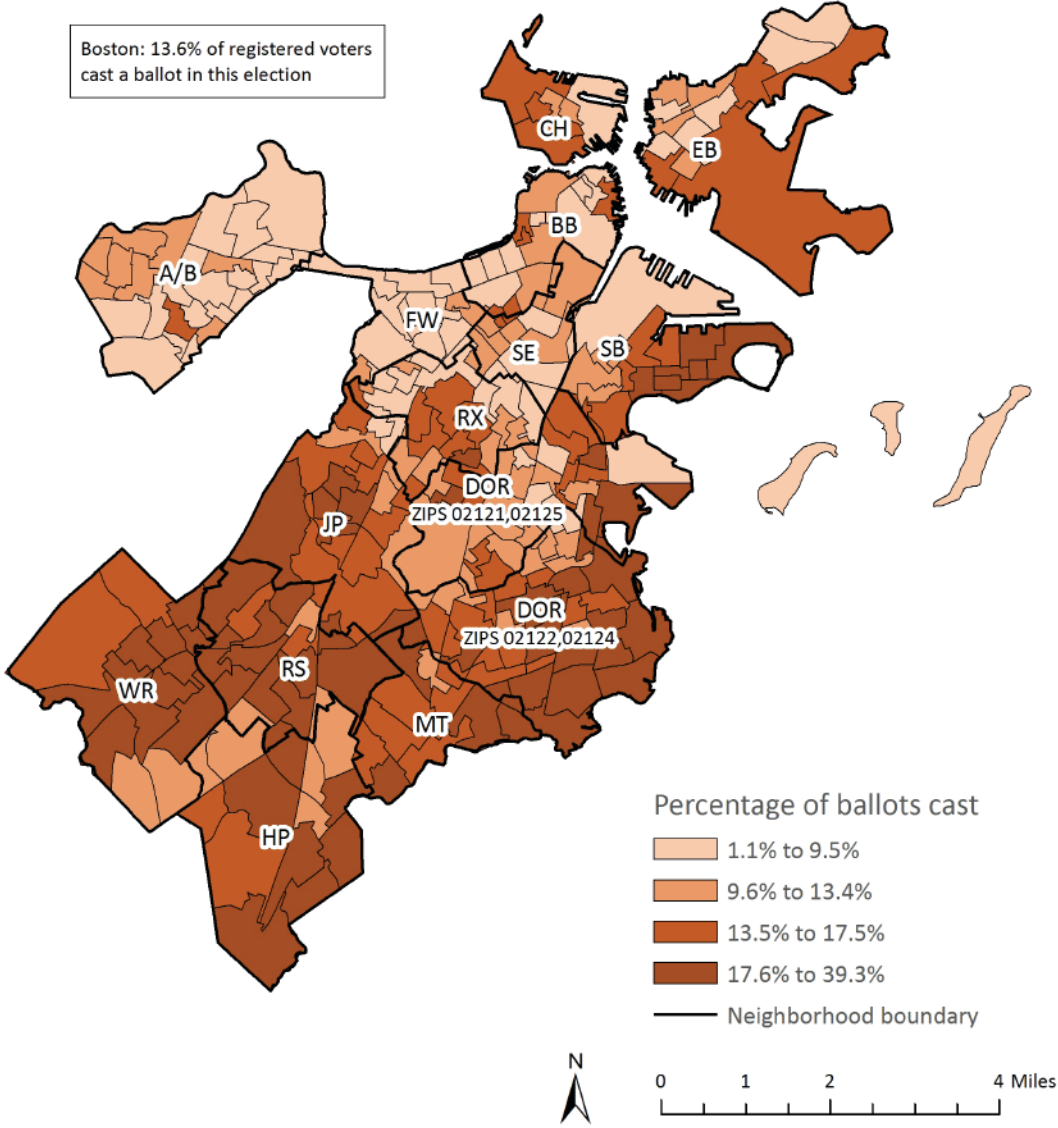
	Number of Calls
Parking enforcement	25,701
Requests for street cleaning	11,995
Schedule a bulk item pickup	11,465
Missed trash/recycling/yard waste/bulk item	9,488
Improper storage of trash (barrels)	8,850

NOTE: Data includes 311 reports and service requests by phone, online, and through the mobile application.

DATA SOURCE: 311 Service Requests, City of Boston.



### Figure 3.3 Voter Turnout for the November 3, 2015 Municipal Election by Voting Precinct

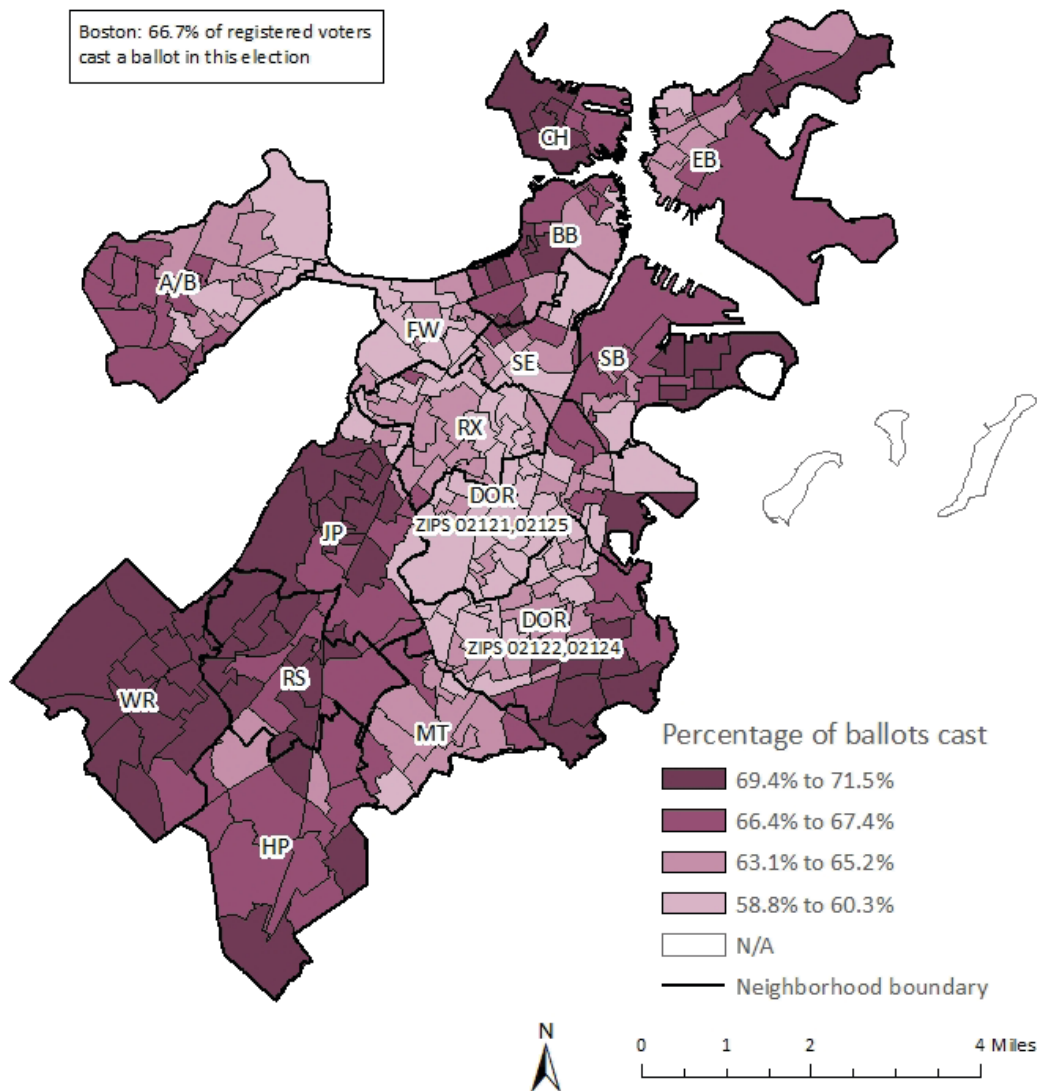


NOTE: “BB” includes the Back Bay, Beacon Hill, Downtown, the North End, and the West End. “SE” includes the South End and Chinatown. Includes Thompson, Spectacle, and Long Islands. Percentages are based on the number of registered voters in each precinct.

DATA SOURCE: State and City Election Results, November 3, 2015: Municipal Election, City of Boston Election Department.

Please see text under Figure 3.4 on the following page for map summary.

### Figure 3.4 Voter Turnout for the November 8, 2016 General Election by Voting Precinct



NOTE: "BB" includes the Back Bay, Beacon Hill, Downtown, the North End, and the West End. "SE" includes the South End and Chinatown. Percentages are based on the number of registered voters in each precinct. Thompson, Spectacle, and Long Islands (Ward 1, Precinct 15) were excluded due to outlier issue.

DATA SOURCE: State and City Election Results, November 8, 2016: General Election, City of Boston Election Department.

The voter turnout rate is the percentage of registered voters who cast a ballot in an election. The voter turnout rate for the general (presidential) election in November 2016 was 67% in Boston, while the turnout rate for the municipal election in November 2015 was considerably lower at 14% in Boston. The turnout rate also differed across precincts. In general, precincts where residents were more likely to own their homes (vs. rent), such as Charlestown, South Boston, Roslindale, West Roxbury, and some parts of Dorchester (zip codes 02122, 02124), had among the highest rates of voter turnout. Precincts with larger communities of color, such as Roxbury, Dorchester, and Mattapan, had higher rates of voter turnout in the municipal election in contrast with areas of downtown Boston where the percentages of ballots cast were very low.

## Built Environment

The built environment includes all of the physical parts of where we live, work, and play. It relates to land uses, transportation systems, buildings, parks, traffic systems, trails, housing and so forth (22, 23). In public health, built environment refers to physical environments that are designed with health and wellness as integral parts of the communities. Research has indicated that the way neighborhoods are created can affect both the physical activity and mental health of the communities' residents (24).

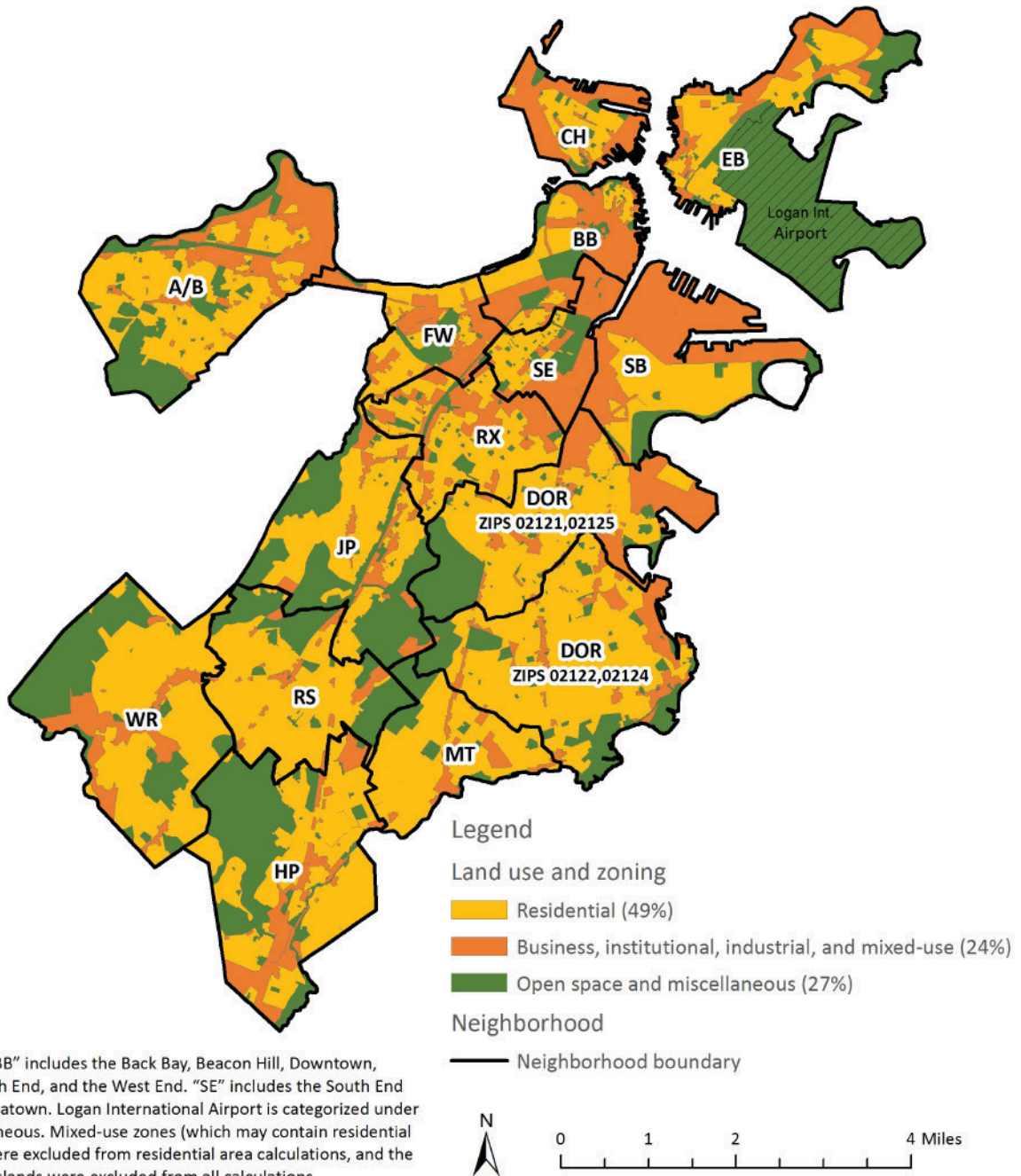
Built environments that are expressly designed to improve physical activity may lead to higher rates of physical activity, which in turn, positively affects health in the population (25). The natural and built environment of parks, playgrounds, recreation centers, and walking paths support physical activity by providing places for people to engage in exercise and active play. Community programs and businesses that support healthy eating by providing easy access to fresh and affordable food include local grocery stores, community gardens, farmer's markets, and food banks. Research has shown that lack of these structures may contribute to sedentary habits, which may further lead to poor health outcomes such as chronic disease (26, 27). When such structures are missing from the community, residents are less likely to eat nutritious foods, be physically active, or engage in community activities (28-31).

In this section of the report, we summarize indicators of the built environment including land use and zoning; residential property values; protected and recreational open space and bicycle trails; walkability; activity centers; landmarks, historic districts, and main street districts; food resources; and schools, colleges, and universities.





Figure 3.5 Land Use and Zoning, 2016

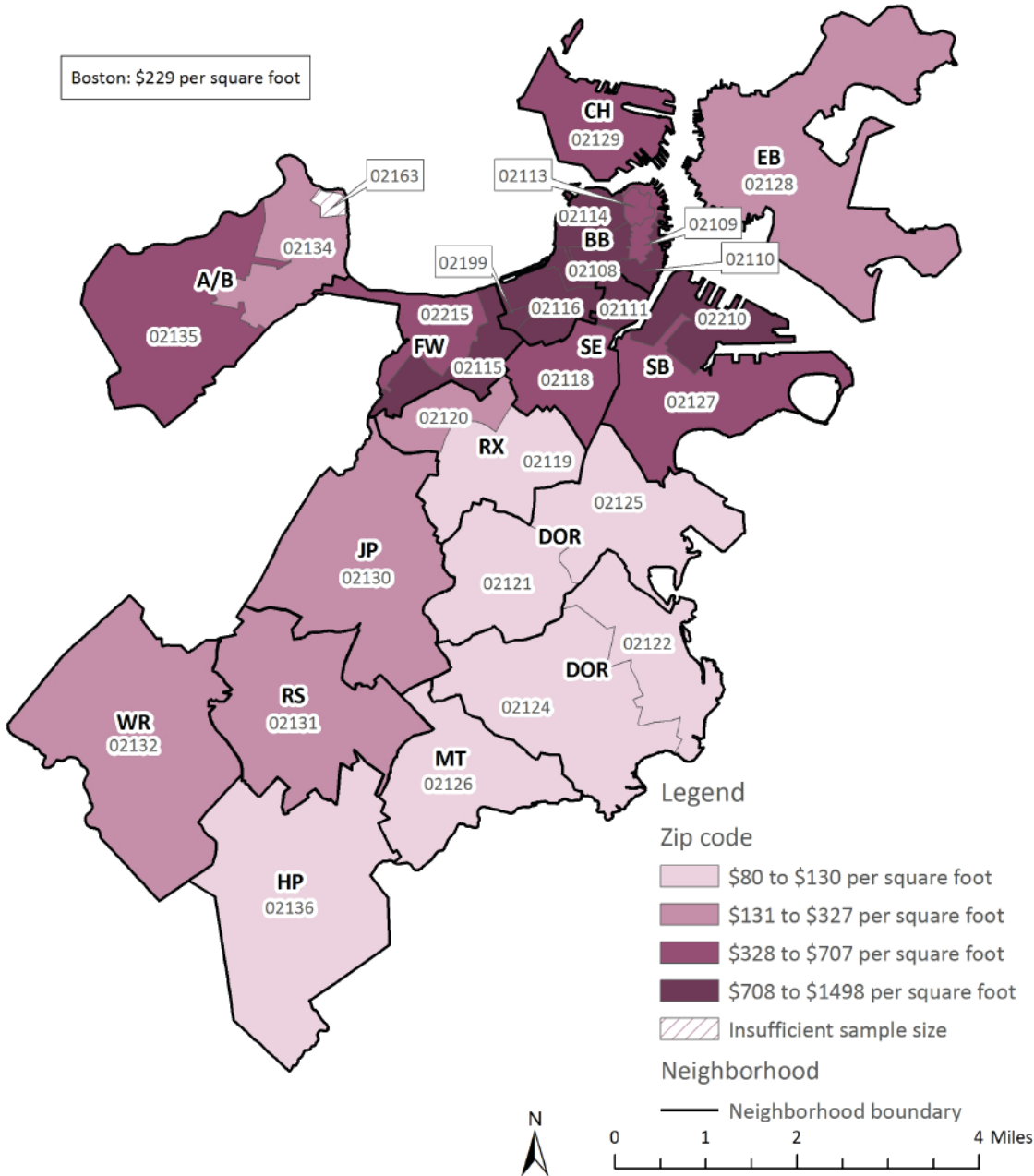


DATA SOURCE: Zoning Subdistricts, BostonGIS, City of Boston.

Land use in Boston is regulated through zoning. Approximately 49% of Boston's 47 square miles (excluding Harbor Islands) is zoned residential while approximately 24% is zoned as business, institutional, industrial, or mixed-use. The remaining 27% consists mostly of open space and miscellaneous.

While residential zones can be found throughout the city, most of Boston's business, institutional, industrial, and mixed-use zones are concentrated in the northern half of the city in the neighborhoods of Charlestown, Dorchester (zip codes 02121, 02125), Back Bay, South Boston, South End, Roxbury, Fenway, and Allston/Brighton. Most of the largest continuous parcels of open space and miscellaneous zoning can be found in the central and southwestern sections of the city spread across the neighborhoods of Dorchester (zip codes 02121, 02125), Dorchester (zip codes 02122, 02124), Jamaica Plain, Mattapan, Roslindale, Hyde Park, and West Roxbury. Logan International Airport is also classified as miscellaneous and makes up roughly half the area of East Boston.

### Figure 3.6 Median Residential Property Value by Zip Code, 2017

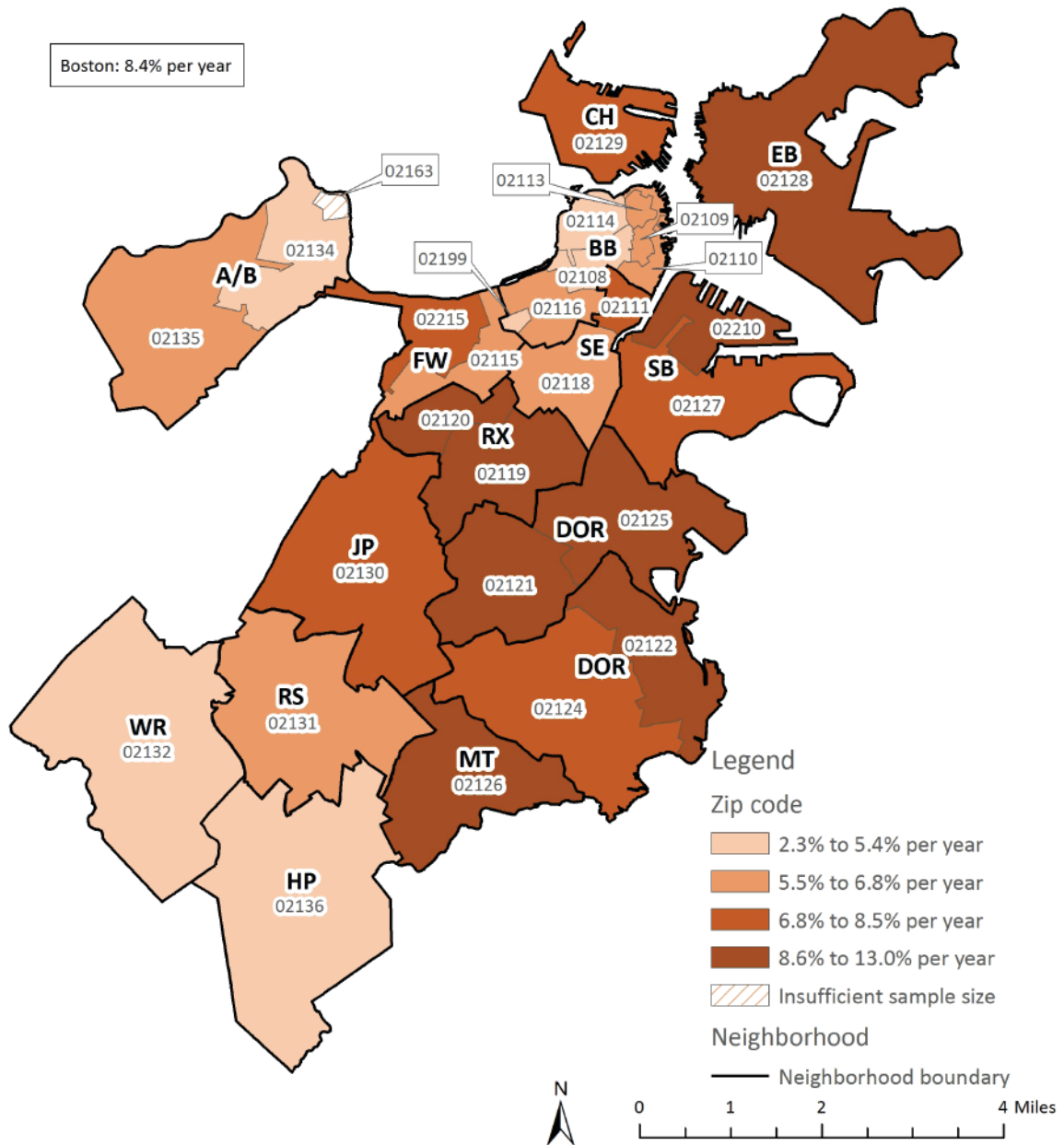


NOTE: "BB" includes the Back Bay, Beacon Hill, Downtown, the North End, and the West End. "SE" includes the South End and Chinatown. Restricted to residential or mixed-use properties with assessed values and living space. Data for the portion of zip code 02467 in Boston are not presented. Does not include Harbor Islands.

DATA SOURCE: Property Parcel Data, 2017, City of Boston Assessing Department.

The median assessed value of residential properties in Boston increased from \$171 per square foot in 2014 to \$229 per square foot in 2017, after adjusting for inflation. The highest per square foot median assessed value occurred in the zip codes 02199 (\$1498/sq ft) and 02108 (\$894/sq ft). The lowest per square foot median assessed value occurred in zip codes 02121 (\$80/sq ft) and 02126 (\$106/sq ft).

Figure 3.7 Average Annual Growth in Median Residential Property Value by Zip Code, 2014 to 2017

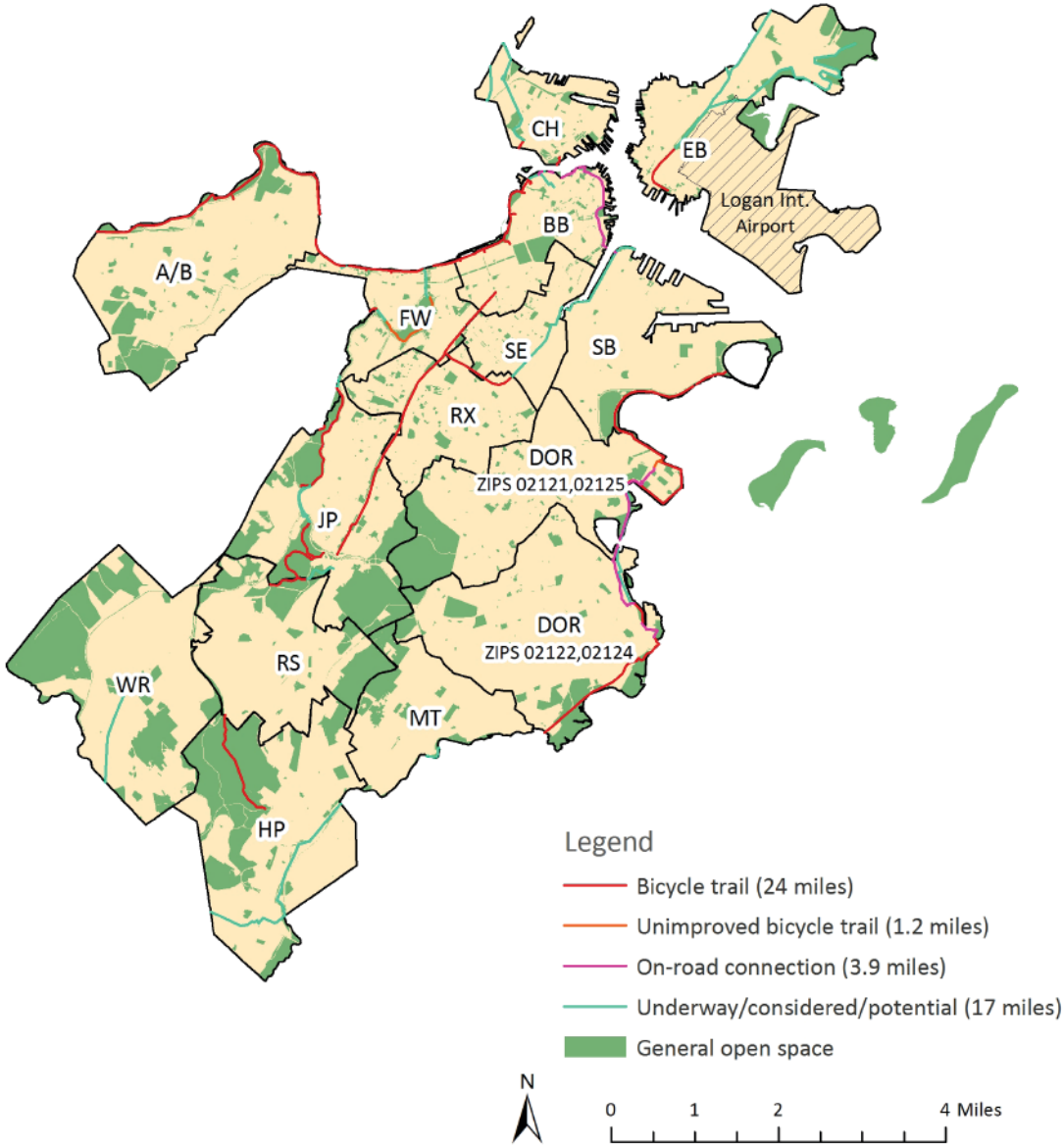


NOTE: "BB" includes the Back Bay, Beacon Hill, Downtown, the North End, and the West End. "SE" includes the South End and Chinatown. Restricted to residential or mixed-use properties with assessed values and living space. Data from 2014 was adjusted for inflation using the Consumer Price Index. Data for the portion of zip code 02467 in Boston are not presented. Does not include Harbor Islands.

DATA SOURCE: Property Parcel Data, 2014 and 2017, City of Boston Assessing Department.

The median per square foot assessed value of residential properties in Boston increased 34% in 4 years between 2014 and 2017, or 8% per year, after adjusting for inflation. The largest increases in the median per square foot assessed value within a zip code were observed in the zip codes associated with South Boston/Waterfront (13% per year in 02210), East Boston (11% per year in 02128), Mission Hill (11% per year in 02120), Roxbury (11% per year in 02119) and Dorchester (zip codes 02121, 02125) (10% per year in 02125).

### Figure 3.8 General Open Space and Bicycle Trails by Neighborhood, 2017

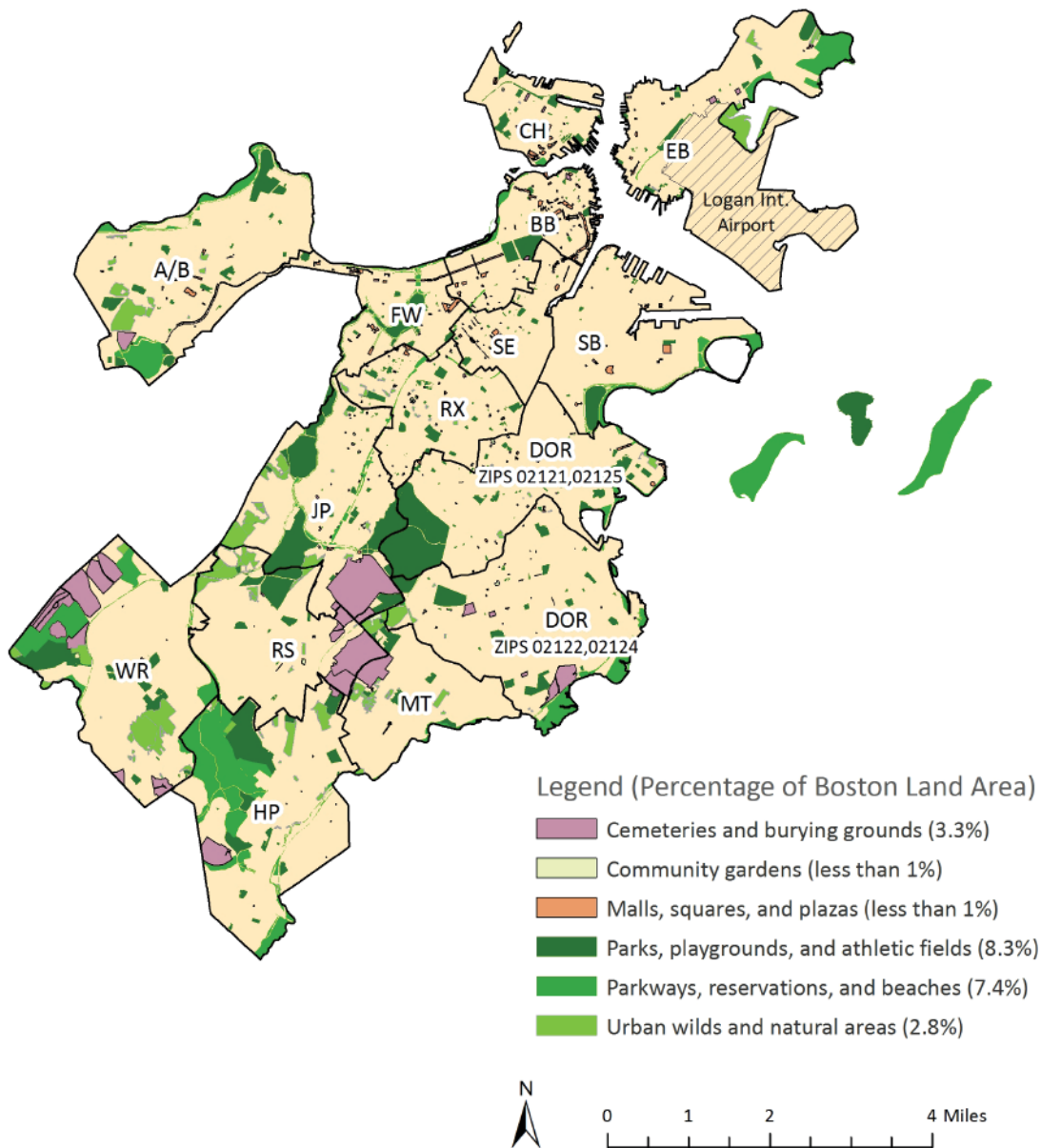


NOTE: "BB" includes the Back Bay, Beacon Hill, Downtown, the North End, and the West End. "SE" includes the South End and Chinatown. Includes Thompson, Spectacle, and Long Islands.

DATA SOURCE: Boston Open Sapce, Parks and Recreation Department, City of Boston; and Bicycle Trails, Office of Geographic Information (MassGIS).

Boston’s protected and recreational open space provides residents with access to parks and greenery for leisure and exercise. There are approximately 11 square miles of open space and about 29 miles of bicycle trails in Boston. The largest portions of bicycle trails are in East Boston and Hyde Park (about 6 miles each). There are less than 1 mile of bicycle trails in Mattapan and Roslindale. In addition, there about 17 miles of potential bicycle trails under development (i.e., underway, considered, or proposed). About 1.2 miles of the bicycle trails remain unimproved or unpaved.

### Figure 3.9 General Open Space by Type and Neighborhood, 2017

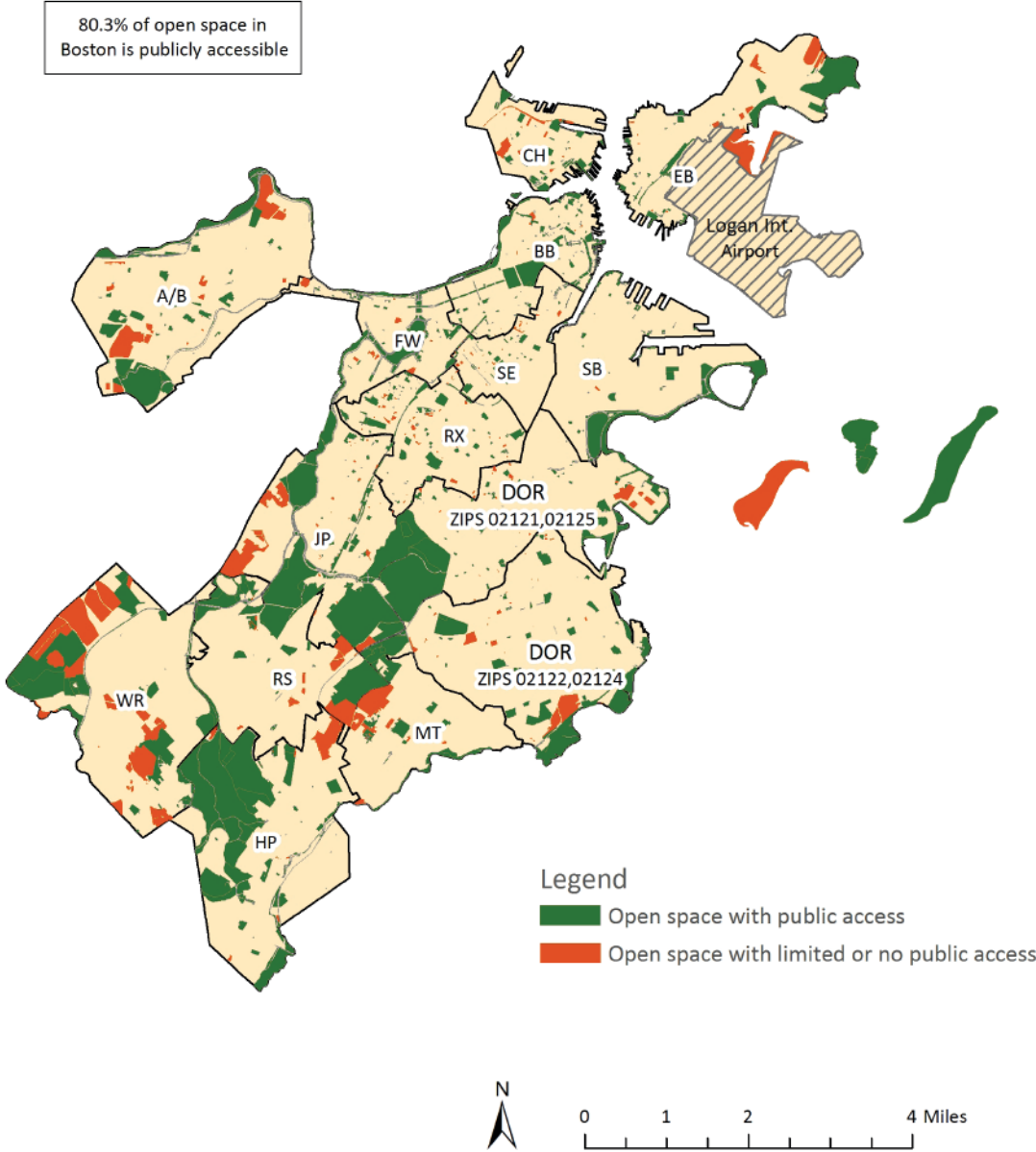


NOTE: "BB" includes the Back Bay, Beacon Hill, Downtown, the North End, and the West End. "SE" includes the South End and Chinatown. Includes Thompson, Spectacle, and Long Islands.

DATA SOURCE: Boston Open Space, Parks and Recreation Department, City of Boston.

Approximately 11 square miles of Boston's 48 square miles (including the Harbor Islands) is open space. Boston's open space consists of cemeteries and burying grounds (3%); community gardens (less than 1%); malls, squares, and plazas (less than 1%); parks, playgrounds and athletic fields (8%); parkway, reservations, and beaches (8%); and urban wilds and nature areas (3%).

### Figure 3.10 General Open Space by Public Access, 2017

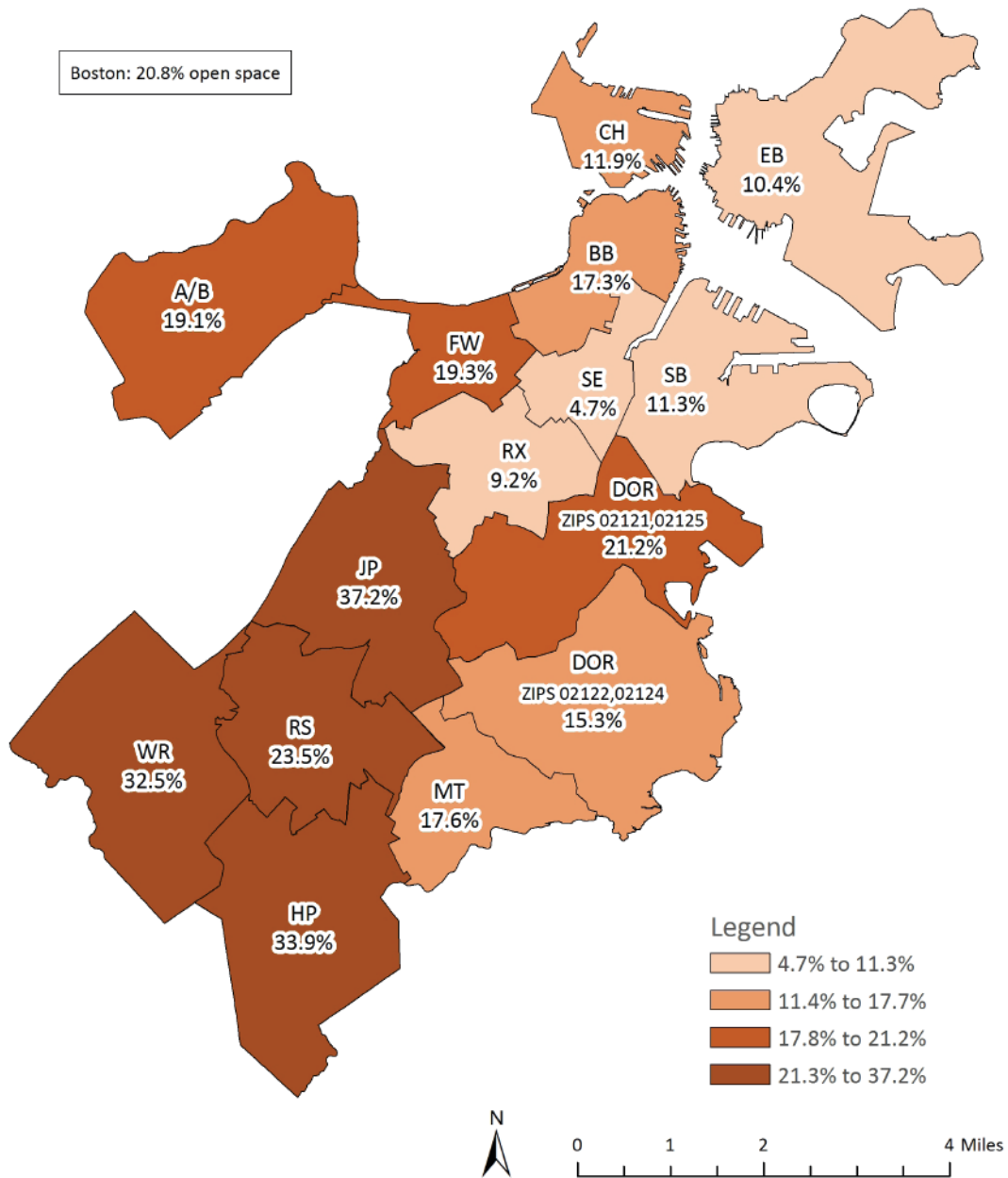


NOTE: "BB" includes the Back Bay, Beacon Hill, Downtown, the North End, and the West End. "SE" includes the South End and Chinatown. Includes Thompson, Spectacle, and Long Islands.

DATA SOURCE: Boston Open Space, Parks and Recreation Department, City of Boston.

Approximately 80% or 8.8 square miles of Boston’s open space is publicly accessible. Public access to some of open space may be limited, depending on location and ownership.

### Figure 3.11 Percentage of General Open Space by Neighborhood, 2017

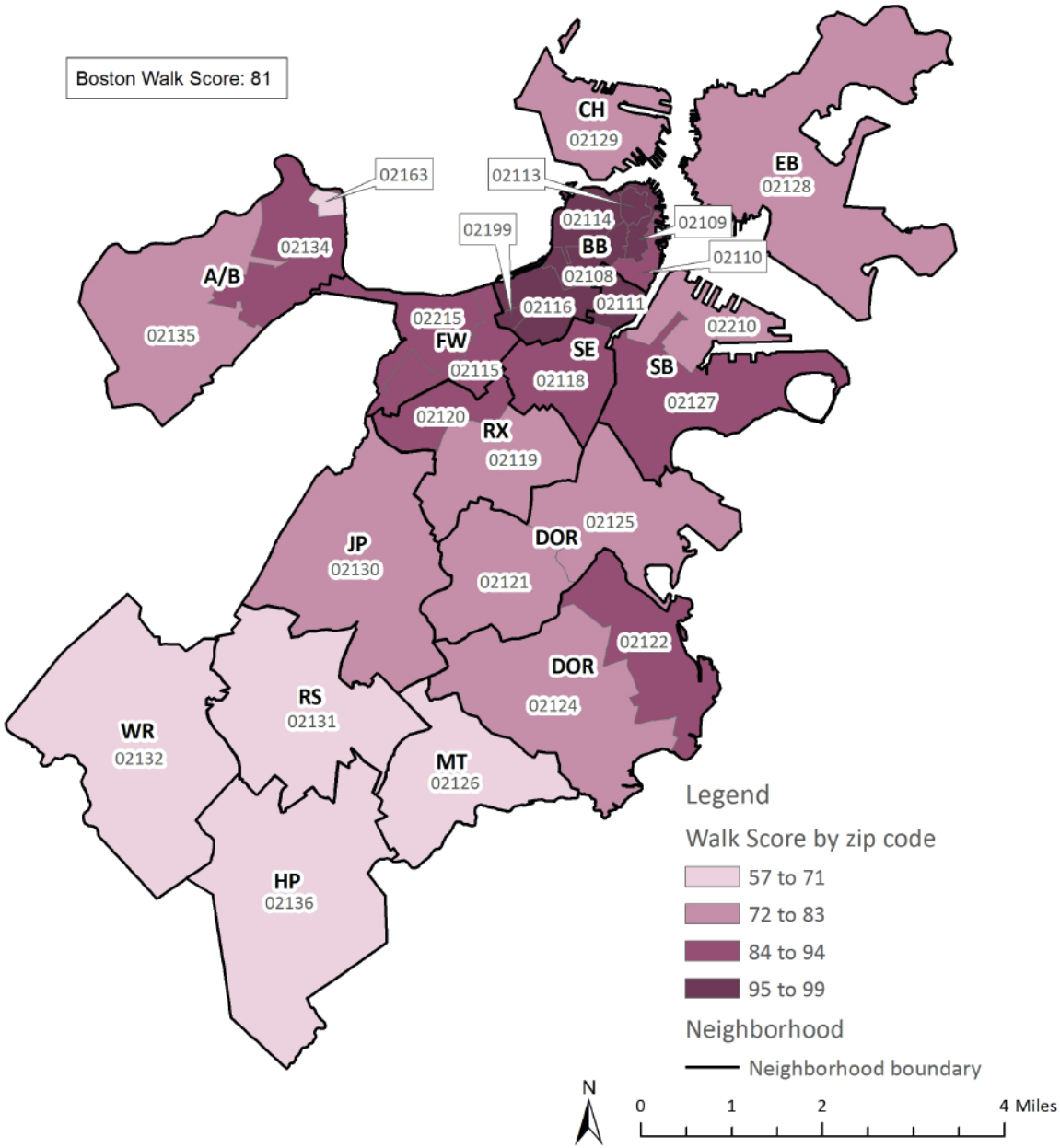


NOTE: "BB" includes the Back Bay, Beacon Hill, Downtown, the North End, and the West End. "SE" includes the South End and Chinatown. Includes Thompson, Spectacle, and Long Islands.

DATA SOURCE: Boston Open Space, Parks and Recreation Department, City of Boston.

Approximately 21% percent of Boston neighborhoods, excluding the Harbor Islands and including ponds and reservoirs, is open space. Jamaica Plain (37%) and Hyde Park (34%) have the highest percentages of land consisting of open space, while the South End (5%) and Roxbury (9%) have the least.

Figure 3.12 Walk Score by Zip Code, 2017



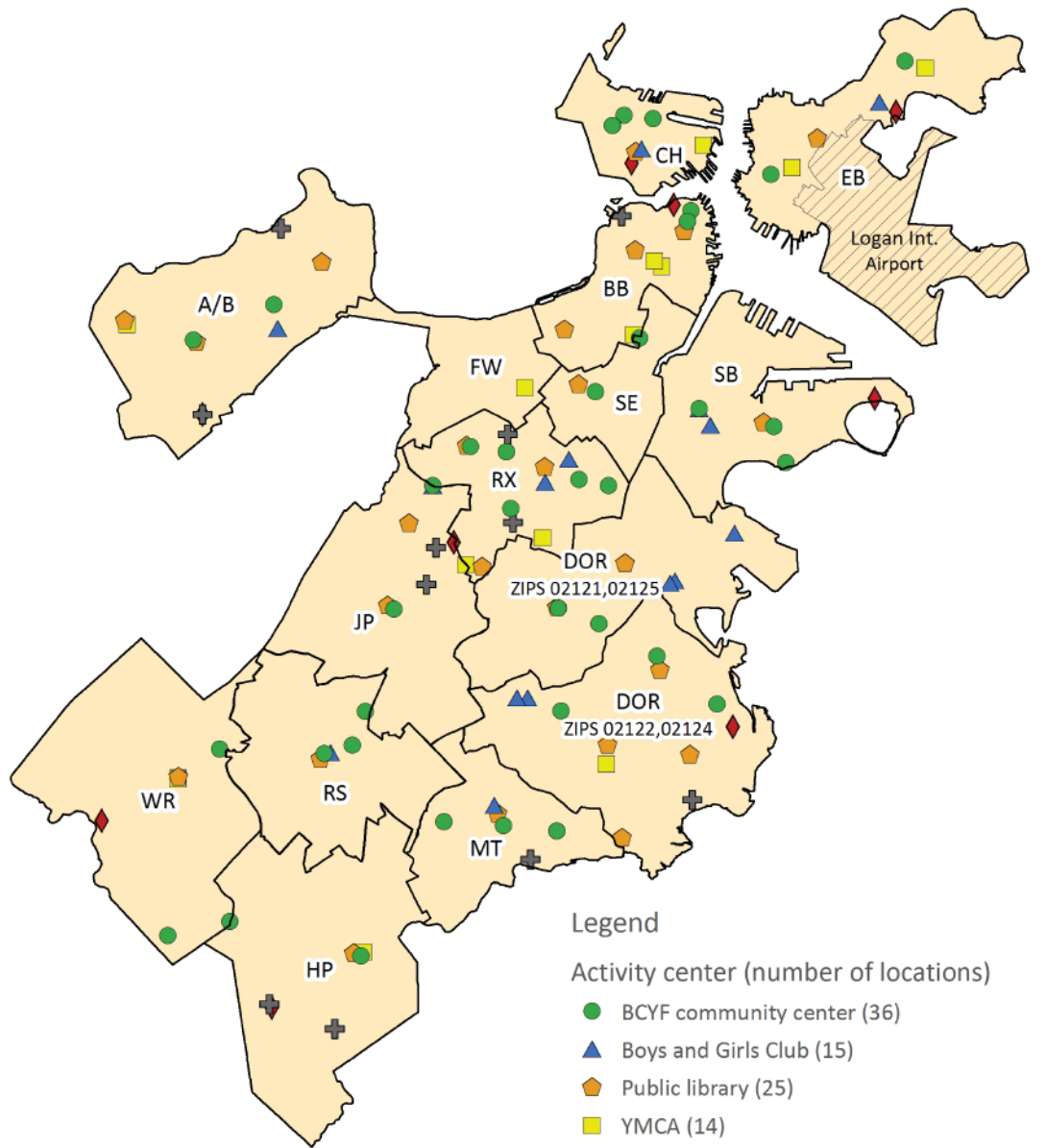
NOTE: "BB" includes the Back Bay, Beacon Hill, Downtown, the North End, and the West End. "SE" includes the South End and Chinatown. Walk Score is an index of pedestrian-friendliness that ranges from 0 to 100. Data for the portion of zip code 02467 in Boston were unavailable. Does not include Harbor Islands.

DATA SOURCE: Walk Score, www.walkscore.com.

Walkability is a measure of accessibility by walking. The Walk Score walkability index, published by [www.walkscore.com](http://www.walkscore.com), ranges from 0 to 100, based on walking routes to local destinations such as grocery stores, parks, schools, and store outlets. Boston is the 3rd most walkable large city with a Walk Score of 81. In 2017, the Walk Score varied widely by zip code in Boston from 57 to 99. The highest Walk Score was observed in the zip codes associated with North End (99 in 02113) and Back Bay/Bay Village (98 in 02199), while the lowest Walk Score was observed in the zip codes associated with Hyde Park (57 in 02136) and West Roxbury (61 in 02132).



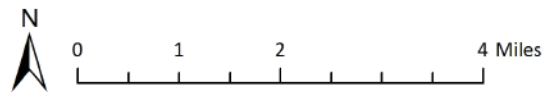
Figure 3.13 Activity Centers by Neighborhood, 2016



NOTE: "BB" includes the Back Bay, Beacon Hill, Downtown, the North End, and the West End. "SE" includes the South End and Chinatown. Does not include Harbor Islands.

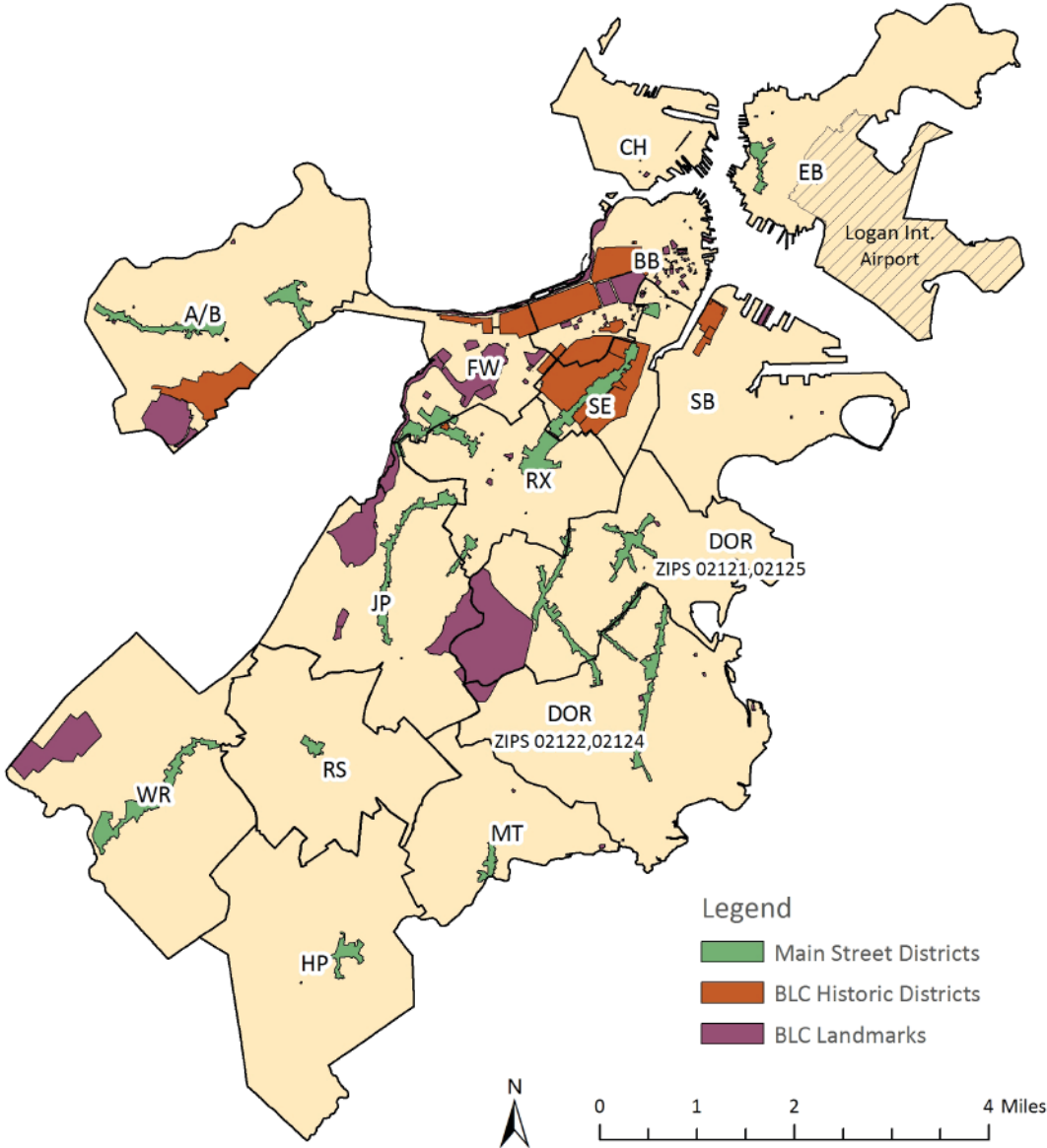
DATA SOURCE: Boston Centers for Youth & Families (BCYF); YMCA of Greater Boston; Boys & Girls Clubs of America; Neighborhood Branch Libraries, Boston Public Library; Department of Conservation and Recreation, Commonwealth of Massachusetts.

- Legend
- Activity center (number of locations)
- BCYF community center (36)
  - ▲ Boys and Girls Club (15)
  - ⬠ Public library (25)
  - YMCA (14)
  - ⊕ Pool or spray deck (11)
  - ◆ Skating rink (9)



There are a variety of activity centers offering affordable individual and group-based extracurricular activities for youths and adults in Boston. The 25 locations of the Boston Public Library were visited by 3.7 million people last year. The city also maintains 36 Boston Centers for Youth and Families (BCYF). The Boys and Girls Clubs of America has 15 locations in Boston and the YMCA has 14 facilities. There are also 11 public swimming pools and spray decks, and 9 ice skating rinks in Boston.

Figure 3.14 Landmarks, Historic Districts, and Main Street Districts by Neighborhood, 2017

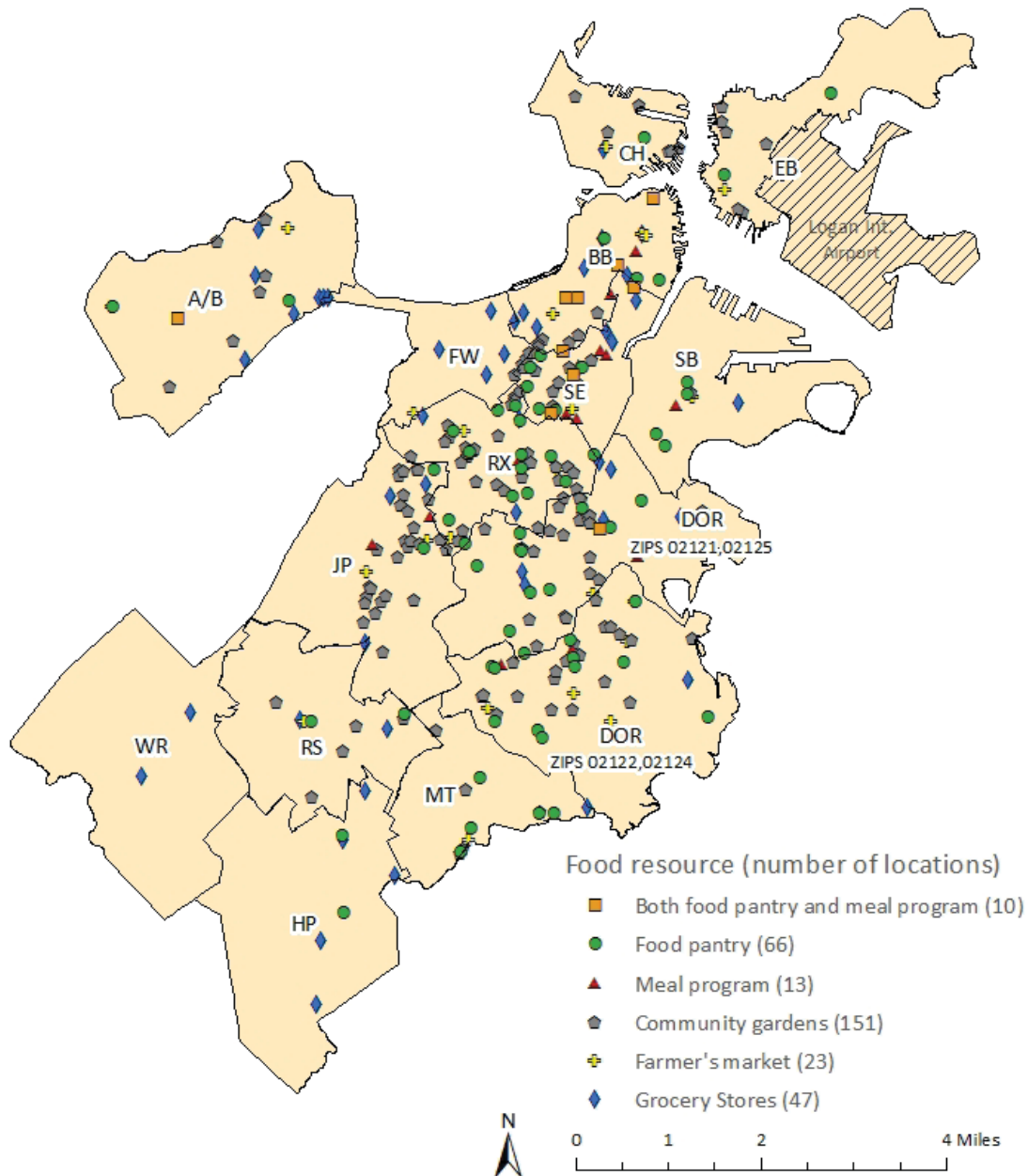


NOTE: "BB" includes the Back Bay, Beacon Hill, Downtown, the North End, and the West End. "SE" includes the South End and Chinatown. Landmarks and historic districts are designated by the Boston Landmarks Commission (BLC). Main Streets are commercial districts sustained by a network of Main Streets Organizations. Does not include Harbor Islands.

DATA SOURCE: BLC Landmarks, BLC Historic Districts, and Main Street Districts from BostonGIS, City of Boston.

Boston is rich with cultural heritage. A number of city and community organizations have been established to preserve and protect historic buildings, places, and neighborhoods. Boston Main Streets, comprised of 20 Main Streets Organizations, aims to sustain healthy commercial districts through creative revitalization. The Boston Landmarks Commission (BLC) aims to preserve Boston’s historical neighborhoods through official designation of landmarks and historical districts and architectural design review. Nine local Historic District Commissions review property proposals within each Historic District.

Figure 3.15 Food Resources by Neighborhood, 2016

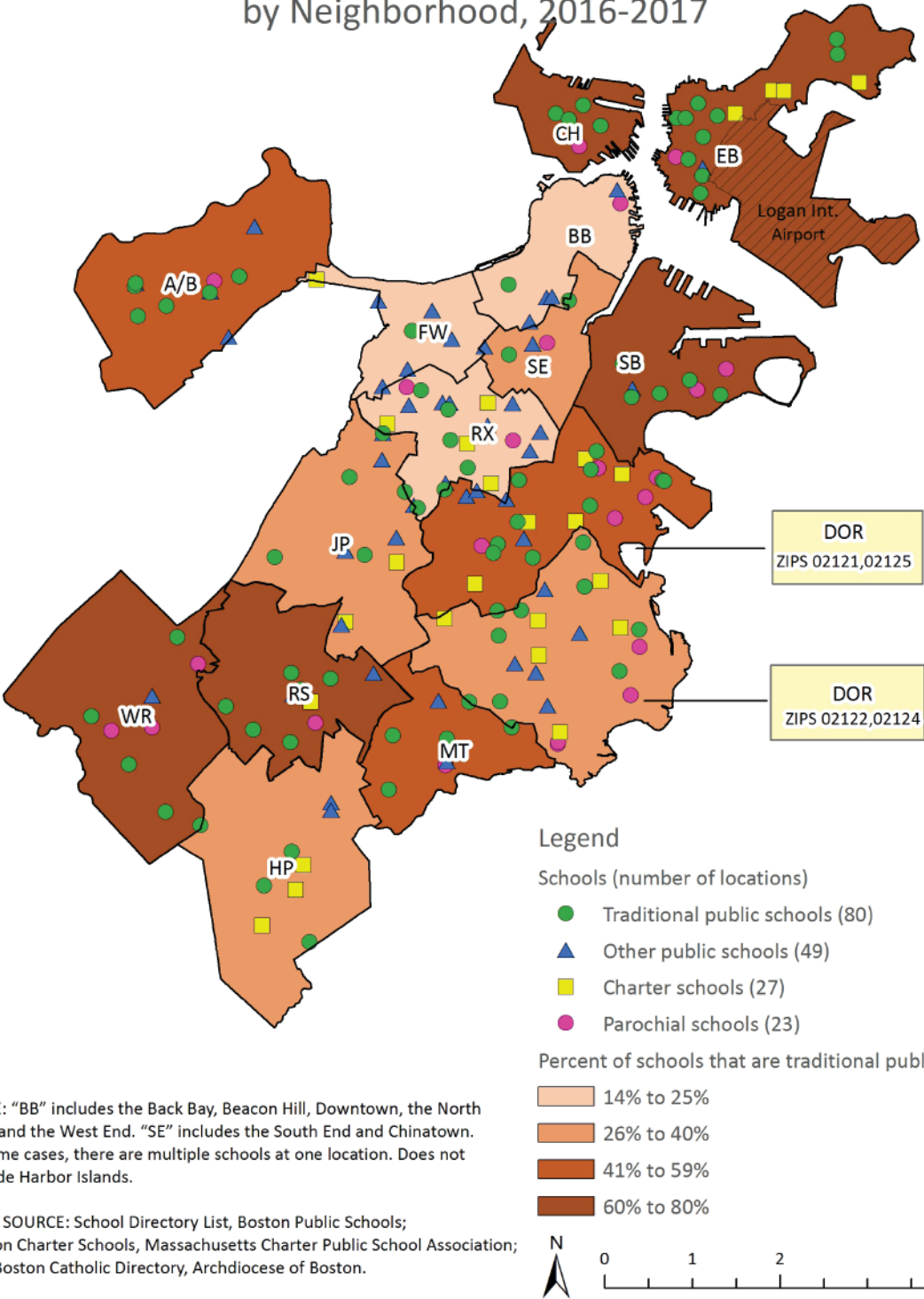


NOTE: "BB" includes the Back Bay, Beacon Hill, Downtown, the North End, and the West End. "SE" includes the South End and Chinatown. Does not include Harbor Islands.

DATA SOURCE: The Greater Boston Food Bank; Trustees Boston Community Gardens, The Trustees of Reservations; The Mayor's Office of Food Access, City of Boston; InfoUSA Business Database, Boston Planning & Development Agency Research Division Analysis

Boston offers a wide network of food resources for local communities. The Mayor's Office of Food Access, in conjunction with local community organizations like the Greater Boston Food Bank, works to ensure that Boston residents have access to fresh and healthy food. The network of local food resources includes food pantries and meal programs, community gardens, farmer's markets, and local grocery stores. In 2016, Boston residents had access to 151 community gardens, 89 food pantries and meal programs, 47 grocery stores, and 23 farmer's markets within Boston city limits.

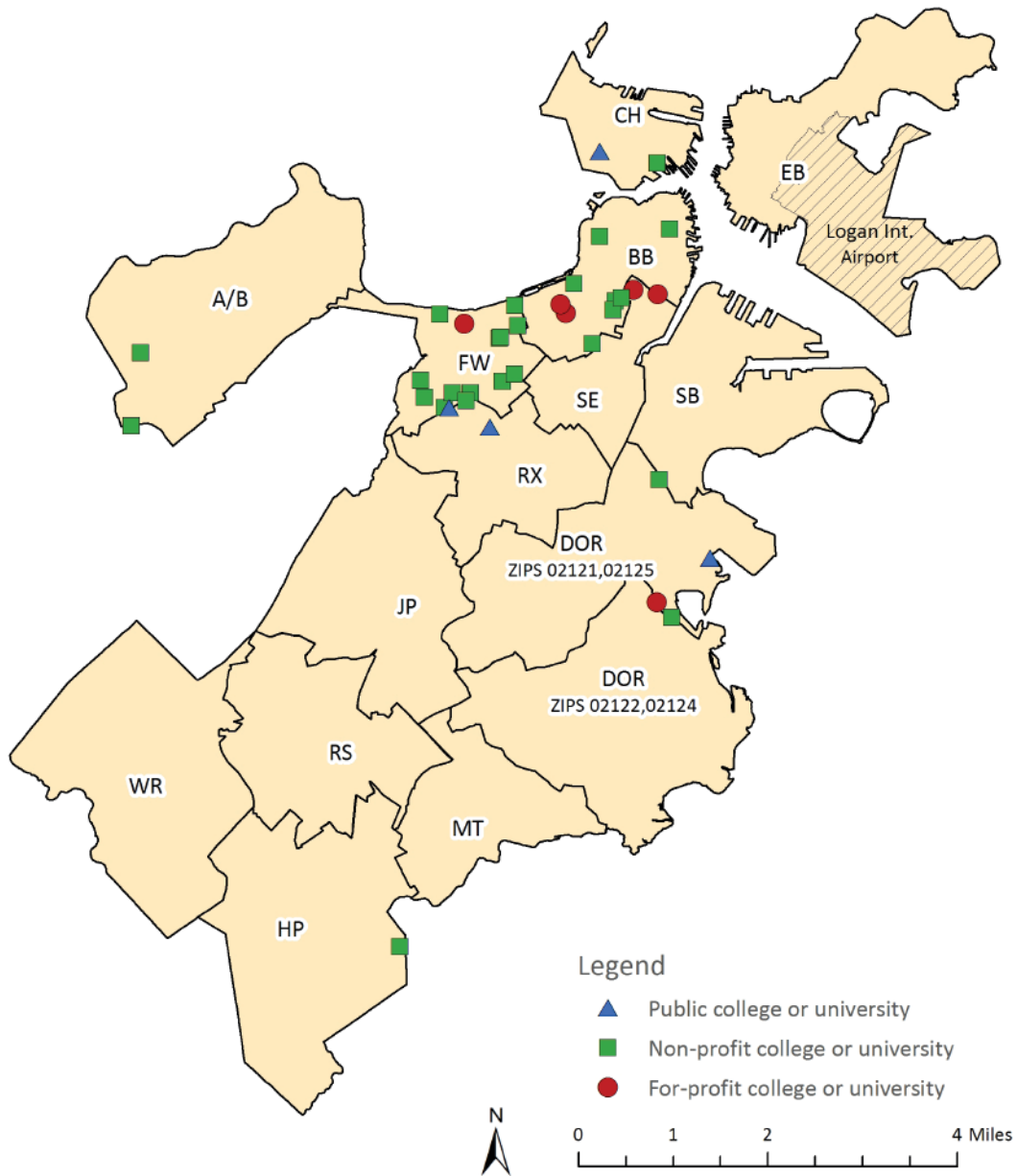
Figure 3.16 Public, Charter, and Parochial Schools by Neighborhood, 2016-2017



Boston Public Schools (BPS) and a network of independent schools provide Boston residents with access to education for grades K-12. Of 181 public, charter, or parochial school locations, 80 were identified as traditional public schools, 49 as other types of BPS-operated public schools, 27 as charter schools, and 25 as parochial schools. Sixty to eighty percent of schools in Charlestown, East Boston, Roslindale, South Boston, and West Roxbury are traditional public schools.

The 49 other types of BPS-operated public schools include: 3 alternative schools, 4 early education centers, 3 exam schools, 7 Horace Mann/in-district charter schools, 1 inclusion, 6 innovation, 20 pilot, 4 special, and 1 specialized. For definitions of each school type, please refer to Boston Public Schools' official website at <http://www.bostonpublicschools.org/Page/941>.

Figure 3.17 Colleges and Universities by Neighborhood, 2016



NOTE: "BB" includes the Back Bay, Beacon Hill, Downtown, the North End, and the West End. "SE" includes the South End and Chinatown. One non-profit college located in the zip code 02467 (not pictured) is not represented on the map. Does not include Harbor Islands.

DATA SOURCE: College Navigator, National Center for Educational Statistics.

Boston residents have access to a variety of local centers of higher education. In addition to four public colleges and universities within the city boundary, there are 29 private non-profit colleges and universities and 6 for-profit schools. Many of these colleges and universities are in the neighborhoods of Fenway or Back Bay.

## Summary

This chapter described the distribution of various community assets related to civic engagement and the built environment among Boston residents, many of which vary at the neighborhood level. Voter turnout for the general presidential election of November 2016 (67%) was considerably higher than for the municipal election of the previous year (14%). We also observed a wide range in voter turnout across precinct for both elections; precincts with lower voter turnout for both elections were concentrated in the neighborhoods of Allston/Brighton, Dorchester (zip codes 02121, 02125), Fenway, and Roxbury.

While Boston offers a wide network of food resources for local communities, there is only one grocery store, at most, in the neighborhoods of East Boston, Mattapan, and South Boston. According to Walk Score, Boston is the 3rd most walkable large city in 2017, but Walk Scores varied across zip code. The zip codes with lower Walk Scores were found in Allston/Brighton, Hyde Park, Jamaica Plain, Mattapan, Roslindale, and West Roxbury. Although there are about 29 miles of bicycle trails throughout Boston, less than 1 mile of the bicycle trails are in Mattapan and Roslindale.

The median assessed residential value in Boston is \$229 per square foot. The neighborhoods of Dorchester (zip codes 02121, 02125), Dorchester (zip codes 02122, 02124), Hyde Park, Mattapan, and Roxbury have lower median assessed residential values ranging between \$80 and \$130 per square foot. However, the residential properties in these neighborhoods, with exception to Hyde Park, are growing in value at a faster rate with the average annual growth rate between 8 and 13% per year since 2014.

# Community Assets

**174,000** Boston 311 calls placed in 2016



**15%** of calls were for parking enforcement



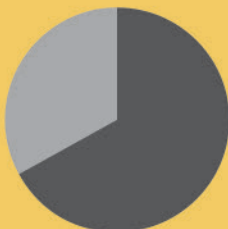
The voter turnout rate for the municipal election in November 2015 was

**14%**



The voter turnout rate for the general presidential election in November 2016 was

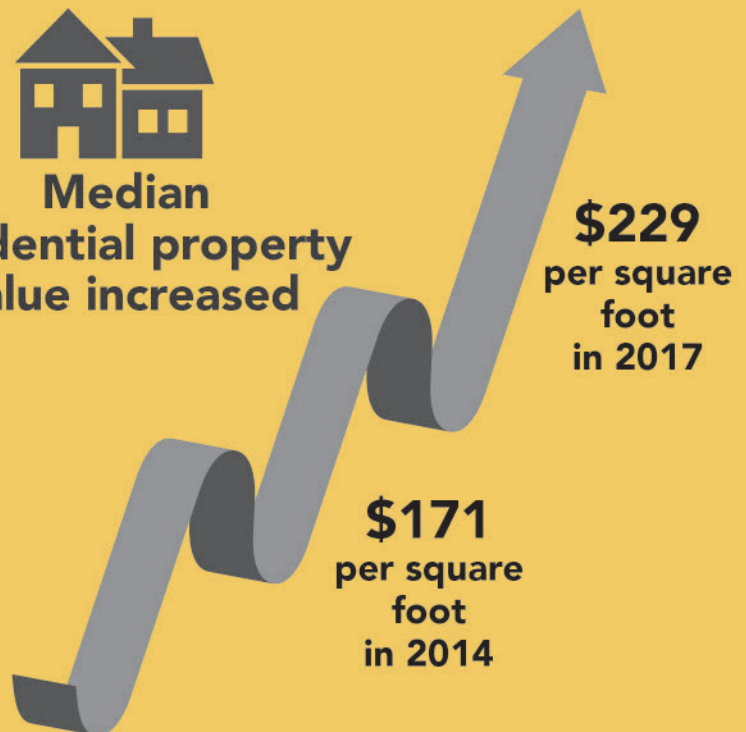
**67%**



According to Walk Score, Boston is the 3rd most walkable large city in 2017



Median residential property value increased



## Our Point of View: Thoughts from public health

### A Dorchester Neighborhood Rich in Community Assets

By Makaila Manukyan

Program Manager, Office of Health Equity

Boston Public Health Commission

And

Marcos Beleche

Associate Director, Codman Square Neighborhood Development Corporation

Access to affordable quality housing, transportation, education, healthy food, decent jobs, and health care can promote health and wellbeing – that is public health! The Codman Square community has worked tirelessly to put all of these assets into their 1.5 square mile neighborhood. In support of those residents, the Codman Square Neighborhood Development Corporation (CSNDC) in Dorchester promotes health by addressing social determinants of health in all its work and has been doing so for over 35 years. Until just a few years ago, they didn't really know that they were practicing public health.

The CSNDC began its work on housing to reverse the depreciation of property values in the 1970s and 1980s due to arson and white flight. At that time, community activists took a stand and renovated family properties and sold them to low and moderate-income first-time home buyers. In the fall of 1981, the Codman Square Housing Development Corporation was formed and for the next 30 years, it developed and rehabilitated large rental housing developments, collaborating with Codman Square Health Center and Codman Square Neighborhood Council among many others. In 1993, the organization changed its name to its current one to acknowledge the community development and organizing work it was doing beyond housing and has been going strong ever since.

One of the strengths of the CSNDC is its deep understanding of the uneven burden of poor health outcomes that low-income and people of color bear. Working with many partners – faith leaders, small businesses, and local political leaders, plus thousands of devoted community residents – the CSNDC is preserving and building the neighborhood by focusing on the intersection of health and community development. They take every opportunity to integrate equity into their work. Not only do they engage youth, they are also engaging reentry citizens. They have used their urban farm project – OASIS on Ballou – to provide jobs to formerly incarcerated men of color. Housing is high on their list of priorities. The CSNDC has created 1126 units of protected rental and ownership properties, and provides financial and housing counseling supports.

Residents have made this community their own by investing in what they needed to create a healthy and livable neighborhood. It has its own school, health center, grocery store, thousands of affordable housing units, locally-owned businesses, and about 10 community gardens and three different urban farming entities. As Boston neighborhoods become gentrified, the community is focused on ensuring that the long-term residents of this predominantly Black /Afro Caribbean and Latino neighborhood can stay. The Codman Square community is not wealthy but it is asset-rich!



## Our Point of View: Thoughts from a community resident

### A Community We Can Live and Work in

By Lakisha Jordan and Darryl Jordan

Lakisha and Darryl are longtime Codman Square, Dorchester residents involved in their community.

We are very appreciative of the Codman Square Neighborhood Development Corporation (CSNDC). We grew up in Codman Square, ended up at the same college and will soon be married. We came back to our Codman Square community and very much wanted to stay. About six years ago we applied for affordable rental housing. We were #654 on the lottery application! Luckily we were selected and were the first to put down our deposit on an apartment in the Levedo building. Codman Square Neighborhood Development Corporation built our apartment building. It is a “green” building with solar panels, energy efficiency, rainwater irrigation, and more. I believe in being involved in my community and always attend the meetings for our building.

Living in an affordable apartment made it possible to save money to own a home. We are currently building a two-family home on the street we once grew up on. We took advantage of a Codman Square community meeting and found out that paying rent on time helps with your credit score. We also took advantage of the City of Boston home-ownership certificate program, to be knowledgeable about owning a home.

We are in the process of opening a hydroponic store and also accessing garden plots. I am interested in private gardens for clinicians and their clients in the community, so that clients have peacefulness. Our community has experienced trauma, and therapy isn't contained in four walls. Codman Square NDC pointed us in the direction to develop a business plan and connected us with others interested in the same work. We are excited to bring another needed resource to our community.

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# Chapter 4

## Environmental Health





# Environmental Health

As stated by the Centers for Disease Control and Prevention, “The environment is everything around us - the air we breathe, the water we drink and use, and the food we consume. It’s also the chemicals, radiation, microbes, and physical forces with which we come into contact. Our interactions with the environment are complex and are not always healthy” (1). The World Health Organization describes environmental health as addressing all the physical, chemical, and biological factors external to a person, and all the related factors impacting behaviors. The field of environmental health prioritizes assessment and control of environmental factors that can harm health, with the goal of preventing disease and creating healthy environments in both indoor (e.g. commercial buildings, workplaces, schools, and homes) and outdoor settings (2). Maintaining a healthy environment increases quality of life and years of healthy life. It has been estimated that globally 24% of the disease burden and 23% of premature mortality is attributable to environmental factors (3).

Environmental health is closely related to health equity. Individuals with low incomes are more likely to live in areas with higher air pollution and toxic chemicals in their paint and water. For example, hazardous waste landfills are more often built in low-income communities and communities of color (4, 5). Social inequalities also result in unequal impact of environmental exposures, as disadvantaged communities generally experience less access to resources (e.g. nutritious foods and quality medical care) that might otherwise reduce the negative effects of environmental hazards (6).

In this section of the report, we will present and summarize exposure and health-related indicators relevant to outdoor air quality, indoor environmental quality, and climate change.

## Outdoor air quality and health

Outdoor air pollution is a leading contributor to death, and is estimated to have contributed to 4.2 million premature deaths globally in 2015 (7). Outdoor air pollution is a complex mixture of thousands of components, which differ in health impact and toxicity. The national Clean Air Act requires that the United States Environmental Protection Agency (EPA) maintain and enforce standards that will protect the entire population against adverse health effects associated with six Criteria Air Pollutants: carbon monoxide, lead, ground-level ozone (O<sub>3</sub>), nitrogen dioxide (NO<sub>2</sub>), particulate matter (PM), and sulfur dioxide (SO<sub>2</sub>) (8).

There are primary and secondary standards for these Criteria Air Pollutants. Primary standards provide public health protection, including protecting the health of “sensitive” populations, such as individuals with asthma and other respiratory/cardiac illnesses, children, and the elderly.

Secondary standards provide public welfare protection, including protection against decreased visibility and damage to animals, crops, vegetation, and buildings (8). The Massachusetts Department of Environmental Protection (MassDEP) is the state agency responsible for monitoring outdoor air quality in Massachusetts and developing plans and regulatory programs to reduce emissions of pollutants that adversely affect public health, welfare, and the environment. MassDEP submits all ambient air quality data to the National Air Quality System database that is administered by the EPA (9).

### **Particulate matter less than or equal to 5 microns in diameter (PM<sub>2.5</sub>)**

Outdoor particulate matter (PM) consists of particles that are in the air, such as dust, pollen, dirt, soot and smoke, and little drops of liquid. Some particles, like soot or smoke, are large or dark enough to be seen. Other particles are so small that you cannot see them (10). The major subtypes of outdoor PM include inhalable particles, which includes particles with diameters 10 micrometers and smaller (PM<sub>10</sub>), and fine inhalable particles with diameters that are generally 2.5 micrometers and smaller (PM<sub>2.5</sub>) (11). By comparison, a human hair is 50 micrometers across or larger. A variety of sources directly or indirectly contribute to outdoor PM, some of which include coal fires, power plants, wood stoves, forest fires, motor vehicles, factories, and construction sites. Outdoor PM can be a problem at different times of the year, depending on where you live (12).

Short-term exposure (averaged over preceding hours or days) to elevated outdoor PM levels is a known risk factor for mortality and morbidity related to cardiovascular (e.g. heart attack, stroke)

and respiratory (e.g. asthma, chronic obstructive pulmonary disease (COPD)) diseases (13-15). Studies have also shown that long-term exposure (averaged over the previous year or longer) to low-levels of PM<sub>2.5</sub> is associated with development of cardiovascular disease and associated risk factors (e.g. hypertension, diabetes), COPD, and lung cancer (13-15).

### **Nitrogen dioxide (NO<sub>2</sub>)**

Major sources of outdoor nitrogen dioxide (NO<sub>2</sub>) are motorized road traffic, power generation, industrial sources, and residential heating (9). Breathing air with a high concentration of NO<sub>2</sub> can irritate airways in the human respiratory system. Such exposures over short periods can aggravate cardiovascular and respiratory diseases, particularly asthma, leading to respiratory symptoms (such as coughing, wheezing or difficulty breathing), hospital admissions, and visits to emergency rooms (16). Studies have shown that long-term exposure to NO<sub>2</sub> may contribute to the development of chronic diseases, including cardiovascular disease and associated risk factors, and lung cancer (17, 18).

### **Ground-level ozone**

Ozone is a gas that you cannot see or smell. It occurs naturally in the sky about 10 to 30 miles above the earth's surface. Sometimes, this ozone is called "good ozone" because it forms a layer that protects life on earth from the sun's harmful rays (19). Ground-level ozone, on the other hand, is a harmful air pollutant and in this section of the report, "ozone" will refer to ground-level ozone. Ground-level ozone is the main ingredient of "smog" and is created by chemical reactions between oxides of nitrogen and volatile organic compounds.

This happens when pollutants emitted by cars, power plants, industrial boilers, refineries, chemical plants, and other sources chemically react in the presence of sunlight (19). Ozone levels are highest during the warmest, high-intensity sunlight hours of the day, often showing a broad peak between noon and 9 p.m. when many people are outdoors, resulting in significant human exposure (17).

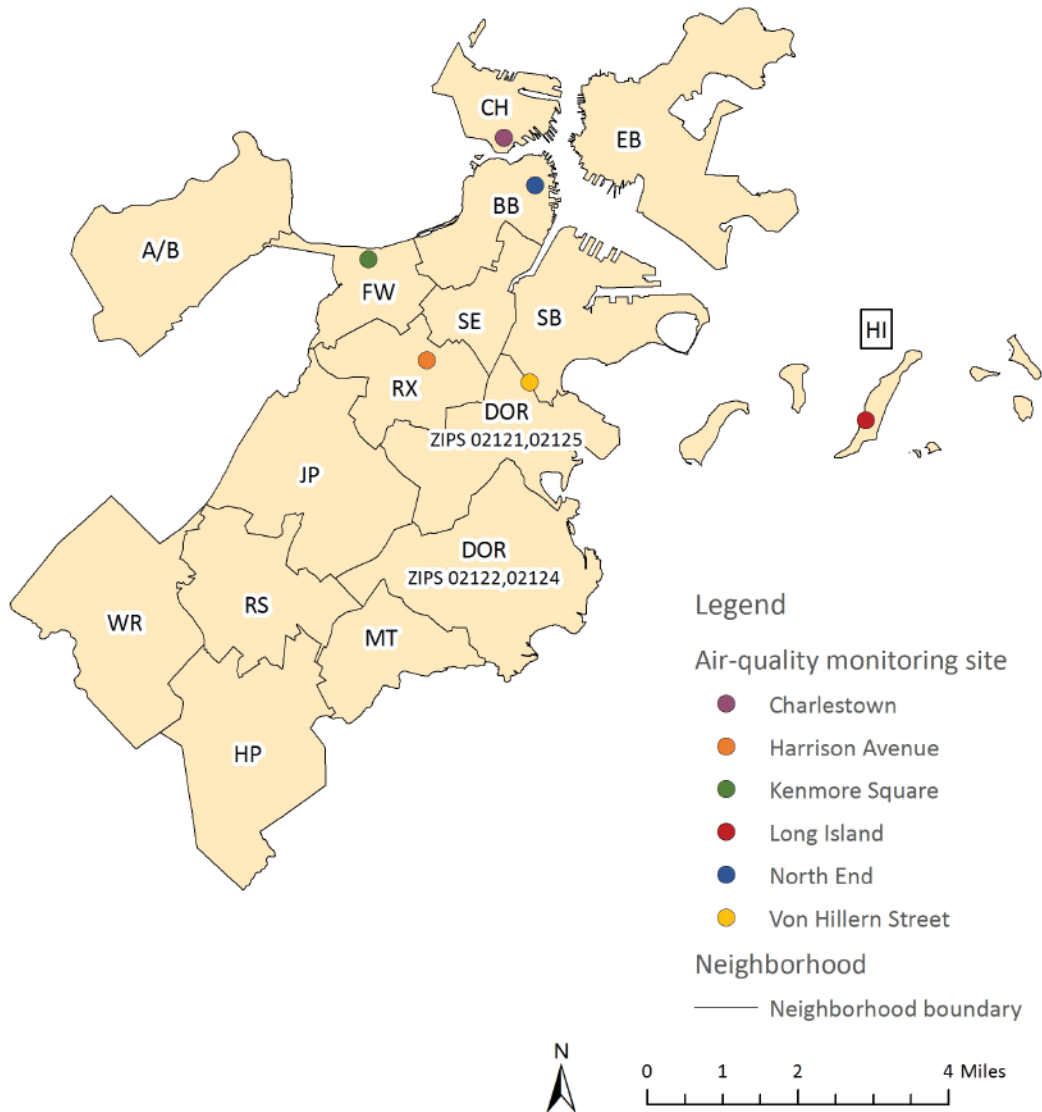
Ozone is a respiratory irritant, and breathing ozone can result in a number of health effects that are observed in broad segments of the population, including the induction of respiratory symptoms, reduction in lung function, and inflammation of the airways (20). Studies have consistently shown that higher levels of ozone are associated with premature mortality (21-23). Individuals who are at higher risk from breathing ozone include those who spend most of their time outdoors (e.g. outdoor workers), children and adolescents, the elderly, people with existing lung diseases, such as asthma and COPD, and people with cardiovascular disease (24).

In this section, we will summarize  $PM_{2.5}$ ,  $NO_2$ , and ozone pollution monitoring data for Boston. These are the pollutants for which there is strongest epidemiological evidence of increased mortality risk (17).





Figure 4.1 Air-Quality Monitoring Sites, 2005-2016

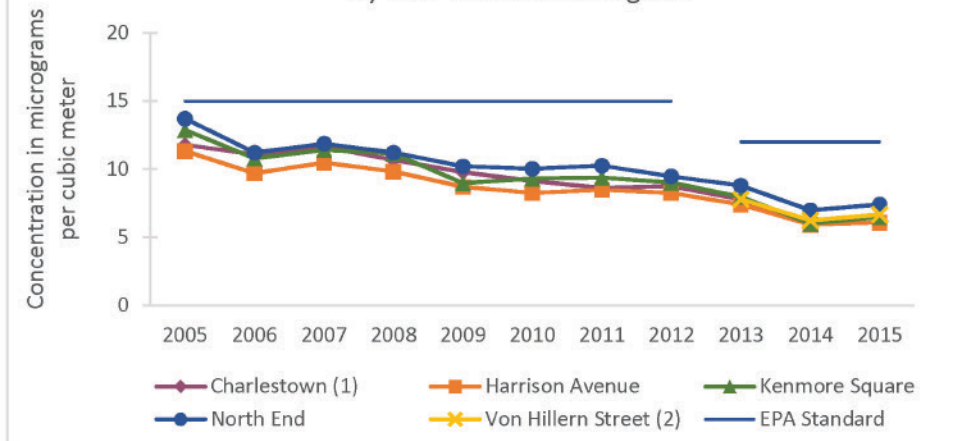


NOTE: "BB" includes the Back Bay, Beacon Hill, Downtown, the North End, and the West End. "SE" includes the South End and Chinatown. "HI" indicates the Boston Harbor Islands. The Von Hillern Street monitoring site was opened in 2013. The Charlestown and Long Island monitoring sites were closed in 2015.

DATA SOURCE: Air Assessment Branch, Massachusetts Department of Environmental Protection

In 2016, there were four Massachusetts Department of Environmental Protection (MassDEP) monitoring sites located in the City of Boston: Harrison Avenue (Roxbury), Kenmore Square (Fenway), the North End, and Von Hillern Street (Dorchester). MassDEP air quality monitoring sites located in Charlestown and on Long Island (a Boston Harbor Island) were closed in 2015. MassDEP opened the Von Hillern Street monitoring site in 2013.

Figure 4.2 Annual Average Concentration of Particulate Matter Less than or Equal to 2.5 Microns in Diameter (PM<sub>2.5</sub>) by Year and Monitoring Site

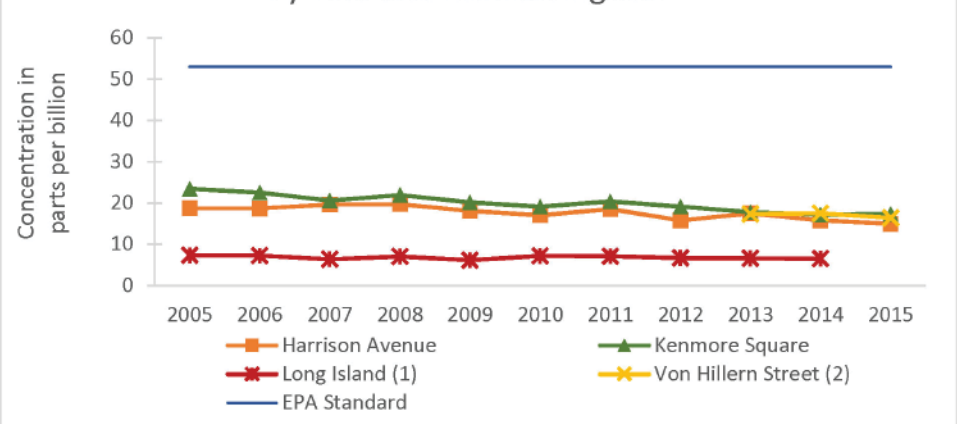


(1) The Massachusetts Department of Environmental Protection closed the Charlestown monitoring site in 2015.  
 (2) The Massachusetts Department of Environmental Protection opened the Von Hillern Street (Dorchester) monitoring site in 2013.

DATA SOURCE: Air Assessment Branch, Massachusetts Department of Environmental Protection

The U.S. Environmental Protection Agency revised the primary (health-based) annual standard for particulate matter less than or equal to 2.5 microns in diameter (PM<sub>2.5</sub>) downward from 15 to 12 micrograms per cubic meter in December 2012. Monitoring data from the five Massachusetts Department of Environmental Protection (MassDEP) sites located in Boston between 2005 and 2015 indicates there were no years when the annual average PM<sub>2.5</sub> concentration exceeded the primary annual standard. The annual PM<sub>2.5</sub> concentrations measured from the four MassDEP monitoring sites in 2015 were well below the current standard of 12 micrograms per cubic meter. Additionally, there were no days at any of the MassDEP monitoring sites between 2005 and 2012 when the primary 24-hour PM<sub>2.5</sub> standard was exceeded (data not shown).

Figure 4.3 Annual Average Concentration of Nitrogen Dioxide (NO<sub>2</sub>) by Year and Monitoring Site



(1) The Massachusetts Department of Environmental Protection closed the Long Island monitoring site in 2015.  
 (2) The Massachusetts Department of Environmental Protection opened the Von Hillern Street (Dorchester) monitoring site in 2013.

DATA SOURCE: Air Assessment Branch, Massachusetts Department of Environmental Protection

The primary annual and 1-hour standards for nitrogen dioxide (NO<sub>2</sub>) set by the U.S. Environmental Protection Agency are 53 and 100 parts per billion, respectively. Monitoring data from the four Massachusetts Department of Environmental Protection (MassDEP) sites located in Boston between 2005 and 2015 indicates that there were no years when the annual average NO<sub>2</sub> concentration exceeded the primary annual standard. Additionally, there were no days at any of the MassDEP monitoring sites between 2005 and 2012 when the primary 1-hour NO<sub>2</sub> standard was exceeded (data not shown).

Between January 2005 and December 2014, there were a total of 14 days when the 70 parts per billion (ppb) 8-hour standard for ozone was exceeded at the Massachusetts Department of Environmental Protection (MassDEP) Long Island monitoring site. Between January 2005 and December 2015, there were a total of 3 days when the 70 ppb 8-hour standard for ozone was exceeded at the MassDEP Harrison Avenue monitoring site.

**Figure 4.4 Number of Exceedance Days for Ozone (based on 8-hour Ozone Standard of 70 parts per billion) in Boston by Year**

<b>Year</b>	<b>Harrison Avenue</b>	<b>Long Island<sup>1</sup></b>
<b>2005</b>	1	5
<b>2006</b>	0	0
<b>2007</b>	0	0
<b>2008</b>	0	1
<b>2009</b>	0	3
<b>2010</b>	0	1
<b>2011</b>	0	1
<b>2012</b>	1	1
<b>2013</b>	0	2
<b>2014</b>	0	0
<b>2015</b>	1	<b>Site Closed</b>

<sup>1</sup> The Massachusetts Department of Environmental Protection closed the Long Island monitoring site in 2015.

DATA SOURCE: Air Assessment Branch, Massachusetts Department of Environmental Protection

## Indoor Environmental Quality and Health

Indoor environmental quality (IEQ) refers to the quality of a building's environment (e.g. commercial buildings, workplaces, schools, and homes) in relation to the health and well-being of those who occupy space within it (25). There are many sources of indoor environmental pollution, many of which result in respiratory hazards.

These sources include (26):

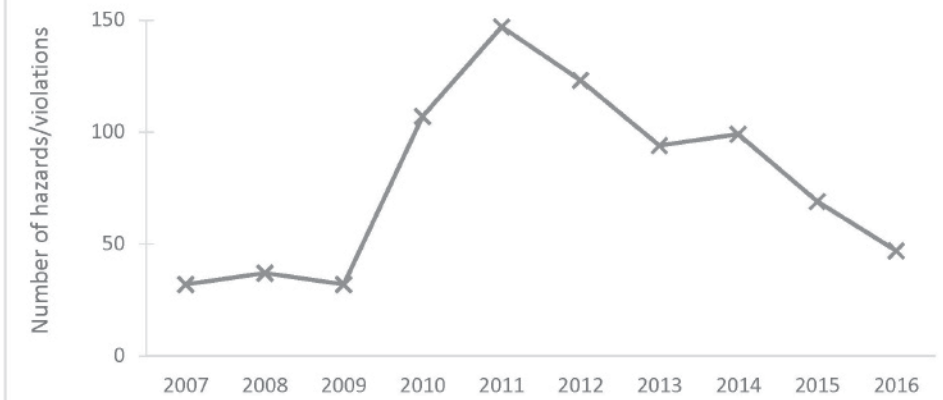
- Excess moisture resulting in water damage and mold growth
- Lead contamination found in paint and tap drinking water
- Tobacco products
- Pest and rodent infestation
- Environmental stressors (e.g. improper lighting, noise, vibration, overcrowding)
- Building materials and furnishings (e.g. asbestos-containing insulation, newly installed flooring, cabinetry or furniture made of certain pressed wood products, and lead paint)
- Fuel-burning combustion appliances (e.g. space heaters, ranges, ovens, stoves, furnaces, fireplaces, water heaters, and clothes dryers)
- Central heating and cooling systems and humidification devices
- Products for household cleaning and maintenance, personal care, or hobbies
- Auto, truck, or bus exhaust from attached garages, nearby roads, or parking areas

Understanding the sources of indoor environmental contaminants and controlling them can often help prevent symptoms or illness associated with the indoor environment. In this section of the report we will summarize exposure and health-related indicators relevant to indoor environmental quality, including hazards/violations for mold and asbestos, leaks and water stains in schools, asthma in school-aged children, secondhand tobacco smoke exposure at home, carbon monoxide poisonings, lead in home tap water, and overcrowded housing.

The Environmental and Occupational Health Division of the Boston Public Health Commission responds to requests from the public for inspections related to a broad range of potential environmental health hazards, including mold. The Environmental and Occupational Health Division addresses hazards in private residences, public buildings, workplaces, and outdoor spaces. If health hazards or violations of laws are found upon initial inspection, the responsible parties are required to take corrective action. The number of inquiries or complaints the Environmental and Occupational Health Division receives typically exceeds the number of hazards or violations identified upon initial inspection.

In 2016, of the initial inspections in response to an inquiry or complaint, 47 identified mold or chronic dampness-related indoor air quality issues. Of the 787 hazards/violations identified for mold from 2007 to 2016, 99% were for indoor air quality problems involving mold/chronic dampness and 1% were for mold in heating, ventilation, and air conditioning systems.

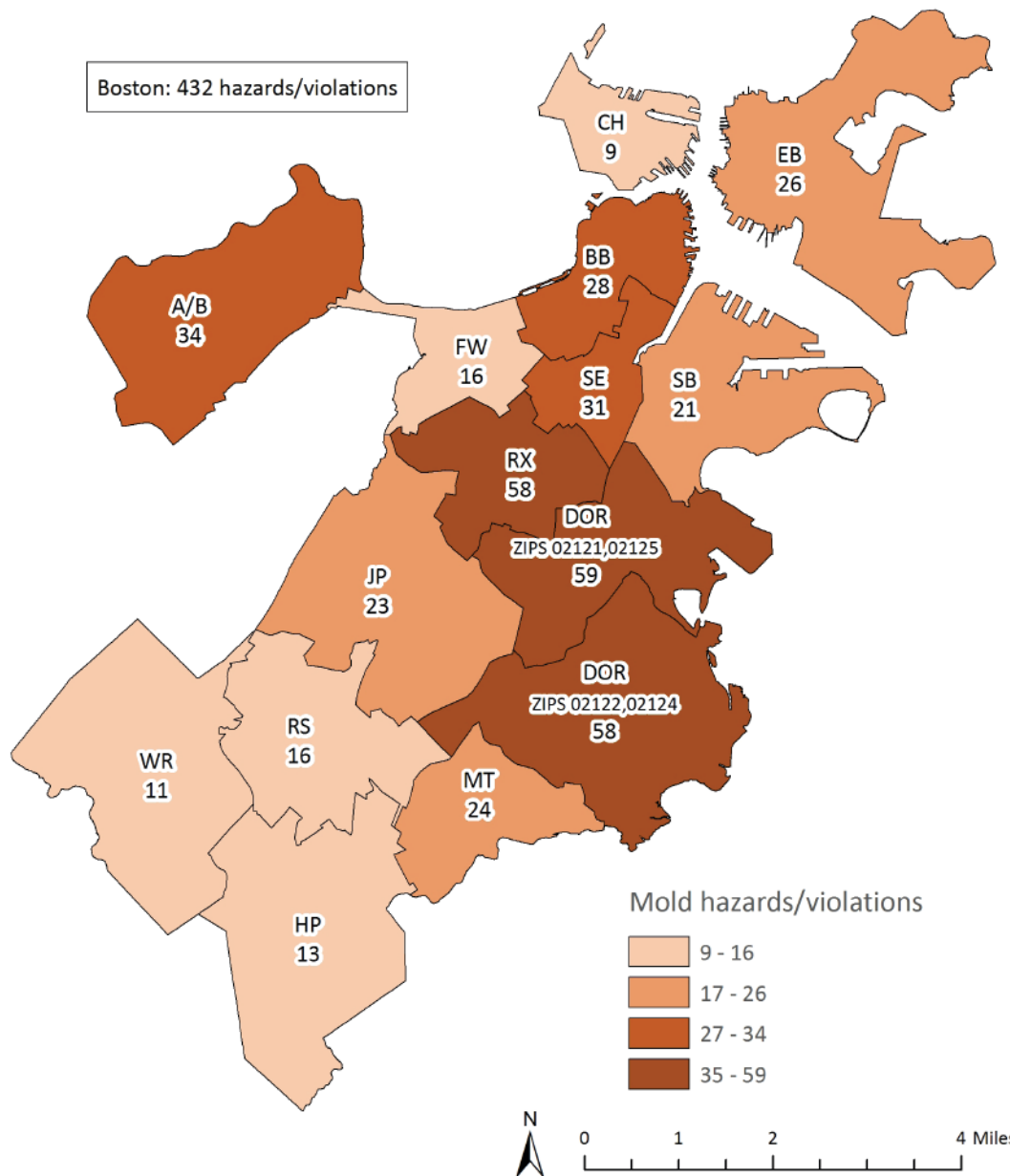
Figure 4.5 Mold Hazards/Violations by Year



DATA SOURCE: Environmental and Occupational Health Division, Boston Public Health Commission



Figure 4.6 Mold Hazards/Violations  
by Neighborhood, 2012-2016



NOTE: "BB" includes the Back Bay, Beacon Hill, Downtown, the North End, and the West End. "SE" includes the South End and Chinatown. A total of 432 hazards/violations were identified for mold between 2012 and 2016, but 5 hazards/violations could not be assigned to neighborhoods due to missing data.

DATA SOURCE: Environmental and Occupational Health Division, Boston Public Health Commission

For 2012-2016, there were 432 hazards/violations identified for mold in Boston. The number of hazards/violations by neighborhood ranged from 9 in Charlestown to 59 in Dorchester (zip codes 02121, 02125).

While it is not against the law to have asbestos in good condition present in a building, defective or damaged asbestos materials are a public health hazard, which must be either repaired or removed by a licensed contractor working under a permit. All asbestos removal or repair projects in Boston require a permit issued by the Environmental and Occupational Health Division of the Boston Public Health Commission. Roughly 1,200 such asbestos abatement permits are issued annually. The Division conducts investigations in response to public complaints/inquiries about potential asbestos hazards in public and private buildings, homes, and open spaces as well as random compliance checks of permitted asbestos removal work.

In 2016, 13 hazards/violations were identified by the Environmental and Occupational Health Division during an initial complaint inspection or compliance check of an active permitted asbestos abatement project. From 2007-2016, 205 hazards/violations were identified for asbestos; 65% of these hazards/violations were for unsafe conditions, 26% were for illegal removal, and 9% were for contractor non-compliance during permitted abatement work.

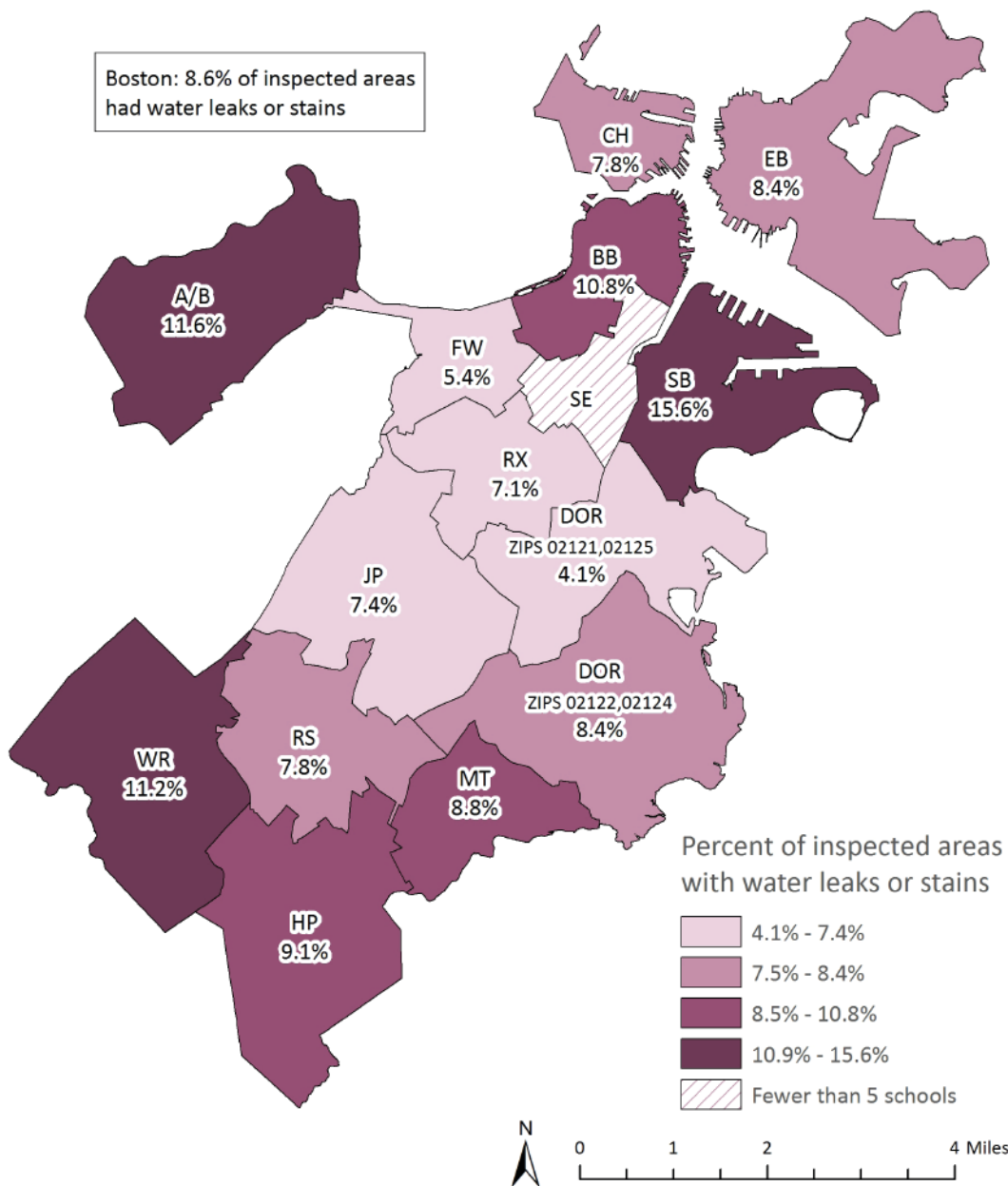
Figure 4.7 Asbestos Hazards/Violations by Year



DATA SOURCE: Environmental and Occupational Health Division, Boston Public Health Commission



Figure 4.8 Water Leaks or Stains in Boston Public Schools by Neighborhood, October 2015 - August 2016



NOTE: "BB" includes the Back Bay, Beacon Hill, Downtown, the North End, and the West End. "SE" includes the South End and Chinatown. Evidence of water leaks or stains includes (but is not limited to) water stains or discoloration on walls, floors, or ceiling tiles as well as active leaks where water is present.

DATA SOURCE: Environmental and Occupational Health Division, Boston Public Health Commission

Between October 2015 and August 2016, 128 Boston Public Schools were inspected for water leaks and stains by the Environmental and Occupational Health Division of the Boston Public Health Commission. Leaks are of concern because persistent moisture can promote mold growth as well as encourage insect or rodent infestations.

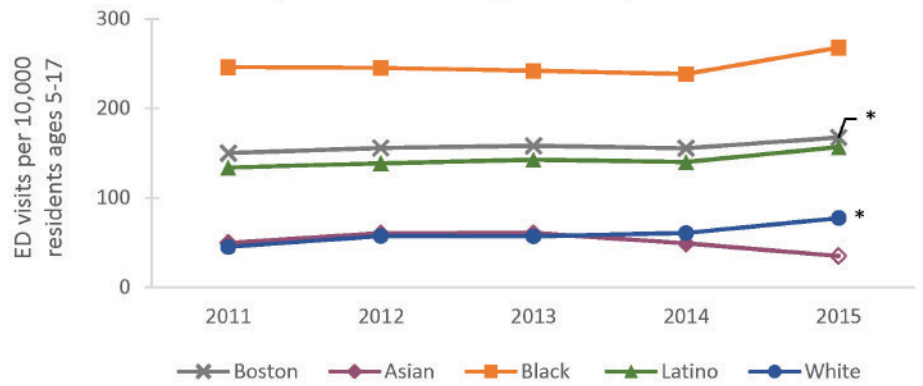
A total of 8,964 areas (classrooms, offices, hallways, etc.) from all 128 schools were accessed during the school survey. Of the 8,964 areas inspected in all schools, 769 (8.6%) were denoted as areas with water leaks or stains. Aggregated at the neighborhood level, the percentage of areas of concern with water leaks or stains ranged from 4.1% in Dorchester (zip codes 02121, 02125) to 15.6% in South Boston.



From 2011-2015, the asthma emergency department (ED) visit rate in Boston among children ages 5-17 increased by 9%. The asthma ED visit rate also increased by 58% among White children ages 5-17 over the same time period.

In 2015, the asthma ED visit rate for Black children (267.8 visits per 10,000 residents ages 5-17) was 3.5 times the rate for White children (77.3). The rate for Latino children (156.7) was 2.0 times the rate of White children. The rate was 55% lower for Asian children (35.0) compared with White children.

Figure 4.9 Asthma Emergency Department Visits Among 5- to 17-Year-Olds by Year and Race/Ethnicity

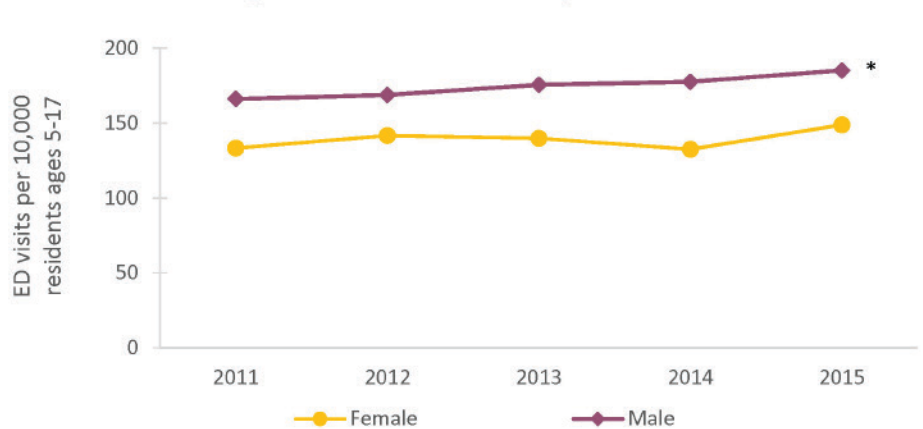


\* Statistically significant change over time

NOTE: HOLLOWED-OUT SYMBOLS represent rates based on 20 or fewer cases and should be interpreted with caution. DATA SOURCE: Acute hospital case-mix databases, Massachusetts Center for Health Information and Analysis

From 2011-2015, the asthma emergency department (ED) visit rate in Boston increased by 11% for male children ages 5-17. In 2015, the asthma ED visit rate for female children (148.9 visits per 10,000 residents ages 5-17) was 20% lower than the rate for male children (185.2).

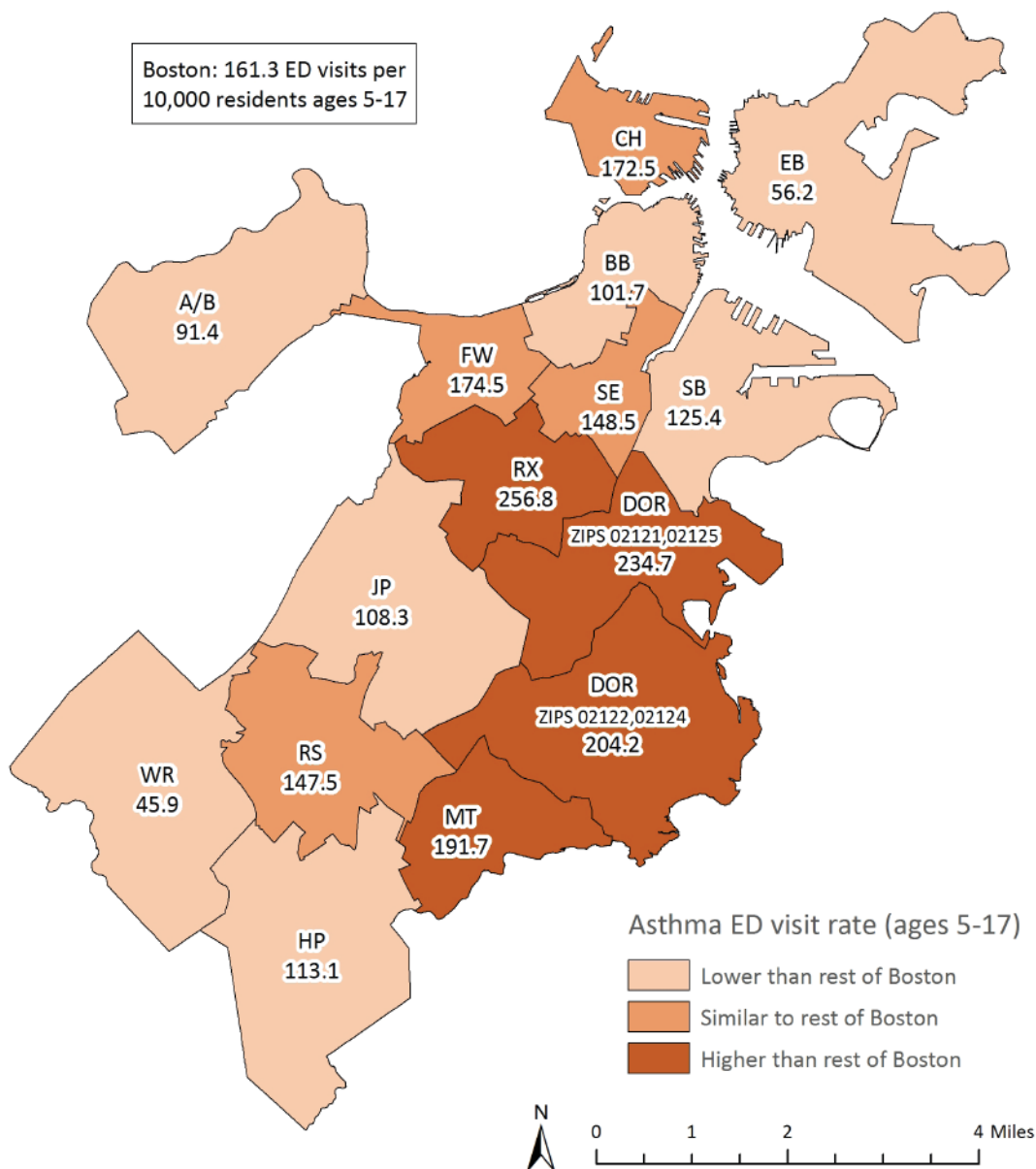
Figure 4.10 Asthma Emergency Department Visits Among 5- to 17-Year-Olds by Year and Sex



\* Statistically significant change over time

DATA SOURCE: Acute hospital case-mix databases, Massachusetts Center for Health Information and Analysis

Figure 4.11 Asthma Emergency Department (ED) Visits<sup>1</sup>  
Among 5- to 17-Year-Olds by Neighborhood, 2014-2015



<sup>1</sup> 2-year average annual rates per 10,000 residents ages 5-17

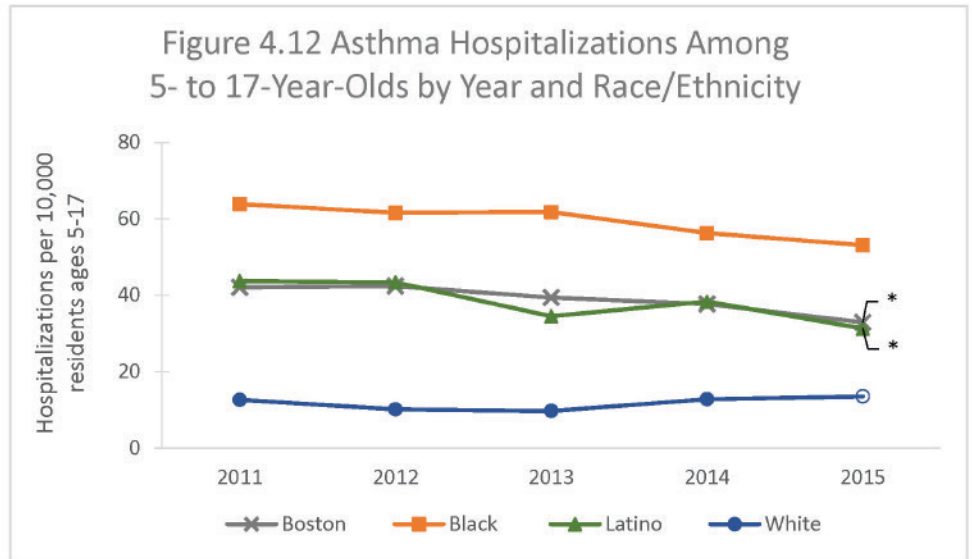
NOTE: "BB" includes the Back Bay, Beacon Hill, Downtown, the North End, and the West End.  
"SE" includes the South End and Chinatown.

DATA SOURCE: Acute hospital case-mix databases, Massachusetts Center for Health Information and Analysis

For 2014-2015, the asthma emergency department (ED) visit rates among children ages 5-17 were higher in Dorchester (zip codes 02121, 02125), Dorchester (zip codes 02122, 02124), Mattapan, and Roxbury compared with the rest of Boston. The asthma ED visit rates among children ages 5-17 were lower in Allston/Brighton, Back Bay, East Boston, Hyde Park, Jamaica Plain, South Boston, and West Roxbury compared with the rest of Boston.

From 2011-2015, the asthma hospitalization rate in Boston among all children ages 5-17 decreased by 21%. The asthma hospitalization rate also decreased by 27% for Latino children ages 5-17 over the same time period.

Despite these decreases, the asthma hospitalization rate for Black children (53.1 hospitalizations per 10,000 residents ages 5-17) in 2015 was 3.9 times the rate for White children (13.5). The rate for Latino children (31.3) was 2.3 times the rate for White children.

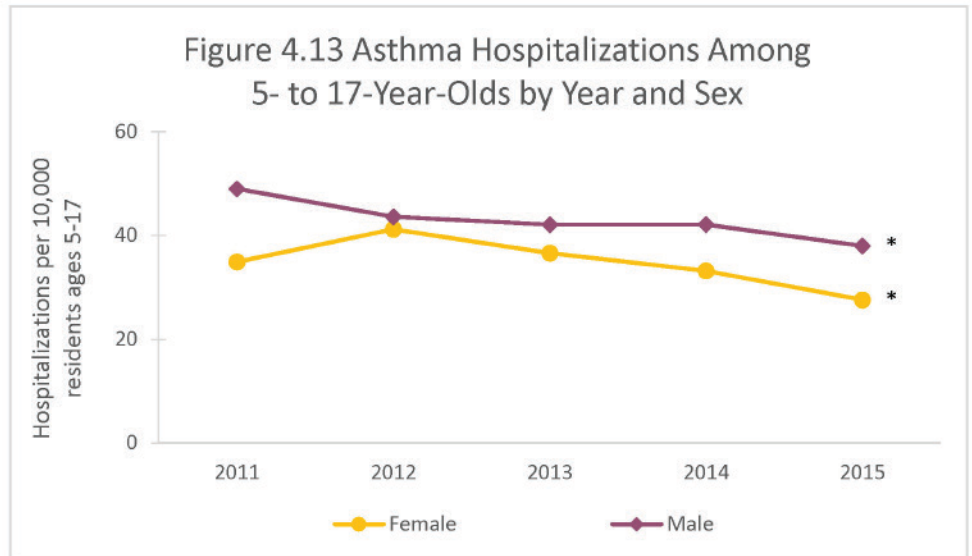


\* Statistically significant change over time

NOTE: Hollowed-out symbols represent rates based on 20 or fewer cases and should be interpreted with caution. Rates are not presented due to a small number of cases for Asian residents for 2011-2015.

DATA SOURCE: Acute hospital case-mix databases, Massachusetts Center for Health Information and Analysis

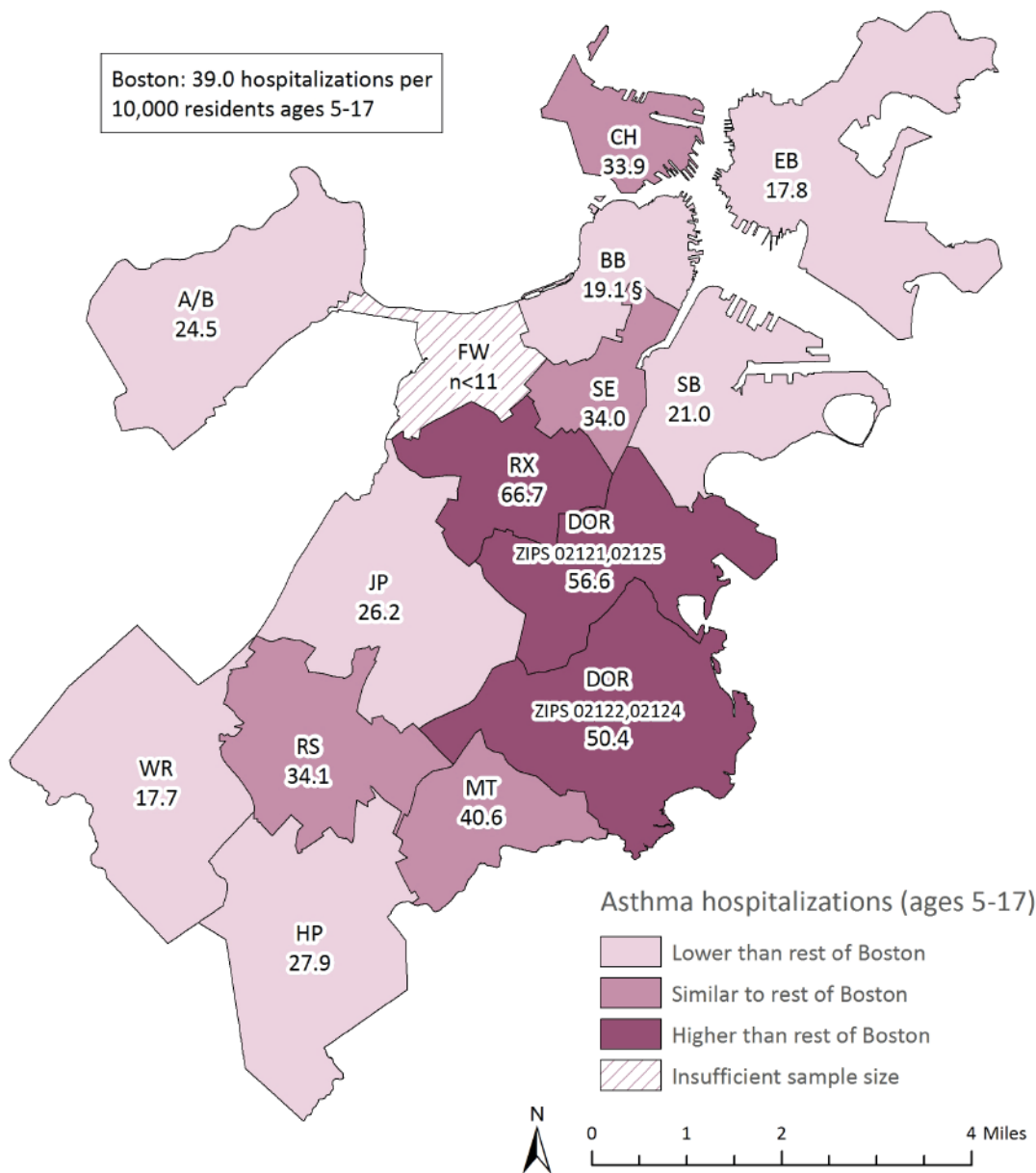
From 2011-2015, the asthma hospitalization rate for children ages 5-17 in Boston decreased by 23% for female and 20% for male children. In 2015, the asthma hospitalization rate for female children (27.6 hospitalizations per 10,000 residents ages 5-17) was 27% lower than the rate for male children (38.0).



\* Statistically significant change over time

DATA SOURCE: Acute hospital case-mix databases, Massachusetts Center for Health Information and Analysis

### Figure 4.14 Asthma Hospitalizations<sup>1</sup> Among 5- to 17-Year-Olds by Neighborhood, 2011-2015



<sup>1</sup>5-year average annual rates per 10,000 residents ages 5-17

§ Rates are based on 20 or fewer cases and should be interpreted with caution.

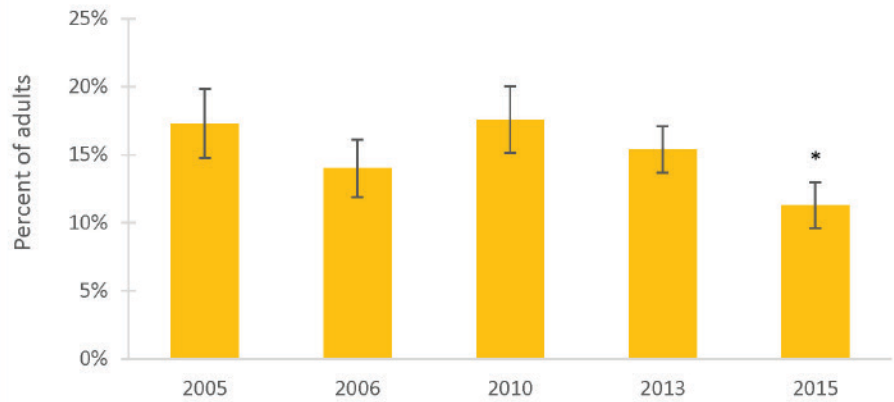
NOTE: "BB" includes the Back Bay, Beacon Hill, Downtown, the North End, and the West End.  
 "SE" includes the South End and Chinatown.

DATA SOURCE: Acute hospital case-mix databases, Massachusetts Center for Health Information and Analysis

For 2011-2015, the asthma hospitalization rates among children ages 5-17 were higher in Dorchester (zip codes 02121, 02125), Dorchester (zip codes 02122, 02124), and Roxbury compared with the rest of Boston. The asthma hospitalization rates among children ages 5-17 were lower in Allston/Brighton, Back Bay, East Boston, Hyde Park, Jamaica Plain, South Boston, and West Roxbury compared with the rest of Boston.

In 2015, 11% of Boston adult residents reported exposure to secondhand tobacco smoke at home in the past week. There was a significant decrease in the percentage of adults who reported exposure to secondhand tobacco smoke at home between 2005 and 2015.

Figure 4.15 Adults Who Reported Secondhand Tobacco Smoke Exposure at Home by Year

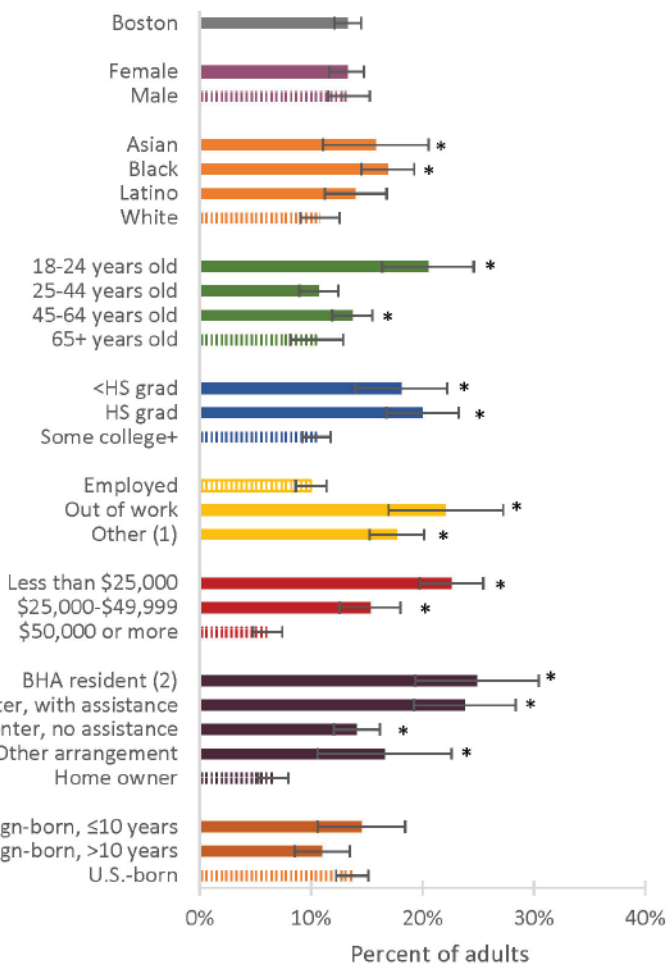


\* Statistically significant change over time

DATA SOURCE: Boston Behavioral Risk Factor Survey (2005, 2006, 2010, 2013, 2015), Boston Public Health Commission



Figure 4.16 Adults Who Reported Secondhand Tobacco Smoke Exposure at Home by Selected Indicators, 2013 and 2015 Combined



\* Statistically significant difference when compared to reference group  
 (1) Includes homemakers, students, retirees, and those unable to work  
 (2) Boston Housing Authority resident

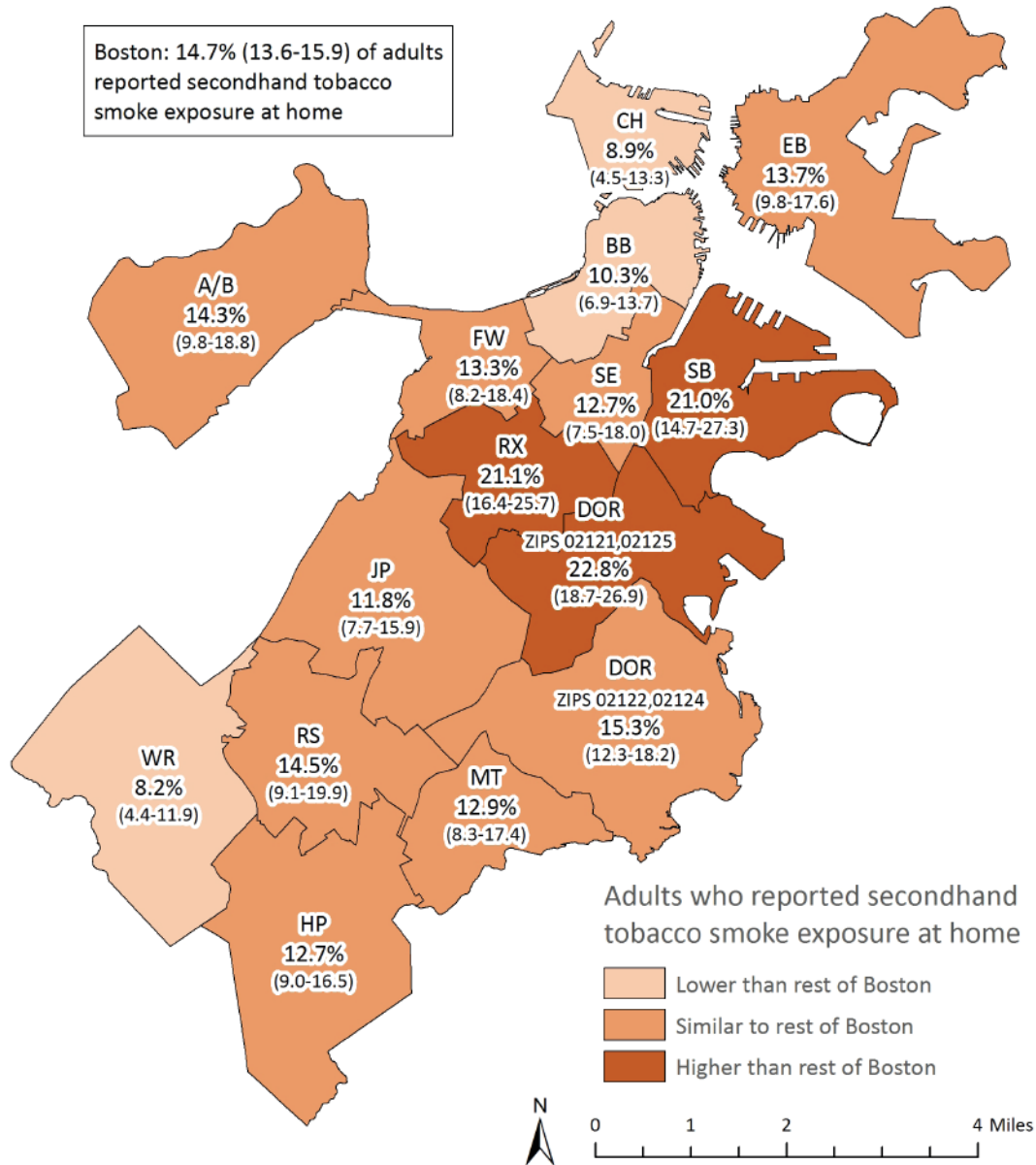
NOTE: Bars with patterns indicate the reference group within each selected indicator.  
 DATA SOURCE: Boston Behavioral Risk Factor Survey (2013, 2015), Boston Public Health Commission

During 2013 and 2015 combined, 13% of Boston adult residents reported secondhand tobacco smoke exposure at home in the past week.

The percentage of adults who reported secondhand tobacco smoke exposure at home was higher for the following groups:

- Black (17%) and Asian (16%) adults compared with White adults (11%)
- Adults ages 18-24 (21%) and 45-64 (14%) compared with adults ages 65 and older (11%)
- Adults with less than a high school diploma (18%) and adults with a high school diploma (20%) compared with adults with some college education (11%)
- Adults who were out of work (22%) or whose employment status was "other" (18%) compared with adults who were employed (10%)
- Adults living in households with an annual income of less than \$25,000 (23%) or \$25,000-\$49,999 (15%) compared with adults living in households with an annual income of \$50,000 or more (6%)
- Adults who were Boston Housing Authority residents (25%), who received rental assistance (24%), who rented but did not receive rental assistance (14%), or who lived in "other arrangements" (17%) compared with adults who owned their home (7%)

Figure 4.17 Adults Who Reported Secondhand Tobacco Smoke Exposure at Home by Neighborhood, 2010, 2013, and 2015 Combined

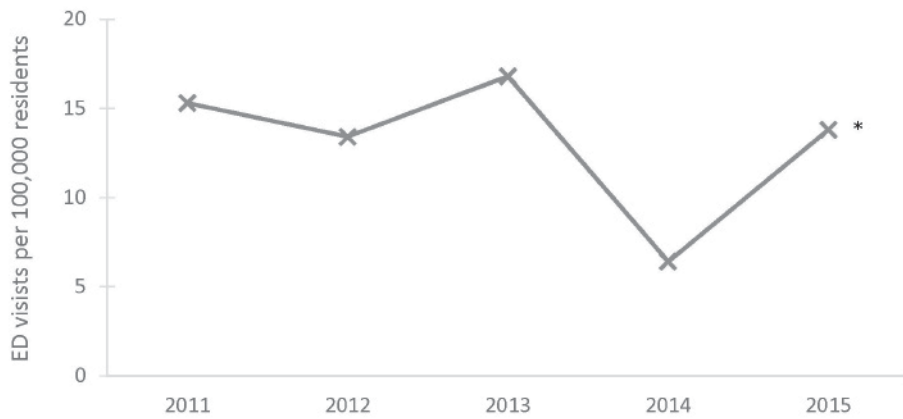


NOTE: "BB" includes the Back Bay, Beacon Hill, Downtown, the North End, and the West End.  
 "SE" includes the South End and Chinatown.

DATA SOURCE: Boston Behavioral Risk Factor Survey (2010, 2013, 2015), Boston Public Health Commission

For 2010, 2013, and 2015 combined, a higher percentage of adult residents in Dorchester (zip codes 02121, 02125), Roxbury, and South Boston reported exposure to secondhand tobacco smoke in the past week compared with the rest of Boston. Lower percentages of adults in the Back Bay, Charlestown, and West Roxbury reported secondhand tobacco smoke exposure in the past week compared with the rest of Boston.

Figure 4.18 Carbon Monoxide Poisoning  
Emergency Department Visits† by Year



\* Statistically significant change over time

† Age-adjusted rates per 100,000 residents

DATA SOURCE: Acute hospital case-mix databases, Massachusetts Center for Health Information and Analysis

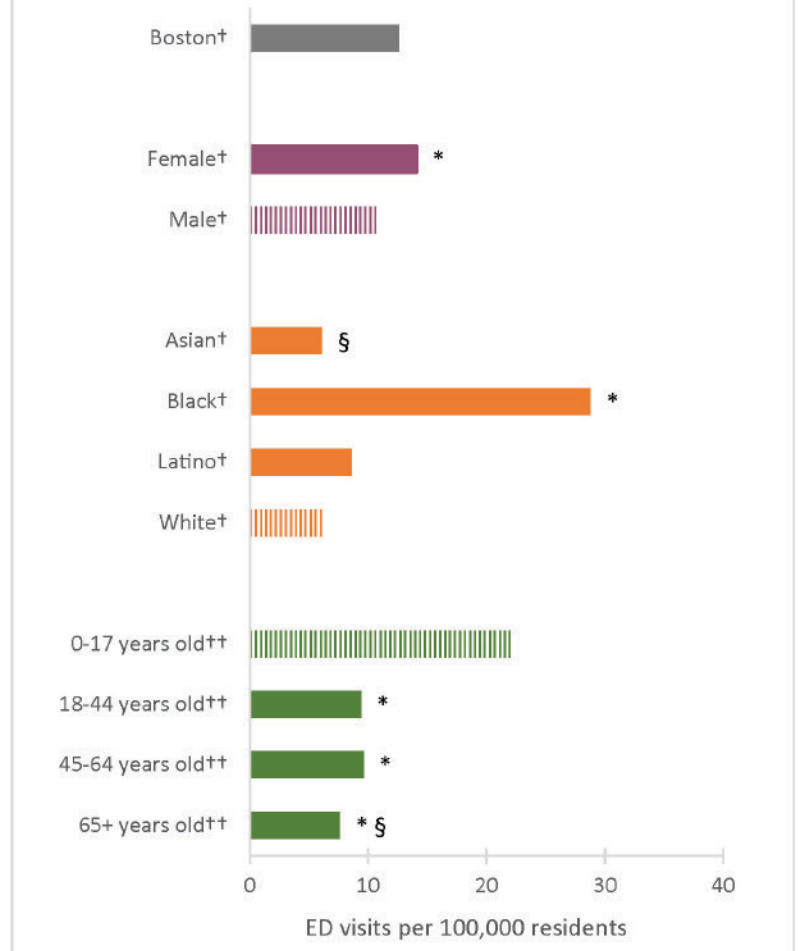
In 2015, the rate of emergency department visits for confirmed carbon monoxide poisonings in Boston was 13.8 visits per 100,000 residents. Between 2011 and 2015, the rate decreased by 26%.





For 2012-2015, the emergency department visit rate for confirmed carbon monoxide poisonings was 12.6 visits per 100,000 residents. The rate for females (14.1) was 30% higher than the rate for males (10.8). The rate was 4.6 times higher for Black residents (28.8) than for White residents (6.2). The rates were lower for residents ages 18-44 (9.4), 45-64 (9.6), and 65 and older (7.6) compared with those under age 18 (22.2).

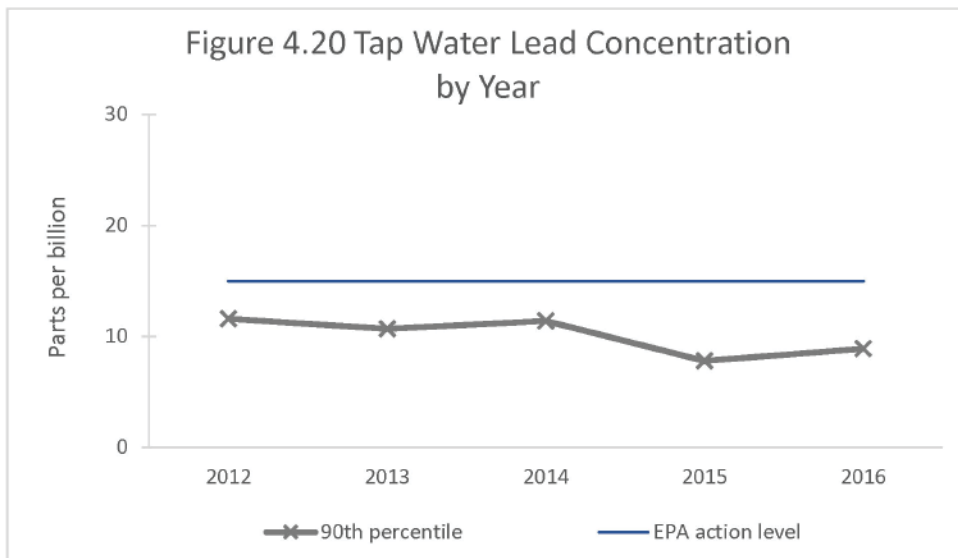
Figure 4.19 Carbon Monoxide Poisoning Emergency Department Visits by Selected Indicators, 2012-2015



\* Statistically significant difference when compared to reference group  
 † 4-year average annual age-adjusted rates per 100,000 residents  
 †† 4-year average annual rates per 100,000 residents  
 § Rates based on 20 or fewer cases should be interpreted with caution.

NOTE: Bars with patterns indicate the reference group within each selected indicator.  
 DATA SOURCE: Acute hospital case-mix databases, Massachusetts Center for Health Information and Analysis

Figure 4.20 Tap Water Lead Concentration  
by Year



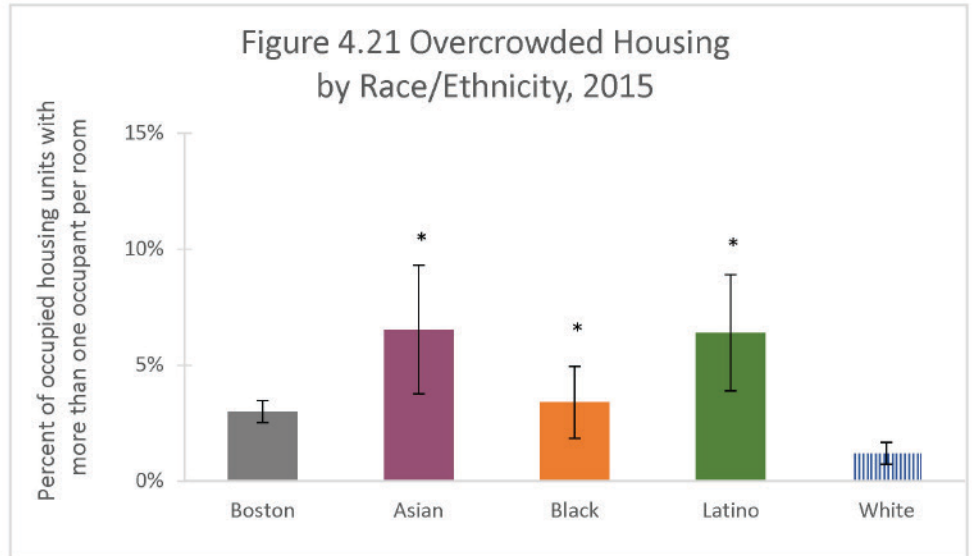
DATA SOURCE: Boston Water and Sewer Commission

Under U.S. Environmental Protection Agency (EPA) rules, each year your local water department must test water in homes that are likely to have high lead levels. The homes sampled are considered higher risk for high lead levels because they have a lead service line or they had water service lines installed in 1983, 1984, or 1985. The requirement is that 90% of the sampled homes must have lead levels below the lead action level of 15 parts per billion.

In 2016, 90% of the sampled homes had tap water lead concentrations at or below 8.9 parts per billion. Since 2012, sampling rounds in Boston have been below the EPA action level.



In 2015, compared with White householder housing units (1%) (e.g. apartments, condos, single family houses), higher percentages of Asian (7%), Black (3%), and Latino (6%) householder housing units were overcrowded (i.e. had more than one occupant per room).

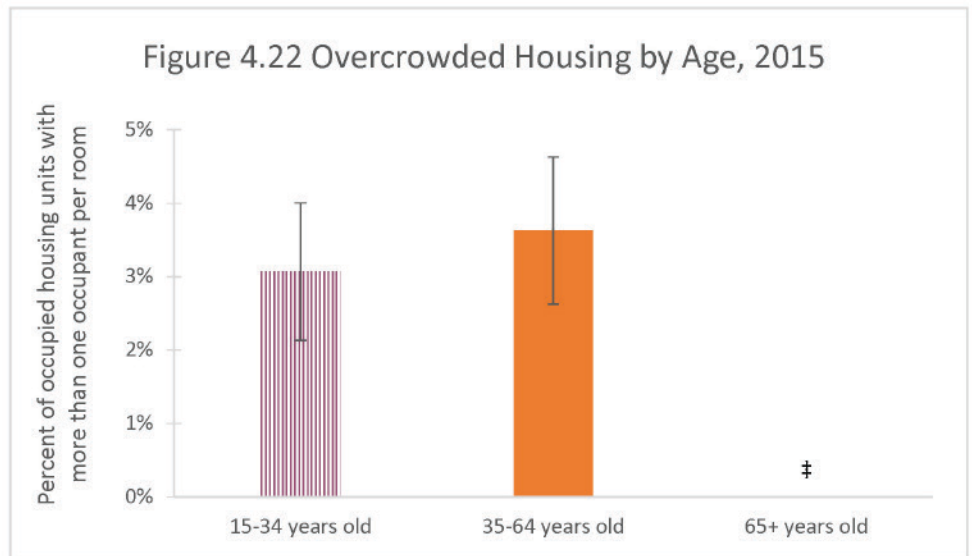


\* Statistically significant difference when comparisons are made between racial/ethnic groups

NOTE: Bars with patterns indicate the reference group within each selected indicator. Due to limited data availability, data for Asian residents includes individuals who identified as Latino (less than 1% of Asian residents identified as Latino).

DATA SOURCE: American Community Survey, 2015, U.S. Census Bureau

In 2015, there were no significant differences by age of householder in percentages of housing units with more than one occupant per room.

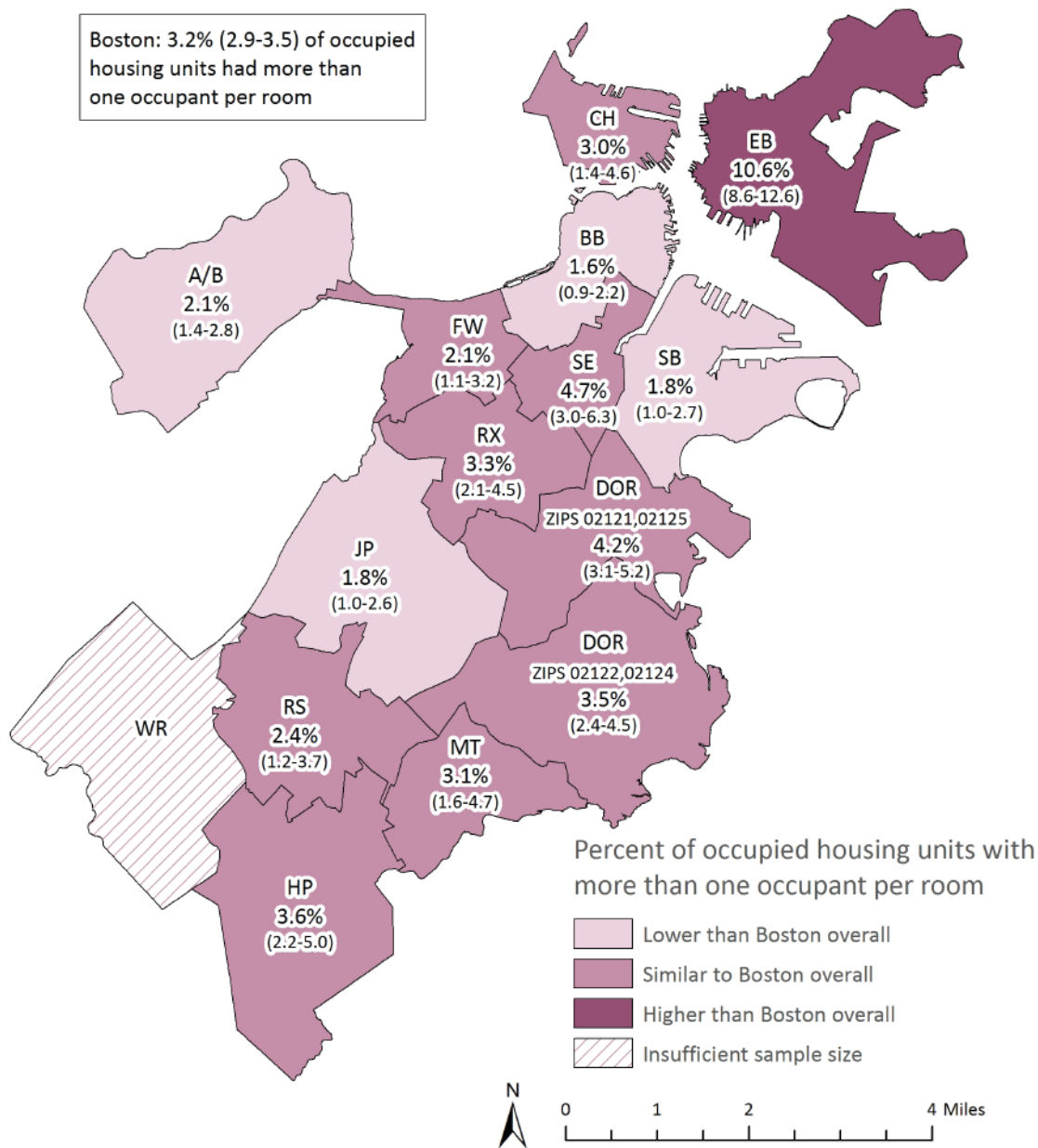


‡ Data not presented due to insufficient sample size

NOTE: Bars with patterns indicate the reference group for statistical testing within each selected indicator.

DATA SOURCE: American Community Survey, 2015, U.S. Census Bureau

### Figure 4.23 Overcrowded Housing by Neighborhood, 2011-2015



NOTE: "BB" includes the Back Bay, Beacon Hill, Downtown, the North End, and the West End.  
 "SE" includes the South End and Chinatown.

DATA SOURCE: American Community Survey, 2011-2015, U.S. Census Bureau

For 2011-2015, 3% of occupied housing units in Boston had more than one occupant per room. A higher percentage of occupied housing units in East Boston had more than one occupant per room compared with Boston overall. Lower percentages of occupied housing units in Allston/Brighton, Back Bay, Jamaica Plain, and South Boston had more than one occupant per room compared with Boston overall.

## Climate Change and Health

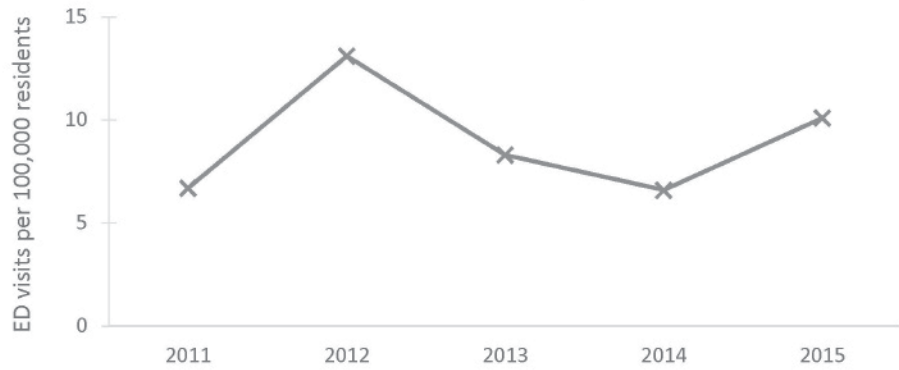
Widespread scientific consensus is that the world's climate is changing as evidenced by more variable weather, heat waves, heavy precipitation events, flooding, droughts, more intense storms, sea level rise, and air pollution (27). The impact of climate change may have already been felt locally. The Climate Ready Boston Initiative, launched by the City of Boston, published a report in December 2016 with several key findings addressing the impact of climate change factors in Boston (28). While sea levels for Boston rose about 9 inches relative to land over the entire 20th century, another 8 inches of relative sea level rise may happen by 2030 (28). Climate Ready Boston also reports that the rate of increase in average temperatures in Boston is accelerating, and that the average summer temperatures and number of days with extreme heat will increase (28). From 1958 to 2010, there was a 70 percent increase in the amount of precipitation in the Northeastern U.S. that fell on the days with the heaviest precipitation. Climate Ready Boston reports that the increase in extreme precipitation is expected to continue (28).

Each of these impacts could negatively affect public health (27). Climate change, either directly or in combination with other natural and human-made health stressors, influences human health and disease in numerous ways. In the U.S., public health can be affected by disruptions (originating here or elsewhere) of physical, biological, and ecological systems, all of which may lead to increased hospitalizations and emergency room visits for cardiorespiratory disease and mental illness, injuries and premature deaths related to extreme weather events, changes in the prevalence and geographical distribution of food- and water-borne illnesses and other infectious diseases (29). Much research has centered on evaluating the association between outdoor temperature and health. It is well-established that colder and hotter outdoor temperature (under both moderate and extreme conditions) is associated with daily mortality (30, 31). Every year, a large number of hospitalizations are also associated with exposure to extreme outdoor temperatures, especially during heat waves and cold spells (32-36).

Though the experience of climate change is often shared among an entire population, not everyone is equally at risk of having a related poor health outcome. Age, economic resources, location, and other factors all contribute to differential impact that climate change may have on health (29). For example, population groups that are more vulnerable to heat waves or extreme hot weather conditions include individuals who are elderly, poorer, lesser educated, non-White, have pre-existing health conditions (e.g. cardiovascular disease, diabetes, renal disease, or respiratory conditions), have no access to air conditioning, and who live in neighborhoods with limited access to green space (37).

In this section of the report we will summarize emergency department visits for heat and cold-related illness.

Figure 4.24 Heat-Related Illness Emergency Department Visits† During Warm-Weather Months by Year



† Age-adjusted rates per 100,000 residents

NOTE: Warm-weather months are defined as May, June, July, August, and September.

