

E X E C U T I V E S U M M A R Y

The Boston Paradox:

Lots of Health Care, Not Enough Health

Research by the
New England Healthcare Institute
Boston, Massachusetts

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Foundation
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The Boston Foundation

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The New England Healthcare Institute (NEHI) is a not-for-profit collaborative dedicated to transforming healthcare for the benefit of patients and their families. Through research, education and policy change, NEHI finds and promotes ways to improve healthcare quality and lower healthcare costs. Working collaboratively with its members from all sectors of the medical industry, NEHI forges bold and lasting solutions to the healthcare crisis.

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.

E X E C U T I V E S U M M A R Y

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 U.S. 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,

A handwritten signature in black ink, reading "Wendy Everett". The signature is fluid and cursive, with a large, sweeping flourish at the end.

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

Contents

Introduction	5
The Goals of this Report	6
Executive Summary	8
Health Status Today	8
Vulnerabilities in Greater Boston’s Health Status	9
Determinants of Health	11
Vulnerabilities in Determinants of Health in Greater Boston	12
Utilization of Health Care and its Impact on the Economy	13
Vulnerabilities in Greater Boston’s Utilization of Health Care	15
30 Critical Indicators of Health, Health Care, and Competitiveness in Greater Boston	18
Background: Population Trends, Health and Health Care	18
Indicators of the Determinants of Health	18
Background: Life Expectancy and Early Mortality	20
Indicators of Health Status	20
Background: Greater Boston’s Economy and Health Care	21
Indicators of Health Care By Sources of Funding	22
Indicators of Health Care By Uses of Funding	23
Indicators of Related Industries	24
Summary: An Opportunity for Leadership	25
Endnotes	26
Acknowledgments	Inside Back Cover

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 economic 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 are not prevented, and the cycle goes on.

For this report, the New England Healthcare Institute and the Boston Foundation have looked at over thirty

broad indicators of trends in health, health care, and economic competitiveness in Greater Boston. This work was undertaken as part of the Foundation's "Boston Indicators Project," which has been creating and releasing biennial reports on key indicators of progress and change in Greater Boston since 2000. In this special Health Care Indicators report, 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 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 we 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 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

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

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 (available on the web) 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.

Go to www.tbf.org or www.nehi.net for a copy of the full *The Boston Paradox* report.

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 also 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 thwart the rise in preventable disease. First, Massachusetts has sustained an historically high level of health insurance coverage: the most recently available data suggests that about 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.

Finally, Greater Boston and Massachusetts have a history of public health activism. Teen smoking in Massachusetts was successfully reduced in the 1990's as a result of initiatives on many fronts: legislation; a voter referendum; litigation; local and state regulation; and an aggressive anti-smoking media campaign. A fully involved and deeply invested public is key to helping Greater Boston achieve lasting success in the fight against chronic disease and realize the potential rewards of global health leadership.

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

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 Boston.¹ 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.**

The full report, with a detailed description of 30 indicators of health, health care and competitiveness is available from the Boston Foundation or New England Healthcare Institute, or through their respective websites, www.tbf.org and www.nehi.net.

Health Status Today

■ **Overall health status in Greater Boston and Massachusetts is good.**

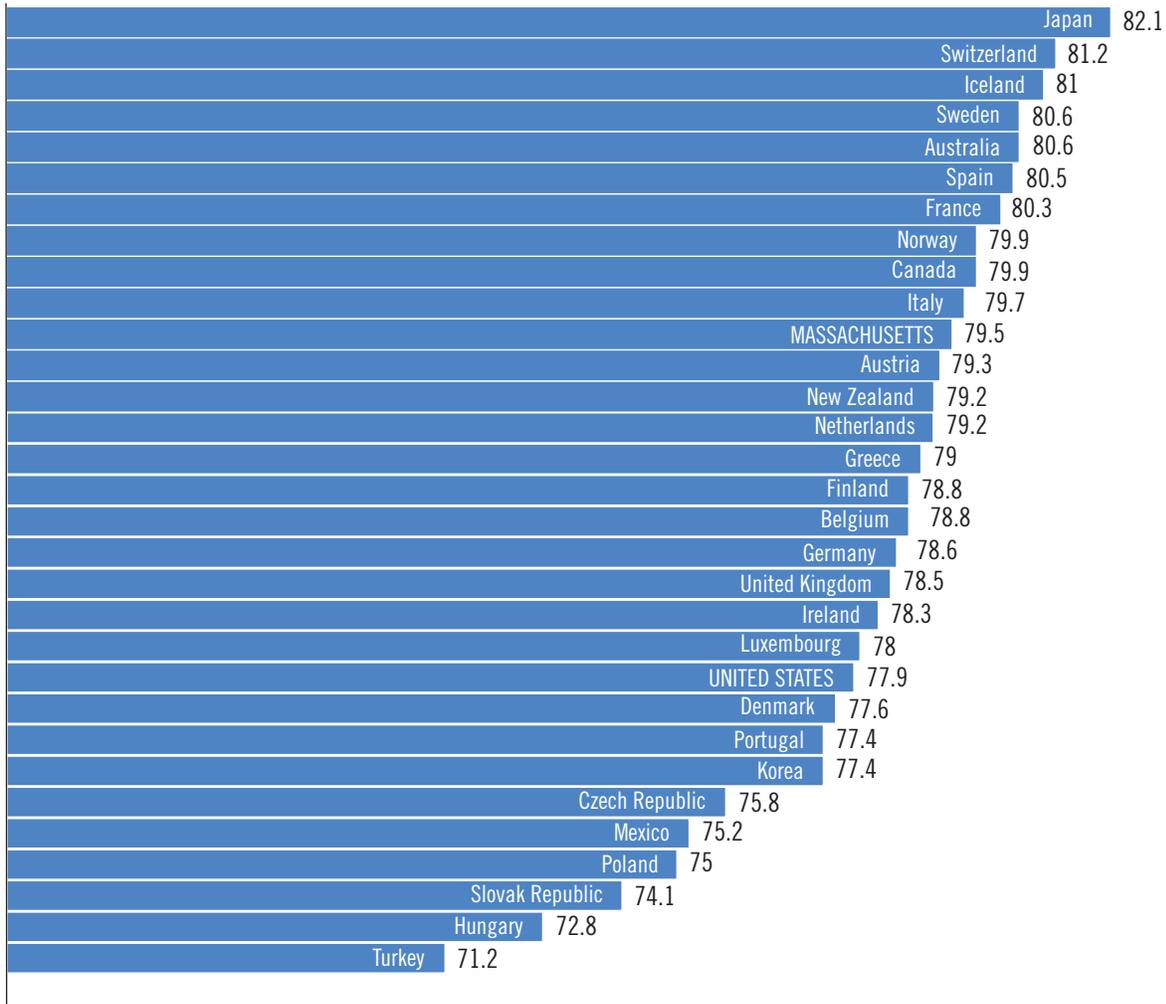
Life expectancy in Massachusetts is at one of the highest levels in the United States. The state's life expectancy rate would place it about 12th among the developed nations of OECD (Organization for Economic Cooperation and Development): the entire US ranks about 25th. The state also has one of the 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

