Characteristics of Workers and Jobs in the Massachusetts Health Care Industry

Chapter 224 Baseline Study

Prepared by Commonwealth Corporation and the
Center for Labor Markets and Policy, Drexel University
for the Commonwealth of Massachusetts
Office of the State Auditor

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Contents

Introduction

The first paper in this series is primarily based on our examination of data from the Quarterly Census of Employment and Wages (QCEW). The paper begins with the definition of the health care sector that we have adopted in this series of papers and the underlying rationale and continues with examinations of the industry composition of the health care workforce and trends in health care and total employment since 2001 in the state and each region across the state. The final section of that paper discusses the occupational and skill impacts of changes in health care employment over time, providing insights into the likely effects on occupational employment from changes in the industry structure of the health care sector in the state in response to Chapter 224.

In this paper we begin with an examination of the demographic characteristics of the health care workforce in Massachusetts and each of the eight regions within the state. In order to paint a comprehensive portrait of the state's health workforce, we have examined a number of demographic traits including gender, race-ethnicity, nativity, age, educational attainment, disability and veteran status. We have also presented a comparison of the demographic traits of health care workers with their counterparts who work in non-health care industries in Massachusetts. The demographic traits of workers in each of the four sub-sectors of the health care industry are also examined in this section.

The second section of this paper contains analysis of the hours and weeks of employment and annual earnings. Hours and weeks of employment are presented for all health care workers across the state and in each sub-sector of the health care industry as well as for all non-health care workers statewide. Findings from our examination of annual earnings are presented for the health care and non-health care workforce of the state and each of the eight regions within the state, for each sub-sector within the health care industry for the state and each region within the state, and for workers employed in major occupations within the health care industry. Also presented in the earnings section is an analysis of the distribution of annual earnings in the health care and non-health care sectors of the state.

Data: American Community Survey

Assessment of the demographic characteristics, weeks and hours of employment, and earnings as well as occupational characteristics (presented in the first paper) of the health care workforce is based on our analysis of the American Community Survey public use micro data files. The American Community Survey (ACS) is an ongoing annual survey conducted by the U.S Bureau of the Census. The ACS survey is designed to replace the long form decennial census survey that was administered to a sample of households in the nation and used in addition to the short form survey that was administered to every household in the nation. The long form survey was used in every decennial census until the year 2010 when the long-form survey was discontinued. Starting in 2006, the Census Bureau introduced the American Community Survey that is conducted annually with a survey instrument containing basic questions about age, gender, and race-ethnicity, as well as detailed questions about housing and population characteristics that were previously gathered with the decennial census long-form survey.

After collection, the Census Bureau releases ACS data for public use in two formats. The first is summary data files where each record is a geographic area including the nation, state, and sub-state areas down to census tracts and blocks; data are released in tabulated format for each of these geographic areas. ACS data are also released in a different format-- micro data files (called Public Use Microdata Samples or PUMS data files) with each de-identified record representing an individual respondent. Because the PUMS data files contain data at the individual respondent level, the Census Bureau protects the confidentiality of respondents by limiting geographic information available in public use data files. The smallest geographical area identified on the ACS PUMS data files is the Public Use Microdata Area (PUMA) which consists of an area with about 100,000 residents.

The ACS survey also asks respondents to provide the address of the job that they held at the time of the ACS survey. This information is provided on the public use ACS PUMA data files in the form of Place of Work PUMAs or POWPUMAs which are equivalent of PUMAs in size but are reported separately in the data file to identify the place of employment of respondents. This information is useful to answer questions regarding commuting patterns of workers and also to identify the characteristics of the workforce of an area. Our analysis of the characteristics of the state's and regions' workers in the health care industry uses POWPUMA to

identify all workers who were employed in the health care industry located in Massachusetts regardless of their place of residence. So for example, if a resident of Providence RI was employed at a community health clinic in Fall River, she would be included in our analysis of the health care workforce in Massachusetts. Using the place of work PUMA (POWPUMA) we have divided the state in the same eight regions that were used in sub-state analysis in the first paper.

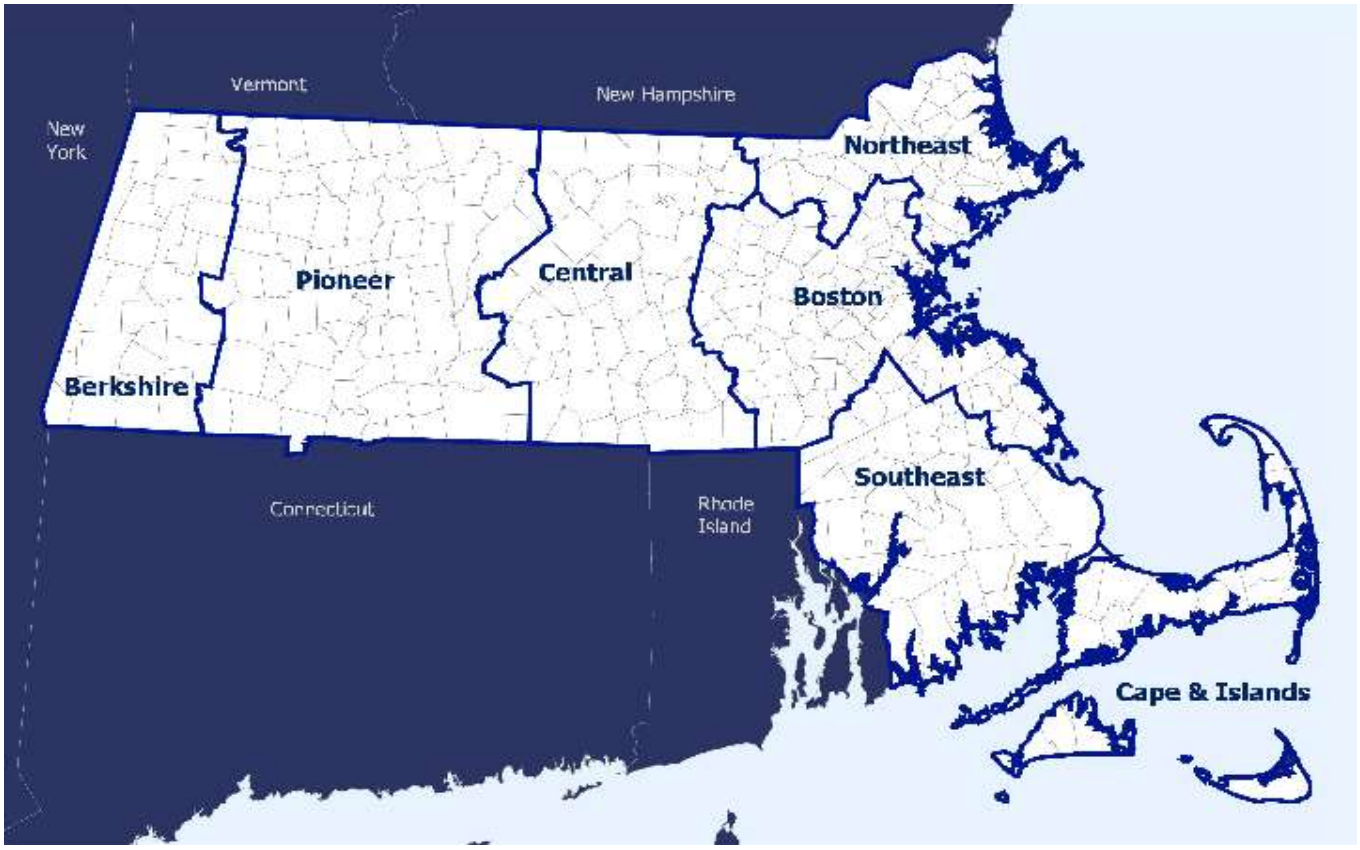
We needed to use five years of combined ACS micro data (PUMS) data files for our analysis so that we could have sufficient samples to produce statistically reliable estimates of the characteristics and earnings of the health care workforce at the regional level. We wanted to use five years of ACS data that would include the period before the implementation of Chapter 224, allowing us to use to use subsequent years of ACS data to compare the state and regional health care workforce before and after the passage of Chapter 224 legislation.

The 2008 to 2012 ACS PUMS data files would meet all these requirements. But we could not use the 2008-2012 ACS PUMS data because of the large and unexpected changes in the Massachusetts place of work PUMA definitions on the 2012 ACS. The boundaries of PUMAs and POWPUMAs were redrawn based on new population counts from the 2010 decennial census enumeration. The 2012 ACS PUMS data were released with these new PUMAs and POWPUMAs. We were able to produce a close match of the 2012 PUMA-based definition of the eight regions with the boundaries of pre-2012 PUMAs. However, the definition of POWPUMAs used in the 2012 ACS micro data files was very different from that of POWPUMAs used in pre-2012 ACS PUMS data files.

The 2012 PUWPUMAs were aggregated with the entire state divided into just 5 POWPUMAs. In contrast ACS PUMS data files prior to 2012 divided the entire state into 48 POWPUMAs. The 2012 POWPUMAs did not allow identification of the eight regions of the state. Consequently we are unable to use the 2008-2012 combined ACS PUMS data files in this study. Instead this study is based on the 2007-2011 combined ACS PUMS data files.[1] Using the more detailed POWPUMAs in the ACS data between 2007 and 2011 we have divided the state into regions. The map below contains boundaries of seven regions of the state.

[1] We have sent an inquiry to the U.S. Census Bureau regarding the rationale for such a drastic change in the number of POWPUMAs identified on the 2012 Massachusetts ACS PUMS data file.

Geographic Boundaries of Regions in Massachusetts



We have divided the Greater Metro Boston region into Boston and the remainder of the Greater Metro Boston region resulting in eight regions. The workforce investment areas that comprise each region are presented below:

Region	Workforce Investment Areas
Berkshire	Berkshire
Pioneer Valley	Franklin/Hampshire, Hampden
Central	North Central, Central
Northeast	Greater Lowell, Merrimack Valley, North Shore
Boston	*Boston*
Greater Metro Boston ex. Boston	*Metro North, Metro South/West*
Southeast	South Shore, Brockton, Bristol, New Bedford
Cape & Islands	Cape & Islands

Demographic Characteristics of Health Care Workers in Massachusetts

In this section of the paper we examine the demographic characteristics of the health care workforce in Massachusetts and each of the eight regions within the state. In order to paint a comprehensive portrait of the state's health workforce, we have examined a number of demographic traits including gender, race-ethnicity, nativity, age, educational attainment, disability and veteran status. We have also presented a comparison of the demographic traits of health care workers with their counterparts who work in other non-health care industries in Massachusetts. The demographic traits of workers in each of the four sub-sectors of the health care industry are also examined in this section.

Analysis of the demographic characteristics of the health care workforce in the state provides insights into demographic subgroups of workers that would be most likely to experience any changes in the health care workforce from the implementation of Chapter 224. If certain demographic subgroups are disproportionately represented in the health care workforce, then one could expect the impact of Chapter 224 to be disproportionately felt by these groups of workers. Additionally, understanding the demographic traits of workers within each sub-sector of the health care industry will allow for a more nuanced assessment of the impact of Chapter 224 and whether it unevenly affects the workforce in different sectors of the health care industry.

Demographic characteristics in this section are presented for the health care workforce in Massachusetts. The health care workforce includes all those who are employed in the health care industry in Massachusetts regardless of their place of residence. So if a health worker in Lawrence resides across the border in New Hampshire, she will be included in our analysis of the Massachusetts health care workforce. Similarly estimates of the health care workforce in each one of the state's eight regions are based on the place of work. For example, if a physician is employed in a Boston hospital but lives in Hingham, he will be included in Boston's health care workforce.

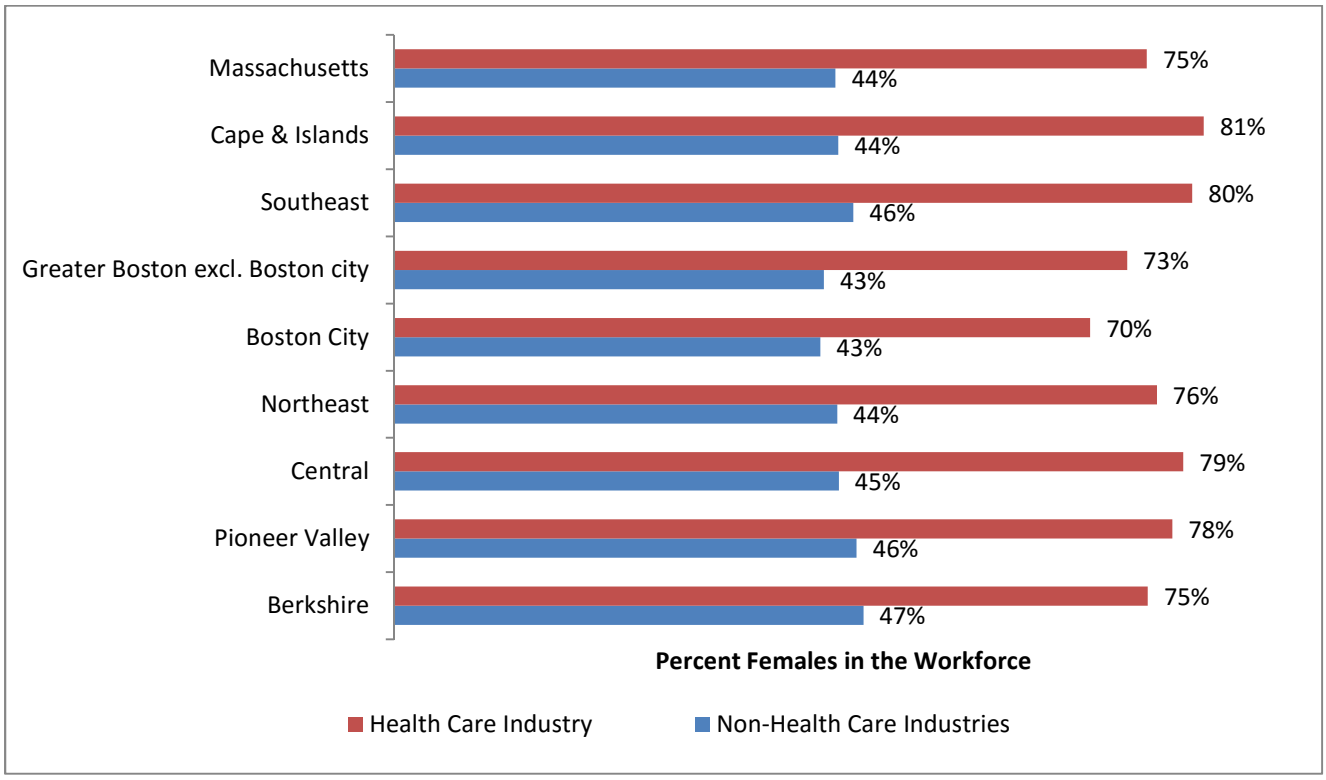
This definition of the health care workforce is similar to the workforce measured using the U.S. Bureau of Labor Statistics Quarterly Census of Employment and Wages (QCEW). Both capture the same concept of the health care workforce—all workers who are employed in the Massachusetts health care industry regardless of where they live. The health care industry includes firms in the following four sub-sectors: ambulatory care, hospitals, nursing homes and

residential care facilities, and individual and family services—the same definition that we have used in the previous paper.

Gender

The health care workforce in Massachusetts is overwhelmingly female. Given the large concentration of nurses, most of whom are women, in the health care industry compared to the non-health care industry (17% versus 0.27%), and the smaller shares of management occupations (23% versus 39%) and blue-collar occupations (2% versus 19%) in the health care industry, it is not surprising to find a much larger concentration of female workers in the state's health care workforce. Three-quarters of workers who are employed in the four health care sub-sectors are women. In sharp contrast, women comprise only 44 percent of the non-health care workforce in the state. Women comprise a large majority of the health care workforce in each of the state's eight regions with their share ranging from 81 percent in the Cape and the Islands region to 70 percent in the City of Boston. In contrast to the health care workforce,

Chart 1: Percent of Women among Health Care and Non-Health Care Industry Workers in Eight Massachusetts Regions, 2007-2011 Averages



Source: 2007-2011 American Community Survey Public Use Microdata Samples (PUMS) data files, tabulations by Center for Labor Markets and Policy, Drexel University.

women make up less than half of the non-health care workforce in each of the eight regions. Clearly, any workforce impact of Chapter 224 will affect women disproportionately more than men.

An examination of the statewide gender composition of the workforce in each of the four health care sub-sectors reveals small differences across sectors. In each of the four sub-sectors, women comprise between 74 and 79 percent of workers. Nursing and residential care facilities have a somewhat higher share of female workers (79%), whereas hospitals have a slightly smaller share of women (74%). However, all four sectors staff nearly three-quarters of their workforce with women.

Table 1: Percent of Women among Health care Industry Workers by Sector of the Health Care Industry, Massachusetts, 2007-2011 Averages

Massachusetts Industry Sector	Total Workers	Percent Female Workers	Percent Male Workers
Non-health Care Industries	2,814,940	44.2%	55.8%
Health Care Industry, Total	463,326	75.4%	24.6%
Ambulatory care	157,161	75.5%	24.5%
Hospitals	190,253	73.8%	26.2%
Nursing and residential care facilities	76,701	79.3%	20.7%
Individual and family services	39,211	74.6%	25.4%

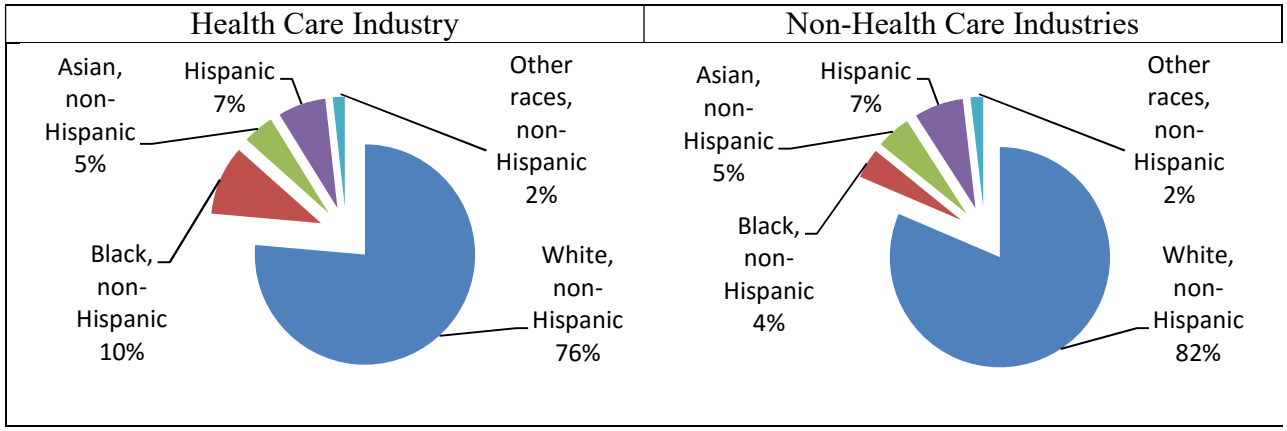
Source: 2007-2011 American Community Survey Public Use Microdata Samples (PUMS) data files, tabulations by Center for Labor Markets and Policy, Drexel University.

Race-Ethnicity

Although predominantly staffed with non-Hispanic White workers, employers in the state's health care industry employ a larger share of non-White workers than employers in non-health care industries in the state. Just over three-quarters of the state's health care workforce consists of non-Hispanic White workers compared to 82 percent of the state's workforce outside the health care industry. Health care employers are more than twice as likely to employ non-Hispanic Black workers. One in ten health care sector workers in the state are non-Hispanic Black compared to just 4 percent in all other industries. The share of non-Hispanic Asian and Hispanic workers was the same in the health care and non-health care industries of the state. Included in the race-ethnicity groups in the ACS is a catch-all category called "other races, non-

Hispanic" which includes the following races: American Indian, Alaska Native, Native Hawaiian and other Pacific Islander, some other race, and individuals who identified themselves as belonging to two or more major race groups. The shares of workers in that category were the same for health care and non-health care industries.

