C H A P T E R 7

Wellness and Chronic Disease

Prevention and treatment of chronic disease has emerged as a leading focus of public health efforts across the country. This report provides a glimpse of the alarming obesity epidemic and burden of chronic diseases and their combined impact on the well-being of residents of Massachusetts, as well as the health care system and economy of the Commonwealth.

This information links the rapidly rising rates of chronic diseases to associated risk factors such as poor nutrition, lack of physical activity, poor air quality, and exposure to tobacco. This report also reveals a gap in the state's ability to systematically monitor the impact of many of the chronic diseases on specific ethnic minority groups, including Asians and American Indians, and people with mental and physical disabilities.

A comprehensive examination of how current policies, systems, and environments in the home, community, workplace, school, and health care sites impact residents' health behavior and access to primary care and preventive services is an important step in the overall effort to improve the Health of Massachusetts.

The Social Spheres of Influence

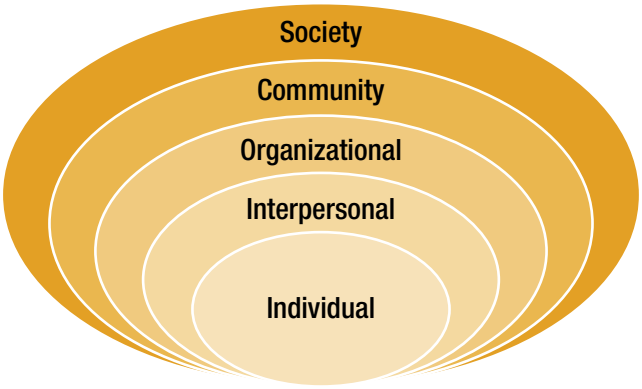
The Bureau of Community Health Access and Promotion – the Bureau at the Massachusetts Department of Public Health with primary

responsibility for the chronic diseases described in this section – has adopted the "Social-ecological Model." This approach helps the Department to plan efforts directed at health promotion and the reduction of morbidity and mortality from preventable conditions (Figure 7.1).

This framework recognizes that our ability to make healthy choices is influenced by the policies, systems and environment that exist in the world around us.[1] Unfortunately, the social spheres that influence our lives often limit rather than support a person's efforts to eat well, be physically active, and seek preventive care.

The result is a population suffering from multiple chronic aliments that generate staggering health care costs. This compromises the health of our residents, and puts the Commonwealth in dire fiscal straits. Whenever possible, we must consider making changes at the policy, systems, and environmental level to support individual's healthy choices.

Figure 7.1 **Ecological Model for Obesity Intervention**



Obesity

More than half of Massachusetts adults – approximately three million people – are either overweight or obese.

Trends in nutrition and physical activity behaviors are at the center of the growing obesity epidemic. Currently, more than half of Massachusetts adults are either overweight or obese. Approximately 25% of high school youth and more than a third of children ages two to five years participating in the WIC program are either overweight, or at risk of becoming overweight.

People who are overweight or obese are more likely to have type 2 diabetes, heart disease, stroke, gall bladder disease, and musculoskeletal disorders. In addition, overweight and obesity are associated with some forms of cancer, and many other health problems that interfere with daily living and reduce the quality of life.

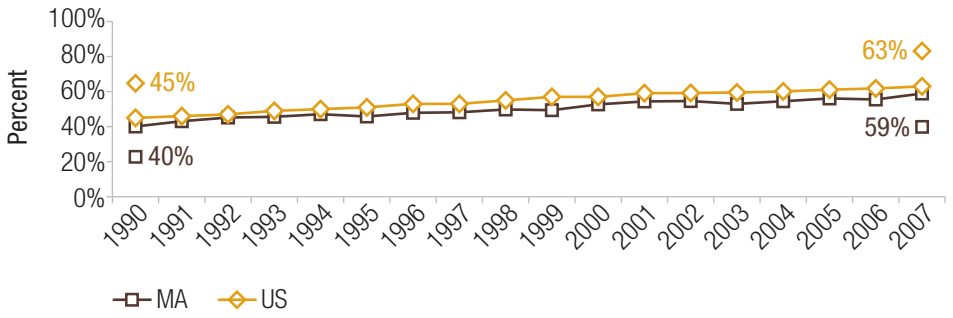
The cost of obesity is high, but quantifying the exact figures has been difficult. Obesity is not generally recognized as a disease, and is rarely listed as a primary diagnosis in hospital and medical records. Using current data sources, a conservative estimate of annual obesity-related medical costs for Massachusetts is $1.8 billion in 2003 dollars.[2]

Figure 7.2 **Three of Five Adults in MA are Either Overweight or Obese**

Prevalence of Overweight and Obesity

Fifty-nine percent of Massachusetts adults are above a healthy weight. This is slightly below the national average of 63%. One in five adults is obese, and not only is obesity prevalence rising, but it exceeds the Healthy People 2010 target of 15% (Figure 7.4), and is fast approaching the 2007 national median (26%).

Figure 7.3 **Overweight/Obesity Among Adults**



Source: MDPH BRFSS 1990-2007 and US BRFSS, 1990-2007.

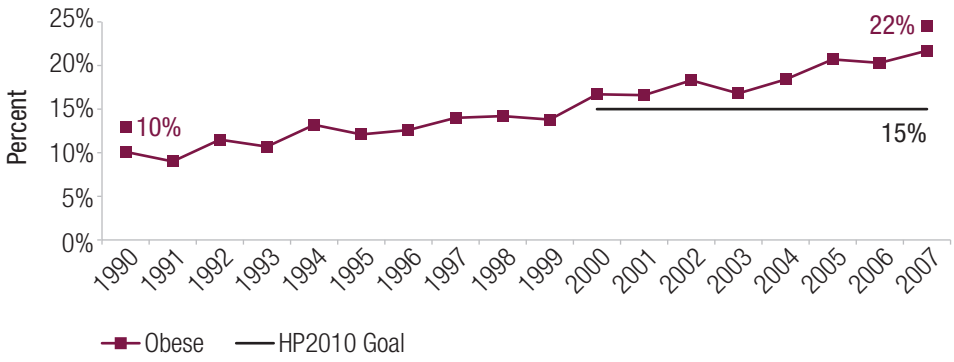
Body mass index (BMI) is used to screen for overweight and obesity. It approximates total body fat and is calculated by dividing weight in kilograms by height in meters squared. In adults, a body mass index between 18 and 25 is normal/healthy weight status, between 25 and 29.9 constitutes overweight, and 30 and higher is obese. BMI is not a perfect measure because it is calculated using weight and height only and does not take into account other objective measures such as waist circumference and muscle to fat ratio. Also, BMI is calculated and determined differently for children and adolescents.

Health Status and Chronic Conditions

Compared with healthy weight adults, obese adults are more than three times as likely to have been diagnosed with diabetes or high blood pressure.[3]

The cost of obesity is high. A conservative estimate of obesity-related medical costs for Massachusetts is $1.8 billion.

Figure 7.4 **Obesity Among Adults**



Source: MDPH BRFSS, 1990-2007; US Department of Health and Human Services Healthy People 2010 Database, 2000-2007.

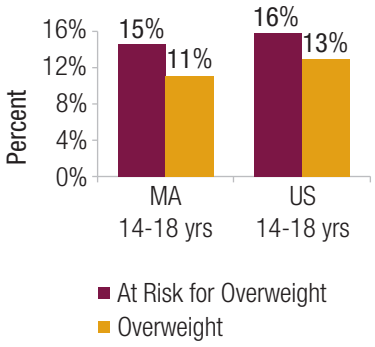
Mobility limitations and other forms of disability also exacerbate the overweight-obesity problem. People with disability have a more than 60% chance of being obese (28% vs. 17%) compared with their healthy peers.[4]

Overweight and obesity are significantly associated with several clinical markers for morbidity. Women who were obese at age 40 lived 7.1 fewer years than their healthy weight peers. Men who were obese at age 40 lived 5.8 fewer years.[5]

Children and Adolescents

Overweight is determined differently in children and adolescents than in adults. In children and adolescents, a BMI-for-age at or above the 95th percentile indicates obesity. Children with a BMI between the 85th and 95th percentiles for their age and gender are considered overweight. BMI classifications in children are both age- and gender-specific to account for changes in body fat that occur as they grow and mature.[6]

Figure 7.5 **Obese or Overweight Among Adolescents**



Source: Massachusetts Department of Elementary and Secondary Education Youth Risk Behavior Survey; CDC Youth Risk Behavior Survey, 2007.

Healthy weight concerns are being seen at much earlier ages. More than one third of two to five year olds who participate in the Massachusetts WIC Program are either overweight (17%) or at risk of becoming overweight (17%).[7]

Similar patterns are observed among older children or adolescents. In 2007, 11% of high school students were obese and 15% were overweight (Figure 7.5). In the same year, 11% of middle school students were considered obese and 18% were overweight.[8] These rates far exceed national goals of 5%.

Overweight and obesity puts children and youth at risk of negative health and social behaviors. Overweight female middle and high school students are more likely to engage in unhealthy practices such as fasting, vomiting, or taking diet pills or laxatives to control their weight. High school students who think they are overweight are more likely to have experienced dating violence, considered suicide or attempted suicide.[8]

Disparities in Overweight and Obesity

Disparities in obesity rates exist by race, education, income, gender, disability status, and geography. In Massachusetts, Hispanic adults are 50% more likely, and Black adults 60% more likely to be obese than their White counterparts.

Overall, obesity appears to be slightly more prevalent among men than women (Figure 7.6). However, this disparity becomes more apparent when examining racial groups. The prevalence estimates for Black women, 37%, and Hispanic women, 31%, both exceed the corresponding state estimate for all women 20%.

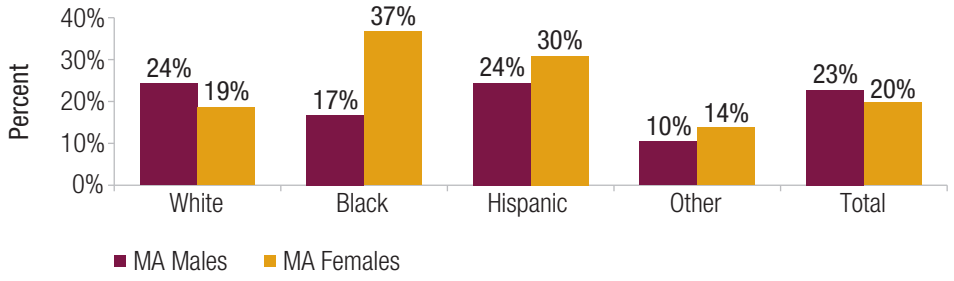
Adults with less than a high school diploma have a 210% increased likelihood of being obese compared with college graduates.[9] Adults who earn

$50,000 or less annually are more likely to be obese than those earning $50,000 or more.

Disparities in overweight also exist among adolescents according to gender and racial groups. The 2007 Massachusetts Youth Risk Behavior Survey (YRBS) found that male high school students were more than twice as likely to be overweight than female students (14.8% vs. 7.1%, respectively). In addition, Black, Hispanic, and students of multiple ethnicities were more likely to be overweight than their White peers: 22% of Black students, 15% of Hispanic students, 11% of students of multiple ethnicity, and 10% of Asian students were overweight, compared with 9% of white students (Figure 7.7).

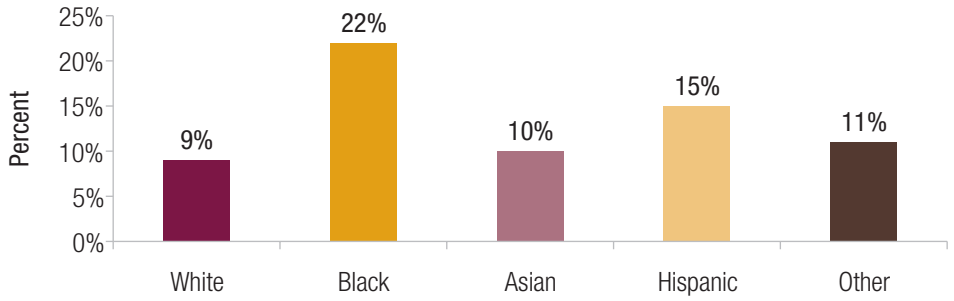
Sedentary behavior such as TV watching is more prevalent among Black and Hispanic students than among White students. Almost half (49%) of the Hispanic students and 46% of Black students in the Commonwealth watch three or more hours of television on an average school day compared with 27% of their White peers.

Figure 7.6 **Obesity Among Adults**



Source: MDPH BRFSS, 2007.