FIGURE 1

Life Expectancy at Birth 2004 – Massachusetts and OECD Countries



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

Vulnerabilities in Greater Boston's Health Status

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

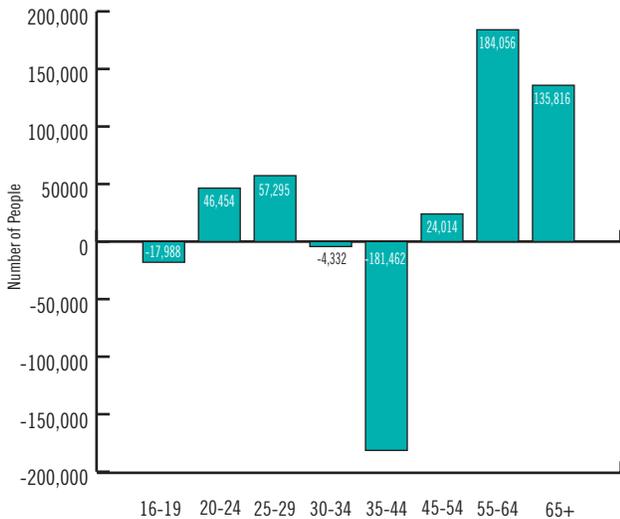
Yearly death rates (the number of deaths per 100,000 people) vary considerably among residents with different educational backgrounds: the death rate for residents with a high school education or less is three times higher than the death rate for more highly educated persons.⁴ Life expectancy among African-Americans 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.**

FIGURE 2

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.

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 US, 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.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

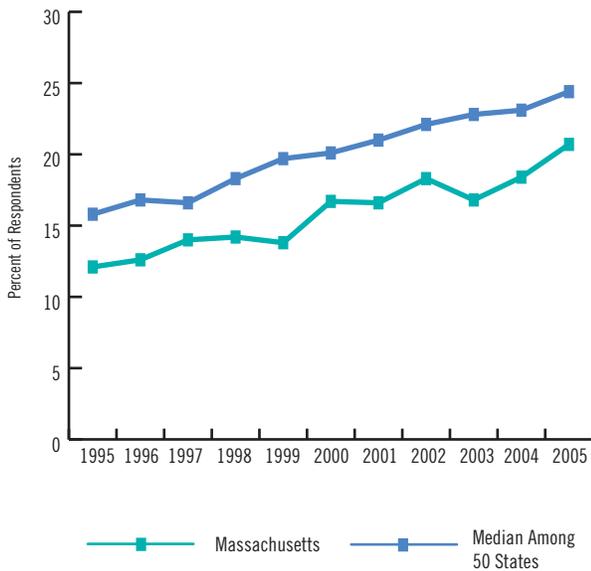
Out-migration and a continued influx of immigrants (some 26,000) has meant that a larger share of the region’s population and workforce is comprised of minority residents from communities with a much lower historical rate of educational attainment than Greater Boston’s overall population. Research from 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

FIGURE 3
Adult Obesity



Source: 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.

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.

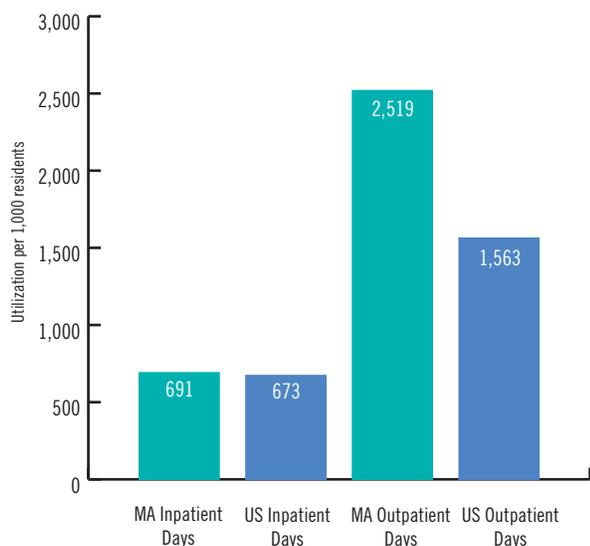
Federal survey data on the 29 largest states indicates that Massachusetts has the 3rd highest percentage of residents who visit a doctor’s office at least once per year, exceeded only by Connecticut and Virginia. The average expense per visit is only 24th among the 29 states—perhaps an indication that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

