

Nashoba Valley Medical Center

A STEWARD FAMILY HOSPITAL



Community Health Needs Assessment 2018

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Executive Summary

This report is a comprehensive analysis of health outcomes and perspectives in the Nashoba Valley Medical Center (NVMC) primary service area which encompasses Ayer, Groton, Harvard, Lancaster, Leominster, Littleton, Lunenburg, Pepperell, Shirley, Townsend, Westford. Data was gathered by analyzing publicly available information, by reviewing community feedback gathered through focus groups, by conducting an extensive review of published literature on the health of the population residing in the region and in the Commonwealth of Massachusetts, and by surveying local health professionals. This data-driven methodology allowed NVMC to investigate the resource requirements of the community in order to better streamline resources and inform community-based initiatives. The information contained herein highlights some of the public health needs identified within the community and may be used to develop targeted community health improvement strategies as well inform the hospital in the development of its subsequent Implementation Strategy and other Community Benefits programming.

The goal has been to engage and learn from community members, particularly those most at-risk for experiencing health disparities, and develop recommendations for Community Benefits programming that bring about improved health outcomes in high priority populations. For the purpose of this CHNA high priority populations may be defined as, members of the community that have been historically marginalized due to racism, poverty and have had limited access to health care services. As noted in the *Attorney General's Community Benefits Guidelines for Non-Profit Hospitals*, released February 2018, *"It is well understood that racism – in all of its forms – and institutional bias impact health outcomes, both through their influence on the social determinants of health and also as an independent factor affecting health. The health equity framework illustrates how racism has an independent influence on all the social determinants of health and that racism in and of itself has a harmful impact on health"*. Through the development and implementation of evidence-based best practices in Community Benefits programming, NVMC seeks to respond to the guidance offered by the Office of the Attorney General and the health equity framework. We accomplish this by: addressing root causes of health disparities; educating community members on prevention and self-care particularly for chronic diseases such as cancer, heart disease, diabetes, obesity, as well as mental illness, substance use disorder, and addressing social determinants of health.

Social determinants of health, including social, behavioral and environmental influences have become increasingly prevalent factors in addressing population health. Literature recommends linking health care and social service agencies in addressing social determinants of health to increase the efficacy of health promotion and chronic disease prevention programs. In particular, services related to housing, nutritional assistance, education, public safety, and income supports are areas for cross sector collaboration with health services in the community. Multicultural communities face particularly complex issues when accessing and receiving treatment in their daily lives.

Maintaining and strengthening community engagement on health promotion, chronic disease prevention, substance abuse prevention, mental illness among other critical areas for collaboration, is key to the success of population health improvement strategies. From promoting access to affordable health care, creating a stable positive economic environment in the region, ensuring that those most at-risk have access to basic needs for better health outcomes such as stable affordable housing, low-cost nutritional food choices, and a healthy environment, NVMC is well positioned to implement community benefits programs that support a healthy and thriving community. The information and recommendations herein, are presented as a starting point for discussions and planning within the hospital and with community-based partners to develop truly comprehensive, actionable and measurable Community Benefits programming.

Introduction

Nashoba Valley Medical Center, located in Ayer, Massachusetts, is a community hospital offering inpatient medical and psychiatric services, a full range of outpatient services and 24/7 emergency services. The primary service area includes Ayer, Shirley, Devens, Harvard, Groton, Westford, Littleton, Pepperell, Townsend, Lunenburg, and Leominster. The secondary market includes Fitchburg, Ashby, Dunstable and Bolton.

Nashoba Valley Medical Center maintains fifty seven acute care beds and a twenty bed Geriatric Psychiatric Unit. The major clinical strengths include a fully digital, state of the art diagnostic imaging (including 3D Mammography), laboratory services, cardiology (including a pulmonary and cardiac rehab program), gastroenterology, oncology, orthopedics, general surgery and bariatric surgery, a comprehensive pain clinic, and comprehensive rehabilitation with physical, occupational and speech therapy (and a new offsite Rehab center focusing on sports medicine).

The Garvin Center for Geriatric Psychiatry is a 20 bed unit offering psychiatric inpatient care to adults ages fifty-five and older who are experiencing emotional or behavioral challenges. Services include diagnostic assessment, psychopharmacological consultation, behavioral management consultants, family consultation, dementia evaluation, depression screening and neuropsychological testing.

Nashoba Valley Medical Center is part of Steward Health Care, a fully integrated national health care services organization committed to providing the highest quality of care in the communities where our patients live. Steward owns and operates 36 hospitals in nine states in the U.S. (Arizona, Arkansas, Florida, Louisiana, Massachusetts, Ohio, Pennsylvania, Texas, and Utah) and the country of Malta. The company employs more than 40,000 health care professionals and is recognized as one of the world's leading accountable care organizations.

Community Benefits Mission Statement

Nashoba Valley Medical Center is committed to collaborating with community partners to improve the health status of the towns we serve. We accomplish this by:

- Focusing on the many conditions that affect our population in the areas we serve by offering inpatient and outpatient diagnostic treatment/healthcare
- Providing comprehensive patient healthcare services utilizing all available resources
- Educating community members on prevention and self-care, particularly for chronic diseases (such as diabetes and hypertension and stroke) and mental health issues related to older adults, ages fifty five and older
- Addressing the social determinants of health through education and access to resources
- Addressing the root causes of health disparities

Community Benefits Statement of Purpose

Nashoba Valley Medical Center is committed to serving the physical and spiritual needs of our community by delivering the highest quality of care with compassion and respect. Our community benefits purpose is to:

- Improve the overall health status of people in our community
- Provide accessible, high quality care and services to all in our community, regardless of ability to pay
- Collaborate with staff, providers, and community representatives to deliver meaningful programs that address statewide health priorities and local health issues
- Identify and prioritize unmet needs and select those that can most effectively be addressed with available resources
- Contribute to the well-being of our community through outreach efforts including, but not limited to, reducing barriers to preventive health education, screening, wellness programs, and access to health care services and becoming an advocate for the populations we serve
- Regularly evaluate our community benefits program

Methods

The 2018 NVMC Hospital Community Health Needs Assessment (CHNA) was developed in full compliance with the Commonwealth of Massachusetts Office of Attorney General-*The Attorney General's Community Benefits Guidelines for Non-Profit Hospitals* released in February 2018. In order to accomplish this, a multi-dimensional approach to the collection of health and social demographic information from the NVMC primary service area was conducted. In accordance with this process, NVMC engaged various community organizations and members to ensure that varying perspectives on health and social topics were taken into account in order to complete this CHNA. Below is a brief description of the data collection process.

Health Indicators and Demographics – Data Analysis

In order to get a broader view of the health and sociodemographic trends in the NVMC primary service area, extensive public data was collected to enable key findings to be derived from the research of online data sources, in partnership with the Massachusetts Department of Public Health (MA DPH). Data sources used by the team included, U.S. Census Bureau, Department of Early and Secondary Education (DESE), Uniform Crime Reporting (UCR) Program of the Federal Bureau of Investigation and the Center for Disease Control and Prevention (CDC). Health indicator data, such as mortality, disease prevalence, hospitalizations, admissions to substance abuse programs and reproductive health was provided by MA DPH Office of the Commissioner MassCHIP staff.

Key Informant Survey

A Key Informant Survey was developed and distributed electronically to all NVMC staff as well as staff at all affiliated medical practices and Steward Medical Group offices within the service area. The survey was also distributed to our community partners, to ensure that the greater health and human service provider community had the opportunity to contribute their view and opinions. We estimate that about 175 individuals received the survey electronically during the four-month survey period. A total of 100 health professionals submitted a response for a response percentage of about (57 %). A copy of the survey may be found in Appendix B.

Focus Group

A total of two focus groups were conducted with community members residing within the NVMC service area, in Pepperell and with members from the local Emergency Medical Response community in Middlesex County. Each focus group was conducted in collaboration with a partnering community organization so as to foster community engagement and collaboration. In total 25 community members took part in the focus groups. The goal was to collect views and opinions of participants that could be used to inform community health improvement strategies recommended in this report. A copy of the focus group questions can be found in Appendix C.

Literature Review

A literature review of recent governmental, public policy, and scholarly works was conducted. The public health information was analyzed and a summary report which included common themes and public health trends among high-priority populations in the NVMC service area was created to inform this community Health Needs Assessment.

Findings

Chronic Disease

Prevention and treatment of chronic disease is a public health priority. These chronic conditions in turn contribute to 56% of all mortality in Massachusetts and over (53%) of all health care expenditures (\$30.9 billion a year) (MDPH, 2014).

A history of policies rooted in structural racism have resulted in environments in which there are inequities in access to healthy foods, safe spaces for physical activity, walkable communities, quality education, housing, employment, and health care services. The health implications of this are that Black and Hispanic residents of Massachusetts are consistently and disproportionately impacted by the high prevalence of all chronic diseases, as well as the related deaths and high acute care service utilization (MDPH, 2017).

In a *Key Informant Survey* of health professionals in the NVMC region, respondents ranked heart health, hypertension, and diabetes highest as “major health concerns in the community where [they] provide services.” Respondents ranked cancer eighth, despite the highest percentage of mortality due to cancer in the NVMC region. In a focus group of EMS professionals, participants reported chest pain and shortness of breath as primary health concerns in the community. A focus group of community members in Pepperell indicated cardiac health and diabetes as two of the top three health concerns within the community. The Pepperell focus group’s reports concur with data, as percentages of mortality due to heart disease in Pepperell and Shirley are highest amongst the NVMC service area. Cancer mortality as a percentage of all causes is slightly higher in the NVMC region compared to Massachusetts overall and is notably high in Lancaster. The most commonly diagnosed cancers across the NVMC region are breast cancer, prostate cancer, and lung cancer.

Mental Health

Over half of respondents to the *Key Informant Survey* identified behavioral health as a major health concern in the community. Both focus groups identified “those dealing with mental health issues” as an underserved community, along with “those dealing with addiction.” In 2015, the rate of mental health hospitalizations was higher in Ayer, Littleton, Shirley, and Groton compared with the rest of the service area. Mental health intersects with many areas of public health, therefore requiring common services and resource mobilization effort. Integrated treatment is critical for treating

people with co-occurring disorders and can ultimately achieve better health outcomes and reduce costs (MDPH, 2017).

Substance Abuse

The rate of substance abuse admissions to DPH funded programs has increased consistently from 2013-2017 in Leominster, whereas other towns do not show a clear trend. In 2015, there were 1,637 opioid-related deaths in Massachusetts. Opioid mortality in the NVMC region totaled 24, with the highest contributors being Leominster (7), Pepperell (3), Lancaster (2) and Lunenburg (2). Alcohol related mortality in the NVMC region is significantly below the statewide rate; however Leominster reports a rate of alcohol related mortality that doubles the state value.

Housing Stability and other factors

Our data point out that race, ethnicity, and socio-economic factors are indicators of health outcomes within the region. To take this into consideration and enhance efficacy of NVMC programs, NVMC will focus its efforts toward individuals and families who are at greatest risk for health inequities due to socio-economic and/or sociodemographic status and lack of access to health and social services. Providing care coordination services and facilitating access to social services and food are essential components of a population health improvement strategy, as indicated by participants in the focus groups conducted in the NVMC service area, and in responses gathered through the *Key Informant Surveys*. Based on data from the US Census Bureau, Leominster is the only town within the service area to have a median household income significantly below the state median household income. Ayer, Leominster, and Shirley report higher poverty levels among families than the state average, and Lancaster reports a value slightly below the state average but still significantly higher than the rest of the towns in the service area. Despite high rates of poverty in these communities, all towns in the service area report percentages of households participating in Supplemental Nutrition Assistance Programs below the average for Massachusetts, suggesting that some residents, particularly those who are housebound, may not have access to senior food services.

Increasing awareness and building capacity in service systems are important in helping identify and treat co-occurring disorders. Treatment planning should be client-centered, addressing clients’ goals and using agreed upon treatment strategies (MDPH, 2017).

Demographics

Who we are directly impacts how we interact with our community and society. Our race, gender identity, age, disability status, etc. influence the social environment that we experience. Our social environment impacts many mental and physical health outcomes, including: mental health, violence, risk behaviors (tobacco and drug use), physical health and well-being, and disease morbidity and mortality. We are influenced by the social environment on three levels: interpersonal, community, and society (MDPH, 2017).

Across all three levels, systems of oppression such as structural racism and gender bias lead to social isolation, social exclusion, poor mental health, increased risk of violence, increased rates of poverty, higher hospitalizations, longer recovery times, and higher mortality rates for many conditions. Social isolation, social exclusion, racism, discrimination and poverty disproportionately affect low-income communities and communities of color and all negatively impact many aspects of health. Communities of color are more likely to have lower levels of resources and connectedness with other neighborhoods and higher levels of racial segregation. They also face more challenges when engaging in group action in neighborhoods to shift these conditions (Hobson-Prater T, 2012).

Medically Underserved Areas (MUAs) and Medically Underserved Populations (MUPs) identify geographic areas and populations with a lack of access to primary care services. MUPs are specific sub-groups of people living in a defined geographic area with a shortage of primary care health services. These groups may face economic, cultural, or linguistic barriers to health care. Examples include, but are not limited to, those who are: homeless; low-income; Medicaid-eligible; Native American; or migrant farmworkers (HRSA, 2018).

Although health care providers intend to provide equal treatment to all, bias among providers has been shown to negatively impact patients. For example, studies suggest that physicians unknowingly offer different treatment options based on the patient's race, even when patients have similar symptoms. Patients are accessing care but being treated differently. These race-based differences may be reduced if physicians recognize they are susceptible to unconscious bias, especially when interacting with their patients and writing prescriptions. The bias among providers and the resulting differences in treatment may also contribute to health inequities (BPHC, 2017).

Racial and ethnic inequities were found in indicators of health care access, particularly for Latino adults. Higher percentages of Latino adults compared with White adults reported both the inability to see a doctor in the past 12 months because of cost and the lack of a doctor or health care provider. Inequities in these indicators tend to disproportionately affect adults with less than a high school diploma or household income less than \$25,000, as well as adults who are non-homeowners or foreign-born residents who lived in the U.S. for 10 or fewer years. To reduce the inequities in being uninsured or faced with barriers to health care access, multi-sector interventions that target subpopulations at higher risk should address social determinants, (e.g. by improving employment opportunities and wage conditions among vulnerable sub-populations, and sources of structural racism that affect health care provider-patient interactions (BPHC, 2017).

Employment

While being employed is important for economic stability, employment affects our health through more than economic drivers alone. Physical workspace, employer policies, and employee benefits all directly impact an individual's health. The physical workplace can influence health through workplace hazards

and unsafe working conditions which lead to injuries, illness, stress, and death. Long work hours and jobs with poor stability can negatively impact health by increasing stress, contributing to poor eating habits, leading to repetitive injuries, and limiting sleep and leisure time. Job benefits such as health insurance, sick and personal leave, child and elder services and wellness programs can impact the ability of both the worker and their family to achieve good health (MDPH, 2017).

The proportion of unemployed residents declined from 10.2% in 2010 to 5.8% in 2015, reflecting a 43% decrease over this period. From 2010 to 2015, the percentage of Massachusetts residents who were unemployed was lower than the national average. In 2015, 5.8% of Massachusetts residents 16 years of age or older were unemployed, compared to 6.3% for the US. Following national patterns, a greater share of younger individuals was unemployed in 2011-2015. A total of 21.1% of Massachusetts residents 16-19 years of age were unemployed and 12% of persons 20-24 years of age were unemployed (MDPH, 2017).

Underemployment is linked to chronic disease, lower positive self-concept, and depression. Workers with incomes below the poverty line are part of the working poor, who are more likely to have low-paying, unstable jobs, have health constraints, and lack health insurance.

Discriminatory hiring practices have limited the ability of people of color to secure employment. Those who have been arrested, have a conviction, felony or have been incarcerated are severely limited in their ability to find employment due to policies placing limitations on individuals who have interacted with the criminal justice system (MDPH, 2017).

Education Attainment

Educational attainment often helps individuals have access to resources that promote good health, such as physical activity breaks, school lunches, after-school programs and health-based resources such as screenings and management of chronic conditions. These programs have been shown to improve health outcomes, like childhood obesity, and mental health as well as school performance and learning outcomes (MDPH, 2017).

Unfortunately, not all school systems have the resources to provide these vital programs. As students spend a significant portion of their day in school, schools also provide basic necessities such as shelter, sanitary facilities, food and water, and opportunities for socialization. All of these exposures while in school are directly associated with both better health and learning outcomes (MDPH, 2017).

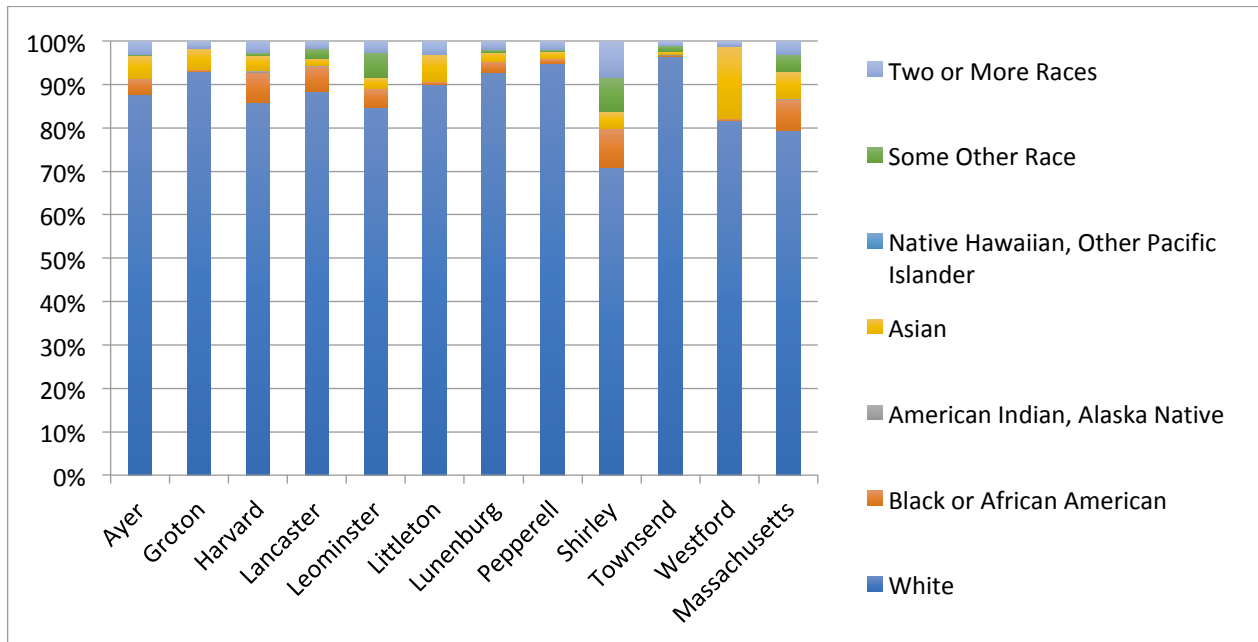
Even after leaving the education system, educational attainment continues to impact individuals' health. Education is associated with better jobs, higher incomes, and economic stability. Education can also provide a greater sense of control over one's life and stronger social networks, which again are linked to ability to engage in healthy behaviors and better overall health (MDPH, 2017).

Unfortunately, educational attainment in Massachusetts is not equitable. Students from low-income communities and communities of color may face challenges in getting to school, differential public-school resources, inequitable discipline practices, resources, and afterschool programming (MDPH, 2017).

Education is associated with health in many ways. Higher educational attainment is associated with improved working conditions and income, which in turn allows for improved housing, nutrition, control of hazards and stress, as well as direct health benefits, including quality health insurance, retirement benefits, and sick leave (Braveman P, 2011). Educational attainment is also closely linked to improved health knowledge, literacy, and behaviors, which are, in turn, associated with improved disease management (Braveman P, 2011). Individuals with more years of formal education tend to have healthier behaviors and better health outcomes. Education also helps promote and sustain healthy

lifestyles and positive choices that support and nurture personal development, relationships, and community well-being (Ross CE, 1993).

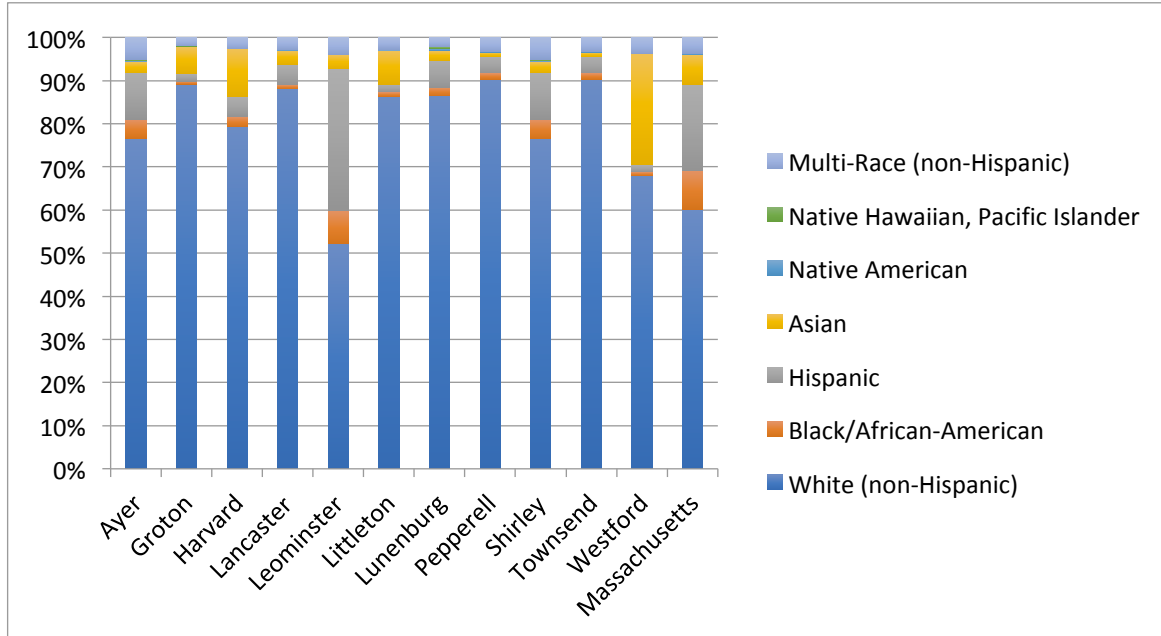
Figure 1: Race Distribution 2012-2016



(Source: US Census Bureau, 2012-2016 American Community Survey 5 Year Estimates)

The U.S Census 2012-2016 ACS estimates recorded that overall the state of Massachusetts is (79.3%) White, (10.9%) Hispanic, (7.3%) Black, (6.1%) Asian, (4.1%) some other race, (3.0%) two or more races, and (0.2%) American Indian or Alaska Native. Ten of the eleven towns and cities in the service area have a White population above the MA state average, with a max of (96.5%) in Townsend. Shirley has a White population of (70.7%), making it the lowest White population out of towns in the report. Hispanic populations of Leominster are reported at (16.5%) and Shirley at (13.9%), both above the state average. Littleton, Groton, Pepperell, Townsend, and Westford were significantly below the Massachusetts stage average for Hispanic population (10.9%).