Figure 7.7 **Overweight Among High School Students**



Source: Massachusetts Department of Elementary and Secondary Education Youth Risk Behavior Survey, 2007.

Modifiable Risk Factors for Obesity and Overweight

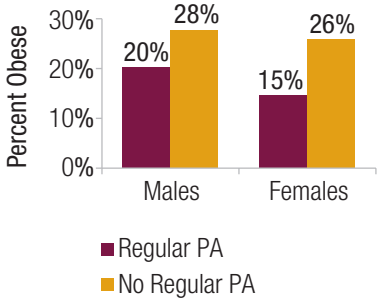
A balanced diet low in saturated fats and added sugars, but rich in fiber from fruits, vegetables, and whole grains protects and promotes good health and may help control overweight and obesity.[10,11,12] Also, regular physical activity reduces a person's risk for obesity and overweight, and adds many other health benefits, including reduced risk of chronic disease morbidity, fall-related injuries, and all-cause mortality.[13]

Mass in Motion

Mass in Motion is a multi-faceted approach to health promotion launched in January 2009 to promote wellness and to prevent obesity in Massachusetts. With a particular focus on the importance of healthy eating and increasing physical activity, *Mass In Motion* includes:

- Interactive website and public education campaign (www.mass.gov/MassInMotion).
- New requirements for large chain restaurants to post calorie information for the food they serve.
- Healthy food requirements for state agencies for all food purchased and served.
- Funding for cities and towns to develop policy and environmental change initiatives.
- Workplace initiative to improve the health of employees and support healthier worksites.

Figure 7.8 **Regular Physical Activity and Obesity**



Source: MDPH BRFSS, 2007.

Eating Patterns

The US Department of Agriculture (USDA) recommends eating at least two servings of fruit and three servings of vegetables daily (commonly referred to as five or more servings of fruits and vegetables).[14] However BRFSS data indicate that in 1996 only 26% of Massachusetts residents met that target. By 2007, that figure was relatively unchanged at 27.5%.[15]

The picture is slightly worse for children and teens: only 15% of high school students reported eating five or more servings of fruits and vegetables per day. Only 15% of middle school boys and 13% of girls reported consuming three or more servings of vegetables the day before the survey.

Activity Patterns

Despite the clear benefits, many Massachusetts adults and adolescents fall short of the Surgeon General's physical activity recommendations which encourage adults to get 30 minutes or more of moderate-intensity physical activity most days of the week.[16] About half of Massachusetts adults report regular moderate physical activity (both leisure and non-leisure).

Women who get no regular physical activity have almost twice the likelihood of being obese compared with those who do (25.8% vs. 14.6%) (Figure 7.8).

The Dietary Guidelines for Americans recommend that children and adolescents participate in at least 60 minutes of moderate intensity physical activity most days of the week, preferably daily.[17] However, among Massachusetts high school students, only 41% report engaging in moderate to vigorous physical activity on five or more days per week for at least 60 minutes. This estimate is higher than the 2007 national data that shows that only about 35% of high schools students nationally meet this recommendation. Nevertheless, six out of ten Massachusetts high school students do not meet the recommended guidelines for physical activity.[18]

The number of Massachusetts high school students attending physical education classes at least once a week declined from 80% in 1993 to 61% in 2007. In 1996, the state mandate stipulating the amount of school time earmarked for physical education was eliminated.

Television and Video Viewing Patterns

Television viewing, a major sedentary behavior in the United States, contributes to overweight and obesity in adolescents and adults as well as adult-onset type 2 diabetes.[19,20,21] The YRBS reports that Massachusetts high school students who watch three or more hours of television per day are more likely than their peers to be overweight (14% vs. 8%). The percent of Massachusetts high school students who watch three or more hours of

television a day decreased from 35% in 1999 to 28% in 2007. This encouraging estimate is also lower than the 2007 national estimate of 35.4%.[22]

Similar sedentary behaviors are observed among middle school students: according to the 2007 YHS data 35.9% of boys and 31.1% of girls watch three or more hours of TV on an average school day. This does not include other screen time such as time spent on computers, on-line and video games.

Differences exist in TV viewing habits among racial groups. Almost half (49%) of the Hispanic students and 46% of Black students in the Commonwealth watch three or more hours of television on an average school day followed by 35% of Asian students, 35% of 'Other' or 'Multiple ethnicity' students, and only 27% of White students.

More Massachusetts students also reported spending time on other similar sedentary behavior than their national peers. Thirty percent of Massachusetts high school students reported playing video or computer games or using the computer for something other than school work for three or more hours on an average school day. This compares with 25% of US high school students.

The data presented link how poor nutrition, lack of regular moderate physical activity and sedentary behavior among children contribute to the growing obesity epidemic and associated chronic diseases. A comprehensive examination and understanding of these factors and their impact on overweight/obesity can facilitate a concerted and coordinated response to this growing public health epidemic. A concerted effort at all levels of the Commonwealth can help create environments that support individuals in making healthy choices and help curb the growing obesity epidemic.

Asthma

Asthma is a chronic inflammatory disease of the airways. The airways become constricted due to swelling and excessive mucous production in response to exposure to environmental triggers. Symptoms of asthma are wheezing, coughing, chest tightness, and trouble breathing.

Asthma is a common and growing public health problem that impacts the lives of many individuals in the United States and Massachusetts. Nationally, the prevalence of asthma has been increasing since 1980 across all age, gender, and racial groups. In Massachusetts, the prevalence of asthma is one of the highest in the country.[23]

In most cases, the exact cause of asthma is unknown. While there is no cure for asthma, asthma can be controlled, and people with asthma are able to sleep through the night, go to work and school, and live normal active lives. However, in Massachusetts, a startlingly small portion of people with asthma have good control of their condition – approximately one in four adults and one in three children (Figure 7.9).

The costs associated with asthma are substantial. In 2007 in Massachusetts, the total hospital charges associated with asthma exceeded $136 million. In the US, the total direct and indirect costs were $19.7 billion.[24]

Figure 7.9a **Asthma Control Among Adults**

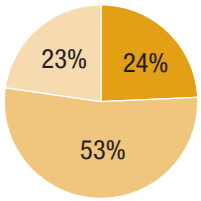
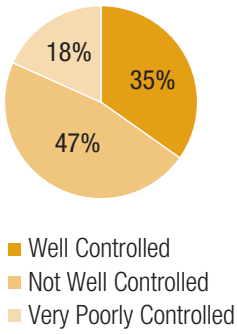


Figure 7.9b **Asthma Control Among Children**



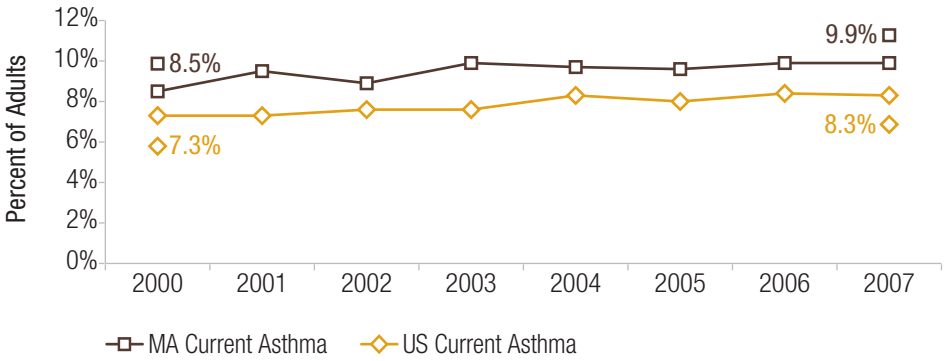
Source: MDPH BRFSS Adult and Child Asthma Call-back Survey, 2006-2007.

The health and economic burden of asthma underscore the need to improve diagnosis and management of asthma, reduce exposure to known environmental triggers, and promote research on the causes of asthma are necessary.[29]

Prevalence of Asthma

In 2007, the prevalence of current asthma among Massachusetts adults was 9.9%, a 16.5% increase from 2000. Among children, the prevalence of current asthma in 2007 was 10.5%.

Figure 7.10 **Trends in Prevalence of Current Asthma Among Adults**



Source: MDPH BRFSS, 2000-2007.
*The prevalence of current asthma was statistically higher in MA than the US (p≤0.05) for every year examined.

When asthma is well controlled, people can sleep through the night, go to work and school, and live normal active lives. However, a startling small portion of people with asthma have good control of their condition – only one in four adults and one in three children.

The characteristics of adults and children with asthma varied by demographics and health risk indicators. According to the BRFSS from 2005 through 2007, while there were no differences across racial and ethnic subgroups, current asthma was higher among adult females, male children, adults and children in households with low educational attainment, adults and children in households with incomes less than $75,000, adult smokers, and adults with disabilities.

Hospital Visits for Asthma

Asthma can be controlled through careful disease management – such as self-management education and use of asthma action plans – and avoidance of environmental triggers. Severe asthma outcomes such as hospitalizations can be prevented. The asthma hospitalization and emergency department rates in Massachusetts are higher than the HP2010 target rates (Figure 7.11).

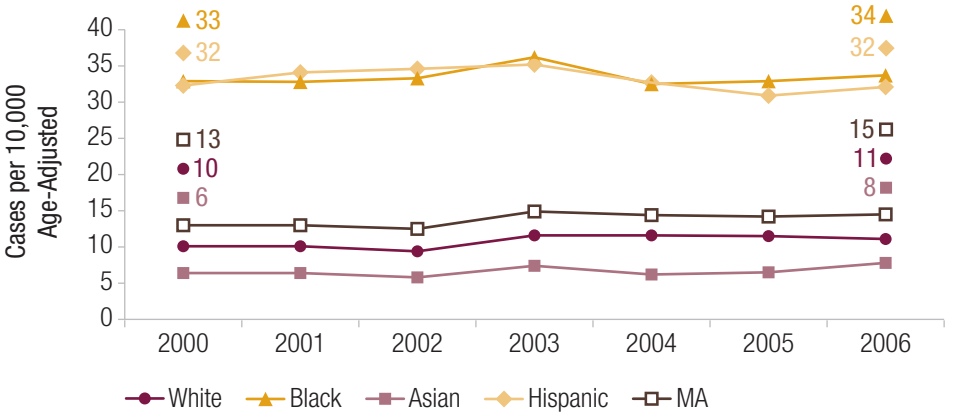
In Massachusetts, children ages zero to four years, adults ages 65 and older, and Black and Hispanic residents have much higher rates of hospitalization due to asthma compared to the overall state rate. Asthma hospitalization rates among Black and Hispanic residents were approximately three times higher than the rate for White residents (Figure 7.12).

Figure 7.11 **Asthma Hospitalization and ED Rates by Age**

Objective	Age Group	MA	HP2010
Reduce hospitalizations for asthma (rate per 10,000)	0-4 Years	37*	25
	5-64 Years	11*	8
	65+ Years	26*	11
Reduce emergency department visits for asthma (rate per 10,000)	0-4 Years	123*	80
	5-64 Years	57*	50
	65+ Years	19*	15

Source: Massachusetts Division of Health Care Finance and Policy, Inpatient Hospitalization and Emergency Department Discharge Databases, FY2005-2007; US Department of Health and Human Services Healthy People 2010 Database, 2000-2007.
*Statistically different from the HP2010 target (p≤0.05).

Figure 7.12 **Asthma Hospitalization Rate by Race and Ethnicity**



Source: Massachusetts Division of Health Care Finance and Policy, Inpatient Hospital Discharge Database, FY2000-2006.
*All racial/ethnic subgroups were statistically different from the Massachusetts rate (p≤0.05) for every year examined.

Black and Hispanic residents suffer disproportionately from poor asthma outcomes compared to their White counterparts.

Figure 7.13 **Asthma Hospitalization Rate by EOHHS Region**

EOHHS Region	Cases per 10,000
Western	13.2*
Central	13.9
Northeast	14.1
MetroWest	9.9*
Southeast	16.5*
Boston	21.5*
MA Total	14.4

Source: Massachusetts Health Care Finance and Policy, Inpatient Hospital Discharge Database, FY2005-2007.
*Statistically different than the Massachusetts rate (p≤0.05).

The Southeast region had a rate of asthma hospitalization that was 15% higher than the overall Massachusetts rate. For the Boston region, the rate was 50% higher than the overall state rate.

Environmental Factors that Cause and/or Exacerbate Asthma

There are approximately 335 substances known to cause or suspected of causing or exacerbating asthma symptoms.[25] These include certain chemicals, allergens (mold, pet dander, dust mites, mice, and cockroaches), tobacco smoke and viral respiratory infections.