FIGURE 4
**Hospital Services Utilization:
 US and Massachusetts – 2004**



From: American Hospital Association, Hospital Statistics 2004

■ **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 3 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, equals about 1100 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.**

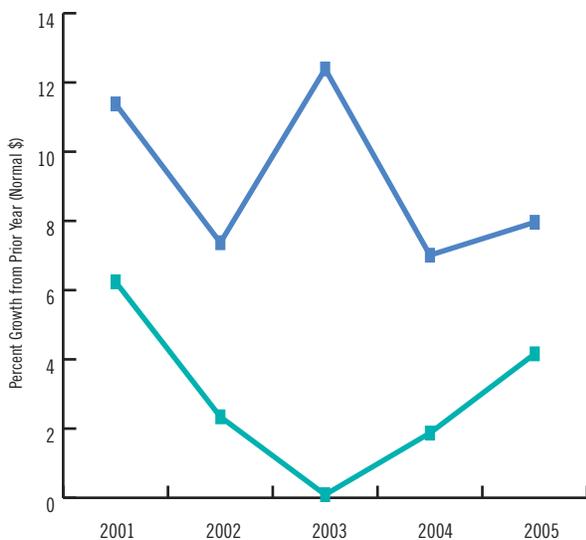
The average cost of an employer-sponsored family health plan in Massachusetts grew 43 percent between 2000 and 2004; more timely data suggests that employer health care costs have grown more than 8 percent a year since then. This represents a 4 to 5 percentage point increase, per year, in real spending 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 5 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.

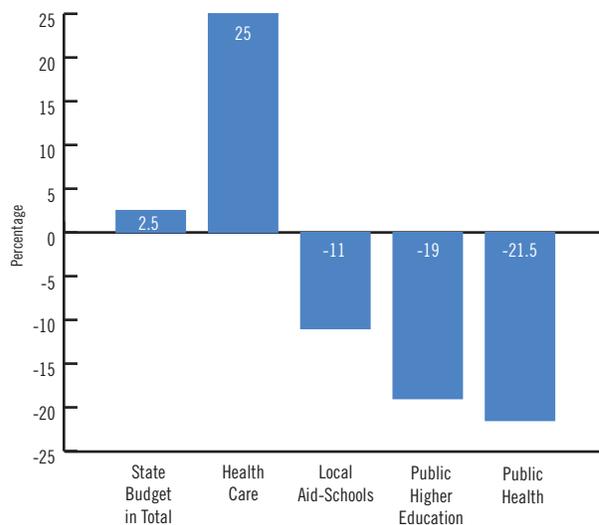
The affordability of health insurance will become an even more acute issue for Greater Boston in the

FIGURE 5
Health Insurance Cost Increases Outpace Income Gains



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.

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.

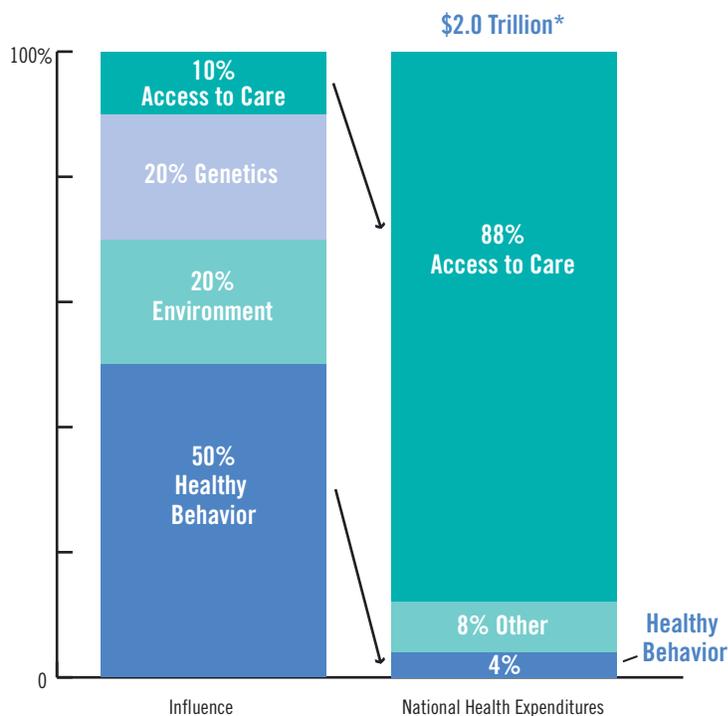
Health care spending by Massachusetts state government rose from 16 to 22 percent of the state budget from Fiscal Years 2001 through 2007.⁵⁴ Health care spending rose by 49 percent in real terms. In the same period, state aid to cities and towns fell by 20 percent in real terms, while state public health 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

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



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 expenditure 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.

Source: New England Healthcare Institute.

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

Here follows a distilled description of 30 critical indicators of health for Greater Bostonians—factors that collectively have a crucial effect on whether we will continue to be a healthy and economically competitive community. For a complete description of these vital indicators, see the full report (available from the Boston Foundation or New England Healthcare Institute) or visit the TBF or NEHI websites. www.tbf.org or www.nehi.net.