Chart 2: Percentage Distribution of the Health Care and non-Health Care Industry Workforce by Race-Ethnicity, Massachusetts, 2007-2011 Averages



Source: 2007-2011 American Community Survey Public Use Microdata Samples (PUMS) data files, tabulations by Center for Labor Markets and Policy, Drexel University.

The race-ethnicity composition of the health care workforce varies across the eight regions in the state. The share of the non-Hispanic White population in the health care workforce of the eight regions varies from 65 percent in the City of Boston; 76 to 78 percent in the Greater Boston region excluding the City of Boston, Pioneer Valley, and the Northeast; 81 and 84 percent in the Central and Southeast regions; and 91 percent in the Berkshire and the Cape and Islands regions. As with the state overall, the health care workforce in each region has a larger share of non-White workers than the non-health care workforce.

Table 2: Percentage of Health Care and Non-Health Care Industry Workers by Race-Ethnicity in Eight Massachusetts Regions, 2007-2011 Averages

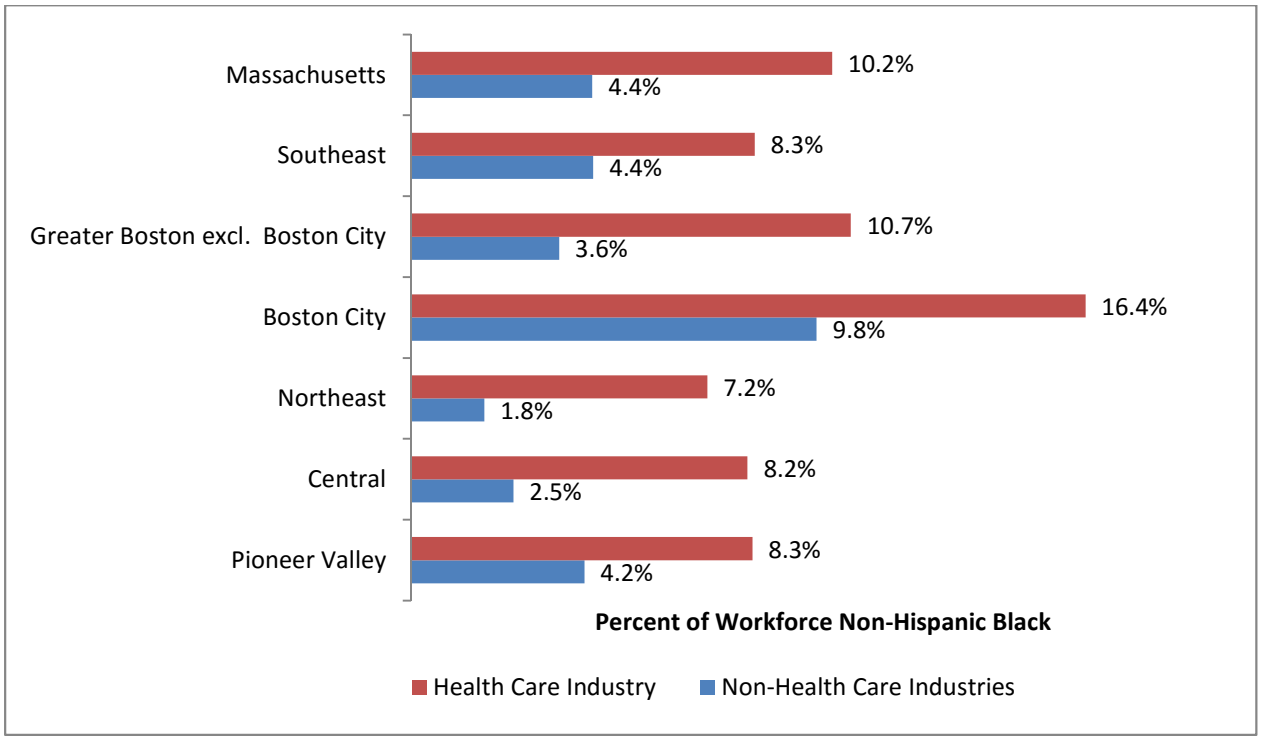
Regions	Health Care Workforce	White, non-Hispanic	Black, non-Hispanic	Asian, non Hispanic	Hispanic	Other, non-Hispanic
HEALTH CARE INDUSTRY						
Massachusetts	463,326	76.4%	10.2%	4.6%	7.1%	1.8%
Berkshire	10,496	91.2%	c	c	c	c
Pioneer Valley	48,703	76.2%	8.3%	c	12.8%	c
Central	45,929	81.1%	8.2%	c	6.7%	c
Northeast	58,024	77.8%	7.2%	3.1%	10.7%	c
City of Boston	98,310	64.8%	16.4%	9.4%	7.3%	2.1%
Greater Boston excluding the City of Boston	112,172	75.8%	10.7%	5.8%	6.1%	1.6%
Southeast	74,813	83.6%	8.3%	2.2%	3.2%	2.6%
Cape Cod & Islands	14,879	90.5%	c	c	c	c
NON-HEALTH CARE INDUSTRIES						
Massachusetts	2,814,940	81.4%	4.4%	5.1%	7.2%	1.9%
Berkshire	47,461	92.9%	c	c	c	c
Pioneer Valley	259,986	82.8%	4.2%	2.8%	8.9%	1.3%
Central	246,044	85.3%	2.5%	3.6%	7.3%	1.3%
Northeast	372,568	83.0%	1.8%	5.0%	9.0%	1.3%
City of Boston	466,287	70.1%	9.8%	7.8%	10.2%	2.1%
Greater Boston excluding the City of Boston	859,951	80.9%	3.6%	6.7%	6.8%	2.0%
Southeast	466,373	86.3%	4.4%	3.0%	4.1%	2.3%
Cape Cod & Islands	96,270	92.0%	2.0%	c	2.4%	2.3%

Source: 2007-2011 American Community Survey Public Use Microdata Samples (PUMS) data files, tabulations by Center for Labor Markets and Policy, Drexel University.
Note: 'c' represents cells with a sample size that is not large enough for statistically reliable estimates.

Among non-White race groups, the biggest difference in the racial composition of the health care and non-health care workforce in these regions is in the share of non-Hispanic Black workers. Health care employers in each region employ a considerably larger share of Black workers than their non-health care counterparts. In the City of Boston, one in six health care workers are Black compared to less than 10 percent of the city's non-health care workforce. Similarly large differences exist between the share of Black workers in the health care and non-

health care industries in each region. The health care industry appears to be a significant source of employment for Black workers across the state and regions.

Chart 3: Percent of non-Hispanic Black Workers in the Health Care and Non-Health Care Industry Workforce in Eight Massachusetts Regions, 2007-2011 Averages



Source: 2007-2011 American Community Survey Public Use Microdata Samples (PUMS) data files, tabulations by Center for Labor Markets and Policy, Drexel University
Note: The sample size of Black workers in the Berkshire and Cape and Islands regions in the 2007-2011 ACS PUMS data file is not large enough for statistically reliable estimates.

The race-ethnicity of the state's health care workforce also varies across each of the four health care sub-sectors. White workers account for 82 percent of workers employed in the ambulatory care sector, 77 percent of hospital workers, 73 percent of those working in the individual and family service sector, and only 66 percent of nursing and residential care employees. Black workers comprise one-fifth of nursing and residential care workers and one in ten workers in the hospital and individual and family services sectors of the state. Hispanic workers account for about one in ten workers in the state's nursing and residential care and individual and family services sectors. The share of Hispanic workers in the hospital and ambulatory care sectors (6%) is similar to the 7 percent share of Hispanic workers in the overall health care workforce in the state.

Table 3: Percentage Distribution of the Health Care Industry Workforce by Race-Ethnicity and by Sub-Sector of the Health Care Industry in Massachusetts, 2007-2011 Averages

Race-Ethnicity	All Health care Workers	Ambulatory Care	Hospitals	Nursing and Residential Care	Individual and Family Services
Total health care workforce	463,326	157,161	190,253	76,701	39,211
Percentage Distribution by Race-Ethnicity					
White, non-Hispanic	76.4%	81.8%	76.6%	66.2%	73.4%
Black, non-Hispanic	10.2%	6.5%	9.3%	19.9%	10.8%
Asian, non-Hispanic	4.6%	4.1%	6.6%	c	c
Hispanic	7.1%	6.3%	5.7%	9.8%	11.1%
Other, non-Hispanic	1.8%	1.4%	1.8%	c	c

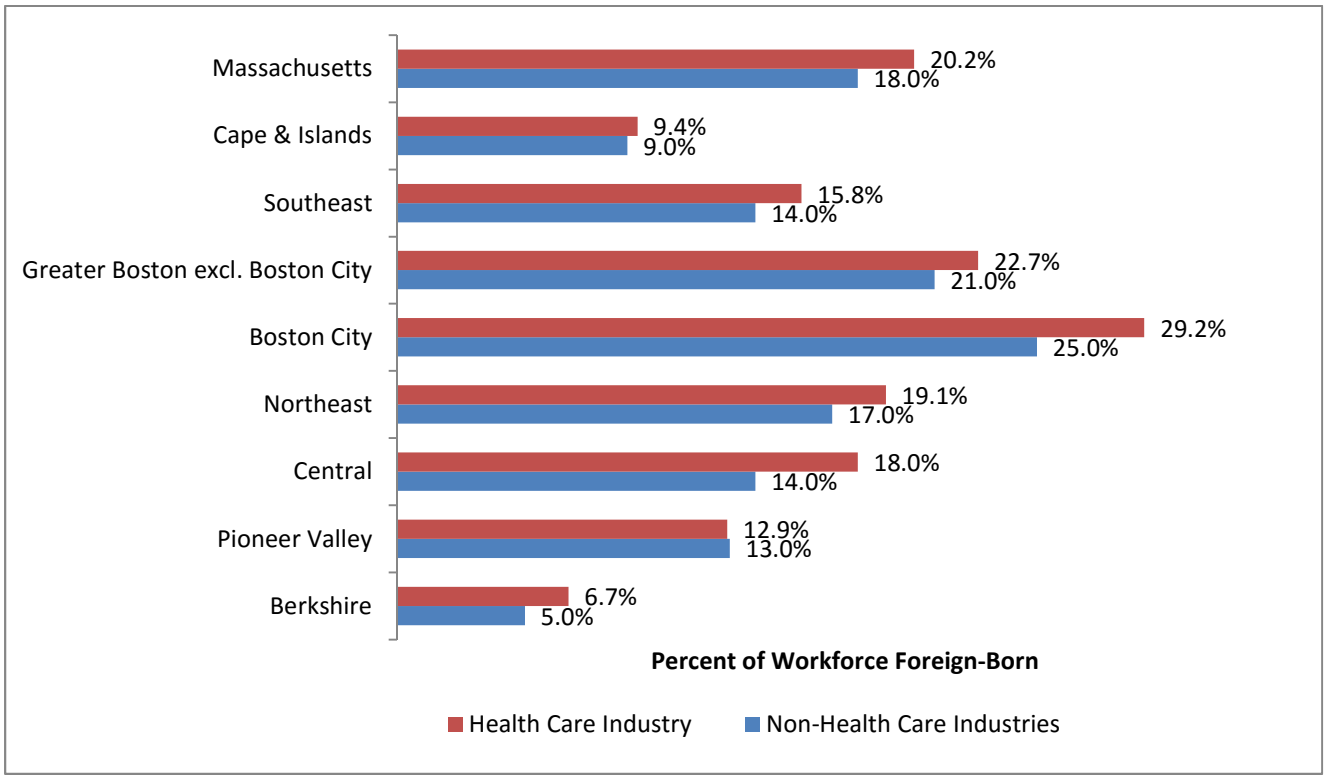
Source: 2007-2011 American Community Survey Public Use Microdata Samples (PUMS) data files, tabulations by Center for Labor Markets and Policy, Drexel University.
Note: 'c' represents cells with a sample size that is not large enough for statistically reliable estimates.

Nativity

The ACS survey gathers data from all respondents regarding their place of birth to determine the nativity status of the population. Respondents to the ACS survey who were born abroad are asked a set of follow-up questions which include a question regarding the year when they first entered the United States. Using ACS data, we have estimated the foreign-born share of the state's health care workforce. Foreign-born individuals include those who were born outside the U.S. or in one of its outlying areas. The foreign-born population includes those who are legally permanent residents, refugees, temporary residents such as students or workers with temporary visas, as well as undocumented workers. The ACS identifies foreign-born individuals but does not identify their visa status or whether they are undocumented.

One-fifth of the health care workforce in the state is foreign-born, a share that is slightly higher than the 18 percent in the rest of the state's workforce. The share of foreign-born workers varies widely across the eight regions, led by the City of Boston, where nearly 3 out of 10 health care workers are born abroad. The city's workforce outside the health care industry has one-quarter foreign-born workers. The Greater Boston area outside the City of Boston also has high shares of foreign-born workers (23% in health care versus 21% outside the health care industry).

Chart 4: Percent of Foreign-Born Workers in the Health Care and Non-Health Care Industry Workforce in Eight Massachusetts Regions, 2007-2011 Averages



Source: 2007-2011 American Community Survey Public Use Microdata Samples (PUMS) data files, tabulations by Center for Labor Markets and Policy, Drexel University.

The share of foreign-born workers in the health care workforce declines outside of the Greater Boston region. Foreign-born workers comprise between 16 and 19 percent of the health care workforce in the Northeast, Southeast, and Central regions, 13 percent of health care workers in the Pioneer Valley, 9 percent of the health care workforce in the Cape and Islands and less than 7 percent of health care workers employed in the Berkshire region. In every region (except Pioneer Valley) the share of foreign-born workers is higher among workers employed in the health care industry than those employed outside of the health care industry. The workforce employed in the Pioneer Valley has the same proportion of foreign-born workers in the health care and non-health care industries (13%).

The share of the foreign-born workforce varies widely within the health care industry. Foreign-born workers comprise 28 percent of the state's nursing and residential care workforce. This segment of the health care industry has a higher concentration of entry level and non-

clinical workers; a much different occupational staffing pattern than the remaining three health care sub-sectors. Almost 31 percent of the workforce in the state's nursing and residential care sector is employed in health care support occupations (compared to 18% in ambulatory care, 10% in hospitals, and 5% in individual and family services); 26 percent are employed in non-health service occupations (compared to 4% in ambulatory care, 6% in hospitals, and 15% in individual and family services). The high concentration of foreign-born workers in this health care sub-sector is likely comprised of immigrants with lower levels of education, skills and English language proficiency.

Foreign-born workers account for 21 percent of the state's hospital workforce, 16 percent of workers employed in the ambulatory care sector and 18 percent of those working in the individual and family services sector of the state.

Recent Immigrants

Labor market challenges for foreign-born workers vary by the amount of time that they have spent in the U.S. New immigrants are likely to face greater labor market hurdles than established immigrants. Most new immigrants face a certain amount of downward mobility in the U.S. labor market while they are assimilating into the culture and practices of their adopted country and its labor market. Immigrants with lower levels of education, skills and English language proficiencies require a longer period of assimilation and therefore face more pronounced initial downward mobility in the U.S. labor market.

We have estimated the share of the state's health care workforce that consists of recent immigrants.[2] Our analysis of the share of recent immigrants in the state's foreign-born health care workforce finds that 23 percent of the immigrant workforce in the state's health care sector consists of recent immigrants who entered the United States in or after 2001. The recent immigrant share of foreign-born workers in the state's health care industry (23%) is lower than that in the non-health care industries of the state (27%). The recent immigrant share among foreign-born workers is about 18 percent in the ambulatory care sector and one-quarter in

[2] Although the word immigrants typically refers to those who have legally entered the US and obtained permanent residency, in this paper we use the word immigrant and foreign-born interchangeably to represent all foreign born individuals. Using the same terminology we will use the label "recent immigrants" to represent foreign-born individuals who entered the United States in 2001 or after.

remaining three sectors (26 percent in the nursing and residential care sector, 25 percent in hospitals, and 23 percent in individual and family services).

Table 4: Percent of Foreign-Born Workers in the Health Care Industry Workforce by Sub-Sector of the Health Care Industry in Massachusetts, 2007-2011 Averages

Massachusetts Industry Sector	Total Workers	Number Foreign-Born	Percent Foreign-Born	Number Recent Immigrants (Entered US in or after 2001)	Percent of Foreign-Born who were Recent Immigrants (Entered US in or after 2001)
All industries ex. health care	2,814,940	508,045	18.0%	138,627	27.3%
Health care industry, total	463,326	93,716	20.2%	21,590	23.0%
Ambulatory Care	157,161	25,307	16.1%	4,442	17.6%
Hospitals	190,253	39,452	20.7%	9,795	24.8%
Nursing and residential care facilities	76,701	21,753	28.4%	5,698	26.2%
Individual and family services	39,211	7,204	18.4%	1,655	23.0%

Source: 2007-2011 American Community Survey Public Use Microdata Samples (PUMS) data files, tabulations by Center for Labor Markets and Policy, Drexel University.

The share of recent immigrants among foreign-born health care workers varies somewhat across regions. Recent immigrants account for 27 percent of foreign-born health care workers in the Central region, about one-quarter in the City of Boston and the Northeast, 22 percent in the Greater Boston region excluding the City of Boston, and 18-19 percent in the Pioneer Valley and Southeast regions. The sample of recent immigrant health care workers in the Berkshire and Cape and Islands regions is not large enough to produce statistically reliable estimates.

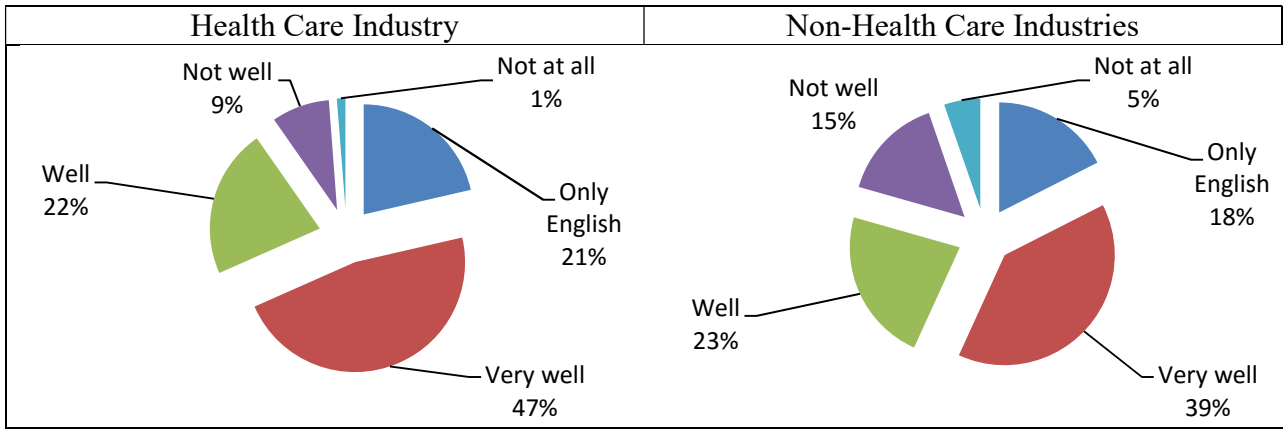
English Speaking Ability

The ACS questionnaire also asks respondents who speak a language other than English at home about their English speaking ability. Respondents to the survey are asked to rate their English speaking ability on the following four point scale: 1=speaks English very well, 2=speaks English well, 3=speaks English but not well, and 4=does not speak English. Using these data, we have classified the state's foreign-born workforce into the following three groups based on their

English speaking ability: speaks only English, speaks English very well or well, and speaks English but not well or does not speak English.

According to the self-rated English speaking ability of the foreign-born health care workforce in Massachusetts nearly 70 percent speak English very well or well, 10 percent are poor English speakers (most of whom speak English but not well and only 1 percent do not speak English at all), and the remaining 21 percent speak only English. A comparison with the English speaking ability of the state's workforce outside health care found twice as many (compared to the health care industry) poor English speakers; 20% (15% not well and 5% not at all), 62 percent who spoke English very well or well and 18 percent who spoke only English.