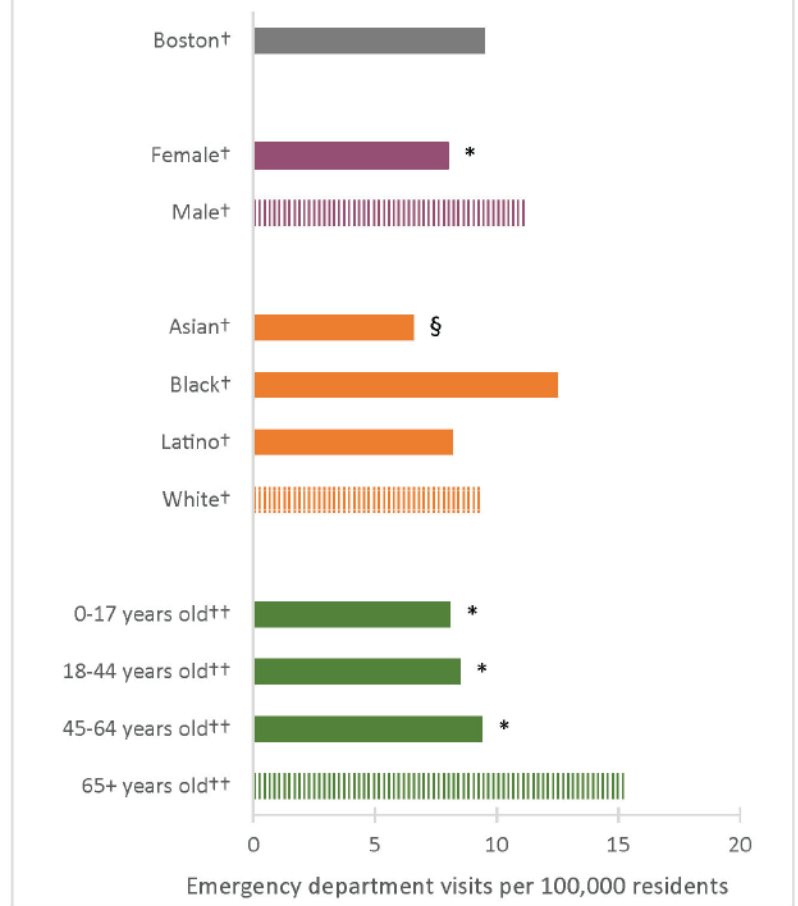
DATA SOURCE: Acute hospital case-mix databases, Massachusetts Center for Health Information and Analysis

In 2015, the rate of heat-related illness emergency department (ED) visits during warm-weather months in Boston was 10.1 per 100,000 residents. The rate of heat-related illness ED visits did not significantly change from 2011 to 2015.



For 2012-2015, the rate of heat-related illness emergency department visits in Boston during warm-weather months was 9.5 per 100,000 residents. The rate was 29% lower for females (8.0) compared with males (11.2). The rate was lower for all age groups compared with those ages 65 and older (15.2).

Figure 4.25 Heat-Related Illness Emergency Department Visits During Warm-Weather Months by Selected Indicators, 2012-2015



\* Statistically significant difference when compared to reference group

† 4-year average annual age-adjusted rates per 100,000 residents

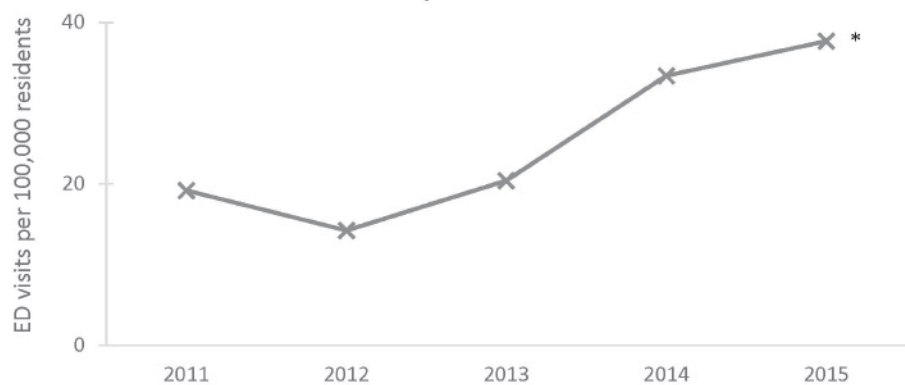
†† 4-year average annual rates per 100,000 residents

§ Rates are based on 20 or fewer cases and should be interpreted with caution.

NOTE: Bars with patterns indicate the reference group within each selected indicator. Warm-weather months are defined as May, June, July, August, and September.

DATA SOURCE: Acute hospital case-mix databases, Massachusetts Center for Health Information and Analysis

Figure 4.26 Cold-Related Illness Emergency Department Visits† During Cold-Weather Months by Year



\* Statistically significant change over time  
 † Age-adjusted rates per 100,000 residents

NOTE: Cold-weather months are defined as November, December, January, February, and March.  
 DATA SOURCE: Acute hospital case-mix databases, Massachusetts Center for Health Information and Analysis

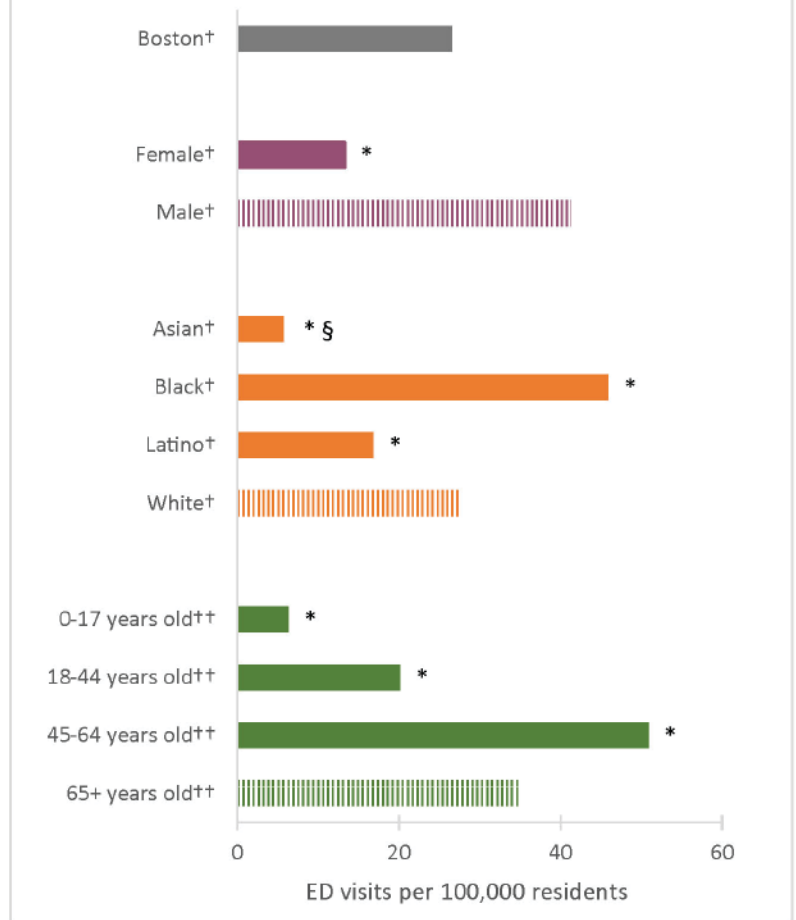
In 2015, the rate of cold-related illness emergency department (ED) visits in Boston during cold-weather months was 37.7 per 100,000 residents. The rate of cold-related illness ED visits increased 2.5 times from 2011 to 2015.





For 2012-2015, the rate of cold-related illness emergency department (ED) visits during cold-weather months for Boston was 26.5 per 100,000 residents. Approximately 51% of all cold-related illness ED visits during this time period indicate that the patient was homeless. The rate was 68% lower for females (13.3) compared with males (41.2). The rate was 67% higher for Black residents (45.9) compared with White residents (27.5). The rate was 79% and 39% lower for Asian (5.7) and Latino (16.8) residents, respectively, compared with White residents. The rate was lower for residents ages 0-17 (6.3) and 18-44 (20.1), and higher for ages 45-64 (50.9) compared with those ages 65 and older (34.8).

Figure 4.27 Cold-Related Illness Emergency Department Visits During Cold-Weather Months by Selected Indicators, 2012-2015



\* Statistically significant difference when compared to reference group

† 4-year average annual age-adjusted rates per 100,000 residents

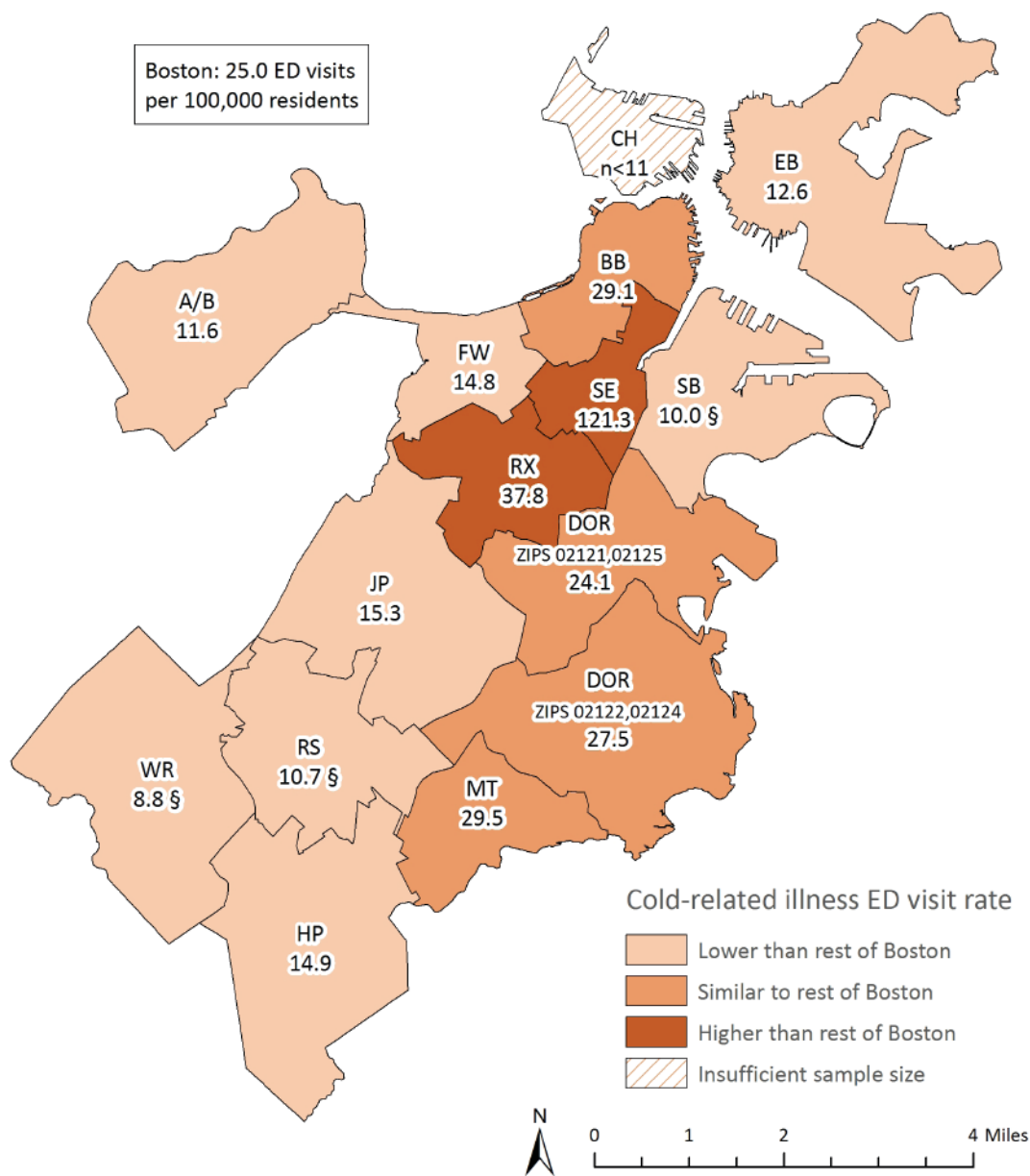
†† 4-year average annual rates per 100,000 residents

§ Rates are based on 20 or fewer cases and should be interpreted with caution.

NOTE: Bars with patterns indicate the reference group within each selected indicator. Cold-weather months are defined as November, December, January, February, and March.

DATA SOURCE: Acute hospital case-mix databases, Massachusetts Center for Health Information and Analysis

Figure 4.28 Cold-Related Illness Emergency Department (ED) Visits† During Cold-Weather Months by Neighborhood, 2011-2015



† 5-year average annual age-adjusted rates per 100,000 residents  
 § Rates are based on 20 or fewer cases and should be interpreted with caution.

NOTE: “BB” includes the Back Bay, Beacon Hill, Downtown, the North End, and the West End. “SE” includes the South End and Chinatown. Cold-weather months are defined as November, December, January, February, and March.

DATA SOURCE: Acute hospital case-mix databases, Massachusetts Center for Health Information and Analysis

For 2011-2015, the cold-related illness emergency department visit rate during cold-weather months was higher in Roxbury and the South End compared with the rest of Boston. The rate was lower in Allston/Brighton, East Boston, Fenway, Hyde Park, Jamaica Plain, Roslindale, South Boston and West Roxbury compared with the rest of Boston.

## Summary

According to data collected by state and local agencies, outdoor PM<sub>2.5</sub> levels and lead levels in home tap water originating from the public drinking water supply met the standards and action level, respectively, set forth by the U.S. Environmental Protection Agency. There was a significant decrease in the percentage of adult residents reporting secondhand tobacco smoke exposure at home from 2005 to 2015. Among all residents, the rate of emergency department (ED) visits for confirmed carbon monoxide poisonings decreased by 26%. Among residents ages 5 to 17 years, who spend much of their time inside schools, the rate of asthma hospitalizations decreased by 21% in the same time period. However, some indicators worsened over time. Among all residents, the rate of ED visits for cold-related illness increased by two and half times from 2011 to 2015. The rate of ED visits for asthma among residents of ages 5 to 17 years also increased by 9% in the same time period.

Inequities across categories of age, sex, and race/ethnicity were observed. During 2012 to 2015, the rates of ED visits for heat-related illness and confirmed carbon monoxide poisonings were highest among residents ages 65 and older and among residents under age 18, respectively. During the same time period, the rate of ED visits for heat and cold-related illness was higher in males than females. Across categories of race/ethnicity, higher percentages of Asian and Black residents reported secondhand tobacco smoke exposure at home compared with White residents in 2013 and 2015 combined. In 2015, higher percentages of Asian, Black, and Latino householder units also reported overcrowded housing than White householder units. During 2012 to 2015, Black residents also had higher rates of ED visits for cold-related illness and confirmed carbon monoxide poisonings than White residents.

At the neighborhood level, the rate of ED visits for cold-related illness during 2011 to 2015 was higher in the South End and Roxbury compared to the rest of Boston. The higher rate observed in the South End may be explained, at least partially, by the frequency of homelessness observed in the neighborhood. Survey data collected between 2010 and 2015 also indicated that higher percentages of secondhand tobacco smoke exposure at home were found for Dorchester (zip codes 02121, 02125), Roxbury, and South Boston. Lastly, a higher percentage of overcrowded housing was also observed for East Boston during 2011 to 2015 compared with Boston overall.

# Environmental Health

## Cold-weather-related illness emergency department visits increased



**2.5** times from 2011 to 2015



**51%** of these visits were among homeless patients

## Outdoor air quality



Annual and daily fine particulate matter pollution levels from 2005 to 2015 in Boston were **lower** than U.S. EPA standards.

The percentage of adult residents who reported secondhand tobacco smoke exposure at home decreased from **17%** in 2005 to **11%** in 2015.



## Our Point of View: Thoughts from a community resident

### Protecting my employees and community at the same time

By Juan Chavez

Juan Chavez is the owner of Moreno Auto Collision in Roslindale, a long-time member of the BPHC's Green & Clean business recognition program for replacing toxic chemicals and processes with safer alternatives.

My name is Juan Chavez. I am the President of Moreno Auto Collision. We repair cars after accidents – no matter how big or small the accident is. I joined the Boston Public Health Commission's Green and Clean program almost 10 years ago because I want to do what I can to protect myself, my workers and the people living in the neighborhood around us. We've made a lot of changes based on BPHC's recommendations.

One of the big changes we've made is switching to products that are safer. We've also started to buy more items that can be recycled because it's better for the environment. To improve our work environment, we started using a vacuum cleaner especially in the summer when we have to work with the doors open to clean up the dust and keep it from getting into the air outside.

Sometimes it's hard to make changes if you're not 100% sure it will make a difference but when I looked at the recommendations that BPHC makes I know that they're better for me, my shop and the neighborhood. There are still more changes I'd like to make. For example, I would like to move from using a solvent-based paint to a water-based paint system in the next five years. It's more expensive but it's better for everyone using it. Making changes like these will mean I can continue do this work for a long time.

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# Chapter 5

## Access to Care





# Access to Care

Access to health care – or the “the timely use of personal health services to achieve the best possible health outcomes” – is linked to a long list of better health outcomes, from healthy babies to higher vaccination rates to earlier cancer diagnosis (1-6). Adequate and affordable health care is essential to preventing and managing disease at every age. Beyond geographic proximity to health services – which is already a benefit for Boston residents – improving access to health care today also means we consider language, education, the cost of medical insurance, and other social, economic, and environmental factors (7). A lack of consistent medical and preventative care leads to sicker individuals who require more resources. This contributes to rising healthcare costs and stressed emergency medical care systems (8). This pattern further contributes to health inequities.

Although health care providers intend to provide equal treatment to all, bias among providers has been shown to negatively impact patients (9-11). For example, studies suggest that physicians unknowingly offer different treatment options based on the patient’s race, even when patients have similar symptoms (10-13). Patients are accessing care but being treated differently. These race-based differences may be reduced if physicians recognize they are susceptible to unconscious bias, especially when interacting with their patients and writing prescriptions (11, 13). The bias among providers and the resulting differences in treatment may also contribute to health inequities (14).

## Insurance Coverage

Most of the data in this chapter focuses on insurance coverage, the most readily available public health data. Thanks to comprehensive health reform in 2006, Massachusetts has near-universal insurance coverage. This remarkable achievement is a result of a system in which the responsibility for health insurance is shared by individuals, their employers, and government (15). Massachusetts succeeded in expanding coverage to nearly all of its residents and has the lowest percentage of uninsured in the U.S. – only 2.8% of MA residents were uninsured in 2015 compared to 9.4% nationally (16).

Nationally, inequities by race and ethnicity were found in insurance coverage. In 2015, the percentage of uninsured was higher for Black (11.0%) and Latino (19.5%) individuals than for White individuals (6.3%) (17).

In Boston, however, approximately 4% of residents were uninsured in 2015, and that percentage did not differ by racial/ethnic group (Figure 5.2). This overall low rate of uninsured individuals and lack of inequity by race and ethnicity is a result of state and federal health care reform that expanded health insurance coverage (18). However, many population groups still experience inequities in health insurance coverage. For example, in Boston, the percentage of uninsured individuals was higher among residents with low household income (less than \$50,000) and among residents born outside of the U.S. (Figure 5.3).

While insurance coverage is reaching new heights, being underinsured – having insurance but with high deductibles or co-pays – is a reality for many Americans. In 2014, 23% of those who had insurance in the U.S. were underinsured (8, 19).

### Use of Health Services

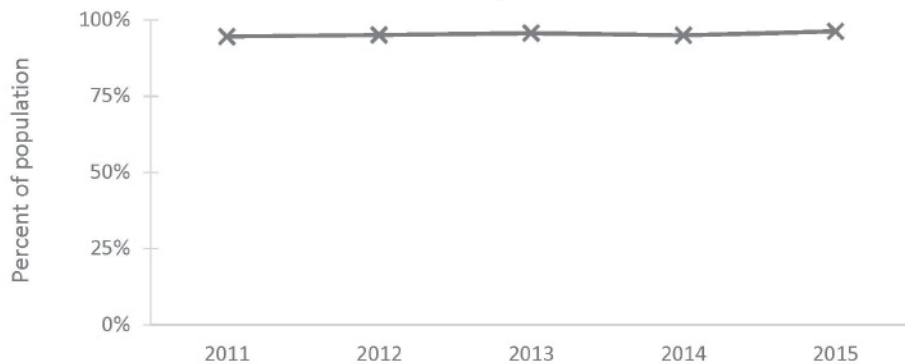
Access to care is also measured by the use of medical services. Boston is home to world-renowned teaching hospitals and over 20 community health centers, yet many residents still do not get routine health screenings or exams. In this report, we look at Bostonians who have a primary care provider, have a regular place to go for care, as well as have the ability to pay for health care. Nationally, in 2015, approximately 79% of adults reported having a doctor or health care provider. Twelve percent of adults reported inability to see a doctor in the past 12 months because of cost (20). And, approximately 12% of the population do not have a usual place to go for medical care (21). Barriers and perceived barriers to participating in the health-care system are faced by low-income residents, immigrants, those whose primary language is not English, and the uninsured and underinsured (22-24).

### Dental Insurance

Access to oral health care is often overlooked. Tooth decay (cavities) is one of the most common chronic conditions in the U.S. Poor oral health has been linked with other chronic diseases, including diabetes and heart disease. Just over a quarter of U.S. adults have untreated tooth decay (25). Nearly half (46%) of U.S. adults over age 30 have gum disease, and approximately 9% of U.S. adults suffer from severe gum disease (25). According to the 2014 BRFSS, approximately 43% of U.S. adults reported having had permanent teeth removed (20). The 2014 BRFSS also indicate that approximately 35% of U.S. adults reported not having visited a dentist or dental clinic in the past year (20). There is evidence that access to dental services is unequally experienced by low-income residents and members of some racial and ethnic groups. For example, approximately 3 in 4 Latino and Black U.S. adults have an unmet need for dental treatment (25). Access to regular dental care provides an opportunity for the early diagnosis, prevention, and treatment of oral diseases and conditions (26).

In this section of the report, we closely examine insurance coverage, health care access, dental insurance coverage, and tooth loss (often a consequence of limited dental care).

Figure 5.1 Boston Population with Health Insurance by Year



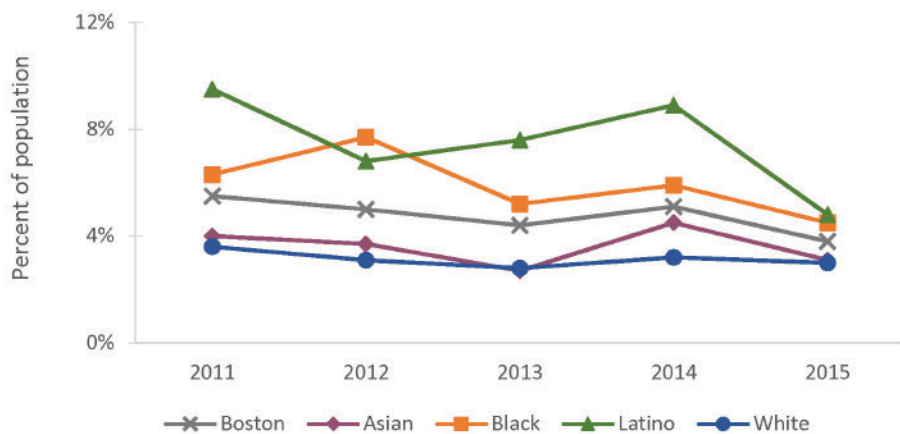
In 2015, 96% of Boston residents had health insurance.

NOTE: See appendix for confidence intervals for point estimates.

DATA SOURCE: American Community Surveys, 2011, 2012, 2013, 2014, 2015, U.S. Census Bureau



Figure 5.2 Uninsured by Race/Ethnicity and Year



In 2015, 4% of Boston residents were uninsured. In 2015, there were no significant differences by race/ethnicity in the percentage of the population without health insurance.

NOTE: See appendix for confidence intervals for point estimates. Due to limited data availability, data for Asian residents includes individuals who identified as Latino (less than 1% of Asian residents identified as Latino).

DATA SOURCE: American Community Surveys, 2011, 2012, 2013, 2014, 2015, U.S. Census Bureau

During the combined years of 2011-2015, 5% of Boston residents had no health insurance coverage.

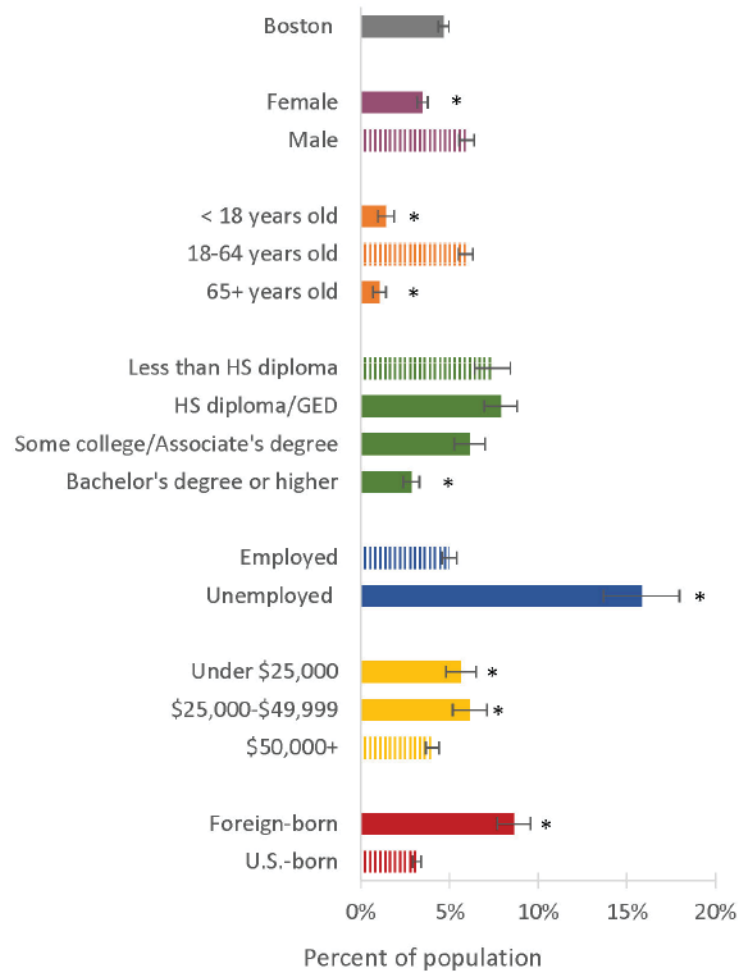
Higher percentages of uninsured residents occurred in the following groups:

- Unemployed residents (16%) compared with employed residents (5%)
- Residents with household income under \$25,000 (6%) or \$25,000-\$49,000 (6%) compared with those with an income of \$50,000 or more (4%)
- Residents born outside of the United States (9%) compared with residents born in the United States (3%)

Lower percentages of uninsured residents occurred in the following groups:

- Females (4%) compared with males (6%)
- Residents under age 18 (1%) and ages 65 and older (1%) compared with residents ages 18-64 (6%)
- Residents with a Bachelor's degree or higher (3%) compared with those with less than a high school education (7%)

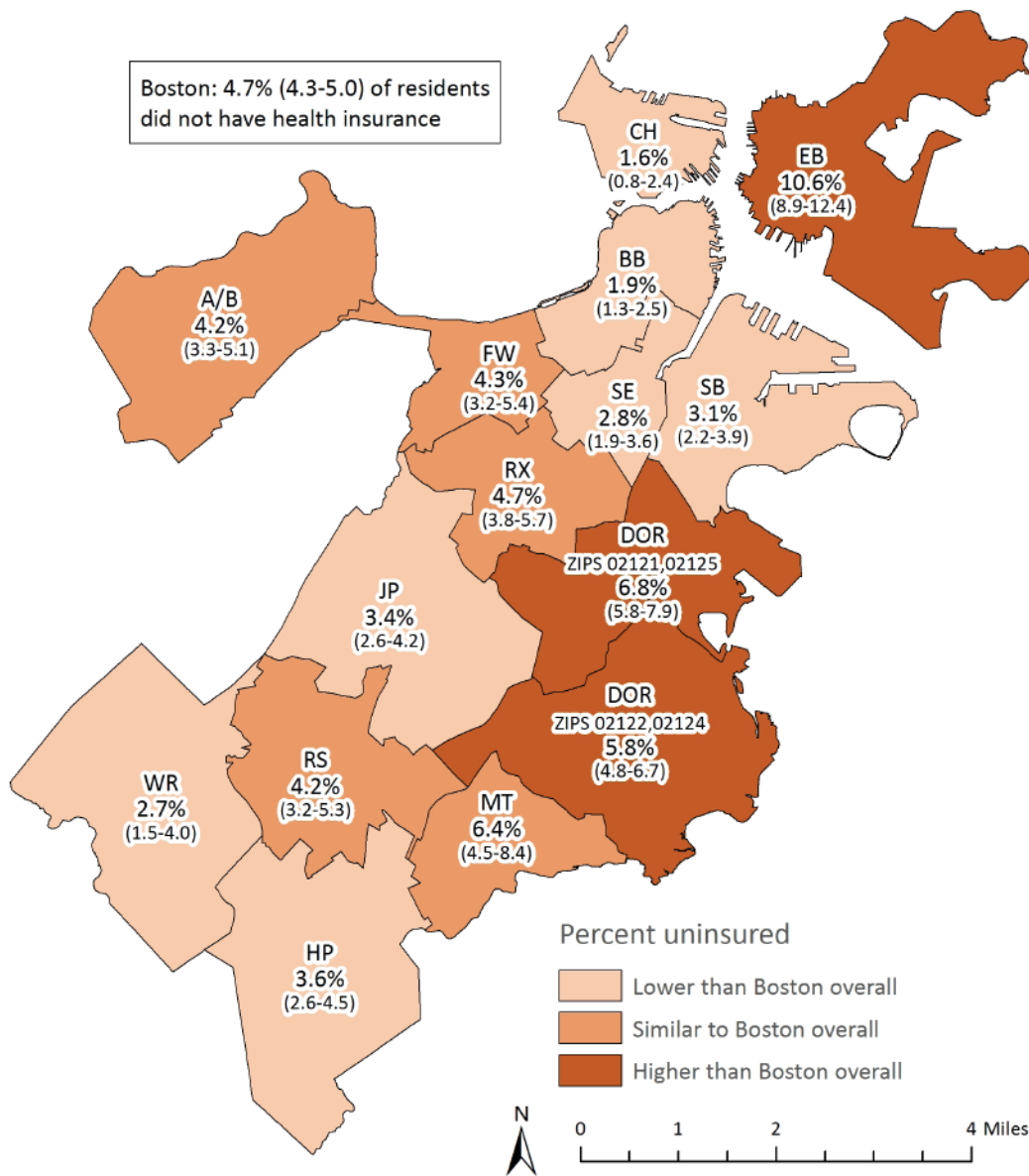
Figure 5.3 Uninsured by Selected Indicators, 2011-2015



\* Statistically significant difference when compared to reference group

NOTE: Bars with patterns indicate the reference group within each selected indicator. Education is among adults ages 25 and older. Employment status is among adults ages 18 and older. Household income is among residents living in households. DATA SOURCE: American Community Survey, 2011-2015, U.S. Census Bureau

### Figure 5.4 Uninsured by Neighborhood, 2011-2015



NOTE: "BB" includes the Back Bay, Beacon Hill, Downtown, the North End, and the West End. "SE" includes the South End and Chinatown.

DATA SOURCE: American Community Survey, 2011-2015, U.S. Census Bureau

During 2011-2015, Back Bay, Charlestown, Hyde Park, Jamaica Plain, South Boston, the South End, and West Roxbury had a lower percentage of uninsured residents compared with Boston overall. In the same time period, Dorchester (zip codes 02121, 02125), Dorchester (zip codes 02122, 02124), and East Boston had a higher percentage of residents without health insurance compared with Boston overall.

During 2013 and 2015 combined, 9% of Boston adult residents reported needing to see a doctor but were unable to do so because of cost.

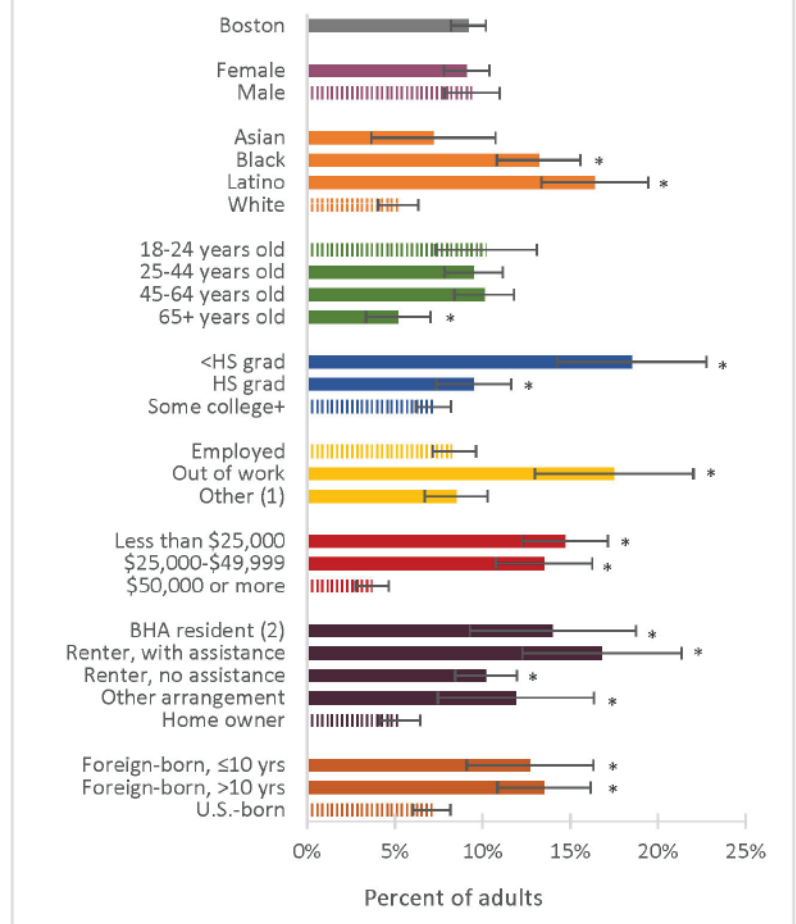
The percentage of adults who could not afford a doctor was higher for the following groups:

- Black (13%) and Latino (16%) adults compared with White adults (5%)
- Adults with less than a high school diploma (19%) or a high school diploma (10%) compared with adults with at least some college education (7%)
- Adults who were out of work (18%) compared with those who were employed (8%)
- Adults living in households with an annual income of less than \$25,000 (15%) or \$25,000-\$49,999 (14%) compared with adults living in households with an annual income of \$50,000 or more (4%)
- Adults who were Boston Housing Authority residents (14%), adults who received rental assistance (17%), adults who rented but did not receive rental assistance (10%), and those with other housing arrangements (12%) compared with home owners (5%)
- Foreign-born adults who lived in the United States for 10 years or less (13%) and foreign-born adults who lived in the United States for over 10 years (14%) compared with U.S.-born adults (7%)

The percentage of adults who were unable to afford a doctor was lower for the following group:

- Adults ages 65 and older (5%) compared with adults ages 18-24 (10%)

Figure 5.5 Could Not Afford to See a Doctor in the Past 12 Months by Selected Indicators, 2013 and 2015 Combined

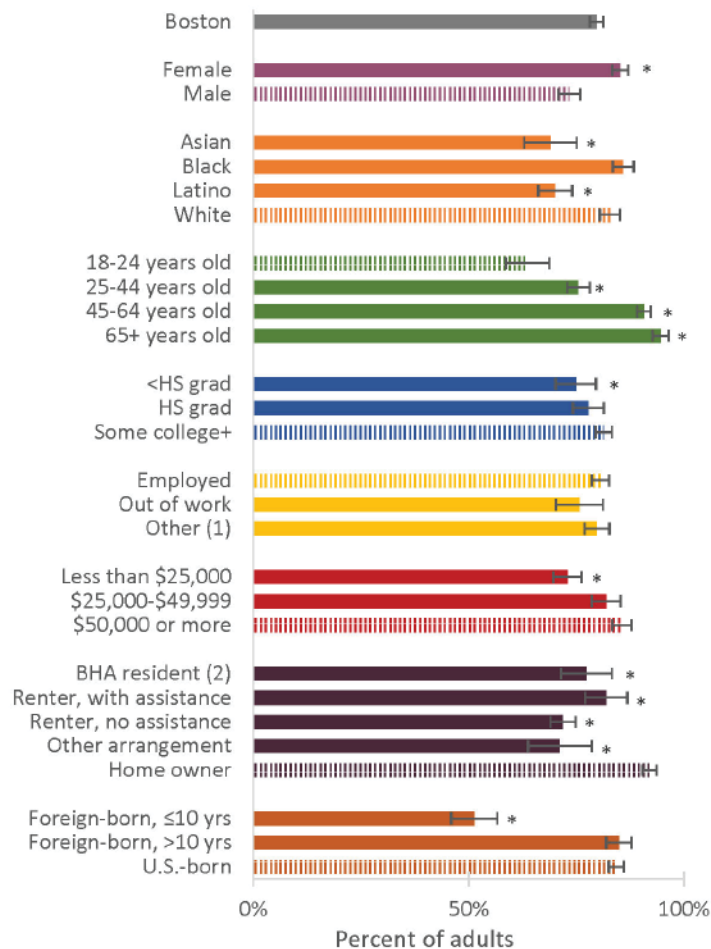


\* Statistically significant difference when compared to reference group  
 (1) Includes homemakers, students, retirees, and those unable to work  
 (2) Boston Housing Authority resident

NOTE: Bars with patterns indicate the reference group within each selected indicator.  
 DATA SOURCE: Boston Behavioral Risk Factor Survey (2013, 2015), Boston Public Health Commission



**Figure 5.6 Has Personal Doctor or Health Care Provider by Selected Indicators, 2013 and 2015 Combined**



\* Statistically significant difference when compared to reference group  
 (1) Includes homemakers, students, retirees, and those unable to work  
 (2) Boston Housing Authority resident

NOTE: Bars with patterns indicate the reference group within each selected indicator.  
 DATA SOURCE: Boston Behavioral Risk Factor Survey (2013, 2015), Boston Public Health Commission

During 2013 and 2015 combined, 80% of Boston adult residents reported having a doctor or health care provider.

The percentage of adults who had a doctor or health care provider was higher for the following groups:

- Females (85%) compared with males (73%)
- Adults ages 25-44 (76%), 45-64 (91%), or 65 and older (95%) compared with adults ages 18-24 (64%)

The percentage of adults who had a doctor or health care provider was lower for the following groups:

- Asian (69%) and Latino (70%) adults compared with White adults (83%)
- Adults with less than a high school diploma (75%) compared with adults with at least some college education (81%)
- Adults living in households with an annual income of less than \$25,000 (73%) compared with adults living in households with an annual income of \$50,000 or more (86%)
- Adults who were Boston Housing Authority residents (77%), adults who received rental assistance (82%), adults who rented but did not receive rental assistance (72%), and those with other housing arrangements (71%) compared with home owners (92%)
- Foreign-born adults who lived in the United States for 10 years or less (51%) compared with U.S.-born adults (84%)

## Has a Health Care Provider

Healthy People 2020 Target: 83.9%

Boston 2013 and 2015 combined: 79.7% (78.1-81.2)

In 2015, 6% of Boston adult residents had no usual place to go when they were sick or needed health advice.

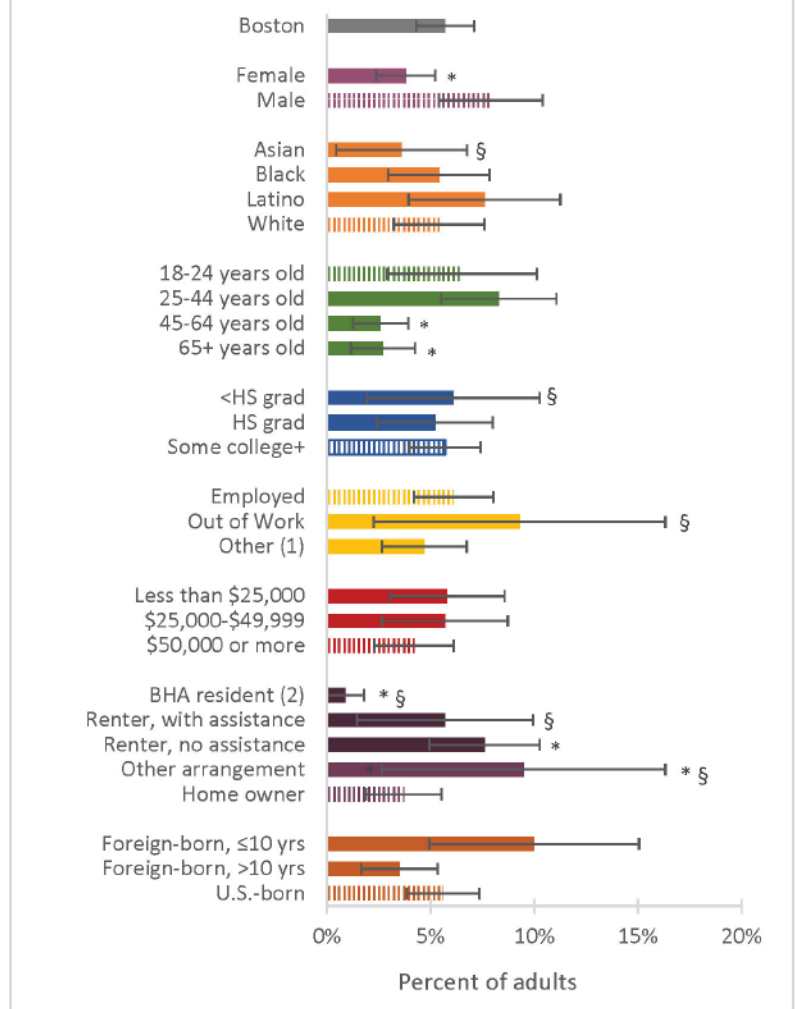
The percentage of adults with no usual place to go when sick or in need of health advice was higher for the following groups:

- Adults who rented but did not receive rental assistance (8%) and those with other housing arrangements (10%) compared with home owners (4%)

The percentage of adults with no usual place to go when sick or in need of health advice was lower for the following groups:

- Females (4%) compared with males (8%)
- Adults ages 45-64 (3%) or 65 and older (3%) compared with adults ages 18-24 (7%)
- Adults who were Boston Housing Authority residents (1%) compared with home owners (4%)

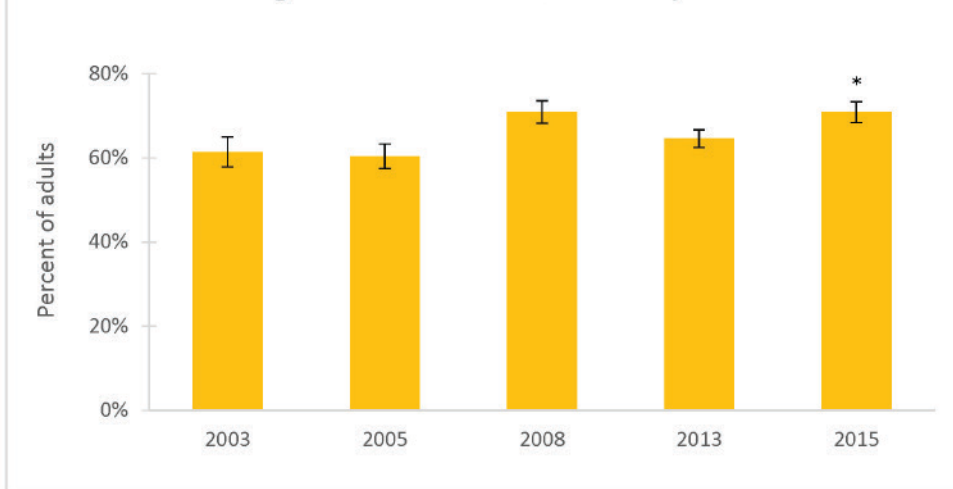
Figure 5.7 No Usual Place for Health Care by Selected Indicators, 2015



\* Statistically significant difference when compared to reference group  
 § Estimates have a coefficient of variation greater than or equal to 30% and should be interpreted with caution.  
 (1) Includes homemakers, students, retirees, and those unable to work  
 (2) Boston Housing Authority resident

NOTE: Bars with patterns indicate the reference group within each selected indicator.  
 DATA SOURCE: Boston Behavioral Risk Factor Survey (2015), Boston Public Health Commission

Figure 5.8 Dental Insurance by Year



\* Statistically significant change over time

DATA SOURCE: Boston Behavioral Risk Factor Survey (2003, 2005, 2008, 2013, 2015), Boston Public Health Commission

In 2015, 71% of Boston adult residents reported having insurance coverage that pays for routine dental care. The percentage of adults with dental insurance increased from 61% in 2003 to 71% in 2015.

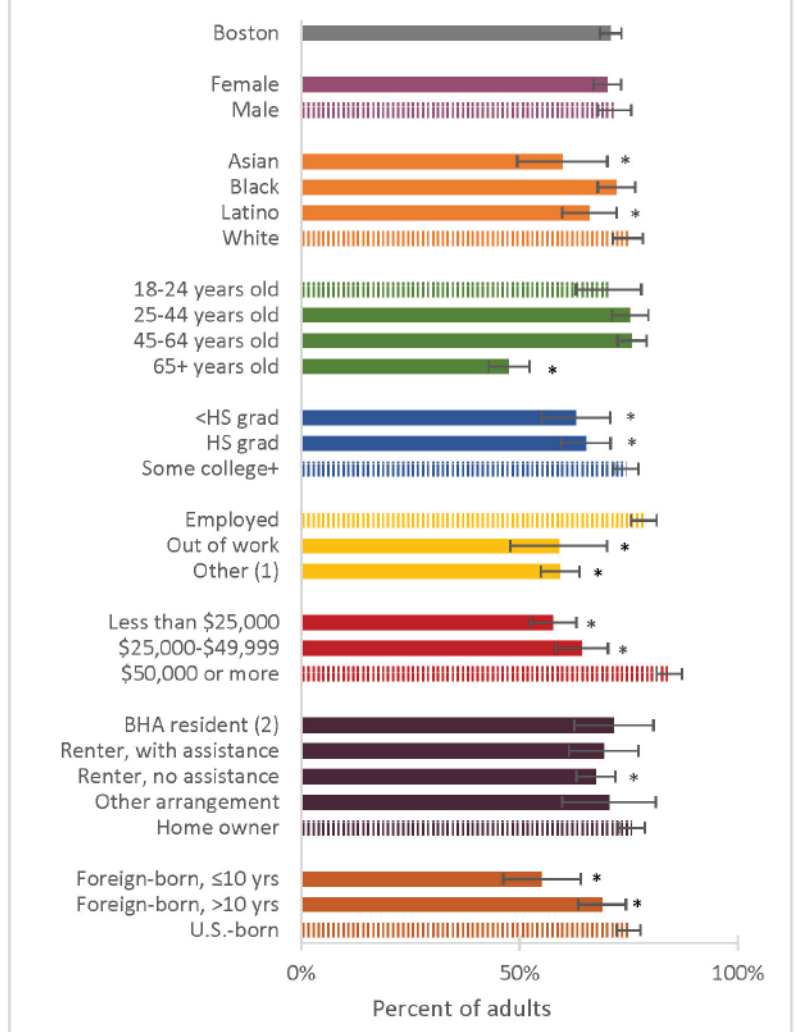


In 2015, 71% of Boston adult residents had insurance coverage for routine dental care.

The percentage of adults with dental insurance was lower for the following groups:

- Asian (60%) and Latino (66%) adults compared with White adults (75%)
- Adults ages 65 and older (48%) compared with adults ages 18-24 (70%)
- Adults with less than a high school diploma (63%) or a high school diploma (65%) compared with adults with at least some college education (74%)
- Adults who were out of work (63%) or a high school diploma (65%) compared with adults with at least some college education (74%)
- Adults who were out of work (59%) and adults whose employment status was "other" (59%) compared with those who were employed (79%)
- Adults living in households with an annual income of less than \$25,000 (58%) or \$25,000-\$49,999 (64%) compared with adults living in households with an annual income of \$50,000 or more (84%)
- Adults who rented but did not receive rental assistance (68%) compared with home owners (76%)
- Foreign-born adults who lived in the United States for 10 years or less (55%) and foreign-born adults who lived in the United States for over 10 years (69%) compared with U.S.-born adults (75%)

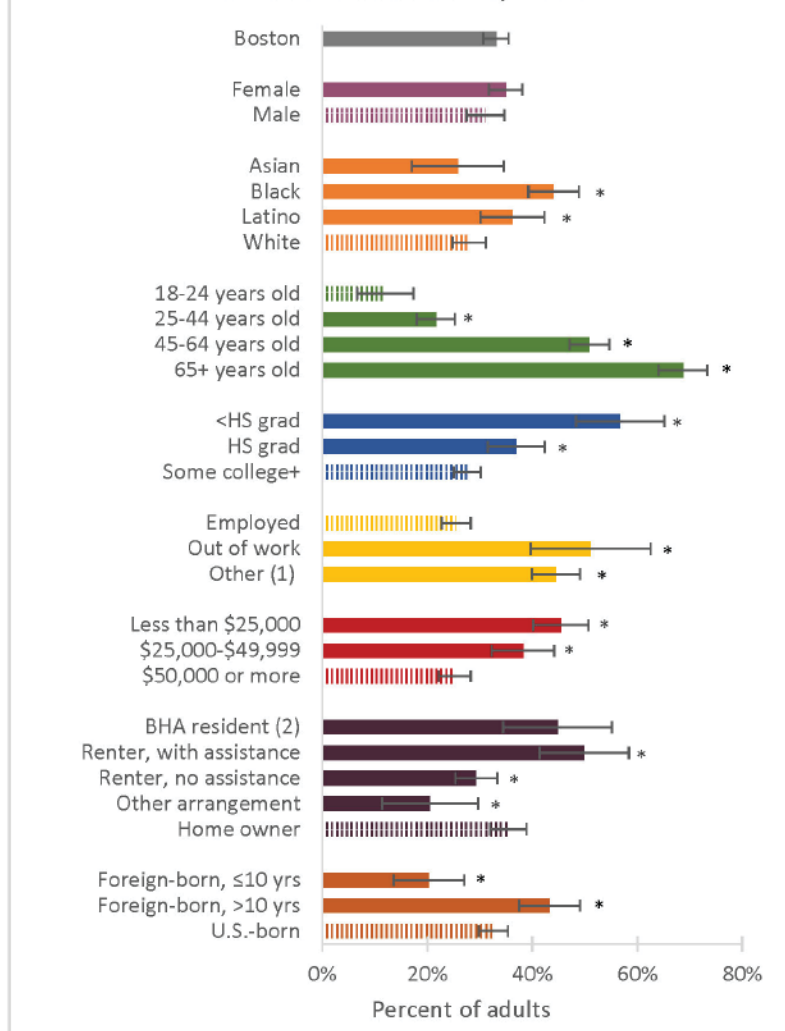
Figure 5.9 Dental Insurance by Selected Indicators, 2015



\* Statistically significant difference when compared to reference group  
 (1) Includes homemakers, students, retirees, and those unable to work  
 (2) Boston Housing Authority resident

NOTE: Bars with patterns indicate the reference group within each selected indicator.  
 DATA SOURCE: Boston Behavioral Risk Factor Survey (2015), Boston Public Health Commission

Figure 5.10 Loss of One or More Teeth by Selected Indicators, 2015



\* Statistically significant difference when compared to reference group

(1) Includes homemakers, students, retirees, and those unable to work  
(2) Boston Housing Authority resident

NOTE: Bars with patterns indicate the reference group within each selected indicator.

DATA SOURCE: Boston Behavioral Risk Factor Survey (2015), Boston Public Health Commission

In 2015, 33% of Boston adult residents reported ever having one or more teeth removed due to tooth decay or gum disease.

The percentage of adults who had teeth removed was higher for the following groups:

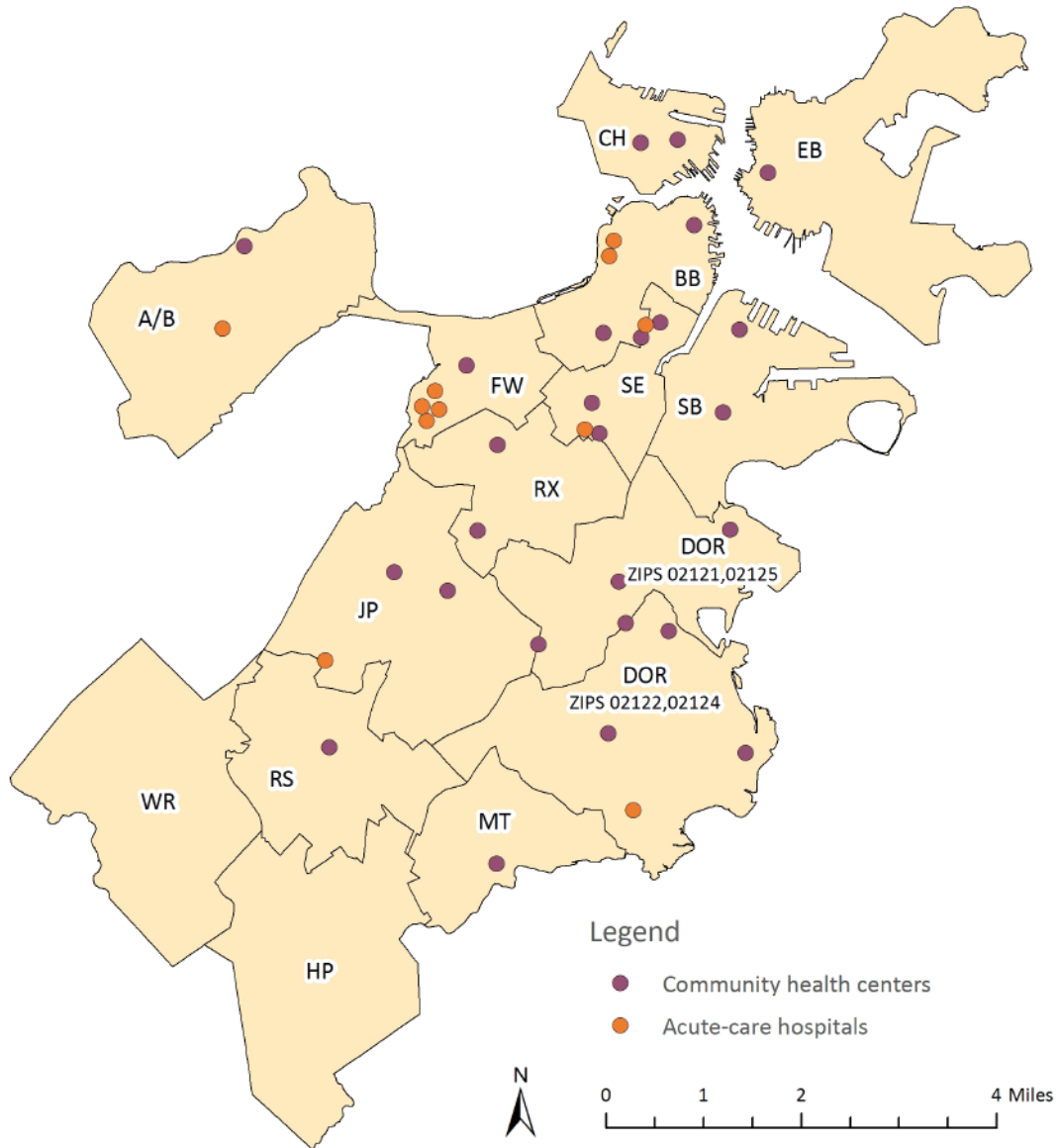
- Black (44%) and Latino (36%) adults compared with White adults (28%)
- Adults ages 25-44 (22%), 45-64 (51%), or 65 and older (69%) compared with adults ages 18-24 (12%)
- Adults with less than a high school diploma (57%) or a high school diploma (37%) compared with adults with at least some college education (28%)
- Adults who were out of work (51%) or whose employment status was "other" (45%) compared with those who were employed (26%)
- Adults living in households with an annual income of less than \$25,000 (45%) or \$25,000-\$49,999 (38%) compared with adults living in households with an annual income of \$50,000 or more (25%)
- Adults who received rental assistance (50%) compared with home owners (35%)
- Foreign-born adults who lived in the United States for over 10 years (43%) compared with U.S.-born adults (33%)

The percentage of adults who had teeth removed was lower for the following groups:

- Adults who rented but did not receive rental assistance (29%) and those with other housing arrangements (21%) compared with home owners (35%)
- Foreign-born adults who lived in the United States for 10 years or less (20%) compared with U.S.-born adults (33%)



Figure 5.11 Community Health Centers (CHCs) and Acute-Care Hospitals by Neighborhood



NOTE: South Boston Health/Seaport (CHC), which opened in October 2016, is included.  
 "BB" includes the Back Bay, Beacon Hill, Downtown, the North End, and the West End.  
 "SE" includes the South End and Chinatown.

DATA SOURCE: CHCs - Massachusetts League of Community Health Centers, June 2016;  
 Hospitals - Boston Health Equity Measure Set, Boston Public Health Commission, February 2017

Each neighborhood, with the exception of Hyde Park and West Roxbury, has at least one community health center (CHC) that offers primary care, and many neighborhoods have more than one CHC. Acute-care hospitals are concentrated in the Back Bay, Fenway, and the South End.

## Summary

Since 2011, Boston has maintained a low percentage of uninsured among its residents. In 2015, the percentage of uninsured in Boston was approximately 60% lower than the reported percentage of uninsured in the U.S. overall. Racial and ethnic inequities in the percentage of uninsured were not observed for Boston, although the percentage of uninsured foreign-born Boston residents was more than two times higher than U.S.-born Boston residents. Inequities in percentage of uninsured were also found across categories of employment status, education, and household income. Differences in the percentage of uninsured residents observed at the neighborhood level may be explained by the fact that those with demographic characteristics associated with being uninsured (e.g. under or unemployment, lower-income) often live in the same neighborhood.

Racial and ethnic inequities were found in indicators of health care access, particularly for Latino adults. Higher percentages of Latino adults compared with White adults reported both the inability to see a doctor in the past 12 months because of cost and the lack of a doctor or health care provider. Among Boston adults, inequities in percentage of those with inability to see a doctor because of cost and with not having a doctor or health care provider were also found across categories of employment status, education, household income, home ownership, and place of origin. Inequities in these indicators tend to disproportionately affect adults with less than high school diploma or household income less than \$25,000, as well as adults who are non-homeowners or foreign born residents who lived in the U.S. for 10 or fewer years.

Among Boston adults, inequities across racial/ethnic groups and other groups of residents were observed in insurance coverage for routine dental care and the experience of tooth loss. Inequities among Boston adults for these indicators tend to disproportionately affect Latinos, those with less than a high school diploma or those with a household income less than \$25,000, individuals who are out of work, and foreign-born residents who lived in the U.S. for more than 10 years.

To reduce the inequities in being uninsured or faced with barriers to health care access, multi-sector interventions that target subpopulations at higher risk should address social determinants, (e.g. by improving employment opportunities and wage conditions among vulnerable sub-populations, and sources of structural racism that affect health care provider-patient interactions). Continued funding to support health insurance coverage in Massachusetts will also help maintain the low percentage of uninsured among Boston residents.

# Access to Care



The percentage of uninsured in 2015



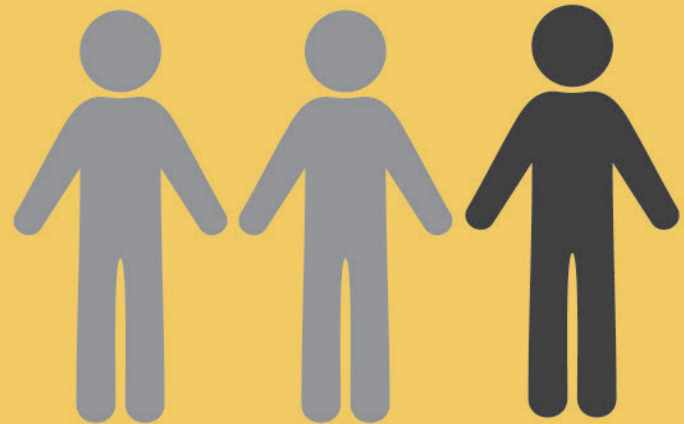
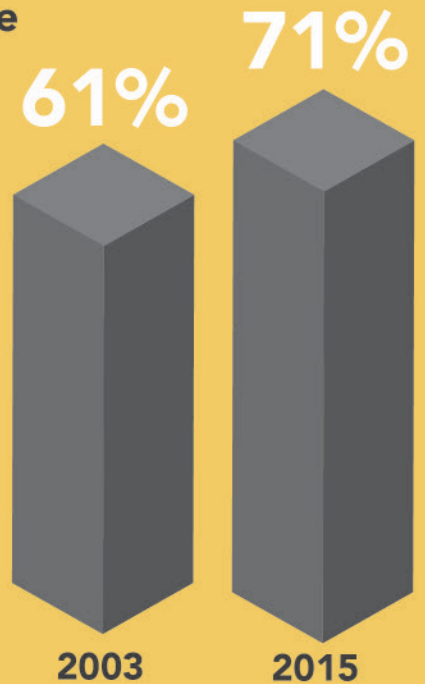
**3.8%**  
for Boston



**9.4%**  
for the U.S.  
overall



The percentage of adult residents with dental insurance increased



In 2015, 1 in 3 adult residents reported ever having had one or more teeth removed due to tooth decay or gum disease





## Our Point of View: Thoughts from public health

### Massachusetts' Uninsured: Reaching the last 4%

By Beth Baker  
Director, Mayor's Health Line  
Boston Public Health Commission

Massachusetts and Boston have a remarkable story to tell when it comes to providing health insurance to our residents. At last count, Massachusetts had one of the lowest rates of uninsured in the country – down to an impressive 3%. Boston is very similar at 4%. Yet, even with this low number of uninsured, reaching that last 4% is important. Good medical care is the first step toward a lifetime of good health. Uninsured residents are less likely to get regular primary care, which can result in delayed medical treatment and more emergency department visits. Further, as this report shows, there are significant inequities in health insurance coverage based on age, education, income, gender, ethnicity, and race.

Robust data allows us to target our outreach, education, and enrollment activities. In Boston, to reach the 4% of uninsured, we zero in on small neighborhoods, trying to provide whatever it takes to get them enrolled. For example, there are two census tracts in East Boston (506 and 507) that have some of the highest rates of uninsured in the state: (23.7% and 20% respectively). The Mayor's Health Line (MHL) works every day to eliminate whatever barriers exist to coverage.

Applying for health insurance is confusing. To complete the online application for MassHealth or Health Connector plans, a person needs reliable internet connectivity and must read English with a high level of proficiency. In order to choose a health plan, a person needs an advanced understanding of how premiums, deductibles and co-pays interact. For many of Boston's uninsured these are real barriers and prevent them from enrolling in health insurance that will meet the unique health and financial needs of their family. MHL case workers help Bostonians navigate this complicated process. Our multi-lingual, multi-cultural case workers walk clients through the application ensure that clients understand what programs are available, and advocate when clients need additional services. Residents can receive assistance and have their questions answered in person and over the phone. In 2015, the MHL helped complete applications for over 1,100 individuals. Each year we redouble our efforts, coming up with creative strategies for getting every person affordable health coverage. Reaching the last 4% is worth every effort we make.

## Our Point of View: Thoughts from a community resident

### **Young, invincible and insured**

By Oliver Madden

Oliver is an alumni of Suffolk University, resident of the North End and member of Spark Boston. SPARK Boston is a Mayor Martin J. Walsh initiative to engage a larger and more diverse range of Boston's millennials in civic participation.

My name is Oliver. I am from New Hampshire but moved to Massachusetts to go to college. Until recently, I always had health insurance – first through my parents, then through school and later through my employers. When I left my job with a large, established company to go to a small start-up just outside Boston, I found out my new employer – with only six employees – didn't offer health insurance. I hadn't even thought to ask about it before accepting the job.

I was young and healthy and didn't think too much about it. It just didn't seem like a priority – until I attended a meeting of Spark Boston (a civic engagement group for young adults) and met Beth Baker, Director of BPHC's Mayor's Health Line.

At the meeting, Beth was talking about so-called "young invincibles" a term coined to describe young adults who are often fairly healthy and uninsured. I kind of laughed when I realized I was one of them.

After the meeting, I spoke with Beth and she gave me the information I needed to sign up for insurance, as well as her contact information in case I had questions or needed help. When I visited the site to sign up, a glitch in the system wouldn't allow me to choose a plan even though I had completed the entire application and met all of the eligibility criteria. After about an hour of troubleshooting myself, I reached out to Beth who was able to work around the glitch and get me enrolled.

It was really that human interaction and outreach that made a difference for me. Had I not met Beth I'm sure I would have figured it out eventually; but being able to call her for help motivated me to do it sooner rather than later.

I'm happy to be enrolled now, but in hindsight I really wish I had done it sooner. I suffered a concussion just two days before my coverage kicked in and ended up having to pay out of pocket for my treatment in the emergency room. Lesson learned, I guess.

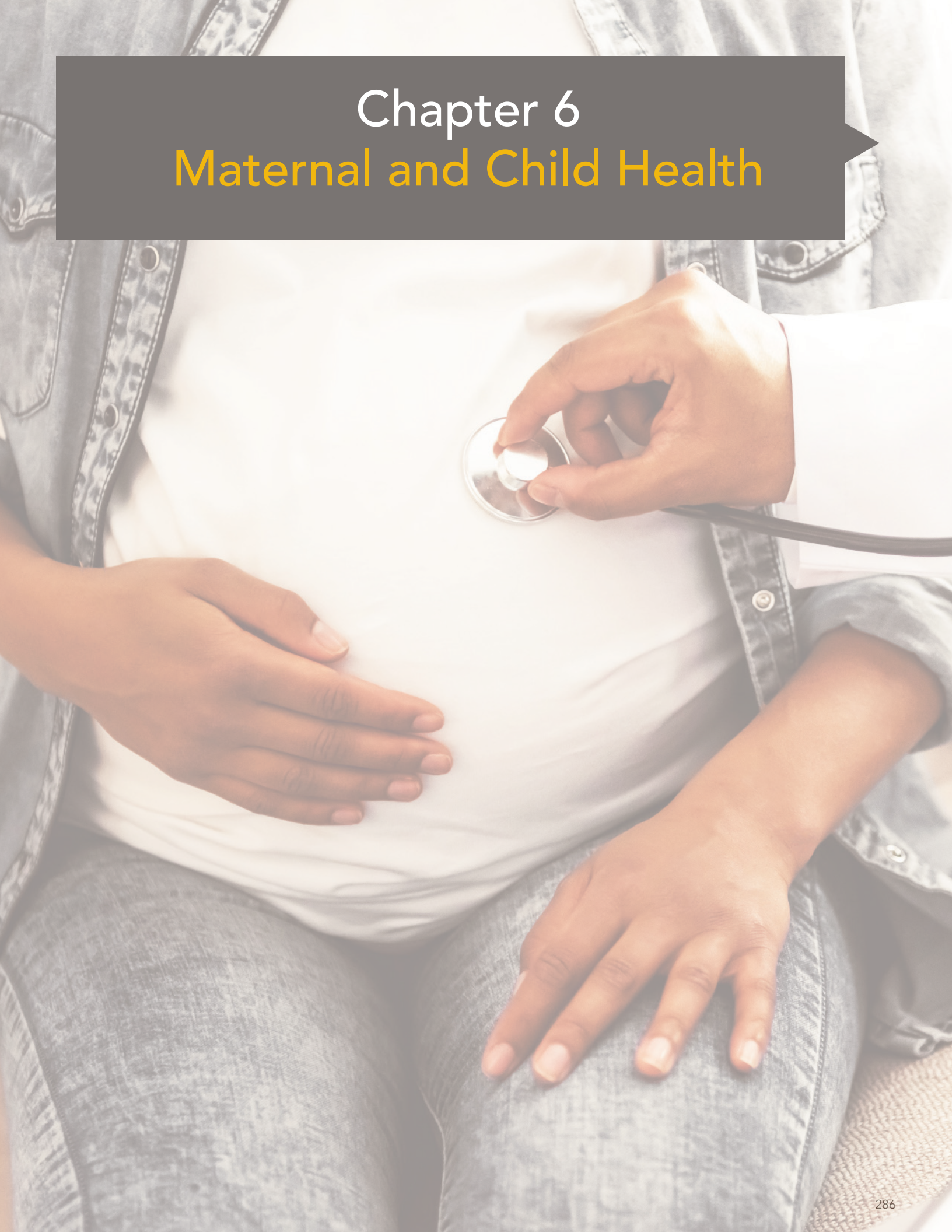
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# Chapter 6

## Maternal and Child Health





# Maternal and Child Health

Birth rates, infant mortality rates (IMR), birth weight, and gestational age provide important measures for the well-being of infants and pregnant women, and are often viewed as a reflection of the health of a community. This chapter looks at birth data, as well as some data on lead poisoning and adverse childhood events, or ACEs.

## Infant mortality

The IMR is a key marker of maternal and child health that has been used for decades to gauge social and economic progress, as well as the effectiveness of the healthcare system (1). Infant mortality is the death of an infant before his or her first birthday, usually due to birth defects, being born too soon (preterm birth) or too small (low birth weight), maternal pregnancy complications, injury to the child, or sudden infant death syndrome (2).

Substantial progress has been made in the 20th century in reducing infant mortality, resulting in an historic low of 5.8 deaths per 1,000 live births in the U.S. in 2014. Despite progress, the IMR for the U.S.—one of the wealthiest countries in the world—is worse than the 34 country-average of the nations participating in the Organization for Economic Cooperation and Development (OECD) (1). The OECD is a partnership of 35 nations working cooperatively to promote global economic prosperity for all people. The majority of the partner nations are in the developed world. In 2013 the average IMR in OECD countries was 3.8 deaths per 1,000 live births, with IMRs being the lowest in Iceland, Slovenia, Finland, and Japan, while the IMR in the U.S. was 6.0 deaths per 1,000 live births (1).

Significant inequities in IMR also occur across racial and ethnic groups in the U.S. In 2014, Black infants (11.4 per 1,000 live births) continue to die at more than twice the rate of White infants (4.8 per 1,000 live births) (3); for Latino infants, the IMR was 6.9 per 1,000 live births. From 2013 to 2014, the IMR decreased for White infants, but did not change significantly for Black or Latino infants.

## Preterm birth and low birth weight

Preterm birth (gestational age less than 37 weeks of completed pregnancy) and low birth weight (birth weight less than 5 pounds, 8 ounces or 2,500 grams) are important predictors of infant survival. Preterm and low birth weight infants are at higher risk of early death and long-term health and developmental issues. Research also suggests that low birth weight and premature birth can lead to chronic disease in adulthood (4).

Preterm birth rates in the U.S. decreased from 10.4% in 2007 to 9.6% in 2015. Racial and ethnic inequities in preterm birth rates continue to exist (4). Preliminary data from 2015 reveal the rate of preterm birth among Black females (13.2%) was approximately 50 percent higher than the rate of preterm birth among White females (9.0%) (5). The preterm birth rate among Latino females in 2015 was 9.1% and among Asian females 8.6%.

Nationally, the low birthweight rate also decreased from 2007-2015. The low birthweight rate was 8.1% in 2015. In 2015, the rate of low birthweight among Asian (8.4%), Black (13.0%) and Latino (7.2%) females was higher than White females (7.0%) (5).

### **Risk factors**

Rates of infant mortality, preterm birth and low birth weight are influenced by a variety of individual, socioeconomic, and environmental factors that impact children and families throughout their lives (6). Individual factors, such as the mother's health and health behaviors can certainly affect her pregnancy but growing evidence shows that external factors outside her control can also affect her pregnancy, including socioeconomic and environmental influences (e.g. living in low-resourced neighborhoods, housing instability). These may contribute to maternal stress and play an important role in pregnancy, low birth weight, and preterm birth (7-10).

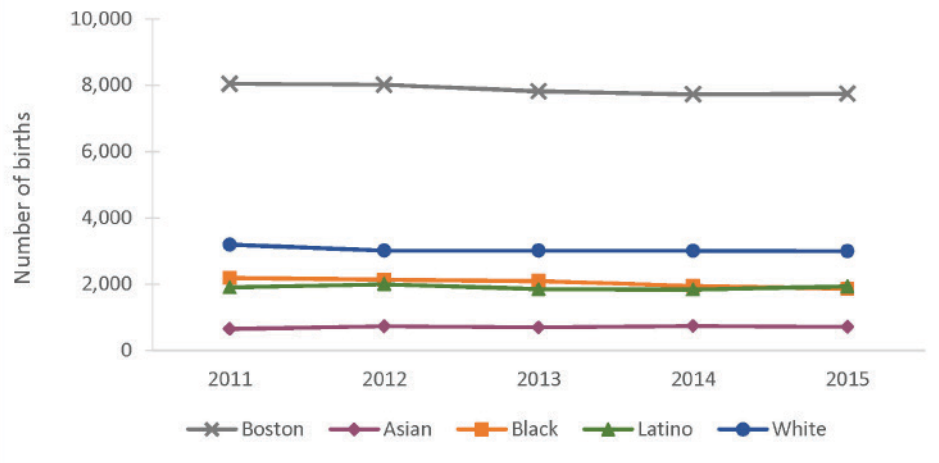
The cumulative effect of constant stress endured by women over time may have an effect on mothers and their infants (11-16). These stressors include racism, violence, being poor, living in neighborhoods with poor housing, and inadequate access to health care (6, 15).

Experiencing racial discrimination and living in a country with a strong history of racial discrimination can damage health, even when the discrimination is not overt or intentional, regardless of socioeconomic status (13, 15, 17). Women who are exposed to the chronic stress of racism may experience physiological changes in their body that are detrimental to their health and the healthy development of their infant (6, 12, 15, 18). Hormonal changes that occur with persistent stressors during pregnancy can interfere with normal brain development in the infant. In addition, parental stress and environmental stressors (unemployment, low income, and substandard housing) are risk factors for childhood maltreatment and increased risk of health and social problems for children later in life (19).

In 2010, the Health Resources and Services Administration (HRSA) developed a set of 12 recommendations to reduce racial inequities in birth outcomes (6). The recommendations specifically aim to improve family, community, social and economic systems by strengthening father involvement, improving the integration of support services, creating social capital, investing in urban renewal and community building, closing the education gap, reducing poverty, supporting working mothers, and undoing racism (6).



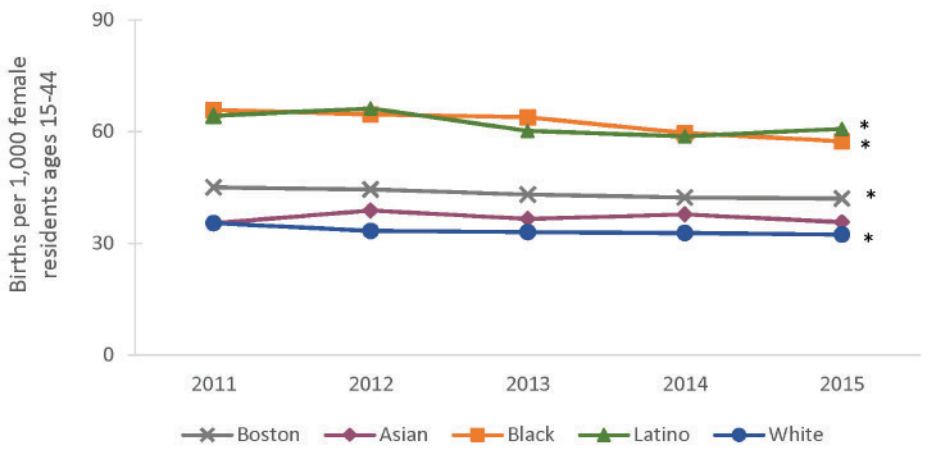
Figure 6.1 Birth Count by Race/Ethnicity and Year



In 2015, there were 7,741 births to Boston female residents. Of the births with reported race/ethnicity, 713 were to Asian females, 1,859 were to Black females, 1,930 were to Latino females, and 2,992 were to White females.

DATA SOURCE: Boston resident live births, Massachusetts Department of Public Health (data as of August 2016). Data may be updated as more information becomes available.

6.2 Birth Rate by Race/Ethnicity and Year



In 2015, there were 42.1 births per 1,000 female Boston residents ages 15-44. From 2011-2015, the birth rate in Boston decreased. There was a decrease in the birth rate among Black, Latino, and White females from 2011-2015.

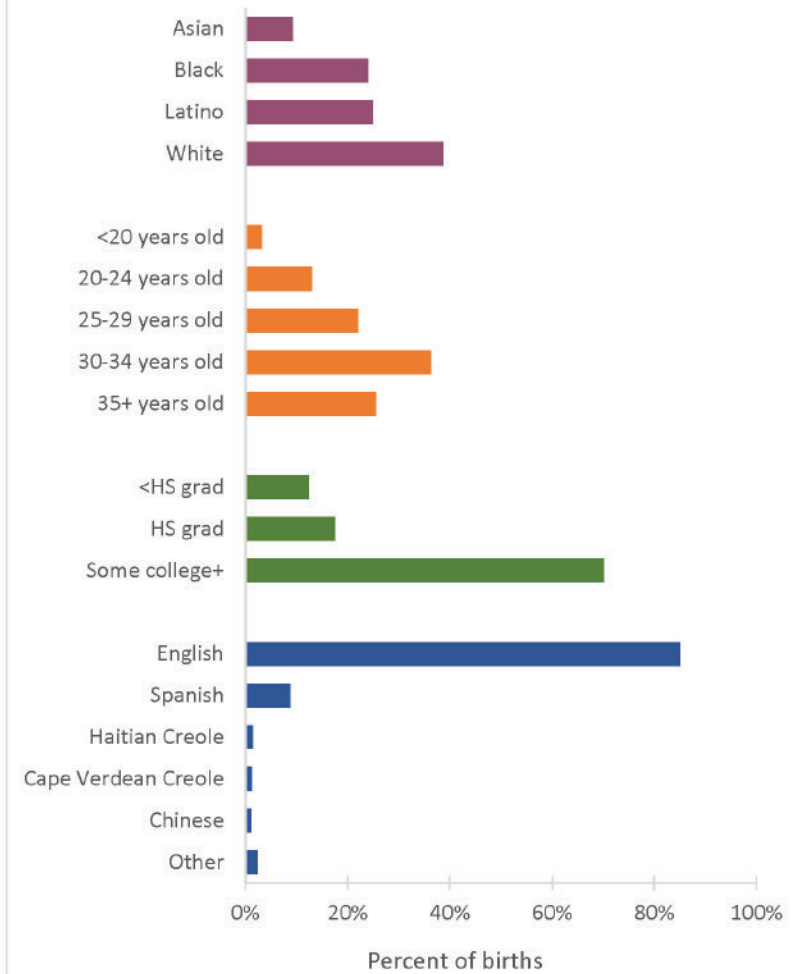
In 2015, the rates of births to Asian (35.7), Black (57.4), and Latino (60.8) females were higher compared with White females (32.4).

\* Statistically significant change over time

DATA SOURCE: Boston resident live births, Massachusetts Department of Public Health (data as of August 2016). Data may be updated as more information becomes available.

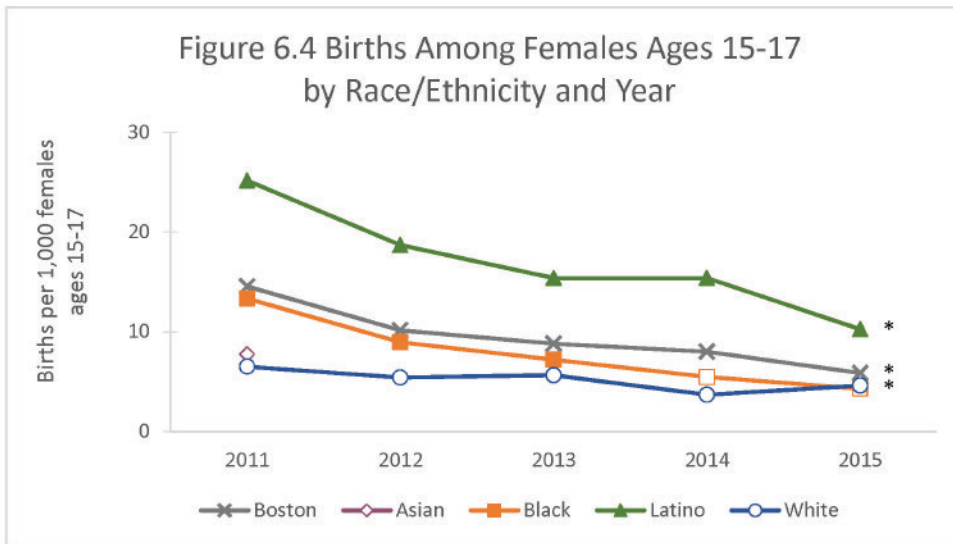
In 2015, 39% of births were to White females and 58% were to females of color. Sixty-two percent of births were to females 30 years of age or older, and 70% of females who gave birth had at least some college education. Eighty-five percent of births were to females whose preferred spoken language was English.

Figure 6.3 Births by Selected Indicators, 2015



DATA SOURCE: Boston resident live births, Massachusetts Department of Public Health (data as of August 2016). Data may be updated as more information becomes available.

Figure 6.4 Births Among Females Ages 15-17 by Race/Ethnicity and Year



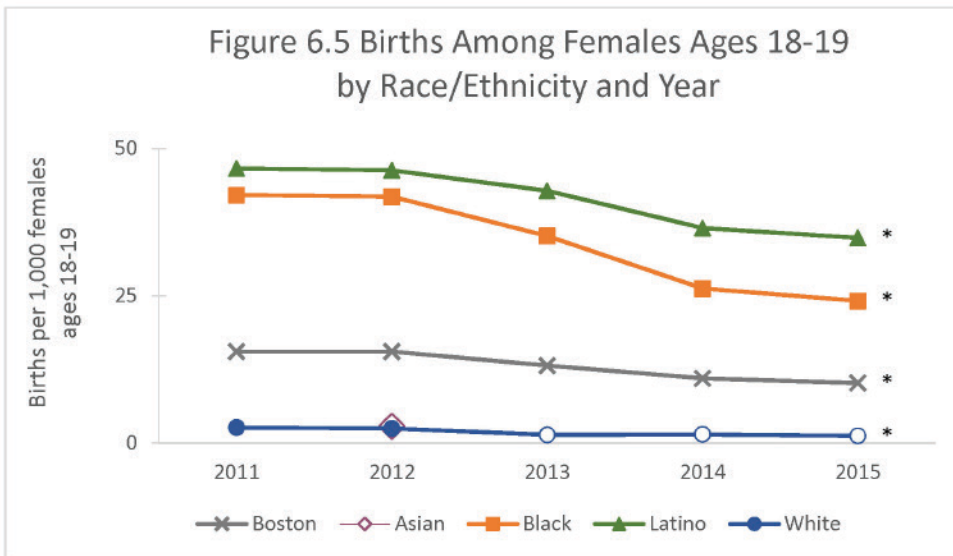
\* Statistically significant change over time

NOTE: HOLLOWED-OUT symbols represent rates based on 20 or fewer cases and should be interpreted with caution. Rates are not presented due to a small number of cases for Asian female residents for 2012-2015.

DATA SOURCE: Boston resident live births, Massachusetts Department of Public Health (data as of August 2016). Data may be updated as more information becomes available.

In 2015, the birth rate among Boston females ages 15-17 was 5.8 births per 1,000 females ages 15-17. From 2011-2015, the birth rate decreased from 14.5 to 5.8. A decrease in the birth rate from 2011-2015 was observed among Black and Latino females ages 15-17. In 2015, there were no significant differences in the birth rate by race/ethnicity.

Figure 6.5 Births Among Females Ages 18-19 by Race/Ethnicity and Year



\* Statistically significant change over time

NOTE: HOLLOWED-OUT symbols represent rates based on 20 or fewer cases and should be interpreted with caution. Rates are not presented due to a small number of cases for Asian female residents for 2011 and 2013-2015.

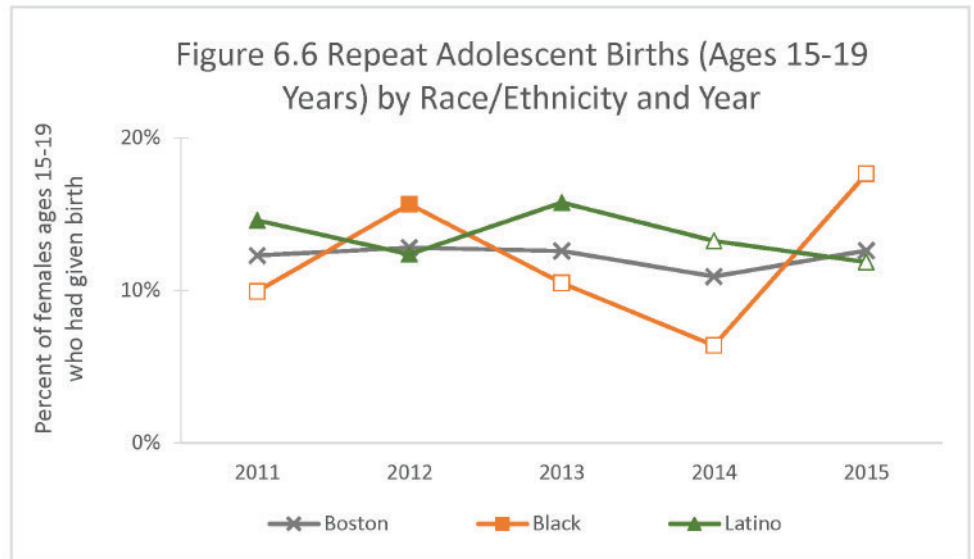
DATA SOURCE: Boston resident live births, Massachusetts Department of Public Health (data as of August 2016). Data may be updated as more information becomes available.

From 2011-2015, the birth rate for Boston females ages 18-19 decreased from 15.5 births per 1,000 females ages 18-19 to 10.2. The birth rate also decreased among Black, Latino, and White females ages 18-19 during the same time period.

In 2015, Black females ages 18-19 had a birth rate of 24.2 and Latino females had a birth rate of 34.8. These rates were higher than the rate of births to White females (1.2) in 2015.

Of the Boston females ages 15-19 who gave birth in 2015, 13% had given birth previously. There was no significant change in the percentage of teens with repeat births from 2011-2015 for Boston overall or by race/ethnicity.

In 2015, the percentage of Black females ages 15-19 who had given birth previously was 18% and the percentage of Latino females who had given birth previously was 12%.

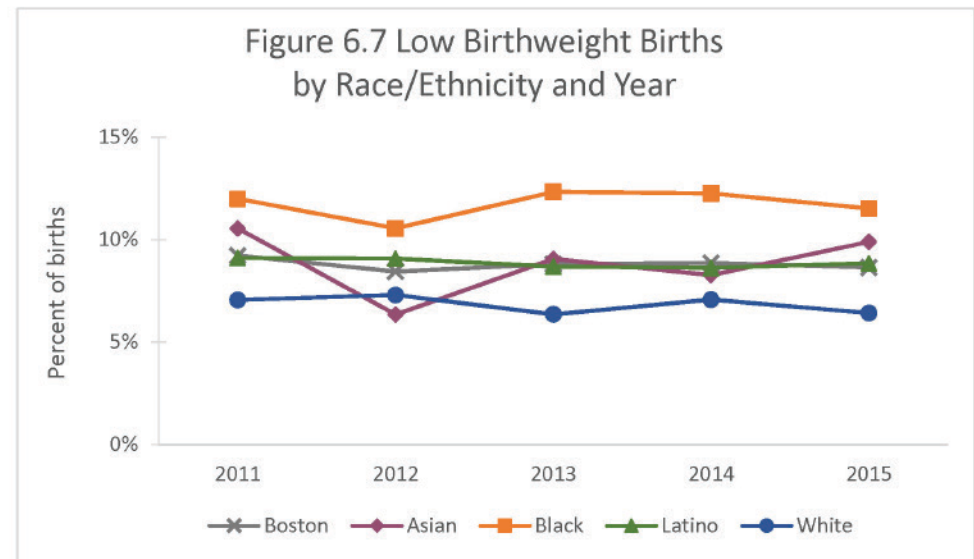


NOTE: Hollowed-out symbols represent rates based on 20 or fewer cases and should be interpreted with caution. Rates are not presented due to a small number of cases for Asian or White female residents for 2011-2015.

DATA SOURCE: Boston resident live births, Massachusetts Department of Public Health (data as of August 2016). Data may be updated as more information becomes available.

In 2015, 9% of all infants were born with low birthweight (weighing less than 5 pounds 8 ounces). From 2011-2015, the percentage of low birthweight births in Boston did not significantly change. There was also no significant change in the percentage of low birthweight births to Asian, Black, Latino, or White females during this same time period.

In 2015, Asian, Black, and Latino females all gave birth to higher percentages of low birthweight babies, 10%, 12%, and 9% respectively, than White females (6%).



DATA SOURCE: Boston resident live births, Massachusetts Department of Public Health (data as of August 2016). Data may be updated as more information becomes available.

### Low Birthweight Births

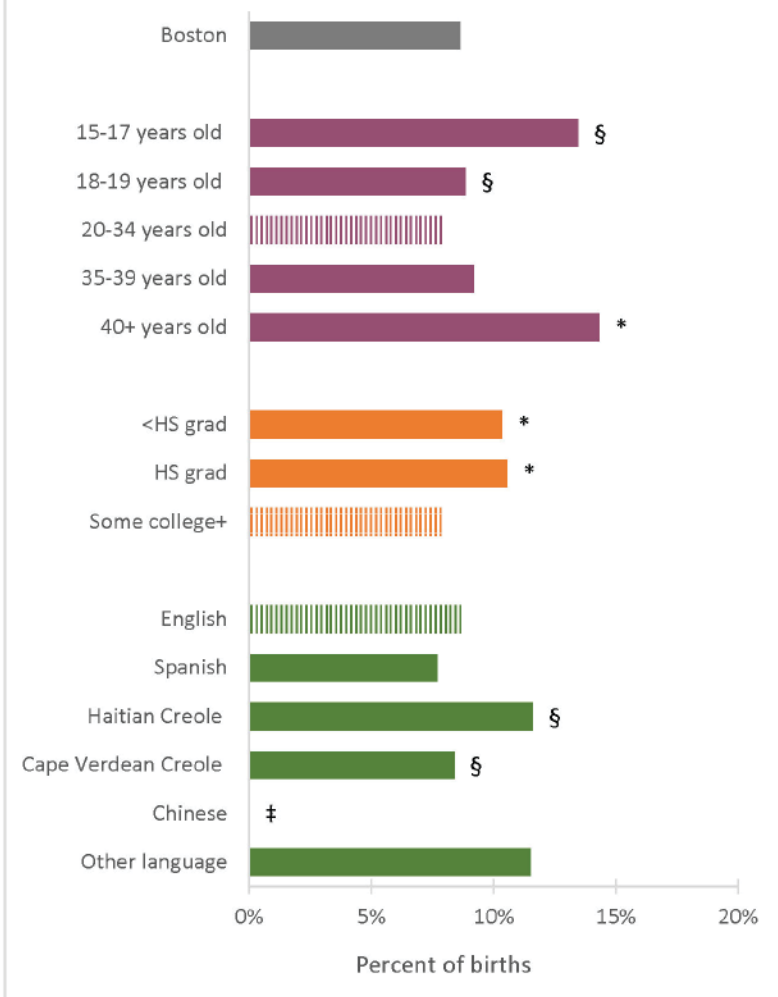
Healthy People 2020 Target: 7.8%

US 2015: 8.1%

MA 2015: 7.5%

Boston 2015: 8.6%

Figure 6.8 Low Birthweight Births by Selected Indicators, 2015



\* Statistically significant difference when compared to reference group

‡ Rates not presented due to a small number of cases

§ Rates are based on 20 or fewer cases and should be interpreted with caution.

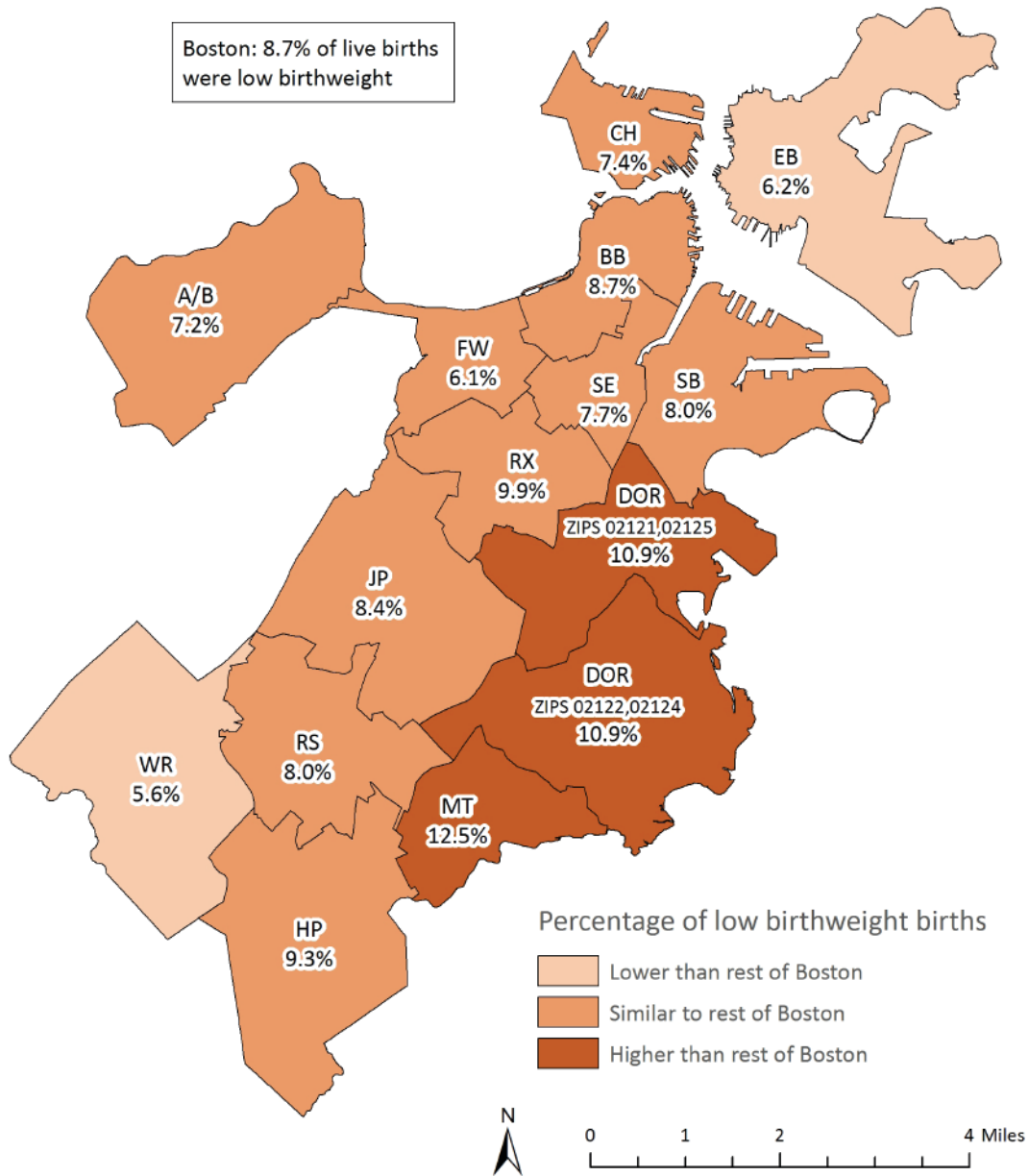
NOTE: Bars with patterns indicate the comparison group within each selected indicator.

DATA SOURCE: Boston resident live births, Massachusetts Department of Public Health (data as of August 2016). Data may be updated as more information becomes available.

In 2015, 9% of all infants in Boston were born with low birthweight. A higher percentage of low birthweight births occurred among:

- Females with less than a high school diploma (10%) and those with a high school diploma (11%) compared with those with at least some college education (8%)
- Females 40 years of age or older (14%) compared with females 20-34 years of age (8%)

Figure 6.9 Low Birthweight Births, 2014-2015

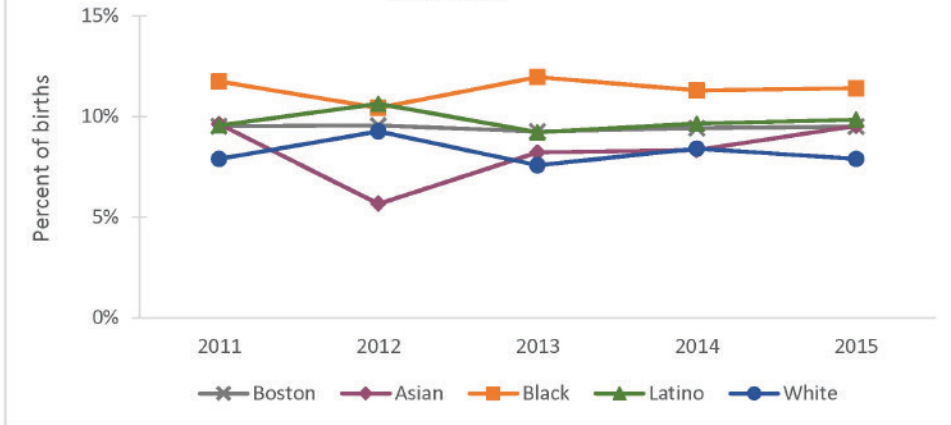


NOTE: "BB" includes the Back Bay, Beacon Hill, Downtown, the North End, and the West End.  
 "SE" includes the South End and Chinatown.

DATA SOURCE: Boston resident live births, Massachusetts Department of Public Health (data as of August 2016).  
 Data may be updated as more information becomes available.

For 2014-2015, 9% of all infants in Boston were born with low birthweight. The percentage of low birthweight births was higher among females in Dorchester (zip codes 02121, 02125), Dorchester (zip codes 02122, 02124), and Mattapan compared with the rest of Boston. The percentage of low birthweight births was lower among females in East Boston and West Roxbury compared with the rest of Boston.

Figure 6.10 Preterm Births by Race/Ethnicity and Year



DATA SOURCE: Boston resident live births, Massachusetts Department of Public Health (data as of August 2016). Data may be updated as more information becomes available.

In 2015, 10% of babies in Boston were born preterm (before 37 weeks gestation). There was no significant change in the percentage of preterm births to Boston females from 2011-2015. This was also true for all racial/ethnic groups during the same time period.

In 2015, Black and Latino females had higher percentages of preterm births, 11% and 10% respectively, compared with White females, 8%.



### Preterm Births

Healthy People 2020 Target: 11.4%

US 2015: 9.6%

MA 2015: 8.4%

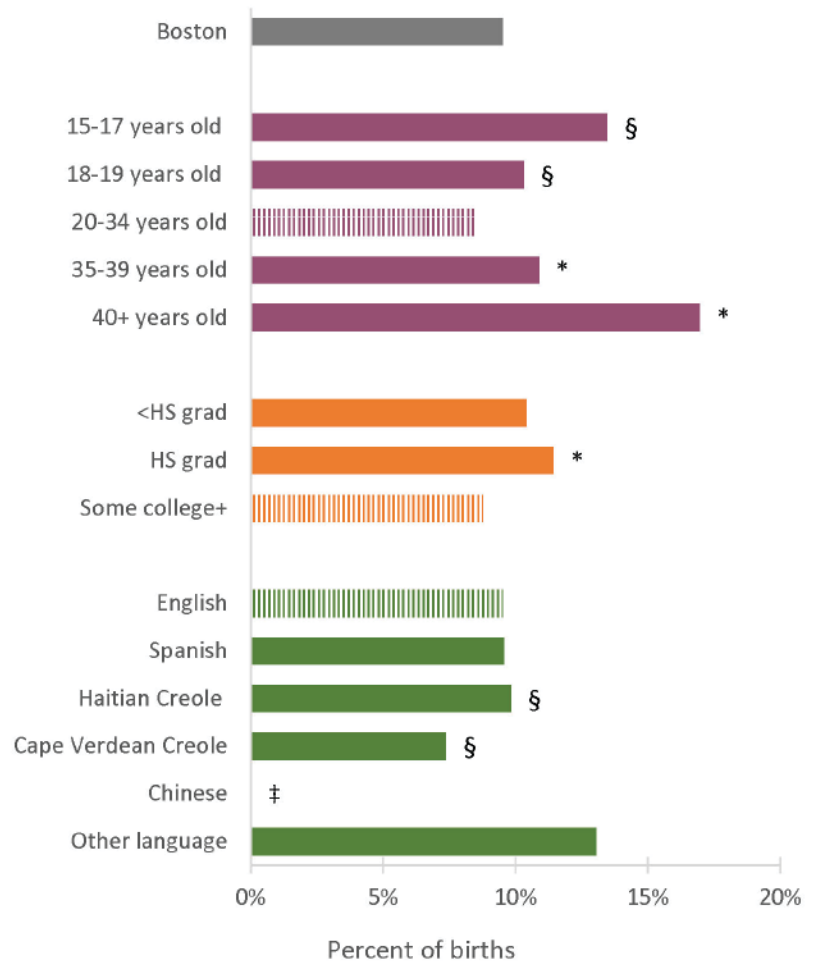
Boston 2015: 9.5%

In 2015, 10% of infants were born preterm.

A higher percentage of preterm births occurred to:

- Females with a high school diploma (11%) compared with those with at least some college education (9%)
- Females 35-39 years of age (11%) and 40 years of age or older (17%) compared with females 20-34 years of age (9%)

Figure 6.11 Preterm Births by Selected Indicators, 2015

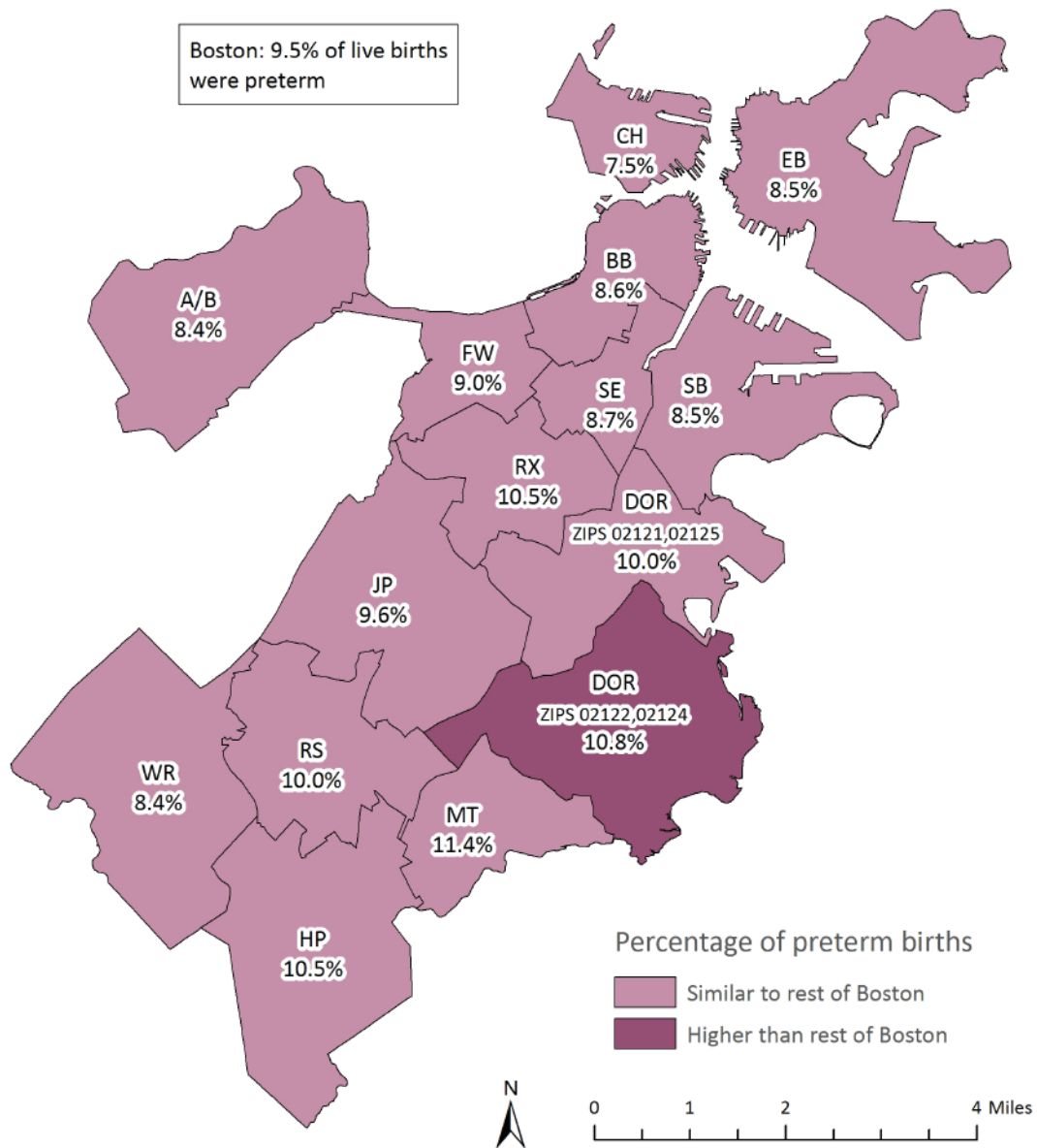


\* Statistically significant difference when compared to reference group  
 ‡ Rates not presented due to a small number of cases  
 § Rates are based on 20 or fewer cases and should be interpreted with caution

NOTE: Bars with patterns indicate the comparison group within each selected indicator.  
 DATA SOURCE: Boston resident live births, Massachusetts Department of Public Health (data as of August 2016). Data may be updated as more information becomes available.



Figure 6.12 Preterm Births, 2014-2015



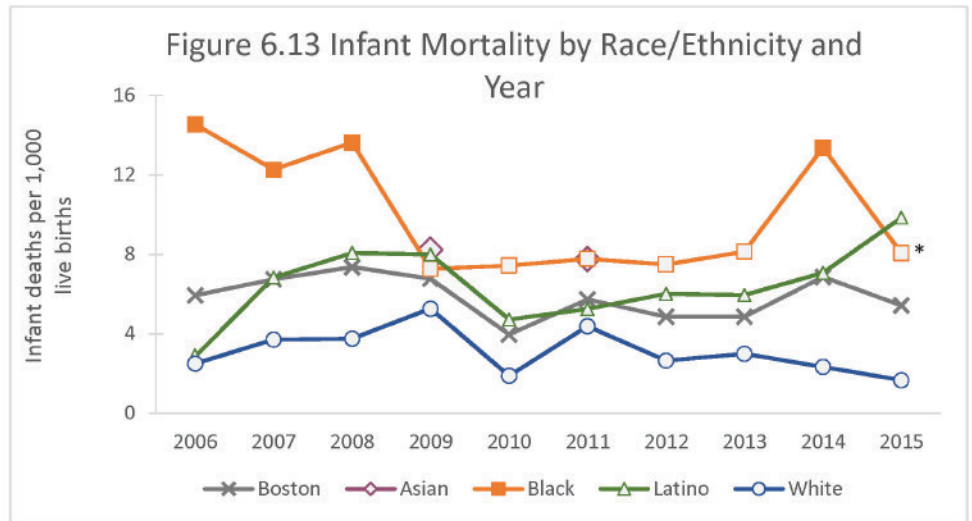
NOTE: "BB" includes the Back Bay, Beacon Hill, Downtown, the North End, and the West End.  
 "SE" includes the South End and Chinatown.

DATA SOURCE: Boston resident live births, Massachusetts Department of Public Health (data as of August 2016).  
 Data may be updated as more information becomes available.

For 2014-2015, 10% of all infants in Boston were born preterm. The percentage of preterm births was higher among females in Dorchester (zip codes 02122, 02124) compared with the rest of Boston.

In 2015, the infant mortality rate in Boston was 5.4 infant deaths per 1,000 live births. From 2006-2015, the rate for Black infants decreased by 36%. There was no significant change from 2006-2015 in the rate for Latino and White infants.

In 2015, the infant mortality rates for Black infants (8.1) and Latino infants (9.8) were higher than that of White infants (1.7).



\* Statistically significant change over time

NOTE: HOLLOWED-OUT symbols represent rates based on 20 or fewer cases and should be interpreted with caution. Rates are not presented due to a small number of cases for Asian infants for 2006-2008, 2010, and 2012-2015. Beginning in October 2014, the method for collecting race/ethnicity for mortality data changed. Interpret trends with caution.

DATA SOURCE: Massachusetts linked infant birth-infant death file (death cohort), Massachusetts Department of Public Health (data as of February 2017). Data may be updated as more information becomes available.

### Infant Mortality

Healthy People 2020 Target: 6.0 infant deaths per 1,000 live births

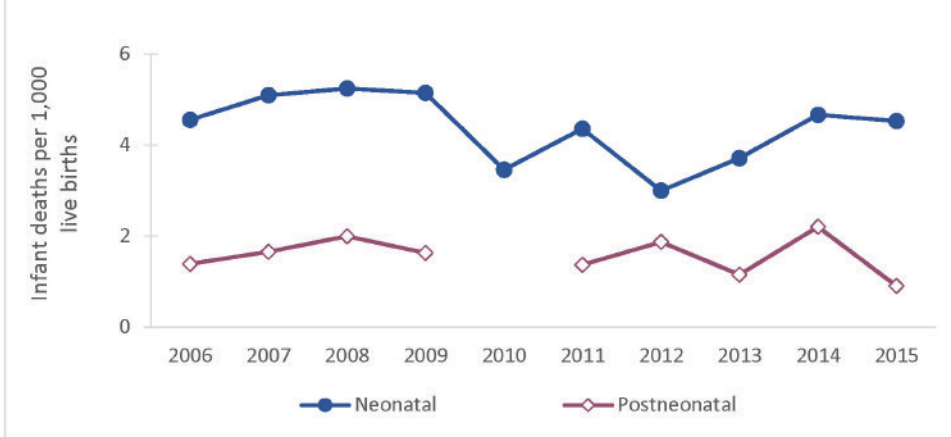
US 2015: 5.8

MA 2015: 4.4

Boston 2015: 5.4



Figure 6.14 Neonatal and Postneonatal Infant Mortality by Year



In 2015, there were 4.5 neonatal infant deaths per 1,000 live births (deaths within the first 28 days of life) and 0.9 postneonatal infant deaths per 1,000 live births (deaths between 28 days and 1 year after birth). From 2006-2015 there were no significant changes in the neonatal or postneonatal mortality rates.

NOTE: Hollowed-out symbols represent rates based on 20 or fewer cases and should be interpreted with caution. Rates are not presented due to a small number of cases of postneonatal deaths for 2010.

DATA SOURCE: Massachusetts linked infant birth-infant death file (death cohort), Massachusetts Department of Public Health (data as of February 2017). Data may be updated as more information becomes available.



### Neonatal Infant Mortality

Healthy People 2020 Target: 4.1 infant deaths per 1,000 live births

US 2014: 3.9

MA 2014: 3.3

Boston 2015: 4.5

### Post Neonatal Infant Mortality

Healthy People 2020 Target: 2.0 infant deaths per 1,000 live births

US 2014: 1.9

MA 2014: 1.2

Boston 2015: 0.9

For 2012-2015 combined, conditions originating in the perinatal period was the most common cause of infant death for all racial/ethnic groups, as well as for Boston overall. This included deaths due to complications of pregnancy, labor, and delivery, disorders related to the length of gestation and fetal growth, birth trauma, respiratory and cardiovascular disorders specific to the perinatal period, and infections specific to the perinatal period.

Figure 6.15a Infant Mortality by Cause of Death, Boston Overall, 2012-2015

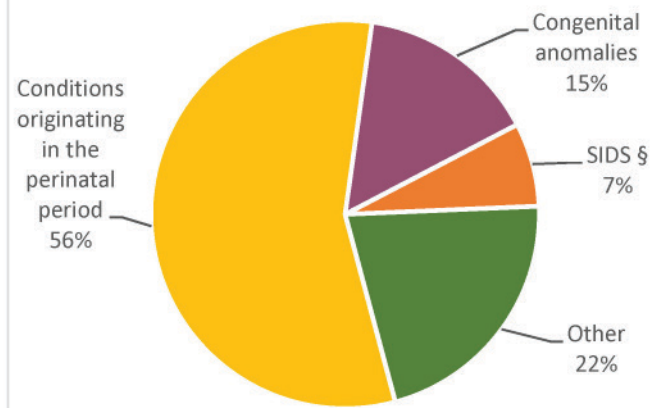


Figure 6.15b Infant Mortality by Cause of Death, Black Infants, 2012-2015

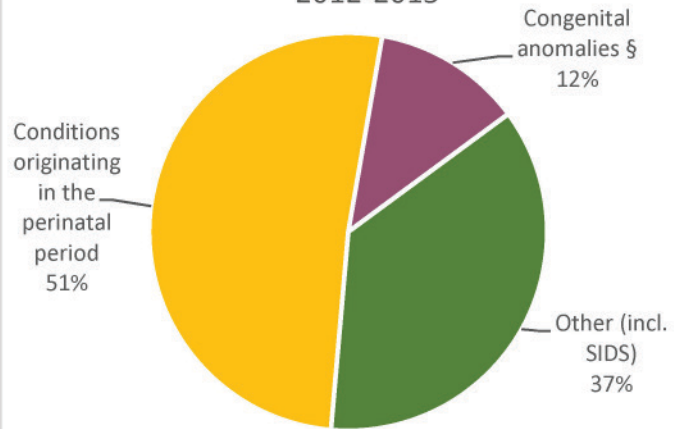


Figure 6.15c Infant Mortality by Cause of Death, Latino Infants, 2012-2015

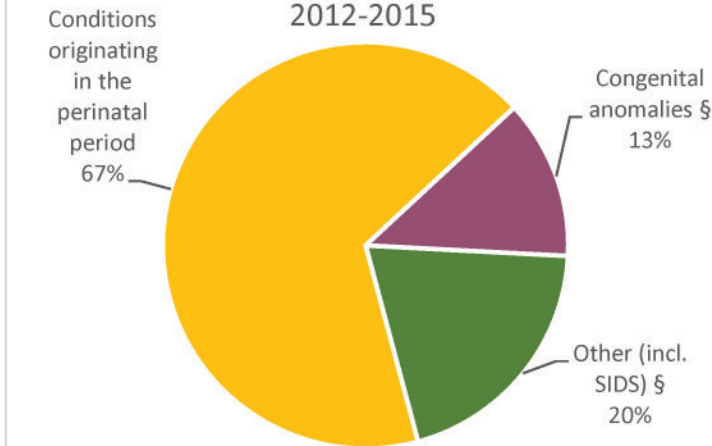
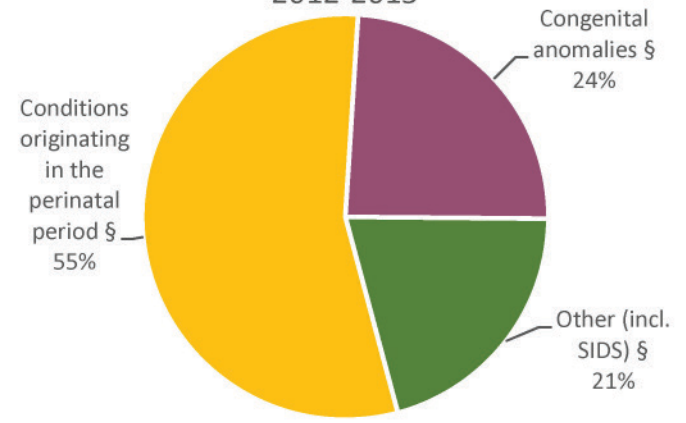


Figure 6.15d Infant Mortality by Cause of Death, White Infants, 2012-2015

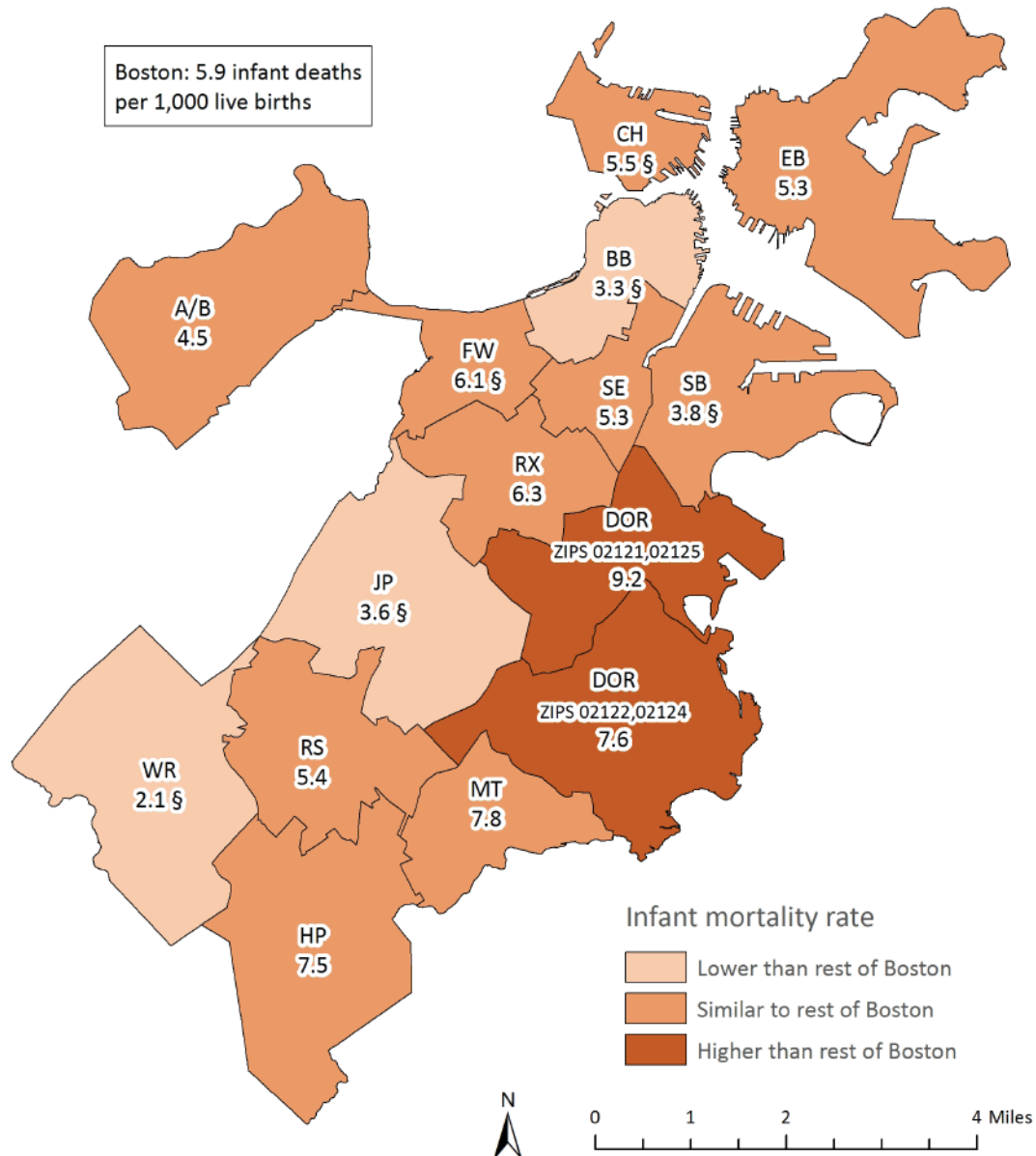


§ Rates are based on 20 or fewer cases and should be interpreted with caution.

NOTE: Rates are not presented due to a small number of cases for Asian infants.

DATA SOURCE: Massachusetts linked infant birth-infant death file (death cohort), Massachusetts Department of Public Health (data as of February 2017). Data may be updated as more information becomes available.

Figure 6.16 Infant Mortality  
by Neighborhood, 2006-2015



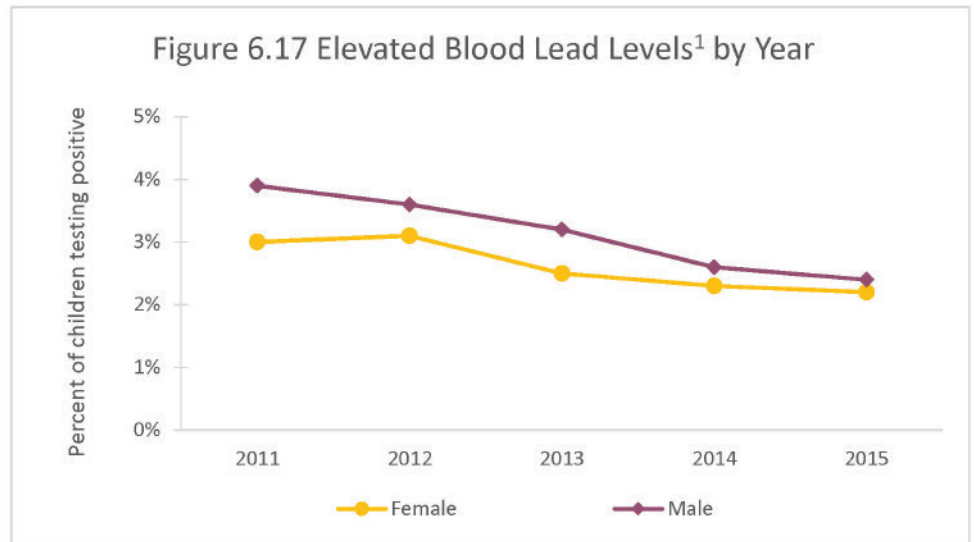
§ Rates are based on 20 or fewer cases and should be interpreted with caution.

NOTE: "BB" includes the Back Bay, Beacon Hill, Downtown, the North End, and the West End.  
"SE" includes the South End and Chinatown.

DATA SOURCE: Massachusetts linked infant birth-infant death file (death cohort), Massachusetts Department of Public Health (data as of February 2017). Data may be updated as more information becomes available.

For 2006-2015, the infant mortality rate in Boston was 5.9 infant deaths per 1,000 live births. Dorchester (zip codes 02121, 02125) and Dorchester (zip codes 02122, 02124) had infant mortality rates that were higher than the rest of Boston. Back Bay, Jamaica Plain, and West Roxbury had infant mortality rates that were lower than the rest of Boston.

In 2015, approximately 2% of male and female children under age 6 tested positive for elevated blood lead levels.



<sup>1</sup> Based on the 2012 CDC recommendation of  $\geq 5$  ug/dl. For more information see Blood-Lead Level in the Technical Notes.

DATA SOURCE: Childhood Lead Poisoning Prevention Program, Massachusetts Department of Public Health



## Adverse Childhood Experiences

Adverse Childhood Experiences (ACEs) are stressful or traumatic events, including abuse and neglect that occur during childhood. They also include household dysfunction such as witnessing domestic violence or growing up with family members who have a mental health disorder, substance use disorder and/or are incarcerated (20). ACEs are strongly related to the development of a wide range of health behaviors (smoking, high risk sexual behavior and substance misuse) and health problems (fetal death, depression, anxiety, sleep disorders, diabetes, cancer, cardiovascular disease and early death) throughout an individual's life (21-23).

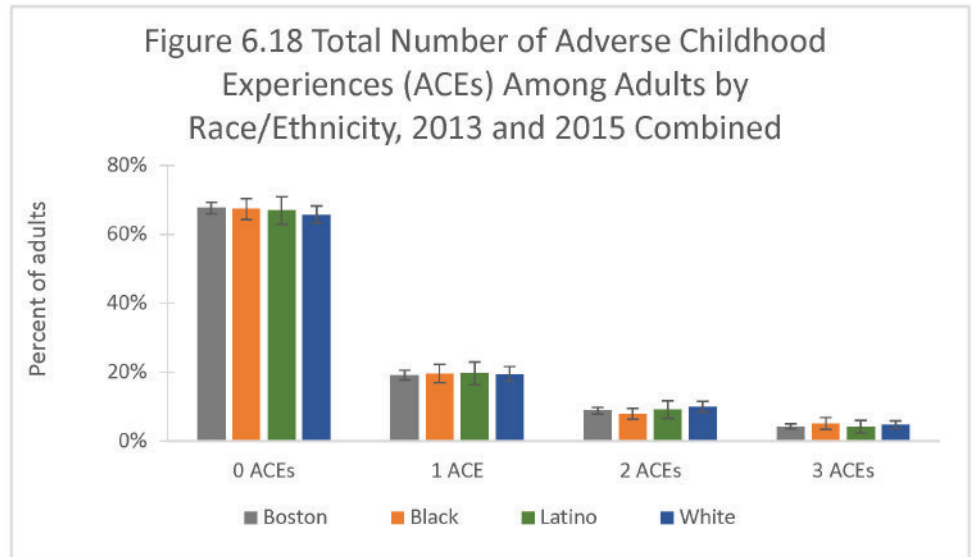
The risk of poor health increases as the number of adverse childhood events a person has experienced increases (20-22). To assess a person's exposure to ACEs, the Centers for Disease Control and Prevention (CDC) developed a survey tool with 10 questions that generates an ACE score. An adult's ACE score is not only associated with their own health outcomes, but can also impact their parenting and thus have intergenerational effects (20). A parent's exposure to ACEs as well as other social determinants of health, such as employment and income, can impact a parent's ability to provide a supportive environment and relationship with their child (21, 22).

Another critical factor in this cycle is the impact of racism. Racism contributes to the inequitable access to social, economic, and other health-promoting resources (i.e. social determinants of health), which in turn impact childhood experiences, and thus social, economic, mental, and physical well-being later in life (23).

Because of the range of health and social impacts of ACEs, prevention of these events and reducing their impact are important (20). Safe, supportive, healthy and stable relationships can reduce the influence of ACEs (20). With acknowledgement of one's own ACEs and with support, parents can learn skills to prevent ACEs in their own children (24). Additionally, trauma-informed care in schools, the criminal justice system, housing systems, and places of health care can help to treat trauma caused by adverse experiences (25, 26).

The Adverse Childhood Experiences (ACE) questions were asked of Boston adult residents to assess associations between childhood maltreatment, and health and well-being later in life. In 2013 and 2015, residents were asked 3 of the 10 questions from the original ACE module created by the CDC, including: 1) if they ever lived with a caregiver who was depressed, mentally ill, or suicidal; 2) if they ever lived with a caregiver who was a problem drinker or alcoholic, or someone who misused drugs; and 3) if their parents were ever physically violent towards each other. This chart captures the number of ACEs experienced by adults by race/ethnicity and for Boston overall.

In Boston for 2013 and 2015 combined, 19% of adults reported one ACE, 9% reported 2 ACEs, and 4% reported three ACEs. There were no significant differences by race/ethnicity when comparing adults with 0 ACEs to those with 1 or more ACEs.



NOTE: Data were not presented for Asian residents due to insufficient sample size.  
 DATA SOURCE: Boston Behavioral Risk Factor Survey (2013, 2015), Boston Public Health Commission



## Summary

Adolescent birth rates continue to decline in Boston. From 2011-2015, the birth rate among females ages 15-17 decreased by 57%, and the birth rate among females ages 18-19 decreased by 38%. For some key indicators, there has been dramatic reduction in differences between racial/ethnic groups. The adolescent birth rates for Black and Latino females ages 15-17 declined 68% and 55%, respectively, from 2011-2015. In fact, there was no difference in the 2015 adolescent birth rates for Asian, Black, and Latino females ages 15-17 compared to their White counterparts. From 2006-2015, the infant death rate for Black infants decreased by 36%.

Racial and ethnic inequities continue to persist for other key indicators of maternal and child health. The percentage of births that were either low birthweight or preterm in 2015 was much higher among Black and Latino than among White women. The percentage of births with low birthweight in 2015 was also higher among Asian than among White women. Similarly, the birth rate for women 18-19 years of age and the infant mortality rate, was much higher among Black and Latino residents compared with White residents in 2015. Inequities in low birthweight and preterm births were also found across categories of age and educational attainment. Inequities in these indicators tend to disproportionately affect women ages 40 and older and with a high school diploma or lesser educational attainment. At the neighborhood level, Dorchester (zip codes 02122, 02124) in particular had elevated percentages of births that were either low birthweight or preterm compared to the rest of Boston. Dorchester (zip codes 02121, 02125) and Mattapan also had elevated percentages of births with low birthweight. Dorchester (zip codes 02121, 02125) and Dorchester (zip codes 02122, 02124) also had higher infant mortality rates compared to the rest of Boston. To reduce the racial/ethnic and social inequities in birth outcomes for Boston, multi-sector interventions that target subpopulations at higher risk should address preconception care, as well as the chronic stressors endured by women over time, which include and are not limited to domestic violence, racism, living in neighborhoods with violent crime, and inadequate access to health resources and services.

# Maternal and Child Health

Teen birth rate decreased among Latino females ages 15-17



**25.2 to 10.2**  
births per 1,000 births from 2011-2015

Teen birth rate decreased among Black females ages 18-19



**42.1 to 24.2**  
births per 1,000 births from 2011-2015



From 2006 to 2015, the infant mortality rate for Black infants decreased **36%**



# Our Point of View: Thoughts from public health

## Social Equality and Infant Health

By Deborah Allen

Child, Adolescent and Family Health Bureau Director, 2008-2017

Boston Public Health Commission

Many cities around the country look to Boston as a leader in infant health and survival. Overall, our statistics justify that. We have a citywide infant mortality rate that first fell below the national 2020 goal for infant survival in 2003 and has been consistently below that benchmark since 2009. But as we see throughout this report, the overall rate is just part of the story. Our focus should not be on how we do citywide, but on how different subgroups in our population fare.

It's partly a matter of poverty: when women are poor, they can't buy good food, live in warm and welcoming homes, get enough of the right kinds of exercise, and feel safe when they are out and about. And all of those factors affect the woman and during pregnancy, her baby.

Infant mortality is also about social marginalization and the stress that comes with being marginalized<sup>1</sup>. The current view is that the experience of discrimination – for example, of being a professional woman of color who finds her views ignored or disparaged by others – results in a physiological stress response that, repeated over and over, puts a growing fetus at risk.

To improve birth outcomes in the city, to attain birth outcomes for Black and Latino women that match those of White women, we have to be prepared to intervene at each step in the pathway from social inequality to poor birth outcomes. That means:

- **Striving for social equality.** An increased minimum wage, Earned Income Tax Credits, and paid sick leave are proven ways to address unequal outcomes due to unequal resources.
- **Taking on racism and other forms of marginalization.** We can't expect equal outcomes if women are exposed to racism and discrimination in our workplaces, schools, streets, parks, stores and airwaves. It takes a village to raise a child – but before that, the village has to embrace the child's mother, making her feel a valued part of her community.
- **Providing support for women whose health has been compromised by social conditions and stress.** This calls for access to high quality health care for all Bostonians and special programs to support women at risk. Two programs that are promoted through the work of BPHC are One Key Question® which aims to improve women's health before pregnancy, and Centering Pregnancy, a model that combines prenatal care with a woman-to-woman group support.

<sup>1</sup>Pathik D. Wadhwa, MD, PhD, Sonja Entringer, PhD, Claudia Buss, PhD, and Michael C. Lu, MD, MPHd. The Contribution of Maternal Stress to Preterm Birth: Issues and Considerations. Clin Perinatol. 2011 Sep; 38(3): 351–384.

## Our Point of View: Thoughts from a community resident

### Group prenatal care – an empowering option

By Keiana Cox

Keiana Cox is a mother to her 1-year-old daughter and a full-time student interested in early childhood education.

I participated both in BPHC's Boston Healthy Start Initiative and the Centering Pregnancy program, a group prenatal care program for pregnant women at Boston Medical Center.

Being able to participate in group prenatal care was an awesome experience. Not only did it cut down on waiting times -- we were all seen in a group rather than one-on-one – but I also got to meet other women who were going through the same experience as I was. Being able to meet with them and hear that they had the same questions and concerns I did was helpful.

Even now, a lot of us stay in touch. In fact, I have one really good friend that I made through the program. We go to school together now and know each other's kids. The other great thing about the program was that we learned how to do a lot of things ourselves – like how to take our blood pressure, weigh ourselves, and listen for our baby's heartbeats. It was really empowering to learn how to do those things on our own.

There's nothing I would change about the program or my experience except maybe to have the fathers be more involved so that they could be more engaged in the process. Other than that, it was a great experience that I would recommend to anyone.

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# Chapter 7

## Health-Related Behaviors







# Health-Related Behaviors

Individual choices can either protect us or put us at risk for disease. Consumption of fruits and vegetables, exercising, abstaining from smoking, and limiting alcohol are examples of behaviors that promote health and well-being (1, 2). Even though most Americans are aware of this, they continue to practice unhealthy behaviors that contribute to poor health outcomes and premature death.

While individuals are ultimately responsible for their own behavior, mounting evidence indicates that the context of one's life – in other words their history, family life, and culture – and the social determinants of health greatly influence the options a person has or the choices they can reasonably make (3-6). In many cases, barriers to healthy choices are greater than a person's ability to overcome them, regardless of motivation (5). For example, in Boston, many individuals live in neighborhoods with limited access to fresh food or safe places to exercise. Children are especially vulnerable because they have limited control of their environment, and yet establishing healthful behaviors in childhood can set the precedent for such behaviors in adulthood (3-6).

Strategies that help people adopt healthy habits must go beyond the individual. Educating individuals about health-promoting behaviors is necessary, but the social determinants of health must also improve in order to create a lasting impact (6).

A more in-depth discussion of these contextual factors can be found in Chapter 2: Social Determinants of Health of this report. In this section, we look closely at individual behaviors, including consumption of fruits and vegetables, physical activity, consumption of sugar-sweetened beverages, smoking, alcohol use, and marijuana use.

# Fruits and Vegetables

Nearly everyone would benefit from eating more fruits and vegetables. Not only are they packed with nutrients, they are also naturally low in fat and calories, but still filling. A diet rich in fruits and vegetables has many health benefits, ranging from a lowered risk of heart disease to the prevention of aging-related eye diseases (7-10).

Despite the many benefits, intake of fruits and vegetables is extremely low for many Americans. Approximately 40% of adults in the United States ate less than 1 serving per day of fruits in 2015; 22% ate less than 1 serving of vegetables per day (11). The 2015 Youth Risk Behavior Surveillance System (YRBSS) indicates that approximately 7% and 5% of U.S. high school students had no vegetables or fruits, respectively, in the past week (12).

The minimum amount of fruits and vegetables a person should eat each day depends on age, sex, and physical activity. To determine the right amount of fruits and vegetables for you, dietary guidelines can be found on the web at <https://health.gov/dietaryguidelines/dga2000/document/build.htm>.

## EXAMPLES OF 1 CUP



1 small apple



1 large banana



1 medium grapefruit



1 large orange



1 medium pear



1 small wedge watermelon



2 large or 3 medium plums



8 large strawberries



1 large bell pepper



1 medium potato



2 large stalks of celery



1 cup cooked greens or 2 cups raw (spinach, collards, mustard greens, turnip greens)



12 baby carrots (or 2 medium carrots)

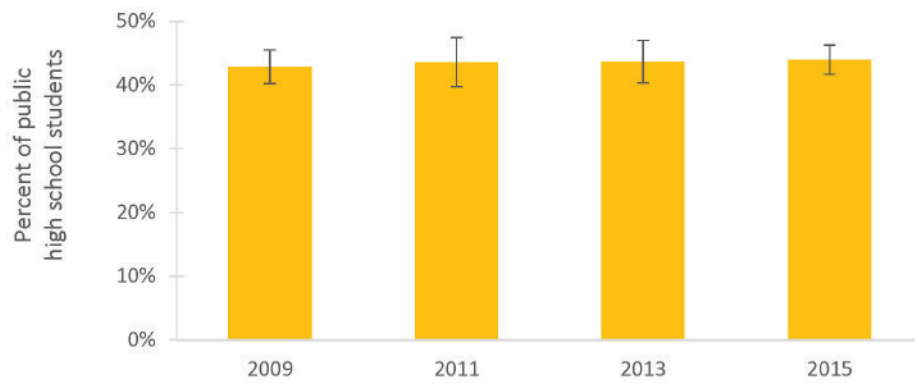


1 large sweet potato



1 large ear of corn

Figure 7.1 Public High School Students Who Consumed Fruit Less Than Once per Day by Year



NOTE: In 2009, 2011, and 2013, 15-20% of unweighted sample was missing data, and estimates should be interpreted with caution.

DATA SOURCE: Youth Risk Behavior Survey (2009, 2011, 2013, 2015), Centers for Disease Control and Prevention and Boston Public Schools

In 2015, 44% of Boston public high school students reported low consumption of fruit, defined as eating fruit less than once per day over the past week. This percentage did not significantly change between 2009 and 2015.



In 2015, 44% of Boston public high school students reported consuming fruit less than once per day over the past week.

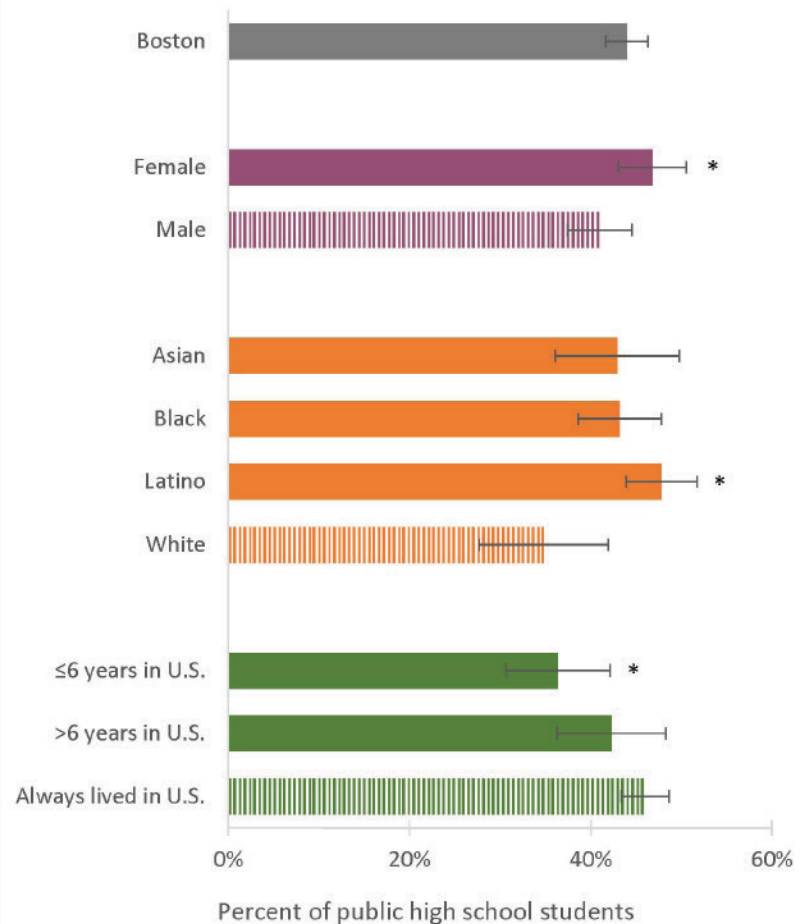
The percentage of students who reported low fruit consumption was higher for the following groups:

- Female students (47%) compared with male students (41%)
- Latino students (48%) compared with White students (35%)

The percentage of students who reported low fruit consumption was lower for the following group:

- Students who lived in the United States for 6 years or fewer (36%) compared with students who had always lived in the United States (46%)

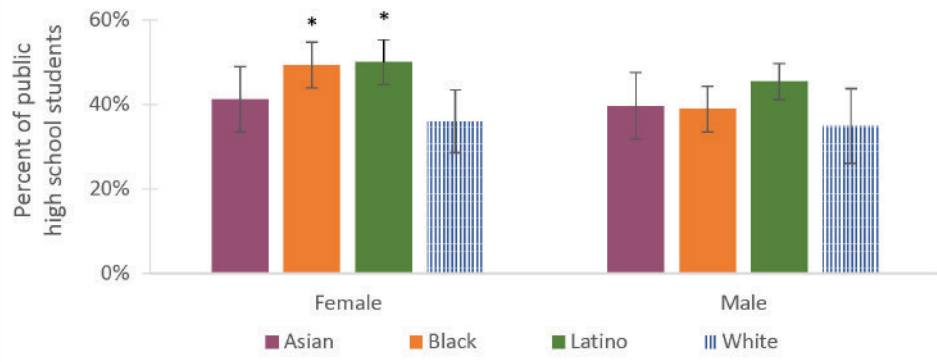
Figure 7.2 Public High School Students Who Consumed Fruit Less Than Once per Day by Selected Indicators, 2015



\* Statistically significant difference when compared to reference group

NOTE: Bars with patterns indicate the reference group within each selected indicator.  
 DATA SOURCE: Youth Risk Behavior Survey (2015), Centers for Disease Control and Prevention and Boston Public Schools

Figure 7.3 Public High School Students Who Consumed Fruit Less Than Once per Day by Sex and Race/Ethnicity, 2013 and 2015 Combined



\* Statistically significant difference when compared to reference group

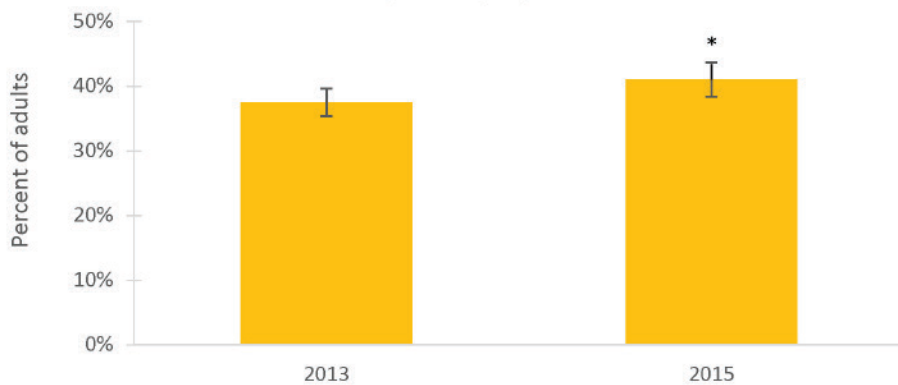
NOTE: Bars with patterns indicate the reference group within each selected indicator. In 2013, 15-20% of unweighted sample was missing data, and estimates should be interpreted with caution.

DATA SOURCE: Youth Risk Behavior Survey (2013, 2015), Centers for Disease Control and Prevention and Boston Public Schools

For 2013 and 2015 combined, a higher percentage of Black (49%) and Latino (50%) female Boston public high school students reported consuming fruit less than once per day over the past week compared with White female students (36%).

There were no significant differences for Asian, Black, and Latino male students compared with White male students.

Figure 7.4 Adults Who Consumed Fruit Less Than Once per Day by Year



\* Statistically significant change over time

DATA SOURCE: Boston Behavioral Risk Factor Survey (2013, 2015), Boston Public Health Commission

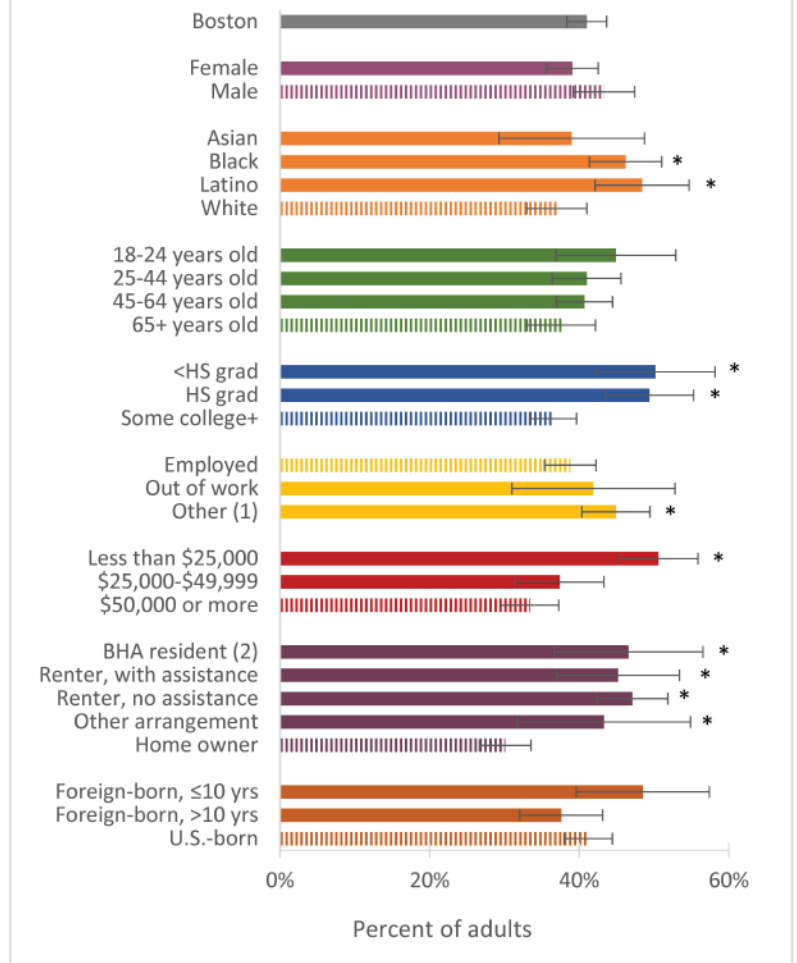
In 2015, 41% of Boston adult residents reported low fruit consumption, defined as consuming fruit less than once per day over the past month. This percentage increased from 2013 to 2015.

In 2015, 41% of Boston adult residents reported consuming fruit less than once per day over the past month.

The percentage of adults who reported low fruit consumption was higher for the following groups:

- Black (46%) and Latino (48%) adults compared with White adults (37%)
- Adults who did not receive a high school diploma (50%) and adults who received a high school diploma (49%) compared with adults with some college education (37%)
- Adults whose employment status was "other" (45%) compared with adults who were employed (39%)
- Adults whose employment status was "other" (45%) compared with adults who were employed (39%)
- Adults who lived in households with an income of less than \$25,000 (51%) compared with adults who lived in households with an income of \$50,000 or more (33%)
- Adults who were Boston Housing Authority residents (47%), adults who received rental assistance (45%), adults who rented but did not receive rental assistance (47%), and adults with other housing arrangements (43%) compared with adults who owned their home (30%)

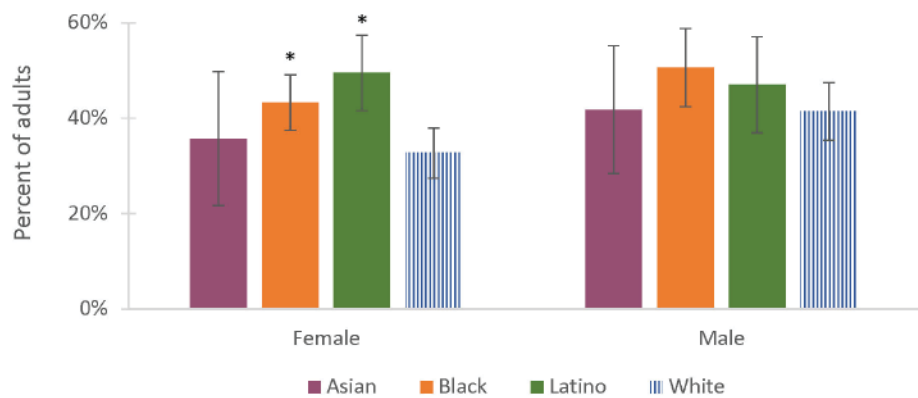
Figure 7.5 Adults Who Consumed Fruit Less Than Once per Day by Selected Indicators, 2015



\* Statistically significant difference when compared to reference group  
 (1) Includes homemakers, students, retirees, and those unable to work  
 (2) Boston Housing Authority resident

NOTE: Bars with patterns indicate the reference group within each selected indicator.  
 DATA SOURCE: Boston Behavioral Risk Factor Survey (2015), Boston Public Health Commission

Figure 7.6 Adults Who Consumed Fruit Less Than Once per Day by Sex and Race/Ethnicity, 2015



\* Statistically significant difference when compared to reference group

NOTE: Bars with patterns indicate the reference group within each selected indicator.

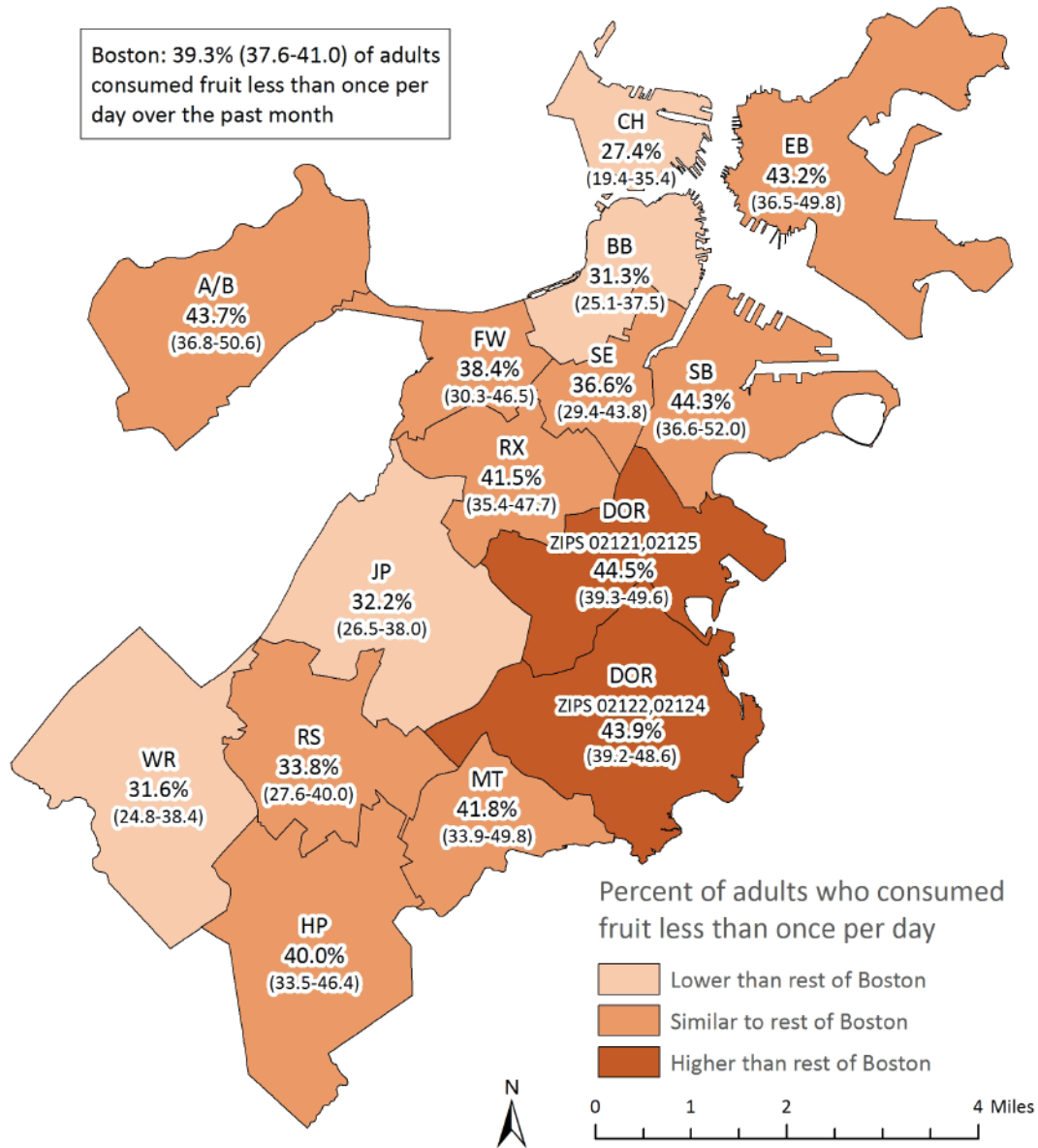
DATA SOURCE: Boston Behavioral Risk Factor Survey (2015), Boston Public Health Commission

In 2015, higher percentages of Black (43%) and Latino (49%) female Boston adult residents reported consuming fruit less than once per day over the past month compared with White female adults (33%).

There were no significant differences for Asian, Black, and Latino male adults compared with White male adults.



Figure 7.7 Adults Who Consumed Fruit Less Than Once per Day by Neighborhood, 2013 and 2015 Combined



NOTE: "BB" includes the Back Bay, Beacon Hill, Downtown, the North End, and the West End.  
 "SE" includes the South End and Chinatown.

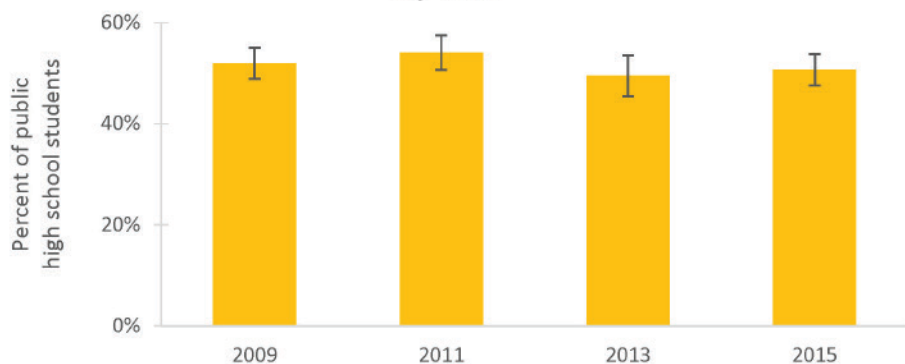
DATA SOURCE: Boston Behavioral Risk Factor Survey (2013, 2015), Boston Public Health Commission

For 2013 and 2015 combined, higher percentages of adult residents in Dorchester (zip codes 02121, 02125) and Dorchester (zip codes 02122, 02124) reported consuming fruit less than once per day over the past month compared with the rest of Boston. Lower percentages of adults in the Back Bay, Charlestown, Jamaica Plain, and West Roxbury reported low fruit consumption compared with the rest of Boston.

Note: A higher percentage of consumption of fruit less than once per day indicates that the population, on average, is engaging in a less healthy behavior.



Figure 7.8 Public High School Students Who Consumed Vegetables Less Than Once per Day by Year



In 2015, 51% of Boston public high school students reported low vegetable consumption, defined as consuming vegetables less than once per day over the past week. The percentage of students who reported low vegetable consumption did not change between 2009 and 2015.

NOTE: In 2009, 2011, and 2013, 15-20% of unweighted sample was missing data, and estimates should be interpreted with caution.

