

The Boston Paradox:

Lots of Health Care, Not Enough Health

Research by the
New England Healthcare Institute
Boston, Massachusetts



The Boston Foundation

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UNDERSTANDING BOSTON is a series of forums, educational events and research sponsored by the Boston Foundation to provide information and insight into issues affecting Boston, its neighborhoods, and the region. By working in collaboration with a wide range of partners, the Boston Foundation provides opportunities for people to come together to explore challenges facing our constantly changing community and to develop an informed civic agenda. Visit www.tbf.org to learn more about Understanding Boston and the Boston Foundation.

THE BOSTON PARADOX

Lots of Health Care, Not Enough Health

Indicators of Health, Health Care, and Competitiveness in Greater Boston

Research by

New England Healthcare Institute, Boston, Massachusetts

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Dear Friends:

The New England Healthcare Institute is delighted to join the Boston Foundation in presenting this special *Understanding Boston* report. This report examines many indicators of health, health care, and competitiveness in Greater Boston, and has one simple conclusion: Greater Boston has lots of health care, but not enough health.

To be fair, the health of Greater Boston's population is good compared to the health of most other places in the United States. But these days that is not a high standard. Serious health disparities in our population are well documented, particularly among residents of color. And as this report shows, Greater Boston has not yet found an answer to a rising incidence of preventable chronic diseases that are putting the health of all Bostonians at risk, regardless of color, ethnicity and income.

The rise of preventable chronic disease would be serious enough if it was "only" a health challenge for Greater Boston, but it is not. It is a health challenge *and* a challenge to our economic competitiveness. An increasing level of chronic disease will have a particularly adverse impact on Greater Boston if current economic and demographic trends persist. We suffer from comparatively sluggish economic growth, weak population growth, and little or no growth in our workforce. Rising levels of illness in our aging workforce will sap our productivity and drive health care costs higher. As it is, rising health care costs are squeezing our ability to invest in other important priorities, including education and public safety.

Greater Boston may well be the canary in the coal mine of US health care. Our rapidly graying workforce means that we may face the challenge of preventable chronic disease earlier than most. We can and we should meet this momentous health challenge and turn it to our economic advantage. At the New England Healthcare Institute we look forward to engaging in this vital work, alongside many allies, in the months ahead.

Sincerely,
Wendy Everett, Sc.D.
President, New England Healthcare Institute

Dear Friends,

The Boston Paradox: Lots of Healthcare, Not Enough Health is a report of singular significance. It draws on groundbreaking research conducted by the New England Healthcare Institute that for the first time juxtaposes the state of our health care economy and the state of our physical wellbeing. The result is an invaluable tool that assesses the landscape just as the Massachusetts universal health care mandate is about to be implemented. The results included here will put into sharp focus a set of issues that business leaders, policy makers and even families, are already grappling with.

To remain competitive in our increasingly global economy, we must have the resources to invest wisely in innovation of all kinds, and that requires us to understand and meet the challenge contained within this report. *The Boston Paradox* describes a double threat—to our physical health, and also to our economic wellbeing, as the cost of a rising tide of preventable chronic illness threatens to submerge other crucial priorities, including education, transportation and the quest for affordable housing.

Greater Boston and the Commonwealth are vulnerable to this trend because we have an older workforce, as well as persistent racial, ethnic and socio-economic health disparities. On the economic side, we have a cost of living that already makes Greater Boston the most expensive place in the country to live for a family of four. And health costs are rising faster than our economic growth. Unless we can reverse these trends, Greater Boston will lose ground, becoming less healthy and less competitive.

How can it be that here, in the hub of American medicine, we enjoy a world-class health care system, and yet do not have enough health? As this report details, some of the most important health strategies, are preventative, including good diet and exercise. *The Boston Paradox* demonstrates that it is now imperative for Greater Boston to become as innovative in public health strategies as we have been in medical technologies.

Stark and sobering as this report is, it also contains a hopeful message, underscoring the unique assets Greater Boston brings to this challenge, including world-class institutions, a robust community of health professionals and a heritage of public health activism, innovation and accomplishment. Our community is in a position to catalyze a revolution in public health.

But unless we act quickly, the very resources we need to innovate can be eaten away by the costs of preventable chronic disease.

At the Boston Foundation, we envision that this powerful report will help to generate an historic, region-wide, collaborative effort—people working together across sectors to generate a new model for health and health care. If we act swiftly and wisely, we believe Greater Boston can have an exceptionally healthy future, in both human and economic terms. We invite your participation in a conversation about how to make that vision for health a reality.

Sincerely,
Paul S. Grogan,
President and CEO, The Boston Foundation

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Introduction

Why the Hub of American Medicine Needs to Worry about its Health

Greater Boston is a global leader in health care and health technology. Bostonians expect that their world-class health care institutions and related industries will be the source of strong economic growth in the years ahead.

But Greater Boston's growth and its health are vulnerable to a challenge that no global medical center has yet conquered: a rising tide of preventable chronic disease.

The increase in preventable chronic disease creates a vicious cycle that puts both Greater Boston's health and its competitiveness at risk.

As more people develop serious chronic diseases such as diabetes, they risk the development of severe complications. The vast majority of health care spending, in both the public and private sectors, is devoted to treating relatively few, severely ill people. Thus, as more people develop serious conditions, more and more must be spent to treat them—and less and less is available to spend on interventions that could prevent the onset of disease or control it at an early stage.

Fewer public funds are available for education, environmental protection, community safety and other priorities that are proven investments in long-term public health and in the region's economic competitiveness. Illness and disability that could be prevented is not prevented, and the cycle goes on.

The New England Healthcare Institute and The Boston Foundation have looked at thirty broad indicators of trends in health, health care, and economic competitiveness in Greater Boston. We have examined trends in fundamental “determinants of health” such as educational attainment and community safety that ongoing research—much of it performed in Greater Boston—has shown to be crucial to sustained health. We find solid evidence that a vicious cycle is underway.

Preventable or controllable diseases such as diabetes and

Greater Boston is vulnerable to a challenge no global medical center has yet conquered: a rising tide of preventable chronic disease

The increase in preventable disease creates a vicious cycle: a growing need to treat intense medical needs, leaving fewer resources for prevention and investments that are critical to long-term health and competitiveness

asthma are on the rise. Rising levels of chronic disease are a major driver of increased health care costs, particularly as new technologies to treat chronic disease are continually introduced. The cost of health insurance is increasing at a rate well in excess of economic growth, outstripping growth in the wages of middle and lower-income households and the tax revenues that government needs to meet its own health care obligations. City and town governments in Greater Boston find themselves weighing the cost of health insurance against the cost of keeping police officers, firefighters and teachers on the job.

Of course, while many chronic diseases can be prevented or controlled, that does not mean that they are easy to prevent or control. Scientific research in genetics and other fields is demonstrating that each person has a different susceptibility to risks for disease, no matter how hard they may try to avoid them.

But we believe that Greater Boston has unique and powerful reasons to respond to the rising tide of preventable chronic disease.

Greater Boston has unique and powerful reasons to respond to the rising tide of preventable chronic disease.

Greater Boston faces a serious squeeze on its workforce, now and in the years ahead. Demographers project that our workforce will grow slowly, if at all, over the next 20 years. The only group expected to grow in great numbers in the workforce are older workers—precisely the group most susceptible to the onset of serious chronic disease. Much will depend on Greater Boston’s ability to keep older workers on the job and productive.

The workforce crisis is acute for health care industries. Health care organizations already face a longstanding shortage of skilled nurses. In the next few years Greater Boston will have an increasing need for home health, nursing care and personal health aides to meet the growing demands of an aging population. Many of the occupations most in demand will be in lower-skilled jobs that pay wages that tend to grow far less than the average annual increase in health insurance costs. Lower-skilled, lower-income people are at particular risk for the development of otherwise-preventable chronic disease, so the productivity of the region’s health care workforce is at risk as well.

In addition to these workforce issues, the crowd-out of public spending on key priorities such as education and research hits Greater Boston’s health care economy especially hard. Federal funding for biomedical research has already been squeezed; in 2006 the National Institutes of Health suffered the first real-dollar cut in its research grant funds in 35 years. Federal funding for basic or high-risk biomedical research is an essential source of new discoveries for Greater Boston life science industries such as biotechnology, which in recent years has grown at a rate that greatly exceeds the rate of growth in the overall local economy.

The rise of preventable chronic illness presents Greater Boston with an enormous challenge, and an enormous opportunity as well. There is a growing worldwide demand for effective innovations in health promotion, health care and medical technology. Overweight and obesity, diabetes and related complications are increasing throughout the world. As an iconic center of innovation, Greater Boston can begin to cultivate the

worldwide market for innovations in health and health care by aggressively addressing the festering problems of chronic illness among its own residents.

Greater Boston has unique assets with which to attack the rise in preventable disease.

First, Massachusetts has sustained an historically high level of health insurance coverage: the most recently available data suggests that as few as 6 percent of the state's residents are uninsured, while the rate in the US as a whole is nearing 20 percent. The state's landmark 2006 health insurance reforms now commit the state to achieve near-universal coverage. Both the public and the private sectors in Greater Boston have made an enormous investment in access to health care, and access needs to be leveraged into measurable gains in public health, including a measurable improvement in the prevention and control of chronic disease.

Second, as the indicators confirm, Greater Boston retains an extraordinarily dense concentration of health care providers and researchers. This great array of providers is sometimes blamed for inducing the utilization of more health care than is necessary in Greater Boston. But Greater Boston's providers and insurers have also shown an ability to collaborate with each other in making important systemic changes, such as the introduction of health care information technologies that reduce medical errors and improve the effectiveness of health care. The same spirit of far-reaching collaboration now needs to be brought to bear on the causes and consequences of preventable chronic disease.

***Preventable
chronic illness is a
challenge for
Greater Boston –
and an enormous
opportunity for
innovation and
global leadership
as well.***

The Goals of this Report

The objective of this report is to focus on broad trends in Greater Boston's health, its health care, and its overall economic competitiveness in a way that will suggest new strategies Greater Boston can use to meet three often conflicting goals:

- The best health for all Greater Boston residents
- Effective and sustainable health care
- Sustained economic growth that benefits all Greater Boston residents

As a result the full version of this report examines trends in many different fields, organized into two sections:

The Health of Greater Boston

- *Population and Demography*: The report looks at broad, ongoing trends at work in Greater Boston's changing population that will affect health and health care demand.
- *Determinants of Health*: Scientific research in epidemiology has identified several factors that have a decisive influence on the health and life expectancy of an entire population such as Greater Boston's. The most critical "determinants" include socio-economic factors such as educational attainment level and the distribution of income among residents. Socioeconomic factors decisively influence the interaction of four other types of determining factors: genetics; environmental factors; health-related personal behaviors; and the degree of access to health care (such as the level of insurance coverage in the population).

Greater Boston's Economy and Its Health Care

- *Health Status*: In the interest of brevity this report examines six conditions prevalent throughout the population: heart disease and cancer (the two leading causes of mortality); hypertension; low birth weight (LBW) births; and diabetes and asthma (both chronic diseases of increasing prevalence in Greater Boston). Equally important conditions (such as mental health) may be incorporated in future revisions or as pertinent data is developed.
- *Sources of health care funding*: The report examines trends in three sectors that provide the majority of health care financing: employer-sponsored health insurance, state government and the federal government.
- *Uses of health care funding*: The report examines the five largest categories of health care as enumerated in the National Health Expenditure Accounts, the federal government's annual measure of all health care-related expenditures in the US and the 50 states. Trends in public health and in the health insurance industry are also examined.
- *Related industries*: The report examines three fields tightly linked to health care in Greater Boston: Medical and nursing education; Biomedical research and technology transfer; and the life science sector.

Executive Summary

The Boston Paradox: Lots of Health Care, Not Enough Health

Greater Boston remains a world-class center of medical care and life science research—but rising levels of preventable illness threaten to sap its health and its global competitive position. This report provides data that can help the Boston community come together to innovate and take a global leadership position in controlling preventable illness and disease.

The Greater Boston Health Care Economy Indicators Project examined over 30 broad indicators of health status, health care, and economic competitiveness in Greater Boston¹. In many cases we identified important trends, but data is not available to illustrate the trend at the metropolitan (Greater Boston) level. In such cases we have illustrated the trend with data that pertains to the state of Massachusetts as a whole.

Often, indicators can be a simple and effective way to identify strengths, weaknesses and threats that the public and public leaders need to confront. In our case, we have worked to identify the strengths and weaknesses of health and health care in Greater Boston, particularly as they relate to strengths and weaknesses of the local economy.

However, health care is such a complex and fragmented part of our economy that strengths can also be weaknesses or threats. To cite just one example: Boston's world-class teaching hospitals are viewed as a linchpin of the burgeoning life science industry cluster in Greater Boston—and simultaneously viewed as too costly by other industries that pay for a share of employee health benefits.

Thus we summarize findings from the indicators in two areas:

- **The status of health, health care and competitiveness in Greater Boston today, particularly the unique attributes that make Greater Boston a global center of medicine and technology; and**
- **The emerging vulnerabilities that threaten the future of health, health care and competitiveness in Greater Boston.**

Health Status Today

Overall health status in Greater Boston and Massachusetts is good.

Life expectancy in Massachusetts is at one of the highest levels in the United States. The state's life expectancy rate would place it about 12th among the developed nations of OECD (Organization for Economic Cooperation and Development); the entire US ranks about 25th. The state also has one of the lowest levels of “premature mortality” (death before age 75), and infant mortality. It typically ranks among the top two states in the US for low rates of accidental death from motor vehicle and occupational accidents.² *See Figure 1*

Good overall health status among Greater Bostonians has been marked by steady progress in reducing major causes of death by disease.

The Massachusetts death rate (deaths per 100,000 residents) due to heart disease has steadily declined for more than 25 years, although the prevalence of heart disease has been fairly stable at about 8 percent of the population. Massachusetts claims the 3rd lowest rate of premature death (death before age 75) due to heart disease in the country. The incidence of cancers among Massachusetts residents has continued to increase and remains at a level above the US average; nevertheless, the death rate due to cancers has fallen continuously to levels that are nearly equal to the US rate.³

Vulnerabilities in Greater Boston's Health Status

Health disparities are persistent along lines of educational attainment, race and ethnicity.

Yearly death rates (the number of deaths per 100,000 people) vary considerably among residents with different educational backgrounds: the death rate for residents with a high school education or less is three times higher than the death rate for more highly educated persons.⁴ Life expectancy among African-Americans in Massachusetts is lower than among whites, as it is throughout the US. The rate of “premature mortality” (death before age 75) among African-Americans is as much as 45 percent higher than the same rate among whites. Life expectancy among Hispanic residents is generally higher than white life expectancy, much higher among Hispanic women in particular. Whether Hispanic residents can preserve this advantage in the future is a major health and health policy issue for the entire community, as noted below.⁵

Greater Boston's demographic dilemma—a slowly growing population and a workforce that is barely growing at all—will exacerbate disparities and weaken overall health status.

As is true throughout the US, the post-Baby Boom generation in Greater Boston and Massachusetts (ages 25 to 44 years old) is smaller than the Baby Boom generation that precedes it. Unlike many competitor regions in the South and Southwest, however, Greater Boston and Massachusetts continue to experience long-term out-migration of residents, including younger adults.⁶

Unless the out-migration trend is reversed, demographers expect the state's prime working age population (25 to 64 years old) to grow by only 2 percent over a ten-year period (2005 to 2015), and then to modestly decline. The number of younger workers (aged 25 to 44 years) is already in decline and is expected to continue dropping until 2020.⁷ **See Figure 2**

Modest growth in the working age population will be driven by increasing numbers of persons aged 45 to 64 years old. Greater Boston and Massachusetts will be reliant on Baby Boomer workers for a longer period of time than competitor regions throughout the U/S/, where growth in younger workers will resume by the year 2015, and resume rapidly in high-growth states in the South.⁸

Increasing numbers of minority workers, including immigrants, will take up the slack within Greater Boston's workforce of younger adults. By 2020 more than 28 percent of the workforce will be comprised of minority residents, over double the percentage present in 2000. Nearly half of all 25 to 29 year olds in the region will be minority residents by 2020, as the Hispanic population in particular is expected to increase robustly.⁹

Trends in Greater Boston's population and demography point towards a higher level of illness, health care needs, and costs in its workforce.

Unless rapid economic growth, rapid population growth, or both, resume in Greater Boston in the next decade, current demographic trends portend several adverse outcomes for Greater Boston, among them:

An older workforce can be expected to have increasing health care needs with age; the prevalence of chronic diseases such as heart disease and diabetes are closely linked with advancing age.

A "graying" workforce that is supported by fewer young workers will yield a pool of health insurance beneficiaries with higher risks that can be expected to drive health benefits costs higher for both employers and employees.¹⁰

A "graying" workforce in a tight, slowly growing labor market means that employers will find an increasing need to employ health and wellness strategies that will keep older workers healthy and on the job—or to transfer jobs to competitor regions where equivalent skills can be found among younger, healthier workers.¹¹

As minority workers become a larger component of the area's younger workforce, the susceptibility of minority workers to existing, serious health disparities will become a critical issue for health, workforce productivity, and health care cost.

Progress in reducing the impact of major diseases such as heart disease and cancer is offset, and could be reversed, by a rising prevalence of preventable chronic disease.

Increased levels of preventable chronic diseases, such as diabetes, are creating higher levels of disability and medical need, and are also linked to the onset of other, "co-morbid" conditions such as heart disease.

Evidence for rising levels of chronic disease or preconditions for disease include:

Hypertension Hypertension is widely controlled through diet, exercise, and prescription drugs; nevertheless in 2005, 25 percent of state residents reported that they had been diagnosed with hypertension at least once in their lives, the highest level recorded in at least 15 years.¹²

Diabetes About 6.4 percent of state residents were estimated to have a diagnosed case of diabetes in 2005, a 39 percent increase from the level reported in 1996.¹³

Adult Asthma About 9.6 percent of the state's adult population was reported to have asthma in 2005, representing a 13 percent increase in prevalence over 5 years, (2000 to 2005).¹⁴

Determinants of Health

The comparatively good health status of Greater Bostonians is consistent with a legacy of positive "determinants of health" at work in Greater Boston's economy, environment and culture.

Epidemiological research has established that the health of an entire population is mostly influenced by socioeconomic factors such as educational attainment and family income, interacting with genetic, environmental and other factors. Access to health care accounts for a relatively small percentage of health status (as little as 10 percent, for the entire population), while behaviors that promote or threaten health ("health risk factors") account for as much as 50 percent of health status.¹⁵

Educational Attainment The Boston metropolitan area is second among the 15 largest metropolitan areas in the US for the highest percentage of college graduates and advanced degree holders among its population; Massachusetts ranks first among the 50 states. Greater Boston ranks among the top five metropolitan areas for the largest percentage of high school graduates among its residents.¹⁶

Income Median household income in Greater Boston and Massachusetts has been among the highest in the US for decades, although current living costs are among the highest in the US as well. The level of per capita personal income in Greater Boston and Massachusetts is also among the highest in the country, (fifth highest among US metropolitan areas). While per capita personal income is not considered a determinant of population health, it is strongly, positively correlated with overall levels of health care spending and investment.¹⁷

Environmental Factors Air pollution has decreased over the last 25 years in Greater Boston. The region ranks among the top third of US cities for clean air, although it may need to take new action to come into compliance with evolving regulations on ozone and airborne particulates. On the whole, the region enjoys clean and plentiful water; the metropolitan water and sewer system have been substantially rebuilt over the last 20 years.¹⁸

The severity of local environmental hazards can vary enormously by neighborhood, as does the level of public safety. The rate of serious violent crime in Greater Boston and Massachusetts is

significantly lower than the US average, but violent crime rates are much higher in urban and minority neighborhoods. Boston's murder rate has steadily increased for five years after a decade of decline between 1996 and 2000.¹⁹

Behaviors and Health Risks—Tobacco Use Tobacco use remains the leading cause of death, but over the past 40 years tobacco use in Massachusetts has fallen to one of the lowest rates in the country. Smoking rates among teenagers fell dramatically in the last 15 years, spanning a period of highly visible anti-smoking campaigns sponsored by the state. Notably, the rate of lung cancer among men in Massachusetts is lower than the US average; the incidence of most other cancers is higher in Massachusetts than in the US.²⁰

Access to Health Care The number of uninsured persons in Massachusetts has declined with the state's recovery from the recession of 2000-2001, while the number of uninsured persons in the US as a whole has gone steadily upwards. About 6 percent of residents are uninsured in Massachusetts, the lowest or second lowest rate among the 50 states.²¹ Recent research suggests that private, employer-sponsored health insurance plans in the state are among the most comprehensive in the country; the average total medical costs to employees are below national averages. New health insurance programs created under the Commonwealth's landmark 2006 health insurance reform act now aim to create near-universal health insurance coverage in Massachusetts.²²

Greater Boston and Massachusetts also have exceptionally widespread facilities that provide access to health care. Thirty-three federally chartered community health centers operate at about 290 delivery sites in the state, the third highest number in the country after the (much bigger) states of California and New York. Twenty non-federally chartered community health centers, many operated by major hospitals, also operate in the state.²³

Vulnerabilities in Determinants of Health in Greater Boston

Among socioeconomic determinants of health, income growth and educational attainment—influences on Greater Boston's health and competitiveness in the past—are showing signs of weakness.

Income Epidemiological research finds a strong if predictable correlation between family or household income and health: more income generally means better health. While stronger economic growth in 2007 may yet yield real income gains, middle and lower income residents have seen their incomes decline, in real terms since the recession of 2000-2001. Data for Eastern Massachusetts (Greater Boston CMSA) suggests that real median household income fell by about 4.6 percent between 2001 and 2005.²⁴ Analysis from the Massachusetts Budget and Policy Center suggests that cuts to real hourly wages have pushed median income down in Greater Boston and Massachusetts: median hourly wages fell by 5 percent from 2003 to 2005 alone, the largest such decline in the US.²⁵

Income Inequality While it is much debated, epidemiological research in the US and the UK also suggests a link between income distribution and health. Studies indicate that the more unequal income distribution is in a given region, the bigger the disparity between the poor health of lower-income residents and the good health of upper-income residents. Current analysis, also from the Massachusetts Budget and Policy Center, indicates that income inequality in Massachusetts has widened over the last 20 years. Household income for the top 20 percent of earners in the state is more than seven times as high as income for the lowest 20 percent, the third widest such disparity in the US, behind New York and Arizona.²⁶

Educational Attainment: Greater Boston's and the state's historical advantage in educational attainment is built on its heavy concentration of colleges and universities, which attract approximately 250,000 students in a given year. This advantage is diminished by the persistent out-migration of younger adults from the area. Out-migration from Massachusetts reached an estimated 60,000 persons in 2005.²⁷

Out-migration and a continued influx of immigrants (some 26,000) has meant that a larger share of the region's population and workforce is comprised of minority residents from communities with a much lower historical rate of educational attainment than Greater Boston's overall population. Research from the University of Connecticut and the University of Massachusetts indicates that the percentage of new entrants into the state's workforce (24 years and older) with college degrees has dropped continuously since 1993, and will continue to drop modestly to less than 40 percent by the year 2020. The educational attainment gap is particularly acute among Hispanic residents; about 20 percent of Greater Boston's Hispanic women hold college degrees, and about 16 percent of Hispanic men.²⁸

Among behavioral determinants of health: Greater Boston's population has a lower smoking rate and a lower obesity rate than the US average—but obesity is increasing continuously.

As noted above, Greater Boston and Massachusetts have lower smoking rates than most states and the US as a whole. Rates of overweight and obesity are also less than US averages but trending steadily upward.

Fitness Student participation in high school physical education dropped markedly in the last decade, but otherwise exercise habits in Greater Boston and Massachusetts appear to have changed little over the last decade.²⁹ About two-thirds of Massachusetts high school students report that they engage in vigorous physical activity for three or more days a week, or about the same level of activity reported by students for the last decade. In 1995, more than 80 percent of students reported participation in school-based physical education; by 2005 participation had dropped to about 59 percent. About one half of adults in Greater Boston report that they engage in regular physical activity, a rate that is also unchanged over the last decade.³⁰

Diet Fruit and vegetable consumption among high school students appears to have declined, but otherwise nutrition habits are mostly unchanged in Greater Boston and Massachusetts over the last decade. Fewer than one-third of adults meet daily nutritional guidelines. Only 9.5 percent of Massachusetts high school students reported that they consumed the recommended five daily servings of fruits and vegetables in 2005, down from 14 percent in 1999.³¹ About 29 percent of

adults reported themselves as meeting the recommended daily allowance of fruits and vegetables, a rate that is also essentially unchanged over the last decade.³²

Overweight and Obesity Rates of overweight and obesity in Massachusetts have grown continuously over the last decade—over half the state population is now classified as overweight, and one in five is classified as obese.

Results from the Commonwealth's 2005 health behaviors survey found the highest level of overweight yet recorded among state residents at 56 percent. More than 20 percent of adults were found to be obese, a 64 percent increase over the level reported in 1996.³³ For all that, the obesity rate in Massachusetts is actually among the best among the 50 states; the United Health Foundation rates the state as second for the lowest obesity rate in the country. Only one state, Oregon, has avoided an increase in its obesity rate in recent years.³⁴ **See Figure 3**

Rising levels of obesity are particularly linked to two groups that will comprise a larger share of Greater Boston's and Massachusetts's workforce in coming years: older workers and minority workers. Middle-aged residents recorded the highest levels of overweight and obesity in the Commonwealth's 2005 survey. Residents aged 45 to 54 years old reported the highest rates of overweight (65 percent) and obesity (26 percent), followed by residents aged 55 to 64 years old, (61.5 percent overweight, 24.6 percent obese).³⁵ Racial and ethnic disparities in obesity are significant. Nearly one-third of African-American residents were reported as obese in 2005, compared to 28 percent of Hispanic residents and 20 percent of whites.³⁶

Utilization of Health Care and its Impact on the Economy

Evidence suggests that Greater Boston and Massachusetts residents utilize basic health care services more frequently than most Americans, and utilize outpatient services much more frequently.

Federal survey data on the 29 largest states indicates that Massachusetts has the 3rd highest percentage of residents who visit a doctor's office at least once per year, exceeded only by Connecticut and Virginia. The average expense per visit is only 24th among the 29 states—perhaps an indication that Massachusetts residents are comparatively good users of physician visits and preventive care.³⁷

Data on prescription drugs indicates that Massachusetts residents fill the 13th highest number of prescription drugs, per capita, per year, exceeded only by the southern states (excluding Virginia), Iowa and Missouri.³⁸

Utilization of hospital outpatient services is significantly higher in Massachusetts on average than in the US: Massachusetts tallied 2,519 visits per 1,000 population in 2004 compared to 1,563 in the US (2004). Total hospital inpatient days in Massachusetts (inpatient days per 1,000 residents) are slightly above US averages (691 days in Massachusetts, 673 in the US, in 2004).³⁹ **See Figure 4**

Greater Boston has an exceptionally high number of practicing physicians for the size of its population, including a high number of doctors trained in primary care medicine. A large proportion of doctors work in hospitals, and two-thirds of them are medical trainees (medical residents).

Greater Boston (the Boston Metropolitan Statistical Area) has over 400 doctors per 100,000 residents actively involved in some form of patient care. About 387 doctors (per 100,000 residents) work in Massachusetts as a whole compared to 245 doctors among the overall US population. This includes 193 doctors (per 100,000) in Greater Boston who are licensed as primary care practitioners—about 1.5 times the concentration of primary care doctors in the US population. The average concentration among OECD countries is 290 doctors per 100,000 population (2005).⁴⁰

Nearly a third of licensed doctors in Greater Boston work in hospitals, compared to about 23 percent of US doctors. Two-thirds of the hospital-based doctors are medical residents or other doctor-trainees; the high concentration of medical trainees in Greater Boston is linked very closely to the high concentration of practicing physicians overall. Excluding hospital-based doctors, about 264 doctors per 100,000 serve residents of Greater Boston, compared to about 188 doctors per 100,000 in the US as a whole.⁴¹

Hospitals have been the primary source of growth in health care in Greater Boston and Massachusetts in the last decade, with growth occurring in both patient care and non-patient activities such as research.

Hospitals account for nearly 40 percent of all health care-related spending in Massachusetts (personal health care expenditures for 2004). Hospital expenditures as a proportion of the state's economy grew to 5.7 percent in 2004, its highest level in 24 years.⁴² After nearly three years of modest decline, hospital-based employment in metropolitan Boston grew nearly 21 percent between 2000 and 2006, as the hospital industry became one of few to generate new jobs during the 2000 to 2001 recession and the slow recovery that followed.⁴³ Hospital growth has not come entirely from patient care: Massachusetts hospitals, as a group, book nearly twice as much non-patient revenue (14.3 percent of all revenues) as the overall US hospital industry (7.3 percent, 2004 data). Non-patient expenditures include research grants, which rose significantly in the late 1990's and in the early years of this decade.⁴⁴

Teaching hospitals have become more dominant in Greater Boston's health care and health care economy.

Hospitals throughout Massachusetts and the United States, both teaching hospitals and community hospitals, reduced their in-patient capacity by 10 percent or more throughout the 1990's. Teaching hospitals emerged with an increased and growing share of hospital-based patient care; most Greater Boston teaching hospitals are currently expanding capacity or planning expansions. Teaching hospitals also emerged with a growing base of operations in medical education and in biomedical research:

Inpatient care Teaching hospitals now account for about 51 percent of total hospital inpatient days in Massachusetts (2003), up from 44 percent in 1991, the result of both increased volume at teaching hospitals and decreased volume at community hospitals.⁴⁵

Outpatient care As noted above, Massachusetts registers substantially more outpatient visits (visits per population) than the US average. A high percentage of outpatient visits occur in teaching hospitals and their affiliated facilities. An estimated 43 percent of outpatient visits in Massachusetts occur in teaching hospital facilities, compared to 10.2 percent in the nation as a whole (2003).⁴⁶

Medical education Teaching hospitals in Massachusetts (nearly all located in Greater Boston) train about 4.7 percent of all medical residents (graduate medical trainees) in the United States. This results in a concentration of about 78 medical trainees per 100,000 state residents, compared to a US average of about 35 medical residents per 100,000 US residents. Medical residency programs in the state's teaching hospitals have grown in the last decade by about 12.8 percent, outpacing overall US growth of nearly 6 percent (1995 to 2005). Graduate training of medical specialists outpaced training of primary care physicians, but primary care resident programs in Massachusetts grew during the decade at a rate nearly double that of primary care programs nationwide, (8.6 percent in Massachusetts, 4.4 percent in the US, 1995 to 2005). Total enrollment in one key primary care field, internal medicine, is approximately 1,100 doctors at a time.⁴⁷

Research Federal research funding to Greater Boston's teaching hospitals doubled to more than \$1 billion per year from 1997 to 2003. Six out of the top 10 most highly funded hospitals in the country are located in Boston (Federal Fiscal Year 2003). As a result, the hospitals' share of all federally funded research in Greater Boston increased from a little more than 30 percent to nearly 40 percent.⁴⁸ Increased research funding has fueled an increase in new technologies licensed by the teaching hospitals and enabled a significant expansion in the number of highly trained researchers retained by the hospitals, including a 50 percent increase among neurology post doctorates and a 116 percent increase among radiology post doctorates.⁴⁹

Related industries Health care technology industries, particularly biotechnology, medical devices, and pharmaceuticals are linked to Greater Boston teaching hospitals (and to its universities) as investors in early-stage technologies developed by the hospitals and as frequent recruiters of researchers trained in the hospitals. Biotechnology is by far the most active industry as an employer: growth in biotech-related companies in Greater Boston from 2001 to 2006 was three times the national average, while employment in medical devices and pharmaceuticals declined.⁵⁰

Vulnerabilities in Greater Boston’s Utilization of Health Care

Increasing health care needs due to higher levels of chronic disease, combined with the continuous introduction of new technologies to diagnose and treat chronic diseases, result in an increased “prevalence of treated disease” that is a powerful driver of increased health care costs.

Recent research suggests that increased obesity and treatment of obesity-related health conditions are primary drivers of the increased cost of privately insured health care over the last 20 years. Increased costs are the result of both an increased level of need and the continuously expanding availability of technologies for diagnosis and treatment. The resulting increase in the volume of medical care is defined as an “increased prevalence of treated disease” and appears to be one of the single most powerful forces driving up health care costs.

Health insurance costs are growing at a rate that outpaces the rate of increase in household income and wages, thus increasing pressure on employers and employees to drop employer-sponsored health insurance benefits.

The average cost of an employer-sponsored family health plan in Massachusetts grew 43 percent between 2000 and 2004; more timely data suggests that employer health care costs have grown more than 8 percent a year since then. This represents a 4 to 5 percentage point increase, per year, in real spending after inflation.⁵¹ In contrast, real median household income in Greater Boston has seen little or no growth since 2000.

As the cost of health insurance rises at rates in excess of wage and income growth, health insurance represents a larger and larger proportion of compensation paid to workers. The price of an average health insurance plan equaled about 16 percent of median family income in Massachusetts in 2005 and at present rates will exceed 20 percent of median family income within five years.⁵²

The continued rise of health insurance costs as a proportion of wages increases financial pressure on employers to drop employer-based benefits, and on employees who must pay a share of the benefits. The pressure is most acute on employers offering lower-wage jobs, including employers in health care-related industries such as home health care and nursing home care. The total cost of an average family health insurance plan (employer and employee contributions combined) equaled about 24 percent of the average wage in the overall health care industry in Greater Boston in 2004, and about 75 percent of the total yearly pay from a minimum wage job.⁵³ **See Figure 5**

The affordability of health insurance will become an even more acute issue for Greater Boston in the months ahead, since all residents of the state will be required to have health insurance under the new health care reform law. As of this writing the Commonwealth’s new health insurance agency—the Commonwealth Health Insurance Connector Authority—faces a difficult task in deciding on a balance between the cost of ‘minimally creditable’ health insurance plans and the comprehensiveness of the plans that will be made available to residents.

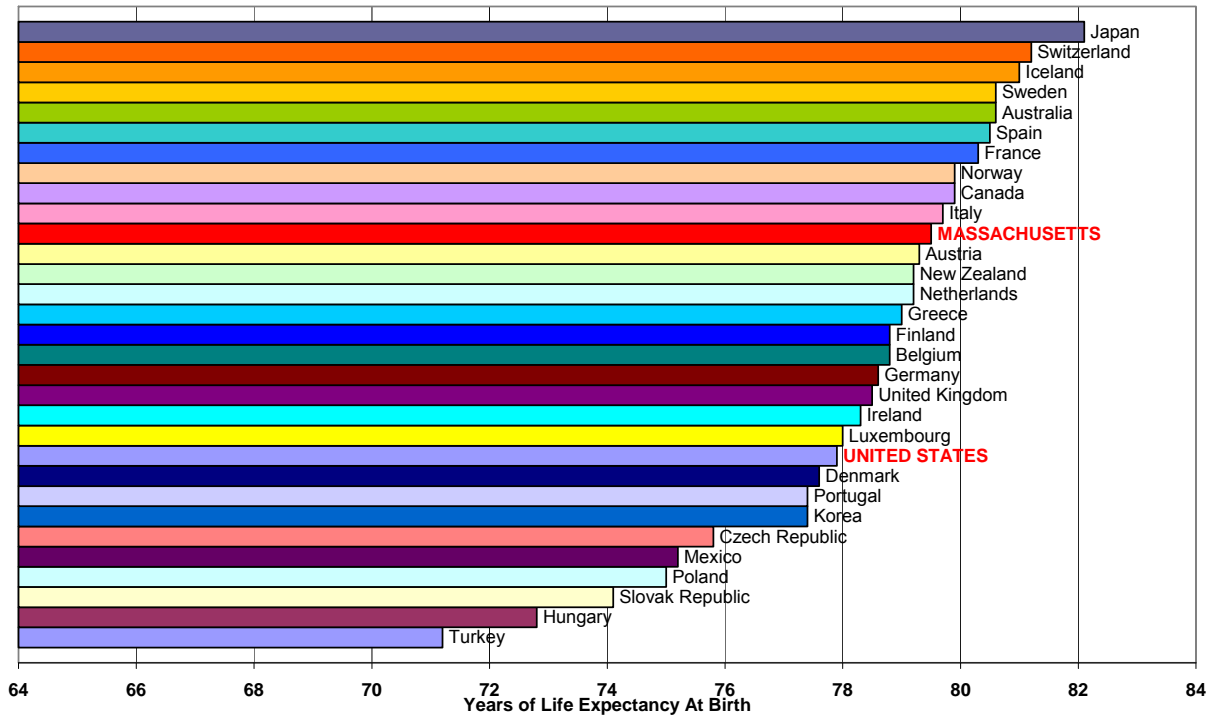
Health care and health insurance costs are also outpacing the rate of growth in government revenues, resulting in the crowd-out of other government spending, including spending priorities that are critical to long-term health *and* economic competitiveness.

Health care spending by Massachusetts state government rose from 16 to 22 percent of the state budget from Fiscal Years 2001 through 2007.⁵⁴ Health care spending rose by 49 percent in real terms. In the same period, state aid to cities and towns fell by 20 percent in real terms, while state public health spending is still 20 percent below 2001 levels in real terms.⁵⁵ Increased health care spending by the state is the result, in part, of a pro-active policy to expand Medicaid eligibility, a policy that has improved health care access in the state by reducing the number of uninsured residents, (as noted above). Estimates made by Governor Deval Patrick in his state budget for FY 2008 suggest that health care costs (net of federal reimbursements) will reach about 23 percent of the state budget in the next year and claim about two-thirds of new state revenues.⁵⁶ Baseline budget projections made by the Massachusetts Taxpayers Foundation assume a minimum of 7 percent yearly growth in state health care spending over the next five years, compared to baseline revenue growth of 6.2 percent.⁵⁷ **See Figure 6**

Health care spending is also growing as a proportion of the federal budget, rising from 18 percent to 22 percent of the budget in 10 years, (1996 to 2006).⁵⁸ Health care has been the fastest growing “super category” of spending (as defined by the Office of Management and Budget) in the last decade, although spending on defense and homeland security has outpaced health care spending since the attacks of September 11, 2001. Current estimates made for the National Health Expenditure Accounts project an average yearly increase of 7.4 percent in health care spending between now and 2014, compared to an average annual increase in Gross Domestic Product of 4.7 percent.⁵⁹ The pressure of increased health care, defense, and homeland security spending has reinforced a long-term trend in which other forms of federal domestic spending have been severely squeezed. Recent estimates made by the Congressional Budget Office suggest that non-defense discretionary spending by the federal government will increase by an average 2.46 percent per year between now and 2012, unless current tax and spending policies are significantly altered.⁶⁰

Figure 1

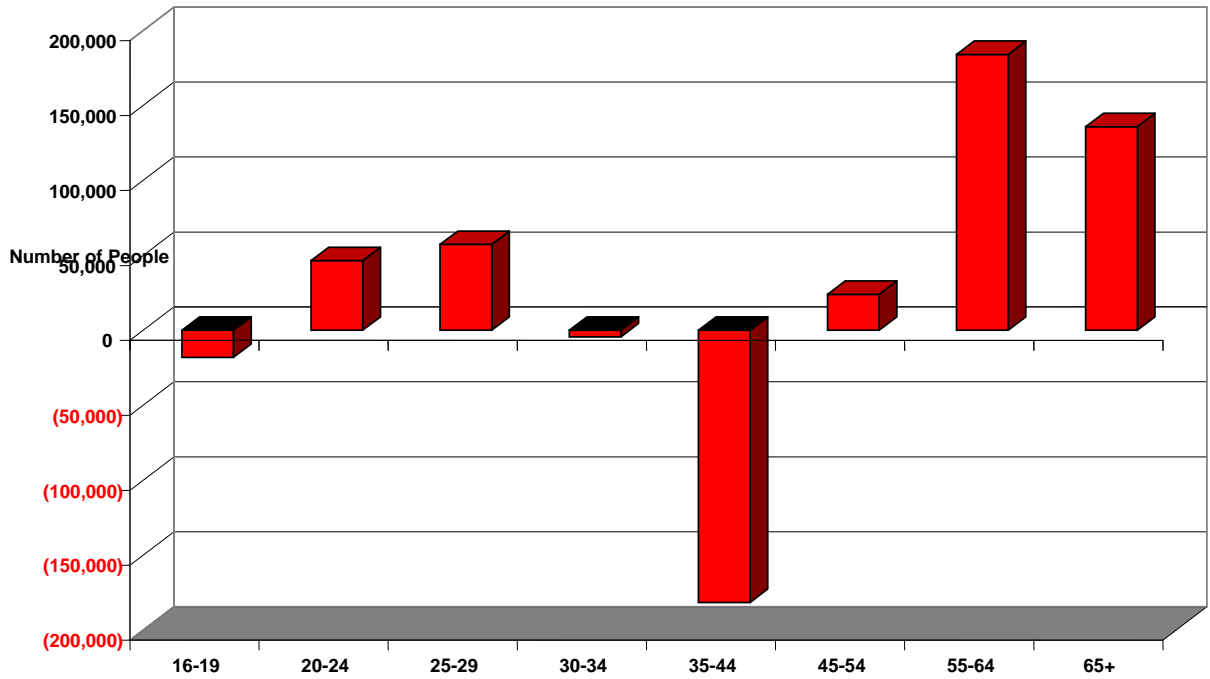
Life Expectancy at Birth 2004 - Massachusetts and OECD Countries



From: Organisation for Economic Cooperation and Development (OECD) "OECD Health Data 2006 - Frequently Requested Data", at www.oecd.org

Figure 2

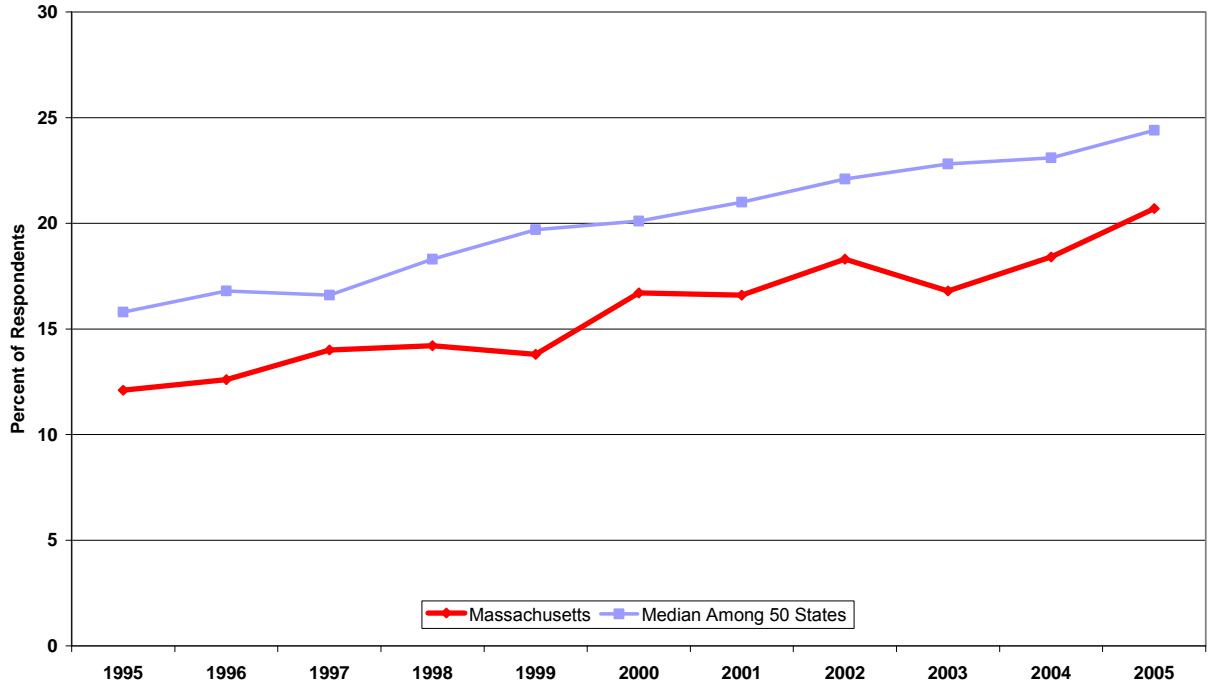
Projected Changes in the Working Age Population of Massachusetts Between 2005 and 2015



Source: MassINC and Northeastern University Center for Labor Market Studies, *Mass Economy: The Labor Supply and Our Economic Future* December 2006.