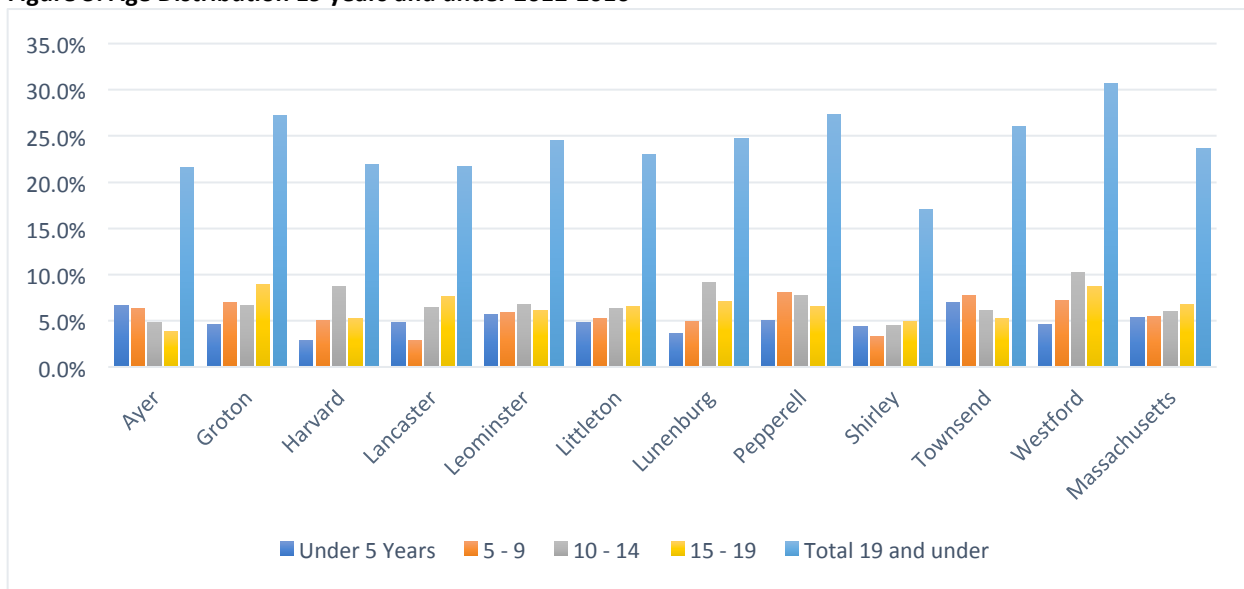
Figure 2: Race Distribution in Public School Population (2017)



(Source: MA Dept. of Elementary and Secondary Education, 2018, Enrollment by Race/Gender Report)

The Massachusetts public school population is (60.1%) white (non-Hispanic), (20%) Hispanic, (9%) Black, (6.9%) Asian, (3.6%) multi-race (non-Hispanic), (0.2%) Native American and (0.1%) Native Hawaiian or Pacific Islander. Westford (25.8%) and Harvard (11.1%) have the highest Asian populations in their public schools. Leominster is below the state average for White non-Hispanic population (32.7%). Thus, Leominster is the only town in the service area to meet or surpass the state percentage for Hispanic public-school population.

Figure 3: Age Distribution 19 years and under 2012-2016

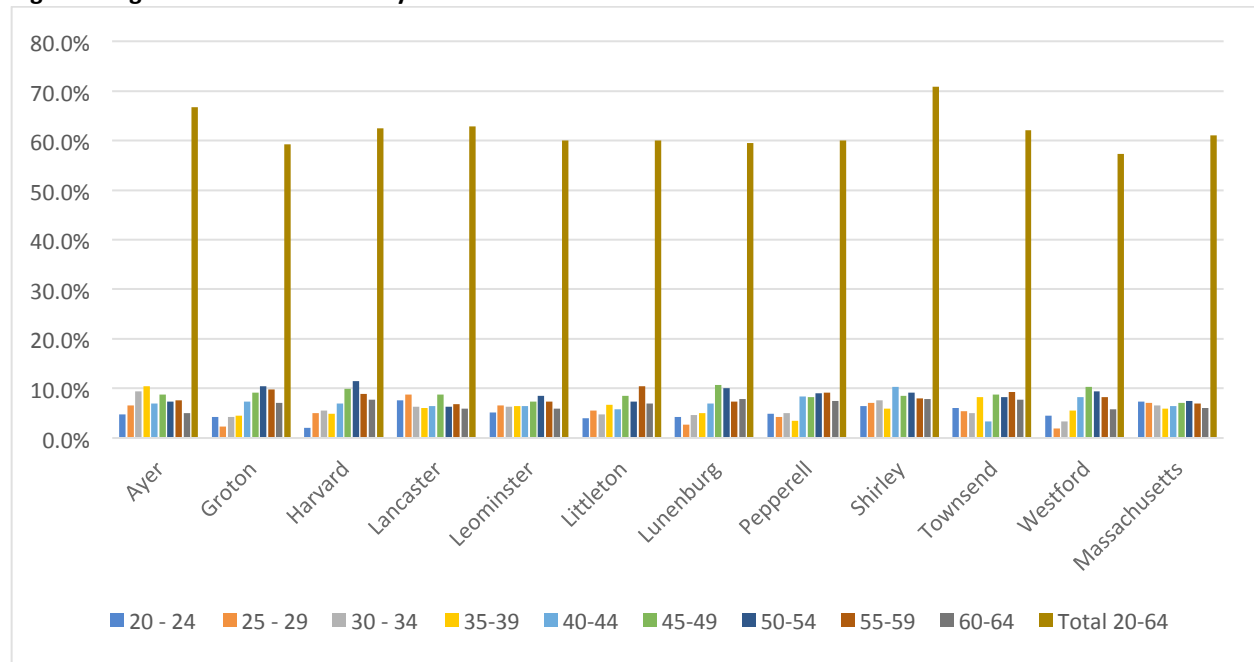


(Source: US Census Bureau, 2012-2016 American Community Survey 5 Year Estimates)

The communities' age distributions are relatively consistent with the state averages. Harvard has the smallest population under 5 years (2.9%), followed by Lunenburg (3.6%). Townsend has the largest population under 5 years (7.0%), followed by Ayer (6.7%). The Massachusetts state average for

population under 5 years of age is (5.4%), placing only Townsend, Leominster, and Ayer above the state average and the rest of the towns in the service area below. Westford has a large population ages 10-19 at (18.9%) and Ayer has a small population from 10-19 of (8.6%), compared with state average of (12.8%). Overall, Westford (30.7%), Pepperell (27.3%) and Groton (27.2%) have the highest population percentages at 19 years of age or below.

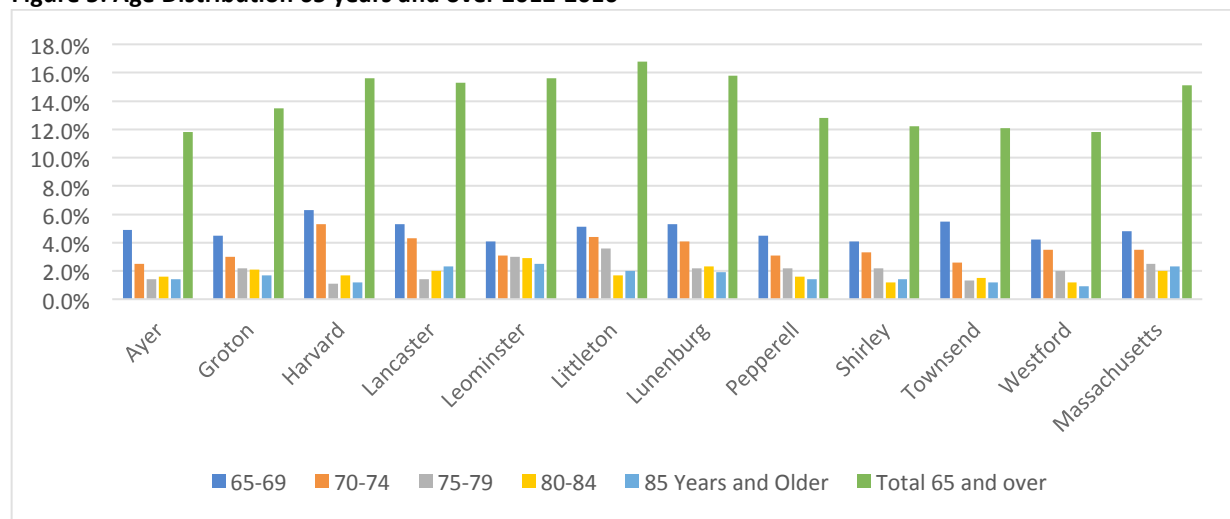
Figure 4: Age Distribution 20 to 64 years 2012-2016



(Source: US Census Bureau, 2012-2016 American Community Survey 5 Year Estimates)

Ayer has a higher population percentage between the ages of 30-39 totaling (19.8%), with the state average of (12.4%). Westford (1.9%), Groton (2.3%) and Lunenburg (2.7%) have the lowest percentages in the 25-29 age group. Harvard has the lowest percentage of population between the ages of 20 and 24 (2.1%) and Lancaster has the highest (7.6%). All towns except Lancaster have a population percentage for the 20-24 age group lower than the statewide average (7.3%). Shirley has the highest total population percentage between 20 and 64 years of age (70.9%), much higher than the Massachusetts value (61.1%).

Figure 5: Age Distribution 65 years and over 2012-2016

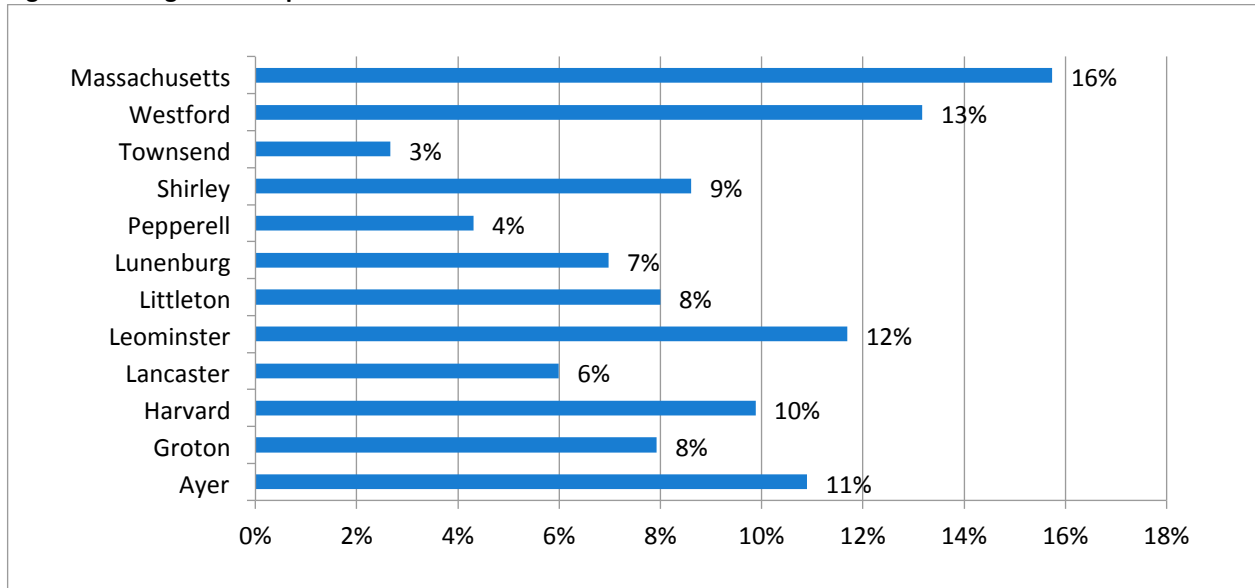


(Source: US Census Bureau, 2012-2016 American Community Survey 5 Year Estimates)

The lowest total population percentages 65 years of age and older were reported by Ayer and Westford (11.8%). These are both significantly below the state value (15.1%). The towns with higher 65+ population percentages than the state average are Lunenburg (15.8%), Littleton (16.8%), Leominster (15.6%), Lancaster (15.3%) and Harvard (15.6%). The lowest percentage for 85+ was reported by

Westford (0.9%), followed by Townsend (1.2%) and Harvard (1.2%). The highest percentage for 85+ was reported by Leominster (2.5%), only slightly higher than the state 85+ population percentage (2.3%).

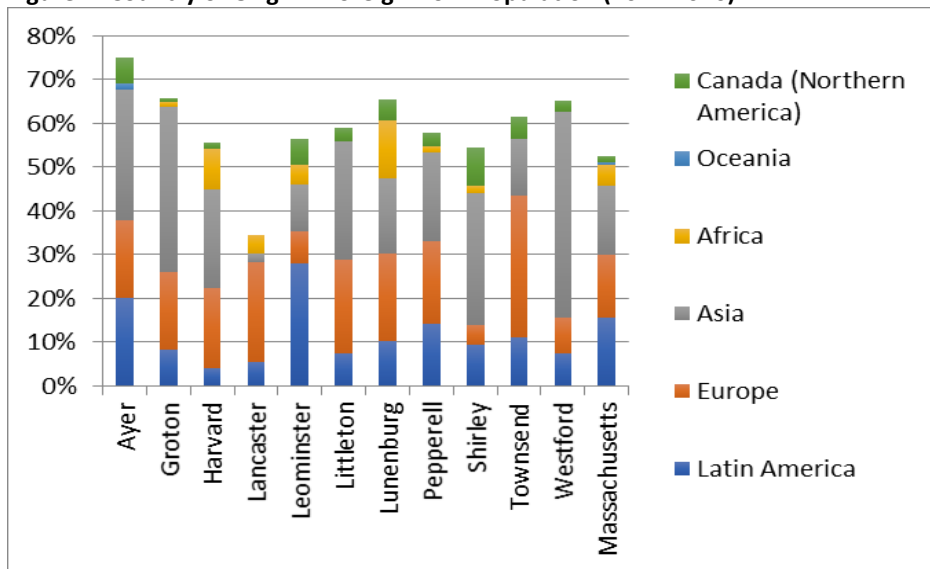
Figure 6: Foreign Born Population 2012-2016



(Source: US Census Bureau, 2012-2016 American Community Survey 5-Year Estimates)

All towns in the service area report percentages of the population that are foreign born below the state average (16%). The highest percentage is reported by Westford (13%), followed by Leominster (12%) and Ayer (11%). The lowest percentage is reported by Townsend (3%), followed by Pepperell (4%). The distribution of data is wide, and the lower values reported are significantly lower than the state average.

Figure 7: Country of Origin – Foreign-Born Population (2012-2016)

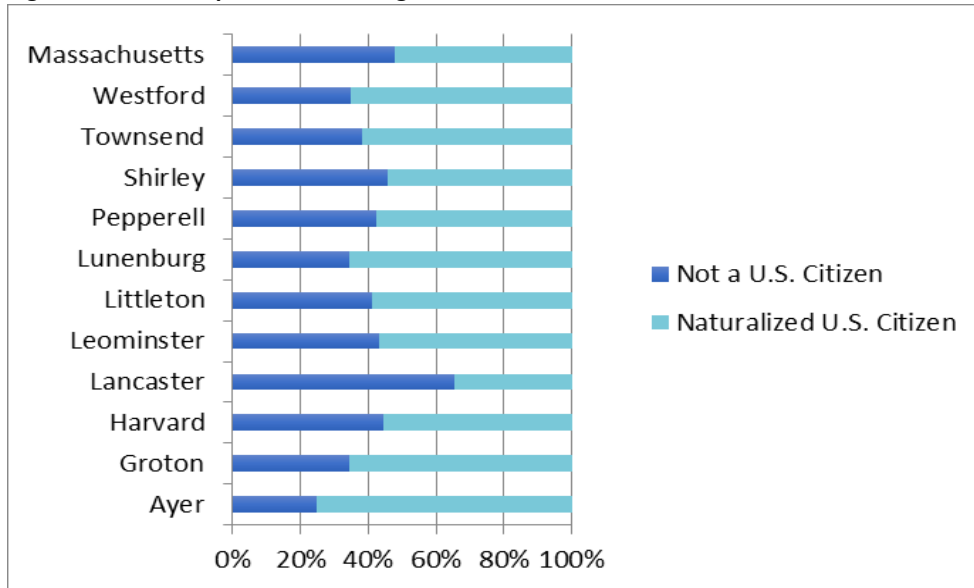


(Source: US Census Bureau, 2012-2016 American Community Survey 5-Year Estimates.) Note: At the time of the report, data was not available through US Census Bureau for Africa (Ayer, Littleton, Townsend, Westford), Oceania (all but Ayer and Massachusetts), and Canada (Lancaster)

The highest percentage of the foreign-born population to originate from Latin America is reported by Leominster (28%). Ayer also reports a high Latin American population (20%), and both are higher than the state average (16%). Harvard reports the lowest percentage for Latin America (4%). The percentage of the foreign-born population that originates from Europe is higher than the state average (14%) in all towns in the service area except for Leominster (7%), Shirley (5%), and Westford (8%). The highest

percentage is reported by Townsend (32%). The highest percentage for Asia is reported by Westford (47%), and only Townsend (13%), Leominster (11%), and Lancaster (2%) are below the state average (16%). The percentage of foreign-born population originating from Africa is lowest in Groton (1%) and Pepperell (1%), followed by Shirley (2%). Lunenburg (13%) and Harvard (9%) are the only towns that report higher percentages than the state average (5%). Percentages for Canada are significantly higher in Ayer (6%), Leominster (6%), and Shirley (9%) than the state average (1%).

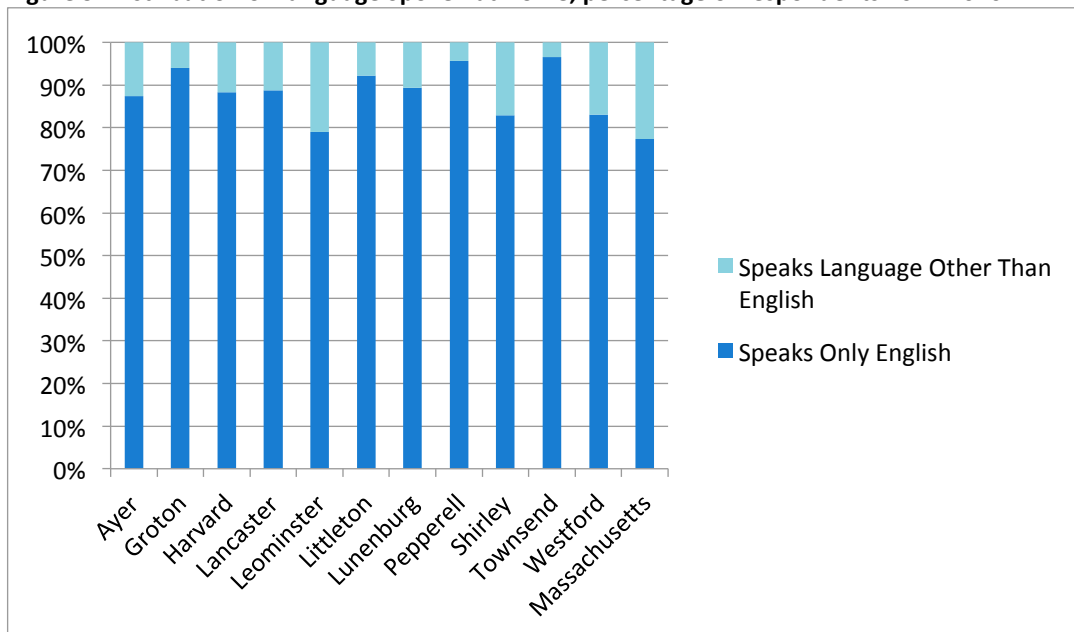
Figure 8: Citizenship Status of Foreign Born 2012-2016



(Source: US Census Bureau, 2012-2016 American Community Survey 5-Year Estimates)

The only town in the service area to have a lower percentage of citizenship among the foreign-born population than the state average (52%) is Lancaster (36%). The highest citizenship percentage is in Ayer (75%), followed by Lunenburg (66%) and Groton (66%). The rest of the towns reported relatively similar values to the state average.