The primary outdoor air pollutants linked to asthma are ground level ozone, sulfur dioxide, particulate matter and nitrogen oxides. Children are particularly vulnerable to environmental factors as their bodies take in proportionately greater amounts of these substances than adults. Reducing

Reducing harmful exposures in the home, school, work and neighborhood environment is necessary to control and in some cases, prevent asthma.

harmful exposures in the places where people with asthma spend most of their time – home, school, work and neighborhoods – is necessary to control and in some cases, prevent asthma.

Housing can seriously influence health, especially for people with asthma. According to the 2007 American Housing Survey, the percentage of New England homes with severe physical problems is approximately twice that of the US.[26] These problems include signs of mice, leaks, incomplete plumbing and exterior problems with the roof, siding and foundation.

Figure 7.14 **Environmental Triggers in the Homes of Those with Current Asthma**

Trigger	Adults %	Children %
Carpeting or rugs in bedroom	58.5	56.3
Pets in home	59.3	49.6
Pets in bedroom	48.8	26.6
Use gas for cooking	41.8	51.5
Use wood burning fireplace or stove	24.0	27.2
Use unvented gas logs, fireplace, or stove	*	*
Smoking in the home (past week)	18.2	*
Mold in the home (past month)	16.4	*
Mice or rats in the home (past month)	7.9	11.0
Cockroaches in the home (past month)	*	*

Source: MDPH Adult and Child Asthma Call-back Survey, 2006-2007.
*Percentages not shown if the unweighted sample size for the denominator was <50 or if the relative standard error was ≥ 30%.

More data on indoor and outdoor environmental factors can be found in Chapter 8 - Environmental Health.

Inside the Home
Mold is present in almost 2 out of 10 homes of adults with asthma. Persistent moisture problems can lead to structural problems and may exacerbate pest problems. Policies are needed to improve the conditions in affordable housing and encourage homeowners to repair damages. Almost 2 out of 10 homes of adults with asthma had someone smoking inside the home in the past week. Smoking does not affect just the smoker, but also family members and neighbors. Smoke-free housing policies can effectively limit exposure.

For adults, exposures in the work environment are important contributing factors that can cause asthma or make asthma symptoms worse. According to the Asthma Call-back Survey, 40% of adults with asthma reported that their current or previous workplace environment caused or aggravated their asthma, and 5% reported changing or quitting their job because of their work-related asthma.[27]

The American College of Chest Physicians recommends that doctors discuss work exposures with all adults with new onset or worsening asthma symptoms. All health care providers practicing in Massachusetts are required to report work-related asthma to the MDPH.[28] By reporting cases to MDPH, health care providers can play an important role in primary prevention of work-related asthma.

For more information on work-related asthma, see Chapter 9: Occupational Health.

Creating healthy environments in homes, schools, workplaces, and neighborhoods, minimizing exposure to triggers and implementing better asthma management practices, such as self-management education and asthma action plans, are essential to prevent and control asthma in Massachusetts.[29]

Diabetes

Diabetes is a disease where sugar accumulates in the blood (called "blood glucose") at much higher levels than normal. Poorly controlled blood glucose can lead to several serious complications including blindness, kidney failure, stroke, amputation of the lower leg, and heart attack.

Diabetes is classified as either type 1 or type 2. In type 1 diabetes, the body cannot produce insulin, a hormone used to convert sugar, starches, and other food into the energy needed for everyday life. In type 2 diabetes, the body can produce insulin, but does not use it efficiently.

Nearly 95% of people with diabetes have type 2 diabetes, a condition associated with overweight and obesity.[30] This section will focus on type 2 diabetes.

Nearly 95% of people with diabetes have type 2 diabetes, a condition associated with overweight and obesity.

Risk Factors

Pre-diabetes and gestational diabetes are two conditions that indicate a person has an increased risk for developing type 2 diabetes. Prevention efforts should focus on people with these conditions.

A person with pre-diabetes has higher blood glucose levels than normal, but not high enough for a diagnosis of diabetes. Gestational diabetes occurs in women during a pregnancy where they experience glucose intolerance. It can cause complications to both the mother and her child.[31] The child also has an increased risk for developing type 2 diabetes later in life.[32,33,34,35]

For more information on gestational diabetes, see Chapter 5: Natality and Early Childhood.

Other individuals at increased risk for type 2 diabetes include those with a family history of diabetes (having a parent, brother or sister with diabetes), older individuals, racial and ethnic minorities (African-American, American Indian, Asian-American, Pacific Islander, or Hispanic-American/Latino heritage), and those with high blood pressure or high cholesterol.

Impact and Scope of Diabetes

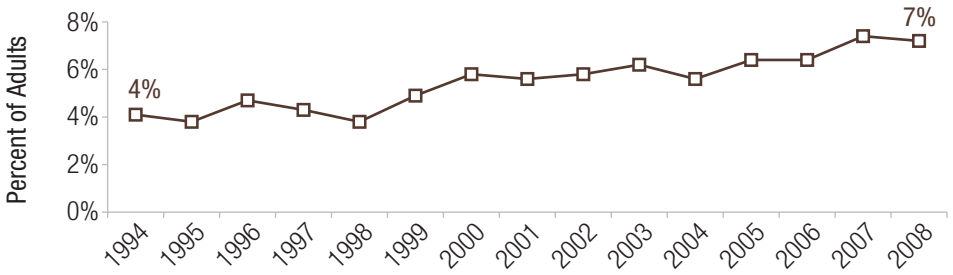
More than 300,000 people in Massachusetts have diagnosed diabetes. Based on estimates from the Centers for Disease Control and Prevention, there may be an additional 100,000 undiagnosed individuals in the Commonwealth.[36]

In 2008, 7.2% of the Massachusetts adult population reported that they have been diagnosed with diabetes. This represents nearly a 75% increase since 1994. Given the strong association between overweight/obesity and type 2 diabetes, the major increase of type 2 diabetes may be attributed to the overweight/obesity increase during the same period. [36]

In 2008, 7.2% of the Massachusetts adult population reported that they have been diagnosed with diabetes. This represents nearly a 75% increase since 1994.

In 2007, 5.4% of the adult population in Massachusetts reported that they had been diagnosed with pre-diabetes.[37] The Centers for Disease Control

Figure 7.15 **Trends in Prevalence of Diabetes Among Adults**



Source: MDPH BRFSS, 1994-2008.

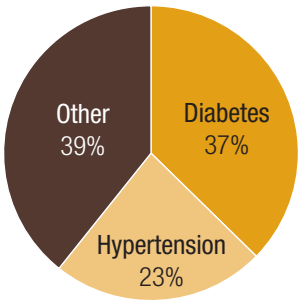
The American Diabetes Association estimates the nation's annual price tag for diabetes is $174 billion.

and Prevention has estimated that the prevalence of pre-diabetes may be 25% of the adult US population but that most people are unaware of their condition. Clinical trial results have shown a 58% reduction of new cases of diabetes through lifestyle intervention among people with pre-diabetes.[38,39,40]

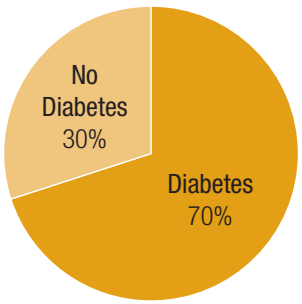
Diabetes is one of the most costly chronic diseases in the United States. It absorbs 25% of the Medicare budget[41] and the American Diabetes Association estimates the nation's annual price tag for diabetes based on 2007 expenses is $174 billion.[42] However, much of the health care costs associated with diabetes care are avoidable if providers can meet the standards of care for diabetes and patients can achieve good self-management. According to the Massachusetts Division of Health Care Finance and Policy, diabetes ranks fifth among causes of preventable hospitalizations for adults aged 18 and older.[43] Even the most serious complications caused by diabetes can be prevented.

Figure 7.16 **Major Complications of Diabetes**

Causes of Kidney Dialysis

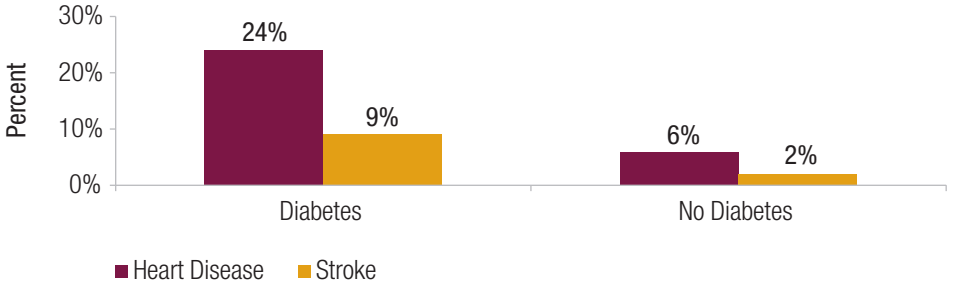


Diabetes and Hospitalizations for Lower Extremity Amputations



Source: (Top) New England End-Stage Renal Disease Network, 2007; (Bottom) Massachusetts Division of Health Care Finance & Policy, Uniform Hospital Discharge Data Set, 2007.

Figure 7.17 **Prevalence of Heart Disease and Stroke by Diabetes, Adults 45+**



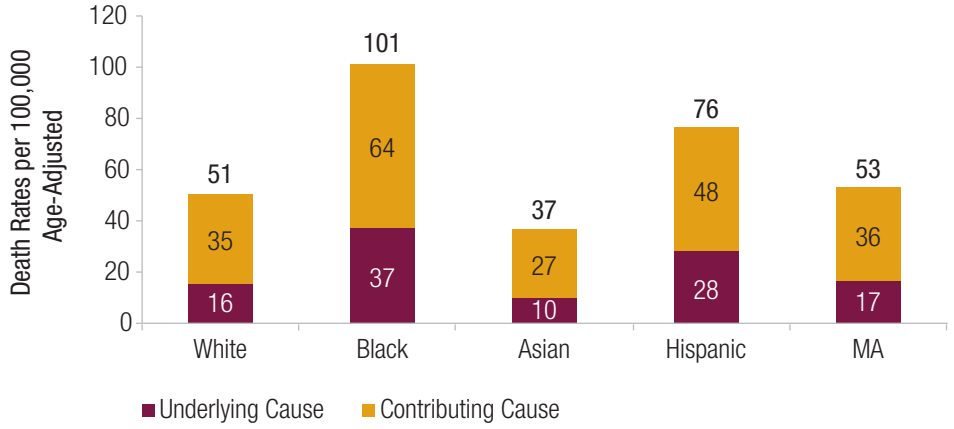
Source: MDPH BRFSS, 2008.

The clinical and economic consequences of diabetes do not impact everyone equally, and diabetes and its consequences can vary greatly depending on several variables. Gender, race/ethnicity, disability status, primary language, literacy level, where a person lives, income, and education can influence how well a person can maintain a healthy lifestyle. These same factors may also affect how well a community or a health care system can provide services to a person with diabetes.

Men have diabetes at higher rates than women (7.9% vs. 5.9%). Black and Hispanic populations have nearly twice the rate of diabetes as White populations. Those with less income and fewer years of education have significantly higher rates of diabetes. Higher rates of diabetes are found in certain communities, including Lawrence (12.8%), Springfield (12.3%) and Fall River (10.8%), compared to the state as a whole (6.8%).

In 2007, diabetes was the ninth leading cause of death in Massachusetts. Diabetes was also associated with many more deaths as a contributing condition. Compared with other race/ethnic populations, Black and Hispanic residents have much higher death rates from diabetes as the underlying and contributing condition.

Figure 7.18 **Diabetes Death Rates**



Source: MDPH Death File, 2007.

Screening, Quality Improvement, Community

The best way to improve detection of undiagnosed diabetes and pre-diabetes is through screening of high-risk populations. Every resident aged 45 and older should be screened regularly for diabetes. Those under the age of 45 should be screened if they are overweight and have at least one other risk factor for diabetes. Anyone found to have pre-diabetes at screening should receive intervention to prevent diabetes and then be regularly screened for diabetes.

For those with diabetes, receiving preventive care and achieving good self-management of their blood glucose level are vital to avoiding complications that generate associated costs. Preventive care includes receiving annual foot exams that test for numbness, annual dilated eye exams, flu and pneumonia vaccinations, tests for kidney disease, regular HgA1c tests, and support with quitting smoking.