Figure 3

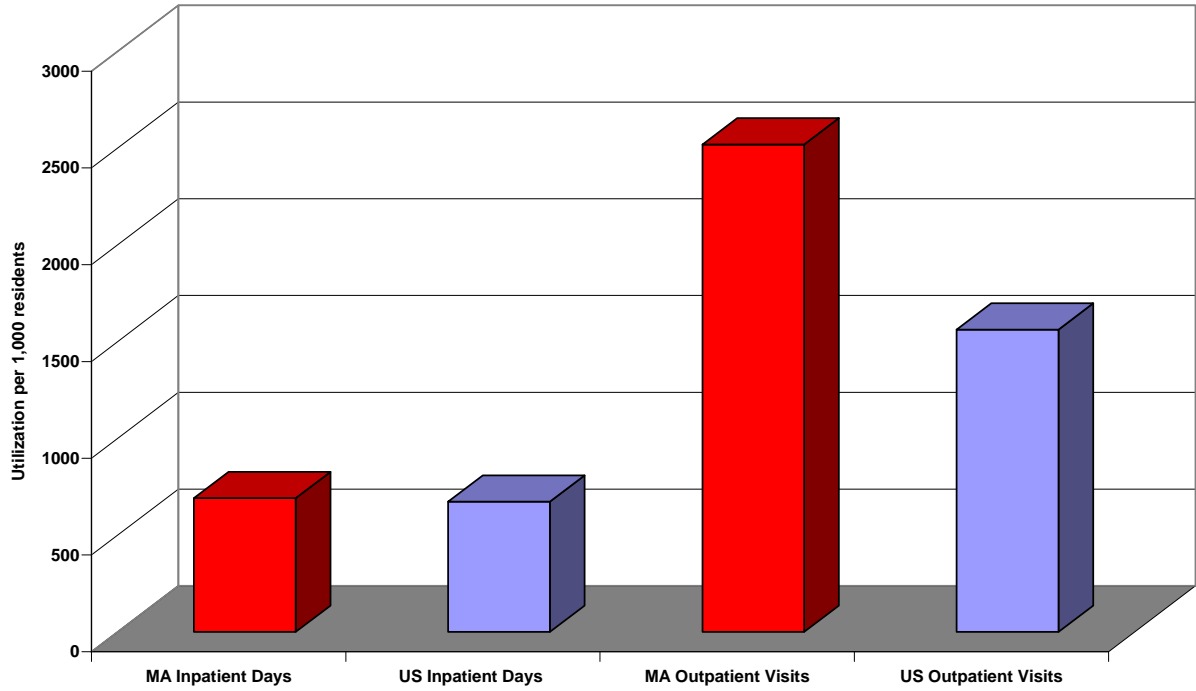
Adult Obesity



From: Massachusetts Department of Public Health, annual Behavioral Risk Factor Surveillance System (BRFSS) reports, as reported on MassCHIP online data system. Obesity is defined as Body Mass Index in excess of 30.

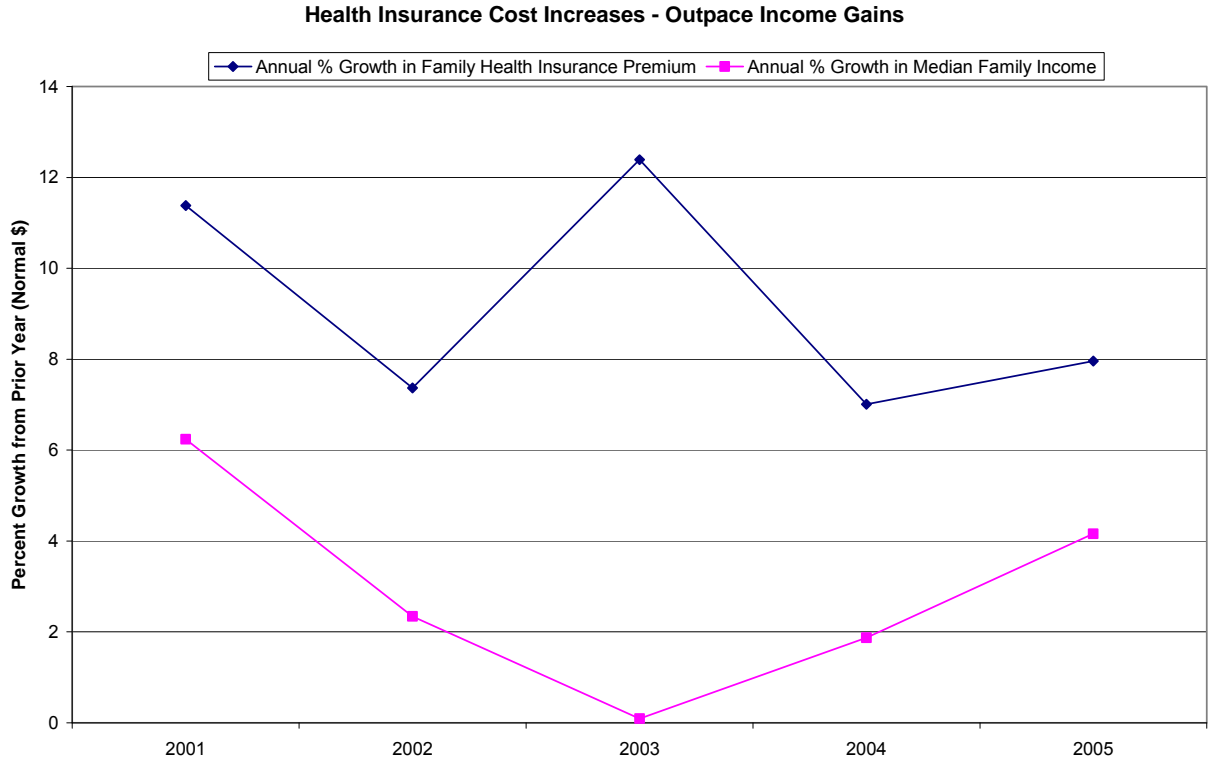
Figure 4

Hospital Services Utilization: US and Massachusetts - 2004



From: American Hospital Association, Hospital Statistics 2004

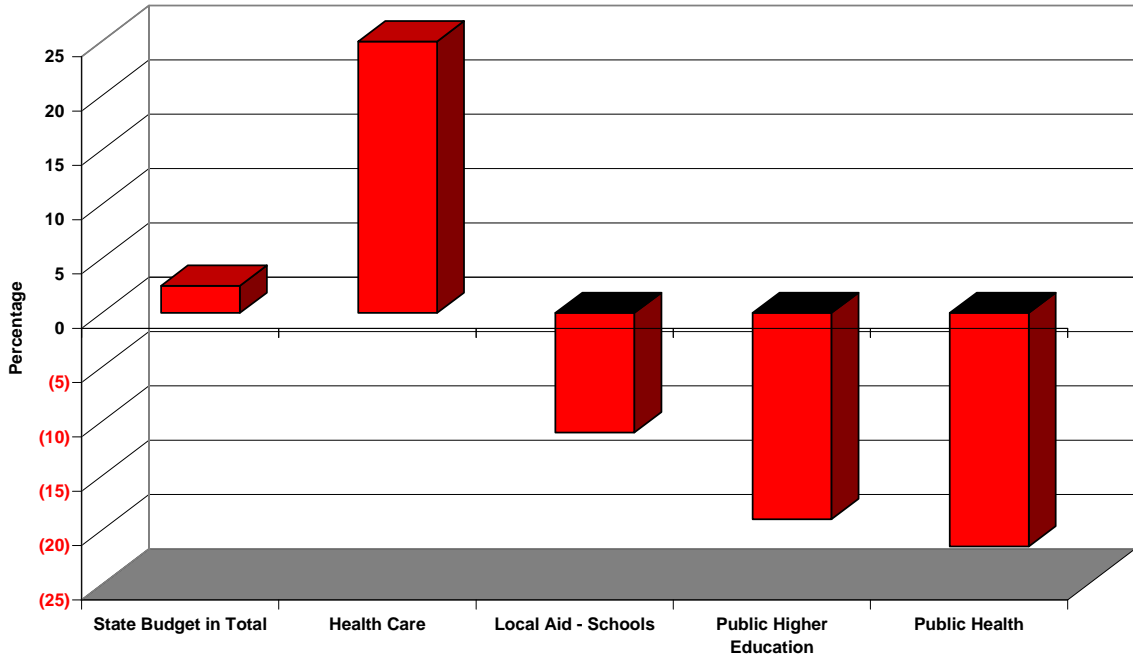
Figure 5



From: Medical Expenditure Panel Survey, Centers for Medicare and Medicaid Services (health insurance data), and US Census Bureau - American Community Survey (median family income data)

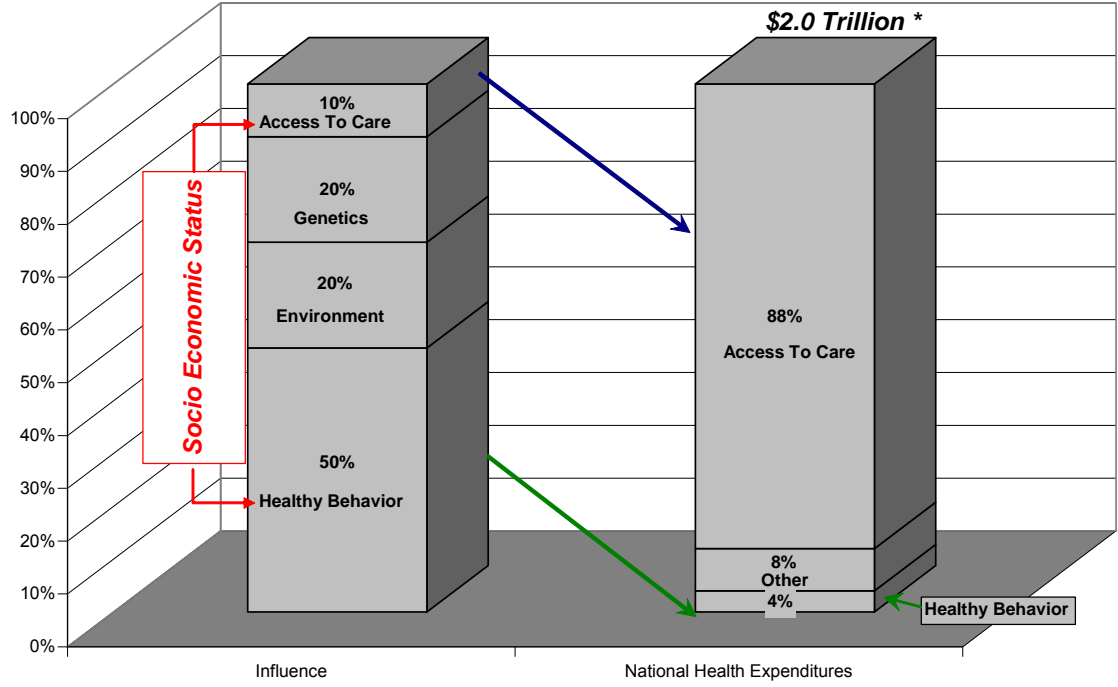
Figure 6

**Net Change in Real Spending
Massachusetts Budget - FY 2001 through 2007**



From: New England Healthcare Institute estimates from Massachusetts Taxpayers Foundation Data.

A Mismatch in Spending: Health Care and Other Key Determinants of Health



Source: Institute for the Future, University of California-San Francisco, CDC

* = Total U.S. Personal Health Care Expenditure 2005

Access to health care is a critical determinant of health status, but personal behaviors are actually a much greater influence on health over a lifetime. Environmental factors and genetics are also important factors, while socioeconomic status (especially educational attainment) influences every determinant of our health.

Yet our national expenditure on health care is far greater than our expenditures on other critical determinants of health. Nearly 90 percent of personal health care expenditures in the U.S. are spent on direct care; much less is spent on changing risky behaviors or reducing environmental risks.

A: The Health of Greater Boston

Population and Demography:

Sluggish Population Growth Will Shape Greater Boston's Health, Its Health Care and its Competitiveness

Two demographic trends have characterized the area economy for decades: a relatively high level of educational attainment among Greater Boston residents, and a comparatively slow rate of population growth. Population growth in Massachusetts as a whole has lagged national growth rates since the 1960s. Even during the most prosperous years of the 1990s population and workforce growth in the state was sustained only because of a yearly influx of immigrants from abroad.⁶¹

Greater Boston's slow economic recovery from the last recession (2000-2001) has exacerbated several of the trends seen in the 1990s and point towards a future of modest growth in the area's population, and little or no growth in the Greater Boston workforce.

The population of Greater Boston and Massachusetts has declined in recent years.

The population of the Greater Boston area has declined since the 2000-2001 recession. US Census population estimates indicate that the population of the Boston Metropolitan Statistical Area (MSA) declined by approximately one-half percent (0.5 percent) between 2002 (the prior population peak) and 2005.⁶² Census estimates show an even larger decrease of 3.4 percent across Eastern and Central Massachusetts and adjacent areas.⁶³

The city of Boston may be an exception to the trend: recently adjusted population estimates for the city of Boston show a slight increase of 1.3 percent in the city's population between 2000 and 2005.

Population losses are caused by the area's relatively low birth rate and an accelerated rate of out-migration from Greater Boston and Massachusetts.

Net population losses in the Greater Boston area are the result of a low birth rate and persistent out-migration of area residents.

In 2005 the overall Massachusetts birth rate was 4.4 births per 100 residents lower than the US rate, (12.4 births vs.16.8 births per 100),⁶⁴ reflecting a long-term trend.

Meanwhile, approximately 233,000 Massachusetts residents left the state for other states between 2000 and 2005, the second highest rate of out-migration in the US, with nearly all of the net out-migration occurring in three Greater Boston counties, (Suffolk, Middlesex, and Norfolk).⁶⁵

Population loss is acute among residents of working age: Massachusetts has experienced virtually no labor force growth since 2000, ranking 48th in the nation, due in large measure to a reduction in Greater Boston's workforce.

Analysis from MassINC and the Northeastern University Center for Labor Market Studies shows that the state's labor force experienced three consecutive years of decline from 2003 to 2005, the only state in the US to experience such a decline. The decline in the state workforce was driven primarily by losses in the three Greater Boston counties of Suffolk, Middlesex and Norfolk. At year-end 2006 the Greater Boston labor force had not increased, despite resumption in job growth that started in late 2004.⁶⁶

Population and workforce losses would be significantly more severe but for a continued influx of immigrants; immigration is increasing the racial and ethnic diversity of Greater Boston

Further analysis from MassINC and Northeastern University indicate that nearly 200,000 immigrants have come to Massachusetts since 2000, an influx that nearly offset the out-migration of existing residents. Immigrants are entirely responsible for the slight growth measured in the state's labor force since 2000, (growth which, as noted, appears to have reversed in 2003).

Immigration is gradually increasing the racial and ethnic diversity of Greater Boston. Greater Boston was 21.5 percent non-white in 2005, an increase of about 2.5 points since 2000. By way of comparison, the US population as a whole was estimated to be approximately 37 percent non-white in 2005. The city of Boston is far more diverse than the region as a whole: Boston's population was estimated to be over 51 percent minority in 2005.⁶⁷

Immigration among Hispanic and Asian ethnic groups is primarily responsible for the increased diversity in Greater Boston. Hispanic residents are more numerous in Greater Boston, but the region's Asian and Asian-American population has increased nearly twice as fast in recent years.⁶⁸

Demographers expect Greater Boston's population to increase only modestly in the years ahead; the increase will be driven almost entirely by longevity among the Baby Boom generation

Projections from the Metropolitan Area Planning Council suggest that Greater Boston's population will increase by a little over 10 percent in 30 years (2000-2030), a rate significantly lower than the projected increase of 28 percent in the US population as a whole. Population growth will be due entirely to residents over the age of 55: as the Baby Boom generation ages and enters its retirement years, it will be larger than both the generation that preceded it and the generation that comes after. The population over the age of 55 will increase by 75 percent by 2030, while demographers expect the number of Greater Boston residents under the age of 55 to decline.⁶⁹

Greater Boston's workforce may well shrink in future years, and it will be heavily reliant on older workers and a continued influx of immigrants.

Current projections indicate that the Greater Boston will decline over the next 10 and 25 years as the number of younger working residents decreases.

State population projections made by the US Census Bureau suggest that the number of residents aged 25-44 years will decline until at least 2015, and rise very modestly thereafter. Many states are experiencing this same post-Boomer 'Baby Bust,' but the decline is pronounced in Greater Boston and Massachusetts. The Census projections predict that the population of 25-44 year olds will rise throughout the US after 2010, and rise robustly in growing southern states.

More recent projections made by MassINC and the Northeastern University Center for Labor Market Studies suggest that the current 'Baby Boomlet' working its way through area schools will yield 70-80,000 new workers in Massachusetts by 2015. Immigrants will comprise an increasing share of the younger workforce. Projections from the Universities of Connecticut and Massachusetts suggest that minority residents will comprise fully half of the new entrants into the Massachusetts workforce by 2020, and will constitute nearly 30 percent of the entire state workforce.

Nevertheless, modest gains among the number of younger workers will be more than offset by a reduction of nearly 200,000 residents in the 35-44 year age cohort, the age group that has proven susceptible to out-migration away from Greater Boston and Massachusetts in recent years. Workers over the age of 45, led by the Baby Boom generation, will comprise over half of the entire working age population.⁷⁰

What are the implications of Greater Boston's sluggish growth on health, health care and competitiveness?

Sluggish population growth and weak growth in the local labor force has distinct implications for the health status of Greater Boston residents, as well as for the future of health care and the overall economic competitiveness of the area. These implications will be seen throughout the 31 indicators that follow in this report.

Major implications include the following:

Greater Boston will not be a health care boom town: Greater Boston may well prove to be a boom town for life science industries, but its slow population growth suggests that the size of the health care market will not grow as robustly as the markets of other metropolitan areas in the US, particularly those in fast-growing regions of the south and southwest, ***but***

The intensity of health care need in Greater Boston's population will rise: The relatively high proportion of older working-age and retirement-age residents will mean that health care needs will also be relatively more intense in Greater Boston, since many chronic diseases are associated with aging. Demand for intensive health care services will increase even if the incidence of disease remains steady. (Unfortunately, as indicators in

the following report will show, the incidence of disease may *not* remain steady because of a rising level of preventable chronic diseases such as diabetes.)

An older, sicker workforce may create a higher risk insurance pool to be covered by employer-based health insurance: In principle, if Greater Boston's workforce becomes more dominated by older workers, who are more apt to suffer illness, and less dominated by younger workers, who are apt to be healthy, the cost of insuring against medical costs in the area's workforce will rise.

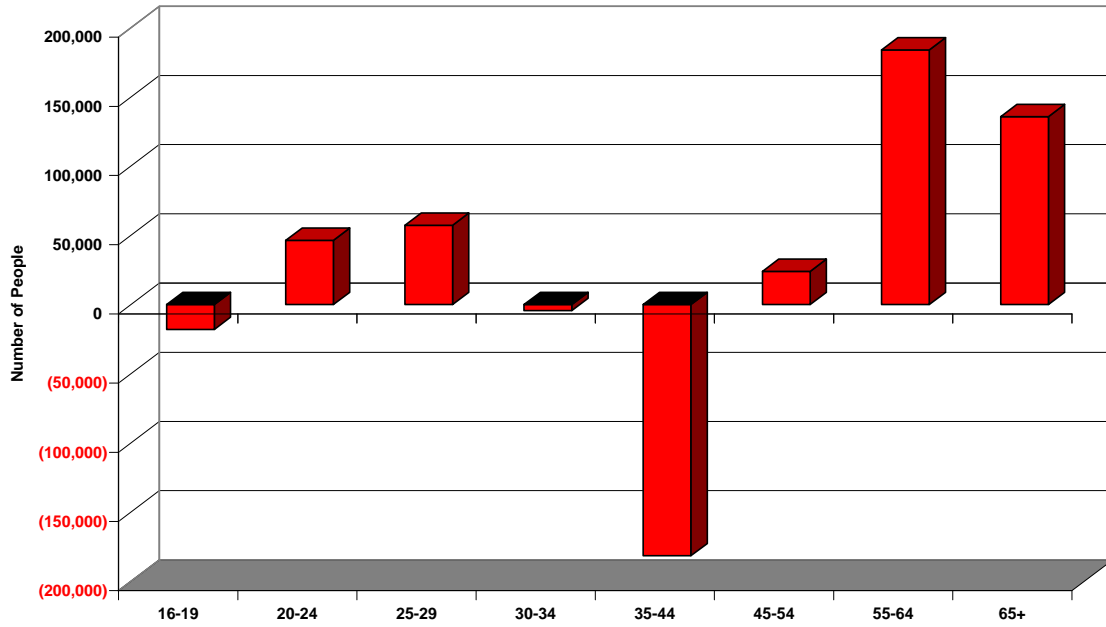
An older, potentially sicker workforce will have an impact on productivity: High worker productivity has been a hallmark of the local economy for decades. To the extent that Greater Boston will be more dependent on older workers who are more apt to suffer from chronic illnesses, it will be more vulnerable to losses in productivity.

The health and wellness of workers will become an issue for economic development as well as for health care policy: To the extent that Greater Boston's reliance on older workers drives up health care costs and taxes worker productivity, the use of effective measures to sustain worker health will become an economic development issue for the area as well as a health policy issue.

The increasing importance of immigrants in Greater Boston's population and workforce will make the fight against health disparities more important: As immigrants and their children become a larger part of Greater Boston's population and workforce, their health and health care needs will become a larger issue for the area's health status and competitiveness. Many immigrants come to Greater Boston with better health and health behaviors than long-time residents. But disparities in health status along racial and ethnic lines Greater Boston are frequently deep and persistent. Greater Boston's overall health status, health care costs and productivity will be directly influenced by whether minority immigrants maintain a 'Healthy Immigrant' status or assimilate Greater Boston's health disparities as they assimilate into the larger economy and culture.

Figure 7

Projected Changes in the Working Age Population of Massachusetts Between 2005 and 2015



From: MassINC and Northeastern university Center for Labor Market Studies, *Mass Economy: The Labor Supply and Our Economic Future*, December 2006, Page 14.

Determinants of Health

Introduction: What are the determinants of health and why are they important?

Each person's health is shaped by his or her personal circumstances. Inherited traits, access to good health care, the level of safety in the home and in the community, and other factors determine the risk of injury and illness, and thus are said to be "determinants" of health.

In analyzing the health of an entire population such as Greater Boston's, epidemiologists have identified several broad categories of determinants that appear to powerfully shape levels of illness, disability and life expectancy. Identifying trends among these determinants and whether they are promoting or undermining the health of the population can provide important insights into how healthy the population will be in future years and just how much new demand will be put on the health care system. Trends in critical determinants of health thus become key indicators of progress in improving health and health care.

Epidemiological research suggests that social and economic factors are critical influences on health. Perhaps the most critical influences are *educational attainment* and *income*. For the most part, higher levels of education in the population, and greater levels of income and wealth are linked to higher levels of health and well-being.

Socioeconomic factors such as educational attainment and income act on other key determinants of health. Research has identified four broadly influential categories by examining the major underlying causes of death before the age of 75 years, (what epidemiologists define as "premature mortality"). These four categories are *genetics*, *environmental factors*, *access to health care*, and *health-related behaviors*.⁷¹

Research also finds that these four broad categories have greatly differing impacts on health and on the likelihood of illness and disability.

Genetics and environmental factors are each thought to explain up to 20 percent of overall health status, although continuing and rapid advances in genetic research and the interaction of genetic make-up with environmental factors are likely to cause continuing revisions of these estimates. It is clear that some people have a distinct genetic predisposition to certain diseases, but research is also making clear that genetic factors interact with environmental factors in differing ways. One set of environmental factors (such as pollution) may well trigger disease or disability in some people but not in others. The social environment of a community may also trigger disease or disability among some persons, but not in others. The "gene by environment interaction" is a major target of ongoing research.⁷²

Access to health care is thought to account for 10 percent of overall health status. Typically the critical indicator of health care access is the extent to which the population

has health insurance, be it private health insurance, Medicaid, or Medicare. In an increasingly diverse society like Greater Boston's, however, other key indicators of access pertain to whether residents from differing linguistic and cultural backgrounds can find health care that can diagnose and respond to their needs in an effective or "culturally competent" manner.

After socioeconomic factors, personal behaviors have the largest impact on the health status of individuals and the population at large. Research finds that risky behaviors such as smoking, poor diet and inactivity, and unsafe sexual behaviors account for up to half of population health status.

That personal behaviors play such a large role in determining the overall health of a population like Greater Boston's is a finding that has become more and more significant as health care plays a larger role in our economy and health care costs rise higher and higher.

Risky behaviors are strongly linked to the leading causes of death in society and to the most costly drivers of health care cost. The two biggest underlying causes of death in the US are both behavior-related: tobacco use, and poor diet and fitness leading to overweight and obesity.⁷³ Risky behaviors such as tobacco use, poor diet and poor fitness are directly linked to several conditions and chronic diseases, such as hypertension, diabetes, heart disease and some forms of cancer, which now claim an increasing share of health care spending.⁷⁴

Health-related behaviors have a two-pronged effect on Greater Boston and its Health Care Economy. Since behaviors play a large, and increasing, role in generating illness, they act as a driver of demand for the health care industry, and for the health care technology industries (such as biotechnology) that strive to provide new and more effective treatment.

On the other hand, health-related behaviors drive higher costs for the entire economy as they drive new health care demand. Since behaviors can be modified, much of the illness and health care cost created by risky behaviors can be prevented or reduced if action is taken before risky behavior turns into serious disease. Greater Boston is thus challenged to find ways to reduce illness, and moderate the rising cost of health care, by applying the same level of effort and innovation to preventing behavior-related illness as it has so often applied to treating illness.

Indicator 1 – Education

Why is this important?

Research suggests that the greatest determinant of an individual’s health over a lifetime is unrelated to lifestyle or even to medical care, but instead is dependent on educational attainment. Higher levels of education are linked with better health and well-being.⁷⁵

Education can influence an individual’s health in the following ways:

- By imparting knowledge and skills to understand and adopt healthy behaviors and to navigate the complexities of the health care system.
- By enabling one to compete for better and more lucrative jobs, including those with health benefits.
- By increasing one’s likelihood of obtaining “knowledge-based” jobs which may be less physically strenuous than physical labor and are less prone to cause accident and injury.
- By improving the health of entire families and households, as the children of parents with higher incomes and educational levels are more likely to enjoy safer environments, greater support for learning and academic achievement, and better access to health care.

What do the data say?

- **Greater Boston and Massachusetts are among the US leaders in the percentage of college and advanced degree holders.**

Thanks to its heavy concentration of colleges and universities, both Greater Boston and Massachusetts surpass the national average for the proportion of college graduates and advanced degree holders in their populations. Massachusetts ranks first among states in the US, with 36.9 percent and 15.7 percent of its adult residents holding college and advanced degrees respectively. College education attainment in the state has out-paced the national average by 7 to 8 percentage points even as college attainment in the US has increased from about 20 to 27 percent since 1990.⁷⁶

College-level and advanced degree attainment in the Boston metropolitan area itself is even higher at about 40 percent for college and over 17 percent for advanced degrees. Among large metropolitan areas of the US Greater Boston trails only the Washington-Baltimore area for the largest percentage of college graduates and advanced degree holders. However, college and advanced degree attainment in smaller metropolitan areas with a strong university base, such as Austin and Raleigh-Durham, rival those of Greater Boston.⁷⁷ **See Chart X.**

- **Greater Boston ranks high for the rate of high school completion in its population, but recent data shows a declining percentage of high school students in Massachusetts are graduating from high school within 4 years.**

At 87.7 percent, Greater Boston ranks 5th among the 15 largest metropolitan areas in high school attainment; attainment in the leading metropolitan area (Cleveland, Ohio) was 90.7 percent (2005).⁷⁸ However recent data on the graduation rate of high school students statewide shows that a decreasing percentage of high school freshmen complete their high school education within 4 years. The 4-year graduation rate in Massachusetts fell from 78.9 percent to 75.7 percent from 2001 to 2003.⁷⁹

- **Educational attainment statistics for Greater Boston mask significant disparities among racial and ethnic minority groups.**

While Greater Boston's population boasts impressive rankings in higher education attainment, some groups fare better than others.

Asian-American residents are more likely than other groups to have achieved a college education or advanced degree. Over 60 percent of Asian men and 54 percent of Asian women have completed college, and approximately a third hold advanced degrees. Within the city of Boston, 51 percent of Asian men and 37 percent of Asian women have completed college.

White residents, particularly those living within Boston's city limits, possess the highest levels of educational attainment after Asian Americans. Over 57 percent of white men and women there hold college degrees compared to 44 percent and 41.5 percent among white men and women respectively in the greater region. In addition, about one quarter of whites in Boston hold advanced degrees.

African American residents are only about half as likely as whites to obtain college and advanced degrees. Approximately 13 percent of African Americans from Boston and 20 to 23 percent from outside the city go on to college. While only 9 to 10 percent of African Americans in the region possess advanced degrees, this is much higher than the national average of just under 4 percent.

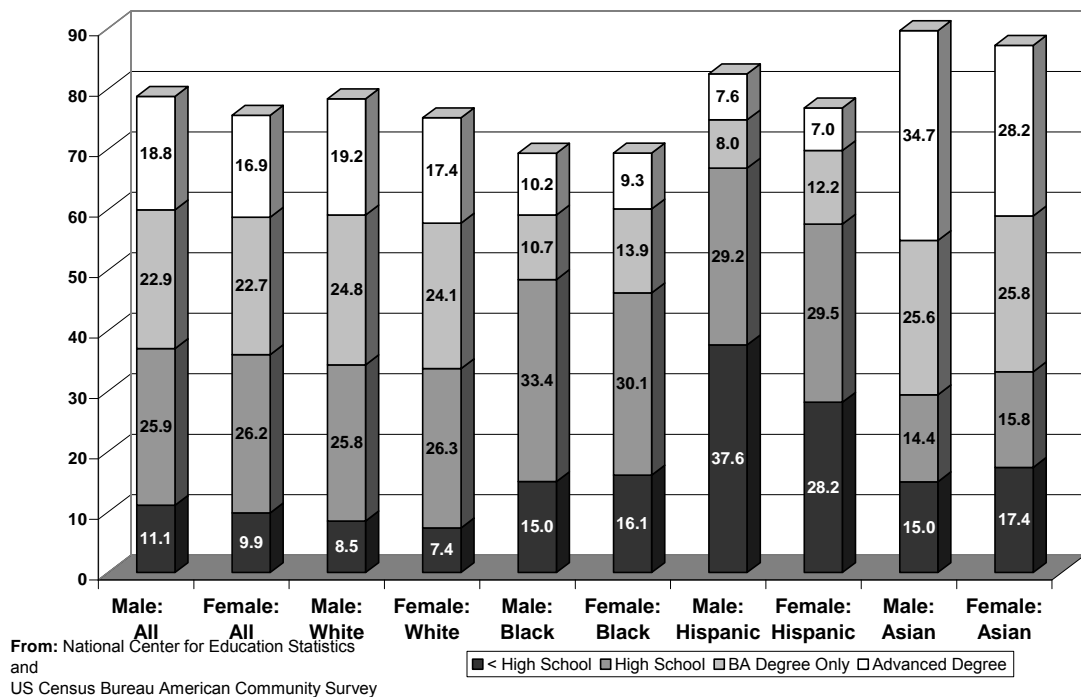
Hispanic residents are more likely than the overall US Hispanic population to hold college or advanced degrees, but the numbers are still low. Nearly 20 percent of Hispanic women and 15.6 percent of Hispanic men in the region hold college degrees (compared to 12.7 percent of Hispanic women and 11.8 percent of Hispanic men nationwide). Hispanic men and women in Greater Boston obtain advanced degrees at a rate nearly twice the 3.9 percent average for Hispanics nationwide. On the other hand, the Hispanic population in the area has the highest proportion of individuals with less than a high school education, ranging from 30 to 50 percent of residents depending on location. The comparable rates among the white and African American communities run between 7 and 20 percent.

Implications

- Educational attainment rates in Greater Boston are high compared to the rest of the country, but Greater Boston's competitive edge in educational attainment is not guaranteed. Other metropolitan areas with a strong university presence (such as Raleigh-Durham and Austin) have high and rising attainment levels and are projected to have strong population growth in the years ahead.
- Demographers find that the percentage of college graduates among young workers entering the workforce in Greater Boston and Massachusetts is gradually declining and will continue to decline through 2020.⁸⁰
- There are significant disparities in educational attainment among racial and ethnic minority groups, and rates of high school and college attainment are particularly low among the Hispanic population. Demographic projections suggest that nearly half of new entrants to the workforce will be from minority groups by the year 2020. Unless educational attainment among minority residents can be improved, overall levels of educational attainment in Greater Boston's workforce will erode. This decline in education and skill can have several adverse consequences for health, health care and competitiveness, since lower-skilled and less well educated workers are at greater risk for poor health and less likely to hold jobs that will offer adequate wages and benefits for quality health care.
- Evidence that four-year high school graduation rates are declining and that college attainment among growing minority groups is low underscores the importance of the "second chance" at education provided by adult basic education and by community colleges. Basic adult education is not guaranteed in Greater Boston, however: waiting lists for ABE services in Massachusetts contain approximately 17,000 names. Meanwhile, real spending (inflation-adjusted) on public higher education, including community colleges, remains below pre-recession levels (2000 to 2001).

Figure 8

Educational Attainment: Greater Boston 2005



Indicator 2 - Median Income

Why is this important?

With its link to education, income also plays a fundamental role in determining individual and family health. A higher income provides greater ability to obtain nutritious food, secure safe and adequate housing, live in safe and supportive neighborhoods, and purchase health care. In addition, higher incomes are invariably associated with jobs that are less physically taxing and in safer worksites.⁸¹

What do the data say?

- **While median income in Greater Boston is relatively high, elevated costs of living reduce real purchasing power.**

Median household income is a basic indicator of the financial position of an area's population in Greater Boston it was estimated at \$62,068 in 2005 compared to \$46,242 in the US as a whole.⁸² Median income estimates for the city of Boston (\$46,242) place it 13th among US cities.

While the median income is high in Greater Boston, living costs are also high. The US government Consumer Price Index for Greater Boston was 12 percent higher than the US city average by year-end 2006.⁸³ The ACCRA Cost of Living Index is a long-established, private estimate of costs in over 200 metropolitan areas in the US. The ACCRA Index for Greater Boston is nearly 40 percent higher than the US city average, (139.7 for the third quarter of 2006, where the city average is 100).⁸⁴ The purchasing power of Greater Boston's median income falls much closer to the national median after adjustment for the ACCRA Index.⁸⁵ Living costs in Boston are over 40 percent higher than less expensive competitor areas such as Atlanta, Raleigh-Durham, and Austin.⁸⁶ By some estimates median household income in Greater Boston is now at or below the level necessary for a basic budget supporting a family of four.⁸⁷

- **Wide disparities in income are apparent by racial and ethnic group.**

Median household income varies considerably by racial and ethnic groups in Greater Boston. White and Asian American families earn in excess of two thirds more than African American and Hispanic families.

Asian American	\$66,537
White	\$65,450
African American	\$38,354
Hispanic	\$32,953 ⁸⁸

- **Median income growth has lagged in recent years, while accelerated growth has occurred for upper-income earners.**

Stagnant growth in median income has been the norm of late, in both Greater Boston and the US as a whole. Median household income grew by 0.9 percent in the city of Boston between 2000 and 2004, while it decreased by about 0.1 percent in the state at large.⁸⁹

Hourly wage decreases have played a large role in keeping earnings down, median hourly wages fell by 5 percent between 2003 and 2005 alone, the largest drop in the country during that time.⁹⁰

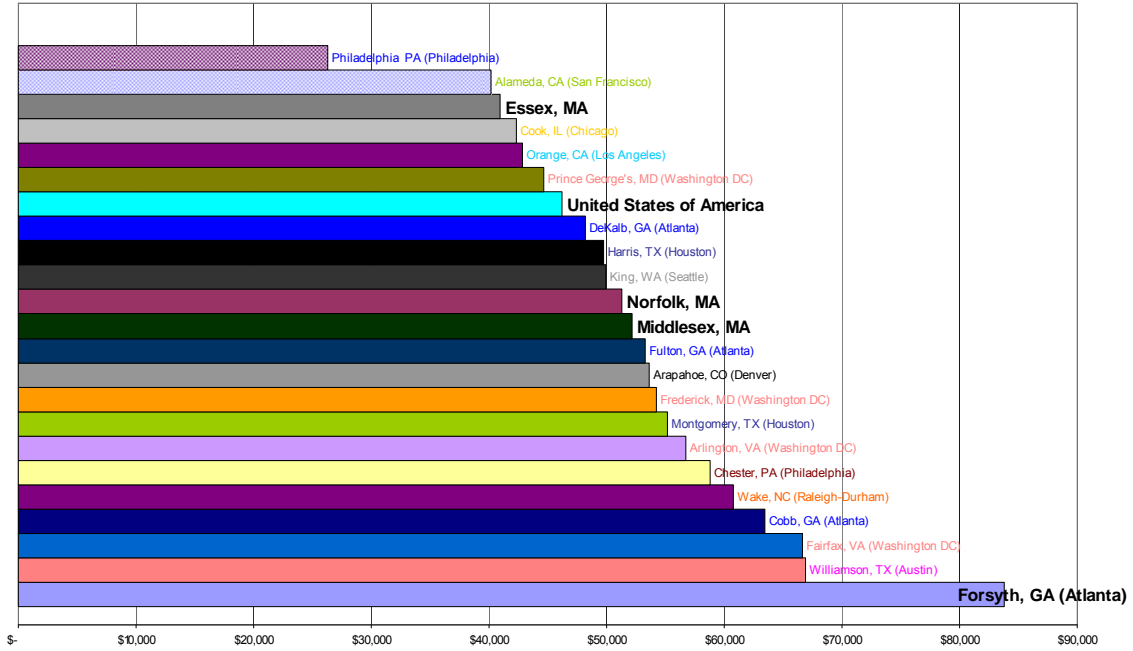
While median income has changed very little in recent years, upper-income households have benefited from considerable income growth, and income inequality in Massachusetts has developed at one of the fastest rates in the US. Growth in average annual income for the highest-earning 20 percent of families grew 77 percent from 1984 through 2002, compared to 40 percent growth for families in the middle 20 percent of income-earners and 16 percent for families in the lowest 20 percent.

Implications

- In Greater Boston, costs are out-pacing income for middle and lower income households, a scenario that will make it more difficult to afford necessities and will negatively affect health. As noted in Indicator 18, health insurance costs have also continued to rise at rates in excess of inflation and have increased costs for both employers and employees.
- The wide disparity in incomes among racial and ethnic groups points to a vulnerability in Greater Boston's overall health status. Median incomes for African Americans and Hispanics, who will make up greater shares of the population and the workforce in years ahead, are well below the levels that analysts suggest are adequate to live on a "basic" budget in Greater Boston.
- Income distribution in Massachusetts continues to skew very heavily towards upper income households. Epidemiological research has suggested that income inequality in and of itself is a negative influence on health status throughout the population.⁹¹

Figure 9

Median Household Income, Adjusted for Cost Of Living: 2005
(Selected Counties)



Source: ACCRA, 2005 Median Household Income of Metropolitan Areas Adjusted for Cost of Living Index, November 2006

Indicator 3 - Clean Air

Why is this important?

Clean air is essential to life, and air pollution can trigger or worsen respiratory conditions such as asthma and can contribute to the development of respiratory and cardiovascular conditions.

What do the data say?

The US Environmental Protection Agency maintains an Air Quality Index (AQI) that measures concentrations of five classes of pollutants in terms of relative safety for the public and for persons with sensitive respiratory conditions. AQI conditions for 125 days recorded in 2006 were generally good: no days were “unhealthy” and only one day was “unhealthy for sensitive groups.” About two-thirds were rated “good,” and about one third “moderate.” Substantially more AQI days were recorded by EPA in 2005 (353); 12 days were rated “unhealthy” for sensitive groups, and about 40 percent of the days were of “moderate” air quality.⁹²

In a ranking by the EPA based on the number of unhealthy air days, Greater Boston ranked No. 111 out of 303 metropolitan areas in 2006 and No. 71 out of 309 in 2005, where the No. 1 community (Riverside/San Bernardino, California) had the highest number of unhealthy air days.

Particulates measuring less than 2.5 micrometers were the most common pollutants in 2005 and 2006, followed by ozone. On average, ozone exceeds federal standards in the area on 20 to 25 days per year in recent years.⁹³ The Greater Boston region is one of many that do not meet the most current US ozone pollution standards. But this may change: under current federal law, the Commonwealth of Massachusetts has until June 2010 to impose regulations that will reduce emissions that contribute to the formation of ozone in the atmosphere.

Implications

- Clean air regulations relating to particulate matter have reduced the level of larger particulates in Greater Boston, but fine particulates remain a significant public health threat. Recent research attributes 20 to 50,000 US deaths per year to particulate exposures.⁹⁴
- In Greater Boston, the prevalence of asthma is higher than the national average, a finding that may be linked to air pollution. Research continues to reveal additional health consequences from extended exposure to fine particulates in the atmosphere, and the Environmental Protection Agency has announced a more stringent standard

for fine particulates. But because the rules are not scheduled to take effect until 2015, the consequences for Greater Boston are not known.

Indicator 4 - Clean Water

Why is this important?

Clean drinking water is essential for public health, as was evident in earlier centuries when cities including Boston were frequently plagued by outbreaks of water-borne infectious diseases. Thankfully, the construction of public drinking water and wastewater treatment systems in the 19th century nearly eliminated such threats.

Despite these advances, chemicals and other contaminants in the drinking water supply continue to impact health, even at minute levels. Thus public water systems are required to conduct rigorous tests for agents of infectious disease and a wide variety of chemical contaminants, including chemical by-products of the disinfectants used to clean water.

What do the data say?

Over 40 communities in Greater Boston (which includes over 4 million people) receive some or all of their water from the Massachusetts Water Resource Authority (MWRA), which pipes water to the metropolitan area from the Quabbin Reservoir in Western Massachusetts. Most other communities in Greater Boston rely on municipal water systems that draw upon groundwater sources.

- **Water quality in Greater Boston meets public health standards**

Drinking water supplied by the MWRA met all federal and state standards for clean drinking water through 2005, including tests for approximately 120 potential contaminants. The MWRA is now in the latter stages of a \$1.7 billion overhaul of its water purification and transport system. Improvements have included bringing the Authority's main water storage facility under cover and introducing new purification technologies that reduce chemical by-products of disinfection.⁹⁵

Drinking water quality is also high for communities in Greater Boston and throughout the state that are not served by the MWRA. Tests indicate that 90 percent of state water systems serving 89 percent of the state's total population are in full compliance with all health-based standards at all times. Temporary non-compliance among other systems can be caused by unexpected weather conditions (such as storms that cause sewer overflows) or by delays by local water agencies in meeting new and higher water quality standards.⁹⁶

Implications

- Greater Boston's water supply meets or exceeds current drinking water quality standards, thus meeting one of the single most important requirements of public health. While intermittent water quality problems can and do arise in individual

communities, the central water authority (the MWRA) has made a substantial reinvestment in clean drinking water over the past 10 years.

- At the same time, the cost of modernizing the region's water and sewer facilities has created significant long-term debt for the MWRA that contributes to continuously rising water and sewer rates for users. Rate increases are expected to exceed 8 percent in each of the next 5 years, thus exacerbating the region's high costs to households and employers.⁹⁷

Indicator 5 –Community Safety: Violent Crime, Youth Violence and Domestic Violence

Why is this important?

Safety in the home and in the neighborhood is a critical factor in health. Aside from the health effects of violent crimes themselves, *fear* of violent crimes can also have negative impacts on health: it discourages exercise and other activities in neighborhoods; it inhibits the creation of social bonds among neighbors that support the education of the young and the care of the old and frail; and it can induce retaliation and thus more violent crime.

What do the data say?

- **Violent crime overall has dropped in Massachusetts over the last decade.**

From homicide and rape to assault and robbery, violent crime in Massachusetts occurred at a rate of 456.9 crimes per 100,000 residents in 2005 (compared with 469 in the US as a whole), representing a 28 percent reduction since 1996. The rate of violent crime in the US as a whole dropped by 26 percent in the same period.⁹⁸

- **Rates of serious violent crimes are significantly lower in Massachusetts than in the nation as a whole, but murder and rape rates are now increasing.**

In 2005, the murder rate of 2.7 murders per 100,000 residents in Massachusetts was less than half the rate in the US as a whole, and the state's rape rate of 27.1 rapes per 100,000 residents was modestly lower than the US rate of 31.7.

However, crime rates in Massachusetts for both murder and rape have been on the rise in recent years. While the murder rate in the state dropped from 2.6 murders per 100,000 residents in 1996 to 2.0 in 2000, it rose to 2.7 in 2005. The murder rate is increasing in the US as a whole as well, but at a slower rate, from 5.5 in 2000 to 5.6 in 2005. After decreasing from 29 per 100,000 residents in 1996 to 26.7 in 2000, the rate of rape in Massachusetts increased to 27.1 in 2005, while it continued to decrease in the US as a whole, dropping from 32 per 100,000 residents to 31.7 in 2005.

- **Violent crime is higher in Boston than in the state as a whole, and residents of poor and minority neighborhoods are most likely to be victimized.**

In 2005, the rate of violent crime in Boston was nearly three times higher than the state's rate of 1,317.7 crimes per 100,000 residents. The 2005 murder rate in Boston was over five times higher than the state rate (12.9 vs. 2.7) and was nearly doubled that of 1996. Boston's rape rate of 47.2 rapes per 100,000 residents is about 75 percent higher than in the state as a whole, but unlike the rest of the state, Boston's rate has continued to fall since 2001.

Poor and minority residents of the city suffer from a disproportionately high rate of violent crime than other city residents. As of 2003, the rate of overall violent crime in Roxbury was five times greater than the same rate in West Roxbury (25 crimes per 1,000 vs. 5 crimes per 1,000).⁹⁹

Youth gun violence may play a role in the city's increased murder rate, as shooting incidents in Boston increased from 268 in 2004 to 341 in 2005; through the Fall of 2006 shootings continued to increase at a rate projected to result in over 600 shootings. High school-age teenagers accounted for about 50 of the city's shooting victims.¹⁰⁰

Implications

- The recent upsurge in the most violent crimes, including homicide, are associated with many factors, including the easy availability of guns and an increase in the number of teenagers to levels not seen since the 1970's.
- The psychological impact of resurgent violence can be widespread. Fully 87 percent of Boston schoolchildren reported witnessing one or more acts of violence in a 2004 school survey, and 44 percent reported experiencing one or more acts of violence themselves.¹⁰¹
- The impact of violent crimes on health is manifested in the death, disability, and increasing demand on Boston hospitals and community health providers. A resurgent level of violence is a driver of new health care needs and demands, particularly in Boston.
- Paradoxically, the rising cost of health insurance has put increased stress on cities' ability to sustain investments in priorities that are critical to maintaining safety and a healthy environment in neighborhoods. These priorities include law enforcement and education.