Figure 9: Distribution of Language Spoken at Home, percentage of respondents 2012-2016



(Source: US Census Bureau, 2012-2016 American Community Survey 5-Year Estimates)

All towns in the NVMC service area are above the state average for percentage of English-only speakers. Leominster shows the highest percentage of the population speaking a language other than English (21.0%) among the towns in the service area, followed by Shirley (17.1%) and then Westford (17.0%). Townsend has the lowest population speaking a language other than English (3.5%).

Leominster ranks second for the highest foreign-born population percentage and ranks lowest for citizenship amongst that population. Leominster also has the highest percentage of non-English-only speakers and the lowest percentage of the public-school population to be White. Westford has the highest foreign-born population and the third highest percentage of non-English-only speakers. Shirley has the lowest overall percentage of the population to be White. Overall, most foreign-born individuals in Massachusetts are from Asia, Europe, or Latin America.

Chronic Disease

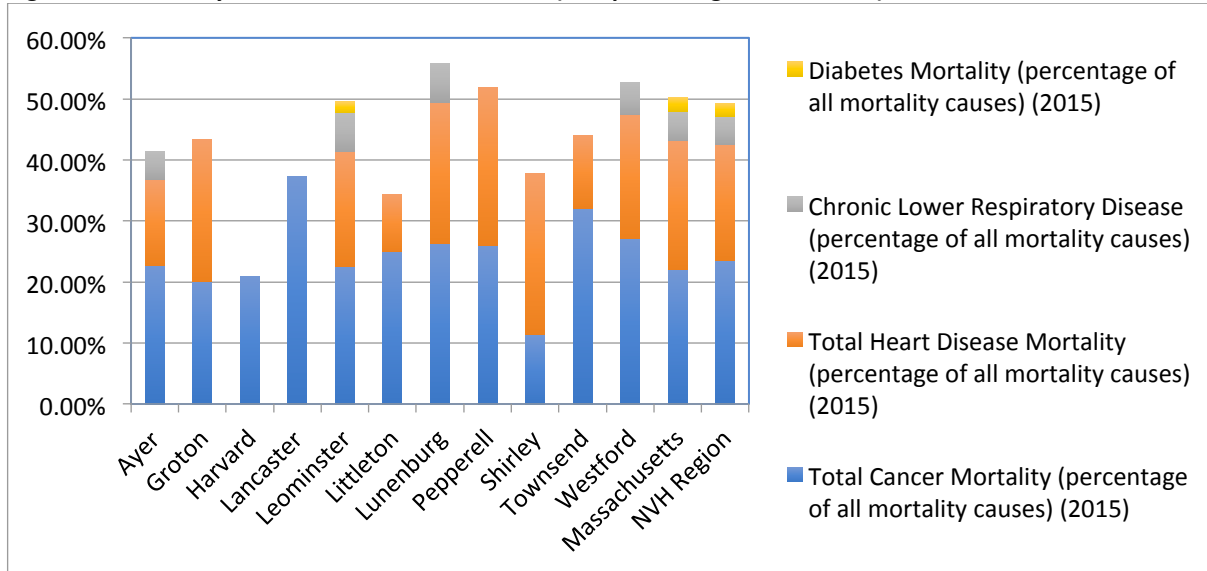
According to the Massachusetts Department of Public Health (MDPH), prevention and treatment of chronic disease is a public health priority. Nutrition, physical activity, and tobacco use and exposure are three key risk factors that directly impact cancer, diabetes, chronic lower respiratory disease, and cardiovascular disease rates. These chronic conditions in turn contribute to 56% of all mortality in Massachusetts and over 53% of all health care expenditures (\$30.9 billion a year) (MDPH, 2014). In Massachusetts, cancer is the leading cause of mortality due to chronic disease (22.1% of all mortality). It is followed by heart disease (21%) and chronic lower respiratory disease (4.8%).

Although the three leading risk factors are modifiable, studies have shown that the conditions in which people live, learn, work, and play do not offer equal access or opportunity to make this possible. For example, a history of policies rooted in structural racism have resulted in environments in which there are inequities in access to healthy foods, safe spaces for physical activity, walkable communities, quality education, housing, employment, and health care services. The health implications of this are evident in the fact that Black and Hispanic residents of Massachusetts are consistently and disproportionately impacted by the high prevalence of all chronic diseases, as well as the related deaths and high acute care service utilization. Healthy people cannot exist in unhealthy environments. Because of this, MDPH frames its chronic disease prevention and wellness efforts around addressing the social determinants of health and focusing on policies that ensure that all individuals have access to healthy choices (MDPH, 2017).

Chronic diseases are “managed” as opposed to cured. Management practices extend life; therefore, chronic diseases continue to rise in prevalence. Methods of chronic disease management include medications, medical procedures, and lifestyle changes. Prevention is the key to reducing the burden of these diseases. To prevent chronic disease, people need opportunities to live a healthy lifestyle which includes, among other things, participating in adequate physical activity, eating a balanced diet, managing stress and limiting exposure to chronic stressors, refraining from tobacco use, and limiting alcohol consumption (Adler NE, 2002).

Unfortunately, the modern environment is often not supportive of these healthy habits, encouraging sedentary behavior, overeating, and alcohol consumption. Changing the environment to promote healthier behaviors requires strategic vision and planning. Implementing systems and policies that increase opportunities for physical activity, providing support to live tobacco free, and improving access to healthy foods are strategies that have been used to create healthier environments. Systems and policies that address other social determinants by improving access to routine preventive medical care and increasing educational and employment opportunities will also contribute to healthy environments. A healthier environment can support an individual’s choice to walk or bike instead of drive, to quit smoking, or to limit sugary beverage consumption. Ultimately, building healthier environments will encourage residents to live a healthy lifestyle, greatly improving their health and longevity (BPHC, 2017).

Figure 10: Mortality Due to Chronic Disease 2015 (as a percentage of all causes)



(Source: Massachusetts Department of Public Health, MassCHIP) Note: At the time of this report data was not available through DPH for: Total Heart Disease Mortality (Harvard, Lancaster), Chronic Lower Respiratory Disease (Groton, Lancaster, Littleton, Pepperell, and Townsend) and Diabetes Mortality (Ayer, Lancaster, Littleton, Lunenburg, Pepperell, Shirley, Townsend, and Westford).

The data for chronic disease mortality due to cancer, heart disease, lower respiratory disease, and diabetes in the general NVMC region did not significantly differ from that of Massachusetts as a whole. However, when the data is separated by town, there are significant variations in chronic disease mortality. Lancaster recorded a markedly high total cancer mortality as a percentage of all mortality causes at (37.25%), followed by Townsend at (32%) and Lunenburg at (26.32%). All three are significantly higher than the state level of (22.1%). On the other hand, Shirley exhibits the lowest cancer mortality of (11.32 %), notably much lower than the statewide value.

The percentage of mortality due to heart disease in the NVMC region, (18.98%), is lower than in Massachusetts overall at (21%). Heart disease mortalities in Pepperell and Shirley are the highest among the NVMC service area, and the lowest in Littleton and Townsend. Data on heart disease mortality was not available for Harvard and Lancaster.

Percentage of mortality due to chronic lower respiratory disease in the NVMC region (4.63%) was similar to that in Massachusetts overall. Leominster and Lunenburg noted the highest mortalities due to chronic lower respiratory disease, both significantly above the regional average. Harvard and Shirley report zero percent mortality due to chronic lower respiratory disease, and data was unavailable for Groton, Lancaster, Littleton, Pepperell, and Townsend.

Finally, the mortality due to diabetes was lower in the NVMC region than in Massachusetts overall. Groton and Harvard report zero percent mortality due to diabetes, and Leominster shows (1.79%), significantly below the overall NVMC region value. Data was not available for other towns in the service area.

Two focus groups were conducted on the NVMC service area community: one including Emergency Medical Services (EMS) personnel in Middlesex County and one in Pepperell. The EMS group reported chest pain and shortness of breath as primary health concerns in the community and noted an increase in shortness of breath among community members. In accordance with the data analysis above, the Pepperell group indicated cardiac health as one of the top three health concerns within the community, along with diabetes.

Despite highest percentage of mortality due to cancer in the NVMC region, a *Key Informant Survey* of 100 health professionals in the area reported cancer was ranked as a major health concern of consumers and the community less frequently than diabetes, heart health, and hypertension.

Cancer

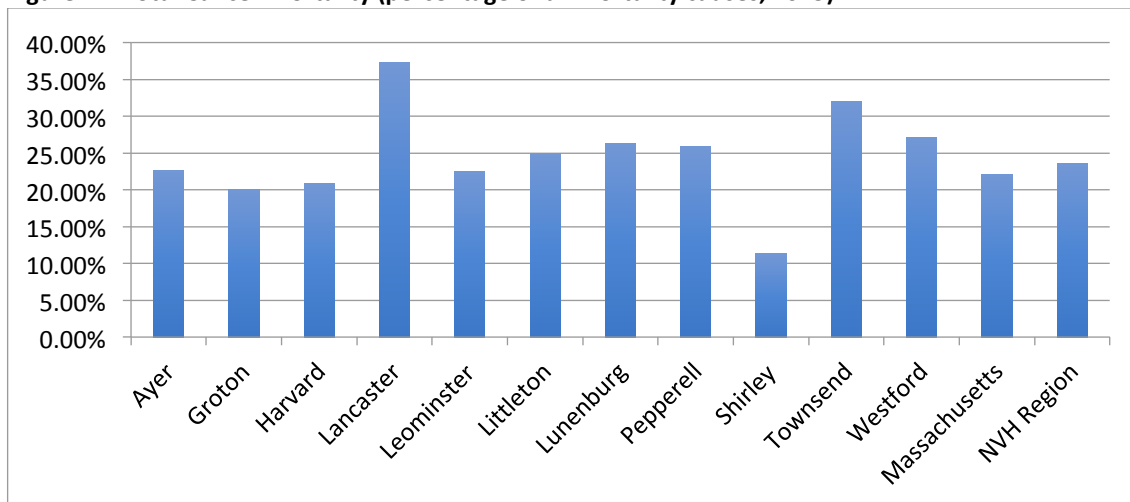
Since 2006, cancer has surpassed heart disease as the leading cause of death in Massachusetts. Although cancer incidence and mortality rates decreased in Massachusetts from 2010 to 2014, there were still more than 36,000 new cancer cases diagnosed annually during this period. The age-adjusted cancer incidence rate in Massachusetts was (471.1 per 100,000 population) with men having a higher cancer incidence rate than women (505.7 versus 450.4 per 100,000 population). From 2010 to 2014, cancer incidence decreased (3.2%) annually among men (MDPH, 2017).

Black non-Hispanic men and White non-Hispanic women had the highest incidence rate of all cancer types during this period. Across the Commonwealth, breast cancer among women and prostate cancer among men is most common. Lung cancer, colon cancer, and melanoma are also among the leading types of cancer among both women and men. Together, these five cancers account for more than half of all cancer cases across the Commonwealth (MDPH, 2017).

Several socioeconomic factors contribute to the prevalence of cancer and/or late stage cancer diagnoses. Obesity, tobacco use, and tobacco exposure are leading risk factors for many cancers including colorectal and breast cancer. Additionally, lack of access to healthy foods, limited physical activity, and lack of access to smoking cessation services are also risk factors. Gaps in health care coverage represent a barrier to covering the costs of diagnostic testing. For examples, individuals with high deductibles, low premiums, or high co-pays must pay for diagnostic tests to confirm a cancer diagnosis, contributing to delays in diagnosis (MDPH, 2017).

It is worth noting that Worcester County had the third highest prevalence of adult smoking at (17.2%) in 2015 among all other MA counties, according to *County Health Rankings* (Data USA, 2016). Given the median age of the population in Worcester County at 40 years of age, the adult smoking prevalence and the link between tobacco use/exposure and chronic diseases, health service organizations would do well to implement smoking cessation programs and support services. The Massachusetts Tobacco Cessation and Prevention Program (MTCP) may be a great resource for many. MTCP is a statewide public health program focused on comprehensive approaches to reduce tobacco and nicotine use. Their mission is to reduce the health and economic burden of tobacco use by preventing young people from starting to use tobacco and nicotine products, helping current tobacco and nicotine users to quit, protecting children and adults from secondhand smoke, and identifying and eliminating tobacco-related disparities (MTCP, 2018).

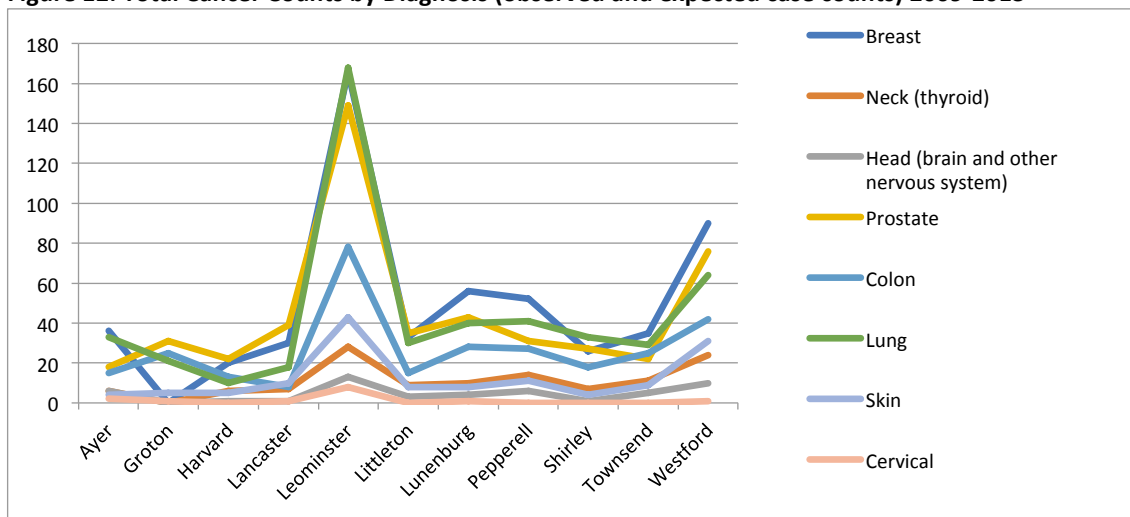
Figure 11: Total Cancer Mortality (percentage of all mortality causes, 2015)



(Source: Massachusetts Department of Public Health, MassCHIP)

Cancer is the leading reported cause of mortality in the NVMC region, with a percentage slightly higher than in Massachusetts overall. Lancaster and Townsend show the highest mortality due to cancer (37.25% and 32%, respectively), whereas Shirley shows a markedly lower cancer mortality (11.32%) than the statewide average. Littleton, Lunenburg, Pepperell, and Westford all report values higher than the statewide cancer mortality.

Figure 12: Total Cancer Counts by Diagnosis (observed and expected case counts) 2009-2013



(Source: Massachusetts Department of Public Health, Massachusetts Cancer Registry) Note: at the time of the report, data was not available through the DPH for breast cancer in Groton, neck (thyroid) cancer in Groton, and head (brain and other nervous system) cancer in Groton.

Lung cancer, breast cancer and prostate cancer appear to be the most often diagnosed types of cancer within the NVMC service area. Cancer diagnoses exhibit highest prevalence in Leominster and Westford. The counts of diagnoses of lung cancer (168), breast cancer (166) and prostate cancer (149) in Leominster are notably high. Westford reports the second highest overall diagnosis count, with breast cancer most common (90) followed by prostate cancer (76). The lowest diagnosis count for breast cancer is reported by Harvard (20). The lowest count for prostate cancer diagnosis is reported by Ayer (18). The lowest count for lung cancer diagnosis is also reported by Harvard (10). The gap between diagnosis counts in Leominster and in Harvard is substantial. However, given that the data indicates total counts, population size should be accounted for, and because Leominster's population is about seven times that of Harvard, the counts per population are still higher in Leominster compared to Harvard but by a much smaller margin.

Heart Disease

Cardiovascular disease is a broad term that encompasses several adverse health outcomes, including congestive heart failure, myocardial infarction, and stroke. In Massachusetts, cardiovascular disease is the second leading cause of death after cancer (MDPH, 2017).

Hypertension is a critical risk factor for adverse cardiovascular and cerebrovascular outcomes including stroke, heart attacks, and congestive heart failure. In 2014, hypertension contributed to \$19 million in total hospitalization costs in Massachusetts. Studies have shown that, hypertension disproportionately impacts people of color. These disparities are grounded in social and economic inequities such as access to health care and poverty (MDPH, 2017). In 2015, (29.6%) of Massachusetts adults said they had been diagnosed with hypertension, similar to previous years.

Congestive heart failure can be debilitating and challenging for patients to manage. It is also a costly disease, amounting to \$540 million in total hospitalization costs in Massachusetts in 2014 (Center for Health Information and Analysis, 2014). If not managed properly, congestive heart failure is associated with high readmission rates, poor quality of life, and high health care utilization (Krumholz H, 1997. 157(1):99-104.) (Heo S, 2009).

In 2014, the rate of hospitalizations attributed to congestive heart failure for Black non-Hispanic residents (520.5 per 100,000 population) was more than twice as high than that for White non-Hispanic residents (248.4 per 100,000 population). Similarly, Hispanic residents (400.7 per 100,000 population) were hospitalized for congestive heart failure at a rate that was 1.6 times higher than that for non-Hispanic White residents (248.4 per 100,000 population) (MDPH, 2017).

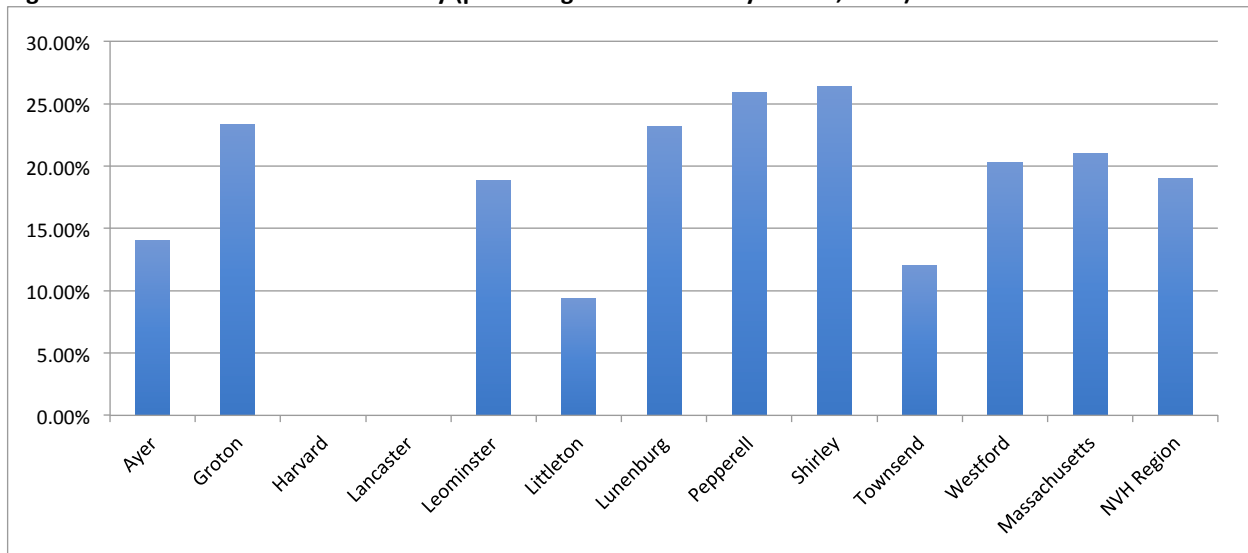
The rate of myocardial infarction-related hospitalizations declined 9.5% from 2010 (169.9 per 100,000 population) to 2014 (153.7 per 100,000 population). In 2014, the myocardial infarction hospitalization rate for Hispanic residents in Massachusetts (182.5 per 100,000 population) and Black non-Hispanic residents (159.0 per 100,000 population) exceeded the state average (153.7 per 100,000 population) and the average for White non-Hispanic residents (145.6 per 100,000 population) (MDPH, 2017).

Strokes were responsible for \$613 million in total hospitalization costs in Massachusetts in 2014 (Center for Health Information and Analysis, 2014). These hospitalization costs do not include other economic costs of stroke, such as lost productivity or outpatient health care expenditures, nor loss of life, reduced quality of life, and increased disability (MDPH, 2017).

Racial/ethnic disparities continue to exist in stroke-related hospitalizations. In 2014, Black non-Hispanic residents (368.1 per 100,000 population) experienced stroke-related hospitalization at a rate that was nearly twice as high as that for White non-Hispanic residents (201.5 per 100,000 population). Similarly, Hispanic residents (264.9 per 100,000 population) had a stroke hospitalization rate that was 1.3 times that for White non-Hispanic residents (201.5 per 100,000 population) (MDPH, 2017).

Some important risk factors for heart disease, among others, are smoking, being overweight or obese being physically inactive, having a family history of early heart disease, having a history of preeclampsia during pregnancy, unhealthy diet, and age (55 or older for women). After menopause, women are more likely to be diagnosed with heart disease, in part because the body's production of estrogen drops. Women, who have gone through early menopause, either naturally or due to hysterectomy, are twice as likely to develop heart disease as women of the same age who have not yet gone through menopause. Another reason for the increasing risk is that women tend to develop risk factors for heart disease around middle ages. Family history of early heart disease is another inherent risk factor (NIH, 2017).

Figure 13: Total Heart Disease Mortality (percentage of all mortality causes, 2015)



(Source: Massachusetts Department of Public Health) Note: At the time of this report data was not available through DPH from Harvard and Lancaster.

Mortality due to heart disease in the NVMC region (18.98%) is slightly lower compared to that in Massachusetts overall (21%). Shirley, Pepperell, Groton, and Lunenburg show higher percentages than the statewide value, and Townsend and Littleton show the lowest percentages in the service area. It is worth noting that heart disease is the leading cause of death in Groton and Shirley, is equal to cancer in Pepperell, and is the second most common cause of death behind cancer in the rest of the service area.