Chart 5: Percentage Distribution of the Health Care and non-Health Care Industry Workforce by Self-Rated English Speaking Ability in Massachusetts, 2007-2011 Averages



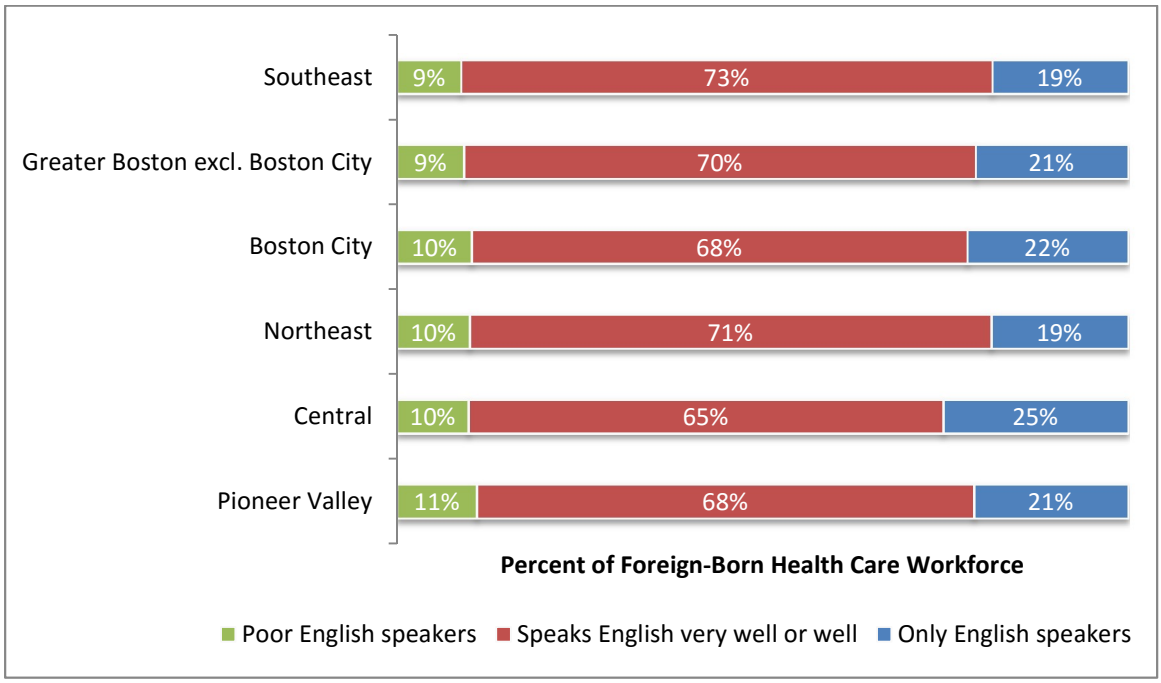
Source: 2007-2011 American Community Survey Public Use Microdata Samples (PUMS) data files, tabulations by Center for Labor Markets and Policy, Drexel University.

The English speaking ability of foreign-born health care workers varies somewhat across the state's regions. Poor English speakers comprise a higher share of foreign-born health care workers in the Pioneer Valley (11%), and the City of Boston, Northeast and Central regions (10% each); and a smaller share in Southeast and Greater Boston excluding the City of Boston (9% each). The 5-year ACS sample of foreign-born workers in the Cape and Islands and Berkshire regions was not large enough to produce statistically reliable estimates of their English speaking ability.

An examination of the English speaking ability of workers employed in each sub-sector of the state's health care industry finds that while each sector has about the same share of

workers who spoke English very well or well (69%), there are differences in the shares of foreign-born workers who are poor English speakers; 8 percent in the ambulatory care and hospital sectors and 13 percent in the nursing and residential care and individual and family services sectors.

Chart 6: Percentage Distribution of Health Care Workers by Self-Rated English Speaking Ability in Six* Massachusetts Regions, 2007-2011 Averages



Source: 2007-2011 American Community Survey Public Use Microdata Samples (PUMS) data files, tabulations by Center for Labor Markets and Policy, Drexel University.
*Note: The sample size of foreign-born workers in the Berkshire and Cape and Islands regions in the 2007-2011 ACS PUMS data file is not large enough for statistically reliable estimates of their English speaking ability.

The prevalence of foreign-born workers and recently arrived foreign-born workers provides some insights into the potential barriers to labor market success and upward mobility for some health care workers. The educational attainment of foreign-born workers in the U.S. is known to be bi-modal, with concentrations of workers at the upper and lower ends of the educational spectrum. Foreign-born workers with lower levels of education are more likely to have low English language proficiencies, presenting additional challenges to their integration into and upward mobility in the labor market.

College-educated foreign-born workers also face labor market hardships, especially if their college degree was earned abroad. Compared to their counterparts with a U.S. college

degree, foreign-educated college graduates have lower wages, higher unemployment rates, higher rates of involuntary part-time employment and higher rates of mal-employment (employment in jobs that do not utilize the skills and knowledge typically acquired from a college education).[3]

We have learned from our conversations with leaders in different segments of the state's health care industry that one of the ways in which employers will address the cost containment pressures from Chapter 224 and ACA is to train and deploy health care workers to perform their jobs to the top of their license. This means that the job duties of workers across the health care hierarchy, from CNAs and health aides all the way to advanced practitioners (Nurse Practitioners and Physicians Assistants), will change so that workers in every job are performing duties at the highest level within their position. Furthermore, workers will be trained to step up and perform some of the lower level duties of workers in positions above them; they in turn will be expected to step up in their jobs and begin to perform duties at the top of their license, as well as lower level duties of workers in positions above them. The presence of workers with limited education, skills and English language proficiency (foreign-born and native-born) will pose a challenge to health care employers in implementing this strategy successfully.

Age

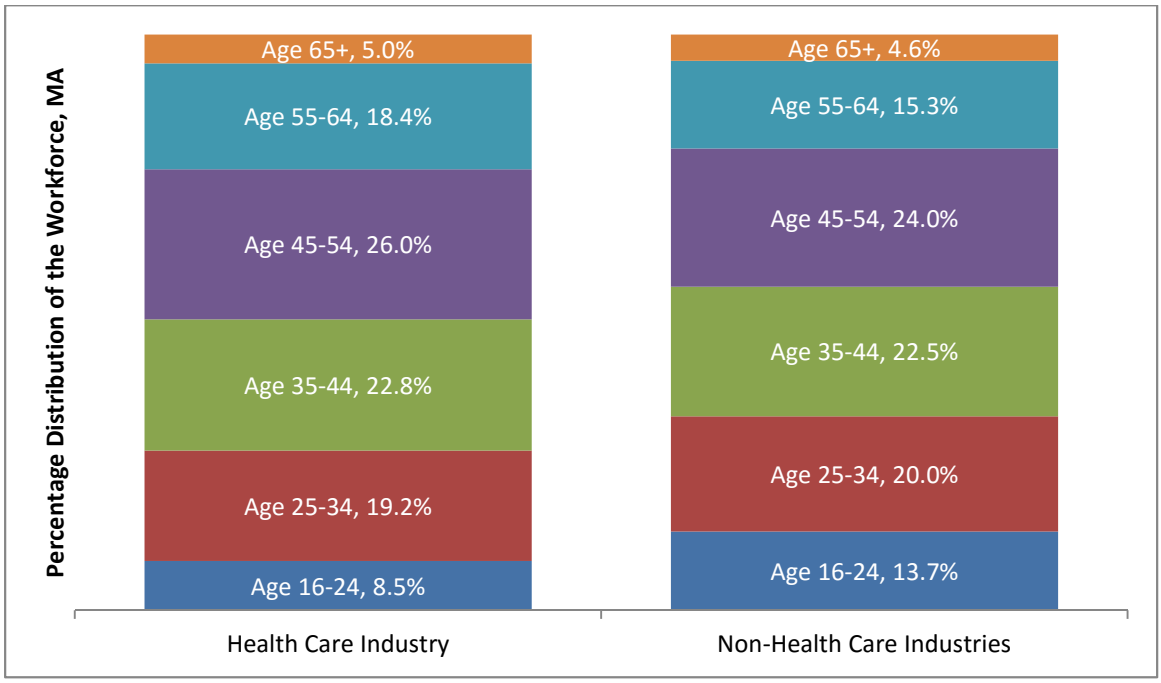
The state's health care workforce is older than the workforce employed outside the health care sector. The median and mean age of health care workers is 44 years, or 2 years older than the median and mean ages of the workforce in the non-health care industries of the state. This means one-half of the workers in the state's health care industry have already celebrated their 44th birthday.

Fewer than 9 percent of the workers in the state's health care industry are between the ages of 16 and 24 compared to nearly 14 percent among their counterparts employed outside the health care industry. The shares of 25- to 34-year olds and 35- to 44- year olds in the health care industry are similar to their shares among workers employed in other industries. Health care workers are more concentrated among the older age groups; 26 percent (versus 24% in non-health industries) are 45- to 54 years old; 18 percent (versus 15% in non-health industries) are

[3] Neeta P. Fogg and Paul E. Harrington, "Labor Market Underutilization Problems among College-Educated Immigrants in the United States," prepared with NOVA Research Company for the U.S. Department of Education, January 2013.

between the ages of 55 and 64, and 5 percent (versus 4.6% in non-health industries) are at or over the official retirement age of 65.

Chart 7: Percentage Distribution of the Health Care and Non-Health Care Industry Workforce by Age in Massachusetts, 2007-2011 Averages



Source: 2007-2011 American Community Survey Public Use Microdata Samples (PUMS) data files, tabulations by Center for Labor Markets and Policy, Drexel University

The age composition of the workforce in each of the four health care industry sub-sectors reveals that with a mean age of 45 years, workers in the state's ambulatory care sector are older than those in the other three health care sectors. The mean age is over 43 years among workers in the hospital and the individual and family services sectors, and under 43 years in the nursing and residential care sector.

The distribution of workers by age group shows more clearly the differences between the age compositions of workers employed in each one of the four health care sectors in Massachusetts. Nursing and residential care facilities have the highest share of young workers. Over 14 percent of workers employed in the state's nursing and residential care facilities are under 25 years old; a share of young workers that is twice as large as their share in the ambulatory care sector (6.7%) and much larger compared to hospitals (7.6%) and the individual and family services sector (9%). The larger concentration of entry-level health care support and

service occupations in the nursing and residential care sector (47%) compared to other sectors of the state's health care industry likely underlies the larger share of younger workers in this sector.

Table 5: Percentage Distribution of the Workforce in Four Health Care Industry Sub-Sectors by Age in Massachusetts, 2007-2011 Averages

Age	Ambulatory Care	Hospitals	Nursing and Residential Care	Individual and Family Services	Health care, Total
Mean Age	44.7	43.4	42.7	43.5	43.7
Median Age	45	44	44	44	44
16-24	6.7%	7.6%	14.4%	9.1%	8.5%
25-34	17.9%	20.6%	16.3%	23.0%	19.2%
35-44	24.0%	22.9%	21.9%	19.3%	22.8%
45-54	26.1%	27.0%	24.8%	23.7%	26.0%
55-64	19.0%	18.5%	17.0%	18.5%	18.4%
65+	6.2%	3.4%	5.6%	6.4%	5.0%

Source: 2007-2011 American Community Survey Public Use Microdata Samples (PUMS) data files, tabulations by Center for Labor Markets and Policy, Drexel University

Workers between the ages of 25 and 34 comprised a larger share of the individual and family services sector (23%) than other health care sectors. This sector has high concentrations of workers in professional occupations such as social workers that are typically staffed by young adults and recent college graduates. Prime age workers (35- to 54-years old) account for about half of the workforce in the ambulatory care sector and hospitals, 46 percent in the nursing and residential care sector, and 43 percent of the staff in the individual and family services sector.

One-quarter of the workforce in the ambulatory care and individual and family services sectors was 55 years or older at the time of the ACS surveys. Both sectors also have higher shares of workers at or over the official retirement age (65 years). Many of the health care industry leaders that we spoke with highlighted the advanced age of their physician workforce and the problems that they will face from large impending retirements, particularly among primary care physicians. Health care industry leaders in the state also expressed concerns about the age of nurses and impending retirements in the state's nursing workforce. The 55-plus population is slightly lower in hospitals and nursing and residential care facilities (22-23%).

Educational Attainment

The health care workforce in Massachusetts is better-educated than the state's workforce that is employed in all other non-health care industries in the state. Most of this difference in education occurs at the lower end; 22 percent of the state's health care workforce has either completed just a high school education (17%) or has failed to complete high school (5%). In all other industries (excluding health care) 32 percent of workers have either just completed high school (24%) or have failed to complete high school (8%).

Nearly one-fifth of health care industry workers in the state have completed some college education without earning a college degree. This group of workers have already enrolled in college and earned some credits. Therefore, even if only a subset of this group is found to have surmountable barriers that stopped them from completing college and earning a credential, it provides proverbial low-hanging fruit for improving the education and career mobility of a subset of health care workers.

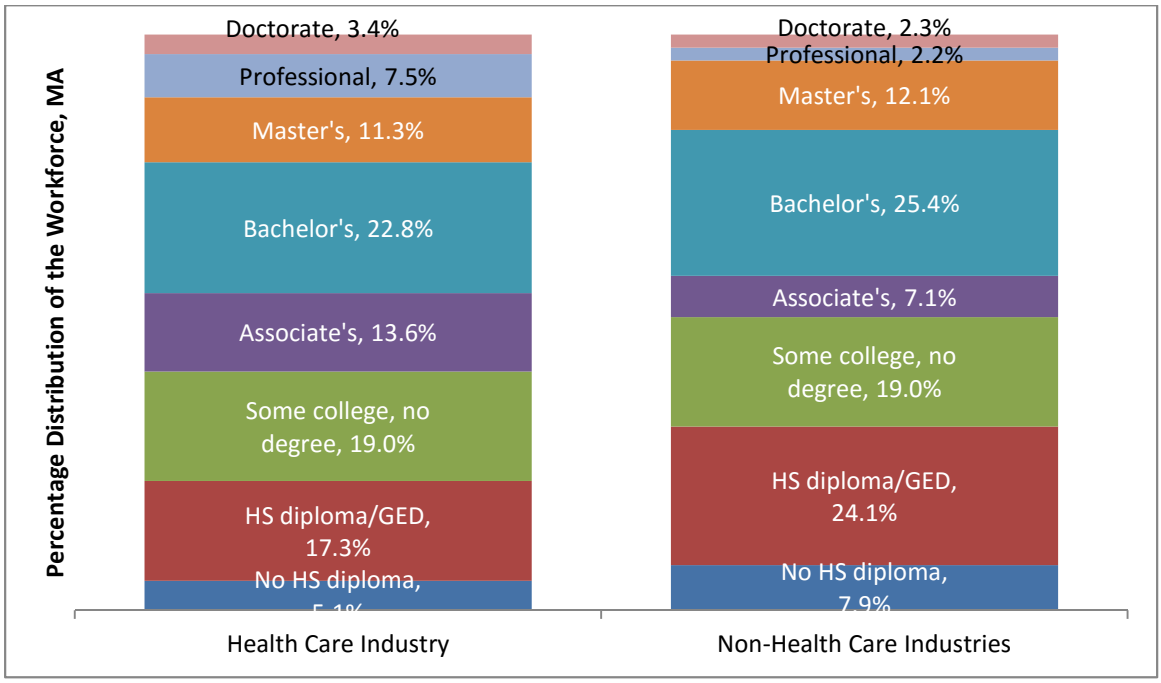
Another sharp difference between the education of health care and non-health care workers is in the share of workers with associate's degrees (14% among health care workers versus 7% among non-health care workers). This difference is likely attributable to the prevalence of nurses with an ASN in the state's nursing workforce. Some health care industry leaders discussed with us their focus on the Institute of Medicine recommendation that 80 percent of the nursing workforce have a BSN degree by 2020.[4] The push to increase BSNs in the nursing workforce (if it does happen) will further increase the education of the state's overall health care workforce, moving many of the associate's degree nurses in the bachelor's degree column.

Another educational category with a much higher concentration among health care workers is, unsurprisingly, workers with a professional degree. The health care workforce has more than three times the share of workers with a professional degree compared to the non-health care workforce in the state. Examples of professional degrees include MD, DDS, DVM,

[4] For details on the Institute of Medicine recommendations, see: *The future of Nursing: Leading Change, Advancing Health,* Institute of Medicine of the National Academies, Washington, D.C. Available for download at: http://www.iom.edu/~/media/Files/Report%20Files/2010/The-Future-of-Nursing/Future%20of%20Nursing%202010%20Recommendations.pdf

LLB, JD, etc. Most of the professional degrees among employees in the health care sector include physicians with a professional degree, such as an MD or a DDS.

Chart 8: Percentage Distribution of the Health Care and Non-Health Care Industry Workforce by Educational Attainment in Massachusetts, 2007-2011 Averages



Source: 2007-2011 American Community Survey Public Use Microdata Samples (PUMS) data files, tabulations by Center for Labor Markets and Policy, Drexel University

Findings from our analysis of the educational characteristics of the health care workforce in each of the state's eight regions are presented below. The health care industry workforce in the Pioneer Valley and Southeast regions has the highest shares of less educated workers. Workers with just a high school diploma, GED or lower level of education accounted for 27 to 28 percent of the health care workforce in these two regions. About one-quarter of health care industry workers in the Central and Northeast regions have just a high school diploma, GED or lower education. More than one-fifth of the health care industry workers in the Greater Boston region excluding the City of Boston and 17 percent of their counterparts in the City of Boston were high school graduates or high school dropouts. The sample size of high school dropout workers in the Berkshire and Cape and Islands regions was not large enough for statistically reliable estimates.

In six of the eight regions, 22-23 percent of health care workers had completed some college without earning a college degree. This group comprises lower shares of health care workers in the City of Boston (13%) and the Greater Boston region outside the City of Boston (18%). Between 15 and 17 percent of health care workers have associate's degrees in six out of the eight regions. The remaining two regions, the City of Boston and the Greater Boston region outside the City of Boston have much lower shares of workers with associate's degrees (9% and 12%, respectively).

Nearly 29 percent of the City of Boston's health care workers have a bachelor's degree; twice as large as their share in the Berkshire region (15%). One-quarter of health care workers in the Greater Boston region excluding the City of Boston had a bachelor's degree. About one-fifth (19-21%) of the health care workforce in five regions (Pioneer Valley, Central, Northeast, Southeast and Cape and Islands) had a bachelor's degree education.

Table 6: Percentage Distribution of the Health Care Industry Workforce by Educational Attainment in Eight Massachusetts Regions, 2007-2011 Averages

Educational Attainment	Berkshire	Pioneer Valley	Central	Northeast	The City of Boston	Greater Boston excl. The City of Boston	Southeast	Cape and Islands
No H.S. Diploma	c	7%	5%	6%	5%	4%	6%	c
H.S. Diploma/GED	23%	21%	20%	18%	12%	17%	21%	17%
Some college, no degree	23%	22%	22%	22%	13%	18%	22%	22%
Associate's degree	16%	16%	15%	16%	9%	12%	17%	16%
Bachelor degree	15%	19%	21%	21%	29%	24%	19%	21%
Master's degree	c	9%	9%	9%	14%	13%	9%	12%
Professional degree	c	5%	6%	6%	11%	9%	5%	c
Doctorate degree	c	c	c	c	7%	4%	c	c

Source: 2007-2011 American Community Survey Public Use Microdata Samples (PUMS) data files, tabulations by Center for Labor Markets and Policy, Drexel University.
Note: 'c' represents cells with a sample size that is not large enough for statistically reliable estimates.

Data for educational attainment at the higher end, particularly at the doctorate level, are not provided for six out of the eight regions because the sample sizes for these groups are not

large enough for statistically reliable estimates. Education data for the master's and professional degrees in the Berkshire region and professional degrees in the Cape and Islands region are also not provided due to sample size limitations. Only two regions (the City of Boston and the Greater Boston region excluding the City of Boston) had a large enough sample of health care workers to allow statistically reliable estimates of shares of workers in each educational attainment category.