Indicator 6 - Tobacco Use

Why is this important?

Smoking is the No. 1 underlying cause of death in the United States. Long-standing research links the habit with lung cancers, emphysema and other respiratory diseases, hypertension, heart disease and stroke. In addition, second hand smoke increases non-smokers' risks of developing respiratory disease, asthma and lung cancer.

While smoking rates have halved in the US over the last 40 years, a substantial minority of residents in the country, and in Greater Boston, remain frequent or heavy smokers who bear a greatly increased risk of developing poor health and succumbing to chronic disease.

What do the data say?

- **Smoking rates among Massachusetts teenagers have dropped dramatically in the last decade – but one in five still smokes.**

Survey data indicate that the smoking rate among the state's high school students dropped by over a third between 1997 and 2003, from 34.4 percent to 20.9 percent.¹⁰² The current youth smoking rate appears to be stable, as 20.7 and 20.5 percent of students identified themselves as smokers in 2004 and 2005 respectively.

Survey data from the Boston public schools reveal a consistently lower smoking rate among the city's students: the rate was 19 percent in 1997 and it dropped to 15.3 percent in 2005.

- **Smoking rates among Massachusetts adults have modestly declined over the last decade.**

The self-reported rate of smoking in the state has declined from 20.5 percent in 1997 to 18.1 percent in 2005.¹⁰³

- **Smoking rates in the US, Massachusetts and Boston do not meet the national goal for smoking reduction.**

Smoking rates among high school students in Boston and in the state as a whole are below the national teen rate of 23 percent¹⁰⁴. The smoking rate among adults is also lower in Massachusetts than the US's rate of 21.1 percent. Yet despite recent declines in smoking rates, the city, state and country all fall short of the national goals for smoking reduction. The "Healthy People" strategy of the US Centers for Disease Control includes goals for measured reduction of risky health behaviors, and the national goals for smoking are a 23 percent reduction in smoking rates among adolescents by 2010 and a 12 percent reduction among adults.

- **Smoking rates in Massachusetts vary more by income and education than by race and ethnicity.**

Adult white residents in Massachusetts are slightly more likely to smoke than adult minority residents. Over 18 percent of white residents surveyed in the state claimed to be smokers in 2005, compared to 16.2 percent of African Americans, 17.9 percent of Hispanics and 10.7 percent of other residents.

This disparity is similar to that found among US residents as a whole¹⁰⁵ and reflects a higher rate of smoking among white teenagers than that found among minority teenagers. While differences in smoking rates do not vary significantly along racial and ethnic lines in the students in the state as a whole (21, 19.3, and 17.5 percent among whites, African Americans, and Hispanics respectively), white students in the city of Boston were far more likely to identify themselves as smokers (31.9 percent) than African American (12.2 percent) or Hispanic students (11.8 percent).

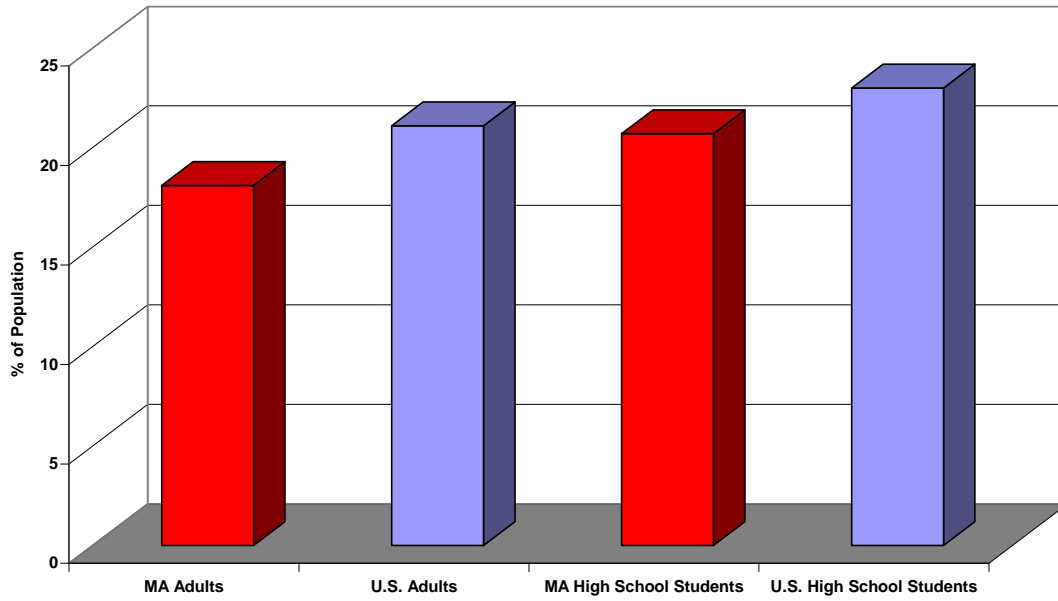
Smoking rates are inversely associated with levels of education and income. Residents with only a high school education are three times more likely to smoke than college graduates (27 percent vs. 9 percent), and residents with household incomes less than \$25,000 are 2.5 times more likely to smoke than residents with incomes over \$75,000, (26.2 percent vs. 10.5 percent).¹⁰⁶

Implications

- Reductions in smoking among high school students in Massachusetts over the past decade coincide with aggressive anti-smoking campaigns mounted by advocacy groups and the state government. Funds for these efforts came from state resources and proceeds from successful litigation against tobacco companies. However, these funds were subsequently diverted to general purposes when the state faced severe fiscal constraints in 2001 and 2002. As a result, public health authorities and advocates watch the youth smoking rate carefully for signs of renewed increase.
- To protect non-smokers from second hand smoke and to discourage smoking in general, Massachusetts has also adopted workplace and restaurant smoking bans. However, roughly one in five state residents smokes and is therefore exposed to higher risks for lung cancer and other chronic illnesses.

Figure 10

Smoking Rates - 2005



From: High School data from Youth Risk Behavior Survey (YRBS), Massachusetts Department of Education; Adult data for Behavioral Risk Factor Surveillance System (BRFSS) survey, Massachusetts Department of Public Health; and US data from Centers for Disease Control & Prevention

Indicator 7 - Exercise and Fitness

Why is this important?

While exercise and physical fitness are clearly beneficial for weight control and the prevention of obesity, research increasingly shows many additional physical and mental benefits: lower cholesterol levels and blood pressure; improved bone, muscle and joint strength; reduction of stress, anxiety and depression; and regulation of insulin and blood glucose levels among diabetics.¹⁰⁷

What do the data say?

Physical activity levels among adolescents have changed little over the last decade, with the exception of a decrease in participation in high school physical education¹⁰⁸

In 2005, 68.7 percent of high schoolers nationwide reported that they engaged in vigorous physical activity for three or more days a week compared to 62.9 percent of students in Massachusetts and only 50.1 percent of those in Boston.

While participation in high school sports teams in Massachusetts has remained constant over the past decade (ranging from 53.7 to 55.7 percent), participation in physical education classes has decreased significantly since the mid 1990's. In 1995, 80.1 percent of the state's high school students participated in physical education classes at least once a week, while in 2005, only 59.3 percent of students did so (and only 38.2 in Boston).

- **Half of adults in Greater Boston and in Massachusetts say they engage in “regular” physical activity.**

Slightly over 51 percent of adults in Greater Boston reported engaging in regular physical activity in 2005, defined as either thirty minutes of moderate physical activity 5 days a week or 20 minutes of vigorous activity 3 days per week.

Slightly over 76 percent of Massachusetts adults reported themselves as engaged in “any” physical activity over a month in 2005, a percentage that has changed little over the last decade.

Approximately 25 percent of adults consistently report themselves as engaging in no physical activity.

- **Higher education and income are associated with an increased likelihood to engage in leisure time physical activity, particularly among individuals who do not engage in regular physical exercise.**

Approximately 87 percent of college graduates surveyed in Massachusetts in 2005 engaged in some form of leisure time physical activity, compared to 68.4 and less

than 50 percent of those with only a high school degree and those with no high school education respectively. But among those who engage in regular “moderate” or “vigorous” physical activity (which includes 55.5 and 46.8 percent of college graduates and high school graduates in the state respectively), the gap is less than 10 percent.

- **Whites are much more likely than African Americans and Hispanics to engage in regular physical activity.**

In 2005, 79.5 percent of white, 62.2 percent of African American and 54.2 percent of Hispanic state residents reported some level of leisure time physical activity. The gap between whites and minorities nationwide is smaller: 77.8 percent for whites, 67.8 percent for African Americans, and 66.9 percent for Hispanics.

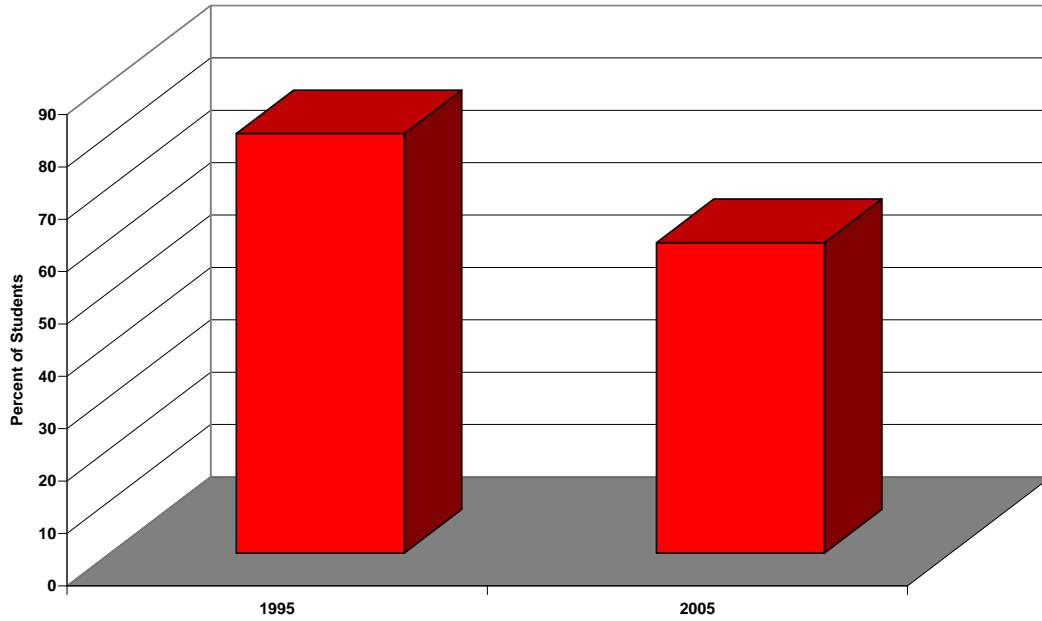
The racial and ethnic gap among state residents who exercise regularly is even larger. Over half of whites report themselves as engaging in regular physical activity, while only a third of African Americans and Asians and 38 percent of Hispanics report themselves as engaging in regular exercise.

Implications

- About half of adults in Greater Boston report that they engage in regular physical activity several times per week, and thus as many as one half of adults do *not* get regular physical exercise. In addition, a quarter of adults consistently report that they do not engage in any physical activity whatsoever.
- With one exception, physical activity patterns among the young show little change over time. A significant reduction in student participation in physical education coincides with the implementation of education reform in Massachusetts, which has significantly increased classroom time requirements for Massachusetts students.
- Self-reported levels of activity among both adults and the young suggest that it will be difficult to change the physical activity behaviors of Greater Boston residents over time.
- Survey data suggest that the gap between individuals in Massachusetts who regularly exercise and those who do not is more significant along racial and ethnic lines than among income and educational lines.

Figure 11

**Participation in High School Physical Education:
Massachusetts - 1995 and 2005**



From: Youth Risk Behavior Survey (YRBS); Massachusetts Department of Education 1995 and 2005.

Indicator 8 - Diet and Nutrition

Why is this important?

Medical research conducted in the Greater Boston area has been instrumental in establishing the link between diet and health. For example, beginning in the late 1940's, the Framingham Heart Study demonstrated that rich, fatty diets greatly increase the risk of heart disease. Subsequent research has established the critical link between a nutritionally balanced diet and the healthy growth and development of children. Research has also identified links between a poor diet and the risk of conditions such as hypertension and high cholesterol and the development of serious chronic diseases such as heart disease, diabetes, and some forms of cancer.

The more recent upsurge in obesity throughout the US and the world is making diet/nutrition more than an issue of personal choice, it is now also an issue relating to public health and the economy, as increased obesity rates raise both the incidences of preventable chronic disease and health care costs.

What do the data say?

- **Fruit and vegetable consumption among adolescents in Massachusetts has declined and appears to be below the national average.**

Data from the annual Youth Risk Behavior Survey for Massachusetts suggest that a very low and declining number of the state's high school students consume the recommended daily allowance of five servings of fruits and vegetables. Only 13.9 percent of students met this standard in 1999 and only 9.8 percent in 2005. The US average was 20.1 percent, or more than double the reported level in Massachusetts.

Massachusetts high school students also consume less than the daily recommended allowance of three glasses or more of milk per day. Only 22.3 percent of students met the allowance in 1999, declining to 15.2 percent in 2005. As with food and vegetable consumption, the national average in 2005 was over twice the Massachusetts rate, at 30 percent.¹⁰⁹

- **While fruit and vegetable consumption varies among different groups, for the most part no more than a third of people in any category meet the recommended daily nutrition standard.**

About 29 percent of Massachusetts adults reported consuming the recommended daily allowance of five servings of fruits and vegetables in 2005, similar to numbers over the past decade. The Massachusetts rate is higher than the US median of 23.2 percent but still suggests that fewer than one in three Massachusetts adults meet the current national standard for optimal nutrition.

Data collected in 2005 indicate that more highly educated residents, people with higher income, and Asian and white residents are more likely to consume the recommended daily level of fruits and vegetables, but in most cases no more than a third of each meet the daily nutrition standard.

Stratifying by age, only one quarter of young adults 18 to 24 years old met the nutrition standard; only 33.7 percent of residents 75 years or older met the standard.

In terms of educational attainment, only 16 percent of residents with less than a high school education met the standard compared to 34.3 percent of college graduates.

Income also has an effect, as about one quarter of residents with household income of less than \$25,000 met the daily fruit and vegetable standard, while about a third of residents with incomes over \$75,000 did.

Among racial and ethnic groups, Asian residents recorded the highest attainment level for meeting the recommended nutrition standard at 38.5 percent, compared to 27 percent of African American, 20.4 percent of Hispanic and 20.2 percent of white residents.

Implications

- State and local data on residents' dietary habits suggest that only about one third of individuals meet the recommended daily standard for fruits and vegetables. Because failure to maintain a healthy diet is a pervasive problem that spans age, income, education, race and ethnic lines, motivating people to eat better is a common challenge.
- While improvements are needed in all groups, there are disparities in fruit and vegetable consumption: for example, consumption among Hispanic residents is lower than among Asians, whites and African Americans.
- Data on daily consumption of fruits and vegetables do not reveal the barriers faced by residents in purchasing healthy food and meeting good nutritional standards. Calorie for calorie, fresh fruits and vegetables are now generally more expensive than snack foods and other processed foods. People with lower incomes and who live in neighborhoods with poor access to markets with fruits and vegetables are at a clear disadvantage, with or without the motivation to eat well.

Indicator 9 - Overweight and Obesity

Why is this important?

Poor diet and inactivity are the major causes of overweight and obesity, which underlie at least 400,000 deaths per year in the US. Only tobacco related deaths exceed the death toll from poor diet and fitness, overweight and obesity. The effects are widespread: obesity is closely linked to at least three of the top ten causes of death in the US: heart disease, stroke, and diabetes. Research also suggests that obesity may be linked to some cancers.

Currently, approximately 32 percent of US adults are obese and over 66 percent are either obese or overweight. Obesity has doubled in the past 30 years and has grown by over 42 percent in the last decade. Moreover, the situation is expected to get worse, not better, and overweight/obesity is expected to overtake tobacco use as the leading contributor to mortality.¹¹⁰

This surge is having an effect on costs as well: total obesity-related health care costs in the US now account for approximately 5 to 7 percent of national health expenditures, at a cost of over \$90 billion per year.¹¹¹

What do the data show?

- **The rate of overweight and obesity in the state is rising and currently over half of residents are overweight and one in five is obese.**

The reported rate of adult obesity in Massachusetts reached a new high in 2005. Based on annual telephone survey results, the Massachusetts Department of Public Health identified 56 percent of the Massachusetts population as overweight and 20.7 percent as obese, a 64 percent increase over the level reported in 1996.¹¹²

- **The middle-aged have the highest prevalence of obesity and overweight.**

The state's 45 to 54 year olds recorded the highest level of overweight (65 percent) and the highest rate of obesity (26 percent), followed by residents aged 55 to 64, at rates of 61.5 percent and 24.6 percent respectively. The prevalence of overweight and obesity drops among current residents now 75 years and older.

- **Overweight and obesity is more prevalent among lower-income and less well-educated residents but has increased rapidly among the more highly educated and the more affluent.**

In 2005 Massachusetts residents with only a high school diploma were 18 percent more likely to be overweight than college grads (60.7 percent vs. 51.4 percent) and 56 percent more likely to be obese (24 percent vs. 14.4 percent).

Despite the lower percentages among college grads, the rate of obesity has increased even faster among this group than among those with only a high school degree. Obesity increased 79 percent among college graduates surveyed from 1996 to 2005, while it increased 61 percent among those with only a high school diploma.

In terms of income, households making less than \$25,000 were modestly more likely than those with incomes over \$75,000 to be overweight or obese. Nearly 60 percent of the poorer residents were overweight and one quarter were obese compared to 56 percent overweight and one fifth obese among those with higher incomes.

As with the higher education group, the obesity rate is increasing rapidly among the higher income group, an increase of 160 percent from 1996 to 2005. Obesity increased 55 percent among those with incomes less than \$25,000.

- **Racial and ethnic disparities in obesity are significant, but the rate of increase among majority whites is the most high.**

Over half of whites, Hispanics and African Americans in Massachusetts were reported as overweight in 2005 (55.6 percent, 68.5 percent and 63 percent respectively). About a third of Asian residents were reported as overweight.

Obesity rates significantly differ among whites, African Americans, and Hispanics. Nearly one third of African American residents in 2005 were reported as obese. This represents a 120 percent increase from the level reported in 1996. About 28 percent of Hispanic residents were found obese, an increase of 28 percent from 1996. Approximately 20 percent of whites were obese, a 62 percent increase from 1996.

Implications

- Over half of Greater Boston's residents are overweight and one in five is obese. Obesity continues to increase at a rate that mirrors the national trend and is particularly prevalent among groups that will comprise a greater share of the region's population in years to come: residents of color, who already experience disparities in health conditions such as diabetes; and older residents, who will experience a greater incidence of preventable or modifiable chronic diseases if obesity rates rise.
- Given the impact of obesity on heart disease and stroke as well as on diabetes and diabetes-related illnesses or complications, obesity is expected to be a significant driver of health care costs in years to come, costs that will only be partially offset by innovations in medical management.¹¹³ Non-elderly obese adults incur an average of 36 percent higher annual medical expenditures than their non-obese counterparts. And after 70 years of age, an obese person incurs an average of \$40,000 in additional health care costs.¹¹⁴ In 2003, the CDC estimated that obesity imposed net costs of \$1.8 billion on the Massachusetts economy.

- An increased prevalence of obesity also has consequences on productivity in the workplace. According to one study, obese employees are 74 percent more likely than normal weight employees to have high rates of absenteeism (7 or more absences due to illness every 6 months). Such employees are also associated with lower on-the-job work performance. Overall, the combined cost to employers from diminished productivity as a result of three obesity-related health conditions (hypertension, heart disease and diabetes) is estimated at \$1,018 per employee per year.¹¹⁵
- Rising levels of obesity can be expected to have fiscal implications. As a higher proportion of overweight and obese people survive past age 65, the elderly population may experience a dramatic increase in morbidity and disability, thus increasing demand for services under Medicare. Some recent estimates attribute nearly all real spending increases in Medicare to increased prevalence of chronic disease and the continued introduction of new medical innovations that expand the “treatability” (treated prevalence) of disease.¹¹⁶

Figure 12

Massachusetts: Prevalence of Obesity - By Gender

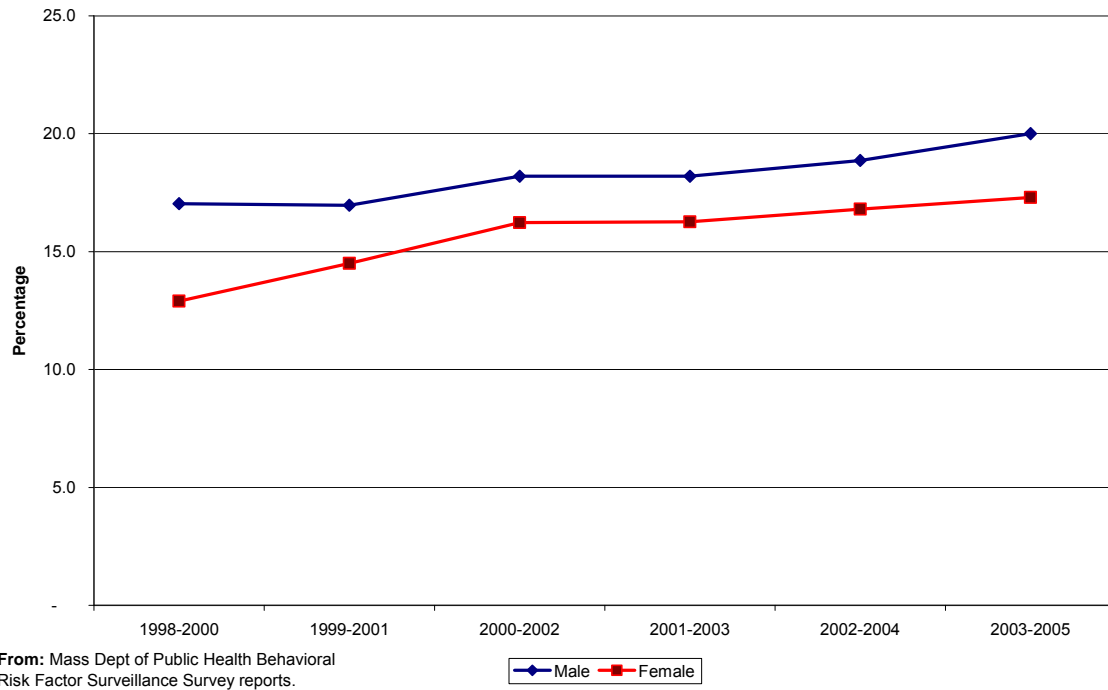


Figure 13

Prevalence of Obesity: By Age

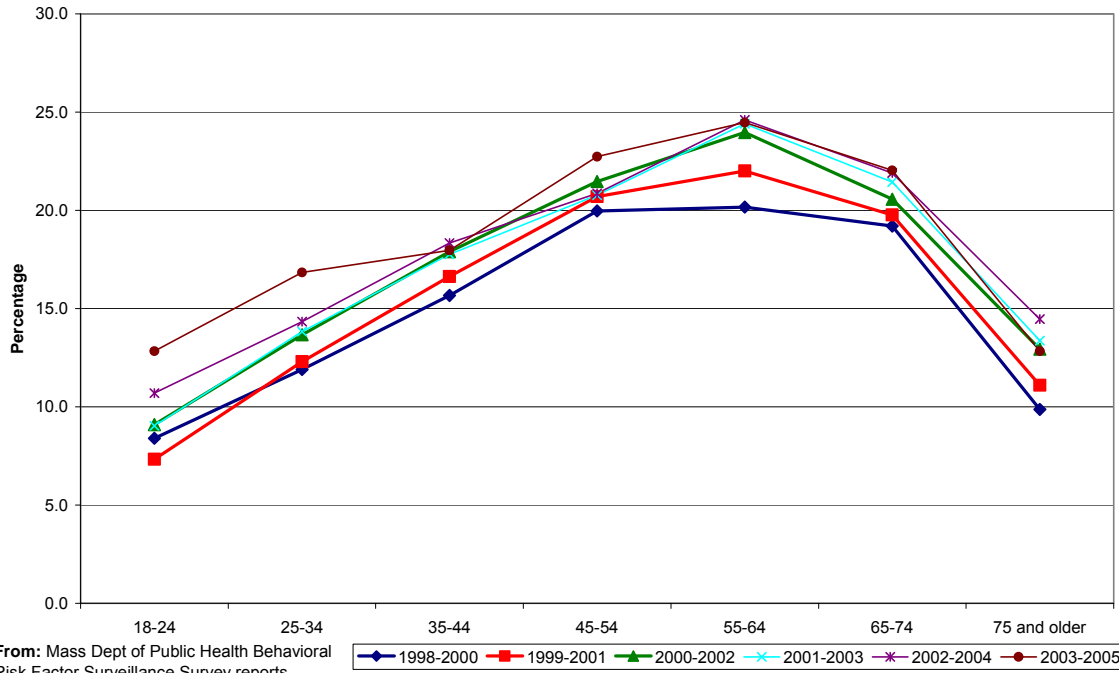
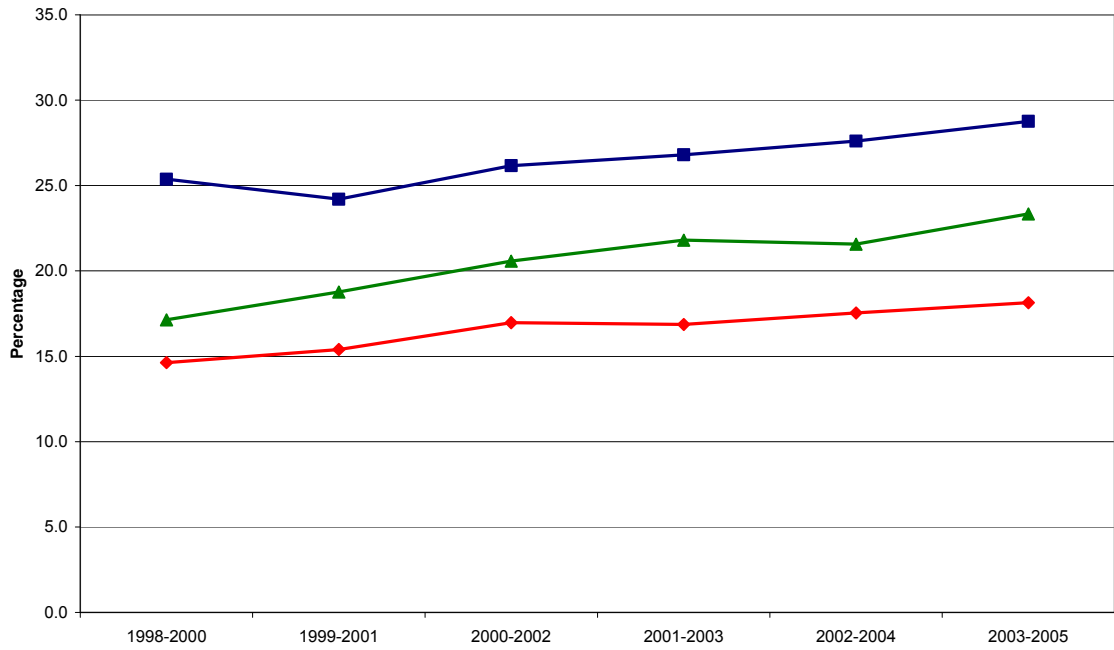


Figure 14

Prevalence of Obesity: By Ethnicity



From: Mass Dept of Public Health Behavioral Risk Factor Surveillance Survey reports.

White Black Hispanic

Note: Asian, not shown due to lack of data

Figure 15

Prevalence of Obesity: By Education

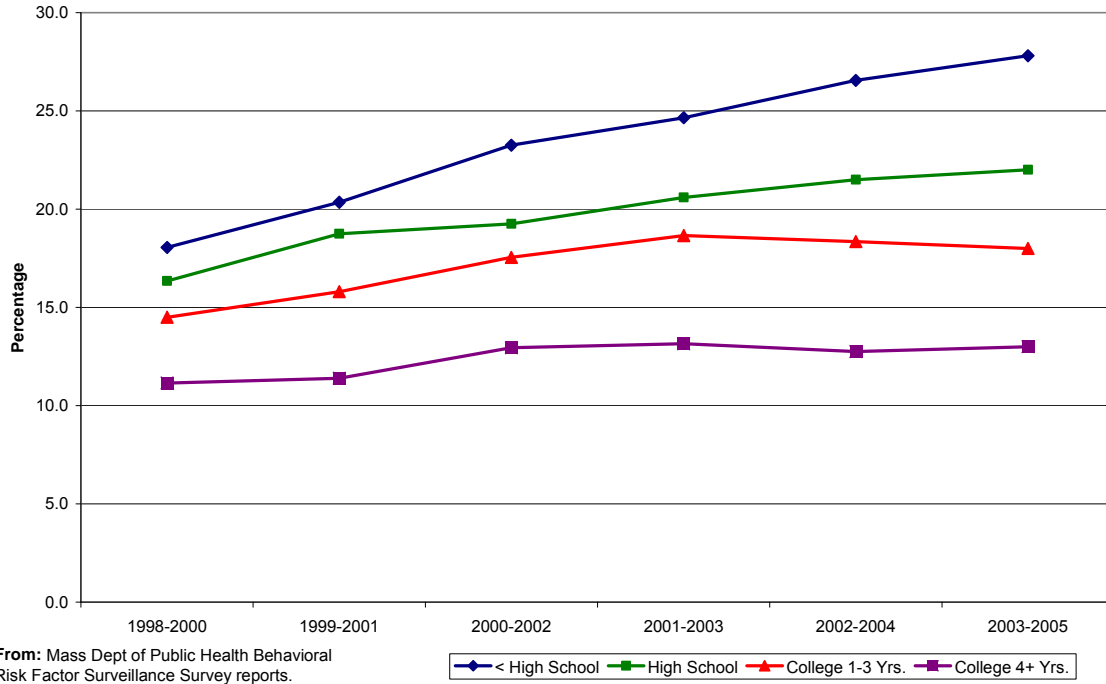
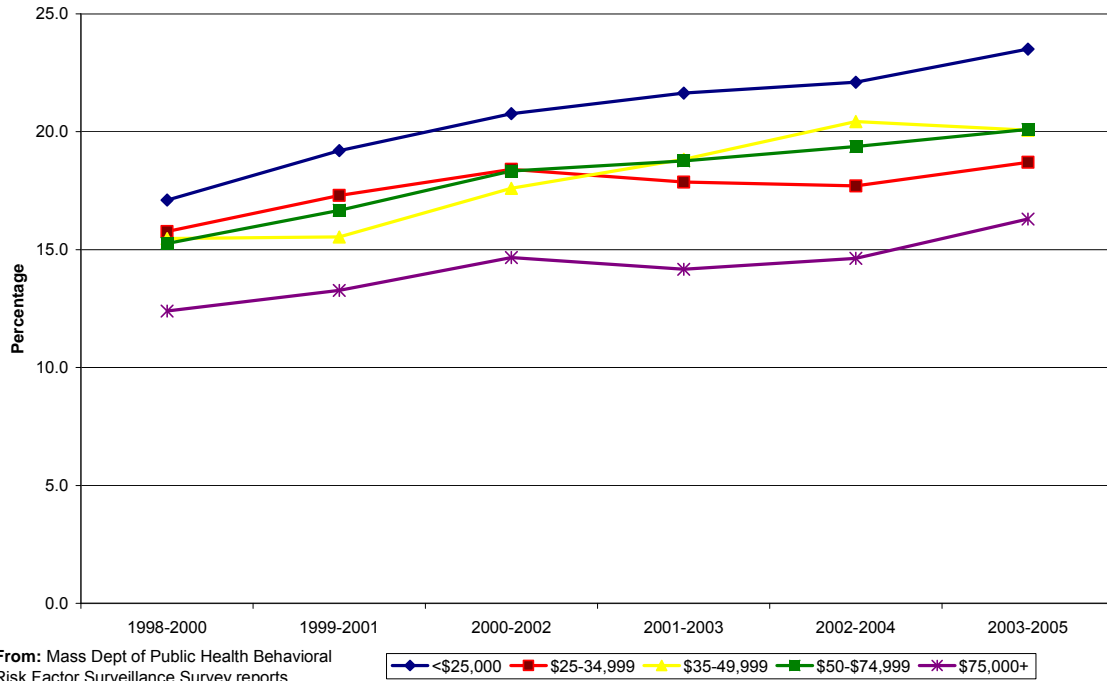


Figure 16

Prevalence of Obesity: By Household Income



Indicator 10 – Access to Health Care: Health Insurance Coverage

Why is this important?

Nearly all health care provided to civilians in the US is paid for through some form of insurance, including private insurance, federal Medicare insurance for the elderly, and the federal-state Medicaid program for lower-income families and individuals.

Insurance provides individuals with access to a full range of health care, including routine and preventive care, and those without it are more likely to endure health problems and only seek medical care once they elevate to a state of emergency.

What do the data say?

- **The number of uninsured persons is declining in Massachusetts due to a strengthened economy and greater Medicaid enrollment.**

According to a recent state health insurance survey, approximately 6 percent of Massachusetts residents (372,000 persons) were uninsured in 2006. This represents a decline from previous years (8.3 and 9.8 percent uninsured in 2004 and 2005 respectively).¹¹⁷

The reported drop in the number of uninsured in Massachusetts coincides with a period of accelerated job growth in the state that began in late 2003. In addition, the state's Medicaid program enrolled over 50,000 new members into the state's program in 2006.

While this downward trend looks promising, estimates of the uninsured in Massachusetts have been much disputed. For example, a recent survey by the US Census Bureau placed the Massachusetts uninsurance rate as high as 11 percent in 2004, but independent analysts claim that the Bureau's estimates have consistently over-estimated the number of uninsured in the state by under-estimating the number of residents enrolled in Medicaid. In any event, all recent surveys point to a declining rate of uninsurance in Massachusetts.

- **A declining rate of uninsurance in Massachusetts runs counter to the national trend.**

Analysis from the Kaiser Commission on Medicaid and the Uninsured indicates that the rate of uninsurance in the US as a whole increased from 17.6 to 17.9 percent from 2004 to 2005. The Urban Institute attributes the increase to declines in the rates of employer-sponsorship and employee take up of private health insurance as well as declines in Medicaid funding that have increased the number of uninsured children

throughout the country. Both trends come despite generally stronger economic conditions nationwide.¹¹⁸

- **Health insurance coverage rates diverge along age and income levels as well as racial and ethnic lines; coverage rates also vary by employer size.**

Despite an improvement in overall health insurance coverage rates in Massachusetts, disparities persist and are correlated with the following:

Poverty and low income: An Urban Institute analysis indicates that up to 73 percent of non-elderly uninsured persons in the state are from households with incomes below 400 percent of the Federal Poverty Line, and about 75 percent come from households with one or more full time workers.

Youth: While young adults aged 19 to 34 years comprise only about one quarter of the state's non-elderly population, they account for about 40 percent of the uninsured.

Minority status: African American and Hispanic residents are much more likely than whites and Asians to be uninsured. Estimates suggest that 13 to 14 percent of African Americans, 12.8 to 16 percent of Hispanics, 5.1 percent of whites and 3.1 percent of Asians are uninsured.

Small business employment: Although workers at small firms of less than 25 employees comprise only about a third of total workers in the state, they comprise up to half of the working uninsured population.

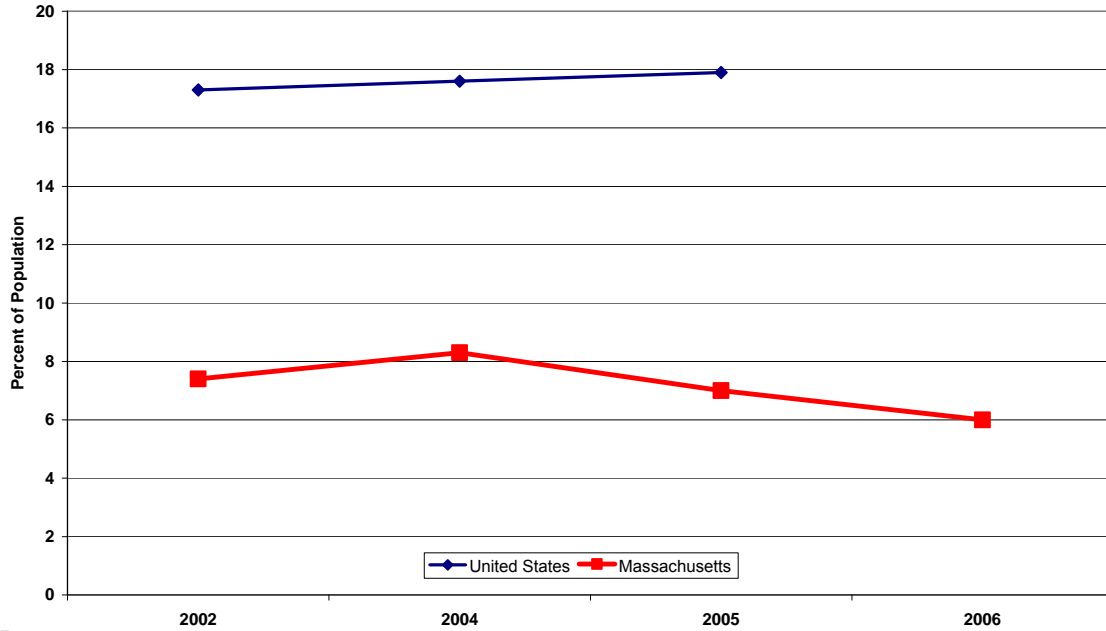
Implications

- The level of uninsurance in Massachusetts is not only among the lowest of any state in the US Massachusetts is also bucking the national trend as rates of uninsurance have declined in the state while rising nationally. In addition, employer sponsorship of health insurance remains level in Massachusetts while it continues to fall nationwide (see Indicator 17). The situation may get even better in the region, as the 2006 Massachusetts health reform law now commits the state to further reduce the level of uninsurance among residents. Reforms are targeted squarely at the population most likely to be uninsured: residents and families with incomes less than 300 percent of the Federal Poverty Line. In addition, insurance coverage will be mandated for residents at higher income levels. The state will also attempt to streamline and reduce costs of health insurance for small firms, which have proven to be the employers least able or apt to offer adequate health insurance coverage to employees.
- Its comparatively high rate of health insurance coverage positions Massachusetts and its residents to achieve health gains that might be more difficult to achieve in states with higher rates of uninsurance. It remains to be seen whether the state's new health insurance reform will bring about measurable health gains for previously uninsured residents.

- Massachusetts' attendant health insurance costs are running higher than national averages (see Indicator 18). Given the high costs of living and of doing business in the state, high health insurance coverage and high health costs are a source of competitive tension for employers.

Figure 17

Percentage of Population Without Health Insurance



From: Massachusetts Division of Health Care Finance and Policy; Health Insurance Status of Massachusetts Residents, Fifth Edition, October 2006
John Holahan and Allison Cook, "Why Did The Number of Uninsured Continue to Increase in 2005?"; The Kaiser Commission on Medicaid and the Uninsured, October 2006.

Health Status

Introduction: Indicators of health and illness in Greater Boston and Massachusetts.

What kind of health does Greater Boston enjoy? What do the “determinants of health” actually determine in Greater Boston?

As with many of the statistical indicators already cited in this report, many of the most telling indicators are based on data for the population of the entire state of Massachusetts; in many instances this Massachusetts data will serve as a proxy for trends in Greater Boston.

Historically, the overall status of health in Greater Boston and Massachusetts has been high by American standards.

Life expectancy at birth in Massachusetts is typically higher than US life expectancy. In 2004 both reached new high points: 79.6 years in Massachusetts, and 77.9 years in the US as a whole. Life expectancy for women in the state was 82 years, (higher than the US rate of 80.4 years), and among men it was 77 years, (higher than the US rate of 75.2 years).¹¹⁹

An alternative measure of longevity is “premature mortality”, ordinarily defined in the US as a measure of deaths that occur before the age of 75, or the years of life lost to death before the age of 75. Massachusetts ranks high on this measure of life expectancy as well. The most recent calculations done by the Centers for Disease Control and Prevention (for 2003) indicate that Massachusetts ranks 6th among the 50 states for the lowest number of years lost to death before the age of 75, (6,183 years per 100,000 population, compared to a US rate of 7,562 years).¹²⁰ Only Minnesota, New Hampshire, Vermont, Connecticut and Hawaii outrank Massachusetts by this measure: all states that are smaller than Massachusetts, less urban, or both.

Several factors not otherwise covered in detail in this report support the comparatively high level of life expectancy among Massachusetts residents. They include a low level of infant mortality (first among the 50 states in 2004 to 2005, as calculated by the United Health Foundation)¹²¹; a comparatively high level of vaccination among infants and young children (first among the 50 states, 2005); an extremely low rate of highway death (2nd among the 50 states, 2005); and a low level of occupational accidents and accidental death, (2nd among the 50 states, 2002 to 2004).

Compared to international levels of life expectancy, life expectancy in Massachusetts is relatively high by the standards of advanced countries, but not among the levels of global leaders. The life expectancy among Massachusetts women would rank approximately 12th among the 33 countries of the Organisation for Economic Cooperation and Development (OECD), surpassed by Japan, Canada, Australia, and several Western European countries, and surpassing the US position (26th). Life expectancy among Massachusetts

men would place about 11th among the OECD countries, surpassed by Iceland, Japan, Canada, Australia and several Western European countries, also surpassing the US position (25th).¹²²

While relatively good overall, life expectancy statistics for the entire Massachusetts population do mask significant disparities along socioeconomic and racial/ethnic lines.

The reported overall death rate for residents with a high school education or less is three times the death rate for more highly educated citizens, (519 deaths per 100,000 vs. 175 deaths per 100,000), suggesting the impact of more difficult living conditions for those with less education.¹²³

Life expectancy among African Americans remains lower than life expectancy among white residents. Life expectancy among African American women is two years less than that for white women (80 years for African Americans, 82 years for whites), and life expectancy among African American men is 5 years lower than that for white men, (72 years for African Americans, 77 years for white men). The lower rate of life expectancy for African American men reflects a substantially higher likelihood of death before the age of 75: the Massachusetts Department of Public Health estimates that premature mortality among African Americans in 2004 was 467.5 deaths per 100,000, compared to a white rate of 320.8, or a difference of over 45 percent.¹²⁴

At this point in time Hispanic residents in Massachusetts enjoy a higher life expectancy than white residents. Estimated life expectancy among Hispanic women is significantly higher than life expectancy for women overall: 93 years, compared to 82 years for white women, (2004 estimate). Life expectancy among Hispanic men is estimated to be 83 years, compared to 77 years for white men.

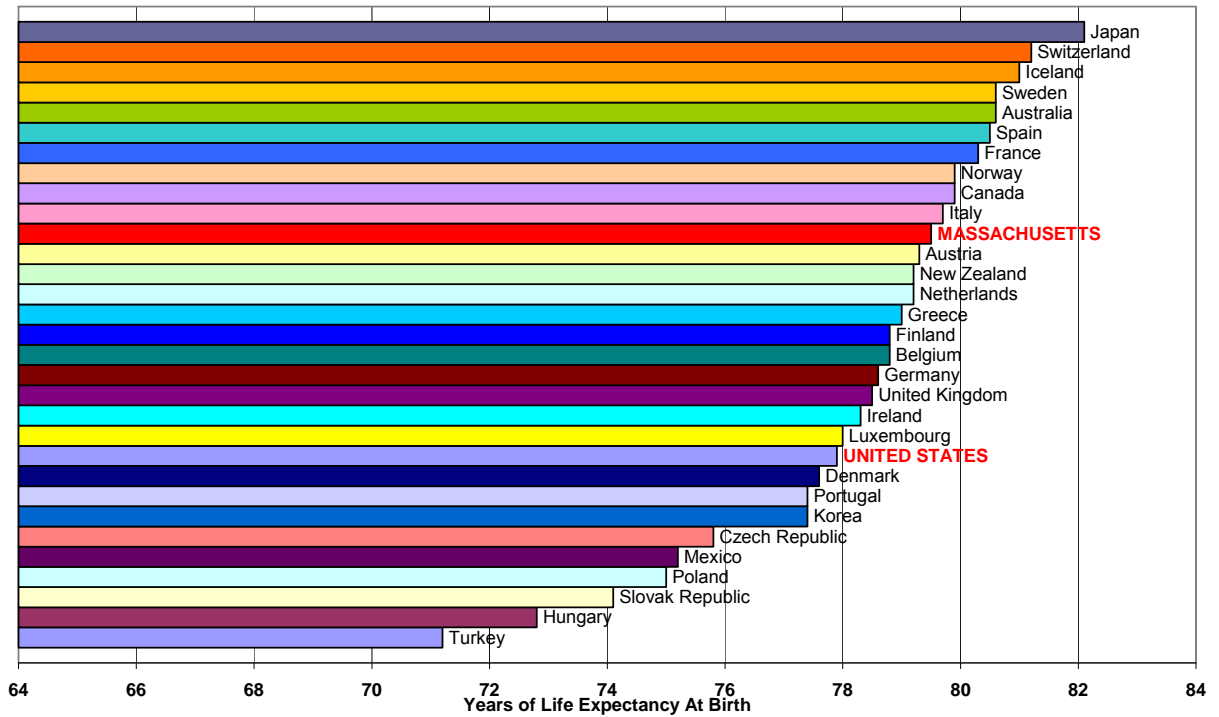
Hispanic residents are expected to be the fastest growing ethnic group in the region, so the health status of the Hispanic community is not only an important issue for Hispanic residents themselves, but an issue with implications for the health and productivity of the local workforce, the level of health care demand, and the cost of health care. To the extent that Hispanic residents can maintain comparatively good health (and perhaps provide a model for others to emulate), it will represent a real strengthening of the area's workforce, and a force for moderating increases in health care costs.