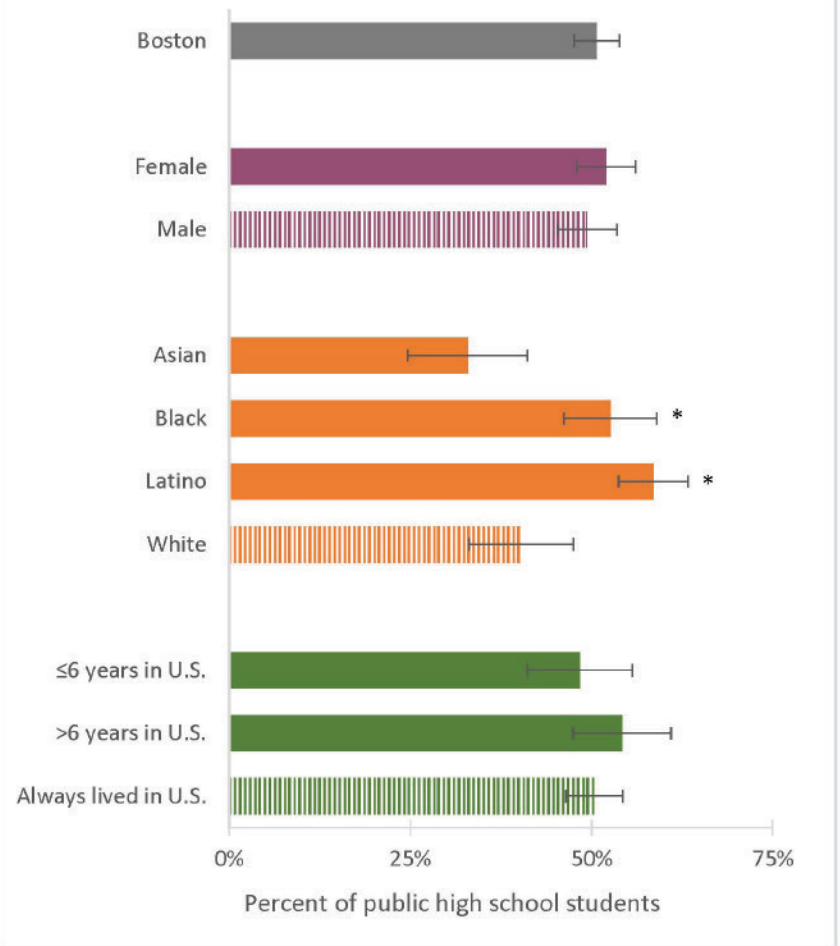
DATA SOURCE: Youth Risk Behavior Survey (2009, 2011, 2013, 2015), Centers for Disease Control and Prevention and Boston Public Schools



In 2015, 51% of Boston public high school students reported consuming vegetables less than once per day over the past week.

A higher percentage of Black (53%) and Latino (58%) students reported low vegetable consumption compared with White students (40%).

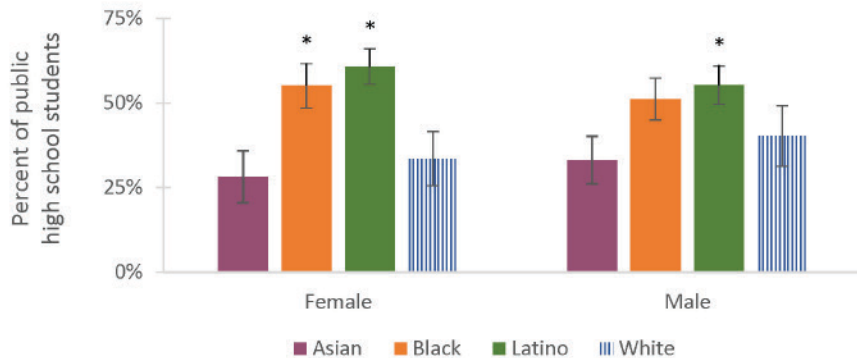
Figure 7.9 Public High School Students Who Consumed Vegetables Less Than Once per Day by Selected Indicators, 2015



\* Statistically significant difference when compared to reference group

NOTE: Bars with patterns indicate the reference group within each selected indicator.  
 DATA SOURCE: Youth Risk Behavior Survey (2015), Centers for Disease Control and Prevention and Boston Public Schools

Figure 7.10 Public High School Students Who Consumed Vegetables Less Than Once per Day by Sex and Race/Ethnicity, 2013 and 2015 Combined



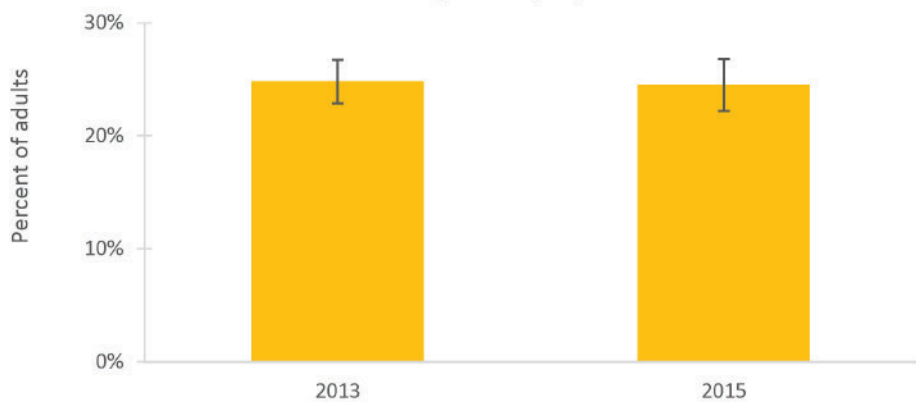
\* Statistically significant difference when compared to reference group

NOTE: Bars with patterns indicate the reference group within each selected indicator. In 2013, 15-20% of unweighted sample was missing data, and estimates should be interpreted with caution.  
 DATA SOURCE: Youth Risk Behavior Survey (2013, 2015), Centers for Disease Control and Prevention and Boston Public Schools

For 2013 and 2015 combined, a higher percentage of Black (55%) and Latino (61%) female Boston public high school students reported consuming vegetables less than once per day over the past week compared with White female students (34%).

A higher percentage of Latino male students (55%) reported low vegetable consumption compared with White male students (40%).

Figure 7.11 Adults Who Consumed Vegetables Less Than Once per Day by Year



DATA SOURCE: Boston Behavioral Risk Factor Survey (2013, 2015), Boston Public Health Commission

In 2015, 24% of Boston adult residents reported low vegetable consumption, defined as consuming vegetables less than once per day over the past month. There was no significant difference in this percentage between 2013 and 2015.

In 2015, 24% of Boston adult residents reported consuming vegetables less than once per day over the past month.

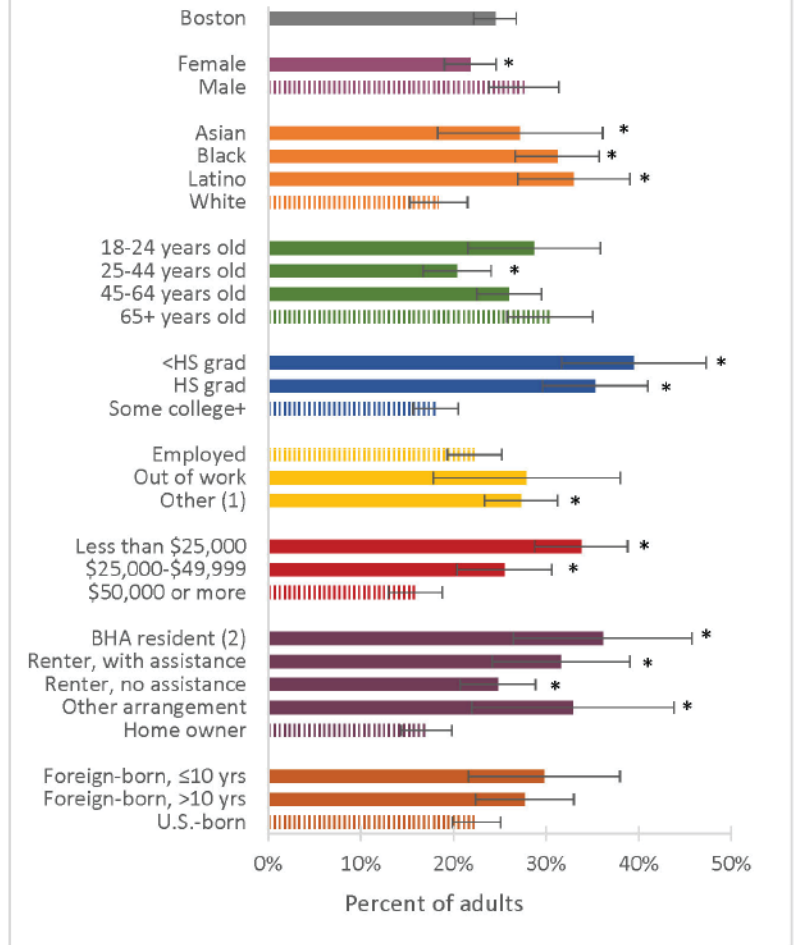
The percentage of adults who reported low vegetable consumption was higher for the following groups:

- Asian (27%), Black (31%), and Latino (33%) adults compared with White adults (18%)
- Adults who did not receive a high school diploma (39%) and adults who received a high school diploma (35%) compared with adults with some college education (18%)
- Adults whose employment status was "other" (27%) compared with adults who were employed (22%)
- Adults who lived in households with an income of less than \$25,000 (34%) and adults who lived in households with an income of \$25,000-\$49,999 (26%) compared with adults who lived in households with an income of \$50,000 or more (16%)
- Adults who were Boston Housing Authority residents (36%), adults who received rental assistance (32%), adults who rented but did not receive rental assistance (25%), and adults with other housing arrangements (33%) compared with adults who owned their home (17%)

The percentage of adults who reported low vegetable consumption was lower for the following groups:

- Females (22%) compared with males (28%)
- Adults ages 25-44 (20%) compared with adults ages 65 and older (30%)

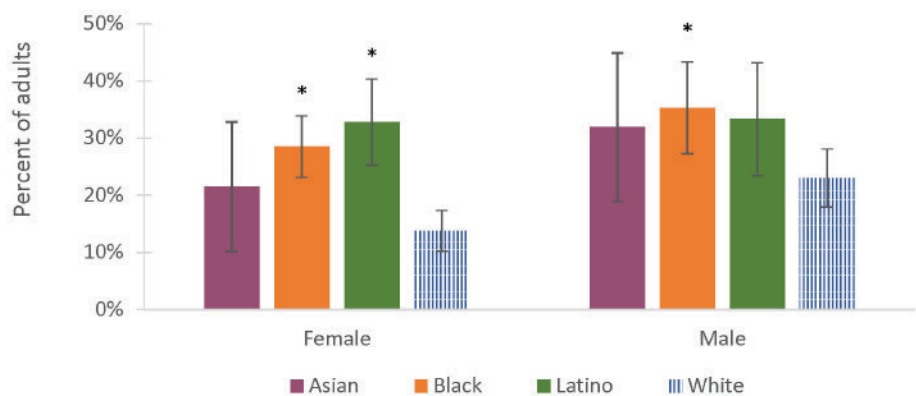
Figure 7.12 Adults Who Consumed Vegetables Less Than Once per Day by Selected Indicators, 2015



\* Statistically significant difference when compared to reference group  
 (1) Includes homemakers, students, retirees, and those unable to work  
 (2) Boston Housing Authority resident

NOTE: Bars with patterns indicate the reference group within each selected indicator.  
 DATA SOURCE: Boston Behavioral Risk Factor Survey (2015), Boston Public Health Commission

Figure 7.13 Adults Who Consumed Vegetables Less Than Once per Day by Sex and Race/Ethnicity, 2015



\* Statistically significant difference when compared to reference group

NOTE: Bars with patterns indicate the reference group within each selected indicator.

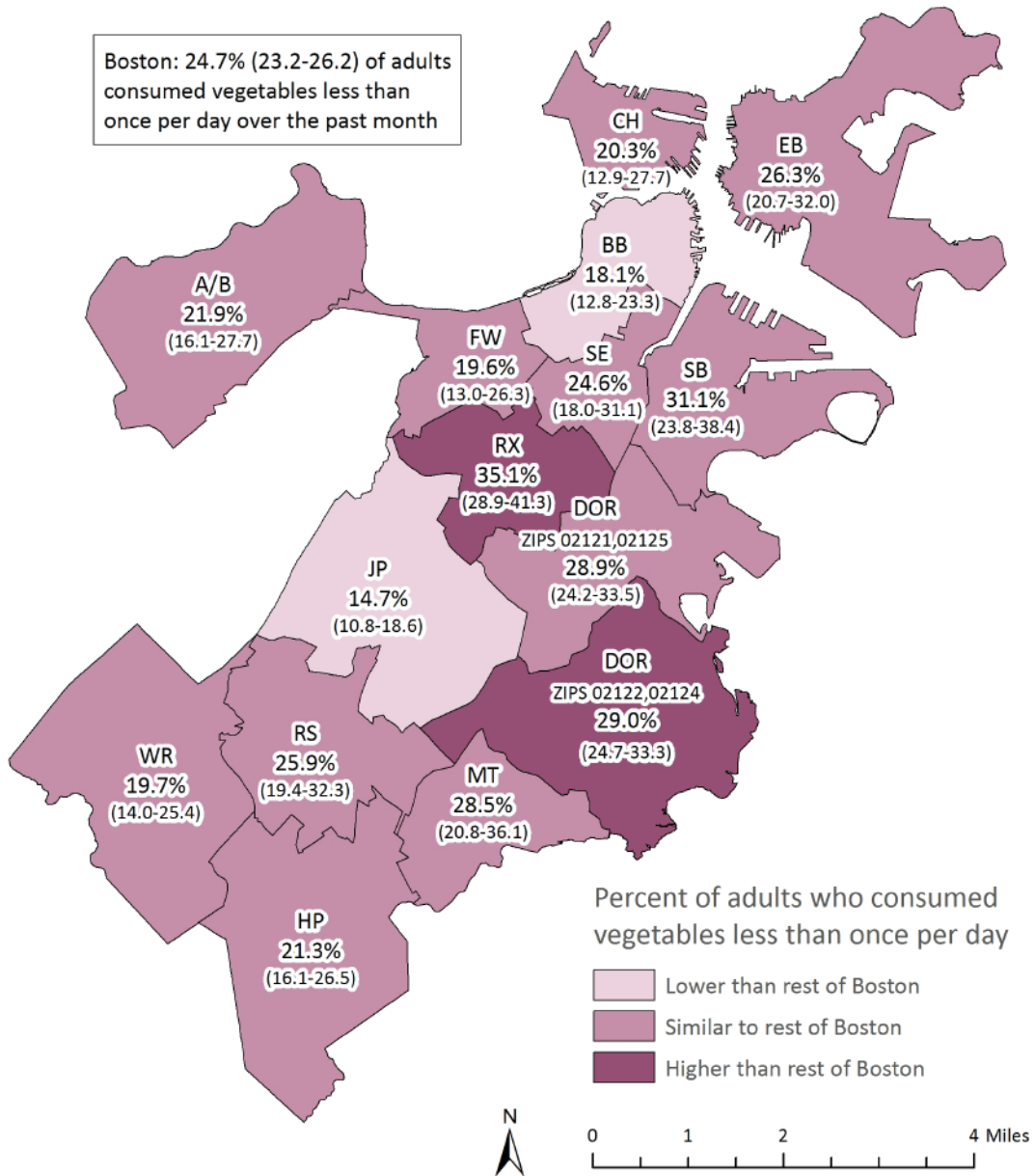
DATA SOURCE: Boston Behavioral Risk Factor Survey (2015), Boston Public Health Commission

In 2015, higher percentages of Black (29%) and Latino (33%) female Boston adult residents reported consuming vegetables less than once per day over the past month compared with White female adults (14%).

A higher percentage of Black male adults (35%) reported low vegetable consumption compared with White male adults (23%).



Figure 7.14 Adults Who Consumed Vegetables Less Than Once per Day by Neighborhood, 2013 and 2015 Combined



NOTE: "BB" includes the Back Bay, Beacon Hill, Downtown, the North End, and the West End.  
 "SE" includes the South End and Chinatown.

DATA SOURCE: Boston Behavioral Risk Factor Survey (2013, 2015), Boston Public Health Commission

For 2013 and 2015 combined, higher percentages of adult residents in Dorchester (zip codes 02122, 02124) and Roxbury reported consuming vegetables less than once per day over the past month compared with the rest of Boston. Lower percentages of adults in the Back Bay and Jamaica Plain reported low vegetable consumption.

## Physical Activity

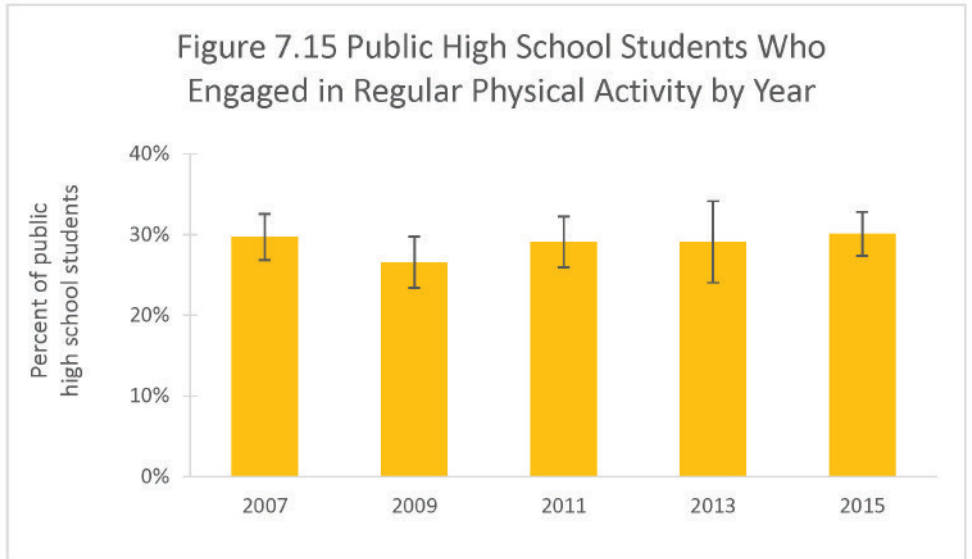
Regular physical activity that includes both aerobic and muscle strengthening activities is important for a healthy lifestyle. It helps control weight, strengthens bones and muscles, improves mental health, and reduces the risk of chronic disease. According to the Centers for Disease Control and Prevention (CDC), children and adolescents need at least one hour of physical activity each day (13). The 2015 YRBSS indicates that approximately 49% of U.S. high school students reported daily physical activity of at least 60 minutes for at least 5 days of the past week, more so for male (58%) than female students (39%) (12). While aerobic activity should make up the bulk of those 60 minutes, muscle strengthening activities such as gymnastics or push-ups, and bone strengthening activities such as jumping rope or running, should be done at least three times a week as part of the 60 minutes of physical activity (14).

Adults require at least 150 minutes of moderate-intensity aerobic activity or 75 minutes of vigorous-intensity aerobic activity every week. Aerobic activities may be broken up into smaller increments of at least 10 minutes and spread out throughout the week. Additionally, muscle strengthening activities for all major muscle groups should be performed at least two days a week (15). These recommendations also apply to adults 65 and older who have no limiting health conditions (16). According to the 2015 Behavioral Risk Factor Surveillance System (BRFSS), approximately 20% of U.S. adults reported participation in aerobic and muscle strengthening exercises to meet these guidelines, with higher percentages generally observed in younger adults ages 18-24 and in men (11).

There are many ways to meet the minimum requirements  
of maintaining a physically active lifestyle.

Moderate Activity	Vigorous Activity	Muscle Strengthening
Walking briskly	Race walking, jogging, or running	Lifting weights
Bicycling (< 10 mph)	Swimming laps	Using resistance bands
Water aerobics	Aerobic dancing	Heavy gardening (i.e., digging, shoveling)
Ballroom dancing	Bicycling (>10 mph)	Yoga
General gardening	Jumping rope	Push-ups, sit ups, etc.

In 2015, 30% of Boston public high school students reported regular physical activity (at least 60 minutes a day for at least 5 of the past 7 days). This percentage did not significantly change between 2007 and 2015.

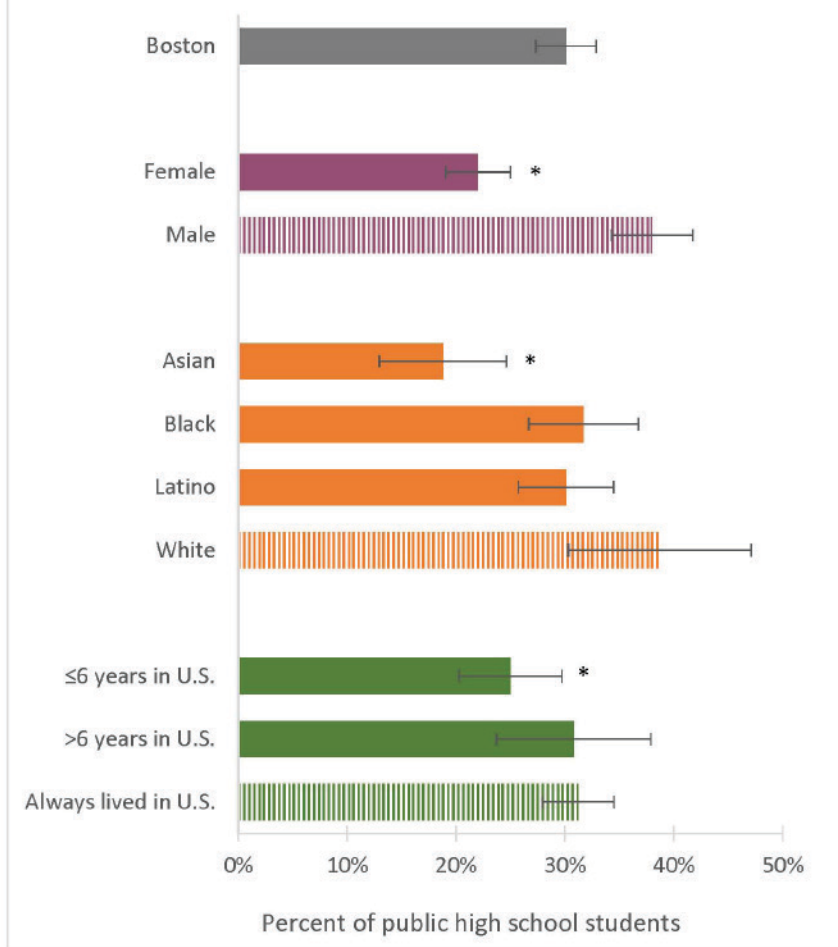


DATA SOURCE: Youth Risk Behavior Survey (2007, 2009, 2011, 2013, 2015), Centers for Disease Control and Prevention and Boston Public Schools





Figure 7.16 Public High School Students Who Engaged in Regular Physical Activity by Selected Indicators, 2015



\* Statistically significant difference when compared to reference group

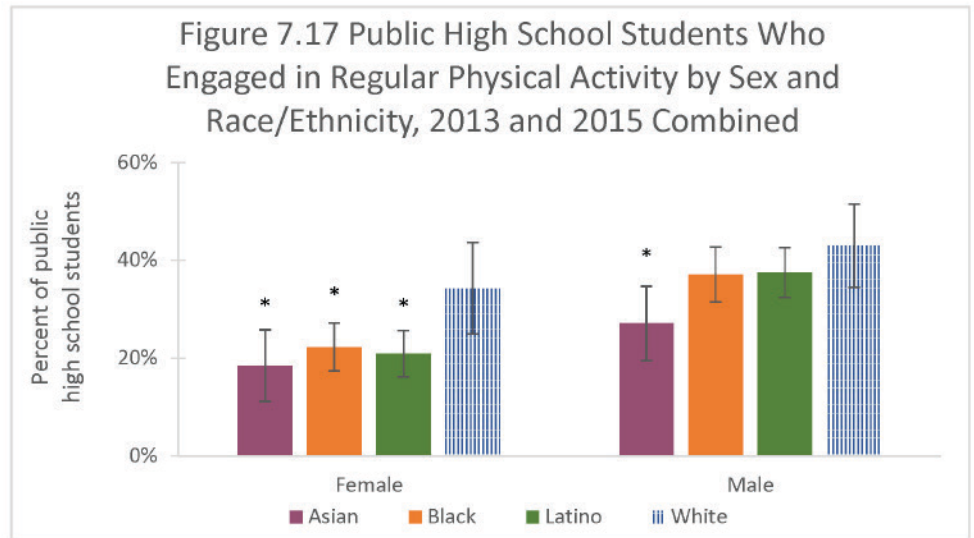
NOTE: Bars with patterns indicate the reference group within each selected indicator.  
 DATA SOURCE: Youth Risk Behavior Survey (2015), Centers for Disease Control and Prevention and Boston Public Schools

In 2015, 30% of Boston public high school students reported regular physical activity (at least 60 minutes a day for at least 5 of the past 7 days). The percentage of students who reported regular physical activity was lower for the following groups:

- Female students (22%) compared with male students (38%)
- Asian students (19%) compared with White students (39%)
- Students who had lived in the United States for 6 years or fewer (25%) compared with students who had always lived in the United States (31%)

For 2013 and 2015 combined, lower percentages of Asian (19%), Black (22%), and Latino (21%) female Boston public high school students reported regular physical activity (at least 60 minutes a day for at least 5 of the past 7 days) compared with White female students (34%).

A lower percentage of Asian male students (27%) reported being physically active compared with White male students (43%).

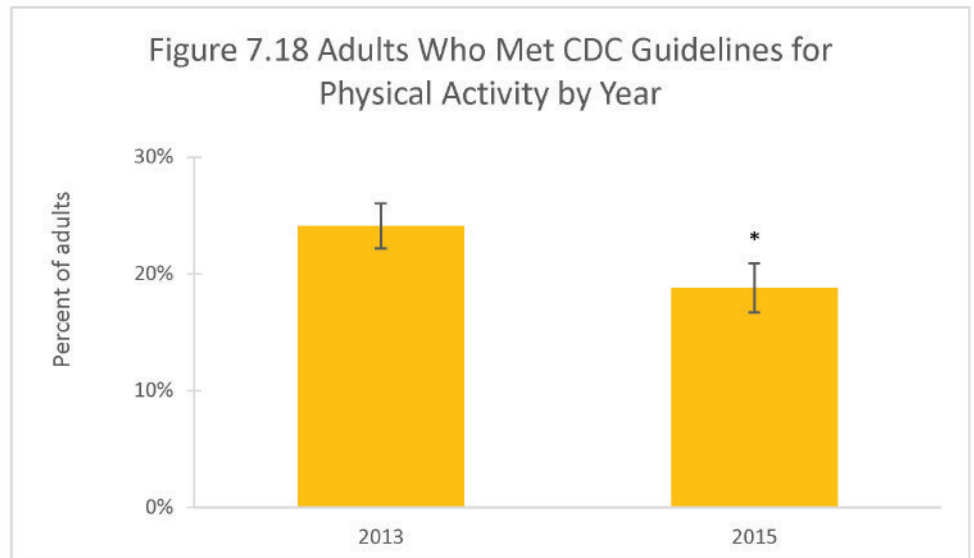


\* Statistically significant difference when compared to reference group

NOTE: Bars with patterns indicate the reference group within each selected indicator.

DATA SOURCE: Youth Risk Behavior Survey (2013, 2015), Centers for Disease Control and Prevention and Boston Public Schools

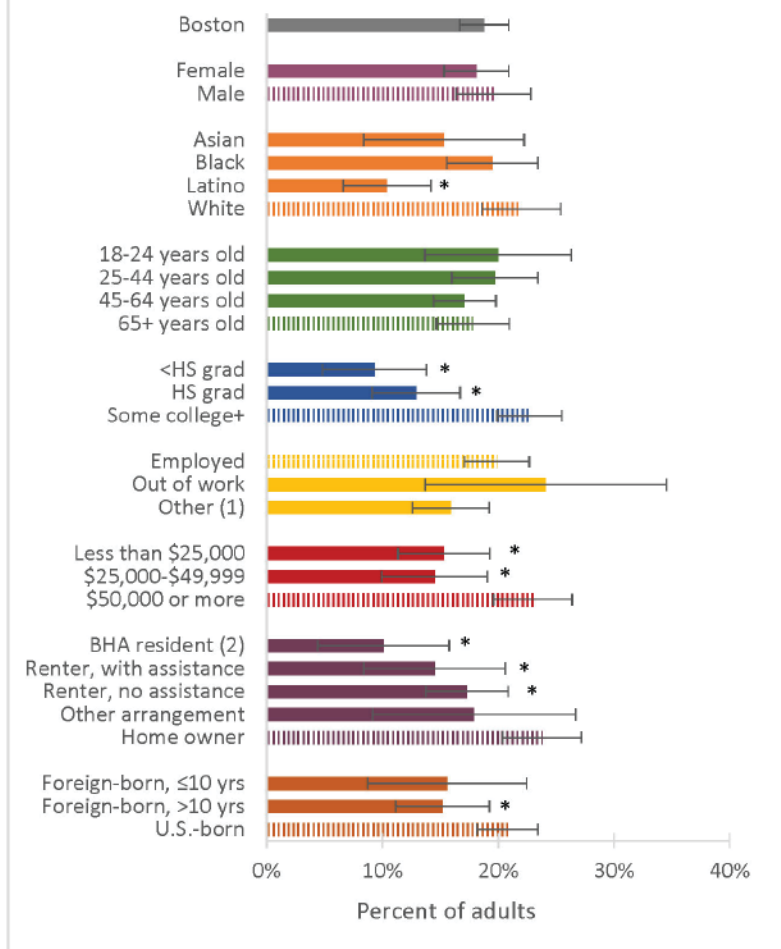
In 2015, 19% of Boston adult residents reported meeting CDC guidelines for physical activity over the past month. This decreased from 2013 to 2015.



\* Statistically significant change over time

DATA SOURCE: Boston Behavioral Risk Factor Survey (2013, 2015), Boston Public Health Commission

Figure 7.19 Adults Who Met CDC Guidelines for Physical Activity by Selected Indicators, 2015



\* Statistically significant difference when compared to reference group  
 (1) Includes homemakers, students, retirees, and those unable to work  
 (2) Boston Housing Authority resident

NOTE: Bars with patterns indicate the reference group within each selected indicator.  
 DATA SOURCE: Boston Behavioral Risk Factor Survey (2015), Boston Public Health Commission

In 2015, 19% of Boston adult residents reported meeting CDC guidelines for physical activity over the past month.

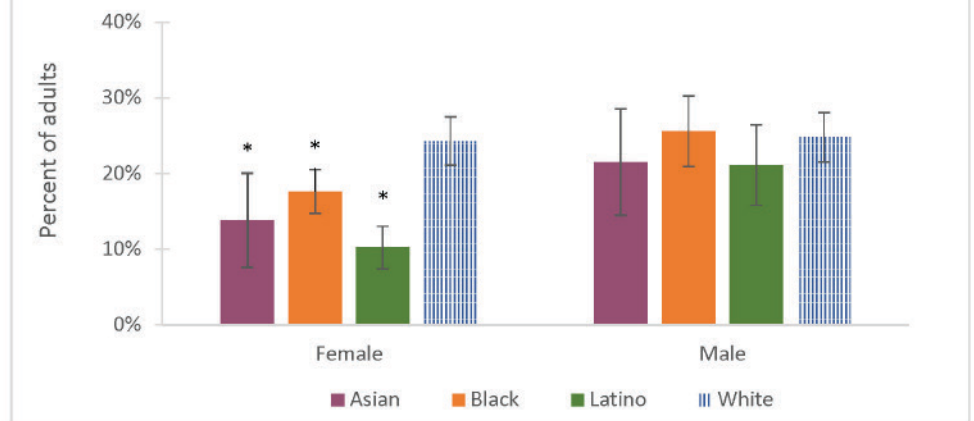
The percentage of adults who reported meeting CDC guidelines for physical activity was lower for the following groups:

- Latino adults (10%) compared with White adults (22%)
- Adults who did not receive a high school diploma (9%) and adults who received a high school diploma (13%) compared with adults with some college education (23%)
- Adults who lived in households with an income of less than \$25,000 (15%) and adults who lived in households with an income of \$25,000-\$49,999 (15%) compared with adults who lived in households with an income of \$50,000 or more (23%)
- Adults who were Boston Housing Authority residents (10%), adults who received rental assistance (14%), and adults who rented but did not receive rental assistance (17%) compared with adults who owned their home (24%)
- Foreign-born adults who lived in the United States for more than 10 years (15%) compared with adults who were born in the United States (21%)

For 2013 and 2015 combined, lower percentages of Asian (14%), Black (18%), and Latino (10%) female Boston adult residents reported meeting CDC guidelines for physical activity over the past month compared with White female adults (24%).

There were no significant differences for Asian, Black, and Latino male adults compared with White male adults.

Figure 7.20 Adults Who Met CDC Guidelines for Physical Activity by Sex and Race/Ethnicity, 2013 and 2015 Combined



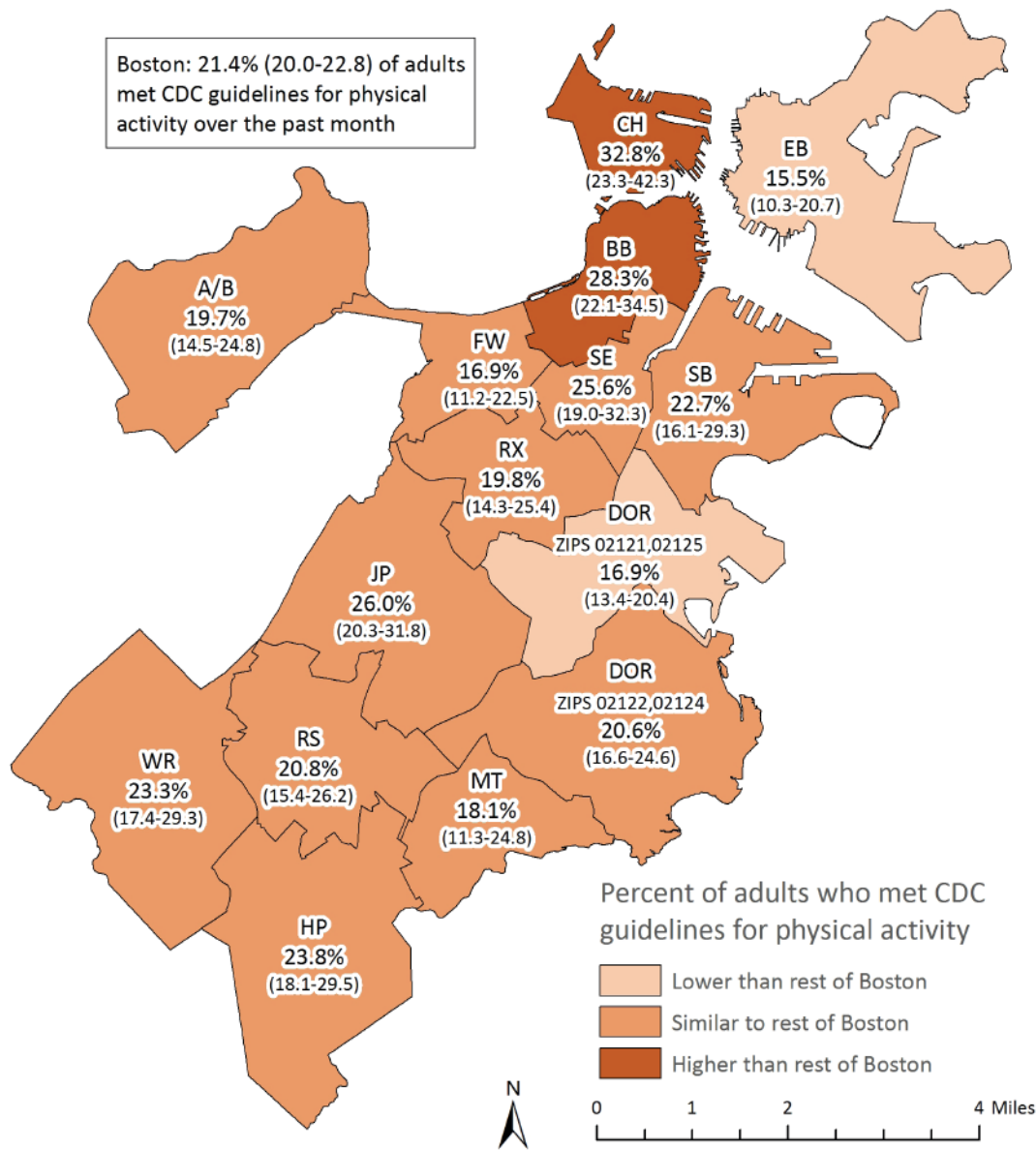
\* Statistically significant difference when compared to reference group

NOTE: Bars with patterns indicate the reference group within each selected indicator.

DATA SOURCE: Boston Behavioral Risk Factor Survey (2013, 2015), Boston Public Health Commission



Figure 7.21 Adults Who Met CDC Guidelines for Physical Activity by Neighborhood, 2013 and 2015 Combined



NOTE: "BB" includes the Back Bay, Beacon Hill, Downtown, the North End, and the West End.  
 "SE" includes the South End and Chinatown.

DATA SOURCE: Boston Behavioral Risk Factor Survey (2013, 2015), Boston Public Health Commission

For 2013 and 2015 combined, higher percentages of adult residents in Back Bay and Charlestown reported meeting CDC guidelines for physical activity over the past month compared with the rest of Boston. Lower percentages of adults in Dorchester (zip codes 02121, 02125) and East Boston reported meeting CDC guidelines for physical activity compared with the rest of Boston.

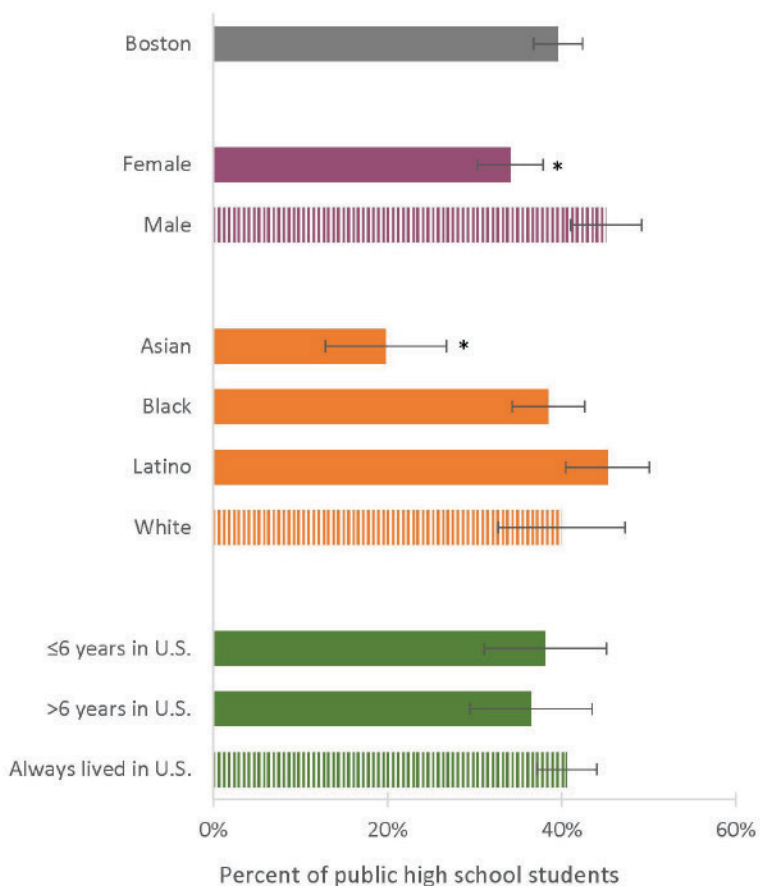
## Sugar-Sweetened Beverages

Sugar-sweetened beverages (SSBs) are drinks with added sugar, including soft drinks (i.e. soda), fruit drinks or punches, sports drinks, tea and coffee drinks, energy drinks, and sweetened milks or milk alternatives (17). They are the largest source of empty calories for children and adolescents in the U.S. (18, 19). SSBs, which provide calories but lack nutritional value, are a major target in the fight to reduce obesity, especially among youth who consume 22% of their empty calories from SSBs (19). The CDC, the American Academy for Pediatrics, and the American Heart Association have all called for the reduced consumption of sugary drinks for health-related reasons including obesity, type 2 diabetes, and heart disease (19-21).

The percentage of U.S. adults who report having at least 1 SSB per day ranges from approximately 20% to 50% (22), with higher percentages observed in younger adults, men, Black residents, unemployed individuals, and individuals with less than a high school education (22). Sugar-sweetened beverage companies specifically target youth and youth of color to buy their products (23). The 2015 YRBSS indicates that approximately 20% of U.S. high school students reported having at least 1 soda per day, with a higher percentage observed in male than female students (12). The availability of SSBs for purchase within and in close proximity of schools may influence SSB consumption among children and adolescents (24, 25).



Figure 7.22 Daily Consumption of One or More Sugar-Sweetened Beverages Among Public High School Students by Selected Indicators, 2015



\* Statistically significant difference when compared to reference group

NOTE: Bars with patterns indicate the reference group within each selected indicator.  
 DATA SOURCE: Youth Risk Behavior Survey (2015), Centers for Disease Control and Prevention and Boston Public Schools

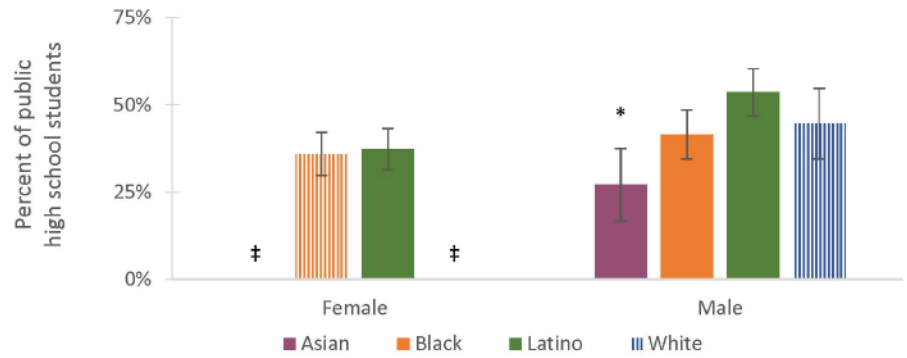
In 2015, 40% of Boston public high school students reported having one or more sugar-sweetened beverages daily over the past week.

A lower percentage of female students (34%) reported having one or more sugar-sweetened beverages compared with male students (45%). A lower percentage of Asian students (20%) reported having one or more sugar-sweetened beverages compared with White students (40%).

In 2015, there was no significant difference in the percentages of Black and Latino female Boston public high school students who reported having one or more sugar-sweetened beverages daily over the past week.

A lower percentage of Asian male students (27%) reported having one or more sugar-sweetened beverages compared with White male students (45%).

Figure 7.23 Daily Consumption of One or More Sugar-Sweetened Beverages Among Public High School Students by Sex and Race/Ethnicity, 2015



\* Statistically significant difference when compared to reference group

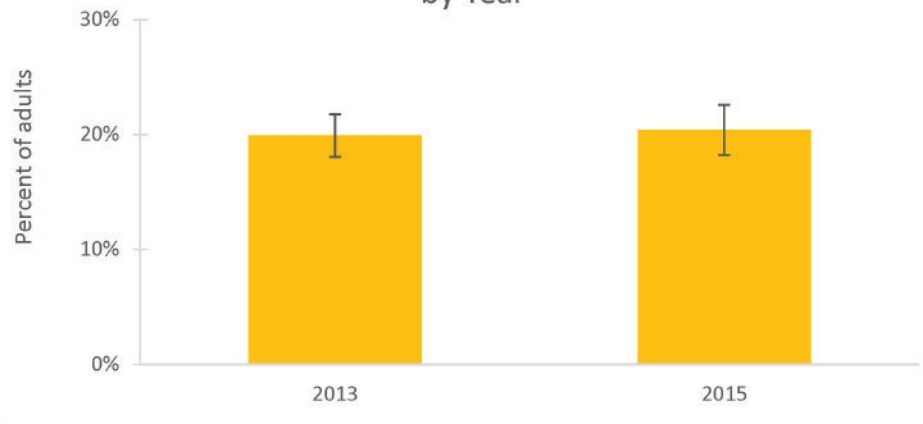
‡ Data not presented due to insufficient sample size

NOTE: Bars with patterns indicate the reference group within each selected indicator.

DATA SOURCE: Youth Risk Behavior Survey (2015), Centers for Disease Control and Prevention and Boston Public Schools

In 2015, 20% of Boston adult residents reported having one or more sugar-sweetened beverages daily over the past 30 days. There was no significant difference in this percentage between 2013 and 2015.

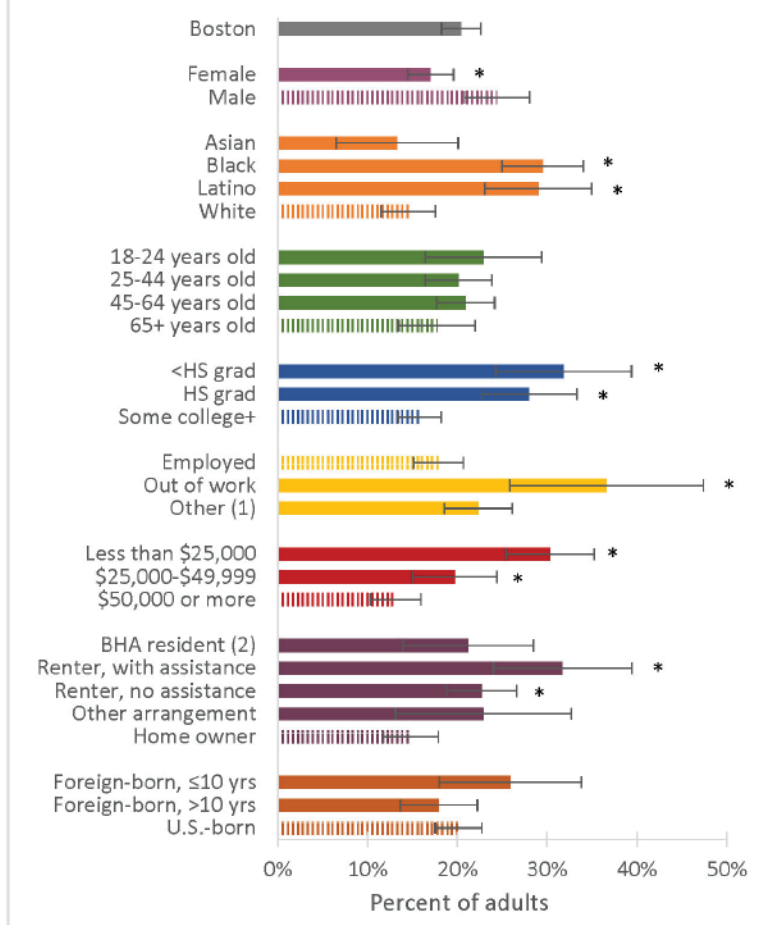
Figure 7.24 Daily Consumption of One or More Sugar-Sweetened Beverages Among Adults by Year



DATA SOURCE: Boston Behavioral Risk Factor Survey (2013, 2015), Boston Public Health Commission



Figure 7.25 Daily Consumption of One or More Sugar-Sweetened Beverages Among Adults by Selected Indicators, 2015



\* Statistically significant difference when compared to reference group  
 (1) Includes homemakers, students, retirees, and those unable to work  
 (2) Boston Housing Authority resident

NOTE: Bars with patterns indicate the reference group within each selected indicator.  
 DATA SOURCE: Boston Behavioral Risk Factor Survey (2015), Boston Public Health Commission

In 2015, 20% of Boston adult residents reported having one or more sugar-sweetened beverages daily over the past 30 days.

The percentage of adults who reported having one or more sugar-sweetened beverages was higher for the following groups:

- Black (30%) and Latino (29%) adults compared with White adults (14%)
- Adults who did not receive a high school diploma (32%) and adults who received a high school diploma (28%) compared with adults with some college education (16%)
- Adults who were out of work (37%) compared with adults who were employed (18%)
- Adults who lived in households with an income of less than \$25,000 (30%) and adults who lived in households with an income of \$25,000-\$49,999 (20%) compared with adults who lived in households with an income of \$50,000 or more (13%)
- Adults who received rental assistance (32%) and adults who rented but did not receive rental assistance (23%) compared with adults who owned their homes (15%)

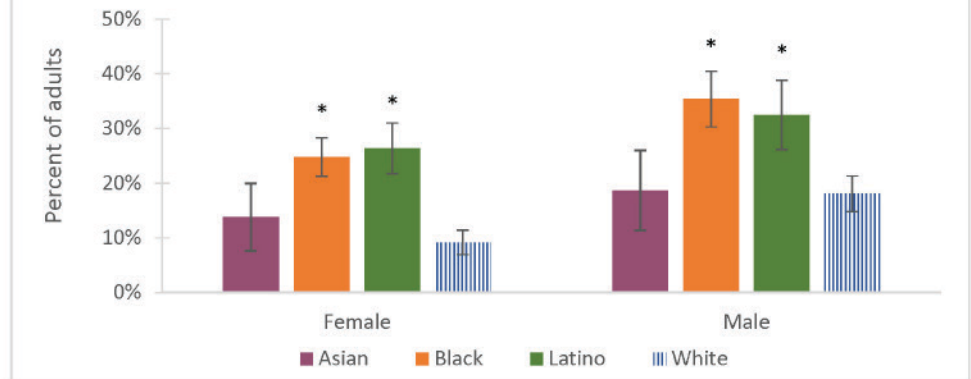
The percentage of adults who reported having one or more sugar-sweetened beverages was lower for the following group:

- Females (17%) compared with males (24%)

For 2013 and 2015 combined, higher percentages of Black (25%) and Latino (26%) female Boston adult residents reported having one or more sugar-sweetened beverages daily over the past 30 days compared with White female adults (9%).

Higher percentages of Black (35%) and Latino (32%) male adults reported having one or more sugar-sweetened beverages compared with White male adults (18%).

Figure 7.26 Daily Consumption of One or More Sugar-Sweetened Beverages Among Adults by Sex and Race/Ethnicity, 2013 and 2015 Combined



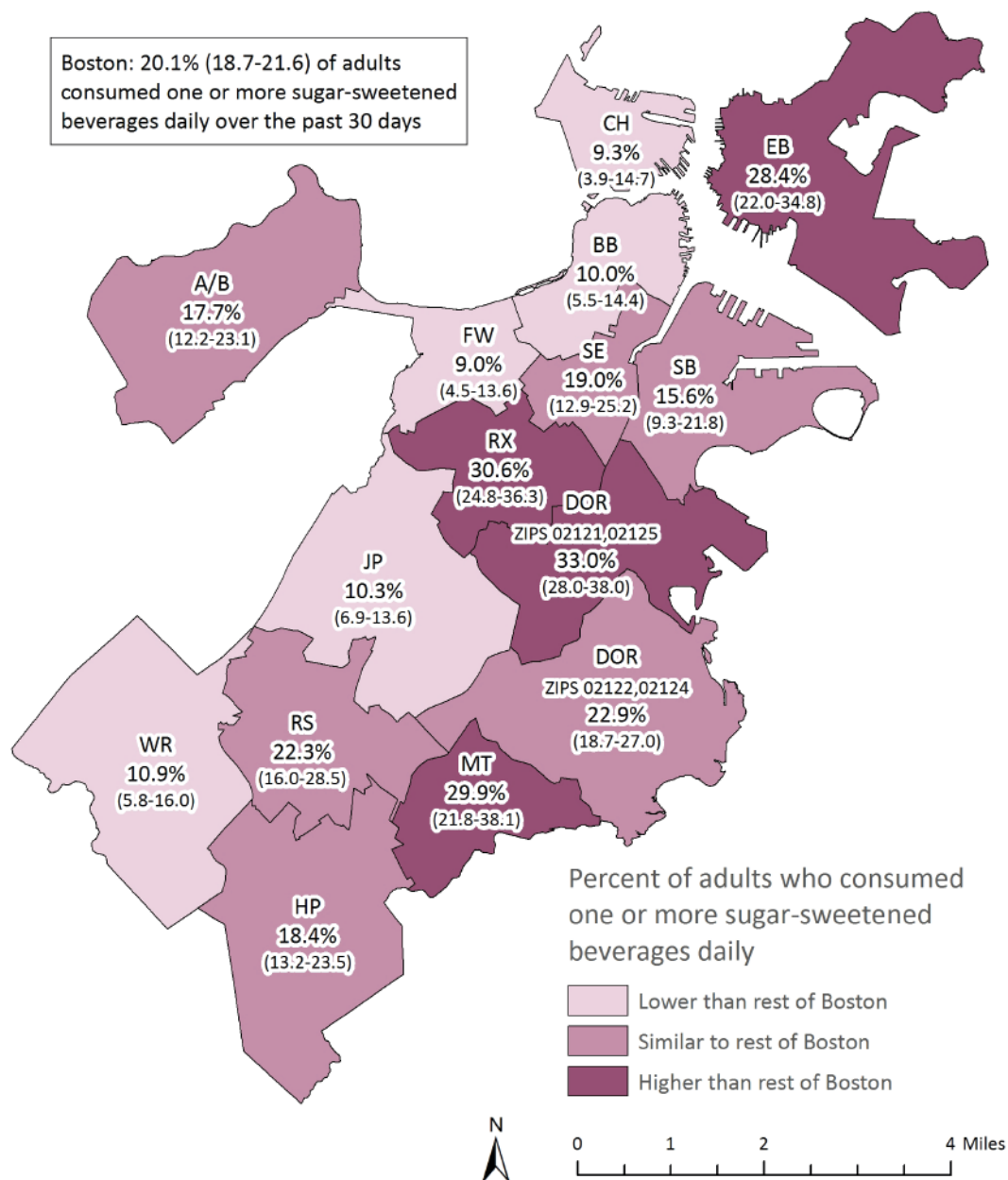
\* Statistically significant difference when compared to reference group

NOTE: Bars with patterns indicate the reference group within each selected indicator.

DATA SOURCE: Boston Behavioral Risk Factor Survey (2013, 2015), Boston Public Health Commission



Figure 7.27 Daily Consumption of One or More Sugar-Sweetened Beverages Among Adults by Neighborhood, 2013 and 2015 Combined



NOTE: "BB" includes the Back Bay, Beacon Hill, Downtown, the North End, and the West End.  
"SE" includes the South End and Chinatown.

DATA SOURCE: Boston Behavioral Risk Factor Survey (2013, 2015), Boston Public Health Commission

For 2013 and 2015 combined, higher percentages of adult residents in Dorchester (zip codes 02121, 02125), East Boston, Mattapan, and Roxbury reported having one or more sugar-sweetened beverages daily over the past 30 days compared with the rest of Boston. Lower percentages of adults in Back Bay, Charlestown, Fenway, Jamaica Plain, and West Roxbury reported having one or more sugar-sweetened beverages compared with the rest of Boston.

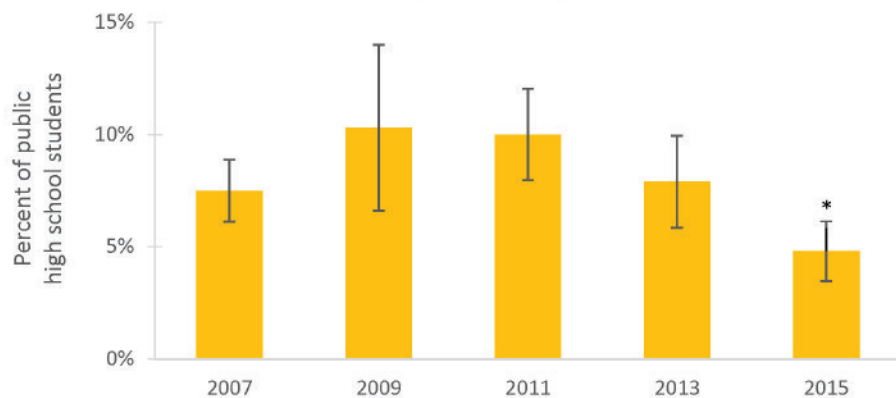
# Smoking

Cigarette smoking is the leading preventable cause of death in the U.S., and is estimated to cause more than 480,000 deaths annually (26). Smoking negatively impacts almost every organ of the body, and the effects begin immediately upon inhalation. Within ten seconds, nicotine reaches the brain, inducing cigarette addiction. Soon after, cancer-causing agents (carcinogens) bind to cells in the lungs and other organs. Tobacco smoke damages blood vessels and increases the likelihood of blood clots. Carbon monoxide, another cigarette toxin, binds to red blood cells, preventing them from effectively circulating oxygen throughout the body (26). Long term damage from smoking includes chronic inflammation of the lungs, a weakened immune system, and DNA damage, all of which can lead to disease and death. The risk and severity of smoking-related illness depends on how long and how many cigarettes the smoker has smoked in his or her lifetime (27).

The 2015 BRFSS indicates that approximately 18% of U.S. adults currently smoke cigarettes (11). According to findings from the 2015 National Health Interview Survey, current cigarette smoking was highest among non-Latino American Indian/Alaska Native adults and people of multiple races, and lowest among Asian adults (28). Lesser educational attainment, lower household income, and blue-collar occupations are social determinants also shown to be associated with cigarette smoking in adults (28, 29). Observational studies in recent years also suggest that the social, economic, and physical attributes of neighborhoods where individuals live may also influence smoking behavior beyond individual choices (30, 31).

Despite the well known health risks, youth and young adult smoking rates in the U.S. have remained unchanged over the past few years (32); the percentage of current smokers among U.S. high school students and young adults ages 18 to 24 in 2015 was approximately 9% and 13%, respectively (12, 28). The reasons why smoking rates have remained unchanged in these subgroups are complex and relate to social and environmental factors that influence cigarette use as well as tobacco marketing tactics that entice young people, and specifically youth of color, to start smoking (33). Today, nearly all adults who smoke on a regular basis started before the age of 26, making adolescents and young adults a key demographic in reducing future smoking-related disease and death (32).

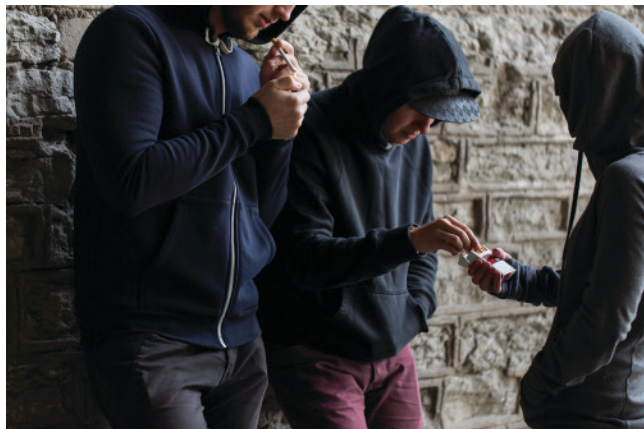
Figure 7.28 Public High School Students Who Smoked Cigarettes by Year



\* Statistically significant change over time

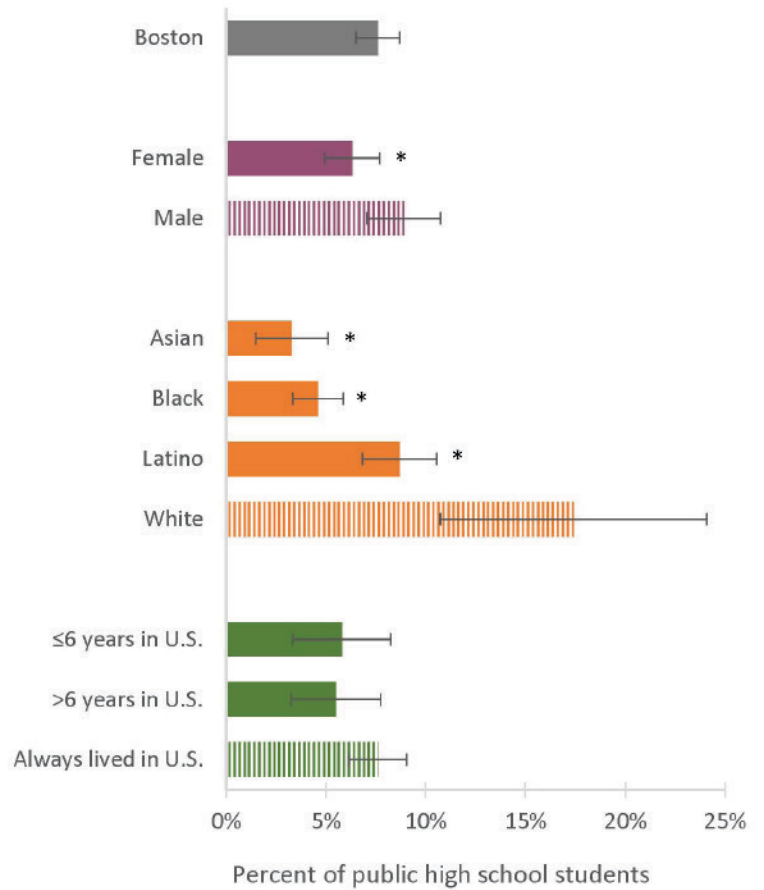
DATA SOURCE: Youth Risk Behavior Survey (2007, 2009, 2011, 2013, 2015), Centers for Disease Control and Prevention and Boston Public Schools

In 2015, 5% of Boston public high school students reported having smoked cigarettes in the past 30 days. The percentage of students who reported smoking cigarettes decreased between 2007 and 2015.



For 2011, 2013, and 2015 combined, 8% of Boston public high school students reported having smoked cigarettes in the past 30 days. A lower percentage of female students (6%) reported smoking cigarettes compared with male students (9%). Lower percentages of Asian (3%), Black (5%), and Latino (9%) students reported smoking cigarettes compared with White students (17%).

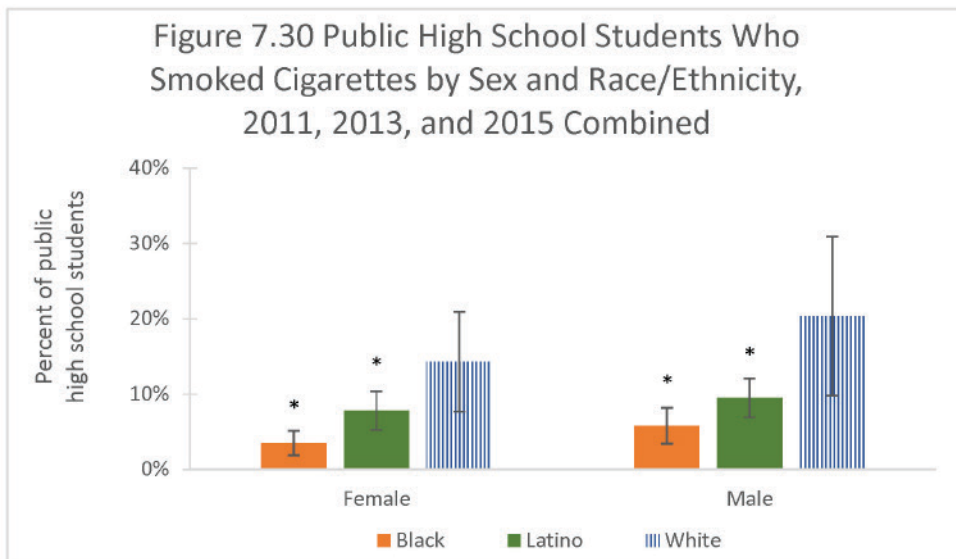
Figure 7.29 Public High School Students Who Smoked Cigarettes by Selected Indicators, 2011, 2013, and 2015 Combined



\* Statistically significant difference when compared to reference group

NOTE: Bars with patterns indicate the reference group within each selected indicator.  
 DATA SOURCE: Youth Risk Behavior Survey (2011, 2013, 2015), Centers for Disease Control and Prevention and Boston Public Schools

Figure 7.30 Public High School Students Who Smoked Cigarettes by Sex and Race/Ethnicity, 2011, 2013, and 2015 Combined



\* Statistically significant difference when compared to reference group

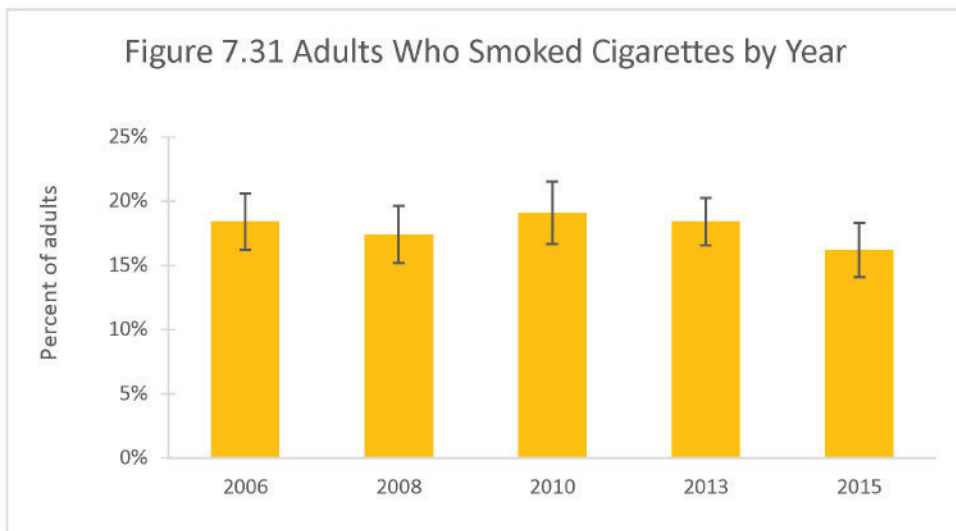
NOTE: Bars with patterns indicate the reference group within each selected indicator. Data not presented due to insufficient sample size for Asian female and male public high school students.

DATA SOURCE: Youth Risk Behavior Survey (2011, 2013, 2015), Centers for Disease Control and Prevention and Boston Public Schools

For 2011, 2013, and 2015 combined, lower percentages of Black (4%) and Latino (8%) female Boston public high school students reported having smoked cigarettes in the past 30 days compared with White female students (14%).

Lower percentages of Black (6%) and Latino (10%) male students reported having smoked cigarettes compared with White male students (20%).

Figure 7.31 Adults Who Smoked Cigarettes by Year



DATA SOURCE: Boston Behavioral Risk Factor Survey (2006, 2008, 2010, 2013, 2015), Boston Public Health Commission

In 2015, 16% of Boston adult residents reported smoking cigarettes every day or some days. This percentage did not change significantly between 2006 and 2015.

In 2015, 16% of Boston adult residents reported smoking cigarettes every day or some days.

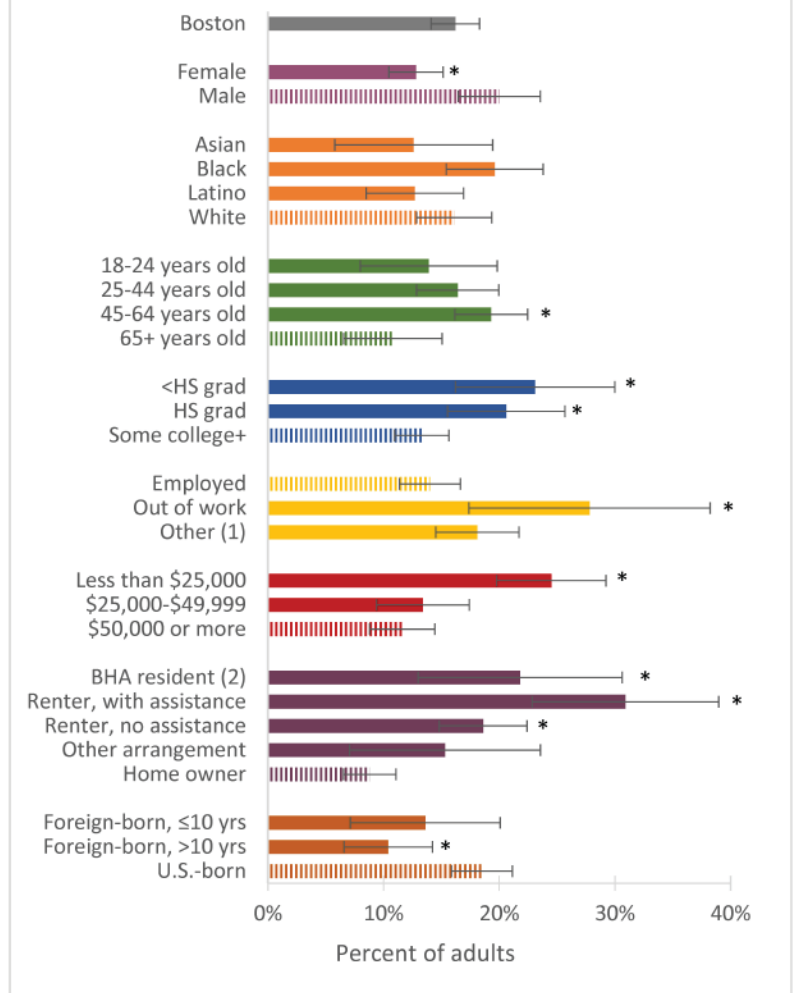
The percentage of adults who reported smoking cigarettes was higher for the following groups:

- Adults ages 45-64 (19%) compared with adults ages 65 and older (11%)
- Adults with less than a high school diploma (23%) and adults with a high school diploma (21%) compared with adults with some college education (13%)
- Adults who were out of work (28%) compared with adults who were employed (14%)
- Adults who lived in households with an income of less than \$25,000 (25%) compared with adults who lived in households with an income of \$50,000 or more (12%)
- Adults who were Boston Housing Authority residents (22%), who received rental assistance (31%), or who rented but did not receive rental assistance (19%) compared with adults who owned their home (9%)

The percentage of adults who reported smoking cigarettes was lower for the following groups:

- Females (13%) compared with males (20%)
- Foreign-born adults who had lived in the United States for more than 10 years (10%) compared with adults who were born in the United States (18%)

Figure 7.32 Adults Who Smoked Cigarettes by Selected Indicators, 2015

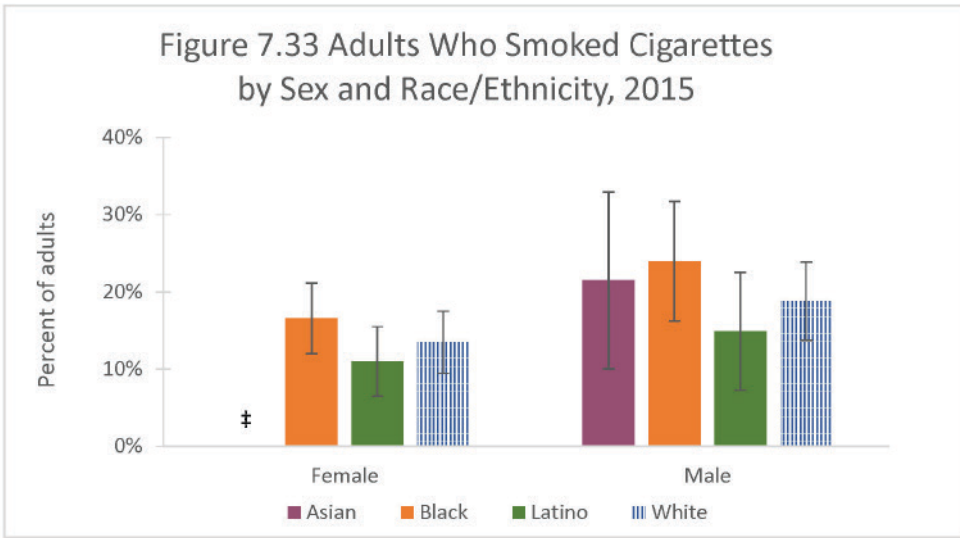


\* Statistically significant difference when compared to reference group  
 (1) Includes homemakers, students, retirees, and those unable to work  
 (2) Boston Housing Authority resident

NOTE: Bars with patterns indicate the reference group within each selected indicator.  
 DATA SOURCE: Boston Behavioral Risk Factor Survey (2015), Boston Public Health Commission



Figure 7.33 Adults Who Smoked Cigarettes by Sex and Race/Ethnicity, 2015



‡ Data not presented due to insufficient sample size

NOTE: Bars with patterns indicate the reference group for statistical testing within each selected indicator.

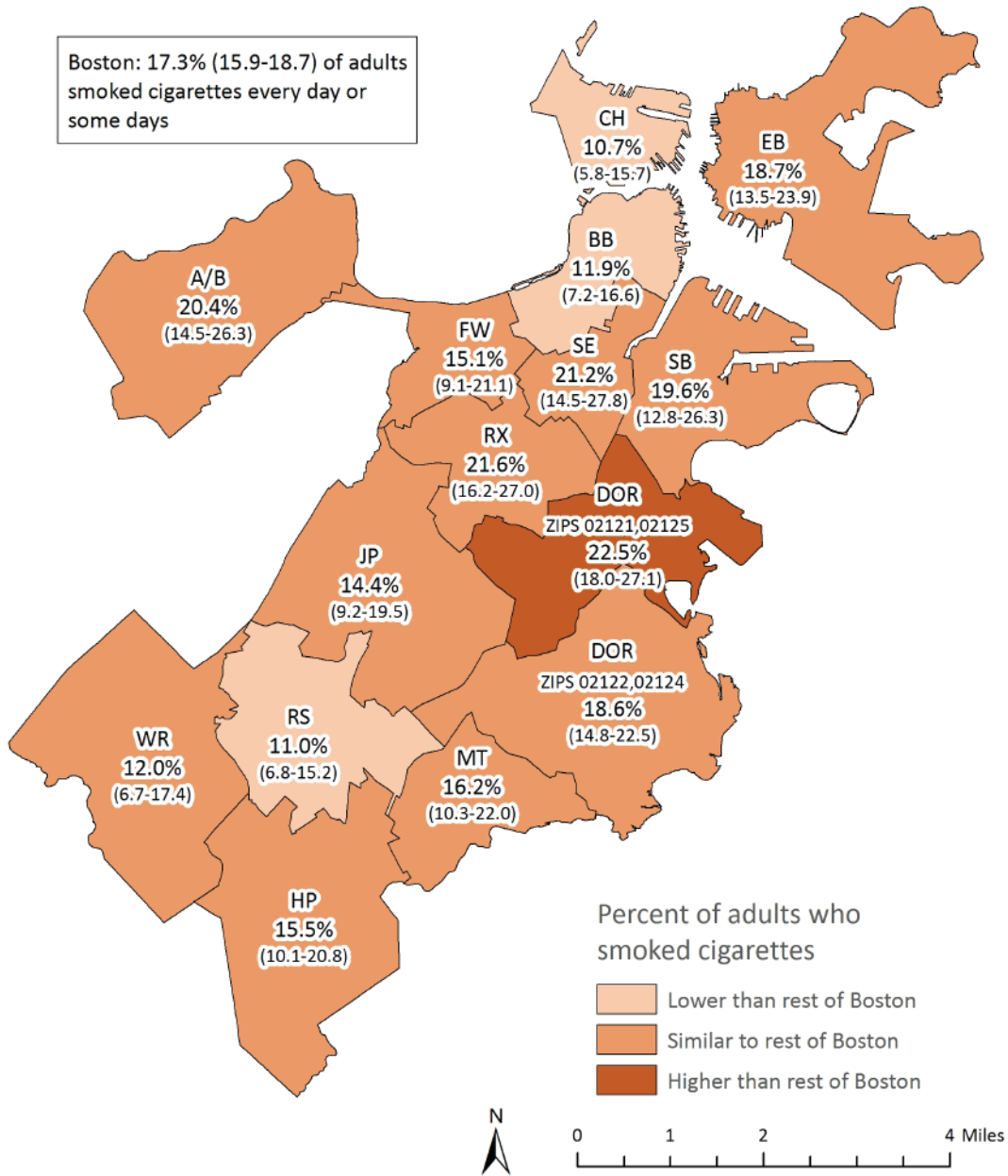
DATA SOURCE: Boston Behavioral Risk Factor Survey (2015), Boston Public Health Commission

In 2015, there were no significant differences in the percentages of Black and Latino female Boston adult residents who reported smoking cigarettes every day or some days compared with White female adults.

Also, there were no significant differences for Asian, Black, and Latino male adults compared with White male adults.



Figure 7.34 Adults Who Smoked Cigarettes by Neighborhood, 2013 and 2015 Combined



NOTE: "BB" includes the Back Bay, Beacon Hill, Downtown, the North End, and the West End.  
 "SE" includes the South End and Chinatown.

DATA SOURCE: Boston Behavioral Risk Factor Survey (2013, 2015), Boston Public Health Commission

For 2013 and 2015 combined, a higher percentage of adult residents in Dorchester (zip codes 02121, 02125) reported smoking cigarettes every day or some days compared with the rest of Boston. Lower percentages of adults in Back Bay, Charlestown, and Roslindale reported smoking cigarettes compared with the rest of Boston.

# Alcohol

Alcohol is the most commonly used drug nationally (34), and it is estimated that a little more than half of U.S. adults currently drink alcohol (11). While it is often considered socially acceptable to drink alcohol, excessive consumption can have negative effects ranging from poor judgment to increased risk of disease and death. The excessive use of alcohol significantly affects U.S. economic costs related to health care, crime, and morbidity-associated productivity. Binge drinking, a form of excessive alcohol use, accounts for three-fourths of these costs (35, 36).

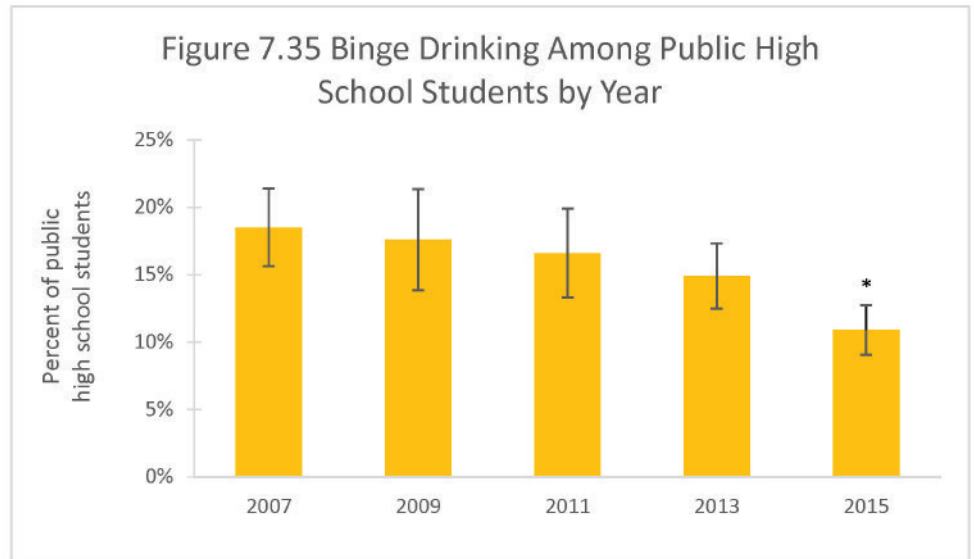
Binge drinking is defined as a pattern of alcohol consumption that brings the blood alcohol concentration level to 0.08% or more. It usually corresponds to 5 or more drinks for men and 4 or more drinks for women on a single occasion, generally within 2 hours. According to the 2015 BRFSS approximately 16% of U.S. adults reported recent binge drinking, with higher percentages generally observed in 18-24 and 25-34 -year-olds and in men (11).

Because the brain is not fully developed until roughly the age of 25, young people who binge drink are at a greater risk for permanent brain damage due to the toxic effects of alcohol (37). According to the 2015 YRBSS, approximately 18% of U.S. high school students reported recent binge drinking (12). Research suggests that youth binge drinking increases the risk of alcohol misuse or alcoholism later in life (38-40). Alcohol misuse is a pattern of drinking which results in harm to one's health, interpersonal relationships, or ability to work. Alcoholism is a chronic disease characterized by a strong craving for alcohol and the inability to limit drinking despite repeated physical, psychological, or interpersonal problems (41).

To reduce the risks associated with alcohol use, consumption should be moderated if not eliminated. Moderate drinking is defined as one drink per day for women and up to two drinks per day for men. Moderate alcohol consumption is associated with a lower risk of cardiovascular disease and all-cause mortality (10). No one should begin drinking or drink more frequently on the basis of potential health benefits because moderate alcohol intake is also associated with increased risk of cancers, violence, drowning, and injuries (10).



In 2015, 11% of Boston public high school students reported having 5 or more drinks of alcohol within a couple of hours at least once in the past 30 days. The percentage of students who reported binge drinking decreased between 2007 and 2015.

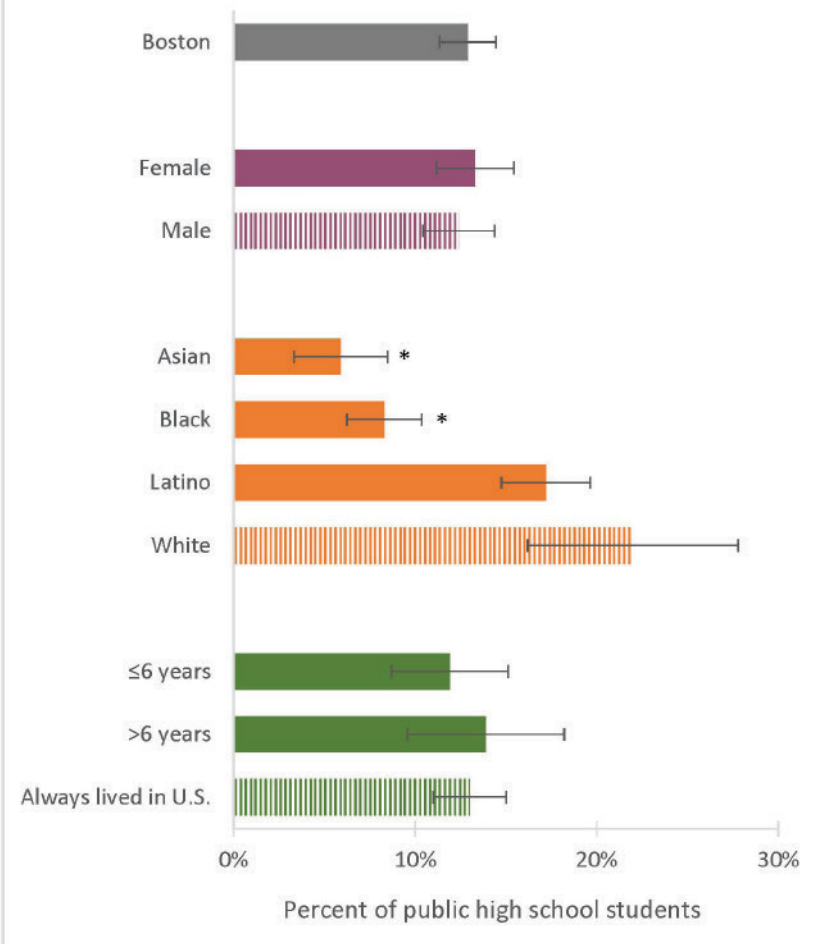


\* Statistically significant change over time

DATA SOURCE: Youth Risk Behavior Survey (2007, 2009, 2011, 2013, 2015), Centers for Disease Control and Prevention and Boston Public Schools



Figure 7.36 Binge Drinking Among Public High School Students by Selected Indicators, 2013 and 2015 Combined



\* Statistically significant difference when compared to reference group

NOTE: Bars with patterns indicate the reference group within each selected indicator.  
 DATA SOURCE: Youth Risk Behavior Survey (2013, 2015), Centers for Disease Control and Prevention and Boston Public Schools

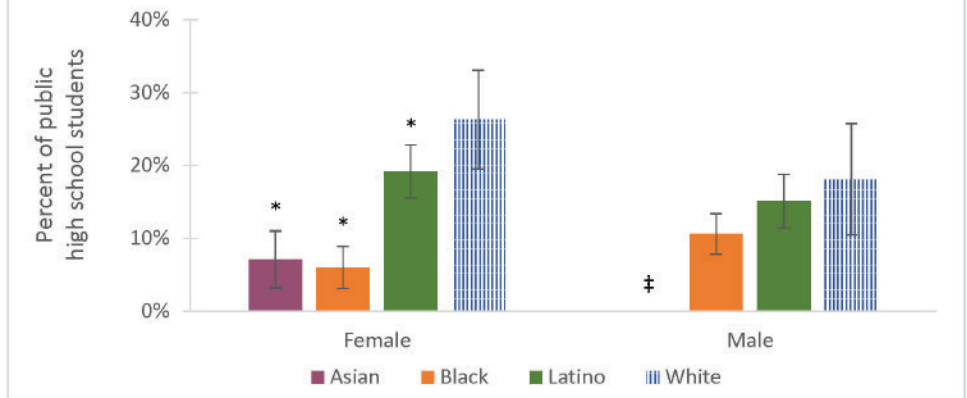
For 2013 and 2015 combined, 13% of Boston public high school students reported having 5 or more drinks of alcohol within a couple of hours at least once in the past 30 days.

Lower percentages of Asian (6%) and Black (8%) students reported binge drinking compared with White students (22%).

For 2013 and 2015 combined, lower percentages of Asian (7%), Black (6%), and Latino (19%) female Boston public high school students reported having 5 or more drinks of alcohol within a couple of hours at least once in the past 30 days compared with White female students (26%).

There were no significant differences for Black and Latino male students compared with White male students.

Figure 7.37 Binge Drinking Among Public High School Students by Sex and Race/Ethnicity, 2013 and 2015 Combined



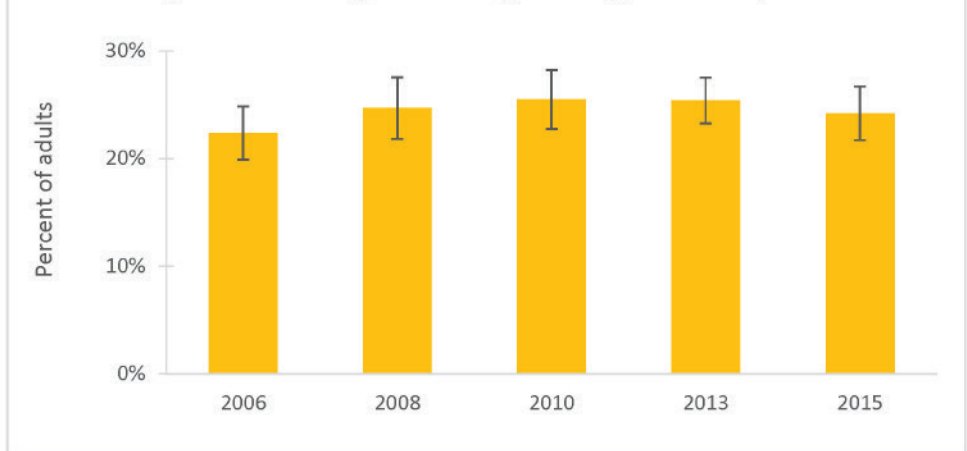
\* Statistically significant difference when compared to reference group  
 ‡ Data not presented due to insufficient sample size

NOTE: Bars with patterns indicate the reference group within each selected indicator.  
 DATA SOURCE: Youth Risk Behavior Survey (2013, 2015), Centers for Disease Control and Prevention and Boston Public Schools

In 2015, 24% of Boston adult residents reported binge drinking at least once in the past 30 days. The percentage of adults who reported binge drinking did not change between 2006 and 2015.

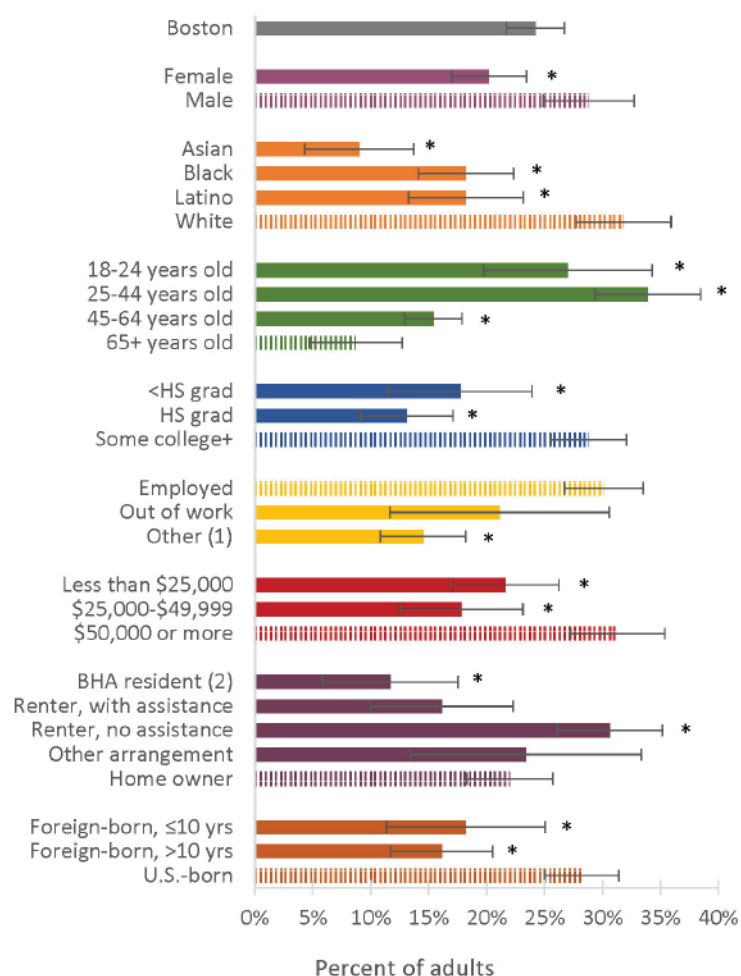
Binge drinking is defined as having 5 or more drinks on an occasion for men or 4 or more drinks on an occasion for women.

Figure 7.38 Binge Drinking Among Adults by Year



DATA SOURCE: Boston Behavioral Risk Factor Survey (2006, 2008, 2010, 2013, 2015), Boston Public Health Commission

Figure 7.39 Binge Drinking Among Adults by Selected Indicators, 2015



\* Statistically significant difference when compared to reference group

(1) Includes homemakers, students, retirees, and those unable to work

(2) Boston Housing Authority resident

NOTE: Bars with patterns indicate the reference group within each selected indicator.

DATA SOURCE: Boston Behavioral Risk Factor Survey (2015), Boston Public Health Commission

In 2015, 24% of Boston adult residents reported binge drinking at least once in the past 30 days. Binge drinking is defined as having 5 or more drinks on an occasion for men or 4 or more drinks on an occasion for women.

The percentage of adults who reported binge drinking was higher for the following groups:

- Adults ages 18-24 (27%), 25-44 (34%), or 45-64 (15%) compared with adults ages 65 and older (9%)
- Adults who rented but did not receive rental assistance (31%) compared with adults who owned their home (22%)

The percentage of adults who reported binge drinking was lower for the following groups:

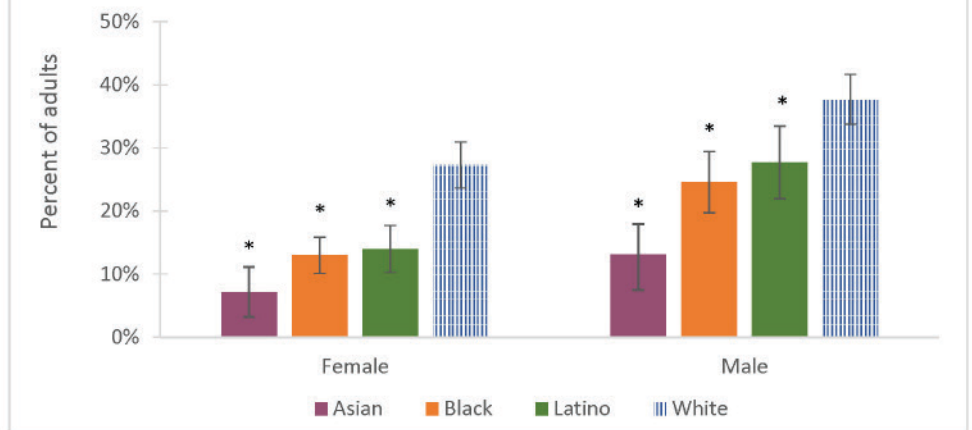
- Females (20%) compared with males (29%)
- Asian (9%), Black (18%), and Latino (18%) adults compared with White adults (32%)
- Adults who did not receive a high school diploma (18%) and adults who received a high school diploma (13%) compared with adults with some college education (29%)
- Adults whose employment status was "other" (15%) compared with adults who were employed (30%)
- Adults who lived in households with an income of less than \$25,000 (22%) and adults who lived in households with an income of \$25,000-\$49,999 (18%) compared with adults who lived in households with an income of \$50,000 or more (31%)
- Adults who were Boston Housing Authority residents (12%) compared with adults who owned their home (22%)
- Foreign-born adults who have lived in the United States for 10 years or fewer (18%) and foreign-born adults who have lived in the United States for more than 10 years (16%) compared with adults who were born in the United States (28%)

For 2013 and 2015 combined, lower percentages of Asian (7%), Black (13%), and Latino (14%) female Boston adult residents reported binge drinking at least once in the past 30 days compared with White female adults (27%).

Lower percentages of Asian (13%), Black (25%), and Latino (28%) male adults reported binge drinking compared with White male adults (38%).

Binge drinking is defined as having 5 or more drinks on an occasion for men or 4 or more drinks on an occasion for women.

Figure 7.40 Binge Drinking Among Adults by Sex and Race/Ethnicity, 2013 and 2015 Combined



\* Statistically significant difference when compared to reference group

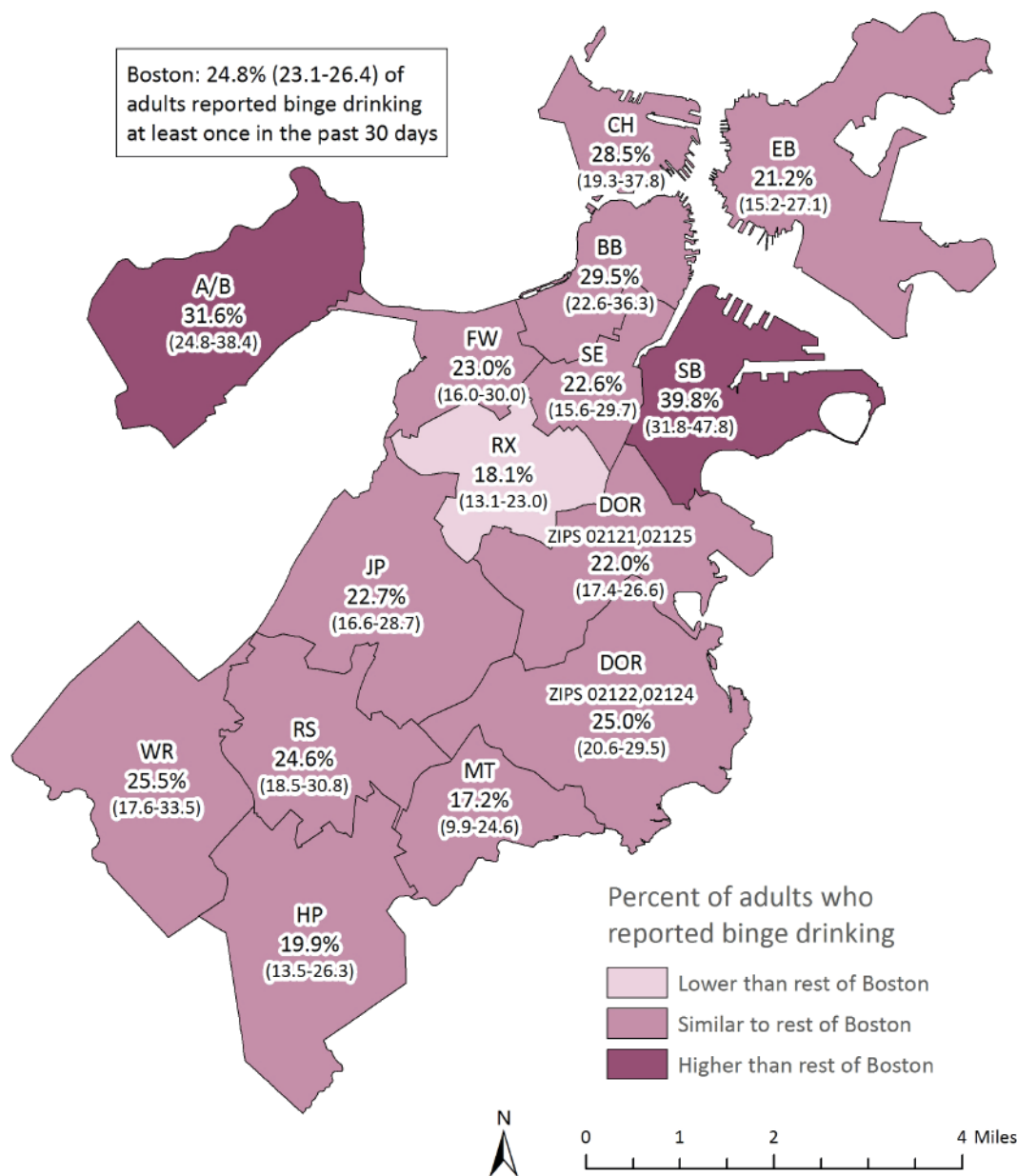
NOTE: Bars with patterns indicate the reference group within each selected indicator.

DATA SOURCE: Boston Behavioral Risk Factor Survey (2013, 2015), Boston Public Health Commission





Figure 7.41 Binge Drinking Among Adults by Neighborhood, 2013 and 2015 Combined



NOTE: "BB" includes the Back Bay, Beacon Hill, Downtown, the North End, and the West End. "SE" includes the South End and Chinatown.

DATA SOURCE: Boston Behavioral Risk Factor Survey (2013, 2015), Boston Public Health Commission

For 2013 and 2015 combined, higher percentages of adult residents in Allston/Brighton and South Boston reported binge drinking at least once in the past 30 days compared with the rest of Boston. A lower percentage of adults in Roxbury reported binge drinking compared with the rest of Boston. Binge drinking is defined as having 5 or more drinks on an occasion for men or 4 or more drinks on an occasion for women.

# Marijuana

## *Legalization*

Marijuana is a widely used drug in the U.S., with over 22 million users (42). For decades marijuana was an illegal drug. However, 29 states and the District of Columbia have legalized marijuana in some form (medical form or decriminalization) (43). The laws in 7 states – including Massachusetts – and the District of Columbia legalized marijuana for recreational use (43). Massachusetts voters first approved legalizing the use of marijuana for medical purposes through a ballot question in 2012. The law allows individuals who are certified by their physician as having a debilitating medical condition to use and possess up to a 60-day supply of medical marijuana. To register, a patient must obtain a letter from his/her physician and apply to the Massachusetts Department of Public Health. Then in 2016, Massachusetts voters approved a ballot question legalizing marijuana for recreational and commercial use (44).

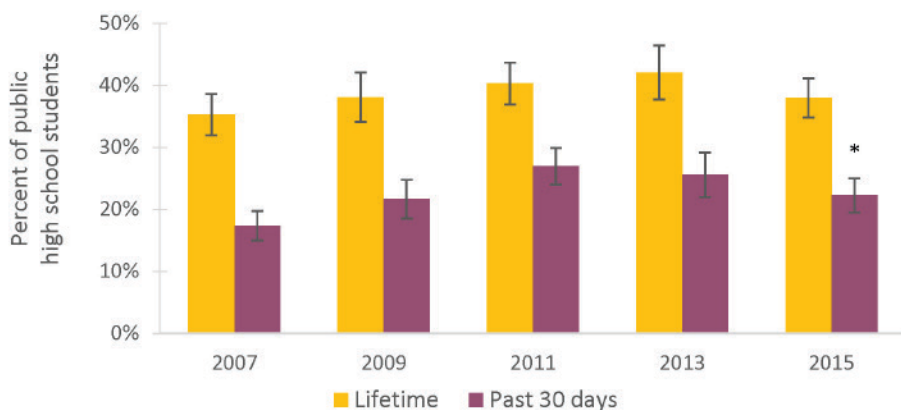
## *National data*

According to the 2015 YRBSS, approximately 39% of U.S. high school students reported having ever used marijuana, and 22% reported marijuana use at least once in the past 30 days (12); similar percentages were observed for having ever used marijuana (41%) and for marijuana use at least once in the past 30 days (25%) among Massachusetts high school students (12). Current marijuana use is higher among Black than White students and higher among 12th grade than 9th grade students (12). The 2015 National Survey on Drug Use and Health estimates that approximately 32% and 10% of adults ages 18-25 years and 26 years and older, respectively, reported marijuana use in the past year (45).

## *Health effects*

Although fewer people perceive that there are health risks associated with smoking marijuana in recent years (46), there is strong evidence from research linking marijuana use with addiction, increased risk of psychosis or schizophrenia, respiratory problems, and negative cognitive development (47). There is also limited evidence linking marijuana use with increased risk of motor vehicle crashes, cancer, cardiovascular disease, and lower IQ and academic/career success (46).

7.42 Lifetime and Past-30-Day Marijuana Use Among Public High School Students by Year



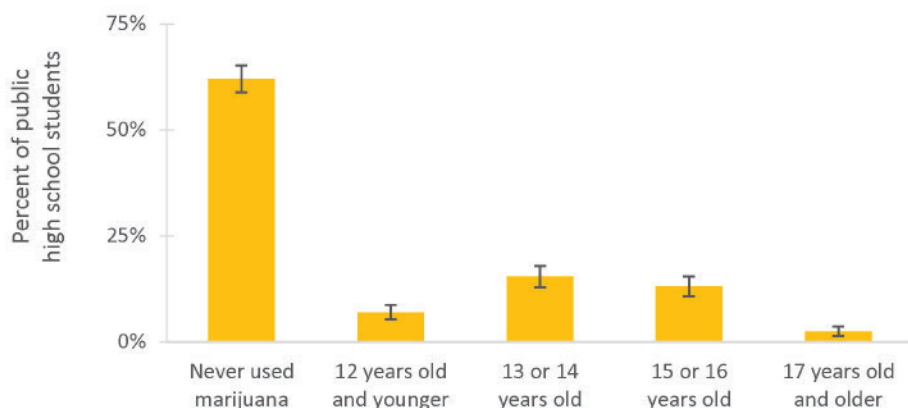
\* Statistically significant change over time

DATA SOURCE: Youth Risk Behavior Survey (2007, 2009, 2011, 2013, 2015), Centers for Disease Control and Prevention and Boston Public Schools

In 2015, 38% of Boston public high school students reported having ever used marijuana in their lifetime. The percentage of students who reported having ever used marijuana did not change between 2007 and 2015.

Also, in 2015, 22% of students reported having used marijuana in the past 30 days. The percentage of students who reported having used marijuana in the past 30 days increased between 2007 and 2015.

Figure 7.43 Age of First-Time Marijuana Use Among Public High School Students, 2015



DATA SOURCE: Youth Risk Behavior Survey (2015), Centers for Disease Control and Prevention and Boston Public Schools

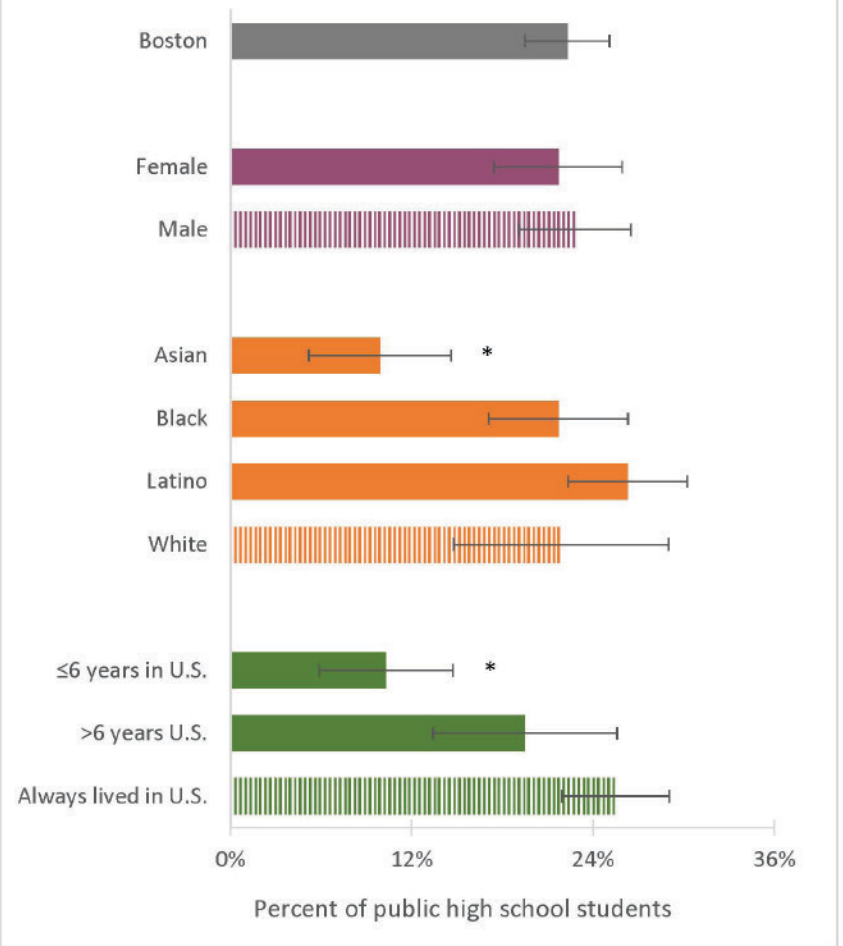
In 2015, 62% of Boston public high school students reported never having used marijuana. Fifteen percent and 13% of students reported having used marijuana for the first time at ages 13 or 14 and ages 15 or 16, respectively. Seven percent of students reported having used marijuana for the first time at ages 12 or younger, while 3% of students reported having used marijuana for the first time at ages 17 or older.

In 2015, 22% of Boston public high school students reported having used marijuana in the past 30 days.

A lower percentage of Asian students (10%) reported using marijuana compared with White students (22%).

A lower percentage of students who had lived in the United States for 6 years or fewer (10%) reported using marijuana compared with students who had always lived in the United States (25%).

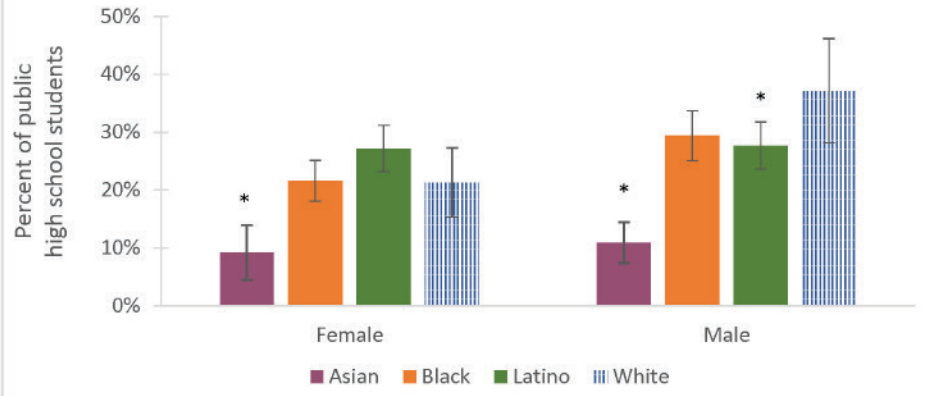
Figure 7.44 Marijuana Use in the Past 30 Days Among Public High School Students by Selected Indicators, 2015



\* Statistically significant difference when compared to reference group

NOTE: Bars with patterns indicate the reference group within each selected indicator.  
 DATA SOURCE: Youth Risk Behavior Survey (2015), Centers for Disease Control and Prevention and Boston Public Schools

Figure 7.45 Marijuana Use in the Past 30 Days Among Public High School Students by Sex and Race/Ethnicity, 2011, 2013, and 2015 Combined



\* Statistically significant difference when compared to reference group

NOTE: Bars with patterns indicate the reference group within each selected indicator.

DATA SOURCE: Youth Risk Behavior Survey (2011, 2013, 2015), Centers for Disease Control and Prevention and Boston Public Schools

For 2011, 2013, and 2015 combined, a lower percentage of Asian female Boston public high school students (9%) reported having used marijuana in the past 30 days compared with White female students (21%).

Lower percentages of Asian (11%) and Latino (28%) male students reported having used marijuana compared with White male students (37%).



In 2015, 14% of Boston adult residents reported having used marijuana, hashish, or products that contain tetrahydrocannabinol (THC), the active ingredient in marijuana, in the past year.

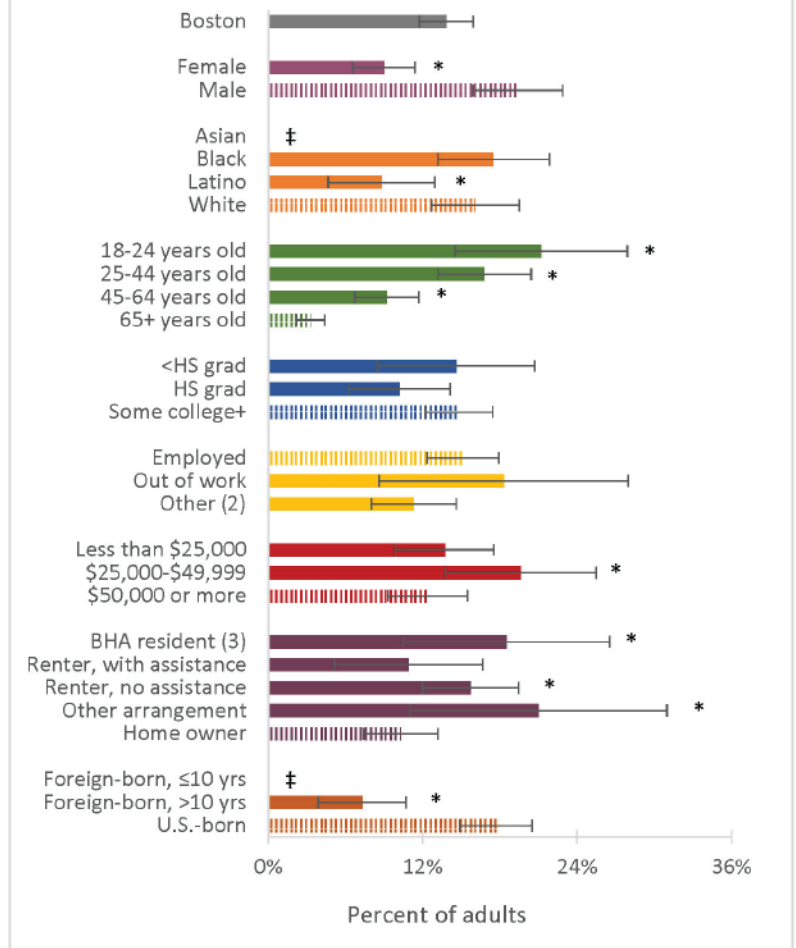
The percentage of adults who reported having used marijuana, hashish, or products that contain THC was higher for the following groups:

- Adults ages 18-24 (21%), 25-44 (17%), or 45-64 (9%) compared with adults ages 65 and older (3%)
- Adults who lived in households with an income of \$25,000-\$49,999 (20%) compared with adults who lived in households with an income of \$50,000 or more (12%)
- Adults who were Boston Housing Authority residents (19%), adults who rented but did not receive rental assistance (16%), and adults with other housing arrangements (21%) compared with adults who owned their home (10%)

The percentage of adults who reported having used marijuana, hashish, or products that contain THC was lower for the following groups:

- Females (9%) compared with males (19%)
- Latino adults (9%) compared with White adults (16%)
- Foreign-born adults who had lived in the United States for more than 10 years (7%) compared with adults who were born in the United States (18%)

Figure 7.46 Non-Medical Marijuana<sup>1</sup> Use Among Adults in the Past Year by Selected Indicators, 2015



\* Statistically significant difference when compared to reference group

‡ Data not presented due to insufficient sample size

<sup>1</sup> Includes non-medical use of hashish and products that contain tetrahydrocannabinol (THC), the active ingredient in marijuana

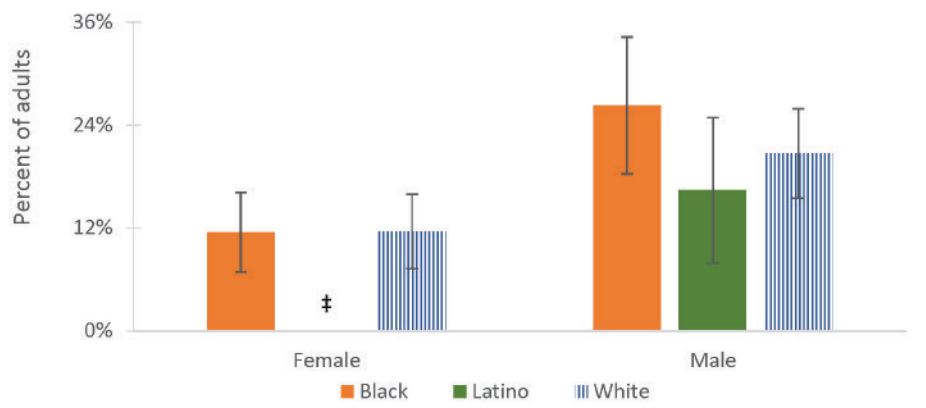
(2) Includes homemakers, students, retirees, and those unable to work

(3) Boston Housing Authority resident

NOTE: Bars with patterns indicate the reference group within each selected indicator.

DATA SOURCE: Boston Behavioral Risk Factor Survey (2015), Boston Public Health Commission

Figure 7.47 Non-Medical Marijuana<sup>1</sup> Use Among Adults in the Past Year by Sex and Race/Ethnicity, 2015



‡ Data not presented due to insufficient sample size

<sup>1</sup> Includes non-medical use of hashish and products that contain tetrahydrocannabinol (THC), the active ingredient in marijuana

NOTE: Bars with patterns indicate the reference group for statistical testing within each selected indicator. Data not presented due to insufficient sample size for Asian female and male residents.

DATA SOURCE: Boston Behavioral Risk Factor Survey (2015), Boston Public Health Commission

In 2015, there was no significant difference in the percentage of Black female Boston adult residents who reported having used marijuana, hashish, or products that contain tetrahydrocannabinol (THC), the active ingredient in marijuana, in the past year compared with White female adults.

Also, there were no significant differences for Black and Latino male adults compared with White male adults.



## Summary

Boston has seen significant reductions in smoking and binge drinking among public high school students from 2007 to 2015, and in 2015, Boston high school students also performed better for these indicators compared with U.S. high school students overall. In contrast, a significant increase in recent marijuana use was observed during the same time period, but the percentage of Boston high school students reporting recent marijuana use in 2015 was consistent with U.S. high school students overall.

In 2015, Boston high school students were also less physically active compared with U.S. high school students overall. We observed inequities in health behavior indicators across sex and race/ethnicity. Female students reported less regular physical activity than male students. More White and Latino students reported smoking and binge drinking than Black and Asian students. Higher percentages of Black and Latino students also reported lower vegetable consumption than Asian and White students. The percentage of students reporting daily SSB consumption was almost half-fold for Asian students compared with Black, Latino, and White students. Asian students and students who lived in the U.S. six or fewer years had the lowest percentage of marijuana use.

Among Boston adults, percentages for smoking, physical activity, and fruit and vegetable consumption in 2015 were consistent with the U.S. overall, although a higher percentage of binge drinking was observed among Boston adults. The reported percentages of marijuana use and daily SSB consumption among Boston adults are within the range reported in previous analyses of U.S. adults. Many of the health-related behavior indicators were also stable over time, with the exception of physical activity and fruit consumption, with percentages of those reporting healthy behaviors having decreased from 2013 to 2015.

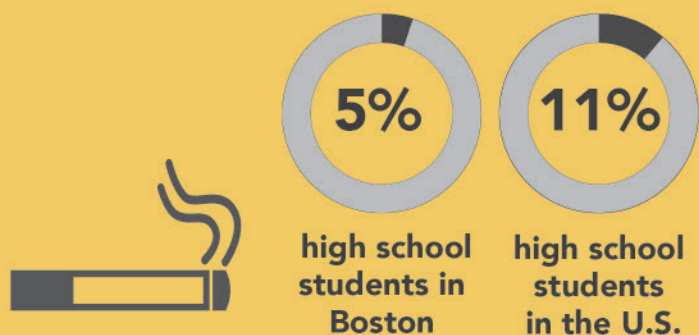
We also identified inequities in health behaviors primarily across sex, race/ethnicity, and other social determinants. The percentages of smoking, binge drinking, marijuana use, daily SSB consumption, and low vegetable consumption were higher in men than women. Compared with White adults, Black and Latino adults had higher percentages of low fruit and vegetable consumption, and of daily consumption of SSBs.

Generally, educational attainment and household income were correlated with unhealthy indicators of smoking, physical activity, and fruit and vegetable consumption. Across categories of housing, percentages of unhealthy behaviors for smoking and SSB consumption were higher among adults who had rental assistance in comparison with adult homeowners. BHA residents also had higher percentages of unhealthy behaviors for physical activity and vegetable consumption in comparison with adult homeowners. In contrast, White adults, and adults who reported higher educational attainment and household income, and adult homeowners, had higher percentages of binge drinking. At the neighborhood level, elevated percentages of unhealthy behaviors were generally clustered in Dorchester (zip codes 02121, 02125), Dorchester (zip codes 02122, 02124), and South Boston. To reduce the inequities in healthy behaviors across sex, race/ethnicity, and social determinants, public health interventions should target subpopulations at highest risk and their social determinants.

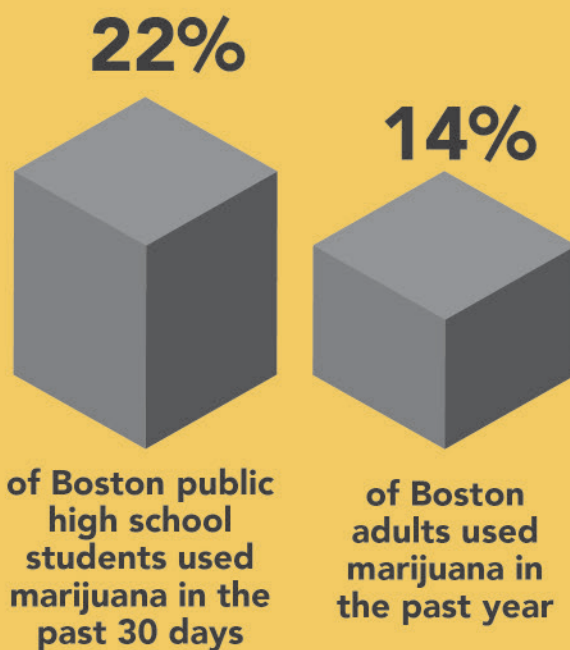


# Health-Related Behaviors

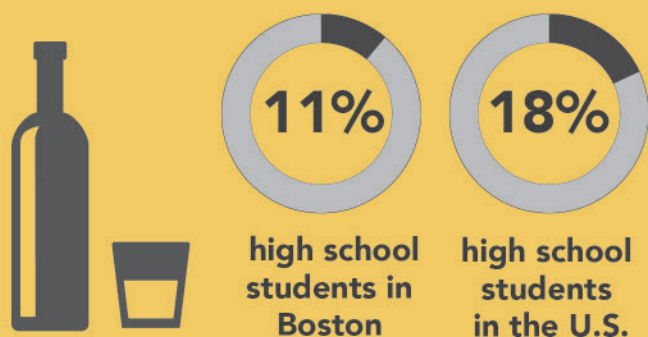
## Youth smoking in 2015



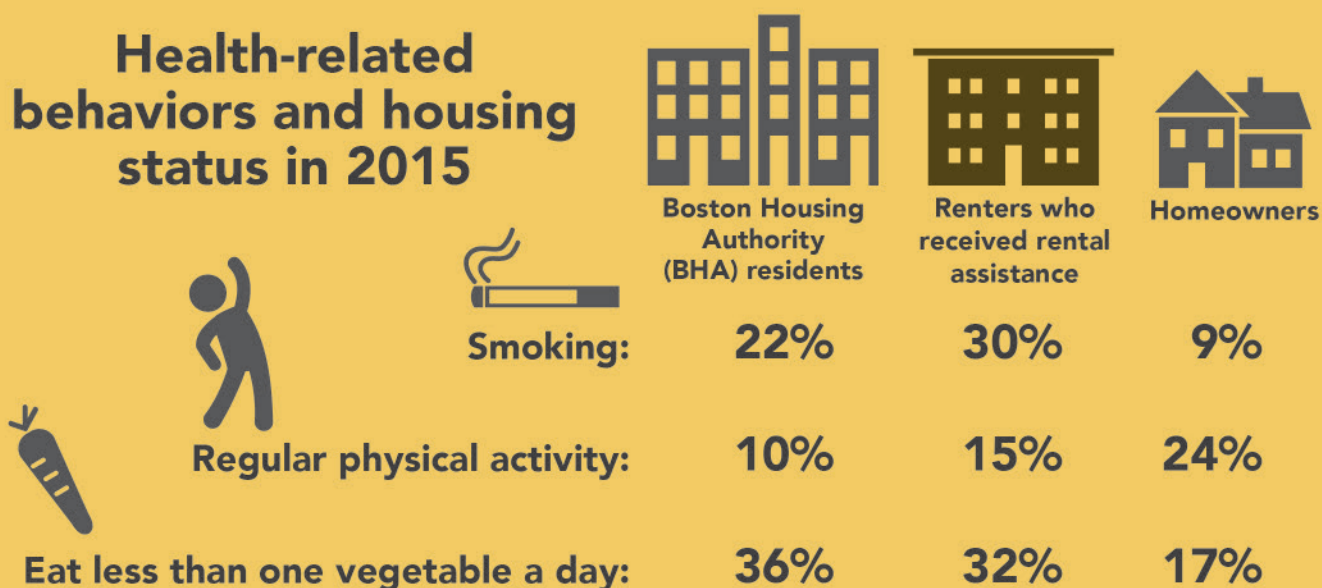

## Marijuana use in 2015



## Binge drinking in 2015



## Health-related behaviors and housing status in 2015



# Our Point of View: Thoughts from public health

## Creating a city that supports healthy behaviors

By Anne McHugh and Eugene Barros

Director, Chronic Disease Division

Director, Healthy Homes and Community Supports, Boston Public Health Commission

*"It is unreasonable to expect that people will change their behavior easily when so many forces in the social, cultural and physical environment conspire against such change."*

*The Future of the Public's Health in the 21st Century, Institute of Medicine<sup>1</sup>*

More than a third of deaths in the U.S. are linked to tobacco use and exposure, poor diet, physical inactivity, and excessive alcohol intake.<sup>2,3</sup> Cigarette smoking is the leading preventable cause of death in the United States, causing more deaths than HIV, illegal drug use, alcohol use, motor vehicle accidents, and firearm-related incidents combined.<sup>4</sup> The serious health consequences and addictive properties of tobacco elevate the need for public health strategies focused on primary prevention.

The profit-driven food and tobacco industries have significant influences on people's behaviors through aggressive marketing practices. In 2011 the tobacco industry spent \$8.3 billion in advertising<sup>5</sup> (\$1 billion more than the entire operating budget of the CDC<sup>6</sup>), while in 2013 the beverage industry spent \$814 million advertising sugary beverages.<sup>7</sup> Marketing strategies frequently target youth, low-income populations, and communities of color.<sup>8</sup>

Public health will never be able to match the billions of dollars that advertise unhealthy products. However, we have many tools at our disposal that have been quite effective.

Looking specifically at tobacco:

- comprehensive tobacco control regulations are in place to protect youth, workers, and residents;
- the business, education, non-profit, and health care communities have implemented smoke-free environments;
- tenants and property owners are working together to create smoke-free homes;
- the city has worked to make smoke-free public parks and ban the sale of tobacco at pharmacies and health care institutions;
- health plans are offering comprehensive tobacco cessation support services.

The good news is social norms are starting to change and we are seeing the benefits of our actions. Youth smoking rates are almost cut in half - from 15% in 2001 to 8% in 2013, and adults are smoking much less too. As creative as we think we have been, new strategies are always needed. Smoking harms nearly every organ of the body. With smoking comes more cancer, chronic obstructive pulmonary disease (COPD), asthma, cardiovascular disease, and reproductive health issues. Strategies that are multi-tiered and include resources to support behavior change will help the many residents struggling to resist or stop smoking.

<sup>1</sup> The Future of the Public's Health in the 21st Century, Institute of Medicine, 2003, p.4.

<sup>2</sup> AH Mokdad, JS Marks, DF Stroup et al, Actual Causes of Death in the U.S., 2000. JAMA. 2004;291(10):1238-1245

<sup>3</sup> J. Michael McGinnis, Actual Causes of Death, 1990-2010, Workshop on Determinants of Premature Mortality, Sept. 18, 2013, National Research Council, Washington, DC.  
<https://www.ncbi.nlm.nih.gov/books/NBK279981/>

<sup>4</sup> Centers for Disease Control and Prevention. Health effects of Cigarette Smoking.2015.

[https://www.cdc.gov/tobacco/data\\_statistics/fact\\_sheets/health\\_effects/effects\\_cig\\_smoking/](https://www.cdc.gov/tobacco/data_statistics/fact_sheets/health_effects/effects_cig_smoking/).

<sup>5</sup> Federal Trade Commission, Cigarette report for 2011, 2013, <http://www.ftc.gov/reports/federal-trade-commission-cigarette-report-2011>.

<sup>6</sup> [https://www.cdc.gov/budget/documents/fy2016/fy-2016-cdc-operating-plan\\_1.pdf](https://www.cdc.gov/budget/documents/fy2016/fy-2016-cdc-operating-plan_1.pdf)

<sup>7</sup> [http://www.sugarydrinkfacts.org/sugary\\_drink\\_facts\\_in\\_brief.aspx](http://www.sugarydrinkfacts.org/sugary_drink_facts_in_brief.aspx) Centers for Disease Control, Smoking and Tobacco Use, Tobacco Industry Marketing

[https://www.cdc.gov/tobacco/data\\_statistics/fact\\_sheets/tobacco\\_industry/marketing/](https://www.cdc.gov/tobacco/data_statistics/fact_sheets/tobacco_industry/marketing/)

<sup>8</sup> Centers for Disease Control, Smoking and Tobacco Use, Tobacco Industry Marketing [https://www.cdc.gov/tobacco/data\\_statistics/fact\\_sheets/tobacco\\_industry/marketing/](https://www.cdc.gov/tobacco/data_statistics/fact_sheets/tobacco_industry/marketing/)

## Our Point of View: Thoughts from a community resident

### Smoking: I can't do this anymore

By Kim Barros

Kim has lived in Boston her whole life

My name is Kim. I am 48 years old and have 3 kids. I have lived in Boston my whole life and graduated from Boston Public Schools. I have a Master's degree in Management and have worked in HIV housing for 25 years.

I grew up mostly in Dorchester and Roxbury. I would walk to the store to buy my mother cigarettes when I was 9 or 10. At that time, there weren't any laws about how old you had to be to buy them. The first time I remember seeing cigarettes advertised was at a gas station – they were advertised for only 67 cents a pack.

I was 14 years old when I started smoking. You could buy a cigarette for 10 cents. I took my first puff on an older friend's cigarette and that was that. I smoked for 25 years. There were many times that quitting crossed my mind. I am a Black Belt in Karate and have been practicing Karate for 20 years. At 19 my breathing started getting bad and I couldn't be as athletic as I wanted. I remember being in the car one day with my kids and they were chanting, "Smoking makes you die. Smoking makes you die."

I tried to quit for 5 years, and it was really hard. I tried smoking cessation, the nicotine replacement patch, gum and an inhaler. Then I had that 'I can't do this anymore' moment. I was going into the hospital for surgery and didn't want to crave cigarettes while in the hospital. A prescription medicine helped me to stop. That was 8 years ago.

As times change, the products and marketing changes. I know a lot of people now that are smoking marijuana in a tobacco leaf, called a fronto leaf. They don't even know that they are smoking tobacco and I know people that have then gotten hooked on tobacco that way. Like any drug, if you try it, before you know it you move from social use to dependency. It's best to not even start.

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# Chapter 8

## Chronic Disease







# Chronic Disease

Changes in public health over the 19th and 20th centuries – namely vaccinations, antibiotics, and hygiene practices – have led to the decline of infectious disease as the major cause of illness (1). In its place, as people now live longer, chronic disease has become the primary obstacle to good health (1). Chronic diseases and conditions—such as heart disease, stroke, cancer, type 2 diabetes, obesity, and arthritis—are among the most common, costly, and preventable health problems. The Centers for Disease Control and Prevention (CDC) estimates that each year 7 of 10 deaths are due to chronic diseases, and as of 2012, about half of all adults in the United States —117 million people—had one or more chronic health condition (2, 3).

By their very definition, chronic diseases are “managed” since cures are not available. Management practices extend life, therefore, chronic diseases continue to rise in prevalence. Methods of chronic disease management include medications, medical procedures, and lifestyle changes. Prevention is the key to reducing the burden of these diseases. To prevent chronic disease, people need opportunities to live a healthy lifestyle which includes, among other things, participating in adequate physical activity, eating a balanced diet, managing stress and limiting exposure to chronic stressors, refraining from tobacco use, and limiting alcohol consumption (4). Unfortunately, the modern environment is often not supportive of these healthy habits, encouraging sedentary behavior, overeating, and alcohol consumption.

Changing the environment to promote healthier behaviors requires strategic vision and planning. Implementing systems and policies that increase opportunities for physical activity, provide support to live tobacco free, and improve access to healthy foods, are strategies that have been used to create healthier environments. Systems and policies that address other social determinants by improving access to routine preventive medical care, and increasing educational and employment opportunities will also contribute to healthy environments. A healthier environment can support an individual’s choice to walk or bike instead of drive, to quit smoking, or to limit sugary beverage consumption. Ultimately, building healthier environments will encourage residents to live a healthy lifestyle, greatly improving their health and longevity.

In this section of the report, we closely examine indicators of the following chronic diseases: asthma, diabetes, heart disease, hypertension, and obesity.

# Asthma

## *What is Asthma?*

Asthma is a common respiratory disease characterized by episodes of coughing, wheezing, difficulty breathing, and chest tightness. These symptoms occur in response to triggers, which include allergens (e.g., mold, pet dander, dust mites, and cockroaches), certain chemicals, exposure to tobacco smoke, and infections. Although asthma is a long-term disease, the signs and symptoms can be minimized by avoiding triggers, adhering to prescribed medication, identifying and treating attacks early, and developing an asthma action plan with a health care provider (5). Findings from the 2015 Behavioral Risk Factor Surveillance System (BRFSS) indicate that approximately 9% of U.S. adults reported currently having asthma (6). Approximately 23% percent of U.S. high school students also reported having been told they have asthma in the 2015 Youth Risk Behavior Surveillance System (YRBSS) (7).

## *Populations at Risk*

Inequities in asthma in the U.S. population are found across sex, race/ethnicity, and income. As data from the 2014 National Health Interview Survey shows, women are more likely to report having asthma than men. In children (less than 18 years of age), the relationship is reverse; boys are more likely to have asthma than girls (8). Black adults have higher asthma prevalence than White and Latino adults. Inequities in asthma are also found across social determinants including education and income. U.S. adults who do not finish high school are more likely to have asthma than adults who graduate from high school or college. Similarly, adults with an annual household income of \$75,000 or more are less likely to have asthma than adults with lower incomes (9). Smokers are more likely to have asthma than non-smokers (10). Obese adults are more likely to have asthma than adults in other weight categories (11).

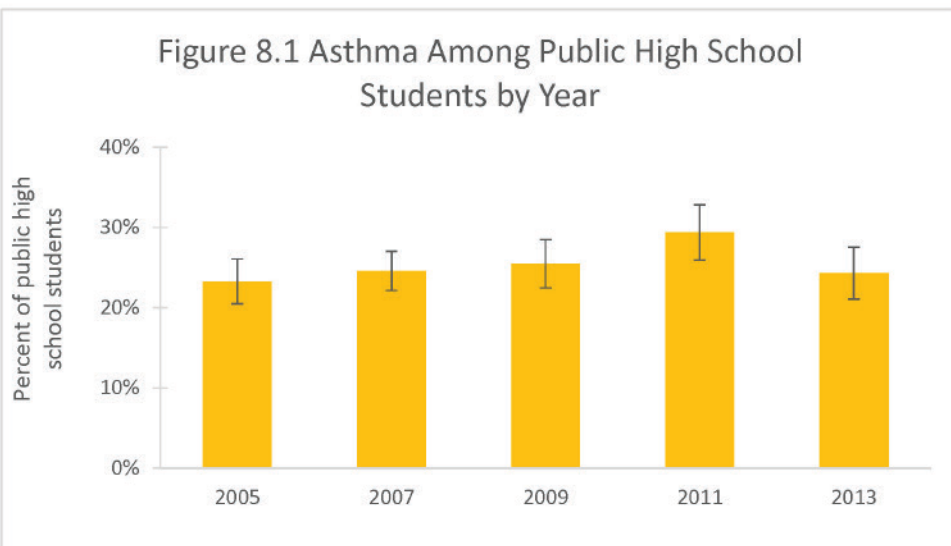
## *Prevention*

Although asthma cannot be cured, it can be controlled by avoiding asthma triggers and seeking proper medical care. Continuous monitoring of the disease, patient education, and having a medical management plan is recommended (12). Creating healthy environments in homes and neighborhoods that reduce exposure to known triggers is vital to preventing symptoms of the disease.





Figure 8.1 Asthma Among Public High School Students by Year

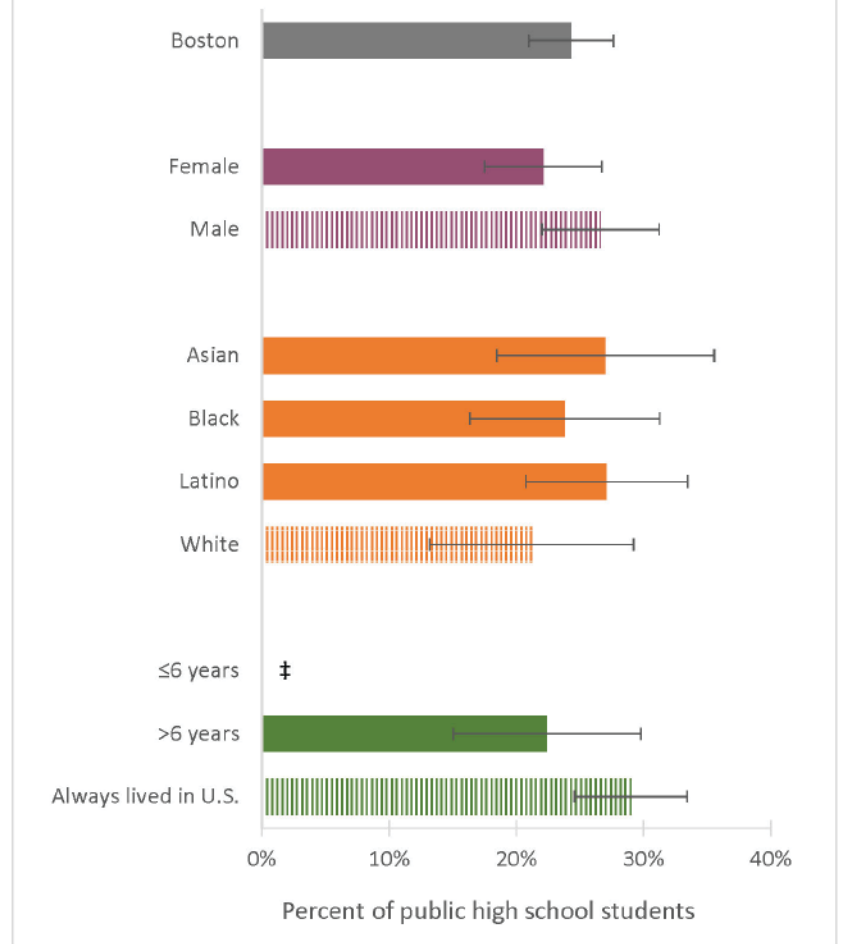


In 2013, 24% of Boston public high school students reported having asthma. There was no significant change in the percentage of students with asthma between 2005 and 2013.

DATA SOURCE: Youth Risk Behavior Survey (2005, 2007, 2009, 2011, 2013), Centers for Disease Control and Prevention and Boston Public Schools

In 2013, 24% of Boston public high school students had asthma. There were no significant differences by sex, race/ethnicity, or years lived in the United States.

Figure 8.2 Asthma Among Public High School Students by Selected Indicators, 2013

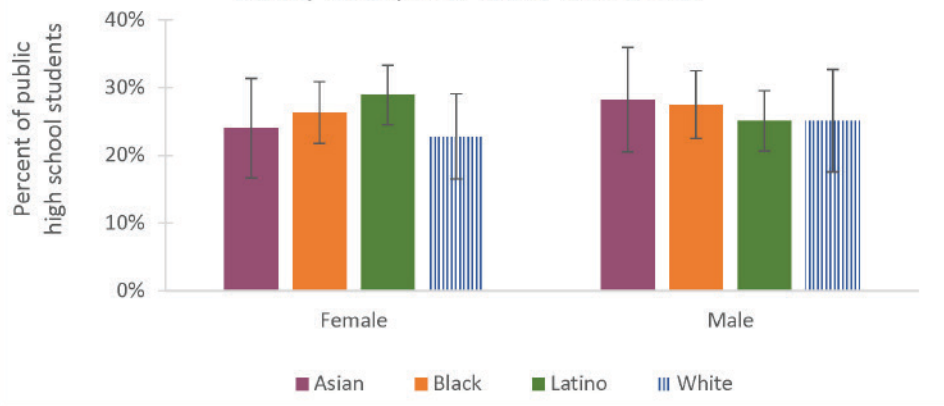


‡ Data not presented due to insufficient sample size

NOTE: Bars with patterns indicate the reference group for statistical testing within each selected indicator.

DATA SOURCE: Youth Risk Behavior Survey (2013), Centers for Disease Control and Prevention and Boston Public Schools

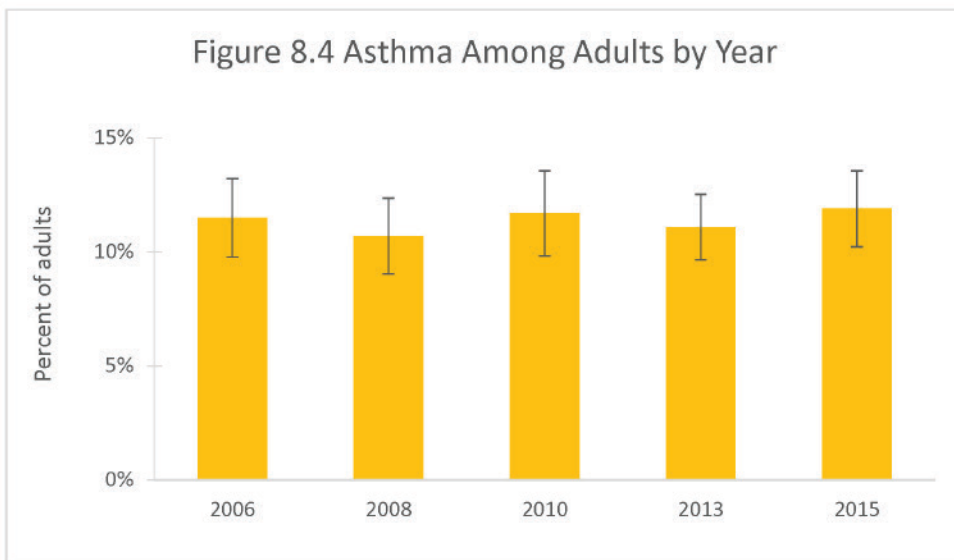
**Figure 8.3 Asthma Among Public High School Students by Sex and Race/Ethnicity, 2009, 2011, and 2013 Combined**



During 2009, 2011, and 2013 combined, there were no significant differences by race/ethnicity among female or male Boston public high school students.

NOTE: Bars with patterns indicate the reference group for statistical testing within each selected indicator.  
 DATA SOURCE: Youth Risk Behavior Survey (2009, 2011, 2013), Centers for Disease Control and Prevention and Boston Public Schools

**Figure 8.4 Asthma Among Adults by Year**



In 2015, 12% of Boston adult residents reported having asthma. There was no significant change in the percentage of adults with asthma between 2006 and 2015.

DATA SOURCE: Boston Behavioral Risk Factor Survey (2006, 2008, 2010, 2013, 2015), Boston Public Health Commission

During 2013 and 2015 combined, 12% of Boston adult residents reported having asthma.

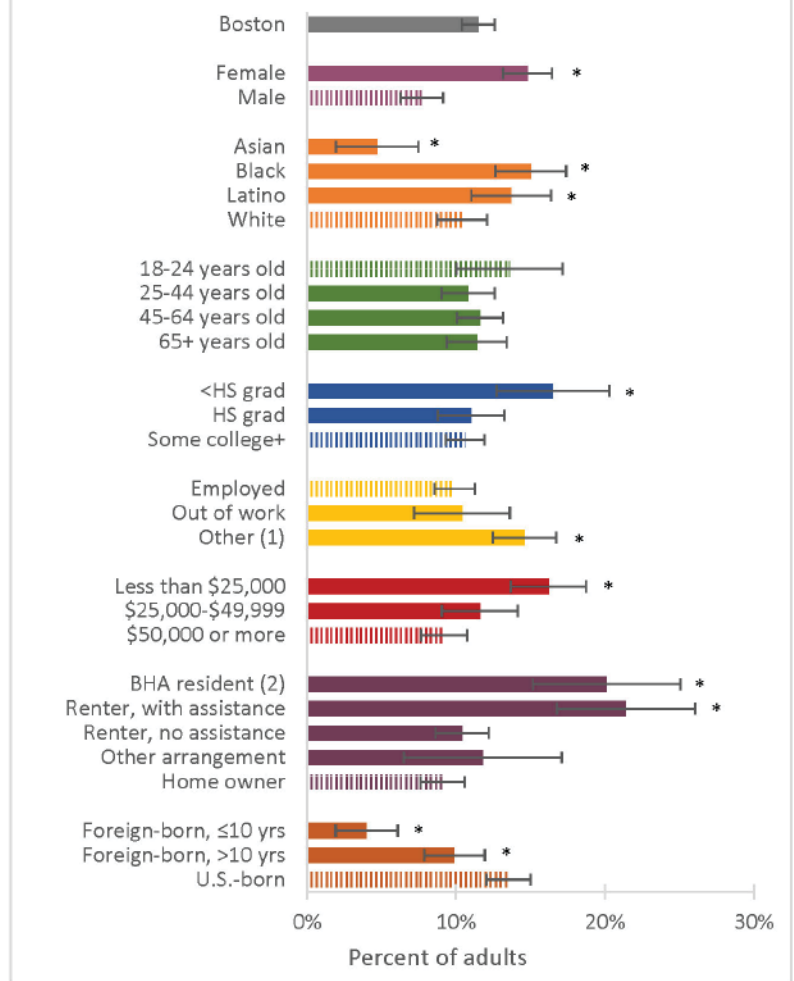
The percentage of adults with asthma was higher for the following groups:

- Females (15%) compared with males (8%)
- Black (15%) and Latino (14%) adults compared with White adults (10%)
- Adults with less than a high school diploma (17%) compared with adults with at least some college education (11%)
- Adults whose employment status was "other" (15%) compared with those who were employed (10%)
- Adults living in households with an annual income of less than \$25,000 (16%) compared with adults living in households with an annual income of \$50,000 or more (9%)
- Adults who were Boston Housing Authority residents (20%) and adults who received rental assistance (21%) compared with home owners (9%)

The percentage of adults with asthma was lower for the following groups:

- Asian adults (5%) compared with White adults (10%)
- Foreign-born adults who lived in the United States for 10 years or less (4%) and foreign-born adults who lived in the United States for over 10 years (10%) compared with adults who were born in the United States (14%)

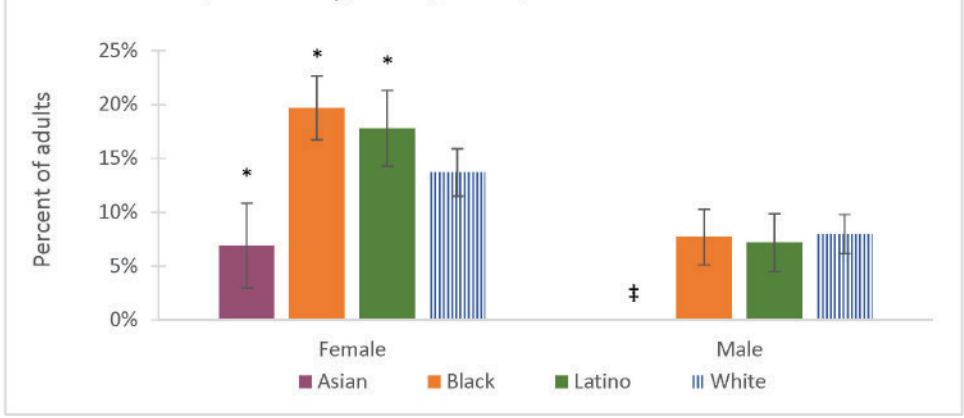
Figure 8.5 Asthma Among Adults by Selected Indicators, 2013 and 2015 Combined



\* Statistically significant difference when compared to reference group  
 (1) Includes homemakers, students, retirees, and those unable to work  
 (2) Boston Housing Authority resident

NOTE: Bars with patterns indicate the reference group within each selected indicator.  
 DATA SOURCE: Boston Behavioral Risk Factor Survey (2013, 2015), Boston Public Health Commission

Figure 8.6 Asthma Among Adults by Sex and Race/Ethnicity, 2010, 2013, and 2015 Combined



\* Statistically significant difference when compared to reference group

‡ Data not presented due to insufficient sample size

NOTE: Bars with patterns indicate the reference group within each selected indicator.

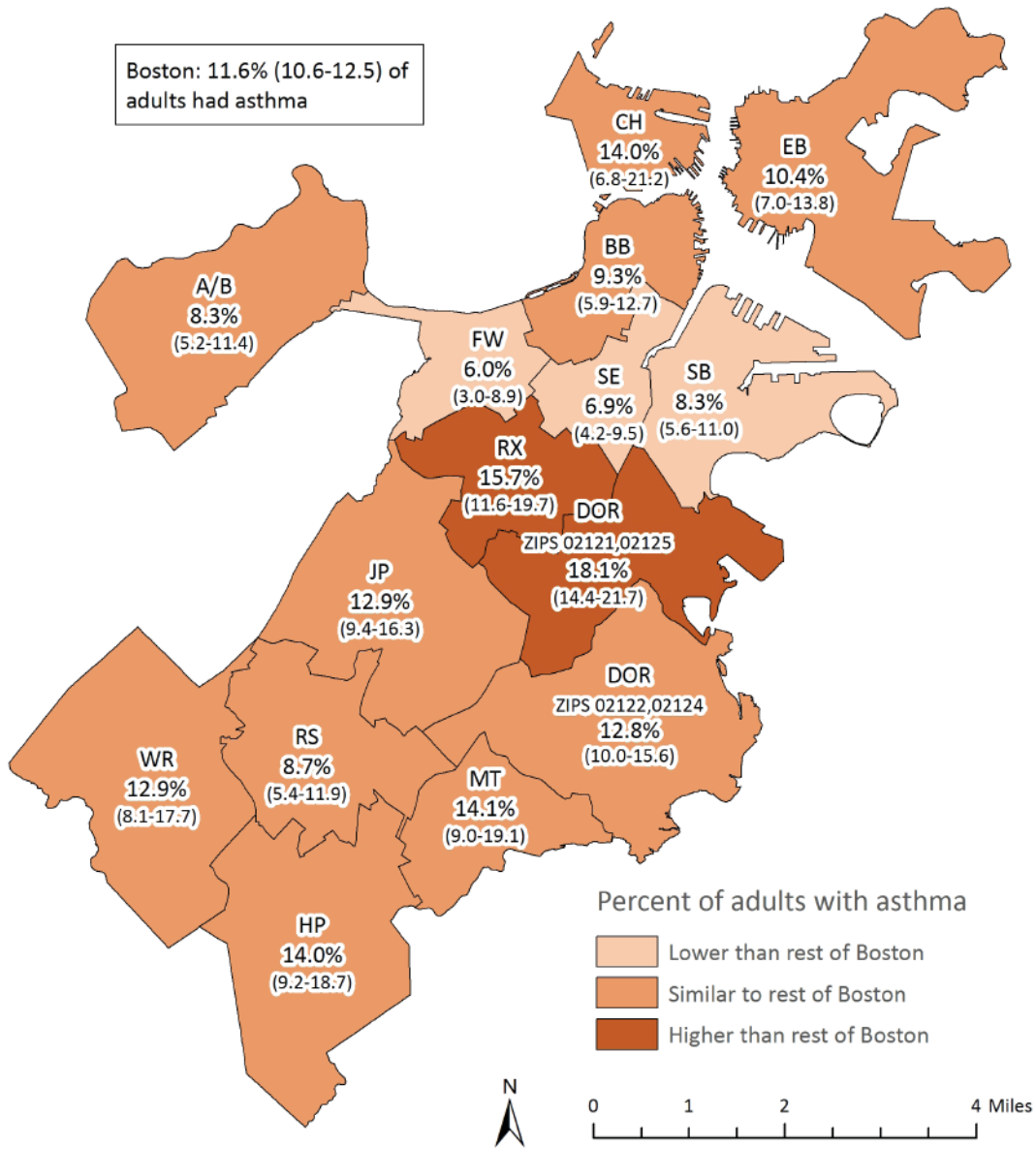
DATA SOURCE: Boston Behavioral Risk Factor Survey (2010, 2013, 2015), Boston Public Health Commission

During 2010, 2013, and 2015 combined, a higher percentage of Black (20%) and Latino (18%) Boston female adult residents and a lower percentage of Asian female adults (7%) had asthma compared with White female adults (14%).

Among male adults, there were no significant differences in the percentages of asthma by race/ethnicity when compared with White male adults.



Figure 8.7 Asthma Among Adults by Neighborhood, 2010, 2013, and 2015 Combined



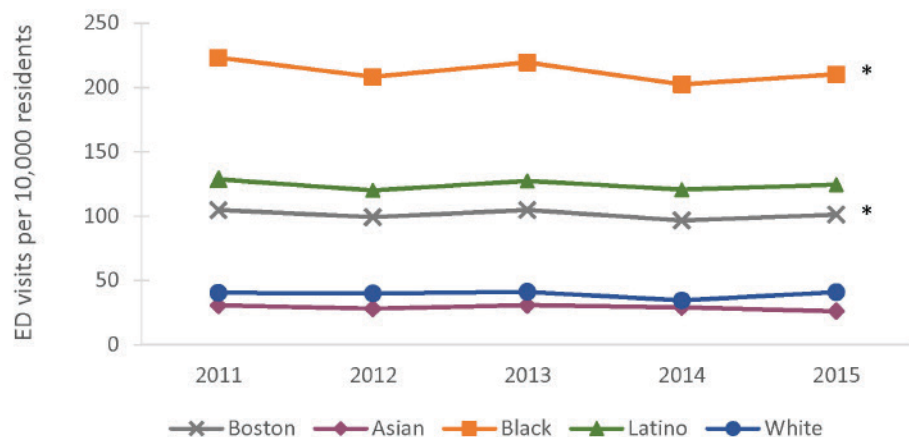
NOTE: "BB" includes the Back Bay, Beacon Hill, Downtown, the North End, and the West End. "SE" includes the South End and Chinatown.

DATA SOURCE: Boston Behavioral Risk Factor Survey (2010, 2013, 2015), Boston Public Health Commission

During 2010, 2013, and 2015 combined, the percentage of Boston adult residents with asthma was lower in Fenway, South Boston, and the South End compared with the rest of Boston. The percentage of adults with asthma was higher in Dorchester (02121, 02125) and Roxbury compared with the rest of Boston.



Figure 8.8 Asthma Emergency Department Visits† by Race/Ethnicity and Year, Boston



\* Statistically significant change over time

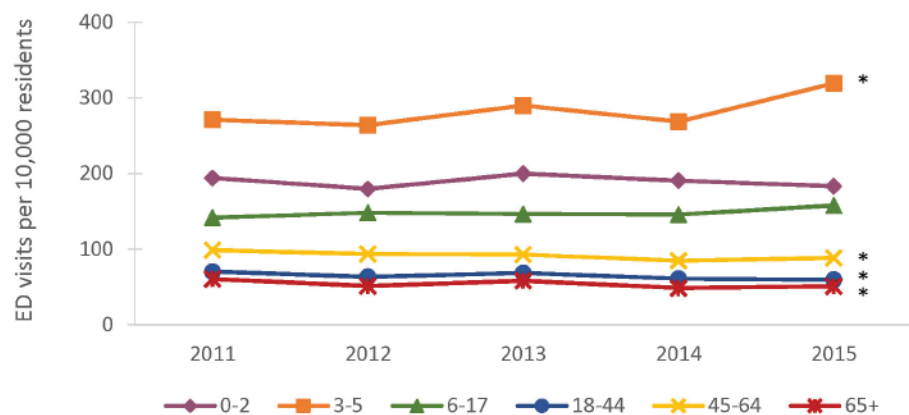
† Age-adjusted rates per 10,000 residents

DATA SOURCE: Acute hospital case-mix databases, Massachusetts Center for Health Information and Analysis

In 2015, the rate of asthma emergency department (ED) visits in Boston was 101.2 per 10,000 residents. From 2011-2015, the rate of asthma ED visits decreased by 4% for Boston overall. The rate decreased by 6% for Black residents during the same time period.

In 2015, compared with White residents (41.0), the asthma ED visit rate was higher for Black (210.3) and Latino (124.4) residents and lower for Asian residents (26.0). The rate for Black residents was 5.1 times the rate for White residents and the rate for Latino residents was 3 times the rate for White residents. The rate for Asian residents was 37% lower than the rate for White residents.