Background: Population Trends, Health and Health Care

■ **Sluggish population growth will shape Greater Boston’s health, its health care and its competitiveness.**

The population of Greater Boston and Massachusetts has declined in recent years due to the area’s relatively low birth rate and an accelerated rate of out-migration from Greater Boston and Massachusetts. Massachusetts has experienced virtually no labor force growth since 2000. Workforce losses would be significantly more severe but for a continued influx of immigrants, which is increasing the diversity of Greater Boston. Demographers expect Greater Boston’s population to increase only modestly in the years ahead, driven almost entirely by longevity among the Baby Boom generation.

■ **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: there are many implications of this for Greater Boston’s health, health care and competitiveness.**

Although the region’s life sciences industries may boom, population growth will not drive growth in health care and related care-giving industries the way it will in other high-growth regions of the US. But because the region’s population is aging, its health care needs will intensify. A rising level of preventable chronic disease will also intensify needs among all age groups. The effects of an older and sicker workforce may be to create a higher risk insurance pool to be

covered by employer-based health insurance and to erode the high productivity that has long been a hallmark of Greater Boston’s economy. The health and wellness of workers will become an issue for economic development as well as for health care policy. The increasing prominence of immigrants in Greater Boston’s population and workforce will make the quest to end health disparities more crucial.

INDICATORS OF THE DETERMINANTS OF HEALTH

Health researchers define “determinants of health” as social, behavioral, environmental and genetic factors that have a decisive influence on each person’s health and susceptibility to illness over the course of a lifetime.

Indicator 1-Educational Attainment

Educational attainment may be the single most important influence on a person’s lifetime health status; the more education you have, the healthier you are likely to be. Historically, the high level of education among Greater Bostonians may be a major reason why our overall health status has been relatively good for decades. Now, as college attainment among Greater Boston residents is slipping, the level of good health among residents and our competitiveness is also slipping. Education for newer residents must be increased to improve both public health and the region’s competitiveness.

Indicator 2-Median Income

The wealthier you are, the more likely you are to be healthy and enjoy access to good health care. While the median income level in Greater Boston is high by US standards, high living costs reduce the purchasing power of typical households. Real (inflation-adjusted) incomes have barely grown over the last decade, so poor income growth poses a long-term threat to sustained good health in Greater Boston. Moreover,

income growth in the region has skewed strongly towards upper-income earners. Epidemiological research suggests that income inequality is itself a negative influence on health status.

Indicator 3-Clean Air

Clean air is essential to life, and polluted air can directly trigger or worsen a range of respiratory illnesses (such as asthma) and non-respiratory illnesses (such as cardiovascular disease). New technologies and air pollution regulation has greatly improved the air quality in Greater Boston over 25 years, but air quality in the region is only about average for US metropolitan areas. Scientific findings also continue to demonstrate the need for greater vigilance regarding ultra-small airborne particulates and thus Greater Boston faces even stricter regulation over the next decade.

Indicator 4-Clean Water

Clean water is also essential to life: many of the greatest advances in public health and life expectancy have been achieved by ensuring a clean supply of drinkable water and the sanitary treatment of sewage. Greater Boston's water supplies meet or exceed national standards and the metropolitan region is one of the few in the country that has recently invested in rebuilding its water supply and sewage treatment infrastructure.

Indicator 5-Community Safety

Not only does crime have an enormous negative effect on health, the fear of crime can also be destructive. Residents of high-crime neighborhoods suffer the effects of isolation, lack of access to recreation and connection with friends and neighbors. Greater Boston as a whole enjoys low crime rates by US standards, but violent crime has increased in recent years. Violent crime has increased dramatically in Boston itself, intensifying premature death, disability, and fear in poor neighborhoods that are already subject to higher health risks. Sadly, the rising cost of health insurance reduces city funds for police protection and emergency services.

Indicator 6-Tobacco Use

Smoking is still the No. 1 underlying cause of death in the United States, although US smoking rates have fallen dramatically over the last 20 years. Historically, smoking rates in Greater Boston and Massachusetts are below the national average. An aggressive state

anti-smoking campaign in the 1990s reduced youth smoking significantly. Nevertheless, nearly one in five state residents still smokes, and smoking is particularly prevalent among less educated and less well off residents.

Indicator 7-Exercise and Fitness

Overwhelming medical evidence demonstrates that fitness is essential to lifelong physical and mental health. Alas, the exercise patterns of both young and old in Greater Boston have shown little improvement over the last decade. Only about half of adults report getting regular physical exercise; the more highly educated and more well off residents are more apt to exercise. Physical activity among school-age children has decreased, with a substantial reduction in school hours devoted to physical education since the state education reforms of the mid-1990s.

Indicator 8-Diet and Nutrition

Pioneering research from Greater Boston, including the Framingham Heart Study, helped to establish the link between diet and health. Unfortunately, Greater Boston is not pioneering exemplary dietary practices. No more than a third of Greater Boston residents meet daily nutritional requirements in their diet. Once again, the more highly educated and more well-off are more likely to enjoy good diets, but compliance among these groups is still poor. Recent data suggests that good dietary compliance among Greater Boston's school-age children is below US averages.

Indicator 9-Overweight and Obesity

Illness caused by overweight and obesity is the second leading cause of death in the US, and obesity-related mortality may exceed tobacco-related mortality within the next decade. While Greater Boston and Massachusetts enjoy a lower overall rate of obesity than the US as a whole, the rate of overweight and obesity is rising, and Massachusetts adults reached the highest reported level of obesity ever in 2005. Obesity is particularly acute among lower income and minority groups, but is rising rapidly among all groups, including whites and residents with high income and education levels. Emerging epidemiological research suggests that obesity-driven illness may be the single most important factor driving up health care costs.