Conversely, if the overall health of Hispanic residents falls to the prevailing level in Greater Boston, Greater Boston will experience both a higher level of illness and an intensification of health care need and cost in the future.

Indicators of specific disease trends provide a glimpse of how health status in Greater Boston will change in the years ahead. The section that follows presents indicators chosen for particular relevance to the changing demographics of the region and to trends among the determinants of health. They include data on the two leading causes of mortality (heart disease and cancer), two of the most prevalent and least controlled chronic diseases (diabetes and asthma), and data on hypertension (high blood pressure), a common condition that is linked closely to several serious chronic conditions.

Figure 18

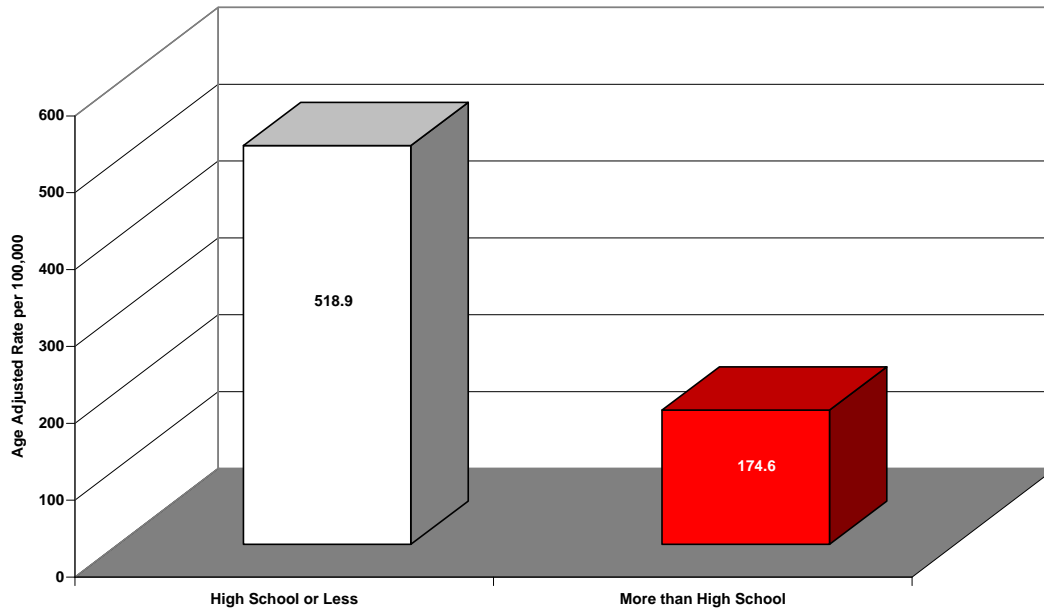
Life Expectancy at Birth 2004 - Massachusetts and OECD Countries



From: Organisation for Economic Cooperation and Development (OECD) "OECD Health Data 2006 - Frequently Requested Data", at www.oecd.org

Figure 19

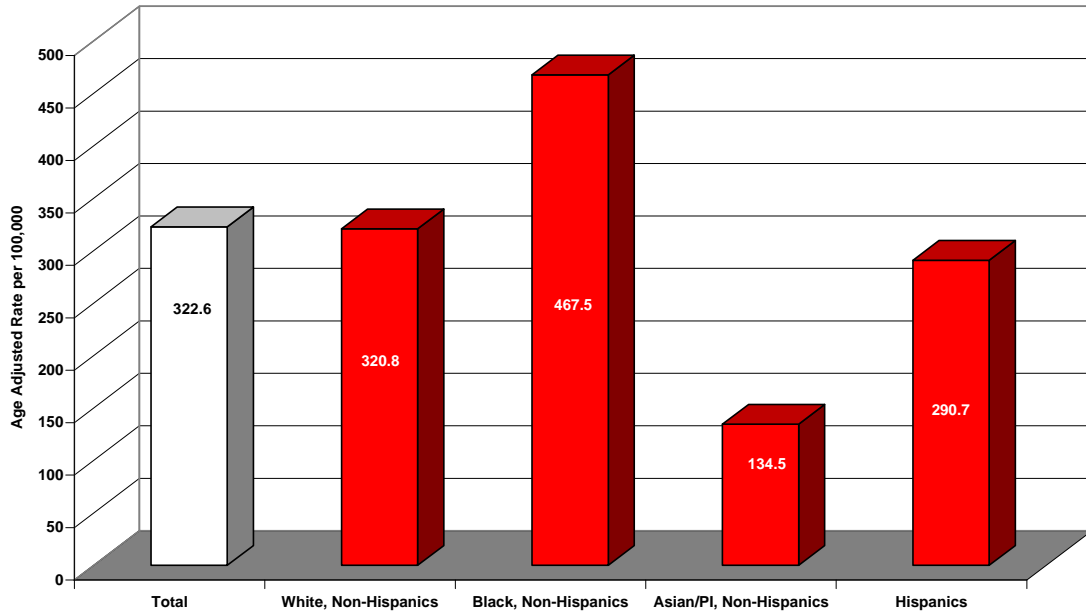
**Age Adjusted Death Rates by Education for Adults
Ages 25 to 64 - Massachusetts 2004**



Note: For this table and figure, 2000 denominator figures are used since these are the latest numbers available for population by age and education.
From: Massachusetts Department of Public Health, *Massachusetts Deaths 2004*, July 2004, Table 5.

Figure 20

Premature Mortality Rates¹ (PMR) by Race and Hispanic Ethnicity - Massachusetts 2004



¹ Deaths that occur before the age of 75 years per 100,000 and is age adjusted to the 2000 US standard population under 75 years of age.

From: Massachusetts Department of Public Health, *Massachusetts Deaths 2004*, July 2006, Figure 6.

Indicator 11 - Low Birth Weight

Why is this important?

Research has tied low weight at birth to an increased risk of disorders among infants, including risks for disorders that develop over time and later in life. Low Birth Weight (LBW) children may be at increased risk for obesity, for diabetes, and for cognitive impairments.

What does the data say? ¹²⁵

- **Low birth weight births have been on the increase in Massachusetts**

In 1990 the rate of low birth weight (now defined as birth at 2500 grams, or 5.5 pounds or less) was 5.8 percent of births statewide. The rate stood at 7.9 percent in 2005, an increase of some 36 percent. The Massachusetts LBW rate is lower than the US rate of 8.2 percent.

- **Racial and ethnic disparities in LBW births are significant**

African-American women have the highest rate of LBW births at 12 percent, (2005 data), while Hispanic women experience an 8.2 percent rate. White and Asian women experience lower rates of 7.3 percent and 7.8 percent, respectively.

- **Low birth weight births have increased with an increase in multiple births, but the rate of LBW births among ‘singletons’ (single births) has increased as well.**

Multiple births may result in low birth weights; about 50 percent of twins are born at LBWs, for example. Multiple births increased by over 60 percent from 1992 to 2005. Multiple births constitute less than 5 percent of all births, however. Low birth weight births among ‘singletons’ increased from 4.8 percent to 5.6 percent in one decade, 1995-2005.

Implications

- The factors behind increasing LBW births are not entirely understood, although they may be tied to the rising age of pregnant mothers. Births to women over the age of 30 have increased since 1980, and have outnumbered births to younger women in the state since 1995. Historic factors in LBW births, such as maternal smoking, have decreased over time. Whatever the causes, the rising level of low birth weight births in the population does represent a possible contributing factor to the prevalence of chronic conditions, including chronic conditions in adulthood.

Indicator 12 – Hypertension

Why is this important?

Hypertension is a primary risk factor for heart disease, stroke, and disorders of the cardiovascular system. According to the US Centers for Disease Control and Prevention, as many as 29 percent of US adults have high blood pressure (an indicator of hypertension) and less than a third of them have it under control. As little as a 12 to 13 point reduction in blood pressure in the population could reduce heart attacks by 20 percent, strokes by 37 percent and deaths from all cardiovascular diseases by 25 percent.¹²⁶

Hypertension can be caused by a number of factors, most particularly high salt intake, stress, excessive alcohol consumption, obesity and insulin resistance associated with diabetes. On the other hand, hypertension can often be reversed with changes in behavior (such as regular exercise and weight loss) or by medications, or both.

What do the data say?

- **One in four Massachusetts residents has hypertension and the prevalence increases with age.**

About a quarter of residents surveyed by the Massachusetts Department of Public Health in 2005 reported that they had received a hypertension diagnosis from a doctor at some point, the highest level reported in Massachusetts in at least 15 years. The Massachusetts rate is only slightly less than the median among all 50 states for 2005.¹²⁷

The prevalence of hypertension increases greatly among those aged 45 years and older. Residents in the 45 to 54 year age bracket have a 25.5 percent prevalence, over twice the 12.2 percent rate in the 35 to 44 year age bracket. Over a third of older working-age adults aged 5 to 64 years are estimated to be hypertensive. In addition, the majority of Massachusetts residents aged 65 years and older have had a hypertension diagnosis (52 percent among those 65 to 84 years and 60 percent of residents aged 75 and older).

- **The risk of hypertension in the US and in Massachusetts is greater among lower-income and less well-educated residents.**

Massachusetts residents with a high school degree (or less) have about a one-third higher chance of hypertension than college graduates (30 vs. 21 percent). Lower income residents also have a higher risk of hypertension: an estimated 34 percent of residents earning less than \$25,000 had a current or former diagnosis of hypertension in 2005 compared to about 20 percent of those earning over \$75,000. In both cases,

the disparities evident in Massachusetts are roughly similar to those in the US as a whole.¹²⁸

A comparison to survey findings from the mid 1990's suggests that education and income disparities for hypertension have narrowed over the years, as hypertension has declined somewhat among residents with lower incomes and education and has increased among those with higher incomes and education.

- **Hypertension levels among Hispanic residents are lower than among whites and African Americans.**

Reported hypertension levels are modestly disparate according to race and ethnic group: over 26 percent of white residents were estimated to be now or formerly hypertensive in 2005 compared to nearly 30 percent of African-American residents.

- **Health care quality indicators suggest room for improvement in care of high blood pressure.**

According to data collected by the National Committee for Quality Assurance from the region's four largest health plans, local providers rate among the best in the country for management of previously diagnosed hypertension.¹²⁹

Nonetheless, there is room for improvement. Survey data from the Massachusetts Department of Public Health indicate that about 75 percent of Massachusetts residents identified as hypertensive take medicine to control their high blood pressure,¹³⁰ and a 2004 RAND Corporation study found that Boston area residents receive appropriate hypertension treatment about 65 percent of the time, which is similar to the national average.¹³¹

Implications

- While it is not increasing dramatically, hypertension is still on the rise in Greater Boston and Massachusetts, and increasing overweight and obesity will act to accelerate this trend. Increased hypertension will elevate the risk of more serious and costly conditions “downstream”, such as heart disease, stroke, and other cardiovascular conditions.
- The prevalence of hypertension increases with age and decreases with income and educational status. As with obesity and diabetes, hypertension could become a more significant problem in Greater Boston and Massachusetts as the area's population grows and includes more elderly individuals, and as education, wages and income lag among middle and lower income earners.
- Hypertension is an example of a common condition that is generally triggered by behaviors such as poor diet and inactivity but has increasingly come to be treated and controlled by medical means. Hypertension is typically treated with prescription

medications, and growth in demand for anti-hypertension drugs has been a significant driver of new pharmaceutical agents and increased costs.

- An overall reduction in blood pressure among the general population would reduce the incidence of serious and costly medical emergencies such as heart attacks and strokes. This might be achieved through improvements in health-related behaviors among the general population as well as greater access to and use of effective primary care.

Figure 21

Prevalence of Hypertension: By Age

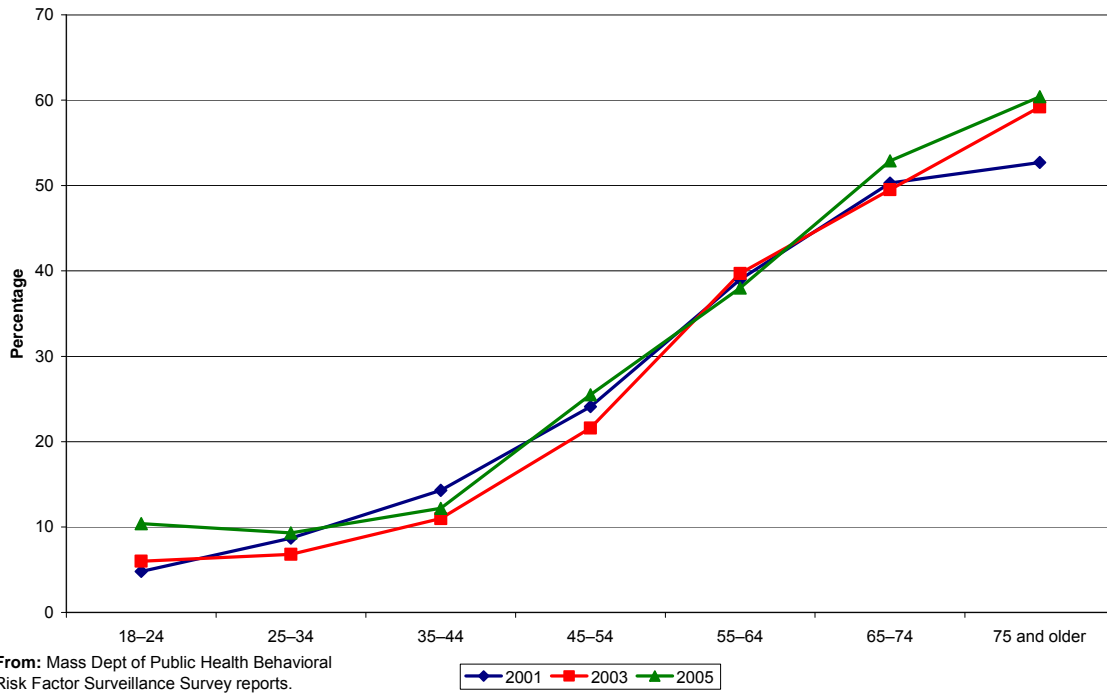
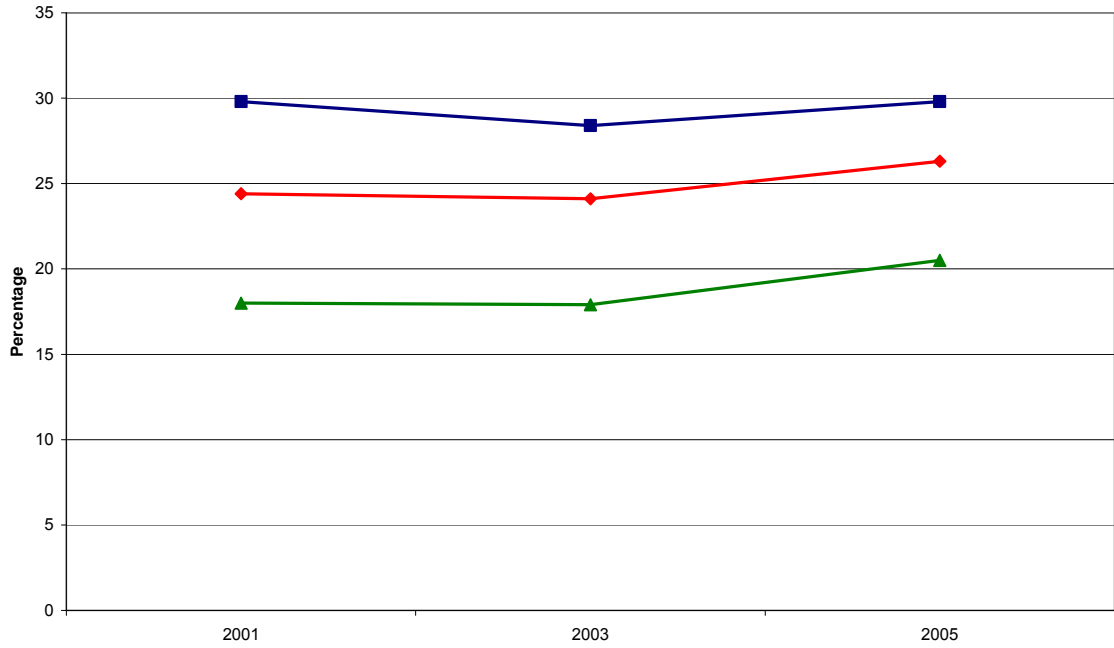


Figure 22

Prevalence of Hypertension: By Ethnicity



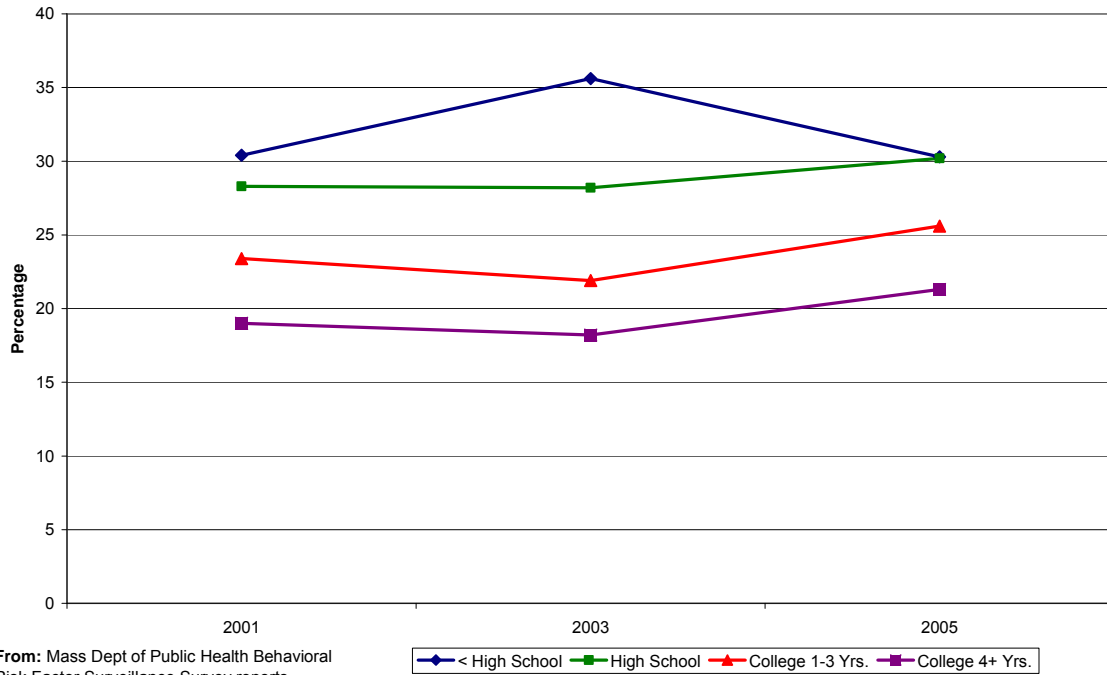
From: Mass Dept of Public Health Behavioral Risk Factor Surveillance Survey reports.

White Black Hispanic

Note: Asian, not shown due to lack of data

Figure 23

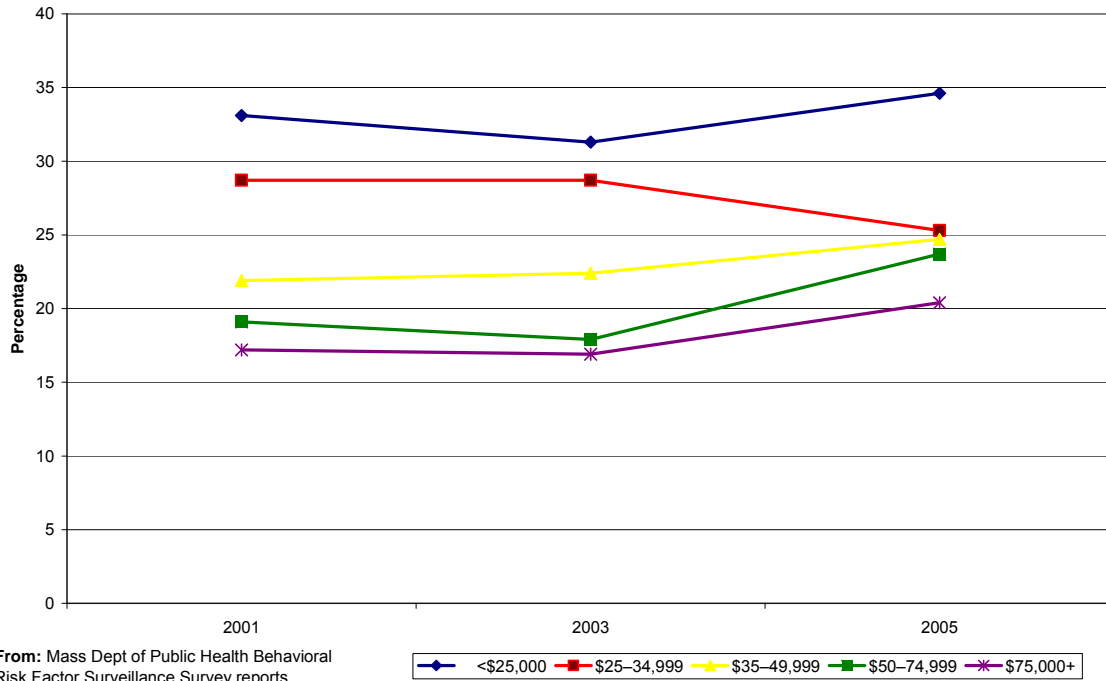
Prevalence of Hypertension: By Education



From: Mass Dept of Public Health Behavioral Risk Factor Surveillance Survey reports.

Figure 24

Prevalence of Hypertension: By Household Income



Indicator 13 – Diabetes

Why is this important?

Type I, or juvenile, diabetes typically appears in patients at an early age and is the result of a genetic predisposition, while Type II diabetes usually strikes adults and its onset is closely linked to poor diet, low activity levels, and obesity. Left uncontrolled, diabetes can lead to conditions including nerve damage, blindness, kidney failure, stroke and heart disease. Type II diabetes is on the rise in the state and in the US as a whole, and because of the serious health consequences of uncontrolled diabetes, this rising rate is a driver of increasing disability and of demand for acute medical services.

For individuals who develop diabetes, tight control of blood glucose levels is essential to prevent serious consequences. This requires access to effective health care, a high degree of understanding by patients, and regular monitoring of blood levels and administration of insulin.

What do the data say?

- **The prevalence of diabetes has increased in Massachusetts and in the US over the last decade.**

The self-reported prevalence of diabetes in the state increased 39 percent from 1996 to 2005, to 6.4 percent of the population (compared to a 60 percent increase in the US as a whole, to 7.3 percent of the population in 2005).^{132, 133} As many as 340,000 adults in the state have diagnosed cases of diabetes.¹³⁴

- **The likelihood of acquiring diabetes increases with age.**

The prevalence of diabetes jumps significantly in early middle age, and diabetes among Massachusetts residents aged 45 to 54 years is over 2.5 times the level of diabetes found among younger adults aged 35 to 44 years (7.3 vs. 2.7 percent). Among older workers aged 55 to 64 years, diabetes increases to nearly 12 percent and jumps to over 15 percent among residents aged 65 to 74 years.¹³⁵

- **Less well-educated and less wealthy residents have higher rates of diabetes.**

Massachusetts residents with no high school degree are 2.5 times as likely as college graduates to report a diagnosis of diabetes. In 2005, 10.4 percent of residents with no high school education and 7.8 percent of residents with only a high school education were identified as diabetic compared to only 4.1 percent of college graduates.

Income also appears to play a role, as residents with household incomes of less than \$25,000 are over 3 times as likely as residents with incomes over \$75,000 to have diabetes (11.5 vs. 3.7 percent).¹³⁶

- **Rates of diabetes have steadily increased among all racial and ethnic groups but are increasing most rapidly among minority residents; diabetes-related mortality is also higher among minorities.**

Diabetes prevalence among whites in Massachusetts averaged 4.4 percent between 1996 and 2000 and increased to 5.8 percent over the next five years. Prevalence is most high among

African-American residents, and the disease increased from an average of 6.5 percent in 1996 to 2000 to an average of 9.4 percent in 2001 to 2005. Diabetes increased most among Hispanic residents, from an average of 3.8 percent to 6.75 percent, an increase of about 75 percent.¹³⁷

While diabetes prevalence has increased among white residents in Massachusetts, diabetes-related mortality has decreased modestly in the last decade from an average 19.7 deaths per 100,000 residents in 1996 to 2000 to an average of 19.2 deaths in 2001-2004. On the other hand, diabetes-related mortality among African American residents increased from approximately 44.6 deaths per 100,000 in 1996 to 2000 to 50.2 deaths in 2001 to 2004. And mortality among Hispanic residents has increased from an average of about 30 deaths per 100,000 to nearly 40 deaths.¹³⁸

Across all races and ethnic groups, diabetes is the 8th leading cause of death in Massachusetts as measured on death certificates. However, diabetes-related deaths exceed those attributed to stroke, the 3rd leading cause of death, when all deaths where diabetes is cited as an underlying cause are included.¹³⁹

- **Diabetes care in Massachusetts is of high quality, but there is room for improvement.**

Massachusetts physicians rank slightly below the 90th percentile among all doctors nationwide in terms of physician performance in screening diabetic patients for cholesterol and hemoglobin.¹⁴⁰ In addition, diabetic patients in the state receive retinal examinations at rates exceeding the national average,¹⁴¹ and Massachusetts doctors perform a higher rate of foot examinations of diabetic patients than US doctors as a whole.¹⁴²

However, there appears to be a rising level of avoidable hospital use attributable to diabetes. Estimates made by the state Division of Health Care Finance and Policy suggest that hospitalizations that could have been averted through earlier ambulatory care increased about 5 percent per year from 1998 through 2003.¹⁴³

Implications

- Diabetes is rising sharply among the very groups that are expected to comprise a larger share of Greater Boston's and the Commonwealth's population over the next 25 years: the elderly, older working-age adults and residents of color.

- The rising prevalence of diabetes will continue to act as a driver of prescription drug spending by individuals and their insurers in the years' ahead: survey data from the Agency for Healthcare Research and Quality (AHRQ) indicates that the cost of insulin and other prescription drugs are the single biggest expense for diabetic patients in the northeastern states. The survey data also suggests that home health services are the second largest category of expense for diabetic patients—an indication that rising levels of diabetes will intensify demand for home health and the need for home health workers.¹⁴⁴
- Increased diabetes among current and soon-to-be-elderly residents foretells an increasing burden on Medicare services at a time when the future solvency of the program is in question.
- Because of the higher prevalence of diabetes among lower-income residents, health care safety net programs in the state, including Medicaid and the new Commonwealth Care program, will face an increasing burden of diabetes-related costs in years to come.
- The rise in diabetes in diabetes is strongly linked to the rise in overweight and obesity throughout the population. While the impact of diabetes falls more heavily on lower-income households and on minority residents, no group in Greater Boston has proven exempt from rising rates of obesity and rising rates of diabetes. Broad-based strategies to help residents reduce overweight and obesity, and manage diabetes, could have an impact throughout the entire Greater Boston community.

Figure 25

Prevalence of Diabetes: By Gender

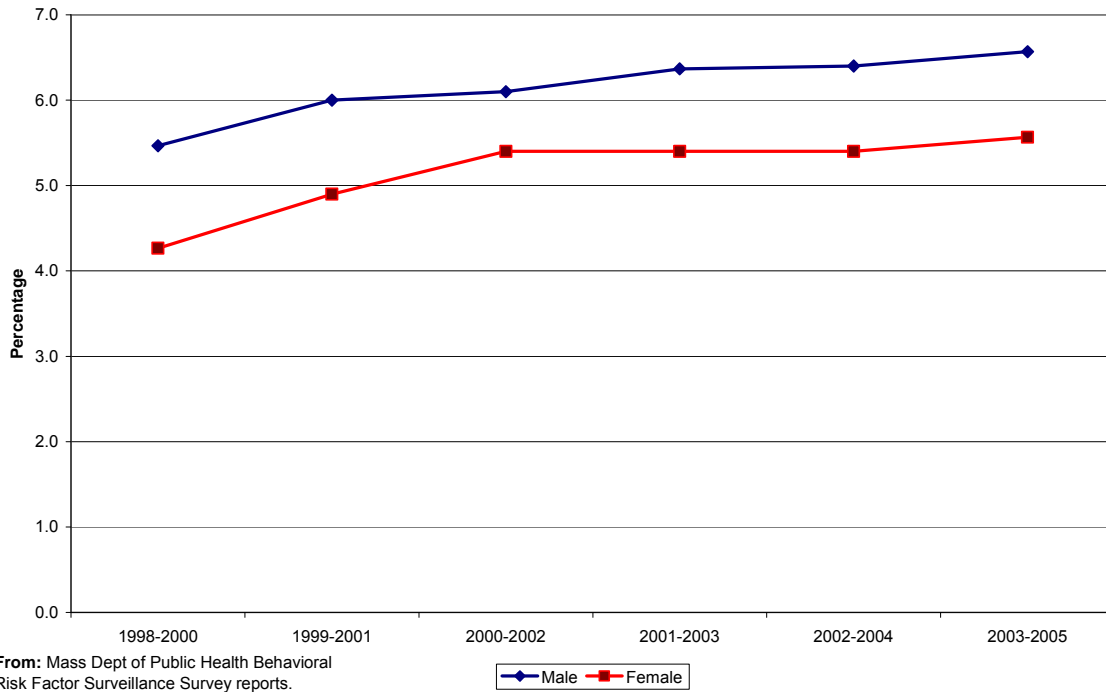


Figure 26

Prevalence of Diabetes: By Age

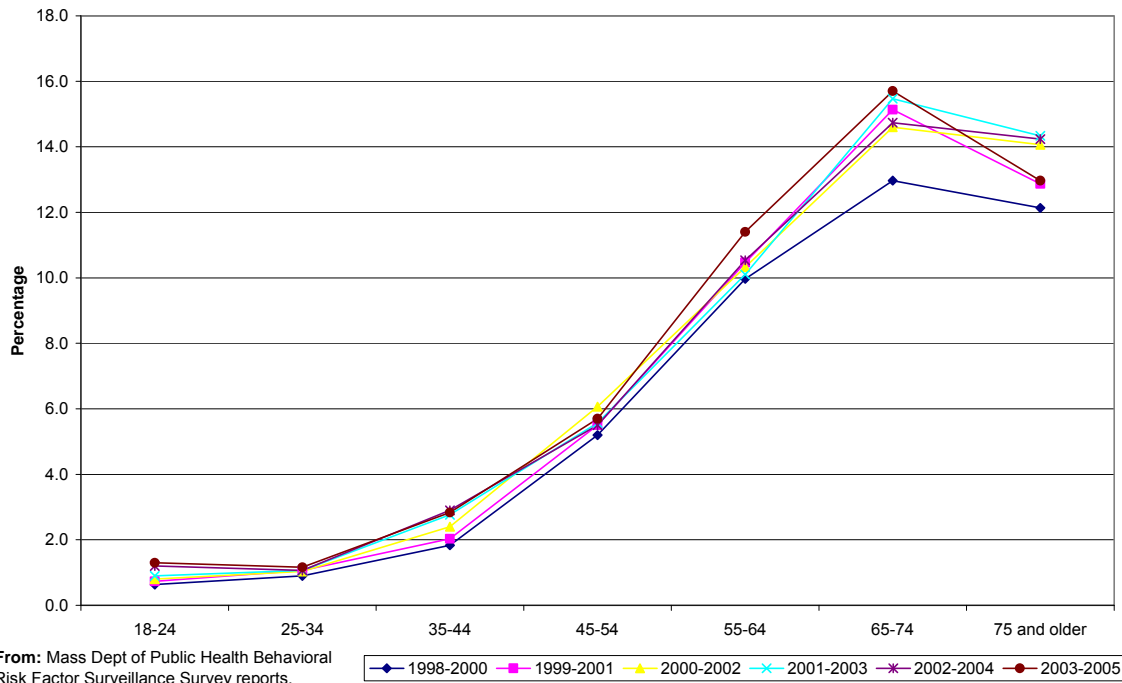
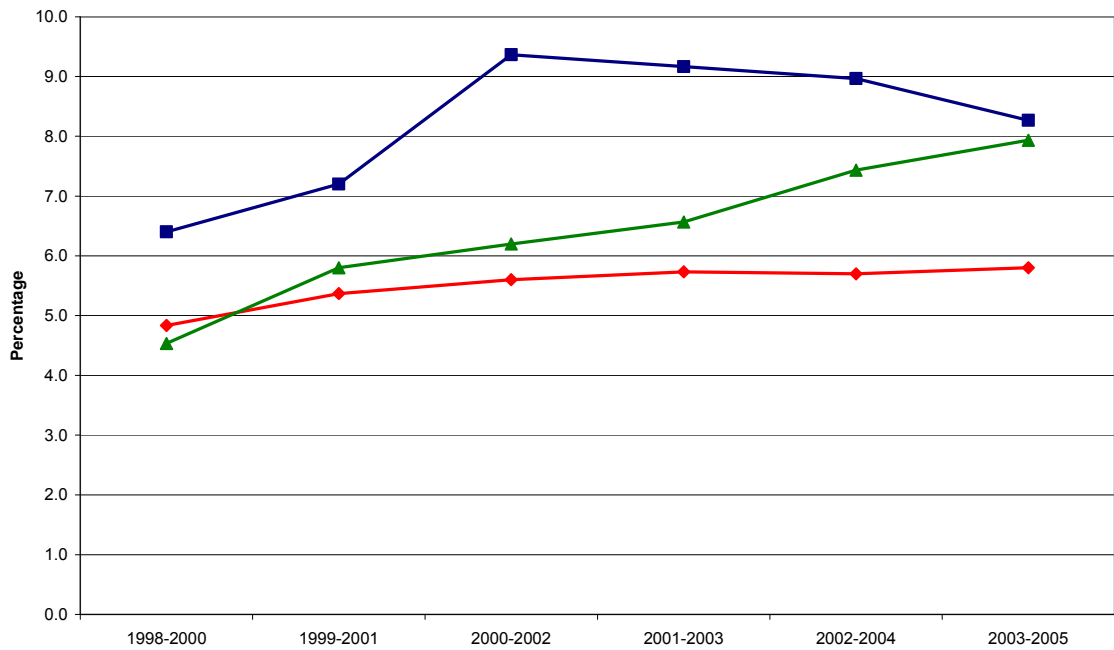


Figure 27

Prevalence of Diabetes: By Ethnicity



From: Mass Dept of Public Health Behavioral Risk Factor Surveillance Survey reports.

White Black Hispanic

Note: Asia, not shown due to lack of data

Figure 28

Prevalence of Diabetes: By Education

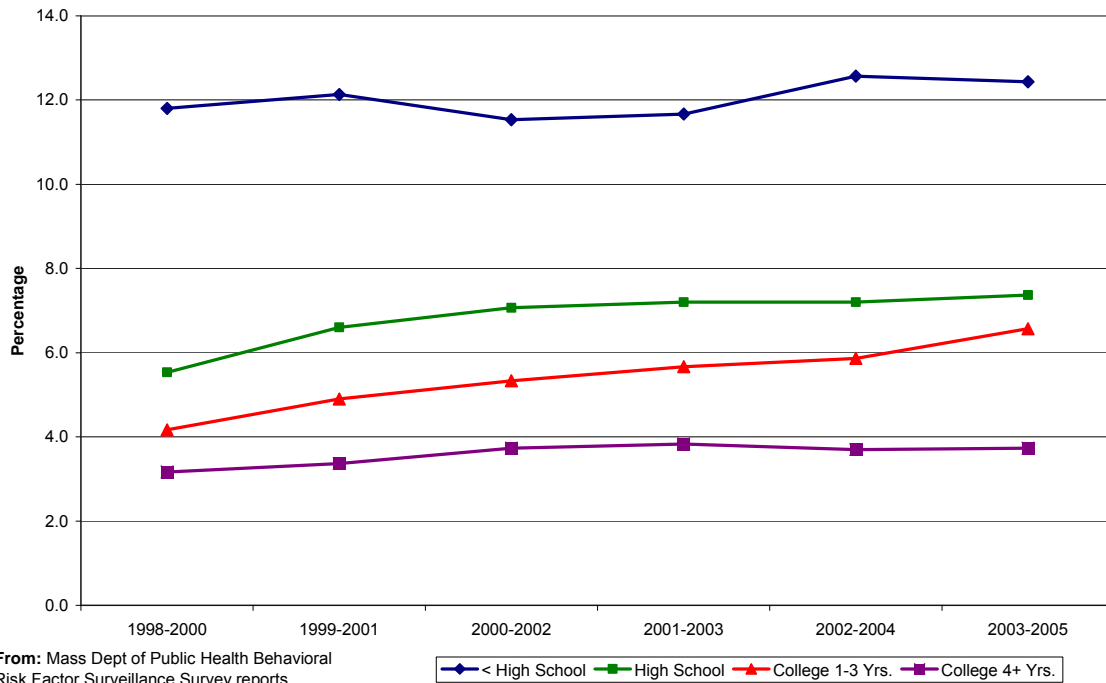
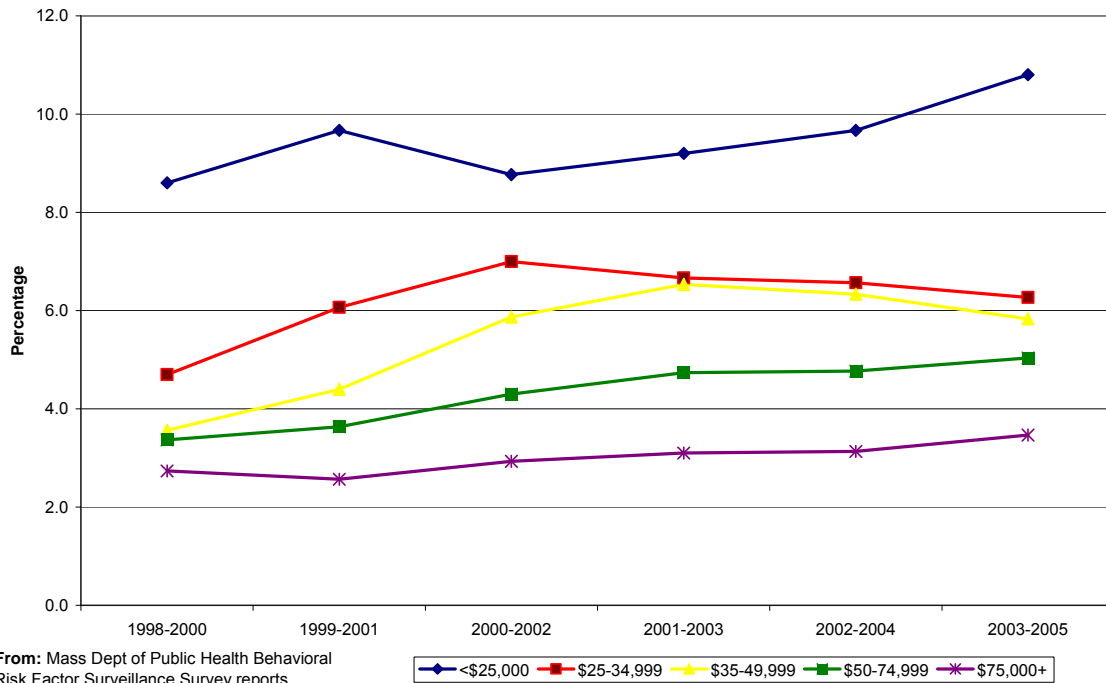


Figure 29

Prevalence of Diabetes: By Household Income



Indicator 14 - Heart Disease

Why is this important?

Heart disease is the leading cause of death in Massachusetts and over 13,000 residents die from heart disease every year.¹⁴⁵ Treatment of heart conditions of all types accounts for the largest category of hospital expense in the northeastern United States.¹⁴⁶ While the incidence is high among all groups, particular racial and ethnic groups in the state and throughout the US have higher rates of heart disease than others.

Risks for heart disease and other cardiovascular conditions are linked to unhealthy behaviors such as smoking, poor diet and poor fitness. At the same time, the progression of heart disease can be controlled by behavior modifications and medications to control blood pressure and cholesterol. Thus, trends in heart disease prevalence can be an indication of how well the population is managing its health through preventive and primary health care.

What do the data say?

Nearly a half million Massachusetts residents have some form of heart disease, but the death rate from the disease has declined over the past quarter-century.

The self-reported prevalence of heart disease among residents aged 35 years and older was 8.5 percent in 2005 (nearly 500,000 residents), a similar finding to years past. Heart disease prevalence in the US as a whole is higher, at 11.5 percent.¹⁴⁷

Despite the high prevalence of heart disease, mortality from the disease has declined in Massachusetts and in the US as a whole for over 25 years. The heart disease death rate in Massachusetts declined about 28 percent (or about 71 persons per 100,000) from 1996 to 2004, a rate modestly better than the rate of decline in the US

“Premature deaths” from heart disease, defined as deaths before the age of 65, are also lower in Massachusetts than in the US as a whole. About 13 percent of all heart disease deaths are estimated to be premature compared to 16.8 percent in the US¹⁴⁸

- **Heart disease-related mortality remains relatively high among African Americans and is increasing among Hispanics.**

Heart disease related mortality among whites in Massachusetts has fallen from about 250 deaths per 100,000 residents in the mid 1990's to about 200 deaths in recent years, while the mortality rate among African Americans has hovered at about 250 deaths per 100,000 residents throughout this entire period. Hispanic residents enjoy a lower mortality but it has increased throughout this period from about 100 deaths per 100,000 to approximately 150 deaths.¹⁴⁹ Heart disease mortality among Asian residents has generally ranged from 100 to 125 deaths per 100,000.

These disparities in heart disease-related mortality do not correlate with disease prevalence however. The reported prevalence among all groups is fairly similar: the prevalence among white residents in 2005 was 8.5 percent compared to 6.2 percent among Hispanic residents and 8.4 percent among African Americans. (The margin of error on the state's 2005 data for African Americans is relatively high, though, and suggests that heart disease prevalence could range as high as 12 percent).¹⁵⁰

The prevalence of heart disease is more tightly correlated to education level and income than to racial and ethnic status.

Residents in poor households making under \$25,000 in income per year are more than four times as likely to report a diagnosis of heart disease than residents with incomes over \$75,000 (16.6 vs. 4.1 percent).

Disparities in heart disease prevalence along lines of educational attainment are only slightly less significant. Almost 17 percent of residents with no high school education develop heart disease, compared with 10.8 percent of those with high school degrees and 6.7 percent of those with college degrees.¹⁵¹

- **Heart-related care in Massachusetts is average to above-average compared to the rest of the country.**

State rankings based on eleven measures of heart disease treatment quality put Massachusetts at average or above average on all measures, including above-average rankings on prevention of avoidable hospitalizations for heart disease, blood cholesterol testing, the prescription of beta blockers after heart attacks, and ejection fraction testing for heart failure.¹⁵²

Implications

- While the prevalence of heart disease has remained fairly steady, mortality from the disease has continued to fall in the population as a whole. Success in reducing deaths is generally attributed to changes in health-related behaviors such as smoking and to better health care through expanded use of medications and new life-saving procedures.¹⁵³
- New and expanded uses of medications and treatments that prevent or delay heart disease are a source of new health care demand and health care cost.¹⁵⁴ Yet because Massachusetts providers are relatively successful in preventing hospitalizations as well as premature deaths due to heart disease, the increasing use of preventive measures can also improve the health of patients and forestall or eliminate more costly hospital services that result when disease becomes life-threatening.
- While the prevalence of heart disease among minority residents appears to be roughly equivalent to the rate among majority whites, mortality among African Americans remains persistently high. Furthermore, while heart disease-related mortality among

Hispanic residents is still lower than among white residents, it is apparently increasing.