The health care workforce that is employed in the Greater Boston region, especially in the City of Boston, has considerably higher levels educational attainment. Over 61 percent of the city's health care workforce and one-half of the health care workforce in the Greater Boston region outside the city have a bachelor's degree or higher. While we cannot get these estimates for other regions because of sample size limitations, a comparison with the statewide estimate of the share of the health care workforce with a bachelors-plus education (45%) reveals disproportionately higher education attainment among health care industry workers employed in the City of Boston and the Greater Boston region.

Within the health care industry there are sizable differences in the educational attainment of the workforce by sub-sector. These differences are related to differences in the staffing patterns of these industries. As we noted earlier in this section and discussed in the occupational staffing section, about 60 percent of the nursing and residential care industry in Massachusetts is staffed with workers in health care support and services occupations which have low educational requirements and are often considered entry-level jobs. Ambulatory care and hospitals in the state are staffed with larger shares of higher level jobs in health diagnostic practitioner occupations such as physicians and nurses, and health technician and technologist occupations.

Nearly 13 percent of the state's nursing and residential care workforce failed to complete high school, a much higher share of high school dropouts compared to 3% in the ambulatory care sector and hospitals and 6% in the individual and family services sector. Workers in the state's nursing and residential care sector are twice as likely to have just completed high school compared to their counterparts employed in the remaining three health care sectors (29% versus 14% in hospitals and individual and family services and 16% in the ambulatory care sector).

The college-educated workforce in the nursing and residential care sector is more concentrated at the lower end. Over one-quarter have completed some college but have not

earned a college degree, 12 percent have earned an associate's degree, and just 14 percent and 6 percent, respectively, have a bachelor's or master's education. The individual and family services sector has a higher concentration of workers with bachelor's (30%) or master's degrees (21%). Both sectors have too few workers with a professional or doctorate degrees resulting in a sample size that was not large enough to produce statistically reliable estimates.

Table 7: Percentage Distribution of the Health Care Industry Sub-Sector Workforce by Educational Attainment in Massachusetts, 2007-2011 Averages

Educational Attainment	Ambulatory Care	Hospitals	Nursing and Residential Care Facilities	Individual and Family Services	Health care Industry Total
No H.S. diploma	3.0%	3.7%	12.8%	5.7%	5.1%
H.S. diploma/GED	16.3%	14.1%	29.1%	14.4%	17.3%
Some college, no diploma	19.7%	16.1%	26.1%	16.8%	19.0%
Associate's Degree	13.8%	15.0%	11.8%	9.1%	13.6%
Bachelor's degree	20.1%	27.2%	13.7%	29.8%	22.8%
Master's degree	12.7%	10.3%	5.6%	21.2%	11.3%
Professional degree	10.4%	9.0%	c	c	7.5%
Doctorate degree	4.0%	4.6%	c	c	3.4%

Source: 2007-2011 American Community Survey Public Use Microdata Samples (PUMS) data files, tabulations by Center for Labor Markets and Policy, Drexel University.
Note: 'c' represents cells with a sample size that is not large enough for statistically reliable estimates.

One-half of the state's workforce employed in hospitals and the ambulatory care sector has a college degree (bachelor's or higher). Ambulatory care workers are slightly more likely to have a master's or a professional degree whereas hospital workers are more likely to have a bachelor's degree or a doctorate. These differences reflect the different staffing pattern of these sectors. Diagnostic physician occupations are workers with both professional degrees as well as doctorate degrees. The educational attainment of the nursing workforce spans the educational spectrum. The nursing occupation comprises workers with associate's degrees, bachelor's, or master's degrees, as well as doctorates.

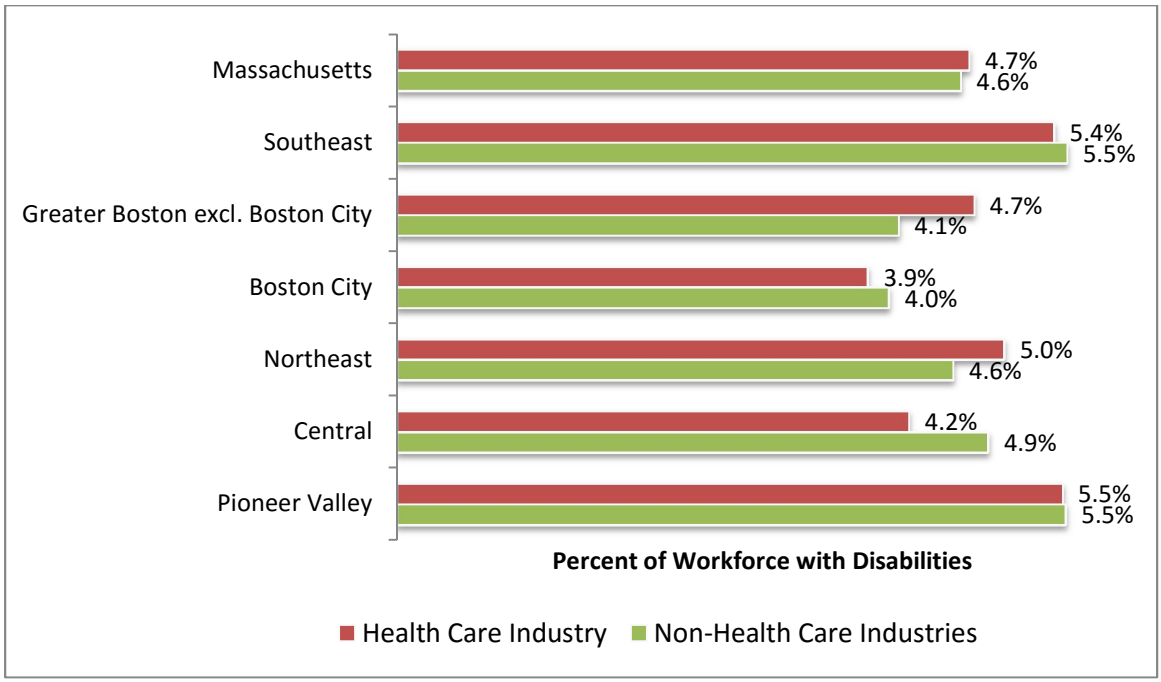
Workers with some college education but without a college degree comprise one-fifth of all workers in the state's ambulatory care sector, one-sixth of hospital workers and, as noted in the table above, 26 percent of nursing and residential care workers and 17 percent of the

workforce in the individual and family services sector. This group can be targeted to complete college and earn a degree. However, not all workers in the group are close to earning a college credential. Some may have earned just a few college credits and are not much further along the college pathway compared to high school graduates. Even among those with considerable number of college credits not all can be targeted for completion. Some in the latter group might have sizable barriers that prevented them from completing credits and all other requirements for a college credential.

Disability Status

The likelihood of a worker with a disability is about the same (less than 5%) in the state's health care workforce as it is among workers in other non-health industries of the state. Workers with disabilities represent about 5.5 percent of the health care and non-health care industry workforce employed in the Pioneer Valley and Southeast regions. Workers with disabilities represent a slightly higher share of health care industry workers compared to non-health care

Chart 9: Percent of Health Care and Non-Health Care Industry Workers with Disabilities in Six* Massachusetts Regions, 2007-2011 Averages



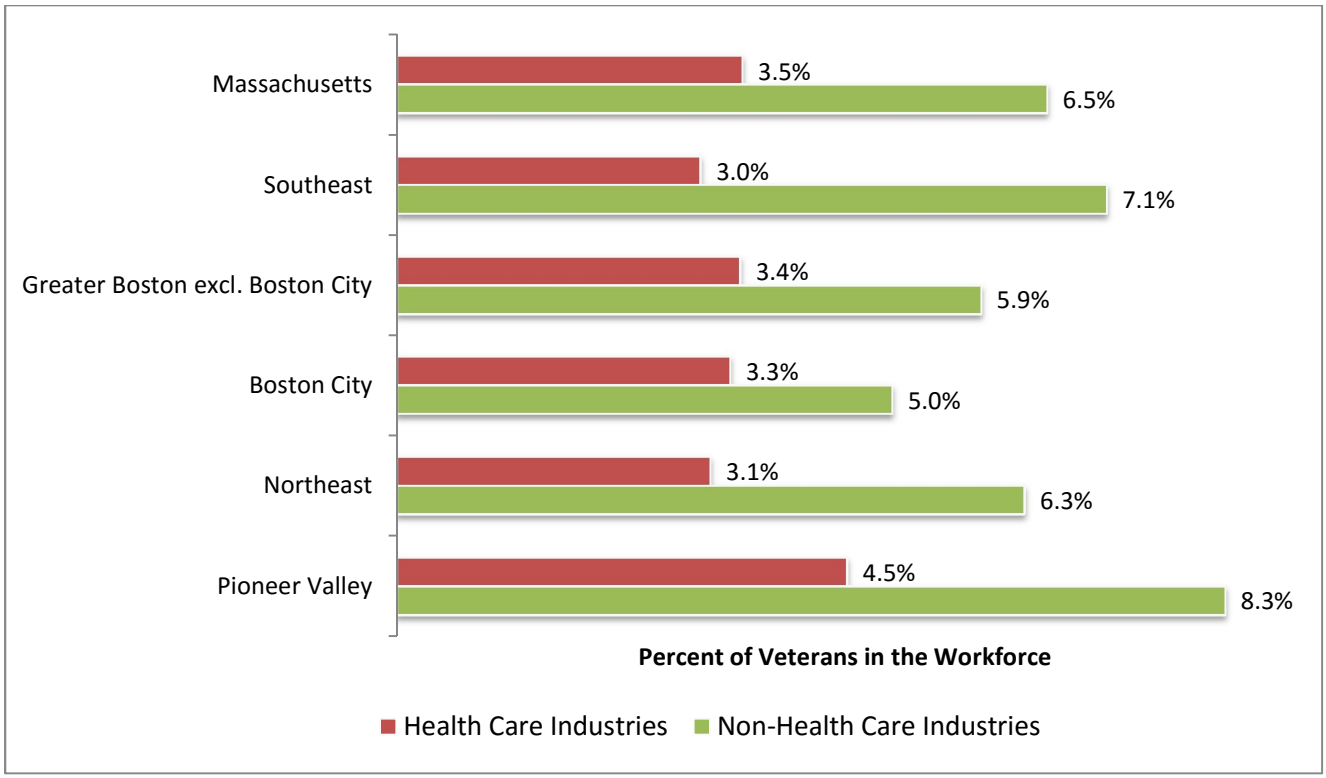
Source: 2007-2011 American Community Survey Public Use Microdata Samples (PUMS) data files, tabulations by Center for Labor Markets and Policy, Drexel University.
*Note: The sample size of workers with disabilities in the Berkshire and Cape and Islands regions in the 2007-2011 ACS PUMS data file is not large enough for statistically reliable estimates.

workers in the Greater Boston region excluding the City of Boston (4.7% versus 4.1%) and the Northeast region (5% versus 4.6%). The City of Boston has the lowest share of workers with disabilities (3.9% in health care and 4% in non-health care industries). Health care workers in the Central region have a lower share of workers with disabilities than their non-health care industry counterparts (4.2% versus 4.9%). Overall, only one in twenty workers in the health care and non-health care industries in Massachusetts has a disability. Thus although the state's health care industry does employ persons with disabilities, it does so at the same rate as the non-health care sector.

Veteran Status

Employment of veterans is lower in the state's health care industries compared to non-health care industries. Only 3.5 percent of the state's health care workers are identified as veterans compared to 6.5 percent among the rest of the state's workforce (excluding health care).

Chart 10: Percent of Health Care and Non-Health Care Industry Workers who were Veterans in Five* Massachusetts Regions, 2007-2011 Averages



Source: 2007-2011 American Community Survey Public Use Microdata Samples (PUMS) data files, tabulations by Center for Labor Markets and Policy, Drexel University.
*Note: The sample size of workers with disabilities in the Berkshire, Central, and Cape and Islands regions in the 2007-2011 ACS PUMS data file is not large enough for statistically reliable estimates.

Given that most veterans are male and most health care industry workers are female, the veteran share of health care workers is expected to be smaller than their share in the non-health care sector. Veteran employment was slightly higher in the health care industry located in the Pioneer Valley (4.5%). Across the other four regions that have sufficient sample size to produce statistically significant estimates of veterans in their workforce, the share of veterans in the health care workforce was between 3% and 3.4%, shares that were considerably lower than the share of veterans in the non-health care sectors in these regions.

Characteristics of Jobs in the Health Care Industry in Massachusetts: Hours, Weeks and Earnings

The workforce effects of Chapter 224 are likely to be felt across an array of labor market outcomes of health industry workers. Workforce changes can occur through actual change in the number of workers and/or through changes in the intensity of employment—weekly hours and annual weeks of employment. Changes in the size and composition of the workforce can also affect the level of earnings of workers and the distribution of earnings across workers. It is not clear how health care employers will respond to the dual mandate of Chapter 224—to contain costs while maintaining or improving the quality of health care services that they provide.

A review of the health care workforce transformation planning grant proposals has provided some insights into the workforce training needs and potential workforce issues from Chapter 224 among more than 75 health care providers across the state. This review finds that some employers are focused on higher level workers, such as adding more advanced practitioners to their workforce to take on more of the delivery of primary care from physicians. Others want to train their workers to move them up the career ladder or create new higher level roles for some workers to improve worker skills and productivity. Still others plan to train all staff members to be effective at delivering team-based care and other service delivery models. Employers have also identified the integration of behavioral health care with primary care as resulting in an increase in staff interaction with patients who have complex health and behavioral health needs. This is leading to the need to train their staff, particularly non-clinical staff, in effectively handling such interactions to provide quality care to these patients. Health care

industry employers are expected to adjust to Chapter 224 in different ways and the net effect of all these different adjustments on the overall health care workforce in the state is not yet clear.

Health care industry employers could choose to contain costs by increasing their service delivery using workers in lower level occupations - by cutting back in the number of workers in higher level jobs and/or by increasing their hiring in lower-level occupations. This kind of adjustment would increase the concentration of the industry's jobs in lower-level occupations. Since lower-level occupations have lower earnings, this type of adjustment by employers would put a downward pressure on earnings in the industry and change the hours and weeks of employment as well. Conversely, some employers could choose to have fewer workers, but deliver high quality services and contain costs through improved productivity. Employers may increase the productivity of their workforce by having workers practice at the top of their license. This type of adjustment by employers would result in a greater concentration of the health care workforce in higher level occupations, leading to an increase in earnings, while at the same time reducing employment opportunities for workers in lower-skill and lower-wage occupations.

The hours and weeks of employment and earnings in the health care industry could also change from a shift in the industry composition and/or the regional distribution of the health care workforce. If the health care workforce becomes concentrated in industry sectors and/or regions with more full-time and year-round employment and higher earnings, we can expect a rise in overall full-time year-round employment among health care industry workers and an increase in the industrywide earnings.

Data and Methods

Data in this section are derived from analysis of the American Community Survey (ACS) Public Use Microdata Samples (PUMS) data files. We have combined ACS PUMS data for five years (2007-2011) to produce estimates of hours and weeks of employment and earnings of workers employed in Massachusetts—in the health care industry and in all other industries (outside health care). Workers were identified by their place of employment and not their place of residence. So if a worker was employed in Springfield, Massachusetts but lived in Hartford, Connecticut, he was included in our analysis of the Massachusetts workforce. Similarly, if a worker was employed in Boston but lived in Plymouth, she was included in the workforce of the City of Boston.

Respondents to the ACS survey were asked two questions regarding their employment status: the first question asks respondents about their employment status in the week prior to the ACS survey and the second asks respondents if they were employed at any time even for a few days during the year prior to the ACS survey. Respondents who were employed at any time during the year prior to the ACS survey were asked about the number of weeks that they were employed during the year, the usual weekly hours of work during the time that they were employed, and the total wages or salary that they had earned during the year. We have analyzed these three employment traits (hours, weeks, and earnings) of workers employed in the health care industry in Massachusetts and those who were employed outside the state's health care industry. We have also examined variations in these employment traits among workers who were employed in different regions across the state.

As noted above, the Massachusetts workforce (in the health care and non-health care industry sectors) consists of those workers who were employed in Massachusetts, that is, those respondents to the ACS survey who had identified Massachusetts as their place of employment (regardless of where they lived). Data on the place of employment on the ACS PUMS data files are provided for only those respondents who were employed at the time of the ACS survey. However, questions regarding hours, weeks, and earnings pertain to the job that respondents had held during the year prior to the ACS survey.

This means that workers who had a job during the year prior to the ACS survey but did not have a job at the time of the ACS survey had to be excluded from our analysis as we could not ascertain their place of work. Therefore our analysis of the hours, weeks, and earnings, includes only those respondents who were employed at both times—the year prior to the ACS survey and at the time of the ACS survey.

Most health care industry workers in the state (over 90%) who were employed during the year prior to the ACS were also employed at the time of the ACS survey. About 9 percent of the state's health care industry workers who were employed during the year prior to the ACS survey did not have a job at the time of the ACS survey and were therefore excluded from our analysis of weekly hours, annual weeks, sector of employment, and earnings.

Each of these measures is computed as a 2007-2011 5-year average. So for example, mean weekly hours of employment measures the average of the mean weekly hours of

employment from the 2007-2011 ACS survey. For annual earnings, we first computed nominal mean annual earnings for each year from the 2007-2011 ACS data. We then converted these estimates of nominal mean annual earnings for each year to real (inflation-adjusted) mean annual earnings in 2011 dollars using the Consumer Price Index and then computed 5-year averages of the real mean annual earnings measured in 2011 dollars.

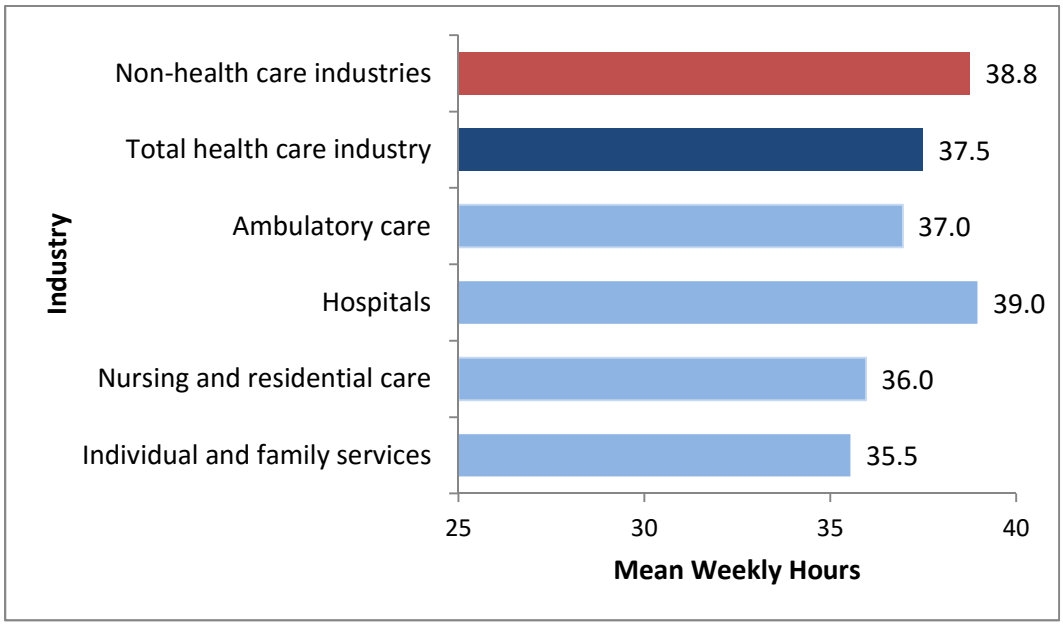
Hours and Weeks of Employment of Health Care Industry Workers

While the size of the workforce employed in an industry is a good measure of the number of jobs and employment opportunities in the industry, it does not measure the amount of work or labor demand that the industry creates. The amount of work that employees in an industry perform in a typical week or during the year provides valuable insights into the actual amount of work performed by employees in that industry. Furthermore, information on the weekly hours of work or annual weeks of work performed by employees in an industry sheds light on the extent to which the industry provides its employees with full-time work (defined as employment for 35 hours or more per week) and whether employees are employed most of the year or just part of the year.