Figure 8.9 Asthma Emergency Department Visits by Age and Year



\* Statistically significant change over time

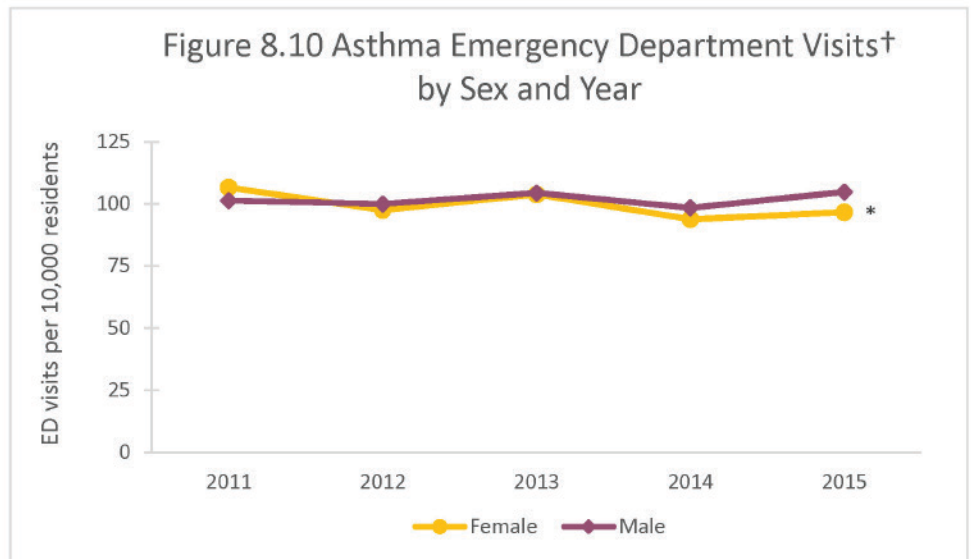
DATA SOURCE: Acute hospital case-mix databases, Massachusetts Center for Health Information and Analysis

From 2011-2015, the asthma emergency department (ED) visit rate for Boston residents decreased by 14% for residents age 18-44, 12% for residents ages 45-64, and 15% for residents ages 65 and older. Residents ages 3-5 experienced a 15% increase in the rate of ED visits over the same time period.

In 2015, the asthma ED visit rate was lower for residents ages 65 and older (51.0) compared with those ages 18-44 (59.7). The rate was higher for all other age groups compared with those ages 18-44. The biggest difference was among 3-5 year olds (319.4) whose asthma ED visit rate was 5.4 times the rate of 18-44 year olds.

From 2011-2015, the asthma emergency department (ED) visit rate for Boston female residents decreased by 9%. There was no change over time for male residents.

In 2015, the asthma ED visit rate was 8% lower for females (96.7 ED visits per 10,000 residents) compared with males (104.8).

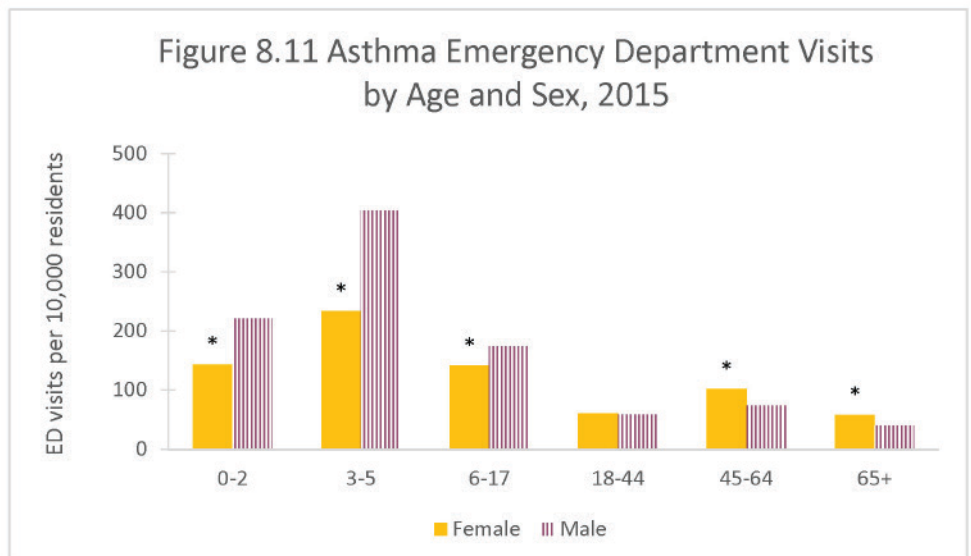


\* Statistically significant change over time  
 † Age-adjusted rates per 10,000 residents

DATA SOURCE: Acute hospital case-mix databases, Massachusetts Center for Health Information and Analysis

In 2015, the rates for asthma emergency department (ED) visits varied by sex across age groups. The rate was highest among males ages 3-5 at 403.8 ED visits per 10,000 residents. Compared with males of the same age, the rates for females ages 0-2 (143.8), 3-5 (233.6), and 6-17 (141.4) were 35%, 42%, and 19% lower, respectively.

While the asthma ED visit rates were similar for males and females ages 18-44, the rates for females ages 45-64 (101.9) and 65 and older (58.2) were 38% and 43% higher, respectively, when compared with males of the same age.

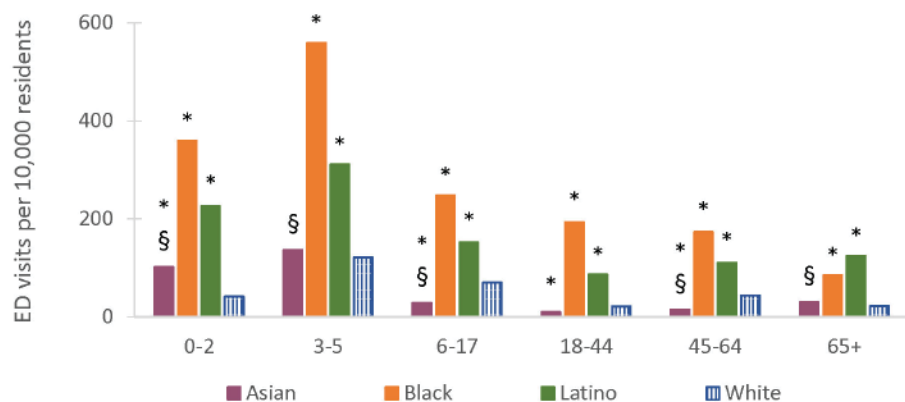


\* Statistically significant difference when compared to reference group

NOTE: Bars with patterns indicate the reference group within each selected indicator.

DATA SOURCE: Acute hospital case-mix databases, Massachusetts Center for Health Information and Analysis

Figure 8.12 Asthma Emergency Department Visits by Age and Race/Ethnicity, 2015



\* Statistically significant difference when compared to reference group  
 § Rates are based on 20 or fewer cases and should be interpreted with caution.

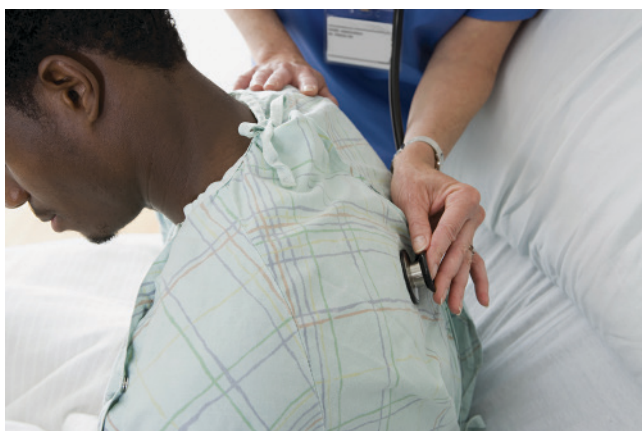
NOTE: Bars with patterns indicate the reference group within each selected indicator.

DATA SOURCE: Acute hospital case-mix databases, Massachusetts Center for Health Information and Analysis

In 2015, Black residents ages 3-5 had the highest rate of asthma emergency department (ED) visits at 558.8 ED visits per 10,000 residents. Black and Latino residents in all age groups had higher rates compared with White residents.

The largest difference when compared to White residents occurred among Latino residents ages 65 and older (124.5) with a rate 5.6 times the rate of White residents of the same age group (22.4). For Black residents, the largest difference occurred among 18-44 year olds (193.0) with a rate approximately 9 times that of White residents of the same age group (21.4).

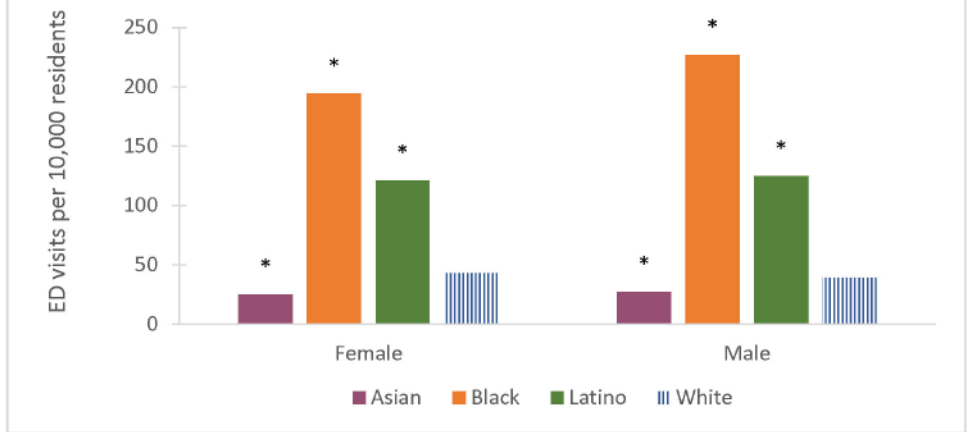
Asian residents ages 0-2 (102.5) had a rate of asthma ED visits 2.5 times higher than White residents of the same age group (41.3). For Asian residents ages 6-17 (28.9), 18-44 (9.7), and 45-64 (14.3), the rate was lower compared with White residents of the same age group.



In 2015, the asthma emergency department (ED) visit rate was lower for Asian female residents and higher for Black and Latino females compared with White females. The same was true for male residents. The rate was 41% lower for Asian females (25.2), 4.5 times higher for Black females (194.3), and 2.8 times higher for Latino females (121.2) compared with White females (42.9 ED visits per 10,000 residents).

The rate was 30% lower for Asian males (27.3), 5.9 times higher for Black males (227.1), and 3.2 times higher for Latino males (124.8) compared with White males (38.8).

Figure 8.13 Asthma Emergency Department Visits† by Sex and Race/Ethnicity, 2015



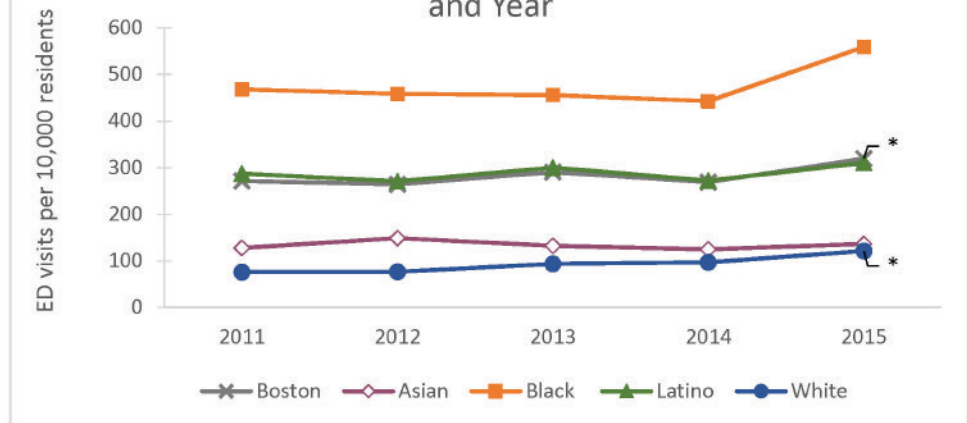
\* Statistically significant difference when compared to reference group  
 † Age-adjusted rates per 10,000 residents

NOTE: Bars with patterns indicate the reference group within each selected indicator.  
 DATA SOURCE: Acute hospital case-mix databases, Massachusetts Center for Health Information and Analysis

In Boston from 2011-2015, the age-specific asthma emergency department (ED) visit rate for children ages 3-5 increased by 15%. There was also an increase of 62% for White children over the same time period.

In 2015, compared with White children (121.0), the rate of asthma ED visits was 4.6 times and 2.6 times higher for Black (558.8) and Latino (310.4) children, respectively.

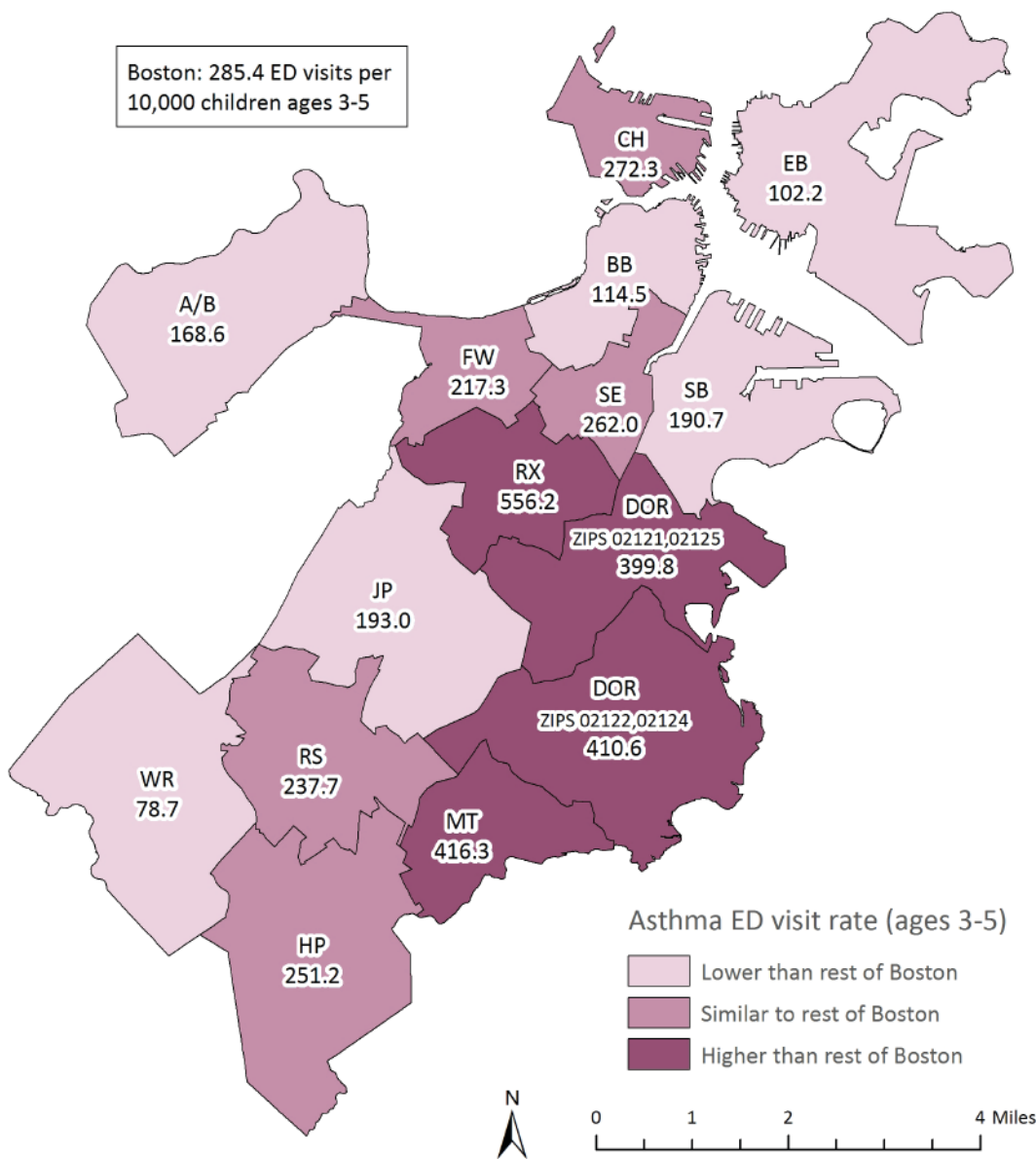
Figure 8.14 Asthma Emergency Department Visits Among 3- to 5-Year-Olds by Race/Ethnicity and Year



\* Statistically significant change over time

NOTE: Hollowed-out symbols represent rates based on 20 or fewer cases and should be interpreted with caution.  
 DATA SOURCE: Acute hospital case-mix databases, Massachusetts Center for Health Information and Analysis

Figure 8.15 Asthma Emergency Department (ED) Visits<sup>1</sup> Among 3- to 5-Year-Olds by Neighborhood, 2012-2015



<sup>1</sup> 4-year average annual rates per 10,000 children ages 3-5

NOTE: "BB" includes the Back Bay, Beacon Hill, Downtown, the North End, and the West End.  
 "SE" includes the South End and Chinatown.

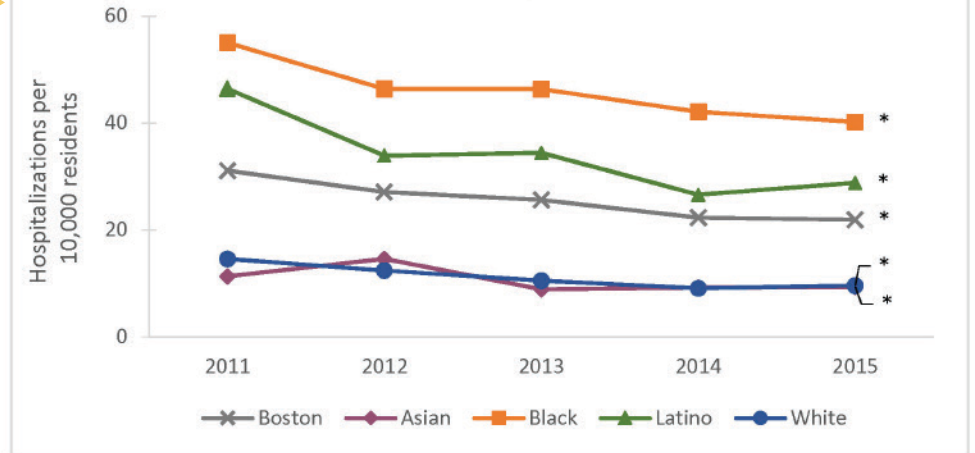
DATA SOURCE: Acute hospital case-mix databases, Massachusetts Center for Health Information and Analysis

For 2012-2015, the rate of asthma emergency department (ED) visits among children ages 3-5 was lower in Allston/Brighton, Back Bay, East Boston, Jamaica Plain, South Boston, and West Roxbury compared with the rest of Boston. The rate was higher in Dorchester (02121, 02125), Dorchester (02122, 02124), Mattapan, and Roxbury compared with the rest of Boston.

In 2015, the rate of asthma hospitalizations in Boston was 21.9 per 10,000 residents. From 2011-2015, the rate of asthma hospitalizations decreased by 31% for Boston overall. Over the same time period, the rate decreased by 29% for Asian residents, 26% for Black residents, 39% for Latino residents, and 38% for White residents.

Despite these decreases, the asthma hospitalization rates for Black (40.2) and Latino (28.8) residents in 2015 were approximately 4 times and 3 times the rate for White residents (9.6), respectively.

Figure 8.16 Asthma Hospitalizations† by Race/Ethnicity and Year



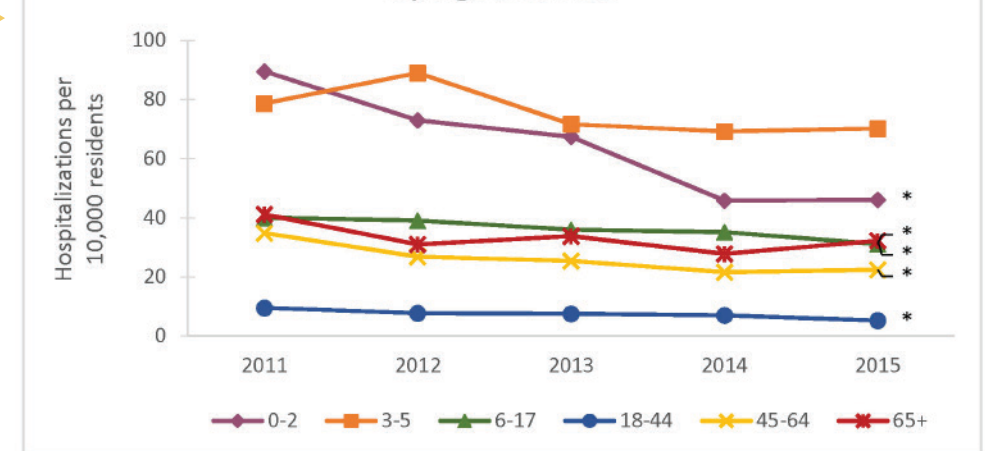
\* Statistically significant change over time  
 † Age-adjusted rates per 10,000 residents

DATA SOURCE: Acute hospital case-mix databases, Massachusetts Center for Health Information and Analysis

From 2011-2015, the rate of asthma hospitalizations decreased for residents of all age groups except those ages 3-5. The rate decreased by 51% for those ages 0-2, by 21% for those ages 6-17, by 40% for those ages 18-44, by 37% for those ages 45-64, and by 22% for those ages 65 and older.

In 2015, the asthma hospitalization rate was higher for residents in all age groups compared with residents ages 18-44.

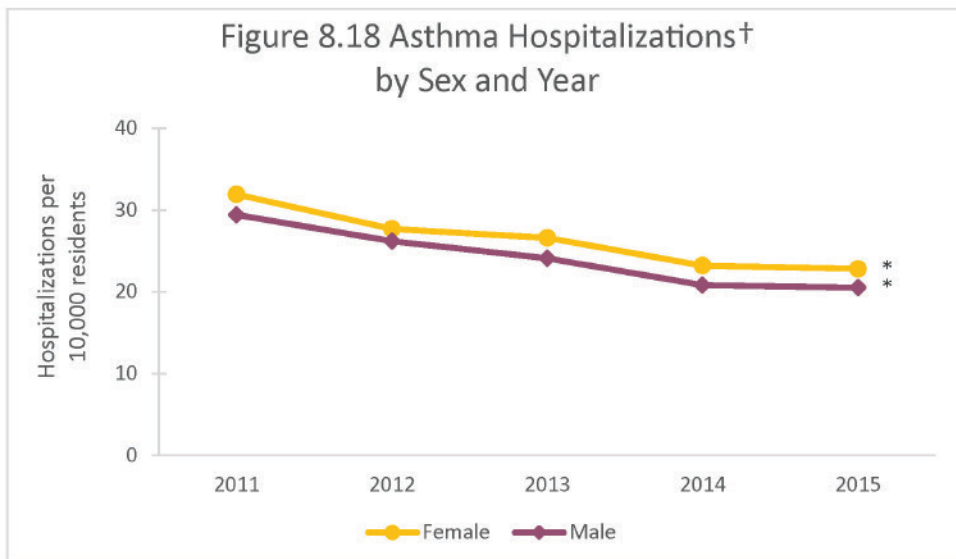
Figure 8.17 Asthma Hospitalizations by Age and Year



\* Statistically significant change over time

DATA SOURCE: Acute hospital case-mix databases, Massachusetts Center for Health Information and Analysis

Figure 8.18 Asthma Hospitalizations† by Sex and Year



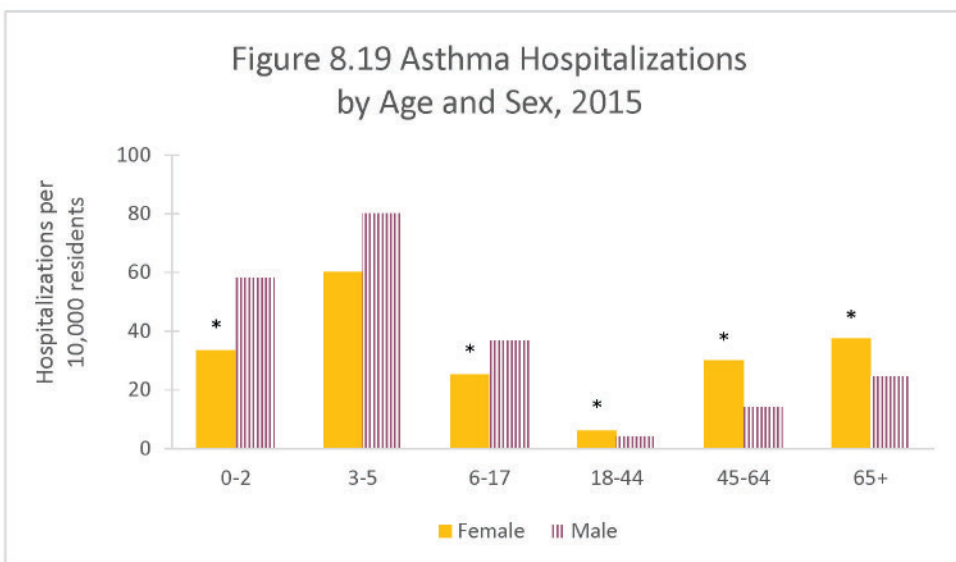
\* Statistically significant change over time  
 † Age-adjusted rates per 10,000 residents

DATA SOURCE: Acute hospital case-mix databases, Massachusetts Center for Health Information and Analysis

From 2011-2015, the rate of asthma hospitalizations decreased by 29% for female residents and 32% for male residents.

In 2015, there was no significant difference in the rate of asthma hospitalizations between males and females.

Figure 8.19 Asthma Hospitalizations by Age and Sex, 2015



\* Statistically significant difference when compared to reference group

NOTE: Bars with patterns indicate the reference group within each selected indicator.

DATA SOURCE: Acute hospital case-mix databases, Massachusetts Center for Health Information and Analysis

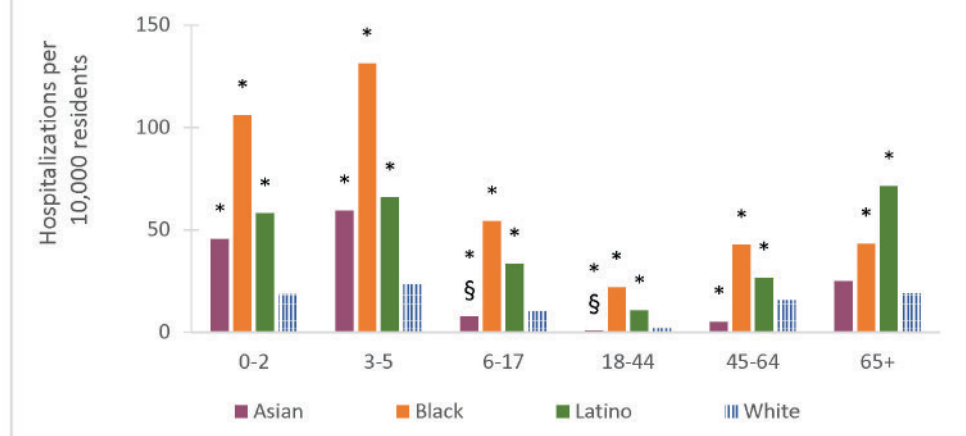
In 2015, the rate of asthma hospitalizations varied by sex across age groups. Compared with males of the same age, the rates for females ages 0-2 (33.5) and 6-17 (25.2) were 43% and 31% lower, respectively. The rates for females ages 18-44 (6.2) and 65 and older (37.6) were 51% and 53% higher, respectively, when compared with males of the same age. The asthma hospitalization rate for females ages 45-64 (30.1) was 2.1 times the rate for males of the same age (14.2).

For 2012-2015, Black residents ages 3-5 had the highest rate of asthma hospitalizations at 131.2 hospitalizations per 10,000 residents. Black and Latino residents in all age groups had higher asthma hospitalization rates compared with White residents.

The biggest difference when compared to White residents occurred among residents ages 18-44. The asthma hospitalization rates for Black (22.0) and Latino (10.6) residents were 10.3 and 5.0 times higher than the rate for White residents of the same age group (2.1), respectively.

The asthma hospitalization rates for Asian residents ages 0-2 (45.5) and 3-5 (59.4) were about 2.5 times the rates of White residents of the same age groups, 18.6 and 23.4, respectively. For Asian residents ages 6-17 (7.7), 18-44 (1.0), and 45-64 (5.1), the rates of asthma hospitalizations were lower compared with White residents, 10.2, 2.1 and 15.6, respectively.

Figure 8.20 Asthma Hospitalizations<sup>1</sup> by Age and Race/Ethnicity, 2012-2015



\* Statistically significant difference when compared to reference group  
 § Rates are based on 20 or fewer cases and should be interpreted with caution.  
<sup>1</sup> 4-year average annual rates per 10,000 residents

NOTE: Bars with patterns indicate the reference group within each selected indicator.  
 DATA SOURCE: Acute hospital case-mix databases, Massachusetts Center for Health Information and Analysis

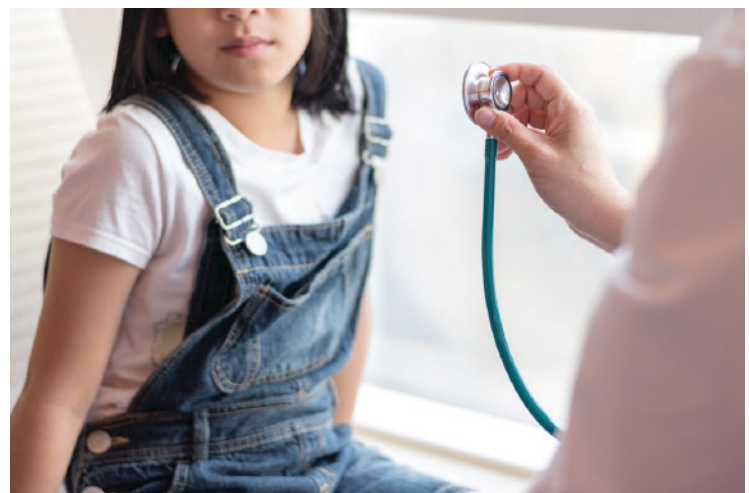
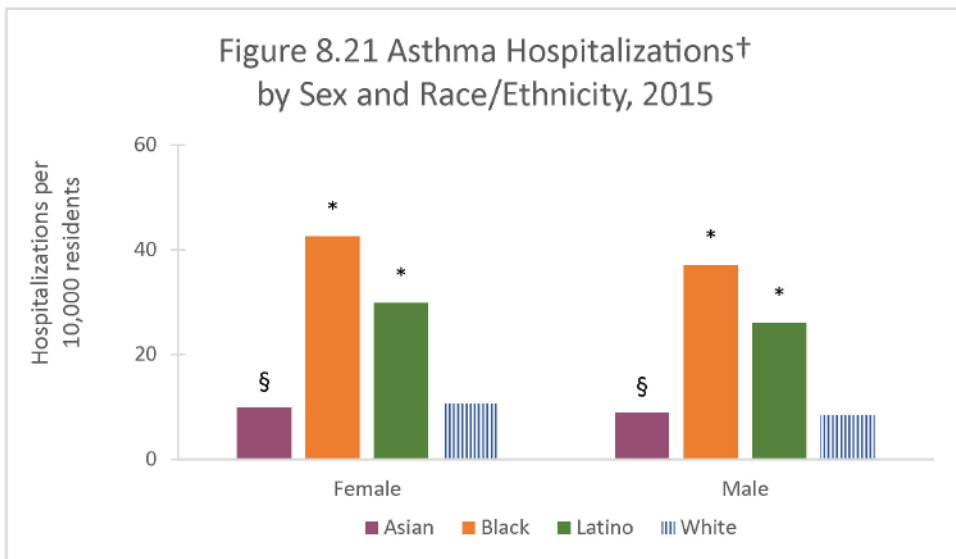




Figure 8.21 Asthma Hospitalizations† by Sex and Race/Ethnicity, 2015



\* Statistically significant difference when compared to reference group  
 † Age-adjusted rates per 10,000 residents  
 § Rates are based on 20 or fewer cases and should be interpreted with caution.

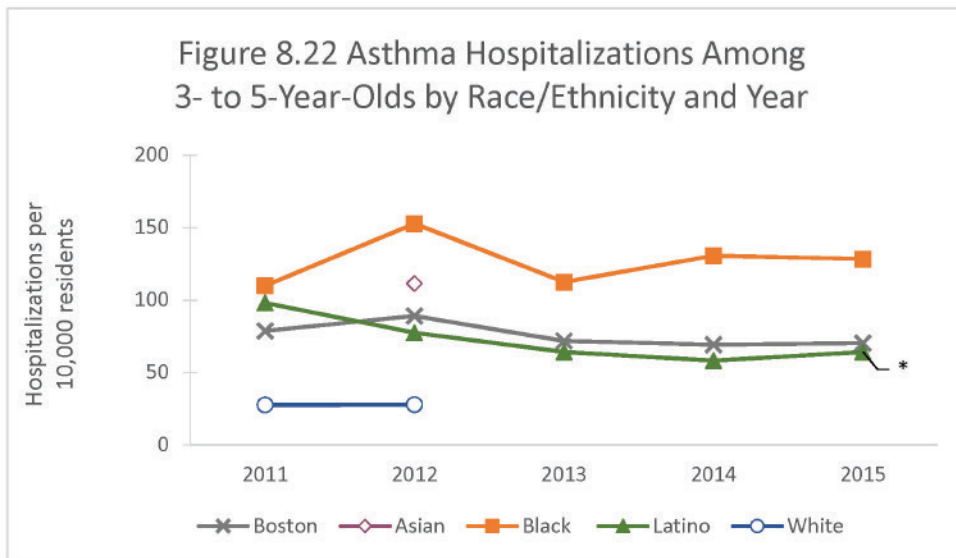
NOTE: Bars with patterns indicate the reference group within each selected indicator.  
 DATA SOURCE: Acute hospital case-mix databases, Massachusetts Center for Health Information and Analysis

In 2015, the asthma hospitalization rate was higher for Black and Latino female residents compared with White female residents. The same was true for male residents.

The rate was 4 times higher for Black females (42.5) and 2.8 times higher for Latino females (29.8) compared with White females (10.6 hospitalizations per 10,000 residents).

The asthma hospitalization rate was 4.4 times higher for Black males (37.0) and 3.1 times higher for Latino males (26.1) compared with White males (8.4).

Figure 8.22 Asthma Hospitalizations Among 3- to 5-Year-Olds by Race/Ethnicity and Year



\* Statistically significant change over time

NOTE: HOLLOWED-OUT symbols represent rates based on 20 or fewer cases and should be interpreted with caution. Rates are not presented due to a small number of cases for Asian residents for 2011 and 2013-2015 and for White residents for 2013-2015.

DATA SOURCE: Acute hospital case-mix databases, Massachusetts Center for Health Information and Analysis

From 2011-2015, the age-specific asthma hospitalization rate decreased by 38% for Latino children ages 3-5. There was no change over this same time period for Boston overall or for Black children ages 3-5.

# Diabetes

## *What is Diabetes?*

Diabetes is a disease in which the body cannot effectively regulate its blood glucose (sugar) levels because it is unable to produce or use a hormone called insulin. Normally, insulin moves glucose from blood into cells where it is used as energy. In people with diabetes, there is excess glucose in the bloodstream which affects multiple organs, including the heart, kidneys, eyes, skin, and peripheral nerves. Symptoms of diabetes include frequent urination, excessive thirst, weight loss, fatigue, and increased susceptibility to infection. Poorly controlled diabetes may lead to debilitating complications including blindness, kidney damage, stroke, peripheral vascular disease, and heart disease including heart attack (13). Approximately 10% of U.S. adults reported ever having diabetes in 2015, and the rate of new diabetes cases among U.S. adults 20 years and older was 7.8 per 10,000 in 2012 (6, 14). There are three main categories of diabetes: type 1, type 2, and gestational diabetes. Type 2 diabetes accounts for 90-95% of most cases and occurs when the body becomes less sensitive to the insulin the pancreas produces, usually because of obesity. Type 1 diabetes occurs when the pancreas itself stops making enough insulin to regulate blood glucose levels (13). Gestational diabetes occurs later in pregnancy and increases the risk of complications for both the mother and the developing fetus if not controlled properly.

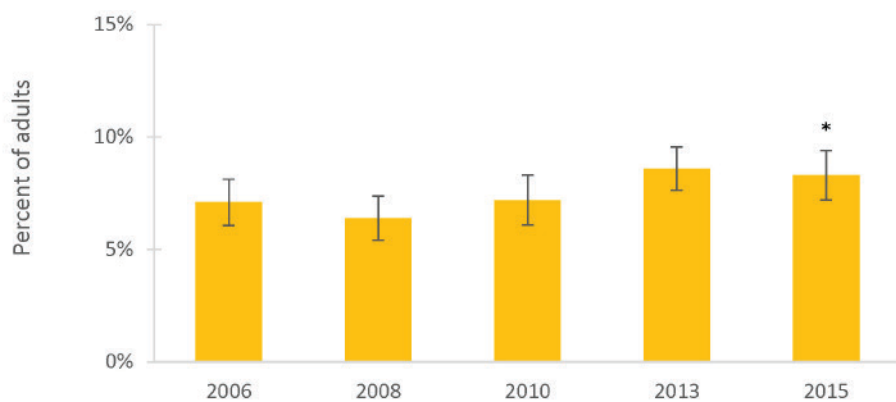
## *Populations at Risk*

People who are overweight or obese are at highest risk of developing type 2 diabetes. Among U.S. adults, people of color are more likely to be diagnosed with type 2 diabetes compared with White adults. Having a close family member with diabetes is also a risk factor for developing type 2 diabetes (15). Socioeconomic disadvantage at the individual and neighborhood level is also associated with higher risk of developing type 2 diabetes (16, 17).

## *Prevention*

Lifestyle changes can prevent or delay the onset of diabetes and help control diabetes once diagnosed. Eating a healthy diet, maintaining a healthy weight, exercising regularly, and avoiding smoking can help prevent diabetes (15, 18).

Figure 8.23 Diabetes Among Adults by Year



\* Statistically significant change over time

DATA SOURCE: Boston Behavioral Risk Factor Survey (2006, 2008, 2010, 2013, 2015), Boston Public Health Commission

In 2015, 8% of Boston adult residents reported having diabetes. There was a significant increase in the percentage of adults with diabetes between 2006 and 2015.



During 2013 and 2015 combined, 9% of Boston adult residents reported having diabetes.

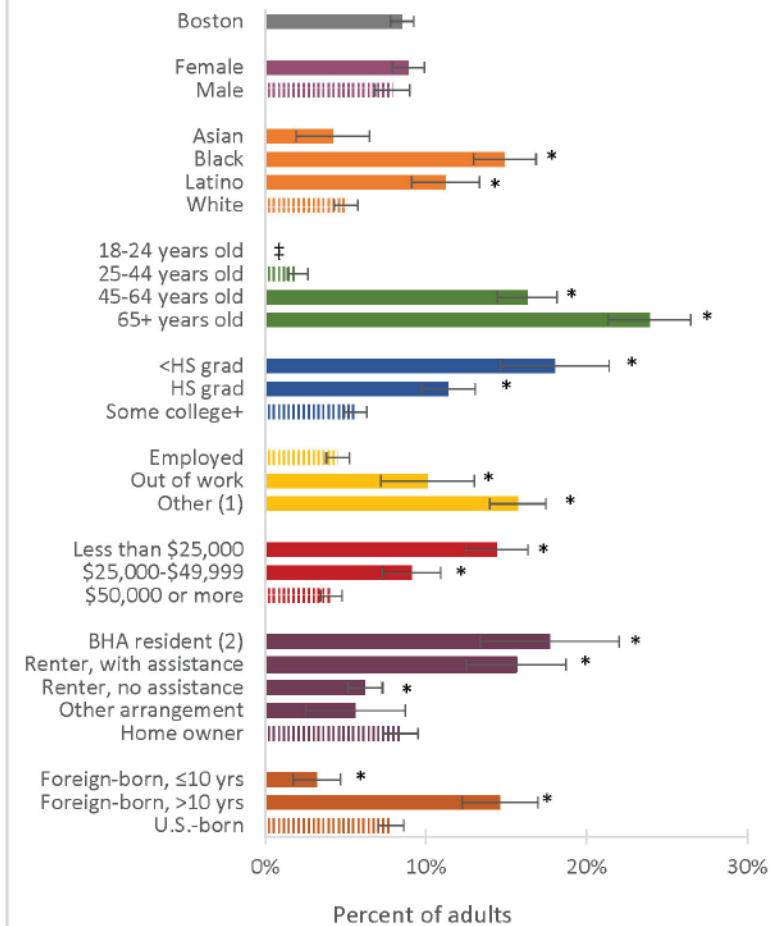
The percentage of adults with diabetes was higher for the following groups:

- Black (15%) and Latino (11%) adults compared with White adults (5%)
- Adults ages 45-64 (16%) or 65 and older (24%) compared with adults ages 25-44 (2%)
- Adults with less than a high school diploma (18%) and adults with a high school diploma (11%) compared with adults with at least some college education (6%)
- Adults who were out of work (10%) or whose employment status was "other" (16%) compared with adults who were employed (5%)
- Adults living in households with an annual income of less than \$25,000 (14%) or \$25,000-\$49,999 (9%) compared with adults living in households with an annual income of \$50,000 or more (4%)
- Adults who were Boston Housing Authority residents (18%) and renters who received rental assistance (16%) compared with adults who owned a home (8%)
- Foreign-born adults who lived in the United States for over 10 years (15%) compared with those who were born in the United States (8%)

The percentage of adults with diabetes was lower for the following groups:

- Adults who rented but did not receive rental assistance (6%) compared with adults who owned a home (8%)
- Foreign-born adults who lived in the United States for 10 years or less (3%) compared with those who were born in the United States (8%)

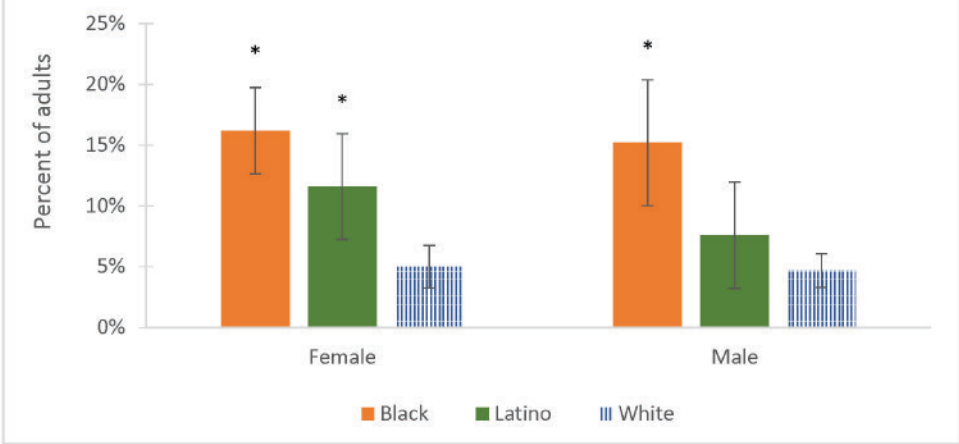
Figure 8.24 Diabetes Among Adults by Selected Indicators, 2013 and 2015 Combined



\* Statistically significant difference when compared to reference group  
 ‡ Data not presented due to insufficient sample size  
 (1) Includes homemakers, students, retirees, and those unable to work  
 (2) Boston Housing Authority resident

NOTE: Bars with patterns indicate the reference group within each selected indicator.  
 DATA SOURCE: Boston Behavioral Risk Factor Survey (2013, 2015), Boston Public Health Commission

Figure 8.25 Diabetes Among Adults by Sex and Race/Ethnicity, 2015



In 2015, a higher percentage of Black (16%) and Latino (12%) female adults had diabetes compared with White females (5%). Similarly, a higher percentage of Black male adults (15%) had diabetes compared with White male adults (5%).

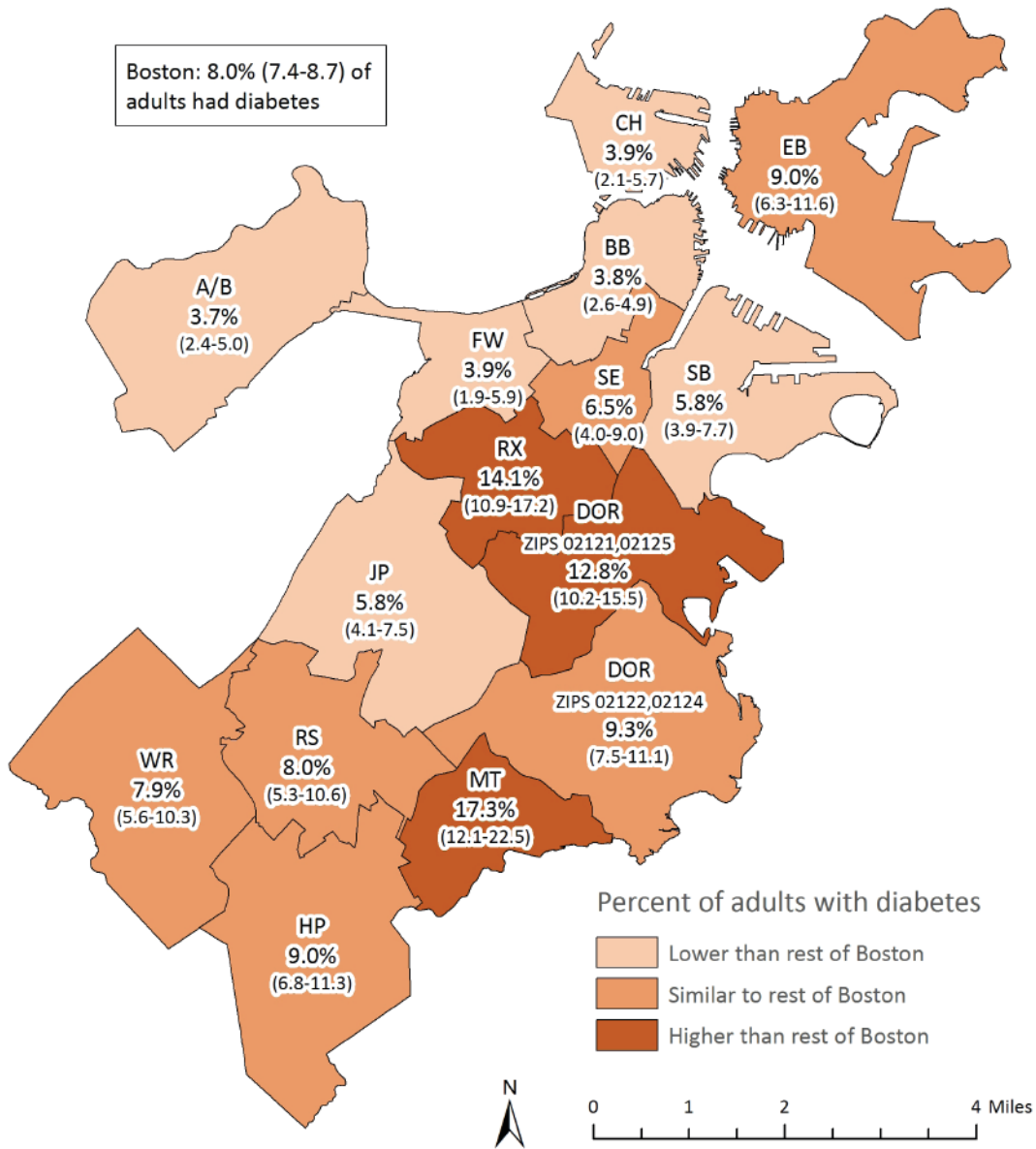
\* Statistically significant difference when compared to reference group

NOTE: Bars with patterns indicate the reference group within each selected indicator. Data not presented due to insufficient sample size for Asian female and male residents.

DATA SOURCE: Boston Behavioral Risk Factor Survey (2015), Boston Public Health Commission



Figure 8.26 Diabetes Among Adults by Neighborhood, 2010, 2013, and 2015 Combined

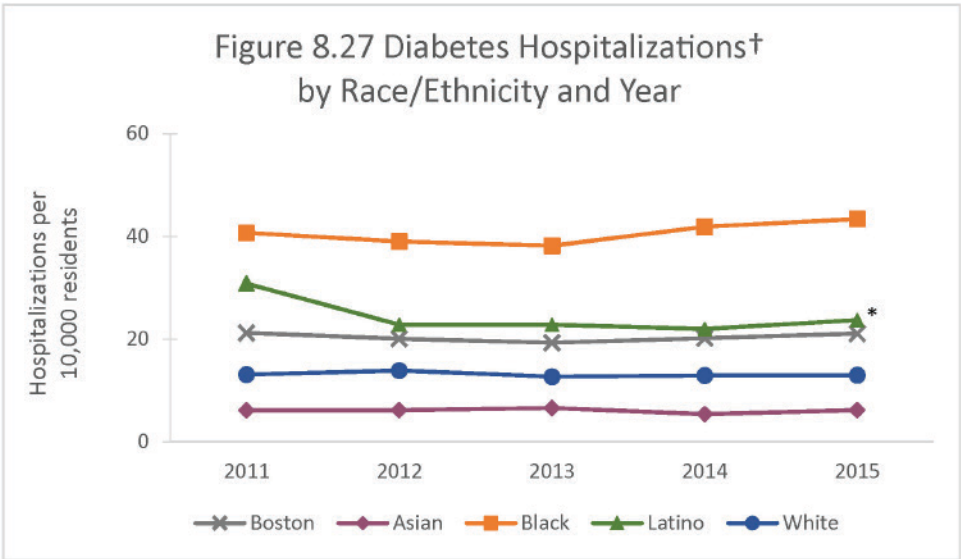


NOTE: "BB" includes the Back Bay, Beacon Hill, Downtown, the North End, and the West End.  
 "SE" includes the South End and Chinatown.

DATA SOURCE: Boston Behavioral Risk Factor Survey (2010, 2013, 2015), Boston Public Health Commission

During 2010, 2013, and 2015 combined, the percentage of adult residents with diabetes was lower in Allston/Brighton, Back Bay, Charlestown, Fenway, Jamaica Plain, and South Boston compared with the rest of Boston. The percentage of adults with diabetes was higher in Dorchester (02121, 02125), Mattapan, and Roxbury compared with the rest of Boston.

Figure 8.27 Diabetes Hospitalizations† by Race/Ethnicity and Year

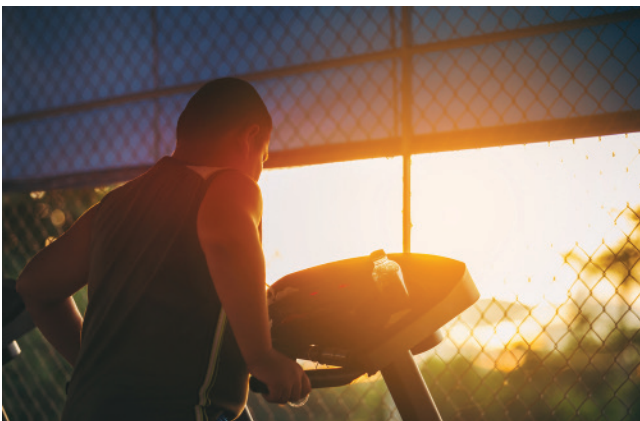


\* Statistically significant change over time  
 † Age-adjusted rates per 10,000 residents

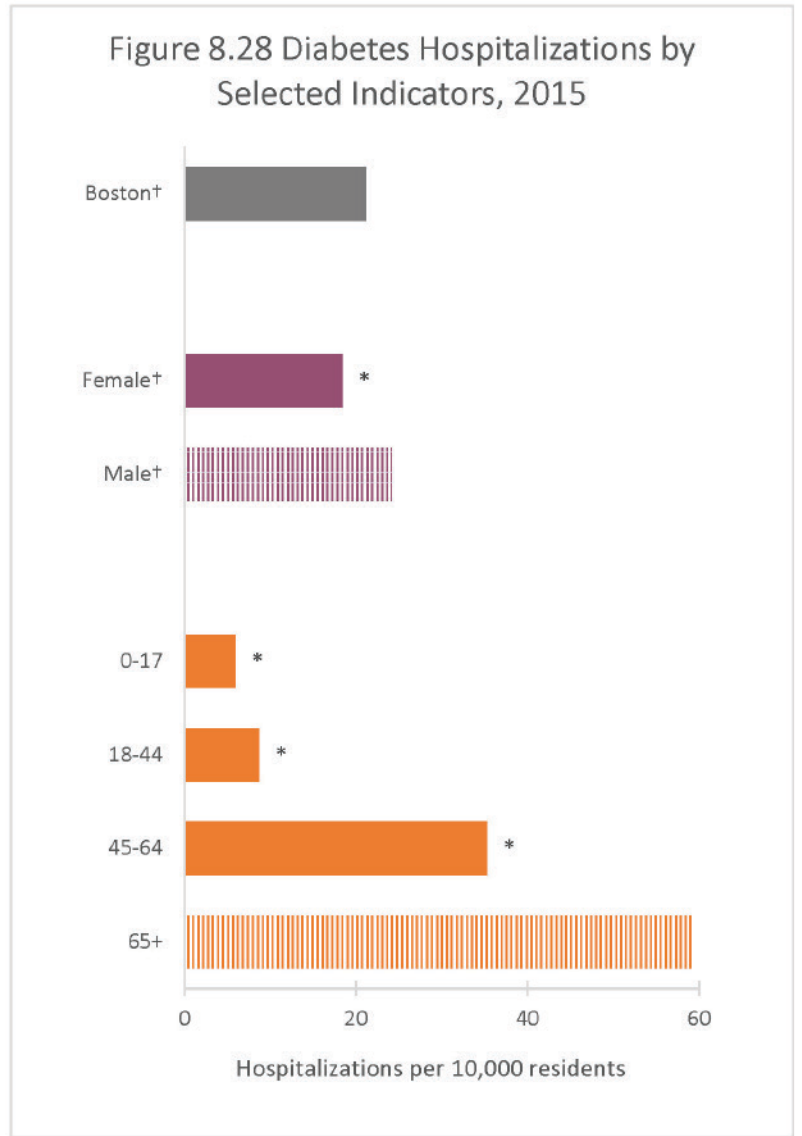
DATA SOURCE: Acute hospital case-mix databases, Massachusetts Center for Health Information and Analysis

In 2015, the rate of diabetes hospitalizations in Boston was 21.1 per 10,000 residents. From 2011-2015, the rate decreased by 21% for Latino residents.

In 2015, the rate of diabetes hospitalizations for Asian residents (6.2) was 52% lower than the rate for White residents (13.0) while the rate for Black residents (43.4) was more than 3 times higher than White residents. The rate for Latino residents (23.7) was 82% higher than the rate for White residents.



In 2015, the rate of diabetes hospitalizations for Boston was 21.1 hospitalizations per 10,000 residents. The rate was 24% lower for females (18.4) compared with males (24.1). The rate was lower for all age groups compared with those ages 65 and older (59.3).

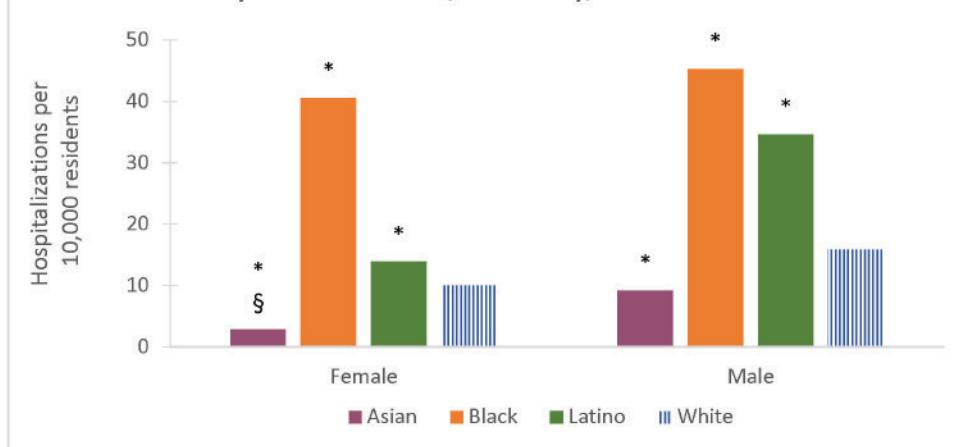


\* Statistically significant difference when compared to reference group  
 † Age-adjusted rates per 10,000 residents

NOTE: Bars with patterns indicate the reference group within each selected indicator.  
 DATA SOURCE: Acute hospital case-mix databases, Massachusetts Center for Health Information and Analysis



Figure 8.29 Diabetes Hospitalizations† by Sex and Race/Ethnicity, 2014-2015



\* Statistically significant difference when compared to reference group

† 2-year average annual age-adjusted rates per 10,000 residents

§ Rates are based on 20 or fewer cases and should be interpreted with caution.

NOTE: Bars with patterns indicate the reference group within each selected indicator.

DATA SOURCE: Acute hospital case-mix databases, Massachusetts Center for Health Information and Analysis

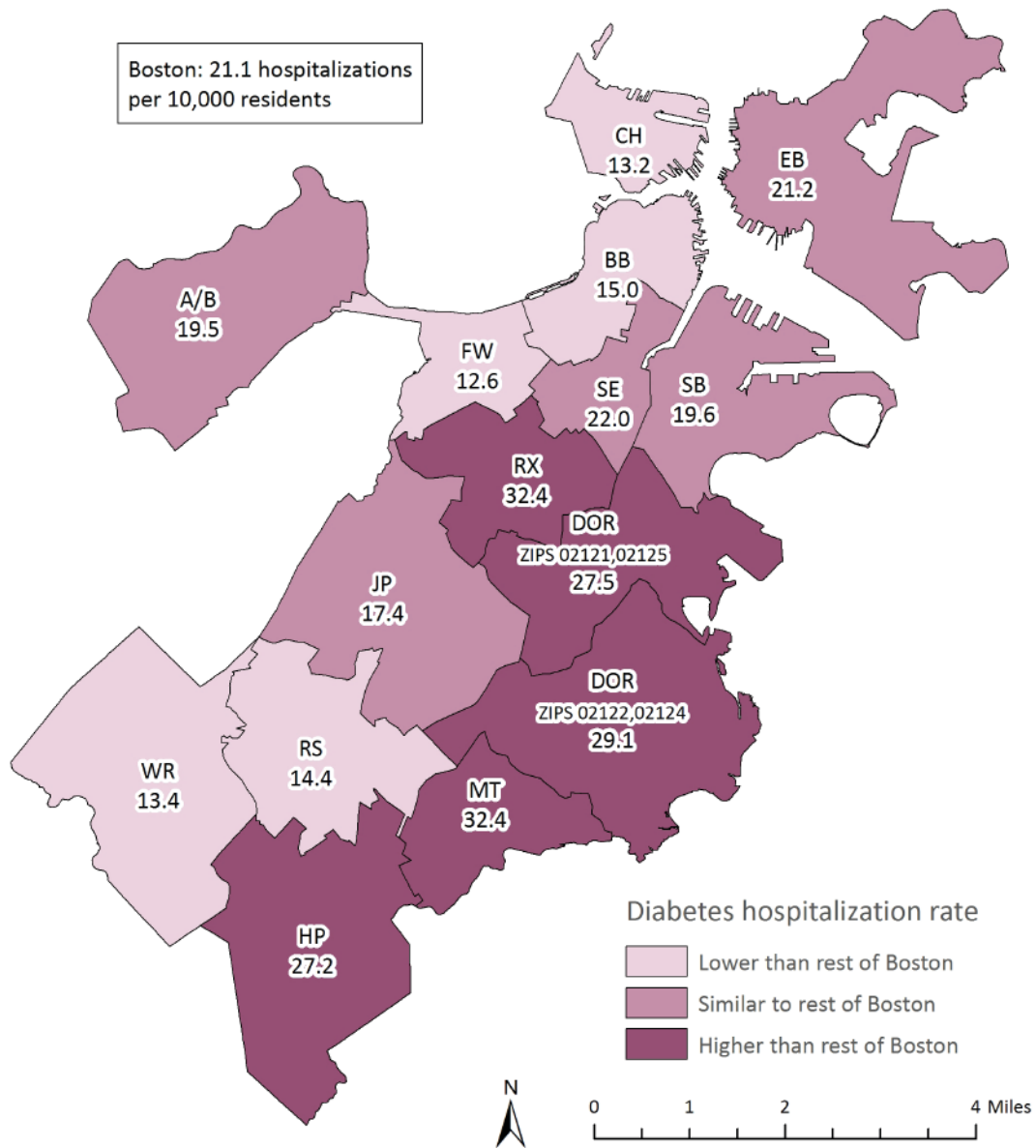
During 2014-2015, the diabetes hospitalization rate was higher for both Black and Latino female and male residents, and lower for Asian female and male residents compared with White female and male residents.

The diabetes hospitalization rate was 4.0 times higher for Black females (40.6), 39% higher for Latino females (13.9), and 72% lower for Asian females (2.9) compared with White females (10.0 hospitalizations per 10,000 residents).

The diabetes hospitalization rate was 2.9 times higher for Black males (45.3), 2.2 times higher for Latino males (34.6), and 42% lower for Asian males (9.2) compared with White males (15.9).



### Figure 8.30 Diabetes Hospitalizations<sup>†</sup> by Neighborhood, 2015

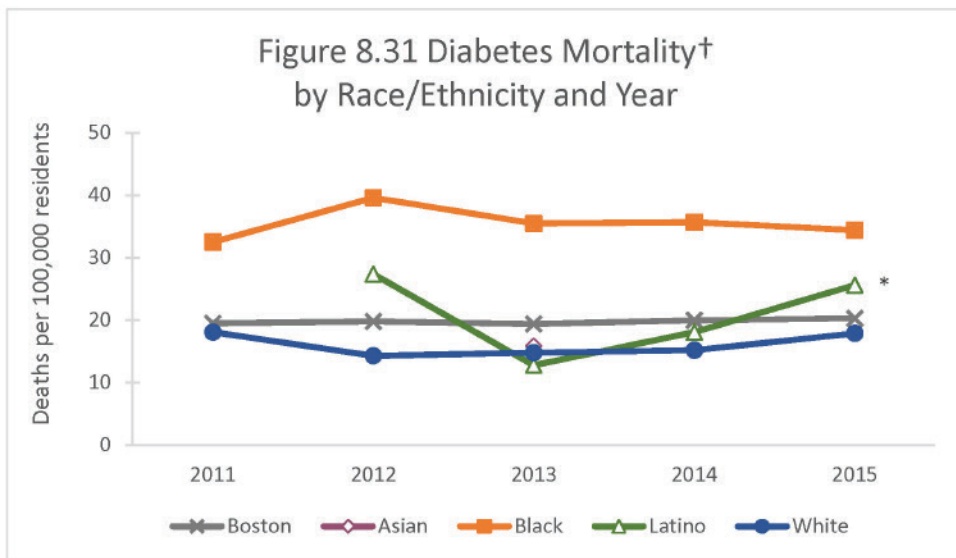


<sup>†</sup> Age-adjusted rates per 10,000 residents

NOTE: "BB" includes the Back Bay, Beacon Hill, Downtown, the North End, and the West End.  
"SE" includes the South End and Chinatown.

DATA SOURCE: Acute hospital case-mix databases, Massachusetts Center for Health Information and Analysis

In 2015, the rate of diabetes hospitalizations was lower in Back Bay, Charlestown, Fenway, Roslindale, and West Roxbury compared with the rest of Boston. The rate was higher in Dorchester (02121, 02125), Dorchester (02122, 02124), Hyde Park, Mattapan, and Roxbury compared with the rest of Boston.



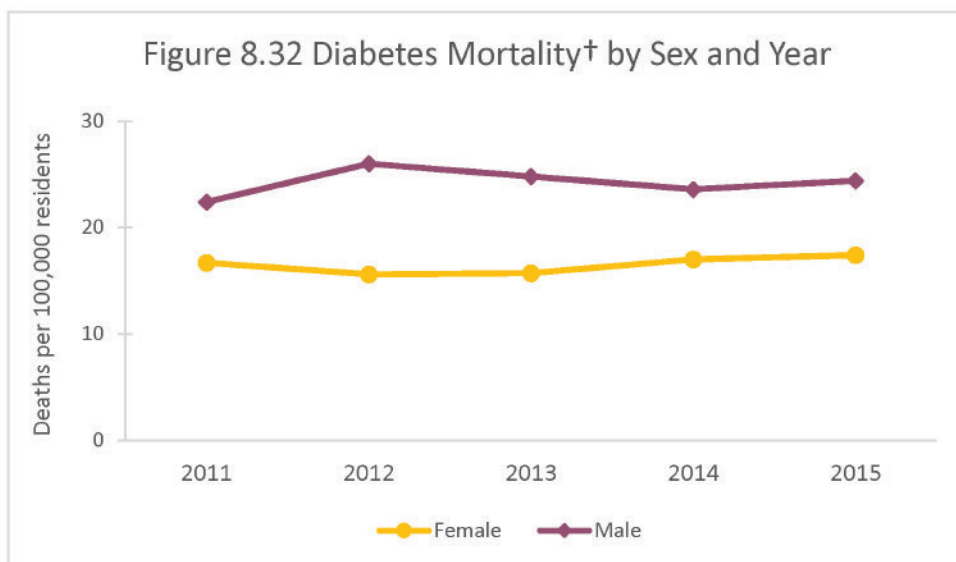
\* Statistically significant change over time  
 † Age-adjusted rates per 100,000 residents

NOTE: Hollowed-out symbols represent rates based on 20 or fewer cases and should be interpreted with caution. Rates are not presented due to a small number of cases for Asian residents for 2011-2012 and 2014-2015 and for Latino residents in 2011. Beginning in October 2014, the method for collecting race/ethnicity for mortality data changed. Interpret trends with caution.

DATA SOURCE: Boston resident deaths, Massachusetts Department of Public Health (data as of December 2016). Data may be updated as more information becomes available.

In 2015, there were 20.3 deaths per 100,000 Boston residents due to diabetes. Between 2011 and 2015, the diabetes mortality rate increased by 90% for Latino residents.

In 2015, compared with White residents (17.9), the diabetes mortality rate was 92% higher for Black residents (34.4).

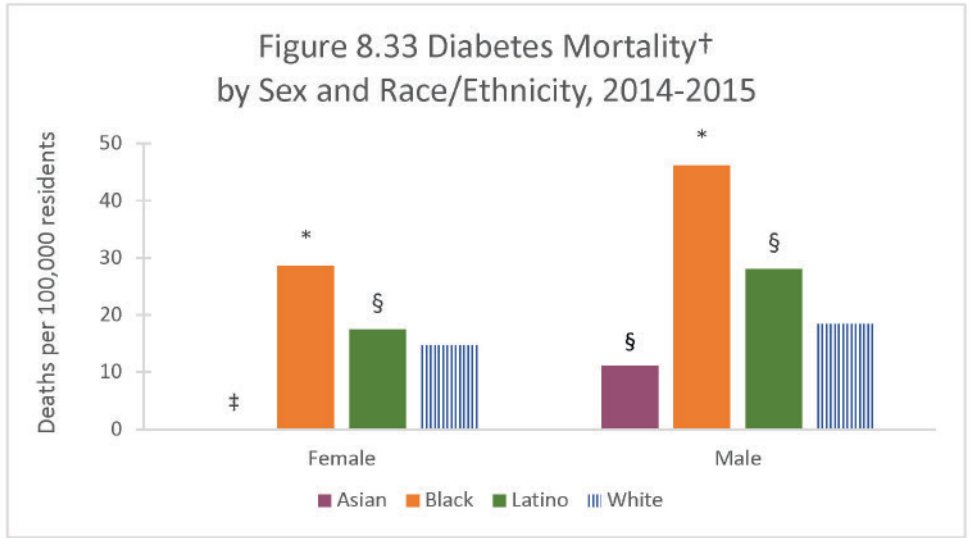


† Age-adjusted rates per 100,000 residents

DATA SOURCE: Boston resident deaths, Massachusetts Department of Public Health (data as of December 2016). Data may be updated as more information becomes available.

Between 2011 and 2015, there were no significant changes in the diabetes mortality rates for either males or females. In 2015, there was no difference in the diabetes mortality rate by sex.

For 2014-2015, the mortality rate for diabetes was 94% higher for Black female residents (28.6 deaths per 100,000 residents) compared with White females (14.7). The rate for Black males (46.2) was 2.5 times that of White males (18.4).



\* Statistically significant difference when compared to reference group

† 2-year average annual age-adjusted rates per 100,000 residents

‡ Rates not presented due to a small number of cases

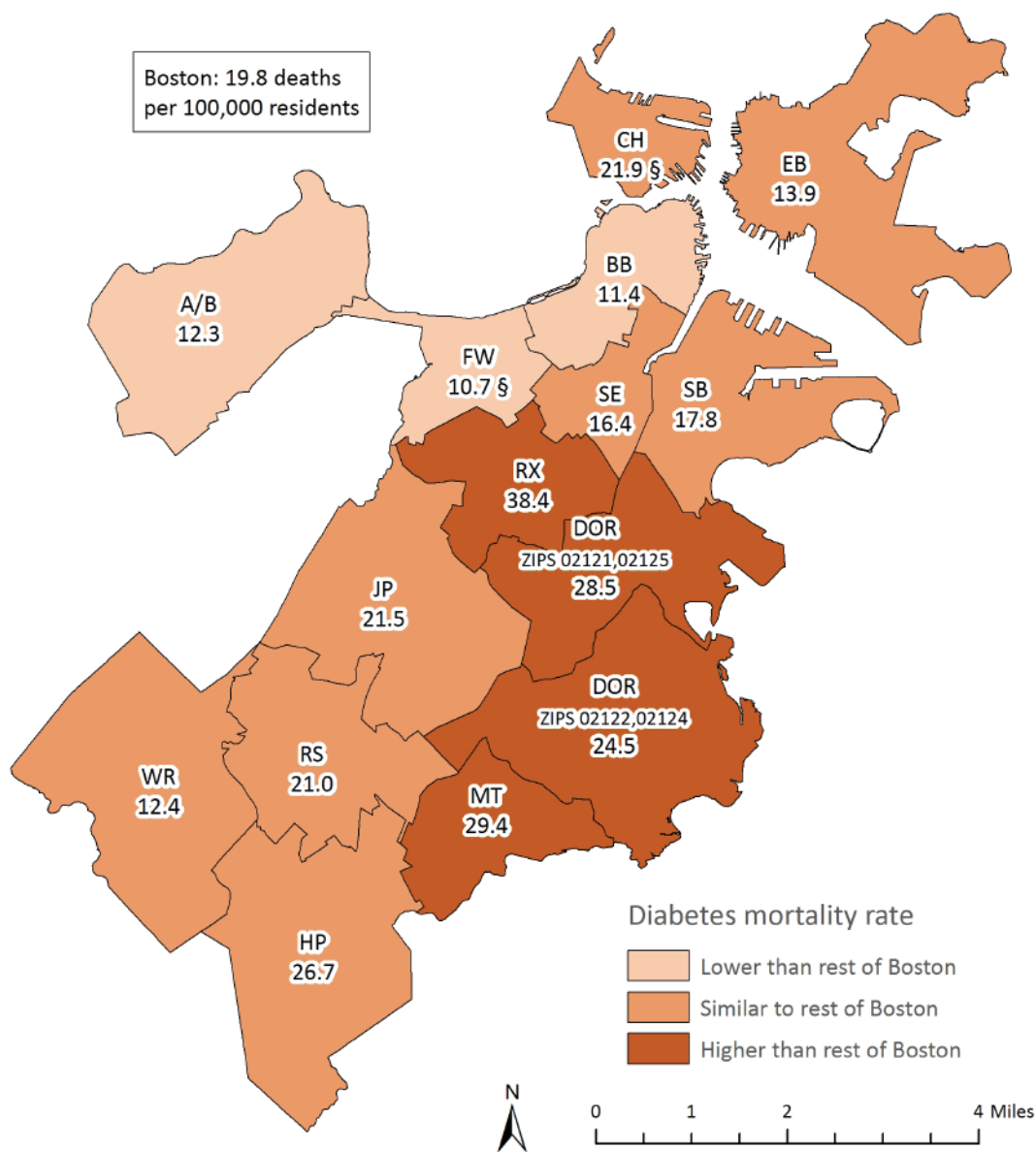
§ Rates are based on 20 or fewer cases and should be interpreted with caution.

NOTE: Bars with patterns indicate the reference group within each selected indicator.

DATA SOURCE: Boston resident deaths, Massachusetts Department of Public Health (data as of December 2016). Data may be updated as more information becomes available.



Figure 8.34 Diabetes Mortality<sup>†</sup>  
by Neighborhood, 2011-2015



<sup>†</sup> 5-year average annual age-adjusted rates per 100,000 residents

<sup>§</sup> Rates are based on 20 or fewer cases and should be interpreted with caution.

NOTE: "BB" includes the Back Bay, Beacon Hill, Downtown, the North End, and the West End.  
"SE" includes the South End and Chinatown.

DATA SOURCE: Boston resident deaths, Massachusetts Department of Public Health (data as of December 2016). Data may be updated as more information becomes available.

For 2011-2015, the mortality rate for diabetes was lower for Allston/Brighton, Back Bay, and Fenway compared with the rest of Boston. The rates for Dorchester (02121, 02125), Dorchester (02122, 02124), Mattapan, and Roxbury were higher compared with the rest of Boston.



## Heart Disease

### *What is Heart Disease?*

Heart disease is an umbrella term that covers several conditions related to the heart, including coronary artery disease, arrhythmias, and heart failure. The most common type of heart disease in the U.S. is coronary artery disease (CAD) (19). CAD is caused by cholesterol deposits that build up in the blood vessels that supply the heart with blood. As these deposits accumulate over time, the blood vessels narrow and blood flow is reduced. Symptoms of heart disease depend on the specific condition, but worrisome symptoms include heaviness or pressure in the chest, shortness of breath, and feeling weak or lightheaded (19). According to findings from the 2013-2014 National Health Interview Survey, 11.5% of U.S. adults reported ever having heart disease (20). The age-adjusted mortality rate for CAD was estimated at 102.6 per 100,000 in 2013 (21).

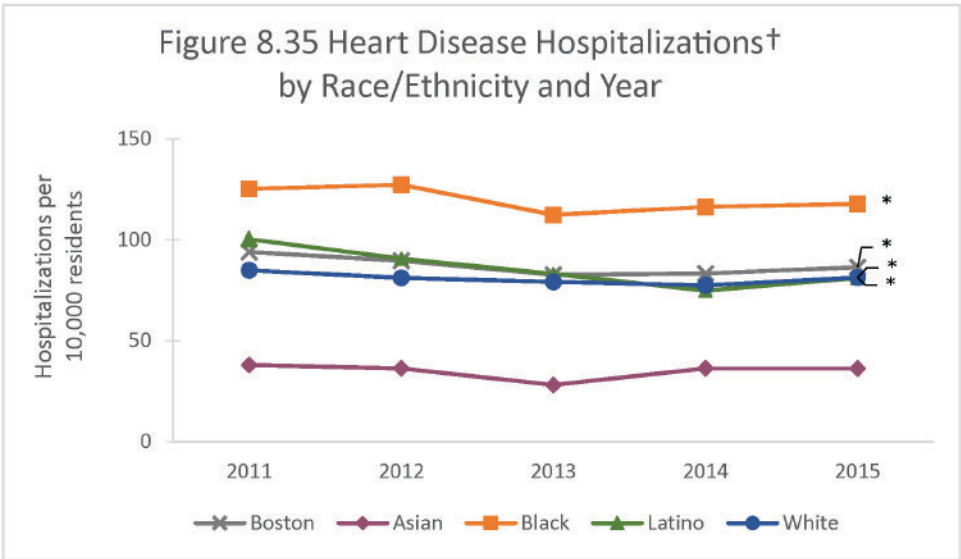
### *Populations at Risk*

Heart disease is the leading cause of death for Black, Latino, and White individuals in the U.S., and it is the second leading cause of death for Asian individuals. In Boston, it is the second leading cause of death for these groups; for more information see Chapter 15: Death. Nearly half of Americans have at least one of the three key risk factors for developing CAD: high blood pressure, high LDL cholesterol, or cigarette smoking (19). Other risk factors include diabetes, overweight/obesity, diet with few fruits and vegetables, physical inactivity, and excessive alcohol use (19). Educational attainment and household income are inversely related with CAD (22).

### *Prevention*

Lowering blood pressure, quitting smoking, exercising regularly, and maintaining a healthy diet can help reduce the risk of developing heart disease (19).

Figure 8.35 Heart Disease Hospitalizations† by Race/Ethnicity and Year



\* Statistically significant change over time  
 † Age-adjusted rates per 10,000 residents

DATA SOURCE: Acute hospital case-mix databases, Massachusetts Center for Health Information and Analysis

In 2015, the rate of heart disease hospitalizations in Boston was 86.5 per 10,000 residents. From 2011-2015, the rate decreased by 9%. The rate also decreased by 8% for Black residents, 22% for Latino residents, and 5% for White residents over the same time period.

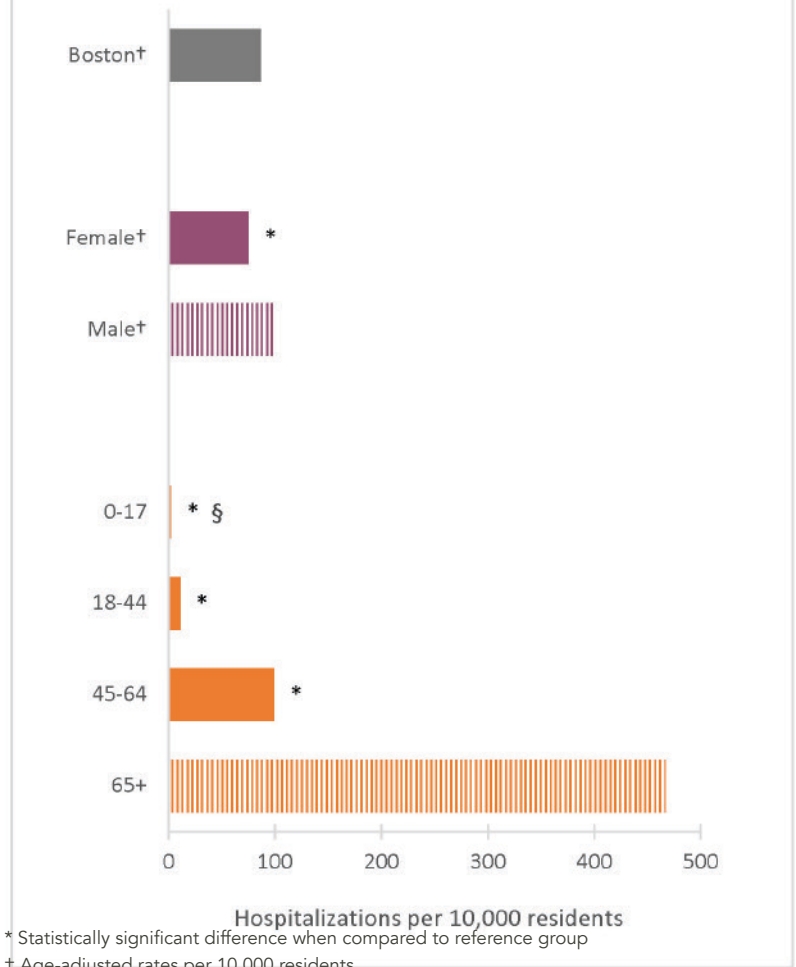
In 2015, the heart disease hospitalization rate for Asian residents (36.3) was 55% lower than the rate for White residents (81.3) while the rate for Black residents (117.8) was 45% higher than the rate for White residents.



In 2015, the rate of heart disease hospitalizations for Boston was 86.5 hospitalizations per 10,000 residents.

The rate was 26% lower for females (74.8) compared with males (100.9). The rate was lower for all age groups compared with those ages 65 and older (467.2).

Figure 8.36 Heart Disease Hospitalizations by Selected Indicators, 2015

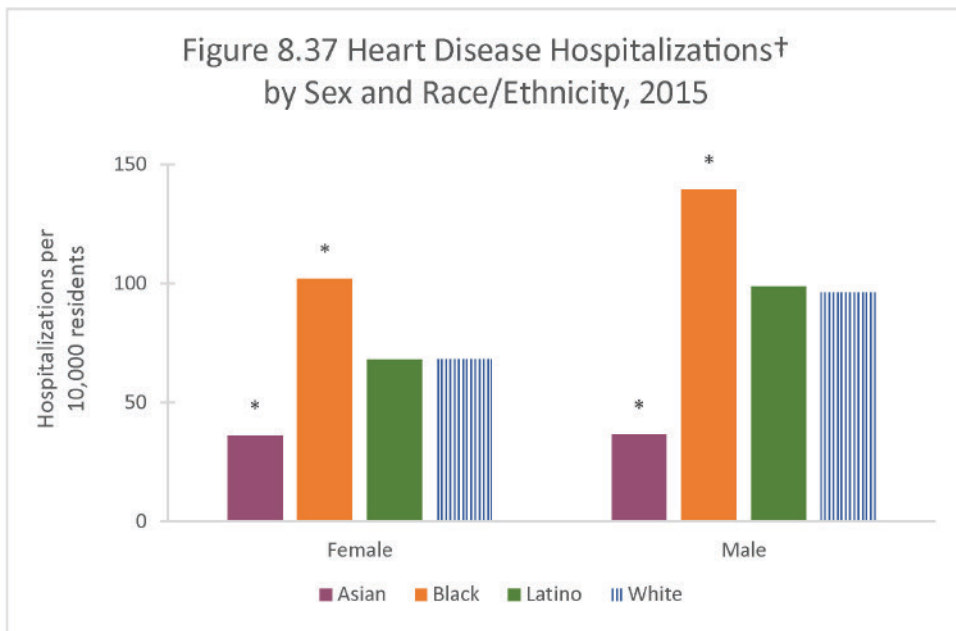


\* Statistically significant difference when compared to reference group  
 † Age-adjusted rates per 10,000 residents  
 § Rates are based on 20 or fewer cases and should be interpreted with caution.

NOTE: Bars with patterns indicate the reference group within each selected indicator.  
 DATA SOURCE: Acute hospital case-mix databases, Massachusetts Center for Health Information and Analysis



Figure 8.37 Heart Disease Hospitalizations† by Sex and Race/Ethnicity, 2015



\* Statistically significant difference when compared to reference group  
 † Age-adjusted rates per 10,000 residents

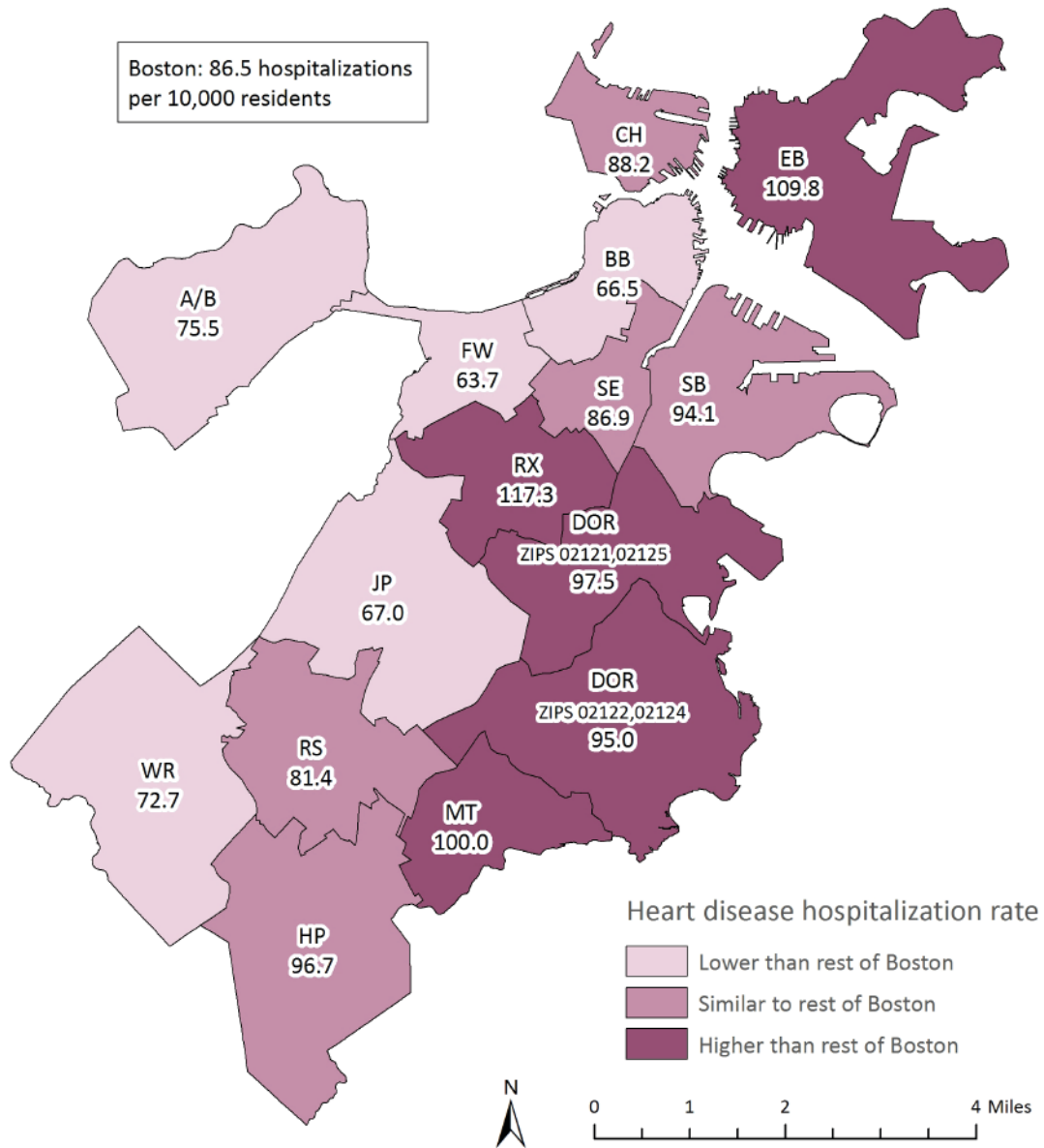
NOTE: Bars with patterns indicate the reference group within each selected indicator.  
 DATA SOURCE: Acute hospital case-mix databases, Massachusetts Center for Health Information and Analysis

In 2015, the heart disease hospitalization rate was higher for both Black females and males, and lower for Asian females and males compared with White females and males.

The heart disease hospitalization rate was 49% higher for Black females (102.0) and 47% lower for Asian females (36.2) compared with White females (68.3 hospitalizations per 10,000 residents). The rate was 45% higher for Black males (139.5) and 62% lower for Asian males (36.5) compared with White males (96.2).



Figure 8.38 Heart Disease Hospitalizations<sup>†</sup>  
by Neighborhood, 2015



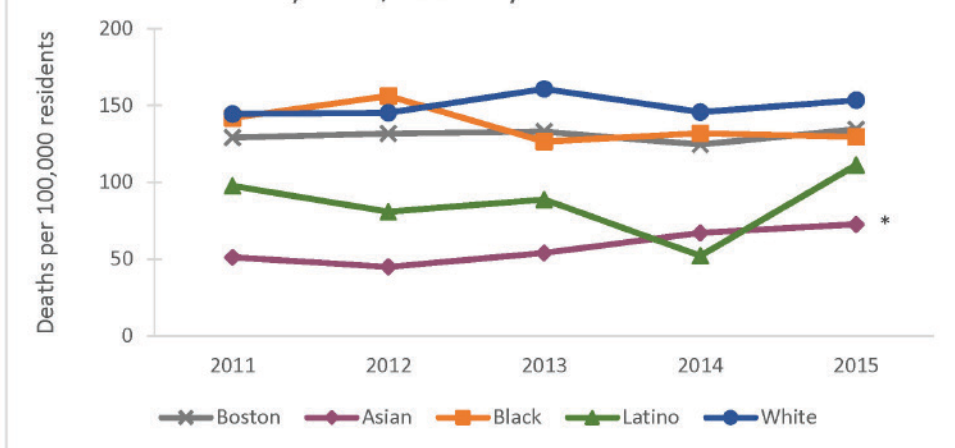
<sup>†</sup> Age-adjusted rates per 10,000 residents

NOTE: "BB" includes the Back Bay, Beacon Hill, Downtown, the North End, and the West End.  
"SE" includes the South End and Chinatown.

DATA SOURCE: Acute hospital case-mix databases, Massachusetts Center for Health Information and Analysis

In 2015, the rate of heart disease hospitalizations was lower in Allston/Brighton, Back Bay, Fenway, Jamaica Plain, and West Roxbury compared with the rest of Boston. The rate was higher in Dorchester (02121, 02125), Dorchester (02122, 02124), East Boston, Mattapan, and Roxbury compared with the rest of Boston.

Figure 8.39 Heart Disease Mortality† by Race/Ethnicity and Year



\* Statistically significant change over time  
 † Age-adjusted rates per 100,000 residents

NOTE: Beginning in October 2014, the method for collecting race/ethnicity for mortality data changed. Interpret trends with caution.

DATA SOURCE: Boston resident deaths, Massachusetts Department of Public Health (data as of December 2016). Data may be updated as more information becomes available.

In 2015, there were 134.5 deaths per 100,000 Boston residents due to heart disease. Between 2011 and 2015, the heart disease mortality rate increased by 57% among Asian residents.

Compared with White residents (153.5), the heart disease mortality rate was 53% lower for Asian residents (72.7) and 28% lower for Latino residents (111.3).

Figure 8.40 Heart Disease Mortality† by Sex and Year



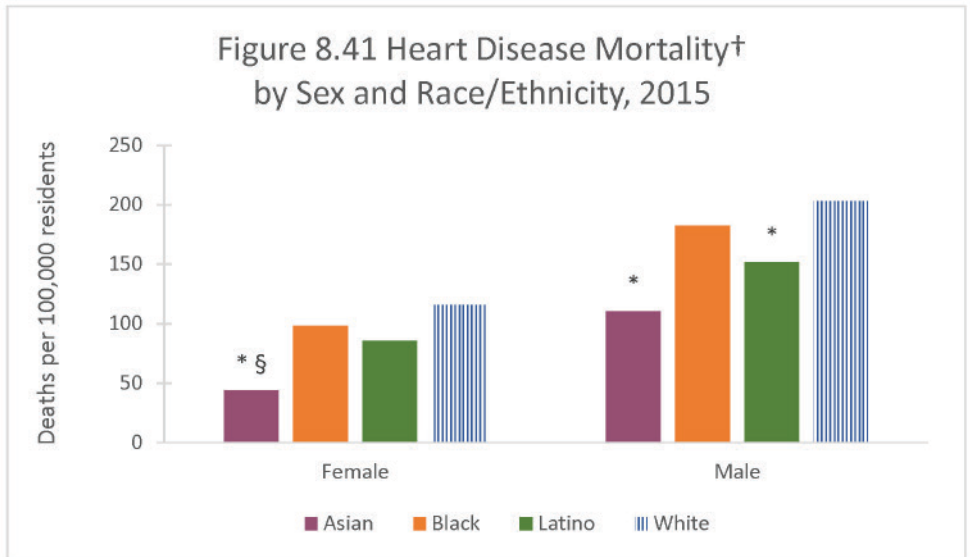
† Age-adjusted rates per 100,000 residents

DATA SOURCE: Boston resident deaths, Massachusetts Department of Public Health (data as of December 2016). Data may be updated as more information becomes available.

Between 2011 and 2015, there were no significant changes in the heart disease mortality rates for either male or female residents.

In 2015, the heart disease mortality rate was 43% lower for females (102.6 deaths per 100,000 residents) compared with males (179.9).

In 2015, the heart disease mortality rate was 62% lower for Asian female residents (44.0 deaths per 100,000 residents) compared with White females (115.7). The rate was 45% lower for Asian male residents (110.7) and 25% lower for Latino males (151.7) compared with White males (202.9).



\* Statistically significant difference when compared to reference group

† Age-adjusted rates per 100,000 residents

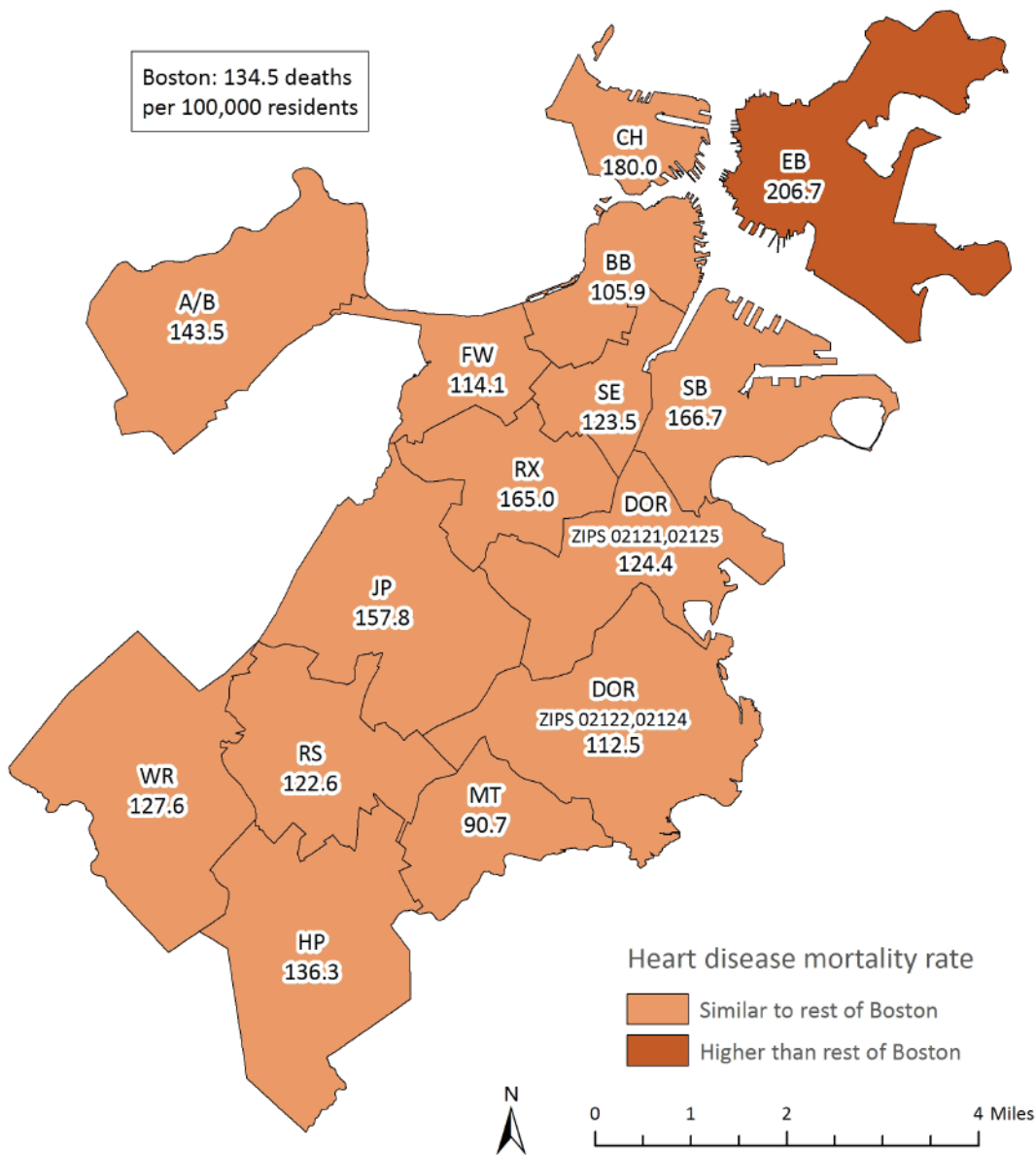
§ Rates are based on 20 or fewer cases and should be interpreted with caution.

NOTE: Bars with patterns indicate the reference group within each selected indicator.

DATA SOURCE: Boston resident deaths, Massachusetts Department of Public Health (data as of December 2016). Data may be updated as more information becomes available.



### Figure 8.42 Heart Disease Mortality<sup>†</sup> by Neighborhood, 2015



<sup>†</sup> Age-adjusted rates per 100,000 residents

NOTE: "BB" includes the Back Bay, Beacon Hill, Downtown, the North End, and the West End. "SE" includes the South End and Chinatown.

DATA SOURCE: Boston resident deaths, Massachusetts Department of Public Health (data as of December 2016). Data may be updated as more information becomes available.

In 2015, East Boston had a higher heart disease mortality rate compared with the rest of Boston.

# Hypertension

## *What is Hypertension?*

Hypertension is another word for high blood pressure. As blood is pumped throughout the body, it generates a force against the walls of the blood vessels that carry it. This force is known as blood pressure. A healthy person's blood pressure varies with age and sex, and also fluctuates within a normal range throughout the day (23).

Blood pressure is recorded as two numbers: the higher number is called systolic pressure and the lower number is called diastolic pressure. Normal values for systolic pressure are less than 120 mmHg and for diastolic pressure are less than 80 mmHg (23). This is also written as 120/80 mmHg. The CDC defines high blood pressure, or hypertension, for adults as a systolic blood pressure of 140 mmHg or higher or a diastolic blood pressure of 90 mmHg or higher (or 140/90 mmHg) (23). A person with high blood pressure may not have any signs or symptoms until they develop a serious health complication. Complications such as heart disease, heart attack, stroke, heart failure, kidney disease, and peripheral artery disease can be prevented through early diagnosis and management of blood pressure (23). The prevalence of U.S. adults with hypertension during 2015 was approximately 31% (24).

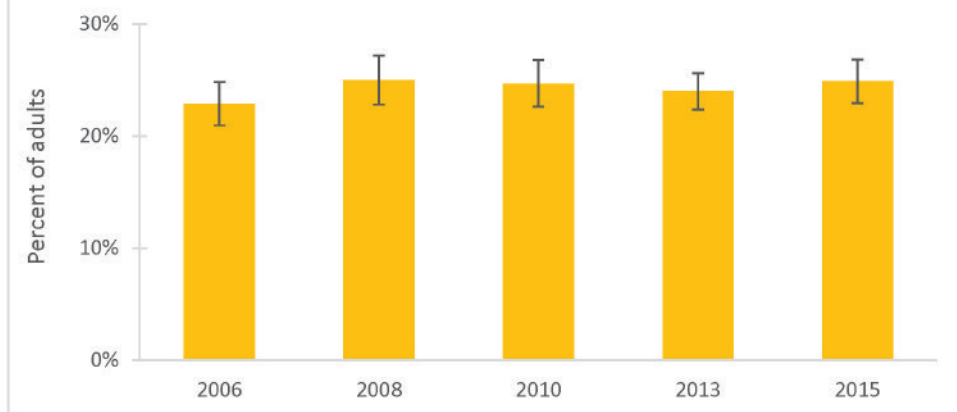
## *Populations at Risk*

Compared to White individuals, Black individuals have a higher prevalence of high blood pressure. High blood pressure is also associated with increasing age. Pre-hypertension (blood pressure above the normal range but below the hypertensive range) and diabetes also increase the risk of developing high blood pressure. Family history of hypertension is another important risk factor, especially when combined with smoking and a diet high in sodium (23). Higher levels of educational attainment and family income, and higher status occupations, are also shown to be protective factors (25, 26).

## *Prevention*

Maintaining a healthy lifestyle is the key to keeping blood pressure normal. Eating a healthy diet, which includes fruits and vegetables and is low in sodium, engaging in regular physical activity, maintaining a healthy weight, avoiding tobacco and excess alcohol consumption, and controlling diabetes can help to maintain a healthy blood pressure. Engaging in stress management and/or stress reduction, and limiting exposure to chronic stressors, may also help with control of blood pressure and prevention of hypertension (27, 28). In addition, regular check-ups with a health care provider can help detect hypertension before complications develop (23).

Figure 8.43 Hypertension Among Adults by Year



DATA SOURCE: Boston Behavioral Risk Factor Survey (2006, 2008, 2010, 2013, 2015),  
Boston Public Health Commission

In 2015, 25% of Boston adult residents reported having hypertension. There was no significant change in the percentage of adults with hypertension between 2006 and 2015.

### Hypertension Among Adults

Healthy People 2020 Target: 26.9%

US median 2015: 30.9%

MA 2015: 29.6% (28.4-30.9)

Boston 2015: 24.9% (23.0-26.9)

In 2015, 25% of Boston adult residents reported having hypertension.

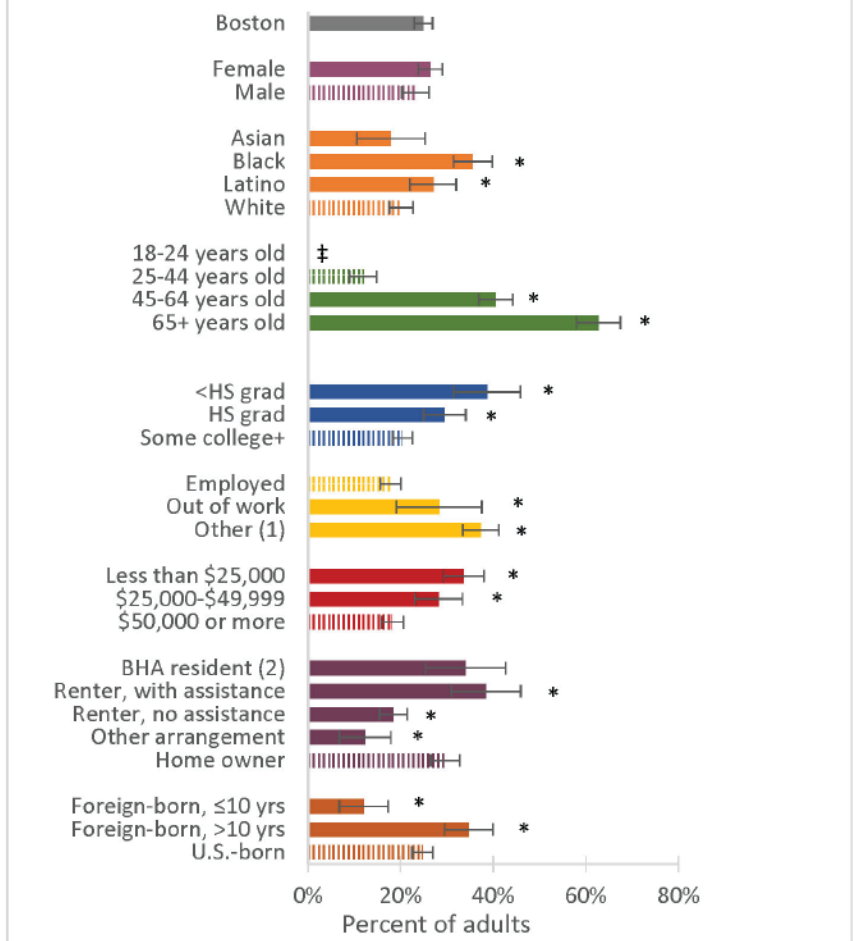
The percentage of hypertension was higher for the following groups:

- Black (36%) and Latino (27%) adults compared with White adults (20%)
- Adults ages 45-64 (41%) or 65 and older (63%) compared with adults ages 25-44 (12%)
- Adults with less than a high school diploma (39%) and adults with a high school diploma (30%) compared with those with at least some college education (20%)
- Adults who were out of work (28%) or whose employment status was "other" (37%) compared with adults who were employed (18%)
- Adults living in households with an annual income of less than \$25,000 (34%) and those with an income of \$25,000-\$49,999 (28%) compared with adults living in households with an annual income of \$50,000 or more (18%)
- Adults who received rental assistance (38%) compared with home owners (30%)
- Foreign-born adults who lived in the United States for over 10 years (35%) compared with those who were born in the United States (25%)

The percentage of hypertension was lower for the following groups:

- Adults who rented but did not receive rental assistance (18%) and those with other housing arrangements (12%) compared with homeowners (30%)
- Foreign-born adults who lived in the United States for 10 years or less (12%) compared with those who were born in the United States (25%)

Figure 8.44 Hypertension Among Adults by Selected Indicators, 2015

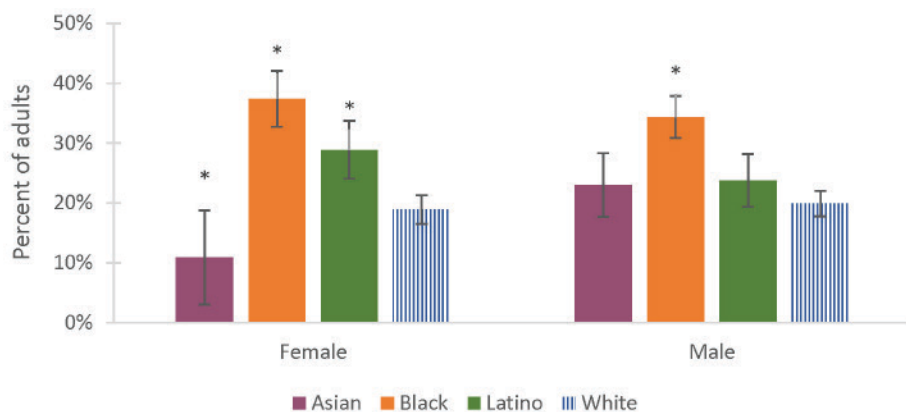


\* Statistically significant difference when compared to reference group  
 ‡ Data not presented due to insufficient sample size  
 (1) Includes homemakers, students, retirees, and those unable to work  
 (2) Boston Housing Authority resident

NOTE: Bars with patterns indicate the reference group within each selected indicator.  
 DATA SOURCE: Boston Behavioral Risk Factor Survey (2015), Boston Public Health Commission



Figure 8.45 Hypertension Among Adults by Sex and Race/Ethnicity, 2013 and 2015 Combined



\* Statistically significant difference when compared to reference group

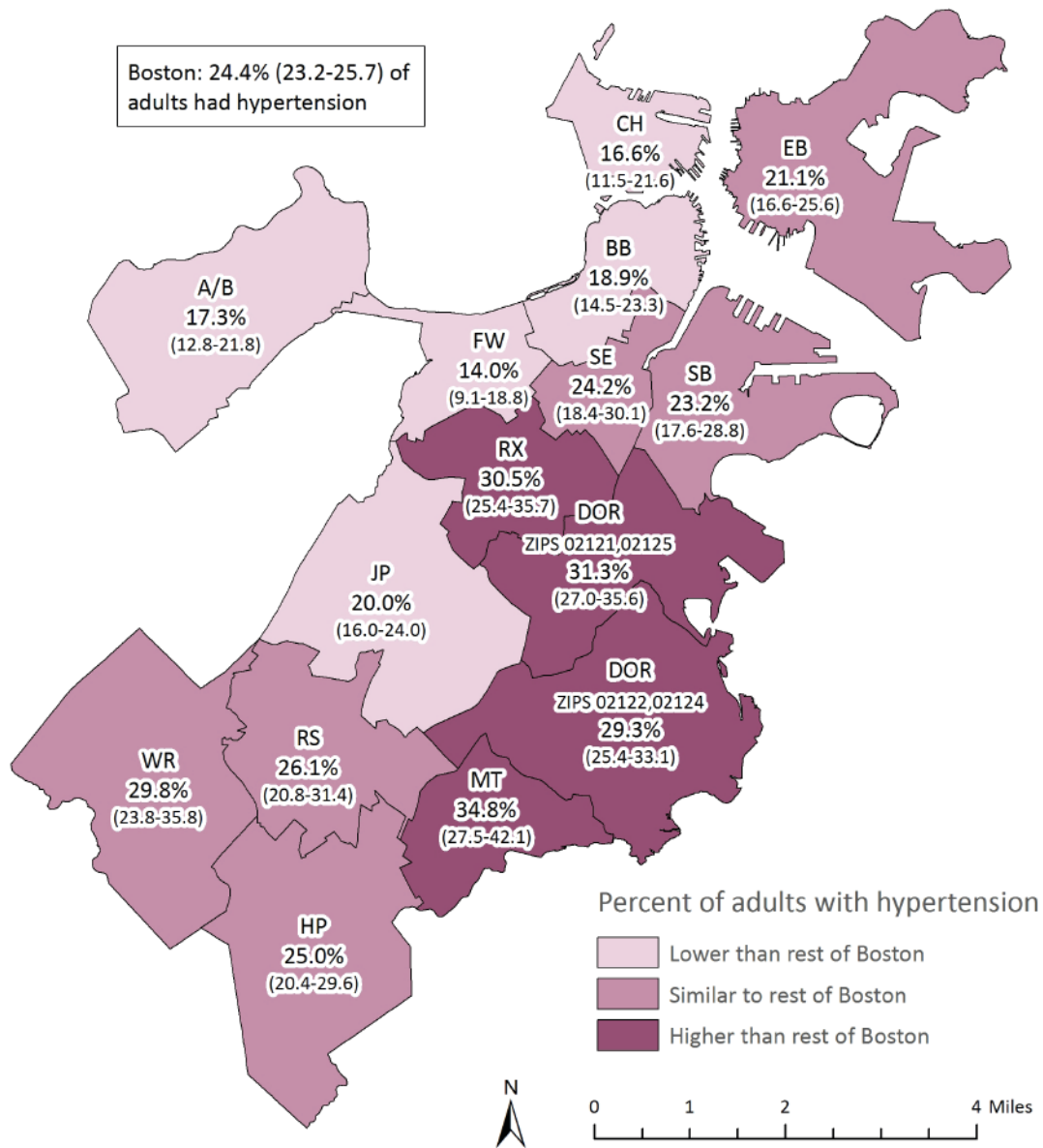
NOTE: Bars with patterns indicate the reference group within each selected indicator.

DATA SOURCE: Boston Behavioral Risk Factor Survey (2013, 2015), Boston Public Health Commission

During 2013 and 2015 combined, a higher percentage of Black (37%) and Latino (29%) female adult residents and a lower percentage of Asian female adults (11%) had hypertension compared with White females (19%). A higher percentage of Black male adults (34%) had hypertension compared with White males (20%).



Figure 8.46 Hypertension Among Adults by Neighborhood, 2013 and 2015 Combined



NOTE: "BB" includes the Back Bay, Beacon Hill, Downtown, the North End, and the West End.  
 "SE" includes the South End and Chinatown.

DATA SOURCE: Boston Behavioral Risk Factor Survey (2013, 2015), Boston Public Health Commission

During 2013 and 2015 combined, the percentage of adult residents with hypertension was lower in Allston/Brighton, Back Bay, Charlestown, Fenway, and Jamaica Plain compared with the rest of Boston. The percentage of adults with hypertension was higher in Dorchester (02121, 02125), Dorchester (02122, 02124), Mattapan, and Roxbury compared with the rest of Boston.

## Overweight and Obesity

### *What is Overweight and Obesity?*

Overweight and obesity are categories of weight based on body mass index (BMI), which is a tool for comparing the weights of people of different heights (29). Obesity and being overweight occur when a person consumes more calories than they use. This surplus of calories leads to excess fat being stored in the body (30). For adults, BMI is calculated using a standard formula that incorporates an individual's height and weight. A BMI between 25.0 and 29.9 is classified as overweight and a BMI of 30 or higher is classified as obese. Being overweight or obese is a risk factor for many chronic diseases including coronary artery disease, type 2 diabetes, hypertension, cancer, sleep apnea and other respiratory problems, and liver and gallbladder disease (29). According to the 2015 BRFSS, approximately 36% and 30% of U.S. adults are overweight and obese, respectively (6).

For children and adolescents (2-19 years), weight categories are determined using an age and sex-specific percentile for BMI. The percentile indicates where the BMI falls relative to children or adolescents of the same sex and age. Youth with a BMI between the 85th and 95th percentile are considered overweight and those at the 95th percentile or higher are considered obese. Findings from the 2015 YRBSS indicates that approximately 14% of U.S. high school students are obese (7).

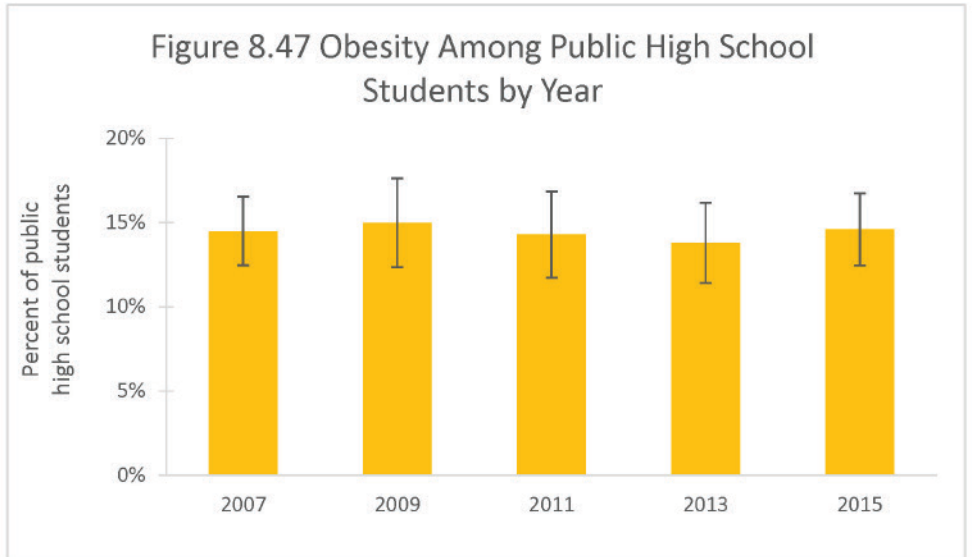
### *Populations at Risk*

Inequities in obesity prevalence are observed in the U.S. adult population across race/ethnicity and socioeconomic status. Findings from the 2011-2012 National Health and Nutrition Examination Survey indicate that among adults 20 years and older, Black and Latino adults had a significantly higher prevalence of obesity compared with White adults and with Asian adults, who had the lowest obesity prevalence (31). The association between obesity and socioeconomic status is more complex. There is no significant relationship observed between obesity and education among men. Among women, however, those with college degrees are less likely to be obese compared with less educated women (32). Many lifestyle factors also play a role including physical inactivity, overeating, sleep deprivation, social influences, and some medications (29). Any environment that makes these factors more difficult to control increases the risk of obesity (33).

### *Prevention*

Adopting health-promoting behaviors that combine regular physical activity and a balanced diet may help maintain or reduce an individual's weight (29). Public systems and policies that address education, income support, transportation, environment, public safety, and housing will also contribute to creating environments that promote healthy behaviors.

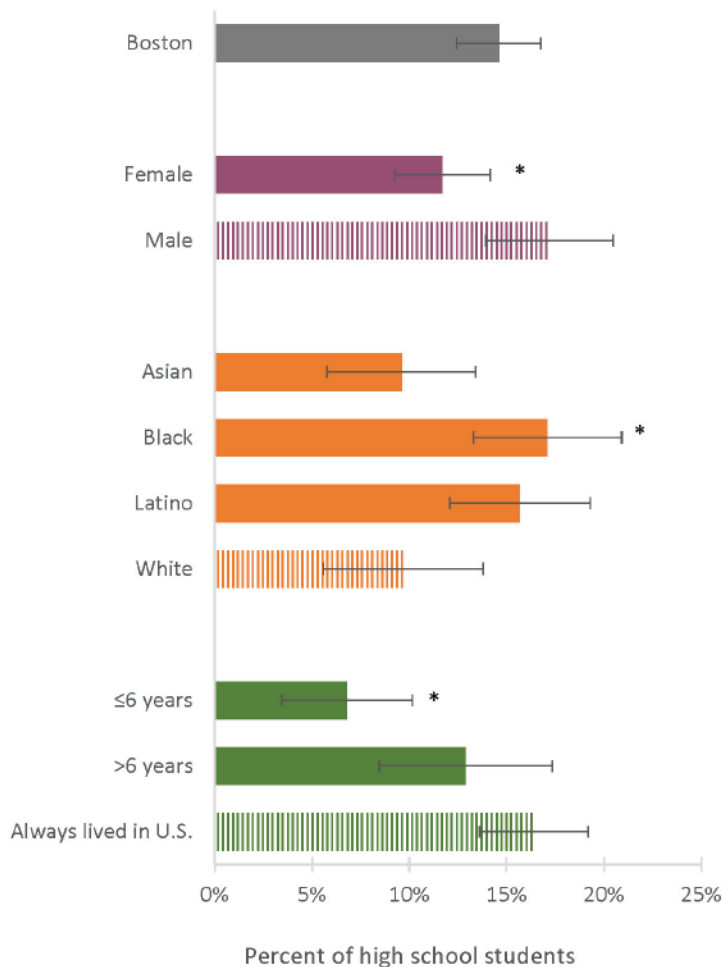
In 2015, 15% of Boston public high school students were obese. There was no significant change in the percentage of students who were obese between 2007 and 2015.



DATA SOURCE: Youth Risk Behavior Survey (2007, 2009, 2011, 2013, 2015), Centers for Disease Control and Prevention and Boston Public Schools



Figure 8.48 Obesity Among Public High School Students by Selected Indicators, 2015



\* Statistically significant difference when compared to reference group

NOTE: Bars with patterns indicate the reference group within each selected indicator.  
 DATA SOURCE: Youth Risk Behavior Survey (2015), Centers for Disease Control and Prevention and Boston Public Schools

In 2015, 15% of Boston public high school students were obese.

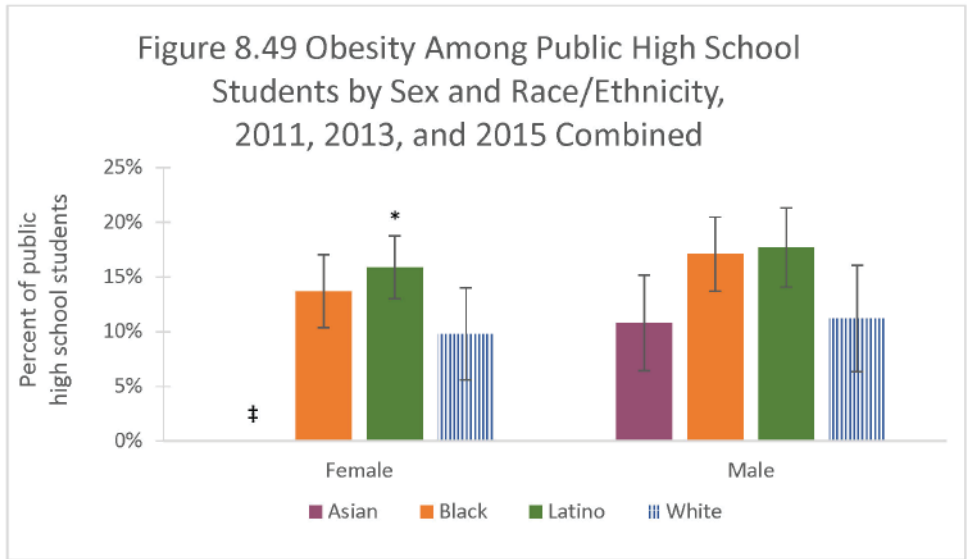
The percentage of obesity was higher for the following groups:

- Black students (17%) compared with White students (10%)

The percentage of obesity was lower for the following groups:

- Females (12%) compared with males (17%)
- Foreign-born students who lived in the United States for six years or fewer (7%) compared with students who have always lived in the United States (16%)

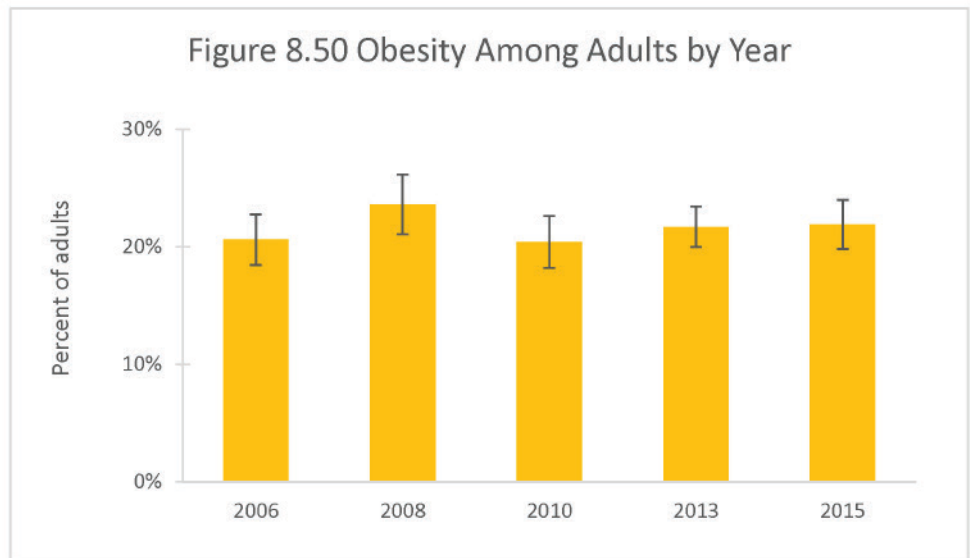
During 2011, 2013, and 2015 combined, a higher percentage of Latina female students (16%) were obese compared with White females (10%). Among male students, there were no significant differences in the percentage of obesity by race/ethnicity.



\* Statistically significant difference when compared to reference group  
 ‡ Data not presented due to insufficient sample size

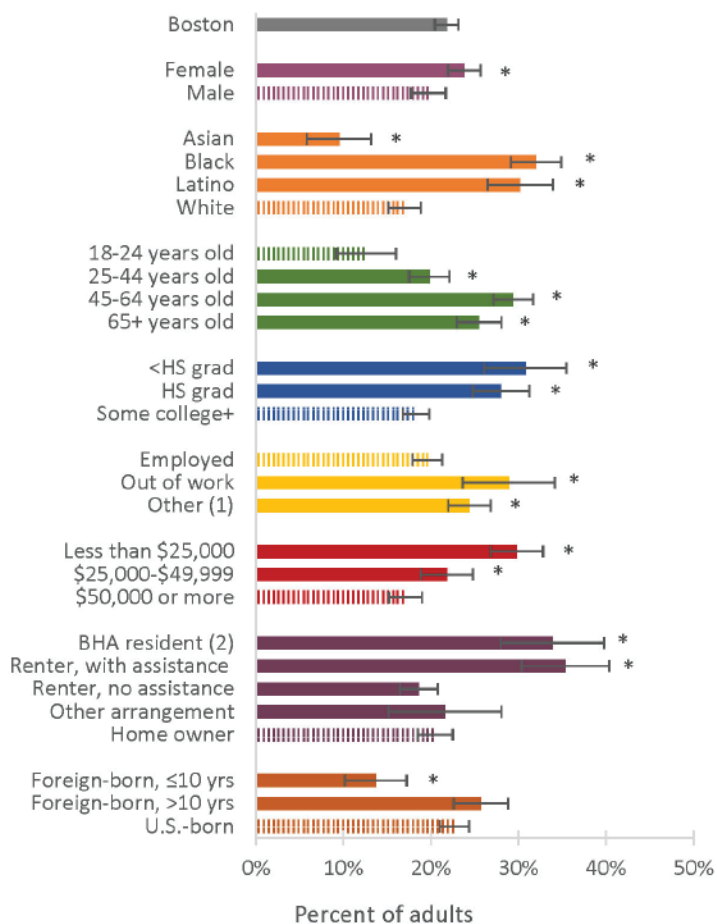
NOTE: Bars with patterns indicate the reference group within each selected indicator.  
 DATA SOURCE: Youth Risk Behavior Survey (2011, 2013, 2015), Centers for Disease Control and Prevention and Boston Public Schools

In 2015, 22% of Boston adult residents were obese. There was no significant change in the percentage of adults who were obese between 2006 and 2015.



DATA SOURCE: Boston Behavioral Risk Factor Survey (2006, 2008, 2010, 2013, 2015), Boston Public Health Commission

Figure 8.51 Obesity Among Adults by Selected Indicators, 2013 and 2015 Combined



\* Statistically significant difference when compared to reference group

(1) Includes homemakers, students, retirees, and those unable to work

(2) Boston Housing Authority resident

NOTE: Bars with patterns indicate the reference group within each selected indicator.

DATA SOURCE: Boston Behavioral Risk Factor Survey (2013, 2015), Boston Public Health Commission

During 2013 and 2015 combined, 22% of Boston adult residents were obese.

The percentage of obesity was higher for the following groups:

- Females (24%) compared with males (20%)
- Black (32%) and Latino (30%) adults compared with White adults (17%)
- Adults ages 25-44 (20%), 45-64 (29%), or 65 and older (26%) compared with adults ages 18-24 (13%)
- Adults with less than a high school diploma (31%) and those with a high school diploma (28%) compared with adults with at least some college education (18%)
- Adults who were out of work (29%) or whose employment status was "other" (24%) compared with adults who were employed (20%)
- Adults living in households with an annual income of less than \$25,000 (30%) or \$25,000-\$49,999 (22%) compared with adults living in households with an annual income of \$50,000 or more (17%)
- Adults who were Boston Housing Authority residents (34%) and those who received rental assistance (35%) compared with adults who owned a home (21%)

The percentage of obesity was lower for the following groups:

- Asian adults (10%) compared with White adults (17%)
- Foreign-born adults who lived in the United States for 10 years or less (14%) compared with adults who were born in the United States (23%)

## Obesity Among Adults

Healthy People 2020 Target: 30.5%

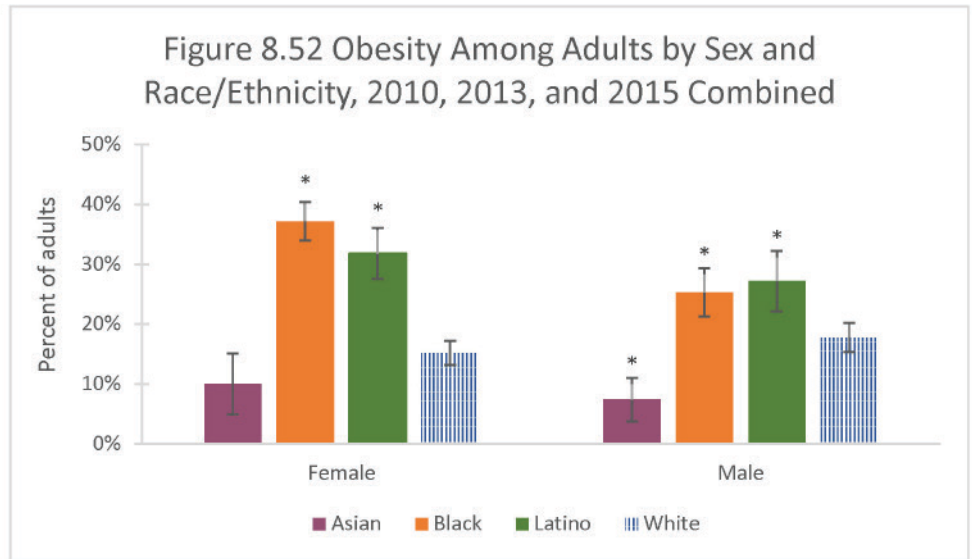
US median 2015: 29.8%

MA 2015: 24.3% (23.0-25.5)

Boston 2015: 21.9% (19.9-24.0)

During 2010, 2013, and 2015 combined, a higher percentage of Black (37%) and Latino (32%) female adult residents were obese compared with White females (15%).

A higher percentage of Black (25%) and Latino (27%) male adult residents and a lower percentage of Asian males (7%) were obese compared with White males (18%).



\* Statistically significant difference when compared to reference group

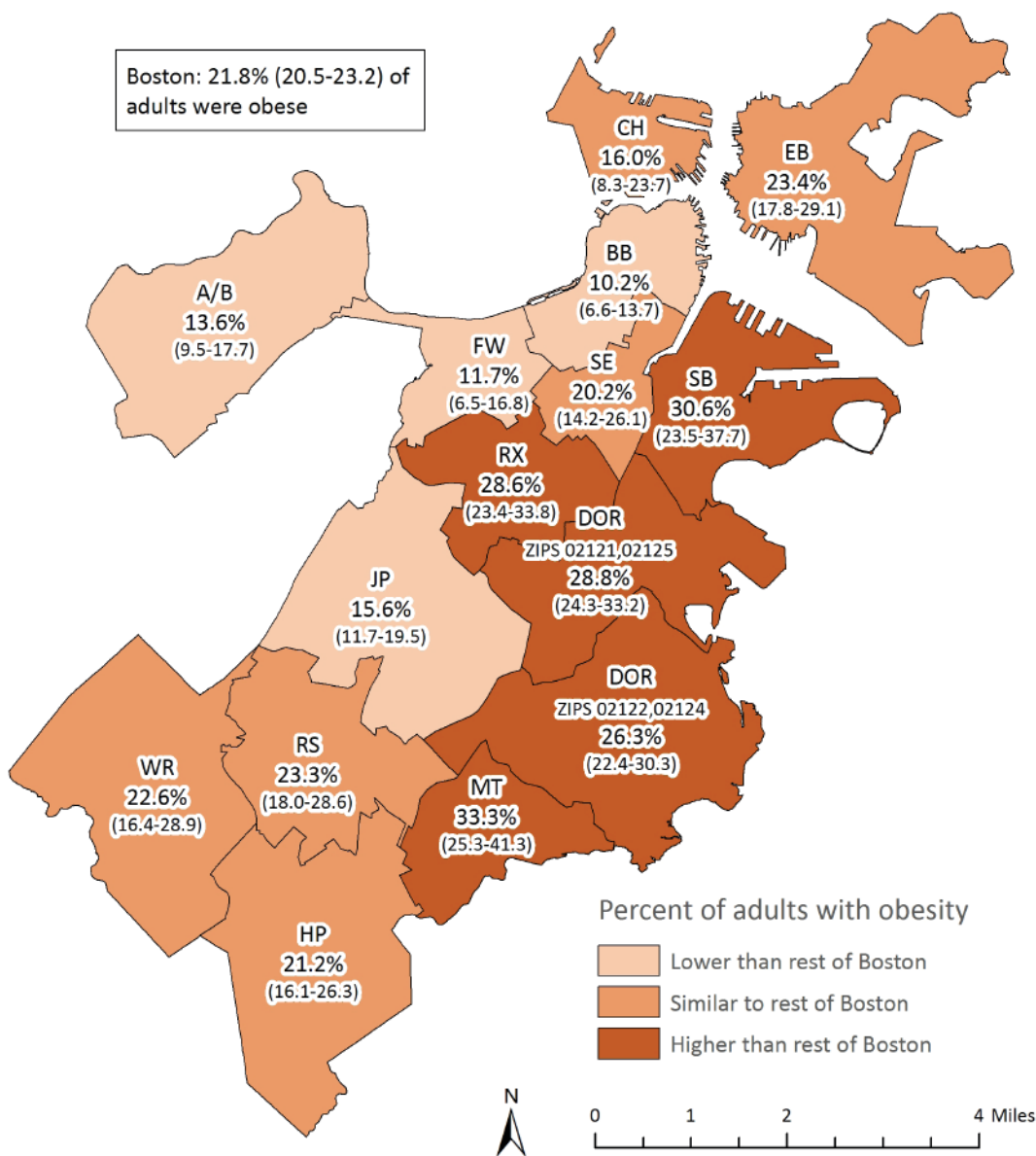
NOTE: Bars with patterns indicate the reference group within each selected indicator.

DATA SOURCE: Boston Behavioral Risk Factor Survey (2010, 2013, 2015), Boston Public Health Commission





Figure 8.53 Obesity Among Adults by Neighborhood, 2013 and 2015 Combined



NOTE: "BB" includes the Back Bay, Beacon Hill, Downtown, the North End, and the West End.  
 "SE" includes the South End and Chinatown.

DATA SOURCE: Boston Behavioral Risk Factor Survey (2013, 2015), Boston Public Health Commission

During 2013 and 2015 combined, a lower percentage of Boston adult residents were obese in Allston/Brighton, Back Bay, Fenway, and Jamaica Plain compared with the rest of Boston. A higher percentage of adults were obese in Dorchester (02121, 02125), Dorchester (02122, 02124), Mattapan, Roxbury, and South Boston compared with the rest of Boston.

## Summary

Black and Latino adults have a higher prevalence of asthma, diabetes, hypertension, and obesity when compared to their White counterparts, and inequities across other social determinants were also observed for these chronic conditions. These conditions tend to disproportionately affect adults with educational attainment less than a high school diploma, who were not employed, with household income less than \$25,000, and who lived in publicly supported housing. At the neighborhood level, elevated percentages or rates for indicators of asthma, diabetes, heart disease, hypertension, and obesity were concentrated in Dorchester (02121, 02125), Dorchester (02122, 02124), Mattapan, and Roxbury.

Although inequities persist across racial/ethnic groups and social determinants, improvements over time were observed for Boston overall for some indicators. The rate of asthma hospitalizations declined by 31% for Boston overall from 2011 to 2015, with corresponding declines of similar magnitude observed for Asian, Black, Latino, and White residents. Similarly, the rate of asthma emergency department visits also declined by 4% from 2011 to 2015 for Boston overall, which may be partially explained by the corresponding 6% decline observed for Black residents. The rate of heart disease hospitalizations declined by 9% for Boston overall from 2011 to 2015. Over the same time period, the rate of heart disease hospitalizations declined by 22%, 8%, and 5% for Latino, Black, and White residents, respectively.

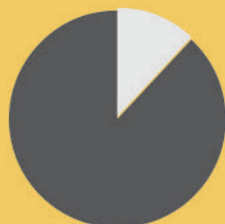
Boston adults also met the Healthy People 2020 goals for hypertension and obesity.

# Chronic Disease

## Chronic conditions among adults in 2015



Asthma  
**12%**



Diabetes  
**8%**



Hypertension  
**25%**



Obesity  
**22%**



## Chronic conditions and Boston neighborhoods

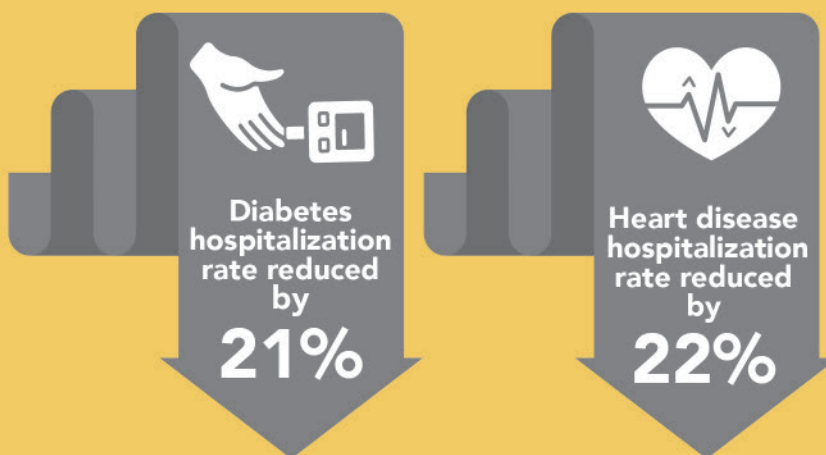


**Dorchester (zipcodes 02121, 02125) and Roxbury had a higher prevalence of asthma<sup>1</sup>, diabetes<sup>1</sup>, hypertension<sup>2</sup>, and obesity<sup>2</sup> than the rest of Boston.**

<sup>1</sup> 2010, 2013, and 2015 combined

<sup>2</sup> 2013 and 2015 combined

## Hospitalization rates decreased among Latino residents from 2011-2015



# Our Point of View: Thoughts from public health

## Coming together to control asthma

By Anjali Nath, MPH  
Director, Asthma Prevention and Control  
Boston Public Health Commission

Asthma is a complicated disease with numerous risk factors that can be challenging to prevent and control. Managing triggers, medications, and communication with medical providers can be confusing but all are important. Exposure to asthma triggers can often be outside the control of the patient – especially if the patient is a child. Pest infestations, tobacco smoke, and mold all contribute to the disease and are known to be more common in low income, urban populations and be a cause for poor asthma control.<sup>1</sup> Research has shown that many of these factors can be modified through the involvement of community health workers (CHWs), who conduct environmental assessments, support remediation efforts, and provide in-home asthma education and problem solving.<sup>2,3</sup> As healthcare transformation continues, incorporating trained CHWs into clinical asthma teams should be considered seriously and adopted.

Boston Public Health Commission (BPHC) has an award-winning, nationally recognized Asthma Program that can help. We offer free home visit services to Boston residents with asthma, in partnership with four Boston hospitals. To best serve Bostonians, we collectively speak seven languages. The Breathe Easy at Home program includes a vital partner – Boston Inspectional Services – which conducts home inspections to help correct poor housing conditions that are covered by the state sanitary code. We have also worked with all the major affordable and public housing providers in Boston to introduce safe pest management and smoke-free housing practices to improve the health of all residents, particularly those with asthma.

In 2014, BPHC received funding from the Massachusetts tax-payer-funded Prevention and Wellness Trust Fund (PWTF) to focus on two priority Boston neighborhoods. BPHC is working with 7 community health centers, 26 Boston Public Schools, and 6 ABCD Head Start child care sites in the neighborhoods of Roxbury and Dorchester (zipcodes 02121, 02125), to strengthen clinical and community linkages and cross-sector collaboration to improve the quality of asthma care.

These are programs that work. While great inequities in asthma outcomes persist, things are moving in the right direction. From 2008 to 2014, Boston saw a statistically significant reduction in emergency department visits for all ages among Black, Latino and White Bostonians.<sup>4</sup> Armed with the right information and a little assistance, people with asthma can lead healthy, active lives.

<sup>1</sup>Phipatanakul, W., et al., Mouse allergen. II. The relationship of mouse allergen exposure to mouse sensitization and asthma morbidity in inner-city children with asthma. *J Allergy Clin Immunol*, 2000. 106(6): p. 1075-80.

<sup>2</sup>Phipatanakul, W., et al., Mouse allergen. II. The relationship of mouse allergen exposure to mouse sensitization and asthma morbidity in inner-city children with asthma. *J Allergy Clin Immunol*, 2000. 106(6): p. 1075-80.

<sup>3</sup>Krieger JK, Takaro TK, Allen C, et al. The Seattle-King County Healthy Homes Project: Implementation of a comprehensive approach to improving indoor environmental quality for low-income children with asthma. *Environmental Health Perspectives*. 2002;110(suppl 2):311-322.  
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<sup>4</sup>Acute Hospital Case Mixes, Massachusetts Center for Health Information and Analysis. Boston Public Health Commission Research and Evaluation Office.

## Our Point of View: Thoughts from a community resident

### Keeping my daughter healthy and active

By Nilda

Nilda is raising her four children in Boston

My seven-year old-daughter, Kailisa, loves to dance and hopes to be a cheerleader. Before she does any activity, she takes a couple of puffs on her albuterol inhaler, to keep the tubes in her lungs open. My other three children have asthma, but Kailisa's asthma is so frightening. She has been in the critical care unit five times because of her asthma. The good news is she hasn't had one of these serious episodes in a long time and she isn't missing as much school anymore.

Kailisa has an asthma nurse at her health center and sees a pulmonologist at her hospital. Both her pulmonologist and nurse taught us what we need to do to keep her asthma under control. We have an asthma action plan that tells us which medications to take every day – whether her asthma is good or whether it is getting worse. It also helps us know what to do when she is going to be active or if she is having an emergency. Her school has a copy as well. Everything I have learned about asthma for Kailisa helps me to manage my other children's asthma better too.

In addition to the health care services Kailisa gets, we got a referral to Boston Breathe Easy at Home through the Boston Public Health Commission. Inspectors from Boston Inspectional Services Department come to the home and inspect for housing issues that make asthma worse. If they find them, the landlord needs to make repairs. We had mold, but the mold problem got resolved. This improved the housing for all of us, not only Kailisa.

All of this coordination around asthma is being supported by a grant called the Prevention and Wellness Trust Fund. In Boston, with the grant, they are working on improving communication and coordination between schools, health centers, hospitals, housing, and community services for children with asthma. For Kailisa and my whole family – it is definitely working!

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# Chapter 9

## Cancer





# Cancer

Cancer is a disease in which normal, healthy cells are damaged or changed, and begin to multiply abnormally. Since 1998, the overall incidence of cancer has slowly declined and stabilized in the United States (1), but some types have been more difficult to control than others. Cancer was the second leading cause of death in the U.S. in 2014, when the age-adjusted mortality rate attributable to cancer was 161.2 per 100,000 population (2). Nationally, the leading types of cancer deaths in 2015 were lung and bronchus, prostate in men, breast in women, colon and rectum, pancreas, and liver and intrahepatic bile duct in men, ovary in women (3).

Inequities by race and ethnicity are observed for some types of cancer. For example, although the risk of getting breast cancer is comparable between Black and White women, in 2014 Black women died of breast cancer at a higher rate (28.1 per 100,000 women) than White women (20.1) (2). In the past, studies have identified inequities in the utilization of mammography screening between Black and White women, which coincided with the difference in the breast cancer mortality rate between Black and White women (2, 4, 5). The mammography screening rates are now similar between Black and White women, but the inequity in the breast cancer mortality rate remains. Inequities by education and income are found for breast cancer screening. U.S. women ages 40 and older reporting lower educational attainment or lower household income are less likely to have received a mammogram (2, 6). Similar inequities across education and income are found for colorectal cancer screening among U.S. men 50 years and older (7).

## Risk factors and prevention

Some risk factors are out of our control, like family history or age. However, many causes of cancer have been identified, and about a third of cancer cases can be prevented (8). Tobacco use and exposure to cigarette smoke causes about 22% of cancers every year (8). Alcohol consumption is another risk factor. Both alcohol use and smoking damage DNA and block the use of many protective antioxidants and vitamins (9, 10). There are a host of other things that encourage cancer formation, including some environmental chemicals and toxins, excessive sunlight or use of tanning beds, ionizing radiation, some viruses and bacteria, and certain hormones (11).

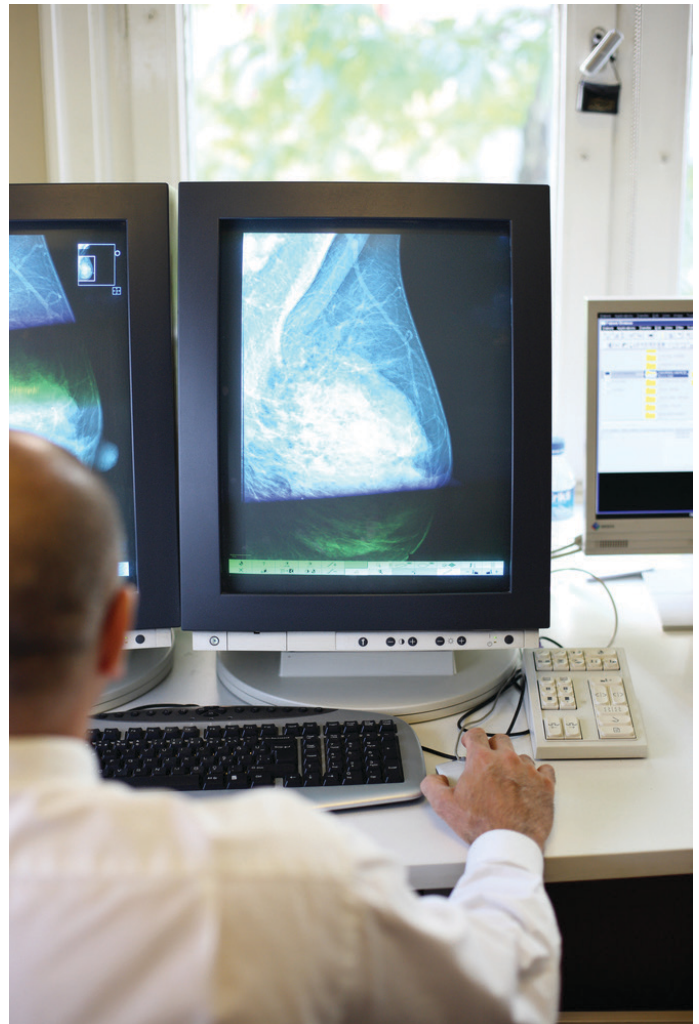
Fortunately, the factors that improve health overall also help prevent cancer. Daily physical activity, regular intake of fruits and vegetables, and a healthy weight diminish risk for some of the most common cancers (12).

## Early detection

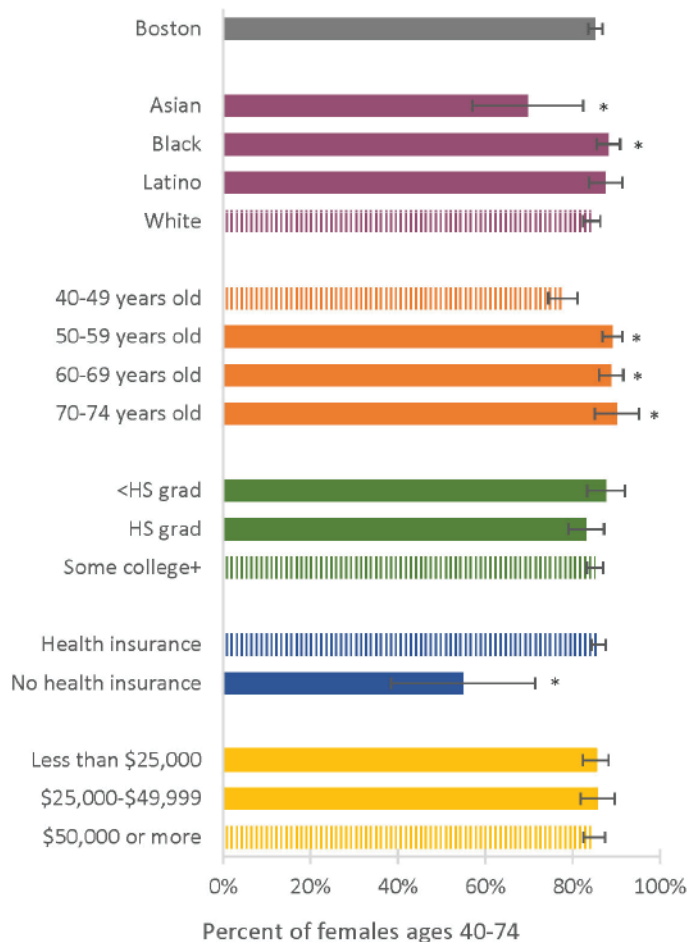
Cancer screening is at the center of the fight against cancer. For many cancers, early detection increases the person's survival rate. Early detection has been especially successful with detecting breast, cervix, rectum and colon cancer, and consistent screening has contributed significantly to the decrease in cancer rates over the past twenty years (13).

For those who are at the highest risk of developing cancer, evidence-based guidelines have been developed to ensure that any abnormal cells are caught early. There are well-established recommendations for breast, cervix, and colon cancer screening, and within the past 4 years, new lung cancer screening guidelines have been released: those with a history of smoking are encouraged to be screened for lung cancer up to 15 years after they quit smoking.

The percent of U.S. adults that report screening for breast, cervix, and colon cancer from recent years suggests that there is room for improvement. According to the 2014 Behavioral Risk Factor Surveillance System (14), 75% of all U.S. adult women reported having a pap test in the last 3 years, and 73% of women ages 40 and older reported having a mammogram within the past two years. Further, only 69% of U.S. adults ages 50 and older reported ever having a sigmoidoscopy or colonoscopy (14). Although screening methods are not perfect, knowing your risk for developing cancer will help you and your doctor determine whether screening is right for you.



**Figure 9.1 Mammogram in the Past 2 Years by Selected Indicators, 2010, 2013, and 2015 Combined**



\* Statistically significant difference when compared to reference group

NOTE: Bars with patterns indicate the comparison group within each selected indicator.

DATA SOURCE: Boston Behavioral Risk Factor Survey (2010, 2013, 2015), Boston Public Health Commission

During the combined years of 2010, 2013, and 2015, 85% of Boston female residents ages 40-74 responded having had a mammogram within the past 2 years.

The percentage was higher for the following groups:

- Black females (88%) compared with White females (84%)
- Females ages 50-59 (89%), 60-69 (89%), or 70-74 (90%) compared with females ages 40-49 (78%)

Having had a mammogram within the past 2 years was lower for the following groups:

- Asian females (70%) compared with White females (84%)
- Females with no health insurance (55%) compared with those who had health insurance (86%)

### Breast Cancer Screening

Healthy People 2020 Target: 81.1%

U.S. median 2014: 73.0%

MA 2014: 82.1% (80.6-83.6)

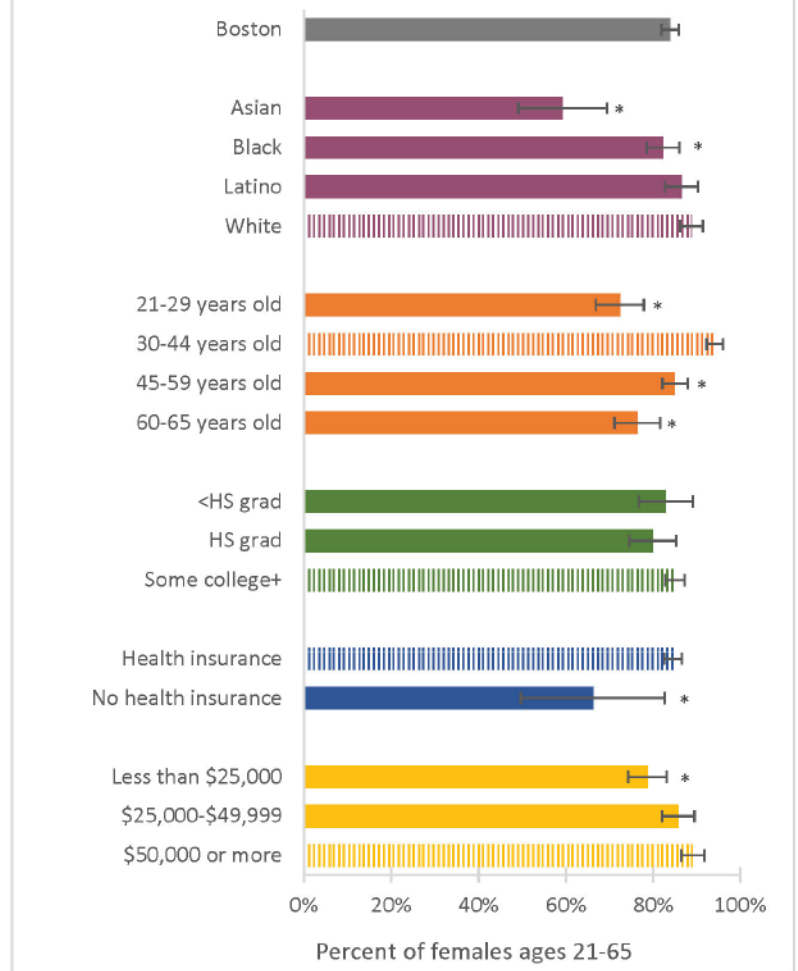
Boston 2015: 85.2% (83.6-86.8)

During 2013 and 2015 combined, 84% of Boston female residents ages 21-65 responded having had a pap test within the past 3 years.

The percentage was lower for the following groups:

- Asian females (59%) and Black females (82%) compared with White females (89%)
- Females ages 21-29 (72%), 45-59 (85%), or 60-65 (76%) compared with females ages 30-44 (94%)
- Females with no health insurance (66%) compared with those who had health insurance (85%)
- Females with an annual household income of less than \$25,000 (79%) compared with those with a household income of \$50,000 or more (89%)

Figure 9.2 Pap Test in the Past 3 Years by Selected Indicators, 2013 and 2015 Combined



\* Statistically significant difference when compared to reference group

NOTE: Bars with patterns indicate the comparison group within each selected indicator.

DATA SOURCE: Boston Behavioral Risk Factor Survey (2013, 2015), Boston Public Health Commission

### Cervical Cancer Screening

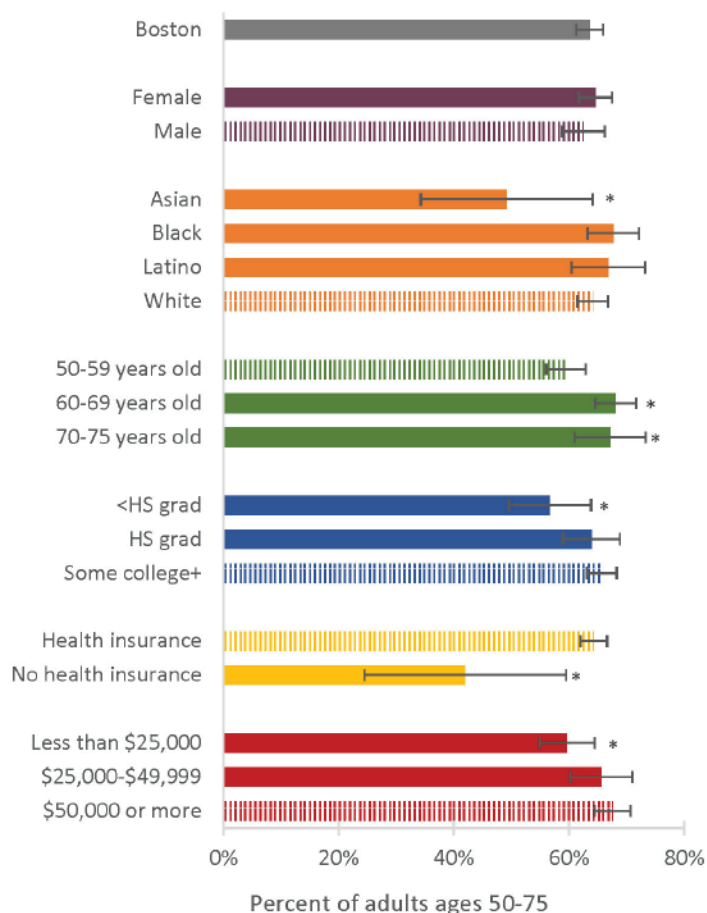
Healthy People 2020 Target: 93.0%

U.S. median 2014: 82.6%

MA 2014: 88.0% (86.5-89.6)

Boston 2015: 83.9% (81.9-85.9)

**Figure 9.3 Sigmoidoscopy or Colonoscopy in the Past 5 Years by Selected Indicators, 2013 and 2015 Combined**



\* Statistically significant difference when compared to reference group

NOTE: Bars with patterns indicate the comparison group within each selected indicator.

DATA SOURCE: Boston Behavioral Risk Factor Survey (2013, 2015), Boston Public Health Commission

During 2013 and 2015 combined, 64% of Boston residents ages 50-75 reported having had a sigmoidoscopy or colonoscopy in the past 5 years. The percentage was higher for the following groups:

- Adults ages 60-69 (68%) or 70-75 (67%) compared with adults ages 50-59 (60%)

Having had a sigmoidoscopy or colonoscopy in the past 5 years was lower for the following groups:

- Asian adults (49%) compared with White adults (64%)
- Adults with less than a high school diploma (57%) compared with adults who completed at least some college (66%).
- Adults with no health insurance (42%) compared with those who had health insurance (64%)
- Adults with an annual household income of less than \$25,000 (60%) compared with those with an annual household income of \$50,000 or more (68%)

### Colon Cancer Screening

Healthy People 2020 Target: 70.5%

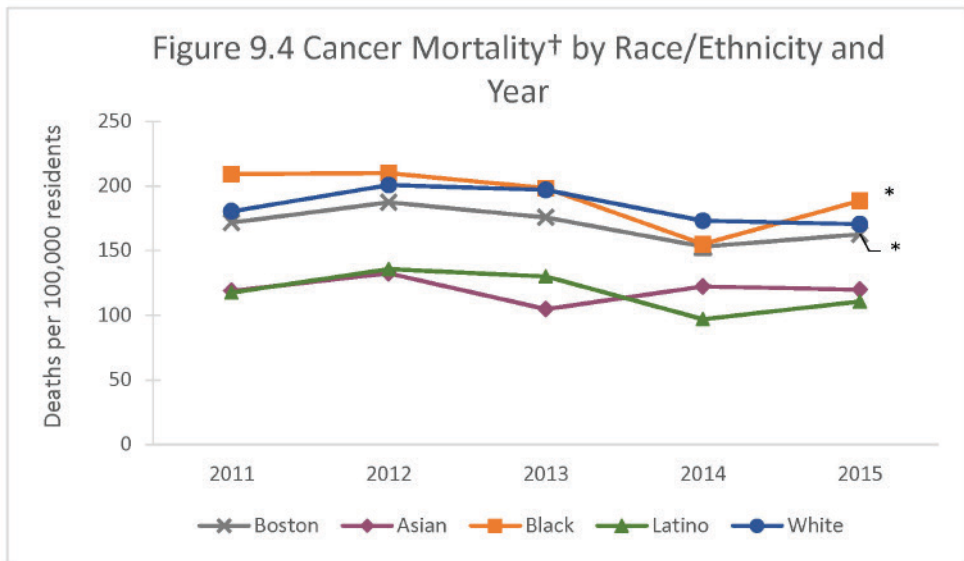
U.S. median 2014: 66.6%

MA 2014: 76.5% (75.0-78.1)

Boston 2015: 63.6% (61.3-65.9)

In 2015, the cancer mortality rate for Boston residents was 162.6 deaths per 100,000 residents. From 2011 to 2015, the rate decreased by 12% among Boston residents overall and by 18% among Black residents.