- Higher levels of income and education are closely linked to the prevalence of heart disease. A lagging level of income growth among middle and lower income households and persistent gaps in educational achievement among minority residents could be contributing factors to heart disease for some years to come.
- Increased overweight and obesity contributes directly to the onset and progression of heart disease and to other diseases such as diabetes that can themselves provoke or accelerate the progression of heart disease. Analyses from the US Centers for Disease Control suggest that heart disease mortality could increase by as much as 22 percent by the year 2025 because of increased rates of diabetes in the population.¹⁵⁵

Figure 30

Prevalence of Heart Disease: By Gender

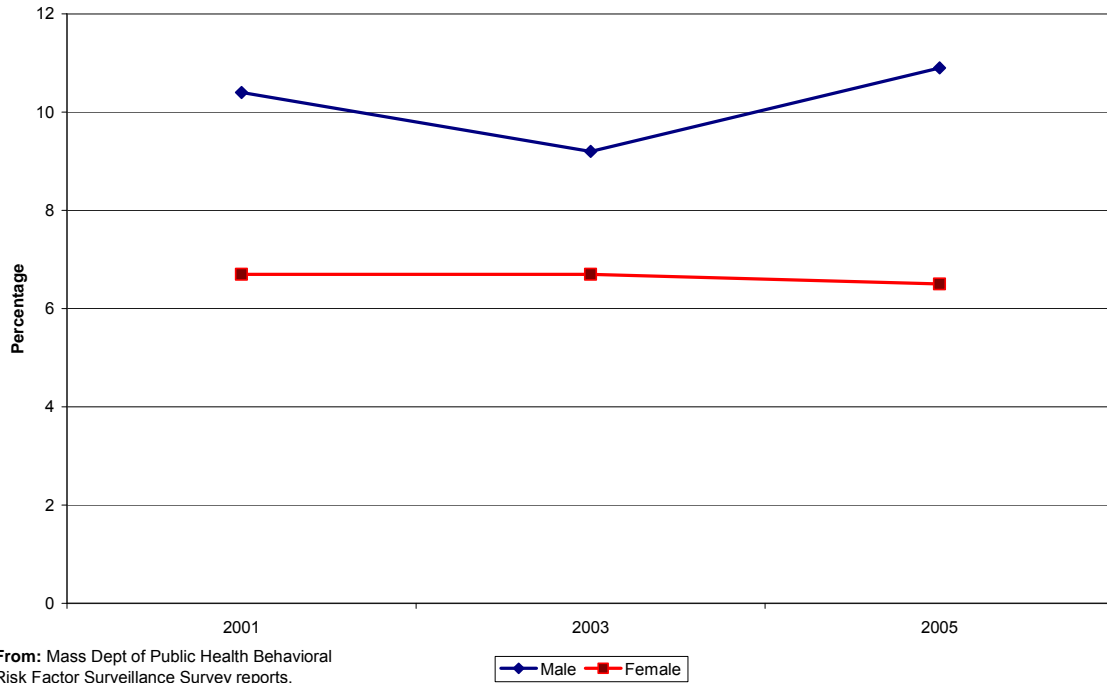


Figure 31

Prevalence of Heart Disease: By Age

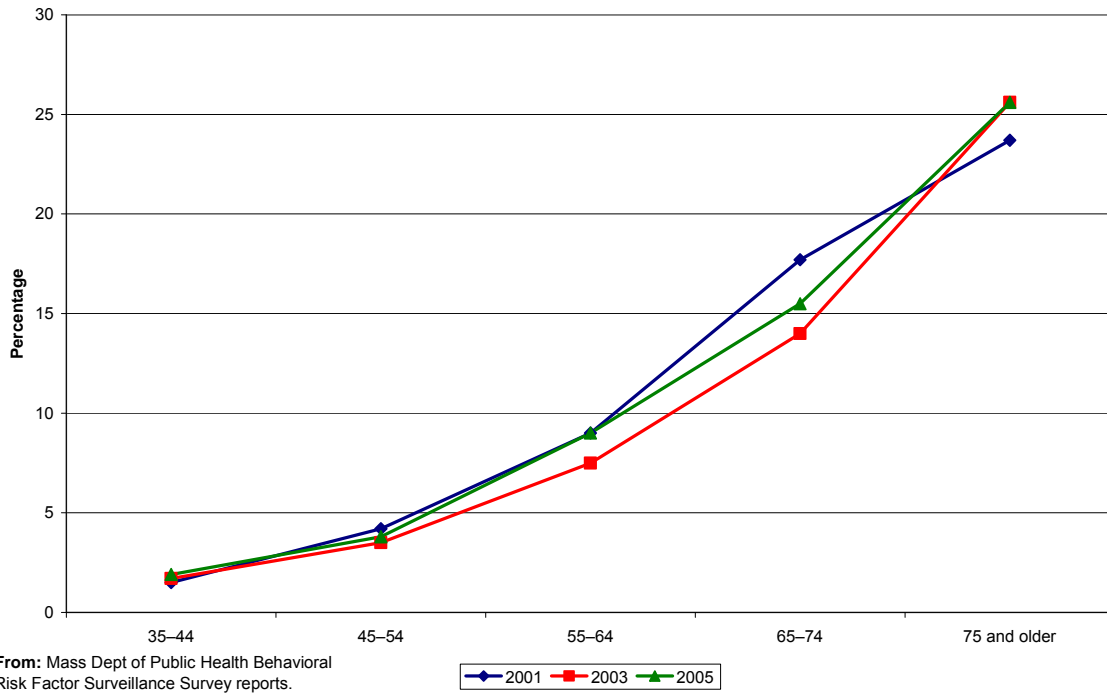
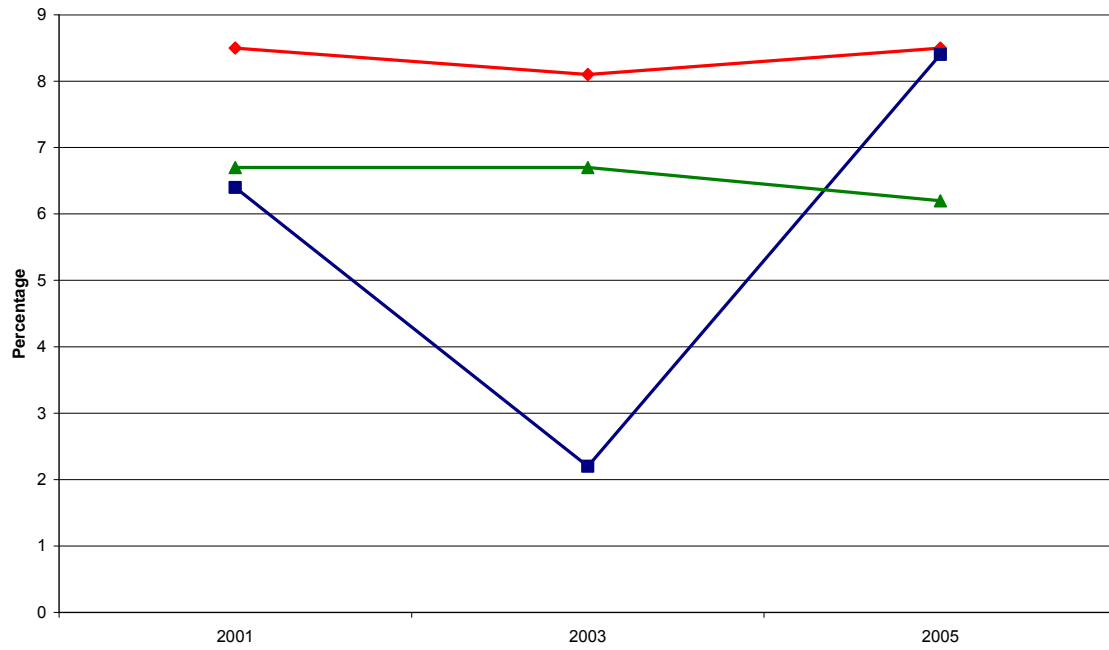


Figure 32

Prevalence of Heart Disease: By Ethnicity



From: Mass Dept of Public Health Behavioral Risk Factor Surveillance Survey reports.

White Black Hispanic

Note: Asian, not shown due to lack of data

Figure 33

Prevalence of Heart Disease: By Education

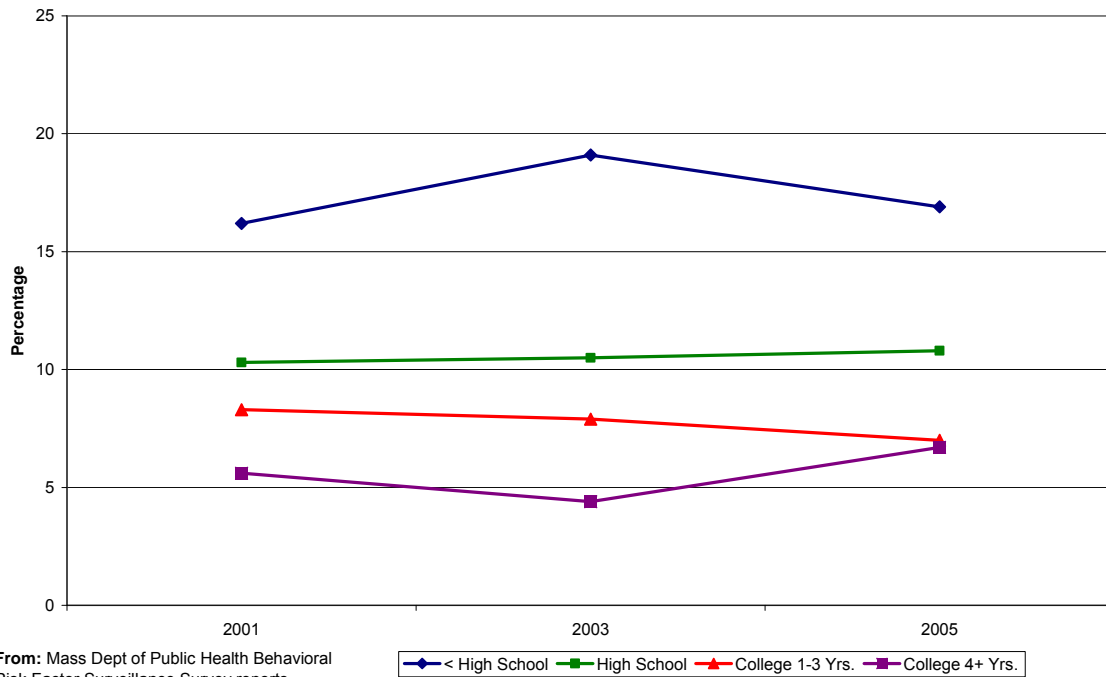


Figure 34

Prevalence of Heart Disease: By Household Income

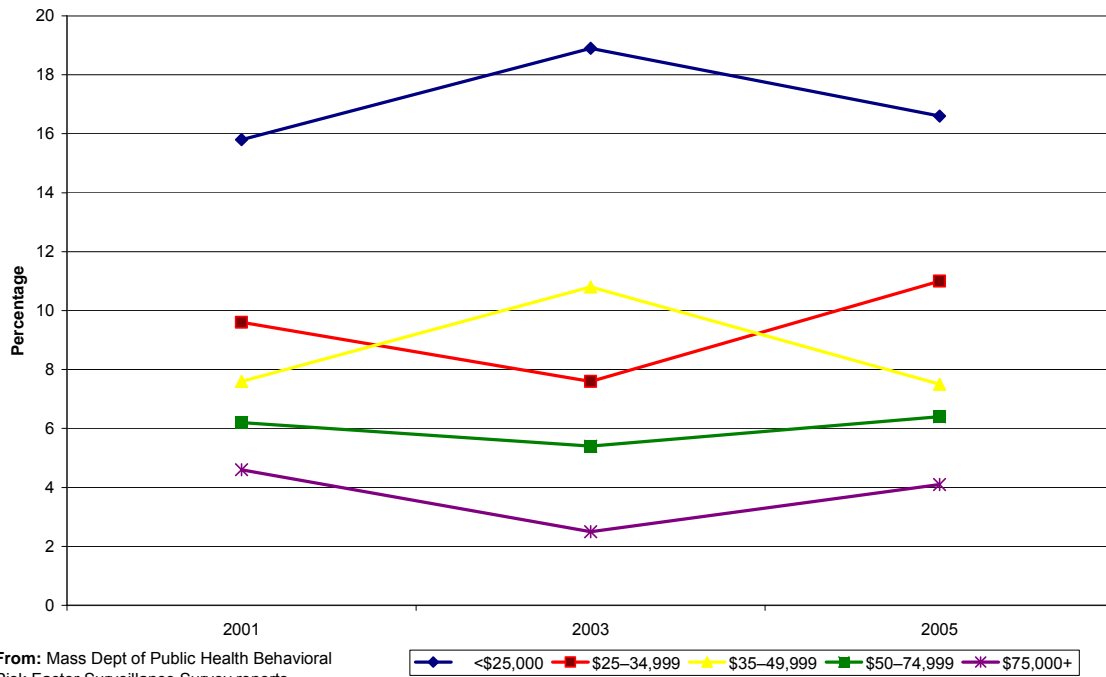
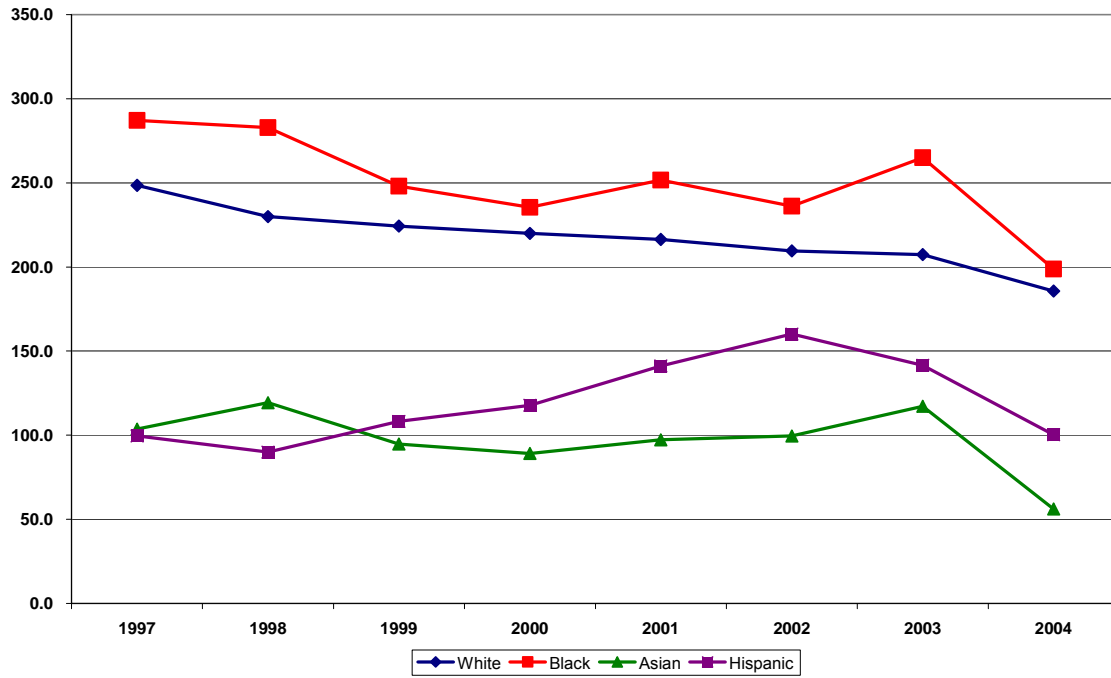


Figure 35

Heart Disease Mortality in Massachusetts
Comparability Unmodified and Comparability Modified Age-Adjusted: 1997 to 2004



Indicator 15 – Cancer

Why is this important?

Following heart disease, cancer is the second leading cause of death in Greater Boston, Massachusetts and the US. Every year, about 33,000 persons receive a cancer diagnosis in Massachusetts and about 13,000 die from some type of cancer.¹⁵⁶

Because many forms of cancer are responsive to today's medical therapies, cancer survivorship has increased and some cancers have become a type of chronic illness that requires continuing health care. Compared to all other conditions, cancer treatment claims the largest share of physician and outpatient expenses in the northeastern US and the third largest share of hospital expenses.¹⁵⁷

There are many preventable risk factors associated with various cancers, for example, smoking can cause lung cancer, and as many as one third of all cancers may have links to preventable factors such as excess drinking and obesity.¹⁵⁸

Significant racial and ethnic disparities in cancer incidence in the United States are well known, including a comparatively high incidence of prostate cancer among African American men.

What do the data say?

- **Massachusetts has a higher cancer incidence than the US as a whole.**

Cancer incidence in Massachusetts is about 9 percent higher than in the US as a whole at approximately 513 cases per 100,000 residents in the state compared to 471 per 100,000 in the US. Cancer incidence in the city of Boston is even higher at approximately 544 cases per 100,000.¹⁵⁹

In addition, cancer rates have continued to increase in Massachusetts, while they have begun to decline in the United States as a whole. The yearly incidence of reported cancers averaged about 490 cases per 100,000 in the state in 1991 to 1995, increasing to an average of 505 in 1996 to 2000 and 513 in 2002. In contrast, the US rate declined from 492 cases per 100,000, to 482 cases, to 471 cases over the same period of time.

- **Despite an increase in cancer prevalence, cancer-related mortality in Massachusetts has declined.**

Thanks to medical advances, cancer-related deaths in Massachusetts have decreased over the past decade, as they have in the United States as a whole. The rate appears to have fallen more sharply in Massachusetts and Boston (over 15 percent in a decade) than in the US (over 9 percent).¹⁶⁰

In 1994 to 1998, average yearly reported cancer deaths totaled 220 per 100,000 Massachusetts residents but dropped to 203 for the years 1999 to 2003 and further still to 188 in 2004. Likewise in Boston, the death rates declined from 251 deaths per 100,000 in 1994 to 1998 to 217 in 1999 to 2003 and to 212 in 2003. Cancer death rates in the US dropped from 207 per 100,000 in 1994 to 1998 to 197 in 1999 to 2002 and to 193 in 2002.

- **Lung, breast, prostate, and colorectal cancers are the most common and cause the most cancer-related deaths.**

Breast cancer is the most frequently diagnosed cancer among women in both Massachusetts and the US (in 2002, there were 134.1 and 124.9 cases per 100,000 residents in Massachusetts and in the US respectively) and is the second leading cause of cancer death (26.3 and 25.5 deaths per 100,000 residents in Massachusetts and in the US respectively).¹⁶¹

Prostate cancer is the most frequently diagnosed cancer among men in both Massachusetts and the US (174.1 cases per 100,000 in the state compared to 161.2 cases in the US). The prostate cancer death rate in Massachusetts (27.9 per 100,000 residents) was lower than the US rate (28.1 deaths per 100,000).

Lung cancer is the second most frequently diagnosed cancer and the No. 1 killer among both men and women in both Massachusetts and the US. In men, the incidence was 84.3 cases per 100,000 in the state vs. 86.4 in the US, and the lung cancer mortality rate was 69.9 deaths per 100,000 in Massachusetts vs. 73.5 in the US. In women, the incidence was 60.8 cases per 100,000 in the state vs. 53.7 in the US, and the mortality rate was 45 deaths per 100,000 in Massachusetts vs. 41.5 in the US.

Colorectal cancer is the third most frequently diagnosed cancer as well as the third leading cause of cancer mortality among both men and women. The incidence in Massachusetts is higher than the US rate for both men (68.4 cases per 100,000 Massachusetts men vs. 61.3 for all American men) and women (49.3 cases per 100,000 in Massachusetts, 44.9 in the US). Colorectal cancer mortality is also higher in the state (25.2 deaths per 100,000 men in Massachusetts vs. 23.8 in the US and 18.6 deaths per 100,000 women in Massachusetts vs. 16.5 in the US).

- **Cancer prevalence and mortality rates differ along racial and ethnic lines.**

African Americans in Massachusetts have the highest incidence of cancers (an average 516 cases per 100,000 in 2000 to 2002), followed by white residents (506 cases per 100,000). Cancer incidence is significantly lower among Hispanic residents (436 cases per 100,000 in 2000 to 2002) and among Asian residents (279 cases per 100,000).

Cancer incidence within the Hispanic community is growing rapidly, however, from 1996 to 2002, it grew over 40 percent. Cancer incidence grew slightly among whites (2.8 percent) and among African Americans (4.8 percent) and decreased among the Asian community (-22 percent). The rising level of cancer within the local Hispanic community stands in contrast to the larger nationwide Hispanic community, where cancer incidence fell slightly during the same period.¹⁶²

For the period between 1994 to 2003, the cancer-related death rate among Hispanic residents in Massachusetts increased approximately 42 percent, to 130 deaths per 100,000 residents, while decreasing among other racial and ethnic groups. Cancer mortality among whites fell by over 11 percent (to 203 deaths per 100,000), among African-Americans by 7.5 percent (to 258 deaths), and by about 20 percent among Asian residents (to 133.5 deaths per 100,000).

Cancer-related mortality is highest among African-Americans, and prostate cancer is the leading killer among this group. Prostate cancer caused 52.5 deaths per 100,000 African American men in 2004, a rate twice as high as the rate among white men (23.1 deaths per 100,000).

- **Cancer care and prevention practices in Massachusetts are comparatively good.**

Survey data from the Massachusetts Department of Public Health indicate that twice as many adults over 50 years of age are now receiving recommended colonoscopies for colorectal cancer screening compared to ten years ago. Currently, over 58 percent are screened, a rate that is over 13 points higher than the median among all US states.¹⁶³

In addition, the percentage of women in the state who have had a recent mammogram (within the past 2 years) has increased over the past ten years, from 78 percent to over 84 percent, a rate that is over 9 points higher than the national average.

Performance measures of physician screening for breast and cervical cancers compiled by the Massachusetts Health Quality Partners indicate that the state's physicians perform within the 90th percentile of all US physicians relative to thorough screening.¹⁶⁴ Furthermore, American Cancer Society ratings of breast care, Pap smear screening, colorectal and prostate cancer screening generally show a higher rate of screening performed by Massachusetts physicians than national averages, including a higher rate of screening conducted among uninsured persons.¹⁶⁵ And a 2004 RAND Corporation study of health care in 12 metropolitan areas found that 72 percent of patients in Greater Boston receive appropriate cancer screening, a result significantly higher than averages among other communities studied.¹⁶⁶

Implications

- While Massachusetts residents suffer a higher-than-national average incidence of most cancers, the state has a lower rate of overall cancer-related mortality. This may be the result of continuing advances in cancer care that improve detection and treatment, as well as a comparatively high level of health insurance coverage and health care quality in the state.
- Massachusetts men have a lower incidence and death rate from lung cancer. This may be due to a reduction in smoking rates in the state to levels that are consistently below national averages. The success is not shared with the state's women, however, who experience a higher than national average rate of lung cancer incidence and mortality.
- Massachusetts men also manifest a lower level of prostate cancer mortality despite a higher-than-average incidence of the disease.
- The generally declining level of cancer mortality is a sign that more cancer survivors are enjoying longer lives. The increasing number of cancer survivors is a driver for expanded primary care, for screening and monitoring services, and for continuing chronic care, all of which will create new jobs but will intensify health care costs as well.
- Unless significant health disparities in the African American and Hispanic communities can be overcome, the need for effective cancer care in the minority community will further intensify health care demand as the Greater Boston population becomes more diverse.
- Behavior modifications can reduce cancer rates and mortality. Despite a reduction in smoking rates, nearly 20 percent of Massachusetts residents still smoke, and lung cancer remains the most deadly form of cancer in the population. Prostate cancer has been linked at least partially to poor diet and inactivity; some breast cancer has been linked to triggering factors related to alcohol use and obesity; and colorectal cancer has linked to alcohol use, poor diet and smoking. This all points to a potential benefit from identifying successful strategies to improve nutrition and fitness in Greater Boston's population.

Figure 36

Cancer Death Rates in Massachusetts

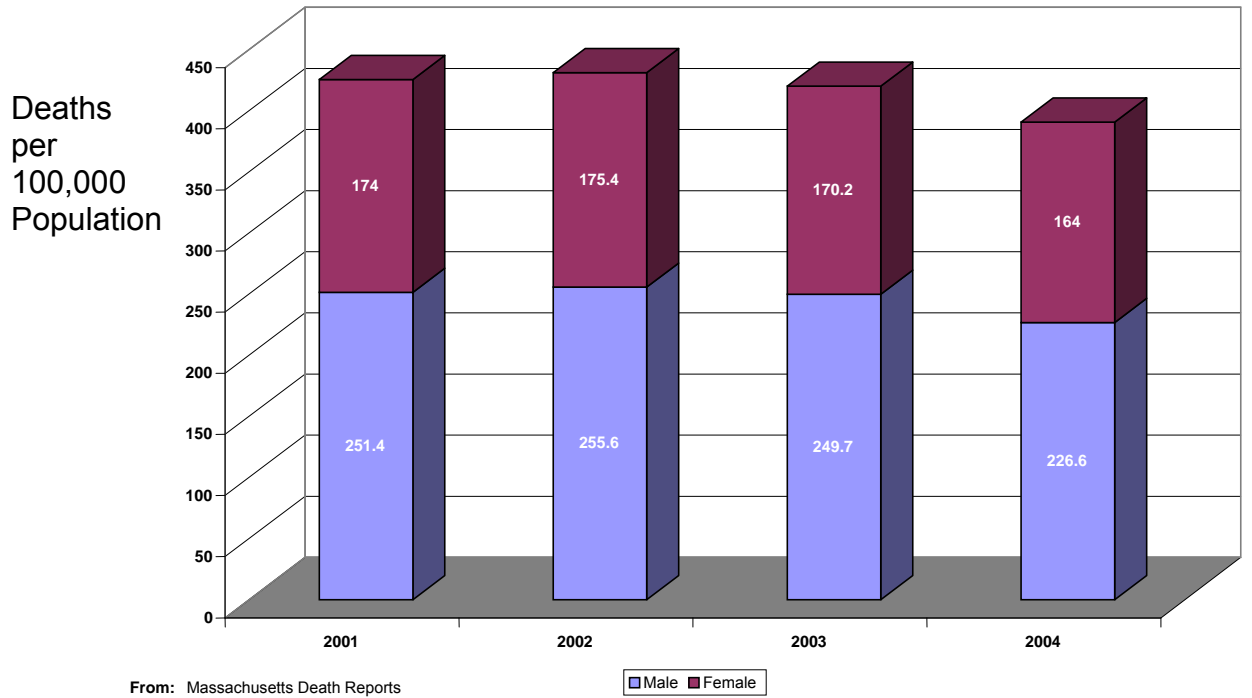
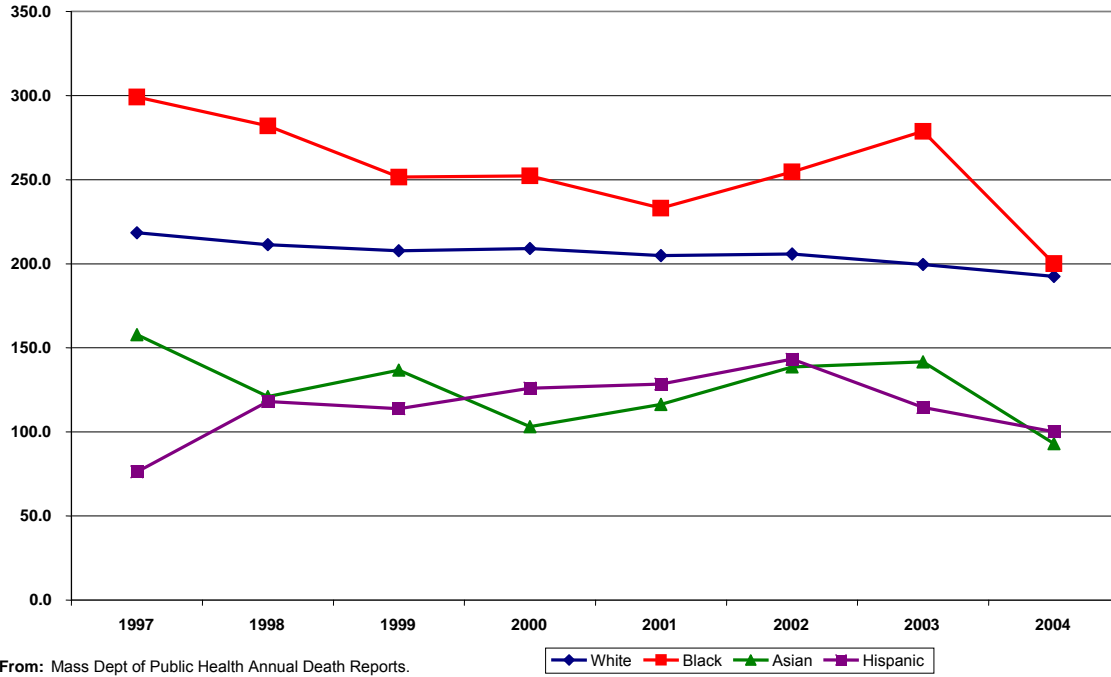


Figure 37

Cancer Mortality in Massachusetts: 1997-2004

Deaths per 100,000 Population
Comparability Unmodified and Comparability Modified Age-Adjusted: 1997 to 2004



Indicator 16 – Asthma

Why is this important?

Asthma, a condition that has no cure, is one of the most common chronic diseases and has increased steadily in Massachusetts and Boston in recent years. However unlike most chronic diseases, asthma can arise in children, and it can impede their development and schooling (and thus long-term educational attainment), prospects for employment, and continued access to health care.

Despite asthma's serious effects in adults and children, the environmental factors that trigger asthma and asthma attacks can be controlled or reduced. These environmental factors are found in the home (cockroaches, dust mites, pets, mold, tobacco smoke), the neighborhood (locally-generated pollution such as that produced by dense street traffic), and throughout the region (region-wide air pollution).

What do the data say?

- **Asthma prevalence in Massachusetts is consistently higher than the national average.**

The self-reported prevalence of adult asthma in Massachusetts was consistently 1.5 to 2.5 percentage points higher than the national average from 2000 to 2005.¹⁶⁷ In 2004, 9.7 percent of Massachusetts adult residents had asthma, up from 8.5 percent from 2000; the nationwide prevalence was 8.1 percent, up from 7.2 percent.

Asthma hospitalization rates have increased statewide but have decreased in Boston.

Data from the Massachusetts Department of Public Health indicate that asthma-related hospitalizations statewide have increased over the last decade from about 516 hospitalizations per 100,000 residents to a level of about 775 hospitalizations.¹⁶⁸ On the other hand, data compiled by the Boston Public Health Commission reveal that asthma-related hospitalizations in Boston itself have consistently decreased over the decade from a level of 300 per 100,000 to a record 240 in 2004. Young children in Boston are twice as likely to be hospitalized for asthma as older children and adults, at a rate of 770 per 100,000 in 2004.¹⁶⁹

Preventable hospitalizations in the state are also on the rise. According to the Massachusetts Department of Healthcare Finance and Policy, there were 9,448 preventable asthma hospitalizations in Massachusetts in 2003, a 14 percent increase from 1998.¹⁷⁰

- **Overall care of asthma is not as strong as care for other diseases.**

According to data from health insurers compiled by the Massachusetts Health Quality Partners, Massachusetts doctors rank below the 90th percentile in measures for asthma care, and they provide appropriate medication to adults and children with asthma in approximately 75 percent of cases.¹⁷¹ Research conducted by the RAND Corporation of asthma-related care in twelve major US cities suggests that only 51 percent of asthma patients in Greater Boston receive recommended levels of care for their asthma.¹⁷²

- **Racial and ethnic disparities in asthma-related hospitalizations are apparent in Boston.**

Data from 1996 to 2004 show that asthma hospitalization rates for Hispanic and African American residents in Boston are consistently three times higher than those for whites and Asian residents. The highest rates of hospitalization are found in Mattapan, Dorchester and South Boston.¹⁷³

Implications

- Asthma ranks as the fifth leading cause of preventable hospitalizations in the state, following preventable episodes of pneumonia, heart failure, cardiopulmonary disease, and urinary infections.¹⁷⁴ Asthma has increased in prevalence throughout all communities, suggesting that continued improvement of regional air quality is essential. However, asthma also strongly correlates with unsatisfactory living conditions, including poor housing, neighborhoods afflicted with high burdens of local environmental pollution, and poor or inconsistent access to primary health care. Several recent trends in Greater Boston may be contributing factors to asthma and asthma attacks: high housing costs and an inadequate supply of clean and safe housing, high costs of living, and increasing levels of dense traffic congestion.
- As with diabetes, the prevalence of asthma is disproportionately large among African American and Hispanic residents. As Hispanic residents in particular become a larger part of the area's population and workforce, control of asthma could become an even more important issue for both the health of residents and the competitiveness of the economy, given asthma's potential impact on minority schoolchildren and among minority entrants into the Greater Boston workforce.

Figure 38

Prevalence of Asthma: By Gender

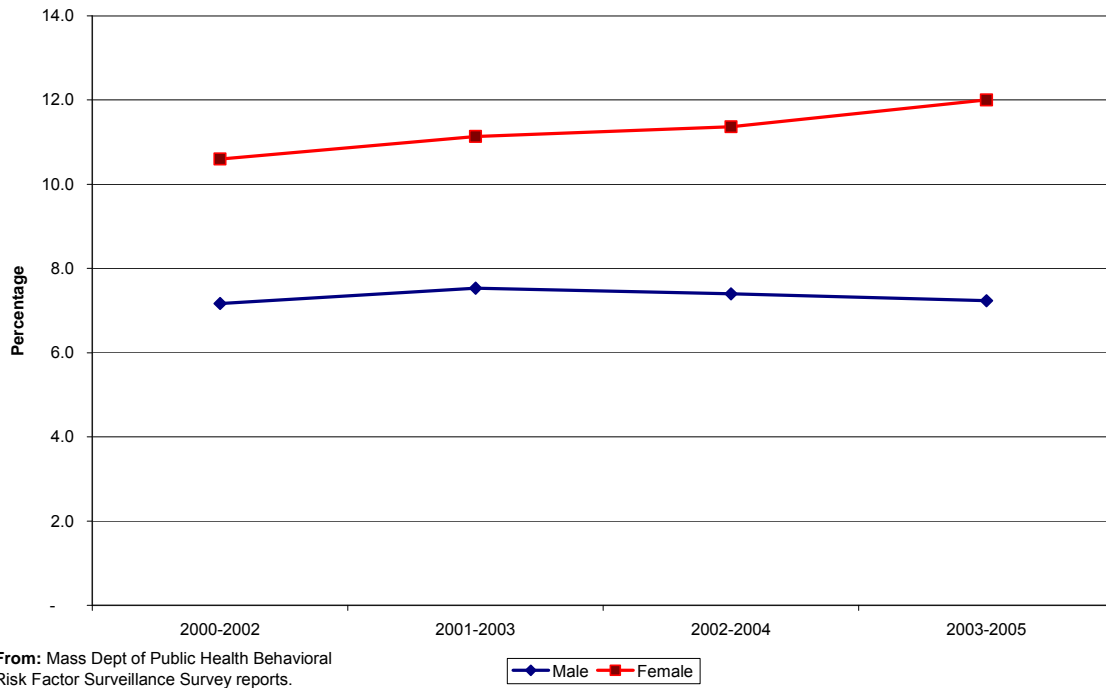


Figure 39

Prevalence of Asthma: By Age

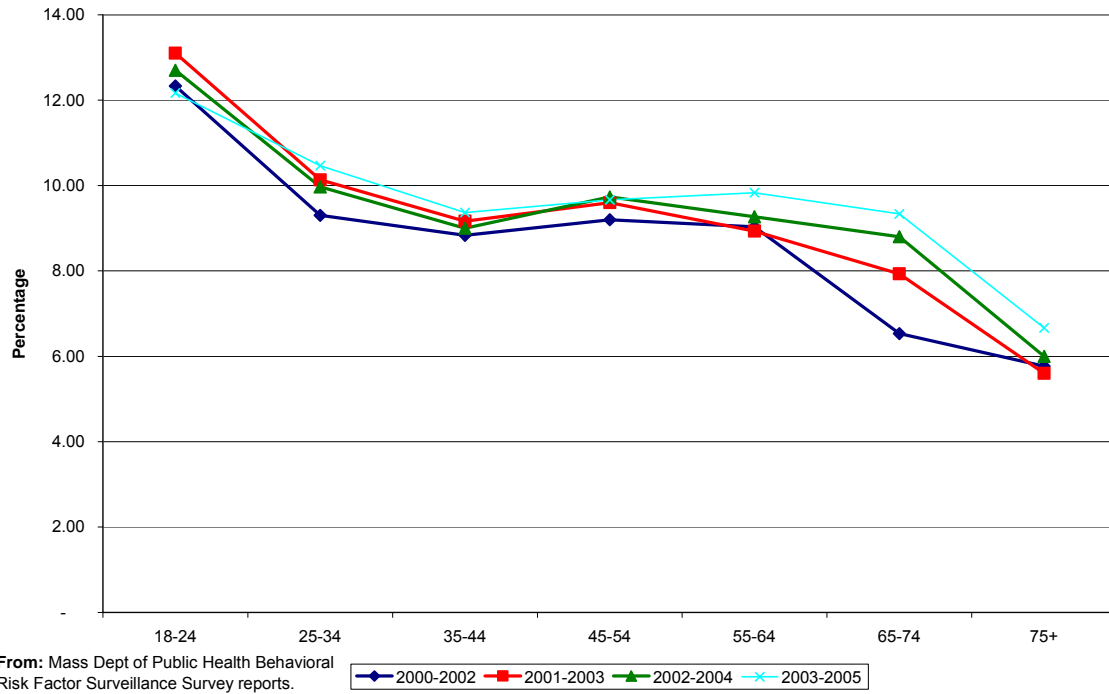
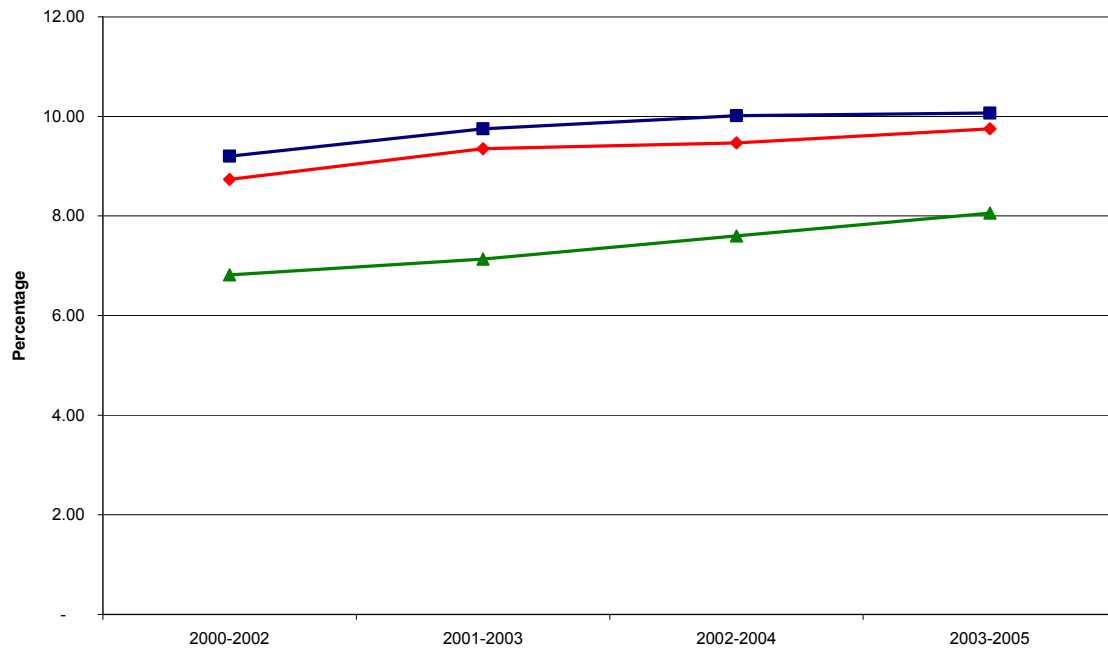


Figure 40

Prevalence of Asthma: By Ethnicity



From: Mass Dept of Public Health Behavioral Risk Factor Surveillance Survey reports.

White Black Hispanic

Note: Asian, not shown due to lack of data

Figure 41

Prevalence of Asthma: By Education

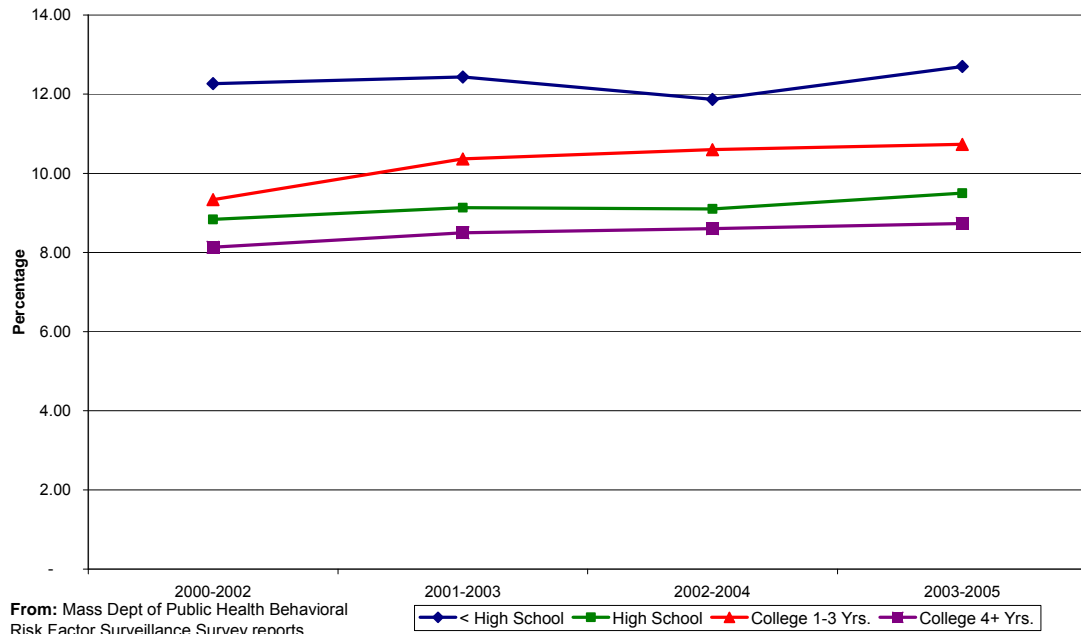
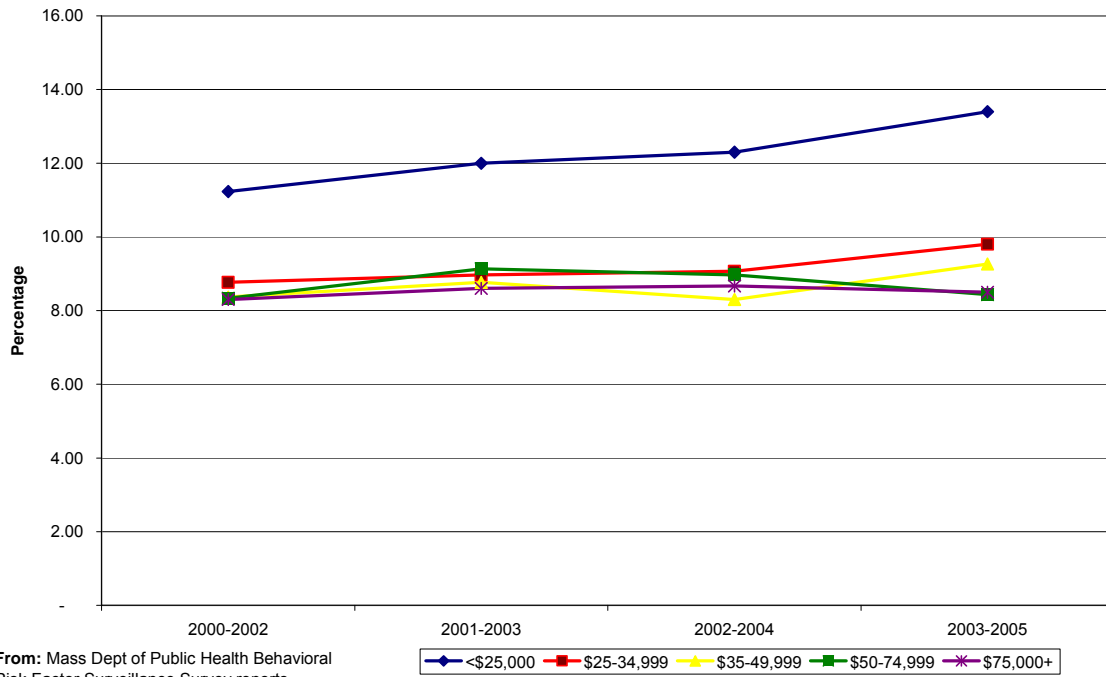


Figure 42

Prevalence of Asthma: By Household Income



B: Greater Boston's Economy and Health Care

Introduction: Greater Boston's Economy and the Role of Health Care

Greater Boston's recovery from the last recession (2000-2001) has been led in great measure by health care industries.

The recession that hit the Greater Boston economy in 2000 ultimately cost over 135,000 jobs before the economy began to generate a net increase in jobs in late 2004. Job losses were heaviest in the high-technology and financial services industries.

The health care industry suffered modest job cutbacks of its own in the late 1990's, primarily due to consolidation in the hospital industry, (see Indicator 23). Health care jobs began to increase in 2001, however, and have increased every year since that time. Greater Boston health care providers created about 30,000 jobs between 2001 and 2006, including 14,700 (or 20 percent) of the nearly 73,000 new jobs created in the entire Greater Boston economy since 2004. Only the professional and business services sector has created more jobs than health care, at a rate of 6 percent growth since 2004 (compared to 5.5 percent in health care).

Health care providers now employ over 286,000 people in the Greater Boston metropolitan area. Job increases have been led by the hospital sector, which has grown by 20 percent since 2000 (an increase of over 22,000 jobs), and by over 6 percent since 2004 alone. The hospital sector has also been the single fastest-growing industry (by employment) in the state as a whole.¹⁷⁵

Health care industries have always comprised a relatively high share of Greater Boston's employment. In recent years health care's share of employment has increased.

Health care has been highly concentrated in Greater Boston for many years. A 2003 study by the Milken Institute found that Greater Boston had the highest intensity of health care-related employment of any metropolitan area in the US¹⁷⁶

Health care employment now represents about 11.35 percent of all jobs in the Greater Boston economy, a slightly higher percentage of area jobs compared to decade ago. Health care jobs represent an even larger proportion of employment in the city of Boston, slightly over 17 percent of all jobs.¹⁷⁷

By contrast, health care employment in the US economy as a whole is 9.3 percent of all jobs, up from 8.4 percent one decade ago.¹⁷⁸

Health care's share of the state's and Greater Boston's economic output has increased in recent years as growth in health care-related spending has outpaced growth in the larger state economy.

The federal government's annual enumeration of personal health care expenditures (PHCE) in each state is an indicator of the size of health care-related expenditure in each state economy. PHCE grew rapidly in Massachusetts and in the US after 2000, increasing at an average rate of 8.5 percent per year in Massachusetts through 2004, (the latest year for which data is available), while PHCE grew at 8.1 percent on average in the US as a whole. See Figure 43.