Utilizing a few key measures of hours and weeks of employment, we have analyzed the intensity of work among workers in the entire health care industry and each of the four industry sub-sectors within the health care industry. These key measures include: (i) mean weekly hours, (ii) percent of workers employed full-time (35-plus weekly hours), (iii) percent of workers employed full-time and year-round (35-plus weekly hours for 40-plus annual weeks), (iv) mean annual hours, and (v) distribution of workers by annual weeks of employment. Using the 2007-2011 ACS PUMS data we have provided estimates of each of these five measures for the health care and non-health care industry workforce in Massachusetts.

On the first measure, mean weekly hours of work, over 2007-2011, the health care industry workforce in Massachusetts had an average workweek of 37 hours, 2 hours lower than the 39 hours of mean weekly employment among their counterparts working in industry sectors outside health care. Across the four sectors of the state's health care industry, mean weekly hours were higher among hospital workers (39 hours), and lower among ambulatory care workers (37 hours) and workers employed in the nursing and residential care and individual and family services sectors (36 hours).

Chart 11: Mean Weekly Hours of Employment among Workers in the Health Care and Non-Health Care Industries, Massachusetts, 2007-2011 Averages

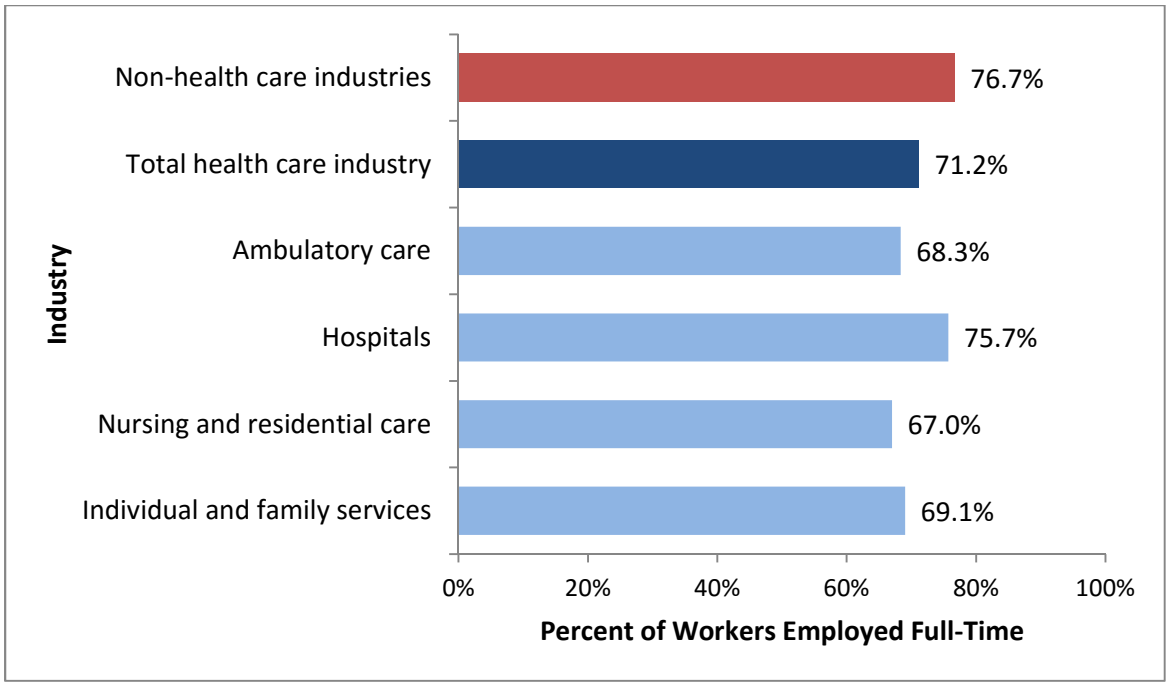


Source: 2007-2011 American Community Survey Public Use Microdata Samples (PUMS) data files, tabulations by Center for Labor Markets and Policy, Drexel University.

A full-time job is typically defined as a job with a workweek of 35 hours or more. Our analysis of the mean weekly hours of workers in the health care industry and each sector within the industry found that the mean weekly hours of employment among workers in each sector exceeded this threshold. However, underlying the measure of mean weekly hours are groups of workers with weekly hours that are more than 35 hours and less than 35 hours.

An examination of the proportion of workers with a workweek of 35 hours or more can shed light on the extent to which the industry provides its workers with full-time employment opportunities. This examination reveals that in the state's health care industry, over 71 percent of the workforce was employed for 35 hours or more. A comparison with the remaining (non-health) industries finds that full-time employment was somewhat more prevalent in the state's non-health industry sectors. Nearly 77 percent of the state's workers employed outside the health care industry were employed in full-time jobs (35-plus weekly hours).

Chart 12: Percent of Workers in the Health Care and Non-Health Care Industries that were Employed Full-Time (35+ weekly hours), Massachusetts, 2007-2011 Averages



Source: 2007-2011 American Community Survey Public Use Microdata Samples (PUMS) data files, tabulations by Center for Labor Markets and Policy, Drexel University.

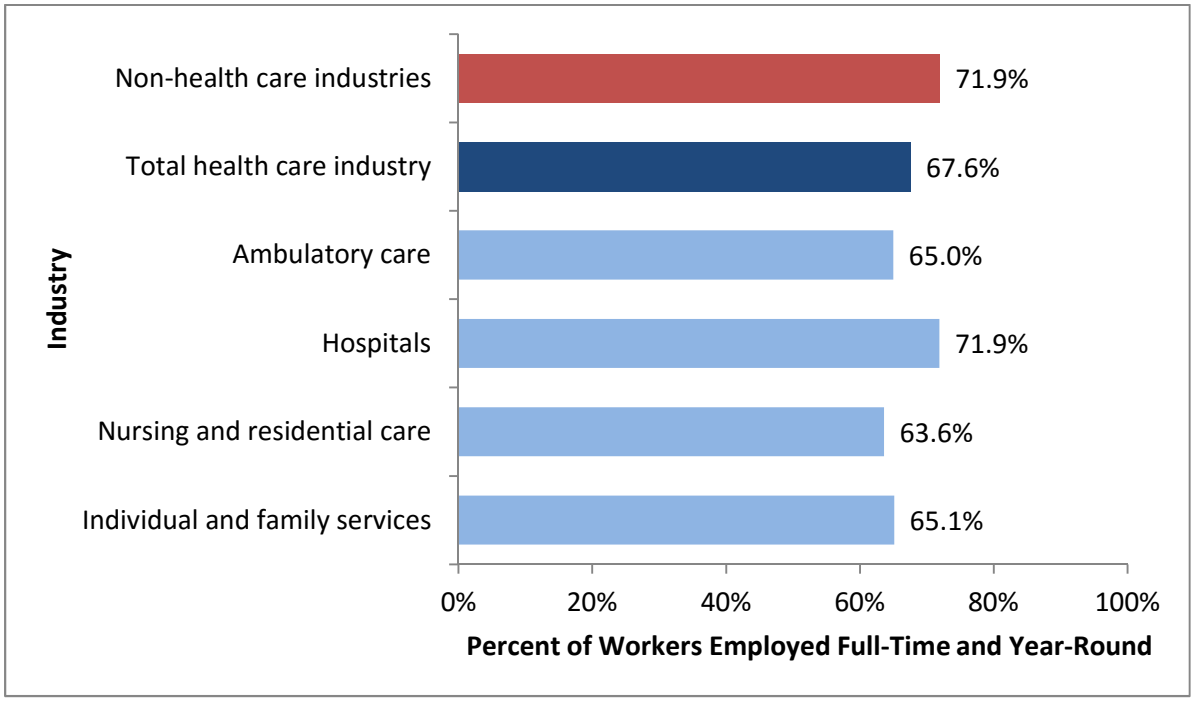
Within the health care industry, full-time employment was considerably more prevalent in hospitals. Nearly 76 percent of the state's hospital workforce was employed for 35 hours or more during most weeks of the year (2007-2011 average). In the remaining three health care industry sectors, about two-thirds of the workforce was employed in full-time positions; 69, 68, and 67 percent, respectively, among workers in individual and family services, ambulatory care, and nursing and residential care sectors.

Although weekly hours measure the employment intensity during a typical week of the year, it does not measure whether this full-time work is performed for most of the year. The ACS PUMS data files provide the number of weeks of employment during the year. Using data on weekly hours of work and annual weeks of work, we have measured the extent of full-time and year-round employment. We have defined year-round employment as employment for 40 or more weeks during a year. Full-time and year-round employment includes workers who worked for 35 or more weekly hours and 40 or more weeks during the year.

This analysis reveals that full-time year-round work was more prevalent among non-heath care industry workers than among health care industry workers in the state. Two-thirds of the health care industry workforce in Massachusetts was employed full-time and year-round

compared to 72 percent among the state's workforce in non-health care industry sectors. Within the state's health care industry, hospital workers were most likely to be employed in full-time year-round positions and the remaining three health industry sectors provided smaller shares of their workforce with full-time year-round work; 65 percent among workers employed in the ambulatory care and individual and family services sectors, and under 64 percent among those employed in the state's nursing and residential care facilities.

Chart 13: Percent of Workers in the Health Care and Non-Health Care Industries that were Employed Full-Time and Year-Round (35+ weekly hours & 40+ annual weeks), Massachusetts, 2007-2011 Averages



Source: 2007-2011 American Community Survey Public Use Microdata Samples (PUMS) data files, tabulations by Center for Labor Markets and Policy, Drexel University.

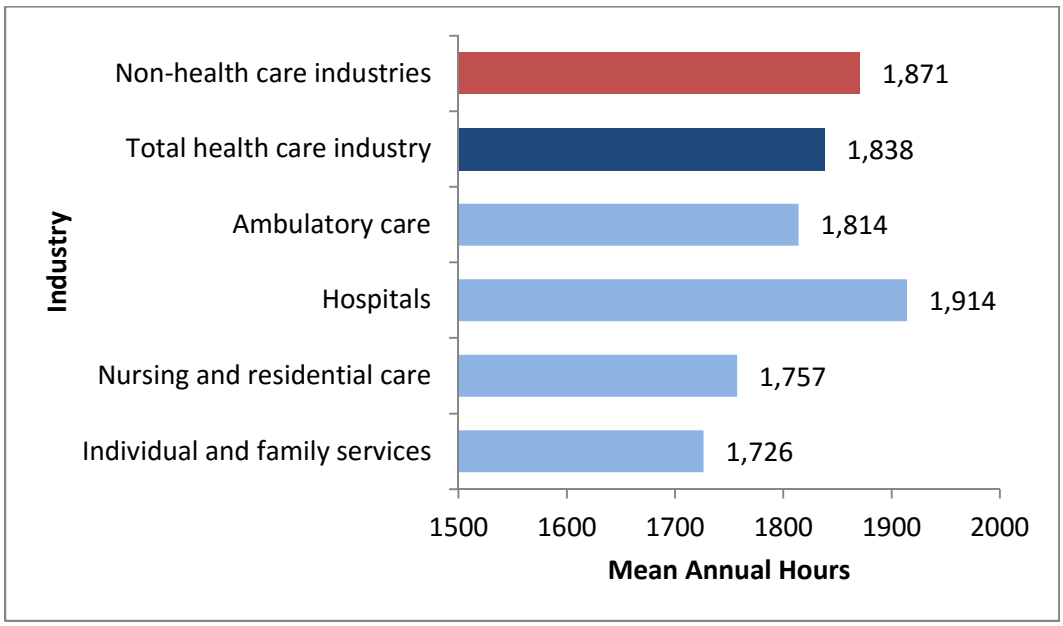
Another gauge of employment intensity measures the actual hours of employment per year. Annual hours of employment are computed from information on the number of weekly hours and annual weeks of work during a year.[5] For example an individual who was employed

[5] Beginning in 2008, the Census Bureau changed the format for reporting annual weeks of employment in the American Community Survey Public Use Microdata Sample data files. Data on annual weeks of employment that were provided in a continuous format prior to the 2008 ACS are now (in the 2008 ACS PUMS and after) provided in a range format using the following ranges: 50-52 weeks, 48 to 49 weeks, 40 to 47 weeks, 27 to 39 weeks, 14 to 26 weeks, and less than 14 weeks. So if a respondent was employed for 20 weeks during a given year, ACS PUMS data files prior to 2008 would report annual weeks for this respondent as 20 weeks, whereas ACS PUMS data files in

for 35 hours per week for the entire year (52 weeks) would have worked for 1,820 hours during the year (35 hours * 52 weeks).

The mean annual hours of work among health care industry workers in Massachusetts was nearly 1,840 hours. Hospital workers had the highest mean annual hours of work; 1,914 hours. The mean annual hours of employees in the state's ambulatory care industry was a full 100 hours less than their hospital counterparts, 1,814 hours. Jobs in the remaining two health care sub-sectors provided fewer hours of employment during the year to their average worker, nearly 1,760 mean annual hours in the nursing and residential care sector and 1,730 in the

Chart 14: Mean Annual Hours of Employment among Workers in the Health Care and Non-Health Care Industries, Massachusetts, 2007-2011 Averages



Source: 2007-2011 American Community Survey Public Use Microdata Samples (PUMS) data files, tabulations by Center for Labor Markets and Policy, Drexel University.

individual and family services sector. The mean annual hours of the health care industry workers in the state was smaller than that of workers in other (non-health care) industries; 1,871 versus 1,838. Hospital employees were the only health care industry employees whose annual hours of work exceeded that of non-health workers.

2008 and in the years after 2008 would report this as a range (14 to 26 weeks). For 2008-2011 ACS data, we have used the linear interpolation method to compute annual weeks of work for each respondent by using the midpoint estimates of each range of annual weeks to represent the annual weeks of work. These midpoint estimates of annual weeks of work were used along with weekly hours to estimate annual hours of employment.

An examination of the distribution of health care industry workers by annual weeks of employment reveals that most workers in the health care industry were employed for at least 40 weeks during the year. On average between 2007 and 2011, 92 percent of health care industry workers in Massachusetts were employed for 40 weeks or more during the year. Out of the remaining, 3 percent worked for 27 to 39 weeks, another 3 percent were on the job for 14 to 26 weeks, and 2 percent worked for fewer than 14 weeks during the year. Data on non-health care sector employees by annual weeks of work reveal a smaller share of year-round workers (40-plus weeks) compared to health care industry workers (88% versus 92%). However among workers with 40-plus weeks of employment, those who were employed in non-health care industries were more likely to work full-time than workers employed in the state's health care industry. This is evident in the higher share of full-time year-round workers among non-health care industry workers compared to health care industry workers, 72 percent in non-health care industries versus 68 percent in health care.

Despite a slightly lower share of year-round workers among non-health care industry workers (compared to health care industry workers), the mean annual hours of employment was higher among non-health care workers than health care workers because non-health care workers with year-round employment were more likely to work in full-time positions.

Within the health care industry, hospital workers were most likely to be employed in year-round positions. Over 93 percent of the state's hospital workforce was employed for 40 weeks or more during the year. Year-round employment stood at 92 percent in the ambulatory care sector, 91 percent in nursing and residential care facilities, and 89 percent among workers employed in the individual and family services sector.

Analysis of the intensity or amount of work among workers employed in the state's health care and non-health care sectors shows somewhat lower employment intensity among health care workers compared to their non-health care counterparts. Four out of five measures of employment intensity presented above—mean weekly hours, percent of workers with full-time employment, percent of workers with full-time and year-round employment, and mean annual hours of employment—were slightly lower among workers in the state's health care industry compared to those of workers in non-health care industries.

Table 8: Percentage Distribution of Workers by Annual Weeks of Employment, Health Care and Non-Health Care Industries, Massachusetts, 2007-2011 Averages

Annual Weeks of Employment	Ambulatory Care	Hospitals	Nursing and Residential Care Facilities	Individual and Family Services	Health Care Industry, Total	Non-Health Care Industries
1-13 weeks	1.9%	1.9%	2.7%	3.2%	2.1%	3.4%
14-26 weeks	2.5%	2.3%	2.7%	4.0%	2.6%	3.6%
27-39 weeks	3.6%	2.5%	3.6%	3.6%	3.2%	5.1%
40+ weeks	92.0%	93.3%	90.9%	89.2%	92.1%	87.9%
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Source: 2007-2011 American Community Survey Public Use Microdata Samples (PUMS) data files, tabulations by Center for Labor Markets and Policy, Drexel University.

The fifth measure of work intensity--the distribution of workers by annual weeks of work--found a somewhat larger share of health care industry workers with 40-plus weeks compared to non-health care workers. But among health care workers a smaller share of these year-round workers had full-time jobs compared to the share of full-time workers among year-round employed non-health care industry workers. Higher prevalence of full-time work among year-round non-health care industry workers means that annual hours of work are more concentrated at the upper end of the hours' distribution in non-health care industries than in the state's health care industries.

We have examined mean annual hours of employment among health care and non-health care workers in the bottom and top quintile of the distribution of annual hours.[6] On average the state's health care workforce worked 33 fewer hours (-1.8%) during the year than the non-health care workforce. However, the mean annual hours of work among health care workers in the

[6] Quintiles of annual hours of work were identified using the following method. After ranking workers in ascending order by their annual hours of employment, the annual hours of workers at the 20th and 80th percentile were used as boundaries of the bottom and top quintiles. One fifth of the workers with annual hours below the 20th percentile of annual hours distribution were classified in the bottom quintile and another one-fifth of the workers with annual hours above the 80th percentile of the annual hours distribution were classified in the top quintile. This process was conducted separately for the state's health care workforce and non-health care workforce. The middle three quintiles could not be identified because of bunching of workers with the same level of annual hours of employment (2,040) between the 40th and 70th percentiles partly arising from our use of mid-point interpolation to estimate annual weeks of work from a range of annual weeks of work that was assigned to each worker.

Table 9: Mean Annual Hours of Employment by Quintile of the Distribution of Annual Hours in the Health Care and Non-Health Care Industry Sectors of Massachusetts, 2007-2011 Averages

Quintile of Annual Hours Distribution	Mean Annual Hours Employment (A) Health Care	(B) Non-Health Care	Absolute Difference (A-B)	Relative Difference (A-B)/B
Bottom quintile	783	647	136	21.0%
Middle three quintiles	1,902	1,962	-60	-3.1%
Top quintile	2,702	2,819	-117	-4.2%
All Workers	1,838	1,871	-33	-1.8%
Top quintile/bottom quintile	3.4	4.4		

Source: 2007-2011 American Community Survey Public Use Microdata Samples (PUMS) data files, tabulations by Center for Labor Markets and Policy, Drexel University.

lowest quintile were much higher than their non-health care counterparts. Health care workers in the lowest quintile were employed for 783 hours during the year while non-health care workers were employed for 467 hours, a difference of 136 hours or 21 percent. Health care workers in the highest quintile were employed for 117 fewer hours per year (-4.2%) compared to non-health care workers in the highest quintile.

The mean annual hours of work of the state's health care workforce in the highest quintile was 3.4 times the mean annual hours in the lowest quintile. Among workers in the non-health care industries, mean hours of employment in the highest quintile were 4.4 times as high as those in the lowest quintile. Said another way, on average, for each annual hour of employment among health care workers in the lowest quintile their counterparts in the highest quintile were employed for 3.4 hours (2702/783). Among non-health care workers this ratio stood at 4.4 (2819/647).

The distribution of opportunities for employment (or hours worked) was less uneven in the state's health care sector compared to the state's non-health care sector. The lower inequality in the distribution of employment opportunity in the health care sector compared to the non-health care sector of the state is expected to translate into a lower inequality in the distribution of earnings in the health care sector compared to the non-health care sector.