Diabetes

Nationwide, the prevalence of diabetes is projected to increase dramatically. The prevalence of type 1 and type 2 diabetes is anticipated to increase (54%) by 2030, affecting 54.9 million Americans. In Massachusetts, the prevalence of diagnosed diabetes has more than doubled over a 22-year period. For example, in 1993, an estimated 3.9% of Massachusetts residents were told by a provider that they had diabetes. By 2015, an estimated 8.9% of Massachusetts residents were told they had diabetes (MDPH, 2017).

Before people develop type 2 diabetes, they almost always have "prediabetes" — blood glucose levels that are higher than normal but not yet high enough to be diagnosed as diabetes. Doctors sometimes refer to prediabetes as impaired glucose tolerance (IGT) or impaired fasting glucose (IFG), depending on what test was used when it was detected. This condition puts individuals at a higher risk for developing type 2 diabetes and cardiovascular disease (ADA, 2014).

Socioeconomic disparities exist in diabetes prevalence. In Massachusetts, adults with an annual household income of less than \$25,000 (15.6%) have three times the prevalence of diabetes as compared to those with an annual household income more than \$75,000 (5%). The prevalence of diabetes also decreases as educational attainment increases. A total of 14.5% of adults without a high school degree were diagnosed with diabetes compared to 5% of adults with four or more years of post-high school education (MDPH, 2017).

Diabetes prevalence and mortality in Massachusetts also differs by race/ethnicity. In 2015, a greater proportion of Black non-Hispanic (12.3%) and Hispanic (11.7%) adults reported being diagnosed with diabetes compared to White non-Hispanic adults (8.7%). In 2014, Black non-Hispanic residents were

more than 2.1 times more likely to die from diabetes than White non-Hispanic residents (29.5 versus 13.8 per 100,000 population) (MDPH, 2017).

In 2014, Black non-Hispanic residents had more than four times the rate for diabetes emergency department visits as White non-Hispanics (419.1 versus 99.3 per 100,000 population). Further, the diabetes emergency department visit rate among Hispanic residents was almost four times that for White non-Hispanics (376.5 versus 99.3 per 100,000 population) (MDPH, 2014).

Figure 14: Diabetes Mortality (percentage of all mortality causes, 2015)

Region:	Groton	Harvard	Leominster	Massachusetts	NVMC Region
Diabetes Mortality:	0.00%	0.00%	1.79%	2.40%	2.12%

(Source: Massachusetts Department of Public Health) Note: At the time of this report data was not available through DPH from Ayer, Lancaster, Littleton, Lunenburg, Pepperell, Shirley, Townsend, or Westford

The NVMC region recorded a lower percentage of mortality caused by diabetes than Massachusetts overall. Groton and Harvard both report zero percent mortality due to diabetes, and Leominster reported (1.79%). Data from most other towns was not available, but because the NVMC region percentage is higher than any of the reported town values, it is reasonable to expect that the diabetes mortality may be higher in some of the towns that were not represented in this data. Notably, diabetes was ranked as one of the major health concerns in the community by professionals in the *Key Informant Survey* and was listed as one of the top three health concerns of the community by focus group participants in Pepperell.

Obesity

Obesity is both a chronic disease and a risk factor for other chronic conditions including type 2 diabetes, cardiovascular disease, some cancers, and many other health problems that interfere with daily living and quality of life. Engaging in physical activity and maintaining a healthy diet have been proven to lower the incidence of obesity, however not all Massachusetts residents are well resourced to prevent obesity. Structural barriers to accessing healthy foods and opportunities to be physically active disproportionately affect people of color in the Commonwealth (MDPH, 2017).

A body mass index (BMI) of 25.0 to 29.9 kg/m² is classified as overweight. Obesity is defined by a BMI greater than or equal to 30.0 kg/m². Both conditions are linked to poor nutrition and inadequate physical activity, although other factors contribute to the development of overweight/obesity. Given the association between obesity chronic diseases, addressing obesity is a public health priority. Reducing the prevalence of obesity should in turn reduce the incidence of several chronic diseases and their associated health and economic burdens.

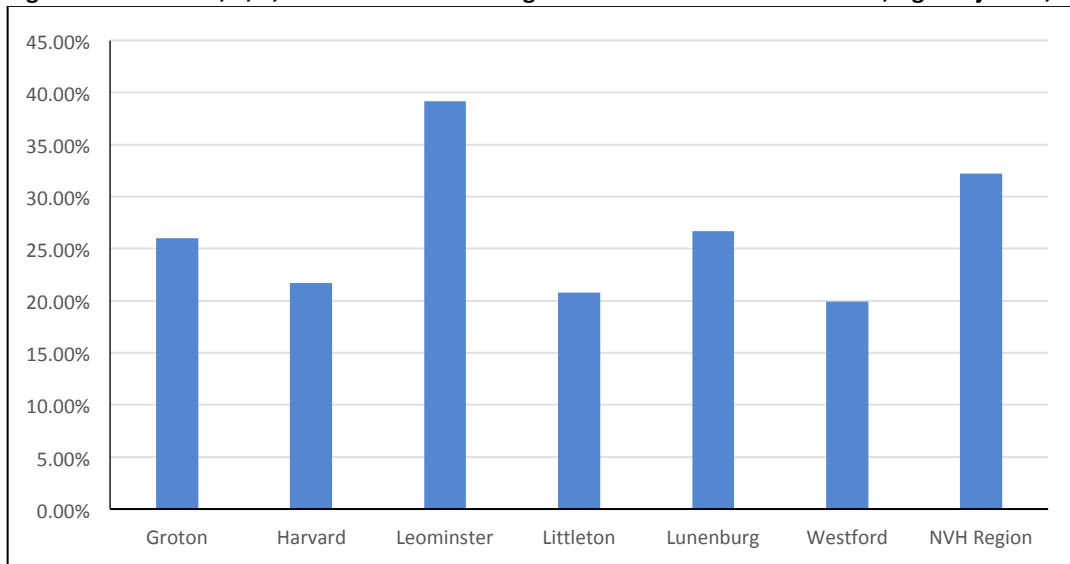
In 2015, nearly (60%) of Massachusetts adults were classified as overweight or obese, (24.3%) had a BMI greater than or equal to 30.0kg/m². More than one-third of Black non-Hispanic adults (35.6%) were obese compared to Hispanic (28.9%), and White non-Hispanics (22.7%). Adults with disabilities (34.3%) were significantly more likely to be obese than adults with no disability (20.7%). Adults who have less than a high school education are almost twice as likely to be obese than adults with four or more years of college (MDPH, 2017).

Childhood obesity has important implications for the physical and emotional well-being of children and youth. Child overweight is defined as a BMI at or above the 85th percentile for age. Child obesity is defined as BMI at or above the 95th percentile of expected for age. Children who are obese are more likely to develop risk factors for chronic disease early in life, such as high blood sugar, high triglycerides, and high blood pressure. Children who are obese are also more likely to develop chronic diseases and

experience bullying related to weight. Childhood obesity is linked to poor nutrition and inadequate physical activity in adulthood; and inequities persist across socioeconomic status and race/ethnicity. Massachusetts is ranked as the fifth worst US state on the prevalence of obesity among children enrolled in the Women, Infant and Children (WIC) program who are two to four years old.

BMI screening reports conducted by school districts indicate that the prevalence of overweight and obesity in school aged children decreased by 2.1% from 2009 (34.3%) to 2015 (31.3%). However, this reduction in overweight and obesity was not consistent across all school districts. The prevalence of overweight and obesity did not change in school districts where median household income was less than \$37,000. These districts had the highest prevalence across the state with approximately (40%) of students being overweight or obese (MDPH, 2017).

Figure 15: Grades 1, 4, 7, 10 – Percent Overweight or Obese Males and Females, Age-Adjusted, 2015



(Source: Massachusetts Department of Public Health, 2015) Note: at the time of this report, data was not available from the DPH for Ayer, Lancaster, Pepperell, Shirley, Townsend, and Massachusetts.

Leominster shows the highest percentage of overweight or obese youth in grades one, four, seven and ten (39.20%), whereas the other towns in the service area for which data was available show rates of obese and overweight youth that are less than the NVMC region total (32.30%). The lowest percentage of youth to be overweight or obese was in Westford (19.90%). Data was not available for Ayer, Lancaster, Pepperell, Shirley, and Townsend. In the *Key Informant Survey* of healthcare professionals in the area, over half identified obesity as a major health concern in the community that NVMC provides services to.

Mental Health

The coexistence of both a mental disorder and a substance use disorder (SUD) is known as co-occurring disorders. People with mental health disorders are more likely to experience a SUD. Often, people receive treatment for one disorder while the other disorder remains untreated. Undiagnosed, untreated, or undertreated co-occurring disorders can lead to a higher likelihood of experiencing negative outcomes, such as homelessness, incarceration, medical illnesses, suicide, or even early death (SAMHSA, 2016).

Mental health intersects with many areas of public health, including addiction, cancer, cardiovascular disease, and HIV/AIDS, therefore requiring common services and resource mobilization effort. Integrated treatment is critical for treating people with co-occurring disorders and can ultimately achieve better health outcomes and reduce costs. Increasing awareness and building capacity in service systems are important in helping identify and treat co-occurring disorders. Treatment planning should be client-centered, addressing clients' goals and using treatment strategies that are acceptable to them (MDPH, 2017).

Mental health is an important part of overall health for children as well as adults. For many adults who have mental disorders, symptoms were present—but often not recognized or addressed—in childhood and youth. For a young person with symptoms of a mental disorder, the earlier treatment is started, the more effective it can be. Early treatment can help prevent more severe, lasting problems as a child grows up. It can be tough to tell if troubling behavior in a child is normal and transient or a problem that should be discussed with a health professional. But if there are signs and symptoms that last weeks or months; and if these issues interfere with the child's daily life, not only at home but at school and with friends, health professional likely should be consulted (NIMH, 2018).

It's just as important for an older person with symptoms of depression to seek treatment as it is for someone younger. The impact of depression on health in older adults can be severe: much research has reported that depression is associated with worse health in people with conditions like heart disease, diabetes, and stroke. Depression can complicate the treatment of these conditions, including making it more difficult for someone to care for him- or herself and to seek treatment when needed. In older adults, depression may be disregarded as frailty, or it may be viewed as an inevitable result of life changes, chronic illness, and disability. Recognizing the signs and seeing a health practitioner is the first step to getting treatment, which can make a real difference in someone's quality of life (NIMH, 2018).

Mental Illness

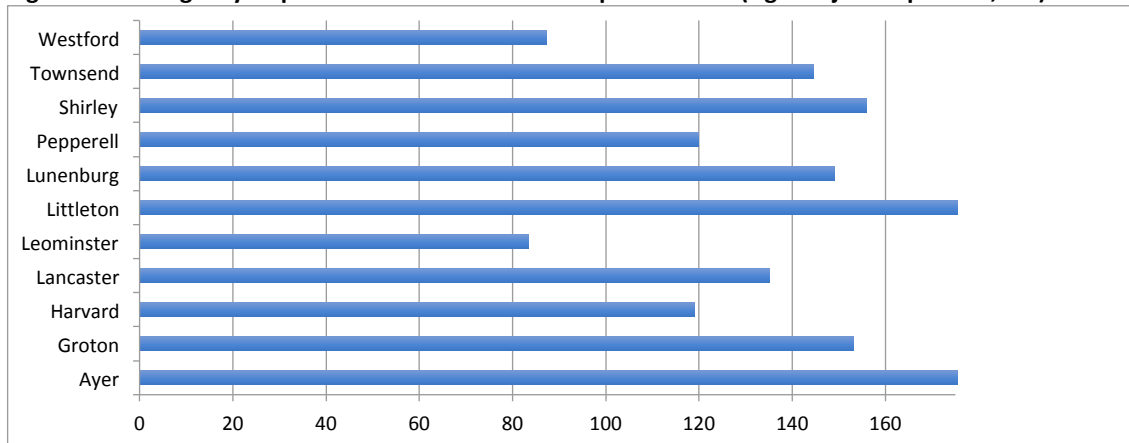
Approximately one in four persons ages 11 and older in the MassHealth patient population were identified as having a serious mental illness. Of these individuals, roughly two in five have been homeless for some period of time between 2011 and 2015. The risk of fatal opioid-related overdose is six times for those with a serious mental illness (SMI) and three times higher for those diagnosed with depression compared to those without any mental health diagnosis (MDPH, 2017).

Emotional well-being is shaped by a variety of factors, including biological factors, life experiences, family and community supports, education, and environmental factors. Social connections are an important source of support for children and adolescents that can buffer the effects of stress, connect children with resources, and shape health behaviors (Robert Wood Johnson Foundation, 2011).

Early detection and intervention to address social and emotional risk factors can greatly improve outcomes for children and adolescents. Promoting emotional wellness and social connectedness across

the life course is a Title V priority for MDPH, including during early childhood and adolescence (MDPH, 2017).

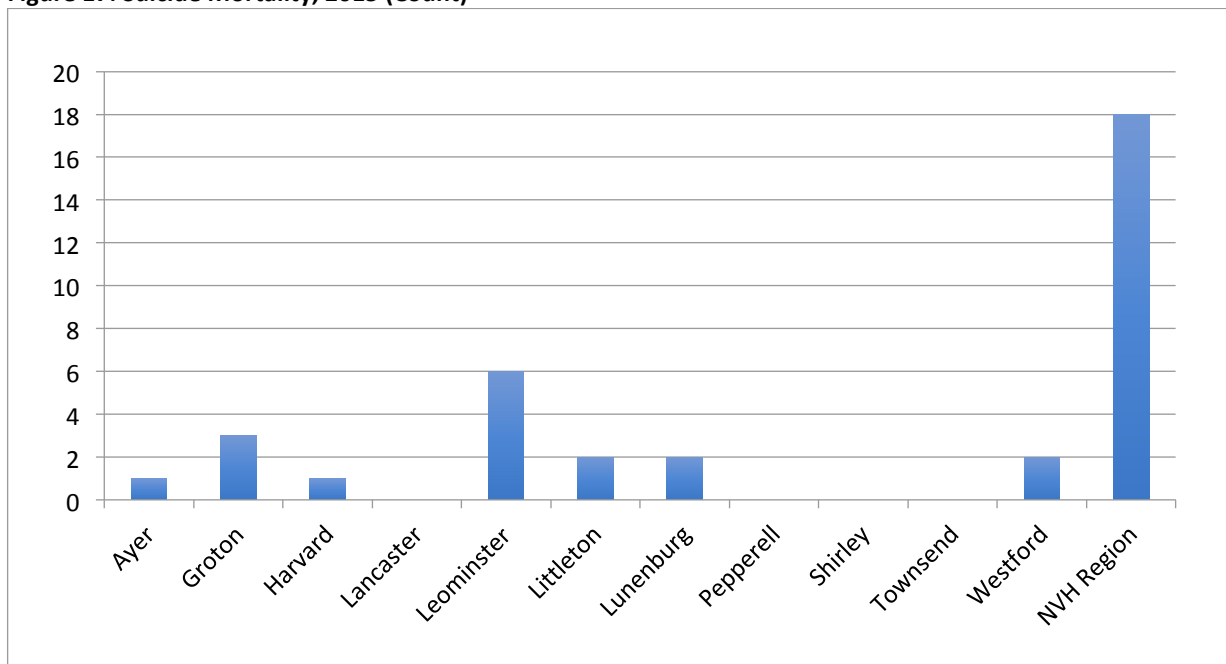
Figure 16: Emergency Department Mental Health Hospitalizations (Age- adjusted per 100,000) 2013



(Source: Massachusetts Department of Health) Note: Data for Massachusetts and the overall NVMC Region was not available at the time of this report

Littleton and Ayer show highest rates of ED hospitalizations for mental health reasons compared to other towns in the NVMC service area (222.55 and 216.54, respectively). Shirley, Groton, and Lunenburg follow behind the highest two towns. Leominster (83.33) and Westford (87.22) show the lowest values in the area. Harvard and Pepperell report higher values than Leominster and Westford and lower than the rest of the towns. The difference between the lowest rate (83.33) and the highest rate (222.55) is significant, with the highest rate almost tripling the lowest.

Figure 17: Suicide Mortality, 2015 (Count)



(Source: Massachusetts Department of Public Health)

Suicide mortality counts in Massachusetts in 2015 totaled 647, with the NVMC region accounting for 18 of those 647. Four of the towns in the region do not report any suicide mortalities, and Leominster reports the highest count (6). Groton reported the second highest count with 3 suicide mortalities in the year. Notably, the *Key Informant Survey* of health professionals in the area reports the write-in “we

need mental health providers in [the] area.” Behavioral health services were ranked second in response to “what kind of services does your organization primarily provide?” and over half of respondents identified behavioral health as a major health concern in the community. Both focus groups identified “those dealing with mental health issues” as an underserved community, along with “those dealing with addiction.” The EMS focus group participants also noted “the number of hoarders and squatters who need [mental health] services.”

Substance Use Disorder

Each year in the US, more than 2,200 overdose deaths are due to alcohol and 5,415 deaths are attributed to cocaine/crack. Drug overdose deaths also occur as a result of the illicit manufacturing and distribution of synthetic opioids, such as fentanyl, and the illegal distribution of prescription opioids. Illicit fentanyl, for example, is often combined with heroin or counterfeit prescription drugs or sold as heroin and may be contributing to recent increases in drug overdose deaths. In 2014, there were 17,465 overdoses from illicit drugs and 25,760 overdoses from prescription drugs in the US. There was a 2.8-fold increase in the total number of opioid-related overdose deaths during this time period. In 2015, US overdose deaths totaled 52,404, including 33,091 (63.1%) that involved an opioid (CDC, 2016).

According to the National Survey on Drug Use and Health (NSDUH) in 2015, an estimated 27.1 million people in the US aged 12 and older used illicit drugs in the past month. Of these, a majority (22.2 million) reported using marijuana and 3.8 million misused prescription opioids (SAMHSA, 2015).

During the same survey period, an estimated 20.8 million, approximately 1 in 10 people needed substance use treatment (i.e., treatment for problems related to the use of alcohol or illicit drugs). Of this population, 10.8 percent received treatment (SAMHSA, 2016).

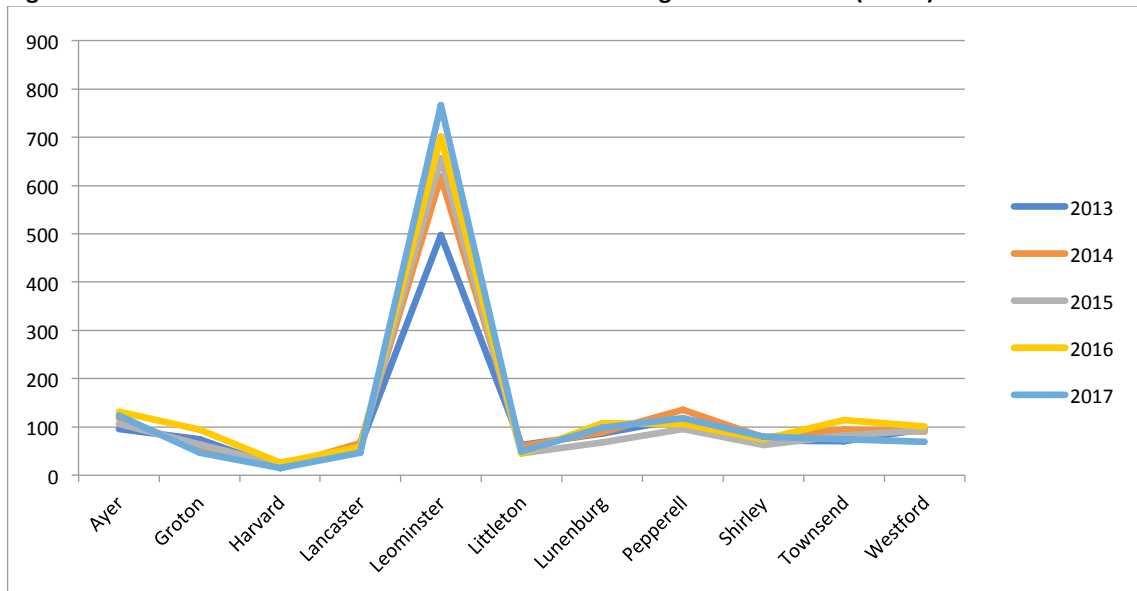
According to the 2013-2014 NSDUH, 6.7% of Massachusetts residents 12 years of age or older met the criteria for dependence or abuse of alcohol and 3% met the criteria for dependence or abuse of illicit drugs. From 2002 to 2015 there was a 2.2-fold national increase in the total number of deaths from all drug overdoses (National Institute on Drug Abuse, 2017).

In 2014, among those under the age of 45, Massachusetts ranked highest among all states for rate of opioid-related emergency department visits and second highest for rate of opioid-related inpatient stays. The Centers for Disease Control and Prevention (CDC) reported that Massachusetts had the nation's second highest rate of fentanyl seizures among all states in 2014 (MDPH, 2017).

Many people in Massachusetts who have a substance use disorder also have co-occurring mental health disorders. In Fiscal Year 2016, 52% of treatment admissions reported to MDPH Bureau of Substance Addiction Services (BSAS) had a history of mental health treatment. Approximately one in four persons ages 11 and older in the MassHealth population were identified as having a serious mental illness (SMI). The risk of fatal opioid-related overdose is six times higher for persons diagnosed with an SMI and three times higher for those diagnosed with depression (MDPH, 2017).