By way of contrast, nominal growth in the state's Gross Domestic Product averaged 3.5 percent per year from 2001 to 2004, compared to annual average growth in the GDP of the 50 states of 4.6 percent.¹⁷⁹ GDP in Massachusetts grew by about 3 percent in 2005 (1.7 percent in real dollars), compared to 6.5 percent (3.6 percent in real dollars) among the 50 states.¹⁸⁰

Consequently, personal health care expenditure has increased as a share of the overall state economy. PHCE equaled 14.3 percent of the state's Gross Domestic Product in 2004, up from 12.8 percent in 1996. PHCE represented 13.4 percent of the gross domestic product of the 50 states. See Figure 44.

Health care-related spending continues to contribute a relatively high share of real growth in the Greater Boston and Massachusetts economies, but overall economic growth is lagging both growth in the US economy at large, and the state's recent historical rate of growth.

While health care-related spending accounts for about 14.3 percent of the state economy, it contributed about 26 percent of the overall real growth in the Massachusetts economy (Massachusetts GDP) in 2005, second only to the broad professional and business services sector.¹⁸¹ Real GDP grew by only 1.7 percent in 2005, however, or less than half the 3.7 percent average annual rate of real growth the state enjoyed from 1997 to 2004.

Wage and salary earnings in the health care industries have grown strongly in recent years – but not as high as the rate of overall personal health care spending or health care costs.

Wage and salary disbursements in the state's health care industries grew by an average of 6.4 percent from 2001 through 2005, or over twice the average rate of increase in wage and salary earnings in the overall state economy (2.9 percent) or the growth rate in personal income (3 percent).¹⁸² Data for Greater Boston is available through 2004: growth in health care salaries and wages averaged 6.6 percent per year (2001 to 2004), over twice the average growth rates in personal income and earnings in the metropolitan area, (3 percent).¹⁸³

The strong growth in yearly earnings does not match the even larger yearly rate of growth in health care spending. As noted above, personal health care expenditures in the state

rose at an average rate of 8.5 percent from 2000 to 2001. Health insurance costs in the state rose by an average of over 8 percent per year during the same period of time. (See Indicator 18)

Health care wages on the whole are at about the average for all jobs in Greater Boston, although they vary considerably by specific industry. For the most part, average wages in growing health care industries are below the average in the “Innovation Economy” industries in which the state has suffered job losses in recent years.

The average wage for all jobs in health care in Greater Boston in 2006 was approximately \$49,800, below the average wage for all jobs in the entire Greater Boston economy in 2005 (\$53,150).¹⁸⁴ Average wages in Greater Boston’s general and specialty hospitals were close to the average at \$53,100 and \$54,700 respectively. Above-average wages are found in the Greater Boston physician practices (\$78,600), and the health insurance industry (\$60,000). Wages in the nursing home and home health industries were as much as half of the average area wage, at \$33,027 and \$27,200. *See Figure 45.*

For the most part, the average wage in health care industries is below the average wage in the technology and financial service industries in which the state has suffered job losses over the last five to six years. For example, of the 10 “Innovation Economy industry clusters” tracked yearly by the Massachusetts Technology Collaborative, only two (postsecondary education and the textile/apparel industries) offer wages at or below the economy-wide average. At least 10 out of 14 health care delivery industries in Greater Boston offer wages that are generally below the metropolitan average.¹⁸⁵

Greater Boston’s teaching hospitals and affiliated research institutions are critical catalysts for growth in the life science industries, which are contributing both growth and high-wage jobs to Greater Boston’s economy. But growth in the life science industries is not yet at a scale where it can pull Greater Boston’s economic growth rate up above the national average.

Medical device, pharmaceutical and biotechnology firms are frequently “clustered” in regions with a heavy concentration of academic research institutions: Greater Boston has one of the heaviest concentrations of both academic research and life science industry found in any metropolitan area of the US.¹⁸⁶ Average wages in the life science industries are more than competitive with the wages offered in the high-technology industries that have suffered cutbacks since the recession of 2000 to 2001. Average salaries in 2006 in the Greater Boston medical device industry were \$84,000, \$107,000 in the research and testing (primarily biotechnology) industry, and \$110,000 in the pharmaceutical industry.¹⁸⁷

Output from each life science industry has grown significantly since 2001: 32 percent in local pharmaceutical firms, 50 percent in local medical device firms, and 78 percent in the commercial “research and testing” industry sector that is dominated by biotechnology firms.¹⁸⁸ Growth in the medical device industry occurred despite a nearly 20 percent cutback in jobs, while the pharmaceutical industry grew with only a modest increase in

jobs (4.3 percent). Employment in the research and testing sector (predominantly comprised of biotechnology firms) grew very robustly at over 34 percent.

Teaching hospitals play a critical and growing role in the growth of life science industries by generating new research findings that are licensed to life science firms, by providing advanced training to doctors and researchers, and by employing a large pool of scientists who bolster the life science workforce of the entire region. (See Indicator 29)

Yet, while the life science industries are growing strongly they still represent less than 3 percent of employment in the Greater Boston area (compared to health care's 11.35 percent).¹⁸⁹ Overall growth in the Greater Boston and Massachusetts economies has run below the US average and that of many competitor states in recent years. Growth in the life science industries, and the successful commercialization of discoveries generated at the area's teaching hospitals, is not yet at a scale where it can pull the growth of the region up to recent national averages, or to the higher-than-average growth rates that Greater Boston enjoyed in the late 1990's and in the 1980's.

Lagging economic growth contributes to a crisis of affordability and sustainability in health and health care in Greater Boston.

Lagging economic growth in the larger economies of Greater Boston and Massachusetts have created a squeeze on household and family incomes, and thus on the ability of residents to afford health insurance and health care. It has also created stress on the state government, which is forced to "crowd out" critical investments in public health, education, and other priorities that influence health, because of lagging tax revenue and increasing health care costs.

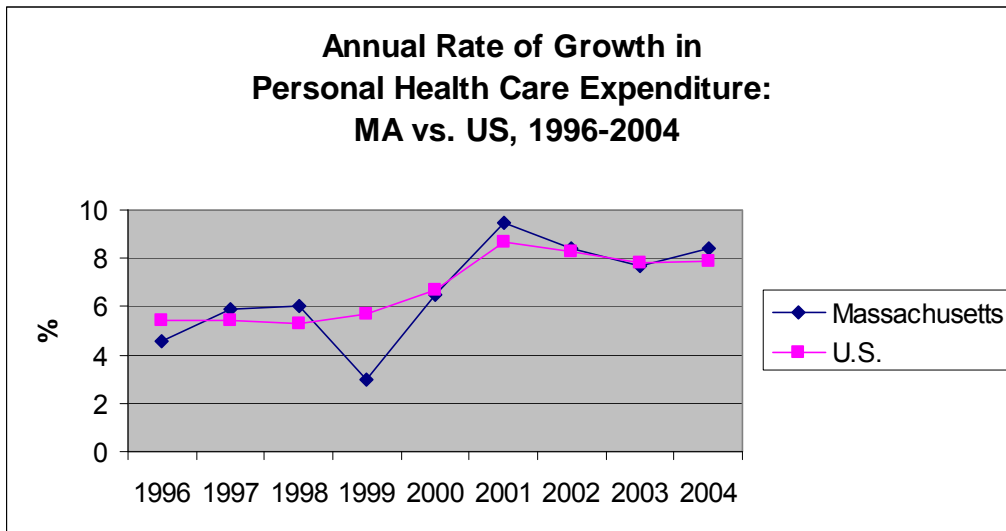
As noted in Indicator 2, growth in real median household income in Greater Boston has stagnated in recent years, while real wages have actually fallen. Meanwhile average health insurance costs have continued to rise at 5 percentage points or more above the rate of inflation, year by year. The annual cost of health insurance as a proportion of the area's median income has continued to rise and will reach 20 percent of median income within the next 5 years if current trends persist. As health insurance costs rise against median income, pressure increases for the employers of lower-wage workers to stop offering health benefits (if they offer them in the first place), and the ability of employees to afford their share of health benefits decreases.

Paradoxically, the affordability crisis is particularly acute for many health care providers, since many health care jobs pay wages at or below the area's median wage and income level, and many providers in low-wage industries such as home health and nursing care are small businesses or non-profit organizations.

Increasing pressure on employers and employees is also felt by state government, which covers over 20 percent of the state population through the Medicaid program, and is committed to subsidizing insurance to lower-income residents as part of the health care mandate adopted in the state's landmark 2006 health insurance reform act.

The Massachusetts Taxpayers Foundation projects that health care costs to the state will increase at an average annual rate of 7 percent per year through 2012.¹⁹⁰ Meanwhile the Foundation expects that personal income in the state will increase by only 4.5 to 5.1 percent over the next two years, generating annual increases in tax revenues available for the state budget of 4 percent or less. This small rate of increase in tax revenues will make it difficult to sustain, much less increase investment in several state priorities that are important for both public health and competitiveness that have suffered cuts in real spending levels in recent years, including local aid to public schools, public higher education, and public health programs. (See Indicator 20)

Figure 43



From: Centers for Medicare and Medicaid Services(CMS),
National Health Expenditure Accounts 2004

Figure 44

Personal Health Care Expenditure as a Percentage of Gross Product

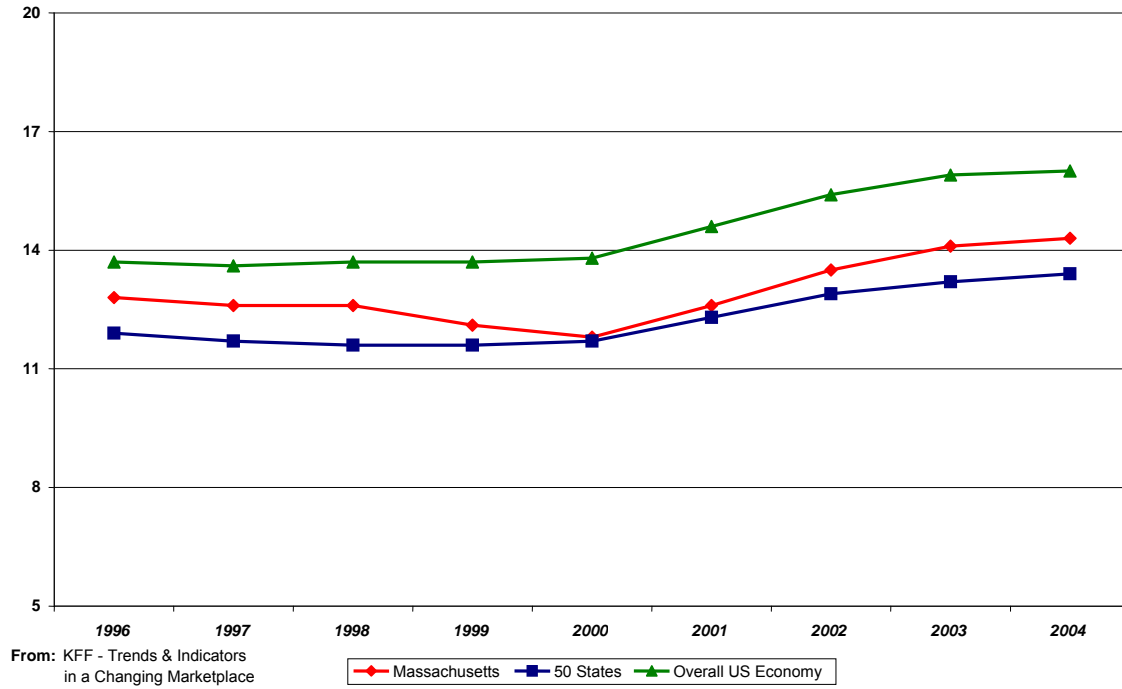
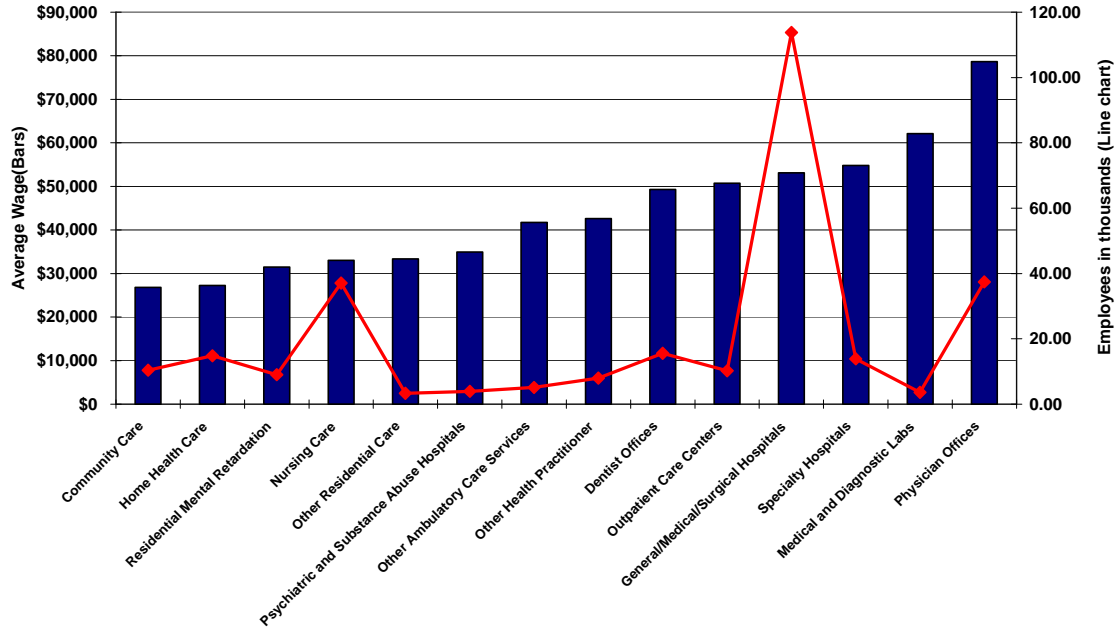


Figure 45

**Health Care Industries in Great Boston
Average Yearly Wage and Employment - 2006**



From: New England Healthcare Institute calculations from estimates made by Moody's Economy.com from US Bureau of Labor Statistics data

■ Avg Wage ◆ Employment

Indicators by Sources of Health Care Funding

Indicator 17 - Employer-sponsored Health Insurance

Why is this important?

From the World War II era to today, employer-sponsored health insurance has been the primary form of payment for health care, and thus the primary means of access to care, for well over 60 percent of working Americans and their families. Yet overall employer sponsorship of health benefits has been decreasing over time in the US

What do the data say?

- **Overall employer sponsorship of health benefits has remained stable in Massachusetts.**

The number of US employees covered by employer-based health insurance peaked at 164.4 million (62 percent of the non-elderly population) in 2000 and has declined by over 5 million people since that time.¹⁹¹ In Massachusetts, however, 85 percent of working age adults were insured through employers in 2004, a level significantly higher than the national average of 63.1 percent.¹⁹²

The percentage of all US employers offering health insurance dropped from 69 percent in 2000 to 60 percent in 2005, and sponsorship decreased most rapidly among employers with workers that earned wages at or near the poverty level.¹⁹³ In comparison, 70 percent of Massachusetts employers offered health insurance benefits in 2005, a similar percentage to 2001 and 2003.¹⁹⁴

- **However, some evidence suggests that fewer private sector employees take coverage from their private sector employer.**

The enrollment of private sector employees in health plans sponsored by their private sector employers has decreased over time in the US and within Massachusetts. The percent of private sector employees in the US enrolled in employer-sponsored health insurance fell from 76.1 percent to 72.3 percent from 1997 to 2004.¹⁹⁵ In Massachusetts, 68.7 percent of full time private sector employees enrolled in their employer health plans in 2004, compared to 77.5 percent in 2000.¹⁹⁶ Data from the Agency for Healthcare Research and Quality found that 63 to 65.6 percent of the state's private employers offered health benefits in 2003 to 2004, down from the 66 to 68 percent documented in 2000 to 2001. Recent data suggesting that overall employer sponsorship of health benefits has returned to 70 percent (cited above) may indicate that employer sponsorship of health benefits has increased since those years as the state's economy has improved.

- **Smaller employers are less likely than larger employers to offer health benefits.**

In recent years, nearly 100 percent of private firms in the US with 1,000 or more employees have sponsored health insurance benefits, compared to less than 40 percent of US firms with 10 or fewer employees.¹⁹⁷ Health benefits become more prevalent as firms employ twenty or more workers: both state and federal survey data both suggest that sponsorship of health benefits is nearly universal among employers with over 25 employees.^{198, 199}

The smallest businesses in Massachusetts are more likely to offer health insurance than counterparts in the US as a whole. The state's 2005 survey data noted that 60 percent of employers in Massachusetts with 2 to 9 employees offered health benefits, while federal data from 2003 to 2004 revealed that sponsorship among firms in the country with less than 10 employees ranged from 44.3 percent to 48.9 percent.²⁰⁰

- **The state's new health care reforms will change the structure of employer-sponsored health insurance and expand options for the smallest employers, while requiring that they either offer insurance or pay a fee.**

Massachusetts has taken the lead in attempting to expand employer-sponsored health insurance with its 2006 health care reform legislation. Most employers in the state are now mandated to either offer their employees health insurance or pay a fee to the state's new Connector Authority that will offset the cost of insurance provided to employees through the Connector. (Employers with fewer than 10 employees are exempted).

Implications

- The rate of employer sponsorship of health benefits in Massachusetts appears to be stable and high relative to the overall US level and may reflect several trends evident in Greater Boston and Massachusetts, including:
 - A generally low unemployment rate (held down by limited growth in the region's workforce), which creates greater competition among employers for needed talent,
 - A trend towards employment in larger establishments, which are more likely to offer health benefits. As of 2004, over 47 percent of the workforce worked in 1,000+ employee establishments; less than 40 percent of the workforce worked in 1,000+ employee establishments in the mid 1990's. Meanwhile, the proportion of employment in very small establishments has shrunk slightly over the past decade at about 11 percent, declining from a peak reached in the Internet Boom years of 1999 to 2000. One percent worked in establishments of 10 or fewer employees in 2004.²⁰¹

- As a result of the Commonwealth's new health care reforms, sponsorship of health benefits will no longer be strictly voluntary, nor will the take-up of health insurance by employees. The state will also provide new avenues to access of health benefits by subsidizing the cost of health insurance to individuals with lower incomes (300 percent of the Federal Poverty Line or below) and by creating a single broad market for health insurance for individuals and small businesses.
- In the debate over creation of the state's new health insurance program (Commonwealth Care) much has been made over whether the program will strengthen or weaken the state's longstanding reliance on employers as the leading source of health insurance to residents. A successful small business health insurance market offering affordable benefits to employees could strengthen the business climate for all employers in the state. Yet programs that are too expensive could result in higher subsidies, thus increasing the budgetary pressure that crowds out non-health care expenditures. In recent years tight state budgets have crowded out spending that supports long-term public and long-term economic competitiveness, (see Indicator 20). However, business growth among firms that can afford health benefits will minimize pressure on the Commonwealth. Unfortunately, the recent history of lagging wage growth in Greater Boston and Massachusetts may indicate a weakening ability in the business community to offer health benefits. An additional challenge will arise for locally-based firms that do business in markets outside Greater Boston and Massachusetts and compete with other US firms that have lower health care costs or with foreign firms that have no responsibility for employee health benefits in their home countries.

Indicator 18 - Cost of Employer-sponsored Health Insurance

Why is this important?

Since over 60 percent of insured individuals in Greater Boston and Massachusetts access health care for themselves and their dependents through employer-sponsored health insurance, the cost of this insurance has a direct effect on millions of employers and employees.

What do the data say?

- **The cost of an average family health insurance plan in Massachusetts has been rising 4 to 5 points above the rate of inflation and now exceeds \$12,000 per year.**

The average cost of a family health insurance plan in Massachusetts dipped slightly in 1997 but has risen every year since. The average rate of growth in family health insurance premiums was about 9 percent per year from 1998 to 2004.²⁰²

More recently, the cost of health insurance in the state has is estimated to have risen about 8 percent per year, compared to 6 percent annual growth in the US as a whole.²⁰³ The average family health insurance plan in the state cost over \$12,300 in 2006.

The rate of growth in the cost of family health insurance has exceeded the rate of inflation since 1998. The Consumer Price Index for the Greater Boston area grew an average of 3.15 percent yearly from 1998 through 2006, or about 5 points less every year than the average rate of growth in family health insurance.

- **Costs to private sector employees have risen as total costs of health insurance have increased, but recent research suggests that employees with employer-sponsored health insurance in Massachusetts still pay less for their health care than employees in many other states.**

Employers throughout the US have shifted more of the costs of health benefits to employees in recent years. Federal government data for Massachusetts suggests that a cost shift to private sector employers took place early in this decade: private employees were responsible for an average of 20.6 percent of overall premium costs in 2000, rising to 23 percent in 2002 and 26 percent in 2004 (with an average contribution of \$2,784).²⁰⁴

However, state survey data suggest that among all employees in the state (public and private) the average employee contribution to health insurance has remained stable since the start of the decade. Employee contributions to the average plan varied between 25 to 26 percent from 2001 to 2005.²⁰⁵

Research published in 2006 (based on 2002 data) compared the actual cost of health care to employees of different states, with both employee insurance contributions and actual out-of-pocket costs taken into account. Analysts found that actuarially-adjusted value of the average Massachusetts employee's contribution to employer-sponsored health insurance was \$3,184, less than the US average (\$3,203), and less than employee costs in 27 of the 43 states surveyed.²⁰⁶

- **The cost of health insurance is rising faster than growth in incomes and wages.**

In recent years, hourly wages in Massachusetts have not kept pace with the rate of increase in family health insurance. While hourly wages rose at about 2 points over inflation in the years 2001 to 2003, they declined markedly (nearly 5 percent) against inflation in 2003 to 2005 and in the early months of 2006.²⁰⁷ The average cost of a family health insurance plan in Massachusetts in 2005 was approximately 31 percent of the value of the annual median wage of hourly workers, as calculated by the US Bureau of Labor Statistics.²⁰⁸

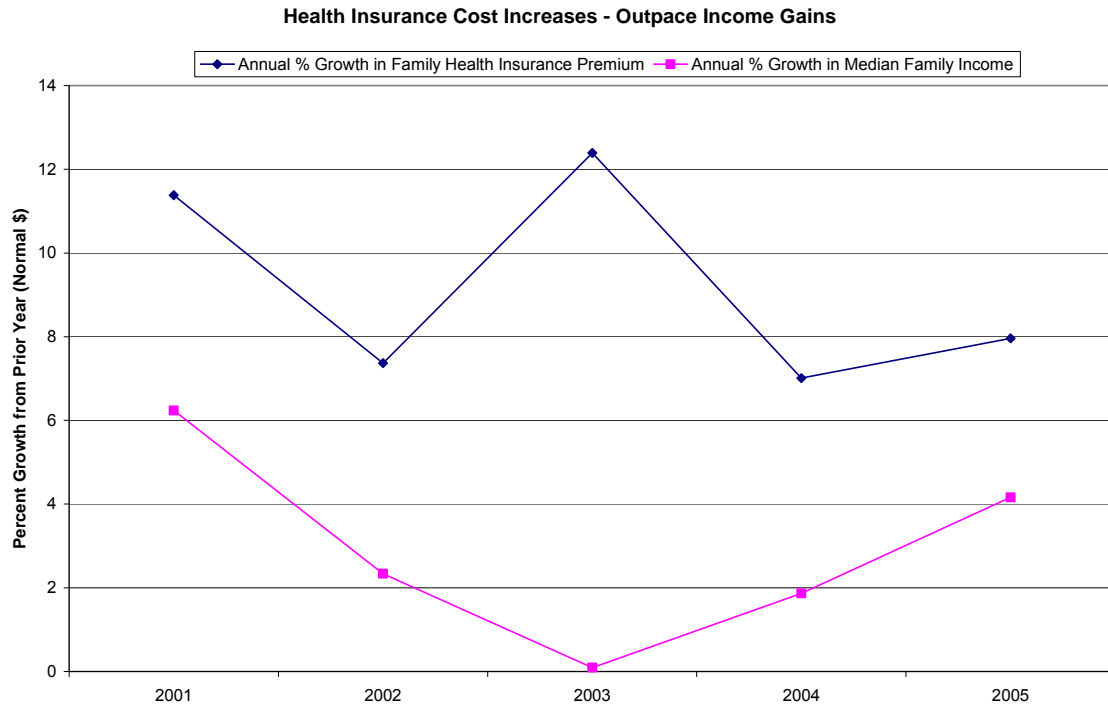
Government estimates of median family incomes provide a measure of income available to a family that is more inclusive than measures of hourly wages. Here again, the cost of the average family health insurance plan has risen continuously against the median income reported for Massachusetts families. The cost of an average family health insurance plan in 2000 was equal to about 12 percent of the median family income in Massachusetts, and in 2005 it equaled about 16 percent. At this rate, the average cost of family health insurance will exceed 20 percent of median family income within the next 5 years.²⁰⁹ The same trend can be seen in the rest of the country: family health insurance has gone from about 13.6 percent of median family income to 18.6 percent in 2004.

Implications

- As the cost of health benefits rises in comparison to wages, employers may drop benefits altogether and employees may decline health benefits because of the rising cost of their contribution to health plans.
- However, the new Massachusetts health insurance reforms force employers to offer or contribute to health insurance and compel individuals to accept coverage and shoulder at least some share of its cost. As a result, new pressure will build on the Commonwealth to ensure the availability of adequate and affordable health insurance plans, a feat that could prove difficult amidst the current trend of health insurance inflation above and beyond the rate of growth in incomes.
- Health insurance in Massachusetts is comprehensive compared to insurance in many other states: notwithstanding higher costs of living and of business, the actuarial-adjusted value of health insurance to Massachusetts employees is below the national average and competitive with many other states. This suggests that Massachusetts employers pay a commensurately higher amount of the total cost of employee health

insurance.²¹⁰ However, recent federal data suggests that employee health care costs are actually a higher percentage of employee compensation in most other regions of the country.²¹¹ A 2006 analysis by the Pioneer Institute suggests that the cost of health insurance to employers is not currently a major disincentive for job creation in Massachusetts compared to other US states.²¹² Nevertheless, to the extent that Massachusetts and US employers will continue to face competition from global employers with very little, if any responsibility for employee health care, then the rising cost of health care as a cost of employee compensation will continue to be a competitive issue.

Figure 46



From: Medical Expenditure Panel Survey, Centers for Medicare and Medicaid Services (health insurance data), and US Census Bureau - American Community Survey (median family income data)

Indicator 19 – State Expenditures for Health and Health Care

Why is this important?

After the federal government, state government has the most far-reaching obligations for financing health care of any organization in the Commonwealth, public or private. State government directly supports the health insurance coverage of over 20 percent of the state's population, sharing responsibility with the federal government for over 1 million Medicaid recipients, and shouldering the majority of health insurance expenses for nearly 290,000 state employees, retirees, and state dependents such as the foster children, the developmentally disabled and the incarcerated.

With enactment of the state's landmark health insurance reforms in 2006 the Commonwealth has expanded its commitment to health insurance coverage in Massachusetts. The new commitment includes a pledge of state funds to subsidize health insurance for the working poor (through the Commonwealth Care program), and to create a market for new insurance products (through the Commonwealth Choice program) for residents who are typically apt to be uninsured, including self-employed individuals and the employees of small businesses.

Through local aid the state provides 25 percent or more of funds for local government, and thus indirectly supports the health care coverage of municipal employees and retirees. State government is responsible for statewide public health programs, and for a variety of regulatory programs that govern physician, hospital, and nursing home certification and operation, the conduct of the health insurance industry and other health care industry practices.

What does the data say?

- **The number of persons served by state-sponsored or state co-sponsored health insurance has increased over the last decade; state-supported health insurance coverage will increase under the Commonwealth's new health insurance reform act.**

The number of Medicaid beneficiaries in Massachusetts reached a record high in the early months of 2007 and stood at 1.08 million persons by April.²¹³ Much of the increased enrollment in Medicaid in the state is the result of a deliberate effort to expand outreach that dates back over a decade, and includes enrollment of uninsured children in the State Children's Health Insurance Program (SCHIP) and, more recently, expanded enrollment of individuals as a result of the state's new health insurance reform law. Even with expanded outreach, Medicaid enrollment in the state has trailed the national average for much of the last decade (see Indicator 20). Expanded

enrollment has been critical to maintaining a comparatively low level of health care ‘uninsurance’ in the state, (see Indicator 10).²¹⁴

Continued expansion of state-supported health insurance is a goal of the state’s new health insurance reform law. In addition to continued outreach to Medicaid-eligible persons, the state’s new Commonwealth Connector authority reaches out to working-poor individuals and families to enroll them in the state-subsidized Commonwealth Care program. Individuals and families with incomes between 100% and 300 % of the current Federal Poverty Line are eligible for the program. As of spring 2007 approximately 63,000 of an estimated 200,000 eligible persons were enrolled in the program.

- **Since 2001 health insurance-related costs have risen from about 16 percent of the state budget to over 20 percent of state spending, after receipt of federal reimbursements. Health insurance-related costs constitute have increased from one-quarter to over one-third of overall state spending, (state and federal spending combined).**

Health insurance costs, including costs for state employees, retirees and Medicaid recipients, have claimed an increasing share of state spending since 2001. Analysis from the Massachusetts Taxpayers Foundation in 2006 estimated such costs increased from about 26 percent of the budget to about 32 percent of the budget between Fiscal Years 2001 and 2006, or from about 16 percent to over 22 percent when federal reimbursements are factored-out.²¹⁵ Estimates from the Massachusetts Budget and Policy Center in spring 2007 indicate that health care costs (Medicaid and state employees combined) represent about 34 percent of overall state budget spending for Fiscal Year 2007.²¹⁶

Total health insurance-related spending, state and federally-funded, constitutes about 38 percent of overall spending called for in the Patrick Administration’s budget for Fiscal Year 2008. Budgets subsequently released or approved by the Massachusetts House and Senate project roughly equivalent levels of health care spending for Fiscal Year 2008.

- **Increased health care spending has been offset by cutbacks (in inflation-adjusted dollars) in most other areas of state spending as real growth in spending for all state programs combined has been severely constrained.**

Overall health care spending by the Commonwealth increased by 49 percent, in real dollar terms, from Fiscal Years 2001 to 2007, but total spending (for health care and all other state expenses), in inflation-adjusted terms, grew by only 2.5 percent. As a result nearly all other forms of state spending have experienced cutbacks.

State spending on many priorities, including local aid and public health, fell drastically in the wake of the recession of 2000-2001; some cutbacks have been

restored in recent years. Nevertheless, through Fiscal Year 2007 state spending on local aid for schools was still over 10 percent below 2001 levels. Spending on public higher education was about 20 percent below 2001 levels, while public health spending was also over 20 percent below 2001 levels.²¹⁷ (See Figure 47)

- **Annual health care spending by the state has generally grown at rates below those seen in the private sector; nevertheless, state health care spending is increasing at rates above yearly increases in the revenue necessary to support it.**

Yearly increases in state Medicaid spending have averaged below 7 percent since the recession year of 2001-2002 (State Fiscal Year 2002), when the state experienced a one-year increase of nearly 13 percent. Yearly increases in the state's employee and retiree health care costs (administered by the state Group Insurance Commission) have generally been at 8 percent or below. Comparable annual increases in private, employer-sponsored health insurance during the same period have been at 8 percent or more, (see Indicator 18).

At the same time, state government's revenues have made an uncertain recovery from the 2000-2001 recession. After plunging 7.6 percent in Fiscal Year 2002, revenues increased by an average of only 5.1 percent per year in the ensuing three years.²¹⁸ State revenues increased by 8.2 percent in Fiscal Year 2006, but have since dropped again; Massachusetts Taxpayers Foundation estimates in February 2007 projected an increase of only 4.2 percent for Fiscal Year 2007, ending in June 2007.²¹⁹

As a result, projected increases in health care spending are expected to claim as much as two-thirds of the expected net new tax revenues available to state government in Fiscal Year 2008.²²⁰

Implications

- **Current health care obligations leave the Commonwealth with little fiscal flexibility, despite the fact that the state's economy is now growing.**

At current rates of spending the state's budget is in a state of structural deficit, with the cost of obligations outpacing expected revenues, despite the fact that the state economy now appears to be growing at a faster rate than the US as a whole for the first time since the boom years of the 1990s. As noted above, projected health care cost increases will consume well over half of expected new revenues, unless new revenues are raised or ongoing health care costs are reduced or mitigated.

- **Increased health care costs—and lagging economic growth and tax receipts—created a severe “crowd out” of other critical investments from the state budget after the 2000-2002 recession. Now that economic growth has returned, a lengthening list of new needs will further strain fiscal flexibility.**

When adjusted for inflation, current state appropriations for many state programs remain at a level below the level reached before the recession of 2000-2001. Programs that represent investments in critical determinants of public health, including K-12 education, public higher education, public health, public safety and environmental protection have not yet recovered. Restoration of these programs now must also compete with new needs, particularly an accumulation of capital spending demands, including spending on deferred capital maintenance and modernization of the state's transportation system.²²¹

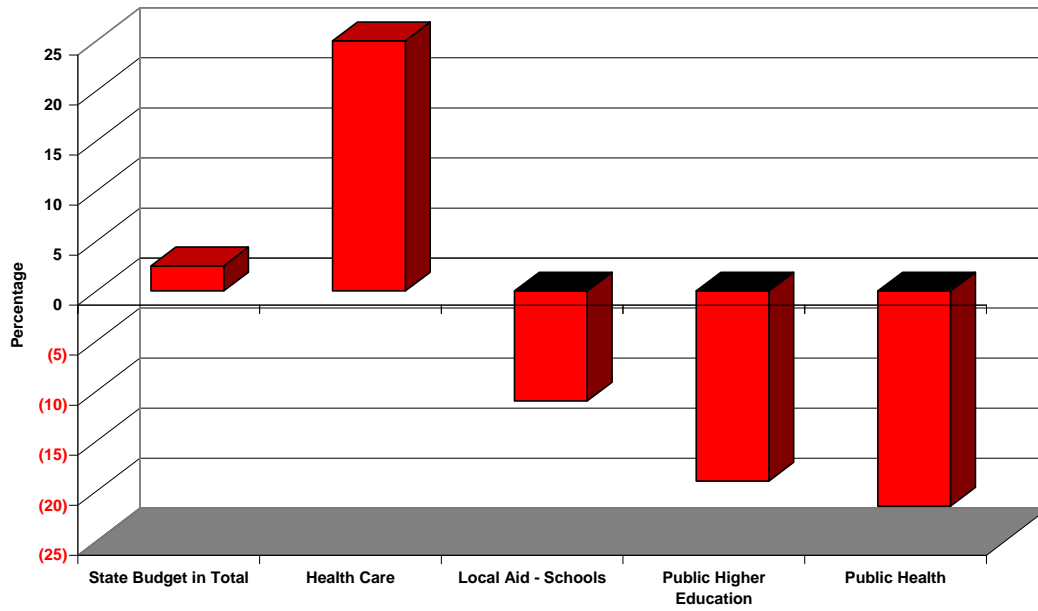
- **In recent years inflation in the state's health care costs have run at rates at or below those seen in the private sector, but the state will face upward pressure on its health care costs as the population ages and chronic diseases and related ('co-morbid') conditions.**

State policy, medical advances and favorable population trends have all played a role in keeping the annual rate of increase in state health care spending below rates seen in the private sector. Increased enrollment in the Medicaid program has focused heavily on children and families; typically, children and families are comparatively low-cost consumers of health care. The elderly, particularly elderly confined to nursing homes, are high cost consumers of care in the state's budget; nursing home enrollments have steadily fallen in Massachusetts over the last decade as older residents live healthier lives for longer periods of time, (see Indicator 26).

Nursing home enrollments can be expected to rise with the projected large increase in older residents that will occur with the aging of the Baby Boom generation. The medical needs of aging residents can also be expected to intensify if current trends persist and the prevalence of behavior-related chronic diseases, such as diabetes continue to rise and provoke a higher rate of related conditions such as heart disease. This expected increase in the number of chronically ill residents and the intensity of their needs gives the Commonwealth an increasing stake in the search for ways to prevent illness and sustain health in its population.

Figure 47

Net Change in Real Spending
Massachusetts Budget - FY 2001 through 2007



From: New England Healthcare Institute estimates from Massachusetts Taxpayers Foundation Data.

Indicator 20 - Federal Expenditure for Health and Health Care

Why is this important?

The federal government is the largest single funding source for health care in the US. It financed approximately 35 percent of all personal health care spending in the country in 2006. (Public programs from all sources, including state and local governments, funded over 48 percent of all personal health care expenditure.)²²²

Medicare accounts for 60 percent of overall federal health care spending, and Medicaid represents another 23 percent. Both programs are “mandatory” spending programs, in that any US citizen who meets eligibility requirements is entitled to benefits under the programs. The Medicare insurance programs for routine medical services (Medicare Part B), its new prescription drug program (Medicare Part D), and the Medicaid programs are all subject to yearly appropriation by Congress and compete for tax funding with all programs subject to annual appropriation. While the Medicare program for hospital services (Medicare Part A) is not funded by general revenues, it is considered by economists to be part of an overall, unified federal budget and thus affects the surplus or deficit attributed to the entire federal government budget.

Therefore, all federal health care spending has a profound effect on funding for other programs supported by the federal government including those in education, public health, environmental protection, and scientific research.

What do the data say?

- **Federal health care spending has risen at rates in excess of growth in the US economy and will likely continue to do so.**

Health care related spending comprised over 22 percent of total federal spending in Fiscal Year 2006, up from 18 percent in 1996. Over the decade it has been the fastest growing of 10 major categories of spending as tracked by the US Office of Management and Budget, although increases in defense and homeland security spending have kept pace with health care spending since 2002.²²³

Federal health care spending has grown at annual average rates of over 6 percent since 1998, including rates of growth estimated at over 7 percent in 2004 and 2005, and over 16 percent in 2006, the first year of the Medicare Part D prescription drug program. While the Congressional Budget Office currently projects that the Gross Domestic Product will grow by an annual average of 4.7 percent for the period 2007 to 2016, economists for the National Health Expenditure Accounts project an annual average increase in federal health spending of 7.4 percent through 2014.²²⁴

As a result, health care spending is expected to claim an increasing share of available federal tax revenues. The federal budget has run at a deficit since 2001 and is expected to remain there. Federal health care spending, including spending supported by dedicated revenues such as Medicaid Part A payroll taxes, will be a major driver of federal deficit spending for the foreseeable future unless significant spending reductions, tax increases, or both are enacted.²²⁵

- **Budget deficits have put pressure on programs that support long-term health and economic competitiveness.**

Since 2001, defense-related spending has increased most rapidly in the federal budget, with average yearly increases of 12.7 percent from 2001 to 2005. Non-defense discretionary spending, which includes all federal spending on scientific research, aid to education, public health, disease control, and environmental protection, increased by an annual average rate of 7.35 percent during the same period, an average rate that is higher than the average annual rate of increase in mandatory spending during the same period.²²⁶

The most recent federal budgets have severely restricted non-defense discretionary spending, however, and projections by the Congressional Budget Office indicate that non-defense discretionary spending will increase by an average of 2.46 percent per year through 2012 if current budget priorities are maintained in place.

- **Federal health care spending accounts for over a third of health care-related expenditures in Massachusetts.**

Federal Medicare and Medicaid spending in Massachusetts represented about 36 percent of all personal health care expenditure in Massachusetts in 2004, compared to 40.8 percent in 1996.²²⁷

The declining share of health care expenditure claimed by federal funds is reflected in the significantly reduced share of hospital expenditures attributed to the Medicare program. Medicare's share of overall hospital expenditures in Massachusetts declined from 35.4 percent in 1996 to 26.3 percent in 2004. Medicare's share of hospital spending across the country also declined, but by a lesser amount, from 33.3 percent in 1996 to 28.6 percent in 2004.²²⁸

- **Growth in Medicare spending and enrollments in Massachusetts has trailed Medicare growth in the US as a whole.**

Medicare enrollment in the US grew 11.4 percent from 1996 through 2005, but in Massachusetts it grew only 1.8 percent.²²⁹ Massachusetts saw the least growth in Medicare enrollments in this period save for the states of Rhode Island and North Dakota

Despite slow growth in enrollment, Medicare spending in Massachusetts increased by 34 percent from 1996 to 2004, compared to 54 percent growth in the US as a

whole.²³⁰ The most recent data suggest that Massachusetts has the 6th highest Medicare costs per Medicare enrollee in the US at approximately \$7,065 per enrollee in 2002. However, costs in Massachusetts were only 12.6 percent higher than the US average (\$6,271).

- **As the Medicare-eligible population in Greater Boston and Massachusetts increases, it will comprise a higher share of the population than other regions in the US**

With Baby Boomers reaching the age of 65, the number of Medicare eligible residents in Massachusetts and in the US as a whole is expected to grow within 10 years (20 percent growth in the state vs. 27 percent in the US).²³¹ While the Medicare-eligible population in Massachusetts will not grow as fast as the national average, the expected weak growth in the state's younger population means that older people will comprise a larger share of the population in the state than in the US as a whole. Census Bureau projections suggest that by the year 2020, residents over 65 years old will represent about 17 percent of the state's population, compared to 16.3 percent of the US population.²³²

- **Medicaid enrollment and spending in Massachusetts are on the rise, and costs per enrollee in the state are higher than the US average.**

Medicaid enrollment growth in Massachusetts has slightly exceeded the national average over the last decade. Enrollment grew 37.5 percent in the state between 1997 and 2005, while growing by 36.3 percent in the US. Medicaid spending in Massachusetts grew more slowly than in the nation: spending in Massachusetts grew 72.2 percent from 1996 through 2004, while it grew by 87.5 percent in the US²³³

Medicaid costs per enrollee in Massachusetts are about 30 percent higher than the US average. The gap between Massachusetts and the US average is due in most part to a 30 percent differential for the cost of elderly Medicaid recipients (\$14,052 vs. \$10,799), reflecting both higher utilization and higher costs of nursing home care covered by Medicaid in the state. Spending for children was only 8.6 percent higher in Massachusetts (\$1,593 vs. \$1,467), while spending on adults was 12.6 percent lower in Massachusetts than in the US as a whole (\$1,637 vs. \$1,872).

Implications

- The federal government faces a persistent, structural deficit in the federal budget, and the most important contributing factor in the coming years will be the continued aging of the American population and resulting demands on Social Security, Medicare and Medicaid. The impact of the federal deficit on federal health care spending in Greater Boston and Massachusetts will depend greatly on how aggressively Congress and the president choose to reduce the deficit, and how soon.

- In the last few years Congress has chosen to restrict non-defense discretionary spending in order to reduce the annual deficit, and spending has been reduced in many programs that are directly linked to biomedical research and long-term health promotion. In Federal Fiscal Year 2006, research grants from the National Institutes of Health were cut, in absolute terms, for the first time in 35 years.
- In the case of Medicare, previous acts of Congress have created “trigger points” at which Congress and the President are ostensibly mandated to recommend changes in benefits and taxes in order to preserve the program’s solvency. The 2003 Medicare Modernization Act requires the president to submit a plan to reduce benefits and/or increase payroll taxes for Medicare if the program begins to draw on general budget revenues for 45 percent or more of its funding; Medicare is expected to reach this point in 2008. Meanwhile, trust funds supporting Medicare’s Part A hospital benefits program are now expected to be exhausted in 2018.²³⁴
- Greater Boston and Massachusetts face a period of uncertainty, at best, in the Medicare and Medicaid programs in the next decade, as the number of Medicare eligible residents in Greater Boston and Massachusetts increases. Factors that will come into play are a likely increase in admissions to nursing homes (whose revenues come in large part from state and federal Medical funds) and impacts of the Commonwealth’s new health care insurance reforms (which depend in large measure on the ability to subsidize the maximum number of eligible low-income residents through the Medicaid program).

Indicators by Uses of Healthcare Funding

Indicator 21 - Public Health Programs

Why is this important?

State and local public health agencies ensure individuals' health within society by performing traditional, population-wide activities such as mass vaccinations for childhood diseases and influenza, enforcement of food-related regulation, and surveillance of infectious disease outbreaks.²³⁵ Some of the most fundamental public health activities are also performed by other agencies, including public water supply and wastewater treatment providers (such as the Massachusetts Water Resources Authority) and environmental protection agencies that enforce clean air and clean water mandates (such as the Massachusetts Department of Environmental Protection).

Public health agencies have also assumed responsibility for a wide variety of specific health care activities, including the provision of services to targeted populations at high risk for disease or disability. Public health agencies have also spearheaded public campaigns to improve health-related behaviors that might prevent disease and reduce long-term health care needs and costs. For example, the extensive anti-smoking campaign in Massachusetts in the 1990's was conducted through the Massachusetts Department of Public Health.

It is now becoming increasingly apparent that rising levels of illness and health care cost in Greater Boston are connected to broadly-based health risk behaviors, such as poor diet and inactivity, as well as to localized environmental effects and socioeconomic factors. Population wide initiatives such as those traditionally mounted by public health agencies may therefore be a means to attack preventable chronic disease.²³⁶

What do the data say?

- **State funding of public health activities is increasing but is below the levels reached before the last recession in 2001-2002.**

The state budget for public health for Fiscal Year 2007 appropriates an 18 percent overall increase for programs of the Massachusetts Department of Public Health.²³⁷ The budget restores substantial amounts of funding to several programs that were severely cut earlier in the decade, including smoking cessation programs and prevention and screening programs for breast cancer, prostate cancer, and Hepatitis C.²³⁸

After adjustments for inflation, however, nearly all state public health programs are funded at levels below their Fiscal Year 2001 level. By way of example, the current funding level, in FY 2001 dollars, for several programs are:

Breast cancer screening	36 percent
Prostate cancer screening	38 percent
Hepatitis C screening	56 percent
AIDS prevention, treatment and services	38 percent
School health services	68 percent
Smoking prevention and cessation programs	86 percent ²³⁹

- **Reductions in state public health spending reflect a diversion of revenue sources designated for smoking cessation and related public health programs.**

Massachusetts fell from first place to 31st place in per capita funding of tobacco prevention and smoking cessation programs between 2001 and 2006. The tobacco prevention program was originally funded through a 25 cent per pack cigarette tax raised as a result of voter referendum in 1993 and proceeds of the tax were designated for a special health trust fund. In 1999 the Massachusetts Legislature voted to devote all of the state's proceeds from litigation with tobacco companies to health related purposes, including 70 percent on tobacco prevention and related programs, and 30 percent on other health programs. A substantial expansion of school-based health programs was accomplished as a result.