Compared with White residents (170.5), the cancer mortality rate was 30% lower for Asian residents (119.9) and 35% lower for Latino residents (110.6) in 2015.

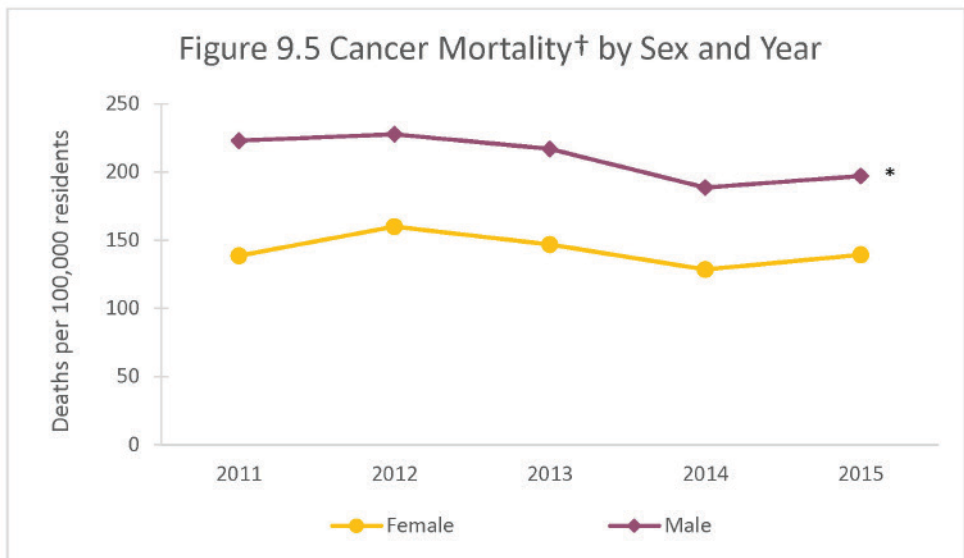


\* Statistically significant change over time  
 † Age-adjusted rates per 100,000 residents

NOTE: Beginning in October 2014, the method for collecting race/ethnicity for mortality data changed. Interpret trends with caution.  
 DATA SOURCE: Boston resident deaths, Massachusetts Department of Public Health (data as of December 2016). Data may be updated as more information becomes available.

From 2011 to 2015, the cancer mortality rate decreased by 16% for male residents. There was no change in the rate for female residents over the same time period.

In 2015, the cancer mortality rate for females (139.3 deaths per 100,000 residents) was 29% lower than the rate for males (197.0).



\* Statistically significant change over time  
 † Age-adjusted rates per 100,000 residents

DATA SOURCE: Boston resident deaths, Massachusetts Department of Public Health (data as of December 2016). Data may be updated as more information becomes available.

### Cancer Mortality

Healthy People 2020 Target: 161.4 deaths per 100,000 population

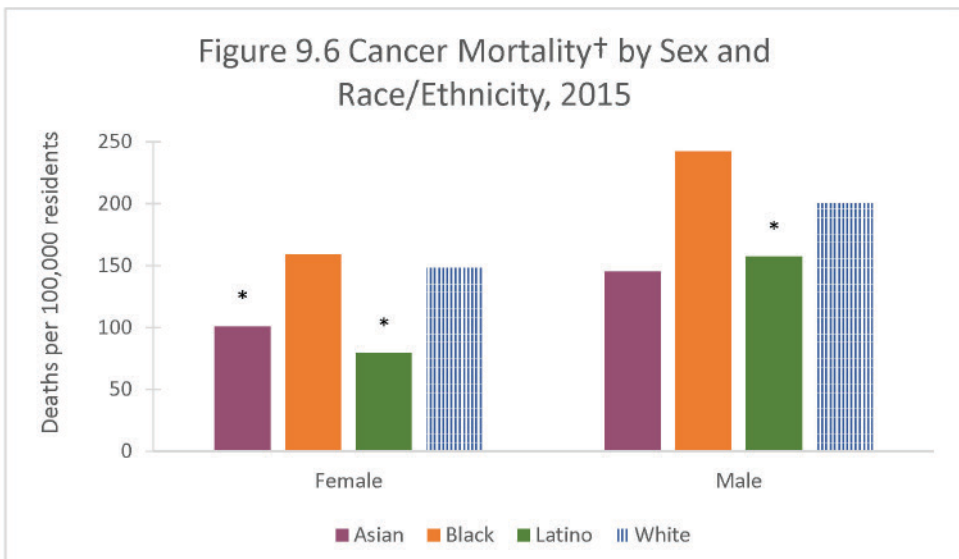
U.S. 2015: 158.5

MA 2015: 152.9

Boston 2015: 162.6



Figure 9.6 Cancer Mortality† by Sex and Race/Ethnicity, 2015



In 2015, the cancer mortality rate was 32% lower for Asian females (101.2 deaths per 100,000 residents) and 47% lower for Latino females (79.3) compared with White females (148.3).

The rate for Latino males (157.2) was 22% lower than the rate for White males (200.4).

\* Statistically significant difference when compared to reference group

† Age-adjusted rates per 100,000 residents

NOTE: Bars with patterns indicate the reference group within each selected indicator.

DATA SOURCE: Boston resident deaths, Massachusetts Department of Public Health (data as of December 2016). Data may be updated as more information becomes available.

Figure 9.7 Leading Types of Cancer Mortality† by Year

Rank	2011	2012	2013	2014	2015
1	Lung 214 (42.1)	Lung 238 (45.3)	Lung 219 (42.0)	Lung 219 (41.5)	Lung 199 (36.2)
2	Colon/rectum 82 (15.4)	Colon/rectum 91 (16.8)	Colon/rectum 91 (16.7)	Colon/rectum 67 (12.5)	Colon/rectum 74 (13.3)
3	Pancreas 55 (9.8)	Pancreas 69 (13.2)	Pancreas 71 (13.1)	Female breast 52 (16.8)	Female breast 61 (18.9)
4	Female breast 54 (17.7)	Prostate 56 (27.6)	Liver 63 (11.2)	Pancreas 47 (8.6)	Pancreas 59 (11.0)
5	Prostate 49 (24.9)	Female breast 52 (17.7)	Female breast 59 (18.4)	Liver 43 (7.7)	Liver 53 (9.4)

Cancer type, count  
(rate per 100,000 residents)

From 2011 to 2015, lung cancer was the most common cause of cancer mortality in Boston. The next most common cause of cancer death was colorectal cancer.

† Age-adjusted rates per 100,000 residents

NOTE: Rank is based on number of deaths. Both counts and rates are presented.

DATA SOURCE: Boston resident deaths, Massachusetts Department of Public Health (data as of December 2016). Data may be updated as more information becomes available

### Lung Cancer Mortality

Healthy People 2020 Target: 45.5 deaths per 100,000 population

U.S. 2015: 40.5

MA 2015: 38.9

Boston 2015: 36.2

Figure 9.8a Leading Types of Cancer Mortality† by Year Asian Residents

Rank	2011	2012	2013	2014	2015
1	Lung 11 (24.3) §	Lung 20 (42.3) §	Lung 12 (24.5) §	Lung 21 (40.8)	Lung 22 (41.6)
2	Pancreas 7 (15.6) §	Colon/rectum 11 (22.4) §	Liver 9 (17.6) §	Liver 11 (21.0) §	Pancreas 5 (9.8) §
3	Liver 6 (13.0) §	Liver 9 (18.3) §	Female Breast 5 (18.5) §	Colon/rectum 5 (15.1) §	Liver 5 (9.4) §
4	Colon/rectum 5 (10.7) §	‡	Colon/rectum 5 (10.6) §	‡	Stomach 5 (9.3) §
5	‡	‡	Pancreas 5 (9.7) §	‡	‡
Cancer type, count (rate per 100,000 residents)					

From 2011 to 2015, lung cancer was the most common cause of cancer mortality in Boston for Asian, Black, Latino, and White residents. Colorectal cancer was the second most common cause of cancer mortality for White residents. The second most common cause of cancer mortality varied over time for Asian, Black, and Latino residents.

Figure 9.8b Leading Types of Cancer Mortality† by Year Black Residents

Rank	2011	2012	2013	2014	2015
1	Lung 59 (48.9)	Lung 51 (37.8)	Lung 57 (46.7)	Lung 48 (33.6)	Lung 48 (33.6)
2	Colon/rectum 36 (29.5)	Prostate 25 (59.2)	Colon/rectum 24 (19.1)	Colon/rectum 21 (15.1)	Female Breast 24 (29.5)
3	Female Breast 23 (29.1)	Colon/rectum 21 (16.7)	Pancreas 23 (18.2)	Prostate 20 (45.6) §	Colon/rectum 23 (16.4)
4	Prostate 19 (52.3) §	Liver 20 (13.5) §	Prostate 20 (51.2) §	Uterine 11 (12.5) §	Prostate 21 (45.5)
5	Pancreas 15 (11.5) §	Pancreas 17 (14.4) §	Liver 18 (11.2) §	Female Breast 10 (13.4) §	Liver 20 (13.4) §
Cancer type, count (rate per 100,000 residents)					

† Age-adjusted rates per 100,000 residents  
 ‡ Rates not presented due to a small number of cases  
 § Rates based on 20 or fewer cases should be interpreted with caution.

NOTE: Rank is based on number of deaths. Both counts and rates are presented. Beginning in October 2014, the method for collecting race/ethnicity for mortality data changed. Interpret with caution.  
 DATA SOURCE: Boston resident deaths, Massachusetts Department of Public Health (data as of December 2016). Data may be updated as more information becomes available.

### Colon/Rectum Cancer Mortality

Healthy People 2020 Target: 14.5 deaths per 100,000 population

U.S. 2015: 14.3

MA 2015: 12.0

Boston 2015: 13.3

Figure 9.8c Leading Types of Cancer Mortality† by Year  
Latino Residents

Rank	2011	2012	2013	2014	2015
1	Lung 11 (19.9) §	Lung 14 (22.2) §	Lung 11 (23.2) §	Lung 9 (16.2) §	Lung 13 (19.0) §
2	Colon/rectum 6 (14.2) §	Pancreas 7 (13.3) §	Colon/rectum 11 (18.0) §	Stomach 5 (8.2) §	Pancreas 7 (8.7) §
3	Prostate 5 (23.7) §	Colon/rectum 7 (12.8) §	Liver 9 (15.2) §	‡	Liver 6 (11.1) §
4	Liver 5 (7.9) §	Stomach 7 (8.3) §	Stomach 6 (9.7) §	‡	Kidney 6 (7.3) §
5	Leukemia 5 (7.3) §	Non-Hodgkin lymphoma 6 (10.2) §	Pancreas 5 (5.2) §	‡	‡

Cancer type, count  
(rate per 100,000 residents)

Figure 9.8d Leading Types of Cancer Mortality† by Year  
White Residents

Rank	2011	2012	2013	2014	2015
1	Lung 132 (47.8)	Lung 152 (54.3)	Lung 139 (51.3)	Lung 138 (52.1)	Lung 113 (41.8)
2	Colon/rectum 35 (11.8)	Colon/rectum 51 (16.9)	Colon/rectum 48 (16.6)	Colon/rectum 36 (13.3)	Colon/rectum 42 (14.4)
3	Female Breast 29 (18.0)	Pancreas 42 (14.9)	Pancreas 38 (13.5)	Female Breast 33 (22.0)	Pancreas 31 (11.6)
4	Pancreas 29 (9.5)	Female Breast 35 (22.3)	Female Breast 35 (21.1)	Pancreas 28 (10.0)	Female Breast 28 (16.1)
5	Liver 25 (9.0)	Prostate 23 (20.1)	Liver 27 (9.3)	Liver 22 (7.7)	Prostate 24 (20.3)

Cancer type, count  
(rate per 100,000 residents)

† Age-adjusted rates per 100,000 residents

‡ Rates not presented due to a small number of cases

§ Rates based on 20 or fewer cases should be interpreted with caution.

NOTE: Rank is based on number of deaths. Both counts and rates are presented. Beginning in October 2014, the method for collecting race/ethnicity for mortality data changed. Interpret with caution.

DATA SOURCE: Boston resident deaths, Massachusetts Department of Public Health (data as of December 2016). Data may be updated as more information becomes available.

## Female Breast Cancer Mortality

Healthy People 2020 Target: 20.7 deaths per 100,000 population

U.S. 2015: 20.3

MA 2015: 17.7

Boston 2015: 18.9





Lung cancer was the leading type of cancer mortality among both female and male Boston residents from 2011 to 2015. For females, breast cancer was the second leading type of cancer mortality and for males, prostate cancer was the second leading type of cancer mortality.

Figure 9.9a Leading Types of Cancer Mortality† by Year  
Female Residents

Rank	2011	2012	2013	2014	2015
1	Lung 90 (30.1)	Lung 126 (41.7)	Lung 99 (32.7)	Lung 99 (32.8)	Lung 93 (29.2)
2	Female breast 54 (17.7)	Female breast 52 (17.7)	Female breast 59 (18.4)	Female breast 52 (16.8)	Female breast 61 (18.9)
3	Colon/rectum 45 (14.0)	Colon/rectum 51 (16.0)	Colon/rectum 52 (15.9)	Colon/rectum 31 (9.5)	Pancreas 31 (10.0)
4	Pancreas 31 (9.1)	Pancreas 42 (13.4)	Pancreas 29 (9.1)	Uterine 27 (8.2)	Colon/rectum 31 (9.5)
5	Uterine 22 (7.2)	Ovary 25 (8.2)	Ovary 25 (7.9)	Pancreas 26 (8.6)	Ovary 23 (7.5)

Cancer type, count  
(rate per 100,000 residents)

Figure 9.9b Leading Types of Cancer Mortality† by Year  
Male Residents

Rank	2011	2012	2013	2014	2015
1	Lung 124 (58.1)	Lung 112 (50.3)	Lung 120 (54.5)	Lung 120 (53.3)	Lung 106 (46.6)
2	Prostate 49 (24.9)	Prostate 56 (27.6)	Prostate 49 (24.2)	Prostate 42 (20.2)	Prostate 49 (23.7)
3	Colon/rectum 37 (17.8)	Colon/rectum 40 (18.3)	Liver 43 (17.0)	Colon/rectum 36 (16.0)	Colon/rectum 43 (17.7)
4	Liver 31 (13.6)	Liver 40 (16.1)	Pancreas 42 (18.7)	Liver 30 (11.6)	Liver 42 (17.1)
5	Pancreas 24 (10.2)	Esophagus 28 (12.5)	Colon/rectum 39 (17.1)	Pancreas 21 (9.5)	Pancreas 28 (12.0)

Cancer type, count  
(rate per 100,000 residents)

† Age-adjusted rates per 100,000 residents

NOTE: Rank is based on number of deaths. Both counts and rates are presented.  
DATA SOURCE: Boston resident deaths, Massachusetts Department of Public Health (data as of December 2016). Data may be updated as more information becomes available.

Figure 9.10a Leading Types of Cancer Mortality† 2011-2015  
Female Residents by Race/Ethnicity

Rank	Asian	Black	Latino	White
1	Lung 30 (22.0)	Lung 123 (30.6)	Colon/rectum 17 (9.3) §	Lung 333 (43.5)
2	Colon/rectum 14 (10.1) §	Female breast 88 (22.8)	Lung 16 (10.9) §	Female breast 160 (19.9)
3	Pancreas 12 (9.0) §	Colon/rectum 69 (17.6)	Female breast 13 (6.4) §	Colon/rectum 106 (12.1)
4	Female breast 11 (8.1) §	Pancreas 48 (12.0)	Pancreas 12 (6.0) §	Pancreas 85 (10.7)
5	Liver 10 (7.3) §	Uterine 46 (11.3)	Non-Hodgkin lymphoma 10 (6.7) §	Ovary 66 (8.8)

Cancer type, count  
(rate per 100,000 residents)

For 2011-2015, lung cancer was the most common cause of cancer mortality for male and female residents of all racial/ethnic groups except for Latino female residents.

Figure 9.10b Leading Types of Cancer Mortality† 2011-2015  
Male Residents by Race/Ethnicity

Rank	Asian	Black	Latino	White
1	Lung 56 (51.8)	Lung 140 (55.7)	Lung 42 (32.6)	Lung 340 (57.0)
2	Liver 30 (26.5)	Prostate 105 (50.5)	Prostate 21 (23.0)	Prostate 113 (19.4)
3	Colon/rectum 16 (14.6) §	Liver 59 (18.3)	Colon/rectum 15 (13.5) §	Colon/rectum 106 (17.7)
4	Pancreas 10 (9.2) §	Colon/rectum 56 (20.9)	Liver 15 (12.6) §	Pancreas 83 (13.4)
5	Stomach 8 (6.9) §	Pancreas 33 (12.6)	Pancreas 15 (12.0) §	Liver 79 (12.4)

Cancer type, count  
(rate per 100,000 residents)

† 5-year average annual age-adjusted rates per 100,000 residents  
§ Rates based on 20 or fewer cases should be interpreted with caution.

NOTE: Rank is based on number of deaths. Both counts and rates are presented.  
DATA SOURCE: Boston resident deaths, Massachusetts Department of Public Health (data as of December 2016). Data may be updated as more information becomes available.



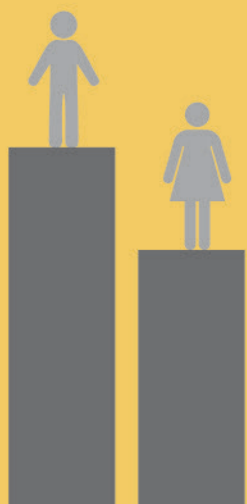
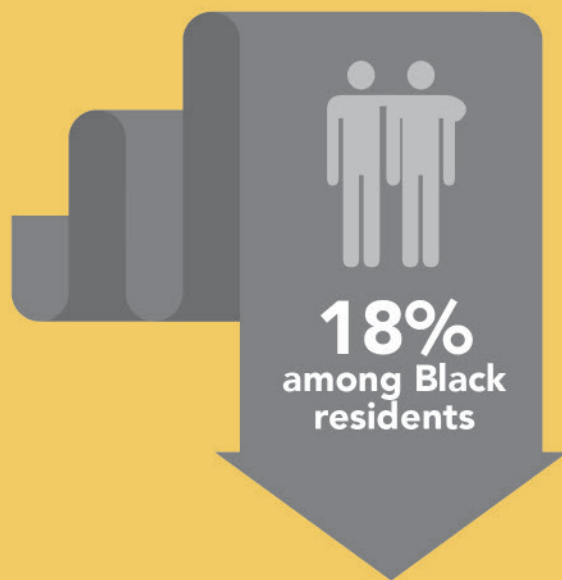
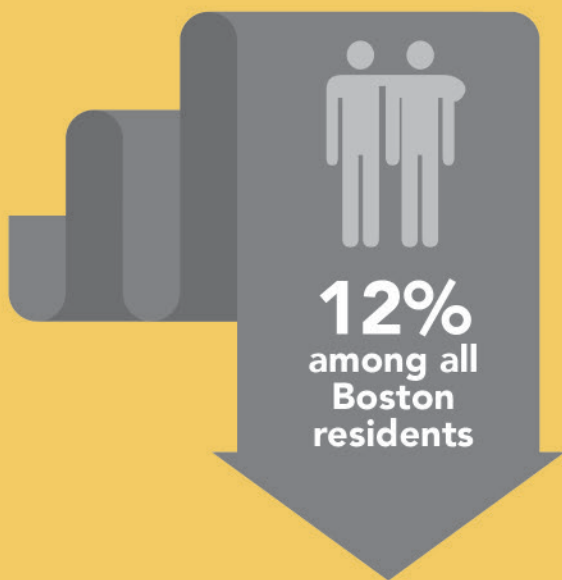
## Summary

Overall, the cancer death rate decreased by approximately 12% from 2011 to 2015, more so among Black residents. The five leading types of cancer deaths among Boston residents were generally consistent with what is observed for the U.S. overall, with lung cancer as the top cause. Some patterns emerge for lung cancer mortality rates across sex and race/ethnicity. Lung cancer mortality rates are generally higher in men than women. Across race/ethnicity, rates were generally lowest among Latinos.

Boston is doing well in meeting many of the Healthy People 2020 goals – including for breast cancer screening and mortality, lung cancer mortality and colorectal cancer mortality. Healthy People 2020 targets are still unmet for cervical and colon cancer screening. Inequities across age, race/ethnicity, insurance coverage, and income were also found for breast, cervical, and colon cancer screening tests. For breast, cervical, and colon cancer screening, inequities tend to disproportionately affect Asian adults as well as adults with no insurance coverage. Adults with household income less than \$25,000 were also less likely to report cervical and colon cancer screening. Across age categories, younger adults in the target population were less likely to report screening for breast (ages 40-49), cervical (ages 21-29), and colon cancer (ages 50-59).

# Cancer

From 2011-2015, the cancer mortality rate decreased



In 2015, the cancer mortality rate for females was **29%** lower than the rate for males.

In 2015, **85%** of women ages 40 years and older reported having a mammogram in the past two years.



# Our Point of View: Thoughts from public health

## Continuing the search to identify men at high risk for prostate cancer

By Mark W. Kennedy, MBA

Senior Program Manager, Chronic Disease Prevention and Control Division  
Boston Public Health Commission

Prostate cancer is one of the most confusing areas of clinical management in modern medicine. In 2012, the U.S. Preventive Services Task Force (USPSTF) recommended against the use of the prostate-specific antigen test, or the PSA test, for the early detection of prostate cancer in healthy men, regardless of age or risk. The PSA test is a blood test primarily used to screen for prostate cancer. In April 2017, after continued review of the research, the USPSTF revised its recommendation. This "C recommendation" (recommendations are graded based on strength of evidence) supports the use of PSA testing in healthy men 55-69 years of age, when accompanied by a discussion with a physician about the harms and benefits of screening [1]. This change from a previously issued D recommendation paves the way for a population health approach that will be more inclusive for high risk men.

According to the Boston Public Health Commission, prostate cancer is still very common in Boston, and among Black men, prostate cancer deaths are over 2 times that of White men. The racial inequity for Black men in Boston is the largest for any major cancer. In the United States, 1 in 23 Black men with prostate cancer will die from the disease compared to 1 in 42 White men.

The shift toward equity has begun with the new draft recommendation. It continues by acknowledging that the PSA test is not best used as a diagnostic tool. Instead, measuring PSA levels in the blood is strongly prognostic of the long-term risk of aggressive disease [2]. Getting a man's baseline PSA is a better predictor of risk than just looking at ethnicity or family history [3]. Those established considerations of risk should inform the decision to be screened, but baseline PSA is an important clinical tool that establishes actual risk and informs future screening intervals for men.

Screening recommendations may continue to change as more research is done. By talking with their healthcare providers, men can make informed decisions about whether getting the PSA test makes sense for them based on their risk factors. Building on public health approaches, like shared decision-making, better addresses high-risk populations. Proper use of PSA testing supports tailored, evidence-based early detection in primary care.

<sup>1</sup>U.S. Preventive Services Task Force. Draft Recommendation Statement: Prostate Cancer: Screening. April 2017. <https://www.uspreventiveservicestaskforce.org/Page/Document/draft-recommendation-statement/prostate-cancer-screening>.

<sup>2</sup>Vickers AJ, Lilja H. Predicting prostate cancer many years before diagnosis: how and why? *World Journal of Urology*. 2012;30(2):131-135. doi:10.1007/s00345-011-0795-8.

<sup>3</sup>Vertosick EA, Poon BY, Vickers AJ. Relative Value of Race, Family History and Prostate Specific Antigen as Indications for Early Initiation of Prostate Cancer Screening. *The Journal of Urology*. 2014;192(3):724-729. doi:10.1016/j.juro.2014.03.032.



## Our Point of View: Thoughts from a community resident

### A warrior against prostate cancer

By Dr. Gary Taylor

Dr. Taylor is a cancer survivor and proud to be originally from Dorchester

My father had prostate cancer. Because of that, when I was still in my 40s, I requested periodic PSA antigen screening for cancer. That being said, I was totally shocked when my prostate biopsy revealed aggressive disease at age 58. As an experienced physician, I was aware prostate cancer is very different than any other type of cancer for several reasons:

- Prostate cancer kills more than twice as many Black men as Caucasian men, and we are at least 150% more likely to be diagnosed with it.
- Most men are diagnosed and treated without ever being evaluated by a cancer specialist.
- Prostate cancer is the only cancer that you are advised to wait until the disease gets worse before definitive therapy is recommended.
- And finally, there are no head to head studies comparing surgery to radiation or other therapeutic modalities.

Fortunately, we live in a city rich in medical resources. I obtained opinions from several specialists, including cancer, radiation, surgery and primary care – not to mention advice from many family members and friends. The Prostate Health Education Network (PHEN) provided invaluable information and support from men who had been diagnosed and treated successfully before me. After much discussion, I began treatment that included surgery, radiation and chemotherapy.

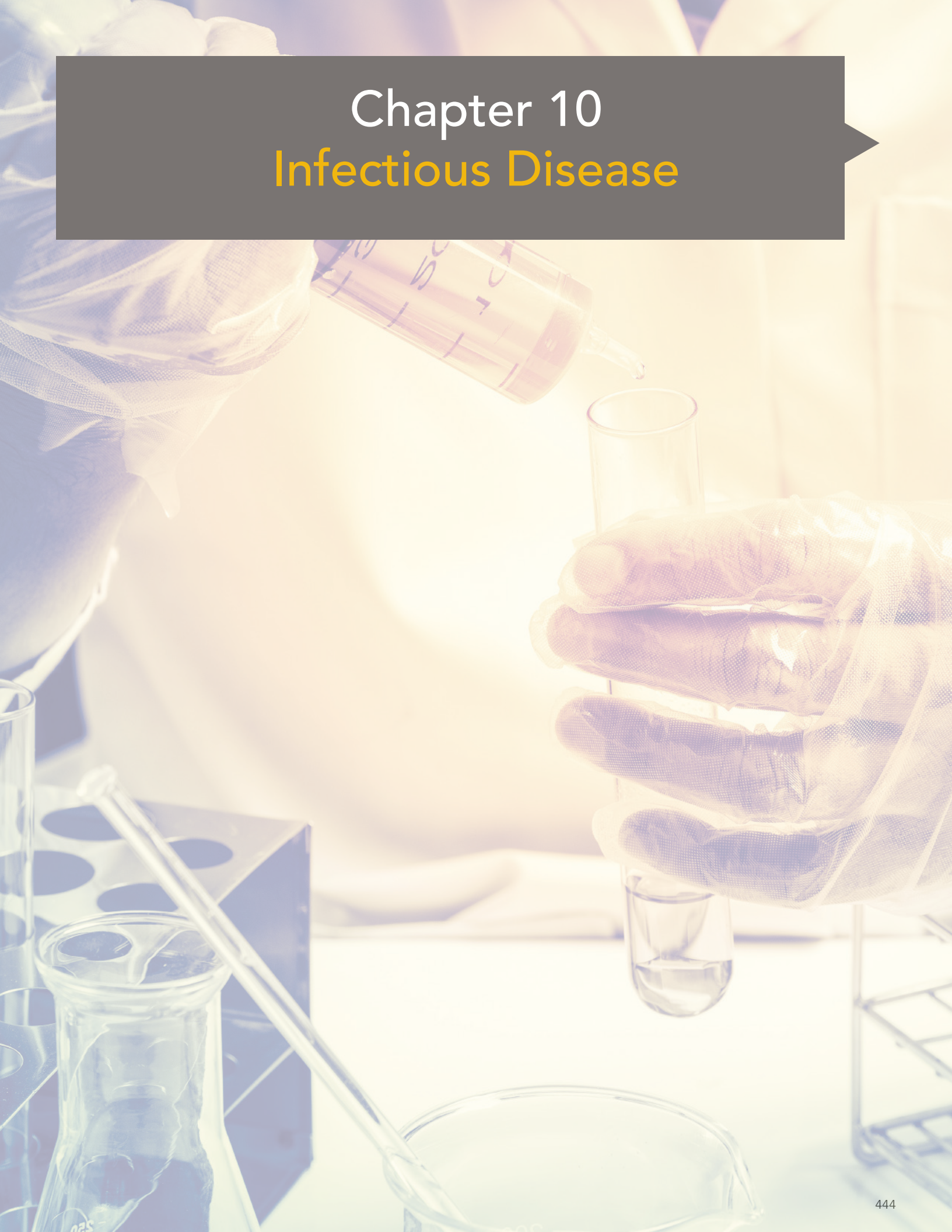
Today, I consider myself a warrior against prostate cancer. I encourage all men over the age of 40 – especially African Americans and those with a family history of prostate cancer – to discuss screening options with their healthcare providers. If the diagnosis is positive, get second opinions! There is perhaps no other cancer in which a second opinion is more important. Finally, and above all, tell anyone whom you trust and is willing to listen about your disease. Prostate cancer kills more men than any other non-skin cancer in the world. Today, we have options. We don't have to suffer in silence.

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# Chapter 10

## Infectious Disease





# Infectious Disease

Infectious diseases are caused by microbes, tiny organisms like bacteria and viruses that require a microscope to be seen. These microscopic organisms are everywhere, from the air we breathe to the things we touch. Many live naturally in the human body. There are more microbial cells inside of a human body than there are human cells (1, 2).

The human-microbe relationship is complex: some promote health, and others promote disease. Many microbes are essential for maintaining good health by helping us digest food and produce vitamins (2). Microbes that cause infectious disease are called pathogens. Some pathogens make a person very sick and then leave him/her immune to future attacks, while others can cause a long-term infection resulting in death. Some infectious diseases last a lifetime and cause infrequent symptoms.

The discovery of antibiotics is considered one of the greatest medical achievements of all time. Since physicians began using penicillin in 1942, millions of lives have been saved. Today, overuse and misuse of antibiotics – such as not finishing a prescribed course or using them when it's not necessary-- contributes to the development of drug-resistant bacteria (3). Drug-resistance makes us vulnerable to infections we might otherwise be able to cure with conventional antibiotics (3). The medical and public health communities are working together to prevent drug-resistant bacteria from becoming more common (4).

Vaccines prevent infectious disease without contributing to disease-resistance (5). A vaccine contains part of a disease-causing microbe that was killed or weakened and thus is no longer able to cause illness. When a person receives a vaccine, the body's immune system develops protective antibodies that will attack the disease-causing microbes if it tries to infect a person in the future.

Despite the use of vaccines to prevent disease and antibiotics to treat it, infectious diseases are responsible for more deaths worldwide than any other single cause. The estimated annual cost of medical care for infectious disease treatment in the United States is about \$120 billion (6).

In this section of the Health of Boston, we will examine indicators for the following infectious diseases: hepatitis B and C, influenza, salmonellosis, and tuberculosis.

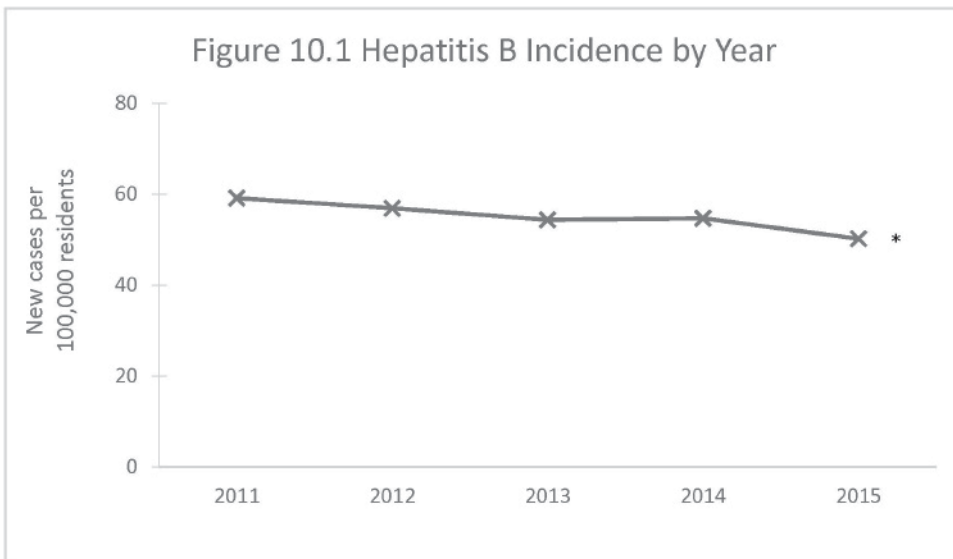
## Hepatitis B & C

Hepatitis, which means inflammation of the liver, results most frequently from heavy alcohol use or viral infections (7). Hepatitis A, B, and C are types of viral infections. Hepatitis A is an acute diarrheal disease, and people usually recover without treatment. Hepatitis B and C begin as acute infections, but have the potential to become chronic. Vaccines are available for hepatitis A and B, but not hepatitis C.

Chronic hepatitis B infection can cause considerable damage to the liver. The likelihood of a hepatitis B infection becoming chronic depends upon the age of infection. Infants and children are more likely to develop chronic hepatitis B compared with adults. Approximately 25%–50% of children infected between the ages of 1 and 5 years develop chronic hepatitis. Hepatitis B is spread when bodily fluids from an infected person enter the body of an uninfected person. This can occur through sexual contact, mother-to-child transmission at birth, sharing of personal items (e.g. toothbrushes, razors, etc.), and direct contact with blood or open sores of an infected person. There is a vaccine for hepatitis B, and routine vaccination is recommended for all infants and children as well as adults at high risk for exposure to the virus.

Transmission of hepatitis C is similar to hepatitis B, although the likelihood of transmission via sexual contact and sharing of personal items is much lower (8). While a vaccine to prevent hepatitis C infection does not exist, highly effective treatments for those infected with hepatitis C virus have become available in the last few years (9). The development of chronic hepatitis C is not age-dependent. Approximately 70%–85% of people who become infected with the hepatitis C virus develop chronic infection (8). People with acute hepatitis B and C infections do not always have symptoms. When present however, symptoms include fever, vomiting, stomach pain, dark urine, and being jaundiced (having yellow skin and eyes). Chronic infections may eventually produce symptoms similar to acute infections and develop into irreversible liver damage or liver cancer (7, 8).

In the U.S., more than 4 million people have chronic hepatitis B or C, but many people do not know they are infected (7, 8). In 2014, the rate of chronic hepatitis B in the U.S. was estimated at 7.1 per 100,000 population; the rate of past-or-present hepatitis C was 52.3 (10).



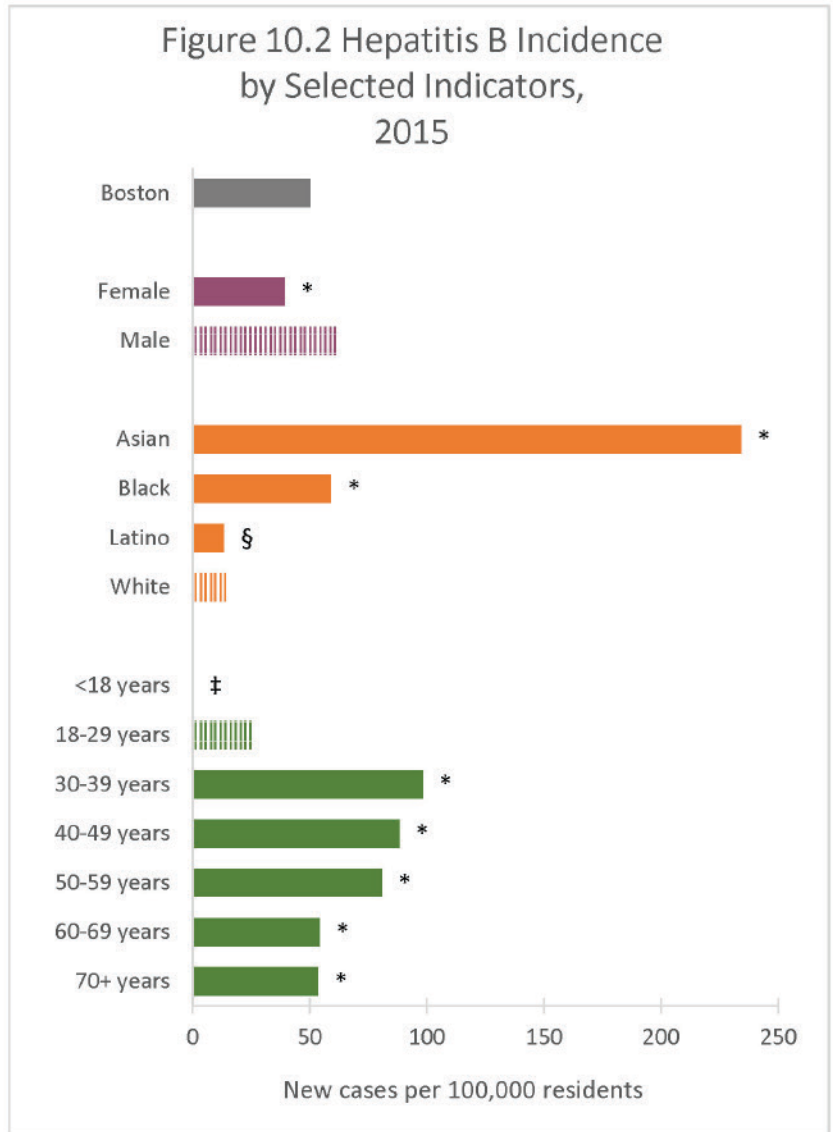
\* Statistically significant change over time

DATA SOURCE: Infectious Disease Bureau, Boston Public Health Commission

In 2015, the incidence rate for hepatitis B infection was 50.2 new cases per 100,000 residents. Between 2011 and 2015, the incidence rate for hepatitis B decreased by 14%.



In 2015, the incidence rate for hepatitis B infection among Boston residents was 50.2 new cases per 100,000 residents. The hepatitis B incidence rate for females (39.3) was 36% lower than the rate for males (61.4). The hepatitis B incidence rate for Asian residents (234.1) was almost 17 times the rate for White residents (14.1), and the rate for Black residents (59.1) was 4 times the rate for White residents. The rates for all age groups presented were higher than the rate for residents ages 18-29 (25.7). The biggest difference was found among residents ages 30-39 (98.2) with a rate almost 4 times the rate for residents ages 18-29.

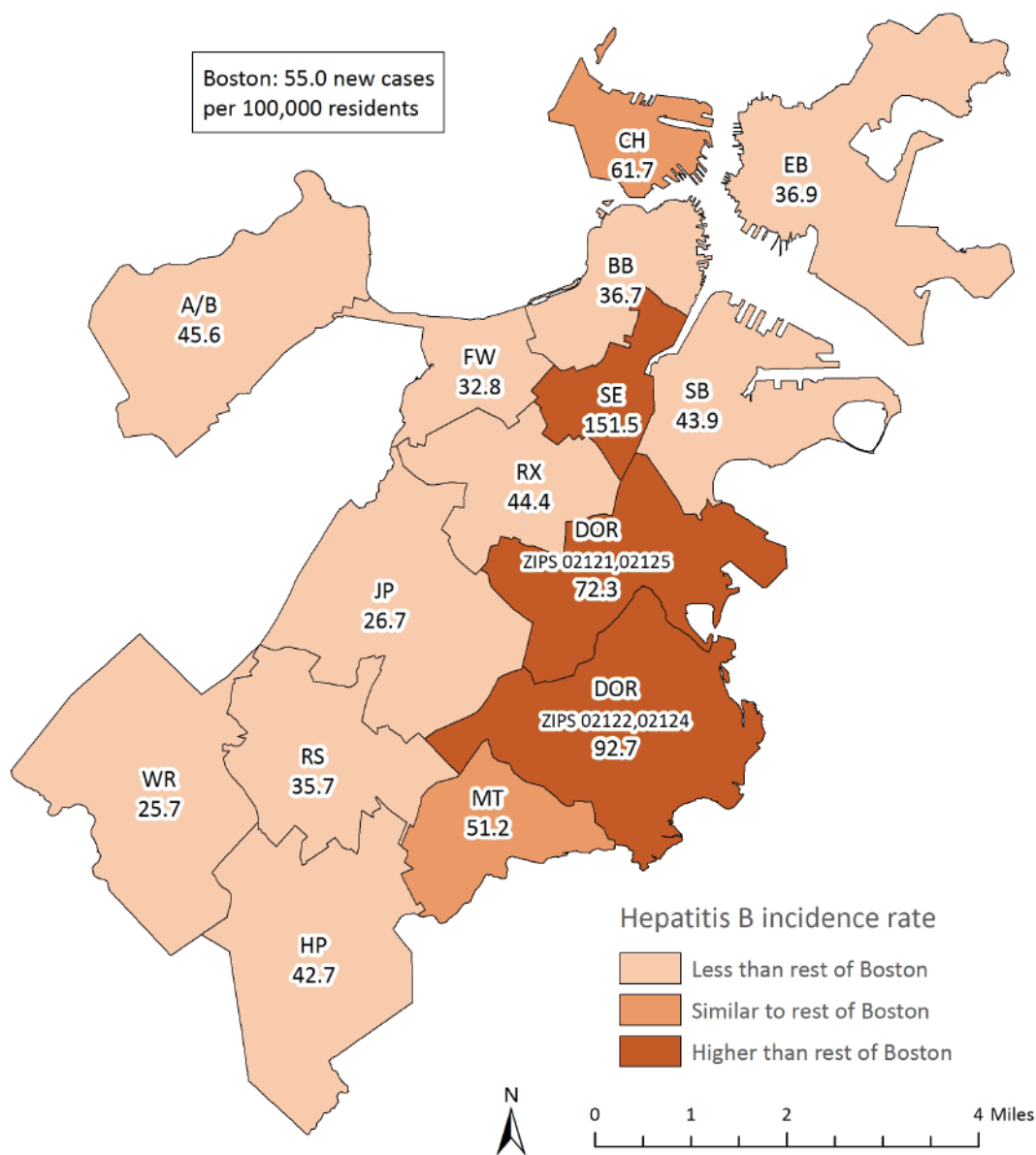


\* Statistically significant difference when compared to reference group  
 ‡ Rates not presented due to a small number of cases  
 § Rates are based on 20 or fewer cases and should be interpreted with caution.

NOTE: Bars with patterns indicate the reference group within each selected indicator.  
 DATA SOURCE: Infectious Disease Bureau, Boston Public Health Commission



Figure 10.3 Hepatitis B Incidence<sup>1</sup>  
by Neighborhood, 2011-2015



<sup>1</sup>5-year average annual rates

NOTE: "BB" includes the Back Bay, Beacon Hill, Downtown, the North End, and the West End.  
"SE" includes the South End and Chinatown.

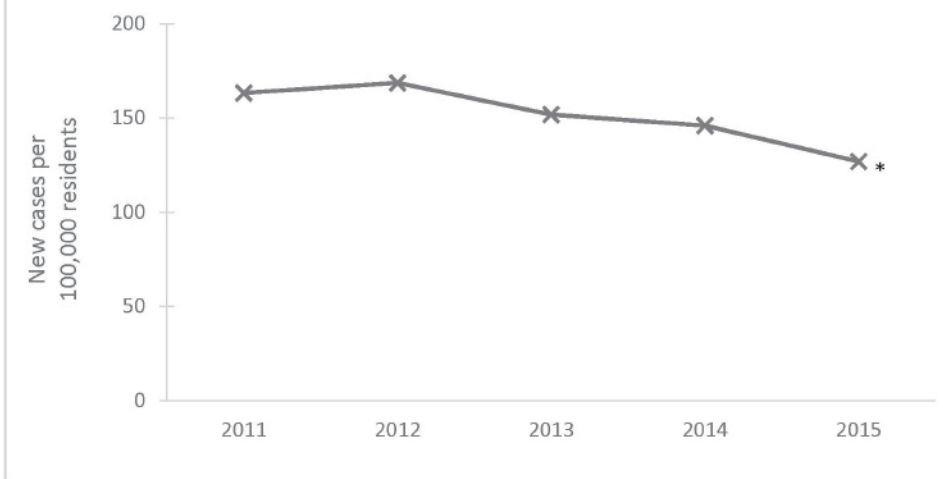
DATA SOURCE: Infectious Disease Bureau, Boston Public Health Commission

In 2011-2015, the incidence rate for hepatitis B infection among Boston residents was 55.0 new cases per 100,000 residents. The rate of hepatitis B infection was higher among residents in Dorchester (zip codes 02121, 02125), Dorchester (zip codes 02122, 02124), and the South End compared with the rest of Boston. The rate of hepatitis B infection was lower among residents in Allston/Brighton, Back Bay, East Boston, Fenway, Hyde Park, Jamaica Plain, Roslindale, Roxbury, South Boston, and West Roxbury compared with the rest of Boston.



In 2015, the incidence rate for hepatitis C infection was 126.9 new cases per 100,000 residents. Between 2011 and 2015, the incidence rate for hepatitis C infection among Boston residents decreased by 22%.

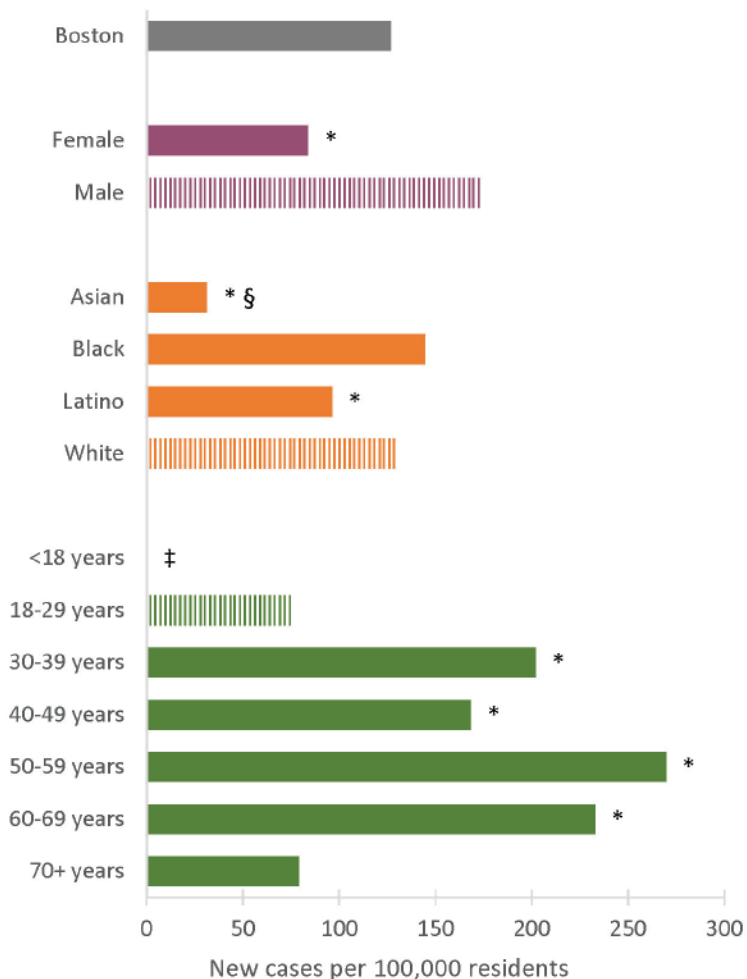
Figure 10.4 Hepatitis C Incidence by Year



\* Statistically significant change over time

DATA SOURCE: Infectious Disease Bureau, Boston Public Health Commission

Figure 10.5 Hepatitis C Incidence by Selected Indicators, 2015



\* Statistically significant difference when compared to reference group

‡ Rates not presented due to a small number of cases

§ Rates are based on 20 or fewer cases and should be interpreted with caution.

NOTE: Bars with patterns indicate the reference group within each selected indicator.

DATA SOURCE: Infectious Disease Bureau, Boston Public Health Commission

In 2015, the incidence rate for hepatitis C infection among Boston residents was 126.9 new cases per 100,000 residents. The hepatitis C incidence rate for females (83.8) was 52% lower than the rate for males (173.3). The rates for Asian (31.3) and Latino (96.3) residents were 76% and 26% lower, respectively, than the rate for White residents (269.6). The rates for those ages 30-39 (202.0), 40-49 (168.3), 50-59 (269.6), and 60-69 (232.7) were higher than the rate for residents ages 18-29 (74.6). The biggest difference was found among those ages 50-59 with a rate almost 4 times the rate for residents ages 18-29.

## Hepatitis C

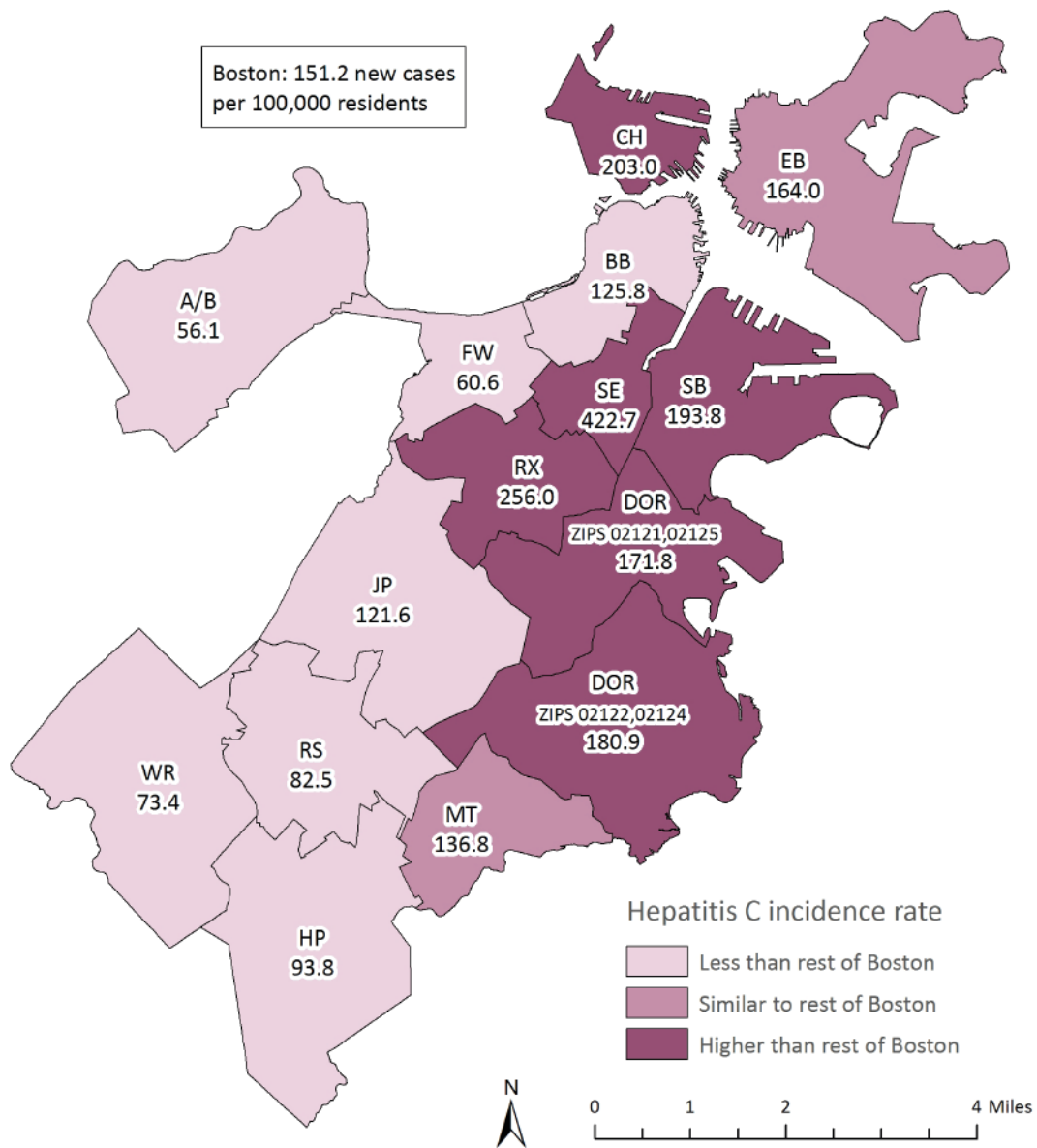
Healthy People 2020 Target: 11.4 cases per 100,000 population

U.S. 2013: 16.1

MA 2013: 17.2

Boston 2015: 22.1

### Figure 10.6 Hepatitis C Incidence<sup>1</sup> by Neighborhood, 2011-2015



<sup>1</sup>5-year average annual rates

NOTE: "BB" includes the Back Bay, Beacon Hill, Downtown, the North End, and the West End.  
"SE" includes the South End and Chinatown.

DATA SOURCE: Infectious Disease Bureau, Boston Public Health Commission

In 2011-2015, the incidence rate for hepatitis C infection among Boston residents was 151.2 new caes per 100,000 residents. The rate of hepatitis C infection was higher among residents in Charlestown, Dorchester (zip codes 02121, 02125), Dorchester (zip codes 02122, 02124), Roxbury, South Boston, and the South End compared with the rest of Boston. The rate of hepatitis C infection was lower among residents in Allston/Brighton, Back Bay, Fenway, Hyde Park, Jamaica Plain, Roslindale, and West Roxbury compared with the rest of Boston.

## Influenza

Influenza, or the “flu,” is a respiratory system (nose, throat, and lungs) infection caused by the influenza virus. Every year, a flu epidemic hits the United States during the fall and winter months, commonly referred to as flu season. Flu is very contagious and can be spread to people up to 6 feet away in the form of respiratory droplets released during coughing, sneezing, or talking (11). The flu and common cold have similar symptoms that include fever, cough, sore throat, runny nose, body aches, and fatigue. However, the flu is different from the common cold in that symptoms are usually more intense and the severity of illness is less predictable, sometimes resulting in hospitalization or death. Although most people recover within a few days to two weeks, complications such as pneumonia, bronchitis, and sinus and ear infections may occur. People with certain chronic medical conditions, pregnant women, young children, and the elderly, are especially vulnerable to developing serious flu-related complications (11). The cumulative incidence of influenza-related hospitalizations in the U.S. between October of 2015 and April of 2016 is estimated at 31.3 per 100,000 (12).

### Prevention strategies

The flu vaccine and frequent hand washing are the best ways to prevent the flu. New influenza vaccines are developed each year to accommodate the ever-changing genetic code of the influenza virus. Individuals must be vaccinated every year (13). Although the vaccine has been proven to prevent disease, income, education, and place of residence among older individuals can be barriers to vaccination (14).

CDC guidelines suggest that people with flu-like symptoms should stay home for at least 24 hours after their fever is gone (without the use of a fever-reducing medicine), except to get medical care or for other necessities (15). Furthermore, it is recommended that a sick individual covers his/her nose and mouth with a tissue when coughing or sneezing, and then throws the tissue in the trash thereafter. We can all minimize transmission of flu-like viruses by minimizing contact with our eyes, noses, and mouths, and by cleaning and disinfecting surfaces and objects that may be contaminated by frequent touching (keyboards, telephones, etc.) (11).

During the 2015-2016 influenza season, the incidence rate of influenza was 270.3 new cases per 100,000 residents. Between the 2013-14 and 2015-16 seasons there was no significant change in the influenza incidence rate among Boston residents.

Figure 10.7 Influenza Incidence by Annual Season<sup>1</sup>

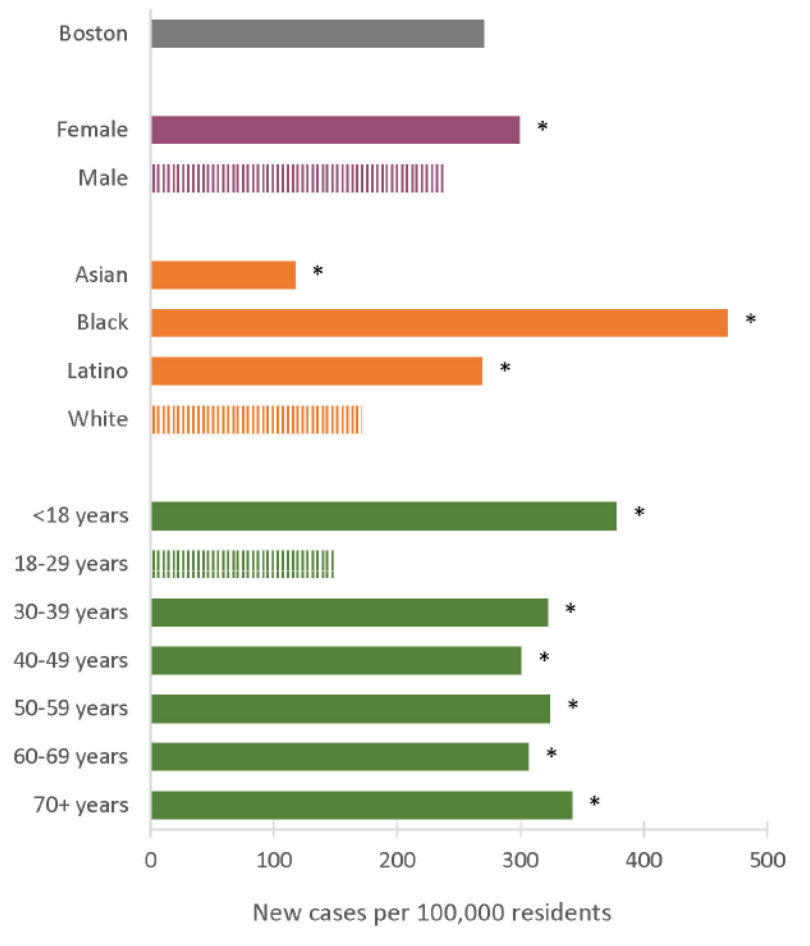


<sup>1</sup> November-April

DATA SOURCE: Infectious Disease Bureau, Boston Public Health Commission



Figure 10.8 Influenza Incidence by Selected Indicators, 2015-2016 Season<sup>1</sup>

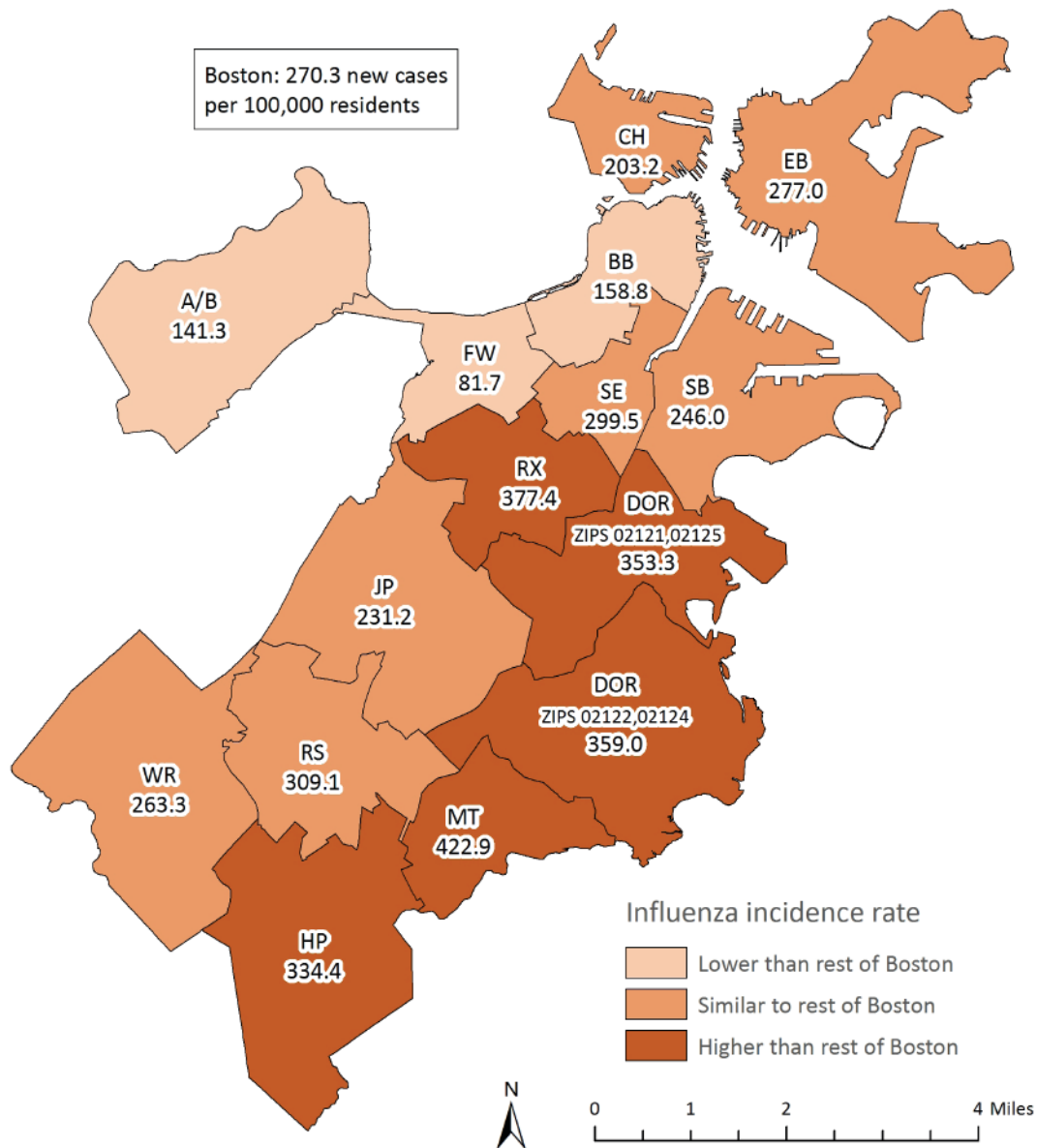


For the 2015-2016 influenza season, the incidence rate for influenza among Boston residents was 270.3 new cases per 100,000 residents. The influenza incidence rate for females (299.2) was 25% higher than the rate for males (238.8). The influenza incidence rate was higher for Black (468.1) and Latino (268.8) residents and lower for Asian residents (117.2) compared with White residents (170.8). The biggest difference was found among Black residents whose influenza incidence rate was almost 3 times the rate for White residents. The rates for all age groups were higher than the rate for residents ages 18-29 (148.2). The biggest difference was found among residents 18 years and younger (377.6) with a rate 2.5 times the rate of those ages 18-29.

\* Statistically significant difference when compared to reference group  
<sup>1</sup> November 2015 - April 2016

NOTE: Bars with patterns indicate the reference group within each selected indicator.  
 DATA SOURCE: Infectious Disease Bureau, Boston Public Health Commission

Figure 10.9 Influenza Incidence by Neighborhood, 2015-2016 Season<sup>1</sup>



<sup>1</sup> November 2015 - April 2016

NOTE: "BB" includes the Back Bay, Beacon Hill, Downtown, the North End, and the West End.  
 "SE" includes the South End and Chinatown.

DATA SOURCE: Infectious Disease Bureau, Boston Public Health Commission

For the 2015-2016 influenza season, the incidence rate for influenza among Boston residents was 270.3 new cases per 100,000 residents. The rate of influenza was higher among residents in Dorchester (zip codes 02121, 02125), Dorchester (zip codes 02122, 02124), Hyde Park, Mattapan, and Roxbury compared with the rest of Boston. The rate of influenza was lower among residents in Allston/Brighton, Back Bay, and Fenway compared with the rest of Boston.



## Salmonella Infection

Salmonella bacteria live in the intestinal tracts of infected humans and animals. Most people infected with salmonella develop diarrhea, fever, vomiting, and abdominal cramps 12 to 72 hours after infection. Fortunately, most people with salmonella have a mild infection, and recover in four to seven days without treatment. In rare instances, hospitalization may be required (16).

Salmonella infection (salmonellosis) occurs when a person eats microscopic fecal material that contains the salmonella bacteria. Contamination of food with fecal material may occur during food processing, handling, or preparation. Undercooked or raw poultry, beef, milk, and eggs, are common sources of salmonella. In addition, handling animals such as reptiles, baby chicks, or small rodents, is another common source of infection. These animals are particularly likely to carry salmonella even when they are healthy.

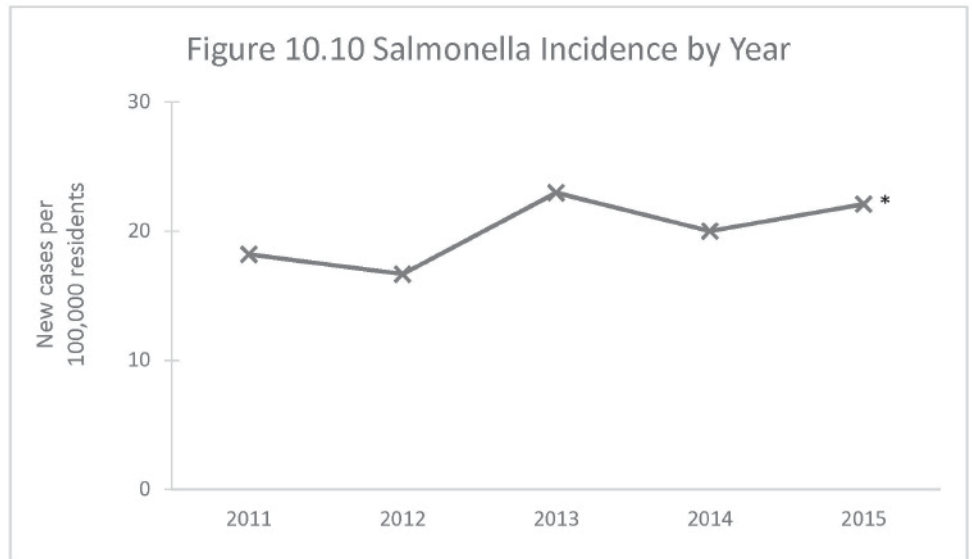
### Prevention strategies

There is no vaccine for salmonellosis. The best way to prevent salmonella infection is to:

- Carefully wash hands with soap and water before and after preparing food, after using the toilet, and after handling pets.
- Cook foods thoroughly – especially poultry, ground beef, and eggs.
- Wash utensils, knives, cutting boards, counter tops, and dishes with clean soapy water before and after preparing food.
- Wash all fruits and vegetables with clean drinking water and use a brush if necessary.
- Refrigerate or freeze perishable foods without delay. Refrigerator temperatures should be at 40°F or below. Freezer temperatures should be below 0°F.

Salmonellosis occurs more commonly in children than in adults (16). Because most people do not seek treatment for their illness, many salmonella cases are not reported to the health department (16). For this reason, the actual number of cases in Boston is thought to be much higher than what is included in this report. The incidence rate for new illnesses of salmonellosis in the U.S. in 2013 was 16.1 per 100,000 population (17).

In 2015, the incidence rate for salmonella was 22.1 new cases per 100,000 residents. Between 2011 and 2015, the incidence rate for salmonella infection among Boston residents increased by 25%.



\* Statistically significant change over time

DATA SOURCE: Infectious Disease Bureau, Boston Public Health Commission



### Salmonella

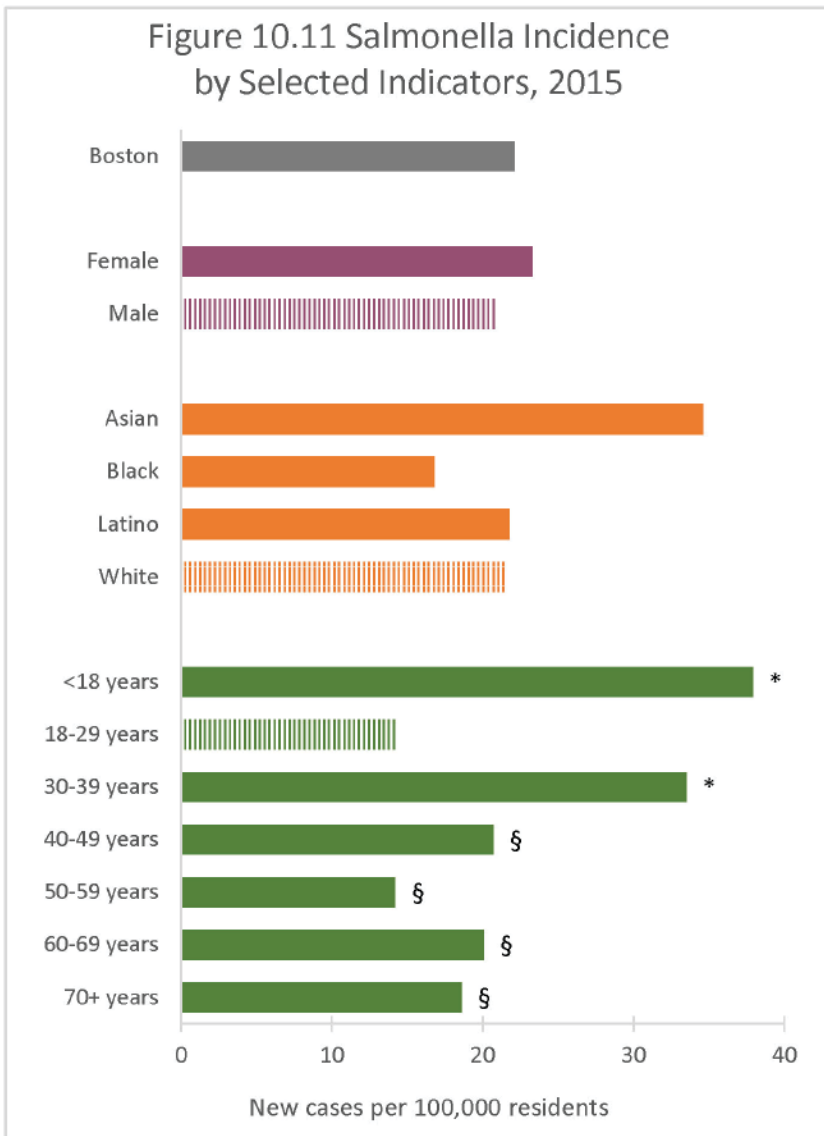
Healthy People 2020 Target: 11.4 cases per 100,000 population

U.S. 2013: 16.1

MA 2013: 17.2

Boston 2015: 22.1

Figure 10.11 Salmonella Incidence by Selected Indicators, 2015

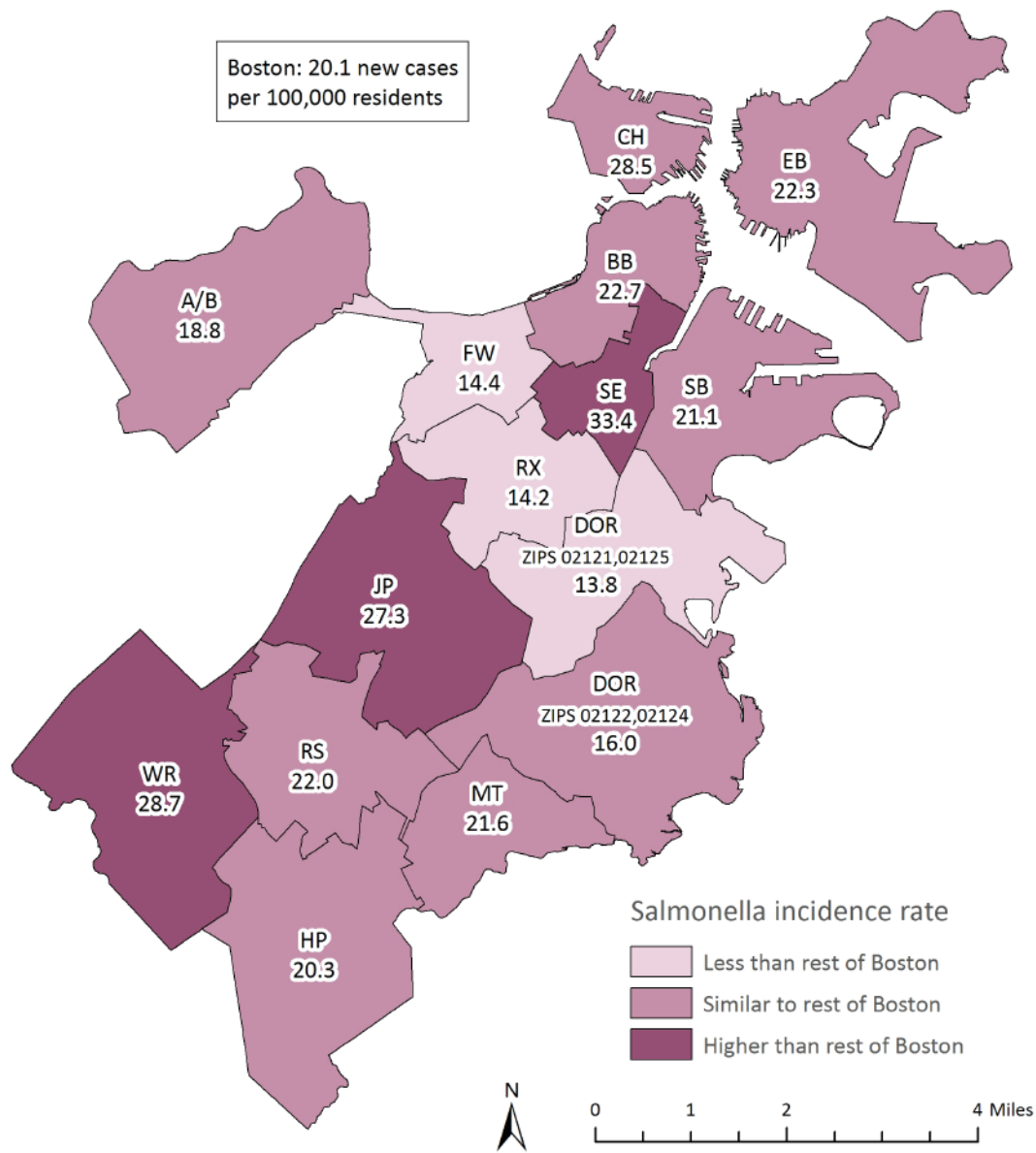


\* Statistically significant difference when compared to reference group  
 § Rates are based on 20 or fewer cases and should be interpreted with caution.

NOTE: Bars with patterns indicate the reference group within each selected indicator.  
 DATA SOURCE: Infectious Disease Bureau, Boston Public Health Commission

In 2015, the incidence rate for salmonella infection among Boston residents was 22.1 new cases per 100,000 residents. The rate for residents under the age of 18 (37.9) was 2.7 times the rate for residents ages 18-29 (14.3). The rate for residents ages 30-39 (33.5) was 2.3 times the rate for residents ages 18-29. There were no significant differences by sex or race/ethnicity.

Figure 10.12 Salmonella Incidence<sup>1</sup>  
by Neighborhood, 2011-2015



<sup>1</sup>5-year average annual rates

NOTE: "BB" includes the Back Bay, Beacon Hill, Downtown, the North End, and the West End.  
"SE" includes the South End and Chinatown.

DATA SOURCE: Infectious Disease Bureau, Boston Public Health Commission

In 2011-2015, the incidence rate for salmonella infection among Boston residents was 20.1 new cases per 100,000 residents. The rate of salmonella infection among residents in Jamaica Plain, the South End, and West Roxbury was higher compared with the rest of Boston. The rate of salmonella infection among residents in Dorchester (zip codes 02121, 02125), Fenway, and Roxbury was lower compared with the rest of Boston.

# Tuberculosis

Tuberculosis (TB) is an infectious disease caused by the bacterium *Mycobacterium tuberculosis*. The bacteria usually infect the lungs but can infect other parts of the body as well. TB is spread through the air when a person with an active infection releases respiratory particles into the air by coughing or sneezing.

## Latent TB and Active TB

Not everyone exposed to TB becomes infected, and not everyone infected with TB becomes sick. In fact, most people who are infected are able to fight the bacteria, prevent it from spreading, and avoid symptoms altogether, in what is known as latent TB. A person with latent TB cannot spread the infection. However, the latent form can become active with time, at which point the infected person will become symptomatic and infectious to others. Although latent TB is often asymptomatic, treatment of latent TB is recommended to prevent the development of active TB. TB symptoms include severe cough with blood or sputum, chest pain, weakness, weight loss, chills, fever, and night sweats (18).

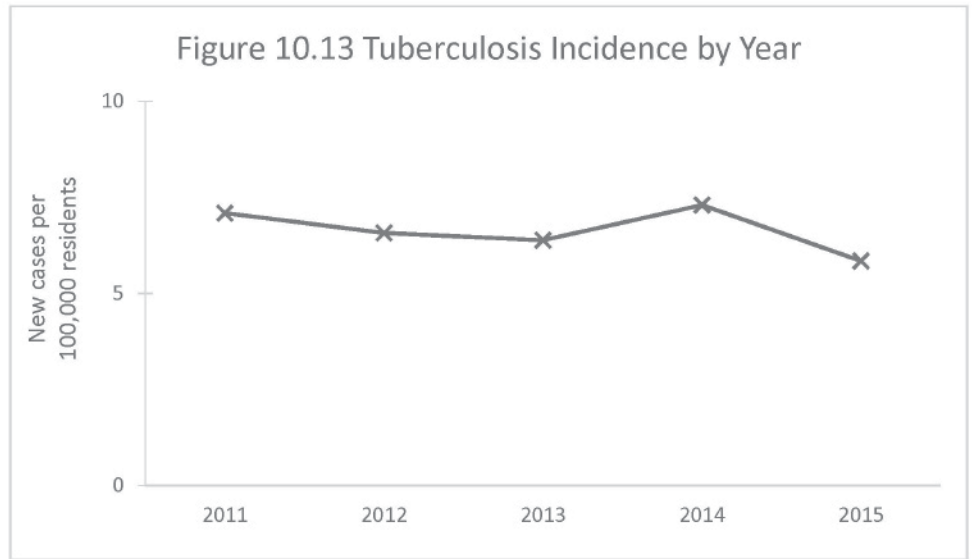
## Screening and prevention

Tests to determine TB infection include a skin test and a blood test. A positive test result usually means that a person has been infected with the TB bacteria but does not necessarily mean that the person has an active TB infection. In some instances, because of cross-reactivity, people who received a vaccine for TB will have a positive skin test even though they are not infected with the TB bacteria. BCG, or bacille Calmette-Guerin, is a vaccine for TB, which is most commonly used in countries with high prevalence of TB. It is not generally recommended for use in the U.S. because of the low risk of infection domestically, because it is not consistently effective at preventing disease, and because it interferes with the skin test reactivity. In these cases, other diagnostic tests, such as blood tests, chest x-rays, and sputum samples, are needed to see whether the person has TB (18).

## Treatment

Tuberculosis can be treated by taking several drugs for 6 to 9 months. There are currently 10 drugs approved by the U.S. Food and Drug Administration for treating TB (19). Latent TB infection can also be treated with drugs in order to prevent active TB from developing. The treatment of latent TB infection is essential for controlling and eliminating TB infection in the U.S., where it has been in decline since 1992; the TB incidence rate has now leveled at 3.0 new cases per 100,000 in 2015 (20). However, most cases in the U.S. occur among immigrants from tuberculosis endemic areas (18); the incidence rate for foreign-born individuals in 2015 was 15.1 per 100,000 (20). Although the TB incidence rate in the U.S. is lower than in many other nations, TB represents one of the leading causes of death around the world, particularly among those infected with HIV (21).

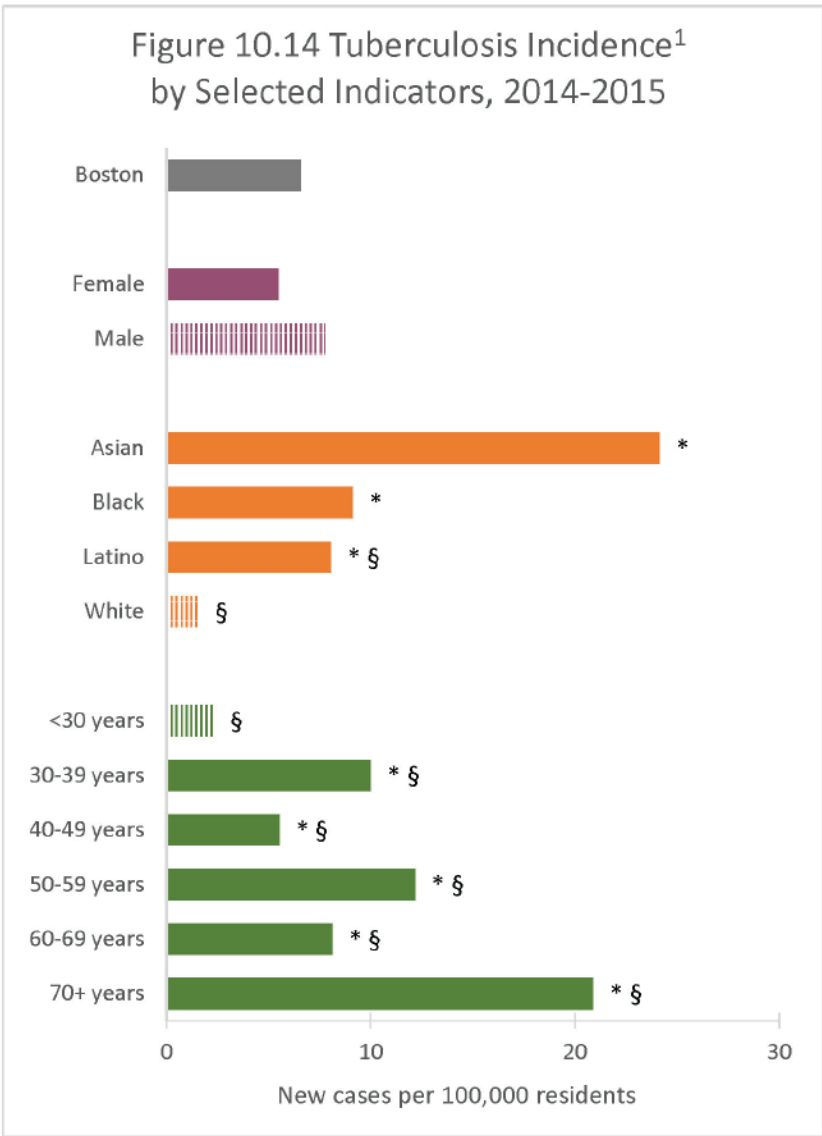
In 2015, the incidence rate for tuberculosis was 5.8 new cases per 100,000 residents. Between 2011 and 2015 there was no significant change in the tuberculosis incidence rate among Boston residents.



DATA SOURCE: Infectious Disease Bureau, Boston Public Health Commission



Figure 10.14 Tuberculosis Incidence<sup>1</sup> by Selected Indicators, 2014-2015



During 2014-2015, the average annual incidence rate for tuberculosis among Boston residents was 6.6 new cases per 100,000 residents. The tuberculosis incidence rates for Asian (24.1), Black (9.1), and Latino (8.0) residents were higher than that of White residents (1.6). The biggest difference was among Asian residents with a rate 15.5 times the rate of White residents. The rates for all age groups were higher than the rate for residents under age 30 (2.3). The biggest difference was found among residents ages 70 or older (20.9) with a rate 9 times the rate for those under age 30. There was no significant difference by sex.

\* Statistically significant difference when compared to reference group  
 § Rates are based on 20 or fewer cases and should be interpreted with caution.  
<sup>1</sup> 2-year average annual rates

NOTE: Bars with patterns indicate the reference group within each selected indicator.  
 DATA SOURCE: Infectious Disease Bureau, Boston Public Health Commission

**Tuberculosis**

Healthy People 2020: 1.0 new case per 100,000 population

U.S. 2015: 3.0

MA 2015: 3.0

Boston 2015: 5.8

## Summary

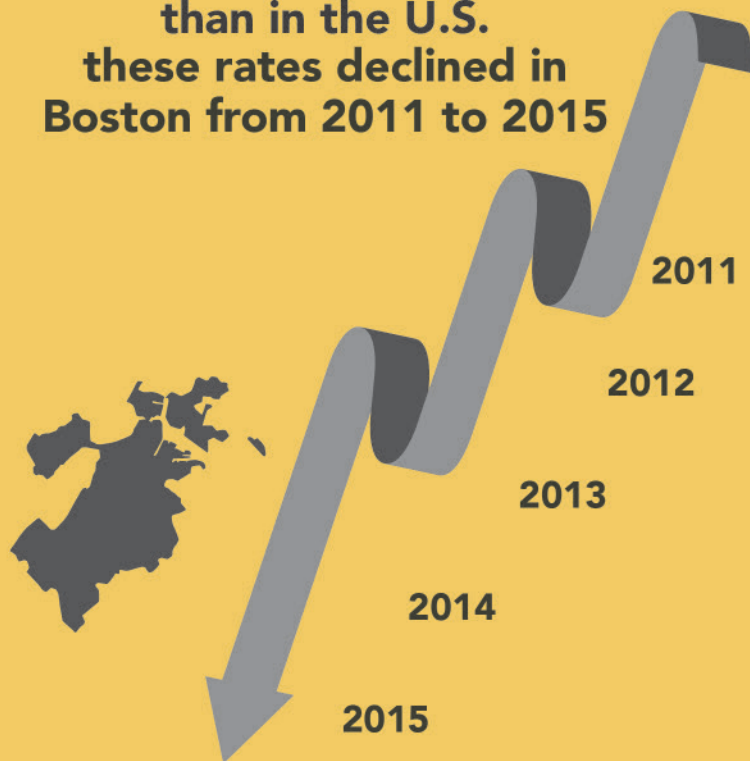
As expected, rates for hepatitis B, hepatitis C, salmonella, and TB, are higher in Boston than in the U.S. overall, which is likely explained by Boston's urban demographic composition with high immigrant representation. For hepatitis B and hepatitis C, the incidence rates reported for Boston in 2015 are both significantly lower from 2011, while for salmonella, the incidence rate reported for Boston in 2015 was significantly higher. We also identified racial/ethnic and age inequities for the majority of the infectious diseases reported in 2015. Most notably, the risk of hepatitis B and TB was approximately sixteen times greater in Asian residents than in White residents. Black residents also had 2 to 6 fold higher risk of hepatitis B, influenza, and TB relative to White residents. While higher incidence rates were concentrated in the middle-age categories for hepatitis B and hepatitis C, for other infectious diseases higher incidence rates were found in younger (influenza, salmonella) and elderly (influenza, TB) age categories. We also detected geographic variation in the incidence rates for infectious diseases at the neighborhood level. The neighborhoods Dorchester (zip codes 02121, 02125) and Dorchester (zip codes 02122, 02124), in particular, had elevated incidence rates for hepatitis B, hepatitis C, and influenza. The elevated incidence rates observed in Dorchester (zip codes 02121, 02125) and Dorchester (zip codes 02122, 02124) are likely explained by the sociodemographic composition of these neighborhoods. To reduce the inequities of infectious disease in the Boston population, interventions that target subpopulations at higher risk should address pathways (education, employment, foreign-language outreach) associated with insurance coverage, access to health care, and receipt of vaccination.



# Infectious Disease



While in 2015 the rates for hepatitis B and hepatitis C infection were higher in Boston than in the U.S. these rates declined in Boston from 2011 to 2015



## Selected infectious diseases and the age spectrum:



High rates of influenza and salmonella in children ages 17 and younger



High rates of hepatitis C in middle aged adults



High rates of influenza and TB in adults ages 70 and older



In 2015 the rate of hepatitis B was almost 17 times higher among Asian residents than among White residents



**Asian**  
**234.1**  
new cases per  
1,000 residents

**White**  
**14.1**  
new cases per  
1,000 residents

## Our Point of View: Thoughts from public health

### Eliminating Hepatitis C is an achievable goal

By Marguerite Beiser, NP  
Director, Hepatitis C Services  
Boston Health Care for the Homeless Program

Hepatitis C (HCV) is a curable infection. Yes, you read that right. Thanks to advances in treatment (namely direct-acting antiviral therapy), Hepatitis C is no longer a death sentence. In fact, treatment greatly improves the health of the person, can be done at all stages of liver disease, is cost-effective, and prevents spread of the disease to others. With this tool, Massachusetts is now in the position where it can eliminate Hepatitis C.

What is in the way? There are many barriers to uptake of curative treatment and pursuing state-wide eradication. These barriers include:

- identification of undiagnosed individuals
- linkage of people living with HCV to experienced HCV-treaters
- negotiating cost and insurance issues
- support for individuals to ensure adherence to treatment
- prevention of reinfection for individuals once they are cured

Of paramount importance is the way we engage with individuals who use drugs. Particular recognition of the challenges for drug users is crucial, because they have traditionally had increased barriers to medical care and have ongoing risk factors for HCV transmission and reinfection.

At Boston Health Care for the Homeless Program (BHCHP), 23% of our patients are living with HCV. Experiencing homelessness and living with HCV infection is associated with higher healthcare utilization and cost as well as excess mortality from liver disease. Over 60% of patients at BHCHP have a substance use disorder (SUD) and injection drug use is the main route of transmission for HCV in our population.

Our Hepatitis C treatment program, in existence since 2014, provides HCV therapy keeping in mind the particular challenges related to homelessness and substance use disorders. Experienced primary care providers, a nurse and a care coordinator provide treatment within the patient's existing medical home. The model includes adherence support, harm reduction, and coordination with other providers, such as with behavioral health or office-based addiction treatment providers.

The results so far have been remarkable. Among the first 64 patients to receive HCV treatment, 97% were cured. The prevalence of history of SUDs was 92% and 73% of patients reported a history of injection drug use. Almost half of the group also had HIV. As our program has grown and treated patients with more active substance use, we have seen this cure rate evolve to 91.5% (184 out of 201) with 12 cases of reinfection and 8 individuals lost to follow up due to substance relapse. These results are similar to cure rates and reinfection rates in the general population.

Our experience shows that even among the most hard-to-reach members of our society, HCV treatment can be successful. That puts us in a position where we can eradicate Hepatitis C statewide. It will take political will and substantial investment that recognizes and reduces the particular challenges for populations who use drugs.

## Our Point of View: Thoughts from a community resident

### Struggling to afford medication for Hepatitis C

By a Community Resident

I was hurt and shocked when I found out I had Hepatitis C. My mom was a heroin addict and had it. She was always careful about things like sharing toothbrushes and razors. I was too young to understand. I didn't realize how serious it was. She was my mom. I loved her.

I had no idea that you could get it by sharing needles and cotton or having sex. My mom told me she got it when she got a tattoo before she even started using drugs. I found out I had it when I was pregnant with my second daughter. I'm not even sure how I got it. I was so ashamed. I didn't want anyone to know. I found out because I got really sick. I had a bad cold, my eyes turned yellow and my urine was dark. I had a great primary care doctor who I still see now. She told me it was undetectable. It still is.

I've never had to take medication for it. It scares me because what if I did need medication? The medication is so expensive. I wouldn't be able to afford it and then what would happen?

I have Mass Health but I have a lot of problems especially when I have to renew it. Right now, my daughter and I have been without insurance for a month. I have a newborn and no insurance. I had to pay out of pocket to take my daughter to the doctor.

That's why I think they should have more programs to help people pay for the medication. There are people who work and still can't afford them. They have to choose between paying for their medications and paying their bills.

I also wish there was more education. We have people who come and talk to us like once a year. But a lot of women still don't know a lot about Hepatitis C and HIV. They're afraid to get tested because they don't want to know. Maybe if someone explained to them how you get it and that there are medications available that would help.

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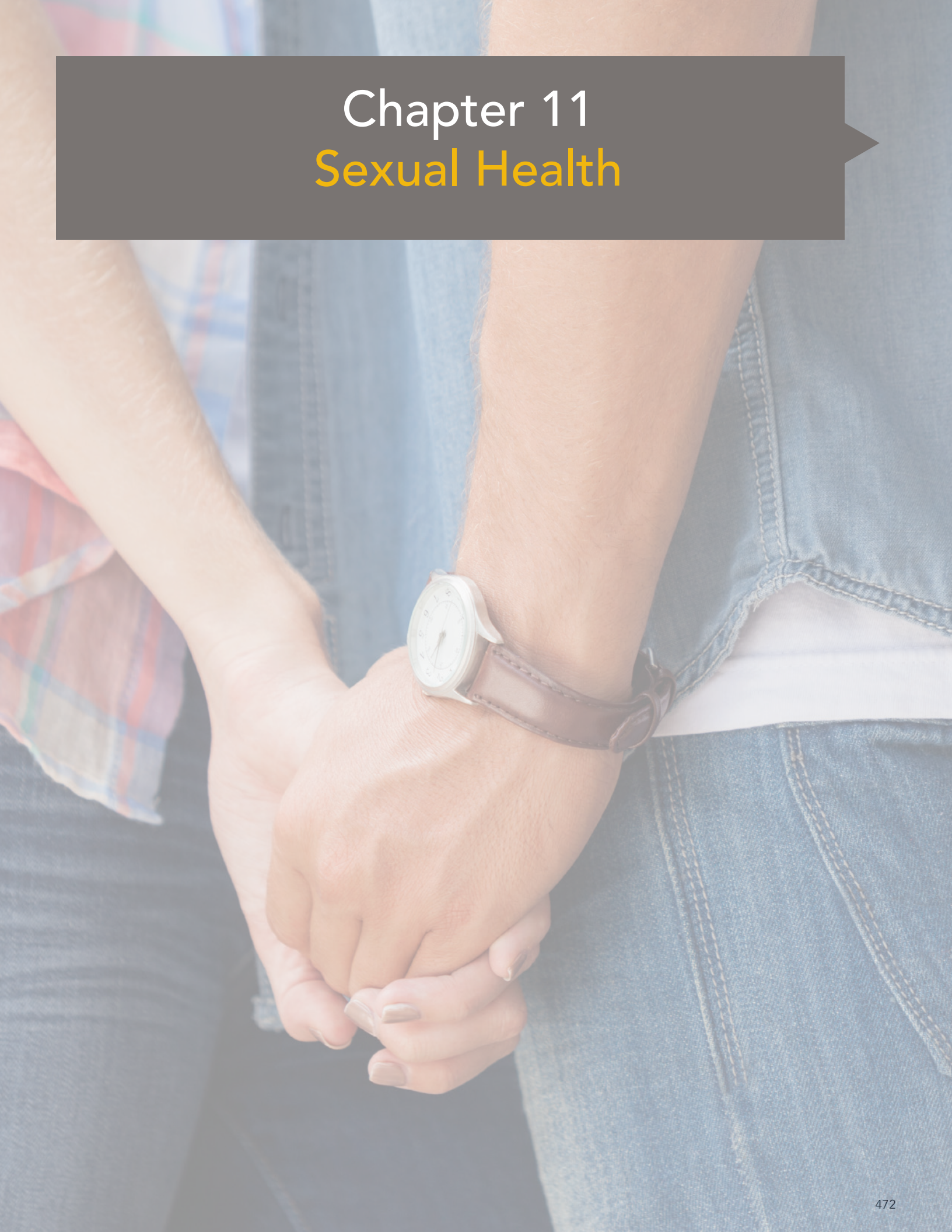
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# Chapter 11

## Sexual Health







# Sexual Health

Sexual health is a state of physical, emotional, mental, and social well-being in relation to sexuality (1). Achieving this state of well-being includes the prevention of, and when necessary, effective treatment of sexually transmitted infections (STIs), sometimes called sexually transmitted diseases (STDs) (2). The Centers for Disease Control and Prevention (CDC) estimates that 20 million sexually transmitted infections occur each year, with half of new diagnoses occurring in adolescents ages 15-24 (3). In 2015, combined cases of chlamydia, gonorrhea and syphilis reached the highest number ever reported (3). It was also the second year in a row in which increases were seen in all three of these reported STIs (3). The overall increase among these three STIs is due to increasing rates among men, however, young people and women are still those most affected by STIs (3). Overall, chlamydia, gonorrhea and syphilis are the three most commonly reported medical conditions in the United States (3).

Nationally there are higher rates of STIs among Black individuals. These elevated rates have been attributed to the impact of social determinants of health (4-7). Researchers at the CDC have proposed a socioecological model to describe racism, social determinants of health, and their impact on Black women's sexual and reproductive health (6). The authors describe how racism impacts social determinants of health, which in turn, affect individual behaviors and interpersonal relationships. In addition, sexually active people who live in communities with higher rates of infection may be more likely to get an STI than those who live in communities with low STI rates, even if they have the same behaviors (condom use, number of partners), because those in communities with high STI rates have a higher chance of selecting a partner who is infected (4, 8).

## Symptoms and health effects

Many people are unaware they are infected with an STI. STI symptoms are often absent, or when present, may be attributed to another cause (9). Symptoms as benign as non-specific abdominal pain or itching can be the first signs of an infection with the potential to cause serious long-term complications if not treated (9). Uncontrolled infections can make an individual more vulnerable to other STIs, including HIV (10).

Although anyone can experience serious health effects from STIs, they impact women more frequently and extensively than men (11). Infections can cause pelvic inflammatory disease, infertility, and ectopic pregnancy if left untreated. It is estimated that undiagnosed STIs cause infertility in more than 20,000 women per year (11). Infections may also be passed on to an unborn child, causing serious harm including brain damage, blindness, or stillbirth (12). Often times, women do not have noticeable symptoms when infected with the most common STIs, and thus may not seek medical attention, whereas symptoms for men are more obvious (11).

## Prevention strategies and treatment

Reducing the risk of becoming infected with an STI is the goal of recommended prevention strategies. Using condoms can prevent infection. Having honest conversations with new partners about infection and being aware of common STI symptoms can prevent STIs from spreading (13). Abstaining from sexual activity or being active in a long-term, monogamous relationship with an uninfected partner can prevent infection. High-risk behaviors for contracting an STI include having multiple partners, unprotected intercourse with infected persons, and injection drug use (2).

After prevention, seeking medical care immediately after a potential infection is the next best approach. Although many STIs do not present with obvious symptoms, they can be detected through targeted medical screening tests. Since bacteria are often responsible for infections, most STIs can be effectively treated with antibiotics. Even STIs caused by viruses, such as herpes and HIV, can be medically managed (2).

This section of the report presents data on chlamydia, gonorrhea, and HIV/AIDS.

## Chlamydia

Chlamydia is by far the most frequently reported STI in the U.S., and is caused by the bacterium *Chlamydia trachomatis*. Nationally, over 1.5 million cases of chlamydia were reported in 2015, a 6% increase from the year before (3). While women were twice as likely to be infected with chlamydia, there were increased rates among men – 20% more men had chlamydia in 2015 than in 2011 (3).

## Symptoms and health effects

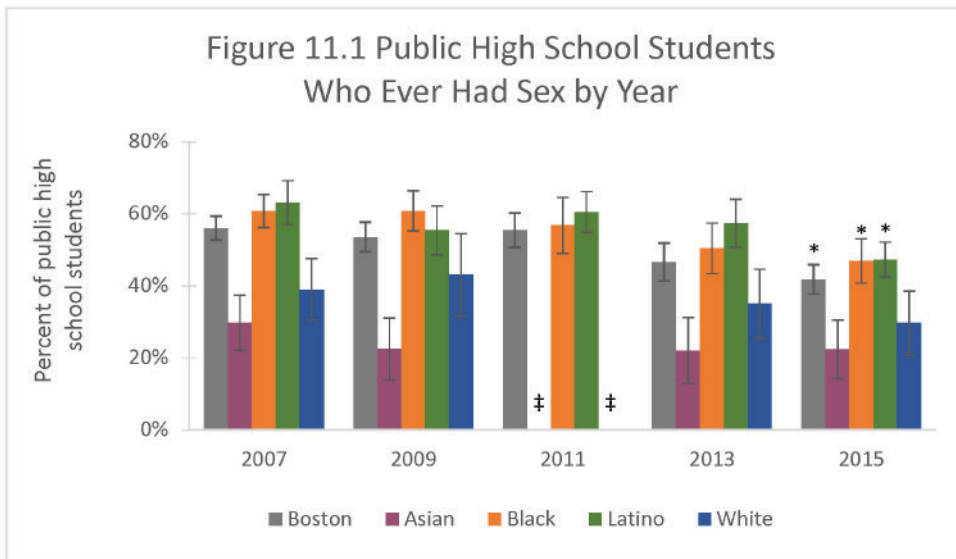
Chlamydia is considered a “silent infection” – most people are asymptomatic. If they do have symptoms, it is usually in the form of vaginal discharge for women and burning during urination for both men and women. While the symptoms are relatively minor, untreated infections can lead to serious consequences including pelvic inflammatory disease, infertility, and pregnancy complications. Infection can also be spread from an untreated mother to her baby during childbirth, which can cause conjunctivitis or pneumonia in the infant (14).

## Screening, treatment and prevention strategies

Sexually active young people are at higher risk of acquiring chlamydia for several reasons related to behavior and biology. Nevertheless, any sexually active person can become infected. CDC recommends yearly chlamydia screening of all sexually active women ages 25 and younger, and older women with new or multiple sex partners (2). Due to the disease’s asymptomatic nature, a laboratory test is usually necessary (2).

Chlamydia infections can effectively be treated with antibiotics, which stop the infection, but sometimes the damage caused by the infection is irreversible. Therefore, treatment is most effective when delivered as soon as possible after exposure. Repeated infection is common and can occur if a person’s sex partners have not been treated (14). Chlamydia infection can be prevented by using barrier contraception. In Massachusetts, partners of patients with chlamydia can be treated without needing to be tested to prevent spread of the disease.

Figure 11.1 Public High School Students Who Ever Had Sex by Year



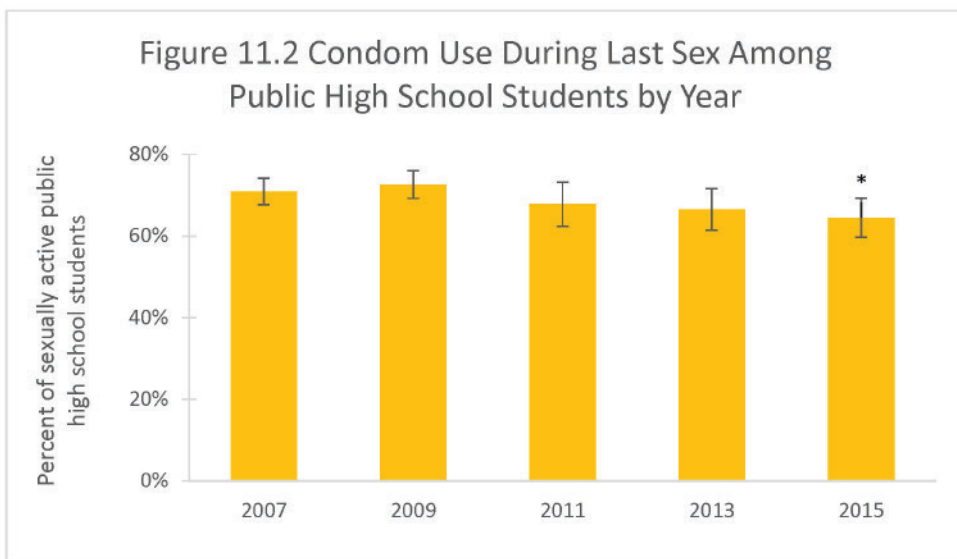
\* Statistically significant change over time for the indicated groups  
 † Data not presented due to insufficient sample size

DATA SOURCE: Youth Risk Behavior Survey (2007, 2009, 2011, 2013, 2015), Centers for Disease Control and Prevention and Boston Public Schools

In 2015, 42% of Boston public high school students had ever had sex. Between 2007 and 2015, the percentage of students who had ever had sex decreased. The percentage of Black and Latino students who had ever had sex also decreased from 2007 to 2015.

In 2015, the percentage of Black (47%) and Latino (47%) students who had ever had sex was higher than the percentage of White students (30%) who had ever had sex.

Figure 11.2 Condom Use During Last Sex Among Public High School Students by Year

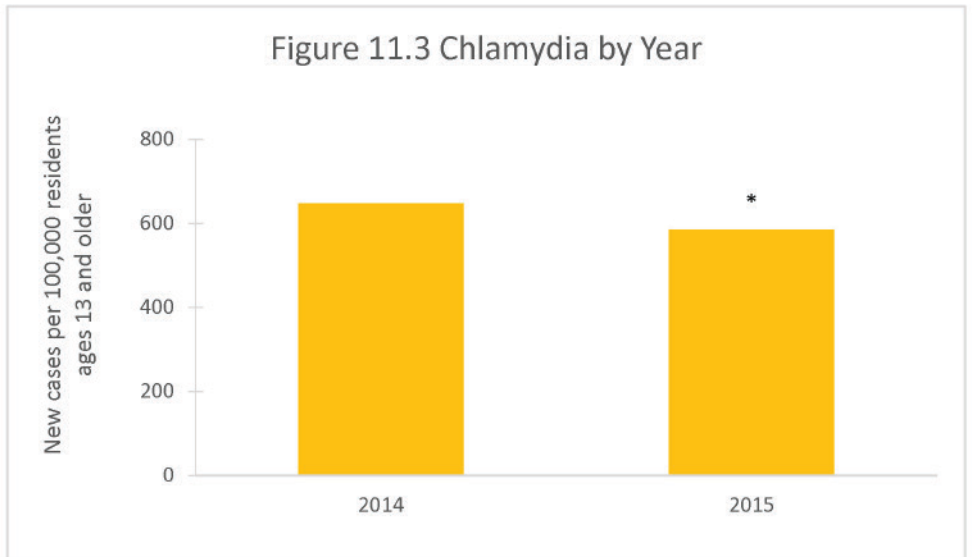


\* Statistically significant change over time

DATA SOURCE: Youth Risk Behavior Survey (2007, 2009, 2011, 2013, 2015), Centers for Disease Control and Prevention and Boston Public Schools

In 2015, 65% of sexually active Boston public high school students used a condom during the last time they had sex. Between 2007 and 2015, this percentage decreased over time.

In 2015, the incidence rate for chlamydia was 585.3 new cases per 100,000 residents ages 13 and older. The incidence rate was 10% lower in 2015 compared with 2014.

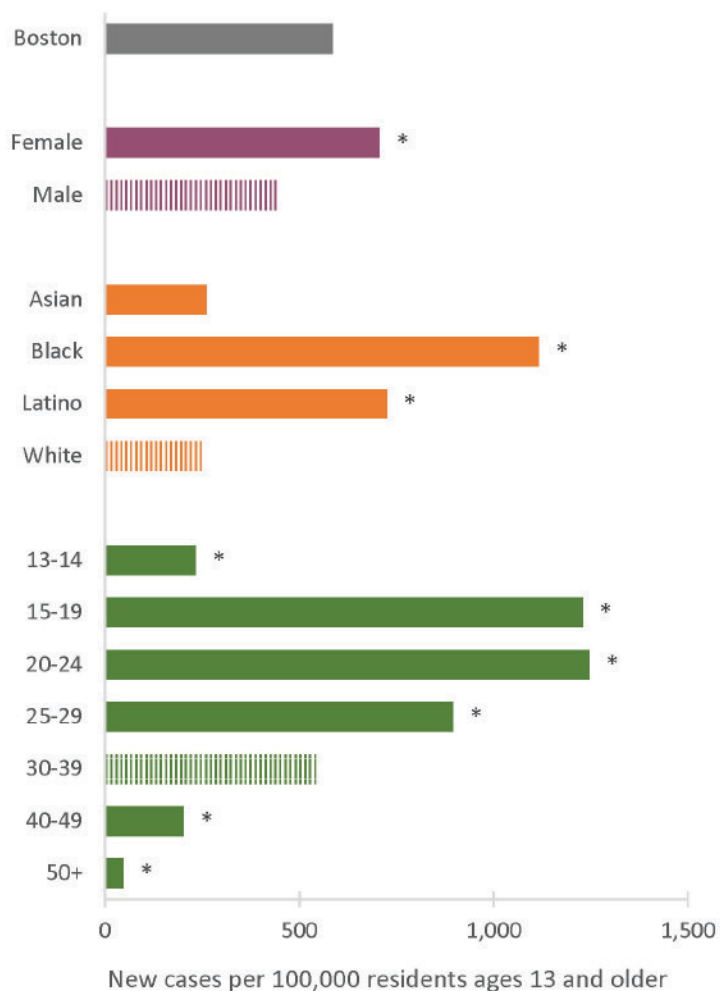


\* Statistically significant change over time

DATA SOURCE: Infectious Disease Bureau, Boston Public Health Commission



Figure 11.4 Chlamydia by Selected Indicators, 2015



In 2015, there were 585.3 new cases of chlamydia per 100,000 residents ages 13 and older. The incidence rate for females (706.9) was 58% higher than the rate for males (446.3). Black (1,116.2) and Latino (725.7) residents experienced higher rates of chlamydia with incidence rates 4.5 times and almost 3 times, respectively, the rate of White residents (248.5).

The incidence rate for chlamydia was higher among residents ages 15-19 (1,229.8), 20-24 (1,246.3), and 25-29 (895.4) compared with residents ages 30-39 (541.4). The incidence rate was lower for residents ages 13-14 (233.8), 40-49 (202.8), and 50 and older (47.7) compared with residents ages 30-39.

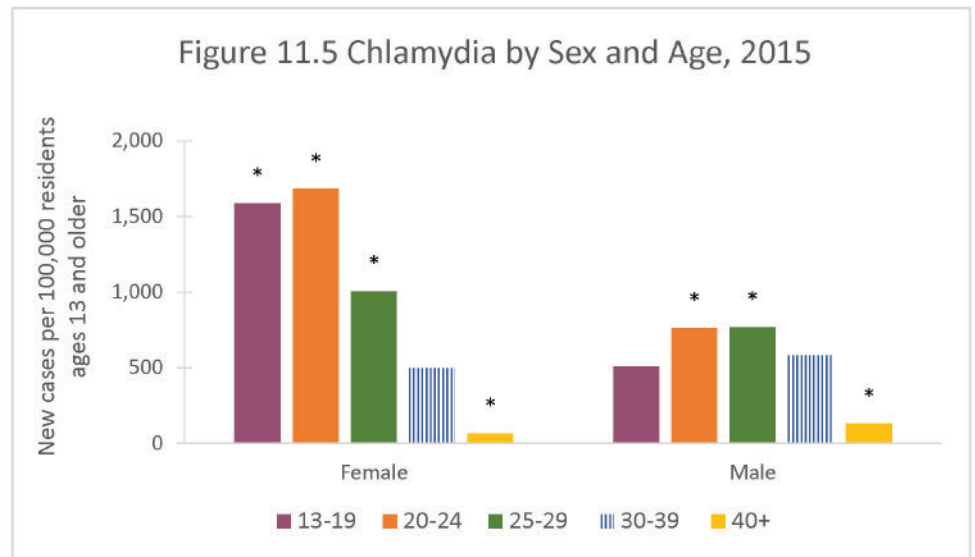
\* Statistically significant difference when compared to reference group

NOTE: Bars with patterns indicate the reference group within each selected indicator.  
 DATA SOURCE: Infectious Disease Bureau, Boston Public Health Commission

Among females, the incidence rate for chlamydia was 3.2, 3.4, and 2.0 times higher respectively, for females ages 13-19 (1,590.2 new cases per 100,000 residents), 20-24 (1,682.7), and 25-29 (1,006.5) compared with those ages 30-39 (496.3). The incidence rate for females ages 40 and older (65.0) was 87% lower than that of females ages 30-39.

Among males, the incidence rate of chlamydia was 30% higher for residents ages 20-24 (762.5), 31% higher for residents ages 25-29 (768.1), and 78% lower for residents age 40 and older (129.4) compared with those ages 30-39 (584.7).

Figure 11.5 Chlamydia by Sex and Age, 2015

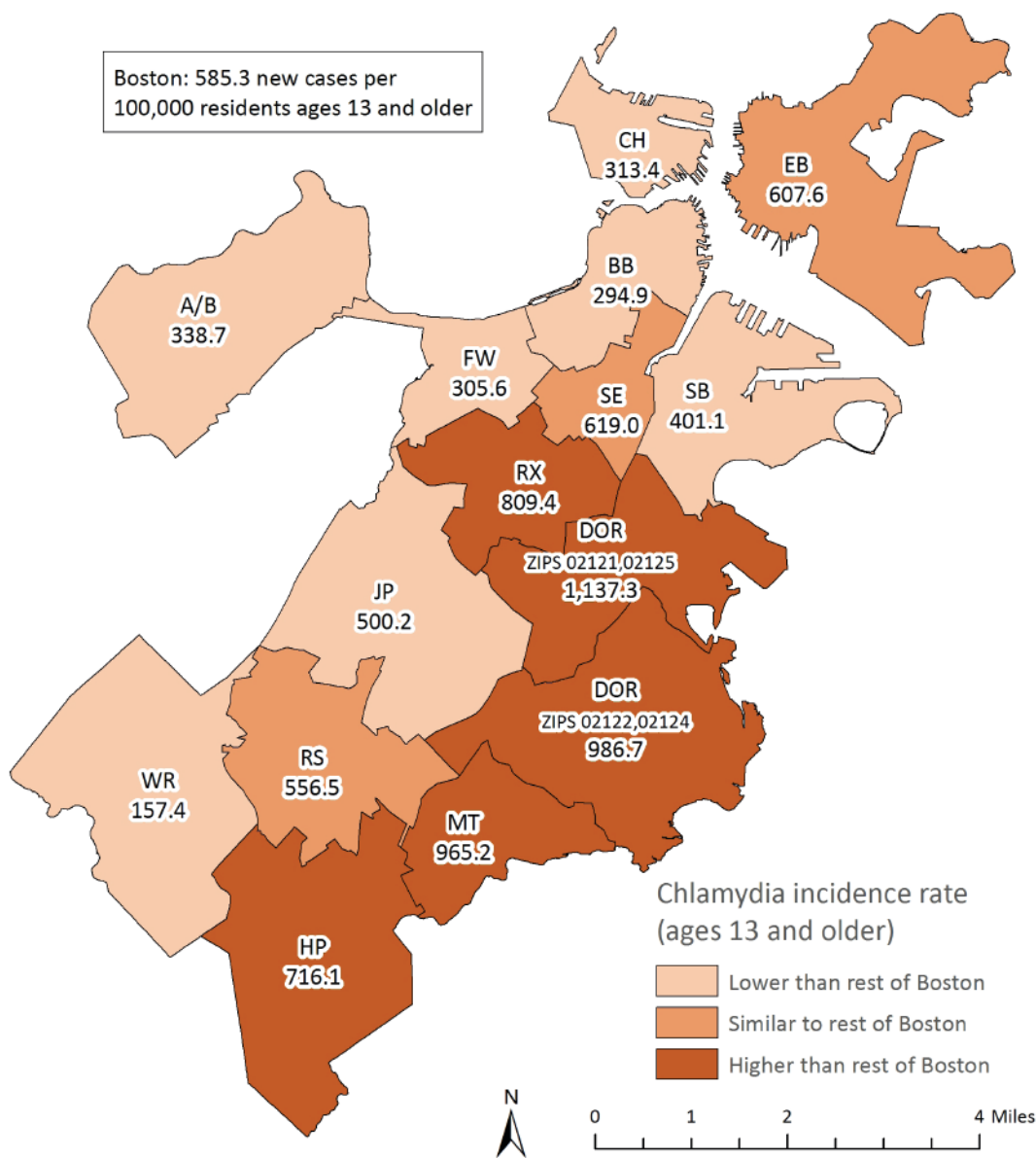


\* Statistically significant difference when compared to reference group

NOTE: Bars with patterns indicate the reference group within each selected indicator.  
 DATA SOURCE: Infectious Disease Bureau, Boston Public Health Commission



### Figure 11.6 Chlamydia Incidence by Neighborhood, 2015



NOTE: "BB" includes the Back Bay, Beacon Hill, Downtown, the North End, and the West End. "SE" includes the South End and Chinatown.

DATA SOURCE: Infectious Disease Bureau, Boston Public Health Commission

In 2015, the incidence rate for chlamydia among Boston residents ages 13 and older was 585.3 new cases per 100,000 residents. The rate of chlamydia was higher among residents in Dorchester (zip codes 02121, 02125), Dorchester (zip codes 02122, 02124), Hyde Park, Mattapan, and Roxbury compared with the rest of Boston. The rate of chlamydia was lower among residents in Allston/Brighton, Back Bay, Charlestown, Fenway, Jamaica Plain, South Boston, and West Roxbury compared with the rest of Boston.

## Gonorrhea

Gonorrhea is a sexually transmitted infection caused by the bacterium *Neisseria gonorrhoea*. It is the second most commonly reported communicable disease in the U.S. (after chlamydia) (15). In 2015, the rate of gonorrhea was 124 per 100,000 people, an increase of 13% since 2014 (3). There was an increase in the rate among both men and women from 2014 to 2015; however, there was a larger increase among males. The rate of gonorrhea also increased in people in every age group among those ages 15 years and older during 2014–2015 (3). As you will see in the following section, trends in gonorrhea infection are slightly different in Boston as compared to the nation as a whole.

### Symptoms and health effects

Many infections are asymptomatic; however, symptoms can include sore throat, painful urination, or abnormal vaginal/urethral discharge. Symptoms among women are generally mild and may be mistaken for bladder or vaginal infections. Men sometimes experience testicular pain or pain with urination. If left untreated, gonorrheal infection can lead to several serious complications including joint infections, pelvic inflammatory disease, infertility, and ectopic pregnancies. Transmission of infection to newborns is possible during childbirth, which can result in blindness, joint infection, and blood infection. In addition, people with untreated gonorrhea are at higher risk of becoming infected with HIV (16).

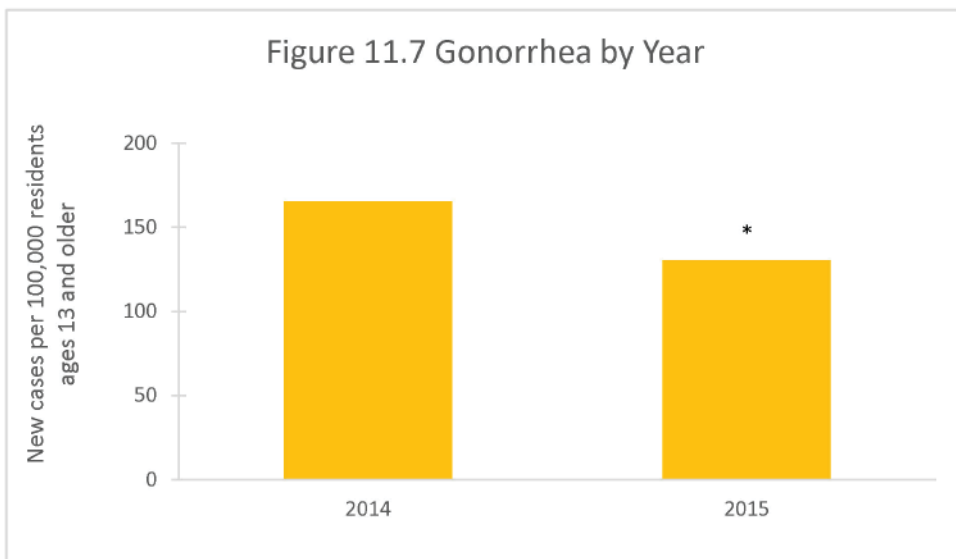
### Screening and treatment

The prevalence of gonorrhea varies widely among communities and populations. In Boston, healthcare providers are urged to consider local patterns of infection when making screening decisions, including targeted screening of all sexually active women under age 25, those who have unprotected sex with multiple partners, and pregnant women (2).

A laboratory test is usually necessary to diagnose gonorrhea (16). Gonorrhea can be effectively treated with antibiotics. Evidence indicates that patients with gonorrhea are frequently co-infected with chlamydia. For this reason, CDC recommends treating both conditions simultaneously (2). Many strains of gonorrhea have developed resistance to antibiotics, making it even more important to be retested for gonorrhea following treatment (16).



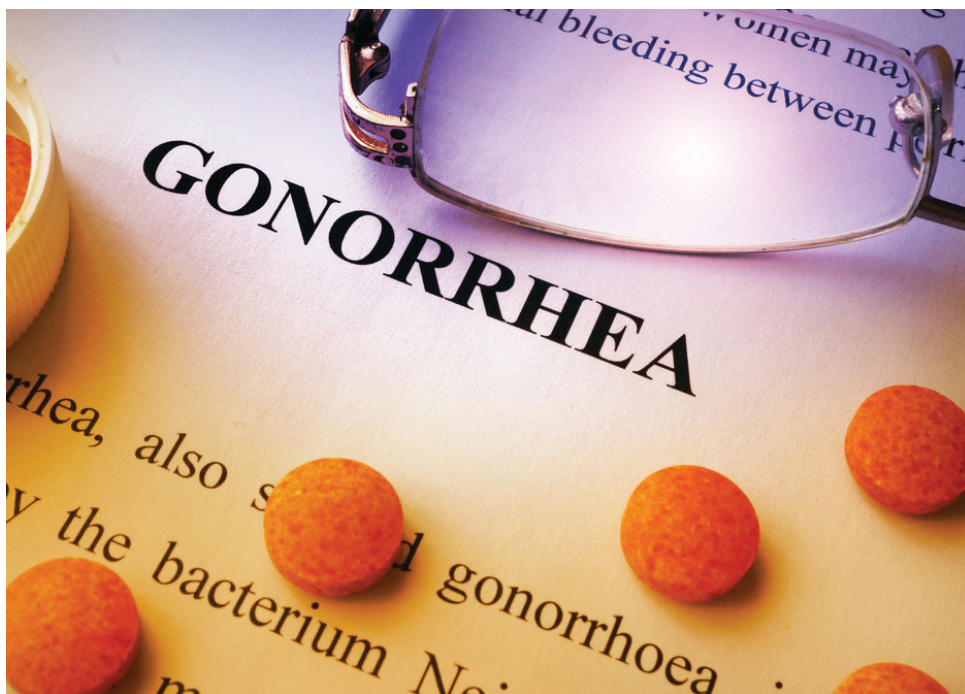
Figure 11.7 Gonorrhea by Year



\* Statistically significant change over time

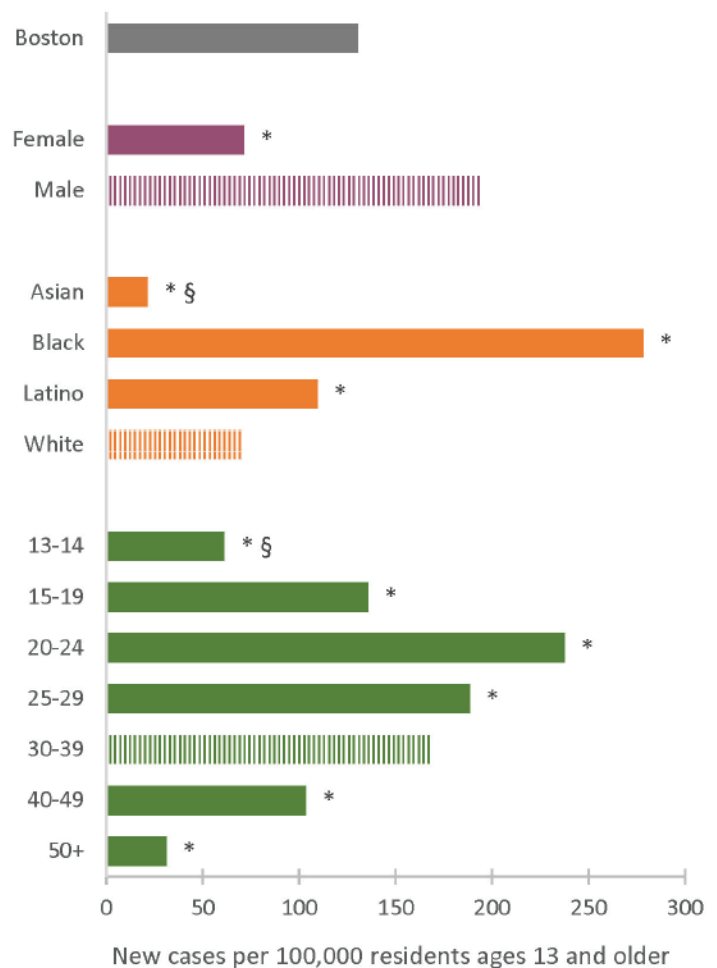
DATA SOURCE: Infectious Disease Bureau, Boston Public Health Commission

In 2015, the incidence rate for gonorrhea was 130.2 new cases per 100,000 residents ages 13 and older. The incidence rate was 21% lower in 2015 compared with 2014.



In 2015, there were 130.2 new cases of gonorrhea per 100,000 residents ages 13 and older. The incidence rate for females was 63% lower than the rate for males. Black and Latino residents experienced incidence rates of gonorrhea, 278.4 and 109.5 respectively, that were higher than that of White residents (70.4), while the rate for Asian residents (21.5) was lower than that of White residents. The rate for Black residents was 4.0 times the rate of White residents. The rate for Latino residents was 56% higher, and the rate for Asian residents was 70% lower than White residents. The incidence rate was highest among residents ages 20-24 (237.5) with a rate 41% higher than the rate for residents ages 30-39 (168.6). Compared with residents ages 30-39, the incidence rate for gonorrhea was lower for residents ages 13-15 (61.0), 40-49 (103.5) and 50 and older (31.2).

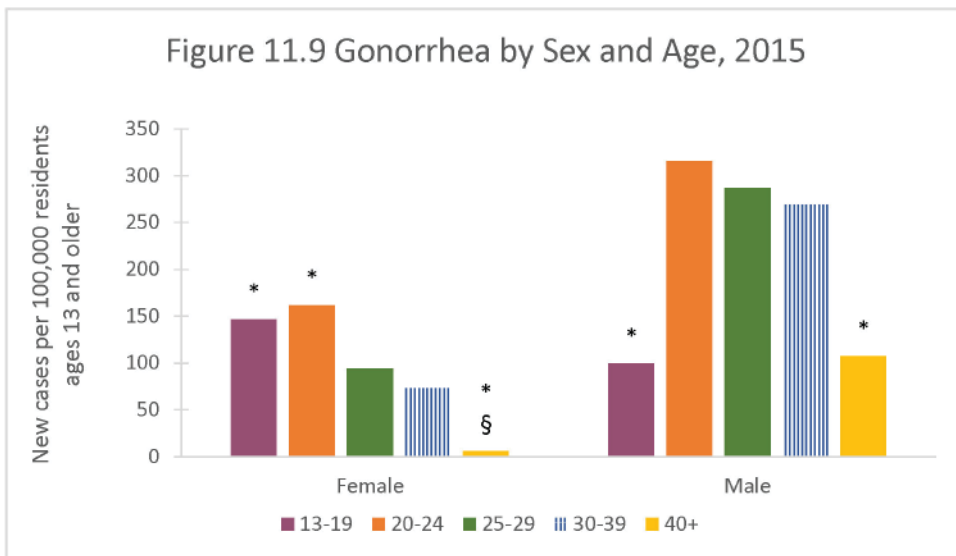
Figure 11.8 Gonorrhea by Selected Indicators, 2015



\* Statistically significant difference when compared to reference group  
 § Rates are based on 20 or fewer cases and should be interpreted with caution.

NOTE: Bars with patterns indicate the reference group within each selected indicator.  
 DATA SOURCE: Infectious Disease Bureau, Boston Public Health Commission

Figure 11.9 Gonorrhea by Sex and Age, 2015



\* Statistically significant difference when compared to reference group  
 § Rates are based on 20 or fewer cases and should be interpreted with caution.

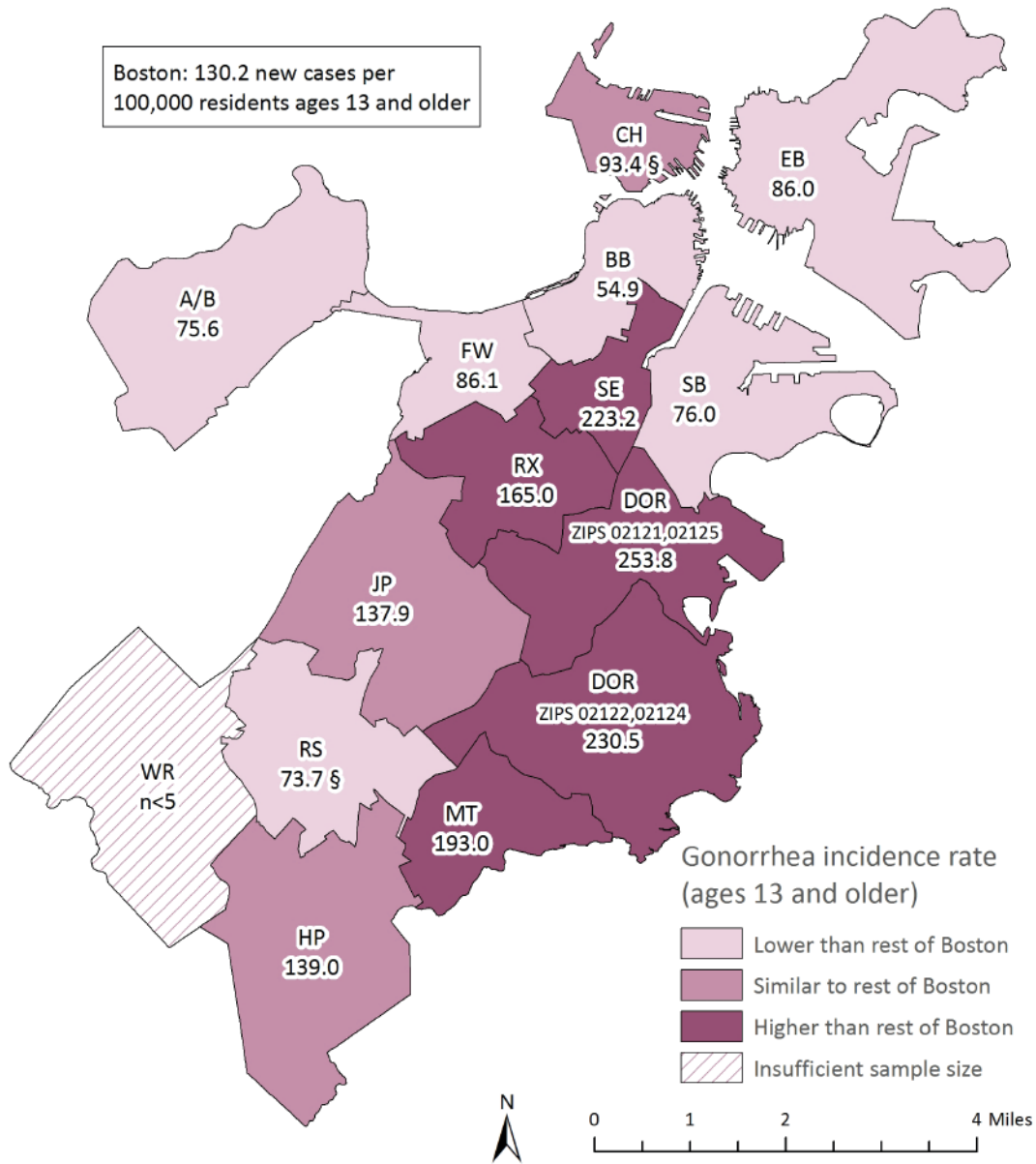
NOTE: Bars with patterns indicate the reference group within each selected indicator.  
 DATA SOURCE: Infectious Disease Bureau, Boston Public Health Commission

Among females, the incidence rate for gonorrhea was 2.0 and 2.2 times higher respectively, for residents ages 13-19 (146.8 new cases per 100,000 residents) and 20-24 (161.8) compared with those ages 30-39 (73.7). The incidence rate for females ages 40 and older (6.3) was 91% lower than that of females ages 30-39.

Among males, the incidence rate of gonorrhea was 63% and 60% lower respectively, for residents under age 20 (99.5) and age 40 and older (107.5) compared with those ages 30-39 (269.3).



### Figure 11.10 Gonorrhea Incidence by Neighborhood, 2015



§ Rates are based on 20 or fewer cases and should be interpreted with caution.

NOTE: "BB" includes the Back Bay, Beacon Hill, Downtown, the North End, and the West End.  
 "SE" includes the South End and Chinatown.

DATA SOURCE: Infectious Disease Bureau, Boston Public Health Commission

In 2015, the incidence rate for gonorrhea among Boston residents was 130.2 new cases per 100,000 residents ages 13 and older. The rate of gonorrhea was higher among residents in Dorchester (zip codes 02121, 02125), Dorchester (zip codes 02122, 02124), Mattapan, Roxbury, and the South End compared with the rest of Boston. The rate of gonorrhea was lower among residents in Allston/Brighton, Back Bay, East Boston, Fenway, Roslindale, and South Boston compared with the rest of Boston.

## HIV/AIDS

Human immunodeficiency virus (HIV) is a virus that affects the CD4 cells of the immune system and can eventually lead to acquired immunodeficiency syndrome (AIDS). Overtime HIV destroys the CD4 cells (or T cells), preventing the body from fighting off infections. Once infected, the body does not get rid of HIV. This means that HIV is considered an incurable infection (17).

Today, over a million people in the U.S. are living with HIV, and nearly a half million have developed AIDS. About 40,000 infections are diagnosed each year (18). Between 2005 and 2014, the annual number of new HIV diagnoses declined 19% (18). It is estimated that about 1 in 8 individuals with HIV are unaware they have the infection, the majority being those between the ages of 13-24 years (19).

In July 2015, the National HIV/AIDS Strategy (NHAS) was updated to provide new goals for the next five years, including decreasing the number of new HIV diagnoses by at least 25% by the year 2020. The NHAS will measure progress towards decreasing new HIV infections by using HIV diagnosis as an indicator (18).

### Transmission and progression of disease

Transmission of HIV occurs when bodily fluids from an infected person come into contact with mucous membranes (found inside the vagina, penis, rectum, or mouth), damaged tissue, or blood stream of an uninfected person. Examples of bodily fluids that carry the virus include blood, semen, vaginal fluids, rectal fluids, and breast milk (20).

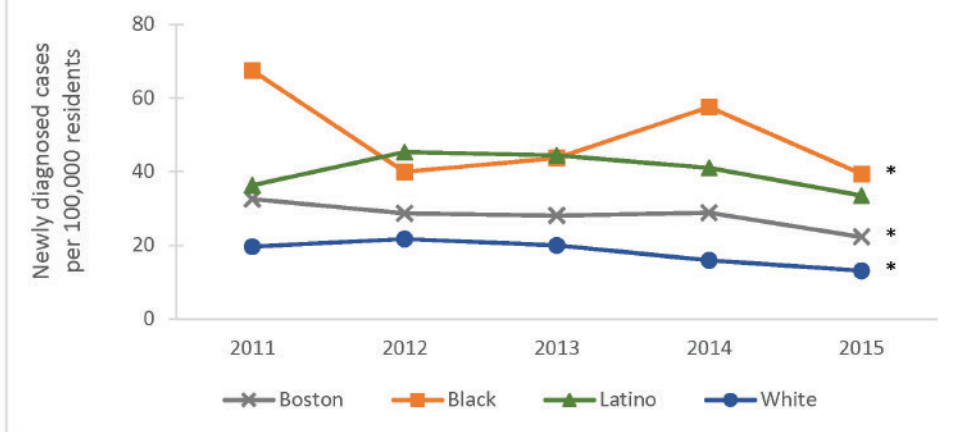
Within two to four weeks of HIV infection, acute retroviral syndrome can develop, which may or may not have symptoms similar to a common cold (17). During this early stage of infection, large amounts of HIV are produced in the body and one's ability to spread the infection is very high. Eventually, the immune system will stabilize the amount of virus in the body. The next stage of HIV infection is known as clinical latency, in which HIV reproduces at very low levels. Depending upon response to treatment, clinical latency can last several decades. Over time, the viral load in the body begins to rise again, and the CD4 cell count begins to drop. This final stage of HIV infection is known as AIDS when the number of CD4 cells falls below 200 cells per cubic millimeter of blood [200 cells/mm<sup>3</sup>] (normal CD4 counts are between 500 and 1,600 cells/mm<sup>3</sup>) (17). AIDS can also be defined by a person developing one or more opportunistic infections. Opportunistic infections take advantage of the weakened immune system and cause serious health consequences in people with HIV infection. Examples of opportunistic infections include fungal infections, tuberculosis, and pneumonia (17).

### Prevention, screening and treatment

Prevention of HIV infection is possible through consistent condom use during sex, refraining from needle sharing during intravenous drug use, and avoiding breastfeeding if infected. CDC recommends HIV screening for all persons who seek evaluation and treatment of STIs (21). Screening can also be performed at home with HIV test kits that are available over-the-counter. Although there is no cure for HIV infection, people can live long, productive lives with antiretroviral therapy (ART) and preventive treatment for opportunistic infections (17).



Figure 11.11 Newly Diagnosed Cases of HIV by Race/Ethnicity and Year of Diagnosis



\* Statistically significant change over time

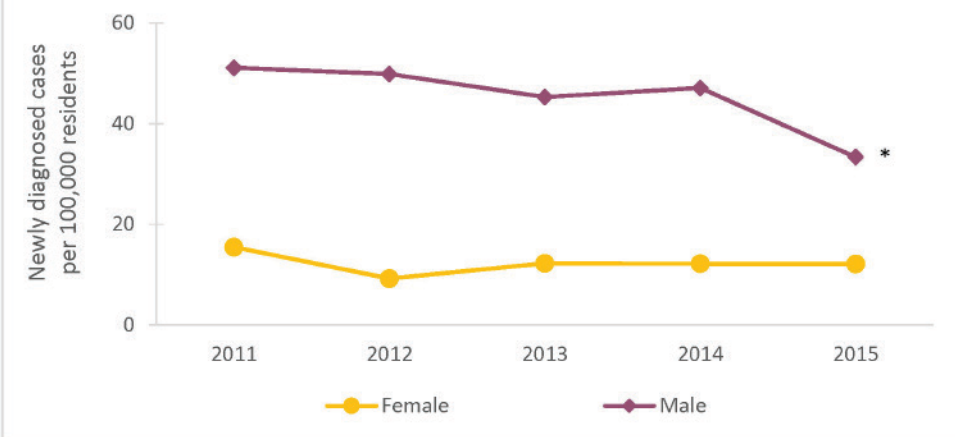
NOTE: Rates are not presented due to a small number of cases for Asian residents. Prisoners were excluded from these data.

DATA SOURCE: HIV/AIDS Surveillance Program, Massachusetts Department of Public Health

In 2015, the incidence rate for newly diagnosed HIV was 22.3 new cases per 100,000 Boston residents. Between 2011 and 2015, the incidence rate decreased by 25% for Boston overall. During the same time period, the incidence rate decreased for both Black and White residents, 27% and 34%, respectively. There was no significant change over time for Latino residents.

In 2015, the incidence rate for Black residents (39.4) was 3.0 times the rate for White residents (13.1). The incidence rate for Latino residents (33.5) was 2.6 times the rate for White residents.

Figure 11.12 Newly Diagnosed Cases of HIV by Sex and Year of Diagnosis



\* Statistically significant change over time

NOTE: Prisoners were excluded from these data.

DATA SOURCE: HIV/AIDS Surveillance Program, Massachusetts Department of Public Health

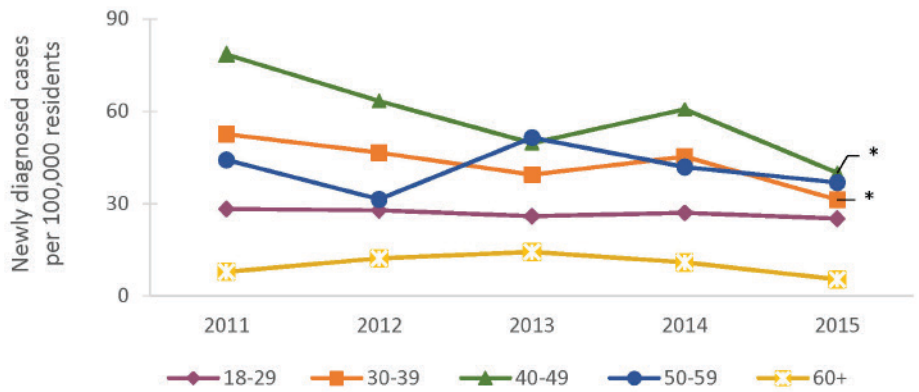
Between 2011 and 2015, the incidence rate for newly diagnosed HIV among male residents decreased by 29%. There was no significant change over time for female residents during the same time period.

In 2015, the HIV incidence rate for female residents was 12.1 new cases per 100,000 residents, which was 64% lower than that of male residents (33.3).

Between 2011 and 2015, the incidence rate for newly diagnosed HIV decreased by 34% for residents ages 30-39 and by 42% for residents ages 40-49.

In 2015, the rate for 18- to 29-year-olds was 25.2 new cases per 100,000 residents. In comparison to those ages 18-29, the incidence rate was 59% higher for 40- to 49-year-olds (40.0) and 79% lower for those ages 60 and older (5.4).

Figure 11.13 Newly Diagnosed Cases of HIV by Age at Diagnosis and Year of Diagnosis



\* Statistically significant change over time

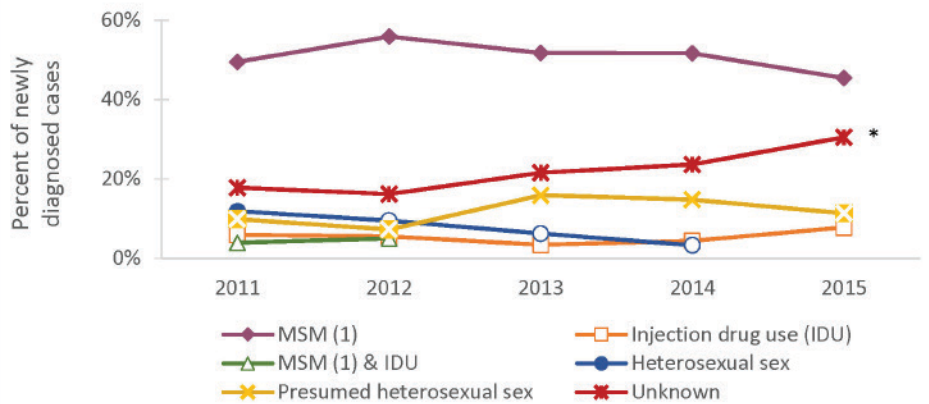
NOTE: HOLLOWED-OUT symbols represent rates based on 20 or fewer cases and should be interpreted with caution. Rates are not presented due to a small number of cases for residents ages 0-17. Prisoners were excluded from these data.

DATA SOURCE: HIV/AIDS Surveillance Program, Massachusetts Department of Public Health

From 2011 to 2015, HIV infections acquired from an unknown mode of transmission increased by 79%.

In 2015, the mode of transmission of 45% of all newly diagnosed cases of HIV in Boston was men who have sex with men (MSM). Thirty-one percent of cases were reported as an unknown mode of transmission, 11% were through presumed heterosexual sex, and 8% were from injection drug use.

Figure 11.14 Newly Diagnosed Cases of HIV by Mode of Transmission and Year of Diagnosis



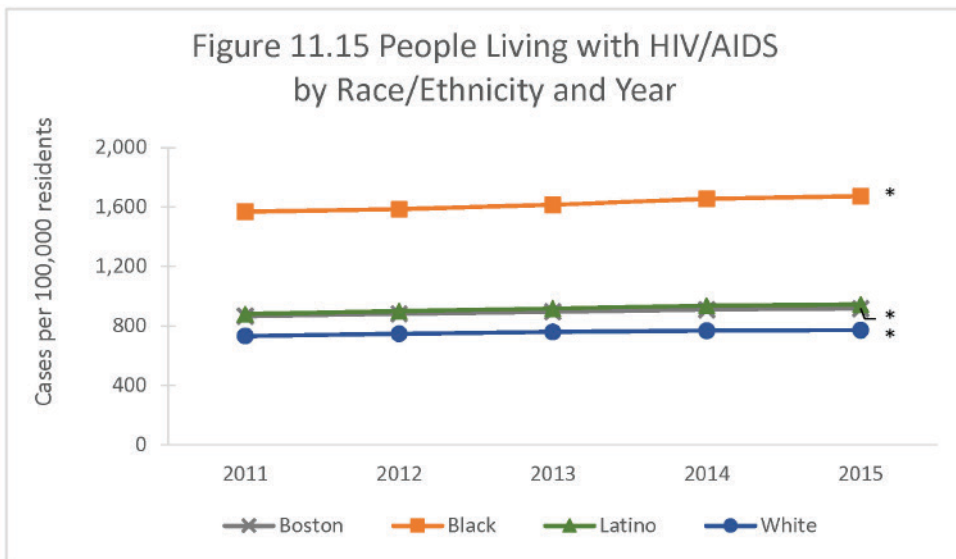
\* Statistically significant change over time  
(1) Men who have sex with men

NOTE: HOLLOWED-OUT symbols represent percentages based on 20 or fewer cases and should be interpreted with caution. Percentages are not presented due to a small number of cases for MSM & IDU transmission for 2013-2015 and heterosexual sex transmission for 2015. Prisoners were excluded from these data.

DATA SOURCE: HIV/AIDS Surveillance Program, Massachusetts Department of Public Health



Figure 11.15 People Living with HIV/AIDS by Race/Ethnicity and Year



\* Statistically significant change over time

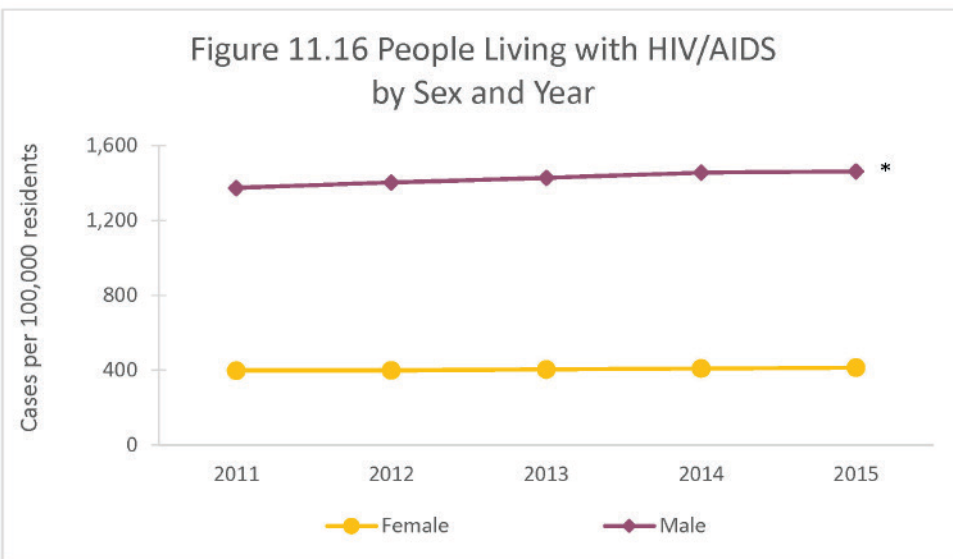
NOTE: Rates are not presented due to a small number of cases for Asian residents. Prisoners were excluded from these data.

DATA SOURCE: HIV/AIDS Surveillance Program, Massachusetts Department of Public Health

In 2015, the prevalence rate for people living with HIV/AIDS in Boston was 915.4 cases per 100,000 Boston residents. Between 2011 and 2015, the rate increased by 6% for Boston overall. During the same time period, the rate increased 7% for Black residents and 6% for White residents. There was no significant change over time for Latino residents.

In 2015, the prevalence rate for Black residents (1,672.4) was 2.2 times the rate for White residents (771.2). The prevalence rate for Latino residents (944.0) was 1.2 times the rate for White residents.

Figure 11.16 People Living with HIV/AIDS by Sex and Year



\* Statistically significant change over time

NOTE: Prisoners were excluded from these data.

DATA SOURCE: HIV/AIDS Surveillance Program, Massachusetts Department of Public Health

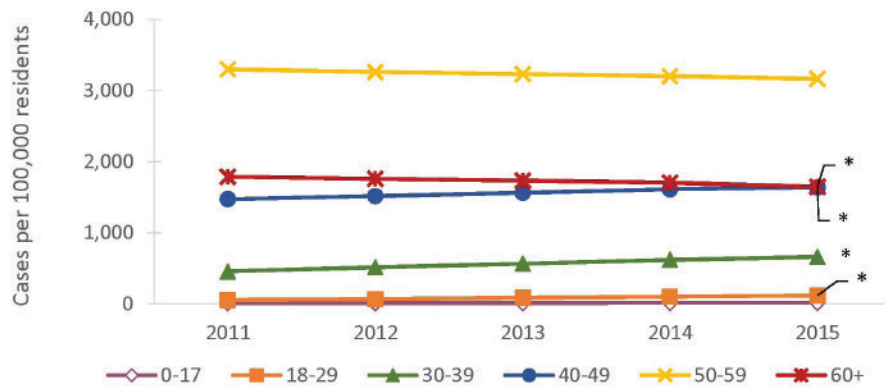
Between 2011 and 2015, the prevalence rate for male residents living with HIV/AIDS increased by 7%. There was no significant change over time for female residents.

In 2015, the rate of HIV/AIDS for female residents was 414.5 cases per 100,000 residents, which was 72% lower than the rate for male residents (1,461.9).

Between 2011 and 2015, the prevalence rate for people living with HIV/AIDS increased for residents ages 18-29, 30-39, and 40-49. The greatest change over time was among the 18- to 29-year-olds with an increase of 109%. The rate decreased by 8% for residents ages 60 and older.

In 2015, the rate of HIV/AIDS among 18- to 29-year-olds was 118.3 cases per 100,000 residents. In comparison to residents ages 18-29, the rate was higher for all of the older age groups. The greatest difference was seen among residents ages 50-59 (3,163.9) with a rate 27 times the rate for 18- to 29-year-olds. The rate of HIV/AIDS among residents under age 18 (12.3) was 90% lower than the rate for 18- to 29-year-olds.

Figure 11.17 People Living with HIV/AIDS by Age and Year



\* Statistically significant change over time

NOTE: Hollowed-out symbols represent rates based on 20 or fewer cases and should be interpreted with caution. Prisoners were excluded from these data.

DATA SOURCE: HIV/AIDS Surveillance Program, Massachusetts Department of Public Health

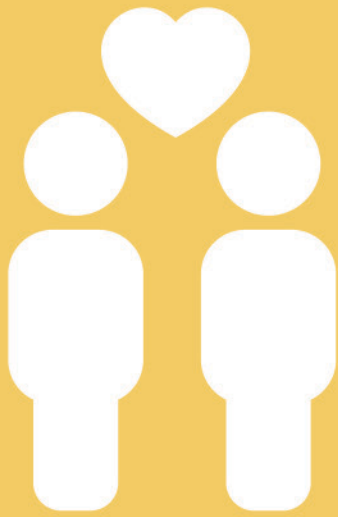


## Summary

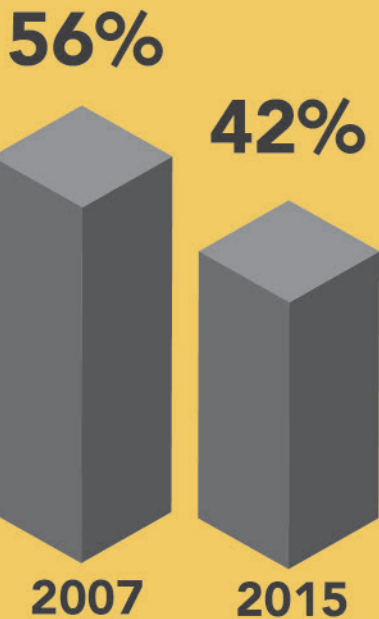
The City of Boston experienced significant reductions in the incidence rates for chlamydia and gonorrhea from 2014 to 2015 and for HIV from 2011 to 2015. The reduction in the rate of HIV is explained by the 27% decline in the incidence rates observed for Black residents and the 34% decline for White residents, across the same time period. However, racial and ethnic inequities continue to persist, as the incidence rates for chlamydia, gonorrhea, and HIV in 2015 among Boston residents were consistently higher in Black and Latino residents in comparison with White residents. Sex and age inequities also vary by health outcome. Among Boston residents, incidence rates for both chlamydia and gonorrhea in 2015 were higher in individuals ages 20-24 in comparison with individuals ages 30-39. While the incidence rate for HIV from 2011 to 2015 declined by 29% for men and by 42% for individuals ages 40-49, these subgroups continued to have higher incidence rates of HIV in 2015 in comparison with women and individuals ages 18-29. At the neighborhood level, Dorchester (zip codes 02121, 02125), Dorchester (zip codes 02122, 02124), Mattapan, and Roxbury experienced elevated incidence rates for both chlamydia and gonorrhea.

Findings from the 2007 to 2015 Boston Youth Risk Behavior Summary indicate that there was a significant reduction in the percentage of Boston public high school students that reported ever having sex. Significant reductions were also observed for both Black and Latino students over the same time period. Among all Boston public high school students, condom use during the last time having sex also decreased over the same time period. Reducing the risk of becoming infected should remain the goal of STI prevention strategies. Strategies should include efforts to increase the use of condoms.

# Sexual Health



**% of Boston public high school students who reported ever having sex decreased**



**10%**  
decrease in chlamydia incidence rate



**21%**  
decrease in gonorrhea incidence rate



**25%**  
decrease  
in HIV  
incidence  
rate from  
2011 to  
2015

## Our Point of View: Thoughts from public health

### Striving for sexual health

By Stewart Landers  
JSI Research & Training Institute

Let's talk about sex, and more importantly sexual health. According to the World Health Organization, "Sexual health is a state of physical, mental and social well-being in relation to sexuality. It requires a positive and respectful approach to sexuality and sexual relationships, as well as the possibility of having pleasurable and safe sexual experiences, free of coercion, discrimination and violence."<sup>1</sup> Whatever your orientation – straight, gay, lesbian, bisexual, transgender, queer, or asexual – it is important to strive for sexual health and well-being. Becoming infected with a sexually transmitted infection (STI) can have a big impact on the health and wellbeing of sexually active residents of the city of Boston.

For many years, Chlamydia<sup>2</sup> has been the most commonly occurring STI in Boston. It affects women more than men, with the highest rates for both men and women in people ages 15-19. Sexual contact that is vaginal, oral, or anal (with or without ejaculate/semen) can transmit the disease, and a pregnant mother with chlamydia can transmit the disease to her newborn child. The good news is condoms, used correctly every time, can prevent transmission, and Chlamydia is treatable. Remember – Chlamydia often has no symptoms so it's important to detect and treat<sup>3</sup> Chlamydia early to prevent any side effects.