Earnings of the Health Care Industry Workers in Massachusetts

Using the American Community Survey Public Use Microdata Samples (PUMS) data files combined for five years (2007-2011) we have produced real (inflation-adjusted) mean annual earnings (measured in 2011 dollars) of the health care workforce in Massachusetts and within each of the eight regions in the state. We have also produced mean earnings of workers employed in the state and each of the eight regions who were working in non-health care industries (all industries excluding the health care industry).

Mean Annual Earnings of Health Care and Non-Health Care Industry Workers by Region

The mean annual earnings of health care industry workers in Massachusetts was $2,300 or 4 percent higher than that of workers employed outside the health care industry. The mean annual earnings of health care workers in the state were $57,700 while their counterparts employed in other industries earned on average $55,400 during the prior year (2007-2011 averages).

The mean annual earnings of health care workers ranged from a high of $71,600 in the City of Boston to $48,100 in the Pioneer Valley, and $49,100 in the Berkshire and Cape and Islands regions. Health care workers in the Central, Southeast, and Northeast regions earned on average a mean annual salary between $50,000 and $52,000. Within the Greater Boston region, health care workers employed outside the City of Boston earned on average $61,500 or about $10,000 less per year compared to the mean annual salary of those who were employed in Boston ($71,600).

As noted in the other sections, there were sharp differences across regions in the sector composition of the health care industry and the educational attainment and occupational staffing patterns of the health care industry workforce. Regions with the best educated health care workforce and greater concentrations of workers in higher level occupations had a greater concentration of workers in the hospital and ambulatory care sectors of the health care industry. These differences in the industry composition, occupational staffing patterns, and education of the health care workforce are reflected in the difference in mean earnings of health care workers across regions.

Table 10: Mean Annual Earnings of Health Care Industry and Non-Health Care Industry Workers, Massachusetts and Eight Regions, 2007-2011 Averages (2011 Dollars)

Region	Health Care Industry	Non-Health Care Industries	Absolute Difference (Health Care Minus Non-Health Care)	Relative Difference
Massachusetts	57,656	55,369	2,288	4.1%
Berkshire	49,084	38,947	10,137	26.0%
Pioneer Valley	48,130	41,112	7,018	17.1%
Central	50,463	46,552	3,910	8.4%
Northeast	52,344	52,712	-368	-0.7%
City of Boston	71,605	70,331	1,274	1.8%
Greater Boston excluding City of Boston	61,522	61,837	-316	-0.5%
Southeast	51,165	47,173	3,992	8.5%
Cape & Islands	49,123	44,152	4,971	11.3%

Source: 2007-2011 American Community Survey Public Use Microdata Samples (PUMS) data files, tabulations by Center for Labor Markets and Policy, Drexel University.

An examination of the differences in the mean annual earnings of workers in the health care and non-health care sectors in the state's regions reveals sizable differences, particularly in the western part of the state and the Cape and Islands region. The average earnings of health care workers was one-quarter higher than non-health care workers in the Berkshire region, 17 percent higher in the Pioneer Valley region, and 11 percent higher in the Cape and Islands. Despite the lower earnings among health care industry workers in these regions compared to the rest of the state, the health care industry is an important source of well-paying jobs compared to the non-health care industries in these regions.

Health care industry workers in the Central and Southeast regions also earned a sizable premium (8%) compared to those who were employed in industries outside the region's health care sector. Health care industry workers in the Northeast and the Greater Boston region excluding the City of Boston earned a mean annual salary that was about the same as the mean annual earnings of their non-health care counterparts, while in the City of Boston, the average annual earnings of health care industry workers was about $1,300 or 2 percent higher than that of the city's workers in non-health care industry sectors.

Mean Annual Earnings of Health Care Industry Workers by Health Care Industry Sector in Massachusetts

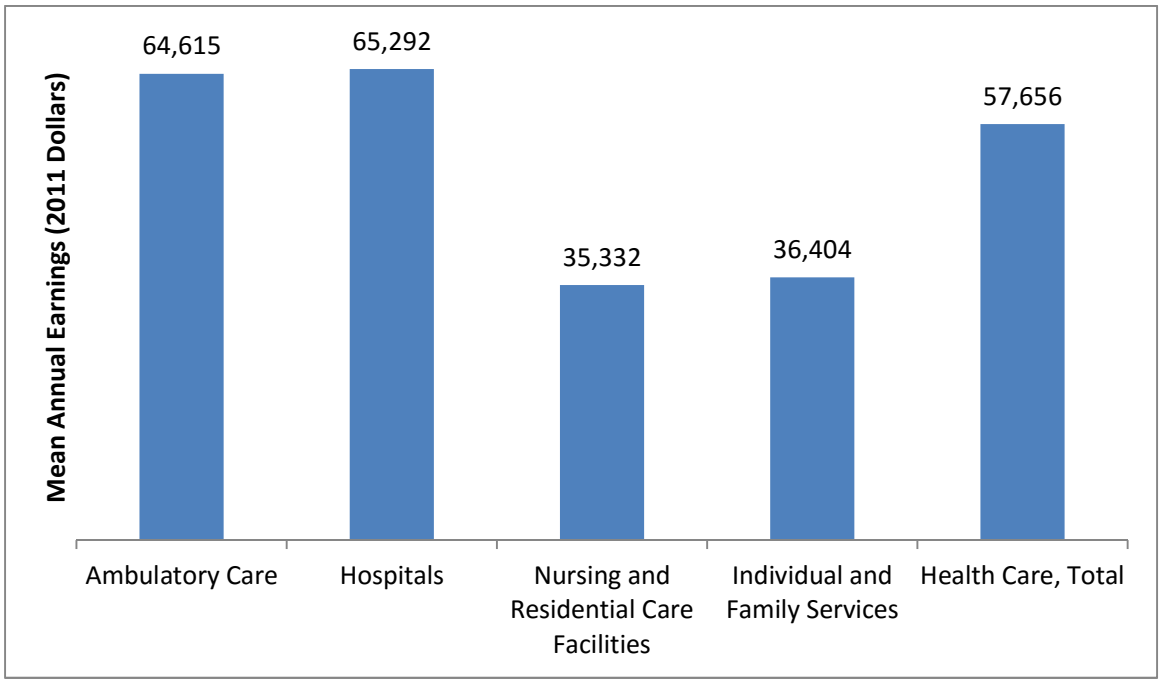
The mean annual salary of the health care workforce in Massachusetts was $57,600 with wide variation across the four sectors that comprise the health care industry. Hospital workers in the state had the highest mean annual earnings over the five years between 2007 and 2011. The $65,300 mean annual salary of hospital workers in the state was 13 percent higher than the overall mean annual salary of all health care workers in the state. Workers in the state's ambulatory care sector also had considerably higher mean annual earnings ($64,600) compared to the mean annual earnings of all health care workers combined and just slightly lower than the mean annual earnings of workers employed by the state's hospitals.

Health care industry workers who were employed in the state's nursing and residential care facilities and in the individual and family services sector had considerably lower earnings than their counterparts employed in hospitals and ambulatory care. Employees of the state's nursing and residential care facilities had mean annual earnings of just $35,300, nearly $30,000 less than the mean earnings of workers in the hospital and ambulatory care sectors. Individual and family services sector workers earned a mean annual salary of $36,400 which was $1,000 more than the mean salary of those employed in the nursing and residential care sector but much lower compared to hospital and ambulatory care sector workers.

The different occupational staffing patterns of these industries partly underlie these earnings differences. Hospitals and ambulatory care sectors have higher shares of workers in high level health diagnostic and treatment occupations such as physicians and registered nurses, whereas nursing and residential care facilities employ many more workers in lower-level health care support occupations (certified nursing assistants, nurse's aides and other occupational aides and assistants, and orderlies) and low-level service occupations. The individual and family services sector has a concentration of workers in managerial and non-health professional occupations with over half of workers with a bachelor's or higher college degree. However, the mean earnings of these workers are only slightly higher than those of nursing and residential care workers. Lower earnings in the individual and family services sector could be from the composition of most professional positions in this industry that consist of community and social service occupations such as counselors and social workers that are characterized by lower

salaries. Some of the lower annual earnings might also be due to the somewhat lower intensity (hours) of employment in this sector.

Chart 15: Mean Annual Earnings of Health Care Industry Workers by Health Care Industry Sub-Sector in Massachusetts, 2007-2011 Averages (2011 Dollars)

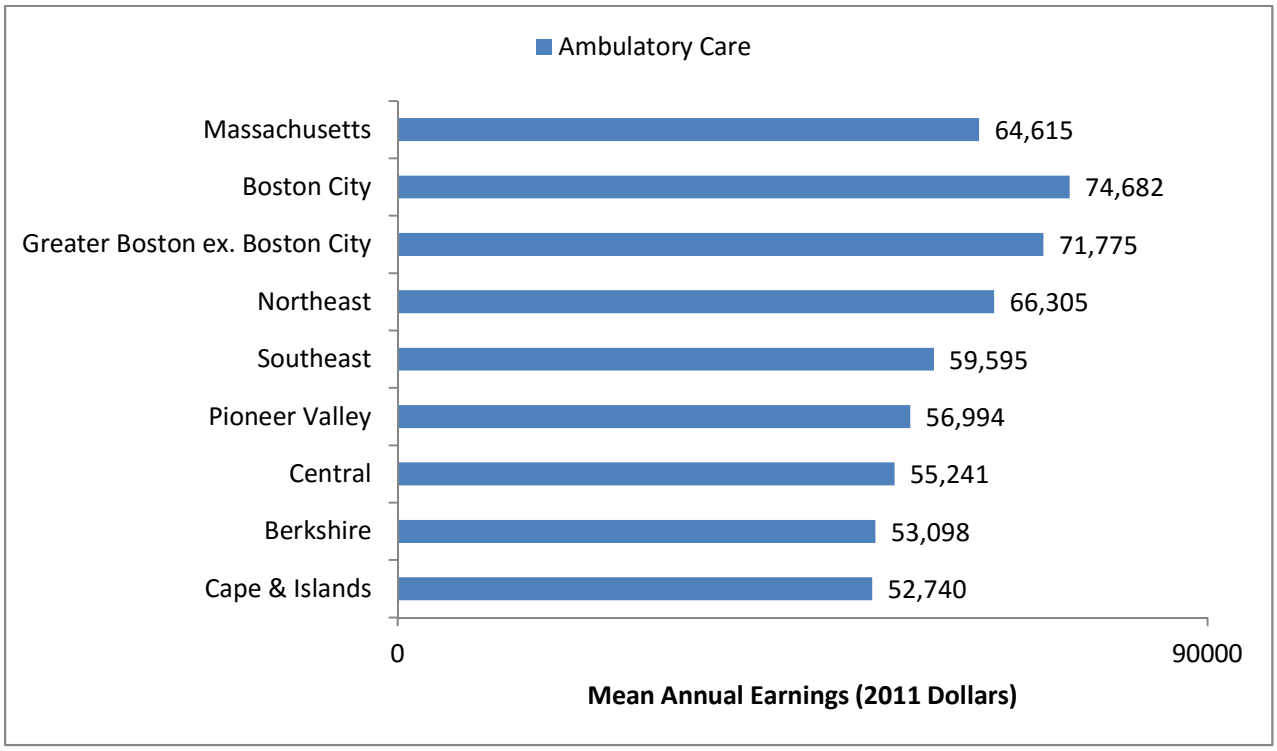


Source: 2007-2011 American Community Survey Public Use Microdata Samples (PUMS) data files, tabulations by Center for Labor Markets and Policy, Drexel University.

Mean Annual Earnings of Health Care Industry Workers by Health Care Industry Sector by Region

The earnings of workers in each of the health care sectors varied widely by region. However, in each of the four health care industry sub-sectors, workers employed in the Greater Boston region had higher earnings than their counterparts who were employed elsewhere. In the ambulatory care sector, the mean annual earnings of workers employed in the City of Boston were $74,700 compared to $71,800 in the remaining Greater Boston region. With mean annual earnings of $66,300, ambulatory care workers in the Northeast region earned more than the statewide average ($64,600). The ambulatory care workforce in the remaining five regions earned annual salaries that were below the statewide average, ranging from $59,500 in the Southeast and $57,000 in Pioneer Valley to $55,200, $53,100, and $52,700 in the Central, Berkshire and Cape and Islands regions respectively.

Chart 16: Mean Annual Earnings of the Ambulatory Care Workforce, Massachusetts and Eight Regions, 2007-2011 Averages (2011 Dollars)

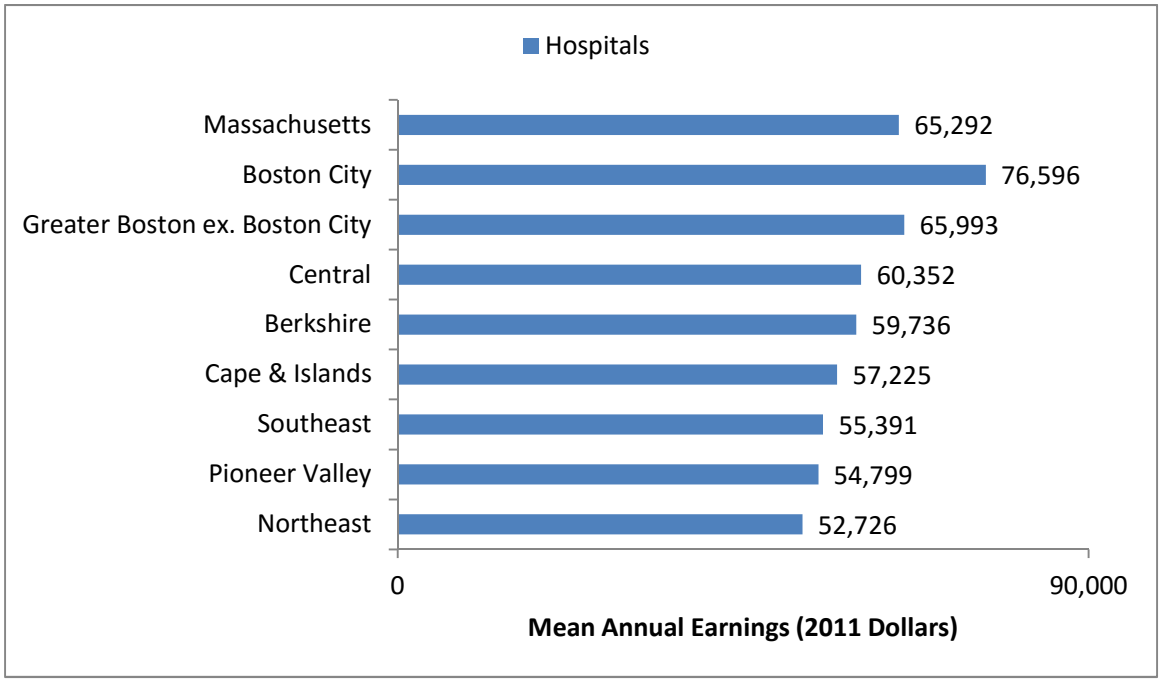


Source: 2007-2011 American Community Survey Public Use Microdata Samples (PUMS) data files, tabulations by Center for Labor Markets and Policy, Drexel University.

Hospital workers in the City of Boston had mean annual earnings that were over $11,000 higher than the statewide average ($76,600 in Boston versus $65,300 statewide). Leading all regions in the state, the mean annual earnings of the hospital workforce in Boston and the remainder of the Greater Boston region were $76,600 and $66,000 respectively. With mean annual earnings of about $60,000, hospital workers in the Central and Berkshire regions ranked third and fourth out of the eight regions. Hospital employees in the Cape and Islands region had mean annual earnings of $57,200 that placed them at five out of eight regions. Workers employed by hospitals located in the Southeast and the Pioneer Valley regions had mean annual earnings of $55,400 and $54,800 while hospital workers in the Northeast had the lowest mean annual earnings of $52,700. The low earnings among hospital workers in the Northeast region is a bit puzzling although it may be partly attributable to the older and smaller hospitals in some of the cities in the region such as Lawrence, Lynn, and Salem. We will explore this question in the

future through additional research and in our discussions with the region's health care industry leaders.

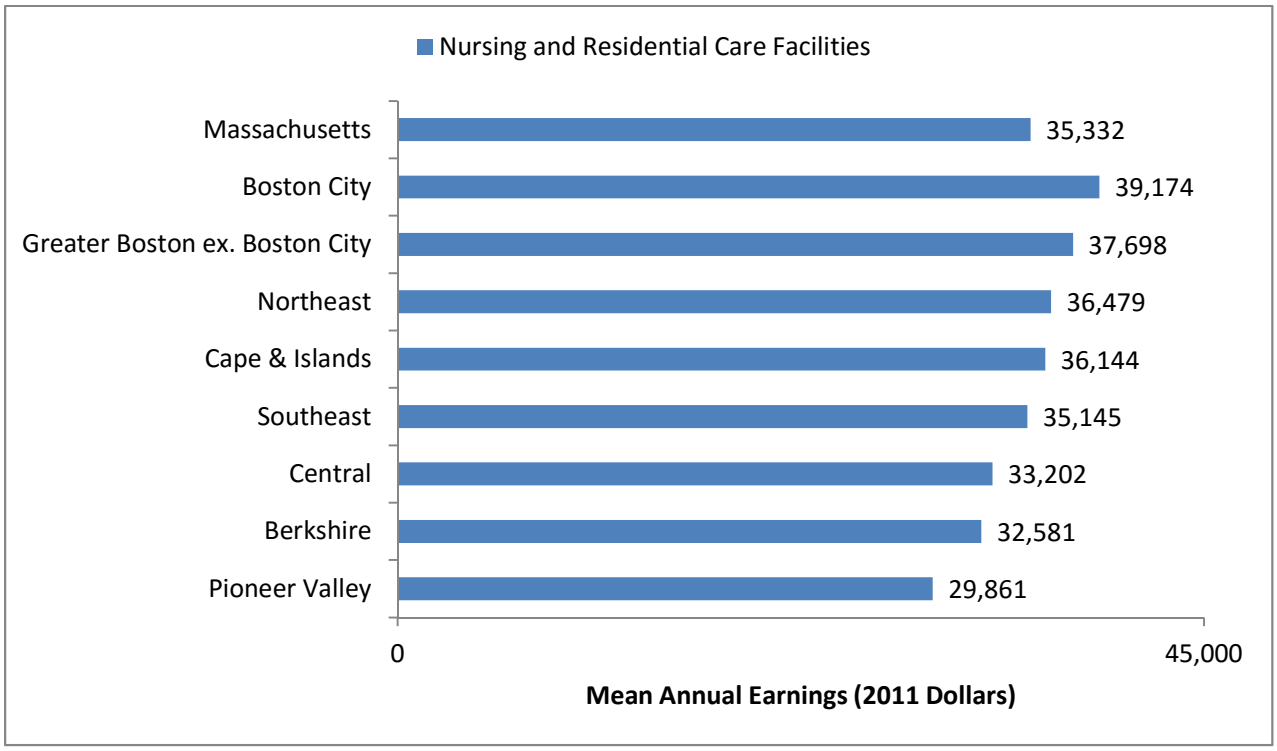
Chart 17: Mean Annual Earnings of the Hospital Workforce, Massachusetts and Eight Regions, 2007-2011 Averages (2011 Dollars)



Source: 2007-2011 American Community Survey Public Use Microdata Samples (PUMS) data files, tabulations by Center for Labor Markets and Policy, Drexel University.

The mean annual earnings of the nursing and residential care workforce ranged from $39,200 in the City of Boston and $37,700 in the rest of the Greater Boston region, to $32,600 in the Berkshire region and just $29,900 in the Pioneer Valley region. Although the mean earnings of workers in this sector of the health care industry were low across the state, workers in Boston had earned 31 percent more than their counterparts in the Pioneer Valley region (the region with the lowest nursing and residential care earnings).