Yet, the state reduced its funding of tobacco prevention and public health programs as its general revenues declined with the onset of the 2001 to 2002 recession. In 2004 the Legislature directed that all of the state's future tobacco litigation proceeds be made available for general appropriations.²⁴⁰

- **Federal public health funds granted to state and local governments represent as much as one-half of public health funds spent in Massachusetts.**

Federal funds for public health programs, such as disease prevention and health promotion, are granted or disbursed by the Centers for Disease Control and Prevention (CDC) and other federal agencies such as the Health Resources and Services Administration (HRSA). Estimates by the non-profit Trust for America's Health indicate that Massachusetts based agencies received approximately \$278 million in FY 2005 from these agencies, similar to the amount received from the Massachusetts Department of Public Health.²⁴¹ Massachusetts ranks 11th among the 50 states in receipt of federal CDC funds per capita at \$26.21, well above the national average of \$20.99.

- **Employment in public sector health-related jobs is more highly concentrated in Massachusetts than in the US as a whole and is particularly concentrated in state agencies.**

The most recent estimates available from the US Census indicate that state and local governments employ about 165 workers per 100,000 residents in health-related jobs, compared to about 147 workers per 100,000 in the US as a whole.

Health-related employment in Massachusetts is far more heavily concentrated in state agencies than in local agencies: about 119 state employees per 100,000 residents worked in health-related jobs in 2005, compared to 46 workers per 100,000 in local government. In the US as a whole, 60 workers per 100,000 residents work for state governments, while 87 workers per 100,000 residents work for local governments. This pattern may reflect the leading role that county governments play in public health in many states across the US²⁴²

Implications

- The National Association of State Budget Officers and the Milbank Memorial Fund, which evaluate public health care expenditures by state government, have found that Massachusetts spends more of its public health dollars on community based services, more on state facility-based services, and somewhat less on population health programs than most other state governments.²⁴³
- The real dollar level of spending on public health in Massachusetts has begun to rise in the last two years after several years of cutbacks prompted by the state fiscal crisis of 2001 to 2003. Cutbacks were initially driven by declining revenues, but rising health care costs at the state and local levels have also acted to crowd out expenditures on other public sector priorities. For now public health programs do not enjoy direct access to dedicated revenue sources, such as the Commonwealth's tobacco litigation settlement proceeds.
- State and local agencies in Massachusetts have taken good advantage of federal public health funds, and federal dollars represent a large proportion of overall public health spending in the state. But funding for core programs of the CDC were cut in Federal Fiscal Years 2005 and 2006 for the first time in over 30 years,²⁴⁴ in part because of the rapid expansion of homeland security programs throughout the US and the constraints imposed by yearly federal deficits. A CDC strategic plan commissioned by Congress in 2003 estimated that the CDC budget would have to double over five years, from approximately \$8 billion to \$15 billion, for the agency to fully meet all of its current public health mandates.²⁴⁵

Indicator 22 - Physician Services

Why is this important?

For patients, the availability and the quality of health care is dependent on the number of doctors, the types of medical specialties they offer, and where in the community they choose to practice. For the larger economy, doctors play a critical role in the growth and evolution of all health care-related organizations since they serve as the key decision makers on when, how and to whom medical service is delivered.

All of this is as true in Greater Boston as it is anywhere else, but the unique characteristics of Greater Boston's health care economy create distinct challenges in the area. Greater Boston is an international center of physician training and is historically known for a high concentration of doctors. Yet there has been a recent and serious shortage of physicians in Greater Boston, particularly among doctors in primary care practice.²⁴⁶ In addition, while Greater Boston is internationally known as a center of medical innovation, the state's medical society believes that the environment for medical practice in Greater Boston and Massachusetts has deteriorated for 12 consecutive years.²⁴⁷ Some researchers also suggest that the high concentration of doctors in the area have caused an excess of "supply sensitive" medical services to patients that drive up health care costs but cannot be linked to improved health care outcomes.²⁴⁸

These findings suggest the need to track how the Greater Boston's historically large and eminent community of physicians is matched to the area's evolving health needs.

What do the data say?

- **The overall number of doctors in Greater Boston and Massachusetts remains highly concentrated compared to the US as a whole.**

Statistics compiled by the American Medical Association (AMA) indicate that over 31,000 physicians worked in Greater Boston, Central Massachusetts and southern New Hampshire in 2004. This represents about 3.4 percent of all physicians in the US at the time, working in an area that encompassed about 2 percent of the US population.²⁴⁹

About 77 percent of the Greater Boston physicians identified by the AMA were actively involved in patient care. About 77 percent of doctors statewide were also identified as working directly in patient care, compared to 79 percent of doctors in the entire US

The concentration of practicing physicians in Greater Boston is about 67 percent higher than the concentration in the US as a whole. In 2004 about 410 doctors worked in patient care for every 100,000 residents in Greater Boston, while 387 doctors per 100,000 residents worked statewide, and about 245 doctors per 100,000

residents nationwide. By way of comparison, the average concentration of primary care physicians in the mostly-European OECD countries is 290 doctors per 100,000 (2005).²⁵⁰ When medical residents (graduate medical students) and other hospital-based physicians are excluded, the concentration of physicians in Greater Boston is about 264 per 100,000 residents, compared to 188 in the US as a whole.

- **Statewide data suggest that there is a large and increasing number of primary care physicians in Greater Boston and Massachusetts.**

AMA statistics for 2004 enumerate doctors in four primary care-related fields: family practice/general practice, internal medicine, pediatrics, and obstetrics and gynecology. Approximately half of the physicians working in direct patient care were in these four primary care-related fields. This represents 193 primary care-related doctors per 100,000 residents, compared to approximately 124 primary care-related doctors per 100,000 residents nationwide.

Yet the numbers of primary care-related physicians and specialists in Massachusetts are rising at slightly slower rates than the US average, primary-care physicians increased by about 14.6 percent between 1999 and 2004 in the state compared to about 16.5 percent in the US, and specialists increased by 9.2 percent in the state compared to 12 percent in the US²⁵¹

- **A significantly larger percentage of Greater Boston doctors work in hospitals compared to most metropolitan areas, and two-thirds of these are medical residents or other trainees.**

AMA data available at the county level indicate that approximately 32.7 percent of doctors practicing in Greater Boston are based at hospitals,²⁵² compared to over 30 percent statewide and 23 percent in the US as a whole.

Fully two-thirds of the hospital-based doctors in Massachusetts are medical residents (graduate medical students) or hospital fellows, while the remaining third are permanent hospital staff doctors. A slightly lower percentage of hospital-based doctors in the US as a whole are medical residents and fellows (63.4 percent).

- **Employment in office based physician practices in the region has grown recently; however, US physician practices overall have grown at a rate over twice as fast as Greater Boston physician practices.**

An estimated 37,400 people worked for physician office based practices in Greater Boston in 2006.²⁵³ Employment in physician practices increased rapidly in the two years from 2004 to 2006, after several years of modest decline and stagnation.

In the last two years, job growth in physician practices has run well ahead of job growth in the Greater Boston economy at large, increasing by 10.9 percent, and has outpaced growth in physician practices in the US as a whole. However, total US

physician office employment increased by some 35 percent from 1996 to 2006, while it grew by 15 percent in Greater Boston.

- **The average wage for jobs in Greater Boston physician practices is high compared to average local wages, and wages physician offices nationwide, but the reported wages of doctors is not higher than US averages.**

The average wage in Greater Boston physician practices in 2006 was \$78,641, over 60 percent higher than the average wage for all occupations in the area's economy at large (\$48,339),²⁵⁴ and about 14 percent higher than the average wage in US physician practices (\$68,839).

Yet data on the income that physicians themselves earn from medical practice suggest that many doctors in Greater Boston and Massachusetts earn incomes that are mostly at or below national averages for their peers. Data from the US Bureau of Labor Statistics indicates that Greater Boston doctors earned more than the mean annual wage in only 3 out of 8 physician specialties surveyed (2005 data). Greater Boston pediatricians earned 10 percent more than their peers nationwide, on average, but family and general practitioners in Greater Boston earned only 4.7 percent more than the national average, while obstetricians/gynecologists earned only 2.1 percent more than the national average. Greater Boston internists, surgeons, anesthesiologists, psychiatrists and other specialists all earned about the same (internists), 5-6 percent less (family practitioners and psychiatrists), or much less, (anesthesiologists, earning 35 percent less than US peers).²⁵⁵ The Massachusetts Medical Society has tracked median income among the state's doctors from 1992 onward, finding that the median income for Massachusetts physicians has trailed the national median every year since that date. The most recent estimates of median income among doctors (for 2005) indicate that median income for Massachusetts doctors was \$189,000, or about 11 percent less than the national median of \$212,300.²⁵⁶

The Massachusetts Medical Society links the comparatively low income of Massachusetts doctors in part to high business costs in Massachusetts, including comparatively high labor and real estate costs. It is estimated that overall costs of practice in the state are 21 percent higher than the US average.

- **Employment in physician practices is highly concentrated in Greater Boston compared to the US**

Employment in Greater Boston physician practices has increased over the decade and remains more concentrated than the US average. As of 2005, approximately 862 persons worked in Greater Boston physician practices per 100,000 residents, compared to 728 in the US as a whole. Employment concentration levels have increased in both Greater Boston and US physician practices over levels seen a decade ago, when employment ratios were approximately 768 persons in Greater Boston and 556 persons in the US per 100,000 residents.

- **Community health centers play a large role in providing physician services in Massachusetts.**

Community health centers (CHCs) are neighborhood-based clinics that primarily serve lower-income residents and historically under-served populations, including recent immigrants, the uninsured, and racial and ethnic minority residents. The federally-supported CHCs in Massachusetts are joined by 20 non-federally supported community health centers, many of them owned or affiliated with major hospitals. For its size, Massachusetts has one of the more dense concentrations of community health centers and highest number of people served by CHCs of any state in the country.

Thirty-three community health centers in the state are federally chartered and partially funded by the federal government: the 4th highest number of any state in the US, following California, New York and Texas. The federally-chartered CHCs in the state provide service at about 290 delivery sites, the 3rd highest number of sites in the country.²⁵⁷ They also serve a higher percentage of the state's population than CHCs serve in the nation as a whole: about 7 percent of the state's population in 2005, compared to 4.9 percent of the US population.

- **Over half of Greater Boston's doctors are in a group or hospital based practice and over a third are in a practice affiliated in some way with Partners Health Care.**

In an analysis published by the Health Leaders/Interstudy group that enumerates the 1,300 or so physicians and the physician organizations in the immediate Boston area, 42 percent of area doctors are in a group practice and another 12 percent are in a hospital-based practice. Over 34 percent (about 4,200 doctors) are in practices affiliated with Partners Health Care, the umbrella organization for Massachusetts General and Brigham and Women's Hospitals in Boston. About 9 percent (1,300 doctors) are in practices affiliated with the Beth Israel Deaconess Medical Center, and 5.3 percent (about 700 doctors) with the Health One Group, which includes the Harvard Vanguard Medical Associates.²⁵⁸

- **Recent per capita spending on physician services in the state is about 17 percent higher than the US rate.**

The National Health Expenditure Accounts estimate the total personal health care expenditures (PHCE) for each state from year to year, including expenditures on physician services. According to the PHCE estimates, spending on physician services in Massachusetts has grown by about 7.9 percent per year since 2000, compared to a growth rate of about 8.5 percent in the US as a whole. Total Massachusetts physician service spending in 2004 came to approximately \$10 billion, or 22 percent of all personal health care expenditure.

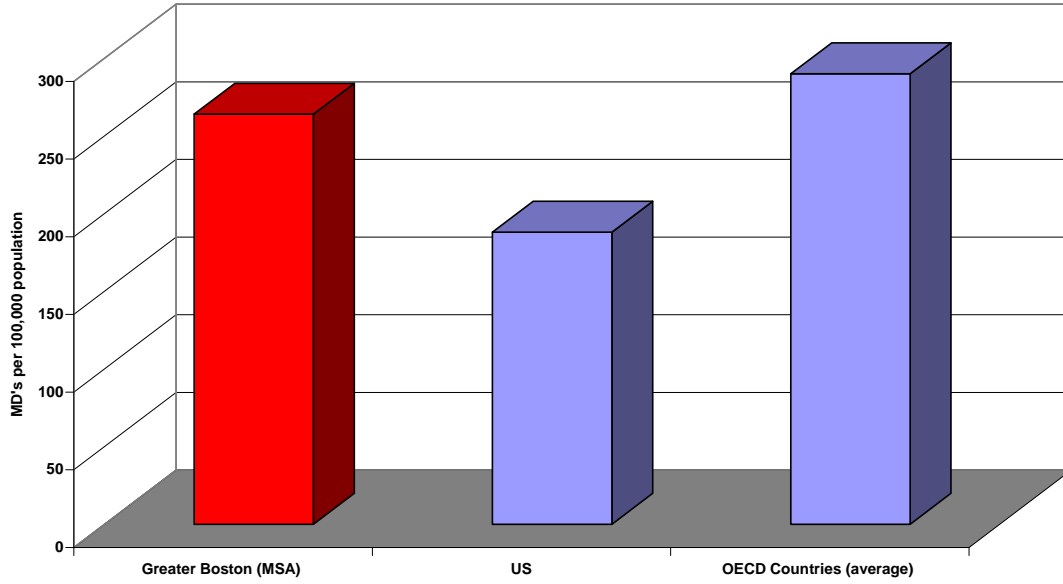
On a per capita basis, physician service spending in Massachusetts came to approximately \$1,631.28 in 2004, a total about 17 percent higher than the US per capita rate of \$1,386.66. Survey data from the Agency for Healthcare Research and Quality (AHRQ) indicates that Massachusetts has the third highest rate of yearly visits to a doctor's office, but only the 24th highest average expense for physician services.²⁵⁹

Implications

- Greater Boston continues to have a high concentration of doctors compared to most areas of the US. The law of supply and demand would suggest that a high concentration of doctors in Greater Boston would tend to depress doctors' incomes, and there is evidence to suggest that doctor incomes in the area are, at best, commensurate with peer incomes elsewhere in the country and are in many cases lower.
- Lower average incomes for Greater Boston doctors may also correlate with the higher percentage of doctors in Greater Boston who work in hospital settings. In addition, two-thirds of hospital-based doctors are actually medical residents and other trainees. To the extent that Greater Boston is perceived as "over doctored", it is testament in great part to the high intensity of medical education carried out in the area's teaching hospitals.
- Data suggest that the number of primary care-related physicians in Greater Boston has increased and is highly concentrated compared to US averages. This is consistent with an increased number of primary care-related medical residents training in local teaching hospitals and suggests that the perceived crisis in primary care in Greater Boston may be more a crisis of deploying doctors to areas of need than a crisis with the physician workforce supply.
- Community health centers play an unusually large role in physician care in Greater Boston, and because they are often very sensitive to state and federal funding, any volatility in state and federal fiscal policy has an immediate impact on many physicians in Greater Boston.
- The growing number of physician practices affiliated with the region's largest hospital system (Partners Health Care) is an increasingly prominent feature of health care in the Boston area.
- Data suggests that Massachusetts residents are comparatively high users of physician services, but incur relatively low expenses, perhaps suggesting that Massachusetts residents use routine physician services more regularly than others.

Figure 48

**Concentration of Physicians
Massachusetts, US and OECD Average
(Non-Hospital Based MDs)**



From: American Medical Association, *Physician Characteristics*, 2004

Indicator 23 - Hospital Services

Why is this important?

The hospital industry has a great impact on the performance of a region's health care economy. In providing the most intensive form of health care service in the health care system, hospitals account for the largest portion of overall health care spending and are the largest employers in the health care system.

Despite hospitals' crucial role in health care, they have been forced to cut back services in the last 20 years. For example, changes in the reimbursement policies of the Medicare program and the ascendance of health maintenance organizations (HMOs) in the 1980's and 1990's created strong pressures to shorten hospital stays. And advances in medical therapies and technologies transformed treatments that once required an overnight stay in the hospital into treatments that could be administered in a hospital outpatient clinic or in a doctor's office.²⁶⁰

Hospitals in the US were also forced to consolidate in the 1990's, and those in Greater Boston and Massachusetts reduced capacity at a faster rate than hospitals in the nation as a whole.²⁶¹ By 2001 hospital, employment in Massachusetts had declined for the first time in living memory.²⁶²

With one of the highest concentrations of teaching hospitals and academic medical centers in the US,²⁶³ Greater Boston is a haven for physician training and biomedical research (see Indicators 28 and 29). These aspects of Greater Boston's hospitals have a powerful influence on the pattern of health care delivery and health care spending that is unique to the area.

What do the data say?

- **On a per-population basis, twice as many people work in the hospital sector in Greater Boston than in the US as a whole.**

Hospital-related employment in Greater Boston in 2006 averaged about 3,080 persons per 100,000 residents, a concentration twice as high as employment in the overall US hospital industry.²⁶⁴

Specifically, 86 percent of Greater Boston hospital employees work in general medical and surgical hospitals, where the employment concentration is 84 percent higher than the national average. Slightly over 10 percent of Greater Boston hospital employees work in specialty hospitals, where the employment concentration is nearly six times the national average.

Approximately 92 employees per 100,000 residents work in Greater Boston psychiatric and substance abuse treatment hospitals, compared to 32.4 employees in similar institutions throughout the US

- **Hospital spending in 2004 represented the highest proportion of Massachusetts' overall economy since at least 1980.**

According to the National Health Expenditure Accounts, hospital-based expenditures in the state's hospitals in 2004, including patient care, biomedical research and medical education, totaled about \$18.09 billion, or 39.9 percent of the entire Personal Health Care Expenditure in the state. This is the highest percentage of the state's overall PHCE to be reached by the hospital sector since 1995 (39.8 percent) and the culmination of a steady increase from a low point reached in 1999 (37.8 percent).

Hospitals' increasing share of PHCE in Massachusetts stands in contrast with the national trend: the hospital share of US PHCE has fallen from over 39 percent of overall spending in the early 1990's to a little over 36 percent since 2000.

Health care-related expenditures have represented a greater share of overall economic activity (Gross State Product, or GSP) in Massachusetts since the recession of 2000 to 2001, rising from 11.7 percent of Gross State Product in 2000 to 14.2 percent in 2004. Hospital-related spending as a percentage of the state's GSP in 2004 was 5.7 percent, the highest percentage of state GSP claimed by the hospital sector since at least 1980. Hospital-related spending comprised 4.9 percent of the GSP among all 50 states in 2004.²⁶⁵

- **Employment growth in the hospital sector has played a leading role in Greater Boston's economic recovery since the recession of 2000-2001; wages in the hospital sector approximate the average wages for all jobs in the region.**

While employment in the Greater Boston hospital sector dropped in the late 1990s, it has been on the rise since. The total job count in the Greater Boston hospital sector grew by 22,000 between 2000 and 2006, an increase of 20.6 percent (compared to an 11.8 percent increase nationwide). Meanwhile, jobs in the entire Greater Boston economy dropped by 135,500 between 2000 and 2004. Since 2004, there has been a rebound in overall employment, but particularly among jobs in the hospital industry: 7,400 new jobs have been created, representing a two-year growth rate of 6.1 percent compared to total job growth of 2.9 percent.²⁶⁶

Employment growth in Greater Boston's general medical and surgical hospitals was over twice the rate of growth amount all US general hospitals: 24.9 percent in Greater Boston, compared to 11.21 percent in the US. Conversely, growth in US specialty hospitals outpaced growth in Greater Boston's specialty hospitals, as jobs grew 23.87 percent in US specialty hospitals compared to 9.4 percent growth in Greater Boston.

The average wage in Greater Boston in 2005 was approximately \$54,837. The average wage for hospital jobs were roughly within range of this figure, \$52,304 in general medical hospitals and \$55,499 in specialty hospitals.²⁶⁷

- **Hospital outpatient services are utilized more frequently and are growing more rapidly in Massachusetts than in the rest of the US**

Since the 1990's, utilization of hospital inpatient services has been dropping in Massachusetts and in the US as a whole. Utilization dropped in Massachusetts through the year 2000 to levels at or below the US average (674 vs. 682 inpatient days per 1000 residents). In the years since, however, inpatient utilization in Massachusetts has increased to 5 to 18 days above the US average (691 vs. 673 days), an increase of about 2.5 percent.

Meanwhile, utilization of outpatient services has risen steadily throughout the 1990's and in the current decade. Excluding emergency department visits, outpatient visits per 1000 residents increased in Massachusetts by over 40 percent between 1995 and 2004 and by over 28 percent in the US. The higher frequency of hospital outpatient visits in Massachusetts than in the US has continued to grow: in 1995, Massachusetts registered over 500 more visits per 10,000 residents than the US average, (1,775 vs. 1,216 visits), and by 2004 the gap was almost 1,000 visits per 10,000 residents (2,519 vs. 1,563 visits). This represents an 18 percent increase between 2000 to 2004 in the state, compared to a 4.6 percent increase in the US as a whole.²⁶⁸

- **Hospital revenues from inpatient and outpatient services have risen in excess of the increase in utilization rates in Massachusetts, and teaching hospitals are providing a rising number of these services.**

Hospital revenues derived from both inpatient and outpatient services have risen to a much greater extent than increases in utilization, indicating rising intensity of service and rising prices. While inpatient services increased 2.5 percent from 2000 to 2004, revenues to Massachusetts hospitals increased 42 percent, to about \$16.03 billion. And while outpatient services increased by 18 percent in the same time period, revenues increased by 76 percent, to about \$14.5 billion.²⁶⁹

Teaching hospitals now account for at least half of total hospital inpatient days in Massachusetts. According to the analysis by economist Edward Moscovitch, teaching hospitals added 263,000 inpatient days between 1997 and 2003, while inpatient days at community hospitals fell by 79,000 days. Teaching hospitals accounted for 48 percent of hospital admissions in Massachusetts in 2003, compared to 17 percent of hospital admissions nationally.²⁷⁰

Teaching hospitals in the state also account for a much higher share of outpatient utilization compared to national averages (42.9 percent of outpatient utilization in Massachusetts, compared to 10.2 percent in the nation as a whole).²⁷¹

- **The cost of hospital care in Greater Boston and Massachusetts, particularly within teaching hospitals, is higher than the US average.**

Data from the National Health Expenditure Accounts suggest that per capita hospital sector spending is approximately 46 percent higher in Massachusetts than in the US as a whole.²⁷² However, these data encompass both patient-related and non-patient related revenue (which includes revenues for biomedical research and medical education), and non-patient revenue in Massachusetts hospitals is significantly higher than that of hospitals nationwide (14.3 percent of overall revenue to Massachusetts hospitals in 2004, compared to 7.3 among US hospitals as a whole). Total patient revenues per capita in Massachusetts hospitals in 2004 were approximately 31 percent higher than the US average, before adjustments for local costs and for the relative mix of medical conditions treated.²⁷³

The average cost of inpatient hospital care in Massachusetts is about 18.8 percent higher than the US average, calculated on a cost-per-inpatient-day basis (2004 data).²⁷⁴ But costs of care are substantially different between community hospitals and teaching hospitals, average charges per patient treated at the end of life were over three times as high in the state's teaching hospitals as in community hospitals (\$70,727 vs. \$20,752). Some but not all of this difference can be explained by the fact that, in general, the teaching hospitals treat more complex and severe cases.²⁷⁵

- **Research budgets at Greater Boston teaching hospitals are among the highest in the United States and a major source of non-patient revenue.**

Research represents a large component of Greater Boston teaching hospital finances, accounting for up to 25 percent of total operating budgets.²⁷⁶ Three Boston teaching hospitals are among the top ten recipients of federal research funding among all non-profit institutions in the country: the Massachusetts General Hospital, Brigham and Women's Hospital, and Beth Israel Deaconess Medical Center. (Two non-hospital non-profits, Dana Farber Cancer Institute and the Whitehead Institute, are also among the top ten.)²⁷⁷

Implications

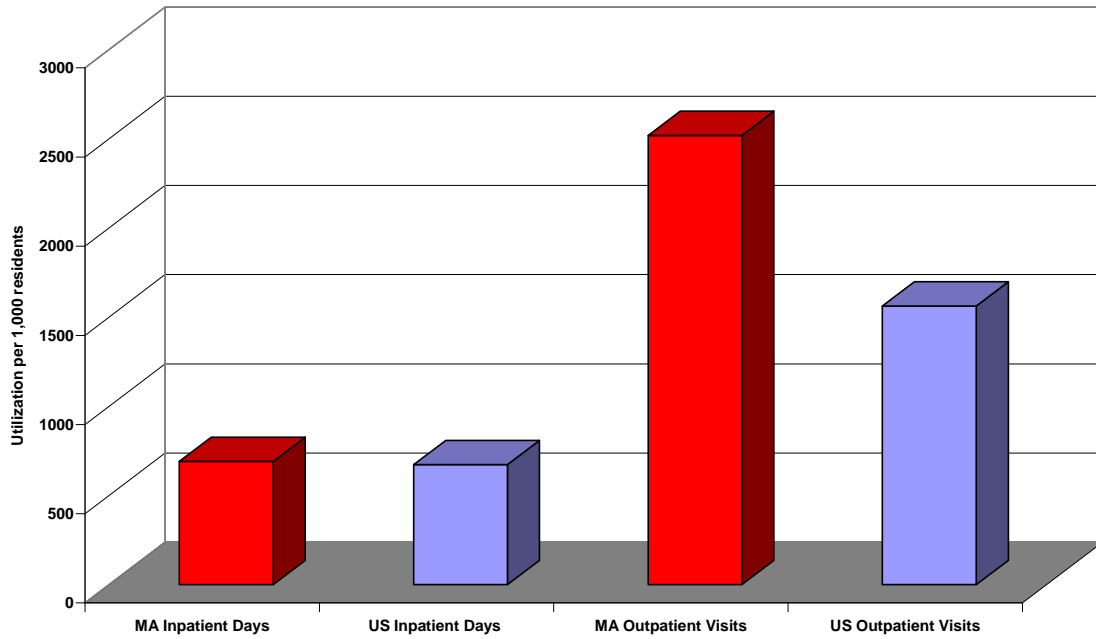
- Only a decade ago the future of Greater Boston's teaching hospitals was in some doubt, as the hospitals were pressured to reduce beds and funding for medical education was reduced as part of federal budget balancing. Ten years later the region's teaching hospitals are an even bigger economic force than ever before, thanks both to rapid expansion of their research programs and their ability to command an increasing share of both inpatient and outpatient hospital services offered in Greater Boston.
- The ability of the teaching hospitals to maintain their world-class research programs is dependent in large part on the federal funding. In recent years federal appropriations for biomedical research have failed to keep pace with inflation, thus

eroding research programs. Federal funding for research, and for domestic priorities has been severely constrained by military and security costs since September 11 and by rapidly increasing federal health care costs, (see Indicator 29). The future of robust biomedical research in Boston and other academic medical centers in the country are thus dependent in part on how the US will deal with health care inflation—including escalating hospital costs—in the years ahead.

- In the meantime, the rapid aging of the local population will guarantee that both teaching and community hospitals will face a period of increased demand in the years ahead as the number of older patients increases along with the intensity of their health care needs. Nearly all Boston-area teaching hospitals are now in the midst of major facility and service expansions; community hospitals are increasingly focused on the need to find new ways to compete and to raise scarce capital.²⁷⁸ The expansion needs of the hospitals will pose an increasing challenge for local health care payers, including insurers and employers, and for state government, which has little fiscal flexibility with which to accommodate increased spending for hospital services, (see Indicator 19).

Figure 49

Hospital Services Utilization: US and Massachusetts - 2004



From: American Hospital Association, Hospital Statistics 2004

Indicator 24 - Prescription Drugs

Why is this important?

The number and variety of prescription drugs have expanded rapidly in the last 30 years and have provided new options for previously untreatable or difficult-to-treat health conditions. This success has come at a cost, however, as with these advanced therapies has come increases in the expense of health care.

Advances in pharmaceutical treatments are credited with extending life expectancy and quality of life among patients with cancers, heart disease, AIDS, and other conditions.²⁷⁹ A rising incidence of chronic disease in the US population has continuously increased demand for prescription drugs, as has the continued aging of the US population.²⁸⁰

The introduction of new drugs, and new applications for existing drugs, has expanded treatment for various diseases and preconditions to disease (such as high cholesterol). The expansion of such services, coupled with increases in needs (such as that caused by rising levels of obesity) contributes to a higher “treated prevalence” of disease and is a major driver of new health care spending.

The expanding number of applications for pharmaceuticals has particular importance for Greater Boston, as the region is a worldwide center of pharmaceutical innovation, led by an expanding biotechnology industry.

What does the data say?

- **Local and national prescription drug spending has increased over 10 percent per year over the last decade and has increased its share of overall health spending.**

State-level data published by the federal government for 2004 show that overall prescription drug spending increased by an annual average rate of 14.7 percent from 1996 through 2004. The rate of increase outpaced the 13.5 percent annual. As a result, prescription drug spending has significantly increased its share of overall health care spending. Prescription drug spending increased as a share of total health care spending by 75 percent in Massachusetts from 1996 to 2004 (from 6 to 10.5 percent) and increased by 61 percent in the US as a whole (from 7.5 to 12.1 percent).

- **Survey findings suggest that Massachusetts has a relatively high utilization rate for prescription drugs.**

Surveys of retail pharmacies indicate that Massachusetts residents fill the 13th highest number of prescription drugs, per capita, per year of any state, exceeded only by the southern states, Iowa and Missouri.²⁸¹

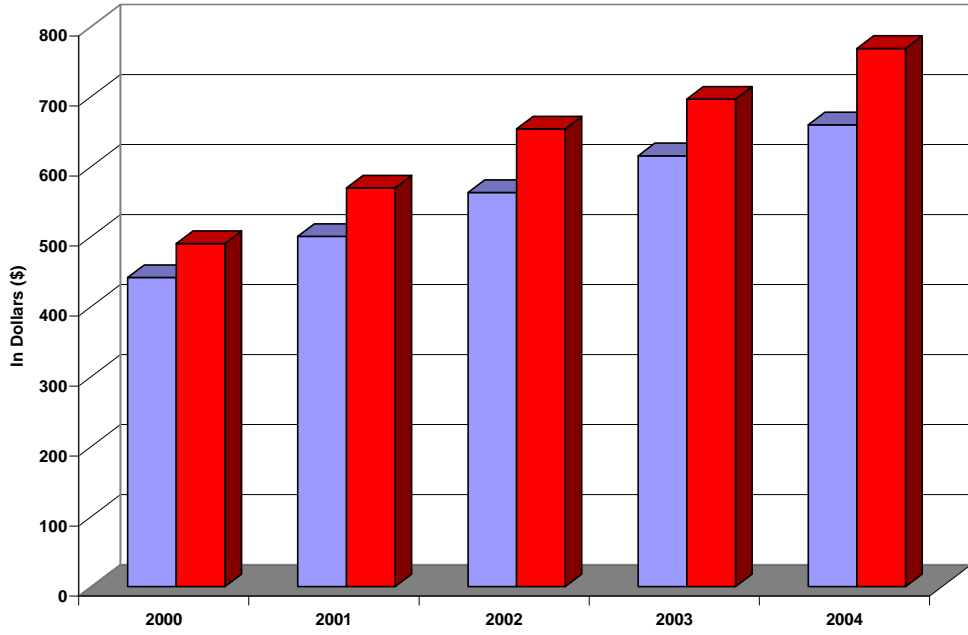
Per capita prescription drug spending in Massachusetts was approximately \$768 in 2004, about 16 percent higher than US per capita spending of \$659.²⁸²

Implications

- While experts debate drug pricing and the role of drug prices in driving pharmaceutical spending, critical drivers of increased drug spending are likely the continuing increases in the “treated prevalence” of various diseases and in the intensity of treatment for many conditions.²⁸³
- The increasing use of prescription drugs is strongly associated with increasing levels of chronic disease and with the aging of the population. Elderly people with multiple chronic conditions are particularly heavy consumers of pharmaceuticals and are at particular risk for continued increases in pharmaceutical costs.²⁸⁴
- Consequently, the Medicare population (65 years and older) is a significant driver of pharmaceutical spending. The creation of a new Medicare prescription drug benefit (Medicare Part D), beginning in 2006, vastly expands the role of Medicare in the financing of prescription drugs in Massachusetts and the US. It should also give Medicare a greater stake in the prevention or management of chronic disease throughout the country, if only because of the uncertain prospects for future funding of the entire Medicare program as the Baby Boom generation moves into its Medicare years.
- Prescription drug spending is also a major concern for health care spending in the under-65 population, and hence for private health insurance. The Massachusetts Business Roundtable and Harvard Pilgrim Health Care reported that prescription drug spending doubled as a share of overall insurance premiums between 1993 and 2003 and were on a par with overall physician spending by 2004.²⁸⁵
- Continued drug spending at rates of 10 percent or more per year will act to further drive health care spending to levels well ahead of the rate of recent increases in wages, incomes and tax receipts. Since the increased “treated prevalence” of disease is driven in part by an increase in behavior-related diseases and conditions such as obesity and hypertension, strategies to improve the health risk behaviors of Greater Boston and Massachusetts’s population may represent one potential response to the continuing increase in drug costs.

Figure 50

Per Capita Prescription Drug Spending: 2000 to 2004



From: Centers for Medicare and Medicaid Services (CMS), Office of the Actuary, National Health Expenditure Accounts, US Census Bureau, American Community Survey

United States Massachusetts

Indicator 25 - Home Health Care

Why is this important?

Home health care services grew rapidly in the 1980's and 1990's as home-based services filled several needs. For example, they were used to provide post-hospitalization services to patients as hospital stays became shorter and as new medical technologies extended the lives of the disabled and the elderly, home-based care became a viable way to meet their chronic health needs. Furthermore, many family members preferred to supplement their own care-giving with home health services and delay the need for nursing home care as long as possible.

The volume of home health services declined throughout the country in the late 1990's as the Medicare program cut back funding in response to restrictions imposed in the 1997 Balanced Budget Act. While Medicare has continued to impose restrictions on the growth of home health care, the volume of services has increased. Looking ahead, the rapidly increasing number of older citizens and an increasing demand for chronic care promise to significantly increase demands for home-based health care. The US Bureau of Labor Statistics estimates that home health care jobs are the fastest growing health care occupations and comprise one of the fastest growing job categories among all industries, growing by an estimated 56 percent over a ten-year period.²⁸⁶

What do the data say?

- **After declining from 1996 to 1999, overall home health care spending has increased modestly.**

According to the National Health Expenditure Accounts,²⁸⁷ home health care spending in Massachusetts and in the US declined by nearly 10 percent between 1996 and 2000. It has increased in the years since, and after adjustments for inflation, home health spending in 2004 was slightly more than 9 percent higher than the previous peak level reached in 1996.

- **Home health care employment in Greater Boston fell by nearly half from 1996 to 2002, but it has increased by 27 percent since then.**

In the early 1990's, home health care employment doubled in Greater Boston in just five years, reaching over 20,000 jobs in 1996.²⁸⁸ In the ensuing six years, home health employment dropped to 11,600 jobs, while it increased by about 2 percent in the US as a whole, despite the impact of Medicare funding cutbacks.

Since 2002, home health care employment in Greater Boston has increased by over 3000 jobs, or an increase of about 27 percent (compared to the national average of about 23 percent). Overall home health care employment in Greater Boston is now at about 70 percent of the level reached at the previous peak in 1996.

Home health care employment in Greater Boston remains more highly concentrated than employment in the US industry as a whole, with about 334 home health workers employed per 100,000 residents in Greater Boston, compared to approximately 290 workers per 100,000 US residents (2005 data).²⁸⁹

- **Average wages in the Greater Boston home health care industry are a little less than half the median income of approximately \$60,000.**

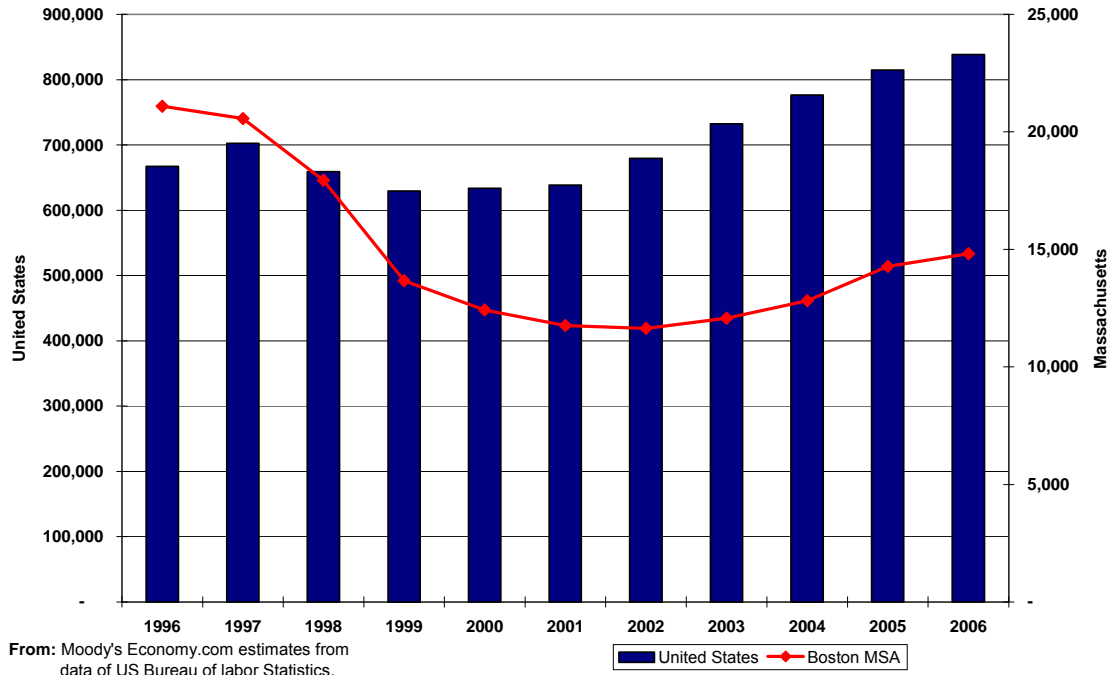
Average wages in the home health care field in Greater Boston in 2006 were an estimated \$27,200.²⁹⁰ This represents about a 12 percent increase in inflation-adjusted dollars over the level of wages paid in the industry in 1996, and a little under half the median income in the Greater Boston area in 2006. The average home health wage in Greater Boston in 2006 was also only about 9 percent higher than the average wage in the entire US home health industry as a whole.

Implications

- Despite the cutbacks that began a decade ago, spending and employment levels in home health care have been increasing in recent years, and Massachusetts as a whole appears to be a comparatively heavy consumer of home health services. For example, a 2003 report from the Government Accountability Office found that Medicare beneficiaries in Massachusetts and Vermont trailed only Louisiana for intensity of home health care use, at 57 users per 1000 Medicare beneficiaries.²⁹¹
- The rapid aging of the population in Greater Boston and in the state will drive demand for increased home health services in the future, but there may not be a sufficient workforce to meet the increased demand. Medical care provided in the home is provided by nurses, and a nursing shortage has confronted the state for almost a decade. Workforce issues will also come into play for the less-skilled workers that often provide elderly and disabled persons with non-medical assistance with the tasks of daily living. Here the industry faces the twin dilemma of a slowly growing local workforce coupled with low prevailing rates of pay. Consequent high turnover in the area's home health and personal care workforce prompted the Massachusetts Legislature to override a gubernatorial veto in the summer of 2006 and enact a new statute to prompt the creation of labor standards for home health care workers and the creation of a statewide directory of workers, an initiative that may yet complement unionization of the industry.²⁹²
- The financial stability of home health care rests heavily on the stability of Medicare. With the long-term solvency of Medicare in continued doubt, particularly after the introduction of a major new benefit (the Medicare Part D prescription drug benefit), any new policies that will significantly increase utilization of home health care will face major fiscal scrutiny.

Figure 51

Home Health Employment



Indicator 26 - Nursing Home Services

Why is this important?

Over half of all elderly persons, particularly those among the increasing number of elders over the age of 85 years old, now require nursing home or other long term care in their lifetimes.²⁹³

As the Baby Boom generation starts to age past 65 years, the elder population will increase dramatically. About 20 percent of Greater Boston's population will be persons aged 65 years and older by 2030, up from about 13 percent today. The US Census Bureau projects that the 2010 Census will find an increase of nearly 20 percent in the population of elders aged 85 years and older in the US and that the 85 year-plus population will then increase by over 50 percent by the year 2030. The Census projects that in Massachusetts the number of persons 85 and older will increase 15 percent from 2005-2010 and increase by 34 percent between 2010 and 2030. The oldest Baby Boomers will reach their 85th birthday in the year 2030.²⁹⁴

What do the data say?

- **The number of nursing home residents, and consequently the number of nursing homes and its beds, in Massachusetts and the US has been declining in recent years.**

The number of nursing home residents in Massachusetts declined 7 percent in 4 years, from 48,482 in 2001 to 45,108 in 2005.²⁹⁵ The nursing home population nationwide declined during that time as well, but by only 1.2 percent (to 1,434,925 persons).

The nursing home industry has steadily contracted since the late 1990's. The number of nursing homes in Massachusetts fell over 9 percent (from 504 to 457 facilities) from 2001 to 2005 alone, while bed capacity fell 5.3 percent (from 53,718 beds to 50,880). Facilities in the US as a whole dropped by 1.2 percent in the 2001 to 2005 time frame, with bed capacity also decreasing by 1.2 percent to approximately 1,434,900 beds.

Notwithstanding the recent reduction in nursing home population in Massachusetts, the number of nursing home residents as a proportion of the population is high compared to national averages. The number of nursing home residents in Massachusetts in 2005 approximated 729 patients per 100,000 population, compared to a national rate of 498.

- **Staffing levels in the Greater Boston nursing home industry have been increasing.**

Despite the ongoing reduction in the number of nursing home residents, estimates suggest that employment in the Greater Boston nursing home industry has increased since 2001. Estimates made by Moody's-Economy.com suggest that the increase has been 4.3 percent from 2001 to 2005, with another 1 percent increase projected by year-end 2006. By comparison, employment in the overall US nursing home industry increased by approximately 1.5 percent in the same period.²⁹⁶

Employment in the Greater Boston nursing home industry in 2005 was at a level of 859 employees per 100,000 general population, compared to a US average of approximately 548 employees per 100,000. In terms of employees-per-nursing home resident, there were approximately 1.19 employees per resident in both Massachusetts and the US as a whole in 2005.

- **Overall spending rates on nursing home services are increasing slightly above the rate of inflation.**

According to the Centers for Medicare and Medicaid Services, nursing home spending in 2004 was \$4.19 billion, and the average annual increase in nursing home spending for the 2001 to 2004 period was 4.5 percent, slightly below annual average growth of 4.9 percent in the US as a whole and above rates of general inflation that have run at about 3 percent in recent years.

Nursing home expenditures constitute a greater overall share of total health care-related spending in Massachusetts than in the US, representing about 9.2 percent of health care-related spending in 2004, compared to a national average of 7.4 percent.

- **Medicaid pays for a greater share of nursing home expenditures in Massachusetts than it does in the US as a whole, although the proportion of Medicaid funds spent on nursing homes in Massachusetts and the US are similar.**

The state-federal Medicaid program is the primary source of funding for indigent elderly or disabled residents or those who have exhausted their resources. The Medicaid program paid for about 55 percent of total nursing home services in Massachusetts in 2004, or approximately \$1.51 billion, representing 18.3 percent of the total Medicaid budget. In the nation as a whole, Medicaid paid for only 44 percent of total nursing home services in 2004, or 18.8 percent of the overall Medicaid budget.²⁹⁷

Implications

- The decline in the population of nursing home residents in Massachusetts and the US is likely the result of several factors: increasing life expectancy among elders, advances in medical care that reduce or postpone disability, the availability of options such as home care and assisted living residences that were not available to previous generations, as well as a preference among many families to care for their elderly and disabled family members as long as possible. Family members remain the primary care givers for the elderly and disabled throughout the US²⁹⁸
- Despite a continuing reduction in nursing home residents, staffing among Greater Boston nursing homes is on an upswing. Increased staffing strongly suggests that care needs among nursing home residents are intensifying as a result of advancing age and disability.
- “Upstream” trends already noted in Greater Boston, including a rising level of obesity and obesity-related disorders that are strongly associated with increasing age, will intensify the level of need among elders in the years ahead. The projected dramatic increase in the number of elder persons, particularly those 85 years and older, will reverse the decline in nursing home enrollments unless better health behaviors, more and better options for non-nursing home care, and other advances in medicine intervene.
- An increasing number of elders with dementia will be one driving force behind a potential increase in need for nursing home services in the years ahead. Risks for development of Alzheimer’s disease and other forms of dementia increases rapidly after age 75. The US Alzheimer’s Association projects that the number of people with Alzheimer’s in Massachusetts will increase by 17 percent over 25 years.²⁹⁹
- An increasing need for nursing home services will have at least two significant economic and financial implications for Greater Boston and Massachusetts. It will drive an increasing need for a skilled nursing home workforce at a time when the size of the region’s workforce is expected to grow only slowly if at all. Much of the projected increase in the region’s workforce is expected to come from older, working-age residents, so that filling Greater Boston’s nursing home needs may be dependent in part on older workers caring for even older patients. Second, the Medicaid program currently pays for a little over half of all nursing home services in the state, although nursing homes account for less than 20 percent of the overall budget. An increasing number of older people in the state in the years ahead will likely be a driver of new demands and costs for the Medicaid program, and an increasing population of nursing home residents will be an important source of this new demand.