Rates of substance use and misuse vary by demographics and geographic factors. Variations across population groups are shaped by several factors, including biological, genetic, psychological, familial, religious, cultural, and historical circumstances. Massachusetts offers a variety of treatment approaches to address the needs of individuals with substance use disorders. However, there are important disparities in the outcomes and effectiveness of substance use treatment for different populations. Treatment needs can differ across populations, suggesting that treatment interventions should be individually tailored and incorporate culturally competent and linguistically appropriate practices relevant to specific populations and subpopulation groups (MDPH, 2017).

Figure 18: Substance Abuse Admissions to DPH Funded Programs 2013-2017 (count)



(Source: Massachusetts Department of Public Health, Bureau of Substance Abuse Services)

Leominster shows a significantly higher rate of admission to DPH funded substance abuse programs than other towns in the NVMC service area. Notably, the rate of admission in Leominster increased from (497 per 100,000) in 2013 to (767 per 100,000) in 2017. Lunenburg and Ayer are the only other regions to see a significant increase in admission during the same time period (86 to 99 and 96 to 124, respectively), but admission rates in both remain low compared to those in Leominster. Given that the data is a total count, the large population in Leominster compared to other towns is a factor. However, the steady increase in number of admissions is still significant in Leominster, as well as in Lunenburg and Ayer.

Opioids

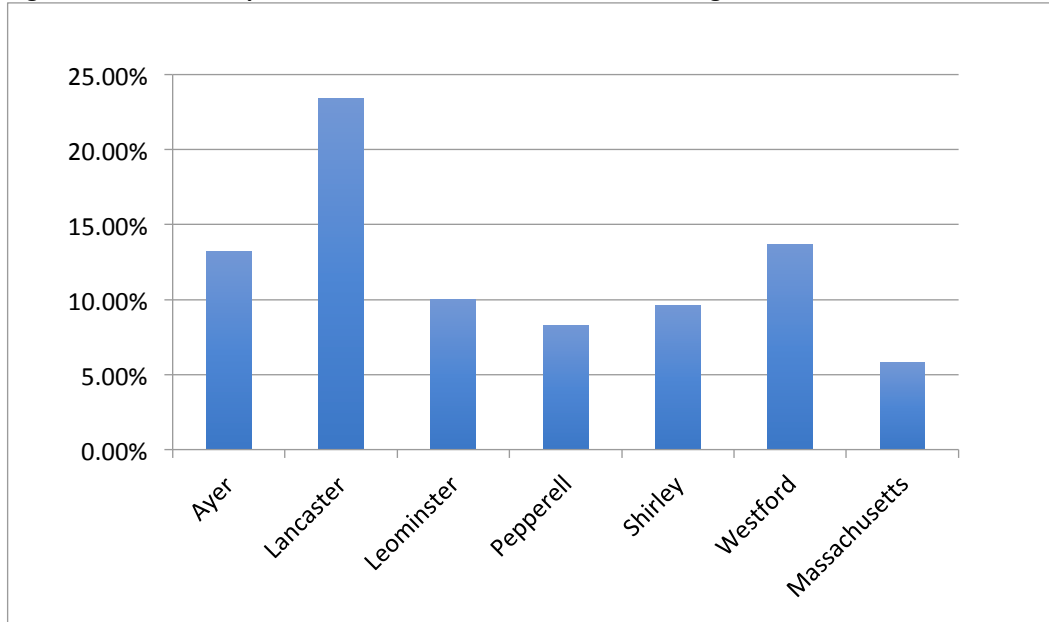
In Massachusetts, there has been a dramatic increase in opioid-related deaths. The number of opioid-related deaths in 2016 represents a 17% increase over 2015, and a 450% increase since 2000. Almost every community in Massachusetts is affected by the opioid epidemic. A key strategy to understanding the opioid epidemic is to improve the timely analysis and dissemination of data on opioid overdoses (MDPH, 2017).

Increasingly, evidence suggests fentanyl is fueling the current opioid epidemic. A Massachusetts-Centers for Disease Control and Prevention (CDC) collaborative epidemiologic investigation identified that the proportion of opioid overdose deaths in the state involving fentanyl, a synthetic, short-acting opioid with 50-100 times the potency of morphine, increased from 32% during 2013–2014 to 74% in the first half of 2016 (MDPH, 2017).

Intervention is an important component of a continuum of services to address substance use disorder (SUD) in a community. Intervention can also be referred to as Secondary or Tertiary Prevention, or Harm Reduction. Secondary Prevention targets individuals who have low levels of alcohol and/or drug use and would benefit from prevention and safety messages. Tertiary Prevention targets individuals who exhibit a greater degree of SUD and experience problems associated with their alcohol or drug use and would benefit from prevention and harm reduction messages as well as referrals to treatment. Individuals may experience a range of alcohol and drug use from no use to addiction and can benefit from different levels of service depending on what they are ready to receive at any given time. A person-centered

approach includes prevention, safety and harm reduction messages tailored to what the individual is ready to receive (MDPH, 2017).

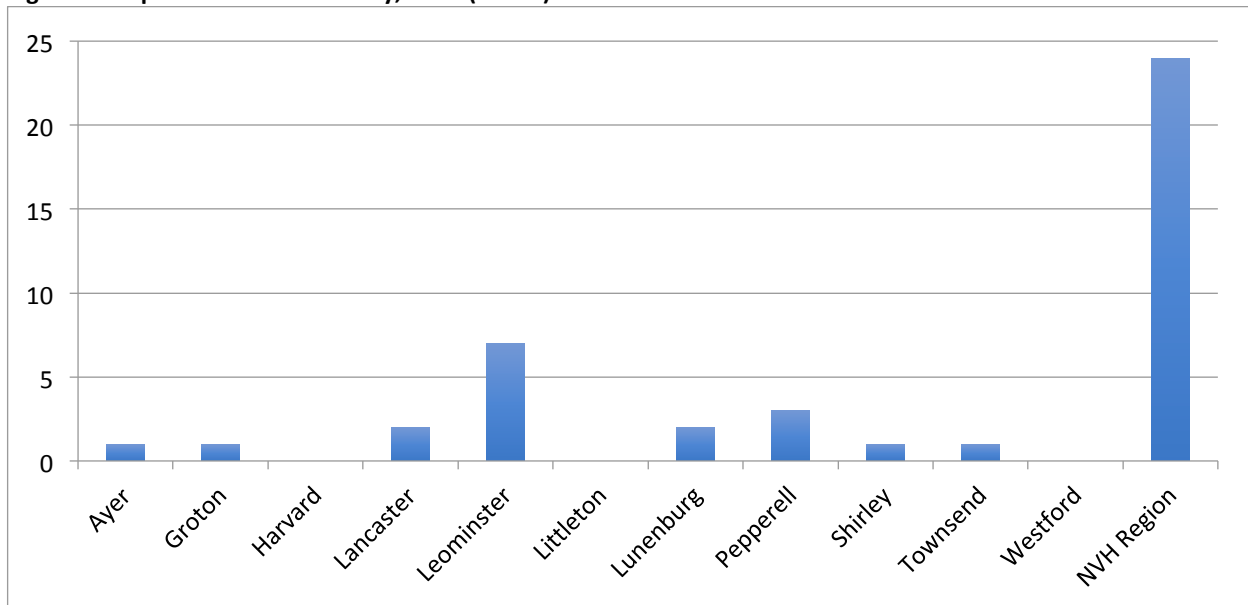
Figure 19: All Other Opioids Admissions to BSAS Contracted Programs 2014



(Source: Massachusetts Department of Public Health – Bureau of Substance Abuse Services FY 2014) Note: at the time of this report, data was not available through the DPH for Littleton, Lunenburg, Townsend, Groton, Harvard, and the NVMC Region overall.

The towns within the NVMC service area for which data was acquired all show higher percentages of admissions due to opioids than the Massachusetts average (5.8% of admissions). Lancaster is highest (23.40% of admissions). Pepperell is lowest (8.30% of admissions). Shirley reports the second lowest (9.6% of admissions). The percentage reported in Lancaster is significantly higher than all other percentages reported and is four times the state average percentage.

Figure 20: Opioid-related Mortality, 2014 (Count)



(Source: Massachusetts Department of Public Health – Bureau of Substance Abuse Services FY 2014)

The total number of opioid related mortalities in Massachusetts in 2014 was 1637. The NVMC region accounted for 24 of those 1637. Leominster shows by far the highest count, totaling seven mortalities in

2015. Pepperell reports three and both Lancaster and Lunenburg report two each. Harvard, Littleton, and Westford show zero during 2015.

Alcohol

Alcohol is also the most prevalent substance used in the past month by Massachusetts residents 18 to 25 years of age. In 2013-2014, 70.2% of Massachusetts young adults reported using alcohol in the past month and 43.9% reported binge drinking in the past month, exceeding national averages for alcohol use among this population (past month alcohol use: 59.6%; past month binge drinking: 37.8%) (MDPH, 2017).

Despite the legal drinking age of 21, alcohol is the primary substance used by youth. According to NSDUH (2013-2014), there has been a decrease in past month alcohol use and binge drinking in the US among individuals 12 to 17 years of age. However, the prevalence of alcohol use in Massachusetts exceeded the national average in 2013-2014 (past month alcohol use: 13.3% in Massachusetts vs. 11.6% nationally; binge drinking: 7% vs. 6.2%). In 2015, 61% of Massachusetts high school students reported using alcohol in their lifetime: 34% reported past month use; 18% reported binge drinking in the past month (DESE) & (DPH), 2015).

The number of BSAS clients who identified as veterans increased 12.1% from Fiscal Year 2011 (5,095 clients) to Fiscal Year 2016 (5,713 clients). In Fiscal Year 2016, 4% of the BSAS treatment population identified as veterans. Also, in Fiscal Year 2016, alcohol was the primary drug reported among the BSAS veteran population (48%) (MDPH, 2017).

Figure 21: Alcohol Related Mortality

	Alcohol Related Mortality (Age adjusted rate, 2015)
Groton	0
Harvard	0
Lancaster	0
Leominster	15.15
Pepperell	0
Shirley	0
Massachusetts	7.40
NVMC Region	1.33

(Source: Massachusetts Department of Public Health) Note: at the time of this report, data was not available through the DPH for Ayer, Littleton, Lunenburg, Townsend, and Westford.

From above, Leominster reports the highest opioid related mortality. Leominster also exhibits the highest rate of alcohol related mortality (15.15). This value doubles the statewide rate (7.4). Notably, the NVMC region shows a lower alcohol related mortality rate (1.33) than the state value. Groton, Harvard, Lancaster, Pepperell, and Shirley all report zero alcohol related mortalities. These are significantly below the state average and are below the NVMC region average.

Marijuana

According to the National Survey on Drug Use and Health (NSDUH) in 2015, an estimated 27.1 million people in the US aged 12 and older used illicit drugs in the past month. Of these, a majority (22.2 million) reported using marijuana and 3.8 million misused prescription opioids (SAMHSA, 2015).

During the same survey period, an estimated 20.8 million, approximately 1 in 10 people needed substance use treatment (i.e., treatment for problems related to the use of alcohol or illicit drugs). Of this population, 10.8 percent received treatment (SAMHSA, 2015).

In Fiscal Year 2016, among BSAS treatment program enrollments, (59.9%) of those 13 to 17 years of age reported marijuana as their primary drug, and (16.2%) reported opioid as their primary drug of choice. Of enrollees that were 18 to 25 years of age, (68.3%) reported opioids as their primary drug (MDPH, 2017).

According to 2013-2014 NSDUH estimates, the prevalence of past month binge drinking, past month illicit drug use and past month marijuana use among Massachusetts residents age 12 and older exceeded the national averages (binge drinking: 24.2% vs. 22.9%; illicit drug use: 13.2% vs 9.8% and marijuana use: 11.8% vs 8%) (MDPH, 2017).

Rates of substance use and misuse vary by demographics and geographic factors. Variations across population groups are shaped by several factors, including biological, genetic, psychological, familial, religious, cultural, and historical circumstances.

Massachusetts offers a variety of treatment approaches to address the needs of individuals with substance use disorders. However, there are important disparities in the outcomes and effectiveness of substance use treatment for different populations. Treatment needs can differ across populations, suggesting that treatment interventions should be individually tailored and incorporate culturally competent and linguistically appropriate practices relevant to specific populations and subpopulation groups (MDPH, 2017).

Overall, Leominster reported the highest mortality related to alcohol and related to opioid use. Lancaster reports the highest opioids admissions to BSAS contracted programs. In accordance with the data above, both the EMS focus group and the Pepperell focus group reported “addiction” as one of the “top three areas of health concerns within the community.” The Pepperell group reported that “*addiction is not that well addressed*” and the EMS group pointed specifically to opioid addiction and identified “*those dealing with addiction*” as a population they would “*identify as underserved within the community.*” In the *Key Informants Survey*, 56.25% of respondents identified substance abuse as a “major health concern in the community.”

Housing Stability

Massachusetts is currently dealing with a severe housing crisis due in large part to a low rate of housing production which has not kept pace with population growth and needs, soaring rents that have outpaced wages, and the lingering effects of the foreclosure crisis. As a result, there is a shortage of suitable and affordable units for young workers, growing families, and the increasing senior population. Overcoming these barriers will require addressing a variety of causes, including high development costs and exclusionary and restrictive zoning, which have made it difficult to keep up with the housing demand, among other factors (MA Legislature, 2016).

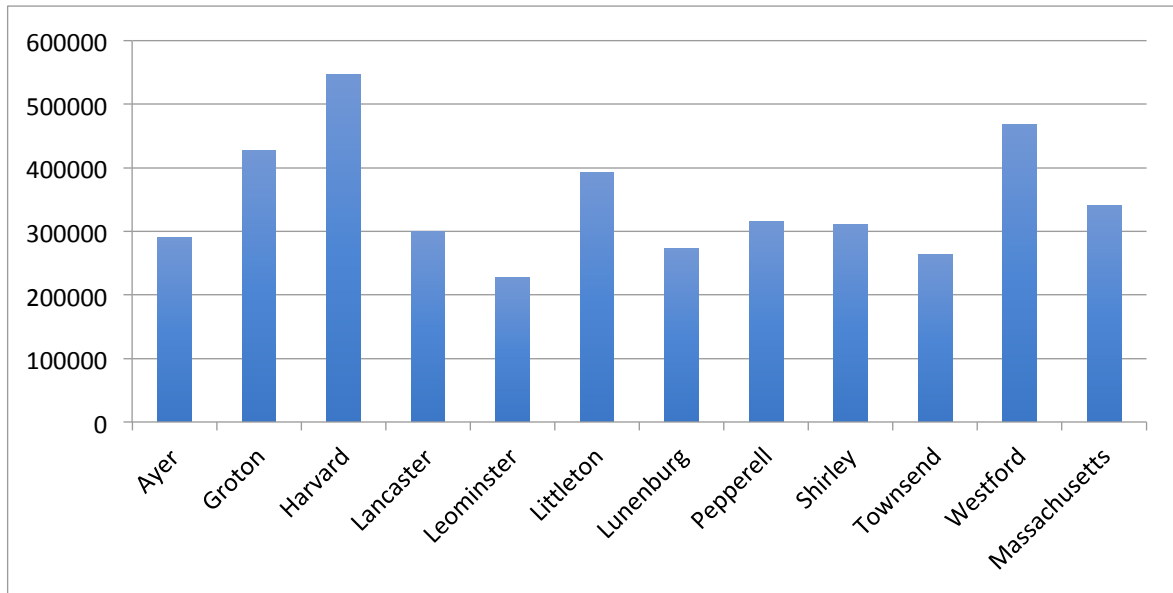
As our population grows older, our world class educational institutions and thriving technology companies continue to attract young professionals while simultaneously leaving the state ill prepared to meet the housing needs of a rapidly changing demographic. Baby Boomers (those born between 1946 and 1964) made up 50% of the state's labor force in 2010. In coming decades, 1.4 million boomers are expected to retire or move away by 2030, depleting the supply of our most critical asset: a skilled, well-educated workforce. Thus, housing production is an economic imperative for the Commonwealth (MA Legislature, 2016).

Housing Stability

Pressure is now highest on home prices in historically working-class communities. As more middle-income and working-class households move to these lower cost communities in hopes of finding more affordable housing, demand pressure is driving up prices. Home prices are still more affordable the further one moves away from the urban core (The Boston Foundation, 2017).

Average monthly rents have not fallen further despite the increase in housing construction is likely because a disproportionate amount of the new rental units are priced at luxury levels. The price of these units might have declined enough to bring the overall average rent down without much affecting median rent or rents in the lower end of the price spectrum. Hence, even as average rents have fallen, the proportion of renters who are housing cost-burdened continued to rise in 2017 (The Boston Foundation, 2017).

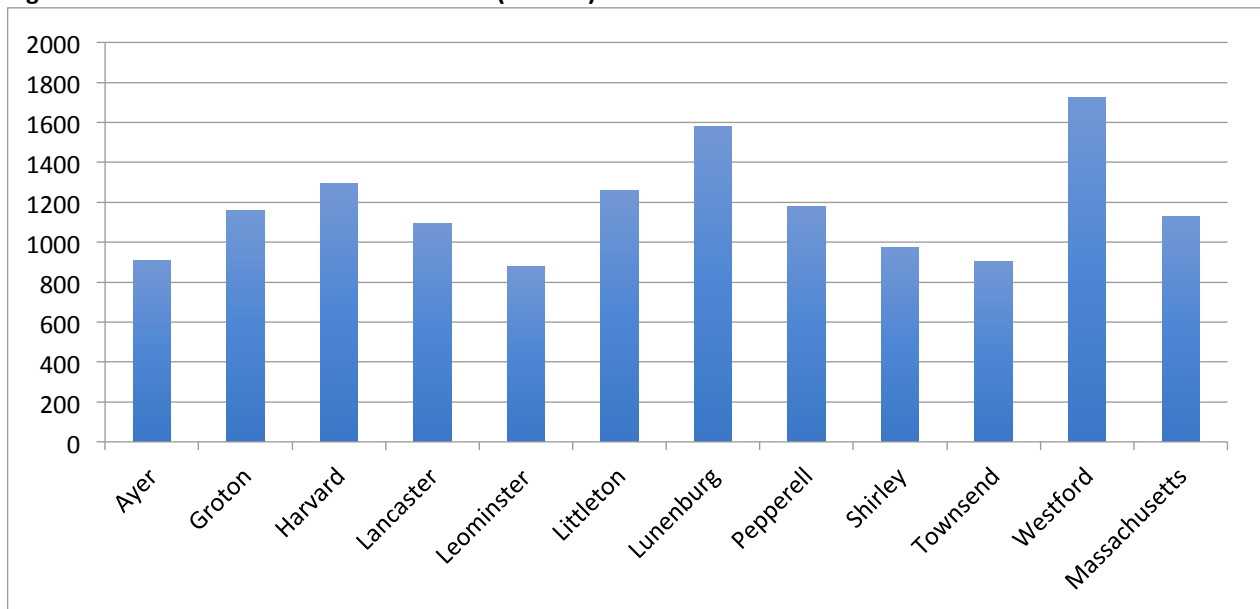
Figure 22: Median Housing Value 2012-2016 (dollars)



(Source: US Census Bureau, 2012-2016 American Community Survey 5-Year Estimates)

Harvard reports the highest median housing value (\$547,000). Harvard, Groton (\$427,800), Westford (\$468,500), and Littleton (\$392,300) all report higher median housing values than the statewide average (\$341,000). The rest of the towns in the service area report lower median housing values than the Massachusetts state average, with Leominster reporting the lowest (\$227,200). Second lowest is (\$263,200), followed by Lunenburg (\$273,600). The median housing value in Harvard more than doubles the median housing value in Leominster.

Figure 23: Median Gross Rent 2012-2016 (dollars)



(Source: US Census Bureau, 2012-2016 American Community Survey 5-Year Estimates)

While Harvard reported the highest median housing value, Westford reports the highest median gross rent (\$1,727). Westford is followed by Lunenburg, Harvard, Littleton, Pepperell, and Groton, all of which are above the Massachusetts state average (\$1,129). The lowest reported median gross rent was in Leominster (\$877) followed by Townsend (\$905) and Ayer (\$908). The median gross rent in Westford doubles that in Leominster, and Leominster ranks lowest among towns in the service area in both median gross rent and median housing value.

Homelessness

In FY 2018, the Commonwealth will spend from its own resources a total of \$432 million on a series of housing programs plus initiatives aimed at combatting homelessness. Of the total, \$183 million goes to the former with the larger share (\$249) going to homeless programs. However, this amount represents the second annual funding cut in a row so that the state budget for housing related spending is now \$71 million below the amount in the FY 2016 budget, a 14 percent reduction. What makes this cut in state funding even more serious is that it is coming on top of a sharp reduction in federal funding for housing in the Commonwealth. Fiscal year 2018 estimated funds for federal housing programs in Massachusetts are expected to be \$71 million less than in FY 2017. Together, the state and federal cuts in the current fiscal year alone amount to more than \$100 million (The Boston Foundation, 2017).

On August 31, 2018, there were 3,636 families with children and pregnant individuals in Massachusetts' Emergency Assistance (EA) shelter program. 36 of these families with children were being sheltered in motels. (The number inched up to 37 families in motels as of November 2, 2018.) This number does not count those families who are doubled up, living in unsafe conditions, or sleeping in their cars. During state fiscal year 2018, 4,895 families were assisted with emergency shelter and/or HomeBASE diversion assistance, out of the 8,145 families who completed applications for assistance. 3,250 families were denied assistance (40% denial rate, as reported by DHCD). Citizens' Housing and Planning Association (CHAPA) estimates a shortage of 158,769 affordable rental homes for extremely low-income households in Massachusetts (November 2017).