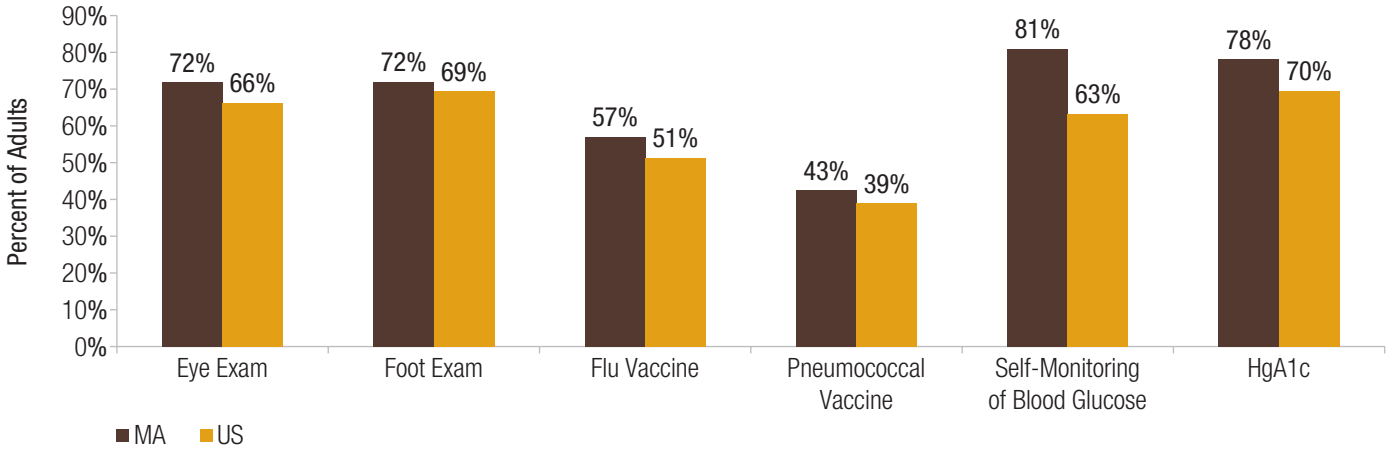
Self-management involves regular monitoring of blood glucose, good nutrition, regular physical activity and achieving a healthy weight. All

Reducing the Burden of Diabetes

To reduce the impact of diabetes, major goals should include improved diagnosing of diabetes and pre-diabetes, interventions for those at high risk (pre-diabetes, history of gestational diabetes) and preventing complications (meeting standards of care, taking prescribed medications, control of blood glucose, tobacco cessation and greater access to and participation in self-management training).

people with diabetes should receive nutrition counseling, support from their clinical diabetes educator, counseling in managing their diabetes, and chronic disease self-management training. A person with diabetes who also has other chronic diseases such as high blood pressure, high cholesterol or cardiovascular disease must also manage these conditions in order to avoid complications from diabetes.

Figure 7.19 **Diabetes Preventive Care**



Sources: MDPH BRFSS, 2008; US BRFSS, 2006.

Key Responses to the Increasing Burden of Diabetes

Massachusetts Department of Public Health Diabetes Pilot Projects:

- Implementing interventions for high-risk people and promoting system changes at the work site.
- Establishing consistent standards of care across all MA insurance carriers for adult diabetes care and for gestational diabetes.
- Promoting flu and pneumonia vaccinations for people with diabetes.

It is important to receive all types of preventive care for diabetes. Unfortunately, fewer than one fifth of persons with diabetes receive all of their preventive care and only half have reported taking a self-management course for their diabetes.[44]

Heart Disease and Stroke

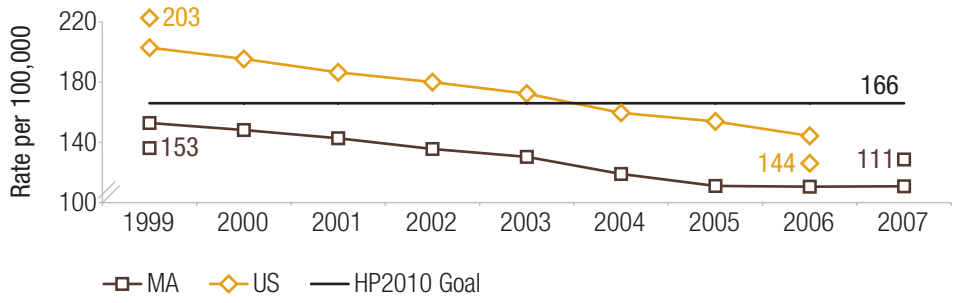
Diseases of the heart and blood vessels, together called cardiovascular disease or CVD, kill more people in Massachusetts and the nation than any other disease. In 2007, CVD caused one of every three deaths in Massachusetts.[45]

The most familiar and deadly form of CVD is coronary heart disease (CHD), the disorder that leads to heart attacks (Figure 7.20). CHD occurs when the arteries that supply nutrient-rich blood to the heart narrow and harden due to the buildup of plaque, a condition called atherosclerosis. The same mechanism is responsible for the occurrence of stroke, where plaque accumulates in arteries and blocks the supply of blood to the brain.[46]

For the past decade, the death rates from heart disease and stroke in Massachusetts have declined, and far surpassed the national HP2010 goals and the national average (Figures 7.21 and 7.22).[46,47,48] Despite this accomplishment, risk factors directly related to these diseases, including high

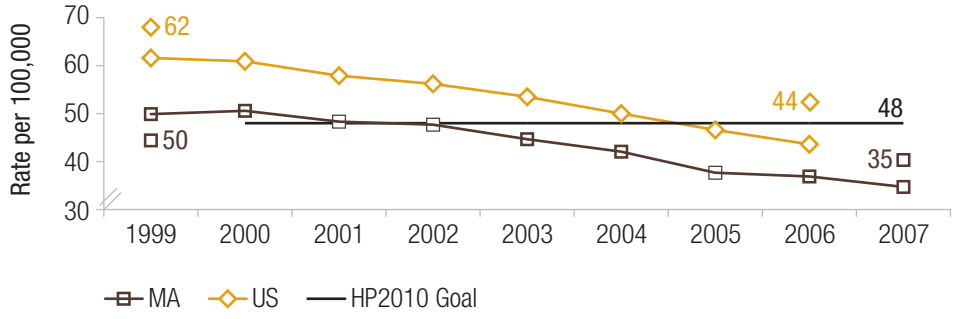
blood pressure, high cholesterol, diabetes, tobacco use, and obesity are on the rise and highly prevalent among Massachusetts residents, especially among minority populations.

Figure 7.21 **Coronary Heart Disease Death Rates**



Source: MDPH Death File, 1999-2007; CDC Wonder Compressed Mortality (Web), 1999-2006.

Figure 7.22 **Stroke Death Rates**



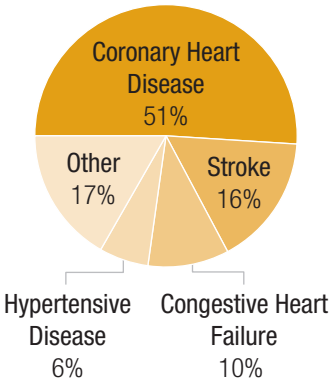
Source: MDPH Death File, 1999-2007; CDC Wonder Compressed Mortality (Web), 1999-2006.

Not only are cardiovascular diseases a leading cause of death, they are also a major cause of permanent disability. Nationally, they are the most costly group of diseases, with an estimated $475 billion in both direct and indirect costs in 2009.[49]

Massachusetts-specific data on the true cost of disease are not readily available. However, one indicator of the economic burden of heart disease and stroke on the Commonwealth is inpatient hospitalization charges. Although the prevalence of cardiovascular diseases have declined in recent years, total inpatient hospital charges have increased annually. In 2007, charges for CVD approached $3.5 billion, representing nearly one-third of the total hospital charges for that year (Figure 7.23).[50]

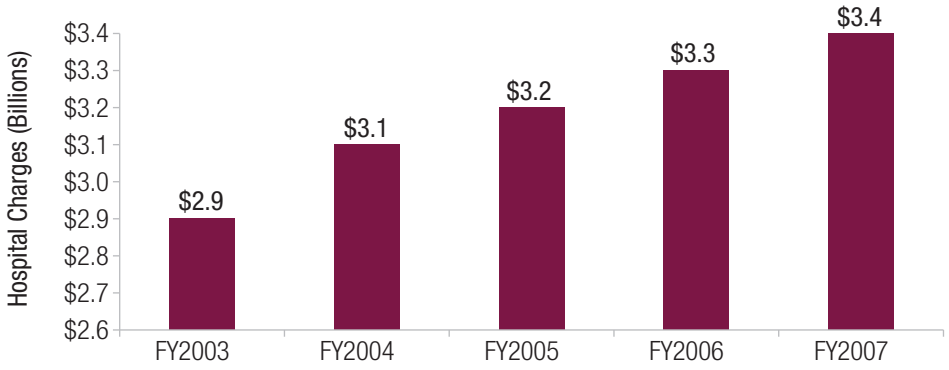
Cardiovascular disease can be prevented in most cases by controlling blood pressure, cholesterol and diabetes, avoiding tobacco, eating a healthy diet, and exercising regularly. Prompt recognition and treatment for heart attack or stroke can have a significant positive impact on outcomes and resulting quality of life.[51]

Figure 7.20 **Cardiovascular Disease Deaths**



Source: MDPH Death File, 2007.
Note: Other includes Rheumatic, Pulmonary, Atherosclerosis and other circulatory diseases.

Figure 7.23 **Total Charges for Inpatient Hospitalizations for CVD**



Source: Massachusetts Division of Health Care Finance and Policy Hospitalization Department Discharge Databases, FY2007.

Figure 7.24 **Signs and Symptoms of Stroke**

Source: MDPH, Heart Disease and Stroke Prevention and Control Program.

Free educational materials are available in English, Spanish, Portuguese, and Khmer at www.maclearinghouse.org.

In 2007, only 15% of adults in Massachusetts could recognize all signs of heart attack, while only 23% could recognize all signs of stroke.[37] Because only one in four people recognize all signs of a stroke, the Heart Disease and Stroke Prevention and Control Program developed a comprehensive public education campaign on the signs and symptoms of stroke and the need to call 9-1-1 for assistance (Figure 7.24).

Prevalence of Heart Disease and Stroke

In 2008, 7% of adults age 35 or older, or about 250,000 people, reported having coronary heart disease. Additionally, 5% of the same adult age group reported having had a heart attack and 3% reported having had a stroke.[36]

Some groups in the Commonwealth have higher rates of heart disease and stroke than others. These include people ages 75 or older, men, persons with disabilities, and Blacks. Those with the lowest education levels and lowest income are also disproportionately affected.

Risk Factors for Heart Disease and Stroke

Figure 7.25 **High Blood Pressure and High Cholesterol Among Adults 35+**

	1997	2007
High Blood Pressure	26%	33%*
High Cholesterol	29%	40%*

Source: MDPH BRFSS, 1997-2007.
*Trend is statistically significant ($p \leq 0.05$).

Significant increases in the prevalence of two cardiovascular risk factors - high blood pressure and high cholesterol - are becoming an increasing concern (Figure 7.25).[52] Because of the lack of symptoms, it is important to have both checked regularly. When present, these risk factors can be prevented or controlled through medication and lifestyle changes.