Indicator 10-Access to Health Care: Health Insurance Coverage

Recent data suggests that the number of uninsured persons in Massachusetts is declining while the rate of uninsured people throughout the US continues to increase. The state's landmark 2006 health insurance reforms is designed to create near-universal health insurance coverage in the state, and as of Spring 2007 over 100,000 persons have been provided health insurance through the state's new programs. The state's low rate of uninsured people represents a comparatively high level of insurance sponsorship among employers in the state and a deliberate, decade-long effort, to maximize the enrollment of state residents, particularly children, in the state's Medicaid program.

Background: Life Expectancy and Early Mortality

Historically, the overall status of health in Greater Boston and Massachusetts has been high by American standards. Life expectancy in the state is among the highest in the US (about 79.6 years in 2004; about 1.7 years higher than the US average). The state ranks 6th among all states for the number of years of life lost to death before the age of 75. Massachusetts also enjoys one of the lowest levels of infant mortality in the country, one of the highest levels of infant and child vaccination, an extremely low rate of highway death, and a very low rate of occupational accidents. However, the state's high life expectancy statistics mask significant disparities along racial, ethnic, education and income lines. Life expectancy among African Americans is much lower than among whites: five years lower among African American men than among white men, a reflection of a much higher likelihood of death before the age of 75. Life expectancy among Asian and Hispanic residents is generally higher than white life expectancy. Disparity in life expectancy is even more pronounced among lines of income, as the death rate among residents with less than a high school education is about three times higher than the death rate among residents with a higher education.

INDICATORS OF HEALTH STATUS

Indicator 11-Low Birth Weight

Infants born at low birth weights (LBW) are at special risk for a range of health problems, including developmental disabilities. LBW births have been increasing in Massachusetts over time, (9.6 percent of births in Greater Boston in 2005, a 36 percent increase since 1990). LBW births vary widely by race. LBW births to African American women are at about 12 percent, compared to a rate among white women of 7.3 percent, a rate among Hispanic women of 8.2 percent. A rising rate of LBW births is consistent with a rising number of multiple births and pre-term labor that is associated with an increasing average age of pregnant women in Greater Boston. Disparities in LBW births are also associated with disparity in access to health care: an estimated 75.8 percent of African American women receive adequate pre-natal care, compared to an estimated 86.8 percent of white women.

Indicator 12-Hypertension

Hypertension (high blood pressure) is a primary risk factor for heart disease, stroke, and cardiovascular disorders. Recent data indicates that one in four Massachusetts residents has received a hypertension diagnosis at least once in their life—the highest level reported in at least 15 years. The Massachusetts hypertension rate is only slightly below the median among all 50 states, and emerging data suggests that while local health care performs comparatively well in combating hypertension, one quarter or more of hypertensive patients receive no treatment or inadequate treatment. The less educated, the less well off, and older people are all more apt to suffer from high blood pressure.

Indicator 13-Diabetes

The US is experiencing an explosion of diabetes, primarily an increase in Type 2 (adult onset) diabetes that is closely associated with poor diet, poor fitness and obesity. While Greater Boston and Massachusetts enjoy a lower-than-US average rate of diabetes, self-reported diabetes has increased by 39 percent from 1996 through 2005. At least 6.4 percent of the state

population is now diabetic. Diabetes is rising sharply among the very groups expected to comprise a larger percentage of the region's population in the future: the elderly, older working persons, and residents of color. Diabetes is strongly correlated with lower income and education, so rising diabetes levels will strain Medicaid and the new Commonwealth Care insurance program.

Indicator 14-Heart Disease

Heart disease is the leading direct cause of death in Massachusetts, and heart disease related hospitalization is the leading category of hospital spending. The prevalence of heart disease among residents has held steady in recent years (about 8.5 percent), but heart disease-related mortality has fallen continuously for over 25 years. Heart disease mortality in Massachusetts is modestly lower than the US average, and "premature mortality" (death before age 75) from heart disease is lower in Massachusetts than in the US as a whole—perhaps a reflection of the good-to-excellent heart care available in the state. More than one half million state residents have heart disease at any given time—creating a steady demand for health services. Overweight, obesity and diabetes are significant risk factors for heart disease, and increases in these conditions threaten to worsen Greater Boston's health status and increase health care costs.

Indicator 15-Cancer

Cancers are the second leading direct cause of death in Massachusetts. Cancers are about 9 percent more common among Massachusetts residents than among US residents as a whole, and cancer incidence has increased in the state even as it has begun to decline in the US. Nevertheless, cancer mortality has decreased and is at levels roughly comparable to the US level—likely a testament to the quality and intensity of medical care available in Massachusetts. Lung cancer mortality among Massachusetts men is lower than the US average—thanks to the state's relatively low smoking rate. Racial/ethnic disparities in cancer include a significantly higher than-average rate of prostate cancer among African American men. The increasing rate of cancer survivorship, and an increasing number of cancer patients (due to an aging population) mean that cancer services will grow strongly in Greater Boston over the next decades.

Indicator 16-Asthma

Asthma is one of the few major diseases in which Greater Boston and Massachusetts perform poorly compared to most other metropolitan areas and to the US average—consistently 1.5 to 2.5 percentage points higher in Massachusetts than in the US. Currently, about 9.7 percent of the state's adults report that they have asthma. State data also shows that asthma-related hospitalizations, including highly preventable hospitalizations, continue to rise. Emerging measures of health care quality also suggest that the quality of asthma care in Greater Boston is not as high as US averages. Asthma levels are particularly pronounced among African American and Hispanic residents.