The second most commonly transmitted STI among Boston residents is gonorrhea. In general, gonorrhea is more common among males. However, in Boston, young females (ages 15-19) have higher rates than young males. Gonorrhea rates have been trending slightly higher in the city and, disturbingly, there has been a steady increase across the United States in antibiotic resistant gonorrhea, potentially making some cases more difficult to treat. If you are getting checked out for either Chlamydia or gonorrhea, you should probably get checked for both at the same time. While syphilis is less common than either Chlamydia or gonorrhea, it has also been increasing over the past decade, especially in some of the nation's largest cities. It is present in Boston, and male-to-male sexual contact has been a major driver of increased syphilis cases.<sup>4</sup>

Lastly HIV and AIDS has been a serious issue affecting sexual health and well-being of many Bostonians since the early 1980s. While no cure exists, there have been major advances in both prevention and treatment of the disease that has substantially changed its impact. For example, pre-exposure prophylaxis or "PrEP" is a pill that can be taken daily by someone at risk for HIV infection. PrEP can greatly reduce the chances of becoming infected with HIV. Any STI clinic or medical provider can give you more information about PrEP and provide help deciding if it's right for you<sup>5</sup>. Treatment for HIV can be very effective, especially treatment that begins before the virus causes serious health issues. Get screened for HIV if you are sexually active or use needles to inject drugs. If you are HIV positive, be sure to see a medical provider and get treatment for HIV and AIDS and stay on your medications.<sup>6</sup> All people deserve a healthy and fulfilling sex life. By becoming knowledgeable and taking action to prevent or treat STIs, it is possible.

<sup>1</sup> [http://www.who.int/topics/sexual\\_health/en/](http://www.who.int/topics/sexual_health/en/) Accessed online 3/3/17

<sup>2</sup> <https://www.cdc.gov/std/chlamydia/stdfact-chlamydia.htm> Accessed online 3/3/17

<sup>3</sup> <https://www.cdc.gov/std/gonorrhea/arg/default.htm> Accessed online 3/7/17

<sup>4</sup> <https://www.cdc.gov/std/syphilis/stdfact-msm-syphilis.htm> Accessed online 3/6/17.

<sup>5</sup> <http://www.bphc.org/whatwedo/infectious-diseases/Infectious-Diseases-A-to-Z/Documents/Fact%20Sheet%20Languages/PrEP/English.pdf> Accessed online 3/7/17.

<sup>6</sup> <http://www.bphc.org/whatwedo/infectious-diseases/Infectious-Diseases-A-to-Z/Pages/HIV.aspx> Accessed online 3/7/17.

## Our Point of View: Thoughts from a community resident

### A second chance at life

By a community resident

I'm a 53-year-old, college-educated, bi-sexual, Black man. I was diagnosed with HIV in 1999 while I was incarcerated. I was afraid to seek treatment at first because I didn't want anyone to know. I worried if people saw me they would know I was infected. There was still a lot of stigma then.

At the time, I was still on the down low – meaning nobody knew about my sexuality or my status. I had a pretty chaotic childhood. I grew up in the suburbs. We were only the second black family to move there, which was confusing. My dad used to beat my mom up. He was an alcoholic, but I didn't know that then. I was literally afraid to share my true identity, so I turned to drugs.

I spent years in and out of drug treatment and incarceration. My drug addiction and crime went hand in- hand. There were times I tried to take my own life because I couldn't understand why this had happened to me. Eventually jail became my safe haven – no access to drugs, and someone to give me my HIV meds and make sure I couldn't hurt myself. I would commit crimes just to go back.

Eventually life got too complicated. I didn't want to keep living like that. A friend told me about an HIV clinic at Massachusetts General Hospital (MGH). Before that I didn't like going to doctors because they would relate everything back to my HIV, whether it was relevant or not. I used to hold back a lot because I was raised that you don't share your business outside the family, but I met a doctor I really liked at MGH and told him everything.

Slowly I started to open up and began to understand my disease. I started working with people who had similar experiences with HIV and incarceration. I realized that I could help myself by helping them. Before that I didn't realize there were other people out there who were like me. I thought I was alone.

Today, I've been sober for 18 months, and I take my meds every day. I realize now life has more to offer – I have more to offer. I started going back to church. I believe everything happens for a reason. I should have been dead. I almost died twice already and was brought back to life. I'm here for a reason: to share my experience and let people know my goals and aspirations.

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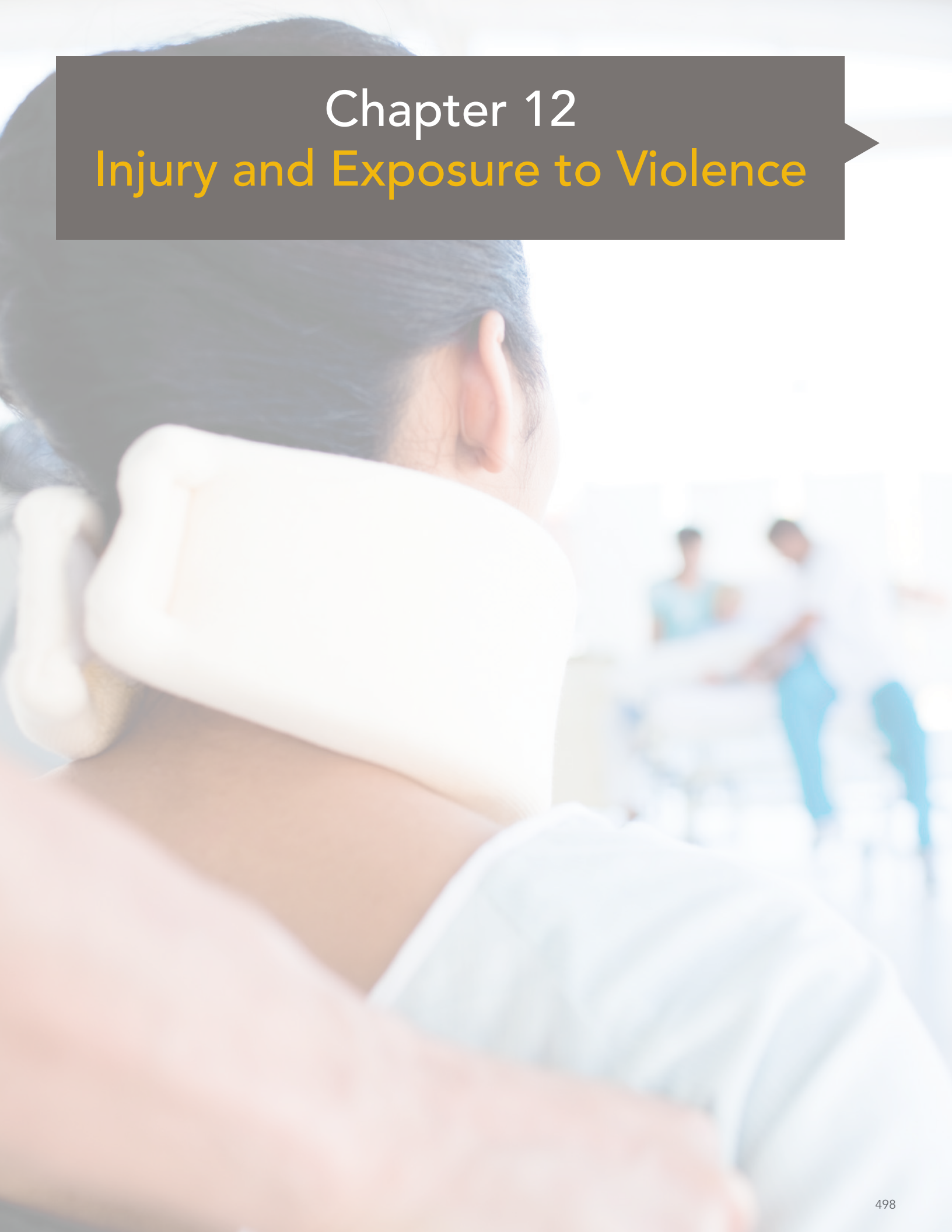
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# Chapter 12

## Injury and Exposure to Violence





# Injury and Exposure to Violence

Injury consists of bodily harm resulting from an individual's actions or inflicted by external agents. Injuries are broadly classified into two categories, intentional and unintentional, which reflect the manner by which an injury occurs. Intentional injuries result from all forms of physical violence (i.e., the use of physical force with the intention of causing death, disability, injury, or harm) (1). Unintentional injuries, historically called "accidents," are the result of unplanned events, many of which are preventable (2). The mechanisms that deliver the injury (e.g. falls, poisonings, and motor vehicle crashes) are often referred to as the cause of the injury. Injuries can also be described by the injured body part or location of the injury (e.g. head injury or traumatic brain injury).

Living in a community with high levels of physical violence and intentional injury can cause people to feel perpetually unsafe and can negatively impact their health. Not feeling safe can lead to prolonged anxiety and depression, less physical activity, and increased social isolation and community distrust (3, 4). Unfortunately, many Boston residents don't feel fully safe in their own neighborhoods. In 2015, 56% of Boston adults reported feeling their neighborhood was only somewhat safe or not safe at all (Figure 12.1). In 2012, 26% of Boston parents reported that they felt their children were sometimes or never safe in the neighborhood in which they live and play (5).

## Intentional Injury/Violence

As stated above, intentional injuries largely result from violence. People of color, women, youth, and people living in low-income communities suffer more physical violence and intentional injury (1). For example, in Boston, Black and Latino residents have higher assault-related injury rates compared with White residents (Figure 12.51 and 12.54). In Boston, as in the United States, Black and Latino individuals also have much higher homicide rates compared with White individuals (6). Violence most often occurs in areas of chronic poverty, community disorganization, and low school connection – in areas where violence seems "normal." Violent acts can be learned behavior in response to environmental influences and social norms. For example, many adolescents who commit violent crimes have previously been victims of violence themselves (7, 8), but this type of behavior can be reversed or not learned at all (9).

Continual exposure to violence, both at home (including on television) and in the community, can lead to desensitization (9-11). Studies have shown that as children are bombarded with images of violence, they are less able to process the information in healthy ways. Internalized stress and conflict may then lead directly to aggression or manifest indirectly in other harmful ways, including substance misuse, learning problems, prolonged anxiety, depression, and disordered eating habits and obesity (12, 13).

Once violence is internalized, adolescents may feel less able to resist pressure from their peers to engage in gang violence, drug use, or petty crime; all of which may further discourage the development of healthy relationships and academic achievement (13, 14). In this manner, violence acts as a contagious infection, spreading through social relationships. One study found youth ages 12-18 were more likely to have been involved in a serious fight if their friends had also been involved in a serious fight. The investigators observed this association up to four degrees of separation (i.e. from friend of friend of friend of friend) (15).

Violence prevention requires comprehensive solutions coming from multiple stakeholders and sectors: public health, law enforcement, the healthcare community, schools, and community-based organizations. Most importantly, prevention efforts must include the families and neighborhoods that are most affected and hold the most power to positively change their environments.

Prevention efforts can focus on the individual-level by helping individuals develop skills to avoid or mitigate violence and on the community-level by strengthening community linkages to create more protective systems (16-18). For instance, school-based programs that reduce aggression by promoting self-knowledge and social skills have been shown to decrease rates of violence among school-aged children and youth (17, 18).

Stopping the cycle of violence also requires changing the social environment in which people live and societal structures such as racism and poverty that inadvertently serve to perpetuate violence. For example, the impact of institutionalized racism within the U.S. educational

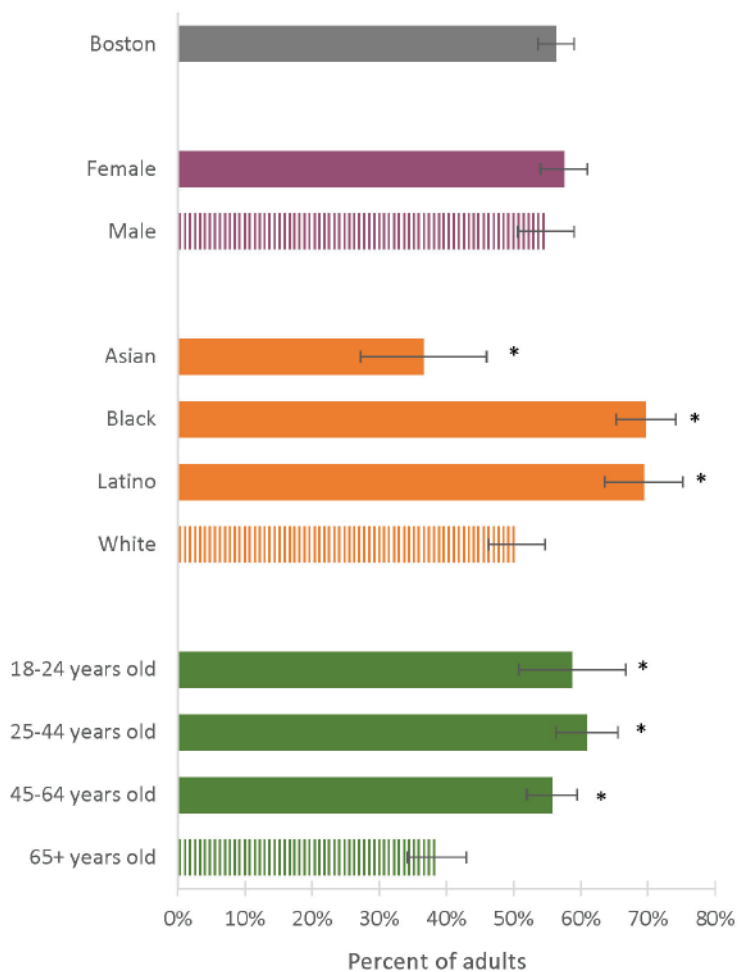
system results in children of color being taught, on average, by less experienced teachers, not having as much access to advanced level courses, and being punished more harshly for the same behaviors as White students. These types of experiences or lack of experiences may contribute to higher high school dropout rates among youth of color, which, in turn, leads to higher rates of unemployment, poverty, and crime, including violent crime resulting in injury (19, 20).

### **Unintentional Injury**

In the U.S., unintentional injuries (including accidental poisonings, motor vehicle crashes, and accidental drowning) were collectively the leading cause of death for individuals ages 1-44 in 2015 (21). Unintentional injuries severely impact older Americans as well. In 2015, approximately 3 million individuals ages 65 and older are treated in emergency departments for fall injuries (22).

Unintentional injuries are considered preventable because the risk of injury is influenced by individual-level factors as well as social, economic, and environmental conditions, and these factors/conditions can be modified (23). For example, communities can reduce injuries to pedestrians, bicyclists and motor-vehicle occupants by creating safer roads and enforcing speed limits (24). Various modifications to the home structure can further protect individuals from unintentional injury within the home. For example, railings and ramps help protect against fall-related injuries among elderly residents (25). Improvements to environmental design, human behavior, education, legislative policy, and regulatory requirements can all help to reduce the levels of unintentional and intentional injuries (2).

Figure 12.1 Adults Who Thought Their Neighborhood Was Not Safe<sup>1</sup>, 2015



\* Statistically significant difference when compared to reference group  
<sup>1</sup> Adults reported that they considered their neighborhood "somewhat safe" or "not safe"

NOTE: Bars with patterns indicate the comparison group within each selected indicator.  
 DATA SOURCE: Boston Behavioral Risk Factor Survey (2015), Boston Public Health Commission

In 2015, 56% of Boston adult residents felt their neighborhood was either somewhat safe or not safe.

The percentage of residents who felt their neighborhood was unsafe was higher for the following groups:

- Black (70%) and Latino (69%) adults compared with White adults (51%)
- Adults ages 18-24 (59%), 25-44 (61%), and 45-64 (56%) compared with those ages 65 and older (39%)

The percentage of adults who felt their neighborhood was unsafe was lower for the following groups:

- Asian adults (37%) compared with White adults (51%)



For 2013 and 2015 combined, 11% of Boston adult residents reported experiencing physical or sexual violence in their lifetime.

Lifetime violence was higher for the following groups:

- Females (15%) compared with males (7%)
- Adults ages 45-64 (13%) compared with those ages 65 and older (10%)

Lifetime violence was lower for the following groups:

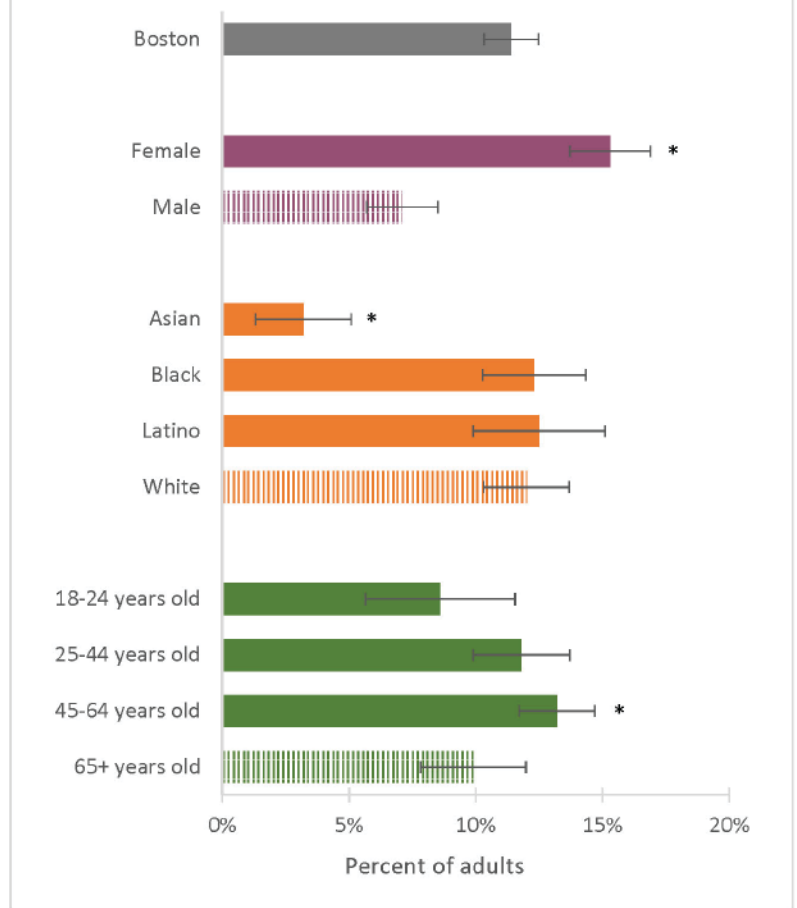
- Asian adults (3%) compared with White adults (12%)

According to the Committee on National Statistics and the Bureau of Justice Statistics, the majority of sexual assaults are not reported.<sup>1,2</sup>

<sup>1</sup> [http://sites.nationalacademies.org/cs/groups/dbassesite/documents/webpage/dbasse\\_085943.pdf](http://sites.nationalacademies.org/cs/groups/dbassesite/documents/webpage/dbasse_085943.pdf)

<sup>2</sup> <https://www.bjs.gov/content/pub/pdf/vnrp0610.pdf>

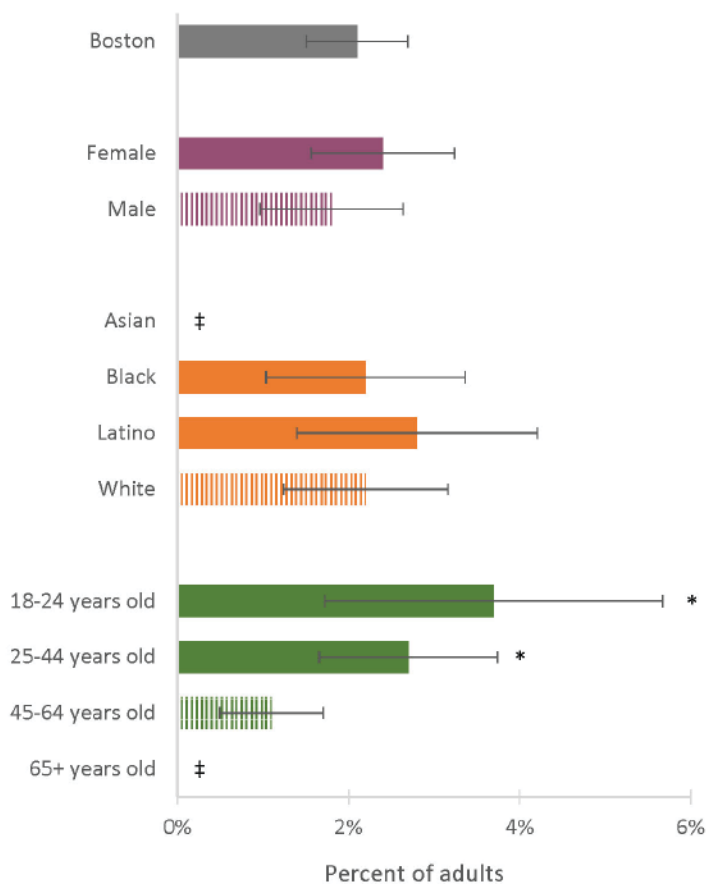
Figure 12.2 Adults Who Experienced Physical or Sexual Violence in Their Lifetime by Selected Indicators, 2013 and 2015 Combined



\* Statistically significant difference when compared to reference group

NOTE: Bars with patterns indicate the comparison group within each selected indicator.  
 DATA SOURCE: Boston Behavioral Risk Factor Survey (2013, 2015), Boston Public Health Commission

Figure 12.3 Adults Who Experienced Physical or Sexual Violence in the Past 12 Months by Selected Indicators, 2013 and 2015 Combined



For 2013 and 2015 combined, 2% of Boston adult residents reported experiencing physical or sexual violence in the past twelve months. Violence in the past year was higher for adults ages 18-24 (4%) and 25-44 (3%) compared with those ages 45-64 (1%).

\* Statistically significant difference when compared to reference group  
 ‡ Data not presented due to insufficient sample size

NOTE: Bars with patterns indicate the comparison group within each selected indicator.  
 DATA SOURCE: Boston Behavioral Risk Factor Survey (2013, 2015), Boston Public Health Commission

In 2015, 7% of Boston adult residents reported having been sexually assaulted in their lifetime.

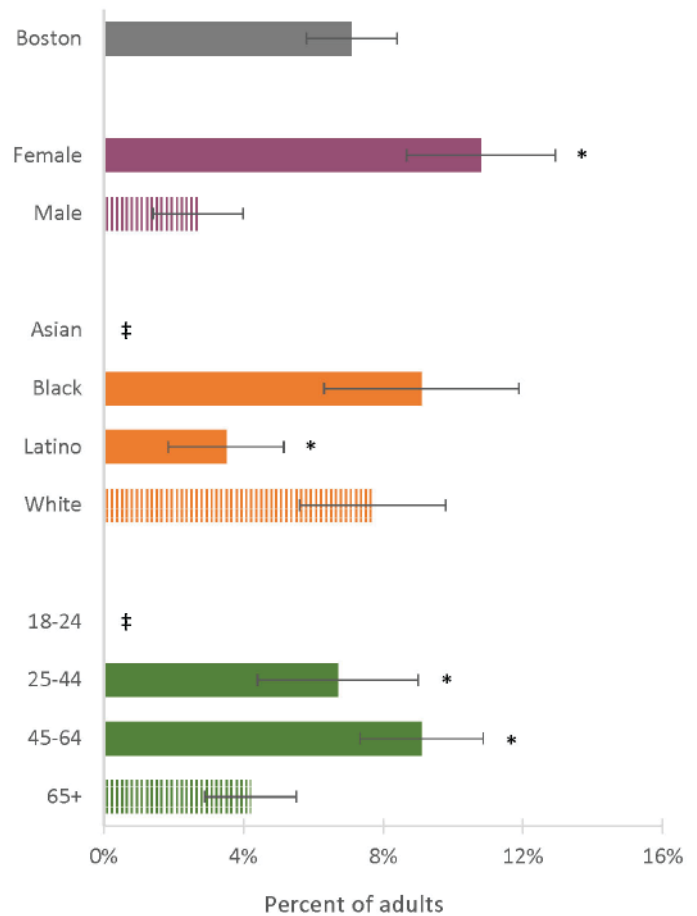
Lifetime sexual assault was higher for the following groups:

- Females (11%) compared with males (3%)
- Adults ages 25-44 (7%) and 45-64 (9%) compared with those ages 65 and older (4%)

Lifetime sexual assault was lower for the following groups:

- Latino adults (4%) compared with White adults (8%)

Figure 12.4 Adults Who Were Sexually Assaulted in Their Lifetime by Selected Indicators, 2015

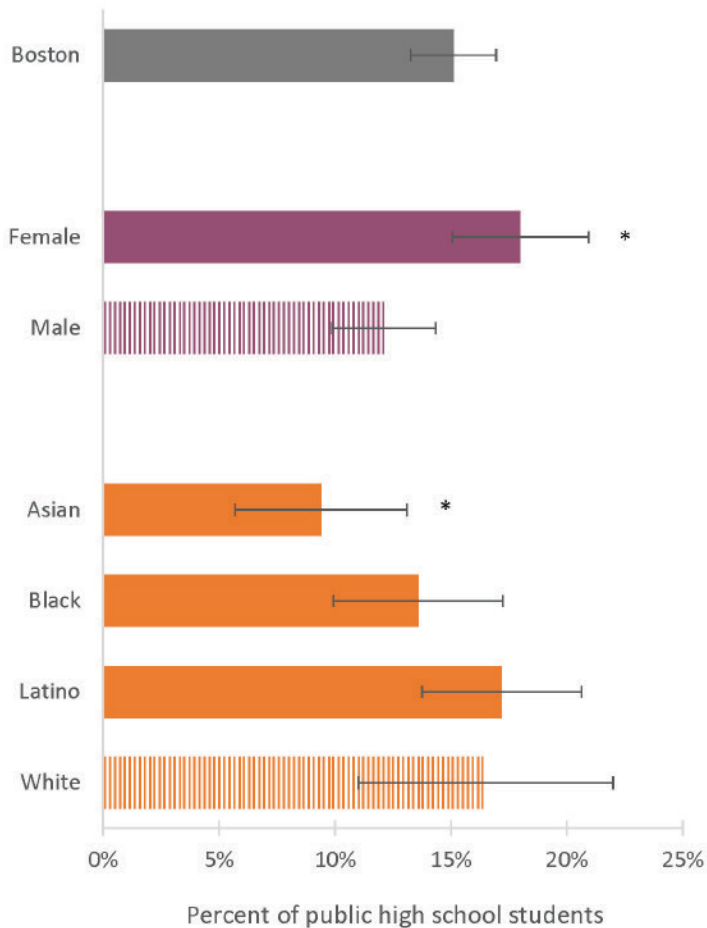


\* Statistically significant difference when compared to reference group  
 ‡ Data not presented due to insufficient sample size

NOTE: Bars with patterns indicate the comparison group within each selected indicator.  
 DATA SOURCE: Boston Behavioral Risk Factor Survey (2015), Boston Public Health Commission



Figure 12.5 Bullied at School or Electronically in the Past 12 Months by Selected Indicators, 2015



\* Statistically significant difference when compared to reference group

NOTE: Bars with patterns indicate the comparison group within each selected indicator.  
 DATA SOURCE: Youth Risk Behavior Survey, 2015, Centers for Disease Control and Prevention

In 2015, 15% of Boston public high school students reported being bullied, either at school or electronically, in the past 12 months. Bullying in the past year was higher for female students (18%) compared with male students (12%), and lower for Asian students (9%) compared with White students (17%).

### Adolescent Bullying

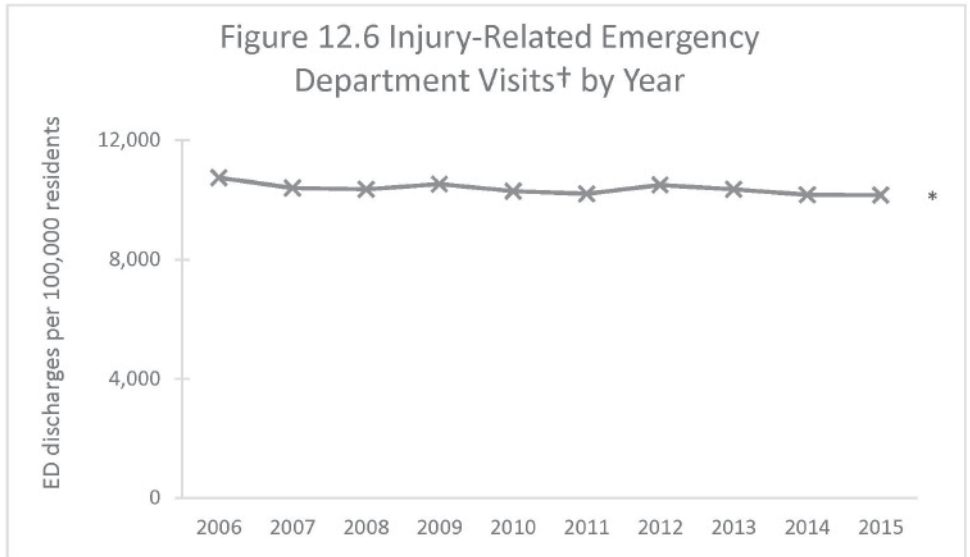
Healthy People 2020 Target: 17.9%

US 2015: 20.2% (18.8-21.7)

MA 2015: 15.6% (14.0-17.4)

Boston 2015: 15.1% (13.3-17)

In 2015, the rate for injury-related emergency department visits in Boston was 10,162.5 per 100,000 residents. Between 2006 and 2015, the rate decreased by 4%.

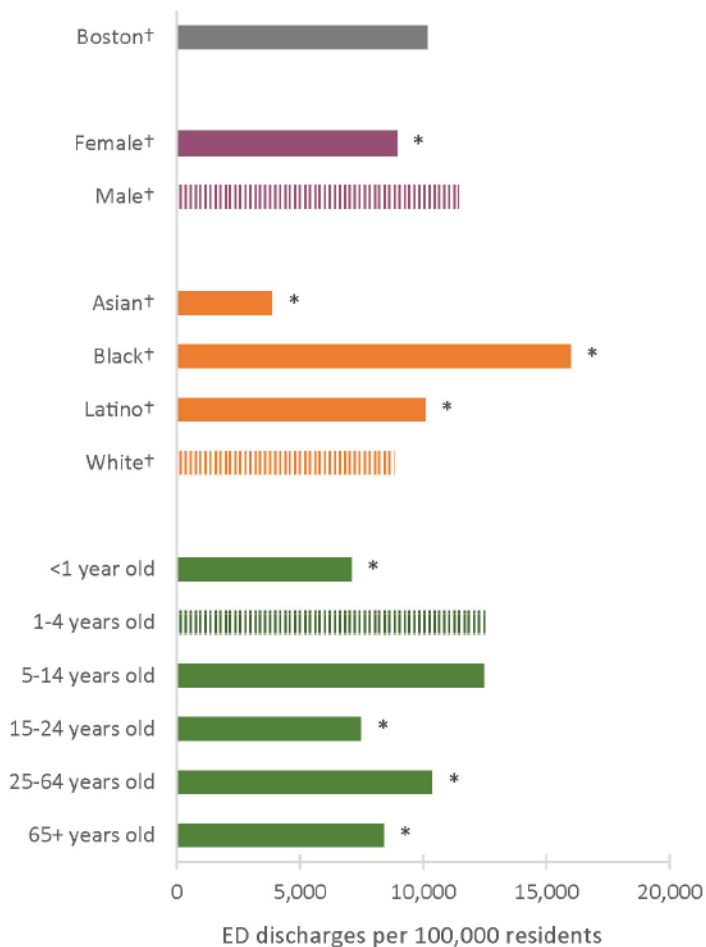


\* Statistically significant change over time  
† Age-adjusted rates per 100,000 residents

NOTE: For injuries, emergency department visits include discharges from the emergency department but exclude care resulting in hospitalizations.  
DATA SOURCE: Acute hospital case-mix databases, Massachusetts Center for Health Information and Analysis



Figure 12.7 Injury-Related Emergency Department Visits by Selected Indicators, 2015



In 2015, the rate of injury-related emergency department visits in Boston was 10,162.5 per 100,000 residents. The rate of injury-related emergency department visits was 22% lower for females (8,921.7) compared with males (11,437.3). The rate for Asian residents (3,865.5) was 56% lower than the rate for White residents (8,806.5). The rate for Black residents (15,965.6) was 81% higher, and the rate for Latino residents (10,085.9) was 15% higher, when compared with White residents. The rates for residents under 1 year of age (7,083.6), ages 15-24 (7,477.6), 25-64 (10,366.5), and 65 and older (8,387.8) were lower than the rates for those ages 1-4 (12,614.8).

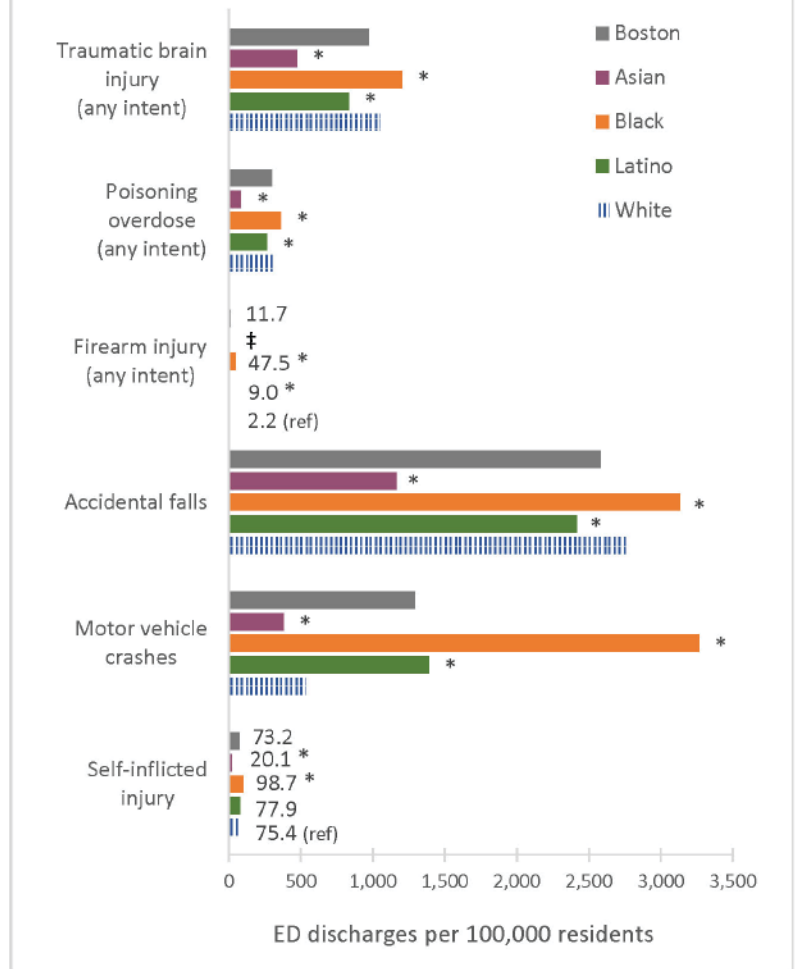
\* Statistically significant difference when compared to reference group  
 † Age-adjusted rates per 100,000 residents

NOTE: Bars with patterns indicate the reference group within each selected indicator. For injuries, emergency department visits include discharges from the emergency department but exclude care resulting in hospitalizations.

DATA SOURCE: Acute hospital case-mix databases, Massachusetts Center for Health Information and Analysis

For 2013-2015, the rate of emergency department visits varied by race/ethnicity for the following selected types of injuries: traumatic brain injury, poisoning/overdose, firearm injuries, accidental falls, motor vehicle crashes, and self-injury. Compared with White residents, the rate was lower for Asian residents for all presented injuries except firearm injury. Black residents had a higher rate for all of the selected injury types compared with White residents. The largest difference was observed for firearm injuries, where the rate for Black residents (47.5 discharges per 100,000 residents) was over 21 times the rate for White residents (2.2). For Latino residents, the rates for firearm injuries and motor vehicle crashes were 4.1 and 2.6 times higher compared with White residents, respectively, while the rates for accidental falls, traumatic brain injury, and poisoning/overdose were lower.

Figure 12.8 Selected Injury Emergency Department Visits† by Race/Ethnicity, 2013-2015

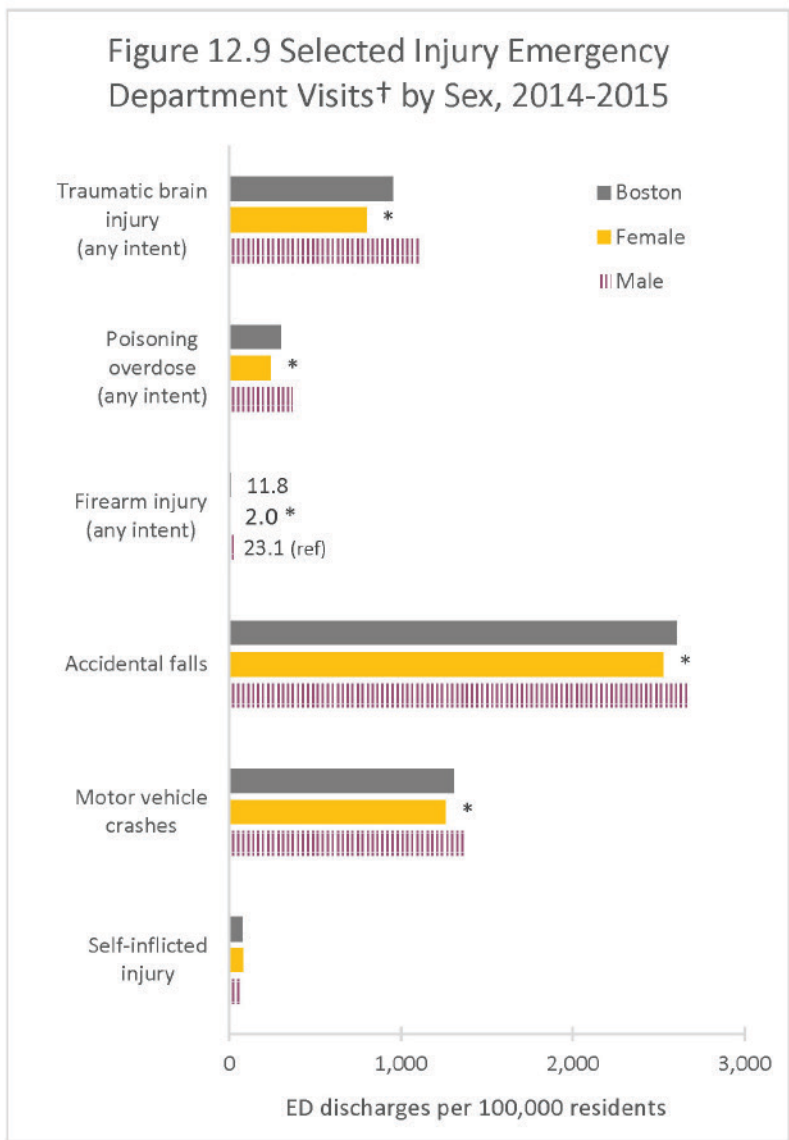


\* Statistically significant difference when comparisons are made between racial/ethnic groups  
 † 3-year average annual age-adjusted rates per 100,000 residents  
 ‡ Rates not presented due to a small number of cases

NOTE: Bars with patterns or where "ref" is indicated represent the reference group within each selected indicator. For injuries, emergency department visits include discharges from the emergency department but exclude care resulting in hospitalizations.

DATA SOURCE: Acute hospital case-mix databases, Massachusetts Center for Health Information and Analysis

Figure 12.9 Selected Injury Emergency Department Visits† by Sex, 2014-2015



For 2014-2015, compared with males, the emergency department visit rate was lower for females for all selected injuries except self-inflicted injuries. The largest difference was observed for firearm injuries, where the rate for males (23.1 discharges per 100,000 residents) was approximately 11.5 times the rate for females (2.0).

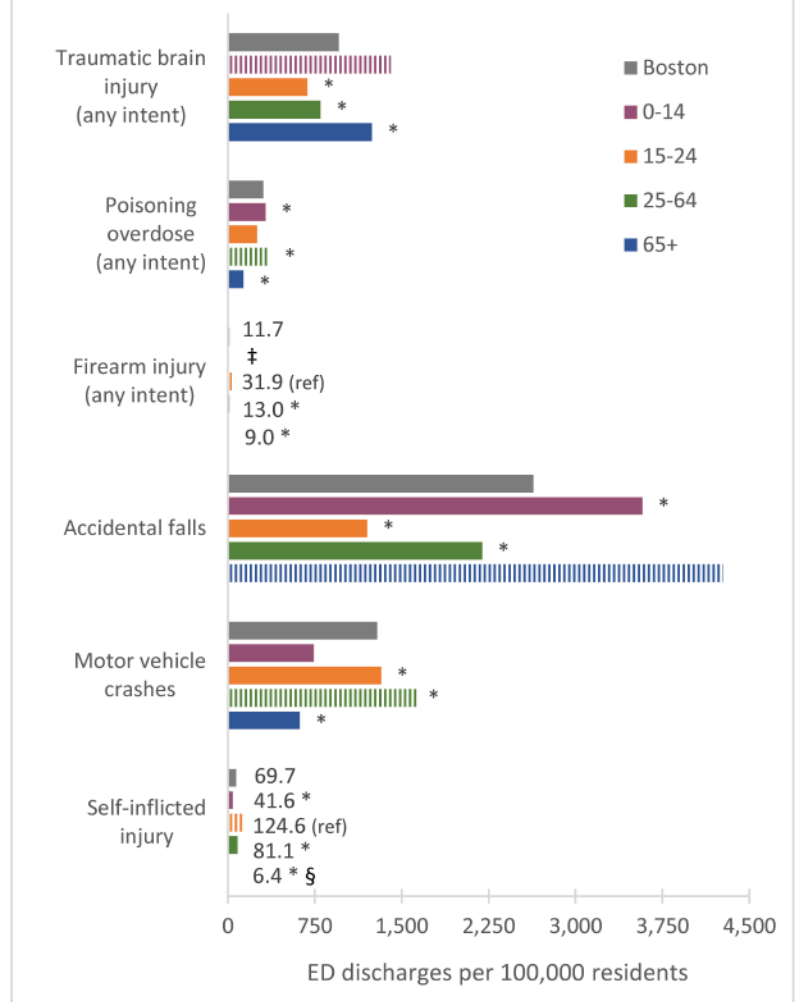
\* Statistically significant difference when comparisons are made between females and males  
 † 2-year average annual age-adjusted rates per 100,000 residents

NOTE: Bars with patterns or where "ref" is indicated represent the reference group within each selected indicator. For injuries, emergency department visits include discharges from the emergency department but exclude care resulting in hospitalizations.

DATA SOURCE: Acute hospital case-mix databases, Massachusetts Center for Health Information and Analysis

For 2011-2015, the rate of emergency department visits for the selected types of injuries varied by age. Compared with those ages 0-14, all other age groups had lower rates of traumatic brain injury. Compared with those ages 15-24, all other age groups presented had lower rates of firearm injuries and self-inflicted injuries. Compared with those ages 25-64, all other age groups had lower rates of poisoning/overdose and motor vehicle crash injuries. Lastly, compared with those ages 65 and over, all other groups had lower rates of injury due to accidental falls.

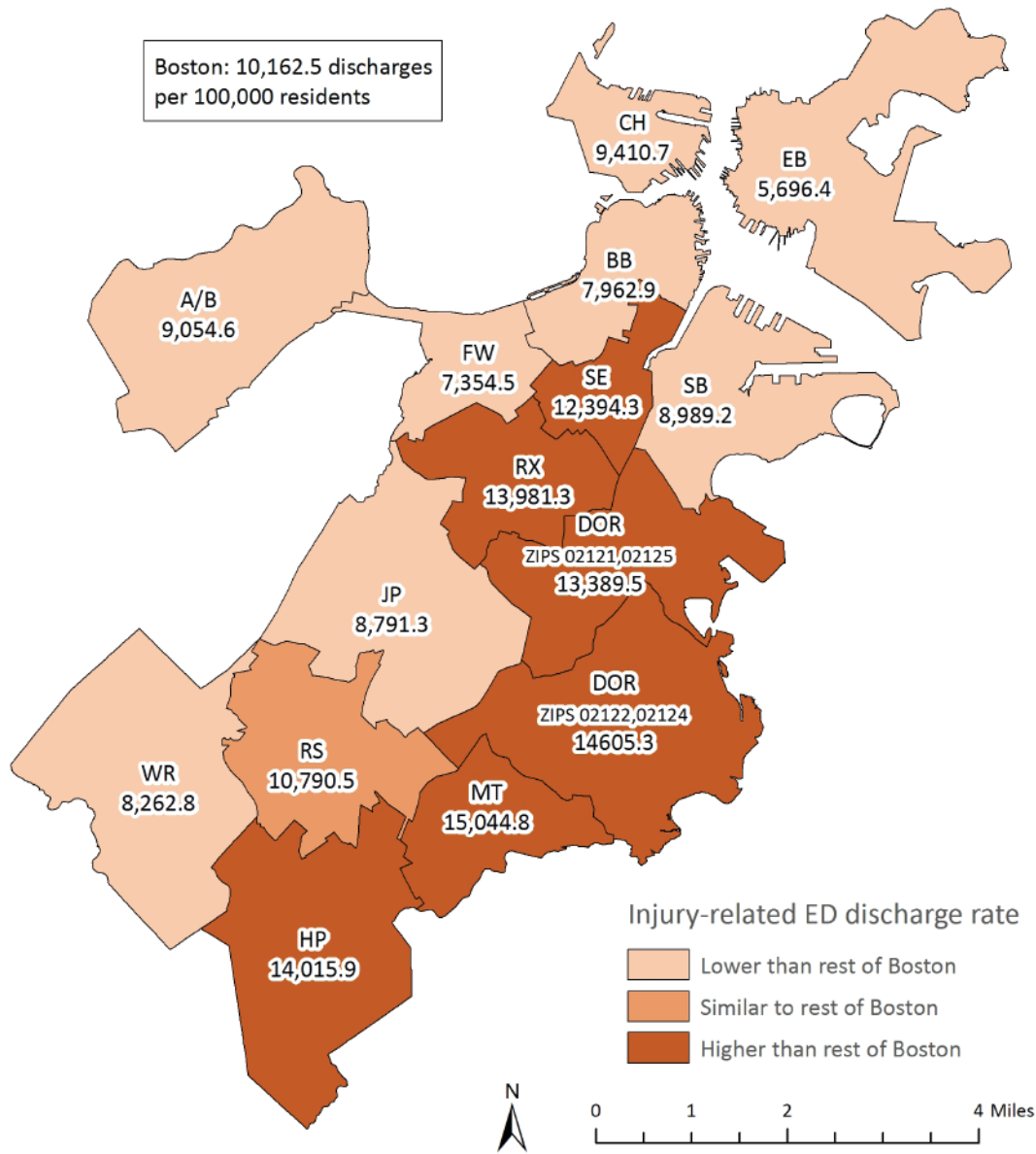
Figure 12.10 Selected Injury Emergency Department Visits<sup>1</sup> by Age, 2011-2015



\* Statistically significant difference when comparisons are made between age groups  
 ‡ Rates not presented due to a small number of cases  
 § Rates based on 20 or fewer cases should be interpreted with caution.  
<sup>1</sup> 5-year average annual rates per 100,000 residents

NOTE: Bars with patterns or where "ref" is indicated represent the reference group within each selected indicator. For injuries, emergency department visits include discharges from the emergency department but exclude care resulting in hospitalizations.  
 DATA SOURCE: Acute hospital case-mix databases, Massachusetts Center for Health Information and Analysis

Figure 12.11 Injury-Related Emergency Department (ED) Visits† by Neighborhood, 2015



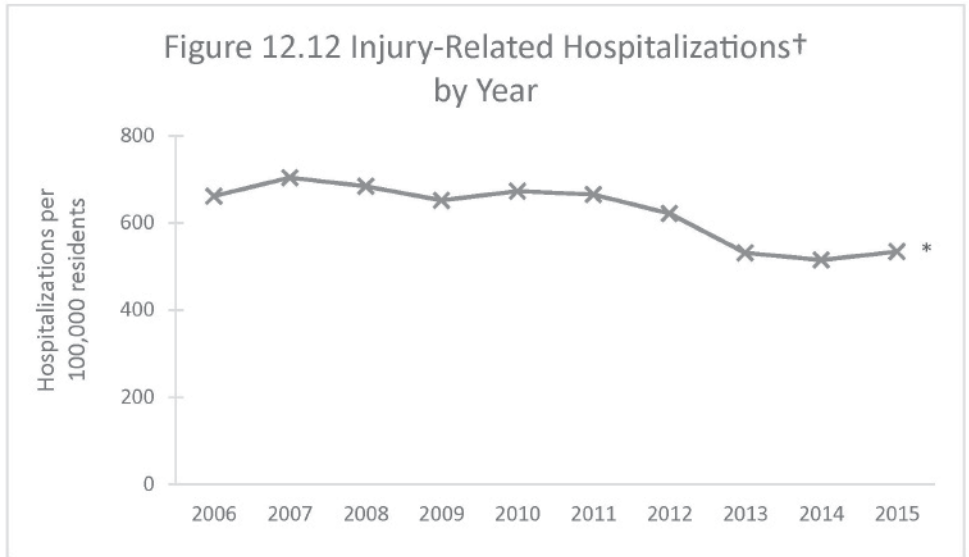
† Age-adjusted rates per 100,000 residents

NOTE: "BB" includes the Back Bay, Beacon Hill, Downtown, the North End, and the West End. "SE" includes the South End and Chinatown. For injuries, emergency department visits include discharges from the emergency department but exclude care resulting in hospitalizations.

DATA SOURCE: Acute hospital case-mix databases, Massachusetts Center for Health Information and Analysis

In 2015, the rate of injury-related emergency department (ED) visits in Boston was 10,162.5 per 100,000 residents. The rate of injury-related ED visits was higher for Dorchester (zip codes 02121, 02125), Dorchester (zip codes 02122, 02124), Hyde Park, Mattapan, Roxbury, and the South End compared with the rest of Boston. The rate was lower for Allston/Brighton, Back Bay, Charlestown, East Boston, Fenway, Jamaica Plain, South Boston, and West Roxbury compared with the rest of Boston.

In 2015, the injury-related hospitalization rate in Boston was 533.8 per 100,000 residents. Between 2006 and 2015, the rate decreased by 25%.



\* Statistically significant change over time  
† Age-adjusted rates per 100,000 residents

DATA SOURCE: Acute hospital case-mix databases, Massachusetts Center for Health Information and Analysis

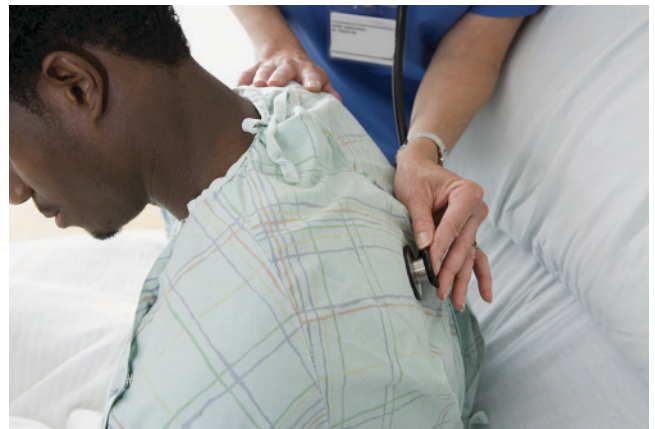
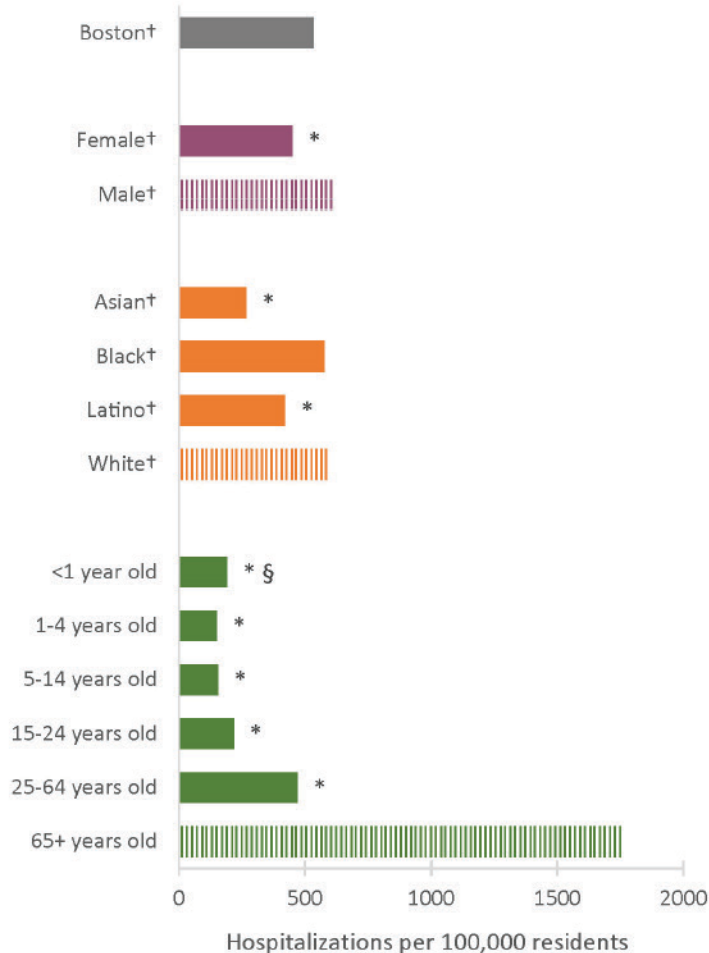




Figure 12.13 Injury-Related Hospitalizations by Selected Indicators, 2015



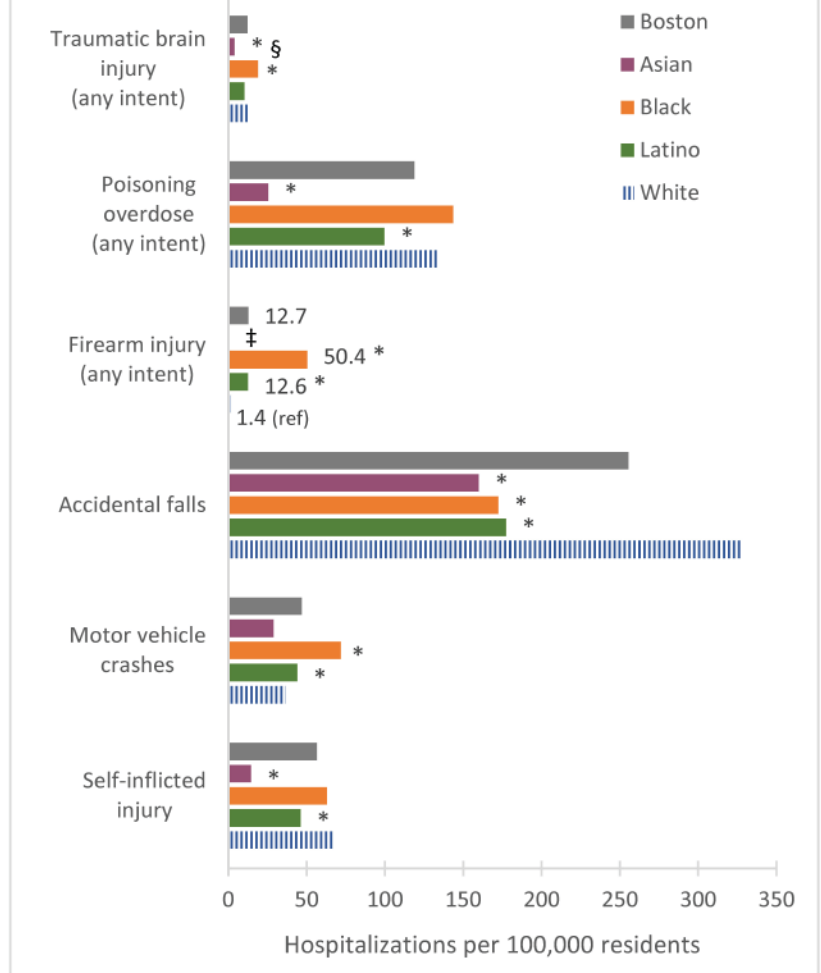
In 2015, the injury-related hospitalization rate in Boston was 533.8 per 100,000 residents. The rate was 26% lower for females (449.4) compared with males (608.8). The rates for Asian residents (266.9) and Latino residents (420.6) were 55% and 29% lower, respectively, than the rate for White residents (592.3). The rates for all age groups were lower than the rate for those ages 65 and older (1,756.9).

\* Statistically significant difference when compared to reference group  
 † Age-adjusted rates per 100,000 residents  
 § Rates are based on 20 or fewer cases and should be interpreted with caution.

NOTE: Bars with patterns indicate the reference group within each selected indicator.  
 DATA SOURCE: Acute hospital case-mix databases, Massachusetts Center for Health Information and Analysis

For 2011-2015, the rate of hospitalizations varied by race/ethnicity for the following selected types of injuries: traumatic brain injury, poisoning/overdose, firearm injuries, accidental falls, motor vehicle crashes, and self-injury. Compared with White residents, the rate was lower among Asian residents for all presented injuries except motor vehicle crashes. Black residents had higher rates of traumatic brain injury, firearm injury, and motor vehicle crashes compared with White residents, but lower rates of accidental falls. The largest difference was observed for firearm injuries, where the rate for Black residents (50.4 hospitalizations per 100,000 residents) was over 36 times the rate for White residents (1.4). For Latino residents, the rates for firearm injury and motor vehicle crashes were 9.1 and 1.2 times higher, respectively, compared with White residents, while the rates for poisoning/overdose, accidental falls, and self-inflicted injury were lower.

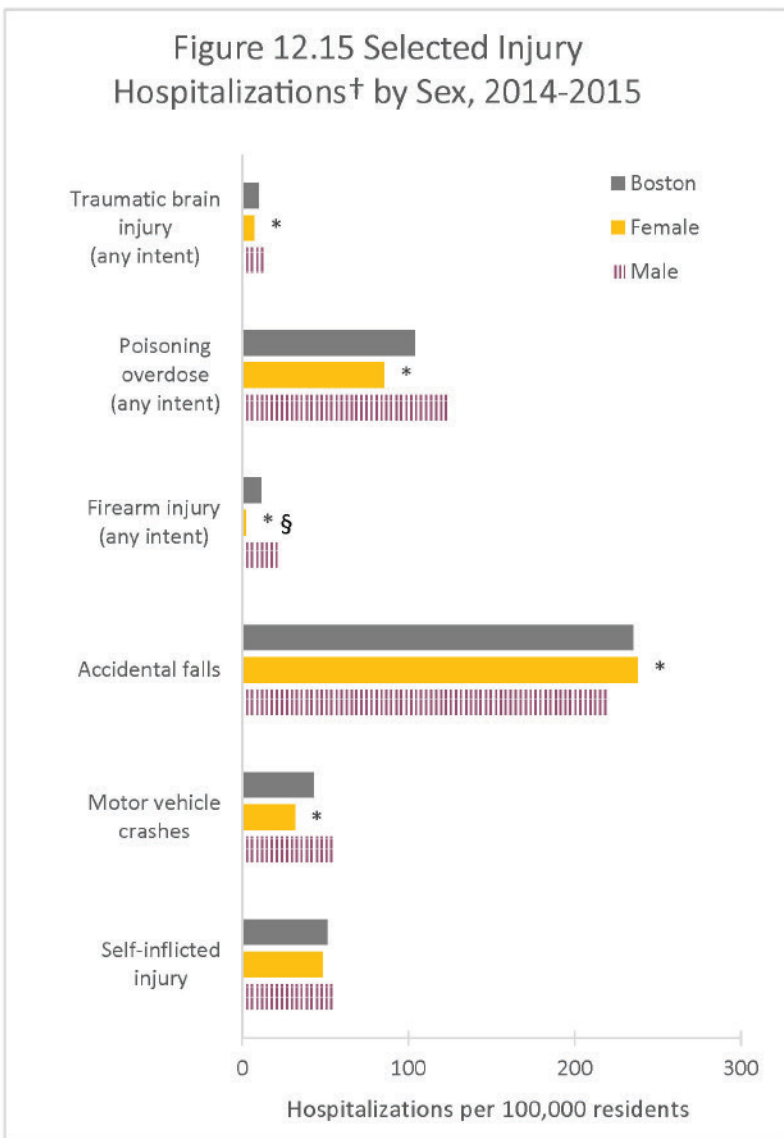
Figure 12.14 Selected Injury Hospitalizations† by Race/Ethnicity, 2011-2015



\* Statistically significant difference when comparisons are made between racial/ethnic groups  
 † 5-year average annual age-adjusted rates per 100,000 residents  
 ‡ Rates not presented due to a small number of cases  
 § Rates based on 20 or fewer cases should be interpreted with caution.

NOTE: Bars with patterns or where "ref" is indicated represent the reference group within each selected indicator.  
 DATA SOURCE: Acute hospital case-mix databases, Massachusetts Center for Health Information and Analysis

Figure 12.15 Selected Injury Hospitalizations† by Sex, 2014-2015



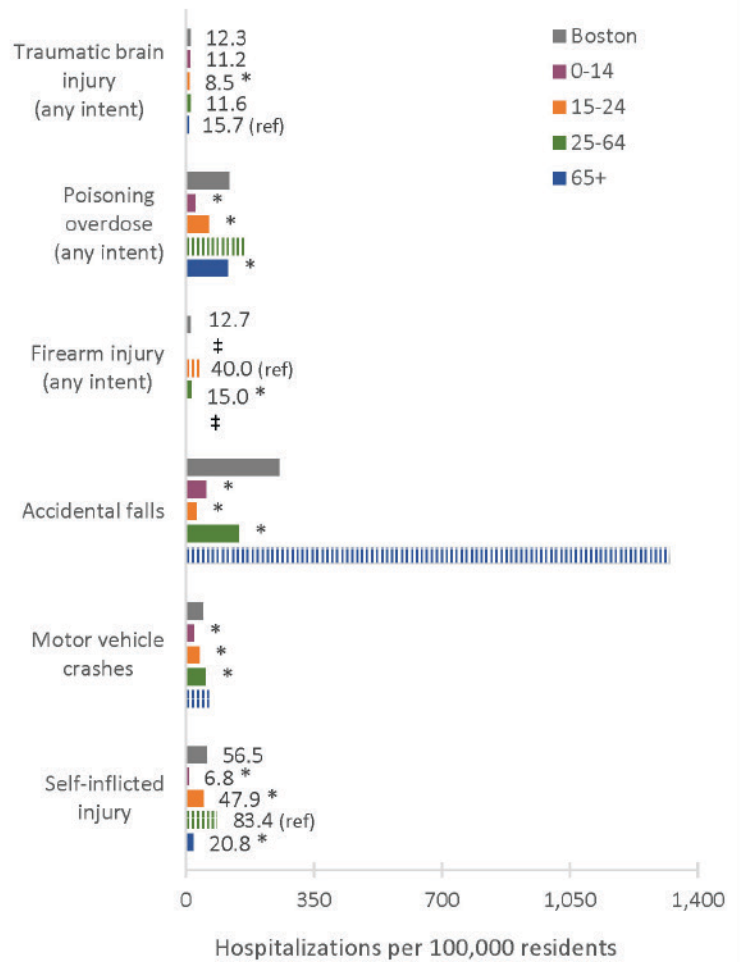
For 2014-2015, compared with males, the hospitalization rate was lower among females for the following injuries: traumatic brain injury, poisoning/overdose, firearm injury, and motor vehicle crashes. The rate for accidental falls was higher for females (238.1 hospitalizations per 100,000 residents) compared with males (220.4).

\* Statistically significant difference when comparisons are made between females and males  
 † 2-year average annual age-adjusted rates per 100,000 residents  
 § Rates based on 20 or fewer cases should be interpreted with caution.

NOTE: Bars with patterns indicate the reference group within each selected indicator.  
 DATA SOURCE: Acute hospital case-mix databases, Massachusetts Center for Health Information and Analysis

For 2011-2015, the rate of hospitalizations for the selected types of injuries varied by age. Residents ages 25-64 had a lower rate of firearm injury hospitalization (15.0 hospitalizations per 100,000 residents) compared with those ages 15-24 (40.0). Compared with those ages 25-64, all other age groups had lower rates of poisoning/overdose and self-inflicted injury. Compared with those ages 65 and older (15.7), residents ages 15-24 had a lower rate of traumatic brain injury (8.5). All other age groups had lower rates of injury due to accidental falls and motor vehicle crashes compared with those ages 65 and older.

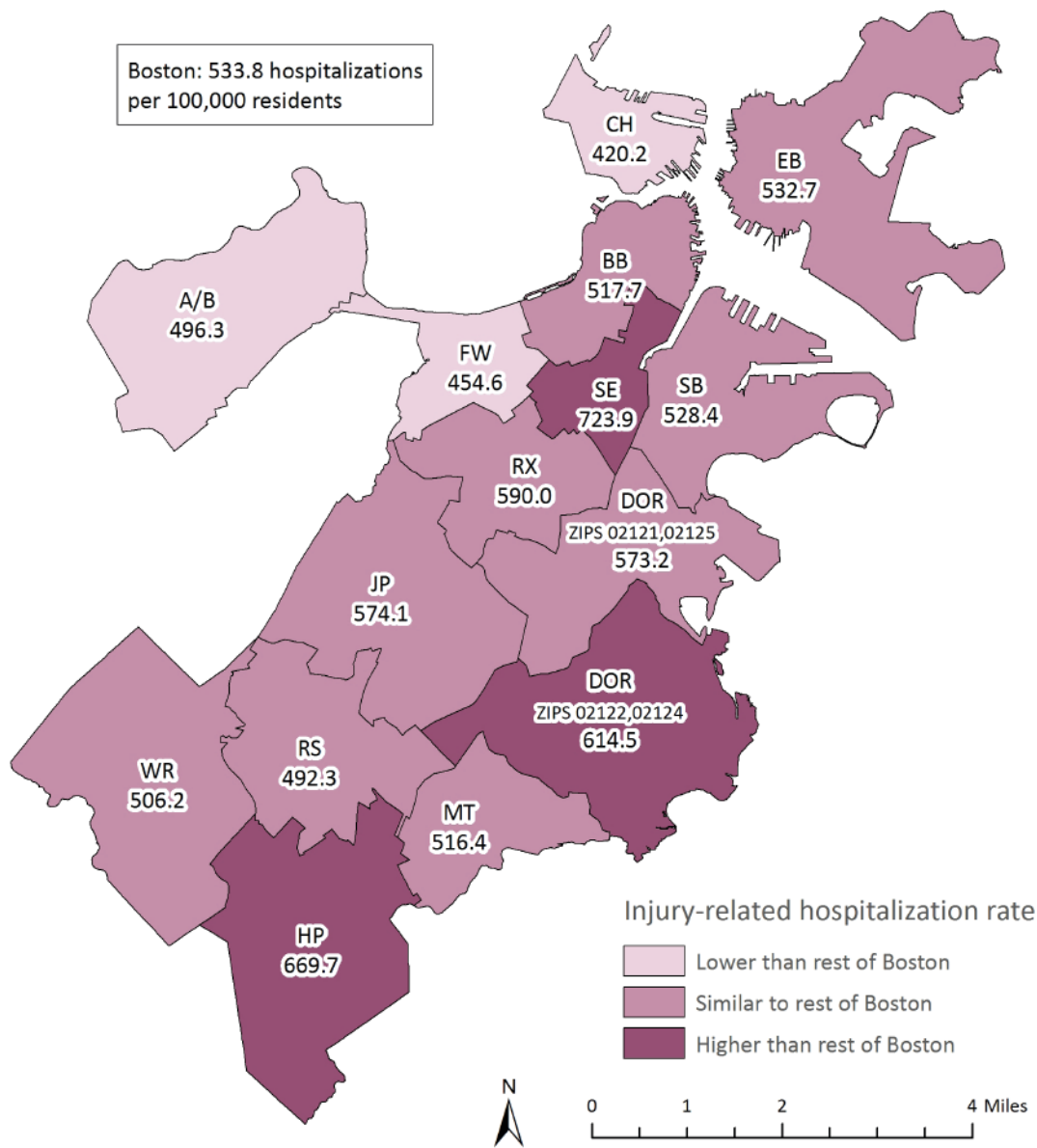
Figure 12.16 Selected Injury Hospitalizations<sup>1</sup> by Age, 2011-2015



\* Statistically significant difference when comparisons are made between age groups  
 ‡ Rates not presented due to a small number of cases  
<sup>1</sup> 5-year average annual rates per 100,000 residents

NOTE: Bars with patterns or where "ref" is indicated represent the reference group within each selected indicator.  
 DATA SOURCE: Acute hospital case-mix databases, Massachusetts Center for Health Information and Analysis

### Figure 12.17 Injury-Related Hospitalizations† by Neighborhood, 2015



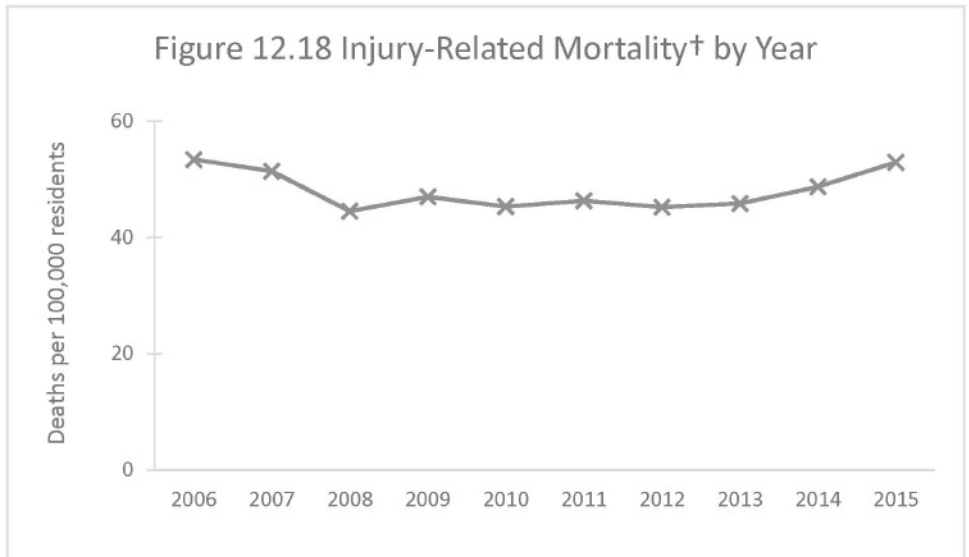
† Age-adjusted rates per 100,000 residents

NOTE: "BB" includes the Back Bay, Beacon Hill, Downtown, the North End, and the West End.  
 "SE" includes the South End and Chinatown.

DATA SOURCE: Acute hospital case-mix databases, Massachusetts Center for Health Information and Analysis

In 2015, the injury-related hospitalization rate in Boston was 533.8 per 100,000 residents. The injury-related hospitalization rate was higher for Dorchester (zip codes 02122, 02124), Hyde Park, and the South End compared with the rest of Boston. The rate was lower for Allston/Brighton, Charlestown, and Fenway compared with the rest of Boston.

In 2015, the injury-related mortality rate was 52.9 deaths per 100,000 residents. There was no significant change over time from 2006 to 2015.



† Age-adjusted rates per 100,000 residents

DATA SOURCE: Boston resident deaths, Massachusetts Department of Public Health (data as of December 2016). Data may be updated as more information becomes available.

### Fatal Injuries

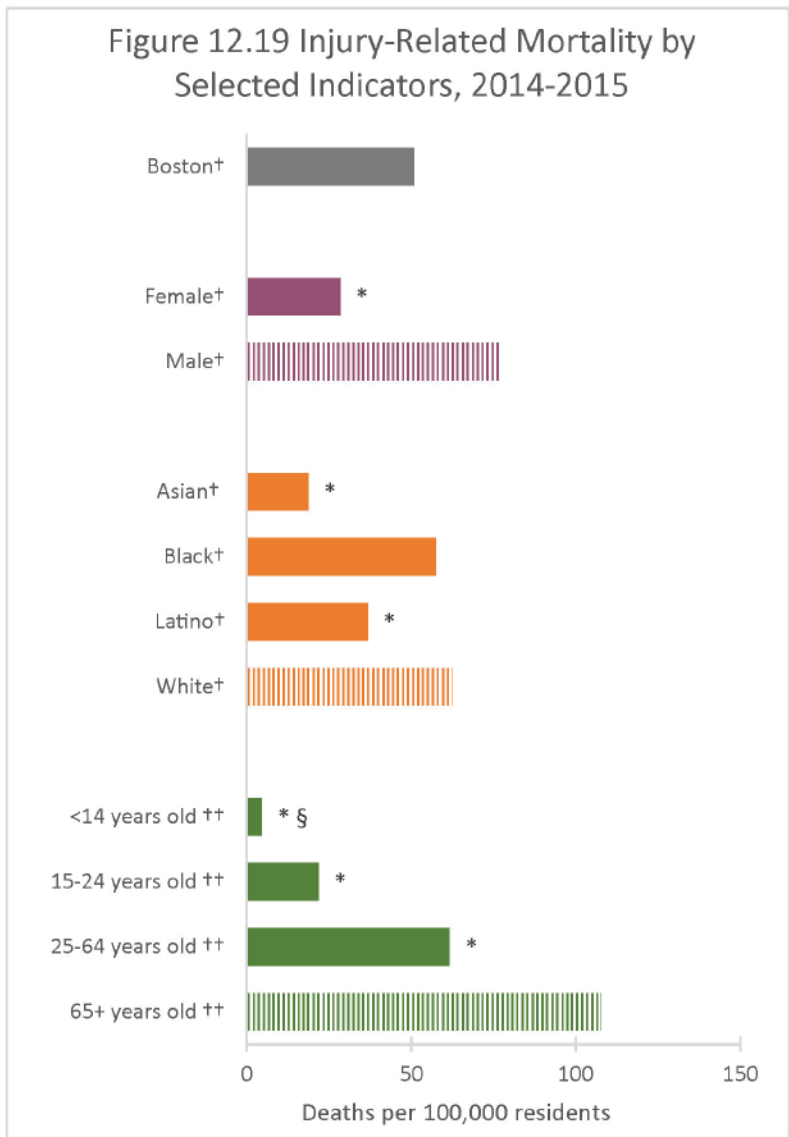
Healthy People 2020 Target: 53.7 deaths per 100,000 population

US 2015: 63.9

MA 2014: 55.9

Boston 2015: 52.9

Figure 12.19 Injury-Related Mortality by Selected Indicators, 2014-2015

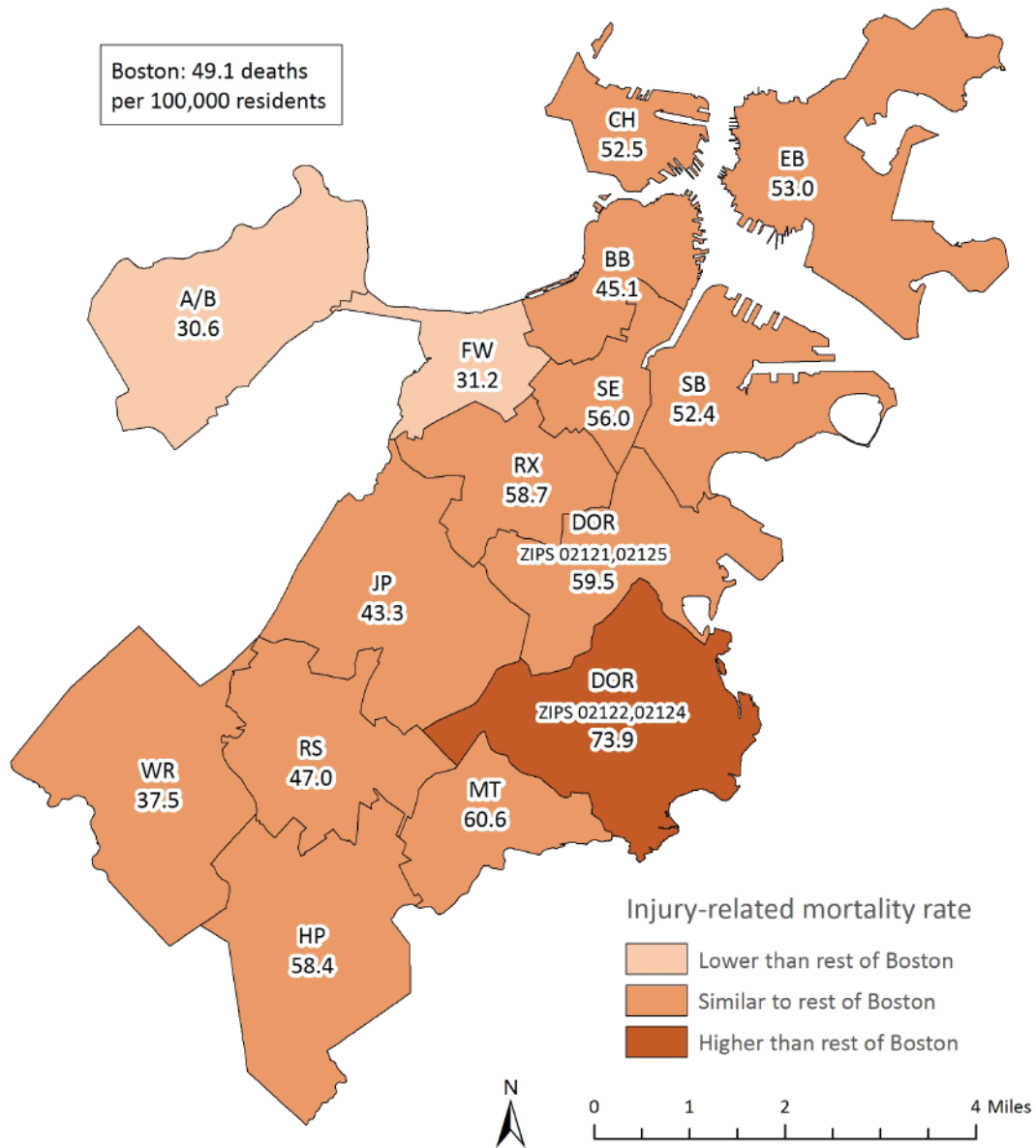


For 2014-2015, the injury-related mortality rate in Boston was 50.8 deaths per 100,000 residents. The mortality rate for females (28.3) was 63% lower than the rate for males (76.6). The rates were 70% and 41% lower for Asian (18.7) and Latino residents (36.7), respectively, when compared with White residents (62.3). The rates for all age groups were lower than the rate for those ages 65 and older (107.7).

\* Statistically significant difference when compared to reference group  
 † 2-year average annual age-adjusted rates per 100,000 residents  
 †† 2-year average annual rates per 100,000 residents  
 § Rates are based on 20 or fewer cases and should be interpreted with caution.

NOTE: Bars with patterns indicate the reference group within each selected indicator.  
 DATA SOURCE: Boston resident deaths, Massachusetts Department of Public Health (data as of December 2016). Data may be updated as more information becomes available.

### Figure 12.20 Injury-Related Mortality† by Neighborhood, 2013-2015



† 3-year average annual age-adjusted rates per 100,000 residents

NOTE: "BB" includes the Back Bay, Beacon Hill, Downtown, the North End, and the West End.  
"SE" includes the South End and Chinatown.

DATA SOURCE: Boston resident deaths, Massachusetts Department of Public Health (data as of December 2016). Data may be updated as more information becomes available.

For 2013-2015, the injury-related mortality rate in Boston was 49.1 deaths per 100,000 residents. The rate was higher for Dorchester (zip codes 02122, 02124) and lower for Allston/Brighton and Fenway compared with the rest of Boston.



Figure 12.21 Leading Causes of Injury Mortality† By Year

Rank	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
1	Unintentional poisoning <sup>1</sup> 122 (22.0)	Unintentional poisoning <sup>1</sup> 99 (17.4)	Unintentional poisoning <sup>1</sup> 71 (12.7)	Unintentional poisoning <sup>1</sup> 93 (16.5)	Unintentional poisoning <sup>1</sup> 64 (10.9)	Unintentional poisoning <sup>1</sup> 81 (13.8)	Unintentional poisoning <sup>1</sup> 72 (12.5)	Unintentional poisoning <sup>1</sup> 99 (16.9)	Unintentional poisoning <sup>1</sup> 116 (18.6)	Unintentional poisoning <sup>1</sup> 147 (24.4)
2	Homicide by firearm 45 (5.3)	Homicide by firearm 47 (6.1)	Homicide by firearm 53 (6.1)	Suicide by means other than firearms 37 (6.2)	Homicide by firearm 58 (7.6)	Suicide by means other than firearms 46 (7.4)	Falls 56 (10.3)	Falls 43 (7.9)	Falls 48 (9.1)	Falls 51 (9.0)
3	Falls 32 (6.1)	Falls 34 (6.4)	Falls 35 (6.7)	Falls 32 (6.2)	Suicide by means other than firearms 42 (6.8)	Homicide by firearm 44 (5.2)	Homicide by firearm 34 (3.7)	Suicide by means other than firearms 32 (4.8)	Homicide by firearm 36 (4.7)	Suicide by means other than firearms 36 (5.2)
4	Motor vehicle crashes 29 (4.7)	Suicide by means other than firearms 26 (4.2)	Suicide by means other than firearms 26 (4.3)	Homicide by firearm 30 (3.6)	Falls 35 (6.5)	Falls 37 (7.0)	Motor vehicle crashes 31 (5.0)	Homicide by firearm 31 (3.3)	Suicide by means other than firearms 29 (4.5)	Homicide by firearm 28 (3.2)
5	Suicide by means other than firearms 24 (3.9)	Motor vehicle crashes 23 (3.5)	Motor vehicle crashes 24 (3.9)	Other non-transportation accidents 29 (5.2)	Other non-transportation accidents 19 (3.9) §	Other non-transportation accidents 29 (5.3)	Suicide by means other than firearms 30 (4.6)	Motor vehicle crashes 28 (4.7)	Motor vehicle crashes 24 (4.3)	Motor vehicle crashes 22 (3.8)
Cause of death, count (rate per 100,000 residents)										

From 2006-2015, the most common cause of injury mortality was unintentional poisoning, which includes drug overdose deaths. From 2012-2015, the second most common cause of injury-related mortality was falls. Prior to 2012, the second most common cause was homicide by firearm or suicide by means other than firearms.

† Age-adjusted rates per 100,000 residents

§ Rates are based on 20 or fewer cases and should be interpreted with caution

<sup>1</sup> Includes drug overdoses. See Chapter 14: Substance Use Disorders for more information.

NOTE: Rank is based on number of deaths. Both counts and rates are presented.

DATA SOURCE: Boston resident deaths, Massachusetts Department of Public Health (data as of December 2016). Data may be updated as more information becomes available.

During 2011-2015, the leading cause of injury mortality varied by race/ethnicity. The leading cause was falls for Asian residents, homicide by firearms for Black residents, and unintentional poisonings (including drug overdose) for Latino and White residents. Black and Latino residents were the only two racial/ethnic groups with homicide in the top five causes of injury mortality. For Latino residents, both homicide by firearm and homicide by other means ranked among the top five.

Figure 12.22 Leading Causes of Injury Mortality† by Race/Ethnicity, 2011-2015

Rank	Asian	Black	Latino	White
1	Falls 17 (7.1) §	Homicide by firearm 115 (15.0)	Unintentional poisoning <sup>†</sup> 75 (13.9)	Unintentional poisoning <sup>†</sup> 333 (24.4)
2	Suicide by means other than firearms 15 (4.6) §	Unintentional poisoning <sup>†</sup> 95 (13.5)	Homicide by firearm 43 (5.7)	Falls 165 (11.0)
3	Motor vehicle crashes 11 (4.4) §	Motor vehicle crashes 45 (6.4)	Motor vehicle crashes 22 (3.8)	Suicide by means other than firearms 106 (7.4)
4	Other non-transportation accidents 10 (3.9) §	Falls 40 (6.1)	Homicide by means other than firearms 16 (2.5) §	Other non-transportation accidents 53 (3.5)
5	‡	Suicide by means other than firearms 31 (4.1)	Suicide by means other than firearms 14 (2.3) §	Motor vehicle crashes 51 (3.8)
Cause of death, count (rate per 100,000 residents)				

† 5-year average annual age-adjusted rates per 100,000 residents

‡ Rates not presented due to a small number of cases

§ Rates based on 20 or fewer cases should be interpreted with caution.

<sup>1</sup> Includes drug overdoses. See Chapter 14: Substance Use Disorders for more information.

NOTE: Rank is based on number of deaths. Both counts and rates are presented.

DATA SOURCE: Boston resident deaths, Massachusetts Department of Public Health (data as of December 2016).

Data may be updated as more information becomes available.

During 2014-2015, the leading cause of injury death for both male and female residents was accidental poisoning, which includes drug overdose. The second leading cause was homicide by firearm for men and falls for women.

Figure 12.23 Leading Causes of Injury Mortality† by Sex, 2014-2015

Rank	Male	Female
1	Accidental poisoning <sup>1</sup> 187 (31.2)	Accidental poisoning <sup>1</sup> 76 (12.3)
2	Homicide by firearm 62 (7.9)	Falls 41 (6.0)
3	Falls 58 (13.5)	Motor vehicle crashes 19 (3.3) §
4	Suicide by means other than firearms 50 (7.9)	Suicide by means other than firearms 15 (2.1) §
5	Motor vehicle crashes 27 (4.9)	Other non-transportation accidents 14 (2.1) §
Cause of death, count (rate per 100,000 residents)		

† 2-year average annual age-adjusted rates per 100,000 residents

§ Rates based on 20 or fewer cases should be interpreted with caution.

<sup>1</sup> Includes drug overdoses. See Chapter 14: Substance Use Disorders for more information.

NOTE: Rank is based on number of deaths. Both counts and rates are presented.

DATA SOURCE: Boston resident deaths, Massachusetts Department of Public Health (data as of December 2016). Data may be updated as more information becomes available.

Figure 12.24 Leading Causes of Injury Mortality<sup>1</sup> by Age, 2011-2015

	15-24	25-64	65+
1	Homicide by firearm 91 (12.5)	Accidental poisoning <sup>2</sup> 477 (28.3)	Falls 181 (57.6)
2	Suicide by means other than firearms 26 (3.6)	Suicide by means other than firearms 132 (7.8)	Motor vehicle crashes 30 (9.6)
3	Accidental poisoning <sup>2</sup> 20 (2.8) §	Homicide by firearm 79 (4.7)	Accidental poisoning <sup>2</sup> 16 (5.1) §
4	Motor vehicle crashes 20 (2.8) §	Motor vehicle crashes 75 (4.5)	Suicide by means other than firearms 13 (4.1)
5	Homicide by means other than firearms 17 (2.3) §	Falls 52 (3.1)	Homicide by means other than firearms 10 (3.2) §

Cause of death, count  
(rate per 100,000 residents)

§ Rates based on 20 or fewer cases should be interpreted with caution.

<sup>1</sup> 5-year average annual rates per 100,000 residents

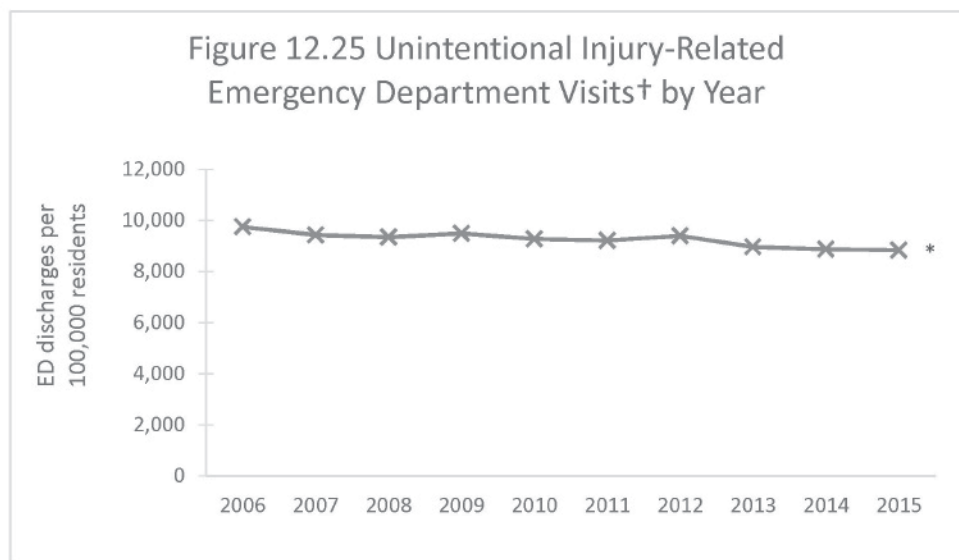
<sup>2</sup> Includes drug overdoses. See Chapter 14: Substance Use Disorders for more information.

NOTE: Rank is based on number of deaths. Both counts and rates are presented. Rates not presented due to a small number of cases for residents ages 0-14.

DATA SOURCE: Boston resident deaths, Massachusetts Department of Public Health (data as of December 2016). Data may be updated as more information becomes available.

During 2011-2015, the leading cause of injury mortality varied by age group. The leading cause was homicide by firearm for those ages 15-24, accidental poisoning (including drug overdose) for those ages 25-64, and falls for those ages 65 and older. Suicide by means other than firearms was the second leading cause for residents under age 65. Motor vehicle crashes was the second leading cause of injury mortality for residents ages 65 and older.

Figure 12.25 Unintentional Injury-Related Emergency Department Visits<sup>†</sup> by Year



\* Statistically significant change over time

<sup>†</sup> Age-adjusted rates per 100,000 residents

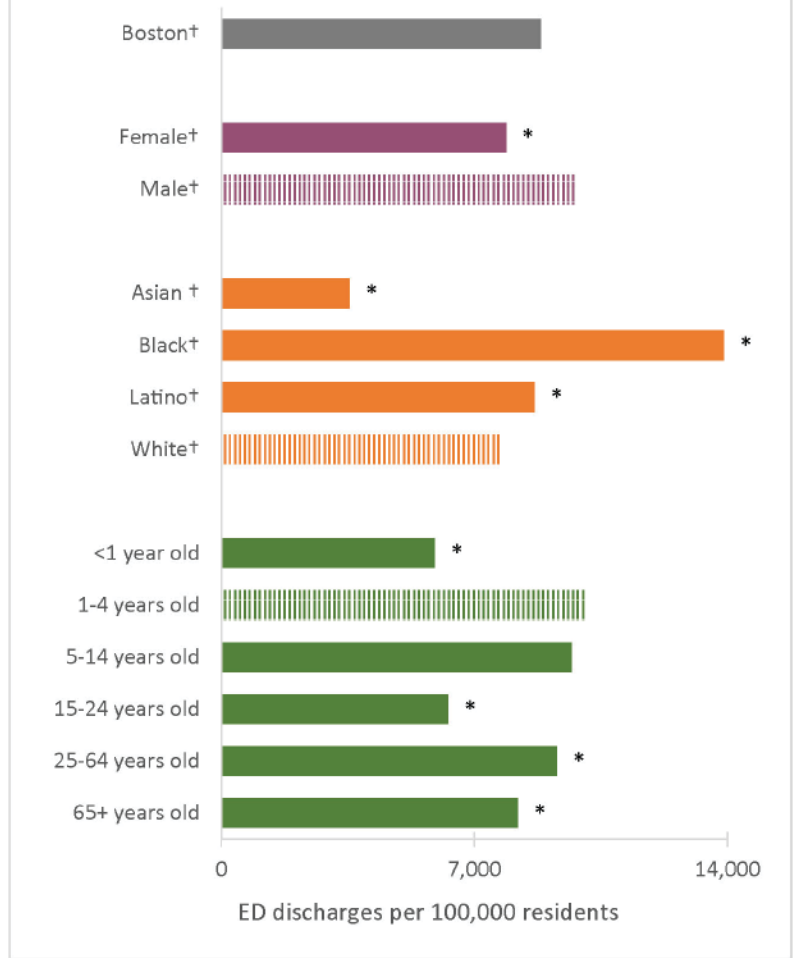
NOTE: For injuries, emergency department visits include discharges from the emergency department but exclude care resulting in hospitalizations.

DATA SOURCE: Acute hospital case-mix databases, Massachusetts Center for Health Information and Analysis

In 2015, the rate of unintentional injury-related emergency department visits was 8,835.2 per 100,000 residents. Between 2006 and 2015, the rate decreased by 8%.

In 2015, the rate of unintentional injury-related emergency department visits was 8,835.2 per 100,000 residents. The rate was 20% lower for females (7,879.7) compared with males (9,814.3). The rate for Asian residents (3,545.7) was 54% lower than the rate for White residents (7,715.3). The rates for Black residents (13,892.7) and Latino residents (8,664.0) were 80% and 12% higher, respectively, compared with White residents. The rates for residents under 1 year of age (5,905.3), ages 15-24 (6,275.6), 25-64 (9,277.3), and 65 and older (8,203.1) were lower than the rates for those ages 1-4 (10,101.4).

Figure 12.26 Unintentional Injury-Related Emergency Department Visits by Selected Indicators, 2015

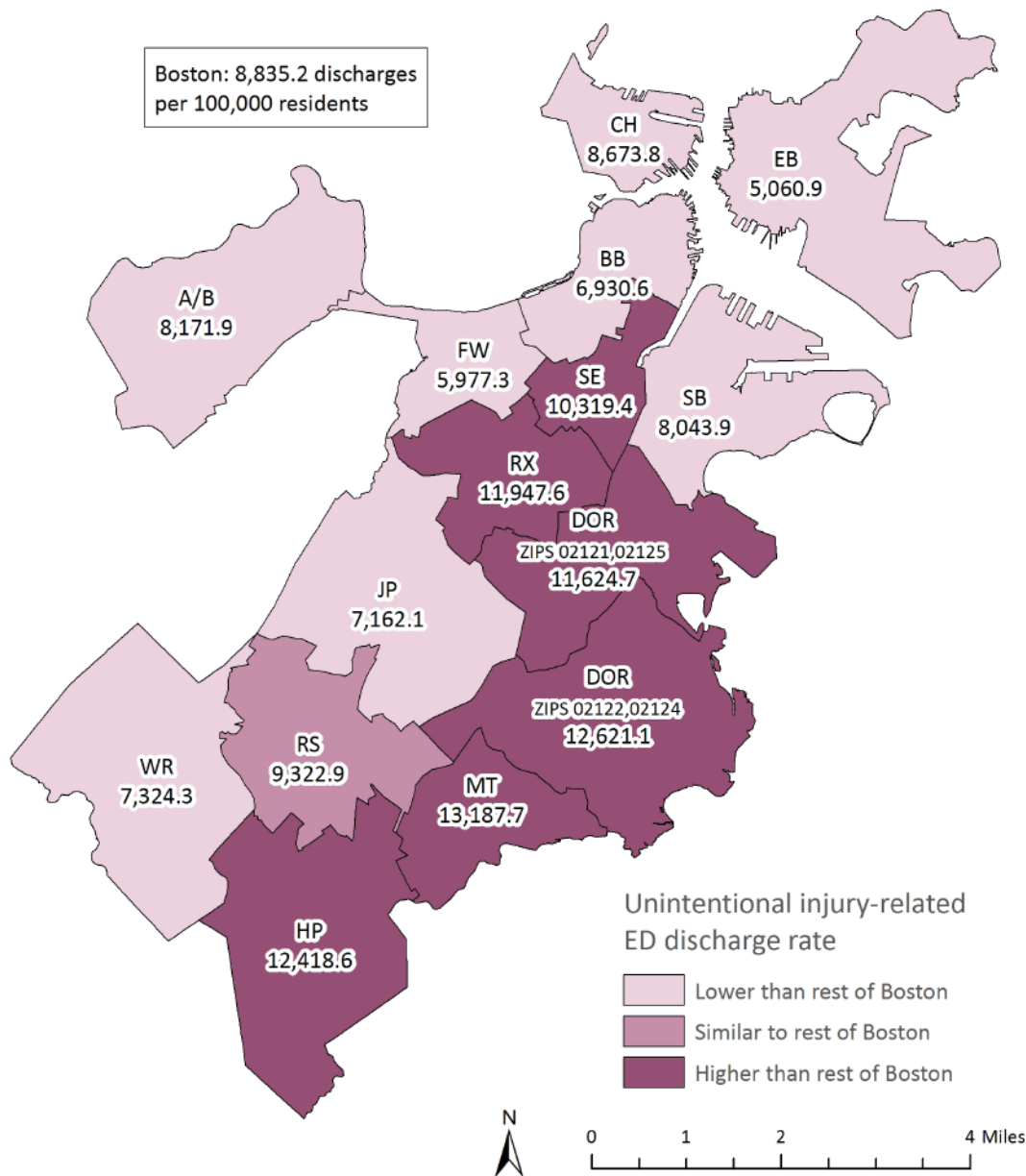


\* Statistically significant difference when compared to reference group  
 † Age-adjusted rates per 100,000 residents

NOTE: Bars with patterns indicate the reference group within each selected indicator. For injuries, emergency department visits include discharges from the emergency department but exclude care resulting in hospitalizations.

DATA SOURCE: Acute hospital case-mix databases, Massachusetts Center for Health Information and Analysis

Figure 12.27 Unintentional Injury-Related Emergency Department (ED) Visits† by Neighborhood, 2015



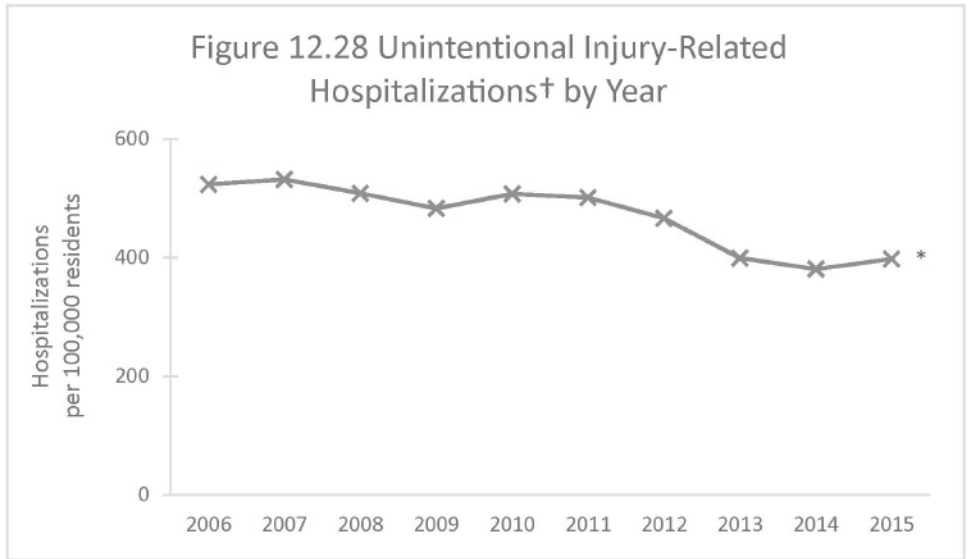
† Age-adjusted rates per 100,000 residents

NOTE: "BB" includes the Back Bay, Beacon Hill, Downtown, the North End, and the West End. "SE" includes the South End and Chinatown. For injuries, emergency department visits include discharges from the emergency department but exclude care resulting in hospitalizations.

DATA SOURCE: Acute hospital case-mix databases, Massachusetts Center for Health Information and Analysis

In 2015, the rate of unintentional injury-related emergency department visits in Boston was 8,835.2 per 100,000 residents. The rate of unintentional injury-related emergency department visits was higher for Dorchester (zip codes 02121, 02125), Dorchester (zip codes 02122, 02124), Hyde Park, Mattapan, Roxbury, and the South End compared with the rest of Boston. The rate was lower for Allston/Brighton, Back Bay, Charlestown, East Boston, Fenway, Jamaica Plain, South Boston, and West Roxbury compared with the rest of Boston.

In 2015, the unintentional injury-related hospitalization rate was 397.9 per 100,000 residents. Between 2006 and 2015, the rate decreased by 28%.



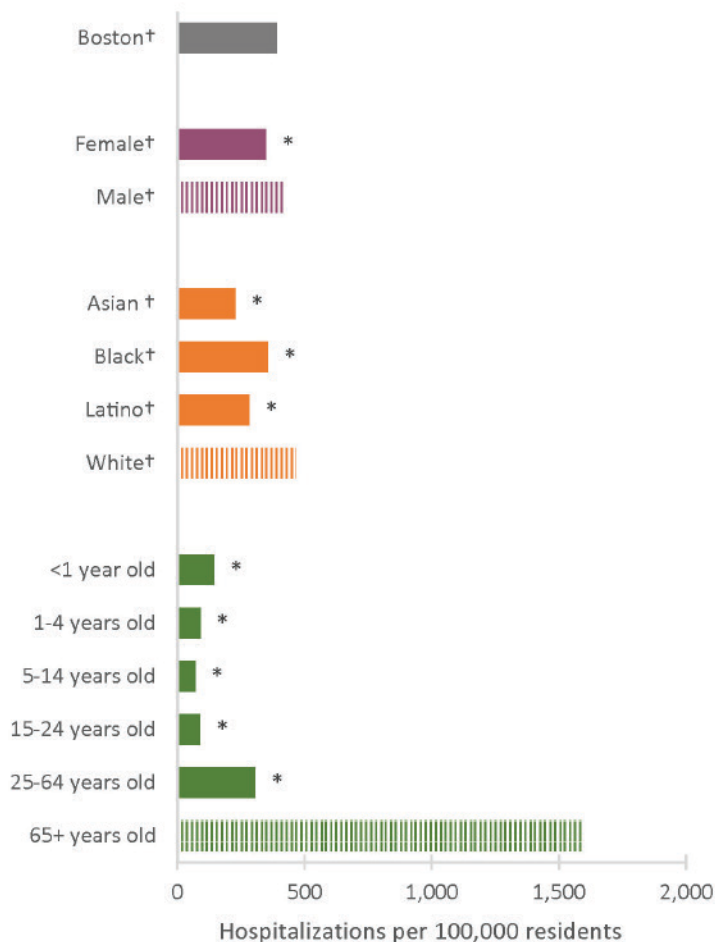
\* Statistically significant change over time

† Age-adjusted rates per 100,000 residents

DATA SOURCE: Acute hospital case-mix databases, Massachusetts Center for Health Information and Analysis



Figure 12.29 Unintentional Injury-Related Hospitalizations by Selected Indicators, 2014-2015

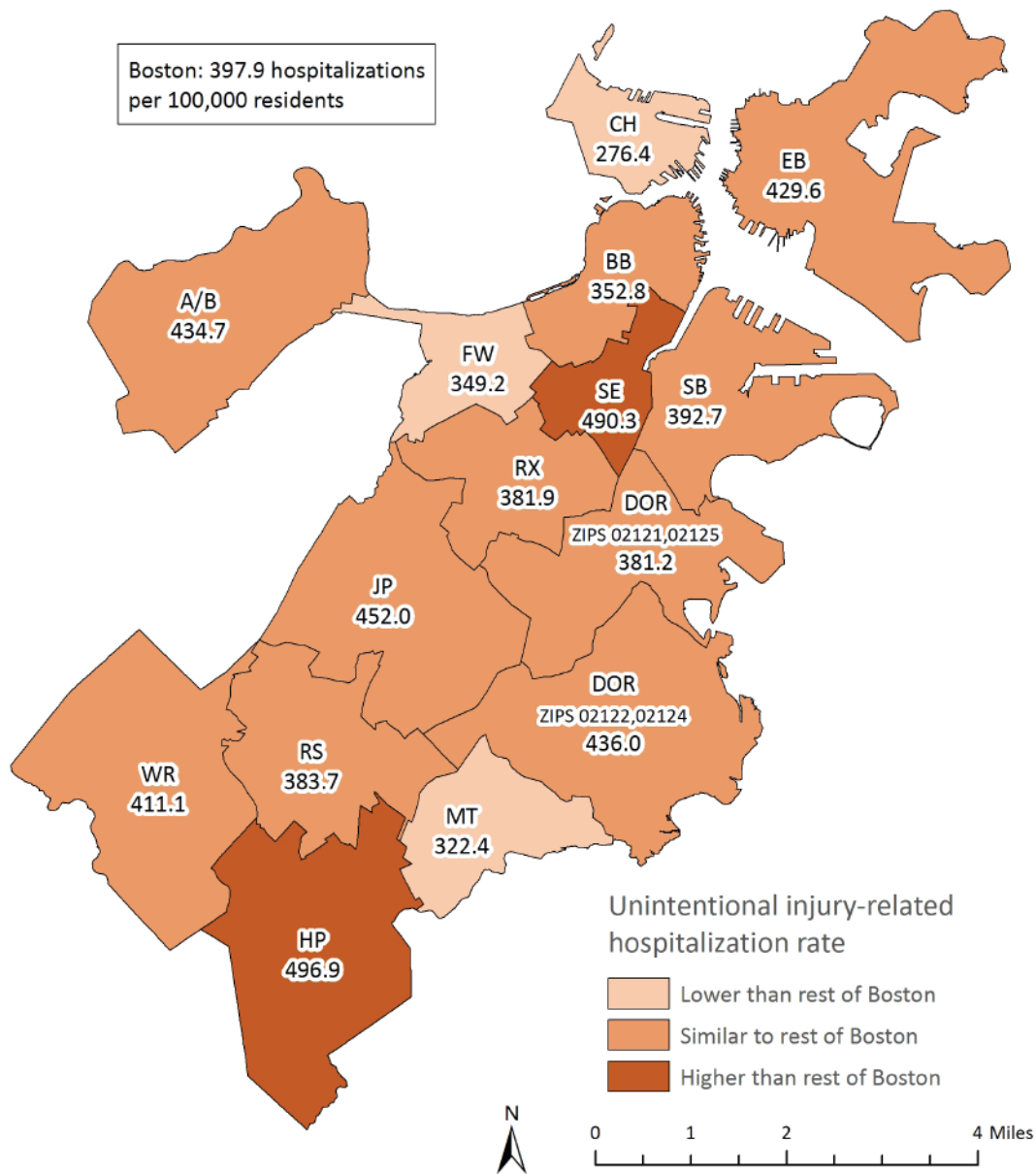


For 2014-2015, the rate of unintentional injury-related hospitalizations was 389.3 per 100,000 residents. The rate was 17% lower for females (348.4) compared with males (420.8). Compared with White residents (463.3), the rates were 51%, 24%, and 39% lower, respectively, for Asian (227.0), Black (354.5), and Latino residents (282.8). The rates for all age groups were lower than the rate for those ages 65 and older (1,593.8).

\* Statistically significant difference when compared to reference group  
 † 2-year average annual age-adjusted rates per 100,000 residents

NOTE: Bars with patterns indicate the reference group within each selected indicator.  
 DATA SOURCE: Acute hospital case-mix databases, Massachusetts Center for Health Information and Analysis

### Figure 12.30 Unintentional Injury-Related Hospitalizations† by Neighborhood, 2015



† Age-adjusted rates per 100,000 residents

NOTE: "BB" includes the Back Bay, Beacon Hill, Downtown, the North End, and the West End.  
 "SE" includes the South End and Chinatown.

DATA SOURCE: Acute hospital case-mix databases, Massachusetts Center for Health Information and Analysis

In 2015, the rate for unintentional injury-related hospitalizations in Boston was 397.9 per 100,000 residents. The rate for unintentional injury-related hospitalizations was higher for Hyde Park and the South End, and lower for Charlestown, Fenway, and Mattapan compared with the rest of Boston.





In 2015, the unintentional injury-related mortality rate was 41.7 deaths per 100,000 residents. There was no significant change over time from 2006 to 2015.

† Age-adjusted rates per 100,000 residents

DATA SOURCE: Boston resident deaths, Massachusetts Department of Public Health (data as of December 2016). Data may be updated as more information becomes available.



**Unintentional Fatal Injury**

Healthy People 2020 Target: 36.4 deaths per 100,000 population

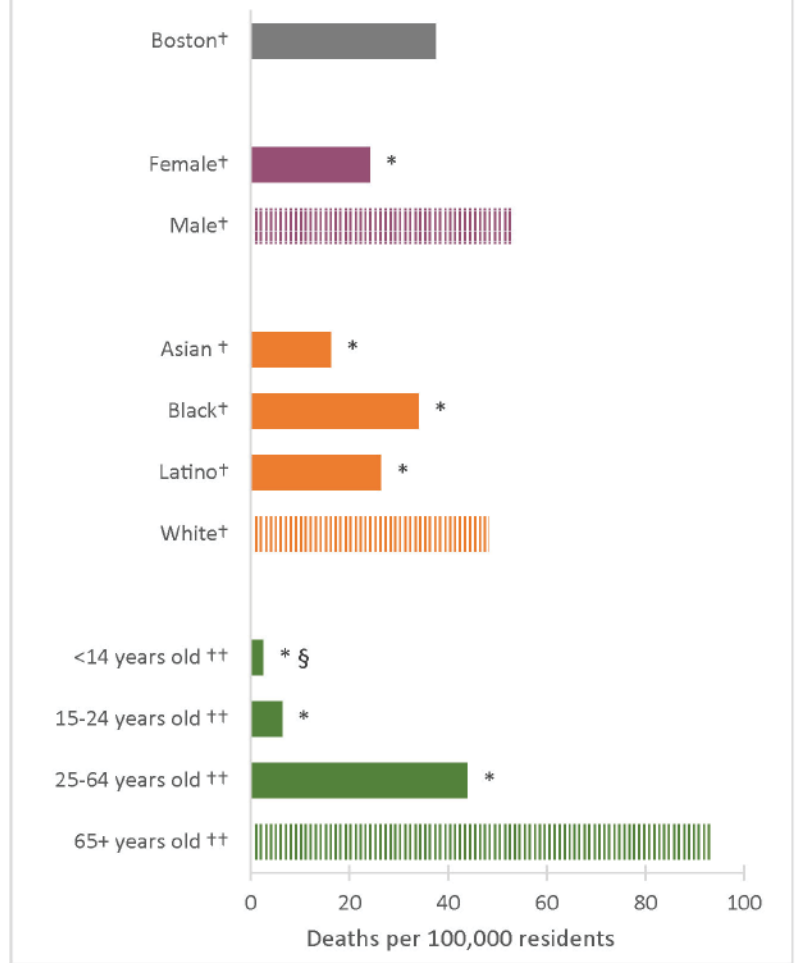
US 2010: 43.2

MA 2013: 44.0

Boston 2015: 41.7

For 2013-2015, the unintentional injury-related mortality rate in Boston was 37.5 deaths per 100,000 residents. The rate for females (24.1) was 54% lower than for males (52.8). The rates were 66%, 29%, and 45% lower, respectively, for Asian (16.2), Black (34.0), and Latino residents (26.3) compared with White residents (48.2). The rates for all age groups were lower than the rate for those ages 65 and older (93.1).

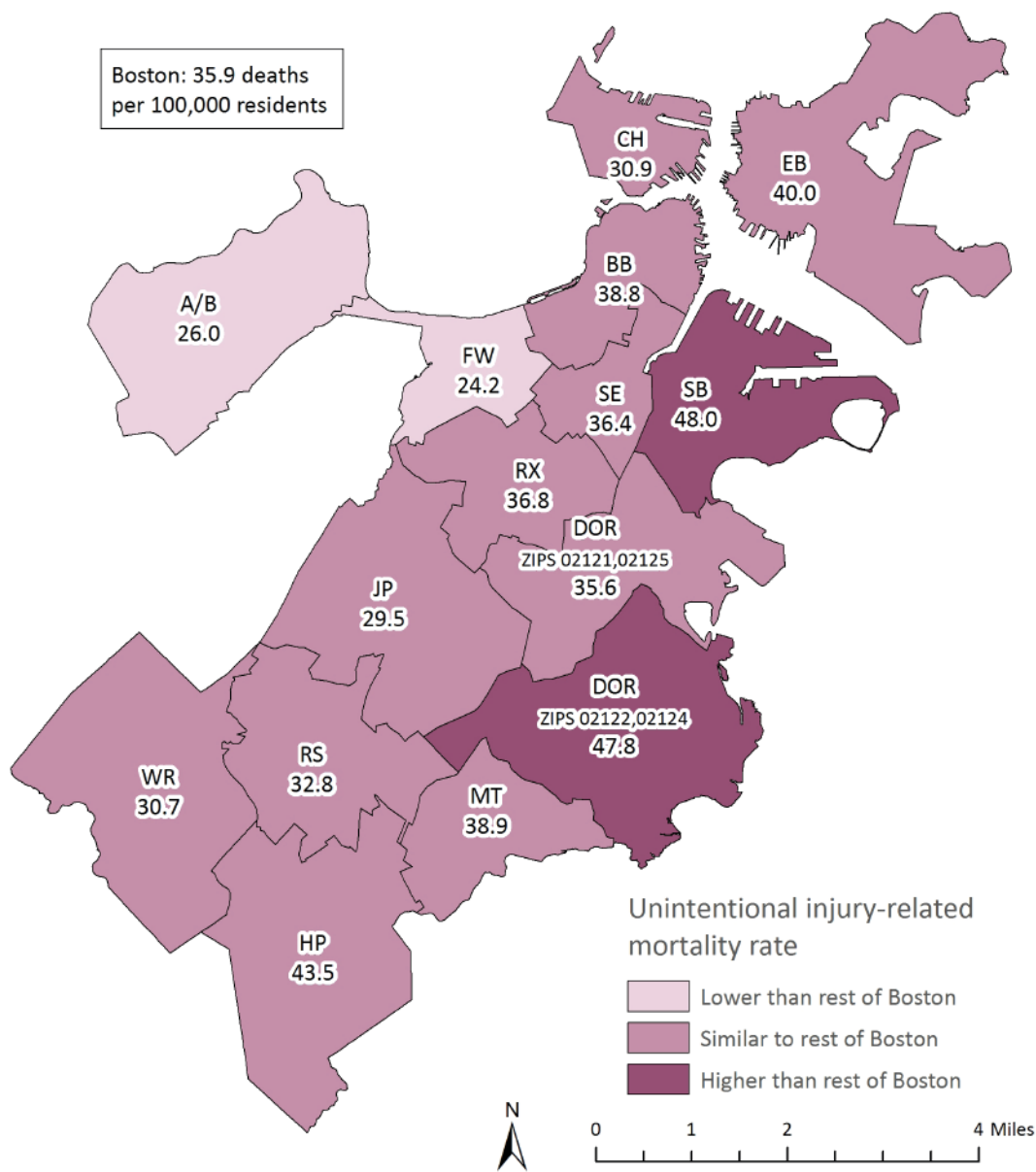
Figure 12.32 Unintentional Injury-Related Mortality by Selected Indicators, 2013-2015



\* Statistically significant difference when compared to reference group  
 † 3-year average annual age-adjusted rates per 100,000 residents  
 †† 3-year average annual rates per 100,000 residents  
 § Rates are based on 20 or fewer cases and should be interpreted with caution.

NOTE: Bars with patterns indicate the reference group within each selected indicator.  
 DATA SOURCE: Boston resident deaths, Massachusetts Department of Public Health (data as of December 2016). Data may be updated as more information becomes available.

Figure 12.33 Unintentional Injury-Related Mortality† by Neighborhood, 2012-2015



† 4-year average annual age-adjusted rates per 100,000 residents

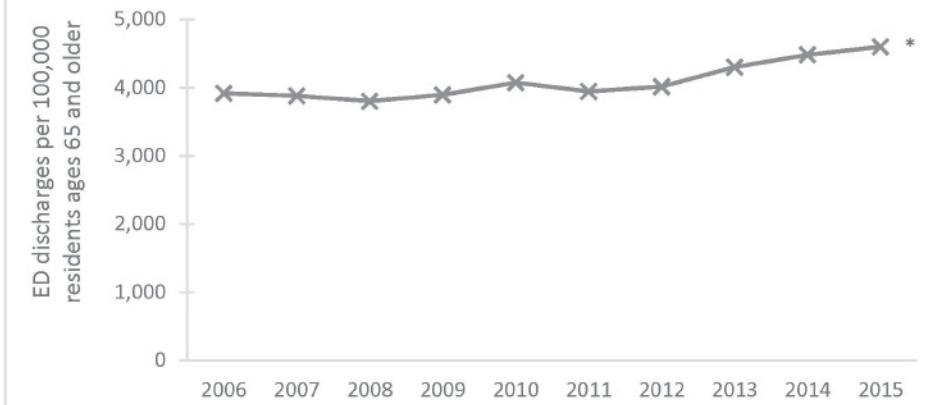
NOTE: "BB" includes the Back Bay, Beacon Hill, Downtown, the North End, and the West End. "SE" includes the South End and Chinatown.

DATA SOURCE: Boston resident deaths, Massachusetts Department of Public Health (data as of December 2016). Data may be updated as more information becomes available.

In 2012-2015, the unintentional injury-related mortality rate in Boston was 35.9 deaths per 100,000 residents. The rate was higher for Dorchester (zip codes 02122, 02124) and South Boston, and lower for Allston/Brighton and Fenway compared with the rest of Boston.

In 2015, the rate of emergency department visits for fall-related injuries in Boston was 4,600.1 per 100,000 residents ages 65 and older. Between 2006 and 2015, the rate increased by 19%.

Figure 12.34 Fall-Related Emergency Department Visits Among Residents Ages 65+ by Year



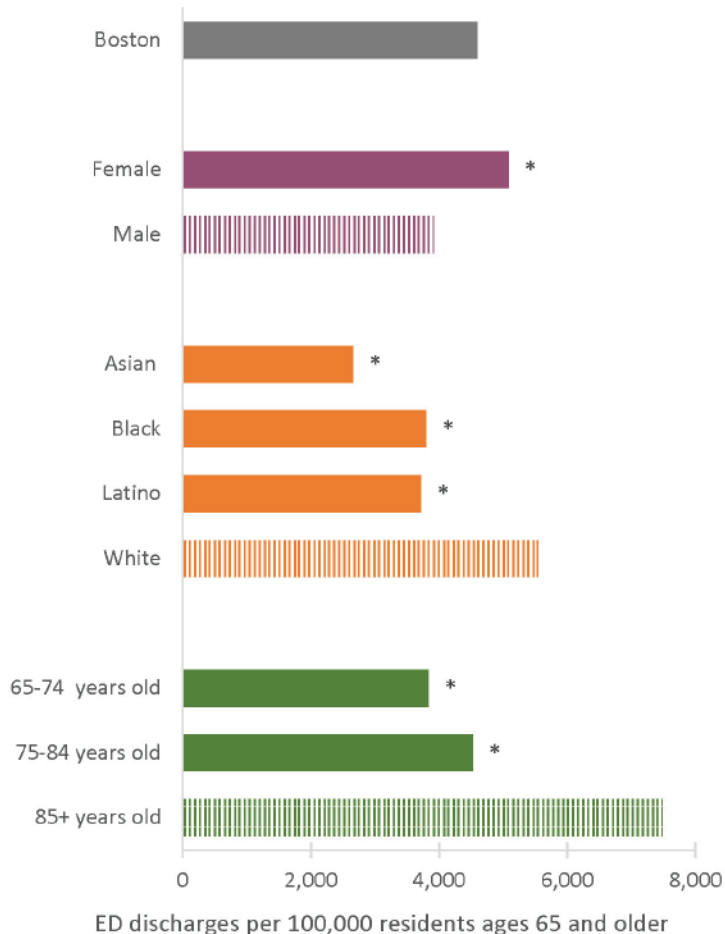
\* Statistically significant change over time

NOTE: For injuries, emergency department visits include discharges from the emergency department but exclude care resulting in hospitalizations.

DATA SOURCE: Acute hospital case-mix databases, Massachusetts Center for Health Information and Analysis



Figure 12.35 Fall-Related Emergency Department Visits Among Residents Ages 65+ by Selected Indicators, 2015



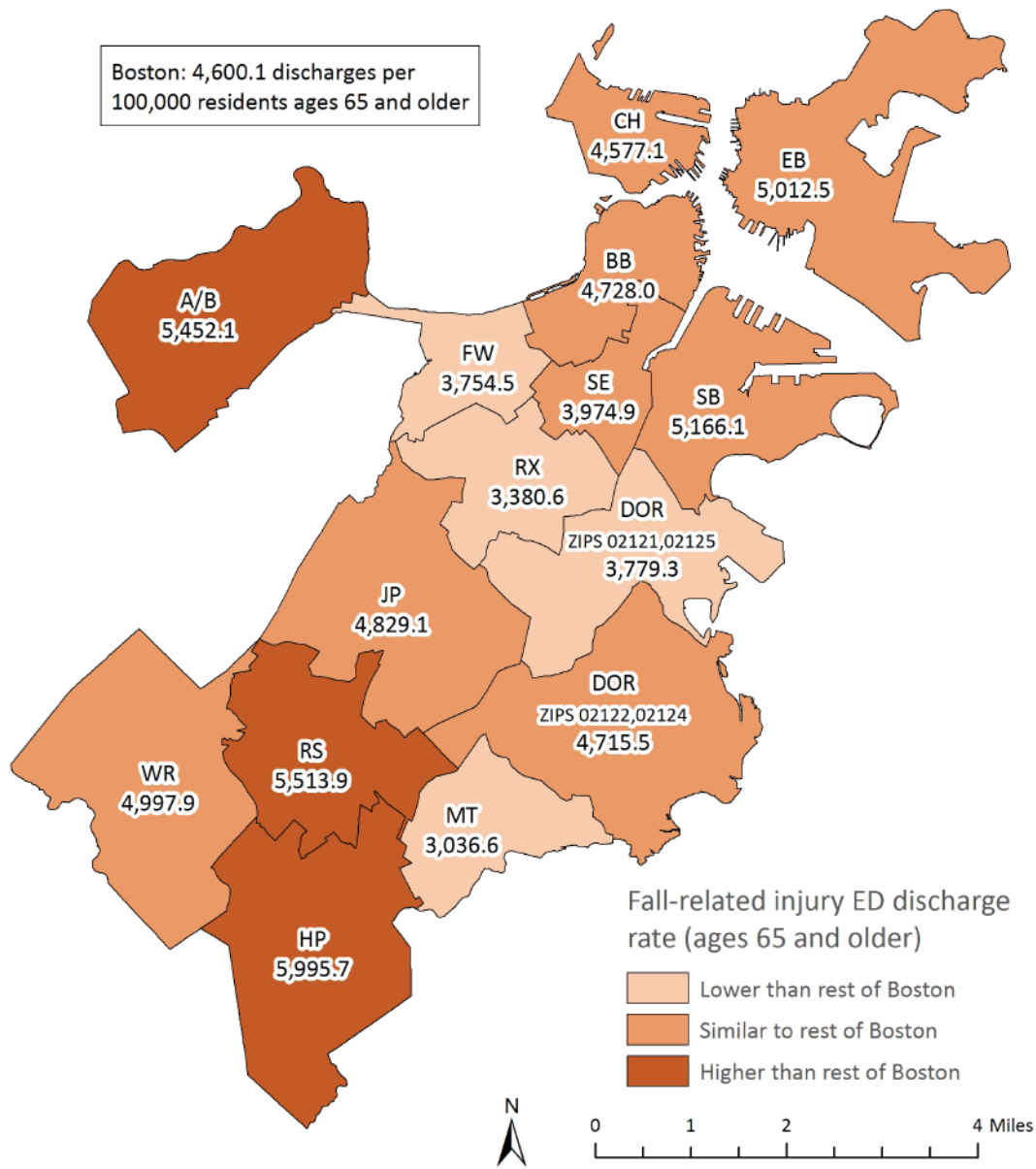
\* Statistically significant difference when compared to reference group

NOTE: Bars with patterns indicate the reference group within each selected indicator. For injuries, emergency department visits include discharges from the emergency department but exclude care resulting in hospitalizations.

DATA SOURCE: Acute hospital case-mix databases, Massachusetts Center for Health Information and Analysis

In 2015, the rate for fall-related emergency department visits was 4,600.1 discharges per 100,000 residents ages 65 and older. The rate for females (5,087.1) was 30% higher than the rate for males (3,913.0). The rates were 52%, 32%, and 33% lower, respectively, for Asian (2,657.9), Black (3,797.9), and Latino residents (3,721.5) compared with White residents (5,548.1). The rates for adults ages 65-74 (3,831.5) and ages 75-84 (4,526.2) were lower than the rate for those ages 85 and older (7,488.3).

### Figure 12.36 Fall-Related Injury Emergency Department Visits<sup>1</sup> by Neighborhood, 2015



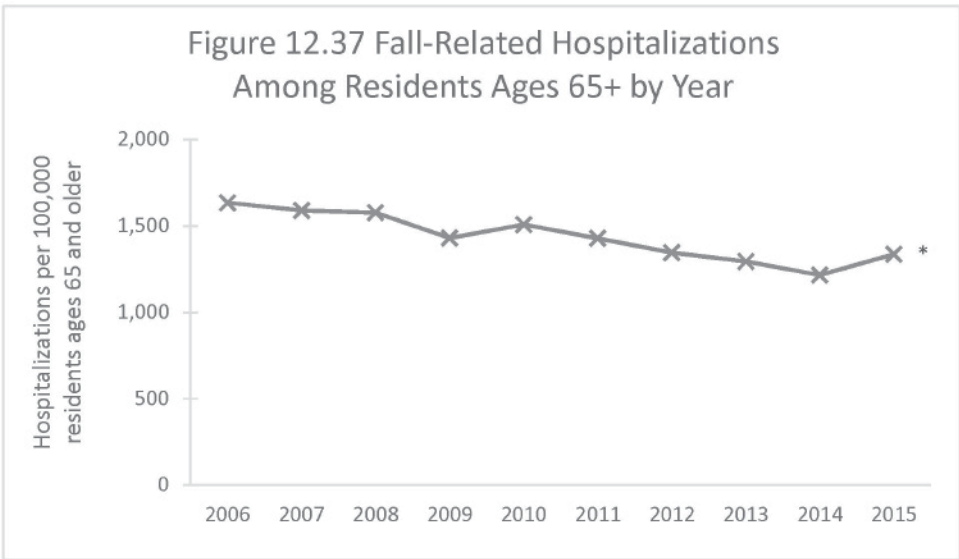
<sup>1</sup> Rates per 100,000 residents ages 65 and older

NOTE: "BB" includes the Back Bay, Beacon Hill, Downtown, the North End, and the West End.  
 "SE" includes the South End and Chinatown. For injuries, emergency department visits include discharges from the emergency department but exclude care resulting in hospitalizations.

DATA SOURCE: Acute hospital case-mix databases, Massachusetts Center for Health Information and Analysis

In 2015, the fall-related injury emergency department visit rate in Boston was 4,600.1 per 100,000 residents ages 65 and older. The rate was higher for Allston/Brighton, Hyde Park, and Roslindale compared with the rest of Boston. The rate was lower for Dorchester (zip codes 02121, 02125), Fenway, Mattapan, and Roxbury compared with the rest of Boston.

Figure 12.37 Fall-Related Hospitalizations Among Residents Ages 65+ by Year



In 2015, the fall-related hospitalization rate was 1,334.8 per 100,000 residents ages 65 and older. Between 2006 and 2015, the rate decreased by 24%.

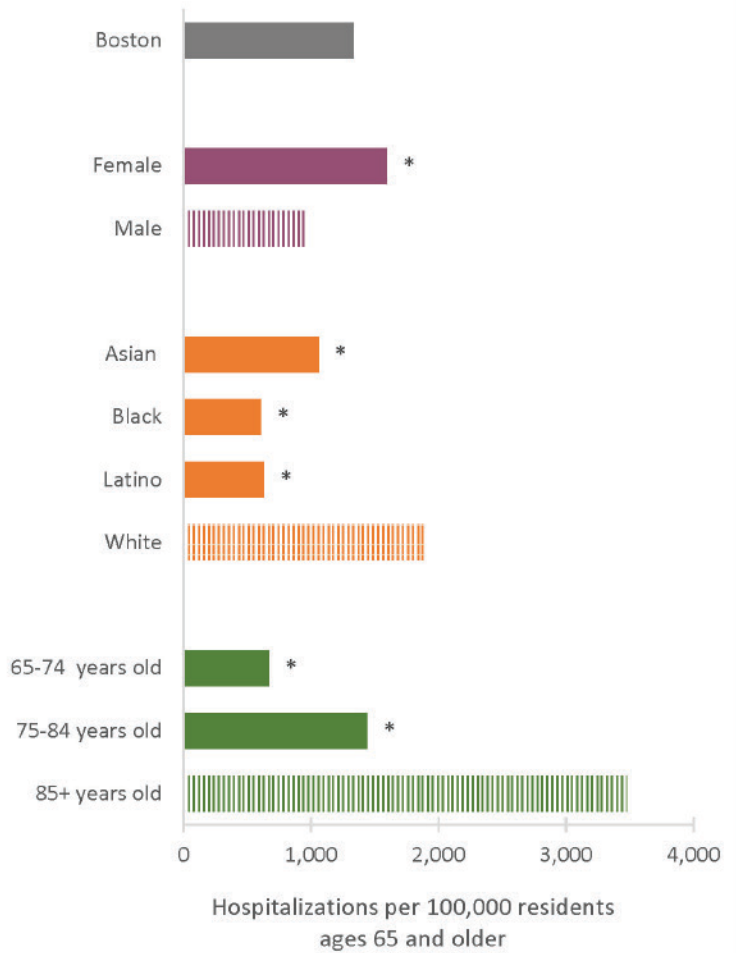
\* Statistically significant change over time

DATA SOURCE: Acute hospital case-mix databases, Massachusetts Center for Health Information and Analysis



In 2015, the fall-related hospitalization rate was 1,334.8 per 100,000 residents ages 65 and older. The rate for females (1,597.7) was 66% higher than the rate for males (963.8). The rates were 44%, 68%, and 67% lower, respectively, for Asian (1,060.1), Black (608.2), and Latino residents (630.3), compared with White residents (1,902.0). The rates for adults ages 65-74 (669.7) and 75-84 (1,442.2) were lower than the rate for those ages 85 and older (3,480.5).

Figure 12.38 Fall-Related Injury Hospitalizations Among Residents Ages 65+ by Selected Indicators, 2015

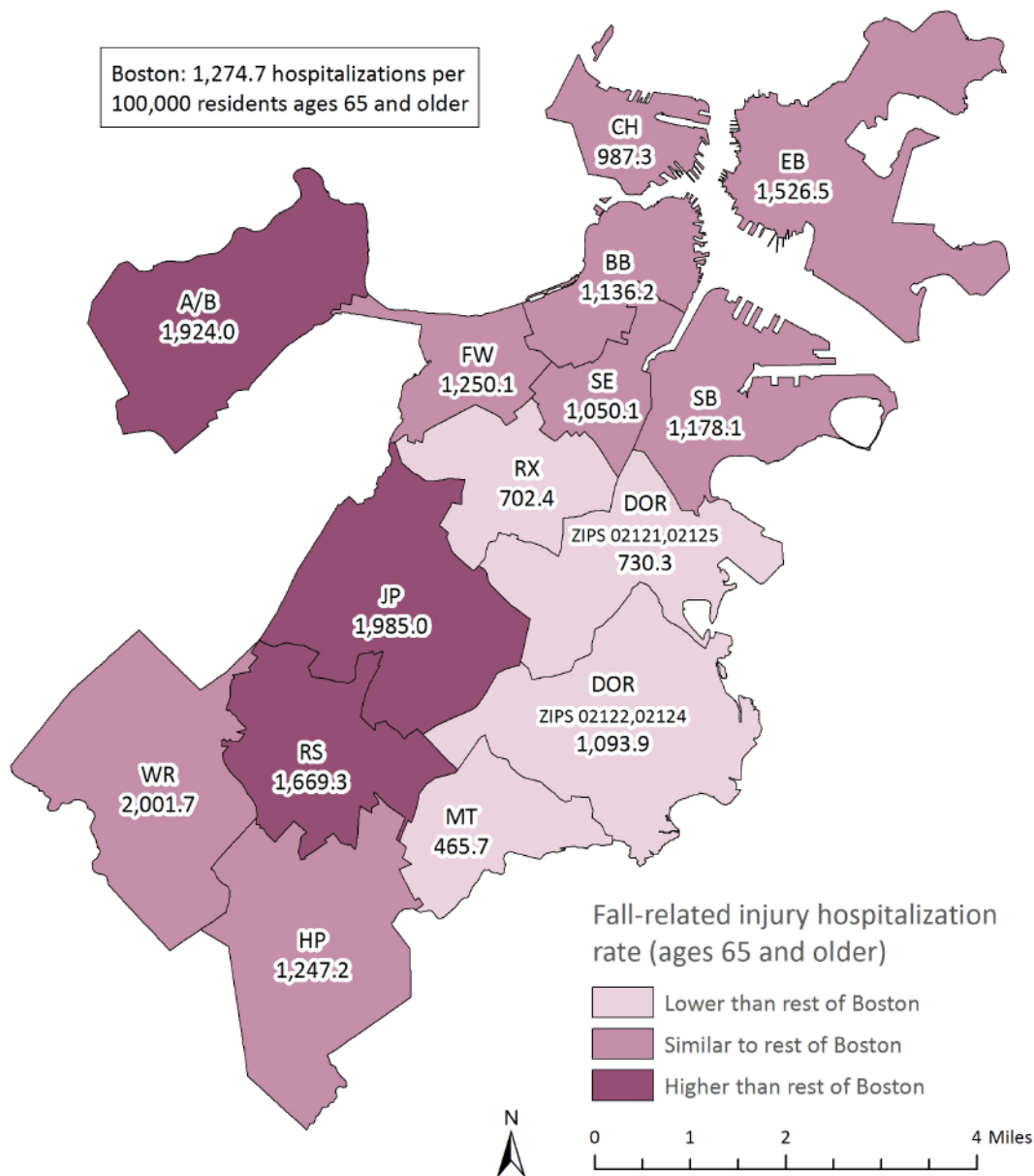


\* Statistically significant difference when compared to reference group

NOTE: Bars with patterns indicate the reference group within each selected indicator.  
 DATA SOURCE: Acute hospital case-mix databases, Massachusetts Center for Health Information and Analysis



Figure 12.39 Fall-Related Injury Hospitalizations<sup>1</sup>  
by Neighborhood, 2014-2015



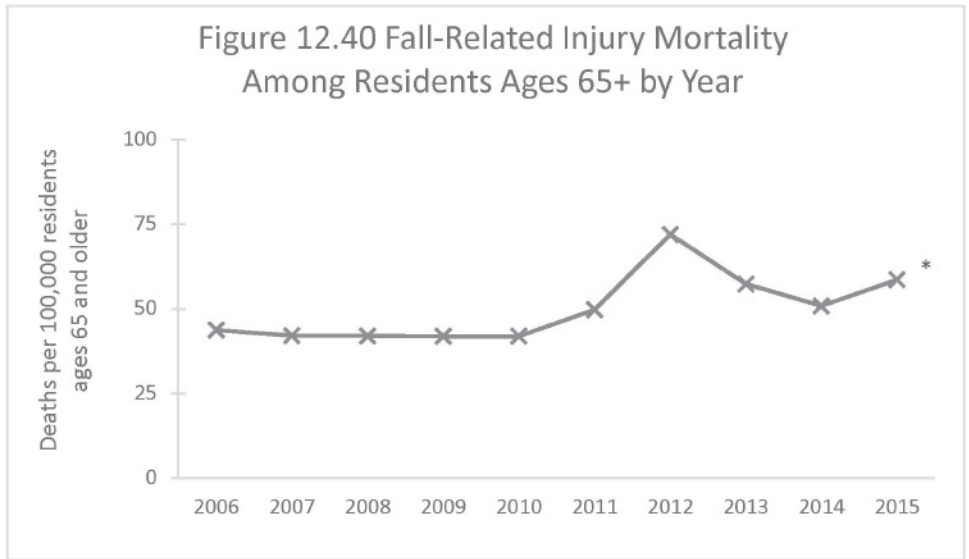
<sup>1</sup> 2-year average annual rates per 100,000 residents ages 65 and older

NOTE: "BB" includes the Back Bay, Beacon Hill, Downtown, the North End, and the West End.  
"SE" includes the South End and Chinatown.

DATA SOURCE: Acute hospital case-mix databases, Massachusetts Center for Health Information and Analysis

During 2014-2015, the fall-related hospitalization rate in Boston was 1,274.7 per 100,000 residents ages 65 and older. The rate was higher for Allston/Brighton, Jamaica Plain, and Roslindale compared with the rest of Boston. The rate was lower for Dorchester (zip codes 02121, 02125), Dorchester (zip codes 02122, 02124), Mattapan, and Roxbury.

In 2015, the mortality rate for fall-related injuries was 58.5 deaths per 100,000 residents ages 65 and older. Between 2006 and 2015, the rate increased by 50%.



\* Statistically significant change over time

DATA SOURCE: Boston resident deaths, Massachusetts Department of Public Health (data as of December 2016). Data may be updated as more information becomes available.

### Elderly Fatal Falls

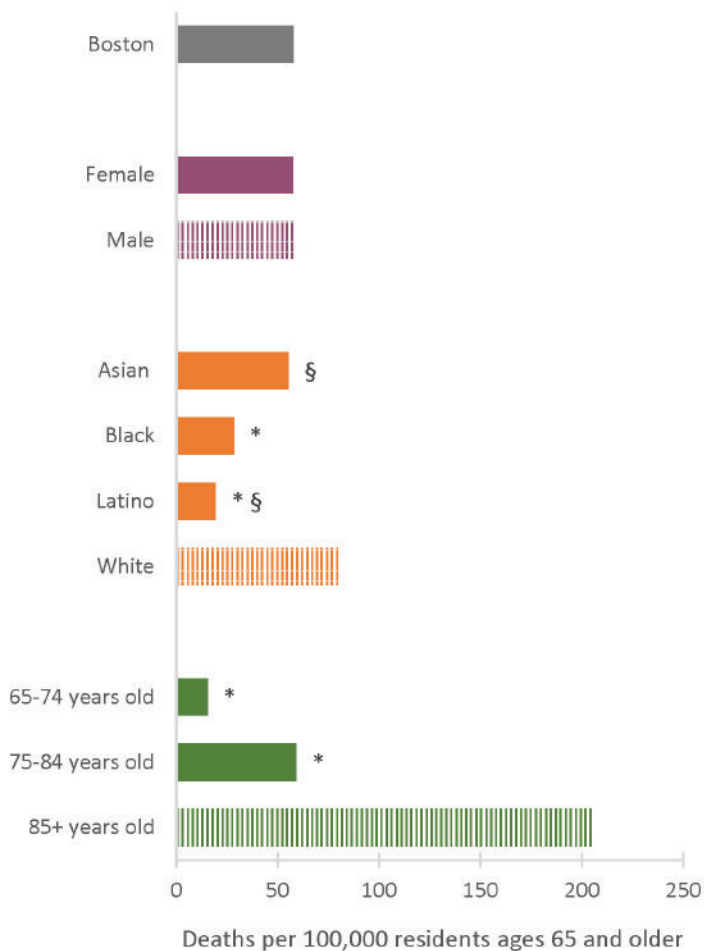
Healthy People 2020 Target: 47 deaths per 100,000 population ages 65+

US 2010: 60.5

MA 2013: 56.2

Boston 2015: 50.1

Figure 12.41 Fall Related Injury Mortality<sup>1</sup> Among Residents Ages 65+ by Selected Indicators, 2011-2015

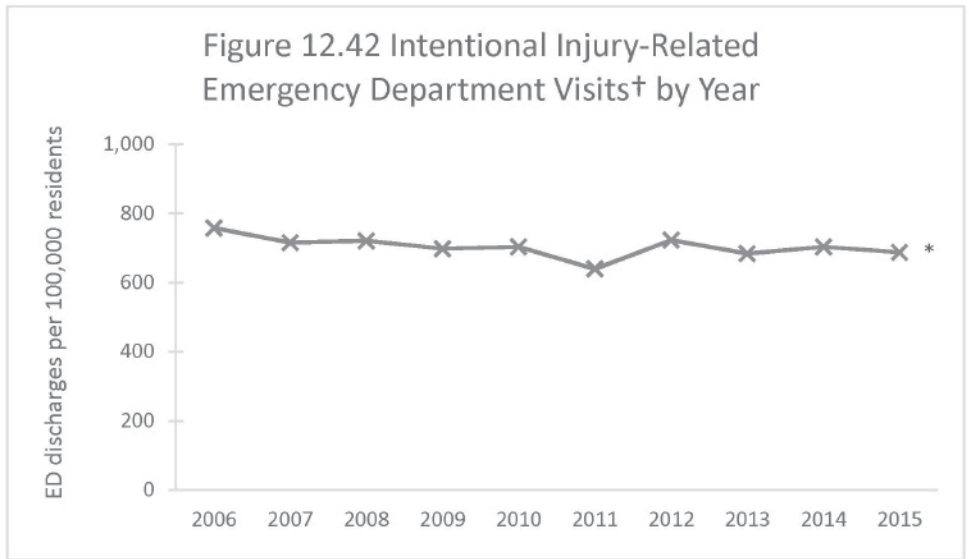


During 2011-2015, the fall-related injury mortality rate in Boston was 57.6 deaths per 100,000 residents ages 65 and older. The rates for Black (28.5) and Latino residents (19.5) were 65% and 76% lower, respectively, than the rate for White residents (81.0). The rates for those ages 65-74 (15.5) and 75-84 (59.2) were lower than that of adults ages 85 and older (205.7).

\* Statistically significant difference when compared to reference group  
 § Rates are based on 20 or fewer cases and should be interpreted with caution.  
<sup>1</sup> 5-year average annual rates

NOTE: Bars with patterns indicate the reference group within each selected indicator.  
 DATA SOURCE: Boston resident deaths, Massachusetts Department of Public Health (data as of December 2016). Data may be updated as more information becomes available.

In 2015, the intentional injury-related rate for emergency department visits was 687.1 per 100,000 residents. Between 2006 and 2015, the rate decreased by 7%.



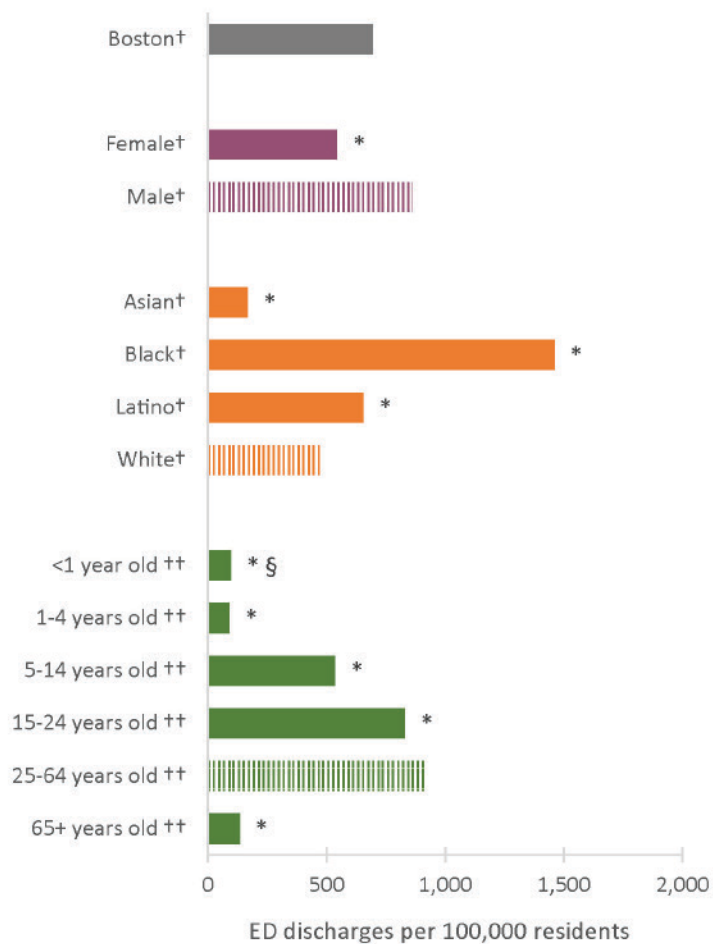
\* Statistically significant change over time  
† Age-adjusted rates per 100,000 residents

NOTE: For injuries, emergency department visits include discharges from the emergency department but exclude care resulting in hospitalizations.

DATA SOURCE: Acute hospital case-mix databases, Massachusetts Center for Health Information and Analysis



Figure 12.43 Intentional Injury-Related Emergency Department Visits by Selected Indicators, 2014-2015



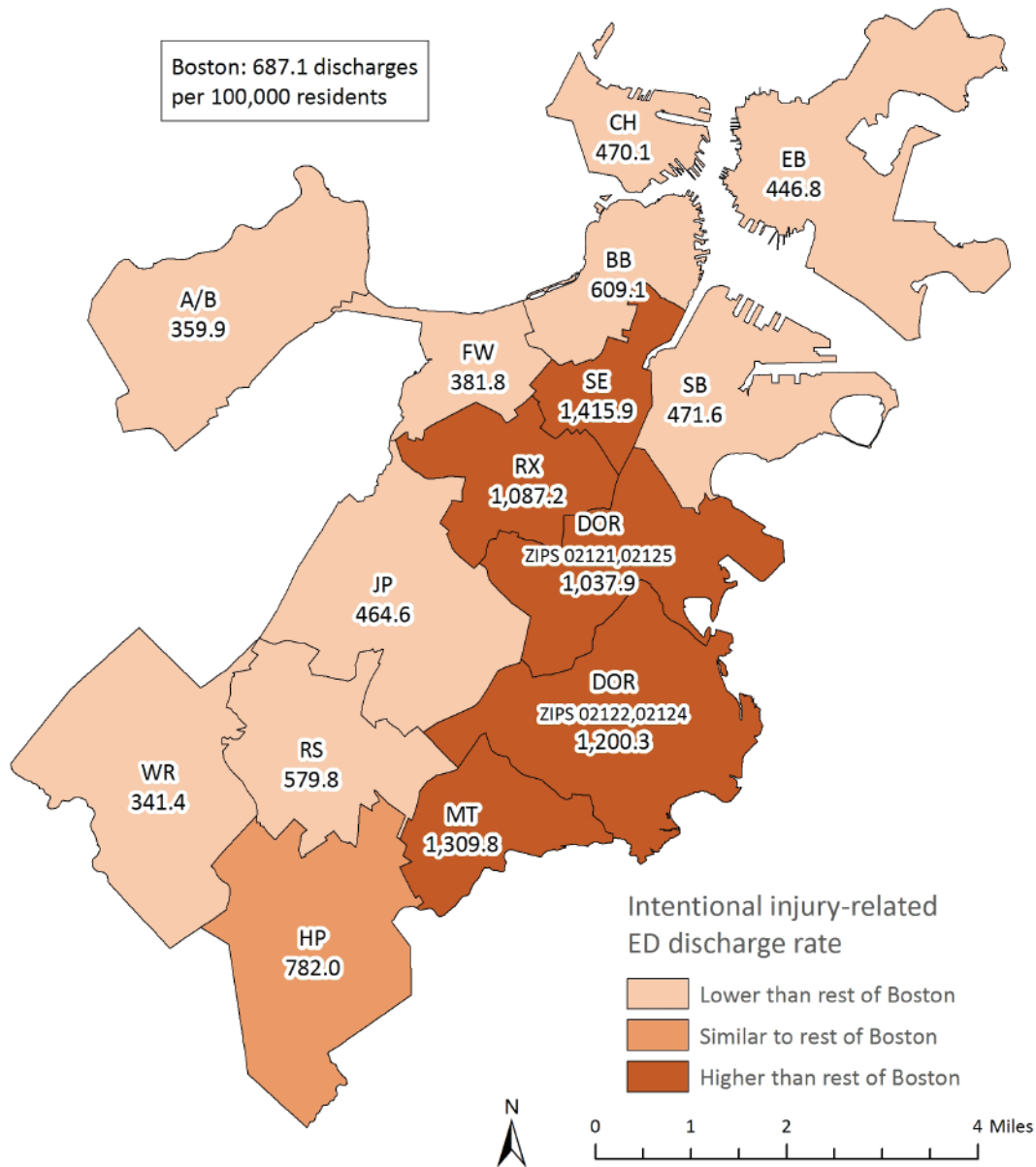
During 2014-2015, the intentional injury-related rate for emergency department visits was 695.3 per 100,000 residents. The rate for females (544.7) was 37% lower than the rate for males (857.4). The rate for Asian residents (166.8) was 65% lower than the rate for White residents (471.4). The rate for Black residents (1,458.8) was 3.1 times the rate of White residents, and the rate for Latino residents (655.1) was 39% higher than the rate for White residents. The rates for all age groups were lower than the rate for those ages 25-64 (910.6).

\* Statistically significant difference when compared to reference group  
 † 2-year average annual age-adjusted rates per 100,000 residents  
 †† 2-year average annual rates per 100,000 residents  
 § Rates are based on 20 or fewer cases and should be interpreted with caution.

NOTE: Bars with patterns indicate the reference group within each selected indicator. For injuries, emergency department visits include discharges from the emergency department but exclude care resulting in hospitalizations.

DATA SOURCE: Acute hospital case-mix databases, Massachusetts Center for Health Information and Analysis

Figure 12.44 Intentional Injury-Related Emergency Department (ED) Visits† by Neighborhood, 2015



† Age-adjusted rates per 100,000 residents

NOTE: “BB” includes the Back Bay, Beacon Hill, Downtown, the North End, and the West End.  
 “SE” includes the South End and Chinatown. For injuries, emergency department visits include discharges from the emergency department but exclude care resulting in hospitalizations.

DATA SOURCE: Acute hospital case-mix databases, Massachusetts Center for Health Information and Analysis

In 2015, the intentional injury-related emergency department visit rate in Boston was 687.1 per 100,000 residents. The rate was higher for Dorchester (zip codes 02121, 02125), Dorchester (zip codes 02122, 02124), Mattapan, Roxbury, and the South End. The rate was lower for Allston/Brighton, Back Bay, Charlestown, East Boston, Fenway, Jamaica Plain, Roslindale, South Boston, and West Roxbury.

Figure 12.45 Intentional Injury-Related Hospitalizations† by Year



In 2015, the intentional injury-related hospitalization rate was 91.8 per 100,000 residents. Between 2006 and 2015, the rate decreased by 33%.

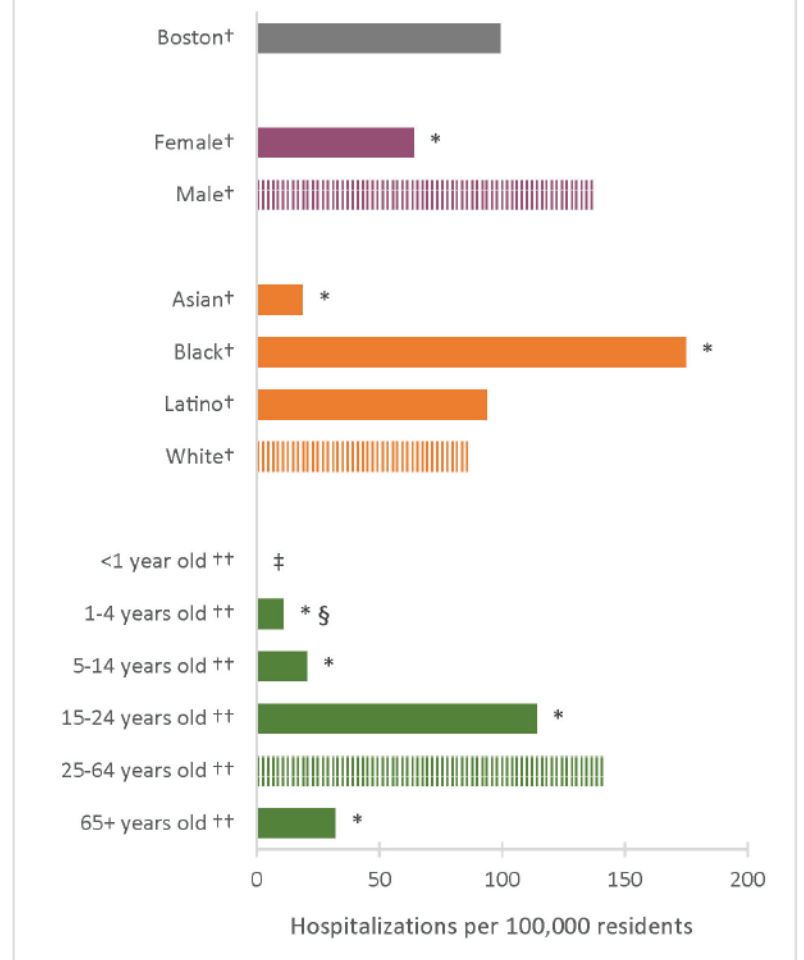
\* Statistically significant change over time  
 † Age-adjusted rates per 100,000 residents

DATA SOURCE: Acute hospital case-mix databases, Massachusetts Center for Health Information and Analysis



During 2012-2015, the intentional injury-related hospitalization rate was 99.2 per 100,000 residents. The rate for females (64.0) was 53% lower than the rate for males (136.8). The rate for Asian residents (18.6) was 79% lower than the rate for White residents (86.8). The rate for Black residents (174.7) was 2 times the rate for White residents. The rate for those ages 1-4 (10.9), 5-14 (20.5), 15-24 (113.9), and 65+ (32.0) were all lower than the rate for those ages 25-64 (141.3).