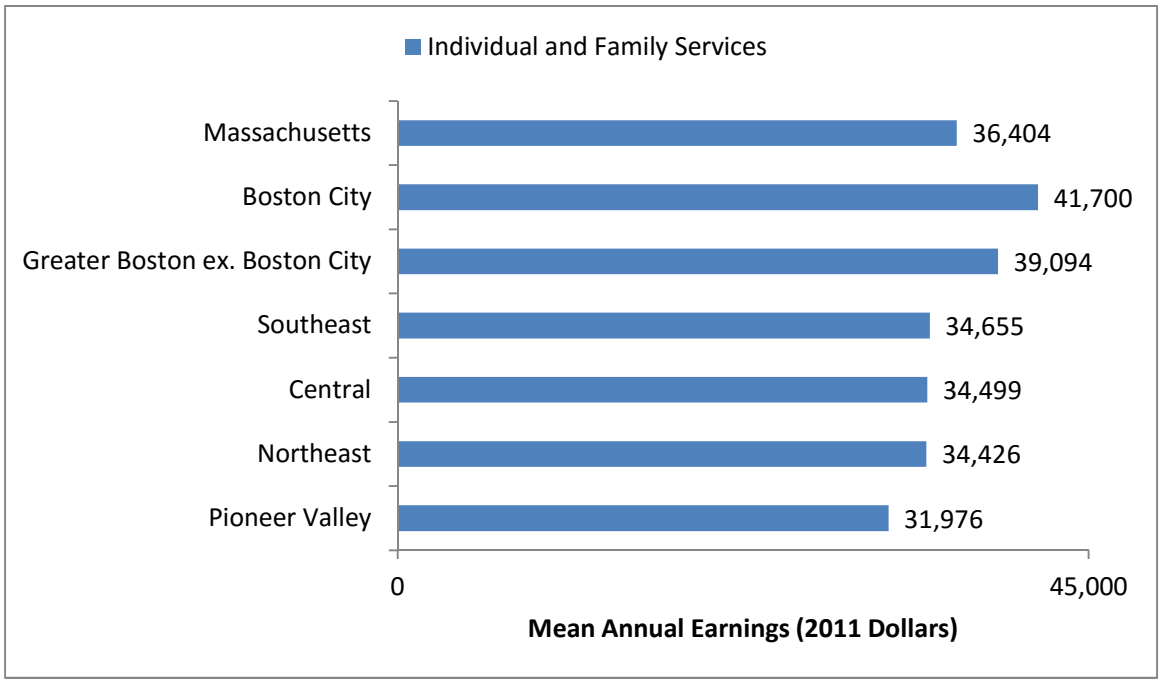
Chart 18: Mean Annual Earnings of the Nursing and Residential Care Workforce, Massachusetts and Eight Regions, 2007-2011 Averages (2011 Dollars)



Source: 2007-2011 American Community Survey Public Use Microdata Samples (PUMS) data files, tabulations by Center for Labor Markets and Policy, Drexel University.

Workers in the individual and family services sector who were employed in the City of Boston earned $41,700 and those working in the Greater Boston region outside the City of Boston had mean annual earnings of $39,100. The individual and family services workforce in the Southeast, Central and Northeast regions earned about $34,500 per year whereas their counterparts in the Pioneer Valley had mean annual earnings under $32,000. The Berkshire and Cape and Islands regions did not have sufficient 2007-2011 ACS sample to produce reliable estimates of mean annual earnings in the individual and family services sector.

Chart 19: Mean Annual Earnings of the Individual and Family Services Workforce, Massachusetts and Six Regions*, 2007-2011 Averages (2011 Dollars)



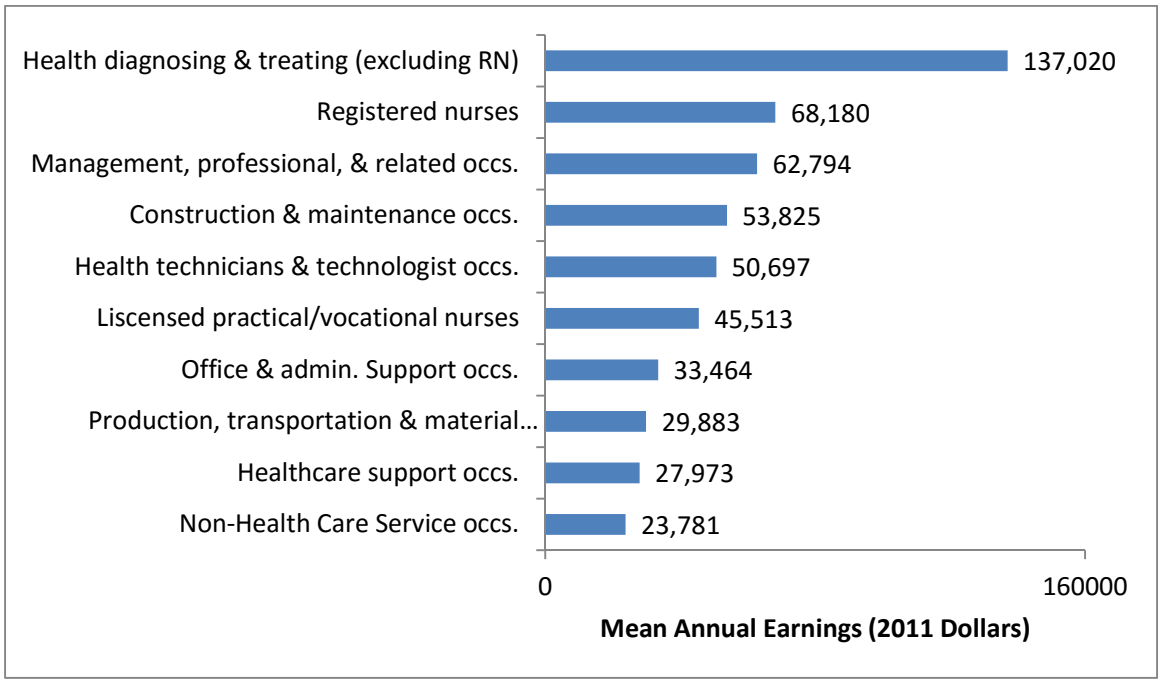
Source: 2007-2011 American Community Survey Public Use Microdata Samples (PUMS) data files, tabulations by Center for Labor Markets and Policy, Drexel University.
*Note: The sample size of individual and family care sector workers in the Berkshire and Cape and Islands regions on the 2007-2011 ACS PUMS data file is not large enough for statistically reliable estimates.

Mean Annual Earnings of Health Care Industry Workers by Occupation in Massachusetts

The health care sector is staffed with workers in varying occupations ranging from higher-level managers, physicians, and registered nurses to lower-level administrative staff, health care support workers (aides, assistants, and orderlies), workers providing services, and blue collar workers. The earnings of workers across these occupations vary widely. We have examined the mean annual earnings of the health care workforce in Massachusetts across ten occupations. Findings presented in the following chart reveal mean annual earnings of $137,000 among health diagnosing and treating practitioners (excluding registered nurses). The second highest mean earnings in the health care industry were among registered nurses, $68,200 per year. Health care industry workers in management and professional occupations (these exclude health professional occupations such as health diagnosing and treating practitioners) earned $62,800 per year, while the fourth highest earnings in the health industry ($53,800) were among skilled blue collar workers employed in construction and maintenance occupations. Technicians

and technologists in health fields earned on average $50,700 per year; about $5,000 more than licensed practical nurses with mean annual earnings of $45,500. Clerical workers in the state's health care industry had mean annual earnings of $33,500 and workers employed in health care support occupations and non-health related service occupations earned a salary of just $28,000 and $23,800 respectively per year.

Chart 20: Mean Annual Earnings of the Health Care Industry Workforce by Occupation, Massachusetts, 2007-2011 Averages (2011 Dollars)



Source: 2007-2011 American Community Survey Public Use Microdata Samples (PUMS) data files, tabulations by Center for Labor Markets and Policy, Drexel University.

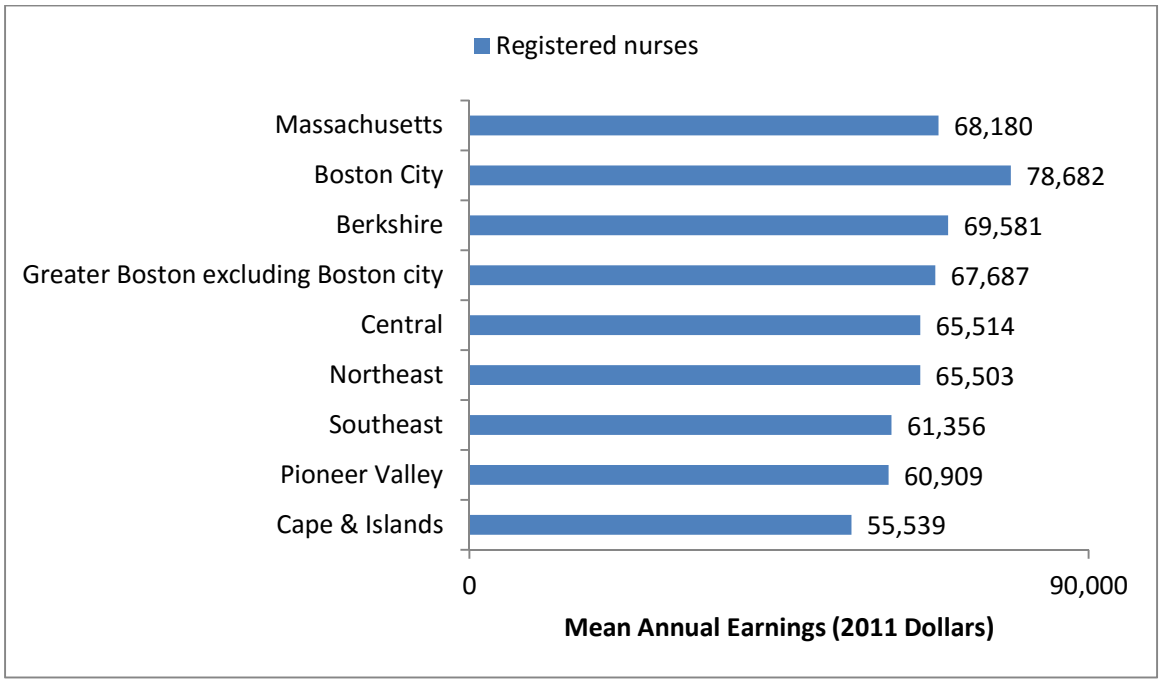
Mean Annual Earnings of Health Care Industry Workers by Occupation by Region

Examination of the mean earnings of health care industry workers by occupation in each of the eight regions across the state is restricted by sample size. We have not provided occupational earnings data for several regions in cases where the sample size in the 2007-2011 ACS data was not sufficient for statistically reliable estimates. Statistically reliable earnings data could be estimated for health care workers across all regions in only the following four occupations: registered nurses, health care support occupations, management and professional occupations, and clerical occupations. Out of the remaining six occupations, one occupation (non-health care services occupation) had reliable data for seven regions, two occupations

(health diagnosing and treating practitioners and health technologists and technicians) had reliable data for six regions, one occupation (licensed practical nursing occupation) had reliable data for just two regions, and the two blue-collar occupations (construction and maintenance, and transportation and moving occupations) had insufficient sample for all regions. Our discussion in this section is focused on seven occupations with statistically reliable earnings data for at least 6 or more regions.

The earnings of registered nurses ranged from $78,700 among those employed in the City of Boston to $55,500 among those working in the Cape and Islands region. The Berkshire region had the second highest pay among registered nurses followed by Greater Boston outside the City of Boston; $69,600 and $67,700, respectively. Registered nurses employed in the state's Central and Northeast regions had about the same mean annual earnings, $65,500 while their counterparts employed in the Southeast region and Pioneer Valley earned about $61,000 per year.

Chart 21: Mean Annual Earnings of Registered Nurses Employed in the Health Care Industry in Massachusetts, by Region, 2007-2011 Averages (2011 Dollars)

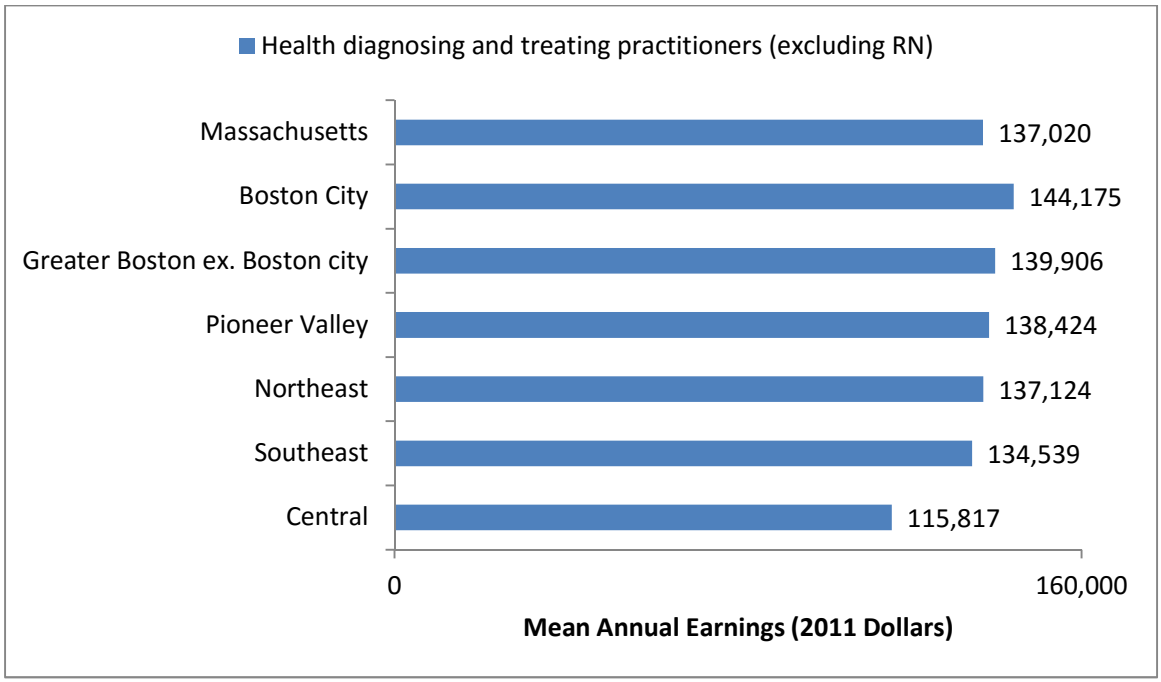


Source: 2007-2011 American Community Survey Public Use Microdata Samples (PUMS) data files, tabulations by Center for Labor Markets and Policy, Drexel University.

The mean annual earnings of health diagnostics and treatment workers varied from $144,200 in the City of Boston to $115,800 in the Central region. There was little variation in the

mean annual earnings of these workers in the Greater Boston area outside of Boston and the Pioneer Valley, Northeast, and Southeast regions. The annual earnings of health diagnostic and treatment workers in these regions ranged from $140,000 in the Greater Boston region outside of the City of Boston and $138,400 in the Pioneer Valley to $137,100 in the Northeast region and $134,500 in the Southeast region. The Pioneer Valley region is generally associated with lower salaries but is ranked relatively high for physician and other health practitioner and treatment occupation workers. Insufficient supply of these workers might underlie the higher earnings among them.

Chart 22: Mean Annual Earnings of Health Diagnostics and Treatment Occupation Workers (Excluding Registered Nurses) Employed in the Health Care Industry in Massachusetts, by Region*, 2007-2011 Averages (2011 Dollars)

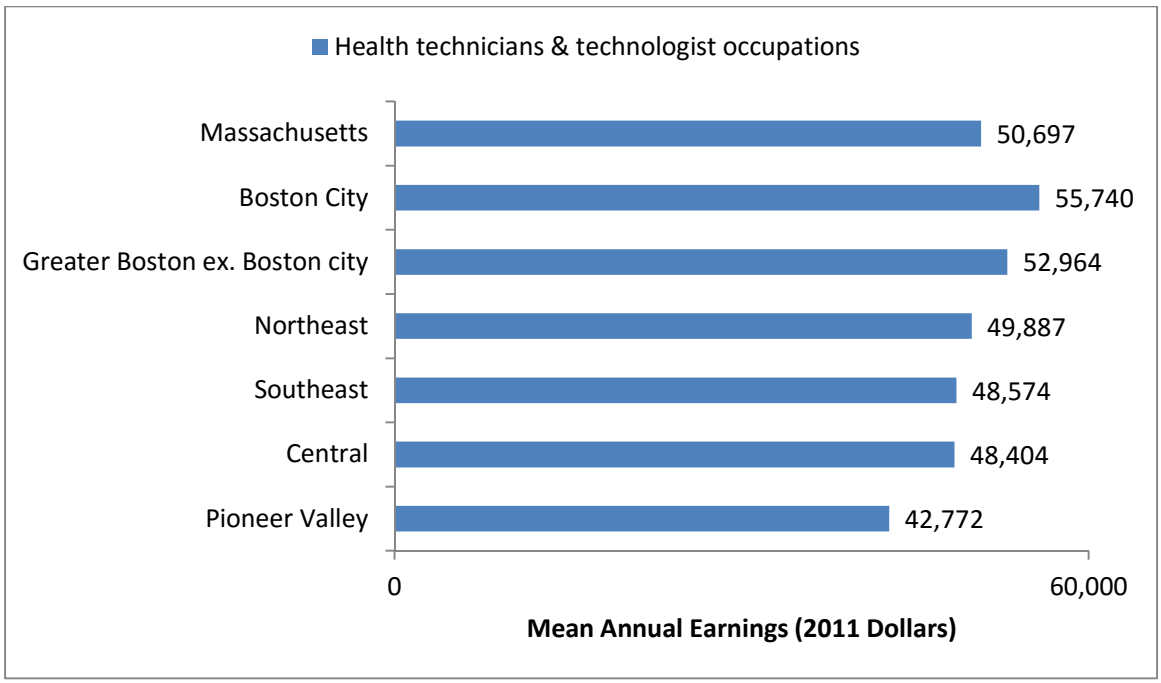


Source: 2007-2011 American Community Survey Public Use Microdata Samples (PUMS) data files, tabulations by Center for Labor Markets and Policy, Drexel University.
*Note: The sample size for the Berkshire and Cape and Island regions on the 2007-2011 ACS PUMS data file is not large enough for statistically reliable estimates.

Like all other health care occupations, health technologists and technicians who were working in the City of Boston earned more per year than their counterparts who were employed in other regions of the state. Boston health care employers paid on average $55,700 to their health technician and technologist workforce. Outside of the City of Boston, health care

employers paid workers in this occupation a mean salary of $53,000. Health technicians and technologists employed in the Northeast, Southeast, and Central regions of the state earned between $48,400 and $50,000 per year while their counterparts working in the Pioneer Valley earned on average $42,800 per year.