Background: Greater Boston's Economy and Health Care

The health care industry played a leading role in Greater Boston's recovery from the recession of 2000-2001. Health care jobs increased continuously from 2001 onward, averaging 6 percent or more per year. Health care's share of the regional economy has grown as well. Personal Health Care Expenditures (PHCE)—a measure of the overall impact of health care and related spending on the economy—increased to about 14.3 percent of the Massachusetts Gross Domestic Product in 2004, up from 12.8 percent in 1996. Health care's increasing share of the local economy is due to rapidly increasing spending in the health care sector and what was, until recently, a lagging rate of growth in the overall economy of Massachusetts and Greater Boston.

Wages and salaries in the health care industries, measured in toto, have grown strongly in recent years (about 6.4 percent), but not as rapidly as overall health care costs and health care insurance—an indication of how health care cost inflation poses a threat even to many health care occupations. Average wages in most health care occupations in Greater Boston are at or below the economy-wide average, and well below average wages in the high-technology and financial services sectors that suffered the largest job losses in the 2000-2001 recession and its aftermath.

One bright spot is growth in the life science industries that are clustered around Greater Boston's teaching

hospitals, universities, and affiliated research institutions. The biotechnology sector continues to grow at rates well above the rate of growth in the overall economy. However, employment in the life science industries represents only about 3 percent of overall employment in Greater Boston, and does not compensate for losses in other major industries since 2000.

INDICATORS OF HEALTH CARE BY SOURCES OF FUNDING

Indicator 17-Employer-sponsored Health Insurance

Employer sponsorship (public and private sectors) of employee health insurance has remained remarkably stable in Massachusetts, while it has continued to decrease throughout the US. While some evidence suggests that private sector sponsorship of health insurance has declined, about 70 percent of employers in the state offer health insurance; about 60 percent of all US employers offer health insurance. Approximately 85 percent of state residents receive health insurance through employers. As in other states, smaller employers in Massachusetts are far less likely to offer health insurance than large employers, although over half of employers with 2-9 employees in the state offer insurance—a rate 10-15 percent higher than the national average. The state's landmark health insurance reform legislation now requires all employers with 11 or more employees to offer health insurance, or to pay a fee. The state aims to ease the burden of the new mandate by creating a new market for lower-cost health insurance available to small businesses and individuals.

Indicator 18-Cost of Employer-Sponsored Health Insurance

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. Recent estimates indicate that health insurance costs in the state have risen at a rate of about 8 percent per year, or almost two points higher than the rate of inflation in health insurance plans for the US as a whole.

The costs of insurance borne by private sector employees have risen as the cost of health insurance has increased, but in general, employees with employer-sponsored health insurance in Massachusetts still pay less for their health care than employees in many other states. The cost of health insurance is rising faster than the incomes and wages of most households in Greater Boston and Massachusetts. The cost of insurance has risen steadily against the reported median income of Massachusetts households. At current rates of growth the cost of insurance will equal about 20 percent of median income within five years.

Indicator 19-State Expenditures for Health and Health Care

Health care spending rose from 16 to 22 percent of the Massachusetts state budget from fiscal years 2001 through 2007, growing 49 percent in real terms, and crowding out other needed expenditures. The increase in health spending is caused in part by a pro-active policy to expand Medicaid eligibility, a policy that has helped reduce the number of uninsured persons to one of the lowest levels in the country. Among the programs squeezed by increased health spending is public health. As of 2007 public health spending was 20 percent below the 2001 level, in real terms.

Indicator 20-Federal Expenditure for Health and Health Care

Health care spending by the federal government also has grown at rates that exceed the rate of growth in the overall US economy and federal tax revenues and comprised about 22 percent of the federal budget in 2006, up from 18 percent in 1996. Health care is the fastest growing category of federal spending in the last decade, although defense and homeland security spending has increased at a faster rate since 9/11. Federal health care spending is estimated to grow at rates of up to 3 percent above the rate of increase in the Gross Domestic Product for the next 10 years. At that rate, the health care budget will squeeze other needed non-defense expenditures including education aid, environmental protection, biomedical research, and public health. Federal spending accounts for over a third of all health care-related expenditure in Massachusetts, and is expected to comprise an even larger share as the Massachusetts population ages.

INDICATORS OF HEALTH CARE BY USES OF FUNDING

Indicator 21-Public Health Programs

State funding for public health activities has increased in recent years but is still below the levels reached before the recession of 2000-2001; as of fiscal year 2007, funding for school-based health services was 68 percent below 2001 levels (in real dollar terms), and smoking-cessation programs were 86 percent below 2001 levels. The reductions in state public health spending reflect a diversion of revenue sources (tobacco litigation settlement proceeds in particular) that had previously been reserved for smoking-cessation programs and other public health initiatives. State public health spending is also constrained by recent federal cutbacks in key programs such as those of the Centers for Disease Control and Prevention. Up to one-half of all public health spending in Massachusetts is derived from federal funds, and Massachusetts ranks as high as 11th among the 50 states for gross receipt of federal public health spending, much of it won on a competitive basis.

Indicator 22-Physician Services

Greater Boston has a high concentration of doctors (doctors-per-residents) by US standards: recent data suggests that about 3.4 percent of the nation's doctors work in metropolitan Boston, an area that comprises about 2 percent of US population. A relatively high proportion of area doctors work in hospitals; about two-thirds of them are medical trainees (resident physicians), but the concentration of fully trained, licensed doctors in Greater Boston is still relatively high, (about 260 doctors per 100,000 population, compared to about 190 doctors per 100,000 population in the US as a whole). The physicians in Massachusetts include a large and growing number of primary care physicians, about 190 physicians per 100,000 residents in Massachusetts, compared to about 125 physicians per 100,000 US residents. Many analysts see a growing crisis in primary care medicine in the area, but the crisis may be less a shortage than difficulty in making primary care physicians available where they are most needed. Wages for Greater Boston physicians are high

compared to average wages for all occupations, but growth in median physician wages in Massachusetts has trailed growth in US median physician wages for several years. Community health services play a significant role in Greater Boston. Massachusetts has the 4th largest number of federally chartered health centers in the nation, exceeded only by the much-larger states of California, New York, and Texas. An estimated 7 percent of the state's population is served by community health centers, compared to about 5 percent in the US as a whole.