Figure 52

Nursing Home Employment

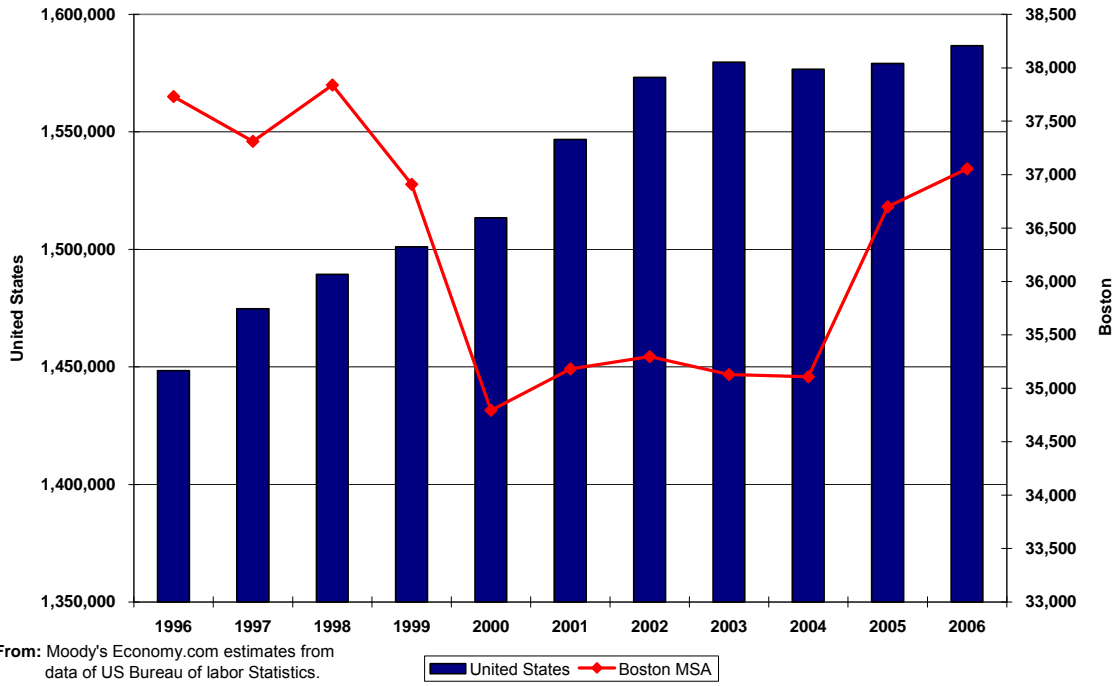
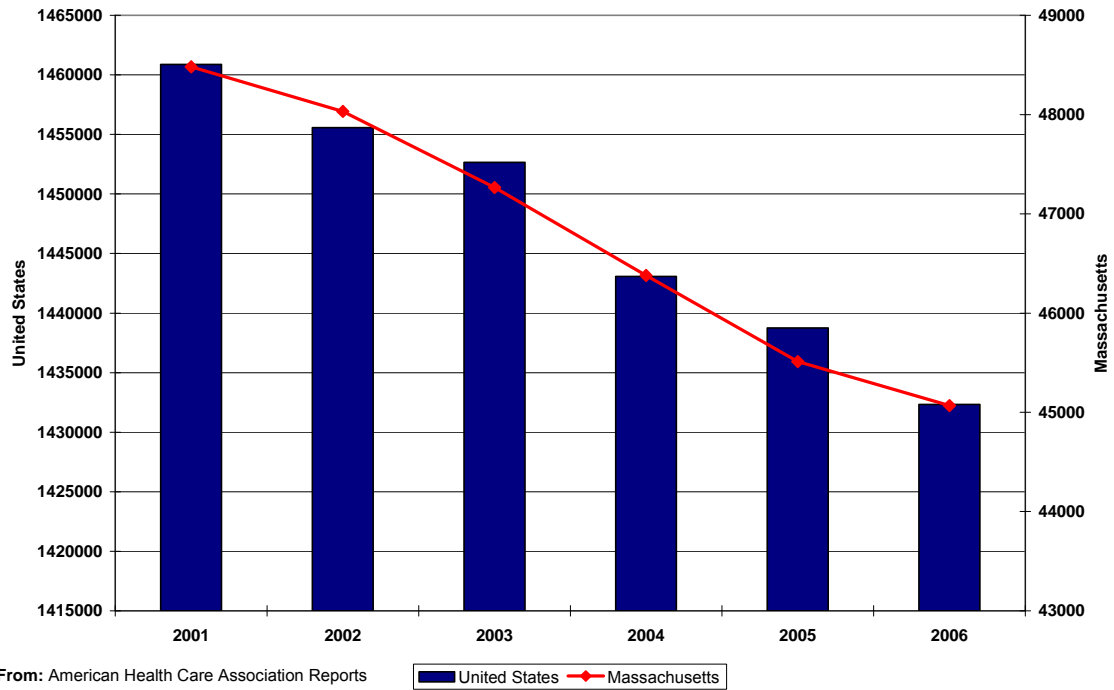


Figure 53

Nursing Home Patients



Related Industries

Indicator 27 - Health Insurance Industry

Why is this important?

As the vast majority of non-elderly residents of Greater Boston and Massachusetts gain access to health care through private health insurance, a viable health insurance industry in the region is essential.

Two measures of viability for the health insurance industry stand out: financial stability and competition. Financial stability in the industry ensures continuity of service and care for patients and continuity of payment for health care providers. The presence of multiple competitors in the market is ordinarily thought to keep prices down and to promote innovation among the competitors, yet critics of the insurance industry believe that the presence of multiple competitors also promotes fragmentation of services and confusion among consumers.

The health insurance industry is also important for residents of Greater Boston because it is a major employer in its own right and is a core industry in the “health care economy” of Greater Boston.

What do the data say?

- **Jobs in the health insurance industry in Greater Boston are increasing after a period of retrenchment.**³⁰⁰

Estimates from Moody's-Economy.com indicate that employment in health insurance in the Boston Metropolitan Statistical Area has grown after a 2 to 3 year period of consolidation and contraction, approximately 9,900 persons worked in the industry in 2005, compared to 7,400 in 2003 and 2004 and 7,800 employees in 2002, and that year-end job totals in the industry for 2006 will show a 12 percent increase over 2005. In contrast, the US health insurance industry as a whole reached an employment peak of 416,900 employees in 2003 and then declined by 4.2 percent by 2005 to 399,800 employees.

Current employment levels in the health insurance industry are significantly higher than levels estimated for the industry one decade ago. Between 1996 and 2005, estimated employment in Greater Boston health insurance nearly doubled (from 5,000 employees to 9,900), while it increased by over 16 percent in the US as a whole.³⁰¹

- **Employment in the health insurance industry is more concentrated in Greater Boston than in the US as a whole, although average wages are roughly similar.**

Estimated employment for 2005 in the Greater Boston health insurance industry was 231.8 employees per 100,000 residents. The comparable concentration in the US industry as a whole was 138.6 employees per 100,000 residents.

The average wage in the Greater Boston health insurance industry in 2005 was approximately \$55,353, similar to the average wage of \$55,187 in the US industry.

- **Health insurance in Greater Boston is dominated by three high-ranking not-for-profit insurers, although all maintain alliances with for-profit insurers.**

Private health insurance in Greater Boston is dominated by three non-profit insurers: Blue Cross Blue Shield of Massachusetts, which covers approximately 3 million people or nearly half of the state's population, Harvard Pilgrim, which has approximately 1 million members, and Tufts Health Plan, which claims over 600,000 members. Fallon Health Plan, another non-profit and traditionally a Central Massachusetts insurer, also operates in Greater Boston with over 190,000 members in the area.³⁰² Over two-thirds of Massachusetts residents are covered by these three non-profit insurers; in the US as a whole only 40 percent of residents are covered by non-profit insurers.

Despite these insurers' non-profit status, all have created alliances with large for-profit insurers or networks of for-profit insurers, so as to provide services to employers with employees located throughout the country. Harvard Pilgrim Health Care is allied with the largest US health insurer, United Healthcare, while Blue Cross of Massachusetts is aligned with the nationwide Blue Card network and Tufts is allied with Cigna.³⁰³

According to the non-profit National Committee for Quality Assurance, which for the past decade has ranked health insurance plans based on the quality and consistency of performance by doctors operating within health plan networks, the three top Greater Boston health insurers historically place among the top 5 health plans in the US. Current rankings place Harvard Pilgrim first, Tufts Health Plan second, and Blue Cross Blue Shield of Massachusetts fourth in the US³⁰⁴

- **Greater Boston and Massachusetts retain a comparatively high level of coverage through Health Maintenance Organizations (HMOs).**

Massachusetts as a state retains the third highest market penetration rate for HMOs in the country at 38.6 percent (2005). Massachusetts lags far behind California (49.9 percent) and Hawaii (43.6 percent). Connecticut follows Massachusetts at 35.1 percent.³⁰⁵

Implications

- The Greater Boston health insurance industry is characterized by relatively high employment concentration relative to the US as a whole, although average wages are roughly similar. The high national rankings of the dominant Boston health insurers suggest that they provide a relatively high level of customer service at the same time.

- The region's industry is also notable for being dominated by non-profit organizations, particularly given the gradual consolidation of the US health insurance industry into large, for-profit, publicly-traded corporations. Unlike other major industries in Greater Boston, health insurance has remained largely under local control, although all insurers maintain active national alliances that accommodate service to multi-state or multi-national corporations. Of note, the need to be responsive to a national clientele could impact the conduct, or even influence the ownership, of local health insurers in the future.
- Greater Boston insurers are notable for the relatively high level of coverage provided through traditional Health Maintenance Organization (HMO) insurance products, although HMO coverage is now not quite 40 percent of the overall private health insurance market. HMO coverage accounts for 25 percent or less of private insurance in at least 36 of the 50 states.³⁰⁶

Indicator 28 - Medical and Nursing Education

Why is this important?

Greater Boston is an international center of physician education, home to four medical schools and 14 teaching hospitals or related teaching organizations. While few medical education programs in the area have a specific mission to place new doctors in the Greater Boston community, the concentration of programs in Greater Boston has induced many physicians to remain in the community in the past. Thus the number and type of physician trainees in Greater Boston are key indicators of whether the area's physician workforce is well prepared to meet local health care needs.

Tracking the number of trainees in each of the many medical specialties is particularly important in order to gauge whether the skills of physician trainees are matched to the actual health needs of Greater Boston's population. Such tracking in primary care-related fields is particularly important, given the front-line role that primary care doctors play in diagnosing, treating and preventing illness.

An equally critical indicator is the number of newly-graduated nurses eligible for licensure in Greater Boston and Massachusetts. Health care leaders and analysts widely agree that Massachusetts and the US as a whole is in the midst of a long-term nursing shortage. Hospital industry surveys estimated a shortage of 6.8 percent in Massachusetts hospitals in 2004, and projections made by the federal Health Resources and Services Administration indicate the shortage will grow to as much as 12 percent in 2020, or a shortage of over 25,000 registered nurses.³⁰⁷

What do the data say?

A large number of medical undergraduates go to school in Greater Boston; Massachusetts residents are somewhat more likely than others in the US to apply and be accepted to medical school.

Each year the four Massachusetts medical schools (Boston University, Harvard, Tufts and University of Massachusetts) enroll 680 to 690 undergraduate medical students and graduate about 160. Enrollment at these medical schools represents about 3.6 percent of the entire medical school enrollment in the US. By way of comparison, the Boston Metropolitan Statistical Area represents about 1.48 percent of the estimated US population for 2005, and the estimated population of Massachusetts is about 2.14 percent of the US population.³⁰⁸

In the same year, Massachusetts residents represented about 2.29 percent of the overall applicant pool to US medical schools and won 2.48 percent of the available positions. This represents an application rate of about 14.5 persons per 100,000 residents vs. a US rate of 13.5 persons, and a success rate of 7.0 persons per 100,000 residents vs. a US rate of about 6 per 100,000.

- **Massachusetts-based teaching hospitals enroll a disproportionately high number of US medical residents.**

In 2005, 120 distinct medical specialty and sub-specialty fields were approved for accredited physician training in US hospitals. Massachusetts-based teaching hospitals offered programs in 95 out of the 120 approved fields,³⁰⁹ and they enrolled 4,882 residents, or 4.7 percent of all residents on duty in the US for that year.

The preponderance of graduate medical education programs in Greater Boston creates a comparatively high concentration of medical residents for the area compared to national averages. In the US as a whole, there were about 35 medical residents per 100,000 Americans in 2005, compared to 78 medical residents in Massachusetts per 100,000 state residents. Moreover, as over 90 percent of medical residents in the state are based in Greater Boston hospitals, the true concentration for Greater Boston for the year was upwards of 100 medical residents per 100,000 residents.

- **Medical residents in specialty fields outnumber those in primary care-related fields, and local teaching hospitals have increased enrollments in most fields at rates higher than the US average.**

The total number of medical residents training in Massachusetts hospitals increased by 12.82 percent from 1995 to 2005, compared to 5.92 percent in the US as a whole.

Residency enrollment in primary care fields, which include family practice medicine, internal medicine, obstetrics and gynecology, and pediatrics, grew by 8.6 percent in Massachusetts hospitals between 1995 and 2005, almost twice the rate of growth in the US as a whole (4.4 percent). Enrollment rates in primary care-related specialties in Massachusetts hospitals are lower than the US average, however: enrollment of medical residents in these fields was 34.42 percent of total medical residency enrollment in Massachusetts in 2005, compared to 42.9 percent in the US as a whole

- **Admissions and graduations from nursing schools in Massachusetts are up substantially, but the number of active registered nurses has not changed over the past decade.**

According to 2005 data from the Massachusetts Board of Registration in Nursing, admissions to the state's nursing schools increased 55 percent between 2001 and 2005, reaching 4,044 admissions. The number of annual nursing school graduates increased by 34 percent over the same time period, from 1,773 graduates in 2001 to 2,384 graduates in 2005.

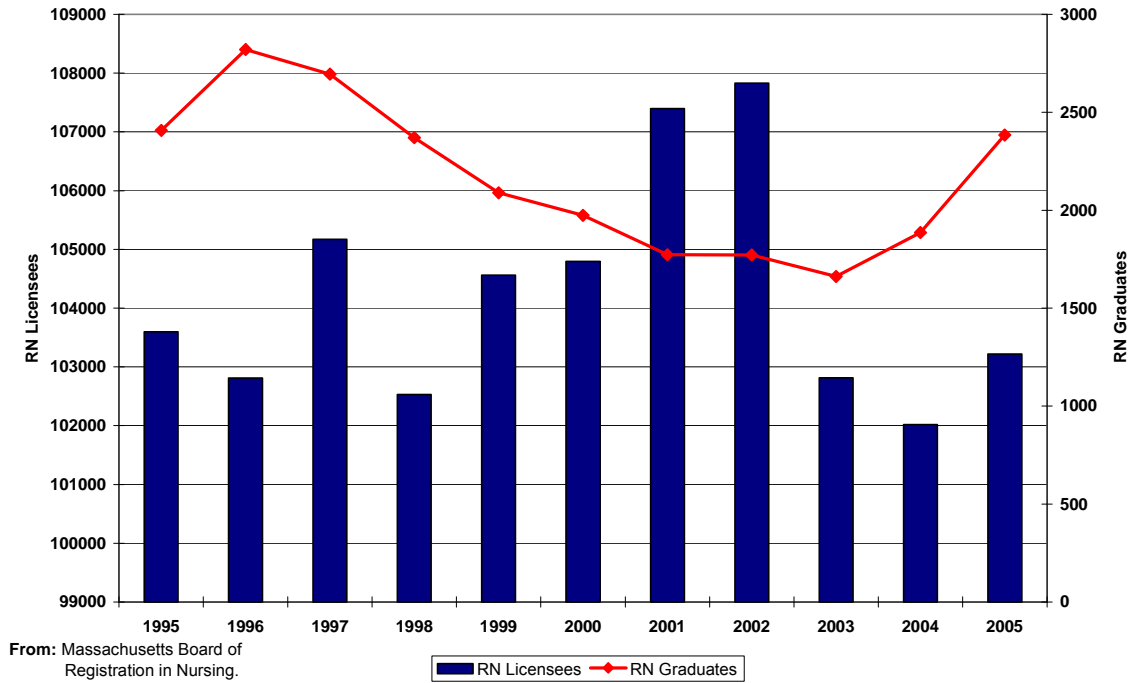
The total number of active and licensed registered nurses has changed little from the level seen ten years ago, however. Board of Registration data indicates that 103,222 registered nurses were active in 2005, a slight dip from the 103,598 registered for 1995, and a level over 4 percent below the peak number of 107,830 licensed nurses reached in 2002.

Implications

- Medical residency enrollments have grown in Greater Boston and in the US over the last decade, despite the fact that federal deficit reduction initiatives in the mid 1990's targeted Medicare subsidies for graduate medical education. (Medicare's Graduate Medical Education (GME) subsidy is the largest source of funding available to hospitals for the support and training of medical residents.) The 1997 Balanced Budget Act reduced Medicare subsidies for medical education and initially capped the number of residencies that Medicare would subsidize. These restrictions were subsequently relaxed.³¹⁰
- The comparatively large number of medical residents and medical residency programs in Greater Boston makes the area's teaching hospitals particularly sensitive to changes in Medicare's GME policies. The Medicare GME program has been subject to continuing scrutiny because of fears that it induces an over-supply of physicians in the US as a whole, and in particular an over-supply of specialists.³¹¹
- The expanding number of medical residents in Greater Boston teaching hospitals complements the expanding base of biomedical research in the hospitals (see Indicator 30), since many medical residency programs in the teaching hospitals offer trainees an opportunity to work in laboratories and pursue biomedical research as well as clinical training.
- The relatively high concentration of medical residents, including those in primary care-related specialties, in Greater Boston hospitals correlates with the area's relatively high concentration of practicing physicians. Many health care providers believe the Boston area has an effective shortage of primary care physicians, but the shortage may be more of an issue of inadequate deployment of primary care physicians to communities with real needs rather than an inadequate supply of physicians.
- Data on nursing school enrollments and graduations suggest that the pipeline for nurse trainees has expanded in recent years to meet the ongoing nursing shortage. However, so far the state is, at best, holding the number of registered nurses steady and is not meeting the increasing demand.

Figure 54

Active Registered Nurse Licensees and Annual Registered Nurse Graduates in Massachusetts - 1995 to 2005



Indicator 29 - Health-related Research and Technology Transfer

Why is this important?

Greater Boston has been an international center of scientific research for many decades and in many settings, including academic institutions (universities and colleges), industry, and independent non-profit organizations such as teaching hospitals. According to the National Science Foundation, Massachusetts continues to rank among the top five states in several areas of research and development, including industrial R&D, academic R&D, federally-funded R&D, and overall R&D spending. As of 2003, Massachusetts research institutions employed the second largest number of postdoctoral scientists (who do a large bulk of the research) of any state in the US (about 6,000).³¹²

Health-related research, both clinical and basic, is one of the three critical missions of the teaching hospitals, along with patient care and medical education. A doubling of the budget at the National Institutes of Health (NIH) between 1998 and 2003 (see below) increased funding for life science research and therefore expanded opportunities for Greater Boston's teaching hospitals.

Both clinical and basic research generate discoveries that can be directly applied to the development of new technologies, including drugs and medical devices. The "intellectual property" created by hospitals is further developed by transfer to outside industries under license or through outright sale. Therefore, teaching hospitals have become an increasingly important source for the "innovation pipeline".

What do the data say?

- **Federally-funded research at Greater Boston teaching hospitals more than doubled from 1997 to 2000, and teaching hospitals now perform much of the federally-funded research in Massachusetts.**

Federal research grants to Greater Boston teaching hospitals grew from a total of \$468 million to over \$990 million in 2003, an increase of 112 percent. Increased funding from the NIH was chiefly responsible for the rapid rise in funds.

By way of comparison, federal research grants to other non-profit institutions and to universities in Massachusetts increased by 67 percent during the same period, and federal grants to all non-profit institutions nationwide increased by 88 percent.³¹³

As a result of the rapid increase in federal research funding to teaching hospitals, these institutions now account for a significantly increased share of the federally-funded research conducted in the state. The teaching hospitals' share was about 32 percent in 1996 and increased to about 40 percent by 2003.

- **Greater Boston's teaching hospitals are among the largest recipients of federal research grants among US hospitals.**

Nearly every teaching hospital in Greater Boston competes independently for federal research funding, notwithstanding their affiliations with medical operated by local universities. Several Greater Boston teaching hospitals are among the top 10 to 15 largest recipients of federal research funds among all hospitals in the country.

In the most recent rankings released by the National Science Foundation, six Greater Boston teaching hospitals were among the Top Ten most highly-funded hospitals in the US (2003 data). Four Boston teaching hospitals were among the ten most highly funded non-profit organizations of all types in 2004. More recent data from the NIH show that Massachusetts General Hospital and Brigham and Women's Hospital remain the top two hospitals in the country for receipt of NIH funding.³¹⁴

- **NIH funding to Greater Boston teaching hospitals has increased only modestly since 2003.**

Teaching hospitals throughout the US enjoyed a considerable increase in NIH funding between 1998 and 2003, when Congress doubled the budget of the NIH from about \$14 billion to \$28 billion. Substantial increases in NIH funding were awarded to Greater Boston teaching hospitals even before 1998, and NIH funding to the hospitals rose by an average of over 12 percent per year from 1997 to 2003, and total funding rose to over \$1 billion in 2005.

However, growth in NIH funding has slowed since 2003, a reflection of severe budget constraints on NIH's entire budget. Total NIH funds to Greater Boston teaching hospitals grew by 4.32 percent in 2005.³¹⁵ The overall NIH budget was reduced by about 2.5 percent in Fiscal Year 2006, the first cut in NIH funds since 1970. Congress has approved a 2.1 percent increase in funding for NIH for the 2007 fiscal year, an increase that does not keep pace with rates of inflation.

- **Increased research programs at the teaching hospitals have led to significant increases in new intellectual property marketed by the hospitals to investors and life science industries.**

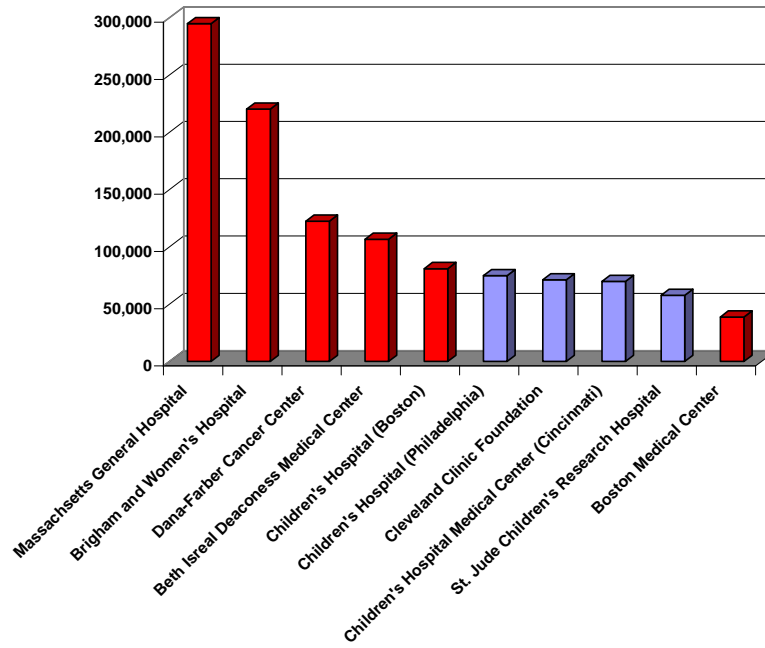
Technology licenses issued by Greater Boston teaching hospitals have increased from an average of about 120 per year in the mid 1990's to about 180 to 200 licenses per year in the early years of this decade. Yearly income from technology licenses has grown from about \$10 million per year in the mid 1990's to nearly \$95 million in 2004.³¹⁶

Implications

- The development of new drugs and medical devices depends upon a “pipeline” of new research findings, and the “innovation pipeline” in Greater Boston is the most robust in the US³¹⁷ The expanding base of research at Greater Boston teaching hospitals has been a critical factor in expanding this pipeline over the last decade. The overall share of local research conducted at these teaching hospitals has risen over the last decade, and in 2004, technology license income to the hospitals exceeded the license income earned by local universities.
- The expansion of hospital-based research has also enabled the hospitals to attract and retain an increased number of postdoctoral scientists, thus increasing Boston’s scientific talent pool to the benefit of both academic and industrial research. The pool of hospital-based researchers also serves as a source for new biomedical entrepreneurs and for advisers to new life science firms started in the Greater Boston area. Research programs at the teaching hospitals also attract substantial amounts of research funding from philanthropies and corporations (a sum not otherwise counted in this indicator report).
- Historically, federal grants support basic biomedical research that is conducted to advance science or patient care and that may have unclear potential for commercialization. After doubling between 1998 and 2003, the NIH budget has had slow growth since and was cut for the first time in 36 years in 2006.
- Funding cuts, or funding growth that does not keep pace with inflation, has begun to have a serious impact on the volume of research in Greater Boston and the region’s ability to retain its scientific talent. Thanks to the high cost of capital equipment and specialized facilities, inflation in biomedical research often exceeds the general rate of inflation; biomedical research inflation was estimated at 4.5 percent in 2006.³¹⁸ This reduction in real-dollar spending for research results in the award of fewer grants, a reduction in opportunities for younger researchers and, eventually, a slow down in discoveries.³¹⁹

Figure 55

Top Ten Voluntary Hospitals Ranked by Total Federal Research Funds Received FY2003



From: National Science Foundation, *Federal Science and Engineering Support to Universities, Colleges, and NPO's: Fiscal Year 2003*, NSF 06-309, June 2006.

Figure 56

**Academic Health Centers Share of Federally
Funded Academic Research In Massachusetts: 1996 to 2003**

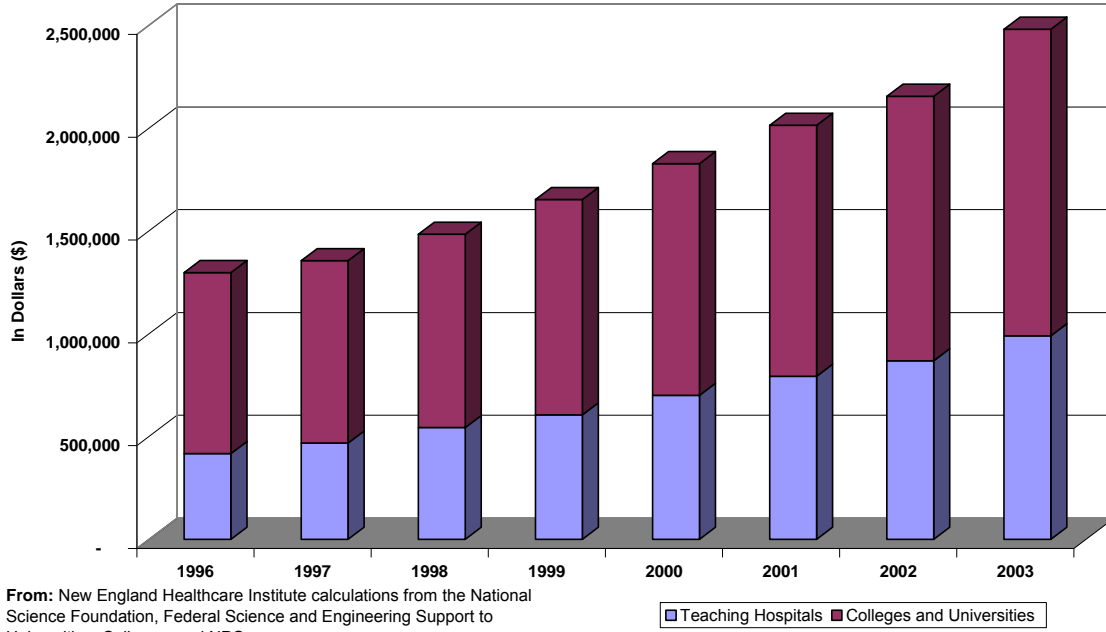
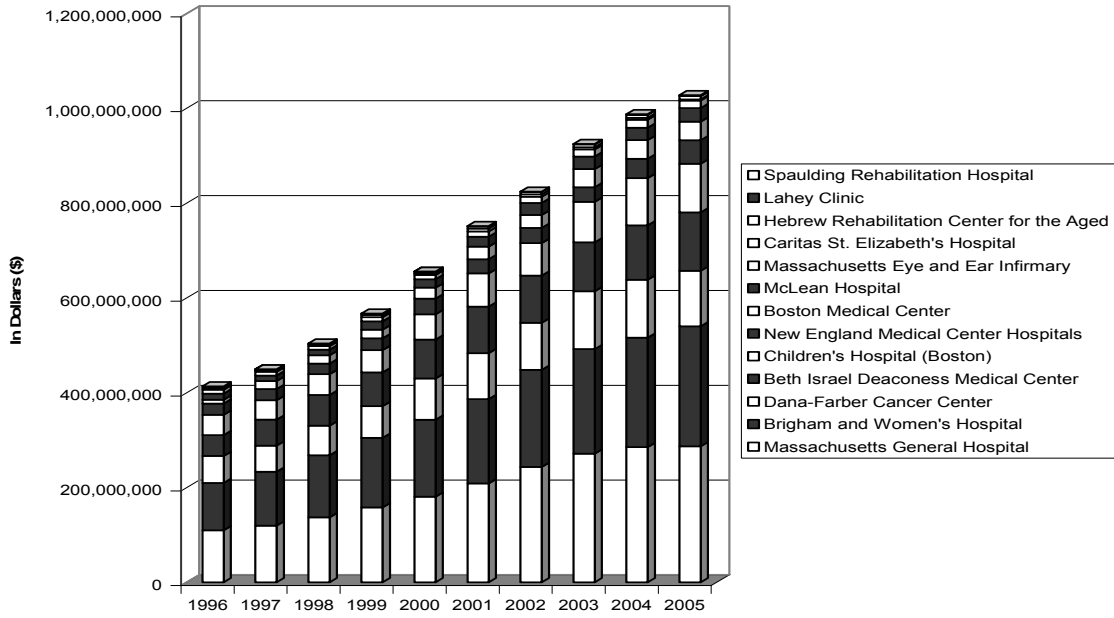


Figure 57

**National Institutes of Health (NIH)
Funds to Greater Boston Teaching Hospitals: 1996 to 2005**



From: National Science Foundation, Federal Science and Engineering Support to Universities, Colleges, and NPOs

Indicator 30 – Life Science Industries

Why is this important?

The life science industries—usually thought of as the medical device, biotechnology and pharmaceutical industries—have a major presence in Greater Boston. These industries are now regarded as one of the region’s best hopes for sustained economic growth in the decades ahead.³²⁰

The life science industries are part of an overall ‘cluster’ of industries and institutions, including teaching hospitals, other health care providers, and area universities, in which a highly technical workforce is trained and new discoveries can be made, developed, financed and eventually brought to market as new health care technologies.

Health care providers serve a market that is overwhelmingly local, but the life science industries serve a market that is mostly located outside of Greater Boston and is increasingly global. Economists describe such export of goods and services as a ‘traded’ activity that results in expands the size of the local economy by bringing new revenue to the local economy.

The vitality of Greater Boston’s life science industries is not entirely tied to teaching hospitals and other health care providers. The area’s universities train the non-physician researchers who represent the bulk of Greater Boston’s talent pool for life science jobs. Nevertheless, very robust growth in the research activities of the teaching hospitals has paralleled robust growth in local life science industries and has accelerated the spin-off of new discoveries to industry, (see Indicator 29), thus strengthening Greater Boston’s life science ‘super cluster.’

What does the data say?

- **The life science industries have expanded the local economy by continuously expanding their output over the last decade.**

Measured by the value of their output, the medical device, pharmaceutical and biotechnology industries have all grown at rates well in excess of growth in the overall Greater Boston economy during the last decade. Pharmaceutical output grew by over 100 percent, medical device output by over 160 percent, and biotechnology output by over 230 percent, (see Figure 58).³²¹

- **The biotechnology industry has generated continuous growth in jobs over the last decade, while employment in medical devices has declined. The pharmaceutical industry has grown, although some job gains made in the 1990s have been lost since 2001.**

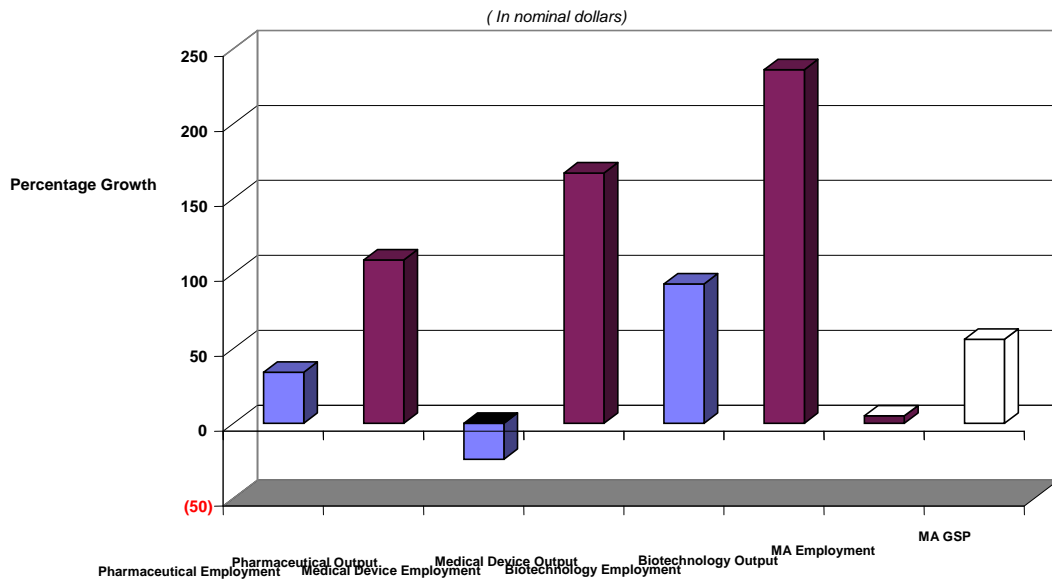
Employment estimates suggest that biotechnology jobs grew by over 90 percent in Greater Boston from 1996 to 2006 and now exceed 20,000 jobs. Pharmaceutical industry jobs grew by over 30 percent during the decade, despite the loss of up to 1700 industry jobs in the 2002-2004 period. The pharmaceutical industry added back up to 1300 jobs in the ensuing two years and employed over 6900 persons in Greater Boston by year-end 2006.

Employment in the medical device industry shrank over the decade, despite growth in the industry's overall output. Employment dropped by 24 percent from 1996-2006, and now totals about 20,000 persons.³²²

Implications

- Life science industries are clearly generating new wealth in the Greater Boston economy, as demonstrated by the continued growth in the value of their output over the last decade. This new growth has appeared at a time when overall growth in the economy has been much slower.
- For the most part the life science industries are also generating new jobs, although the link between industry growth and job growth is not always tight: the medical device industry employs fewer people today than a decade ago, despite doubling in value. The reduction in medical device jobs in Greater Boston, and the more recent contraction of pharmaceutical jobs, has been attributed to the elimination of jobs connected with lower-value, “commodified” products (such as mass-produced syringes and other instruments) that can be more cheaply manufactured elsewhere.
- The example of the medical device industry shows that jobs connected with high-value products and high-value operations thrive most easily in Greater Boston's economy. The biotechnology industry, which depends upon very advanced technical processes, is an example of such a high-value industry, and its growth in Greater Boston is a promising sign.
- At the same time, the life science industries are not yet in a position in which they can provide the kind of broad-based job creation Greater Boston enjoyed with other industries during the 1980s and 1990s. Life science industries still represent less than 3 percent of employment in the Greater Boston area; the health care industry, in contrast, provides over 11 percent. Life science firms will have to enjoy a sustained period of growth in order to provide the sheer number of jobs that were once seen in industries such as defense and computer hardware, software and systems.

Figure 58
Growth in Life Science Industry Employment and Output - 1996 to 2006



From: Employment and output data is for the Greater Boston Metropolitan Statistical Area, as estimated by Moody's-Economy.com; Statewide Massachusetts data on employment is from the Current Employment Series of the Massachusetts Department of Unemployment Assistance; Data on Massachusetts Gross State product is for 2005, as calculated by the Bureau of Economic Analysis - October 2006.

End Notes

¹ Complete text of the 30 indicators, and an executive summary are available directly from The Boston Foundation and the New England Healthcare Institute or at www.tbf.org and www.nehi.net

² MA Dept of Public Health (MDPH) , *Massachusetts Deaths-2004*, July 2006; US Centers for Disease Control and Prevention (CDC) , National Center for Health Statistics (NCHS) , “Deaths: Preliminary Data for 2004,” Table 1, (at www.cdc.gov/nchs/products/pubs/pubd/hestats/prelimdeaths04/preliminarydeaths04.htm); premature mortality data and state rankings as cited by the United Health Foundation, *America’s Health Rankings 2006*, www.unitedhealthfoundation.org/ahr2006;

³ CDC, NCHS, “Fast Stats on heart disease,” www.cdc.gov/nchs/fastrats/heart ; US and “Disparities in Premature Deaths from Heart Disease – 50 States and the District of Columbia, 2001”, *Morbidity and Mortality Weekly*, February 20, 2004; Massachusetts cancer data from MDPH, Massachusetts Cancer Registry, (<http://masschip.state.ma.us/>) National Cancer Institute, SEER 13 Registries for 1992-2002, at <http://seer.cancer.gov/registries/terms.html>.; all data age adjusted, and comparability modified

⁴ MDPH, *Massachusetts Deaths – 2004*, op. cit.

⁵ *ibid*

⁶ See MassINC and the Northeastern University Center for Labor Market Studies, *Mass Economy: The Labor Supply and Our Economic Future*, December 2006.

⁶ Boston MSA population estimates from US Census Metropolitan Statistical Area (MSA) Interim Population Estimates

⁷ MassINC, op cit

⁸ Data from the US Census Bureau’s American Community Survey for 2005 indicate that the Hispanic population represented 7.5 percent of the overall population in the Boston MSA in 2005, while Asian residents represented about 5.7 percent of the population. The population of Asian ethnicity grew by nearly 30 percent between 2000 and 2004 in both the Boston Primary MSA (PMSA) and the somewhat larger Boston Consolidated MSA (CMSA). The Hispanic population in the Boston PMSA and CMSA grew by 15-18 percent during the same period; metropolitan population projections are from the Metropolitan Area Planning Council (MAPC) , *Metro Future* population projections at www.metrofuture.org

⁹ Stephen Coelen and Joseph Berger, “New England 2020: A Forecast of Educational Attainment and its Implications for the Workforce of New England States,” Nellie Mae Foundation, June 2006

¹⁰ For recent analysis of evidence on the impact of aging on health insurance see Patricia Seliger Keenan, David M. Cutler, and Michael Chernen, “The ‘Graying’ Of Group Health Insurance” *Health Affairs*, November/December 2006; 25(6): 1497-1506.

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- ¹¹ For analysis of Greater Boston's evolving dependence on older workers see Andrew Sum, et al, "Mass Economy: The Labor Supply and our Economic Future," MassINC, December 2006
- ¹² CDC Division for Heart Disease and Stroke Prevention, 'At a Glance' web site, www.cdc.gov/nccdphp/publications/aag/cvh.htm
- ¹³ MDPH Behavioral Risk Factor Surveillance System annual surveys, <http://masschip.state.ma.us/>; 2005 data from MDPH, *A Profile of Health Among Massachusetts Adults-2005*, October 2006;
- ¹⁴ *ibid*
- ¹⁵ Original unpublished research: University of California at San Francisco, the Institute for the Future (Menlo Park, California), and the US Centers for Disease Control and Prevention.
- ¹⁶ For a brief overview of research on education and its interaction with other socio-economic determinants of health see, Nancy E. Adler and Katherine Newman, "Socioeconomic Disparities in Health Pathways and Policies", *Health Affairs*, March/April 2002; and Thomas S. Bodenheimer and Kevin Grumbach, *Understanding health Policy: A clinical Approach*, Lange Medical Books/McGraw Hill, 2005; pp. 23-29; Metropolitan educational attainment data is for the Consolidated MSA; Boston data is for the Boston-Worcester-Lawrence, M A/NH/ME/CT Consolidated MSA; see National Center for Education Statistics, http://nces.ed.gov/programs/digest/d05/tables/dt05_014.asp, accessed 10/31/06; state ranking data is from US Statistical Abstract www.census.gov/compendia/statab/tables/06s0218.xls
- ¹⁷ Median household income as estimated for the Boston MMSA and the US by the US Census, American Community Survey 2005 ; for a summary review of income as a determinant of health see Chapter 3 ("Access to Health Care") and Chapter 11("The Prevention of Illness"), Thomas Bodenheimer and Kevin Grumbach, *Understanding Health Policy: A Clinical Approach*, Lange/McGraw Hill Medical, 2005; also see Nancy E. Adler and Katherine Newman, "Socioeconomic Disparities in Health: Pathways and Policies," *Health Affairs*, March –April 2002.
- ¹⁸ US Environmental Protection Agency, Air Quality Index Report data for the Boston MSA available at <http://www.epa.gov/air/data/index.html> ; Environmental League of Massachusetts, *State of the Environment 2006*, www.environmentalleague.org/SOER.html ; also see MA Water Resource Authority, Annual Report on Drinking Water Quality 2005, www.mwra.state.ma.us/annual/waterreport/2005results/2005metro.pdf
- ¹⁹ US Department of Justice, Bureau of Justice Statistics, Data Online, <http://bjsdata.ojp.usdog.gov/dataonline>,
- ²⁰ MA Department of Education, annual Youth Risk Behavior Surveys (<http://www.doe.mass.edu/cnp/hprograms/yrbs/>); MDPH Behavioral Risk Factor Surveillance Surveys.
- ²¹ State survey results from biennial health insurance survey of the MA Department of Health Care Finance and Policy (http://www.mass.gov/Eeohhs2/docs/dhcfpr/survey/res_06_report_5th.pdf)
- ²² Gabel, Jon et al, Generosity and Adjusted Premiums in Job-based Insurance: Hawaii is Up, Wyoming is Down, *Health Affairs*, May/June 2006.

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- ²³ National Association of Community Health Centers, Inc., US and Massachusetts Fact Sheets, www.nachc.com
- ²⁴ Estimates for the Boston Primary MSA, in 2005 dollars, for 2000 and 2004 from the US Census, American Community Survey
- ²⁵ See Massachusetts Budget and Policy Center, “The State of Working Massachusetts 2006,” at www.massbudget.org
- ²⁶ See “The Growing Gap: Income Inequality in Massachusetts”, Massachusetts Budget and Policy Center, January 26, 2006
- ²⁷ See Andrew Sum, et al, op. cit.
- ²⁸ See Stephen Coelen and Joseph Berger, op. cit.
- ²⁹ Data on youth physical fitness from CDC Youth Risk Behavior Survey a “Healthy Youth! Youth Online,” <http://apps.nccd.cdc.gov/yrbss/>
- ³⁰ MDPH, “A Profile of Health Among Massachusetts Adults 2005,” October 2006
- ³¹ MA Department of Education, Youth Risk Behavior Surveys, op. cit
- ³² MDPH, A Profile of Health Among Massachusetts Adults 2005,” op. cit.
- ³³ MDPH, “A Profile of Health Among Massachusetts Adults 2005,” October 2006;
- ³⁴ United Health Foundation, “America’s Health Rankings 2006,” at www.unitedhealthfoundation.org
- ³⁵ MDPH “A Profile of Health Among Massachusetts Adults 2005,” op. cit.
- ³⁶ *ibid*
- ³⁷ Center for Financing, Access, and Cost Trends, Agency for Healthcare Research and Quality: Medical Expenditure Panel Survey Household Component, 2003, www.meps.ahrq.gov/mepsweb/data_stats/summ_tables/hc/state_expend/2003/table4.htm
- ³⁸ Kaiser Family Foundation, State Health Facts, at www.statehealthfacts.kff.org
- ³⁹ American Hospital Association, *Hospital Statistics Series* (annual data)
- ⁴⁰ American Medical Association, *Physician Characteristics and Distribution 2004*; Table 3.14, “Physicians by Metropolitan Statistical Area,”; the data presented in this table pertains to the Greater Boston Consolidated Metropolitan Statistical Area, (or CMSA); population estimate from the US Census Bureau, American Community Survey ; Organisation for Economic Co-operation and Development, OECD Health Data 2006 - Frequently Requested Data, Health Care Resources, at www.oecd.org
- ⁴¹ AMA *Physician Characteristics and Distribution 2004*, Table 3.11
- ⁴² New England Healthcare Institute (NEHI) calculations from National Health Expenditures Accounts data of the US Centers for Medicare and Medicaid Services, “Health Expenditures by

State of Provider: State Specific Tables, 1980 to 2004 – Preliminary, May 2006, at www.cms.hhs.gov/NationalHealthExpendData/

⁴³ Data for the Boston NECTA (New England City and Town Area) from the MA Department of Unemployment Assistance, Current Employment Statistics (CES -790), available at http://lmi2.detma.org/lmi/lmi_ces_a.

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⁴⁵ See Moscovitch, Edward, *Massachusetts Community Hospitals – A Comparative Economic Analysis: Rising Demand vs. Falling Profitability*, Massachusetts Council of Community Hospitals, October 2005, available at www.mcchweb.org/research.html

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