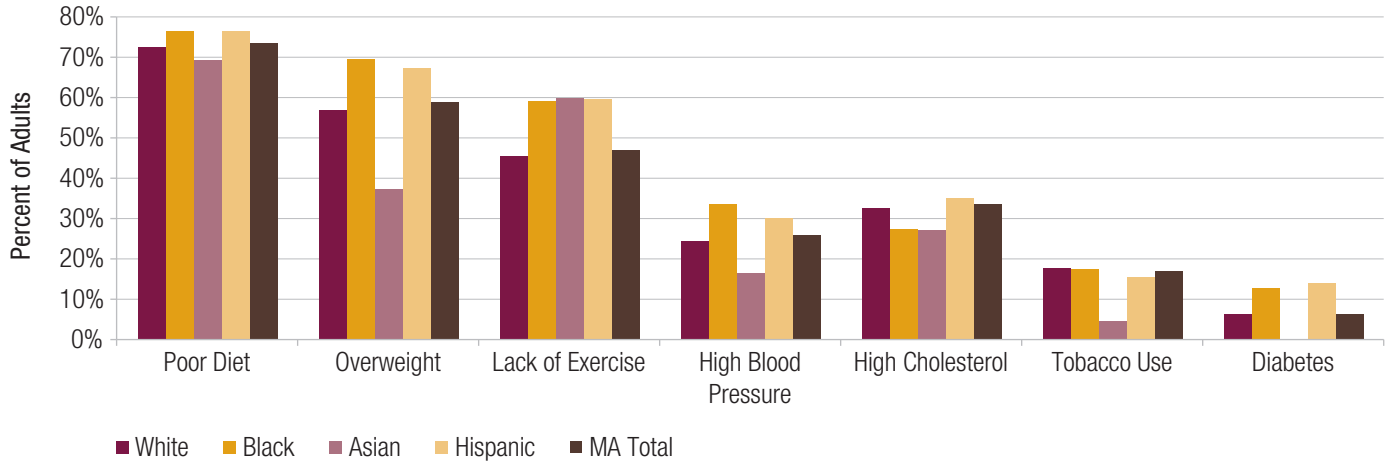
Virtually all population groups 18 and older in Massachusetts have rates of high blood pressure above the HP2010 target of 16%. The rate for Blacks is 34%; for Whites, 24%; and for Hispanics, 30%. Older individuals are at greatest risk of developing high blood pressure. Of residents aged 75 and older, 60% have high blood pressure compared with 26% of those aged 45-54.[37]

In 2007, 33% of Massachusetts residents, aged 18 years and older, had high cholesterol. Those between the ages of 65 and 74 years reported the highest percentage with high cholesterol. A higher proportion of males reported high cholesterol levels compared with females. Hispanics reported the highest proportion of all racial/ethnic groups.[37]

Among racial/ethnic groups, Black individuals and Hispanics reported the highest prevalence of a poor diet, being overweight or obese, having high blood pressure, and having diabetes. These groups were also among the highest to report not engaging in regular physical activity. Only Asian individuals are less active; However, Asian individuals reported the lowest prevalence of having a poor diet, being overweight or obese, high blood pressure, high cholesterol, and tobacco use (Figure 7.26).

Persons with disabilities, those with less than a high school education, and residents earning less than $25,000 have the highest rates of cardiovascular disease.

Figure 7.26 **CVD Risk Factors**



Source: MDPH BRFSS, 2007.

There is often a clustering of these modifiable risk factors and it is important to consider their cumulative effects on developing CVD. Among those who have never had either a stroke or heart attack, only 8% have five or more risk factors. Among those who have ever had either a heart attack or stroke, 43% had five or more risk factors.[37]

Associated Diagnoses with Heart Disease and Stroke

The harmful effects of heart disease and stroke profoundly manifest themselves in patients diagnosed with diabetes. In 2007, individuals in Massachusetts with diabetes had more than twice the prevalence of heart disease, heart attack and stroke than those without diabetes.[37] Complications from CVD not only occur at earlier ages but also cause premature death for those with diabetes. People with diabetes have a nearly four-fold risk of having a stroke and are at double the risk of having a subsequent stroke.[53]

While Massachusetts has made great strides in reducing overall morbidity and mortality due to heart disease and stroke, there is still opportunity for improvement, especially in terms of primary risk factor prevention. Together, diseases of the heart and blood vessels still cause substantial amounts of preventable death, disability, and financial burden for Massachusetts residents.

Cancer

Cancer is a group of diseases in which abnormal cells divide uncontrollably and can invade other tissues.[54] Although not all cancers can be prevented, risk factors for some cancers can be minimized through behavioral changes, vaccines, or antibiotics.

Regular screening for some cancers can help to detect them early, and the removal of precancerous growths (such as colon polyps or moles) can prevent some cancers from spreading to other parts of the body. It is estimated that most cancer deaths can be prevented by regular screening and early detection.[55] Fecal occult blood tests (FOBT), sigmoidoscopy, and colonoscopy are some of the tests and procedures that can detect colorectal cancer in its early stages.[56] Breast cancers can be detected earlier by mammography and clinical breast exams, and prostate cancers can be detected using prostate-specific antigen (PSA) and digital rectal exams (DRE).

Cancer is the leading cause of death in Massachusetts, followed by heart disease, stroke, and chronic lower respiratory disease.[57] Lung, prostate, colorectal, and pancreatic cancers are the leading causes of cancer deaths among males, while lung, breast, colorectal, and pancreatic cancers are the leading causes of cancer deaths in females.

In Massachusetts, from 2002 to 2006, there were 178,414 newly diagnosed cases of cancer, 89,809 (50.3%) in males and 88,593 (49.7%) in females.[58]

During the same time period, among Massachusetts females, breast cancer was the most commonly diagnosed cancer, followed by lung, colorectal and uterine. These four cancers represented approximately 59% of new cancer cases from 2002 to 2006.

From 2002 through 2006, there were 67,266 deaths due to cancer, with 33,508 (49.8%) deaths occurring among males and 33,759 (50.2%) among females. The age-adjusted mortality rate for all cancers combined was 232 deaths/100,000 for males and 163 deaths/100,000 for females.

The next section presents Massachusetts data on incidence, mortality, screening behaviors, and racial disparities for the four cancers most commonly diagnosed in Massachusetts residents.

Breast Cancer

Breast cancer forms in the breast tissues of both men and women, although male breast cancer is rare.[59] White women and elderly women are at an increased risk of developing breast cancer. Other risk factors include an early age at menarche, never having given birth or an older age at first birth, a mother or sister with breast cancer, radiation therapy to the breast or chest, obesity, and taking hormones such as estrogen and progesterone.[60]

Incidence of Breast Cancer

Breast cancer was the leading cause of cancer among females in Massachusetts between 2002 and 2006, representing approximately 28% of all new cancer cases in this group.

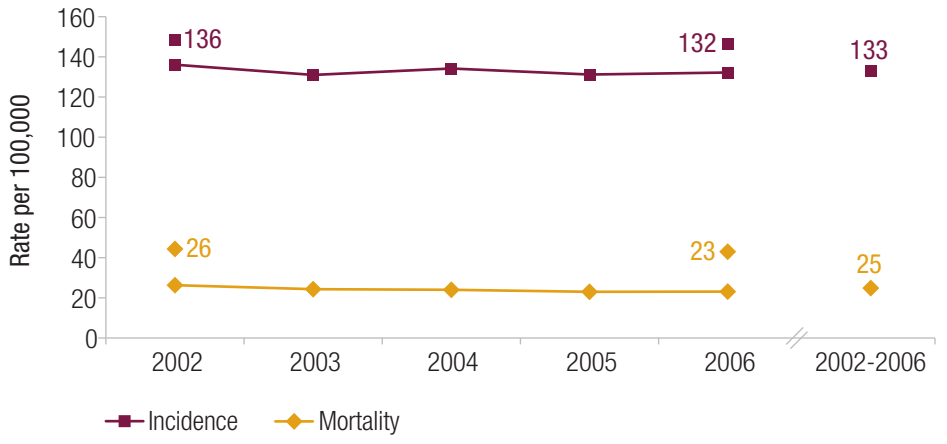
The Massachusetts rate is higher than the national rate (133 vs. 124 per 100,000). From 2002 to 2006, breast cancer incidence essentially stayed the same here while it significantly decreased nationally.[61]

Mortality of Breast Cancer

Between 2002 and 2006, breast cancer was the second leading cause of death among Massachusetts females after lung cancer. It accounted for approximately 26% of all cancer deaths in females and is similar to the national rate.

There was a significant decrease in breast cancer deaths among Massachusetts females from 2002 and 2006, decreasing 3% per year. Nationally, breast cancer deaths declined 2% per year between 1996 and 2005.[62]

Figure 7.27 **Breast Cancer Incidence and Mortality Among Females**



Source: MDPH Cancer Registry, 2002-2006.

Screening for Breast Cancer

According to the BRFSS, 85% of Massachusetts women reported having a mammogram in the past two years. Mammogram rates were similar among all racial groups.

Prostate Cancer

Prostate cancer is a disease that develops in tissues of the prostate (a gland in the male reproductive system found below the bladder and in front of the rectum) and usually occurs in older men.[63] Black men are at an increased risk for prostate cancer. Others at higher risk include those over 50 years of age, and those whose brother, son, or father had prostate cancer.

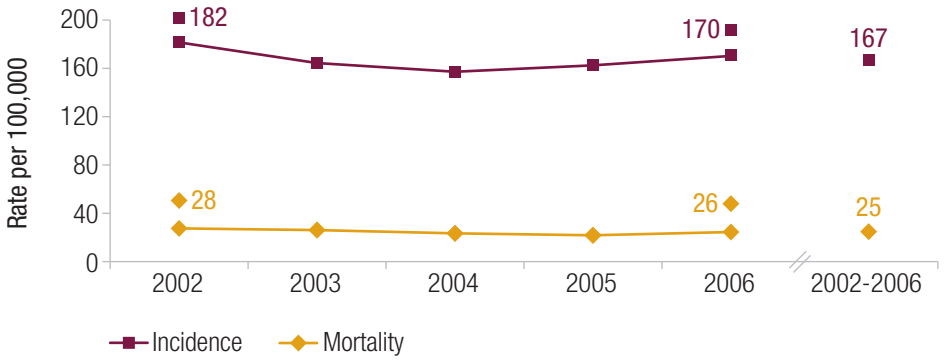
Incidence of Prostate Cancer

Prostate cancer was the most commonly diagnosed type of cancer in Massachusetts males from 2002 to 2006, representing 28% of all new cases of cancer in males.

The age-adjusted incidence rate for prostate cancer was 167/100,000 from 2002 to 2006 (Figure 7.28). During this period, US prostate cancer incidence rates were lower than those for Massachusetts (158/100,000).

In Massachusetts, prostate cancer deaths decreased between 2002 and 2006, but this decline was not statistically significant. National incidence rates for prostate cancer also decreased non-significantly during this period.

Figure 7.28 **Prostate Cancer Incidence and Mortality**



Source: MDPH Cancer Registry, 2002-2006.

Mortality of Prostate Cancer

Prostate cancer was the second leading cause of cancer deaths among Massachusetts males between 2002 and 2006, representing approximately 11% of all cancer deaths in this group. From 2002 to 2006, Massachusetts

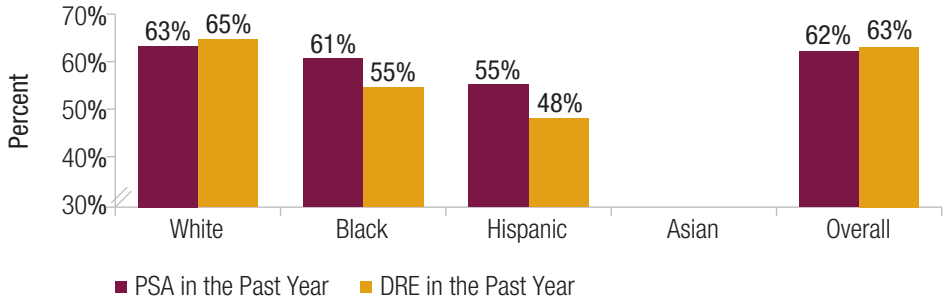
deaths due to prostate cancer decreased annually by 4.0%, however, this decrease was not statistically significant.

Screening for Prostate Cancer

Screening for prostate cancer is performed with a PSA, a blood test used to indicate an increased risk of prostate cancer. A second method is the digital rectal exam (DRE), in which a doctor, nurse, or other health professional places a gloved finger into the rectum to feel the size, shape, and hardness of the prostate gland. Overall nearly two thirds of Massachusetts males 50 years and older reported that they had DRE exam (65%) and PSA test (63%) in 2008 (Figure 7.29).

White males had the highest screening rates at 65% for DRE and 63% for PSA compared to the other racial groups. Screening rates were lowest among Hispanics.

Figure 7.29 **Prostate Cancer Screening Among Men 50+ Years**



Source: MDPH BRFSS, 2008.

Colorectal Cancer

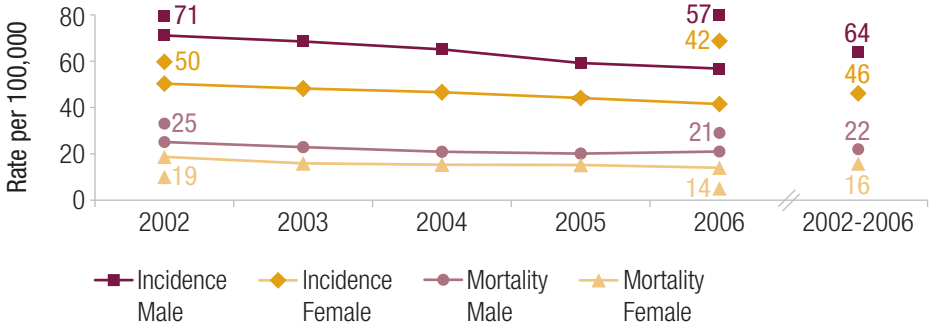
Colorectal cancer is a disease in which cancer forms in the tissues of the colon (the first several feet of the large intestines) or rectum (the last several inches of the large intestine).[64] Risk factors for colon cancer include being older than age 50; a personal history of colon cancer or cancer of the ovary, breast, or uterus; polyps in the colon or rectum; Crohn's disease; or ulcerative colitis. Other risk factors include a diet high in fat and animal protein and low in fiber and folic acid. Blacks also are at higher risk for colon cancer than those of other races.[65]

Incidence of Colorectal Cancer

Colorectal cancer was the third most commonly diagnosed type of cancer in both Massachusetts males and females between 2002 and 2006, accounting for approximately 11% of all cases in both males and females.