Indicator 23-Hospital Services

Hospitals play a disproportionately large role in Greater Boston's economy and health care system. The concentration of hospital-based employment in Greater Boston (employees per resident population) is about twice the concentration in the US as a whole. Hospital-based employment grew over 20 percent after 2000, following several years of decline, exceeding the rate of growth in nearly all Boston-area industries, as well as the rate of growth in the overall US hospital industry. Wages in Boston-area hospitals vary, but on average are nearly equal to the average wage for all jobs in Greater Boston's overall economy. The rebound in hospital employment in Greater Boston—and in Massachusetts—is due in part to strong growth in hospital-based outpatient services. Recent data suggests that Massachusetts residents register more than 1,770 outpatient visits per 10,000 residents per year—about 500 visits more than the rate among US residents as a whole. In recent years outpatient service utilization in Massachusetts has grown at rates nearly 4 times faster than the US average. Hospital costs in Massachusetts are about 46 percent higher than the US average, but estimates of local hospital costs are frequently conflated with the non-patient revenue received by area hospitals. Non-patient revenues (much of it biomedical research funding) account for over 14 percent of hospital revenues in the state, about twice the percentage for US hospitals as a whole. Boston teaching hospitals rank among the Top 10 most heavily funded non-profit research organizations in the country.

Indicator 24-Prescription Drugs

Continuing increases in the variety of drug-based treatments available to patients and a rising level of need have greatly increased the share of health care spending devoted to prescription drugs. The most recent available data suggests that prescription drug spending has grown more rapidly in Massachusetts than in the US as a whole, (a 75 percent increase from 1996 through 2005, compared to 61 percent in the US). Evidence also suggests that state residents fill a relatively high number of prescriptions per capita, exceeded only by the southern states.

Indicator 25-Home Health Care

The home health care industry in Greater Boston and Massachusetts has begun to rebound after severe cutbacks that began with reductions in Medicare funding in the mid-1990s. Home health care employment dropped by half between 1996 and 2002, but has since increased by nearly 30 percent to over 15,000 jobs in Greater Boston. Massachusetts is a comparatively heavy user of home health services, and the concentration of home health workers (workers per resident population) is about 15 percent higher than the concentration nationally. Home health care remains a low-wage industry: the average wage is a little less than half the median income for the metropolitan region, putting home health workers at particular risk for health care coverage.

Indicator 26-Nursing Home Services

The number of nursing home residents, nursing home beds, and nursing homes in Massachusetts has declined steadily since the late 1990s, at rates in excess of a similar decline in the nursing home industry nationwide. Despite the reduction Massachusetts remains a comparatively high user of nursing home services with about 730 patients per 100,000 population, compared to a national rate of about 500. Employment in the nursing home industry has increased since 2001, an indication that the daily needs of nursing home residents are intensifying. The Medicaid program pays for a higher share of Massachusetts nursing home expenditure than it does in the US as a whole, which suggests that the state's increasingly older population will add new pressures on Medicaid and the state's health care budget.

INDICATORS OF RELATED INDUSTRIES

Indicator 27-Health Insurance Industry

The health insurance industry in Greater Boston is dominated by three not-for-profit insurers—Blue Cross Blue Shield, Harvard Pilgrim, and Tufts Health Plan—although each maintains alliances with national for-profit health insurers. All three (and the Worcester-based Fallon Health Plan) are among the highest-rated health insurers in the US, based on consumer satisfaction and on national quality standards. Estimates suggest that health insurance employment in Greater Boston increased by 12 percent in 2006, and has nearly doubled since 1996. US health insurance employment grew by about 16 percent during the same time period. Private health insurance in Massachusetts is distinguished by a relatively high level of coverage provided through health maintenance organization (HMO) plans. Nearly 40 percent of state residents are covered through HMOs, placing Massachusetts about 3rd among the 50 states for HMO utilization.

Indicator 28-Medical and Nursing Education

Massachusetts-based teaching hospitals train a relatively high percentage of US graduate medical trainees (medical residents), at about 4.7 percent of the US total. About 78 medical residents per 100,000 residents are trained in the state's teaching hospitals (100 residents per 100,000 residents of Greater Boston), compared to the national average of approximately 35 residents per 100,000 residents. The number of residents in Massachusetts grew by over 12 percent in the last decade (compared to about 6 percent in the US). Medical residents in primary care fields grew by about 8.6 percent, compared to 4.4 percent growth in the US as a whole. Graduations from local nursing schools have increased substantially (35 percent) in the last five years in response to a persistent, nationwide nursing shortage. The number of active, registered nurses working in Greater Boston has changed little, however, as nurses continue to retire or to leave the field.

Indicator 29-Health-related Research and Technology Transfer

Federally funded research more than doubled at Greater Boston teaching hospitals from 1997 to 2000; the teaching hospitals now perform about 40 percent of all federally-funded research in Massachusetts (an increase in share of about one-third in 10 years).