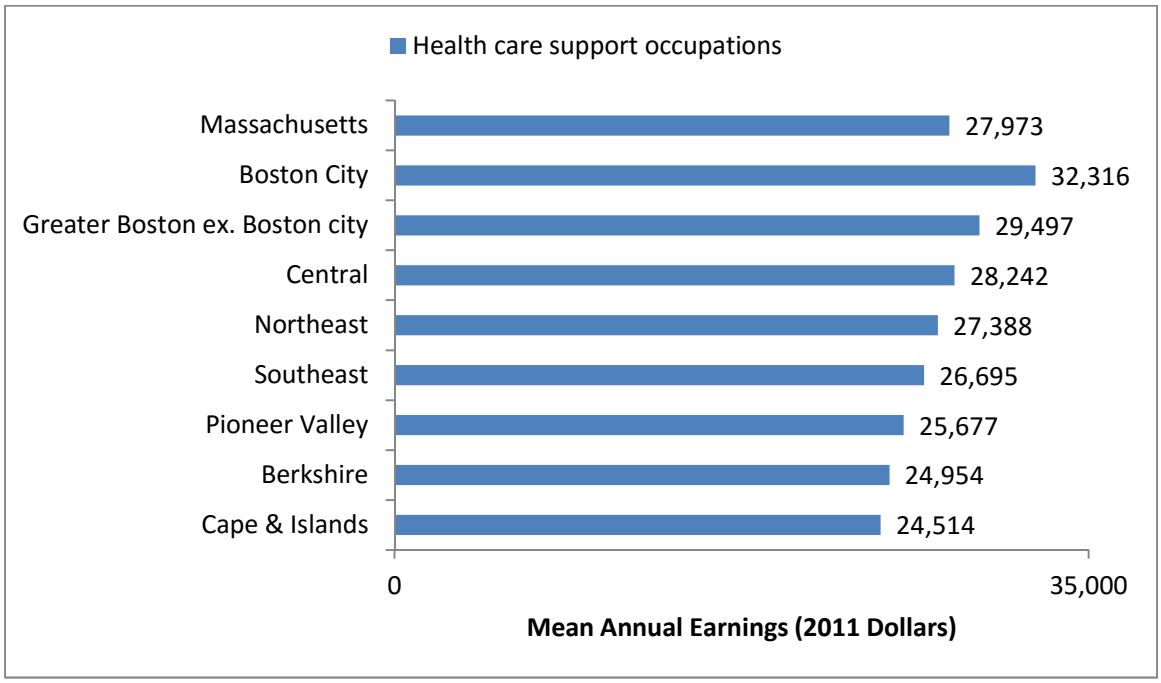
Chart 23: Mean Annual Earnings of Health Technologist and Technician Occupation Workers Employed in the Health Care Industry in Massachusetts, by Region*, 2007-2011 Averages (2011 Dollars)



Source: 2007-2011 American Community Survey Public Use Microdata Samples (PUMS) data files, tabulations by Center for Labor Markets and Policy, Drexel University.
*Note: The sample size for the Berkshire and Cape and Island regions on the 2007-2011 ACS PUMS data file is not large enough for statistically reliable estimates.

The health care support occupations are low wage occupations across every region of the state. The geographic variation in the mean annual earnings of workers employed in these occupations is characterized by a systematic decline in earnings with distance from the City of Boston. The highest mean annual earnings of workers in these occupations were found in Boston ($32,300) followed by the remainder of the Greater Boston region ($29,500). Once outside this region, the mean annual earnings of these workers declined steadily from $28,300 in the Central region, $27,400 in the Northeast region, $26,700 in the Southeast region, $25,700 in Pioneer Valley, $25,000 in the Berkshires and $24,500 in the Cape and Islands region.

Chart 24: Mean Annual Earnings of Health Care Support Occupation Workers Employed in the Health Care Industry in Massachusetts, by Region, 2007-2011 Averages (2011 Dollars)

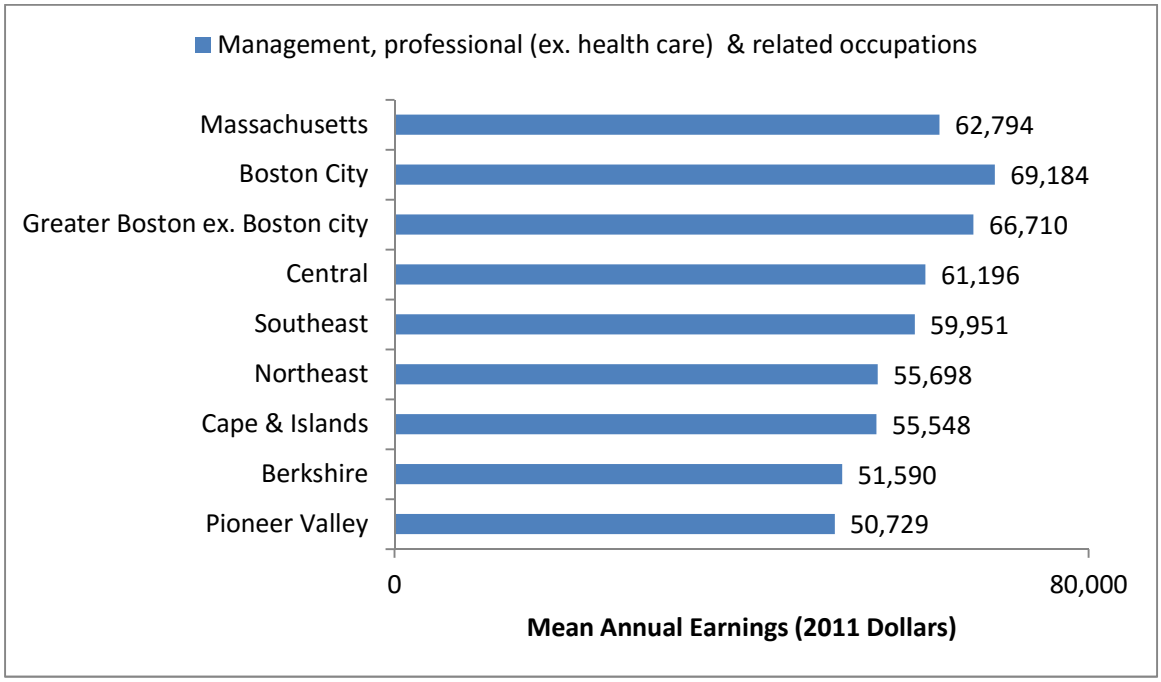


Source: 2007-2011 American Community Survey Public Use Microdata Samples (PUMS) data files, tabulations by Center for Labor Markets and Policy, Drexel University.

Statewide health care industry employees in the managerial and non-health professional occupations[7] earned $62,800 per year. Mean annual earnings of these workers varied across the eight regions of the state with the highest earnings in the City of Boston ($69,200) and the lowest in the Pioneer Valley ($50,700).

[7] Management and professional occupations excluding those primarily engaged in a particular health care specialty include management executives, medical and health services supervisors, business managers and IT specialists. Staff in this category also includes persons engaged in a variety of social service activities including mental health counseling and employment as health care social workers.

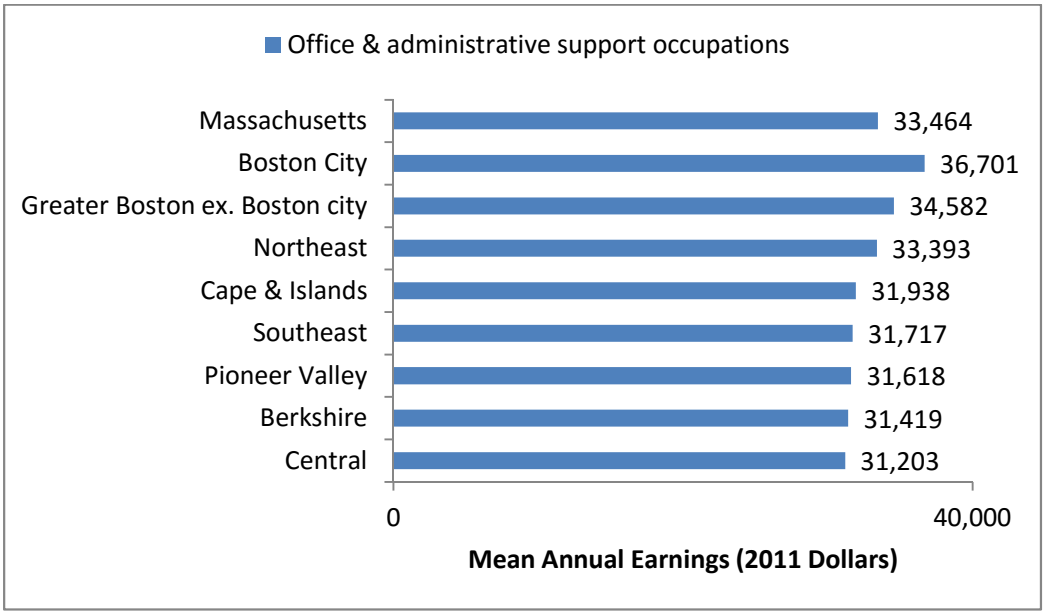
Chart 25: Mean Annual Earnings of Management, Professional (excluding Health Care Professions) and Related Occupation Workers Employed in the Health Care Industry in Massachusetts, by Region, 2007-2011 Averages (2011 Dollars)



Source: 2007-2011 American Community Survey Public Use Microdata Samples (PUMS) data files, tabulations by Center for Labor Markets and Policy, Drexel University.

The salary of clerical workers in the health care industry did not vary much across the state's regions. Statewide these workers earned $33,500 per year and across regions their mean earnings varied from $36,700 in the City of Boston and $34,600 in the remainder of the Greater Boston region, to $33,400 in the Northeast region and between $31,000 and $32,000 in the remaining six regions.

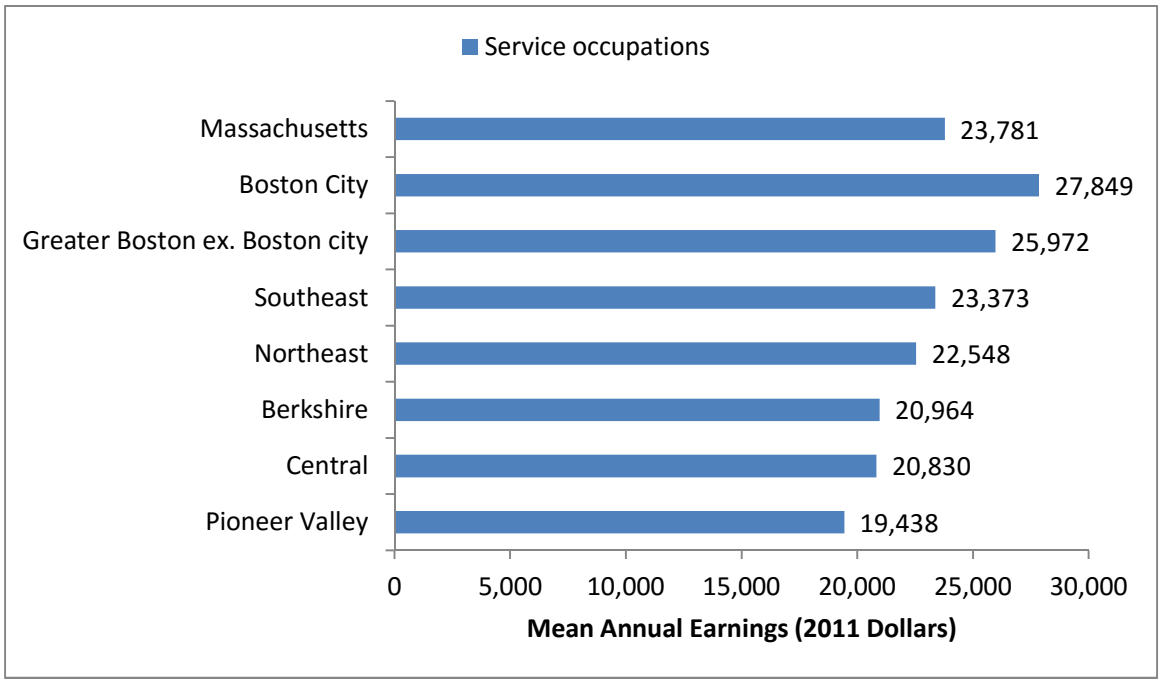
Chart 26: Mean Annual Earnings of Office and Administrative Support Occupation Workers Employed in the Health Care Industry in Massachusetts, by Region, 2007-2011 Averages (2011 Dollars)



Source: 2007-2011 American Community Survey Public Use Microdata Samples (PUMS) data files, tabulations by Center for Labor Markets and Policy, Drexel University.

There was a much greater variation in the mean annual earnings of health industry workers who were employed in service occupations. This is a low wage occupation with statewide mean annual earnings below $24,000. Workers in the City of Boston and the Greater Boston region outside the city had higher annual earnings, $27,900 and $26,000 respectively. Those who were employed in the Southeast and Northeast regions earned $23,400 and 22,500, while their counterparts in the Berkshire and Central regions had mean annual earnings of $21,000. Service workers in the health care industry of the Pioneer Valley were earning just $19,400 per year.

Chart 27: Mean Annual Earnings of Service Occupation Workers Employed in the Health Care Industry in Massachusetts, by Region*, 2007-2011 Averages (2011 Dollars)



Source: 2007-2011 American Community Survey Public Use Microdata Samples (PUMS) data files, tabulations by Center for Labor Markets and Policy, Drexel University.
*Note: The sample size for the Cape and Islands region on the 2007-2011 ACS PUMS data file is not large enough for statistically reliable estimates.

Mean annual earnings of health care industry workers in different occupations varied by region of the state in which they were employed. The City of Boston and the Greater Boston region had consistently higher earnings for all occupations, and mean earnings of workers in most occupations declined by distance from the Greater Boston area. And although the rank of different regions by mean annual earnings was not the same across all occupations, the Pioneer Valley, Central, Cape and Islands, and Berkshire regions frequently had the lowest or second lowest earnings compared to other regions. The analysis of earnings in the state's health care industry reveals sizable variations in mean annual earnings by health care industry sector, occupation, and region. Any changes in the size and composition of the health care workforce—by health care industry sector, occupation, and place of employment—will affect the overall earnings and earnings patterns in the health care industry.

Distribution of Annual Earnings in the Health Care and Non-Health Care Sectors

The final section in the analysis of earnings focuses on the distribution of earnings across workers in the health care industry. Concerns about the negative social and economic effects of rising income inequality are widespread in the U.S., as well as the world. More recently, focus on this issue was sharpened by the sobering account of increased inequality and concentration of wealth by the French economist Thomas Picketty in his book, *Capital in the Twenty-First Century*.

We have examined the distribution of earnings in the health care industry in Massachusetts and compared it with the distribution of earnings in other non-health care industries in the state. This will allow for an assessment of the contribution of the health care industry on overall earnings inequality. The health care industry is staffed with workers across a variety of occupations that require different levels of education, skills, and knowledge. The earnings of the state's workforce vary widely by health care industry sector, occupation, and location within the state. Any change in the industry-occupation-region combination of the health care workforce will change not just the overall structure and level of earnings in the industry but also the distribution of earnings. For example, an increase in low wage workers and a decline in middle wage workers in the industry will increase inequality in the distribution of earnings in the industry.

Earnings distribution in this section is measured in two ways. First, we have measured and compared the level of earnings at different points (e.g., 20^{th}, 50^{th}, 80^{th}, 90^{th} percentiles) of the distribution of earnings across all workers employed in the health care industry, each sub-sector of the health care industry, and the non-health care industries in Massachusetts. Second, we have measured the share of aggregate earnings in the state's health care industry and the non-heath care industries that accrue to workers in each quintile of the earnings distribution.

The distribution of annual earnings among a group of workers (such as workers in the health care industry in Massachusetts) is estimated by arranging all workers in the group in ascending order by their annual earnings. Differences in the level of annual earnings of workers at different percentiles of this ascending order distribution of workers represents the level of inequality in the distribution of annual earnings among this group of workers. Dividing this ascending (earnings) order distribution of workers into five equal groups creates annual earnings

distribution quintiles of workers and the share of the aggregate earnings that goes to each quintile of workers provides the second measure of the distribution of annual earnings described above.

The first measure of earnings inequality presented in the table below reveals a sharply higher inequality in the distribution of earnings outside the health care industry in the state. In the health care industry, workers at the 90th percentile earned 9 times as much per year as their counterparts at the 10th percentile. In the non-health care industries this ratio was 16; meaning for every $1 of annual earnings by workers in the 10th percentile, their counterparts in the 90th percentile earned $16. Within the health care industry, on this measure the ambulatory care sector had the most unequal distribution of earnings, albeit not as high as the non-health care sector, and hospitals had the least unequal distribution of annual earnings.

Table 11: Annual Earnings of Workers Employed in the Health Care and Non-Health Care Industries in Massachusetts at Different Percentiles of the Distribution of the Annual Earnings within the Industry, 2007-2011 Averages (2011 Dollars)

Percentile of Earnings Distribution	Ambulatory Care	Hospitals	Nursing and Residential Care Facilities	Individual and Family Services	Total, Health Care	Non-Health Care (All Industries excluding Health Care)
Annual Earnings at Different Points of the Earnings Distribution						
10	11,031	18,328	7,942	7,152	11,741	6,915
20	20,781	28,054	15,274	14,255	21,180	15,444
50	**39,892**	**51,062**	**30,225**	**33,093**	**41,488**	**41,562**
80	81,459	86,550	50,912	51,930	75,452	78,595
90	122,188	113,255	66,185	66,185	104,794	107,444
Ratio of Annual Earnings at Different Points of the Earnings Distribution						
90th Percentile Ratios						
90/10	11	6	8	9	9	16
90/20	6	4	4	5	5	7
90/50	3	2	2	2	3	3
80th Percentile Ratios						
80/10	7	5	6	7	6	11
80/20	4	3	3	4	4	5
80/50	2	2	2	2	2	2

Source: 2007-2011 American Community Survey Public Use Microdata Samples (PUMS) data files, tabulations by Center for Labor Markets and Policy, Drexel University.

Compared to the annual earnings of workers at the 20th percentile, those at the 90th percentile earned 7 times more in the non-health care industry and 5 times more in the health care industry. And relative to the median, the earnings of workers in the 90th percentile were 3 times higher in the health care and the non-health care industries of the state. Similarly, a comparison of the earnings of workers at the 80th percentile relative to the 10th and 20th percentiles found a bigger gap in the non-health care industries than the health care industries while a comparison of the 80th to 50th percentile found the same gap in the health and non-health care industries (workers at the 80th percentile earned twice as much as workers in the 50th percentile).

Overall these findings suggest wider annual earnings gaps in the non-health care industries compared to the health care industry between the top and bottom of the earnings distribution and about equal sized earnings gaps in both sectors between the top and the middle of the earnings distribution. Within the health care industry the ambulatory care sector has the highest level of inequality in the distribution of earnings while the hospital sector has the lowest inequality in the distribution of earnings.

The second measure also reveals much greater inequality in the distribution of earnings in the state's non-health care sector compared to the health care sector. In both the health care and non-health care industries slightly over one-half of the aggregate earnings during the year (2007-2011 average) accrued to workers in the highest earnings quintile; 50.9 percent in non-health care and 50.7 percent in health care. Workers in the second highest (fourth) quintile earned 22.8 percent of the aggregate industry-wide earnings in the non-health care sector and 21.1 percent in the health care sector. Bigger differences between health care and non-health care are evident at the bottom of the earnings distribution. The slice of annual earnings of workers in the lowest quintile represents 4 percent of the aggregate annual earnings in the health care industry and only 2.6 percent in the non-health care industry. Although both industries have almost the same share of earnings going to workers in the highest quintile, workers at the bottom of the earnings distribution receive a larger slice of the earnings pie in the health care sector compared to the non-health care sector. The ratio of the share of earnings of workers in the highest and lowest quintiles is 12.6 in the health care sector and 19.5 in the non-health care sector of the state. The ratio of the share of earnings of workers in the two highest and the two lowest quintiles is 5.2 in the health care sector and 6.5 in the non-health care sector.

Table 12: The Distribution of Annual Earnings of Workers Employed in the Health Care and Non-Health Care Industries in Massachusetts by Earnings Distribution Quintiles within the Industry, 2007-2011 Averages (2011 Dollars)

Earnings Distribution Quintiles	Health Care Industry	Non-Health Care Industries
Lowest Quintile	4.0	2.6
Second Quintile	9.8	8.7
Third (Middle) Quintile	14.4	15.0
Fourth Quintile	21.1	22.8
Highest Quintile	50.7	50.9
Ratio of Quintile Shares		
Highest/Lowest	12.6	19.5
Highest+Fourth)/(Lowest+Second)	5.2	6.5

In a previous section we had examined the distribution of annual hours of employment among health care workers and found a smaller gap in annual hours between the highest and lowest quintiles. Our examination of the distribution of earnings found the inequality to be lower in the health care industry than the non-health care industries in Massachusetts. Some of this lower inequality might be attributable to the lower inequality in annual hours of work in the health care industry. The health care industry provides employment opportunities across the spectrum of occupations – high and low – and provides more opportunities for work (more hours) to workers, especially at the bottom of the distribution.