The age-adjusted incidence rates for colorectal cancer were 64/100,000 among males and 46/100,000 among females. These rates are slightly higher than the US rates of 61/100,000 for males and 44/100,000 for females (Figure 7.30).

Figure 7.30 **Colorectal Cancer Incidence and Mortality**



Source: MDPH Cancer Registry, 2002-2006.

Colorectal cancer in males decreased significantly from 2002 to 2006 at approximately 6% per year (Figure 7.30). National data show that colorectal cancer incidence rates decreased significantly by 2% per year from 1996 to 2005 for males.

In Massachusetts the incidence rate of colorectal cancer among females decreased significantly by 5% per year from 2002 through 2006. Nationally, the incidence of colorectal cancer in females decreased significantly by 2% per year from 1996-2005.

Mortality of Colorectal Cancer

Colorectal cancer was the third leading cause of cancer death in Massachusetts for both males and females between 2002 and 2006. It accounted for approximately 9% of all cancer deaths in males and 10% of all cancer deaths in females. During this period, the age-adjusted mortality rate of colorectal cancer was 22/100,000 for males and 16/100,000 for females (Figure 7.30).

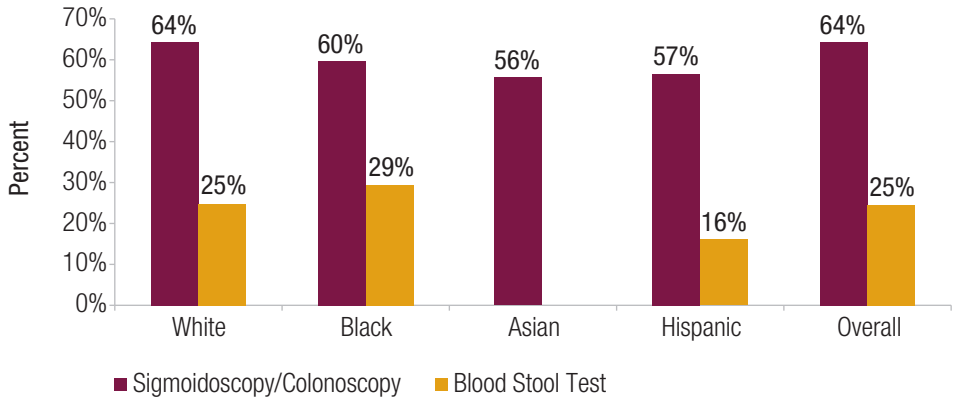
Massachusetts mortality rates among both males and females were similar to US rates. From 2002 to 2006 colorectal cancer mortality decreased by 5% per year among males and 6% per year among females.

Screening for Colorectal Cancer

Screening procedures to detect colorectal cancer in the early stages include FOBT (a home kit to determine if the stool contains blood), and sigmoidoscopy, and colonoscopy (tests that examine the bowel for signs of cancer or other health problems).

Overall 64% of all Massachusetts adults ages 50 years and older reported having a colonoscopy or sigmoidoscopy and one in four reported having an FOBT. Screening rates were higher among Whites than in other racial groups (Figure 7.31).

Figure 7.31 **Colorectal Cancer Screening Among Adults 50+ Years**



Source: MDPH BRFSS, 2008.

Lung Cancer

Lung cancer is a disease in which cancer cells develop in the lung tissue.[66] Tobacco use is the most important risk factor for lung cancer. Other risk factors include exposure to second-hand smoke; radon, a radioactive gas that damages lung cells; asbestos and other substances including arsenic, chromium, nickel, or tar; air pollution; a family history of lung cancer; a personal history of lung cancer; and age over 65.[67]

Incidence of Lung Cancer

In Massachusetts from 2002 through 2006, lung cancer was the second most commonly diagnosed type of cancer in both males and females, accounting for 14% of all cancer cases in both genders. Lung cancer is nearly twice as common in males than in females. Lung cancer rates stayed about the same from 2002 to 2006.

Mortality of Lung Cancer

Lung cancer was the leading cause of cancer death for Massachusetts males and females between 2002 and 2006, accounting for approximately 29% of all cancer deaths in males and 26% of cancer deaths among females. Mortality rates for lung cancer were lower in Massachusetts than in the US for males (66/100,000 vs. 72/100,000, respectively) and slightly higher for females (44.6/100,000 vs. 43/100,000, respectively).

Among Massachusetts males, mortality from lung cancer decreased significantly by 1% per year between 2002 and 2006. Among Massachusetts

females, mortality decreased non-significantly by 1% per year between 2002 and 2006.

Disparities in Cancer

From 2002 to 2006, Black males had the highest incidence rate of all cancer types combined (Figure 7.32). This rate was significantly higher than the rates for Asians and Hispanics, but not for Whites.

Figure 7.32 **Cancer Incidence and Mortality Rates Among Males**

Cancer Site	All Races	White	Black	Asian	Hispanic
			Incidence Rate		
All Sites	601.1	603.3	621.1	318.1	457.4
Prostate	167. 1	161.8	247.3	69.2	167.5
Colorectal	64.1	64.7	53.9	43.0	46.1
Lung	85.1	87.0	88.9	50.8	39.8
			Mortality Rate		
All Sites	231.9	235.0	284.7	133.0	124.2
Prostate	24.6	24.5	49.0	–	14.5
Colorectal	22.0	22.4	25.7	10.5	9.3
Lung	66.3	67.6	77.6	42.7	27.1

Source: MDPH Cancer Registry, 2002-2006.

Among men, Blacks had the highest age-adjusted mortality rates for all types of cancer combined from 2002 to 2006 (Figure 7.32). The mortality rate among Black males was significantly higher than the rates for the three other racial/ethnic groups, and these disparities were evident in each of the leading cancer types.

From 2002 to 2006, Black males had the highest rates of prostate cancer incidence (247/100,000) (Figure 7.32). This rate was significantly higher than the rates for other racial/ethnic groups. Nationally, prostate cancer incidence rates among Black males are decreasing, but the rates remain higher than among White males (236/100,000 vs. 150/100,000).

From 2002 to 2006, White males had the highest incidence rate of colorectal cancer (65/100,000), followed by 54/100,000 among Blacks, 46/100,000 among Hispanics, and 43/100,000 among Asians (Figure 7.32).

From 2002 to 2006, lung cancer was the second leading cancer among males in all racial groups, except among Hispanic males, where it was the third leading cancer. Black men had significantly higher lung cancer mortality rates compared with White men (77/ 100,000 vs. 68/100,000, respectively).

Figure 7.33 **Cancer Incidence and Mortality Rates Among Females**

Cancer Site	All Races	White	Black	Asian	Hispanic
			Incidence Rate		
All Sites	460.5	470.6	385.2	286.1	327.8
Breast	132.9	136.8	112.2	75.5	88.8
Colorectal	46.1	46.4	44.2	34.2	34.8
Lung	64.1	66.9	49.8	30.8	21.6
			Mortality Rate		
All Sites	163.4	166.8	177.1	86.1	86.3
Breast	24.1	24.7	29.7	8.2	14.0
Colorectal	15.8	15.9	19.7	7.8	9.9
Lung	44.3	46.3	38.5	18.3	10.7

Source: MDPH Cancer Registry, 2002-2006.

From 2002 through 2006, White females had the highest incidence rate of all cancer types combined among all racial/ethnic groups (Figure 7.33). Asian females had the lowest incidence rate of all cancers combined. Among females, the mortality rate for Black females was not statistically significantly different from the rate for White females. Both these groups, however, had significantly elevated rates when compared with Asian females.

Among women, Black females had the highest age-adjusted mortality rates for all types of cancer combined from 2002 to 2006 (Figure 7.33). The mortality rate was not statistically significantly different from the rate for White females, but both Black and White females had significantly elevated rates when compared with Asians and Hispanics.

The age-adjusted incidence rate of invasive breast cancer was significantly higher for White females than for other racial/ethnic groups. The incidence of *in situ* breast cancers rate was also significantly higher among White females (48/100,000) than among the other racial/ethnic groups. (Figure 7.33)

Among women, the highest colorectal cancer incidence rates occurred among Whites (54/100,000). The lowest rates occurred among Asians (40/100,000) (Figure 7.33).

White females had significantly elevated mortality rates of lung cancer (46/100,000) compared with the other racial/ethnic groups.

Oral Health

Dental and oral diseases have been called the "silent and neglected epidemic". Though every member of the population may be affected by them,

Though every member of the population may be affected by it, little attention has been paid to the burden of dental and oral diseases.

little attention has been paid to the burden of dental and oral diseases.[68] Dental and oral diseases are inflammation, degeneration and/or abnormalities associated with the teeth, gums, jaw and the surrounding craniofacial structures, such as cleft lip and cleft palate. Most recently, a relationship between oral infections and cardiovascular disease, diabetes, and bacterial pneumonia in seniors has been suggested.

Dental caries and periodontal disease are the most common dental diseases. Both are infectious and chronic, and both can be prevented. These infections are caused by colonies of bacteria commonly known as "plaque," a sticky film that adheres to the teeth and gums. If not effectively removed daily, plaque produces toxins which damage the teeth, gums and supporting structures.

Oral and pharyngeal cancers are destructive oral diseases that can affect any part of the oral cavity, including the lips, tongue, mouth and throat. Tobacco use, alcohol consumption, prolonged sunlight exposure, and oral human papilloma virus (HPV) have all been shown to increase the risk of developing oral and pharyngeal cancer.[69]

"You're not healthy without good oral health."

— Former Surgeon General C. Everett Koop

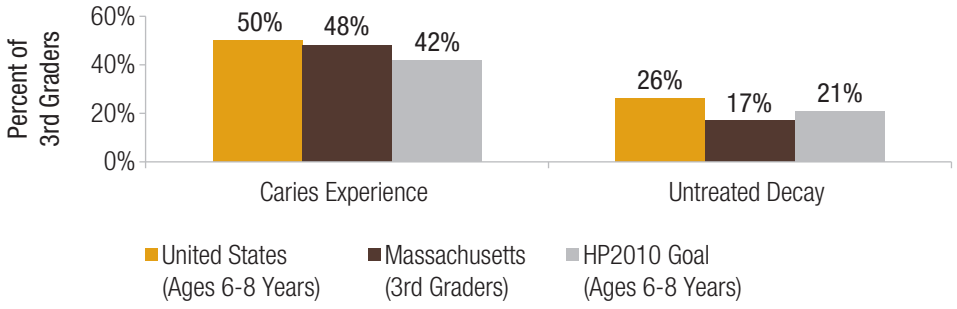
"You're not healthy without good oral health," said former Surgeon General C. Everett Koop. Dental and oral disease can affect an individual's ability to eat and chew food, as well as limit their social interactions and self-esteem. It can also negatively affect a child's ability to learn due by causing excessive absences and an inability to concentrate.[70]

Effective oral health prevention strategies such as community water fluoridation, dental sealants and oral screenings play an integral role in gaining and maintaining optimal oral health.

Prevalence of Oral Disease

In children, dental decay is the most common chronic disease, five times more common than asthma. In 2004, a statewide assessment of Massachusetts children aged three to five years in the Head Start Program revealed

Figure 7.34 **Caries Experience and Untreated Decay Among Young Children**



Source: MDPH *The Status of Oral Disease in Massachusetts*, 2009.

that 37% had experienced dental decay, compared to the national average of 22%.[71] The prevalence of decay experience among Massachusetts 3rd graders is 48%, and the presence of untreated decay is 17%.[72] These rates are lower than the national averages of 50% and 26% among six to eight year-olds (comparable age group).

As children grow and mature into adolescence, dental and oral diseases are compounded by increased exposures to risk factors. Three in ten (30%) Massachusetts middle school students and 35% of high school students self-reported having a cavity during the previous year.

For adults in the Commonwealth, 34% of those aged 35 - 44 year olds have lost at least one tooth compared to 62% nationally. However, adult residents with other health conditions, such as diabetes had almost twice the prevalence of tooth loss; 30% of adults with diabetes were missing six or more teeth compared with just 12% of residents without diabetes.