Greater Boston teaching hospitals are among the most heavily funded research institutions in the US, and include the top two institutions (Massachusetts General Hospital and Brigham & Women's Hospital). The increase in research funding has led to a significant spike in new technologies disclosed, patented and licensed by the hospitals. Yearly licensing income to the hospitals has grown about ten-fold in the decade, to more than \$100 million. Federal research funding has not kept pace with inflation since 2003, however, and at current rates of inflation Boston hospitals will soon face research cutbacks.

Indicator 30-Life Science Industries

Health care technology industries include the biotechnology, medical device, and pharmaceutical industries. All have strong links to Greater Boston teaching hospitals—as investors in new technologies or discoveries generated by the hospitals, and as frequent recruiters of hospital-based researchers. In recent years, biotechnology has been the fastest growing of the area's life science industries. The value of local output from the biotechnology industry has grown by nearly 250 percent in the last decade (1996-2006), while employment has grown by over 75 percent. Output from the medical device and pharmaceutical industries has also grown in excess of 100 percent over the decade, although employment in the medical device industry has slightly declined over the same period of time.

Summary: An Opportunity for Leadership

Many of the key indicators of health, health care and competitiveness in Greater Boston are good news for our community. Compared to most metropolitan areas in America, Greater Boston enjoys comparatively good health overall. Its residents benefit from attributes that support good health and prosperity: relatively high levels of education, income, and access to good health care. Yet there are worrisome signs of strain, and the rising threat of chronic disease could stall or reverse years of progress in reducing the burden of illness. More worrisome yet, the rising cost of health care is hampering critical investments in education, public safety, research, and environmental protection. This is a challenge for the entire country, but could be particularly acute in our community because Greater Boston faces a future in which its population and workforce will grow slowly and health care needs will rise. Greater Boston now has a tremendous opportunity to parlay its immense resources for innovation—including its world-class research community—to reverse the rising tide of preventable disease through new initiatives that will spur future growth and establish our community as a global leader for the control of preventable disease.

Read the Full Report

For a complete description of the 30 Key Health Determinants for Greater Boston and Massachusetts, see the full version of this report, or visit the Boston Foundation or New England Healthcare Institute websites: www.tbf.org or www.nehi.net.

Endnotes

- ¹ The complete text of all 30 indicators in the Greater Boston Health Care Economy Indicators Report will be published in the summer of 2007, and will be available online 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.
- 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 Chernew, "The 'Graying' Of Group Health Insurance" *Health Affairs*, November/December 2006; 25(6): 1497-1506.
- 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, MA/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.

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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/dhcfp/r/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.

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/yrbs/>

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/

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⁴⁴ NEHI calculations from American Hospital Association, Hospital Statistics 2004, op cit

⁴⁵ See Moscovitch, Edward, Massachusetts Community Hospitals – A Comparative Economic Analysis: Rising Demand vs.

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⁴⁹ Association of University Technology Managers (AUTM), as cited by the Massachusetts Technology Collaborative, Index of the Massachusetts Innovation Economy 2006, at www.masstech.org

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⁵¹ Agency for Healthcare Research and Quality, Medical Expenditure Panel Survey, Insurance Component, state level data at Table II, D. 1 www.meps.ahrq.gov/mepsweb/survey_comp/Insurance.jsp; ; Data from the MA Department of Healthcare Finance and Policy’s 2005 Employer Health Insurance Survey indicates that the average cost of family health insurance rose 7.96 percent in Massachusetts in 2005. (Massachusetts Employer Health Insurance Survey, op cit); advance survey results announced by the Mercer Health Benefits consultancy in December 2006 indicated that average costs in Massachusetts rose 8.2 percent in 2006, compared to an overall US increase of 6.1 percent. See “Massachusetts health care costs are 4th highest,” Boston Globe, November 20, 2006

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⁵³ The Bureau of Labor Statistics May 2005 State Occupational and Employment Wage Estimates report a median hourly wage of \$17.45 per hour in 2005, which annualizes to \$36,337, http://www.bls.gov/oes/current/oes_ma.htm#b00-0000; the average cost of a family health insurance plan in Massachusetts is estimated by the MA Department of Health Care Finance and Policy 2005 Employers Health Insurance Survey at \$11,400.

⁵⁴ NEHI calculations of state health care spending, net of federal reimbursements, based on data published by the Massachusetts Budget and Policy Center and the Massachusetts Taxpayers Foundation.

⁵⁵ See Massachusetts Budget and Policy Center ‘Budget Monitor,’ December 13, 2006

⁵⁶ House Bill No. 1, The Governor’s Budget Recommendation, Commonwealth of Massachusetts, February 28, 2007

⁵⁷ Massachusetts Taxpayers Foundation, “The Long-term Mismatch Between Available Resources and Important State Priorities: A Five-Year Fiscal Analysis,” September 2006

⁵⁸ Calculation by NEHI from the US Office of Management and Budget, Historical Tables, Budget of the United States Government, Fiscal Year 2007, Table 3.1, at www.whitehouse.gov/omb/budget/fy2007/.

⁵⁹ GDP projection from the Congressional Budget Office, The Budget and Economic Outlook: An Update, August 2006, at www.cbo.gov/ftpdocs/74xx/doc7492/08-17-BudgetUpdate.pdf; Federal health care spending projection from Stephen Heffler, et al, “US Health Spending Projections for 2004-2014,” Health Affairs, February 23, 2005. .

⁶⁰ GDP projection from the Congressional Budget Office, The Budget and Economic Outlook: An Update, August 2006, at www.cbo.gov/ftpdocs/74xx/doc7492/08-17-BudgetUpdate.pdf; Federal health care spending projection from Heffler, et al, op cit.; Estimates from Exhibit 4 at Heffler, op cit US

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