A report by the *National Low-Income Housing Coalition* details how low wages and high rents lock renters out in Massachusetts and all across the country. For 2017, the Massachusetts statewide housing wage is \$27.39/hour, meaning that a worker would have to earn that amount per hour in order to afford the fair market rent for a 2-bedroom apartment (\$1,424/month), without having to pay more than 30% of their income toward rent. The housing wage is based on a worker working 40 hours/week, 52 weeks/year. For 2016, it was \$25.91 and for 2015, it was \$24.64/hour. Massachusetts ranked as the 6th least affordable area state in the country, when looking at the 50 states and Washington, D.C. (MCH, 2018).

Poverty contributes heavily to homelessness. According to the U.S. Census Bureau's 2015 American Community Survey report (released in October 2016), the overall poverty rate in Massachusetts was just under 11.5% in 2015. This includes an estimated 752,071 people in Massachusetts living in households that fell below the poverty threshold. This estimate includes 202,513 children under the age of 18 and 92,468 elders age 65 and older. 355,730 people were living in households with incomes under 50% of the federal poverty guidelines (MCH, 2018).

Poverty

Income, poverty, and unemployment are each profoundly linked with health (Braveman PA, 2010). Income influences where people choose to live, to purchase healthy foods, to participate in physical and leisure activities, and to access health care and screening services. Having a job- and job-related income provide individuals the opportunities to make healthy choices, engage in healthy behaviors, access necessary health care services, and enjoy a long life (MDPH, 2017).

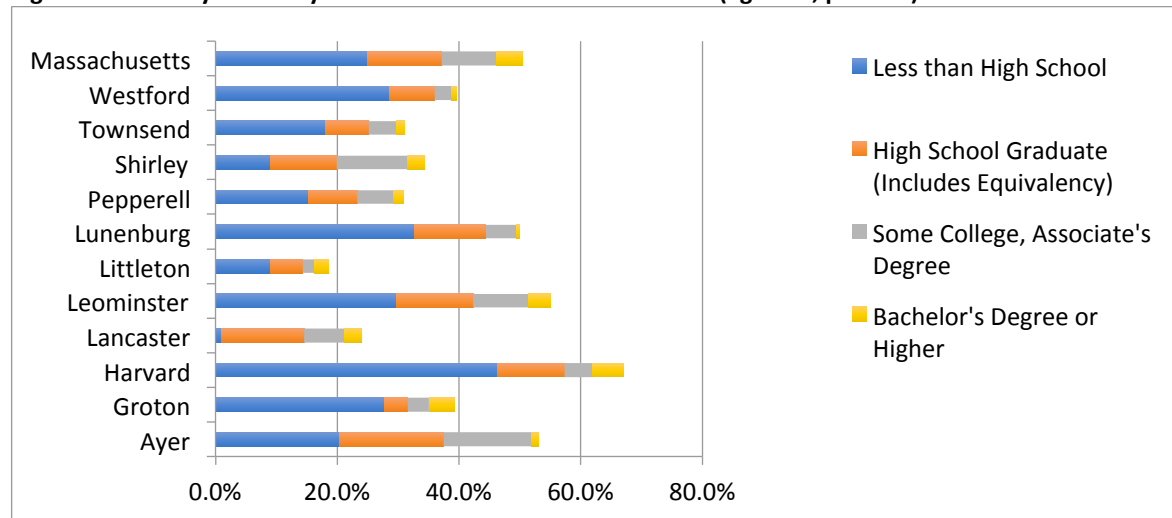
While being employed is important for economic stability, employment affects our health through more than economic drivers alone. Physical workspace, employer policies, and employee benefits all directly impact an individual's health. The physical workplace can influence health through workplace hazards

and unsafe working conditions which lead to injuries, illness, stress, and death. Long work hours and jobs with poor stability can negatively impact health by increasing stress, contributing to poor eating habits, leading to repetitive injuries, and limiting sleep and leisure time. Job benefits such as health insurance, sick and personal leave, child and elder services and wellness programs can impact the ability of both the worker and their family to achieve good health (MDPH, 2017).

Unemployment is also associated with poor health, including increased stress, hypertension, heart disease, stroke, arthritis, substance use, and depression; and the unemployed population experiences higher mortality rates than the employed (Robert Wood Johnson Foundation, 2013) (Henkel, 2011).

Stark racial disparities exist in poverty rates across Massachusetts. In 2011-2015 approximately one in three (29.3%) Hispanic residents and one in five Black non-Hispanic (22%), American Indian or Alaska Native (22.9%), or Native Hawaiian or other Pacific Islander (22.4%) residents recorded incomes below the federal poverty level. These patterns stand in dramatic contrast to less than one in 10 (7.8%) White non-Hispanic and one in seven (14.6%) Asian non-Hispanic residents with incomes below the federal poverty level. Some people’s housing costs exceed 30% of their income, leaving less money to cover other necessities (MDPH, 2017).

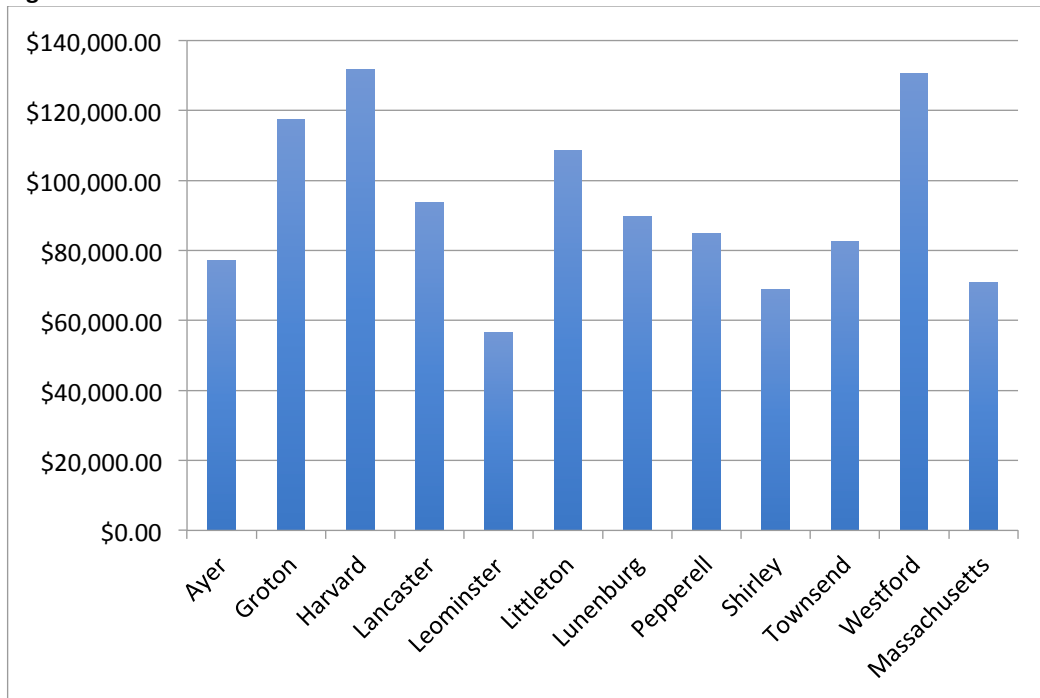
Figure 24: Poverty Status by Educational Attainment 2012-2016 (age 25+, percent)



(Source: US Census Bureau, 2012-2016 American Community Survey 5-Year Estimates)

The highest percentage of those in poverty to have attained less than a high school degree is reported by Harvard (46.3%). Harvard is followed by Lunenburg (32.7%) and Leominster (29.7%) for percentage with less than a high school education. All three are above the Massachusetts average (25%). The lowest percentage of those in poverty with less than a high school education is reported by Lancaster (0.9%). This value is significantly lower than all other reported values. The highest percentage with only a high school degree was reported by Ayer (17.1%), followed by Lancaster (13.7%) and Leominster (12.6%). Only Ayer, Lancaster, and Leominster reported values above the state average (12.2%). The lowest value for high school graduates was reported by Groton (3.8%), followed by Littleton (5.3%). Ayer also reported the highest percentage for some college or Associate’s Degrees (14.4%), followed by Shirley (11.6%) and Leominster (9.1%). The rest of the towns in the service area are below the state average (8.9%), the lowest being Littleton (1.9%). The only town with a higher percentage with Bachelor’s Degrees or higher than the state average (4.3%) is Harvard (5%). The rest of the towns in the service area reported lower values than the state average, with the lowest reported by Lunenburg (0.4%).

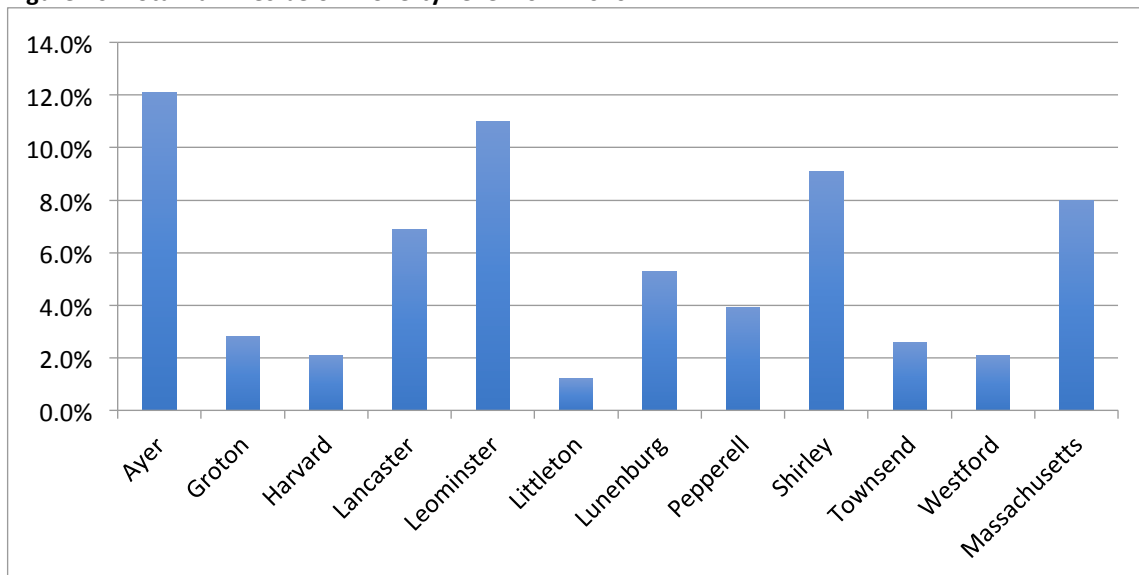
Figure 25: Median Household Income 2012-2016



(Source: US Census Bureau, 2012-2016 American Community Survey 5-Year Estimates)

The median household income is lowest in Leominster (\$56,510) and highest in Harvard (\$131,719). Harvard's median household income is well over double that of Leominster. Second highest is Westford (\$130,739), followed by Groton (\$117,500). Most towns in the service area are above the state median household income (\$70,954), but Leominster and Shirley (\$68,864) remain below the statewide value.

Figure 26: Total Families below Poverty Level 2012-2016

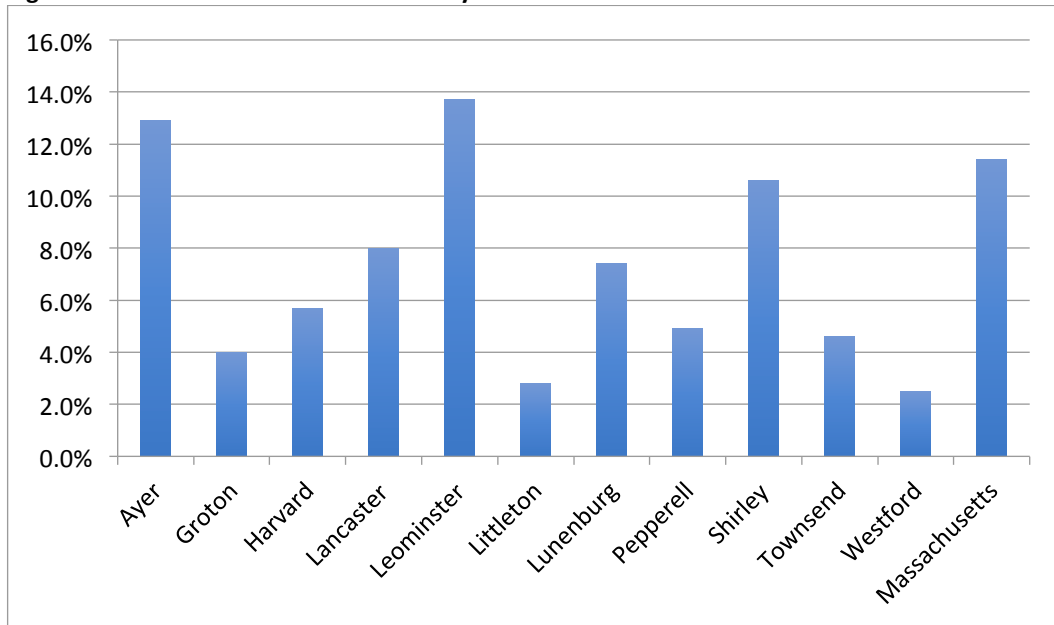


(Source: US Census Bureau, 2012-2016 American Community Survey 5-Year Estimates)

The highest percentages of families that are below the poverty level are in Ayer (12.1%), Leominster (11%), and Shirley (9.1%). All three are above the statewide average (8%). The lowest percentages of families that are below the poverty level are in Littleton (1.2%), Harvard (2.1%), and Westford (2.1%).

Overall, most towns in the service area are below the state average but Ayer, Leominster, and Shirley are notably high.

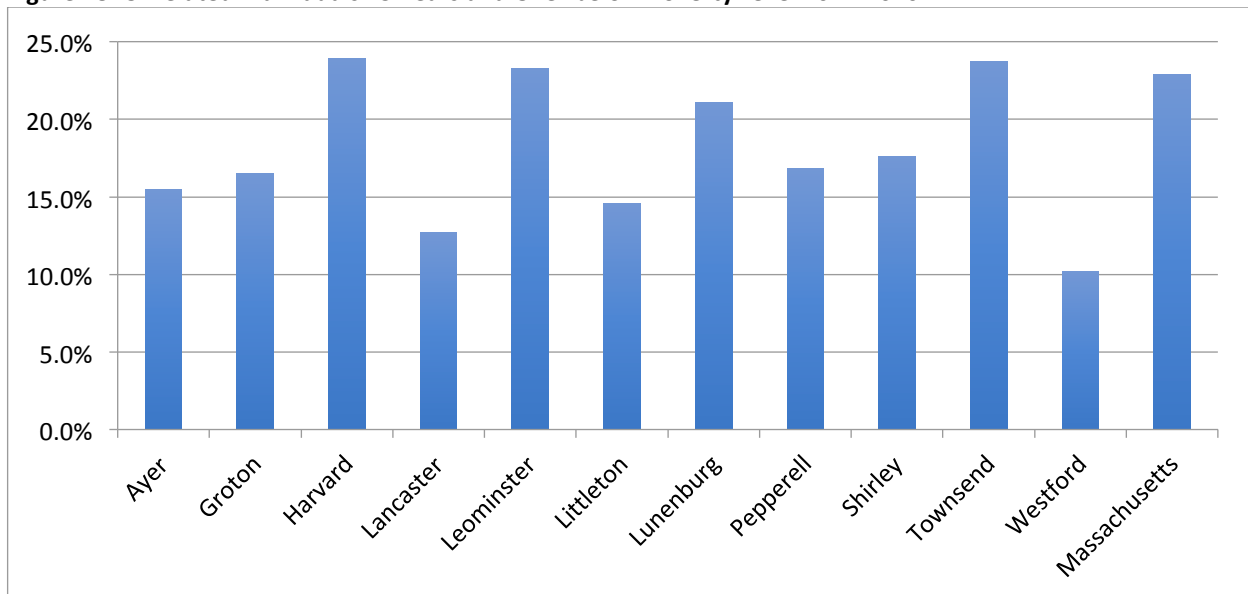
Figure 27: Total Individuals below Poverty Level 2012-2016



(Source: US Census Bureau, 2012-2016 American Community Survey 5-Year Estimates)

The towns that report the three highest percentages of individuals below the poverty level were the same as the three highest percentages of families below the poverty level, discussed above. They are Ayer (12.9%), Leominster (13.7%), and Shirley (10.6%). Only Ayer and Leominster are above the state value (11.4%). Littleton (2.8%) and Westford (2.5%) have the lowest percentages of individuals below the poverty level.

Figure 28: Unrelated Individuals 15 Years and Over below Poverty Level 2012-2016

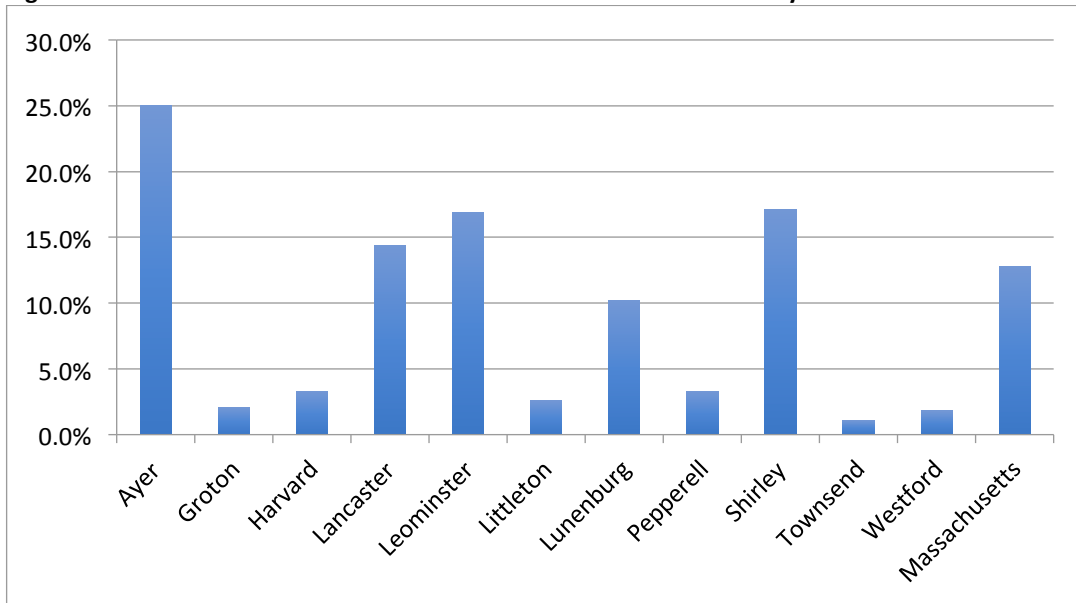


(Source: US Census Bureau, 2012-2016 American Community Survey 5-Year Estimates)

The percentage of unrelated individuals fifteen years and over that are below the poverty level in Massachusetts overall is 22.9%. Townsend (23.7%), Leominster (23.3%) and Harvard (23.9%) report

slightly higher values than the statewide average, and all other towns in the service area report lower values. The lowest is reported by Westford (10.2%).

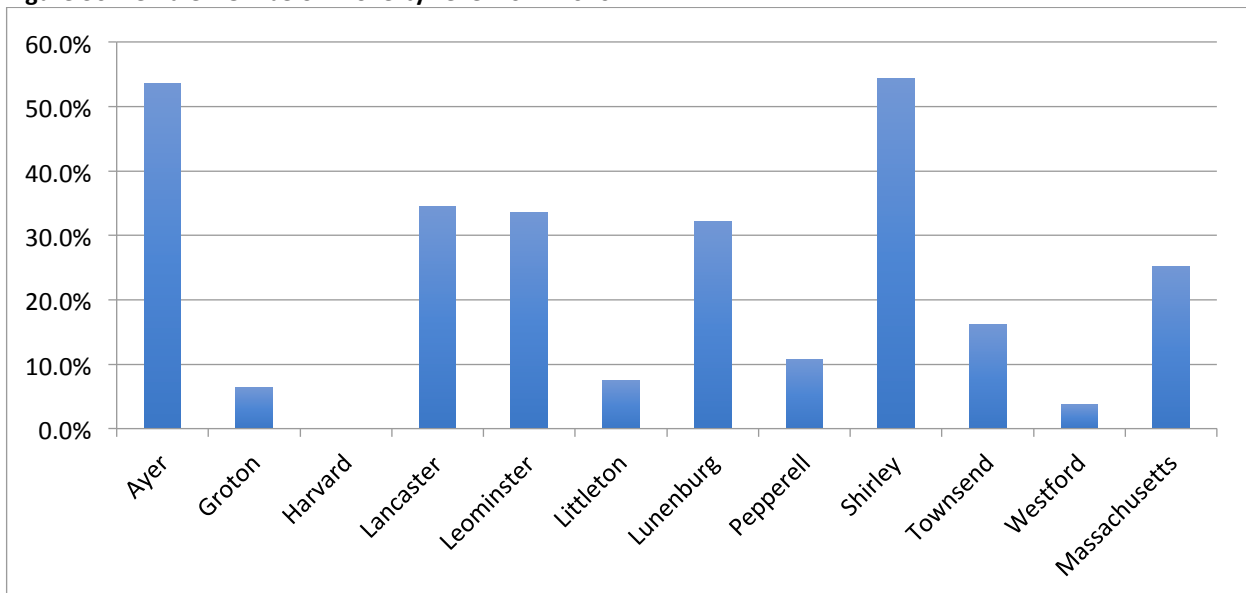
Figure 29: Families with Related Children Under 18 Years below Poverty Level 2012-2016



(Source: US Census Bureau, 2012-2016 American Community Survey 5-Year Estimates)

The discrepancies in percentages of families with related children under 18 that are below the poverty level are extremely large. The highest percentage is reported by Ayer (25%). The second highest value is reported by Shirley (17.1%), followed by Leominster (16.9%) and Lancaster (14.4%). All four towns are above the state average (12.8%). Notably, the percentage reported by Ayer almost doubles the state value. Near the state value is Lunenburg (10.2%). The rest of the towns are significantly below the state average, with the lowest percentage reported by Townsend (1.1%). The percentage of families with related children under 18 years of age who are below the poverty level in Ayer is more than 22 times that in Townsend, highlighting the vast disparity in values.