Figure 12.46 Intentional Injury-Related Hospitalizations by Selected Indicators, 2012-2015



\* Statistically significant difference when compared to reference group

† 4-year average annual age-adjusted rates per 100,000 residents

†† 4-year average annual rates per 100,000 residents

‡ Rates not presented due to a small number of cases

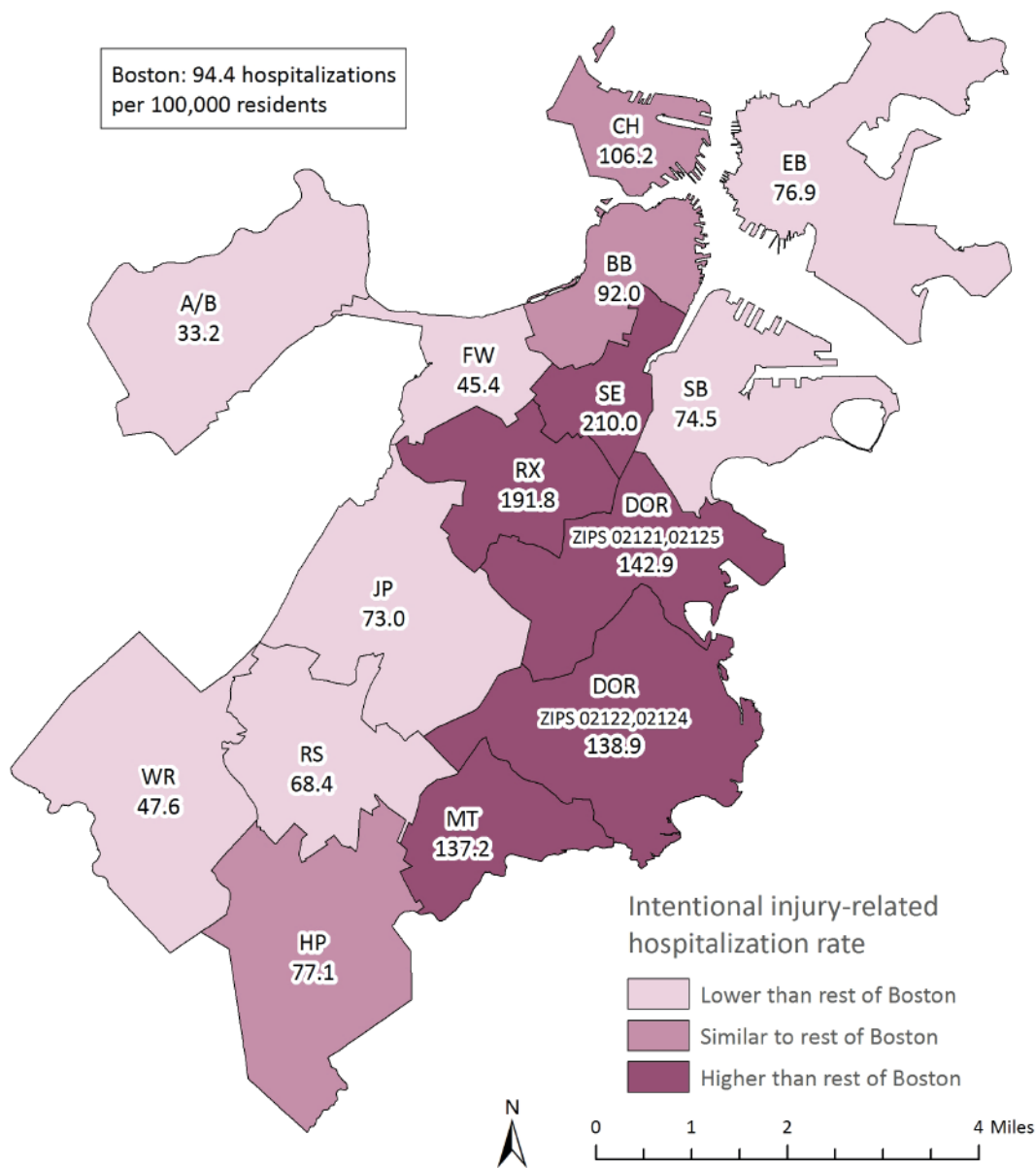
§ Rates are based on 20 or fewer cases and should be interpreted with caution.

NOTE: Bars with patterns indicate the reference group within each selected indicator.

DATA SOURCE: Acute hospital case-mix databases, Massachusetts Center for Health Information and Analysis



Figure 12.47 Intentional Injury-Related Hospitalizations† by Neighborhood, 2014-2015



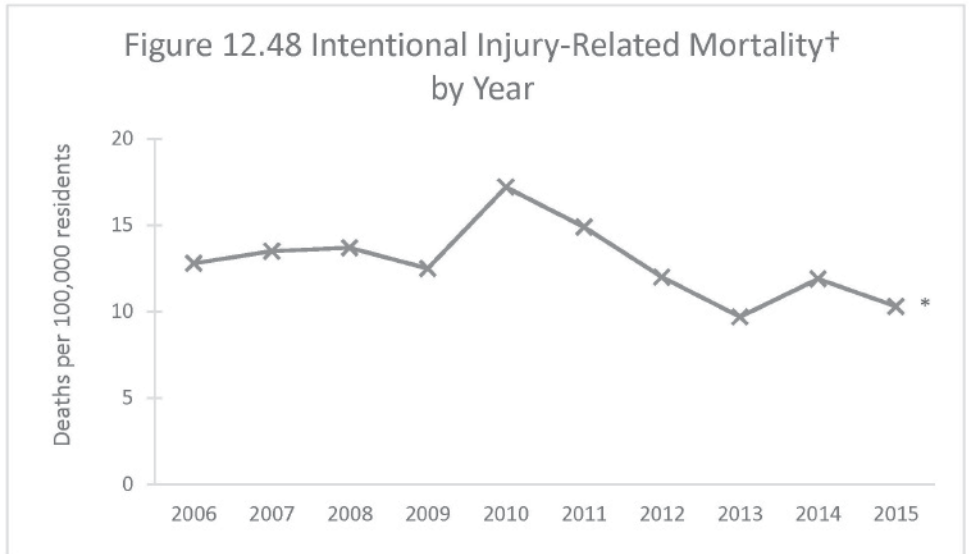
† 2-year average annual age-adjusted rates per 100,000 residents

NOTE: "BB" includes the Back Bay, Beacon Hill, Downtown, the North End, and the West End. "SE" includes the South End and Chinatown.

DATA SOURCE: Acute hospital case-mix databases, Massachusetts Center for Health Information and Analysis

During 2014-2015, the intentional injury-related hospitalization rate in Boston was 94.4 per 100,000 residents. The rate was higher for Dorchester (zip codes 02121, 02125), Dorchester (zip codes 02122, 02124), Mattapan, Roxbury, and the South End. The rate was lower for Allston/Brighton, East Boston, Fenway, Jamaica Plain, Roslindale, South Boston, and West Roxbury.

In 2015, the intentional injury-related mortality rate was 10.3 deaths per 100,000 residents. Between 2006 and 2015, the rate decreased by 22%.

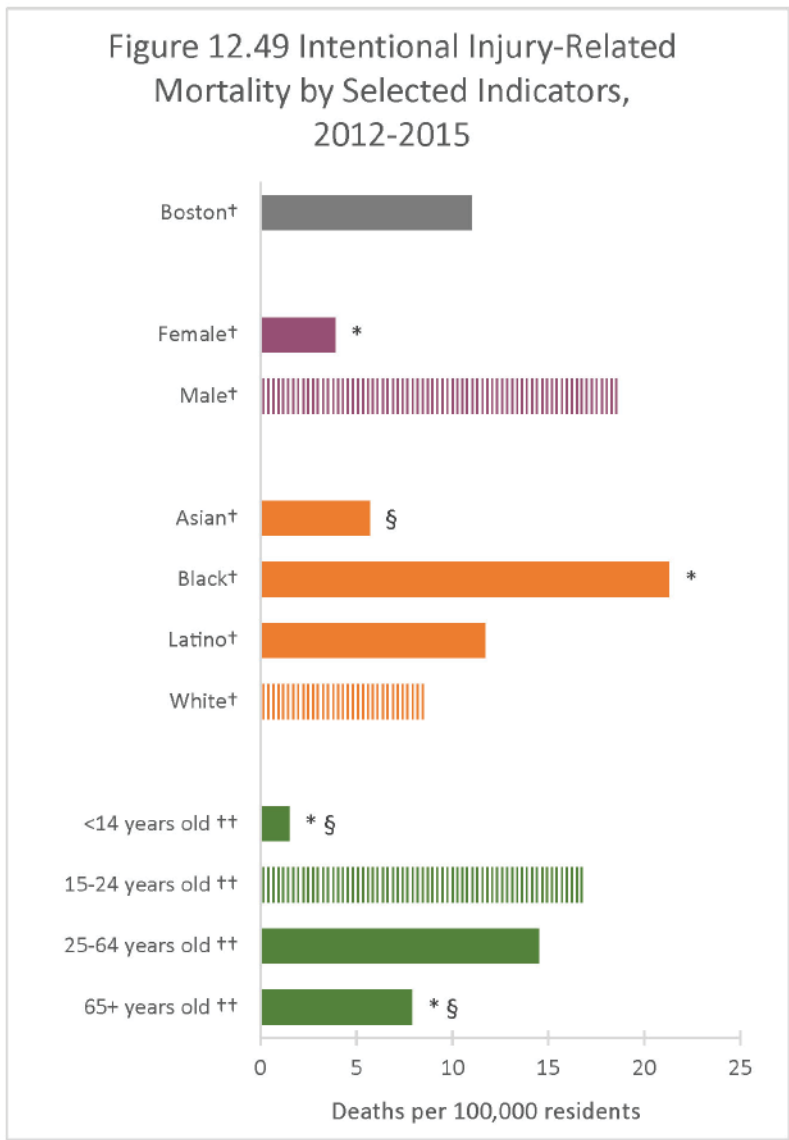


\* Statistically significant change over time  
† Age-adjusted rates per 100,000 residents

NOTE: For more information on suicide, see Chapter 13: Mental Health.  
DATA SOURCE: Boston resident deaths, Massachusetts Department of Public Health (data as of December 2016). Data may be updated as more information becomes available.



Figure 12.49 Intentional Injury-Related Mortality by Selected Indicators, 2012-2015

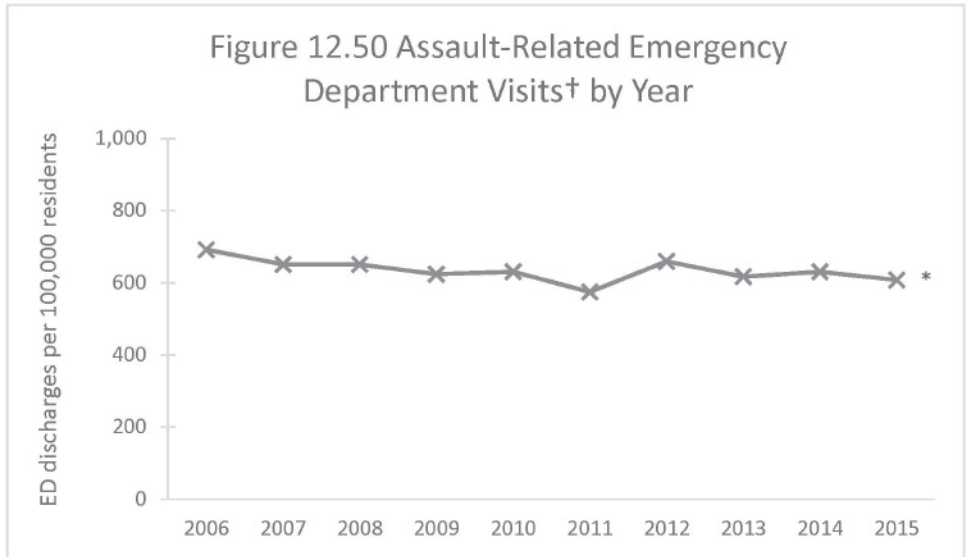


During 2012-2015, the intentional injury-related mortality rate was 11.0 deaths per 100,000 residents. The rate for females (3.9) was 79% lower than the rate for males (18.6). The rate for Black residents (21.3) was 2.5 times the rate for White residents (8.6). The rates for residents ages 14 and younger (1.5) and those ages 65 and older (7.9) were lower than that of residents ages 15-24 (16.9).

\* Statistically significant difference when compared to reference group  
 † 4-year average annual age-adjusted rates per 100,000 residents  
 †† 4-year average annual rates per 100,000 residents  
 § Rates are based on 20 or fewer cases and should be interpreted with caution.

NOTE: Bars with patterns indicate the reference group within each selected indicator. For more information on suicide, see Chapter 13: Mental Health.  
 DATA SOURCE: Boston resident deaths, Massachusetts Department of Public Health (data as of December 2016). Data may be updated as more information becomes available.

In 2015, the assault-related emergency department visit rate was 607.6 per 100,000 residents. Between 2006 and 2015, the rate decreased by 8%.

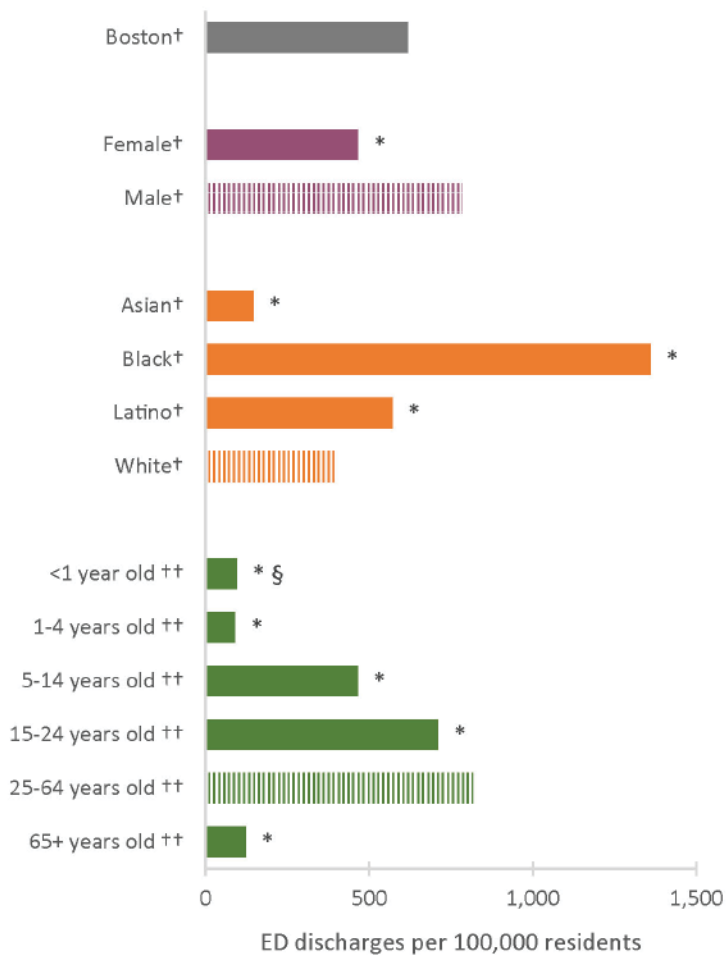


\* Statistically significant change over time  
 † Age-adjusted rates per 100,000 residents

NOTE: For injuries, emergency department visits include discharges from the emergency department but exclude care resulting in hospitalizations.

DATA SOURCE: Acute hospital case-mix databases, Massachusetts Center for Health Information and Analysis

Figure 12.51 Assault-Related Injury  
Emergency Department Visits  
by Selected Indicators, 2014-2015



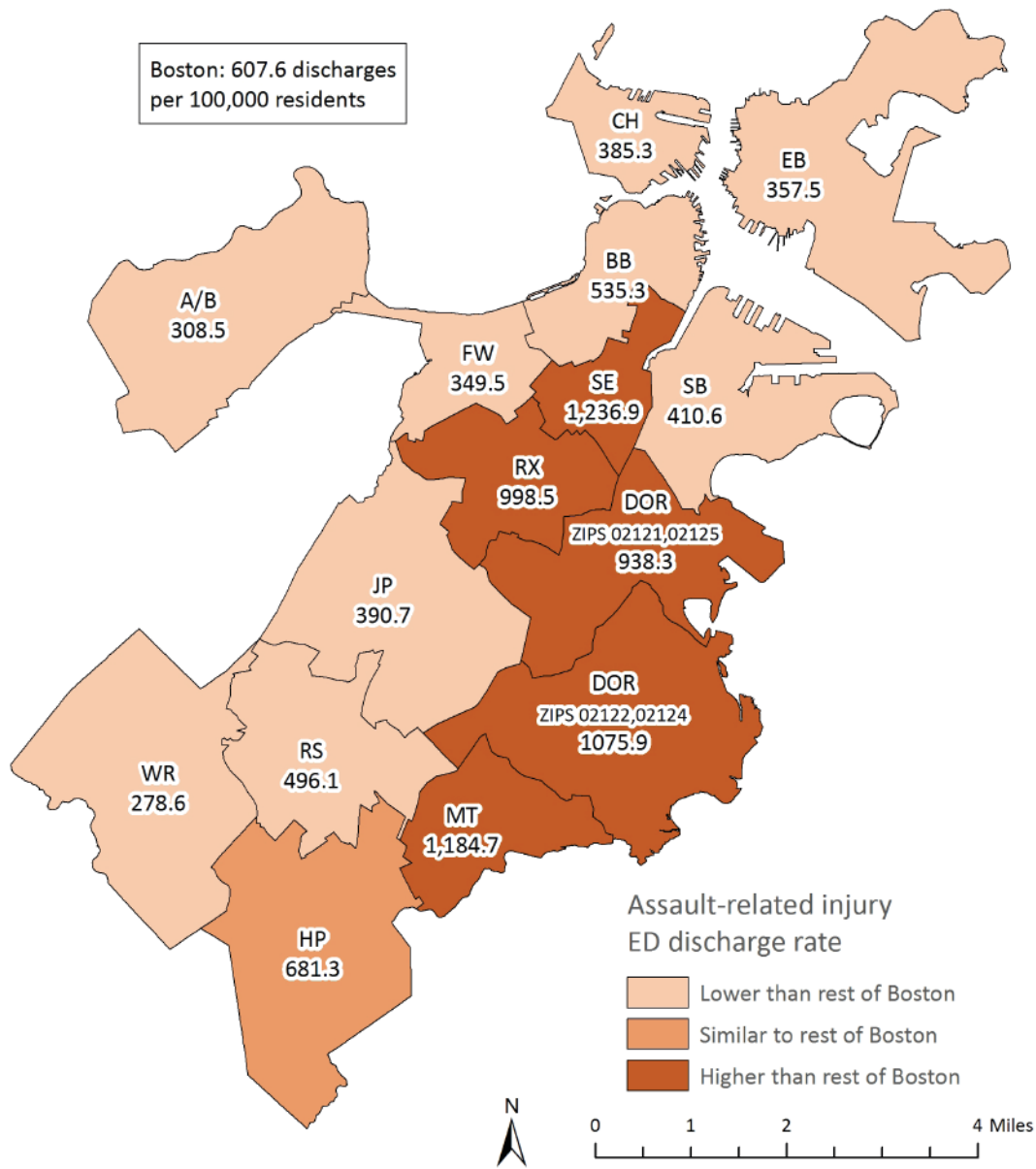
During 2014-2015, the rate of assault-related injury emergency department visits was 619.0 per 100,000 residents. The rate for females (465.7) was 41% lower than the rate for males (783.6). The rate for Asian residents (145.4) was 63% lower than the rate for White residents (393.1). The rate for Black residents (1,360.2) was 3.5 times the rate for White residents, and the rate for Latinos was 45% higher (570.6) compared with White residents. The rates for all age groups were lower than the rate for those ages 25-64 (817.0).

\* Statistically significant difference when compared to reference group  
 † 2-year average annual age-adjusted rates per 100,000 residents  
 †† 2-year average annual rates per 100,000 residents  
 § Rates are based on 20 or fewer cases and should be interpreted with caution.

NOTE: Bars with patterns indicate the reference group within each selected indicator. For injuries, emergency department visits include discharges from the emergency department but exclude care resulting in hospitalizations.

DATA SOURCE: Acute hospital case-mix databases, Massachusetts Center for Health Information and Analysis

Figure 12.52 Assault-Related Injury Emergency Department (ED) Visits† by Neighborhood, 2015



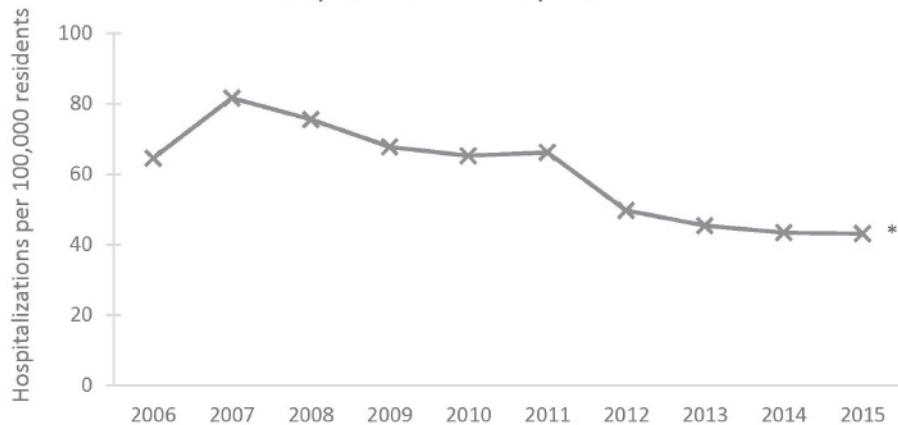
† Age-adjusted rates per 100,000 residents

NOTE: "BB" includes the Back Bay, Beacon Hill, Downtown, the North End, and the West End. "SE" includes the South End and Chinatown. For injuries, emergency department visits include discharges from the emergency department but exclude care resulting in hospitalizations.

DATA SOURCE: Acute hospital case-mix databases, Massachusetts Center for Health Information and Analysis

In 2015, assault-related injury emergency department visit rate in Boston was 607.6 per 100,000 residents. The rate was higher for Dorchester (zip codes 02121, 02125), Dorchester (zip codes 02122, 02124), Mattapan, Roxbury, and the South End. The rate was lower for Allston/Brighton, Back Bay, Charlestown, East Boston, Fenway, Jamaica Plain, Roslindale, South Boston, and West Roxbury.

Figure 12.53 Assault-Related Injury Hospitalizations† by Year



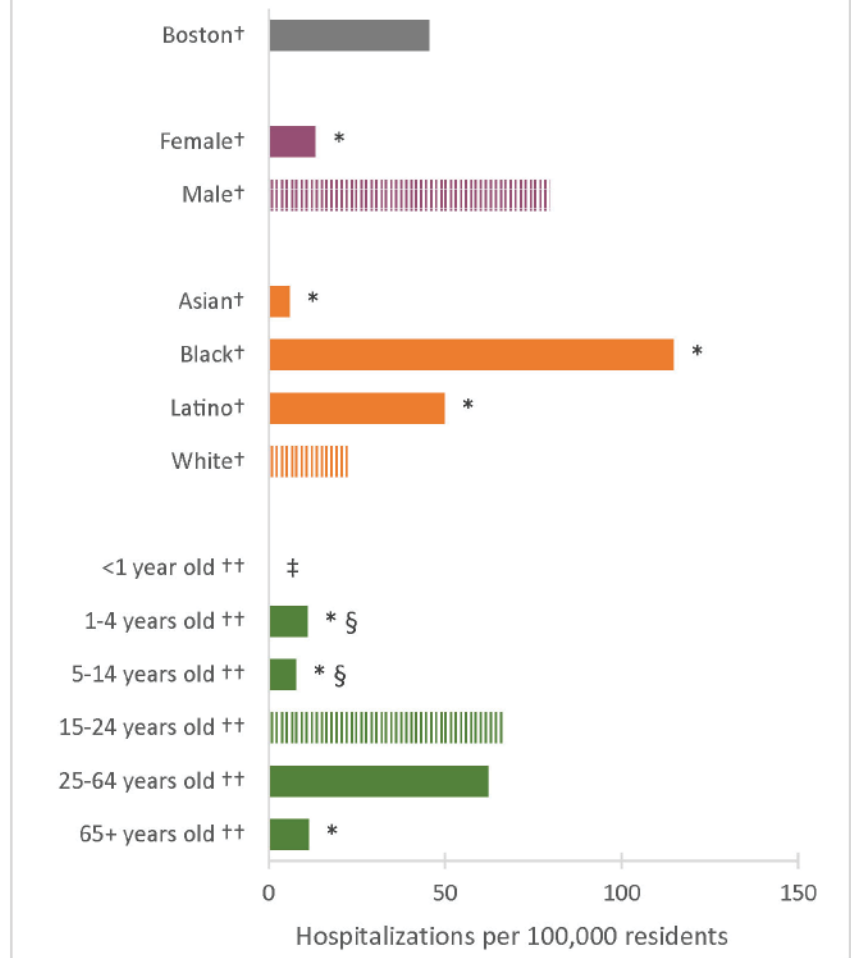
In 2015, the assault-related injury hospitalization rate was 43.1 per 100,000 residents. Between 2006 and 2015, the rate decreased by 46%.

\* Statistically significant change over time  
 † Age-adjusted rates per 100,000 residents

DATA SOURCE: Acute hospital case-mix databases, Massachusetts Center for Health Information and Analysis

During 2012-2015, the assault-related injury hospitalization rate in Boston was 45.4 per 100,000 residents. The rate was 83% lower for females (13.2) compared with males (79.6). The rate was 74% lower for Asian residents (5.8) compared with White residents (22.3). The rates for Black (114.7) and Latino residents (49.8) were 5.1 times and 2.2 times, respectively, the rate of White residents. The rates for residents ages 1-4 (10.9), 5-14 (7.7), and 65 and older (11.2) were lower than that of residents ages 15-24 (66.5).

Figure 12.54 Assault-Related Injury Hospitalizations by Selected Indicators, 2012-2015

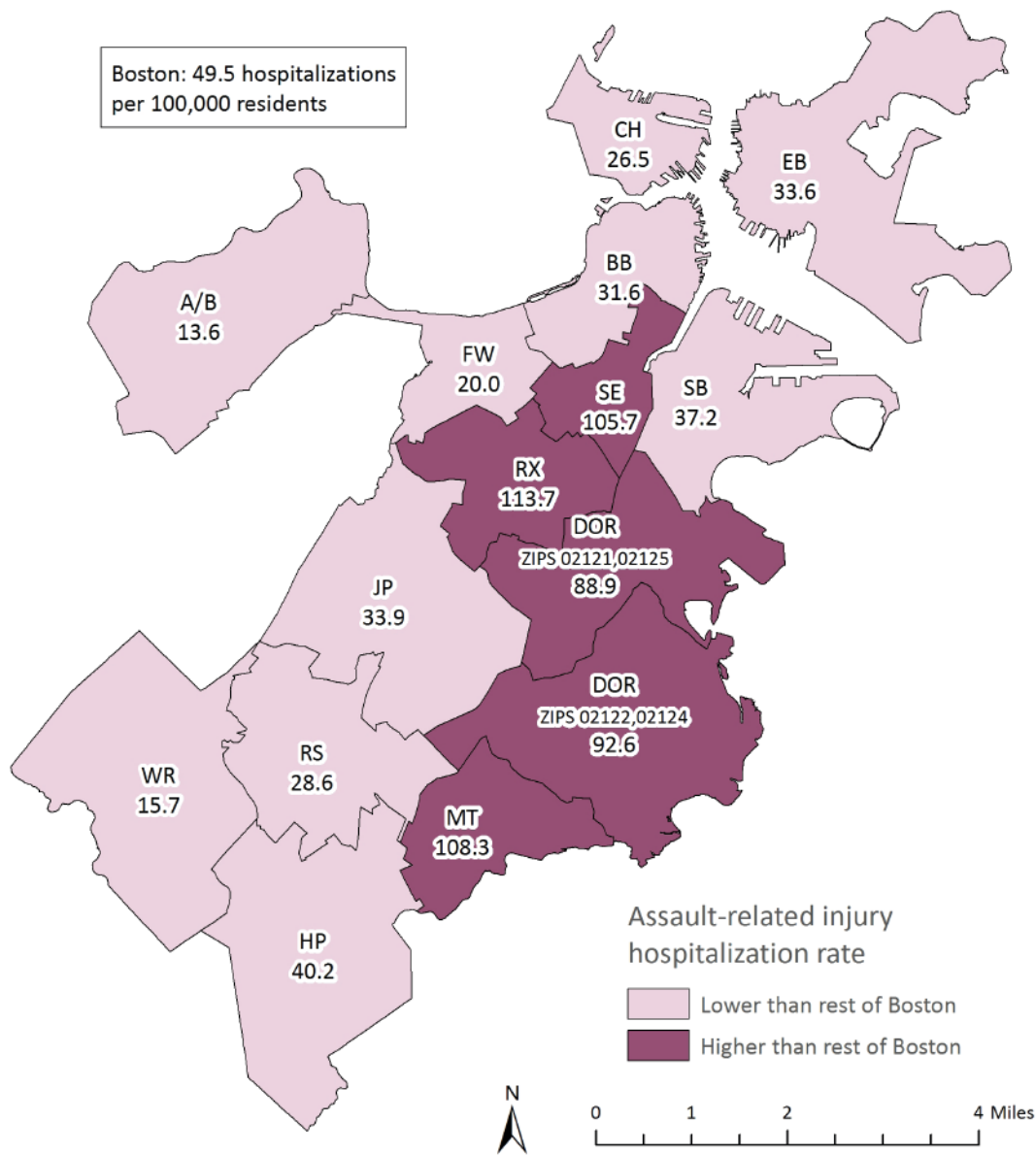


\* Statistically significant difference when compared to reference group  
 † 4-year average annual age-adjusted rates per 100,000 residents  
 †† 4-year average annual rates per 100,000 residents  
 ‡ Rates not presented due to a small number of cases  
 § Rates are based on 20 or fewer cases and should be interpreted with caution.

NOTE: Bars with patterns indicate the reference group within each selected indicator.  
 DATA SOURCE: Acute hospital case-mix databases, Massachusetts Center for Health Information and Analysis



Figure 12.55 Assault-Related Injury Hospitalizations† by Neighborhood, 2011-2015



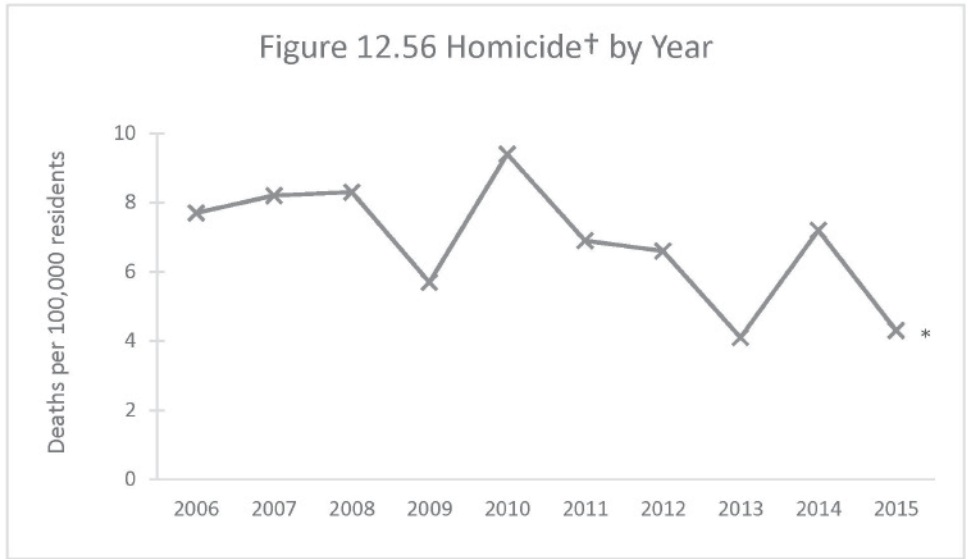
† 5-year average annual age-adjusted rates per 100,000 residents

NOTE: "BB" includes the Back Bay, Beacon Hill, Downtown, the North End, and the West End. "SE" includes the South End and Chinatown.

DATA SOURCE: Acute hospital case-mix databases, Massachusetts Center for Health Information and Analysis

For 2011-2015, the assault-related injury hospitalization rate in Boston was 49.5 per 100,000 residents. The rate was higher for Dorchester (zip codes 02121, 02125), Dorchester (zip codes 02122, 02124), Mattapan, Roxbury, and the South End. The rate was lower for Allston/Brighton, Back Bay, Charlestown, East Boston, Fenway, Hyde Park, Jamaica Plain, Roslindale, South Boston, and West Roxbury.

In 2015, there were 4.3 deaths per 100,000 residents due to homicide. Between 2006 and 2015, the homicide rate decreased by 37%.



\* Statistically significant change over time  
 † Age-adjusted rates per 100,000 residents

DATA SOURCE: Boston resident deaths, Massachusetts Department of Public Health (data as of December 2016). Data may be updated as more information becomes available.

### Homicide

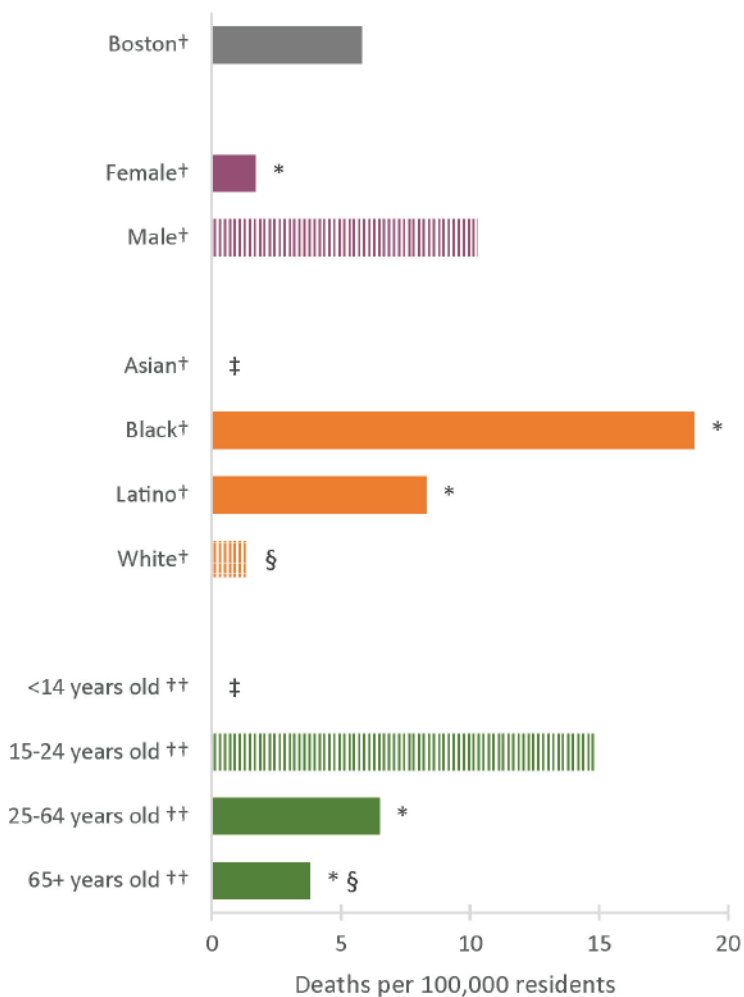
Healthy People 2020 Target: 5.5 deaths per 100,000 population

US 2015: 5.7

MA 2015: 2.1

Boston 2015: 4.3

Figure 12.57 Homicide by Selected Indicators, 2011-2015

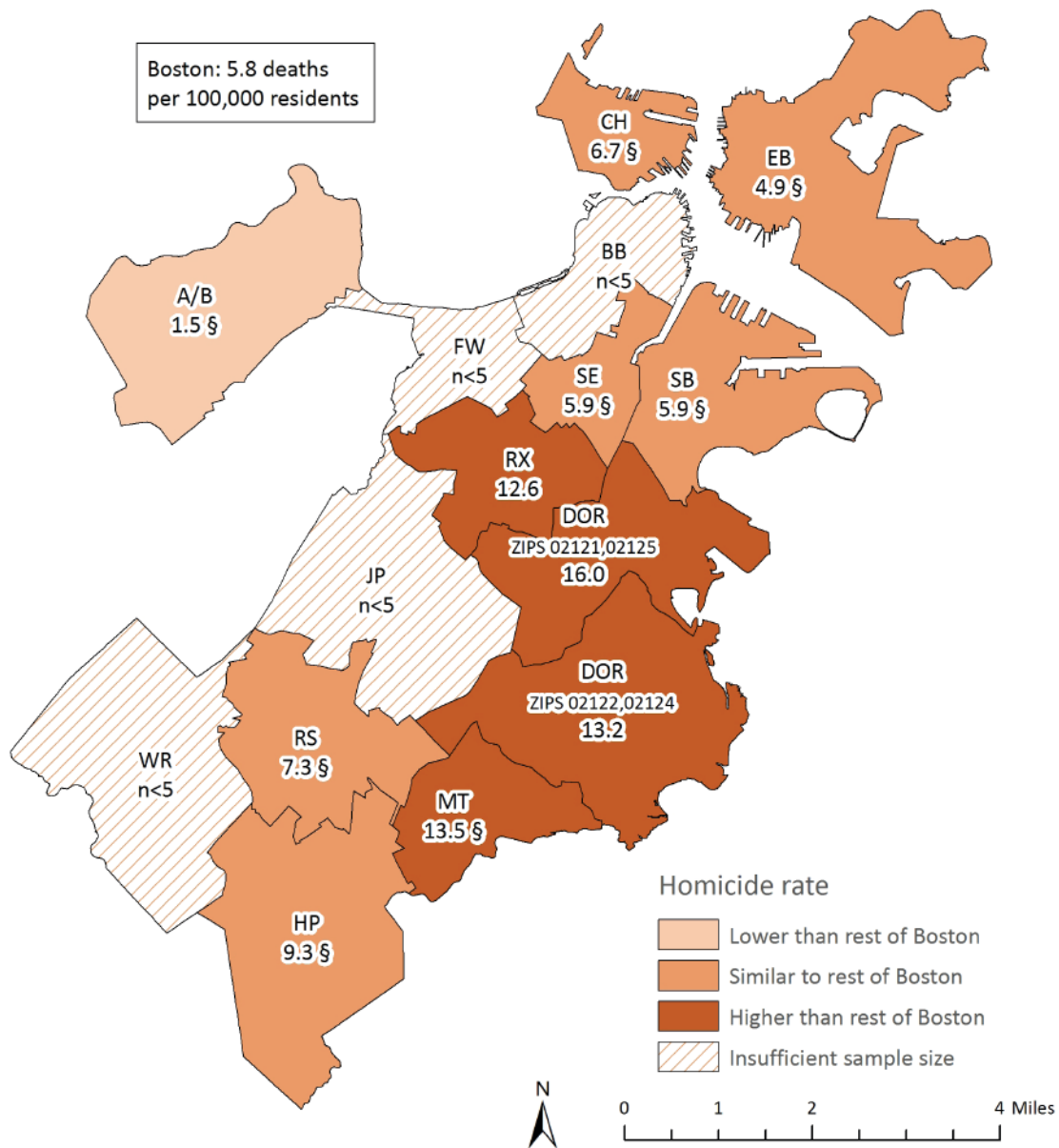


During 2011-2015, the homicide rate in Boston was 5.8 deaths per 100,000 residents. The homicide rate for females (1.7) was 84% lower than the rate for males (10.3). Black (18.7) and Latino residents (8.3) had homicide rates that were approximately 14 times and 6 times, respectively, the rate of White residents (1.4). The rates for those ages 25-64 (6.5) and 65 and older (3.8) were lower than the rate for those ages 15-24 (14.9).

\* Statistically significant difference when compared to reference group  
 † 5-year average annual age-adjusted rates per 100,000 residents  
 †† 5-year average annual rates per 100,000 residents  
 ‡ Rates not presented due to a small number of cases  
 § Rates are based on 20 or fewer cases and should be interpreted with caution.

NOTE: Bars with patterns indicate the reference group within each selected indicator.  
 DATA SOURCE: Boston resident deaths, Massachusetts Department of Public Health (data as of December 2016). Data may be updated as more information becomes available.

Figure 12.58 Homicide† by Neighborhood, 2011-2015



† 5-year average annual age-adjusted rates per 100,000 residents  
 § Rates are based on 20 or fewer cases and should be interpreted with caution.

NOTE: "BB" includes the Back Bay, Beacon Hill, Downtown, the North End, and the West End. "SE" includes the South End and Chinatown.

DATA SOURCE: Boston resident deaths, Massachusetts Department of Public Health (data as of December 2016). Data may be updated as more information becomes available.

During 2011-2015, the homicide rate in Boston was 5.8 deaths per 100,000 residents. The rate was higher for Dorchester (zip codes 02121, 02125), Dorchester (zip codes 02122, 02124), Mattapan, and Roxbury compared with the rest of Boston. The rate was lower for Allston/Brighton compared with the rest of Boston.

## Summary

In 2015, the City of Boston met Healthy People 2020 targets for indicators related to injury and exposure to violence, including adolescent bullying, injury-related hospitalizations, and injury mortality including homicides. Between the years 2006 and 2015, Boston also experienced improvement for a number of other indicators, including assault-related injury emergency department visits and hospitalizations; intentional injury-related emergency department visits, hospitalizations and mortality; unintentional injury-related emergency department visits and hospitalizations; and fall-related injury hospitalizations among elderly residents.

Healthy People 2020 targets were not met in 2015 for injury-related emergency department visits, and unintentional injury-related mortality, including falls among elderly residents. However, the all injury-related rate of emergency department visits decreased by 3% from 2006 to 2015, and the unintentional injury-related mortality remained stable over the same time period. In contrast, the mortality rate for fall-related injuries among elderly residents increased by 50% from 2006 to 2015. Similarly, the emergency department visit rate for fall-related injuries among elderly residents increased by 19% over the same time period.

While Boston experienced improvement or met Healthy People 2020 targets for many indicators of injury and exposure to violence, we identified inequities across categories of age, sex, race/ethnicity, and neighborhood. The leading types of injury mortality varied by age and racial/ethnic group between the years 2011 and 2015. Homicide, accidental poisonings, and accidental falls were the leading causes of injury mortality for those ages 15-24, 25-64, and 65 and older, respectively. The leading causes across racial/ethnic groups were accidental falls, homicide by firearm, and accidental poisonings for Asian residents, Black residents, and both Latino and White residents, respectively.

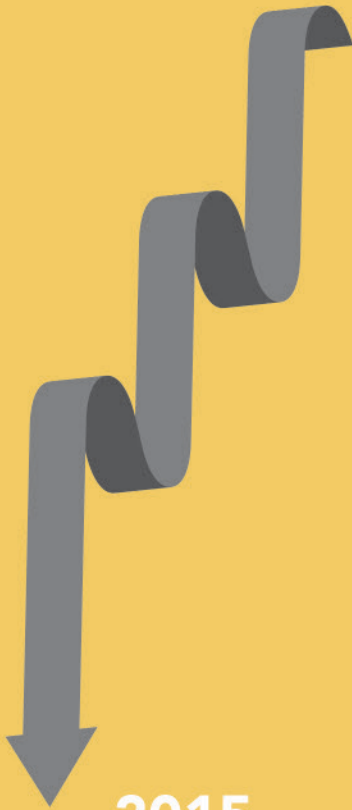
Data collected from recent surveys of the Boston Behavioral Risk Factor Surveillance System indicate the percentage of adult residents experiencing physical and sexual violence, including sexual assault, in one's lifetime was higher for females than for males. Similarly, among Boston public high school students, a higher percentage of females reported being bullied than males in 2015. Emergency department visits, hospitalizations, and mortality for all injuries and intentional injuries, were higher for male residents than females. Over various time periods, the intentional injury-related emergency department visits (2014-2015), hospitalization (2012-2015), and mortality (2012-2015) rates were higher for Black residents than for White residents. The neighborhoods with elevated rates for injuries also vary according to the type of injury. For example, higher rates of both elderly fall-related emergency department visits and hospitalizations were observed in Allston/Brighton and Roslindale. Higher rates of all injury-related emergency department visits and hospitalizations were observed in Dorchester (zip codes 02122, 02124), Hyde Park, and South End. Higher rates of intentional injury-related emergency department visits and hospitalizations were observed in Dorchester (zip codes 02121, 02125), Dorchester (zip codes 02122, 02124), Mattapan, Roxbury, and South End.

# Injury and Exposure to Violence



The homicide rate among all residents decreased **37%**

2006



2015

Between 2011 and 2015, the leading types of injury mortality for residents varied by age group

15 to 24 year olds:  
**Homicide by firearm**



25 to 64 year olds:  
**Accidental poisoning**  
(includes drug overdose)



65 years and older:  
**Accidental falls**



**56%** of Boston adult residents felt their neighborhood was unsafe



## Our Point of View: Thoughts from public health

### Making Boston a Trauma-Sensitive City

By Deborah Allen

Child, Adolescent and Family Health Bureau Director, 2008-2017

Boston Public Health Commission

When we look at violence on TV or in the movies, the message is pretty simple: bad people do bad things; we have to stop them. It's a job for law enforcement. When we look at violence in the real world it's more complicated. There are fluctuations in violence over time, and patterns of violence within communities, that show there is more at work than a few bad people. Public health workers ask what factors cause these patterns and how we can address them. The goal? Stop the spread of violence just as we might stop the spread of HIV, cancer, or heart disease.

Our first thought in public health goes to what we call primary prevention – how do we prevent exposure to the factors that may cause violence? One part of the answer: start with the basics. Community violence throughout the U.S., including Boston, occurs most in communities with high rates of unemployment and poverty; communities in which residents feel marginalized by racism and discrimination. So, one job of public health is to promote public policies that promote social equality; policies like criminal justice reform, fair housing laws and low-cost education. Policies that reduce the flow of guns into our communities are also part of this picture. A second part of the answer: start young. We need to teach children ways to solve problems using negotiation and empathy. BPHC programs aimed at building early childhood social and emotional health and youth development programs that arm kids not with guns but with an understanding of how conflicts escalate – these are forms of primary prevention.

We need to think next about secondary prevention, intervening where violence has occurred to mitigate its effects. Astonishingly, more than half of Boston's school children know someone who has been murdered. That is not an experience a child can simply process and leave behind. Exposure to violence causes stress. Repeated exposure may cause chronic stress. Over time, that takes a toll on every aspect of health, including psychological health. Our strategy: let's make Boston a trauma sensitive city. The Mayor has established Neighborhood Trauma Teams in five high-risk communities with a backup citywide team to support residents through outreach, neighborhood engagement, and specialized mental health counseling. To ensure a focus on children and youth exposed to violence, BPHC programs have trained approximately 2,500 youth workers, over 100 clinicians, 50 public school employees, and 200 maternal and child health workers to recognize and respond appropriately to trauma. We want every adult who works with kids, every social service worker, every teacher, policeperson, librarian, and doctor to recognize that when someone's angry, sad or withdrawn this behavior likely reflects a history of trauma rather than a personal failure or character flaw- and to respond appropriately based on this understanding.

And finally, tertiary prevention. Boston's state-funded Safe and Successful Youth (SSY) program seeks out those who are at highest risk of engaging in or being victimized by violence. They are young men who have been in and out of juvenile detention or jail, have histories of past violence, or have seen multiple friends and relatives fall victim to violence. SSY works with citywide partners to offer them intensive case management and support, job training and placement, mental health and social services -- whatever it takes for them to get beyond the history that puts them at risk.

The fact is, TV violence is not just simple, it's simplistic. Too many lives get thrown away –whether as victims or perpetrators of violence -- if we miss the chance for prevention at every step of the way.

## Our Point of View: Thoughts from a community resident

### **It takes a team to keep kids safe**

By Capravion

Capravion works for Project Right, Inc.

My name is Capravion. I am a block captain for the Violence Intervention and Prevention Project in Grove Hall. I work with the King and Pilot middle schools making sure the students get home from school safely each day.

That might sound easy. Unfortunately, when the students leave school, there can be a lot of trouble waiting for them - from violence to gang activity. We once had a student who went to the basketball courts after school to find other kids waiting there to rob him for his shoes. It takes a whole team working together to keep our kids safe. We have someone outside the school meeting the kids at let out and then others walking the designated safe routes, communicating any problems that come up.

We also try to be very involved in the community - because it's not just about building relationships with the kids but also building respect and trust with their parents. We sponsor lots of events like Grooves in Grove and Arts Outside that give the whole community an opportunity to come together in a safe, fun environment. We also have flag football and basketball leagues for kids who aren't old enough or can't play in other leagues. Keeping them busy provides a safe alternative to the street lifestyle that they often witness and try to emulate even at a young age.

This program is so positive, and we always try to make it better. I do wish there were more opportunities to engage with block captains from other neighborhoods to share ideas and learn from each other. I also wish there was more out-of-school programming available, particularly arts programming. A lot of kids like sports, but there are others who would be interested in music and dancing but haven't had the chance or feel like they can't because it is "uncool." I also think it would be cool to work with the MBTA so the students who use public transportation also feel safe and comfortable getting home because we hear a lot of these kids say that they don't feel safe.



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A close-up photograph of a woman with light brown hair, wearing a red shirt with white polka dots. She is looking down and to the right with a thoughtful or somber expression. Her hands are clasped together in front of her. The background is a soft, out-of-focus blue.

# Chapter 13

## Mental Health



# Mental Health

Mental wellness is a fundamental component of overall health. The World Health Organization (WHO) defines mental health as “a state of well-being in which every individual realizes his or her own potential, can cope with the normal stresses of life, can work productively and fruitfully, and is able to make a contribution to his or her community” (1). Individuals with mental health disorders may have difficulty performing day-to-day tasks, such as going to work or school. Individuals may experience varying degrees of impairment in their mental wellness, and more moderate degrees of impairment can alter the way people feel, reason, and relate to others (2).

Impaired mental health is common in the United States general population. In 2015, nearly one in five adults suffered from a diagnosable mental illness such as depression or anxiety (3), and about 1 in 7 will have a major depressive episode in their lifetime (4). In 2015, 12% of children ages 12-17 reported having a major depressive episode in the past year, higher than the percentages from 2004-2014 (3). Between 1999 and 2014, the overall suicide rate in the U.S. rose by 24% to 13.0 per 100,000 population. In 2015, the overall suicide rate was 13.3 (5, 6). In 2014, suicide was the tenth leading cause of death in the U.S. (5) and more than 90% of patients who died because of suicide also had mental illness (4).

## Connection to physical health

Mental health can also influence physical health. For example, individuals who struggle with eating disorders are at higher risk for brain damage, anemia, infertility, and multi-organ failure (7). Improvements in mental health may lead to more positive health behaviors, such as improved sleep, exercise, and diet, and decreased smoking and alcohol intake (2).

## Mental health and substance use disorders

Of the 20 million U.S. adults who had a substance use disorder in 2015, 41% also had a mental illness in the past year (3). About half of these adults with co-occurring mental illness and substance use disorders did not receive treatment for either illness in the past year (3). Some of the same areas of the brain that are disrupted from mental illness are also disrupted by changes in the brain caused by substance use disorders (8). It can be difficult to separate the symptoms of mental illness and substance use disorders due to their similarities (8). Causality and connection cannot always be proven; however, research shows that some mental illnesses are risk factors for substance use disorders (8). People will often use substances as self-medication for their mental illness, which can result in substance misuse (8). Additionally, some individuals with a substance use disorder experience symptoms of mental illness due to their substance use (8). Mental illness and substance use disorders are both caused by overlapping factors such as underlying biology, genetics, and an individual's experiences (8).

### Sex, race, and ethnicity

The distribution of mental disorders in the general population varies by sex, race/ethnicity, and socioeconomic status. Generally, women are more likely than men to experience an anxiety disorder in their lifetime (9). Black and Latino individuals have a higher lifetime prevalence of dysthymic disorder compared to White individuals (10, 11). Dysthymic disorder is a persistent depressive disorder characterized by chronic feelings of hopelessness and low-self-esteem that can last for years and can significantly interfere with daily life. However, research has shown that the prevalence of major depressive disorder (an episode of persistent feelings of sadness and loss of interest that can lead to a variety of emotional and physical problems) is higher in White individuals compared with Black and Latino individuals (10, 11). Black and Latino individuals are less likely than White individuals to receive medical treatment for mental health disorders when they do arise, which may contribute to the development of chronic depression (4, 10, 11).

Additional research has demonstrated that the longer an immigrant lives in the U.S., the higher the risk of mental health conditions (moderate to severe symptoms of psychological distress, depression, and anxiety) (12-15). It has been suggested that the more time immigrants spend as a resident of the U.S., the more they are exposed to discrimination and stressful conditions, which can contribute to poor health (12-15). In addition, it is thought that the loss of protective factors (e.g. social and cultural networks from their native country) after living in the U.S. for long periods of time contributes to the increased risk of mental health conditions (15).

### LGBTQ population

Lesbian, gay, bisexual, transgender, and/or queer (LGBTQ) individuals are about three times more likely than straight individuals to have a mental health condition such as depression or anxiety (16). LGBTQ individuals of color are subjected to both racism and homophobia, and recent research has found that psychiatric symptoms were associated with both racist and heterosexist stressors for Black and Latino LGBTQ individuals (17, 18). Discrimination has mental health implications; 41% of transgendered individuals attempt suicide at some point in their lives compared to 5% of the general population (19). These rates are even higher among transgendered people of color compared to White transgendered people (19). The increased rate of mental health illnesses can come from rejection or lack of support from family and friends, as well as discrimination faced by LGBTQ individuals in health care, employment, and housing (20).

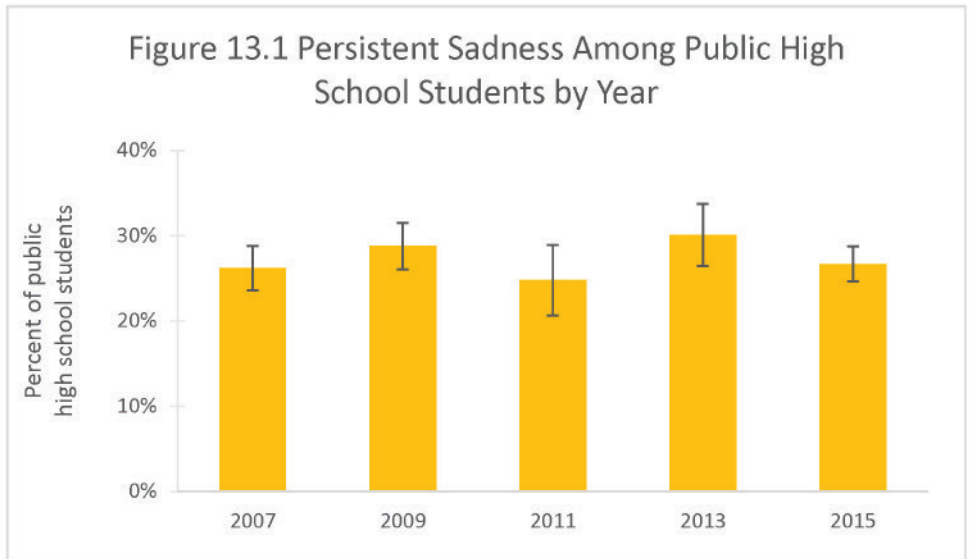
Of LGBTQ homicides in 2013, 67% of the victims were transgendered women of color (20). This disproportionate number of homicides highlights the need for specialized LGBTQ anti-discrimination and antiviolence programs (20). Among LGBTQ youth, studies show elevated rates of emotional distress, symptoms related to mood and anxiety disorders, self-harm, suicidal ideation, and suicidal behavior when compared to heterosexual youth (21). Support from family and friends, as well as in school and work environments, can act as a buffer to the discrimination LGBTQ youth and adults face (22).

## Effect of stress

Although mental illness can be attributed to a variety of genetic, environmental, psychological, and developmental factors, exposure to stressors may partially explain why certain groups suffer from poorer mental and physical health outcomes than others (23). Economic difficulties, physical deprivation, job strain, family responsibilities, material disadvantage, and discrimination can have harmful effects on mental health (24, 25). In addition, chronic stress shares a connection with morbidity and mortality (24). A growing body of evidence demonstrates how chronic stress levels, even low levels can “get under the skin” and influence the release of stress hormones that affect cholesterol levels, blood pressure, and inflammation. These markers of high stress are connected with both depression and heart disease, demonstrating how mental health is integrated with the “whole person” health experience (2). The WHO suggests that in order to reduce the inequities in the occurrence of mental disorders, the social, economic, and physical environment conditions of everyday life must improve, beginning at birth through old age (26).



Students were asked if during the past 12 months they felt sad or hopeless every day for 2 weeks or more. In 2015, 27% of Boston public high school students reported persistent sadness. Between 2007 and 2015, there was no significant change in the percentage of students experiencing persistent sadness.

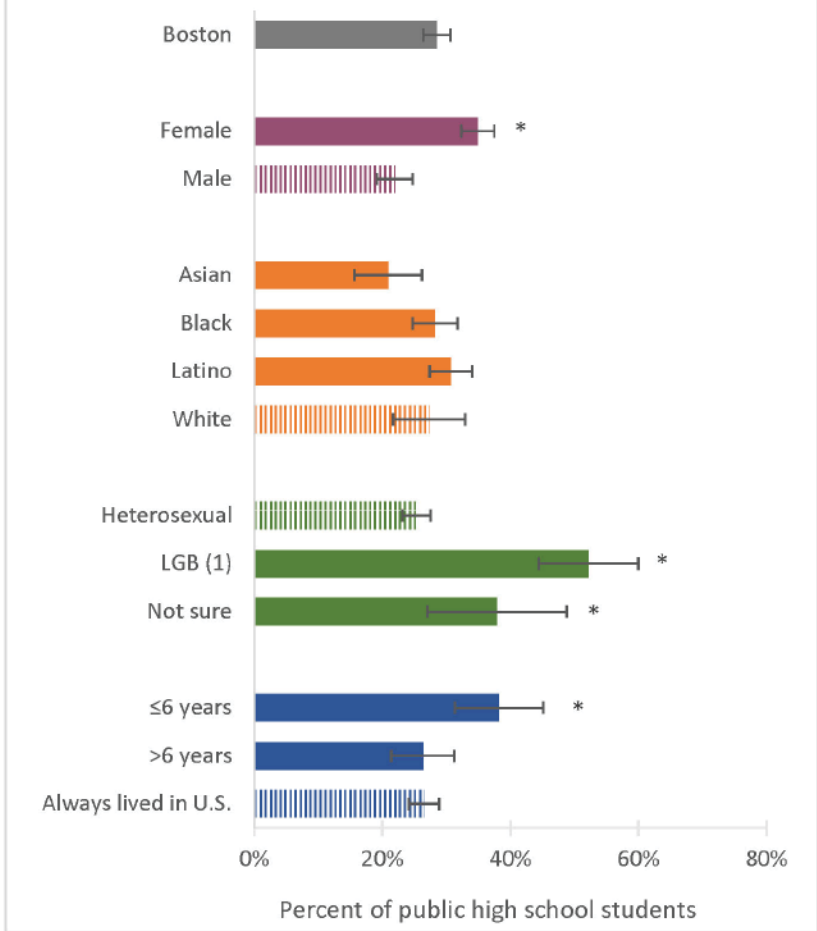


DATA SOURCE: Youth Risk Behavior Survey (2007, 2009, 2011, 2013, 2015), Centers for Disease Control and Prevention and Boston Public Schools





Figure 13.2 Persistent Sadness Among Public High School Students by Selected Indicators, 2013 and 2015 Combined



\* Statistically significant difference when compared to reference group  
 (1) Includes lesbian, gay, and bisexual

NOTE: Bars with patterns indicate the reference group within each selected indicator.  
 DATA SOURCE: Youth Risk Behavior Survey (2013, 2015), Centers for Disease Control and Prevention and Boston Public Schools

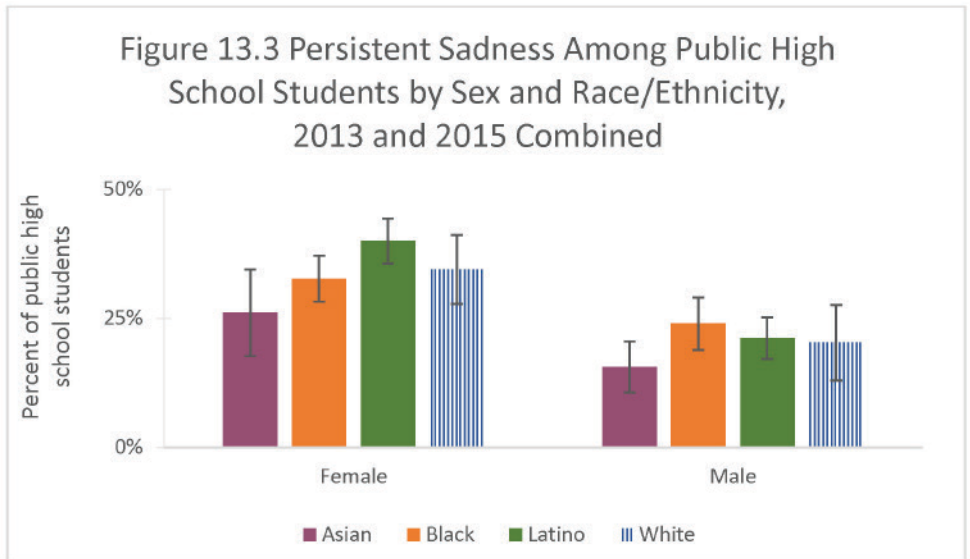
For 2013 and 2015 combined, 28% of Boston public high school students experienced persistent sadness.

The percentage of students with persistent sadness was higher for the following groups:

- Females (35%) compared with males (22%)
- Students who identified as lesbian, gay, or bisexual (52%) and students who were not sure of their sexual orientation (38%) compared with heterosexual students (25%)
- Foreign-born students who lived in the United States for six years or fewer (38%) compared with students who have always lived in the United States (26%)

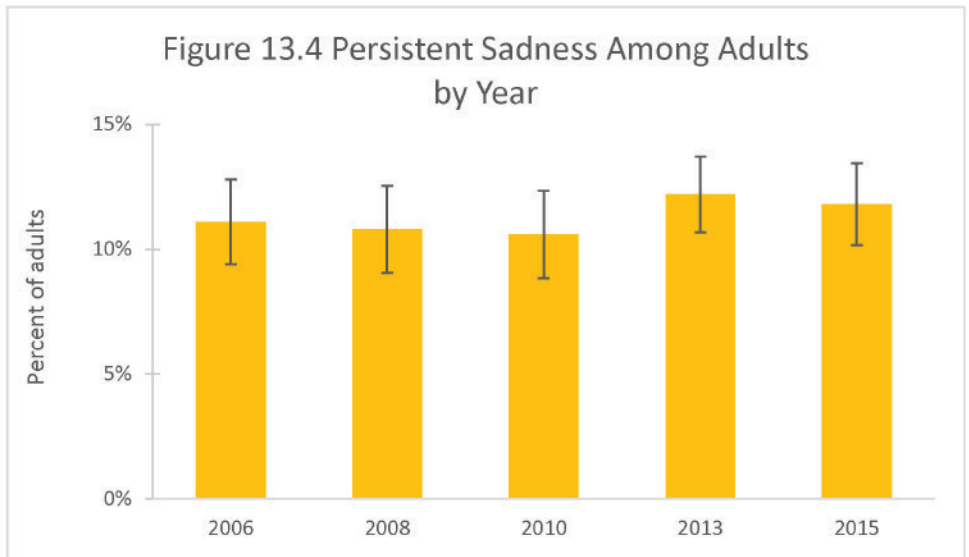
During 2013 and 2015 combined, there were no significant differences in the percentage of Boston public high school students with persistent sadness by race/ethnicity among female students when compared with White female students.

There were also no significant differences by race/ethnicity among male students compared with White male students.



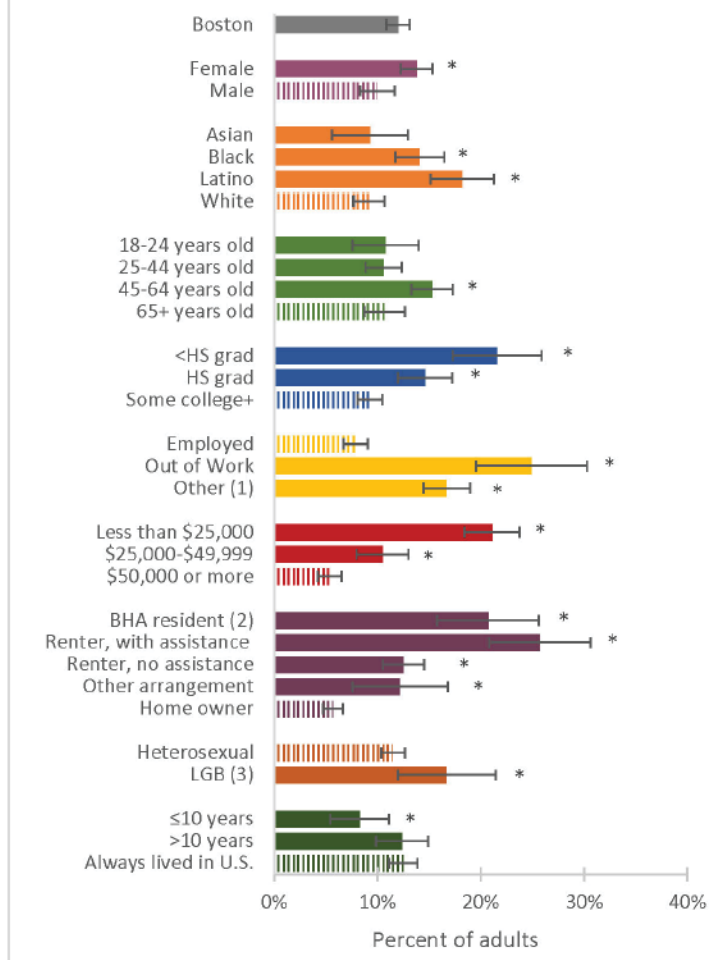
NOTE: Bars with patterns indicate the reference group for statistical testing within each selected indicator.  
 DATA SOURCE: Youth Risk Behavior Survey (2013, 2015), Centers for Disease Control and Prevention and Boston Public Schools

In 2015, 12% of Boston adult residents reported feeling persistent sadness (feeling sad, blue, or depressed for more than 15 days within the past 30 days). Between 2006 and 2015, the percentage of adults with persistent sadness did not change significantly.



DATA SOURCE: Boston Behavioral Risk Factor Survey (2006, 2008, 2010, 2013, 2015), Boston Public Health Commission

Figure 13.5 Persistent Sadness Among Adults by Selected Indicators, 2013 and 2015 Combined



\* Statistically significant difference when compared to reference group

(1) Includes homemakers, students, retirees, and those unable to work

(2) Boston Housing Authority resident

(3) Includes lesbian, gay, bisexual, and other

NOTE: Bars with patterns indicate the reference group within each selected indicator.

DATA SOURCE: Boston Behavioral Risk Factor Survey (2013, 2015), Boston Public Health Commission

For 2013 and 2015 combined, 12% of Boston adult residents reported experiencing persistent sadness.

The percentage of adults with persistent sadness was higher for the following groups:

- Females (14%) compared with males (10%)
- Black (14%) and Latino (18%) adults compared with White adults (9%)
- Adults ages 45-64 (15%) compared with adults ages 65 and older (11%)
- Adults with less than a high school diploma (22%) and adults with a high school diploma (15%) compared with those with at least some college education (9%)
- Adults who were out of work (25%) or whose employment status was "other" (17%) compared with adults who were employed (8%)
- Adults living in households with an annual income of less than \$25,000 (21%) and those with an income of \$25,000-\$49,999 (11%) compared with adults living in households with an annual income of \$50,000 or more (5%)
- Adults who were Boston Housing Authority residents (21%), renters who received rental assistance (26%), adults who rented but did not receive rental assistance (13%), and those with other housing arrangements (12%) compared with homeowners (6%)
- Adults who identified as lesbian, gay, bisexual, or other (17%) compared with heterosexual adults (11%)

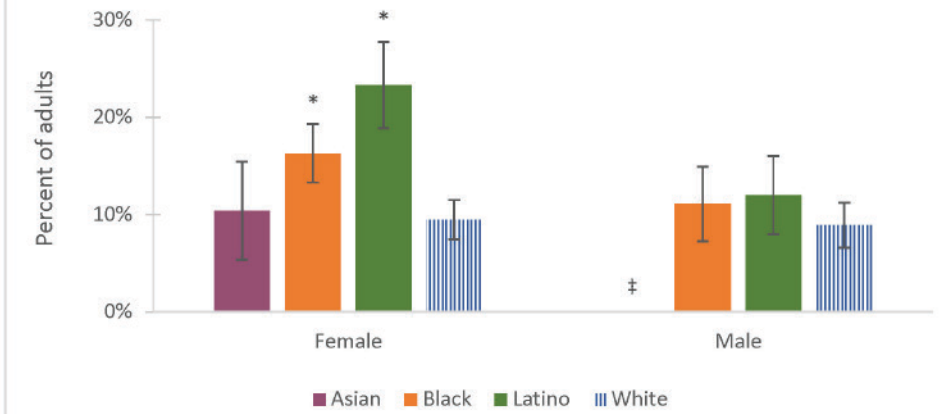
The percentage of adults with persistent sadness was lower for the following groups:

- Foreign-born adults who lived in the United States for 10 years or less (8%) compared with adults who were born in the United States (13%)

For 2013 and 2015 combined, a higher percentage of Black (16%) and Latino (23%) Boston female residents reported having persistent sadness compared with White females (10%).

There were no significant differences for Black and Latino males when compared with White males.

Figure 13.6 Persistent Sadness Among Adults by Sex and Race/Ethnicity, 2013 and 2015 Combined



\* Statistically significant difference when compared to reference group

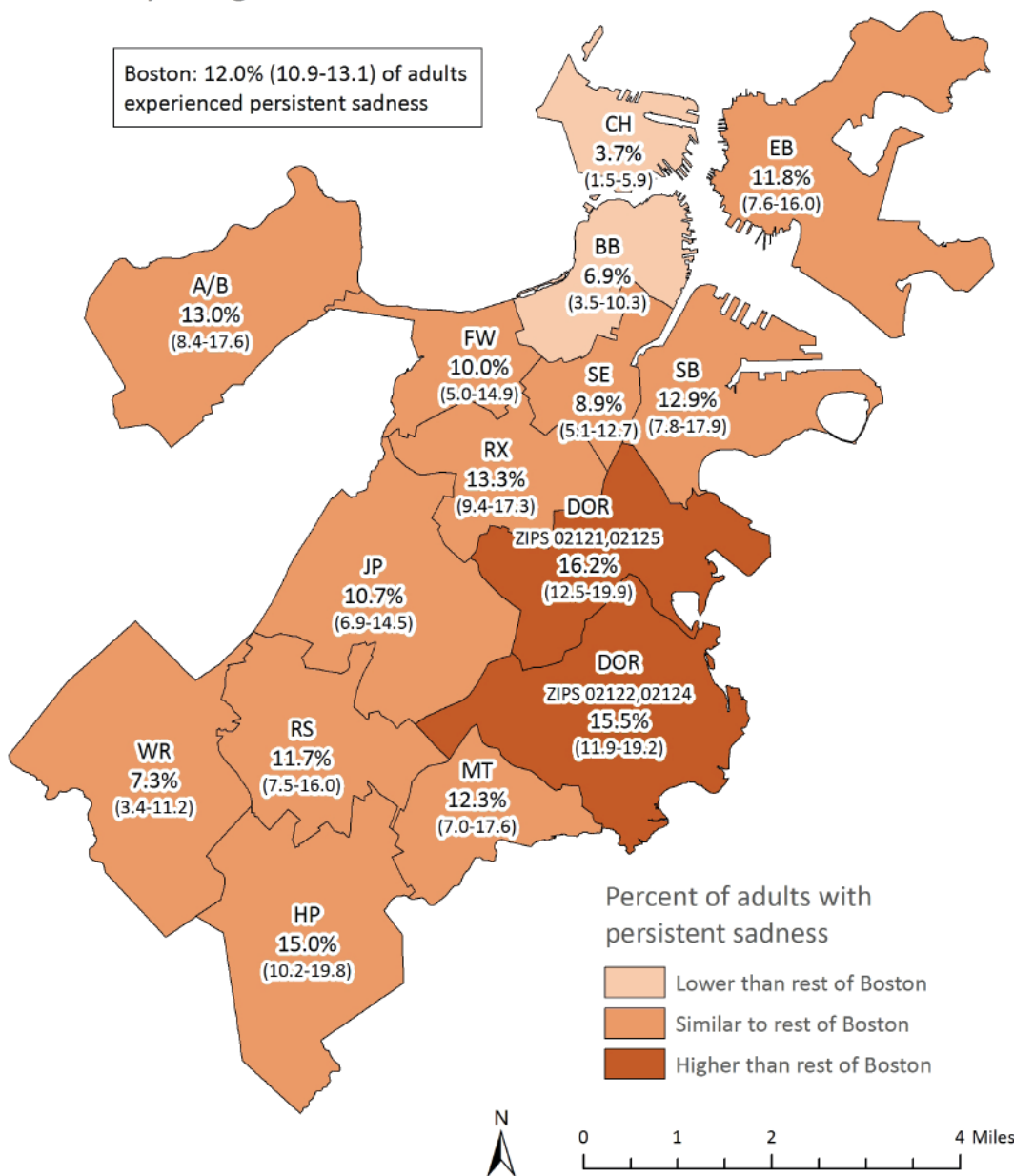
‡ Data not presented due to insufficient sample size

NOTE: Bars with patterns indicate the reference group within each selected indicator.

DATA SOURCE: Boston Behavioral Risk Factor Survey (2013, 2015), Boston Public Health Commission



Figure 13.7 Persistent Sadness Among Adults by Neighborhood, 2013 and 2015 Combined

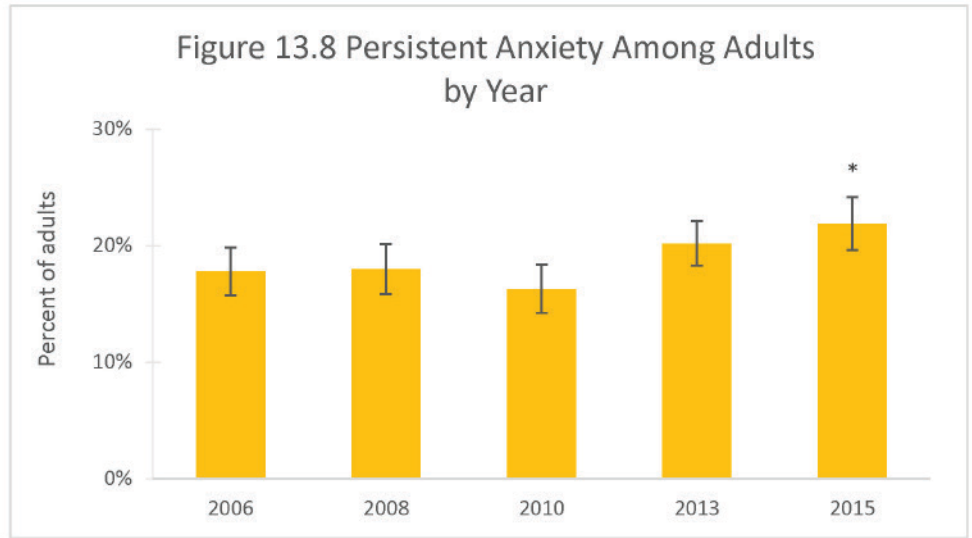


NOTE: "BB" includes the Back Bay, Beacon Hill, Downtown, the North End, and the West End.  
 "SE" includes the South End and Chinatown.

DATA SOURCE: Boston Behavioral Risk Factor Survey (2013, 2015), Boston Public Health Commission

For 2013 and 2015 combined, the percentage of adults with persistent sadness was higher for Dorchester (zip codes 02121, 02125) and Dorchester (zip codes 02124, 02126) compared with the rest of Boston. The percentage was lower for Back Bay and Charlestown compared with the rest of Boston.

In 2015, 22% of Boston adult residents reported feeling persistent anxiety (feeling worried, tense, or anxious for more than 15 days within the past 30 days). The percentage of adults with persistent anxiety increased significantly between 2006 and 2015.

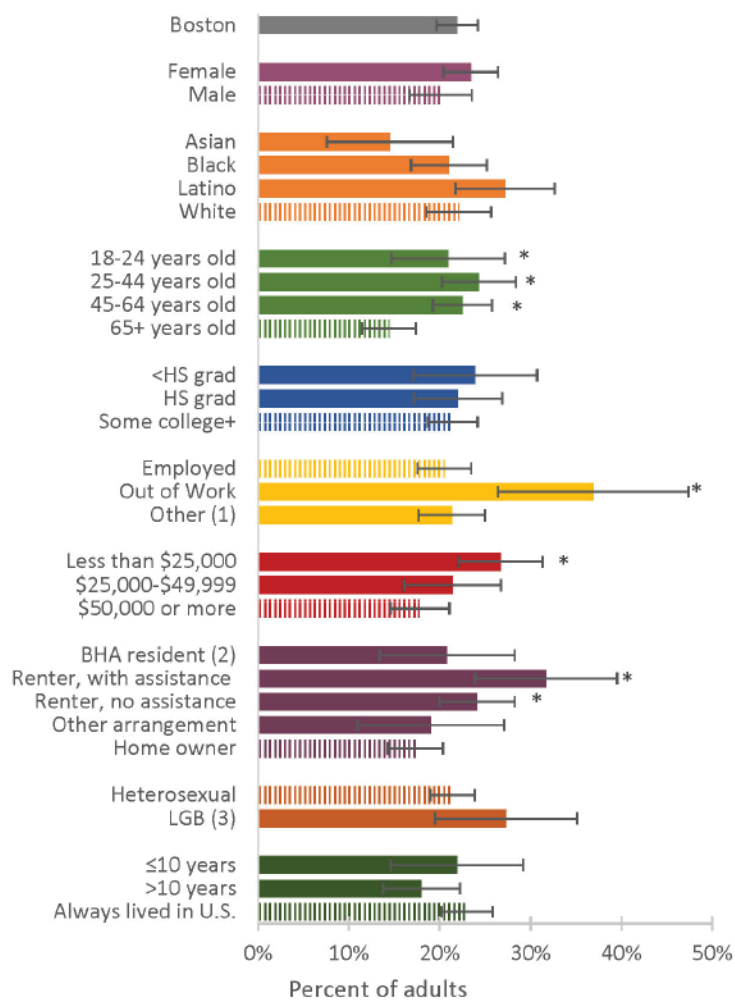


\* Statistically significant change over time

DATA SOURCE: Boston Behavioral Risk Factor Survey (2006, 2008, 2010, 2013, 2015), Boston Public Health Commission



Figure 13.9 Persistent Anxiety Among Adults by Selected Indicators, 2015



In 2015, 22% of Boston adult residents reported experiencing persistent anxiety.

The percentage of adults with persistent anxiety was higher for the following groups:

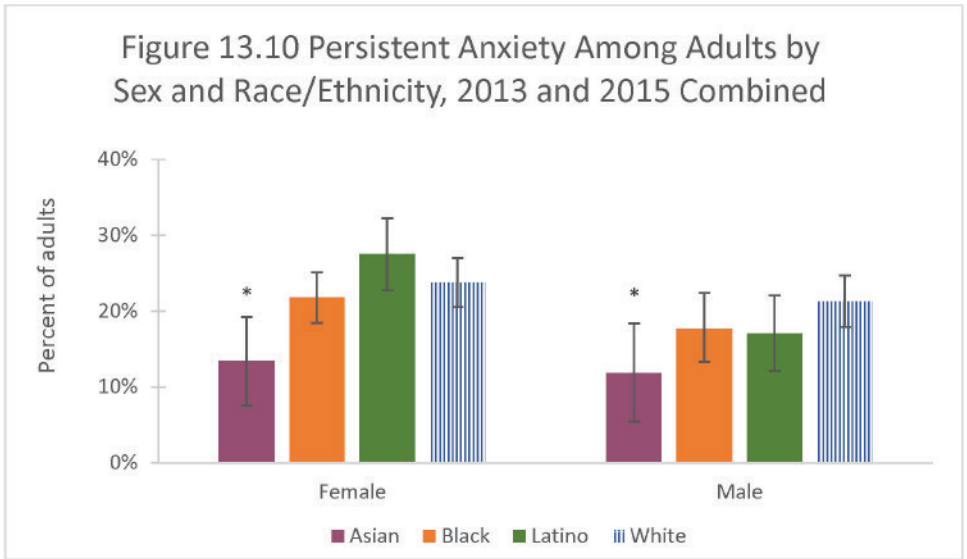
- Adults ages 18-24 (21%), 25-44 (24%), or 45-64 (22%) compared with adults ages 65 and older (14%)
- Adults who were out of work (37%) compared with adults who were employed (21%)
- Adults living in households with an annual income of less than \$25,000 (27%) compared with adults living in households with an annual income of \$50,000 or more (18%)
- Renters who received rental assistance (32%) and adults who rented but did not receive rental assistance (24%) compared with homeowners (17%)

\* Statistically significant difference when compared to reference group  
 (1) Includes homemakers, students, retirees, and those unable to work  
 (2) Boston Housing Authority resident  
 (3) Includes lesbian, gay, bisexual, and other

NOTE: Bars with patterns indicate the reference group within each selected indicator.  
 DATA SOURCE: Boston Behavioral Risk Factor Survey (2015), Boston Public Health Commission

For 2013 and 2015 combined, a lower percentage of Asian female Boston residents (13%) reported having persistent anxiety compared with White females (24%).

A lower percentage of Asian males (12%) experienced persistent anxiety compared with White males (21%).



\* Statistically significant difference when compared to reference group

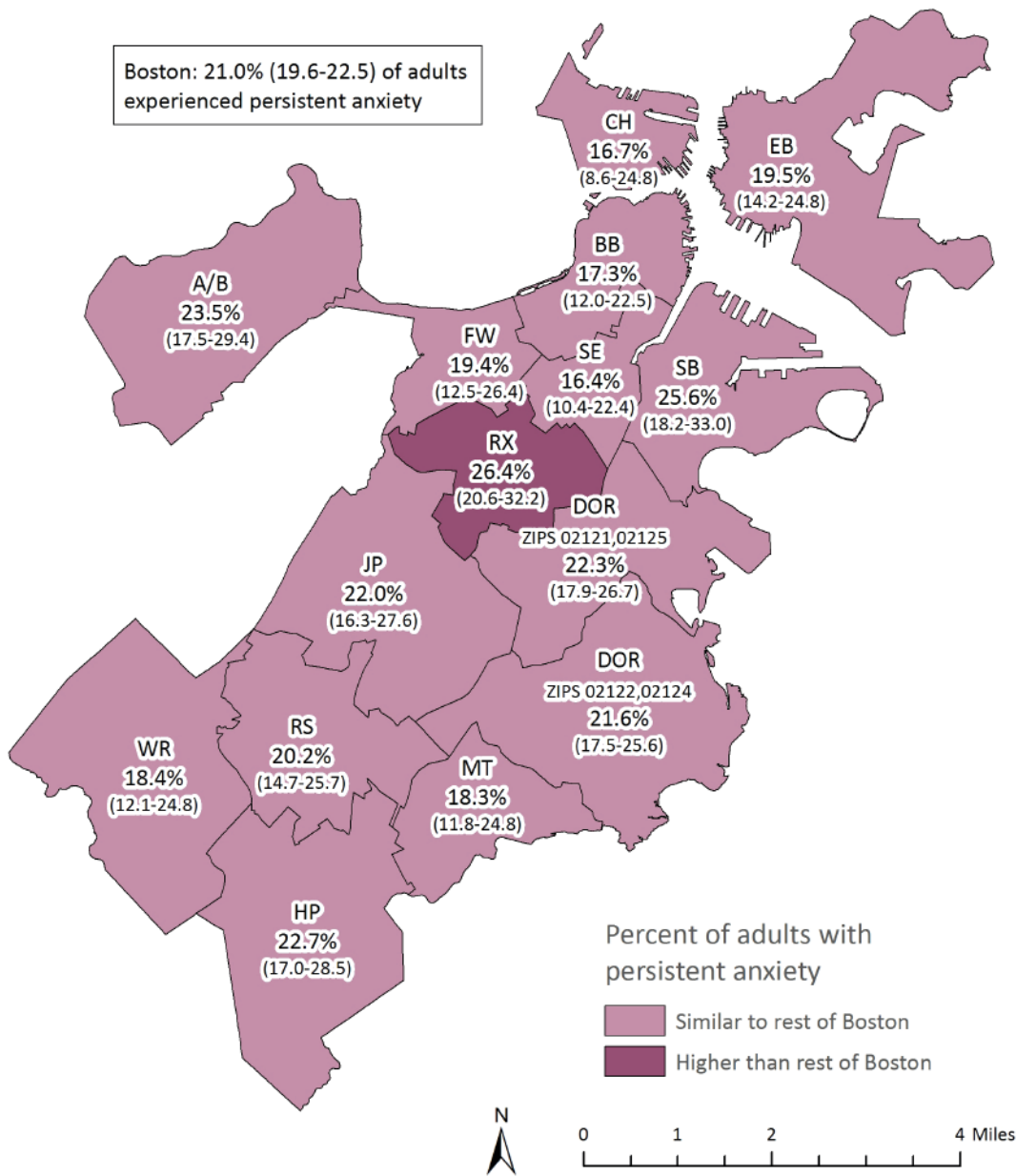
NOTE: Bars with patterns indicate the reference group within each selected indicator.

DATA SOURCE: Boston Behavioral Risk Factor Survey (2013, 2015), Boston Public Health Commission





Figure 13.11 Persistent Anxiety Among Adults by Neighborhood, 2013 and 2015 Combined



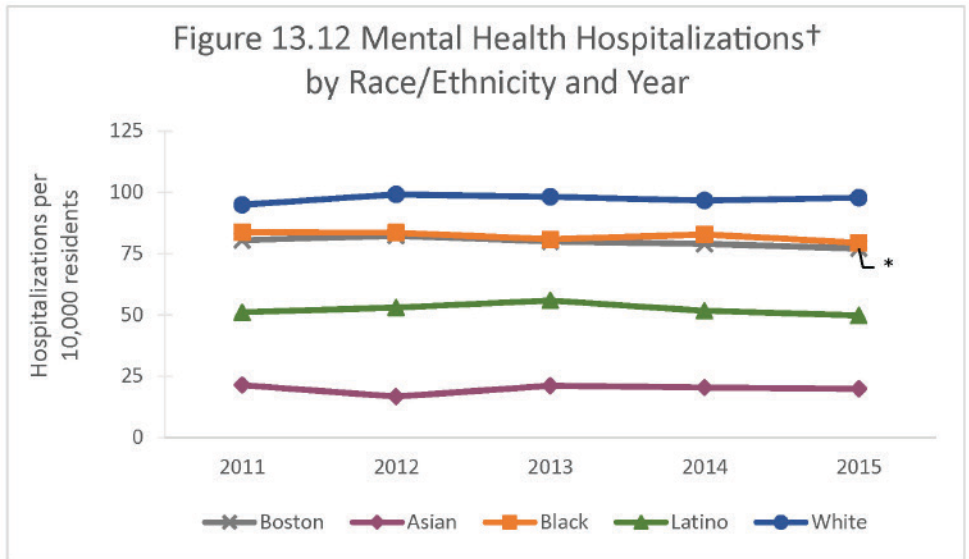
NOTE: "BB" includes the Back Bay, Beacon Hill, Downtown, the North End, and the West End.  
 "SE" includes the South End and Chinatown.

DATA SOURCE: Boston Behavioral Risk Factor Survey (2013, 2015), Boston Public Health Commission

For 2013 and 2015 combined, the percentage of adults with persistent anxiety was higher for Roxbury compared with the rest of Boston.

In 2015, the rate of mental health hospitalizations in Boston was 77.1 per 10,000 residents. From 2011 to 2015, the rate of mental health hospitalizations decreased by 5%. There was no significant decrease over time for any of the racial/ethnic groups presented.

In 2015, compared with White residents (97.8), the mental health hospitalization rate was 80% lower for Asian residents (19.9), 19% lower for Black residents (79.4), and 49% lower for Latino residents (49.8).

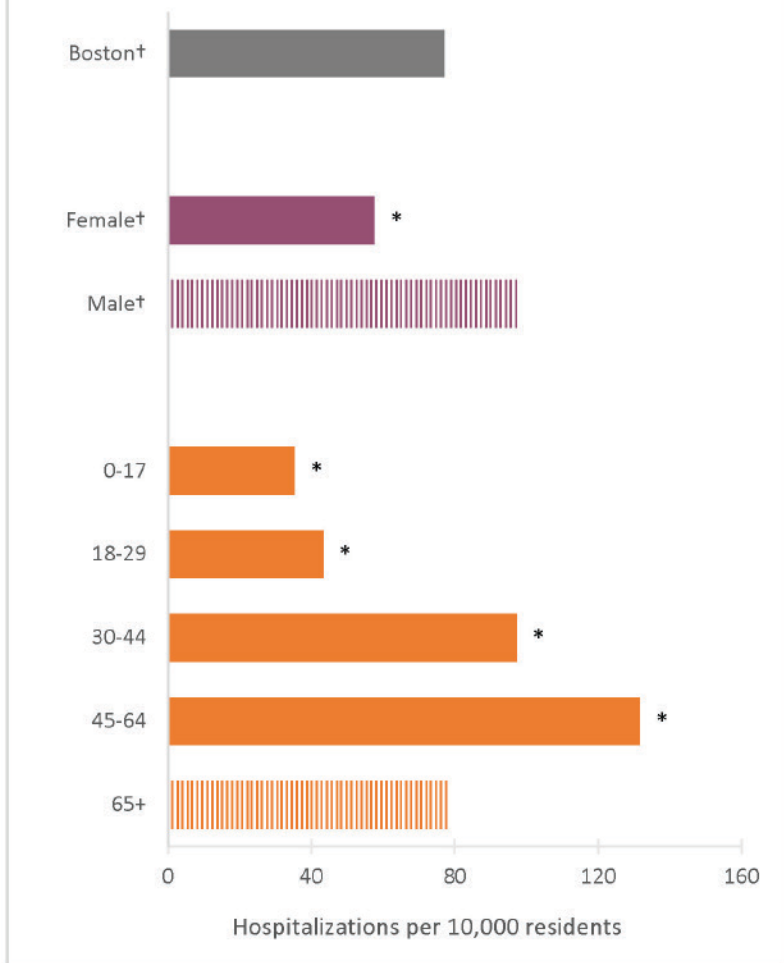


\* Statistically significant change over time  
 † Age-adjusted rates per 10,000 residents

DATA SOURCE: Acute hospital case-mix databases, Massachusetts Center for Health Information and Analysis



Figure 13.13 Mental Health Hospitalizations by Selected Indicators, 2015



\* Statistically significant difference when compared to reference group  
 † Age-adjusted rates per 10,000 residents

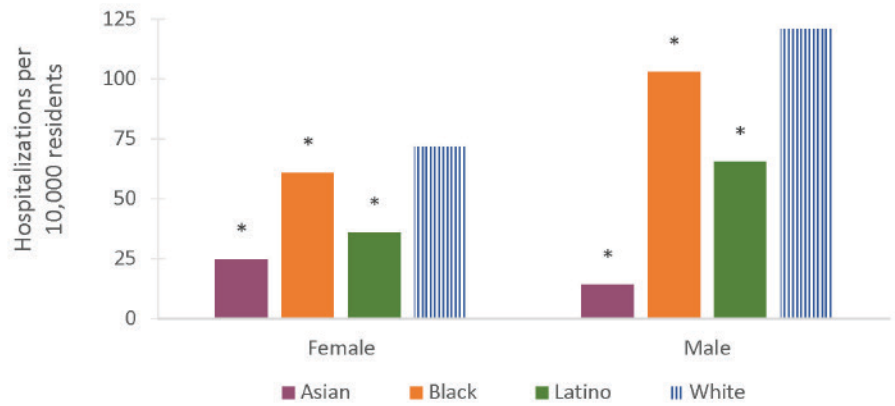
NOTE: Bars with patterns indicate the reference group within each selected indicator.  
 DATA SOURCE: Acute hospital case-mix databases, Massachusetts Center for Health Information and Analysis

In 2015, the rate of mental health hospitalizations in Boston was 77.1 hospitalizations per 10,000 residents. The rate was 41% lower for females (57.6) compared with males (97.6). The rate was 24% and 68% higher, respectively, for residents ages 30-44 (97.3) and 45-64 (131.7) compared with those ages 65 and older (78.2). The rate was 55% and 45% lower, respectively, for residents ages 0-17 (35.2) and 18-29 (43.3) compared with those ages 65 and older.

In 2015, the mental health hospitalization rate was 66% lower for Asian female Boston residents (24.8 hospitalizations per 10,000 residents), 15% lower for Black females (60.9), and 50% lower for Latino females (35.9) compared with White females (71.8).

The mental health hospitalization rate was also 88% lower for Asian male residents (14.1), 15% lower for Black males (102.9), and 46% lower for Latino males (65.4) compared with White males (120.9).

Figure 13.14 Mental Health Hospitalizations† by Sex and Race/Ethnicity, 2015



\* Statistically significant difference when compared to reference group

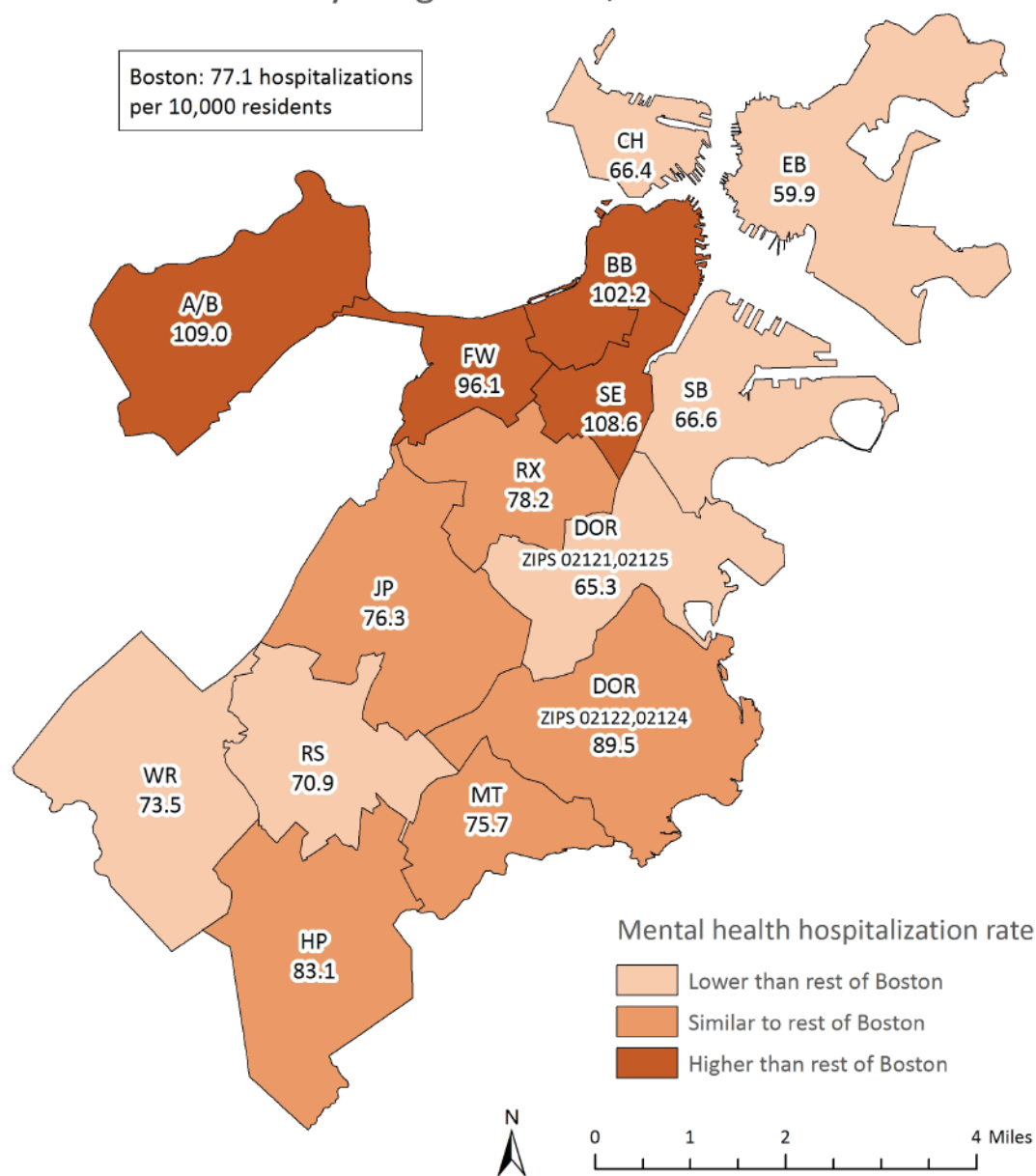
† Age-adjusted rates per 10,000 residents

NOTE: Bars with patterns indicate the reference group within each selected indicator.

DATA SOURCE: Acute hospital case-mix databases, Massachusetts Center for Health Information and Analysis



Figure 13.15 Mental Health Hospitalizations†  
by Neighborhood, 2015



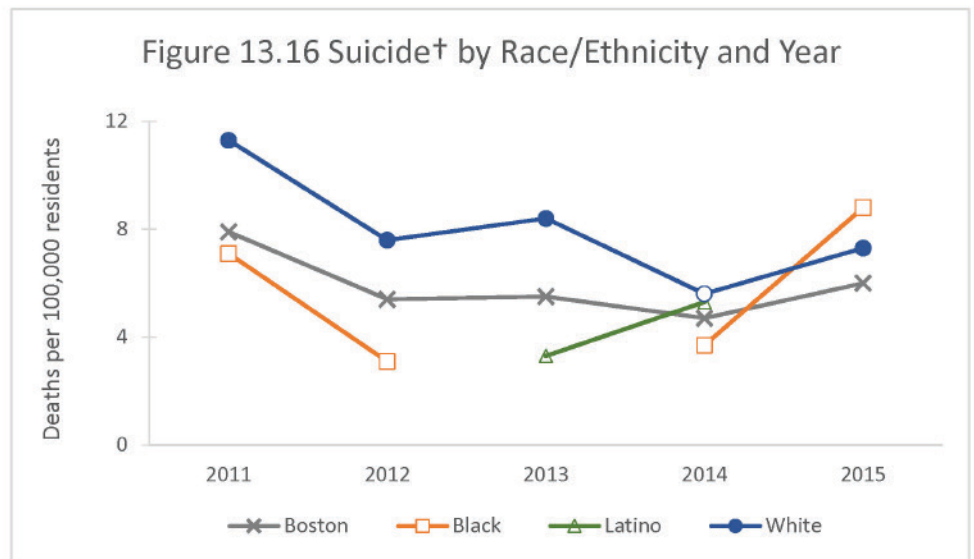
† Age-adjusted rates per 10,000 residents

NOTE: "BB" includes the Back Bay, Beacon Hill, Downtown, the North End, and the West End.  
"SE" includes the South End and Chinatown.

DATA SOURCE: Acute hospital case-mix databases, Massachusetts Center for Health Information and Analysis

In 2015, the rate of mental health hospitalizations was higher in Allston/Brighton, Back Bay, Fenway, and the South End compared with the rest of Boston. The rate was lower in Charlestown, Dorchester (zip codes 02121, 02125), East Boston, Roslindale, South Boston, and West Roxbury compared with the rest of Boston.

In 2015, the suicide rate in Boston was 6.0 deaths per 100,000 residents. From 2011 to 2015, the rate did not change significantly over time. In 2015, there was no significant difference between the rates for Black and White residents.

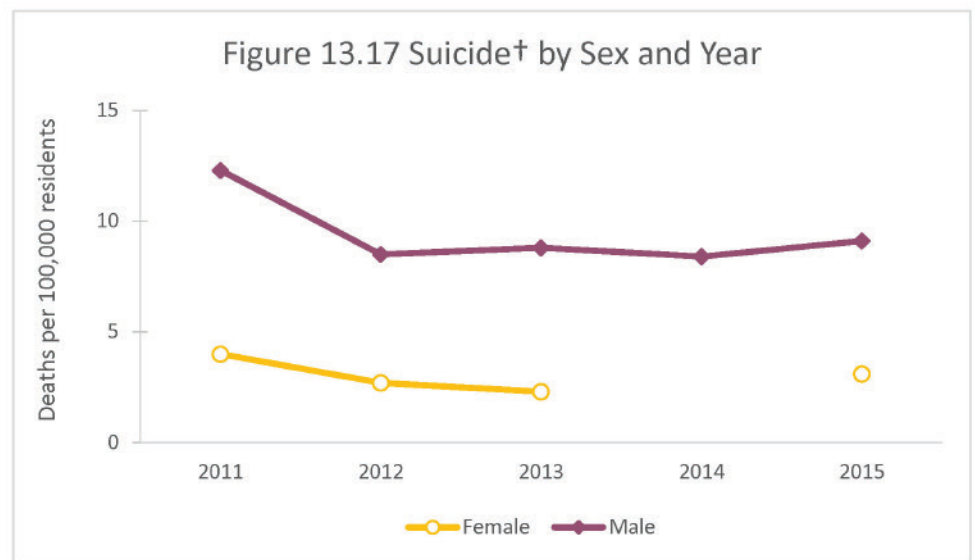


† Age-adjusted rates per 100,000 residents

NOTE: Hollowed-out symbols represent rates based on 20 or fewer cases and should be interpreted with caution. Rates are not presented due to a small number of cases for Asian residents for 2011-2015, Black residents in 2013, and Latino residents in 2011, 2012, and 2015. Beginning in October 2014, the method for collecting race/ethnicity for mortality data changed. Interpret trends with caution.

DATA SOURCE: Boston resident deaths, Massachusetts Department of Public Health (data as of December 2016). Data may be updated as more information becomes available.

From 2011 to 2015, the rate of suicide did not change significantly over time for female or male Boston residents. In 2015, the rate was 66% lower for females (3.1 deaths per 100,000 residents) compared with males (9.1).



† Age-adjusted rates per 100,000 residents

NOTE: Hollowed-out symbols represent rates based on 20 or fewer cases and should be interpreted with caution. Rates are not presented due to a small number of cases for female residents in 2014.

DATA SOURCE: Boston resident deaths, Massachusetts Department of Public Health (data as of December 2016). Data may be updated as more information becomes available.

### Suicide

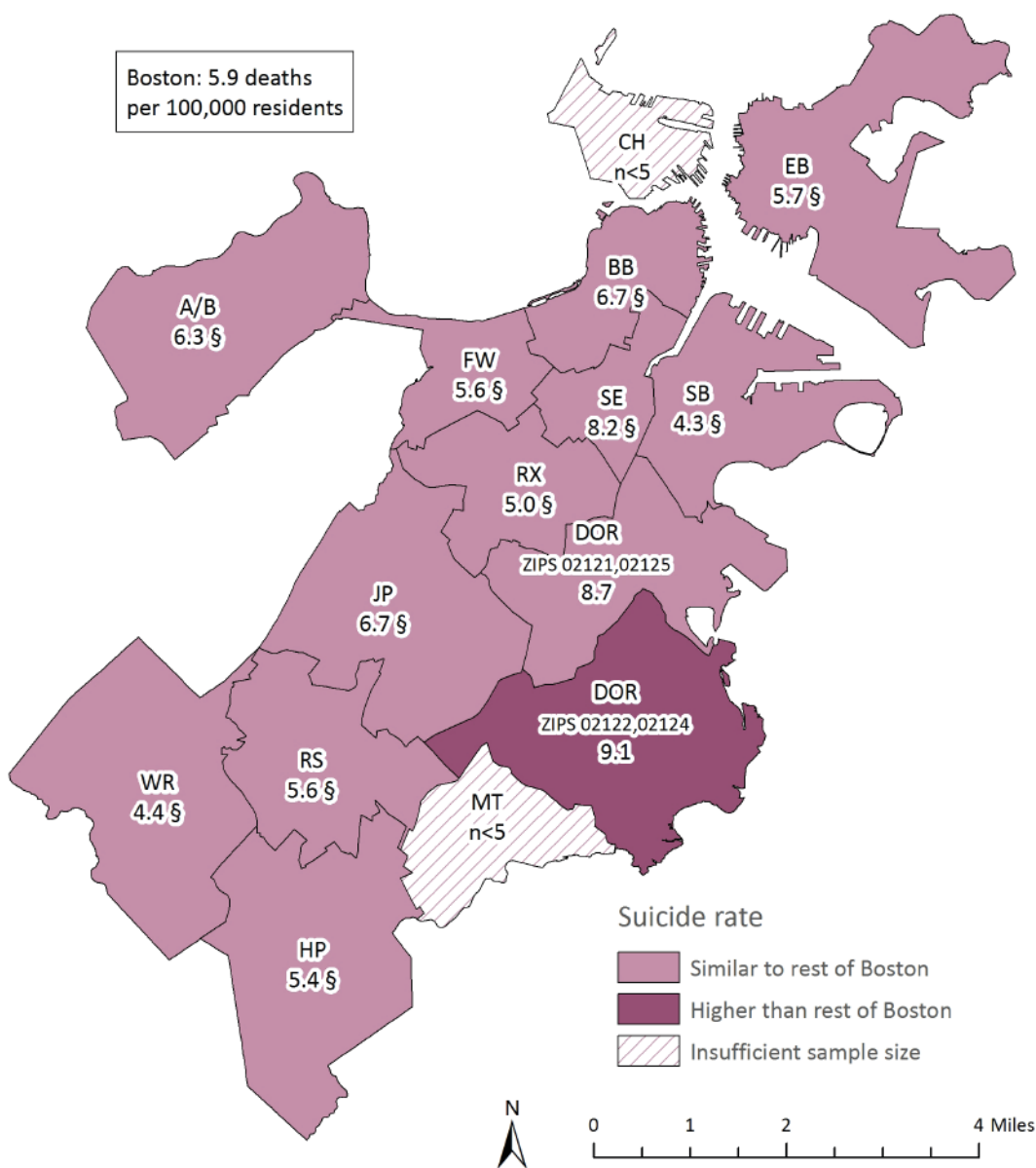
Healthy People 2020 Target: 10.2 per 100,000 population

US 2015: 13.3

MA 2015: 8.9

Boston 2015: 6.0

Figure 13.18 Suicide† by Neighborhood, 2011-2015



† 5-year average annual age-adjusted rates per 100,000 residents  
 § Rates are based on 20 or fewer cases and should be interpreted with caution.

NOTE: "BB" includes the Back Bay, Beacon Hill, Downtown, the North End, and the West End.  
 "SE" includes the South End and Chinatown.

DATA SOURCE: Boston resident deaths, Massachusetts Department of Public Health (data as of December 2016). Data may be updated as more information becomes available.

For 2011-2015, the rate of suicide was higher in Dorchester (zip codes 02122, 02124) compared with the rest of Boston.

## Summary

The rate of mental health hospitalizations among all Boston residents decreased by 5% from 2011 to 2015. However, data from 2015 reveal inequities across categories of age, sex, and race/ethnicity. The rate of mental health hospitalizations was higher for those ages 30-65 years compared with those 65 and older, males compared with females, and White residents compared with Asian, Black, and Latino residents. At the neighborhood level, elevated rates of mental health hospitalizations were observed for Allston/Brighton, Back Bay, Fenway, and the South End.

Inconsistent with the findings for mental health hospitalizations among all Boston residents, higher percentages of Black and Latino adults reported persistent sadness in comparison with White adults. Higher percentages of persistent sadness were observed in women compared with men, unemployed compared with employed adults, low income (less than \$25,000) compared with higher income (\$50,000 or more) adults, and adults who self-identified as lesbian, gay, bisexual, or other compared with heterosexual adults. Higher percentages of persistent sadness were also found in the neighborhoods of Dorchester (zip codes 02121, 02125) and Dorchester (zip codes 02122, 02124). For persistent anxiety, inequities were observed across categories of age, employment status, housing status, and household income. Percentages of persistent anxiety among adult residents were higher in age categories spanning 18 to 64 years compared with those 65 years and older, those out of work compared with those who were employed, renters compared with homeowners, and those whose household income was less than \$25,000 compared with those whose household income was \$50,000 and higher.

Approximately 27% of Boston public high school students reported persistent sadness, which is consistent with what is observed nationally (29). Persistent sadness was two times higher for students who identified as lesbian, gay, or bisexual compared with their heterosexual classmates. Percentages of persistent sadness were also higher in female students compared with male students and in students who lived in the U.S. for six years or fewer compared with students who always lived in the U.S.

The suicide rate remained stable in Boston in recent years. The point estimate for the suicide rate among Boston residents also meets the Healthy People 2020 target, and was also more than two-fold lower than the rate observed nationally. Suicide was almost three-fold lower in women than in men, which is a pattern consistent with national data.

To reduce the inequities of mental health conditions in Boston, interventions targeting subpopulations at higher risk of mental illness are needed. It is also necessary to educate the public about the availability of mental health services and to decrease the stigma of seeking such services. Work also needs to be done to stop discrimination, which impacts the mental health of the person facing the discrimination. Additionally, as the World Health Organization (WHO) suggests, in order to reduce the inequities in the occurrence of mental disorders, the conditions of everyday life, which are the social determinants of health, must improve.



# Mental health



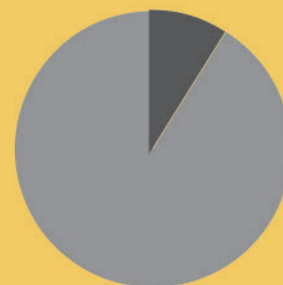
**% of adults with persistent sadness for 2013 and 2015 combined**



**18% of Latino residents**



**14% of Black residents**



**9% of White residents**

**The suicide mortality rate in 2015 was nearly three times higher for male than female residents**



**Mental health among public high school students in 2015**



**52%** of lesbian, gay, or bisexual students reported persistent sadness



**25%** of heterosexual students reported persistent sadness

# Our Point of View: Thoughts from public health

## The Silent Crisis in Outpatient Mental Health Care

By Association for Behavioral Healthcare

There is a silent crisis in outpatient mental healthcare. While workforce shortages challenge all of healthcare, they are compounded in behavioral health by decades of low reimbursement rates. Clinics are closing or reducing their schedules. Adults and children are waiting weeks or months for routine outpatient care.

We have made tremendous strides promoting mental health services. The Mental Health Parity and Addiction Equity Act and the Affordable Care Act unequivocally establish that behavioral healthcare is integral to healthcare.

Care delivery is shifting. Team-based, person-centered care can improve quality, improve mental health, and reduce unnecessary costs. In Massachusetts, policymakers have put forth a bold new vision to implement this team-based approach for Medicaid members. The model calls for Accountable Care Organizations (ACOs) to work with Community Partners (CPs), community-based organizations expert in serving members with behavioral health needs to transform the system.

If people cannot get services however, when they need them, transformation will not succeed, and improved individual and population outcomes are unlikely. The Association for Behavioral Healthcare (ABH), an association of community-based, behavioral healthcare organizations, surveyed our members on the state of outpatient services and found:

- 68% have reduced their outpatient clinic capacity in the past three years to minimize growing financial losses; 45% are actively considering further reductions
- 60% have wait times of at least one month for a child to get a routine prescriber assessment; 58% have wait times of at least one month for adults
- 59% have unfilled psychiatrist positions; 45% have unfilled nurse prescriber positions
- 76% lost money delivering outpatient services in FY15; the average annual loss was \$555,000 - 17% of the average operating budget.

These struggles are due largely to poor reimbursement rates from private and public payers. The Commonwealth recently committed to an unprecedented, multi-year investment in outpatient services. Even with this investment, providers will struggle to deliver outpatient behavioral health services essential to care transformation. If bold visions are to become a reality, policymakers and payers must work together on a long-term strategy to adequately pay for outpatient behavioral healthcare services.

## Our Point of View: Thoughts from a community resident

### Treating mental health and substance use at the same time

By a consumer of Boston Public Health Commission programming

I'm 46 years old. I am dually diagnosed with both substance use and mental health disorders. I was diagnosed with ADHD when I was six, and within the last 15 years I was diagnosed with bipolar and social anxiety disorders. I also struggle with agoraphobia sometimes. There are days when I can't leave the house at all because I'm worried something bad will happen if I do. It's not all the time though. It used to be worse but it has gotten better. Usually I just pull the blanket over my head and go to sleep and then later that day or the next day, I can go out again.

Treatment has been very helpful. I started mental health treatment because my counselor suggested it. It wasn't a surprise to find out I had a mental illness. So many people with substance use disorders have mental illness too. It's one of the reasons why we use drugs – to self-medicate.

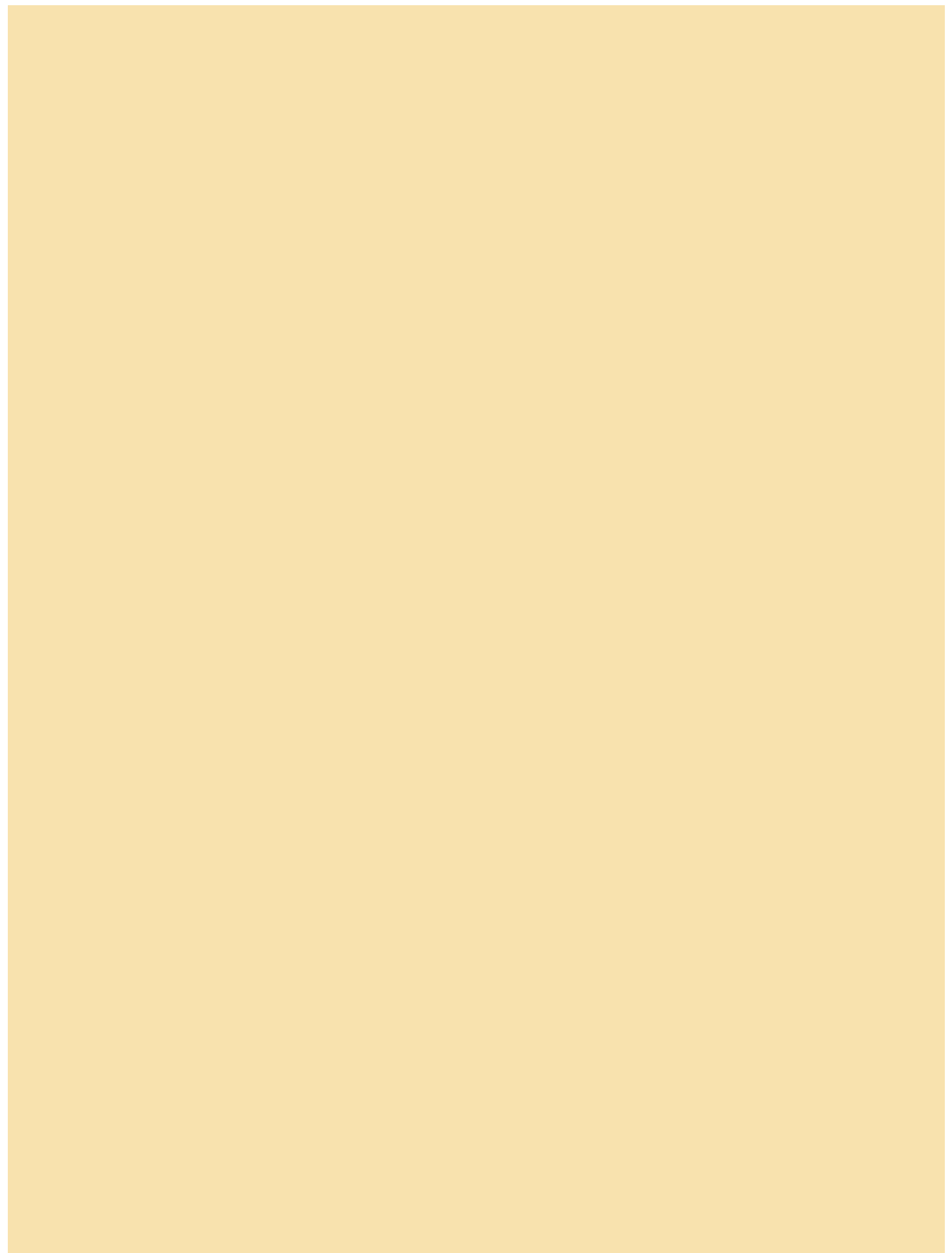
Getting into treatment here at BPHC was easy. I go to a methadone clinic and they referred me a Boston Public Health Commission treatment program. I did an intake and started treatment the next day. I used to go to another place in Lynn but the doctor retired, leaving about 200 patients high and dry. It was terrible. I found a new doctor who wouldn't prescribe the same medications so I went through withdrawal until I found another new doctor who would.

The only other thing I wish they had here in Boston is Double Trouble meetings. It's a support group for people who are dually diagnosed that I used to go to out in Worcester. It would be great if they did it here in Boston. I believe we really need Double Trouble meetings, I think a lot of people would benefit from them, including myself. I would even love to start one.

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# Chapter 14

## Substance Use Disorders







# Substance Use Disorders

Substance misuse and substance dependence are classified as substance use disorders. In 2015, an estimated 20.8 million people ages 12 or older were classified with substance dependence or misuse in the United States (1). A person is said to have an addiction to a substance when the nature and intensity of the cravings for the substance contributes to a pattern of unhealthy or self-destructive behaviors with the purpose of satisfying the perceived need for the substance. Individual-level risk factors such as socioeconomic status, family history, incarceration, and stressful life events are associated with drug use (2). Increasingly, evidence suggests that the social determinants of health may contribute to one's decision to initiate drug use and shape other substance use behaviors (3). For example, the lack of a supportive social network or circumstances related to neighborhood poverty may influence substance use behaviors (3). Additionally, addiction is a chronic neurological disorder and needs to be treated as other chronic conditions (4).

## Substance use disorders and mental health

In 2015, among the 19.6 million adults ages 18 years and over in the U.S. who experienced a substance use disorder, 41% also had had a mental illness in the past year (1). Causality and connection cannot always be proved; however, research shows that some mental illnesses are risk factors for substance use disorders (5). Some of the same areas that are disrupted in the brain due to mental illnesses are also disrupted due to changes in the brain caused by substance use disorders (5). Additionally, people will often use substances as self-medication for their mental illness which can result in substance misuse (5).

## Connection to physical health

Misuse of alcohol or other drugs over time can lead to physical and/or psychological dependence on these substances, despite negative consequences. Substance misuse alters judgment, perception, attention, and physical control (6), which can lead to the repeated failure to fulfill responsibilities and can increase social and interpersonal problems (7). There is a substantially increased risk of morbidity and death associated with alcohol and drug misuse (3). The effects of substance misuse are cumulative, significantly contributing to costly social, physical, mental, and public health challenges. Examples of these include domestic violence, child abuse, motor vehicle crashes, physical fights, crime, homicide, suicide, human immunodeficiency virus/acquired immunodeficiency syndrome (HIV/AIDS), and other sexually transmitted infections (6). Substance misuse can also impact one's social determinants of health, such as employment, income, social network, and housing (4).

## Fentanyl and opioids

The U.S. drug overdose death rate was 16.3 per 100,000 population in 2015 with 18% of all drug overdose deaths in 2015 involving synthetic opioids other than methadone (i.e. pain relievers including fentanyl) (8). Fentanyl is a strong synthetic (man-made) opioid often used as a cutting agent (i.e., adulterant) in combination with other drugs sold on the street (9). The rate of drug overdose deaths involving synthetic opioids other than methadone increased by 72% from 1.8 in 2014 to 3.1 in 2015 (10). Massachusetts residents experienced a 109% increase in the rate of drug overdose deaths involving synthetic opioids other than methadone from 6.9 in 2014 to 14.4 in 2015 (10).

From January to September of 2016, opioid overdose deaths among Massachusetts residents occurred disproportionately more often among White residents and males. Seventy-four percent of the population were White residents, yet White residents made up 82% of opioid deaths. Forty-eight percent of the population were male, yet males comprised 75% of opioid deaths. Additionally, nearly two-thirds of opioid overdose deaths were among residents under age 45, yet deaths in this age group account for only 6% of deaths overall (11). The number of fentanyl-related deaths in Massachusetts continues to increase. Among the 1,374 residents in Massachusetts whose deaths in 2016 were opioid-related and where a toxicology screen was also available, 1,031 of them (75%) had a positive screen result for fentanyl (12).

## Substance misuse response and treatment

In November 2016, the U.S. Department of Health and Human Services released a call to action report, "Facing Addiction in America: The Surgeon General's Report on Alcohol, Drugs, and Health", which asks Americans to "change the way we address substance misuse and substance use disorders in our society. Now is the time to acknowledge that these disorders must be addressed with compassion and as preventable and treatable medical conditions" (4). Reflecting these sentiments, the response to the current opioid epidemic, which disproportionately impacts White residents has been quite different than the response to the past crack cocaine epidemic, which disproportionately impacted communities of color. The crack cocaine epidemic was predominately managed with a "War on Drugs" approach, which included a heavy criminal justice response, while the current opioid epidemic is being addressed with increased funding for prevention, intervention, treatment, rehabilitation, and recovery (12-15).



In 2015, it was estimated that of the individuals who needed treatment for substance use disorders in the U.S., 89% did not receive treatment (16). While Massachusetts has services to treat substance use disorders, there are many barriers to accessing these services. The 2015 report "Access to Substance Use Disorder Treatment in Massachusetts" describes barriers that exist for those who need treatment (17). These barriers to treatment include:

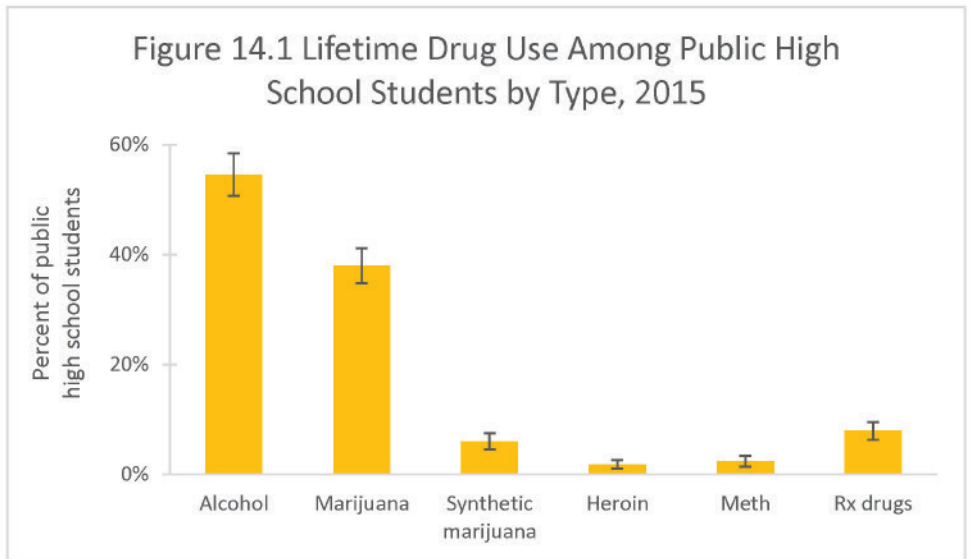
- Not enough counselors to keep up with demand;
- Not enough beds to keep up with demand;
- Lack of coordination between primary care, substance use treatment providers, and mental health professionals;
- Long wait times to access services;
- Difficulty understanding what services are available;
- Varying health insurance coverage (treatment intensity can vary based on health insurance plan type), and;
- Lack of sufficient cultural competency (racial and ethnic groups who need treatment are less likely to access services when controlling for socioeconomic status and criminal justice history)



Additionally, stigma related to substance misuse and addiction can often dissuade people with a substance misuse problem from seeking treatment (4). Depending on the substance(s) involved, treatment may include medications, behavioral treatments, or a combination of both. A doctor, substance use treatment counselor, or other health professional can determine the right treatment based on an individual's needs (19).

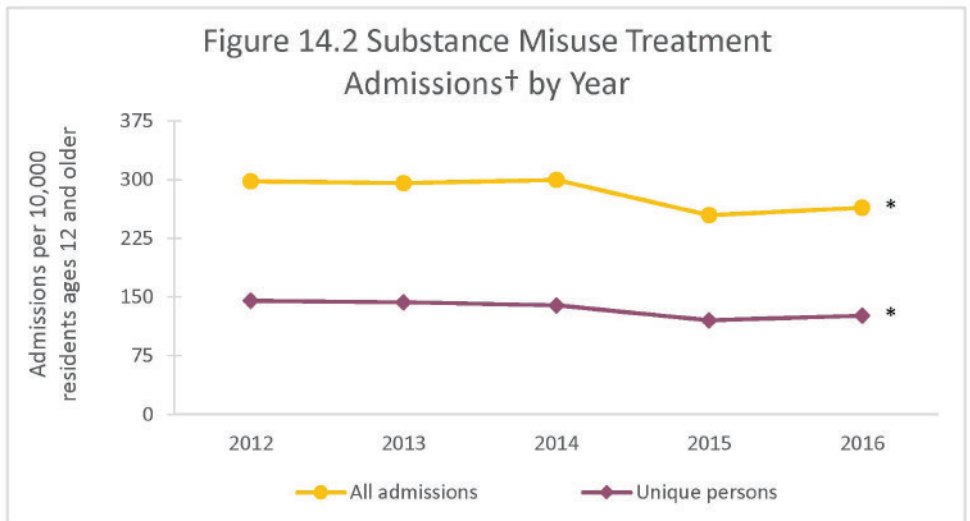
In this section, we will examine the following indicators related to substance use disorders: drug and alcohol use among high school students, substance misuse treatment admissions, hospital patient encounters for substance dependence, misuse and unintentional drug overdose/poisonings, and death rates for substance misuse, including unintentional drug overdose/poisonings.

In 2015, a large portion of Boston public high school students reported ever using drugs such as alcohol (55%), marijuana (38%), synthetic marijuana (6%), heroin (2%), methamphetamines (2%), and prescription drugs used without a prescription or not as prescribed (8%).



DATA SOURCE: Youth Risk Behavior Survey (2015), Centers for Disease Control and Prevention and Boston Public Schools

In 2016, the rate of all substance misuse treatment admissions, including duplicate visits by the same individual, was 264.1 admissions per 10,000 residents ages 12 and older. The rate of unique-person visits was 126.3. Between 2012 and 2016, these rates decreased by 14% and 17%, respectively.

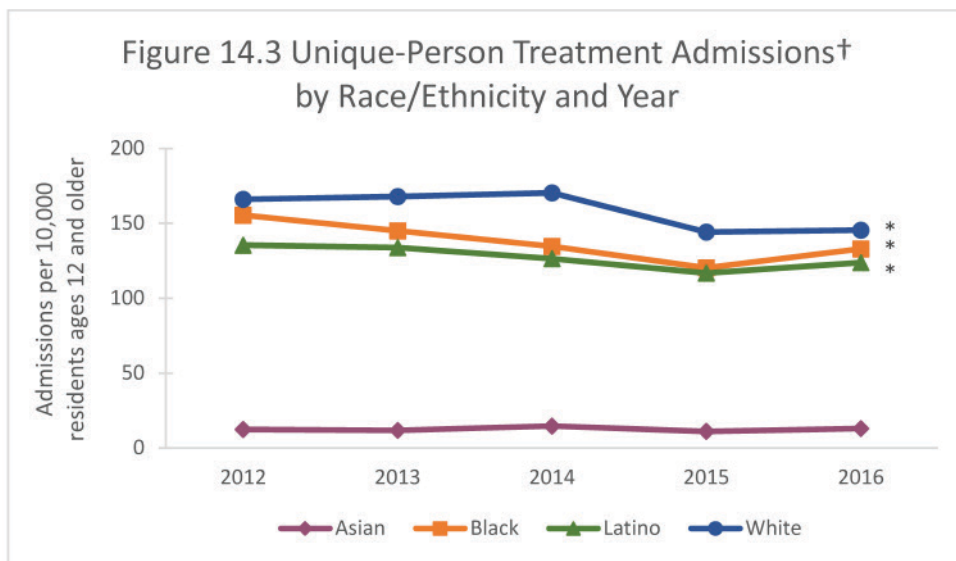


\* Statistically significant change over time

† Age-adjusted rates per 10,000 residents ages 12 and older

DATA SOURCE: Bureau of Substance Abuse Services, Massachusetts Department of Public Health (data as of December 2016)

Figure 14.3 Unique-Person Treatment Admissions† by Race/Ethnicity and Year



\* Statistically significant change over time

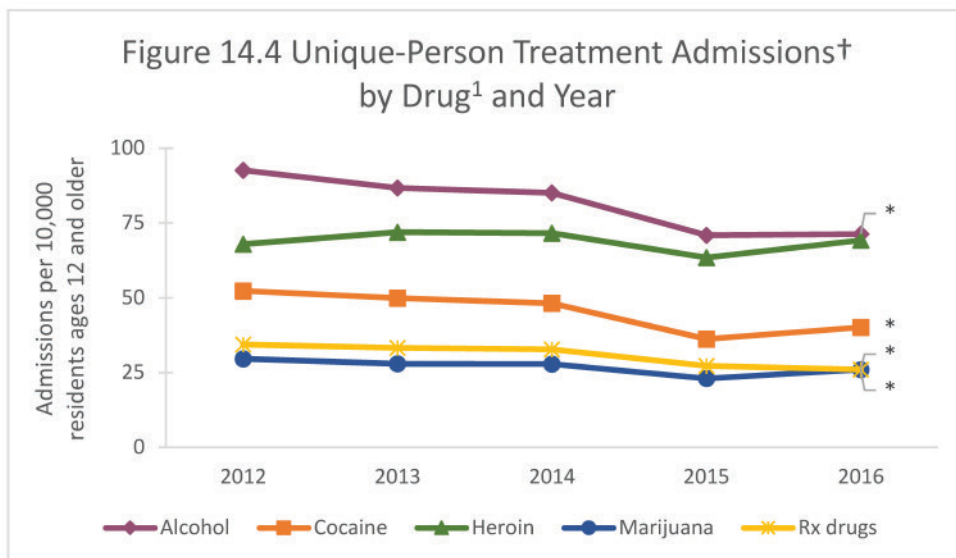
† Age-adjusted rates per 10,000 residents ages 12 and older

DATA SOURCE: Bureau of Substance Abuse Services, Massachusetts Department of Public Health (data as of December 2016)

Between 2012 and 2016, the rate of unique-person substance misuse treatment admissions decreased by 18% for Black residents, 12% for Latino residents, and 15% for White residents. There was no significant change over time for Asian residents.

In 2016, unique-person treatment admission rates were lower among Asian (13.0 admissions per 10,000 residents ages 12 and older), Black (132.9), and Latino residents (123.7) compared with White residents (145.3). These rates were 91%, 9%, and 15% lower, respectively.

Figure 14.4 Unique-Person Treatment Admissions† by Drug<sup>1</sup> and Year



\* Statistically significant change over time

† Age-adjusted rates per 10,000 residents ages 12 and older

<sup>1</sup> Self-identified as primary, secondary, or tertiary drug of misuse

DATA SOURCE: Bureau of Substance Abuse Services, Massachusetts Department of Public Health (data as of December 2016)

In 2016, alcohol was cited most often as a primary, secondary, or tertiary drug of misuse among unique-person treatment admissions in Boston, with a rate of 71.3 admissions per 10,000 residents ages 12 and older. Between 2012 and 2016, the rates of unique-person treatment admissions decreased by 25% for alcohol, 29% for cocaine, 17% for marijuana, and 26% for prescription drugs.

In 2016, the rates of unique-person treatment admissions for alcohol as primary, secondary, or tertiary drug of misuse were 92% lower for Asian residents (5.9 admissions per 10,000 residents ages 12 and older), 18% lower for Latino residents (62.9), and 22% higher for Black residents (93.9) compared with White residents (77.0).

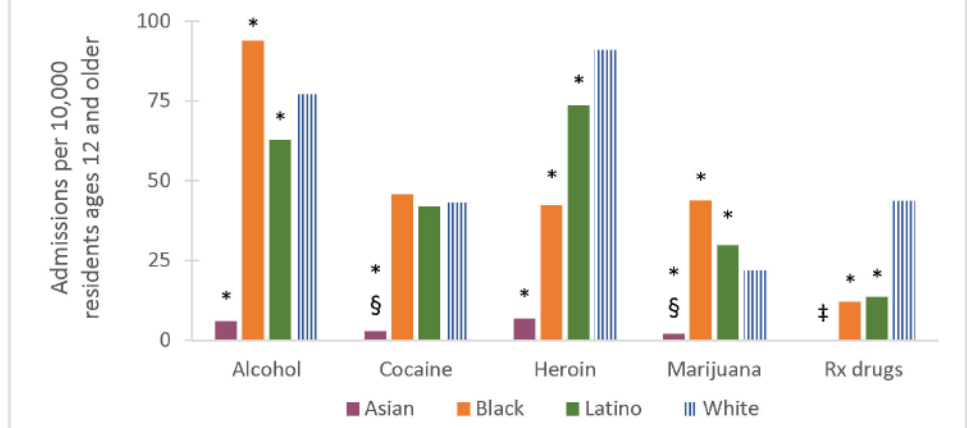
For cocaine-related treatment admissions, the rate was 93% lower for Asian residents (2.8) compared with White residents (43.0).

The rate of treatment admissions for heroin were lower for Asian (6.6), Black (42.3), and Latino residents (73.6) compared with White residents (91.0). These rates were 93%, 54%, and 19% lower, respectively.

For marijuana-related treatment admissions, rates were 91% lower for Asian residents (2.0), 99% higher for Black residents (43.9), and 35% higher for Latino residents (29.7) compared with White residents (22.0).

The rate of treatment admissions for prescription drugs was 73% lower for Black residents (12.0) and 69% lower for Latino residents (13.6), compared with White residents (43.6).

Figure 14.5 Unique-Person Treatment Admissions† by Drug<sup>1</sup> and Race/Ethnicity, 2016



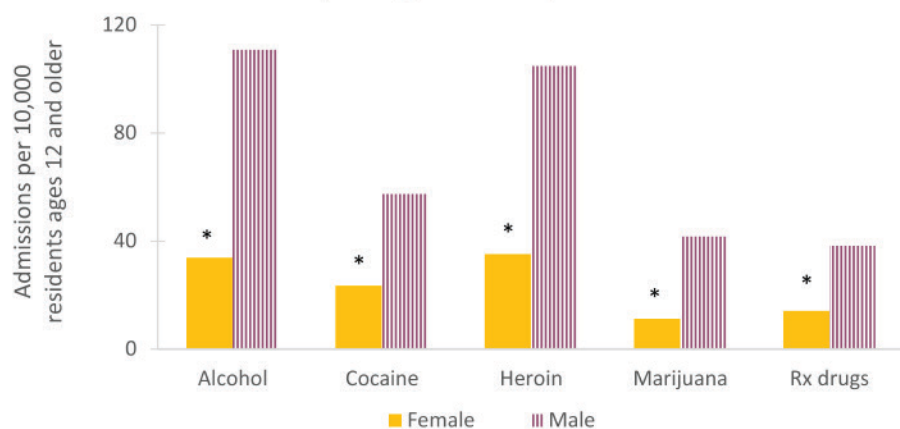
\* Statistically significant difference when compared to reference group  
 † Age-adjusted rates per 10,000 residents ages 12 and older  
 ‡ Rates not presented due to a small number of cases  
 § Rates are based on 20 or fewer cases and should be interpreted with caution  
<sup>1</sup> Self-identified as primary, secondary, or tertiary drug of misuse

NOTE: Bars with patterns indicate the reference group within each selected indicator.  
 DATA SOURCE: Bureau of Substance Abuse Services, Massachusetts Department of Public Health (data as of December 2016)





Figure 14.6 Unique-Person Treatment Admissions† by Drug<sup>1</sup> and Sex, 2016



\* Statistically significant difference when compared to reference group

† Age-adjusted rates per 10,000 residents ages 12 and older

<sup>1</sup> Self-identified as primary, secondary, or tertiary drug of misuse

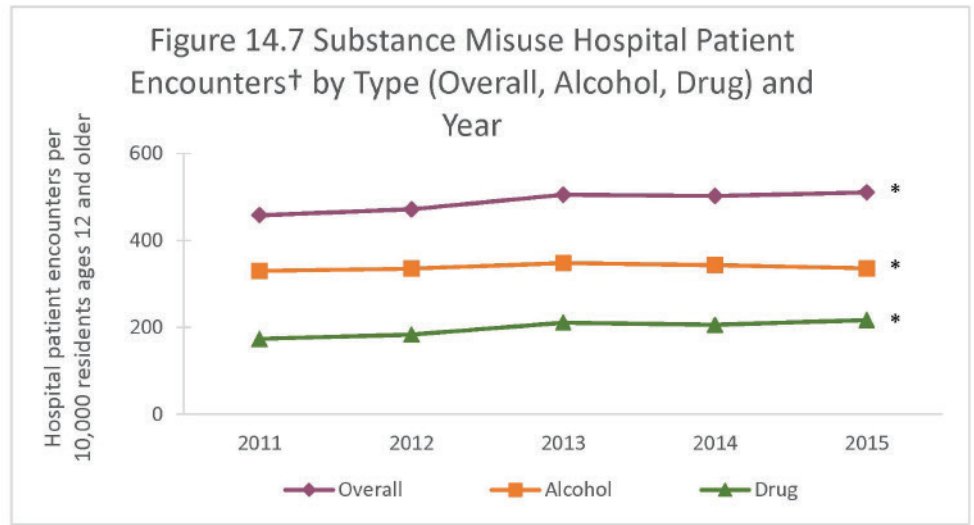
NOTE: Bars with patterns indicate the reference group within each selected indicator.

DATA SOURCE: Bureau of Substance Abuse Services, Massachusetts Department of Public Health (data as of December 2016)

In 2016, the rates of unique-person treatment admissions for alcohol, cocaine, heroin, marijuana, and prescription drugs as primary, secondary, or tertiary drug of misuse were lower for female residents compared with male residents. The largest differences between the rates for females and males occurred for treatment admissions related to alcohol, heroin, and marijuana.

For alcohol, the rate for females (33.8 admissions per 10,000 residents ages 12 and older) was 70% lower than the rate for males (110.8). For heroin, the rate for females (35.2) was 66% lower than the rate for males (104.8). For marijuana, the rate for females (11.2) was 73% lower than the rate for males (41.6).

In 2015, the rate of hospital patient encounters (including emergency department visits and in-patient hospitalizations) for substance misuse was 510.4 per 10,000 residents ages 12 and older. From 2011 to 2015, the rate increased by 12%. During this same time period, the rates for drug and alcohol misuse encounters increased by 25% and 2%, respectively.



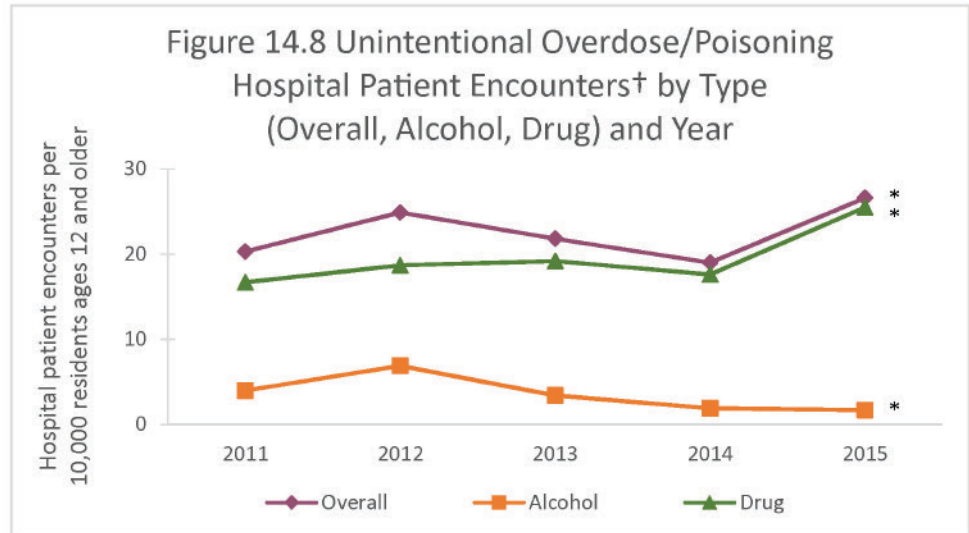
\* Statistically significant change over time

† Age-adjusted rates per 10,000 residents ages 12 and older

NOTE: Hospital patient encounters include in-patient hospital and emergency department discharges but exclude observational stay discharges.

DATA SOURCE: Acute hospital case-mix databases, Massachusetts Center for Health Information and Analysis

In 2015, the rate of hospital patient encounters for substance misuse-related unintentional overdoses/poisonings was 26.6 encounters per 10,000 residents ages 12 and older. From 2011 to 2015, the rate increased by 13%. The rate for drug-related unintentional overdoses/poisonings increased by 40%, while the rate for alcohol-related overdoses/poisonings decreased by 68%.



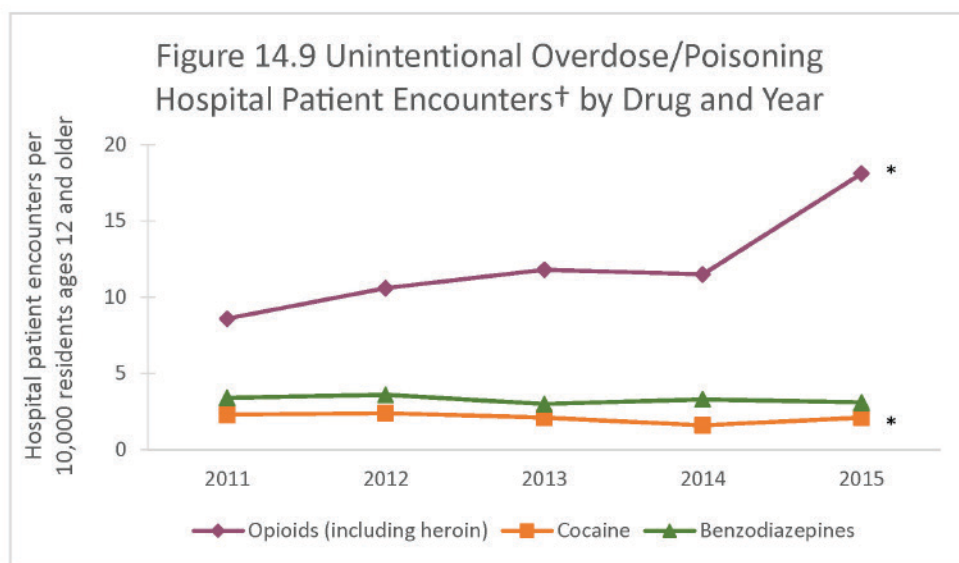
\* Statistically significant change over time

† Age-adjusted rates per 10,000 residents ages 12 and older

NOTE: Hospital patient encounters include in-patient hospital and emergency department discharges but exclude observational stay discharges.

DATA SOURCE: Acute hospital case-mix databases, Massachusetts Center for Health Information and Analysis





\* Statistically significant change over time

† Age-adjusted rates per 10,000 residents ages 12 and older

NOTE: Hospital patient encounters include in-patient hospital and emergency department discharges but exclude observational stay discharges.

DATA SOURCE: Acute hospital case-mix databases, Massachusetts Center for Health Information and Analysis

By drug type, the rates of hospital patient encounters for unintentional overdoses/poisonings in 2015 were 18.1 per 10,000 residents ages 12 and older for opioids, 2.1 for cocaine, and 3.1 for benzodiazepines. From 2011 to 2015, the rate increased by 94% for opioids and decreased by 21% for cocaine. There was no significant change over time for benzodiazepines.

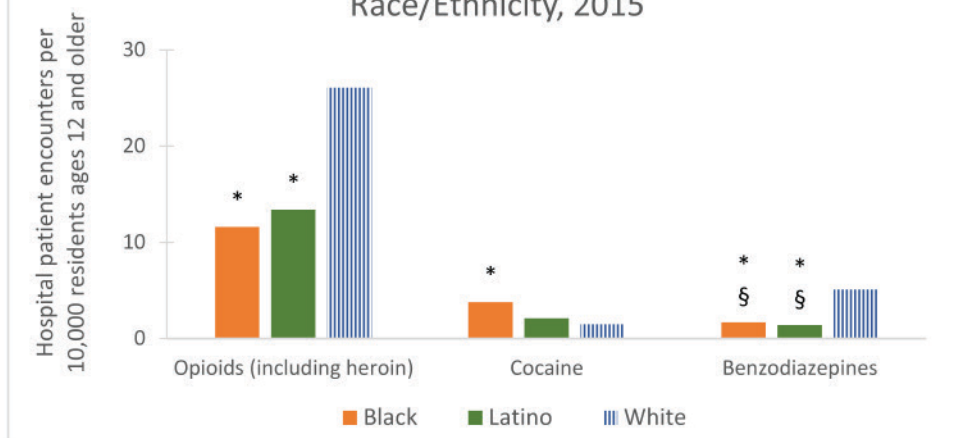
In 2015, the rates of hospital patient encounters for unintentional overdose/poisoning from opioids and benzodiazepines were lower for Black and Latino residents compared with White residents.

For opioids, the rates were 55% lower for Black residents (11.6 hospital patient encounters per 10,000 residents ages 12 and older) and 49% lower for Latino residents (13.4) compared with White residents (26.1), respectively.

For benzodiazepines, the rates were 67% lower for Black residents (1.7) and 72% lower for Latino residents (1.4) compared with White residents (5.1).

In contrast, the rate of cocaine-related overdose/poisoning hospital patient encounters for Black residents (3.8) was 2.5 times the rate for White residents (1.5).

Figure 14.10 Unintentional Overdose/Poisoning Hospital Patient Encounters† by Drug and Race/Ethnicity, 2015



\* Statistically significant difference when compared to reference group

† Age-adjusted rates per 10,000 residents ages 12 and older

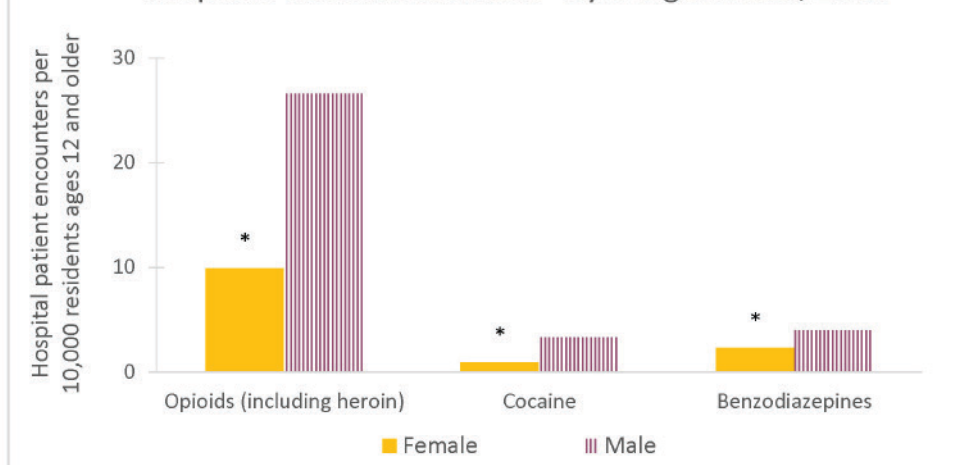
§ Rates are based on 20 or fewer cases and should be interpreted with caution

NOTE: Bars with patterns indicate the reference group within each selected indicator. Rates not presented due to a small number of cases for Asian residents. Hospital patient encounters include in-patient hospital and emergency department discharges but exclude observational stay discharges.

DATA SOURCE: Acute hospital case-mix databases, Massachusetts Center for Health Information and Analysis



Figure 14.11 Unintentional Overdose/Poisoning Hospital Patient Encounters† by Drug and Sex, 2015



\* Statistically significant difference when compared to reference group

† Age-adjusted rates per 10,000 residents ages 12 and older

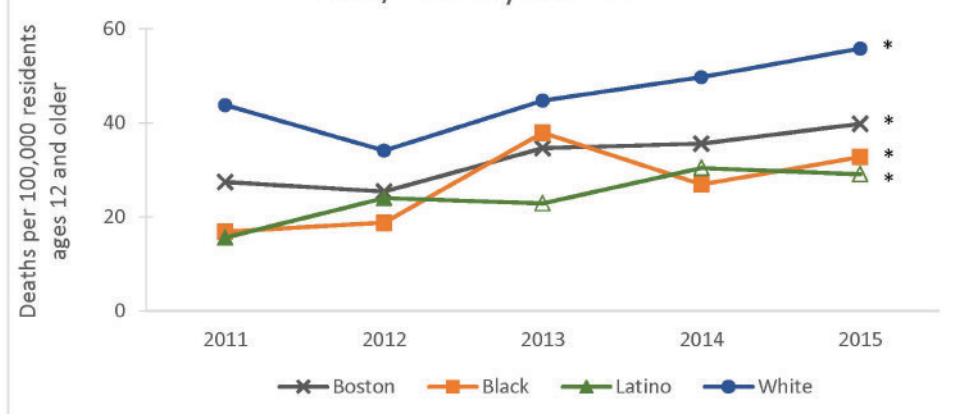
NOTE: Bars with patterns indicate the reference group within each selected indicator. Hospital patient encounters include in-patient hospital and emergency department discharges but exclude observational stay discharges.

DATA SOURCE: Acute hospital case-mix databases, Massachusetts Center for Health Information and Analysis

In 2015, the rates of hospital patient encounters for unintentional overdose/poisoning were lower for females compared with males for opioids (including heroin), cocaine, and benzodiazepines.

For opioids (including heroin), the rate for females (9.9 encounters per 10,000 residents ages 12 and older) was 63% lower than the rate for males (26.6). For cocaine, the rate for females (0.9) was 73% lower than for males (3.3). For benzodiazepines, the rate for females (2.3) was 44% lower than the rate for males (4.0).

Figure 14.12 Substance Misuse Mortality† by Race/Ethnicity and Year



\* Statistically significant change over time

† Age-adjusted rates per 100,000 residents ages 12 and older

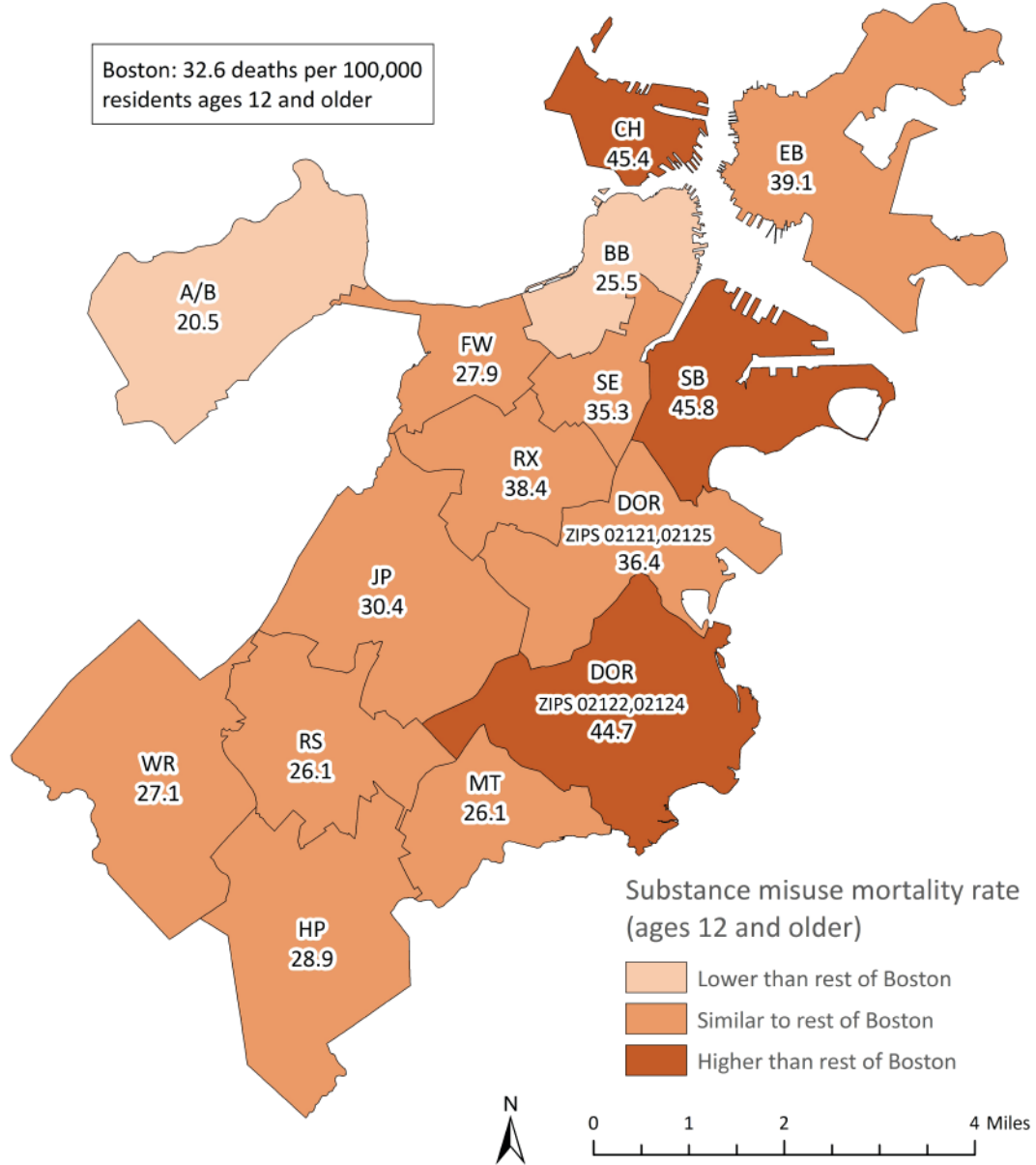
NOTE: Hollowed-out symbols represent rates based on 20 or fewer cases and should be interpreted with caution. Rates not presented due to a small number of cases for Asian residents. Beginning in October 2014, the method for collecting race/ethnicity for mortality data changed. Interpret trends with caution. Unintentional overdose death totals for 2015 are likely an undercount due to deaths awaiting causal determinations. For more information see "Cause of Death Undercount" in the Technical Notes.

DATA SOURCE: Boston resident deaths, Massachusetts Department of Public Health (data as of December 2016). Data will be updated as more information becomes available.

In 2015, the substance misuse mortality rate in Boston was 39.8 deaths per 100,000 residents ages 12 and older. From 2011 to 2015, the rate increased by 54% for Boston overall. Rates also increased by 83% for Black residents, 73% for Latino residents, and 42% for White residents.

In 2015, mortality due to substance misuse was lower for Black (32.7) and Latino residents (29.1) compared with White residents (55.8). These rates were 41% and 48% lower, respectively.

Figure 14.13 Substance Misuse Mortality†  
by Neighborhood, 2011-2015



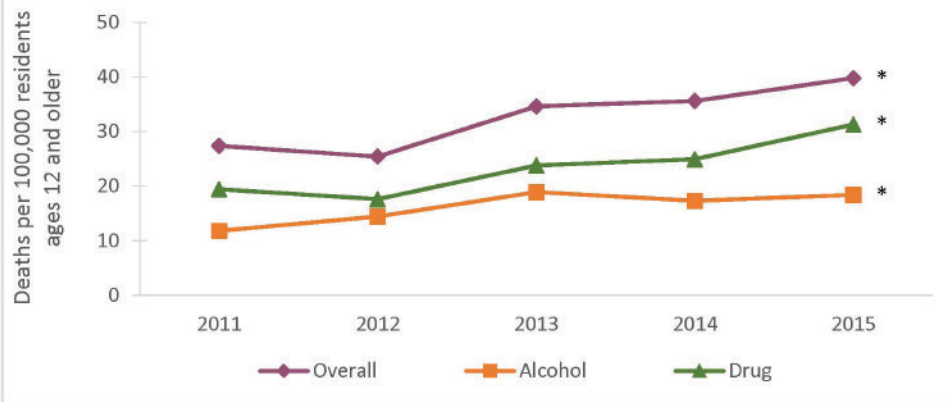
† 5-year average annual age-adjusted rates per 100,000 residents ages 12 and older

NOTE: “BB” includes the Back Bay, Beacon Hill, Downtown, the North End, and the West End. “SE” includes the South End and Chinatown. Unintentional overdose death totals for 2015 are likely an undercount due to deaths awaiting causal determinations. For more information see “Cause of Death Undercount” in the Technical Notes.