Many people believe that as we age, it is natural to lose teeth, but with advances in oral health education, access to fluoridation, fluorides, and professional dental care, more and more people are keeping their natural teeth as they age. In a 2009 statewide assessment of residents ages 60 years and older living in long term care facilities, it was noted that almost 65% had some natural teeth. The assessment also found that of these individuals, 59% had untreated decay and nearly 75% had gingivitis. More than one-third of residents had no natural teeth; many of these (18%) also had no dentures (false teeth).[73,74]

In 2008, more than 35,000 cases of oral cancer were diagnosed in the United States. According to the Massachusetts Cancer Registry, between 1995 and 2005, 8,190 new cases of oral cancer/pharyngeal cancer were diagnosed, and there were 2,033 deaths from oral/pharyngeal cancer in the state. Though females were significantly more likely to be diagnosed at the local stage than males, from 2001 through 2005, the majority of oral/pharyngeal cancers were diagnosed at the regional stage, where the disease had spread to nearby tissues and/or body parts.[74]

Disparities in Oral Health

Though dental disease affects nearly everyone, it disproportionately affects certain minorities and lower socioeconomic groups, as well as those who live in areas with limited access to dental care. Nationally, 80% of dental decay is found among just 25% of children, most of whom are minority and low income.[70] These rates are similar in minority and low income children in Massachusetts.[74]

While the statewide average of untreated decay among 3rd graders was 17%, the racial and ethnic prevalence of untreated decay was[74]:
- 36% among non-Hispanic Black children

Fluoridation is the most cost effective and efficient means of preventing tooth decay for everyone in a community.

Community Water Fluoridation

Since the 1950's, community water fluoridation has been proven to be safe and effective in preventing tooth decay in the United States. In 1951, Danvers, Middleton and Templeton were the first three communities in Massachusetts to fluoridate their water supplies. Since that time, 140 communities provide the health and economic benefits of fluoridation to more than 3.9 million residents (59% of the population). Fluoridation is the most-cost effective and efficient means of preventing tooth decay for everyone in a community; for every $1 spent on fluoridation, $38 is saved in dental treatment costs. Unfortunately, of the top six most highly populated cities in the state, three do not fluoridate (Worcester, Springfield and Brockton).

Preventing and Detecting Oral Cancer

Early detection is key. When found early through periodic screenings, the survival rate for oral cancer is 80-90%. Of those diagnosed with late stage disease, the five-year survival rate is only about 45%.[75] By limiting exposures to alcohol, tobacco, sunlight, and oral human papillomavirus (HPV), oral cancers may be prevented. In addition to educating the public on oral disease risk factors, medical professionals must be educated on the importance of regularly looking at the teeth, gums and surrounding structures as part of a medical examination.

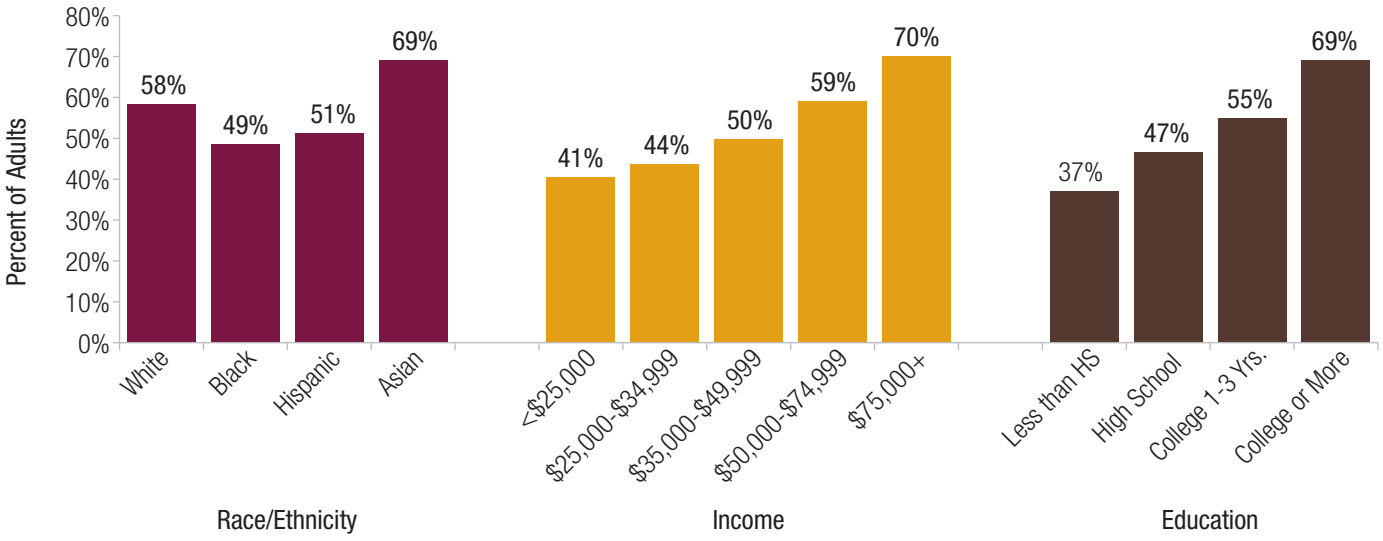
- 26% among Hispanic children
- 32% among low income 3rd graders
- 39% among children with no regular dentist

While Massachusetts adults are fairing better than the rest of the nation, a closer examination reveals that certain subgroups that have much higher rates of tooth loss. For residents with incomes less than $25,000, 59% have lost teeth due to tooth decay and gum disease, compared to only 30% with household incomes over $75,000. Additionally, residents with low income and lower educational levels had the highest risk for tooth loss. Sixty-three percent of those having less than a high school education had tooth loss, compared to 31% of those having a four-year college degree or more.

Access to regular dental care also plays a factor in oral health. About 1.3 million residents live in dental health professional shortage areas (DHPSA), areas of the state where there is a lack of dental care providers for community members. Of those residents living in designated DHPSA communities 29.2% did not visit a dentist in the last year compared to 22.9% of residents living in a non-DHPSA community.[74]

Lack of dental insurance also plays a role in dental health. The proportion of residents with any insurance coverage who visited a dentist in the last year was 80.1%, compared to 58.8% of those with MassHealth (Medicaid) and 48.3% of those with no insurance.[74]

Figure 7.35 **No Tooth Loss Among Massachusetts Adults**



Source: MDPH BRFSS, 2008.

Effective Population-Based Prevention Initiatives for Oral Health

Oral health is an integral part of total health and must become a higher priority in health programs and policies. Effective population-based

initiatives such as water fluoridation and school sealant programs must be promoted and supported to ensure that the residents of Massachusetts have better oral health and well-being. Only then can we defeat this silent and neglected epidemic.

Preventing dental diseases requires a multi-pronged approach which includes:

- Consistent exposure to fluoride in drinking water.
- Good oral hygiene, including flossing and the effective and frequent removal of bacteria by tooth brushing with a fluoridated toothpaste.
- Minimal consumption of high carbohydrate and sticky foods.
- Minimal consumption of sucrose and high sugar drinks.
- Application of dental sealants.
- Access to early and periodic dental care.

Dental Sealant Programs in Schools

According to the CDC, if 50% of children at high-risk participated in school sealant programs, more than half of their tooth decay would be prevented and money would be saved on their treatment costs. In 2006, Massachusetts public school nurses reported only 8% of schools had a school-based dental sealant program. In 2008, a follow-up survey showed no dramatic change. To address this, the Massachusetts Department of Public Health developed the SEAL Program in 2007. Using portable dental equipment in schools, dental hygienists place sealants and fluoride to prevent tooth decay. Since its inception, more than 9,000 children now have dental sealants.

Health-Related Quality of Life

Health-related quality of life refers to a person or group's perceived physical and mental health over time and is used to measure the effects of numerous conditions, short- and long-term disabilities, and diseases. Tracking quality of life in different populations can help identify subgroups with poor physical or mental health and can help guide policies or interventions to improve their health.[76]

In this report we present two measures of health-related quality of life: (1) self-reported health, and (2) mental health status.

Self-Reported Health Status

Self-reported health is a person's assessment of his or her own health. It is influenced by many factors including education, economic status, and living conditions. Self-reported health is a significant predictor of mortality and morbidity. It is useful in determining unmet health needs, identifying disparities, and characterizing the burden of chronic diseases within a population.[77,78]

"Health is a state of complete physical, mental, and social well-being, and not merely the absence of disease or infirmity."

— World Health Organization, 1948[79]

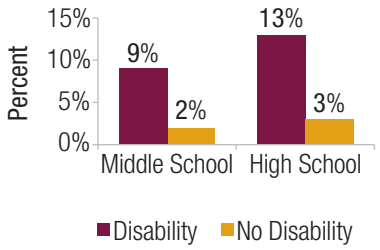
Prevalence

All respondents to the YHS and BRFSS were asked to describe their overall health as excellent, very good, good, fair or poor. Among Massachusetts residents, 4% of middle school students, 7% of high school students and 12% of adults 18 and over report fair or poor health.[8,36]

Disparities

Although Massachusetts residents generally self-report that their health is good or excellent, there are significant differences by gender, racial and ethnic group and disability status.

Figure 7.36 **Students with Fair or Poor Health by Disability Status**



Source: MDPH Youth Health Survey, 2007.

Among adolescents, 6% of female and 3% of male middle school students reported fair to poor health. Among high school students, 8% of females and 5% of males reported fair to poor health.[8]

Among high school students, 10% of Black students, 10% of Hispanics, and 10% of students of other races (Asians, Pacific Islanders, multiracial youth, and multiple race/ethnicities) reported fair to poor health compared to only 6% of White students.[8]

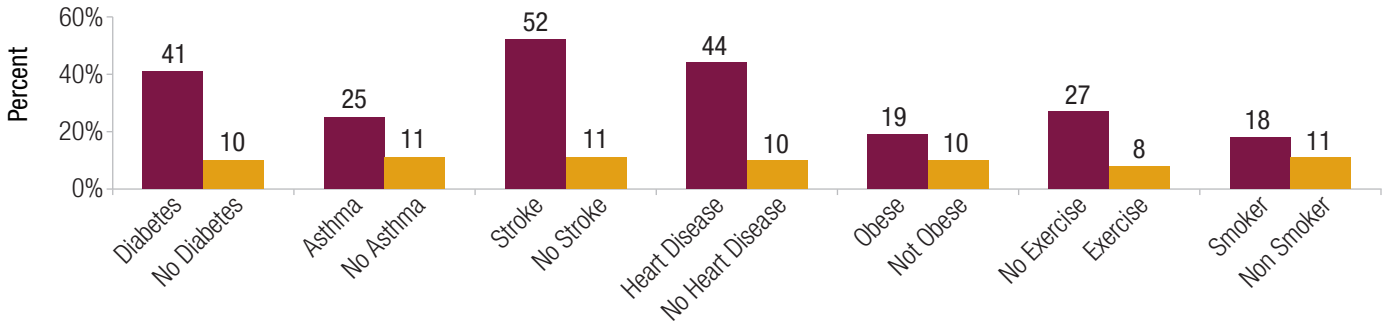
Middle school students with disabilities were more than four times as likely to report fair or poor health (9%) compared to their counterparts without disabilities (2%). Among high school students, 13% of those with disabilities reported fair to poor health compared to 3% of those without disabilities (Figure 7.36).

Massachusetts adults with diabetes were *four times* more likely to report fair to poor health compared to those without diabetes.

Disparities in self-reported health status also emerge among Massachusetts adults. In 2008 more than a quarter of Hispanics (26%) and 18% of Blacks reported fair or poor health compared to 11% of Whites and 4% of Asians. In addition, 34% of adults with a disability reported fair or poor health compared to only 6% of those without a disability.[36]

Massachusetts adults with chronic conditions were more likely to report fair to poor health compared to those without. This holds true for adults with diabetes, asthma, obesity and those who smoke (Figure 7.37).

Figure 7.37 **Fair to Poor Health by Conditions and Risk Factors**



Source: MDPH BRFSS, 2008.

Mental Health

Mental health is as important as physical health to the overall well-being of individuals, societies and countries. Poor mental health, including depression and anxiety, has been correlated to unhealthy behaviors such as smoking, the decreased use of preventive services and chronic health conditions such as heart disease.