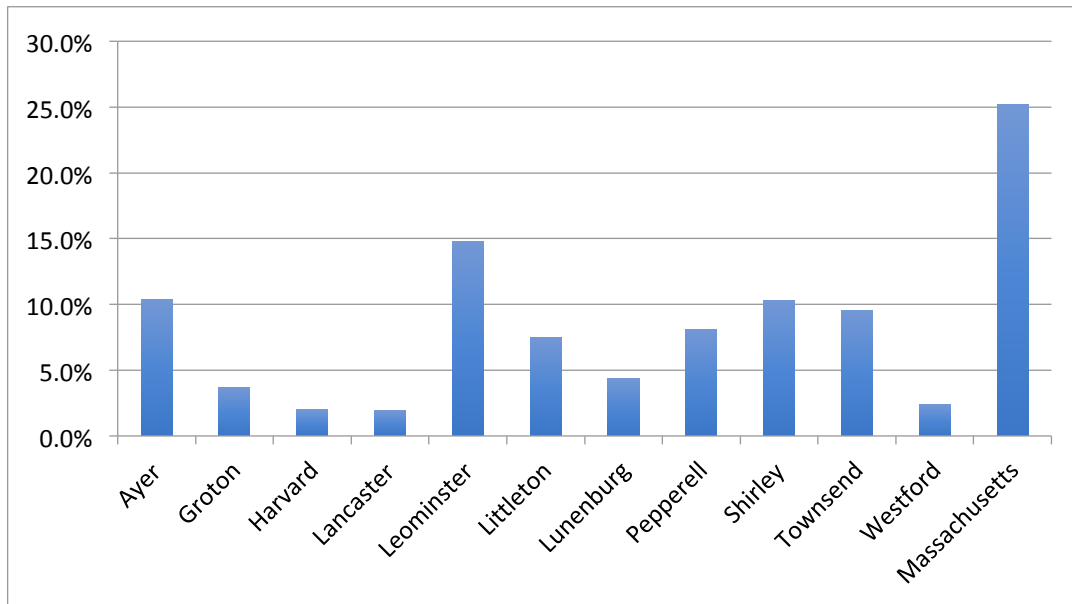
Figure 30: Female HOH below Poverty Level 2012-2016



(Source: US Census Bureau, 2012-2016 American Community Survey 5-Year Estimates)

The highest female HOH poverty levels are reported by Shirley (54.3%) and Ayer (53.5%). The two highest values are followed by Lancaster (34.5%), Leominster (33.5%), and Lunenburg (32.2%). The five towns that report the highest percentages correspond to the five towns that report the highest poverty rate amongst families with related children less than 18 year of age. All five towns report percentages higher than the state average (25.2%). The lowest reported percentage is from Harvard (0%), followed by Westford (3.7%) and Groton (6.4%). As in the above graphs, the disparity between the highest and lowest percentages is large.

Figure 31: Households Participating in Supplemental Nutrition Assistance Program 2012-2016



(Source: US Census Bureau, 2012-2016 American Community Survey 5-Year Estimates)

The five towns that reported the highest rates of poverty show higher poverty levels than Massachusetts overall. However, the percentage of households participating in supplemental nutritional assistance programs is lower in all towns than the state average (25.2%). The percentage is highest in Leominster (14.8%), followed by Ayer (10.4%), Shirley (10.3%), and Townsend (9.5%). The lowest participation percentage is in Lancaster (1.9%), followed by Harvard (2.0%) and Westford (2.4%).

In the *Key Informants Survey*, health professionals in the area rated the household income of the consumers served by their organization most often as “40-60K”, but also selected “Mix” approximately as often. Of the income options available, “60-80K” was selected the second most often. In the same survey, “Cost of care” ranked highest in response to the question “rank what you believe to be the biggest obstacles to healthy living among your consumers.”

Overall, Ayer, Leominster, Shirley, and Lancaster consistently rank among the towns with the highest rates of poverty. Notably, Shirley, Leominster and Ayer all show cancer mortality rates at or below the state average, whereas Lancaster reports significantly higher cancer mortality. Shirley reports the highest heart disease mortality of any town in the service area. Leominster and Ayer have shown a steady increase in substance abuse admissions to DPH funded programs from 2013 to 2017, and substance abuse remains a significant health concern in these communities. As a result, the intersection of poverty rates and health data should be considered individually for these towns.

Recommendations

The Nashoba Valley Medical Center is well positioned to partner with other community-based organizations and coalitions to address the following key strategic priorities to improve health outcomes and wellness in the region:

- 1. Chronic Diseases**
 - a. Cancer
 - b. Heart Disease
 - c. Diabetes
- 2. Mental Health**
- 3. Substance Use Disorders**
- 4. Housing Stability**
 - a. Homelessness
 - b. Affordable housing
- 5. Transportation**

In recognition of the need for further investments in the social determinants of health, NVMC will also consider these six priorities in Community Benefits planning:

- **Built Environment**
 - The built environment encompasses the physical parts of where we live, work, travel and play, including transportation, buildings, streets, and open spaces.
- **Social Environment**
 - The social environment consists of a community's social conditions and cultural dynamics.
- **Housing**
 - Housing includes the development and maintenance of safe, quality, affordable living accommodations for all people.
- **Violence**
 - Violence is the intentional use of physical force or power, threatened or actual, against oneself, another person, or against a group or community, with the behavior likely to cause physical or psychological harm.
- **Education**
 - Education refers to a person's educational attainment – the years or level of overall schooling a person has.
- **Employment**
 - Employment refers to the availability of safe, stable, quality, well-compensated work for all people.

NVMC will continue to foster collaborative partnerships with other community-based organizations whose services align with addressing the aforementioned priorities and focus issues. Particular consideration will be given as to how strategies impact the lives of the underserved populations identified within the NVMC service area. NVMC recognizes the effectiveness of the collective impact that comes from constructive approach associated with both medical and social partnerships, working together towards a common goal of improving health outcomes among all community members, particularly for underserved populations. Where it is deemed appropriate NVMC will coordinate with regional public health organizations to ensure our success in addressing community health issues. Our data reveals that race, ethnicity and socio-economic factors are indicators of health outcome within the region. NVMC will focus efforts toward individuals and families who are facing critical challenges that perpetuate health inequity.

Chronic Disease

Cancer

Cancer was the second leading cause of death in the U.S. in 2014, when the age-adjusted mortality rate attributable to cancer was 161.2 per 100,000 population. Nationally, the leading types of cancer deaths in 2015 were lung and bronchus, prostate in men, breast in women, colon and rectum, pancreas, and liver and intrahepatic bile duct in men, ovary in women. (BPHC, 2017). Despite national efforts, disparities persist, with higher specific-cause mortality for some socio demographic groups when stratified by race, wealth, education, and neighborhood. These disparities have remained constant in recent years. Respondents in the *Key Informant Survey* ranked cancer eighth for health concerns within the community, despite cancer accounting for the highest percentage of mortality in the NVMC region. Cancer mortality as a percentage of all causes is slightly higher in the NVMC region compared to Massachusetts overall and is notably high in Lancaster. The most commonly diagnosed cancers across the NVMC region are breast cancer, prostate cancer, and lung cancer. Worcester County had the third highest prevalence of adult smoking (17.2%) in 2015 out of MA counties (Data USA, 2016). Hence, providing partnership with the American Cancer Society and other cancer education to the community is crucial as it could potentially advance the cancer disease prevention and management.

Community-Wide Recommendations

- Pursue partnerships with the American Cancer Society and/or other cancer education and prevention organizations in the community to advance disease prevention and management.
- Partner with civic and/or faith-based community organizations to reach underserved populations and provide appropriate screenings and prevention education.

Health System Recommendations

- Evaluate the option to offer free cancer screening programs in communities more susceptible to cancer and with higher disease burden and mortality rates in order to increase early diagnosis of cancers and treatment with particular attention to Lung, Prostate and Breast Cancer.
- Work with area school systems to develop programs to educate students on the health risks of Vaping
- Offer cancer prevention education and/or informational materials to high priority populations.
- Participate in community-based cancer awareness campaigns in the region. (participate in local Relay for Life run)
- Offer cancer support groups.

Cardiovascular Disease

Heart Disease is the second leading cause of death in Massachusetts behind cancer. In 2012, heart disease was responsible for (21%) of total mortality in Massachusetts. In a focus group of EMS professionals, participants reported chest pain and shortness of breath as primary health concerns in the community and noted a recent increase in shortness of breath amongst community members. A focus group of community members in Pepperell indicated cardiac health and diabetes as two of the top three health concerns within the community. The quantitative data concurs with the Pepperell focus group's reports, as percentages of mortality due to heart disease in Pepperell and Shirley are highest amongst the NVMC service area. When appropriate, NVMC should provide blood pressure screenings in the community and promote heart health and stroke prevention through partnerships with community-based organizations providing services to target populations in the NVMC service area, especially in Pepperell and Shirley. NVMC should seek to partner with appropriate health care networks and primary care offices to implement chronic disease self-management program to assist community members in learning how to manage their health condition and improve quality of life. NVMC should also provide easier accessibility to health-screenings on-site and off-site, as a major concern about healthcare for senior citizens with limited mobility was reported in one of the focus groups.

Community-Wide Recommendations

- Pursue partnerships with the American Heart Association and/or other cardiovascular disease education and prevention organizations in the community to advance disease prevention and management.
- Partner with civic and/or faith-based community organizations to reach high priority populations and provide appropriate screenings and prevention education.
- Partner with area community providers

Health System Recommendations

- Offer heart attack and stroke prevention education and/or informational materials in target communities, including Pepperell and Shirley.
- Participate in community-based heart health and stroke awareness campaigns in the region.
- Partner with community agencies to provide programs on hypertension, stroke and health eating

Diabetes

Approximately (10%) of U.S. adults reported ever having diabetes in 2015 and the rate of new diabetes cases among U.S. adults 20 years and older was (7.8 per 10,000) in 2012. Among U.S. adults, people of color are more likely to be diagnosed with type 2 diabetes compared with White adults. Having a close family member with diabetes is also a risk factor for developing type 2 diabetes. Socioeconomic disadvantage at the individual and neighborhood level is also associated with higher risk of developing type 2 diabetes (BPHC, 2017).

The NVMC service area reports lower diabetes mortality than Massachusetts overall. However, diabetes was still a major concern among focus groups and the *Key Informant Survey*. In the survey, respondents ranked heart health, hypertension, and diabetes highest in response to the question, “*What are the major health concerns in the community where you provide services?*” A focus group of community members in Pepperell indicated cardiac health and diabetes as two of the top three health concerns within the community. The focus group also noted that nutrition services may be inaccessible to those who lack transportation or mobility to leave the home.

To best address this, NVMC should work together with the American Diabetes Association to promote the use of diabetes type 2 screening tools to foster awareness and prevention. Lifestyle changes can prevent or delay the onset of diabetes and help control diabetes once diagnosed. Eating a healthy diet, maintaining a healthy weight, exercising regularly, and avoiding smoking can help prevent diabetes. NVMC should continue to make available diabetes management information in various languages and through various media channels, as appropriate.

Community-Wide Recommendations

- Pursue partnerships with the American Diabetes Association (ADA) and/or other diabetes education and prevention organizations in the community to advance disease prevention and management.
- Partner with civic and/or faith-based community organizations to reach high priority populations and provide appropriate screenings and prevention education.
- Partner with CHNA 9 CHIP group addressing food access and healthy eating to promote farmer’s markets and access to fresh produce

Health System Recommendations

- Promote use of the ADA and/or CDC diabetes type 2 and prediabetes screening tools within high priority populations.
- Offer diabetes type 2 prevention and self-management programs in communities more susceptible to diabetes type 2 and with higher disease burden and mortality rates in order to increase early diagnosis and management.
- Participate in community-based diabetes awareness campaigns in the region, and spread awareness surrounding nutrition and nutrition services.

Mental Health

Approximately one in four persons ages 11 and older in the MassHealth patient population were identified as having a serious mental illness. Of these individuals, roughly two in five have been homeless for some period between 2011 and 2015. The risk of fatal opioid-related overdose is six times for those with a serious mental illness and three times higher for those diagnosed with depression compared to those without any mental health diagnosis (MDPH, 2017).

Behavioral health services were ranked second in response to “what kind of services does your organization primarily provide?” and over half of respondents identified behavioral health as a major health concern in the community. Both focus groups identified “*those dealing with mental health issues*” as an underserved community, along with “*those dealing with addiction.*” In 2015, the rate of mental health hospitalizations was higher in Ayer, Littleton, Shirley, and Groton compared with the rest of the service area.

Mental health was the major concern among the focus group participants and key informant survey respondents. Both highlighted a lack of specialized services in the NVMC service area. NVMC should continue to collaborate with community-based organizations that can provide services to mentally ill patients. NVMC should serve as a host site for support groups for community members and caregivers. NVMC should promote the creation and availability of an inter-agency comprehensive care plan for this population.

Community-Wide Recommendations

- Disseminate educational materials outlining signs of mental health issues (particularly depression and anxiety) at strategic locations targeting high priority populations.
- Provide family members and/or caregivers with educational information on mental health to assist caregivers in understanding warning signs of mental illness.
- Promote awareness of mental illness and work to decrease stigma surrounding seeking support.
- Pursue collaboration with the National Alliance on Mental Illness, health insurers, and/or other mental health education organizations in the community to advance disease management.

Health System Recommendations

- Collaborate with health and human service organizations to develop a comprehensive care plan that would be accessible to providers at all points of care.
- Implement strategic partnerships with community organizations that are able to provide services to community members, particularly high priority populations.
- Engage community-based service providers to learn of and promote services that may be available to community members in need of services.
- Implement strategic partnerships with community organizations that are able to provide services to community members, particularly high priority populations.

Substance Use

Misuse of alcohol or other drugs over time can lead to physical and/or psychological dependence on these substances, despite negative consequences. Substance misuse alters judgment, perception, attention, and physical control, which can lead to the repeated failure to fulfill responsibilities and can increase social and interpersonal problems. There is a substantially increased risk of morbidity and death associated with alcohol and drug misuse. The effects of substance misuse are cumulative, significantly contributing to costly social, physical, mental, and public health challenges. Examples of these include domestic violence, child abuse, motor vehicle crashes, physical fights, crime, homicide, suicide, human immunodeficiency virus/ acquired immunodeficiency syndrome (HIV/AIDS), and other sexually transmitted infections (6). Substance misuse can also impact one's social determinants of health, such as employment, income, social network, and housing (BPHC, 2017).

For substance misuse indicators evaluated for 2015, inequities across categories of race/ethnicity, sex, and neighborhood were found. The rates of mortality and hospital patient encounters for substance misuse and unintentional overdoses tended to disproportionately affect White residents. However, the overall substance misuse death rate increased almost two-fold from 2011 to 2015 for Black and Latino residents and to a lesser extent for White residents, which suggests the impact of fentanyl was experienced by all three groups. For example, the rates of unique-person treatment admissions for heroin and prescription drugs were higher for White residents compared with Black and Latino residents. For marijuana, the rate was higher for Black and Latino residents compared with White residents. Across most drug types, the rate of unique-person treatment admissions was lowest among Asian residents (BPHC, 2017).

Substance use was a main concern among the focus groups. Importantly, the rate of substance abuse admissions to DPH funded programs has increased consistently from 2013-2017 in Leominster, and Leominster reported the highest opioid mortality. NVMC should promote the use of substance use disorder treatment best practices and continue to partner with community organizations to promote increased access to screening for potential substance abuse. In addition to collaborating with community-based service providers working in various local settings, NVMC should also continue to offer free use of hospital space for a wide variety of support groups including Alcoholics Anonymous and Narcotics Anonymous.

Community-Wide Recommendations

- Advocate for increasing availability of de-tox and long-term treatment facilities, particularly to high priority populations in the region.
- Collaborate with schools and other organizations to incorporate an evidence-based curriculum that addresses substance use and mental health.
- Support community-based substance abuse prevention coalitions.

Health System Recommendations

- Provide support resources for patients for whom illness can cause significant stress and anxiety.
- Promote evidence-based best practices in substance use disorder treatment across the continuum of care.
- Engage community-based service providers to learn of and promote services that may be available to community members in need of services.
- Continue collaborations and expand access to support groups for patients and caregivers.

Housing Stability

As previously noted, in 2017, 6,135 individuals in Boston were homeless. Without consistent access to health care, homeless individuals are less likely to participate in preventative care and are much more likely to utilize the emergency department for non-emergencies. Such patterns of use are not only a burden on the healthcare system, but detrimental to personal health as well (BPHC, 2017).

Several cities and towns in the NVMC service area recorded high individuals living below poverty. Ayer, Leominster, and Shirley report higher poverty levels among families than the state average, and Lancaster reports a value slightly below the state average but still significantly higher than the rest of the towns in the service area. Despite these statistics, the enrollment in the Supplemental Nutrition Assistance Program is lower in all towns in the area than in Massachusetts overall. To address this, NVMC should ensure that all at-risk residents are fully informed and referred to relevant resources such as the Supplemental Nutrition Assistance Program.

Community-Wide Recommendations

- Advocate for and support Housing Authority initiatives aimed at keeping low-income individuals and families housed.
- Partner with community organizations working to stabilize housing and/or rental pricing so as to support high priority populations that have been historically marginalized due to the high cost of housing.
- Challenge housing policies that foster segregation in communities in which segregation has historically contributed to unequal access to health and social supports and perpetuate poverty.

Health System Recommendations

- Partner with community organizations such as Housing Authorities and Shelters to identify ways to support housing first models.
- Consider adopting a housing screening process with patients prior to discharge to ensure patients are discharged to housing that is safe and support recovery.

Affordable Housing/Homelessness

Community-Wide Recommendations

- Advocate for and support public policies aimed at addressing housing shortage and the cost of housing.
- Partner with local shelters to support programs aimed at keeping low-income individuals housed.

Health System Recommendations

- Develop and/or maintain partnerships with service agencies that are able to provide assistance to those who may present at the hospital with a need for stable housing.
- Ensure that all at-risk residents are fully informed and referred to relevant resources such as the Supplemental Nutrition Assistance Program

Transportation

In 2015, community members and hospital members of CHNA 9 (Community Health Network of North Central Massachusetts) identified transportation as one of the key issues impacting health in the region. The lack of reliable, affordable transportation affects every aspect of a person's life: education, access to healthy food, jobs and health care.

Transportation was identified as such a critical issue, that CHNA 9 selected this topic as one of four CHIP's (community health improvement projects). The CHIP has been actively engaged in obtaining survey data as well as interacting with focus groups to identify where there are service gaps and developing a comprehensive tool that could be utilized to select transportation options for the CHNA 9 market (which extends from Ayer to Gardner, MA).

Transportation continues to be a top issue as communities evaluate transit options ranging from transportation for commuters (e.g. Devens project which established a bus route from Fitchburg to Devens to provide entry level workers for the growing number of companies that have come to Devens) to transportation for community members who may not drive but need access to medical services.

Community-Wide Recommendations

- Partner with the CHNA 9 transportation CHIP to support survey and focus group activities with an emphasis on the Nashoba market
- Advocate for affordable transportation services in the Nashoba market

Health System Recommendations

- Work with local COA's and community providers to identify transportation issues for low income and minority populations
- Establish a pilot project with area COA's to address top transit issues (e.g. transportation to dialysis).

Underserved Populations

Oppression such as structural racism and gender bias lead to social isolation, social exclusion, poor mental health, increased risk of violence, increased rates of poverty, higher hospitalizations, longer recovery times, and higher mortality rates for many conditions. Social isolation, social exclusion, racism, discrimination and poverty disproportionately affect low-income communities and communities of color and all negatively impact many aspects of health. Communities of color are more likely to have lower levels of resources and connectedness with other neighborhoods and higher levels of racial segregation. They also face more challenges when engaging in group action in neighborhoods to shift these conditions (Hobson-Prater T, 2012).

As noted above, several social obstacles stand in the way for members of the underserved populations to achieve better health outcomes. NVMC should leverage its physician relations and communications resources to address the identified needs of underserved populations. Wherever possible, informational and/or educational materials should be translated, and community engagement efforts should include various civic venues paying close attention to the social environment

Community-Wide Recommendations

- Support efforts to improve the health care delivery system through reform.
- Collaborate with organizations working to remove barriers to care for underserved populations.

Health System Recommendations

- Engage members of high priority populations such as low-income individuals, immigrants and minorities to identify needs and priorities for improved service delivery.
- Provide accessible central pharmacy and increase availability of health-screenings to high priority populations.
- Provide assistance to community members seeking to apply for public health insurance coverage provided through public health plans.
- Screen individuals for primary care provider, where appropriate, assist community members enroll with primary care provider of their choice.

Limitations

Data collected for analysis was derived from publicly accessible, governmental sources. Some data sources lacked information on certain towns. Data presented in this report is the most recently available at the time of the creation of this report. As such, some of the relative changes, though classified as increases or decreases, are qualitative valuations relative to state values. Though it would have been preferable to have more recent data with statistical evaluation for significance (p value) and correlation (r value), we were limited to datasets provided by the Department of Public Health and other State sources. In previous versions of this CHNA, data had been collected through use of the Massachusetts Community Health Information Profile (MassCHIP). However, at the time of data collection, this resource was unavailable to researchers. Researchers instead relied on datasets provided by the Accreditation Coordinator/Director MassCHIP, Office of the Commissioner, Massachusetts Department of Public Health and guidance provided by the same in order to collect data used to compile this CHNA.