DATA SOURCE: Boston resident deaths, Massachusetts Department of Public Health (data as of December 2016). Data may be updated as more information becomes available.

For 2011-2015, the substance misuse mortality rate was higher for Charlestown, Dorchester (zip codes 02122, 02124), and South Boston compared with the rest of Boston. The rate was lower for Allston/Brighton and Back Bay compared with the rest of Boston.

Figure 14.14 Substance Misuse Mortality† by Type (Overall, Alcohol, Drug) and Year



\* Statistically significant change over time

† Age-adjusted rates per 100,000 residents ages 12 and older

NOTE: Unintentional overdose death totals for 2015 are likely an undercount due to deaths awaiting causal determinations. For more information see "Cause of Death Undercount" in the Technical Notes.

DATA SOURCE: Boston resident deaths, Massachusetts Department of Public Health (data as of December 2016). Data will be updated as more information becomes available.

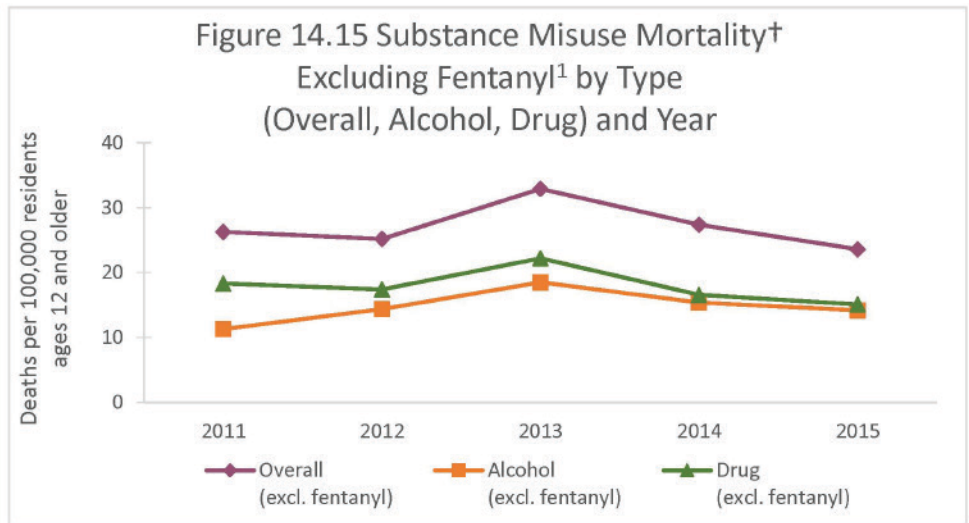
In 2015, the overall substance misuse mortality rate in Boston was 39.8 deaths per 100,000 residents ages 12 and older. The mortality rates for alcohol misuse and drug misuse were 18.4 and 31.3, respectively. From 2011 to 2015, the mortality rates for overall substance misuse, alcohol misuse, and drug misuse increased by 54%, 49%, and 71%, respectively.



According to the National Institute on Drug Abuse (NIDA), “Fentanyl is a powerful synthetic opioid analgesic that is similar to morphine but is 50 to 100 times more potent.” Evidence points to illicit fentanyl increasingly being used as a cutting agent (i.e., adulterant) in street-level heroin and cocaine.<sup>2</sup>

When excluding deaths related to fentanyl use, the 2015 substance misuse mortality rate in Boston was 23.6 deaths per 100,000 residents ages 12 and older. The mortality rates for alcohol and drug misuse when excluding fentanyl were 14.2 and 15.1, respectively. From 2011 to 2015, there was no change in the rates of substance misuse mortality when excluding fentanyl overall or by type of substance used. While increases were observed in overall substance misuse, alcohol, and drug mortality in Figure 14.14, data presented here reveal that these increases were attributable to fentanyl.

<sup>2</sup> <https://www.drugabuse.gov/about-nida/legislative-activities/testimony-to-congress/2017/research-use-misuse-fentanyl-other-synthetic-opeioids>



† Age-adjusted rates per 100,000 residents ages 12 and older.

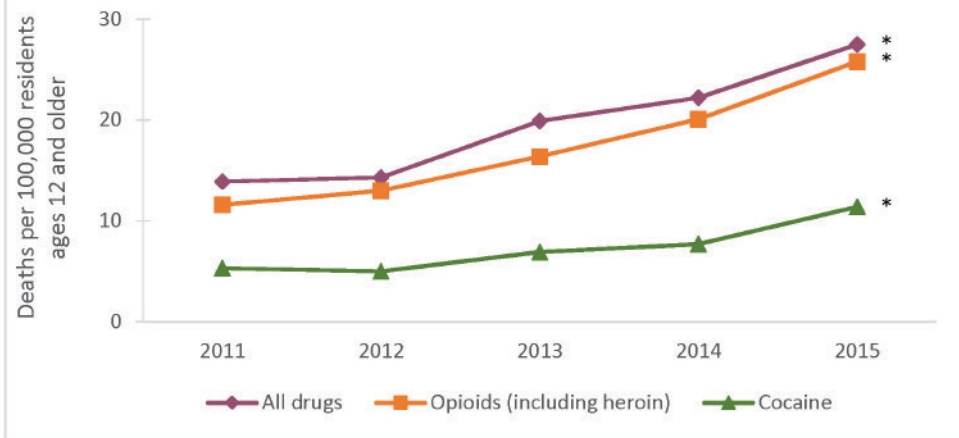
<sup>1</sup> Fentanyl identified by ICD-10 code T40.4. See Fentanyl Identification in Death Data in the Technical Notes for complete methodological description.

NOTE: Unintentional overdose death totals for 2015 are likely an undercount due to deaths awaiting causal determinations. For more information see “Cause of Death Undercount” in the Technical Notes.

DATA SOURCE: Boston resident deaths, Massachusetts Department of Public Health (data as of December 2016). Data will be updated as more information becomes available.



Figure 14.16 Unintentional Drug Overdose Mortality† by Drug and Year



\* Statistically significant change over time

† Age-adjusted rates per 100,000 residents ages 12 and older

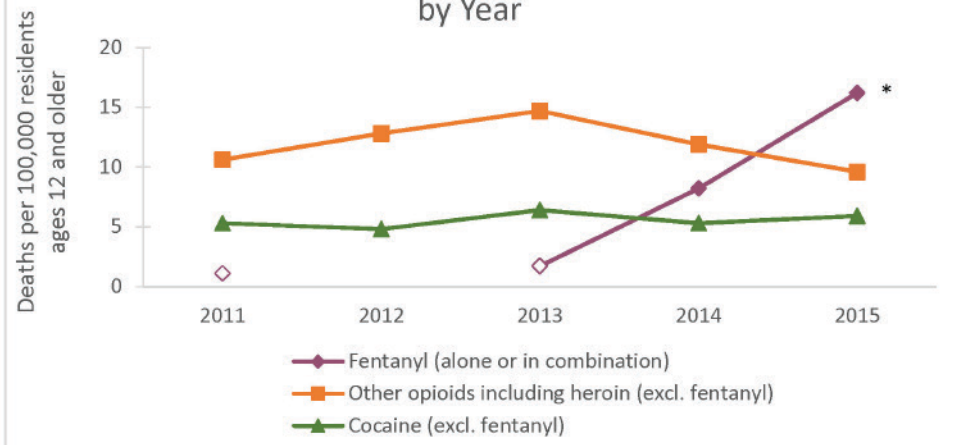
NOTE: Unintentional overdose includes overdose with undetermined intent. Unintentional overdose death totals for 2015 are likely an undercount due to deaths awaiting causal determinations. For more information see “Cause of Death Undercount” in the Technical Notes.

DATA SOURCE: Boston resident deaths, Massachusetts Department of Public Health (data as of December 2016). Data will be updated as more information becomes available.

In 2015, the rate of mortality due to unintentional drug overdose in Boston was 27.5 deaths per 100,000 residents ages 12 and older. The rates of unintentional overdose deaths from opioids (including heroin) and cocaine were 25.8 and 11.4, respectively. From 2011 to 2015, the rates for all drugs, opioids, and cocaine increased by 108%, 130%, and 130%, respectively.

Note: Rates reflect presence of specified drug either alone or in combination with other drugs. Increases in rates over time are likely attributable to combinations including fentanyl and increasing fentanyl-related mortality over time.

Figure 14.17 Unintentional Drug Overdose Mortality† Due to Fentanyl<sup>1</sup> and Other Drugs by Year



\* Statistically significant change over time

† Age-adjusted rates per 100,000 residents ages 12 and older

<sup>1</sup> Fentanyl identified by ICD-10 code T40.4. See Fentanyl Identification in Death Data in the Technical Notes for complete methodological description.

NOTE: Hollowed-out symbols represent rates based on 20 or fewer cases and should be interpreted with caution. Rates not presented due to a small number of cases of unintentional overdose deaths due to fentanyl in 2012.

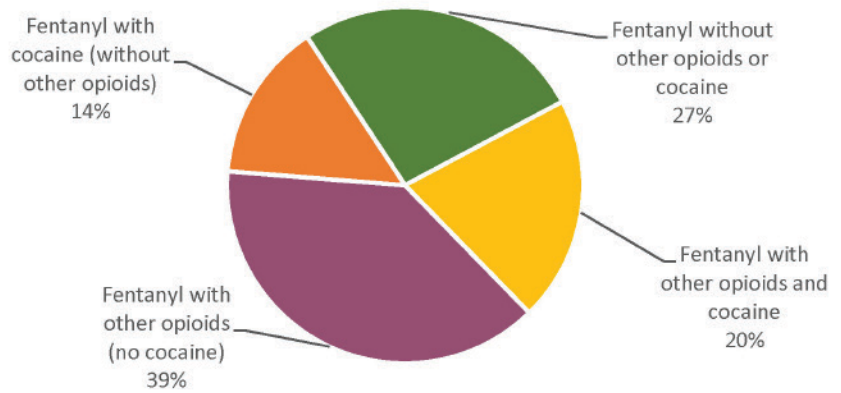
Unintentional overdose includes overdose with undetermined intent. Unintentional overdose death totals for 2015 are likely an undercount due to deaths awaiting causal determinations. For more information see “Cause of Death Undercount” in the Technical Notes.

DATA SOURCE: Boston resident deaths, Massachusetts Department of Public Health (data as of December 2016). Data will be updated as more information becomes available.

In 2015, the rate of unintentional overdose mortality due to fentanyl use alone or in combination with other drugs was 16.2 deaths per 100,000 residents ages 12 and older compared with 1.1 in 2011. From 2011 to 2015, the rate increased by more than 40 times. In contrast, there was no significant change over time for the rates of unintentional overdose death due to the use of other opioids including heroin (excluding fentanyl) or the use of cocaine (excluding fentanyl). While increases in unintentional overdose mortality were observed in opioids (including heroin) and cocaine in Figure 14.16, data presented here reveal that these increases were attributable to fentanyl.

In 2015, 56% of unintentional drug overdose deaths (n=83) were associated with fentanyl use (data not shown). Of these, 27% were due to fentanyl without other opioids (including heroin) or cocaine, 39% were due to fentanyl in combination with other opioids but without cocaine, 20% were due to fentanyl in combination with other opioids and cocaine, and 14% were due to fentanyl with cocaine but no other opioid specified.

Figure 14.18 Unintentional Drug Overdose Mortality Associated with Fentanyl<sup>1</sup> Use, 2015



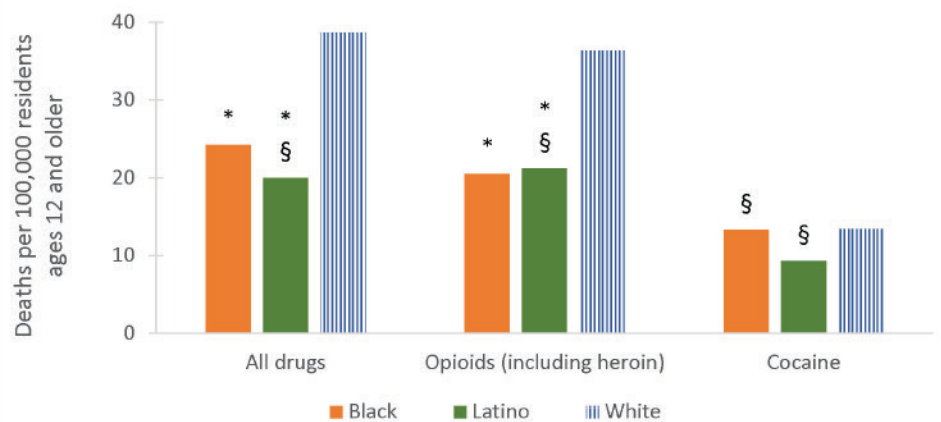
<sup>1</sup> Fentanyl identified by ICD-10 code T40.4 which may include other synthetic opioids. See Fentanyl Identification in Death Data in the Technical Notes for complete methodological description.

NOTE: Unintentional overdose includes overdose with undetermined intent. Unintentional overdose death totals for 2015 are likely an undercount due to deaths awaiting causal determinations. For more information see "Cause of Death Undercount" in the Technical Notes.

DATA SOURCE: Boston resident deaths, Massachusetts Department of Public Health (data as of December 2016). Data will be updated as more information becomes available.

In 2015, the rate of unintentional overdose deaths from all drugs was 38% lower for Black residents (24.2 deaths per 100,000 residents ages 12 and older) and 48% lower for Latino residents (20.0) compared with White residents (38.7). The mortality rate from unintentional opioid overdoses was 44% lower for Black residents (20.5) and 42% lower for Latino residents (21.2) compared with White residents (36.4). There were no significant differences in the rates of unintentional cocaine overdose mortality by race/ethnicity.

Figure 14.19 Unintentional Drug Overdose Mortality<sup>†</sup> by Drug and Race/Ethnicity, 2015



\* Statistically significant difference when compared to reference group

† Age-adjusted rates per 100,000 residents ages 12 and older

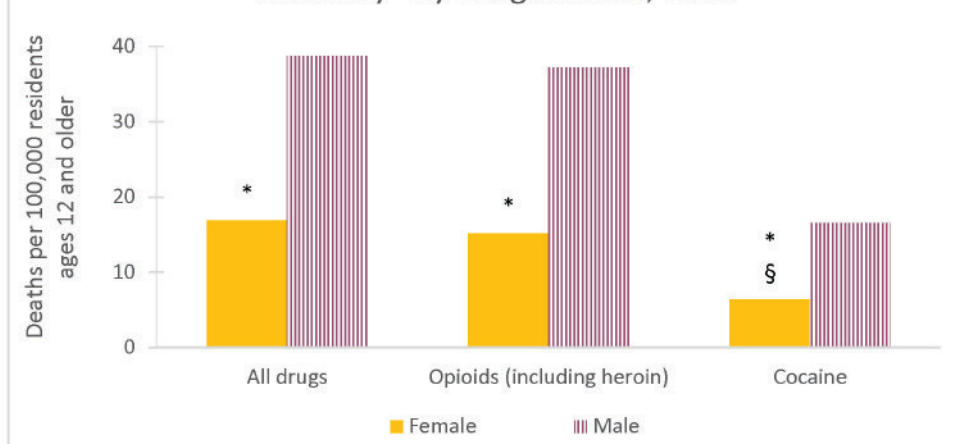
§ Rates are based on 20 or fewer cases and should be interpreted with caution

NOTE: Bars with patterns indicate the reference group within each selected indicator. Rates not presented due to a small number of cases for Asian residents. Unintentional overdose includes overdose with undetermined intent. Unintentional overdose death totals for 2015 are likely an undercount due to deaths awaiting causal determinations. For more information see "Cause of Death Undercount" in the Technical Notes.

DATA SOURCE: Boston resident deaths, Massachusetts Department of Public Health (data as of December 2016). Data will be updated as more information becomes available.



Figure 14.20 Unintentional Drug Overdose Mortality† by Drug and Sex, 2015



\* Statistically significant difference when compared to reference group

† Age-adjusted rates per 100,000 residents ages 12 and older

§ Rates are based on 20 or fewer cases and should be interpreted with caution

NOTE: Bars with patterns indicate the reference group within each selected indicator. Unintentional overdose includes overdose with undetermined intent. Unintentional overdose death totals for 2015 are likely an undercount due to deaths awaiting causal determinations. For more information see “Cause of Death Undercount” in the Technical Notes.

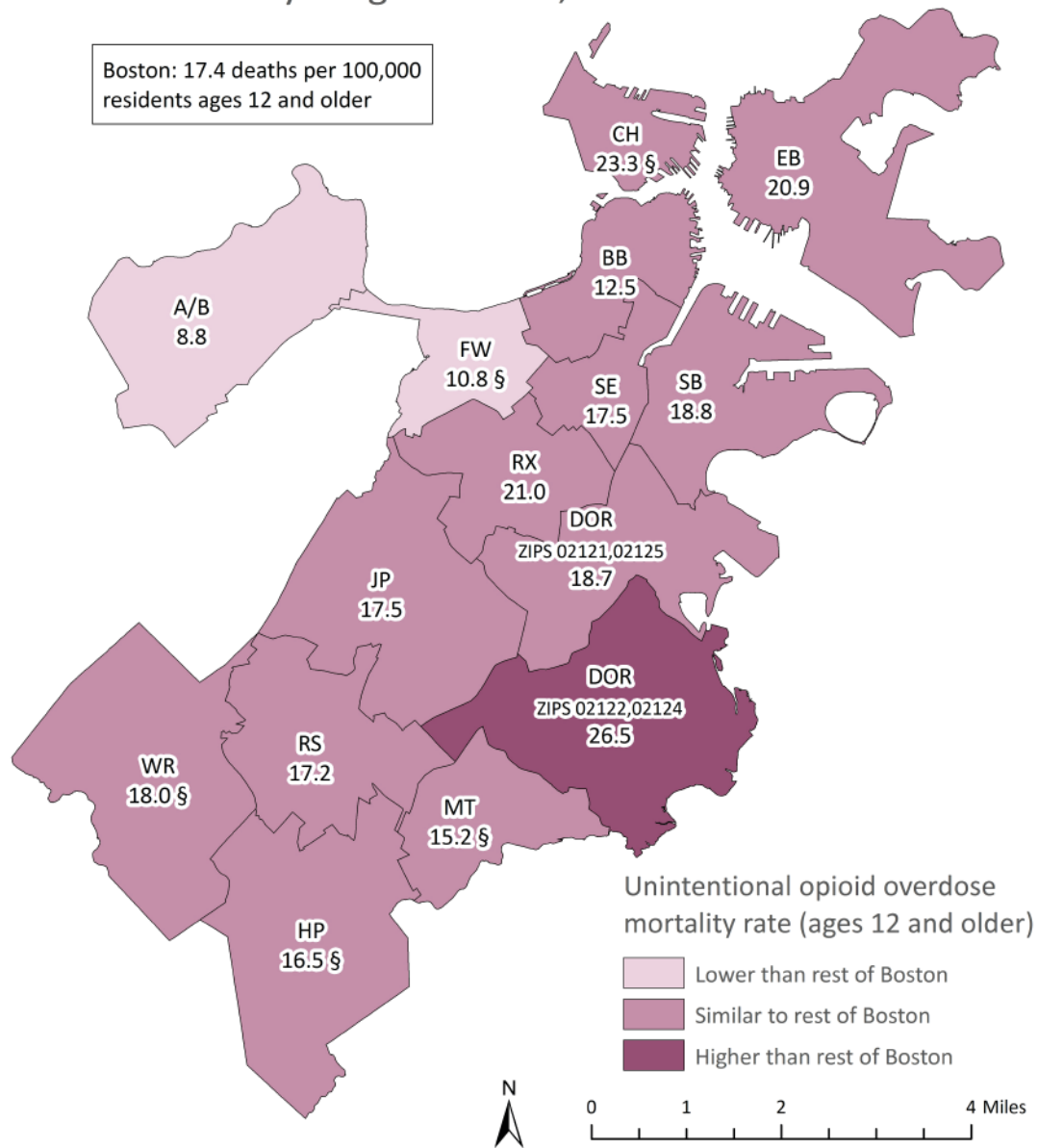
DATA SOURCE: Boston resident deaths, Massachusetts Department of Public Health (data as of December 2016).

Data will be updated as more information becomes available.

In 2015, the unintentional drug overdose mortality rate for all drugs was 56% lower for females (16.9 deaths per 100,000 residents ages 12 and older) compared with males (38.8). Similar patterns held for unintentional drug overdose deaths due to opioids (including heroin) and cocaine. The rate for females was 59% lower for opioids (including heroin) and 61% lower for cocaine compared with males.



### Figure 14.21 Unintentional Opioid Overdose Mortality† by Neighborhood, 2011-2015



† 5-year average annual age-adjusted rates per 100,000 residents ages 12 and older  
 § Rates are based on 20 or fewer cases and should be interpreted with caution.

NOTE: “BB” includes the Back Bay, Beacon Hill, Downtown, the North End, and the West End. “SE” includes the South End and Chinatown. Unintentional overdose includes overdose with undetermined intent. Unintentional overdose death totals for 2015 are likely an undercount due to deaths awaiting causal determinations. For more information see “Cause of Death Undercount” in the Technical Notes.

DATA SOURCE: Boston resident deaths, Massachusetts Department of Public Health (data as of December 2016). Data may be updated as more information becomes available.

For 2011 to 2015, the unintentional opioid overdose mortality rate was higher for Dorchester (zip codes 02122, 02124) compared with the rest of Boston. The rate was lower in Allston/Brighton and Fenway compared with the rest of Boston.

## Summary

The analysis of Boston resident substance use disorders indicators from 2011 to 2015 found increasing rates of mortality and hospital patient encounters and decreasing rates of treatment admissions.

From 2011 to 2015, Boston and Massachusetts experienced similar levels of and significant increases in unintentional opioid overdose mortality (from 11.6 and 9.3 deaths per 100,000 residents ages 12 and older, respectively, in 2011 to 25.8 for both in 2015) (12). The increase in unintentional opioid overdose mortality appears to be attributable to fentanyl, a highly potent opioid often used as an adulterant (i.e., mixed with street-level heroin, cocaine, and other drugs). In Boston, increases in all of the substance misuse mortality indicators (including alcohol misuse mortality) appear to be attributable to fentanyl, often found to have been used in combination with other drugs and alcohol. The number of fentanyl-related unintentional overdose deaths increased from fewer than 10 per year during the three-year period 2011-2013 to 43 deaths in 2014 and 83 deaths in 2015.

With the exception of alcohol-related and cocaine-related unintentional overdose/poisonings which decreased over time, the rates of hospital patient encounters for drug and alcohol-related substance misuse (which includes dependence, misuse, and overdose), as well as for unintentional drug and opioid overdose/poisoning, increased from 2011 to 2015. In contrast, the rates of total treatment admissions and unique-person treatment admissions decreased during the same time period. With the exception of heroin, for which the rate remained stable over time, the rate of unique-person treatment admissions decreased for alcohol, marijuana, cocaine, and prescription drugs.

For substance misuse indicators evaluated for 2015, inequities across categories of race/ethnicity, sex, and neighborhood were found. The rates of mortality and hospital patient encounters for substance misuse and unintentional overdoses tended to disproportionately affect White residents. However, the overall substance misuse death rate increased almost two-fold from 2011 to 2015 for Black and Latino residents and to a lesser extent for White residents, which suggests the impact of fentanyl was experienced by all three of these racial/ethnic groups and lessened relative inequities as rates increased. Racial/ethnic differences in unique-person treatment admissions varied across drug type. For example, the rates of unique-person treatment admissions for heroin and prescription drugs were higher for White residents compared with Black and Latino residents. For marijuana, the rate was higher for Black and Latino residents compared with White residents. Across most drug types, the rate of unique-person treatment admissions was lowest among Asian residents.

The rates of substance misuse deaths, unintentional drug overdose hospital patient encounters, and unique-person treatment admissions were higher for men than women. At the neighborhood level, the rate of overall substance misuse deaths (including alcohol misuse, drug misuse, and unintentional opioid overdose/poisoning deaths) during the five-year time period 2011-2015 was higher for Charlestown, Dorchester (zip codes 02122, 02124), and South Boston compared with the rest of Boston.

# Substance Use Disorders

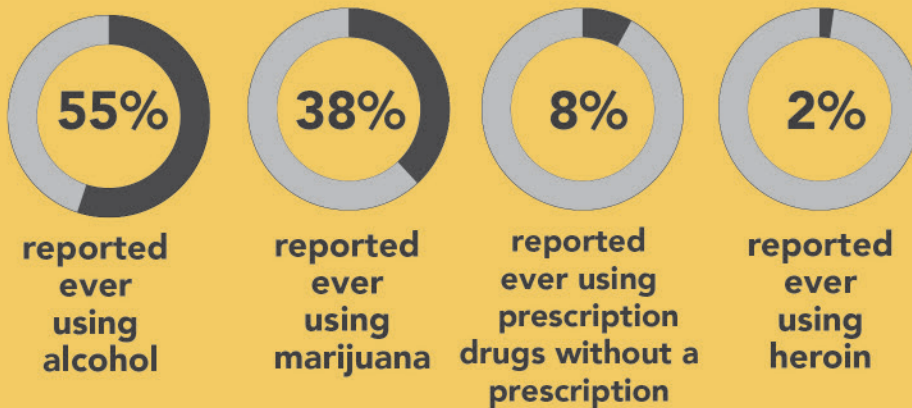
For 2011 to 2015, the unintentional fentanyl drug overdose death rate increased **40 fold**--driving all increases in substance misuse mortality.



From 2011 to 2015, the unintentional opioid overdose death rate increased



## Drug use among Boston public high school students in 2015



# Our Point of View: Thoughts from public health

## Using Medication to Treat Opioid Addiction

By Association for Behavioral Healthcare

Dependence on heroin, fentanyl and opioid-based pain medications has grown to epidemic proportions in Massachusetts. Despite many efforts to curb this rising tide, the overdose death rate continues to climb. The toll of addiction on our citizens, communities and the economy has been devastating with no end in sight. Medication-assisted treatment (MAT), like its name implies, is a whole-patient approach that combines medication, counseling and behavioral therapy. The medications prescribed for opioid treatment include methadone, buprenorphine (Suboxone), and injectable naltrexone (Vivitrol). These medications stabilize brain chemistry, block the euphoric effects of opioids, and stop cravings. Each have their own strengths and are recommended for different populations.

When it comes to treating illness, people rarely hesitate to use medication. Be it allergies or heart disease, depression or strep throat, people rely on medication for relief and for a cure. With addiction, however, there remains deep-rooted stigma, shame and misinformation. Despite overwhelming evidence of its benefits, many patients do not use MAT, even when it is the most clinically appropriate treatment. Every person who is struggling with opioid addiction should be familiar with their options.

Methadone is the most widely studied medication and treatment for any disease in the world. Since its development in 1964, methadone has been studied as a medical response to the post-World War II and the Vietnam opioid epidemics.<sup>1</sup> Methadone maintenance is recommended for chronic, relapsing opioid-addicted individuals including pregnant women, those with heavier use of opioids, concurrent use of alcohol and other drugs, unstable psychiatric disorders, and limited social supports.

Buprenorphine (brand name Suboxone) is another treatment of opioid dependence. It is a preferred formulation for patients with liver disease and those transferring from a methadone clinic, including pregnant women. For individuals already stable on a low to moderate dose of buprenorphine, an implant that delivers a long-lasting dose can be surgically inserted and removed.<sup>2</sup>

Naltrexone (brand name Vivitrol) can be used to treat alcohol and/or opioid dependence. It blocks opioid receptors, reduces cravings, and diminishes the rewarding effects of alcohol and opioids. Extended-release injectable naltrexone is recommended to prevent relapse to opioids or alcohol.

Given the chance, individuals stabilized with the use of medication and counseling can achieve true recovery. Numerous studies show that because MAT reduces drug use, the transmission of viral disease and criminal activity also go down.<sup>3</sup> It's time to think and treat opioid addiction like every other disease out there. Let's use all the tools at our disposal.

<sup>1</sup> Medication-Assisted Treatment for Opioid Addiction in Opioid Treatment Programs, A Treatment Improvement Protocol, TIP 43, Substance Abuse and Mental Health Services Administration, available at <http://store.samhsa.gov/shin/content//SMA12-4214/SMA12-4214.pdf>

<sup>2</sup> Medication-Assisted Treatment For Opioid Addiction: Myths & Facts, Legal Action Center, 225 Varick Street, 4th Floor, New York, NY 10014 | August 2016.

<sup>3</sup> Medication-Assisted Treatment For Opioid Addiction: Myths & Facts, Legal Action Center, 225 Varick Street, 4th Floor, New York, NY 10014 | August 2016

## Our Point of View: Thoughts from a community resident

### **I tried different treatments and found one that is working**

By Consumer of Boston Public Health Commission services

My grandmother raised me and my brother. I never met my biological dad. My mom also struggles with addiction. I was four when my grandmother passed away from a brain aneurysm. It was traumatic. She was my whole world.

I started skipping school, drinking and smoking weed. I moved onto Percocet and OxyContin. The first time I remember being “dope sick” I didn’t know what was happening. A friend offered me heroin. I started sniffing but quickly moved onto needles. At first, everything seemed better, but then I ended up jumping from couch to couch and stealing from family. I was only 16 and I lost everything. Nobody wanted anything to do with me. I ended up with my mom. She taught me how to hit myself with a needle. All I wanted was for her to love me – to be proud of me. But I stole from her too and she kicked me out. I was homeless living on the streets of Boston. It was scary. I was only 21. I should have been in college. I swore I’d never be like my mom. I wanted to be a veterinarian.

The last months of 2016 were the worst – sleeping on loading docks, on concrete bricks and cardboard trying not to freeze to death. I visited AHOPE to get clean needles. The staff there treated me like a human being and helped me get back into a residential treatment program.

I tried Suboxone. It took away the cravings so I didn’t think about getting high as much, but for me, it was too easy to abuse. I’m on methadone now. My mom, who has been on it for ten years now, convinced me to give it a try. Going to the clinic every day provides accountability. There are lots of groups and you have to go to them if you want to get dosed and come up with a treatment plan. I’m only 26. I don’t want to be on it for the rest of my life but I don’t want to rush off either because I know it will lead to relapse.

Right now, my goal is to not stick a needle in my arm. I know I’m here for a purpose – whether it’s God or whatever and that if I do what I have to do –follow my treatment plan and go to groups – I’ll be okay.

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# Chapter 15

## Death







# Death

The increase in life expectancy over the last century has been remarkable. In the early 1900s, infant mortality was so high that the average life expectancy was not much more than 50 years (1, 2). In 2014, the life expectancy in the United States was 78.8 years (3). This increase is mostly due to improvements in infant survival paired with important shifts in the leading causes of death from infectious disease to chronic conditions, which cause death later in life (3). Public health breakthroughs such as vaccines against smallpox, polio, and measles, as well as better and less crowded housing, clean drinking water, and better nutrition have all played a role, especially in the early part of the 20th century when the risk of death from infection was high at every age and only a small proportion of people reached old age (4). Today, all individuals, regardless of race/ethnicity, are living longer. The most recent research shows that life expectancy is continuing to increase for people over the age of 80 (4). The observed gain in life expectancy among the oldest segments of our population raises questions about how we plan for an aging population as families and as a society (4).

## Premature mortality

Premature mortality refers to deaths that occur before a person reaches the expected or average age of death in their population group. The CDC estimates that almost 900,000 Americans die prematurely from the five leading causes of death (heart disease, cancer, chronic lower respiratory diseases, stroke, and unintentional injuries) and that up to 40% of these deaths are preventable (2). Many premature deaths are caused by inequities in the social, environmental, economic, and geographic attributes of the neighborhoods in which people live and work. High poverty rates, income inequality, and low levels of social mobility increase the risk of poor health outcomes and premature deaths. Premature deaths can be prevented through public health programs and policies that address the social determinants of health that contribute to poor health outcomes (5).

## Racial and ethnic differences

Over the last decade, life expectancy in the U.S. has followed a general trend in which White individuals live longer than Black individuals, and women live longer than men. In 1999, the differences in life expectancy between Black and White individuals was 5.9 years (6), but narrowing of the life expectancy gap is evident, with 2014 data showing a 3.6 year difference in life expectancy between Black and White individuals (3). In 2014, the life expectancy was 72.0 years for Black males, 78.1 years for Black females, 79.2 years for Latino males, 84.0 years for Latino females, 76.5 years for White males, and 81.1 years for White females. Life expectancy data for Asian individuals were not available (7). Despite this narrowing, racial inequities in life span continue to persist (3). In 2014, the average risk of death for Black individuals was 17.1% higher than for White individuals (3). This difference may be explained by a higher death rate from chronic disease, cancer, homicide, and perinatal conditions for Black individuals in comparison with White individuals (8).

## Leading causes of death

Examining leading causes of death helps public health and medical professionals prioritize prevention, treatment, and research efforts to improve health. In 2014, the ten leading causes of death in the U.S. were heart disease, cancer, chronic lower respiratory diseases, unintentional injuries, stroke, Alzheimer's disease, diabetes, influenza and pneumonia, kidney disease, and suicide. These causes accounted for 74% of the 2.6 million deaths that year (7). From 2004 to 2014, the age-adjusted death rates from heart disease and cancer decreased by 25% and 14%, respectively (8). In contrast, the suicide rate increased by 21% over that decade, and the drug poisoning death rate involving heroin increased more than five-fold (7).

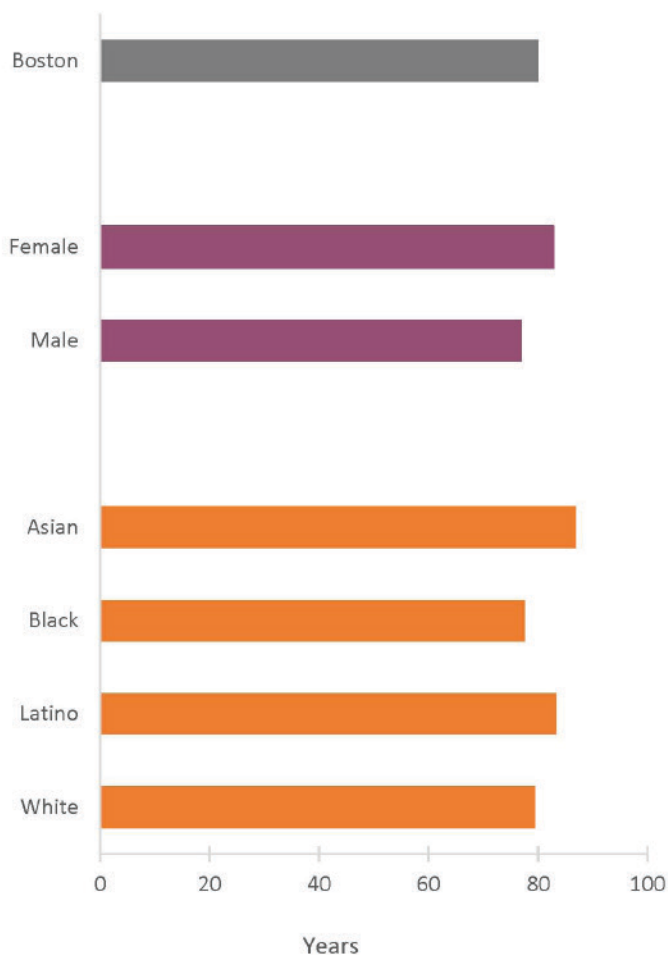
## Social determinants of health

Deaths can be attributed to three broad categories or causes: social factors, disease or physiology, and behavior. Social factors or determinants refer to issues such as low educational attainment, racial segregation, low income, and area-level poverty. These factors have been attributed to causing death (9). In their 2011 study, Galea et al. estimated that the number of deaths attributable to social determinants of health in the U.S. was comparable to the number associated with disease/biology (e.g. heart attacks, lung cancer) and behavioral causes (e.g. lung cancer due to tobacco use) (9). Life expectancy is impacted by the social determinants of health, and racial/ethnic differences in death rates highlight the importance of examining health care delivery, public health systems, and social infrastructure (e.g. schools, employment, transportation, education and housing) with a health equity focus (10).

Racism is also a social determinant of health that can impact a racial/ethnic group's death rate. Much research has linked experiencing explicit and implicit racism to negative health outcomes and a higher death rate (11-14). A recent study found that in U.S. counties where White residents acknowledged more open racial bias, the differences between the rate of death from heart diseases among Black residents and White residents were greater, with Black residents having a higher death rate. At the same time, in these same areas, the heart disease death rate among White residents was higher than in counties where White residents acknowledged less racial bias. Racial biases have a negative effect on life expectancy among those holding the racial bias, as well as those experiencing the discrimination. It is thought that communities with more racial discrimination also have lower social capital (a social determinant of health), such as trust between neighbors, which negatively impacts health outcomes (15).

In this section, we present Boston-specific data on life expectancy, premature mortality, all-cause mortality rate, and leading causes of death. Disease-specific mortality data are also included within other chapters of this report.

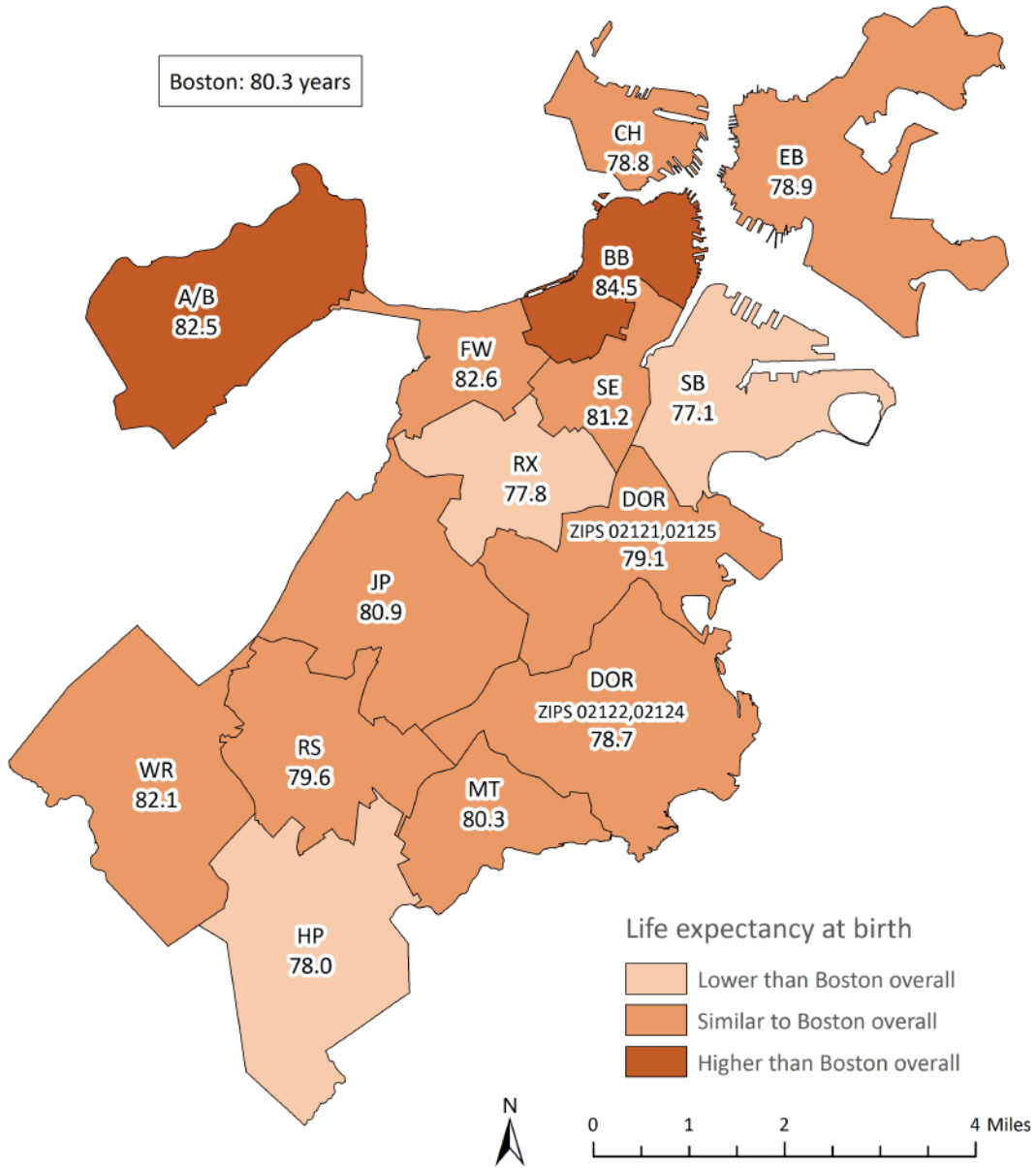
Figure 15.1 Life Expectancy at Birth  
by Selected Indicators, 2015



DATA SOURCE: Boston resident deaths, Massachusetts Department of Public Health (data as of December 2016). Data may be updated as more information becomes available.

In 2015, the life expectancy at birth for a Boston resident was 80.0 years. Life expectancy at birth was 82.8 years for females and 77.0 for males. It was 86.9 years for Asian residents, 77.6 for Black residents, 83.3 for Latino residents, and 79.5 for White residents.

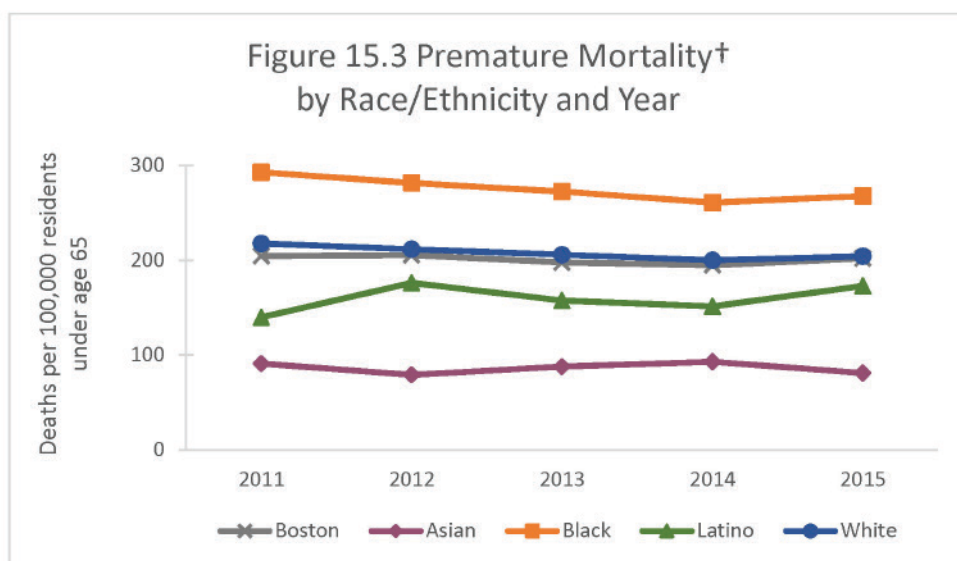
### Figure 15.2 Life Expectancy at Birth by Neighborhood, 2011-2015



NOTE: "BB" includes the Back Bay, Beacon Hill, Downtown, the North End, and the West End.  
 "SE" includes the South End and Chinatown.

DATA SOURCE: Boston resident deaths, Massachusetts Department of Public Health (data as of December 2016). Data may be updated as more information becomes available.

For 2011-2015, life expectancy at birth was higher for Allston/Brighton and Back Bay compared with Boston overall. Life expectancy was lower in Hyde Park, Roxbury, and South Boston compared with Boston overall.



† Age-adjusted rates per 100,000 residents under age 65

NOTE: Beginning in October 2014, the method for collecting race/ethnicity for mortality data changed. Interpret trends with caution.

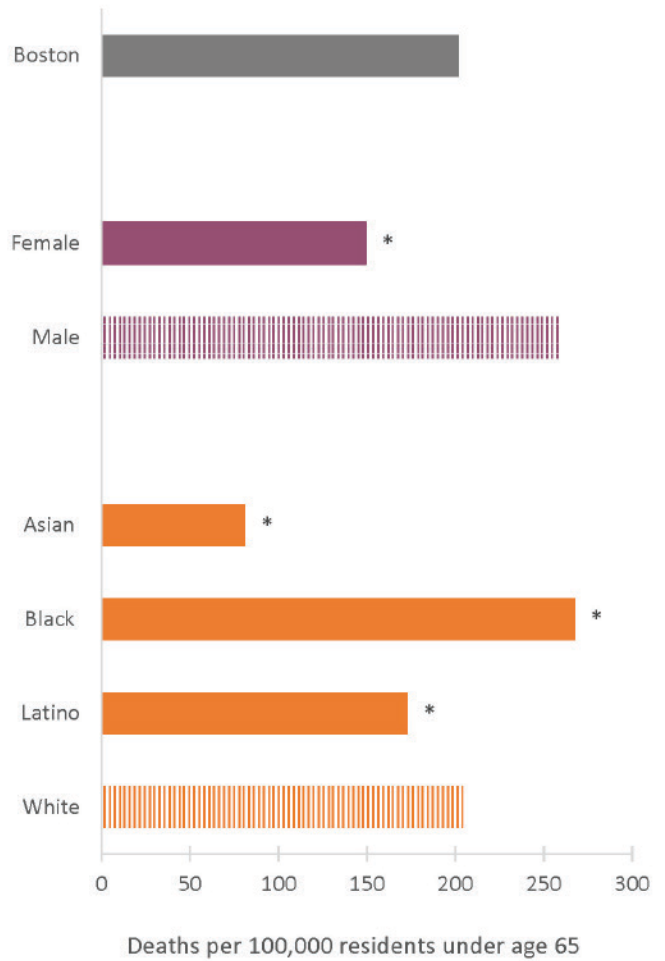
DATA SOURCE: Boston resident deaths, Massachusetts Department of Public Health (data as of December 2016). Data may be updated as more information becomes available.

From 2011-2015, there was no significant change in the premature mortality rate (i.e., deaths among residents under age 65) for Boston overall. This was also true for all racial/ethnic groups presented.

In 2015, the premature mortality rate for Asian residents (81.1 deaths per 100,000 residents under age 65) was 60% lower and the rate for Latino residents (172.8) was 15% lower compared with the rate for White residents (204.1). The rate for Black residents (267.5) was 31% higher than the rate for White residents.

In 2015, the premature mortality rate in Boston was 201.8 deaths per 100,000 residents under age 65. The premature mortality rate was 42% lower for females (149.3) compared with males (259.0). The rate was 60% lower for Asian residents (81.1), 15% lower for Latino residents (172.8), and 31% higher for Black residents (267.5) compared with White residents (204.1).

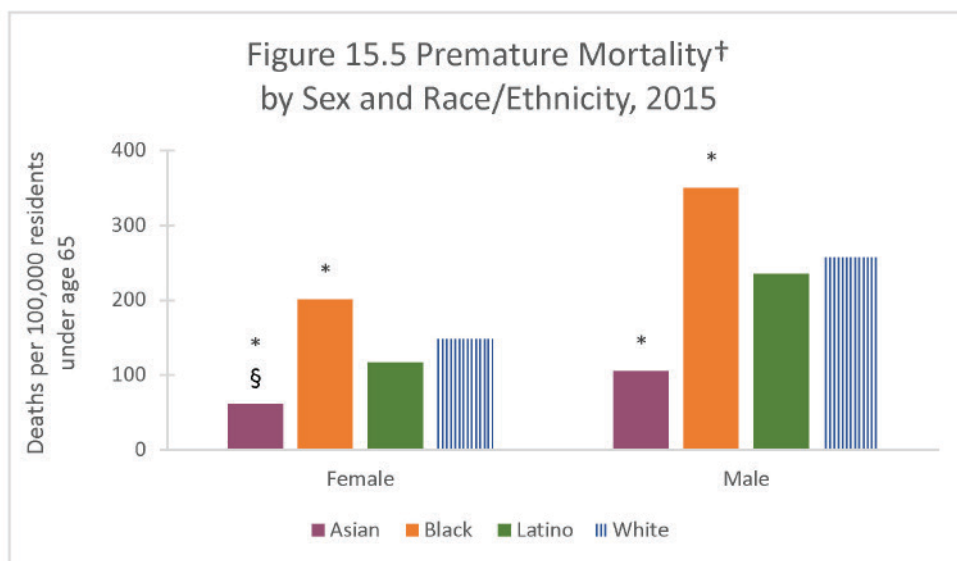
Figure 15.4 Premature Mortality† by Selected Indicators, 2015



\* Statistically significant difference when compared to reference group

† Age-adjusted rates per 100,000 residents under age 65

NOTE: Bars with patterns indicate the reference group within each selected indicator.  
 DATA SOURCE: Boston resident deaths, Massachusetts Department of Public Health (data as of December 2016). Data may be updated as more information becomes available.



\* Statistically significant difference when compared to reference group

† Age-adjusted rates per 100,000 residents under age 65

§ Rates are based on 20 or fewer cases and should be interpreted with caution.

NOTE: Bars with patterns indicate the reference group within each selected indicator.

DATA SOURCE: Boston resident deaths, Massachusetts Department of Public Health (data as of December 2016).

Data may be updated as more information becomes available.

In 2015, the premature mortality rate was 59% lower for Asian females (60.9 deaths per 100,000 residents under age 65) and 36% higher for Black females (200.5) compared with White females (147.9).

The rate was 59% lower for Asian males (105.2) and 36% higher for Black males (350.2) compared with White males (257.0).

**Figure 15.6 Top 5 Leading Causes of Premature Mortality† by Year**

Rank	2011	2012	2013	2014	2015
1	Cancer 288 (55.3)	Cancer 320 (59.6)	Cancer 295 (53.9)	Cancer 247 (44.5)	Cancer 277 (48.4)
2	Heart disease 154 (29.8)	Heart disease 172 (33.1)	Heart disease 149 (27.7)	Accidents 153 (28.5)	Accidents 182 (34.0)
3	Accidents 114 (21.3)	Accidents 110 (20.8)	Accidents 145 (27.5)	Heart disease 136 (25.0)	Heart disease 145 (25.6)
4	Homicide 55 (7.5)	Homicide 49 (6.6)	Chronic liver cirrhosis 36 (6.5)	Homicide 48 (7.3)	Suicide 39 (6.4)
5	Suicide 44 (7.9)	Chronic liver cirrhosis 43 (8.4)	Suicide 35 (6.0)	Diabetes 35 (6.3)	Homicide 35 (4.7)

Cause of death, count  
(rate per 100,000 residents under age 65)

† Age-adjusted rates per 100,000 residents under age 65

NOTE: Rank is based on number of deaths. Both counts and rates are presented.

DATA SOURCE: Boston resident deaths, Massachusetts Department of Public Health (data as of December 2016).

Data may be updated as more information becomes available.

Cancer was the leading cause of premature mortality for Boston residents from 2011 to 2015. Heart disease was the second leading cause of premature mortality from 2011 to 2013, but was replaced by accidents in 2014. Accidents include unintentional drug overdose.

In 2015, unintentional opioid overdoses accounted for 71% of deaths due to accidents for residents under age 65 (11% of all premature mortality) and would rank third if explicitly specified within the ranking scheme. For more information, see Chapter 14: Substance Use Disorders.



Cancer remained the top leading cause of premature mortality for both males and females from 2011 to 2015. Accidents surpassed heart disease as the second leading cause of premature mortality in 2013 for females and in 2014 for males. In 2015, cancer, accidents, and heart disease were the top three leading causes of premature mortality for males and females. For females in 2015, the top five also included chronic lower respiratory diseases and conditions originating in the perinatal period. For males in 2015, homicide and suicide were included in the top five.

In 2015, unintentional opioid overdoses accounted for 73% of deaths due to accidents for females and 70% for males under age 65. This accounted for 9% of all premature mortality for females and 13% for males, and would rank third if explicitly specified within the ranking scheme for both sexes. For more information see Chapter 14: Substance Use Disorders.

**Figure 15.7a Top 5 Leading Causes of Premature Mortality† by Year, Female Residents**

Rank	2011	2012	2013	2014	2015
1	Cancer 139 (51.6)	Cancer 135 (49.0)	Cancer 118 (41.5)	Cancer 113 (39.6)	Cancer 131 (44.6)
2	Heart disease 39 (14.7)	Heart disease 44 (16.9)	Accidents 42 (15.8)	Accidents 39 (14.2)	Accidents 52 (19.6)
3	Accidents 26 (9.8)	Accidents 22 (8.0)	Heart disease 32 (11.6)	Heart disease 38 (13.3)	Heart disease 46 (16.3)
4	Suicide 12 (4.2) §	Chronic liver cirrhosis 15 (5.5) §	Chronic liver cirrhosis 17 (5.7) §	Diabetes 11 (3.9) §	Perinatal 13 (5.6) §
5	Perinatal 10 (4.4) §	Diabetes 10 (3.3) §	Cerebrovascular diseases 12 (4.3) §	Chronic lower respiratory diseases 11 (3.6) §	Chronic lower respiratory diseases 13 (4.8) §

Cause of death, count  
(rate per 100,000 residents under age 65)

**Figure 15.7b Top 5 Leading Causes of Premature Mortality† by Year, Male Residents**

Rank	2011	2012	2013	2014	2015
1	Cancer 149 (59.5)	Cancer 185 (71.5)	Cancer 177 (67.6)	Cancer 134 (50.2)	Cancer 146 (52.8)
2	Heart disease 115 (46.4)	Heart disease 128 (51.0)	Heart disease 117 (45.3)	Accidents 115 (43.6)	Accidents 130 (49.3)
3	Accidents 88 (33.4)	Accidents 88 (34.3)	Accidents 103 (39.8)	Heart disease 98 (37.8)	Heart disease 99 (36.0)
4	Homicide 46 (12.9)	Homicide 43 (11.8)	Suicide 30 (10.1)	Homicide 44 (13.9)	Homicide 32 (8.7)
5	Suicide 32 (11.9)	Chronic liver cirrhosis 28 (11.4)	Homicide 30 (7.9)	Diabetes 24 (9.0)	Suicide 27 (9.4)

Cause of death, count  
(rate per 100,000 residents under age 65)

† Age-adjusted rates per 100,000 residents under age 65

§ Rates are based on 20 or fewer cases and should be interpreted with caution.

NOTE: Rank is based on number of deaths. Both counts and rates are presented.

DATA SOURCE: Boston resident deaths, Massachusetts Department of Public Health (data as of December 2016). Data may be updated as more information becomes available.

Figure 15.8 Top 5 Leading Causes of Premature Mortality†  
by Race/Ethnicity, 2011-2015

Rank	Asian	Black	Latino	White
1	Cancer 93 (40.0)	Cancer 475 (68.1)	Cancer 172 (39.8)	Cancer 660 (51.5)
2	Heart disease 19 (8.4) §	Heart disease 282 (41.9)	Accidents 111 (23.1)	Accidents 406 (34.0)
3	Suicide 14 (4.9) §	Accidents 162 (25.6)	Heart disease 70 (16.6)	Heart disease 379 (30.6)
4	Accidents 13 (5.6) §	Homicide 138 (20.6)	Homicide 58 (9.1)	Suicide 106 (8.4)
5	Cerebrovascular diseases 6 (2.7) §	Diabetes 67 (9.5)	Perinatal 34 (5.5)	Chronic liver cirrhosis 86 (7.1)
Cause of death, count (rate per 100,000 residents under age 65)				

† 5-year average annual age-adjusted rates per 100,000 residents under age 65

§ Rates are based on 20 or fewer cases and should be interpreted with caution.

NOTE: Rank is based on number of deaths. Both counts and rates are presented.

DATA SOURCE: Boston resident deaths, Massachusetts Department of Public Health (data as of December 2016).

Data may be updated as more information becomes available.

For 2011-2015, cancer was the leading cause of premature mortality for all racial/ethnic groups presented. The second leading cause was heart disease for Asian and Black residents, and accidents for Latino and White residents. Cancer, heart disease, and accidents were in the top five for all racial/ethnic groups, though in various orders. Other top causes of premature mortality included suicide and cerebrovascular diseases for Asian residents, homicide and diabetes for Black residents, homicide and conditions originating in the perinatal period for Latino residents, and suicide and chronic liver cirrhosis for White residents.

Unintentional opioid overdoses accounted for 41% of deaths due to accidents for Black residents, 60% for Latino residents, and 70% for White residents under age 65. This accounted for 4% of all premature mortality for Black residents, 5% for Latino residents, and 11% for White residents. For more information see Chapter 14: Substance Use Disorders.

For 2011-2015, cancer was the leading cause of premature mortality for females and males of all racial/ethnic groups. Heart disease was the second leading cause for Black and Latino females, and for Asian, Black, and White males. Accidents were the second leading cause of premature mortality for White females and Latino males.

For 2011-2015, unintentional opioid overdoses accounted for 49% of deaths due to accidents for Black female residents, 45% for Latino female residents, and 71% for White female residents under age 65. This accounted for 4% of all premature mortality for Black female residents, 4% for Latino female residents, and 12% for White female residents. Unintentional opioid overdoses accounted for 37% of deaths due to accidents for Black male residents, 63% for Latino male residents, and 69% for White male residents under age 65. This accounted for 4% of all premature mortality for Black male residents, 4% for Latino male residents, and 12% for White male residents. For more information see Chapter 14: Substance Use Disorders.

Figure 15.9a Top 5 Leading Causes of Premature Mortality†, 2011-2015, Female Residents by Race/Ethnicity

Rank	Asian	Black	Latino	White
1	Cancer 41 (32.7)	Cancer 229 (59.3)	Cancer 79 (33.6)	Cancer 271 (44.0)
2	‡	Heart disease 93 (24.6)	Heart disease 25 (11.1)	Accidents 105 (19.2)
3	‡	Accidents 51 (14.7)	Accidents 22 (8.3)	Heart disease 77 (13.3)
4	‡	Diabetes 25 (6.3)	Chronic liver cirrhosis 12 (5.3) §	Chronic lower respiratory diseases 28 (4.4)
5	‡	Perinatal 23 (9.3)	Perinatal 12 (3.9) §	Suicide 27 (5.3)
Cause of death, count (rate per 100,000 residents under age 65)				

Figure 15.9b Top 5 Leading Causes of Premature Mortality†, 2011-2015, Male Residents by Race/Ethnicity

Rank	Asian	Black	Latino	White
1	Cancer 52 (48.6)	Cancer 246 (79.3)	Cancer 93 (47.6)	Cancer 389 (59.0)
2	Heart disease 17 (16.2) §	Heart disease 189 (64.0)	Accidents 89 (40.1)	Heart disease 302 (47.1)
3	Accidents 12 (11.0) §	Homicide 124 (40.2)	Homicide 51 (16.0)	Accidents 301 (47.5)
4	Suicide 10 (7.5) §	Accidents 111 (38.7)	Heart disease 45 (23.3)	Suicide 79 (11.5)
5	‡	Diabetes 42 (13.8)	Perinatal 22 (7.1)	Chronic liver cirrhosis 59 (9.5)
Cause of death, count (rate per 100,000 residents under age 65)				

† 5-year average annual age-adjusted rates per 100,000 residents under age 65

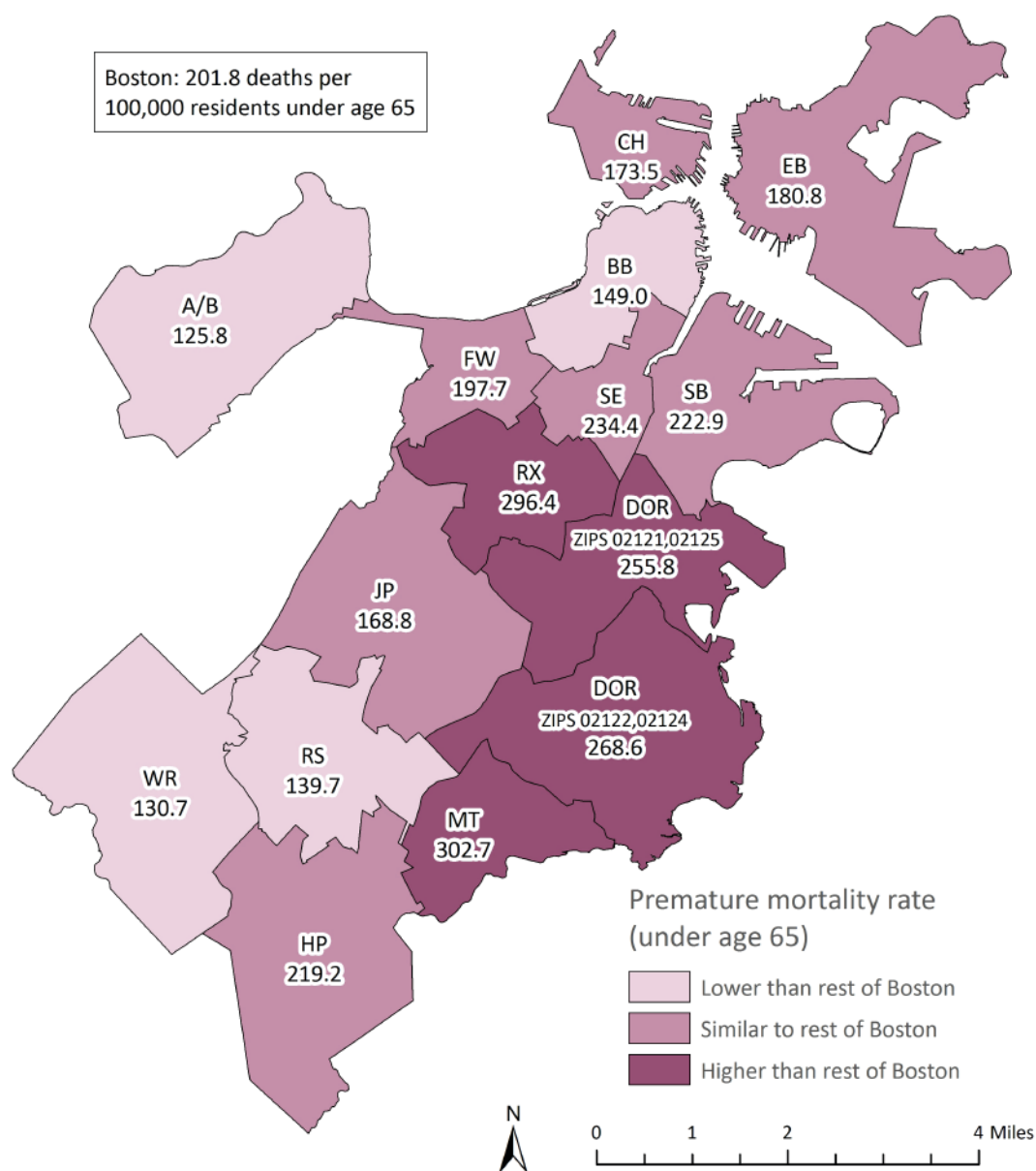
‡ Rates not presented due to a small number of cases

§ Rates are based on 20 or fewer cases and should be interpreted with caution.

NOTE: Rank is based on number of deaths. Both counts and rates are presented.

DATA SOURCE: Boston resident deaths, Massachusetts Department of Public Health (data as of December 2016). Data may be updated as more information becomes available.

Figure 15.10 Premature Mortality†  
by Neighborhood, 2015



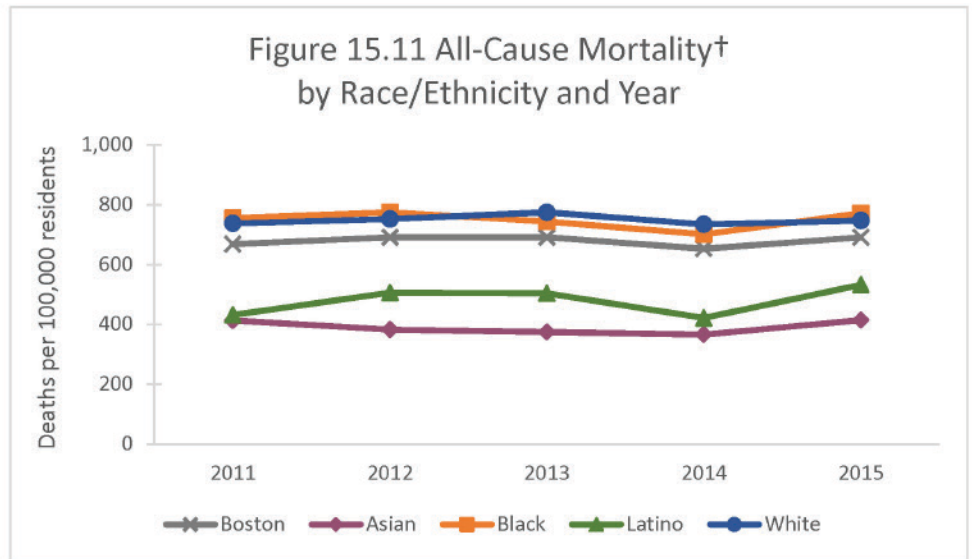
† Age-adjusted rates per 100,000 residents under age 65

NOTE: "BB" includes the Back Bay, Beacon Hill, Downtown, the North End, and the West End.  
"SE" includes the South End and Chinatown.

DATA SOURCE: Boston resident deaths, Massachusetts Department of Public Health (data as of December 2016). Data may be updated as more information becomes available.

In 2015, the premature mortality rate was higher in Dorchester (zip codes 02121, 02125), Dorchester (zip codes 02122, 02124), Mattapan, and Roxbury compared with the rest of Boston. The rate was lower in Allston/Brighton, Back Bay, Roslindale, and West Roxbury compared with the rest of Boston.

From 2011-2015, there was no significant change in the all-cause mortality rate for any of the racial/ethnic groups presented. In 2015, the rate for Asian residents (413.9 deaths per 100,000 residents) was 45% lower and the rate for Latino residents (532.2) was 29% lower when compared with the rate for White residents (747.2).

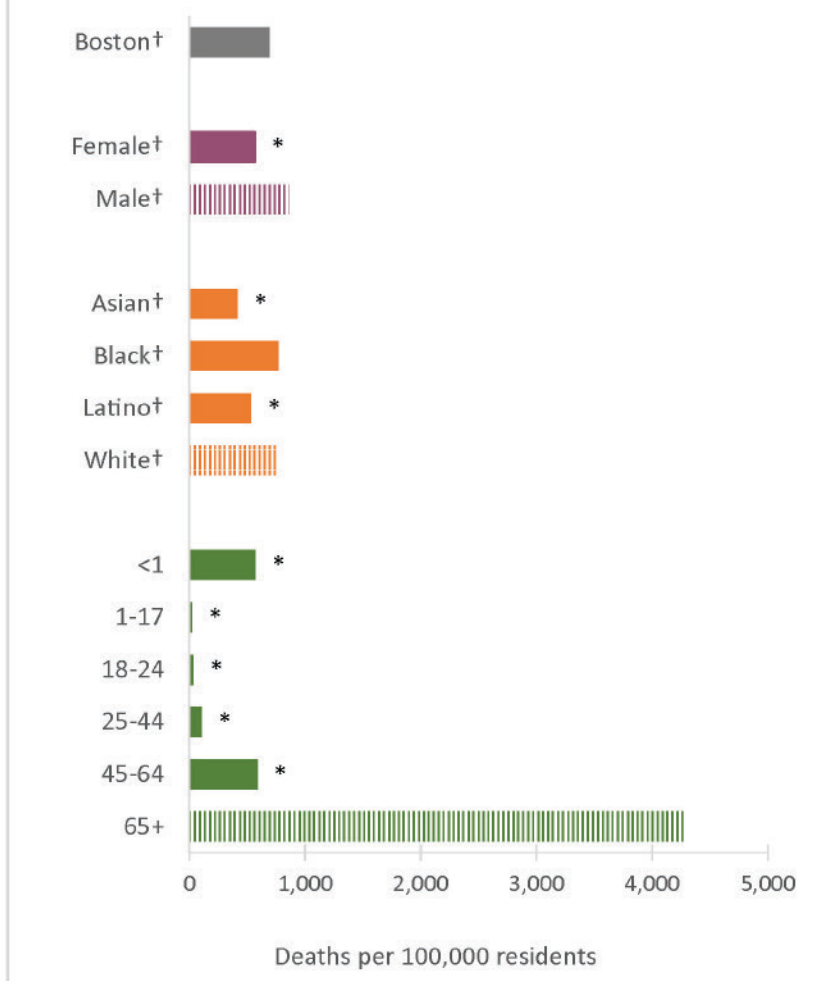


† Age-adjusted rates per 100,000 residents

NOTE: Beginning in October 2014, the method for collecting race/ethnicity for mortality data changed. Interpret trends with caution.

DATA SOURCE: Boston resident deaths, Massachusetts Department of Public Health (data as of December 2016). Data may be updated as more information becomes available.

Figure 15.12 All-Cause Mortality  
by Selected Indicators, 2015



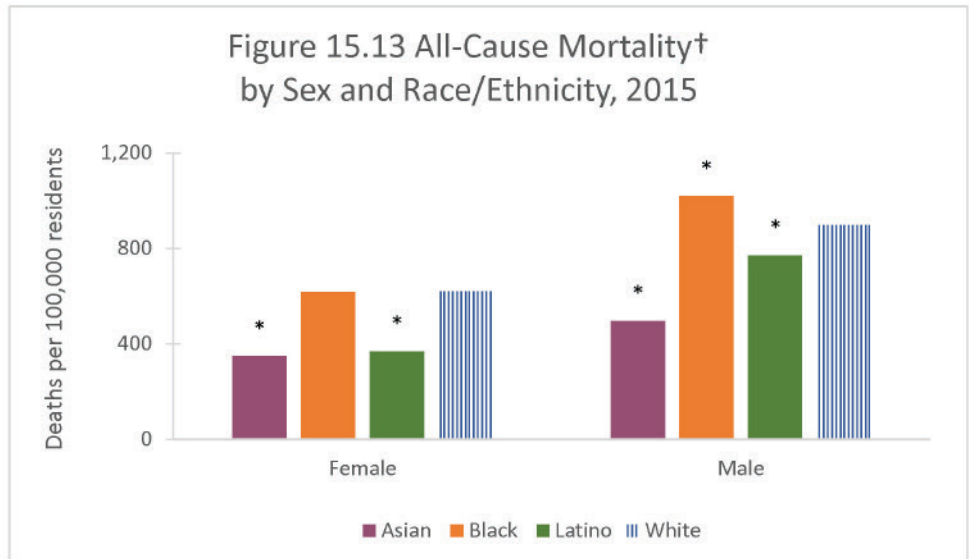
\* Statistically significant difference when compared to reference group  
† Age-adjusted rates per 100,000 residents

NOTE: Bars with patterns indicate the reference group within each selected indicator.  
DATA SOURCE: Boston resident deaths, Massachusetts Department of Public Health (data as of December 2016). Data may be updated as more information becomes available.

In 2015, the all-cause mortality rate in Boston was 690.8 deaths per 100,000 residents. The rate for females (565.3) was 34% lower than the rate for males (859.2). The rate was 45% lower for Asian residents (413.9) and 29% lower for Latino residents (532.2) compared with White residents (747.2). The mortality rate was lower for all age groups compared with those ages 65 and older.

In 2015, the all-cause mortality rate was 44% lower for Asian female residents (348.6 deaths per 100,000 residents) and 40% lower for Latino females (369.4) compared with White females (620.1).

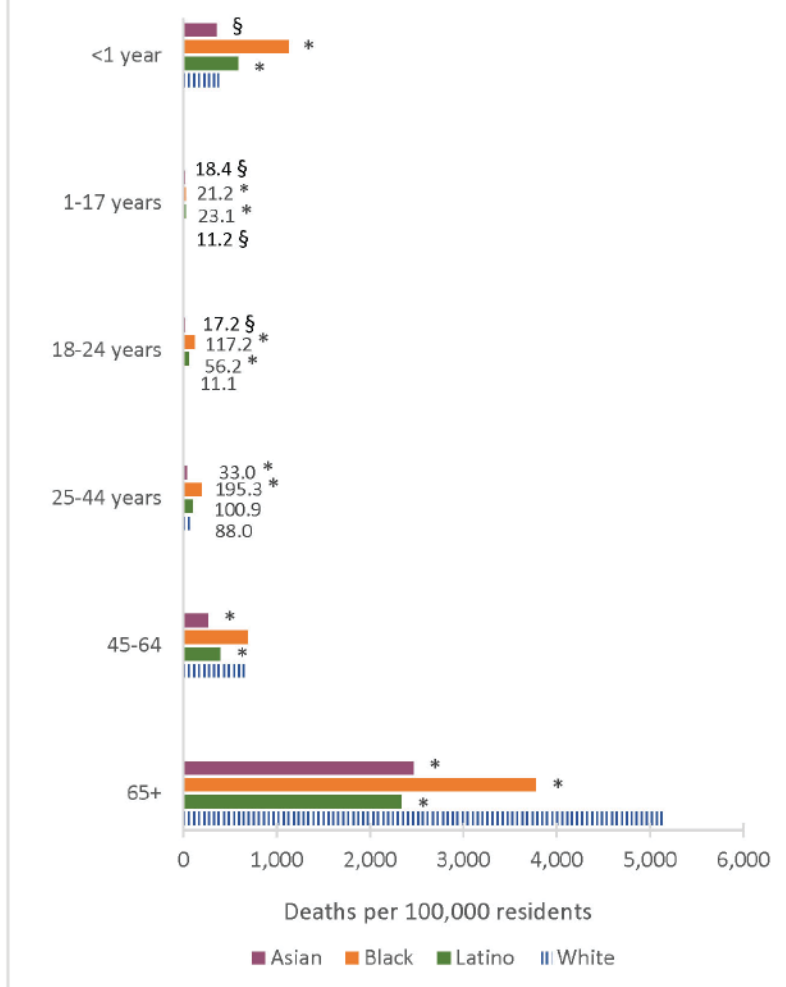
The rate was 45% lower for Asian male residents (497.2), 14% lower for Latino males (771.5), and 13% higher for Black males (1019.5) compared with White males (899.8).



\* Statistically significant difference when compared to reference group  
 † Age-adjusted rates per 100,000 residents

NOTE: Bars with patterns indicate the reference group within each selected indicator.  
 DATA SOURCE: Boston resident deaths, Massachusetts Department of Public Health (data as of December 2016).  
 Data may be updated as more information becomes available.

Figure 15.14 All-Cause Mortality<sup>1</sup>  
by Age and Race/Ethnicity, 2011-2015



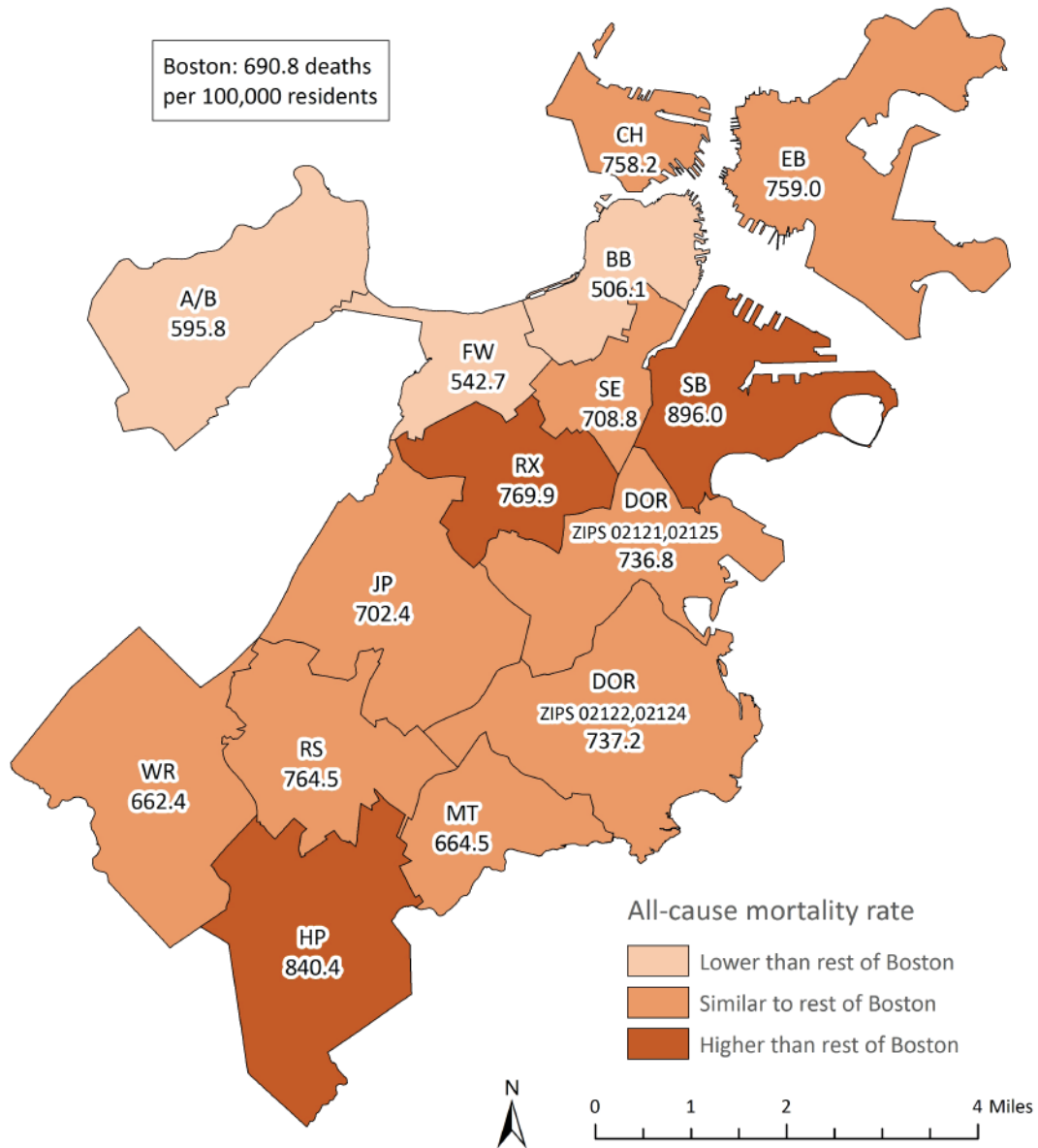
\* Statistically significant difference when compared to reference group  
 § Rates are based on 20 or fewer cases and should be interpreted with caution.  
<sup>1</sup> 5-year average annual rates per 100,000 residents

NOTE: Bars with patterns indicate the reference group within each selected indicator.  
 DATA SOURCE: Boston resident deaths, Massachusetts Department of Public Health (data as of December 2016). Data may be updated as more information becomes available.

During 2011-2015, the mortality rate varied by race/ethnicity within age group. For Asian residents, the age-specific mortality rate was lower compared with White residents for the following age groups: 25-44 (33.0 vs. 88.0 deaths per 100,000 residents), 45-64 (262.4 vs. 661.6), and 65 and older (2,464.7 vs. 5,139.6). For Black residents, the rate was higher than that of White residents for the following age groups: under 1 (1,131.9 vs. 382.4), 18-24 (117.2 vs. 11.1), and 25-44 (195.3 vs. 88.0). For Black residents ages 18-24, the mortality rate was 10.6 times that of White residents. Among residents ages 65 and older, the rate for Black residents (3,777.6) was lower than the rate for White residents (5,139.6). For Latino residents, the rate was higher for those under 1 (583.3 vs. 382.4), 1-17 (23.1 vs. 11.2), and 18-24 (56.2 vs. 11.1) and lower for those 45-64 (393.2 vs. 661.6) and 65 and older (2,334.9 vs. 5,139.6) compared with White residents.



### Figure 15.15 All-Cause Mortality† by Neighborhood, 2015



† Age-adjusted rates per 100,000 residents

NOTE: "BB" includes the Back Bay, Beacon Hill, Downtown, the North End, and the West End.  
"SE" includes the South End and Chinatown.

DATA SOURCE: Boston resident deaths, Massachusetts Department of Public Health (data as of December 2016). Data may be updated as more information becomes available.

In 2015, the all-cause mortality rate was higher in Hyde Park, Roxbury, and South Boston compared with the rest of Boston. The rate was lower in Allston/Brighton, Back Bay, and Fenway compared with the rest of Boston.

Figure 15.16 Top 5 Leading Causes of Mortality† by Year

Rate	2011	2012	2013	2014	2015
1	Cancer 906 (171.5)	Cancer 999 (187.3)	Cancer 943 (175.7)	Cancer 824 (153.1)	Cancer 889 (162.6)
2	Heart disease 693 (129.2)	Heart disease 710 (131.8)	Heart disease 724 (133.0)	Heart disease 687 (124.6)	Heart disease 743 (134.5)
3	Accidents 177 (30.7)	Cerebrovascular diseases 184 (34.4)	Accidents 198 (34.3)	Accidents 214 (36.4)	Accidents 245 (41.7)
4	Chronic lower respiratory diseases 147 (28.8)	Accidents 178 (31.3)	Chronic lower respiratory diseases 160 (30.4)	Cerebrovascular diseases 161 (29.8)	Cerebrovascular diseases 158 (28.9)
5	Cerebrovascular diseases 139 (26.1)	Chronic lower respiratory diseases 123 (23.5)	Cerebrovascular diseases 143 (26.6)	Chronic lower respiratory diseases 137 (25.6)	Chronic lower respiratory diseases 147 (27.9)
Cause of death, count (rate per 100,000 residents)					

† Age-adjusted rates per 100,000 residents

NOTE: Rank is based on number of deaths. Both counts and rates are presented.

DATA SOURCE: Boston resident deaths, Massachusetts Department of Public Health (data as of December 2016).

Data may be updated as more information becomes available.

From 2011 to 2015, the top two leading causes of mortality in Boston were cancer and heart disease. In 2015, these two causes were followed by accidents, cerebrovascular diseases, and chronic lower respiratory diseases.

In 2015, unintentional opioid overdose mortality accounted for 54% of deaths due to accidents (3% of all mortality). For more information see Chapter 14: Substance Use Disorders.

## Cancer

Healthy People 2020 Target: 161.4 deaths per 100,000 population

U.S. 2015: 158.5

MA 2015: 152.9

Boston 2015: 162.6

## Cerebrovascular diseases

Healthy People 2020 Target: 34.8 deaths per 100,000 population

US 2015: 37.6

MA 2015: 28.4

Boston 2015: 28.9

Cancer and heart disease remained the top two leading causes of mortality for both males and females in Boston from 2011 to 2015. In 2015, the top five leading causes of death for females in order were: cancer, heart disease, cerebrovascular diseases, accidents, and chronic lower respiratory diseases. The top five for males were comprised of the same causes of death but in a different order: cancer, heart disease, accidents, chronic lower respiratory diseases, and cerebrovascular diseases.

In 2015, unintentional opioid overdoses accounted for 43% of deaths due to accidents for females and 59% for males. This accounted for 2% of all mortality for females and 5% for males and would rank tenth for females and third for males if explicitly specified within the ranking scheme. For more information see Chapter 14: Substance Use Disorders.

Figure 15.17a Top 5 Leading Causes of Mortality† by Year, Female Residents

Rank	2011	2012	2013	2014	2015
1	Cancer 429 (138.5)	Cancer 495 (160.0)	Cancer 459 (146.9)	Cancer 401 (128.5)	Cancer 439 (139.3)
2	Heart disease 319 (94.3)	Heart disease 349 (104.9)	Heart disease 365 (106.2)	Heart disease 329 (93.2)	Heart disease 349 (102.6)
3	Chronic lower respiratory diseases 88 (28.2)	Cerebrovascular diseases 114 (33.4)	Cerebrovascular diseases 95 (28.0)	Cerebrovascular diseases 91 (27.4)	Cerebrovascular diseases 92 (26.8)
4	Cerebrovascular diseases 79 (23.0)	Alzheimer's disease 82 (23.1)	Chronic lower respiratory diseases 92 (29.4)	Alzheimer's disease 76 (21.4)	Accidents 88 (28.2)
5	Alzheimer's disease 75 (20.4)	Chronic lower respiratory diseases 74 (23.2)	Alzheimer's disease 87 (24.4)	Accidents 66 (20.6)	Chronic lower respiratory diseases 76 (24.2)
Cause of death, count (rate per 100,000 residents)					

Figure 15.17b Top 5 Leading Causes of Mortality† by Year, Male Residents

Rate	2011	2012	2013	2014	2015
1	Cancer 477 (223.1)	Cancer 504 (227.7)	Cancer 484 (216.9)	Cancer 423 (188.6)	Cancer 450 (197.0)
2	Heart disease 374 (178.6)	Heart disease 361 (166.9)	Heart disease 359 (163.1)	Heart disease 358 (166.9)	Heart disease 394 (179.9)
3	Accidents 114 (42.9)	Accidents 118 (45.8)	Accidents 124 (45.5)	Accidents 148 (55.9)	Accidents 157 (56.7)
4	Cerebrovascular diseases 60 (29.1)	Cerebrovascular diseases 70 (34.3)	Chronic lower respiratory diseases 68 (32.8)	Chronic lower respiratory diseases 77 (36.1)	Chronic lower respiratory diseases 71 (33.8)
5	Chronic lower respiratory diseases 59 (30.2)	Diabetes 57 (26.0)	Diabetes 55 (24.8)	Cerebrovascular diseases 70 (33.0)	Cerebrovascular diseases 66 (31.1)
Cause of death, count (rate per 100,000 residents)					

† Age-adjusted rates per 100,000 residents

NOTE: Rank is based on number of deaths. Both counts and rates are presented.

DATA SOURCE: Boston resident deaths, Massachusetts Department of Public Health (data as of December 2016). Data may be updated as more information becomes available.

Figure 15.18 Top 5 Leading Causes of Mortality†  
by Race/Ethnicity, 2011-2015

Rank	Asian	Black	Latino	White
1	Cancer 298 (119.6)	Cancer 1251 (191.8)	Cancer 361 (117.7)	Cancer 2582 (184.3)
2	Heart disease 142 (58.5)	Heart disease 861 (137.1)	Heart disease 215 (86.2)	Heart disease 2298 (150.0)
3	Cerebrovascular diseases 51 (21.0)	Cerebrovascular diseases 224 (37.2)	Accidents 119 (23.8)	Accidents 625 (44.3)
4	Alzheimer's disease 48 (20.0)	Diabetes 222 (35.5)	Homicide 59 (8.3)	Chronic lower respiratory diseases 494 (34.5)
5	Chronic lower respiratory diseases 42 (17.2)	Accidents 212 (31.1)	Cerebrovascular diseases 49 (19.3)	Cerebrovascular diseases 446 (28.6)
Cause of death, count (rate per 100,000 residents)				

† 5-year average annual age-adjusted rates per 100,000 residents

NOTE: Rank is based on number of deaths. Both counts and rates are presented.

DATA SOURCE: Boston resident deaths, Massachusetts Department of Public Health (data as of December 2016).

Data may be updated as more information becomes available.

For 2011-2015, cancer and heart disease were the top two leading causes of mortality for Boston residents of all racial/ethnic groups presented. Alzheimer's disease was a leading cause of death that ranked in the top five only for Asian residents, as was the case with diabetes for Black residents and homicide for Latino residents.

For 2011-2015, unintentional opioid overdoses accounted for 31% of deaths due to accidents for Black residents, 55% for Latino residents, and 46% for White residents. This accounted for 1% of all mortality for Black residents, 4% for Latino residents, and 3% for White residents. For more information see Chapter 14: Substance Use Disorders.

For 2011-2015, the leading cause of death for infants under 1 year of age in Boston was due to conditions originating in the perinatal period. The leading cause of death for children ages 1-9 and adults ages 25-44 was accidents, while the leading cause for those ages 10-17 and 18-24 was homicide. The leading cause of death for adults ages 45-64 and 65 and older was cancer. Cancer was among the top four leading causes of death for all age groups except infants under 1 year of age. Accidents was one of the top five leading causes of death for all age groups except those under 1 year of age and those ages 65 and older.

For 2011-2015, unintentional opioid overdoses accounted for 38% of deaths due to accidents for residents ages 18-24, 72% for residents ages 25-44, and 55% for residents ages 45-64. This accounted for 8% of all mortality for residents ages 18-24, 21% for residents ages 25-44, and 5% for residents ages 45-64. For more information see Chapter 14: Substance Use Disorders.

Figure 15.19 Top 5 Leading Causes of Mortality<sup>1</sup> by Age, 2011-2015

Rank	<1	1-9	10-17	18-24	25-44	45-64	65+
1	Perinatal 126 (345.2)	Accidents 8 (3.2) §	Homicide 12 (5.6) §	Homicide 96 (15.1)	Accidents 303 (29.7)	Cancer 1253 (188.6)	Cancer 3134 (998.0)
2	Congenital malformations 33 (90.4)	Cancer 7 (2.8) §	Cancer 7 (3.3) §	Accidents 45 (7.1)	Cancer 154 (15.1)	Heart disease 642 (96.6)	Heart disease 2801 (891.9)
3	‡	‡	Accidents 5 (2.3) §	Suicide 26 (4.1)	Heart disease 106 (10.4)	Accidents 342 (51.5)	Cerebrovascular diseases 666 (212.1)
4	‡	‡	Suicide 5 (2.3) §	Cancer 6 (0.9) §	Homicide 95 (9.3)	Chronic liver cirrhosis 133 (20.0)	Chronic lower respiratory diseases 599 (190.7)
5	‡	‡	‡	Congenital malformations 6 (0.9) §	Suicide 76 (7.5)	Diabetes 130 (19.6)	Alzheimer's disease 505 (160.8)
Cause of death, count (rate per 100,000 residents)							

‡ Rates not presented due to a small number of cases

§ Rates are based on 20 or fewer cases and should be interpreted with caution

<sup>1</sup> 5-year average annual rates per 100,000 residents

NOTE: Rank is based on number of deaths. Both counts and rates are presented.

DATA SOURCE: Boston resident deaths, Massachusetts Department of Public Health (data as of December 2016).

Data may be updated as more information becomes available.

## Summary

Life expectancy for a Boston resident was approximately 80 years in 2015. Consistent with national data, life expectancy was higher for female than male residents in 2015. Across race/ethnicity, life expectancy was highest for Asian residents and lowest for Black residents in Boston.

Inequities for premature mortality across categories of sex and race/ethnicity were similar to those found for life expectancy. Higher premature mortality rates in 2015 were observed in male residents in comparison with female residents, and Black residents in comparison with White residents. Lower premature mortality rates were observed in Asian and Latino residents in comparison with White residents. In 2014, accidents replaced heart disease as the second leading cause of premature mortality. In 2015, unintentional opioid overdose accounted for 71% of mortality from accidents. Compared to the rest of Boston, elevated premature mortality rates were observed in the neighborhoods of Dorchester (zip codes 02121, 02125), Dorchester (zip codes 02122, 02124), Mattapan, and Roxbury.

The all-cause mortality rate for Boston in 2015 was 690.8 deaths per 100,000 residents, and inequities were found across categories of sex, race/ethnicity, and age. Consistent with the findings observed for life expectancy, the all-cause mortality rate was higher in male residents in comparison with female residents. Among residents in age categories younger than 25 years, the all-cause mortality rates were also generally higher in Black and Latino than White residents. The reverse pattern was observed among residents ages 65 years and older by race/ethnicity. While the all-cause mortality was lower for Asian than White residents among residents in age categories older than 24 years, no differences were found between Asian and White residents in younger age categories.

From 2011 to 2015, the top two leading causes of death for Boston residents were cancer and heart disease, but there was variation in the subsequent leading causes by sex and race/ethnicity. For example, cerebrovascular diseases were the third leading cause of death for female residents and for Asian and Black residents, while accidents was the third leading cause of death for male residents and for Latino and White residents. More variation was found in the leading causes of death across age. With exception to ages 10-24 years, with homicide as the leading cause of death, the leading causes observed for ages < 1 year (conditions originating in the perinatal period), 1-9 years (accidents), 25-44 years (accidents), and 45 years and over (cancer) were generally consistent with national data. We know that life expectancy and mortality are impacted by the social determinants of health. The racial/ethnic differences in death rates both nationally and among Boston residents highlight the importance of efforts to examine health delivery and public systems (e.g. schools, employment, transportation, education, and housing) with a health equity focus.

# Death

## Top 5 leading causes of death in 2015 among Boston residents



Cancer



Heart disease



Accidents including drug overdose deaths



Cerebrovascular diseases



Chronic lower respiratory diseases

## Mortality rate for those under age 65 in 2015



\*Rate per 100,000 residents under age 65

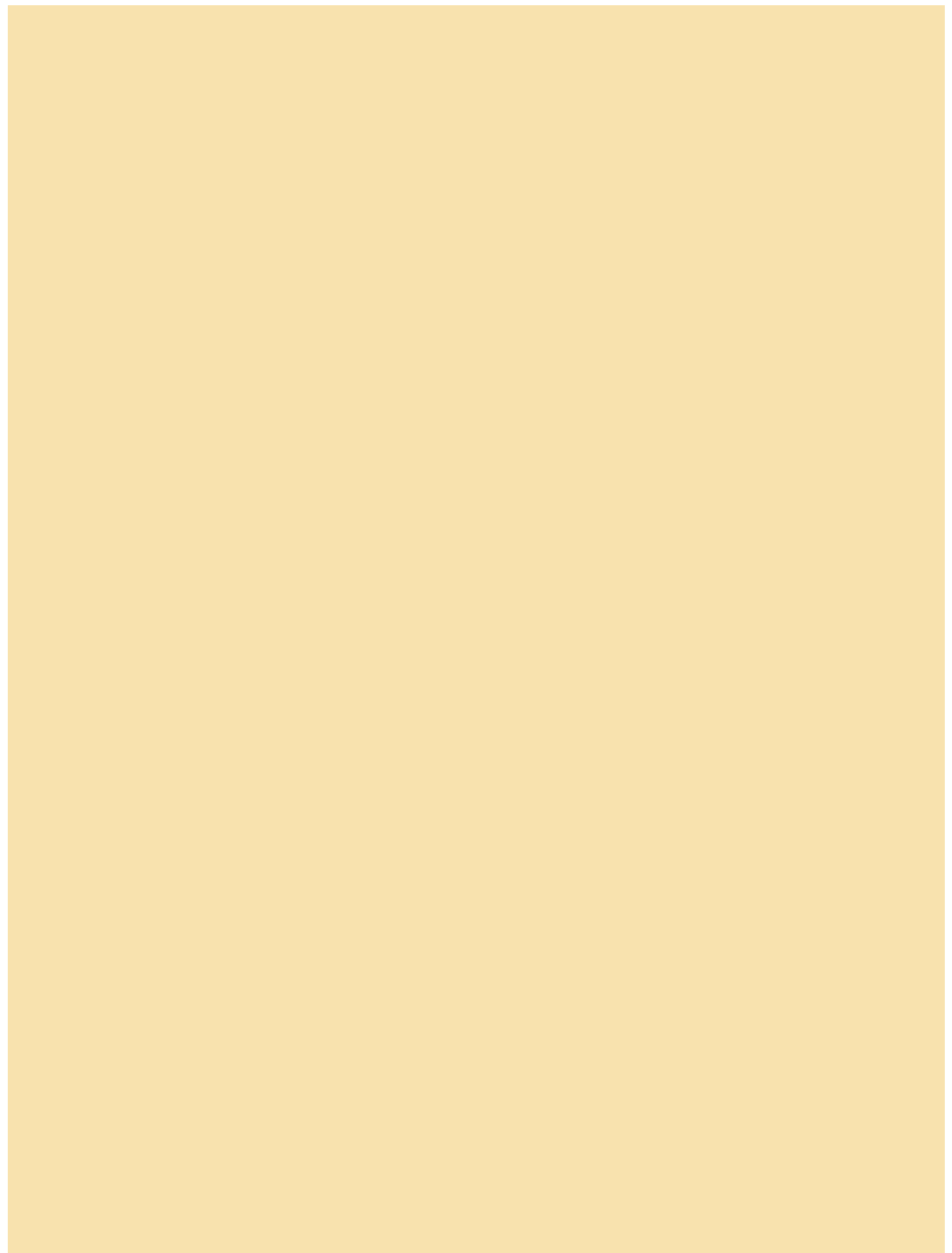


For 2011-2015, one of every five deaths among residents ages 25-44 was caused by an unintentional opioid overdose.

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# Technical Notes

*This section provides the reader with definitions of terms commonly used throughout this report.*

**Asbestos hazard/violation:** While it is not against the law to have asbestos in good condition present in a building, defective or damaged asbestos materials are a public health hazard which must be either repaired or removed by a licensed contractor working under a permit. A hazard/violation occurs if unsafe conditions, illegal removal, or contractor non-compliance for asbestos is identified by the Environmental and Occupational Health Division during an initial complaint inspection or compliance check of an active permitted asbestos abatement project.

**Adolescent births:** In this report, adolescent births are considered births to females ages 15-19.

**Age-adjusted rate (AAR):** Age-adjustment is a statistical process applied to rates of disease and death which allows populations or groups with different age structures to be compared. The occurrence of disease and death is often associated with age and the age distribution between populations may differ considerably. Thus, AARs are helpful when comparing rates over time and between groups or populations.

An AAR is derived by: 1) calculating age-specific rates (ASRs) across all age groups, 2) multiplying the ASRs by age-specific weights that come from proportion of the 2000 U.S. standard population within each age group, 3) summing the adjusted age-specific rates. In Health of Boston 2016-2017 AARs are mainly used for the presentation of death, hospitalization, and emergency department visit data. All AARs are based on a standard population distribution that covers all ages except for AARs that pertain to substance misuse data and premature mortality rates. Substance misuse AARs are based on a standard population distribution of individuals ages 12 and older, and premature mortality AARs are based on a standard population distribution of individuals under age 65.

**Age specific rate (ASR):** Age-specific rates (ASRs) are a type of crude rate limited to a particular age group within a population (e.g. 15-24-year-old females). ASRs enable the comparison of event frequency between different age groups. The calculation for an ASR is the same as for a crude rate.

**Age-specific birth rate:** The number of live births to women in an age group divided by the female population of that age group, expressed per 1,000 females in that age group.

**Alcohol misuse mortality:** Death induced by alcohol use/misuse, such as liver disease due to alcohol consumption, and accidental alcohol overdose. In addition to excluding suicide determinations, this category excludes deaths indirectly due to alcohol use, such as deaths due to injuries occurring while intoxicated or deaths caused by another person who was intoxicated. The alcohol-misuse related death code definition is from National Vital Statistics Reports, Vol. 58, No. 19, May 20, 2010 (page 120). In the report, alcohol misuse mortality was identified among decedents with either alcohol or drug misuse identified as underlying (i.e., primary) cause and any of the following ICD-10 codes subsequently identified across any of up to ten causes (i.e., underlying and associate): E24.4, F10, G31.2, G62.1, G72.1, I42.6, K29.2, K70, K85.2, K86.0, R78.0, X45, and Y15.

**Alzheimer's disease:** A degenerative brain disease that is progressive, irreversible and ultimately fatal. It affects memory, thinking, and language skills by slowly destroying them. Individuals with Alzheimer's disease eventually also have behavioral problems and an inability to perform normal daily activities. In this report, ICD-10 codes G30, G30.0, G30.1, G30.8, and G30.9 are used to identify deaths from Alzheimer's disease for analysis.

**Asian:** For the purposes of analysis in this report, Asian residents are all persons self-identified as Asian or Native Hawaiian or Other Pacific Islander (e.g., Chinese, Japanese, Samoan, Cambodian, Vietnamese, Asian Indian, and Filipino) who do not also identify as Latino.

**Asthma:** Asthma is a chronic inflammatory condition defined by sudden periodic attacks of difficulty in breathing accompanied by wheezing caused by a spasm of the bronchial tubes. Hospitalizations and emergency department visits in this report were identified through the Acute Hospital Case Mix Databases from the Massachusetts Center for Health Information and Analysis. ICD-9-CM code 493 was used to identify asthma-related cases.

**Binge drinking:** A pattern of alcohol consumption that brings the blood alcohol concentration (BAC) level to 0.08% or more. This pattern of drinking usually corresponds to 5 or more drinks on a single occasion for men or 4 or more drinks on a single occasion for women, generally within about 2 hours.

**Birth weight:** The weight of an infant at the time of delivery. It may be recorded in either grams or pounds/ounces. If recorded in pounds/ounces, it is converted to grams for use in this report based on the following formula: 1 pound = 453.6 grams; 1,000 grams = 2 pounds and 3 ounces.

**Black:** For the purposes of analysis in this report, Black residents are all persons self-identified as Black (e.g., African American, Haitian, West Indian) who do not also identify as Latino.

**Blood-lead level:** The amount of lead in micrograms per deciliter of blood, detected during finger stick or venous blood draw tests. Previously, the blood lead level of concern was defined as lead 10 or greater micrograms per deciliter of blood ( $\geq 10 \mu\text{g/dL}$ ). In May 2012, the Centers for Disease Control and Prevention established a new reference level defined as lead 5 or greater micrograms per deciliter of blood ( $\geq 5 \mu\text{g/dL}$ ). The new lower value means that more children will likely be identified as having lead exposure allowing parents, doctors, public health officials, and communities to take action earlier to reduce the child's future exposure to lead.

**Body mass index (BMI):** A measure of the appropriateness of weight in relation to height and allows for categorization of people into weight classes. BMI is calculated by dividing a person's weight in kilograms by his or her height in meters squared ( $\text{kg/m}^2$ ). This calculation is used to screen and monitor populations to detect risks of health or nutritional disorders. BMI is used differently with children and teenagers (ages 2-19) than with adults (ages 20+) and is plotted according to age- and sex-specific charts.

For children and teenagers, BMI-for-age weight status categories and the corresponding percentiles are shown in the following table.

Weight Status Category	Percentile Range
Underweight	Less than the 5th percentile
Healthy weight	5th percentile to less than the 85th percentile
Overweight	85th to less than the 95th percentile
Obese	Equal to or greater than the 95th percentile

The BMI cut points for adults are as follows:

Weight Status Category	BMI
Underweight	Less than 18.5
Healthy weight	18.5 to 24.9
Overweight	25.0 to 29.9
Obese	30.0 or more

**Cancer:** A group of diseases in which abnormal cells divide without control and can spread to other parts of the body. Cancer is a leading cause of death in the United States. According to the National Cancer Institute, there are more than 100 different types of cancer. In this report, ICD 10 codes C00-C97 are used to identify cancer deaths for analysis.

**Carbon monoxide poisoning:** Carbon monoxide (CO) is a colorless, odorless, nonirritating gas that is produced through the incomplete combustion of hydrocarbons. CO poisoning is a leading cause of unintentional poisoning deaths in the United States. This report adopts the Council of State and Territorial Epidemiologists' surveillance case definition of confirmed CO poisoning using administrative data (in the absence of case investigation). A confirmed CO poisoning emergency department visit was defined as an admission to the emergency department for which a primary or other diagnosis ICD-9-CM code in the range of 986.0–986.9 or cause-of-injury code E868.3.0, E868.8, E868.9, E952.1, or E982.1 was recorded.

**Cause of death undercount:** Death data totals change as new information is obtained. The most recent data year (i.e., 2015) typically experiences the most subsequent updating because of there being a higher number of open cases that eventually close. Among open cases, deaths related to injury are most common because the state medical examiner is conducting investigations to determine the cause and/or manner (e.g., natural, accidental, homicide, suicide, undetermined) of death. In 2015 Boston death data as of December 2016, there were 56 deaths that had yet to be assigned a cause with manner pending by the state medical examiner. Many of these will subsequently receive an injury-related causal determination (e.g., unintentional overdose, homicide, suicide) once the case review is completed. As a result, death count totals and rates for injury-related deaths are likely to increase as more information is obtained.

**Chlamydia:** A sexually transmitted disease caused by the bacterium *Chlamydia trachomatis*. It is the most common sexually transmitted disease in the United States.

**Chronic obstructive pulmonary disease (COPD):** Diseases including bronchitis, asthma, emphysema, and allergies from inhaled organic dust particles, which decrease the ability of the lungs to oxygenate the blood. The major cause of COPD is smoking. ICD-10 codes J40-J47 are used to identify COPD deaths.

**Cold-related illness:** Cold-related illness ranges from hypothermia to less severe conditions such as frost bite, trench foot, and chilblains. A cold-related illness emergency department visit was defined as an admission to the emergency department that met the following criteria: 1) it occurred during the seasonally cold months of November–March, and 2) a primary or other diagnosis ICD-9-CM code in the range of 991.0–991.9 or cause-of-injury code E901.0, E901.8, E901.9, or E988.3 was recorded.

**Confidence interval:** A range of values based on a chosen probability level within which the true value of a population parameter is likely found. With a 95% confidence interval, one can assume the true value has a high probability of being contained within the interval (i.e., falling between the two values that define the endpoints of the interval).

**Crude rate:** Crude rates are used to present data pertaining to an entire population, such as all of Boston, or to present data pertaining to a subpopulation, such as males or females. A crude rate is calculated by dividing the number of events for the entire population or subpopulation by the total population or subpopulation. In this report, rates of infectious disease, sexually transmitted infection, and birth are presented as crude rates.

**Death rate:** The number of deaths per year per 100,000 people. In this report, death rates are presented as age-adjusted rates.

**Demographics:** Characteristics of human populations such as age, sex, and race/ethnicity.

**Diabetes:** Diabetes Mellitus is a group of diseases in which the body cannot effectively regulate blood glucose (sugar) due to deficiencies in producing or utilizing a hormone called insulin. ICD-9-CM codes 249 and 250 are used to identify hospitalizations due to diabetes. Diabetes-related deaths are identified using ICD-10 codes E10-E14.

**Diseases of the heart:** A group of conditions that involves the heart and/or blood vessels, such as ischemic heart diseases and coronary artery disease. ICD-10 codes I00–I09, I11, I13, I20–I22 I24–I31, I33–I38 I40, I42– I51 are used to identify deaths.

**Drug misuse mortality:** Deaths, excluding suicide and homicide determinations, due to use of specified drugs other than alcohol and tobacco, including direct physiological causes as well as accidental deaths and poisoning deaths with undetermined manner in which drug use/misuse was involved. This classification does not include deaths indirectly due to drug use, such as deaths due to injuries occurring while under the influence of drugs or deaths caused by another person under the influence of drugs. In this report, drug misuse mortality was identified among decedents with either alcohol or drug misuse identified as underlying (i.e., primary) cause and any of the following ICD-10 codes subsequently identified across any of up to ten causes (i.e., underlying and associate): D52.1, D59.0, D59.2, D61.1, D64.2, E06.4, E16.0, E23.1, E24.2, E27.3, E66.1, F11.0–F11.5, F11.7–F11.9, F12.0–F12.5, F12.7–F12.9, F13.0– F13.5, F13.7–F13.9, F14.0–F14.5, F14.7–F14.9, F15.0– F15.5, F15.7–F15.9, F16.0–F16.5, F16.7–F16.9, F17.0, F17.3–F17.5, F17.7–F17.9, F18.0–F18.5, F18.7–F18.9, F19.0–F19.5, F19.7–F19.9, G21.1, G24.0, G25.1, G25.4, G25.6, G44.4, G62.0, G72.0, I95.2, J70.2, J70.3, J70.5, K85.3, L10.5, L27.0, L27.1, M10.2, M32.0, M80.4, M81.4, M83.5, M87.1, R50.2, R78.1, R78.2, R78.3, R78.4, R78.5, X40–X44, and Y10–Y14.

**Emergency department (ED) visit:** Visits to acute-care hospital emergency departments for care. In this report, emergency department visit data includes cases seen in the emergency department that resulted in either a discharge directly from the hospital ED or from a hospitalization that followed ED care. ED visits resulting in a discharge from the observational stay setting are excluded from this report. For Chapter 12: Injury, ED visits include only cases with a discharge from the emergency department and exclude ED visits resulting in a hospitalization.

**Fentanyl:** Fentanyl is a highly potent opioid produced and distributed both legally and illegally. Though fentanyl can be prescribed for severe pain relief, much of the fentanyl in Massachusetts is believed to be illicitly produced according to the U.S Department of Justice Drug Enforcement Administration's 2015 Investigative Reporting (January 2015). In the electronic death files provided by the Massachusetts Department of Public Health, from 2011 to September 2014, direct identification of fentanyl is not possible. When specifically identified as a drug having a causal role in the death, the case receives ICD-10 code T40.4 (i.e., Other Synthetic Narcotics). Beginning in October 2014, Massachusetts death data provide the literal name of drugs specified as having a causal role in the death in addition to the relevant ICD-10 codes. Subsequent analysis of these death data for Boston reveal that 96% of unintentional overdose deaths with ICD-10 code T40.4 assigned had fentanyl literally specified.

**Head of household:** See “Householder.”

**Heat-related illness:** Heat-related illness comprises mild heat edema, heat syncope, heat cramps, heat exhaustion, and heat stroke. A heat-related illness emergency department visit was defined as an admission to the emergency department that met the following criteria: 1) it occurred during the seasonally warm months of May-September, and 2) a primary or other diagnosis ICD-9-CM code in the range of 992.0–992.9 or cause-of-injury code E900.0 or E900, excluding cases with a code of E900.1 (exposure to a man-made source of heat), was recorded.

**Heart disease:** A group of conditions, including valve and conductive disorders such as hypertensive heart disease and congestive heart failure. ICD-9-CM codes 391-398, 402, 404, 410-416, and 420-429 are used in identifying heart disease hospitalizations.

**Hepatitis B & C:** Diseases caused by the hepatitis B or C virus that lead to inflammation of the liver.

**Homeless:** The homeless data included in *Health of Boston 2016-2017* is based on individuals and families determined to be homeless by the Homeless Emergency Assistance and Rapid Transition to Housing Act of 2009. In general, according to that legislation, homelessness pertains to individuals or families whose primary nighttime place of residence is not a house or building designed for regular sleeping accommodations and is not suitable for humans; individuals or families living in supervised shelters (including hotels/motels) considered temporary and designated for the homeless; and individuals or families with no arrangement for permanent housing. For more information, see [https://www.hudexchange.info/resources/documents/HEARTH\\_HomelessDefinition\\_FinalRule.pdf](https://www.hudexchange.info/resources/documents/HEARTH_HomelessDefinition_FinalRule.pdf).

**Homicide:** A death intentionally caused by a person other than the deceased. ICD-10 codes X85-Y09 and Y87.1 are used in identifying homicides for analysis. Death due to homicide as reported by the Boston Police Department (not included in this report) applies to any homicide that occurs in Boston without regard to the actual city of residence of the deceased. As a result, the homicide rates in this report will likely differ from those reported by the Boston Police Department.

**Hospitalization:** Hospitalization represents a patient’s continuous stay of one night or more in the hospital for observation, care, diagnosis, or treatment before being discharged (released) from the inpatient setting by the hospital. Only hospitalizations from acute-care, non-federal hospitals have been included. In this report, hospitalizations include cases originating in the emergency department that result in inpatient hospital admissions.

**Hospital patient encounters:** In this report, hospital patient encounters include both emergency department visits and hospitalizations (see definitions in Technical Notes). Hospital observational stay discharges are excluded because the data were unavailable.

**Householder:** The U.S. Census Bureau designates one person in each household as the householder. In most cases, this is the person or one of the people in whose name the home is owned, being bought, or rented and who is listed on line one of the American Community Survey questionnaire. If there is no such person in the household, any adult household member 15 years old and over could be designated as the householder. In *Health of Boston 2016-17*, the terms “householder” and “head of household” are interchangeable.

**Incidence:** The number of new cases of a particular disease over a period (usually a year) and in relation to the population in which it occurs. Incidence rates are usually reported on the basis of every 100,000 people per year. New cases of an infectious disease such as hepatitis B and C are presented as incidence rates, which may be age-specific or crude.

**Infant mortality rate:** The number of deaths to children under one year of age per 1,000 live births.

**Infectious/Communicable disease:** Infectious or communicable diseases are illnesses resulting from the presence of pathogenic microbial agents, such as viruses, bacteria, fungi, parasites, or prions. Diseases can be spread directly or indirectly from one person to another.

**Injury-related mortality:** Injury deaths are defined as those with an ICD-10 code of V01-Y36, Y85-Y87, Y89, or U01-U03 in the underlying (i.e., primary) cause of death field. Adverse medical/surgical effects are excluded. This definition follows the guidelines set forth in *State Injury Indicators Report: Instructions for Preparing 2014 Data* (published April 2016) by the Centers for Disease Control and Prevention. For the ranking of leading causes of injury mortality, only the subset of ICD-10 codes from *State Injury Indicators Report: Instructions for Preparing 2014 Data* that were also found in "List of 113 Selected Causes of Death" (National Center for Health Statistics Instruction Manual, Part 9, "ICD-10 Cause-of-Death Lists for Tabulating Mortality Statistics", updated March 2011 to include WHO updates to ICD-10 for data year 2011) were considered.

**Injury-related hospitalizations:** Injury-related hospitalizations are defined as those with an ICD-9-CM code of 800-909.2, 909.4, 909.9, 910-994.9, 995.5-995.59, or 995.80-995.85 in the principal diagnosis field. Adverse medical/surgical effects are excluded. This definition follows the guidelines set forth in *State Injury Indicators Report: Instructions for Preparing 2014 Data* (published April 2016) by the Centers for Disease Control and Prevention.

**Injury-related emergency department (ED) visits:** Injury-related ED visits include discharges from the emergency department but exclude care resulting in hospitalizations. Injury-related ED visits are defined as those with an ICD-9-CM code of 800-909.2, 909.4, 909.9, 910-994.9, 995.5-995.59, or 995.80-995.85 in the principal diagnosis field (these codes exclude adverse medical/surgical effects) or E800-E869, E880-E929, or E950-E999 in any external cause-of-injury (E-code) field. This definition follows the guidelines set forth in *State Injury Indicators Report: Instructions for Preparing 2014 Data* (published April 2016) by the Centers for Disease Control and Prevention.

**Insufficient sample size:** In this report insufficient sample size is used when certain data points are not presented. This occurs with survey data when there is not a large enough sample (number of survey respondents) to allow for the presentation of reliable point estimates. Data are also not presented if a sample size is too small, which may compromise the confidentiality of the respondents, or if the percentage of missing responses among all responses equals or exceeds 20% of the survey sample.

**International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM) codes:** Hospitalization data shown in this report are classified according to ICD-9-CM. This is the official system of assigning codes to diagnoses and procedures associated with hospital utilization in the United States. The ICD system standardizes medical terms and groups them for statistical purposes.

**International Classification of Diseases, Tenth Revision (ICD-10) codes:** Death data presented in this report are classified according to the ICD-10, released by the World Health Organization in 2000 and adopted by the United States National Center for Health Statistics (NCHS), Centers for Disease Control and Prevention. The ICD system standardizes medical terms and groups them for statistical purposes.

**Labor force participation rate:** The labor force participation rate represents the proportion of the population that is in the labor force. For example, if there are 100 people in the population 16 years and over, and 64 of them are in the labor force, then the labor force participation rate for the population 16 years and over would be 64 percent.

**Latino:** Includes people of any race (Asian, Black, White, or Other) self-identified as Hispanic or Latino (such as Puerto Rican, Mexican, Cuban, Spanish, or Dominican).

**Lead screening:** The measurement of blood-lead levels in children to identify those who have been exposed to high levels of environmental lead. In Massachusetts, annual screening of children between 9 and 48 months of age once a year is mandatory. In May 2012, the Centers for Disease Control and Prevention (CDC) issued a recommendation to change the guidelines used for determining clinical lead poisoning from 10 or greater micrograms of lead per deciliter of blood ( $\geq 10 \mu\text{g/dL}$ ) to 5 or greater micrograms of lead per deciliter of blood ( $\geq 5 \mu\text{g/dL}$ ) for children 72 months old and under. This recommendation was based on an increasing body of scientific evidence demonstrating that these lower blood lead levels can also produce negative health consequences over one's lifetime. See Blood-Lead Level for more information.

**Life expectancy:** Calculated using 5-year abridged period life tables for a hypothetical cohort of 100,000 residents developed by the Office for National Statistics, United Kingdom. Applied methodological options are described in "Life Expectancy at Birth: Methodological Options for Small Populations, National Statistics Methodological Series #33," (authors: Barbara Toson and Allan Baker), and include: 1) the calculation of life expectancy at birth based on Chiang's revised methodology, 2) no life expectancy at birth calculations made for populations below 5,000, and 3) no adjustments made by imputing values for age bands with no deaths.

**Low birth weight (LBW):** Birth weight of less than 2,500 grams or 5 pounds, 8 ounces.

**Micrograms per deciliter ( $\mu\text{g/dL}$ ):** A measurement unit for level of lead in a measured quantity of blood: a millionth of a gram in a tenth of a liter.

**Mold hazard/violation:** The Environmental and Occupational Health Division of the Boston Public Health Commission responds to complaints or inquiries from the public regarding mold. A mold hazard/violation is said to have occurred upon inspection if mold is identified in heating, ventilation, or air conditioning systems or if an indoor air quality hazard is identified involving chronic dampness or mold.

**n<5:** A notation used to indicate that for this health indicator there were fewer than five occurrences (for example, births, deaths, new cases of a disease) and therefore a rate could not be presented.

**n<11:** A notation used to indicate that for this health indicator there were fewer than eleven occurrences (for example, hospital patient encounters and ED visits) and therefore a rate could not be presented.

**Neighborhood:** Neighborhoods can be identified in several ways. In Health of Boston 2016-2017 zip codes are used to identify neighborhood boundaries since this information is collected with health data. Please note that the zip code neighborhood definitions used in this report may differ from what are used by other organizations and agencies.

The zip codes used in this report for identifying neighborhoods are those currently used by the United States Postal Service (USPS). USPS zip codes are not based on geography, demographics, or population size; they are collections of mail delivery routes that are defined at the convenience of the U.S. Postal Service and may change from time to time.

Data from the U.S. Census Bureau comes in the form of Zip Code Tabulation Areas (ZCTAs), generalized areal representations of USPS zip code service areas. ZCTA is a trademark of the U.S. Census Bureau whereas ZIP Code is a trademark of the U.S. Postal Service.



## Boston Neighborhoods Defined by Zip Codes/Zip Code Tabulation Areas (ZCTAs)

Neighborhood	Zip Codes/ZCTAs
Allston/Brighton	02134, 02135, 02163
Back Bay (includes Downtown, Beacon Hill, North End, West End)	02108-02110, 02113-02114, 02116, 02199
Charlestown	02129
Dorchester (zip codes 02121, 02125)	02121, 02125
Dorchester (zip codes 02122, 02124)	02122, 02124
East Boston	02128
Fenway	02115, 02215
Hyde Park	02136
Jamaica Plain	02130
Mattapan	02126
North End	02113
Roslindale	02131
Roxbury	02119, 02120
South Boston	02127, 02210
South End (includes the zip code typically used to identify Chinatown (02111))	02111, 02118
West Roxbury	02132

Neighborhood boundaries on maps presented in Chapter 3: Community Assets vary slightly from boundaries presented in all other maps in *Health of Boston 2016-2017*. Boundaries were adjusted in this chapter in order to more accurately reflect how Franklin Park is divided among Boston neighborhoods.

In previous Health of Boston reports, Dorchester was presented as two distinct neighborhoods—North Dorchester and South Dorchester. This was done to highlight health experience differences within Dorchester. While this report continues to present health data representing these two geographic regions, the “North” and “South” designations have been dropped because of their historical role related to race-based housing segregation within Boston.

Since neighborhood health data in this report is zip code-based, *Health of Boston 2016-2017* differentiates the two Dorchester areas by identifying associated zip codes in the labels. Neighborhood maps and text in the report present references to these areas as “Dorchester (zip codes 02121, 02125)” and “Dorchester (zip codes 02122, 02124)”, respectively.

**Nephritis/Nephrosis:** Inflammation of the kidneys (nephritis), or kidney disease with severe protein loss and fluid retention or degenerative changes in the kidneys without inflammation (nephrosis). ICD-10 codes N00-N07, N17-N19, and N25-N27 are used to identify deaths from nephritis/nephrosis for analysis.

**Nitrogen dioxide (NO<sub>2</sub>):** NO<sub>2</sub> primarily gets in the air from the burning of fuel. NO<sub>2</sub> forms from emissions from motor vehicles, power plants, and off-road equipment. The 1-hour and annual National Ambient Air Quality Standards for NO<sub>2</sub> set by the U.S. Environmental Protection Agency for public health protection are 100 parts per billion and 53 parts per billion, respectively. Between 2005 and 2016, the Massachusetts Department of Environmental Protection (MassDEP) monitored outdoor NO<sub>2</sub> levels in Boston at 4 locations: Long Island, Fenway (Kenmore Square), Dorchester (Von Hillern Street), Roxbury (Harrison Avenue). MassDEP opened the Von Hillern Street site in 2013 and closed the Long Island monitoring site in 2015.

**Obesity:** Obesity is a condition in which an accumulation of excess body fat has occurred to the extent that it may lead to adverse health events. Adults with a Body Mass Index (BMI) of equal to or greater than 30 kg/m<sup>2</sup> are considered obese. Obesity among children and youth is determined by a BMI percentile standard ranking of 95% or higher.

**Overcrowded housing:** Overcrowded housing is defined as more than one occupant per room within a housing unit.

**Ozone (O<sub>3</sub>):** Ground-level or “bad” ozone is not emitted directly into the air but is created by chemical reactions between oxides of nitrogen and volatile organic compounds in the presence of sunlight. Emissions from industrial facilities and electric utilities, motor vehicle exhaust, gasoline vapors, and chemical solvents are some of the (indirect) major sources of ground-level ozone. In 2015, the U.S. Environmental Protection Agency strengthened the National Ambient Air Quality Standards for ground-level ozone by revising the 8-hour standard downward from 75 to 70 parts per billion. Between 2005 and 2016, the Massachusetts Department of Environmental Protection (MassDEP) monitored ground-level ozone levels in Boston at 2 locations: Long Island and Roxbury (Harrison Avenue). MassDEP closed the Long Island monitoring site in 2015.

**Particulate matter less than or equal to 2.5 microns in diameter (PM<sub>2.5</sub>):** PM<sub>2.5</sub> refers to particulate air pollution, specifically fine, inhalable particles with diameters that are generally 2.5 microns and smaller. The current 24-hour and annual National Ambient Air Quality Standards for PM<sub>2.5</sub> set by the U.S. Environmental Protection Agency for public health protection are 35 micrograms per cubic meter and 12.0 micrograms per cubic meter, respectively. Between 2005 and 2016, the Massachusetts Department of Environmental Protection (MassDEP) monitored outdoor PM<sub>2.5</sub> levels in Boston at 5 locations: Charlestown, Fenway (Kenmore Square), North End, Dorchester (Von Hillern Street), and Roxbury (Harrison Avenue). MassDEP opened the Von Hillern Street site in 2013 and closed the Charlestown monitoring site in 2015.

**Physical activity:** Physical activity is anything that gets your body moving. According to the *2008 Physical Activity Guidelines for Americans*, adults and children need to do two types of physical activity to improve health: aerobic and muscle-strengthening.

**Point estimate:** A single value calculated from survey sample data indicating the estimated percentage of a population with a given characteristic. A point estimate serves as the best approximation for an unknown population parameter and should be interpreted with information that considers the standard error associated with the estimate.

**Population:** Two types of population statistics are presented in this report. The first is the census of the population taken every ten years by the U.S. Census Bureau; it is a literal count of all residents of the United States. The second is population estimates from a sample of the population taken by the U.S. Census Bureau using the American Community Survey (ACS). Data from the 2000 and 2010 U.S. Censuses as well as American Community Survey are presented in Chapter 1: Demographics and Chapter 2: Social Determinants of Health in *Health of Boston 2016-2017*.

The national decennial census provides the most accurate count of the U.S. population. It presents data from the level of small areas called census tracts, which may have only a few thousand residents, to larger areas, such as zip codes. Census tracts or zip codes can be combined to permit Boston neighborhood-level analyses. Zip code-based populations derived through interpolation and extrapolation using data from the 2000 and 2010 U.S. Censuses are included in the calculation of rates for this report.

The U.S. Census Bureau uses the American Community Survey (ACS) to produce annual estimates that describe the population and housing characteristics of people in the United States. Estimates, by their nature, are less precise than population census data. Because they are generated from a sample, estimates are associated with margins of error that describe their level of accuracy. Margins of error need to be considered when comparisons are made with sample data. Though margins of error are not presented alongside ACS estimates in *Health of Boston 2016-2017*, differences cited reflect statistical significance at the 95% confidence level (as opposed to the 90% confidence level that ACS provides). Additionally, estimates with relative standard errors equal to or greater than 30% have not been included. For more information on the treatment of ACS estimates within this report, please contact the Boston Public Health Commission Research and Evaluation Office.

**Poverty:** There are two predominant definitions of poverty. One is defined by the U.S. Census Bureau and referred to as poverty thresholds and the other is defined by the Department of Health and Human Services and referred to as poverty guidelines. The poverty definition used for data presented in poverty-related charts in *Health of Boston 2016-2017* is the United States Census Bureau poverty thresholds. Poverty estimates are derived from the American Community Survey (ACS).

The U.S. Census Bureau's definition of poverty is a federal definition characterized by a series of poverty thresholds or dollar amounts which specify before-taxes, income maximums an individual and/or family can earn in a given year and still be declared impoverished. This definition takes into account family size and age structure (for example, in 2015, a family of four with two children and two adults had a poverty threshold of \$24,036 while a single person under the age of 65 had a poverty threshold of \$12,331). Income questions in ACS were asked of the population ages 15 and older. The following types of income are not included in the ACS definition of income, and therefore they are not considered when determining poverty status: capital gains; money received from the sale of property (unless the recipient was engaged in the business of selling such property); the value of income "in kind" from food stamps, public housing subsidies, medical care, employer contributions for individuals, etc.; withdrawal of bank deposits; money borrowed; tax refunds; exchange of money between relatives living in the same household; gifts and lump-sum inheritances, insurance payments, and other types of lump-sum receipts. Poverty thresholds are not adjusted for regional differences in mean/median income levels. However, they are modified annually to account for inflation according to rates specified by the Consumer Price Index.

**Poverty level:** A poverty level is the minimum level of income deemed necessary to achieve an adequate standard of living in a given country. Poverty level is what is used to describe poverty thresholds throughout this report.

**Premature mortality rate:** The number of deaths per year per 100,000 people under age 65. In this report, premature mortality rates are presented as age-adjusted rates (i.e., adjusted to the 2000 U.S. standard population under age 65).

**Preterm births:** A preterm birth refers to the birth of a baby less than 37 weeks' gestational age. Preterm births are the major cause of neonatal mortality in the United States.

**Race/Ethnicity:** All racial and ethnic designations except those from the death certificate, some hospital discharge data, and some emergency department data are self-reported.

Several cautions should be kept in mind when using data reported by race/ethnicity. Race and ethnicity are social constructions, not biological facts. There is often more genetic variation between members of the same race than between members of different races. In addition, the meanings of these designations are highly subject to historical, cultural, and political forces. Not only do these designations change over time, but there is also a very subjective element that influences who is considered a member of one group or another. The concept of race can be notably vague: the term "Black," for example, includes people describing themselves as African American, African, or Caribbean, groups with distinct histories and differing health risks.

Nevertheless, racial designations are useful in that they are nearly universally used by people in the United States to describe themselves, and they permit us to identify and address health inequities that exist across racial and ethnic groups.

Latinos can be of any race. In *Health of Boston 2016-2017* data for persons of Latin descent are presented alongside non-Latino racial groups. Prior to 2008, Massachusetts' hospitalization and emergency department visits data by race/ethnicity were subject to variation in reporting practices by hospitals. As a result, stratification of hospitalization and emergency department visit data by race/ethnicity prior to 2008 was not possible in this report. Also, because of changes made by the U.S. Census Bureau in the collection and reporting of population data by race/ethnicity, comparing 1990 U.S. Census population data by race/ethnicity with 2000 or 2010 U.S. Census population data by race/ethnicity is discouraged.

In this report, Boston-specific data by race and ethnicity is presented for non-Latino Asian residents, non-Latino Black residents, non-Latino White residents, and Latino residents of any race. Few sources have data in large enough counts to allow presentation of data about smaller groups such as the many ethnicities included in the category "Asian."

**Rates:** A rate is a measure of a type of event, disease, or condition occurring among a population per unit of time, for instance, the number of deaths due to diseases of the heart per 100,000 population for a given year or across multiple years. Three types of rates are presented in this report: crude rates, age-specific rates (ASRs), and age-adjusted rates (AARs).

In this report, most hospitalization, emergency department visit, and death rates are based on the primary diagnosis only. Injury ED visits and substance misuse rates are based on consideration of multiple levels of diagnosis. The population denominators used for calculating rates are derived through interpolation or extrapolation using data from the 2000 and 2010 U.S. Censuses. Linear interpolation/extrapolation involves the calculation of an average annual percent change for use in estimating population denominators. Linear interpolation is preferred to using a single year of U.S. Census data when calculating rates for intercensal years. This method is used in this report and was first used in *Health of Boston 2014-2015*; therefore, rates from this report cannot be compared to rates in *Health of Boston* reports prior to *Health of Boston 2014-2015* since those rates were calculated based on population denominators that came directly from the 2000 or 2010 U.S. Census.

**Sample size:** The sample size refers to the number of people who responded to a survey (i.e., respondents). Also, see definition for insufficient sample size.

**Secondhand tobacco smoke exposure at home:** The Boston Behavioral Risk Factor Surveillance System administered the following question for assessment of secondhand tobacco smoke exposure at home, "Thinking about the past 7 days, about how many hours a week were you exposed to other people's tobacco smoke when you were at home?" Secondhand tobacco smoke exposure at home was defined as a response of 1 hour per week or higher.

**Sexually transmitted infection (STI):** An infection spread from person to person during sexual contact.

**Socioeconomic status (SES):** An economic and sociological measure based on multiple factors, including but not limited to income, education, and occupation, that describes an individual's or family's economic and social position relative to others.

**Standard population:** A specific population (e.g., Boston) or subpopulation (e.g., Boston females) whose age distribution is used in the calculation of standardized rates for purposes of comparison. The two standard populations used in this report (i.e., all ages, and ages 12 and older) come from the 2000 U.S. standard population.

**Statistical significance:** An attribute of data based on statistical testing. A statistical test examines differences between rates or percentages to help determine if that observed difference reflects a true difference in the actual population experience. Statistical significance means that an observed difference is most likely true but not that it is necessarily meaningful or important. For more information see methods.

**Substance misuse mortality:** Deaths in which alcohol and/or drugs played an underlying (i.e., primary) causal role excluding suicide and homicide determinations. Overdose deaths in which the manner (e.g., natural, accidental, intentional) was unknown/undetermined are included among all substance misuse death data. See Drug Misuse Mortality and Alcohol Misuse Mortality for specific ICD-10 code definitions..

**Substance misuse hospital patient encounters:** Substance misuse-related patient visits/discharges from either the hospital inpatient or emergency department settings. Substance misuse hospital patient encounters are identified by ICD-9-CM codes relating to alcohol/drug dependence, alcohol/drug misuse, and unintentional overdose/poisoning of alcohol and other drugs of misuse. The relevant ICD-9-CM codes could present on any level of diagnosis. As a result, a single encounter could present with multiple drug mentions and would be counted once in each of the relevant totals. Patient encounters do not represent unique persons. A unique person may present to the hospital multiple times in a given period (e.g., year). Drugs included for unintentional overdose/poisonings are a subset of all drugs and include alcohol, heroin, other opiates/opioids, cocaine, benzodiazepines, barbiturates, other sedatives, other tranquilizers, antidepressants, psychodysleptics (hallucinogens) and psychostimulants (see ICD-9-CM codes below). Additionally, all overdose/poisoning patient encounters required having the first external causes of injury code (e-code) among E800-E869, E880-E929, E980-E989 (identifying accidental or undetermined intent) or present with no e-code in the case record. ICD-9-CM Codes: Alcohol dependence or misuse (303, 303.0, 303.9, 305.0), drug dependence or misuse (304.0, 304.1, 304.2, 304.3, 304.4, 304.5, 304.6, 304.7, 304.8, 304.9, 305.2, 305.3, 305.4, 305.5, 305.6, 305.7, 305.8, 305.9), and unintentional alcohol or drug overdose/poisoning (E860.0, E860.9, 980.0, E850.0, E850.1, E850.2, E850.9, E853.0, E853.1, E853.2, E853.8, E853.9, E854.0, E854.1, E854.2, E854.3, E854.8, E851, E852, E855.2, 965.0, 967.0, 967.4, 967.8, 968.5, 969.0, 969.1, 969.2, 969.3, 969.4, 969.5, 969.6, 969.7, 969.8, 969.9, 970.0, 970.8, 980.9). Encounters only having codes related to alcohol/drug dependence and nondependent misuse (303-305) and specifying remission status (i.e., having fifth-digit subclassification equal to 3) were excluded.

**Substance use disorders:** *The Diagnostic and Statistical Manual of Mental Disorders*, Fifth Edition (DSM-5), no longer uses the terms substance abuse and substance dependence, rather it refers to substance use disorders, which are defined as mild, moderate, or severe to indicate the level of severity, which is determined by the number of diagnostic criteria met by an individual. Substance use disorders occur when the recurrent use of alcohol and/or drugs causes clinically

and functionally significant impairment, such as health problems, disability, and failure to meet major responsibilities at work, school, or home. According to the DSM-5, a diagnosis of substance use disorder is based on evidence of impaired control, social impairment, risky use, and pharmacological criteria.

**Suicide:** The intentional and voluntary taking of one's own life. ICD-10 codes X60-X84 and Y87.0 are used in identifying cases of suicide. Of note, every year there are a number of injury-related deaths with unknown/undetermined intent. In these cases, medical examiners did not have enough information to determine if the death was an accident, suicide, or homicide. As a result, the rates of suicide likely reflect an undercount of suicides and are lower than they would be if the intent was known for all injury-related deaths.

**Tap water lead concentration:** The Lead and Copper rule issued by the U.S. Environmental Protection Agency requires that 9 out of 10, or 90%, of sampled homes must have lead levels in drinking water below the Action Level of 15 parts per billion. Since 2012, the Boston Water and Sewer Commission has sampled 25 at-risk homes in Boston during the month of September. The homes sampled are considered higher risk for high lead levels because they have a lead service line or they had water service lines installed in 1983, 1984, or 1985.

**Unintentional cocaine overdose mortality:** Accidental deaths or deaths with undetermined manner (i.e., not determined to be accidental or intentional) due to drug or alcohol poisoning as underlying cause of death as identified by the ICD-10 codes X40-X45 and Y10-Y15 with the cocaine poisoning ICD-10 code T40.5 identified on any of up to nine subsequent associate causes.

**Unintentional drug overdose mortality:** Accidental deaths or deaths with undetermined manner (i.e., not determined to be accidental or intentional) due to drug poisoning as underlying cause of death as identified by the following ICD-10 codes: X40-X44 and Y10-Y14.

**Unintentional opioid overdose mortality:** Accidental deaths or deaths with undetermined manner (i.e., not determined to be accidental or intentional) due to drug or alcohol poisoning as underlying cause of death as identified by the ICD-10 codes X40-X45 and Y10-Y15 with an opioid-related ICD-10 code (T40.0-T40.4 and T40.6) identified on any of up to nine subsequent associate causes.

**Unintentional overdose/poisoning:** Hospital and mortality cases directly resulting from accidental drug and/or alcohol poisoning or in which the intent was undetermined/unknown. Known self-harm/suicide and homicide cases are excluded. Additionally, hospital cases resulting from adverse effects of drugs taken as prescribed are excluded.

**Water leaks or stains:** Water leaks are of concern because persistent moisture can promote mold growth as well as encourage insect or rodent infestations. Evidence of water leaks or stains includes (but is not limited to) water stains or discoloration on walls, floors, or ceiling tiles as well as active leaks where water is present.

**White:** All persons self-identified as White who do not also identify themselves as Latino.

# Data Sources

## Infectious Disease Data

**Source:** Infectious Disease Bureau, Boston Public Health Commission

Data from communicable disease surveillance systems are limited by the degree to which people with a condition seek health care that results in testing and reporting to the system. Diseases may be asymptomatic or mild, or are treated presumptively without laboratory testing, and for some conditions, reporting may be less than complete. These factors may contribute to underestimates of the frequency of disease.

New cases of chlamydia, syphilis and gonorrhea infection are reported to the Massachusetts Department of Public Health and the Boston Public Health Commission by diagnosing physicians and laboratories. Undiagnosed cases and variations in screening practices, and compliance with reporting requirements may influence the accuracy of reported sexually transmitted infections. Due to changes in case identification practices, counts and rates of sexually transmitted infections, such as chlamydia, presented in *Health of Boston 2016-2017* cannot be compared to data in Health of Boston reports prior to 2011.

**Source:** HIV/AIDS Surveillance Program, Massachusetts Department of Public Health

New cases of HIV infection (incidence) and cases of people living with HIV/AIDS (prevalence) are reported to the Massachusetts Department of Public Health by diagnosing physicians and laboratories. Undiagnosed cases may influence the accuracy of reported cases and impede interpretation of HIV/AIDS case data.

## Survey Data

**Source:** American Community Survey, U. S. Census Bureau

The American Community Survey (ACS) uses a sample of the population to provide information about demographics, housing, and socioeconomic characteristics of communities. People who live in households, students, and those in institutions or other group quarters (e.g. jails, college dormitories, and nursing homes) are sampled. *Health of Boston 2016-2017* presents estimates both for single and aggregated years.

The ACS results used in describing the Boston population are subject to the limitations common to all surveys. Samples produce estimates that can never be as precise as tabulations of the whole population. Other kinds of errors can further affect the precision of estimates, and nonrandom (or systematic) error has the potential to bias findings.

**Source:** American Community Survey (ACS), Public Use Microdata Sample (PUMS), U.S. Census Bureau

A data set that provides a full range of population and housing unit responses collected on individual ACS questionnaires for a subsample of ACS housing units and group quarter persons.

The data set allows for a custom analysis of ACS data using a sample of actual responses to the American Community Survey (ACS). It is used to create new measures and categories not supported by the standard ACS tables. This dataset is not aggregated and cannot be analyzed at the neighborhood level.

**Source: Boston Behavioral Risk Factor Survey, Boston Behavioral Risk Factor Surveillance System (BBRFSS), Boston Public Health Commission**

The Boston Behavioral Risk Factor Surveillance System (BBRFSS) is a system of telephone health surveys of adults living in non-institutional household settings ages 18 and over that collects information on health risk behaviors, preventive health practices, and health care access primarily related to chronic disease and injury.

The Boston Public Health Commission (BPHC) conducts an independent survey approximately every other year modeled after the Centers for Disease Control and Prevention (CDC) Behavioral Risk Factor Surveillance System (BRFSS) survey. Over time, the survey has been modified by BPHC to be more reflective of health risk behaviors specific to the Boston population. In 2013, BBRFSS data across all data years were re-weighted to accommodate post-stratification to five population dimensions (i.e., age, gender, racial/ethnic group, education and marital status). As a result, rates, percentages, and point estimates will vary from and cannot be compared with previously produced BBRFSS results. However, the Boston Behavioral Risk Factor Surveillance System survey has maintained many standard core questions included in the BRFSS used by the Massachusetts Department of Public Health. Results from the survey are used by BPHC to plan and implement health initiatives; to identify health problems within populations; to identify racial/ethnic inequities in access to and utilization of health care, in risk behaviors, and selected health conditions; to establish and monitor health objectives; to support health-related legislative activities; to evaluate disease prevention activities and programs; and to assist in receiving grants and other funding.

**Source: Boston Youth Risk Behavior Survey, Youth Risk Behavior Surveillance System (YRBSS), Centers for Disease Control and Prevention and Boston Public Schools**

The Youth Risk Behavior Surveillance System (YRBSS) is a system of national school-based surveys conducted by the Centers for Disease Control and Prevention (CDC) every other year among public high school students in grades 9-12. It is currently conducted in 47 states, 6 territories, 2 tribal governments, and 22 cities. The survey contains questions related to risk behaviors such as unintentional injuries and violence, alcohol and drug use, tobacco use, sexual behavior, unhealthy eating behaviors, physical inactivity, and the prevalence of obesity and asthma.

The Boston Public Health Commission uses results from the YRBSS to identify the prevalence of health risk behaviors among Boston youth, identify racial/ethnic inequities, plan and implement health initiatives, support health-related legislative activities, and assist in obtaining grants and other funding.

## Vital Records

**Source: Boston Resident Live Births, Registry of Vital Records and Statistics, Office of Data Management and Outcomes Assessment, Massachusetts Department of Public Health**

These data present Massachusetts birth certificate information. The recording of resident live births is considered nearly complete for Massachusetts resident births, including those that take place at home or out-of-state but to Massachusetts residents. Birth data in this report pertain only to Boston residents.

For analytical purposes, infants are assigned their mother's self-reported race/ethnicity, and not a combination of both parents' race/ethnicity.



**Source: Boston Resident Deaths, Registry of Vital Records and Statistics, Office of Data Management and Outcomes Assessment, Massachusetts Department of Public Health**

These data present Massachusetts death certificate information. Death data used by the Boston Public Health Commission pertain only to Boston resident decedents. Cause of death determinations are typically made by the certifying physician. However, the Office of the Chief Medical Examiner is responsible for investigating the cause and manner of death occurring under violent, suspicious or unexplained circumstances. Due to delays in investigational results, cause and manner determinations may get updated after analysis of data for any given year. Based on comparison to previous years, we estimate that approximately 20-30 Boston resident deaths in 2015 with cause pending determination (i.e., UC=R99) will likely get resolved post December 2016. As a result, injury deaths are considered likely undercounts for 2015. In addition, out of state resident death records are often delayed. For these and other reasons death totals, especially for the most recent 2015 data year, may change in subsequent cuts of the data. Additionally, certain information within the death record is obtained with the assistance of an informant, typically a family member or funeral director, which may result in errors (for example, in race/ethnicity reporting) that would not occur in self-reported data.

**Source: Boston Resident Linked Infant Birth-Infant Death file (death cohort), Registry of Vital Records and Statistics, Office of Data Management and Outcomes Assessment, Massachusetts Department of Public Health**

These data present information from an infant's birth record linked to the infant's death record. The death cohort consists of Boston resident infants that died during the specified year regardless of their residency at birth. For analytical purposes, infant race/ethnicity in this report reflects the mother's reported race/ethnicity on the birth certificate.

## Other Data

**Source: Air Assessment Branch, Massachusetts Department of Environmental Protection <http://www.mass.gov/eea/agencies/massdep/> (accessed January 11, 2017)**

The Massachusetts Department of Environmental Protection (MassDEP) is the state agency responsible for monitoring outdoor air quality in Massachusetts and developing plans and regulatory programs to reduce emissions of pollutants that adversely affect public health, welfare, and the environment. The Air Assessment Branch of MassDEP submits all ambient air quality data to the national Air Quality System database that is administered by the U.S. Environmental Protection Agency.

**Source: Acute Hospital Case-Mix Databases (Hospital Inpatient Discharge Database and Outpatient Emergency Department Database), Massachusetts Center for Health Information and Analysis**

These hospital patient encounter (HPE) data present information on Boston resident hospitalizations and emergency department visits to acute care hospitals in Massachusetts. All rates are based on encounter count totals covering fiscal years running October through September (e.g., year 2015 covers HPEs from October 2014-September 2015). Data from the Outpatient Hospital Observation Discharge Database are not included in this report.

For a given HPE, the patient's primary diagnosis is used for determination of most health conditions in this report. Some specific injury-type hospitalizations and ED visits and all substance misuse hospital patient encounters are based on further consideration of multiple diagnosis levels after consideration of the primary diagnosis (See Injury and Substance Misuse Hospital Patient Encounters in Technical Notes for more information).

**Source: City of Boston Annual Homeless Census, Department of Neighborhood Development, Boston Continuum of Care (CoC) Homeless Assistance Programs Dashboard Reports, 2012-2017, U.S. Department of Housing and Urban Development**

The City of Boston Homeless Census is conducted annually. The last count was conducted the night of January 25, 2017. The homeless census is a count of Boston homeless persons, for example, living on the streets, in emergency shelters, in domestic violence programs, in residential mental health or substance misuse programs, in transitional housing, and in specialized programs serving homeless youth and homeless veterans.

The reported count in *Health of Boston 2016-2017* is based on data provided to HUD by Continuums of Care (CoC) Homeless Assistance Programs and represents a different methodology from that used in the past for determining the number of Boston homeless during the annual City of Boston Homeless Census. As a result, the homeless count presented in previous *Health of Boston* reports may not be comparable to the data presented in this current report.

**Source: Boston Water and Sewer Commission, <http://www.bwsc.org/> (accessed November 15, 2016)**

In accordance with the Lead and Copper Rule issued by the U.S. Environmental Protection Agency, the Boston Water and Sewer Commission must test tap water for lead in a sample of 25 at-risk homes every year. The homes sampled are considered higher risk for high lead levels because they have a lead service line or they had water service lines installed in 1983, 1984, or 1985. In 1986, Congress banned the use of lead solder containing greater than 0.2% lead, and restricted the lead content of faucets, pipes, and other plumbing materials to 8.0%. It is assumed that lead solder was used when installing water service lines in 1983, 1984, or 1985, since those were the last years it was legal to use lead solder in plumbing.

**Source: Bureau of Substance Abuse Services, Massachusetts Department of Public Health**

The Bureau of Substance Abuse Services at the Massachusetts Department of Public Health provides publicly-supported substance misuse treatment admissions data for Boston resident treatment clients. These data are fiscal year based (July-June). Drug-specific rates of treatment clients presented within *Health of Boston 2016-2017* reflect unique-person counts of clients identifying a specific drug as being either a primary, secondary or tertiary substance of misuse. This methodology of quantifying a given drug's exposure among the treatment client base is meant to better help identify the extent of drug-specific misuse among the client base for drugs not typically identified as a primary drug of misuse. Treatment admissions data reflect only individuals who have successfully accessed the treatment system and, therefore, do not describe the whole Boston resident drug use disorder population.

**Source: Census 2000 and 2010, Bureau of the Census, U.S. Department of Commerce**

The U.S. census is conducted every ten years. Data from the 2000 and 2010 Censuses were used to interpolate and extrapolate population counts used as denominators for the calculation of rates in this report. These population estimates aim to reflect changes in the underlying population during non-census years. The use of interpolated/extrapolated population data was not used in *Health of Boston* reports before *Health of Boston 2014-2015*. Therefore, population-based rates in those previous *Health of Boston* reports are not comparable.

The collection and coding of race/ethnicity data has changed significantly during the past century but has been consistent during the health data reporting periods in this report. Hispanic ethnicity was not asked until 1930, and then was limited to Mexican ancestry. It was collected in 1940 for all Hispanics/Latinos, but then not again until 1970 when it was only included in samples, and not in the count of the whole population. Beginning in 1980, Hispanic origin has been a regular part of the data collection. The capacity to distinguish race groups from Hispanic/Latino origin was not built into the census until 1980. See Race and Ethnicity section in Technical Notes for additional information.

**Source: Childhood Lead Poisoning Program, Bureau of Environmental Health, Massachusetts Department of Public Health**

The Boston Public Health Commission acquires annual lead poisoning screening data for Boston children 72 months of age or under from Childhood Lead Poisoning Program.

The elevated blood lead level data reported in this report are solely related to those children who are screened. In 2012, the guidelines used for diagnosing elevated blood lead levels in children were changed. See Technical Notes.

**Source: Environmental & Occupational Health Division, Boston Public Health Commission**

The Environmental & Occupational Health Division of the Boston Public Health Commission responds to requests from the public for inspections related to a broad range of potential environmental health hazards, including mold, in private residences, public buildings, workplaces, and outdoor spaces. If health hazards or violations of laws for mold are found upon initial inspection, the responsible parties are required to take corrective action.

All asbestos removal or repair projects in Boston require a permit issued by the Environmental & Occupational Health Division. The Division conducts investigations in response to public complaints/inquiries about potential asbestos hazards in public and private buildings, homes, and open spaces as well as random compliance checks of permitted asbestos removal work.

The Environmental & Occupational Health Division is also mandated by city ordinance to conduct bi-annual environmental inspections for all elementary, middle, and high schools in Boston Public Schools. These inspections serve as a method of tracking the environmental status of all Boston Public Schools. As part of the inspections, data regarding leaks and visible water stains, visible mold growth, overt pest signs, improper chemical storage, repairs needed, and other environmental issues are tracked.

**Source: Healthy People 2020, <https://www.healthypeople.gov/> (accessed April 12, 2017)**

Healthy People 2020 (HP 2020) is a national program designed by the U.S. Department of Health and Human Services and effective December 2010. The program consists of 10-year goals and objectives to improve the health of U.S. residents. HP 2020 tracks over 1,000 objectives and 42 topic areas which address general health status, social determinants of health, and disparities. Most of the objectives include established targets pertaining to, for example, selected causes of death, health behaviors, injury and violence, environment health, and access to health care services.

**Source: Office of Data and Accountability, Boston Public Schools**

Provides data about Boston children enrolled in public and non-public schools, e.g., school-age children attending Boston Public Schools (BPS) and non-BPS by race/ethnicity and BPS four-year graduation rates.

**Source: Residential Foreclosures Petitions, Warren Group**

The Boston Department of Neighborhood Development uses data collected and compiled by the Warren Group on real estate sales and ownership throughout New England. Such data includes Boston residential foreclosure petitions. An ordinance relating to the maintenance of vacant, foreclosing residential properties requires all owners of abandoned and/or foreclosing residential properties to register them with Boston's Inspectional Services Department (ISD). If the property is abandoned, the registration must state the name and address of the person or company responsible for its

security and maintenance. The registration must be received within seven days once foreclosure process has begun or 14 days after the first violation (which occurs when ISD finds a property vacant and a foreclosure process is initiated).

#### **Source: Supplemental Nutrition Assistance Program (SNAP)**

Supplemental Nutrition Assistance Program or SNAP (formerly the Food Stamps Program) is a federal government program administered by the Massachusetts Department of Transitional Assistance that offers nutrition assistance to qualified, low-income individuals and families to purchase food at participating retail food stores and farmer markets.

### **Sources for Chapter 3: Community Assets**

#### **311 Calls Map and Table**

- 311 Service Requests, City of Boston, <https://data.cityofboston.gov/City-Services/311-Service-Requests/awu8-dc52> (accessed May 2017)
- Decennial Census 2010, U.S. Census Bureau

#### **Voter Turnout – General Election Map**

- State and City Election Results, November 8, 2016: General Election, City of Boston Election Department, <https://www.boston.gov/departments/elections/results#results-2016> (accessed May 2017)

#### **Voter Turnout – Municipal Election**

- State and City Election Results, November 3, 2015: Municipal Election, City of Boston Election Department, <https://www.boston.gov/departments/elections/results#results-2016> (accessed May 2017)

#### **Land Use and Zoning Map**

- Zoning Subdistricts, 2016, BostonGIS, [http://bostonopendata-boston.opendata.arcgis.com/datasets/b601516d0af44d1c9c7695571a7dca80\\_1](http://bostonopendata-boston.opendata.arcgis.com/datasets/b601516d0af44d1c9c7695571a7dca80_1) (accessed May 2017)

#### **Median Assessed Property Value Map**

- Property Parcel Data, 2017, City of Boston Assessing Department, <https://data.boston.gov/dataset/property-assessment> (accessed May 2017)

#### **Median Assessed Property Value Growth Map**

- Property Parcel Data, 2014 and 2017, City of Boston Assessing Department, <https://data.boston.gov/dataset/property-assessment> (accessed May 2017)

#### **Open Space Maps**

- Open Space: Open Space, BostonGIS, City of Boston, [http://bostonopendata-boston.opendata.arcgis.com/datasets/2868d370c55d4d458d4ae2224ef8cddd\\_7](http://bostonopendata-boston.opendata.arcgis.com/datasets/2868d370c55d4d458d4ae2224ef8cddd_7) (accessed May 2017)
- Bike lanes: Bicycle Trails, Office of Geographic Information (MassGIS), <http://www.mass.gov/anf/research-and-tech/it-serv-and-support/application-serv/office-of-geographic-information-massgis/datalayers/bicycle-trails.html> (accessed May 2017)

#### **Walk Score**

- Walk Score, <https://www.walkscore.com/> (accessed May 2017)

### Activity Centers Map

- BCYF Community Center locations - Boston Centers for Youth & Families (BCYF), <https://www.boston.gov/community-centers> (accessed May 2017)
- YMCA locations – YMCA of Greater Boston, <http://ymcaboston.org/find-your-y> (accessed May 2017)
- Boys & Girls Clubs locations - Boys & Girls Clubs of America, <https://www.bgca.org/> (accessed May 2017)
- Libraries - Neighborhood Branch Libraries, Boston Public Library, <http://www.bpl.org/branches/> (accessed May 2017)
- Pools and Skating Rinks - Department of Conservation and Recreation, Commonwealth of Massachusetts, <http://www.mass.gov/eea/agencies/dcr/masssparks/recreational-activities/> (accessed May 2017)

### Historic Districts Map (Data available from BostonGIS, City of Boston. Accessed May 2017.)

- BLC Landmarks: [http://bostonopendata-boston.opendata.arcgis.com/datasets/7a7aca614ad740e99b060e0ee787a228\\_3](http://bostonopendata-boston.opendata.arcgis.com/datasets/7a7aca614ad740e99b060e0ee787a228_3)
- BLC Historic Districts: [http://bostonopendata-boston.opendata.arcgis.com/datasets/547a3ccb7ab443ceaaba62eef6694e74\\_4](http://bostonopendata-boston.opendata.arcgis.com/datasets/547a3ccb7ab443ceaaba62eef6694e74_4)
- Main Street Districts: [http://bostonopendata-boston.opendata.arcgis.com/datasets/440c7ec0178d4c8593aecef7ea96bb4d\\_0](http://bostonopendata-boston.opendata.arcgis.com/datasets/440c7ec0178d4c8593aecef7ea96bb4d_0)

### Food Resources Map

- Food pantries and meal programs - The Greater Boston Food Bank, as of November 4, 2016
- Community gardens - Trustees Boston Community Gardens, The Trustees of Reservations, as of December 16, 2016
- Farmer's markets - Mayor's Office of Food Initiatives, City of Boston, as of November 4, 2016
- Grocery stores - InfoUSA Business Database, Boston Planning & Development Agency Research Division Analysis, as of November 4, 2016

### Charter and Public Schools Map

- BPS schools - School Directory List, Boston Public Schools, <http://www.bostonpublicschools.org/Page/628> (accessed May 2017)
- Charter schools - Boston Charter Schools, Massachusetts Charter Public School Association, <https://www.masscharterschools.org/schools/boston> (accessed May 2017)
- Parochial schools - Boston Catholic Directory, Archdiocese of Boston, <http://www.bostoncatholic.org/Parishes-And-People/Default.aspx> (accessed May 2017)

### Universities Map

- Universities - College Navigator, National Center for Educational Statistics, <https://nces.ed.gov/collegenavigator/?s=MA> (accessed May 2017)