Prevalence

Seven percent of Massachusetts adults reported 15 or more days of feeling sad, blue, or depressed in the past month.[36] One in four high school students (22%) and 16% of middle school students reported feeling so sad or hopeless almost every day for two weeks or more in a row that they stopped doing some of their usual activities.[8]

Mental health problems occur across the lifespan, affecting persons of all racial and ethnic groups, both genders, and all educational and socioeconomic groups.

Disparities

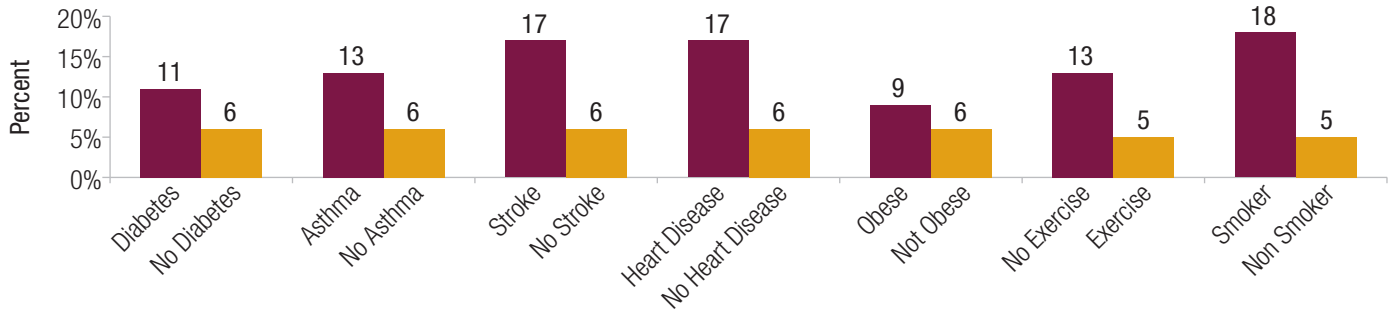
Though mental health problems affect all groups, disparities exist among different subgroups by gender and race and ethnicity. Twenty percent of female middle school students and 29% of female high school students reported feeling depressed compared to only 14% of male middle school students and 14% of male high school students.[8]

Among high school students, 34% of Hispanic students were more likely to report feeling depressed compared to 18% of Whites, 23% of Blacks, and 28% of those of other races. One-third of middle school students with disabilities reported feeling depressed compared to 9% of students without disabilities. Among high school students, 40% of those with disabilities reported these feelings compared to 13% of those without disabilities.[8]

Massachusetts adults with a disability were *six times* more likely to report feeling sad, blue or depressed compared to adults without a disability.

In adults, poor mental health was strongly associated with smoking, obesity, lack of physical activity and chronic diseases such as diabetes and heart disease. Of current smokers, 18% reported being depressed compared to 5% of non-smokers. Of those who were obese, 9% reported being depressed compared to 6% of those who were not obese (Figure 7.38).

Figure 7.38 **Adults Who Report Being Sad, Blue, Depressed**



Source: MDPH BRFSS, 2008.

Special Note on American Indian Health

Poor education and poverty are associated with poorer health outcomes and risk behaviors, and the findings for American Indians in Massachusetts are no exception. According to 2001-2005 BRFSS, more than 29% of American

Indians reported being in poor or fair health as compared with approximately 13% for the state overall. American Indians have less access to health care than Massachusetts residents overall. For example, the proportion of American Indians who reported having no health insurance was 2.3 times greater than that of the state as a whole (18% vs. 8%). The proportion of American Indian adults who reported being unable to see a doctor due to cost was more than twice that of Massachusetts overall (19% vs. 8%).[80] Additional indicators of poor health among American Indians are:

- The prevalence of diabetes, high blood pressure, and high cholesterol (9%, 26%, and 31%, respectively) as compared with the state (6%, 24%, and 27%, respectively).
- Only 65% of American Indians engaged in leisure physical activity as compared with 78% of residents overall.
- American Indian women ages 40 years and older who reported having a mammogram in the last 2 years was 74% vs. the state overall 83%.

American Indians in Massachusetts experience disparities in health outcomes and certain risk behaviors. Often American Indians numbers from surveillance systems such as YRBS and BRFSS are too low to draw meaningful conclusions. Hence problems may be masked and worse than they appear on the limited number of data releases that address or include American Indians. Given the limited health data pertinent to American Indians, lingering disparities, including lower life expectancy, and confounding socio-economic factors affect the health of American Indians of Massachusetts. A comprehensive and concerted effort is required to improve the health of this community.

Our Aging Population

As the life expectancy of Americans continues to increase, that extended longevity brings into focus the need for carefully designed and targeted primary, secondary and tertiary prevention efforts, especially since multiple co-morbid conditions frequently accompany aging.

There are more than 1.2 million residents who are 60 years or older.[82] As this number is projected to grow, it is important to note that health concerns increase as the population ages. Adults older than 65 are more likely to be in poor health, have a disability, not visit the dentist, have high blood pressure, diabetes or a heart attack than the rest of the population.

One major health risk for older adults is falls. For more information on falls, see Chapter 11: Unintentional Injury.

Dementing conditions, commonly grouped under Alzheimer's disease and related dementias (ADRDs), ranked fifth as a leading cause of death for persons aged 65 years and older. In Massachusetts as in other states, total health care costs associated with ADRDs are more than three times higher than for others aged 65 and older.[81] Nationally, it was estimated that unpaid caregivers provided 8.5 billion hours of care for ADRDs (valued at $94 billion) in 2008. The enormous burden on health care expenditures,

prolonged caregiver stress and commitment, and the significant reduction in quality of life make ADRDs a critical area for research and policy.

In terms of prevention, older adults also fell short of Healthy People 2010[83] vaccination objectives: 72% reported receiving a flu shot in the past year (HP2010 target: 90%) and 67% reported pneumonia vaccination in the past year (HP2010 target: 90%). Of those aged 65 and older, Black (58%) and Hispanic adults (61%) were less likely to report having had a flu shot in the past year as compared to Whites (73%). Both Blacks (50%) and Hispanics (34%) were less likely to report ever having a pneumonia vaccination as compared to White adults (70%).

Policy Perspective: Wellness and Chronic Disease

Stuart Chipkin, MD
Research Professor, University of Massachusetts, Amherst School of Public Health and Health Sciences;
Endocrinologist and Director, Diabetes Management Program, Valley Medical Group

Our major health burdens have become linked predominantly to our behaviors and environment. The number of Massachusetts residents suffering from chronic diseases has increased to epidemic proportions. Chronic diseases impact quantity and quality of life; the prolonged duration magnifies consequences to individuals, families, communities, and businesses throughout the Commonwealth.

Our traditional approach to chronic diseases has emphasized urgent and technological responses to late complications. Efforts for heart disease open arteries which were already clogged. Efforts for cancer destroy malignant cells after millions of them were transformed from pre-cancerous states. We allocate many more resources to the complications of diabetes than to its prevention. Our approach to asthma opens inflamed airways instead of addressing air quality and environmental triggers. We battle the consequences of dental carries in our children but haven't achieved water fluoridation in all our communities. The vast majority of our endeavors to address obesity begin after excess fat creates other health abnormalities.

To address our current health needs, we must create healthy environments by implementing successful prevention policies and programs in high-risk communities. Policies which emphasize healthier nutrition, physical activity and oral health create overlapping benefits for obesity, diabetes, cancer and heart disease. Resources to address tobacco and other substance abuse problems create overlapping benefits for asthma, cancer, oral health, heart disease and diabetes. Comprehensive master plans and mixed-use designs need to be culturally sensitive and appropriate for high-risk communities.

Infrastructural changes need to reinforce new behaviors – farmer's markets and healthy ethnic food choices can benefit dietary practices while public safety programs and available facilities can make physical activity more enjoyable. Schools, neighborhoods and workplaces must have clean air and water, and tobacco-free environments to minimize asthma and cancer risk; resources and providers are needed to detect and address pre-cancerous conditions, periodontal disease, pre-hypertension, and pre-diabetes.

Some of these actions may be achievable through incentives; resources, of necessity, will be prioritized based on measured effectiveness.

Massachusetts has made positive changes in many of these areas. We provide near-universal health care. We have programs to reduce smoking, post caloric content and eliminate trans-fat products. We are using school-based measurements to identify children at risk for obesity.

However, we have significant ethnic disparities in health care delivery and outcomes. Children in poorer communities have excess tooth decay; large numbers of Massachusetts residents have no access to dental professionals. We continue to experience soaring rates of obesity, diabetes and their related complications in urban neighborhoods. We have excess asthma-related hospitalizations in poorer neighborhoods. We have too many risk factors among patients with cardiovascular disease. Increases in chronic diseases portend that inadequate action now will rapidly result in a cascade of costs and burdens to the state and its citizens.

New policies and programs need to target prevention strategies, environmental changes and at-risk communities. Healthier food choices need to be available and affordable; excess exposure to high calorie foods needs to be limited. Safe access to facilities (schools, community centers, etc.) is important during evenings and weekends. Schools need to teach life-long skills which encourage healthy dietary choices, promote physical activity, emphasize good oral health care and avoid risks from tobacco, excess alcohol and other substances of abuse. Workplaces need on-site health care providers (medical, dental, nursing, nutrition, exercise, etc.), clean environments free of tobacco and other carcinogens, healthy food choices in eating facilities, and facilities to promote physical activity. Communities need incentives to create safe zones (playgrounds, walking paths, swimming pools) for activity, implement fluoridation and promote businesses which carry healthier foods. Policies and programs must have the flexibility to respond to local ethnic and racial preferences.

By developing policies and programs which optimize nutrition and physical activity, promote oral health, minimize exposure to harmful substances and reduce disparities, we can prevent and reduce the impact of chronic diseases on Massachusetts citizens.

FIGURE NOTES

Figure 7.3: Overweight/Obesity status defined as Body Mass Index (BMI) ≥ 25.

Figure 7.4: Obesity status defined as BMI ≥ 30.

Figure 7.7: The category 'Other' includes American Indians or Alaskan Natives and students indicating multiple ethnicities that did not include Hispanic.

Figure 7.8: Regular physical activity is defined as 30 minutes of moderate physical activity on at least 5 days per week or 20 minutes of vigorous activity on at least 3 days per week.

Figure 7.10-7.14: More data on asthma are available in "The Burden of Asthma in Massachusetts," available at www.mass.gov/dph/asthma.

Figure 7.11, 7.12: Population estimates from National Center for Health Statistics. Postcensal estimates of the resident population of the United States for July 1, 2000-July 1, 2007, by year, county, age, bridged race, Hispanic origin, and sex (Vintage 2007). Prepared under a collaborative arrangement with the US Census Bureau; released August 7, 2008. Available from: http://www.cdc.gov/nchs/about/major/dvs/popbridge/popbridge.htm as of September 5, 2008.

Figure 7.13: Rates shown are three-year average annual crude rates of hospitalization due to asthma by Executive Office of Health and Human Services Region. Population estimates are from 2005. Population source is the Massachusetts (Department of Public Health) Modified Age, Race/Ethnicity, & Sex Estimates 2005 (MMARS05), released October, 2006. Available on MassCHIP V 3.0 R323 as of 8/03/09 dataset: Population file: Census Counts 1990, Intercensal and Post-censal Estimates (1991-2005) year: 2005

Figure 7.18: ICD-10: E10-E14. Rates are per 100,000 age-adjusted to the 2000 US standard population. The underlying cause of death is the disease or injury that initiated the series of events leading directly to death. A contributing cause of death is a disease or injury that did not directly lead to the underlying cause but still played a part in the person's death. For example, a person with diabetes may have had an underlying cause of death due to heart disease and their diabetes was a contributing cause.

Figure 7.19: A1c stands for Glycosylated Hemoglobin A1c. Percentages shown are for adults with diabetes who had eye exams, foot exams and flu vaccinations within the last year. Percentages shown for A1c are for adults with diabetes who had a blood test performed at least twice within the last year. Percentages shown for Self-Monitoring of Blood Glucose are for adults with diabetes who self-monitor their blood sugar every day. US data are from 2006.

Figure 7.21, 7.22: Rates are per 100,000 population. Age-adjusted to the 2000 US standard population. 2007 US data were not available at the time of this release.

Figure 7.25: Age-adjusted to the 2000 US standard population.

Figure 7.26: Age-adjusted to the 2000 US standard population. Insufficient diabetes data for the Asian population.

Figure 7.29: There were no data for Asian non-Hispanics due to inadequate sample size.

Figure 7.32, 7.33: Rates are age-adjusted to the 2000 US Standard Population, per 100,000. An age-adjusted incidence rate was not calculated when there were fewer than 20 cases.

Figure 7.34: The national comparison group is children ages 6-8 years.

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