Although the community focus group provide valuable information, serving as important tools for data collection and community engagement, there are some limitations to consider. Focus group data is qualitative in nature and reflect only the views and opinions of a small sample. Focus groups are limited to the views and opinions of the participants and are not all-inclusive of the various perspectives of the larger populations; they do not constitute complete data for the communities in which focus groups were held. It would have been advantageous to have conducted focus groups in more communities within the service area so as to engage a larger segment of the population, as this may have garnered more diversified data unique to other communities.

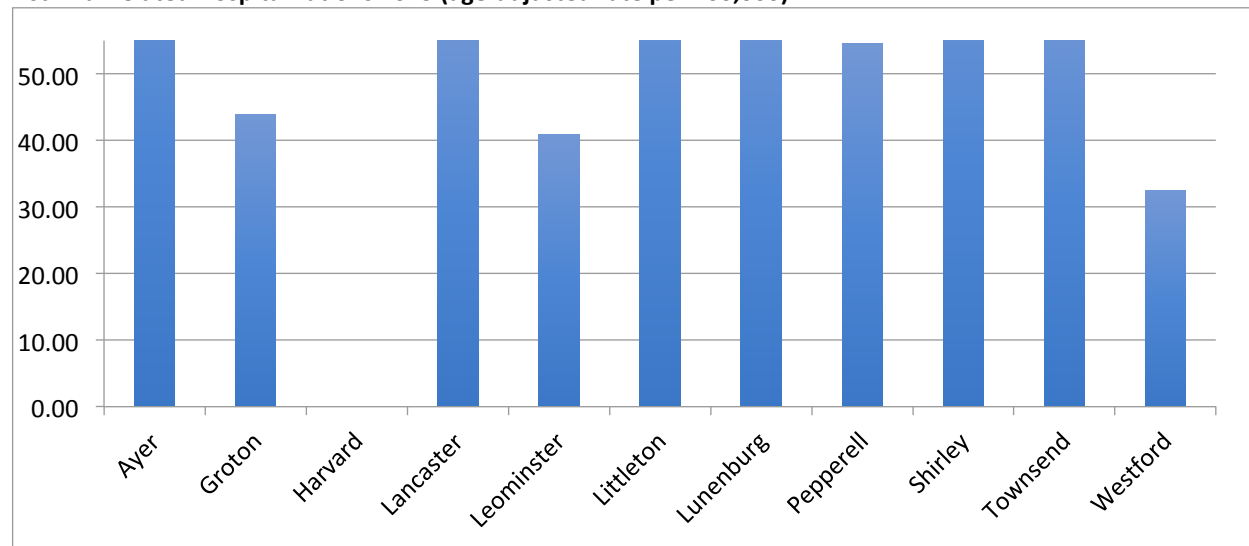
Though the intent of this project was to capture the views and opinions of all or most health and human service providers within the NVMC primary service area, there were also limitations to the survey distribution. The survey was distributed via email by hospital staff and affiliated practices and some community partners. Some health professionals may have been excluded due to a lack of access to computer-based technology. Some providers had a longer period of time to access and respond to the survey as the survey distribution was ultimately at the control and discretion of the NVMC staff.

In total, 100 health service providers responded to the Health Provider Survey. This number is likely exactly representative sample of service providers in the service area.

Appendix A. Supplemental Health Indicators and Demographic Data

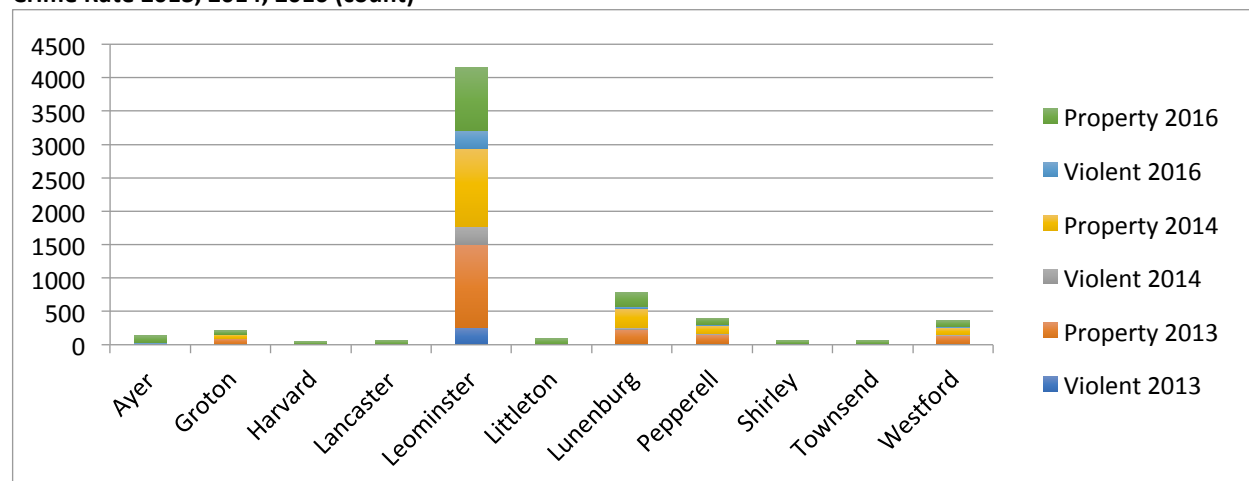
Health Indicators

Asthma-Related Hospitalizations 2013 (age-adjusted rate per 100,000)



(Source: Massachusetts Department of Public Health)

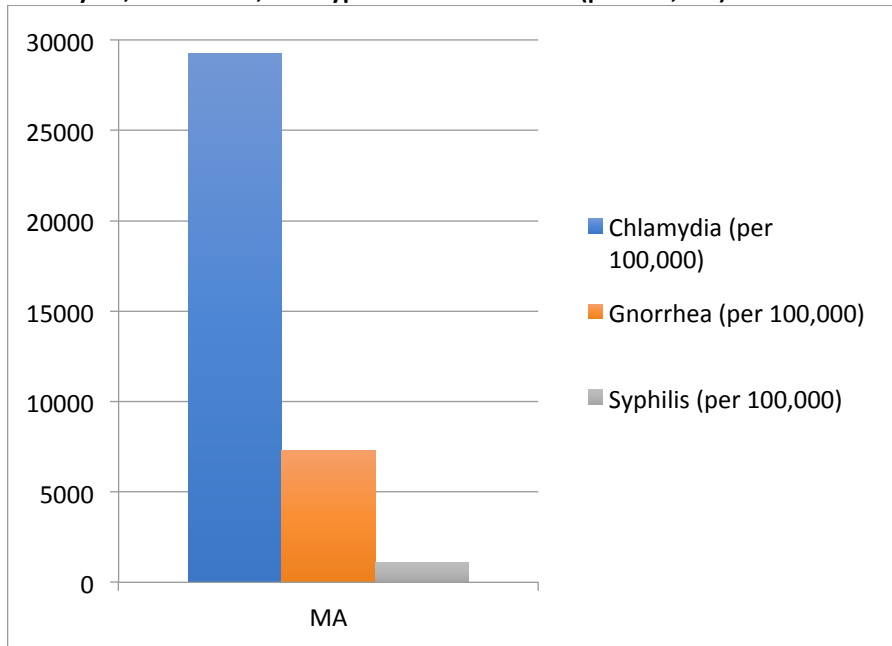
Crime Rate 2013, 2014, 2016 (count)



(Source: U.S. Department of Justice)

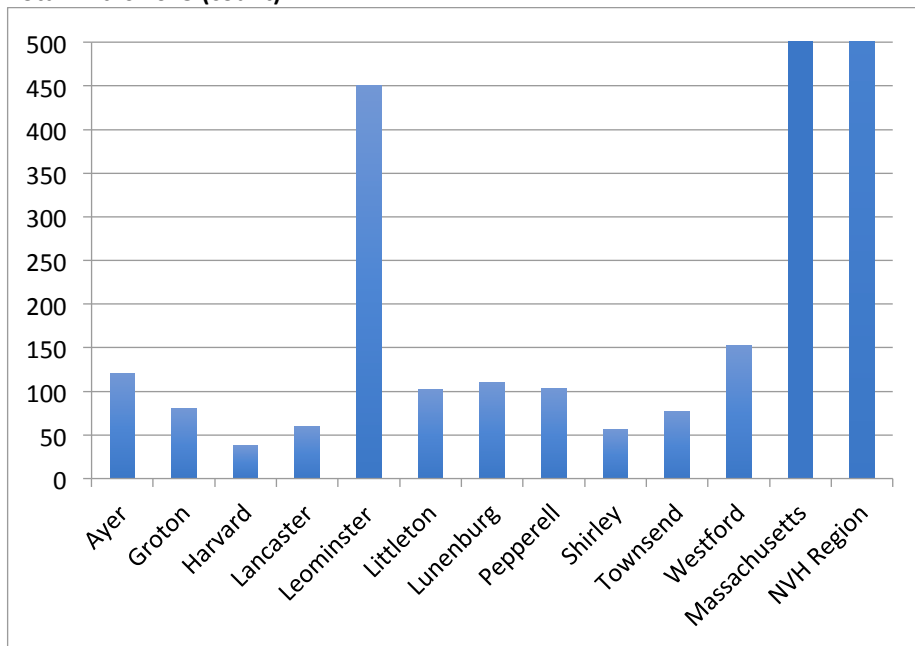
Reproductive and Sexual Health

Chlamydia, Gonorrhea, and Syphilis Incidence 2017 (per 100,000)



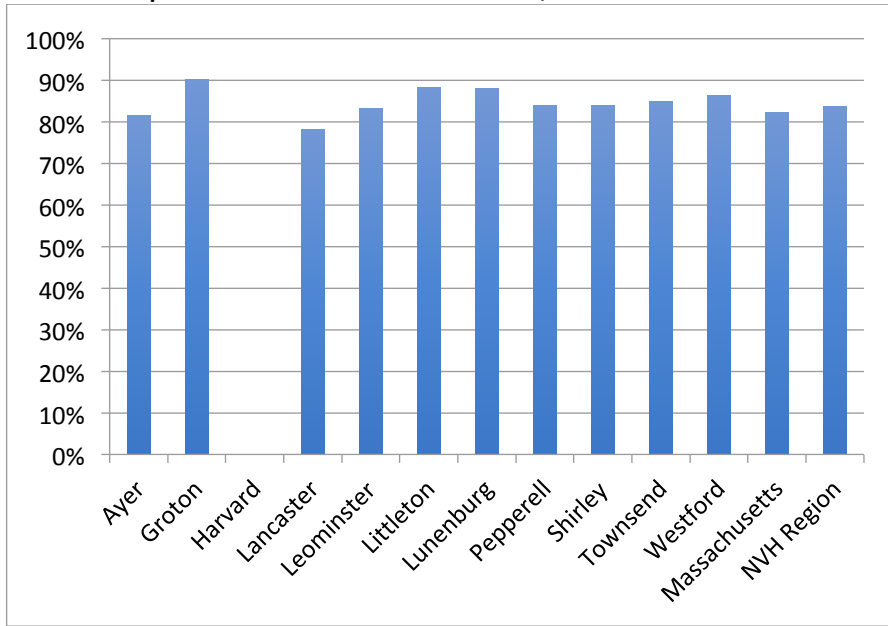
(Source: Massachusetts Department of Public Health Bureau of Infectious Disease)

Total Births 2015 (count)



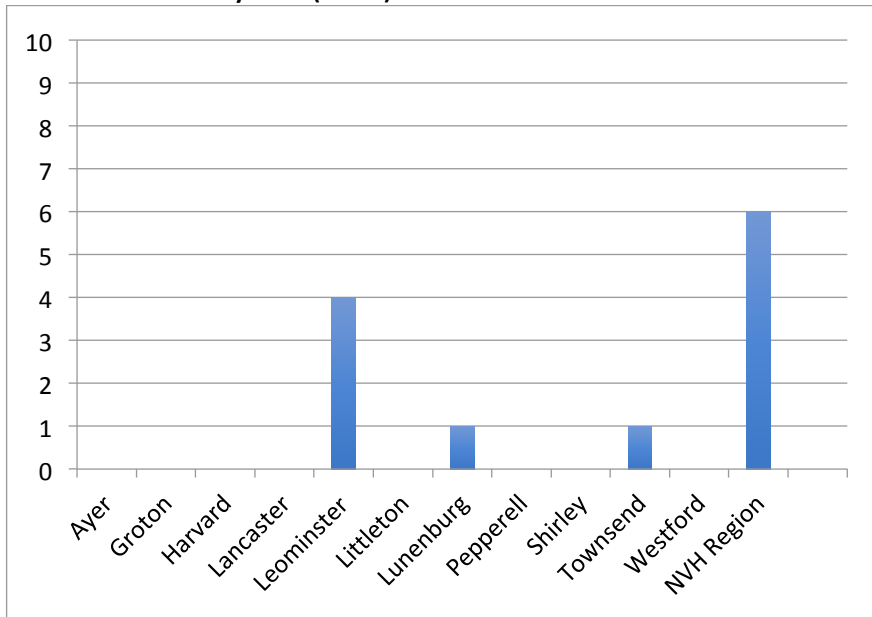
(Source: Massachusetts Department of Public Health)

Percent Adequate Prenatal Care – Kessner Index, 2015



(Source: Massachusetts Department of Public Health)

Total Infant Mortality 2015 (count)

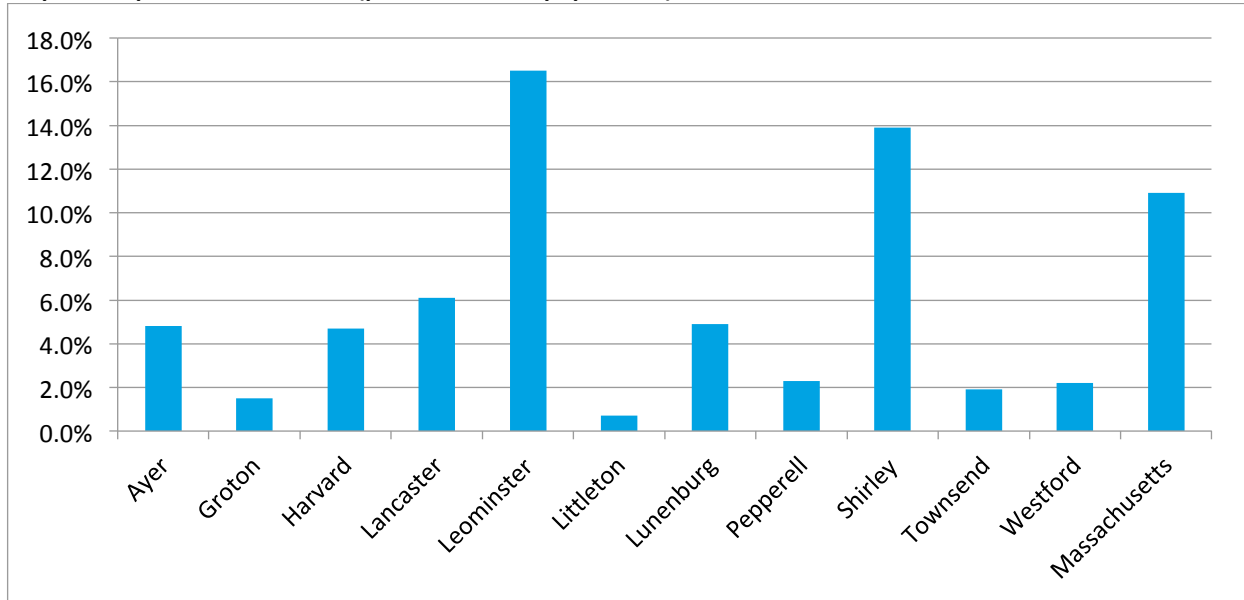


(Source: Massachusetts Department of Public Health)

Demographic Data

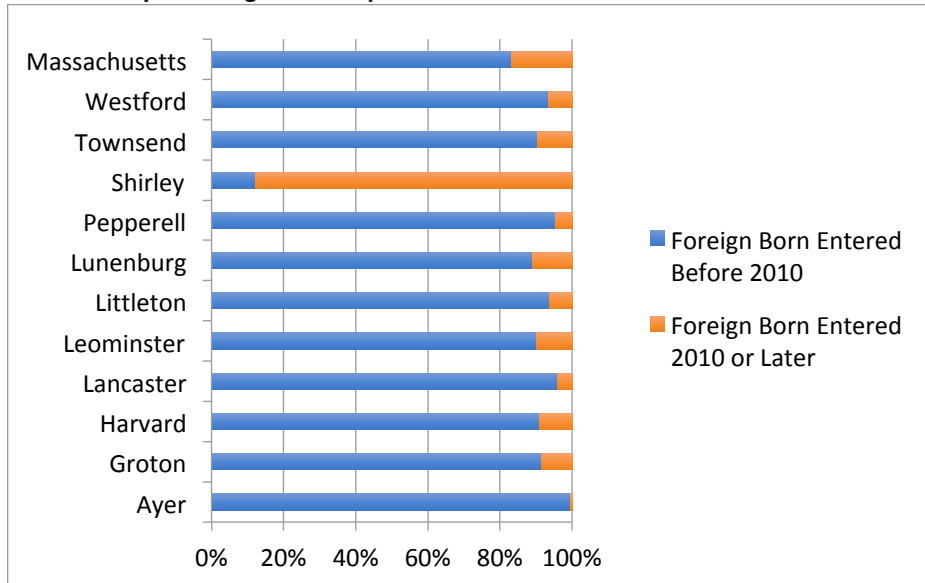
Social

Hispanic Population 2012-2016 (percent of total population)



(Source: US Census Bureau, 2012-2016 American Community Survey 5-Year Estimates)

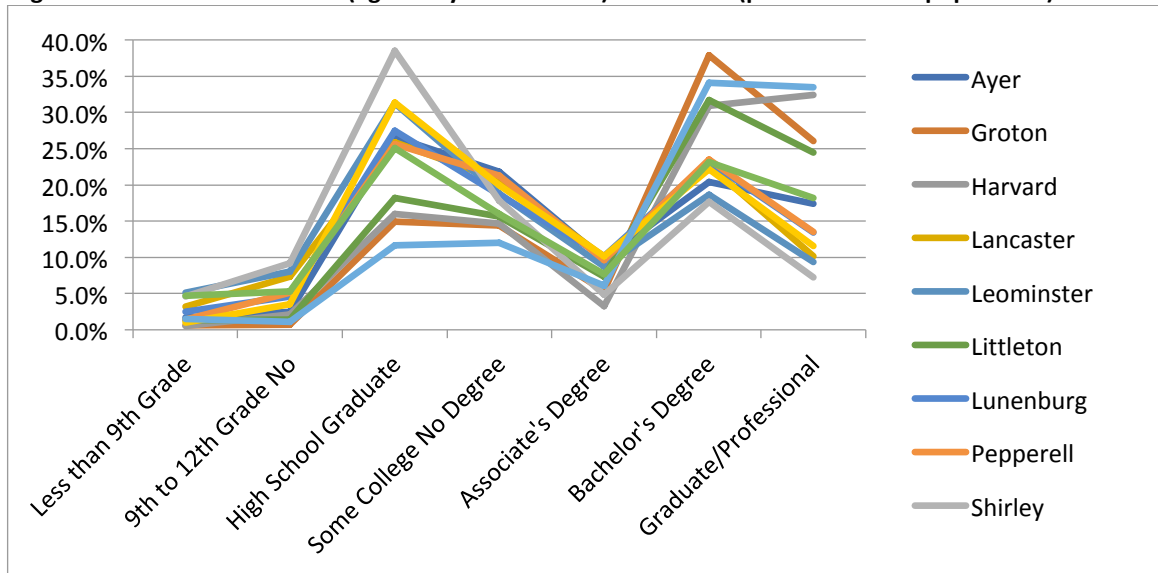
Date of Entry of Foreign-Born Population 2012-2016



(Source: US Census Bureau, 2012-2016 American Community Survey 5-Year Estimates)

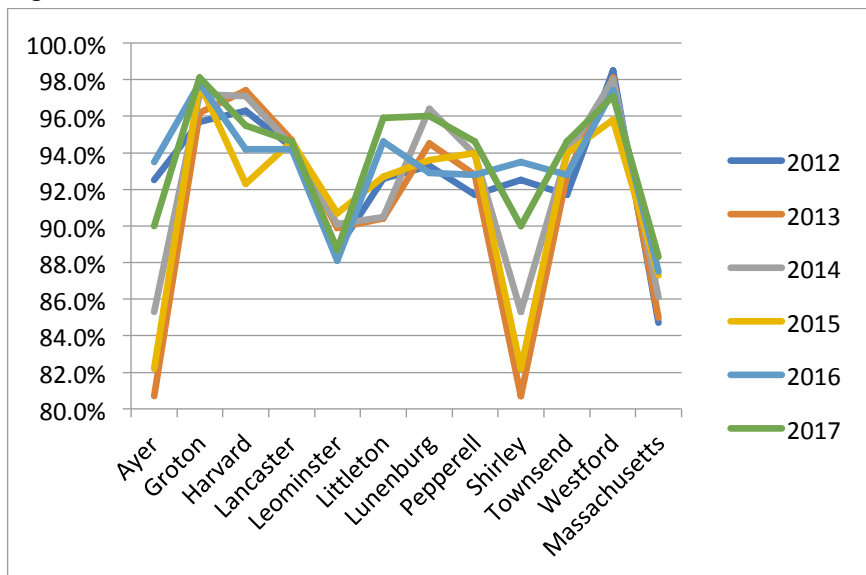
Education

Highest Education Attainment (aged 25 years or older) 2012-2016 (percent of total population)



(Source: US Census Bureau, 2012-2016 American Community Survey 5-Year Estimates)

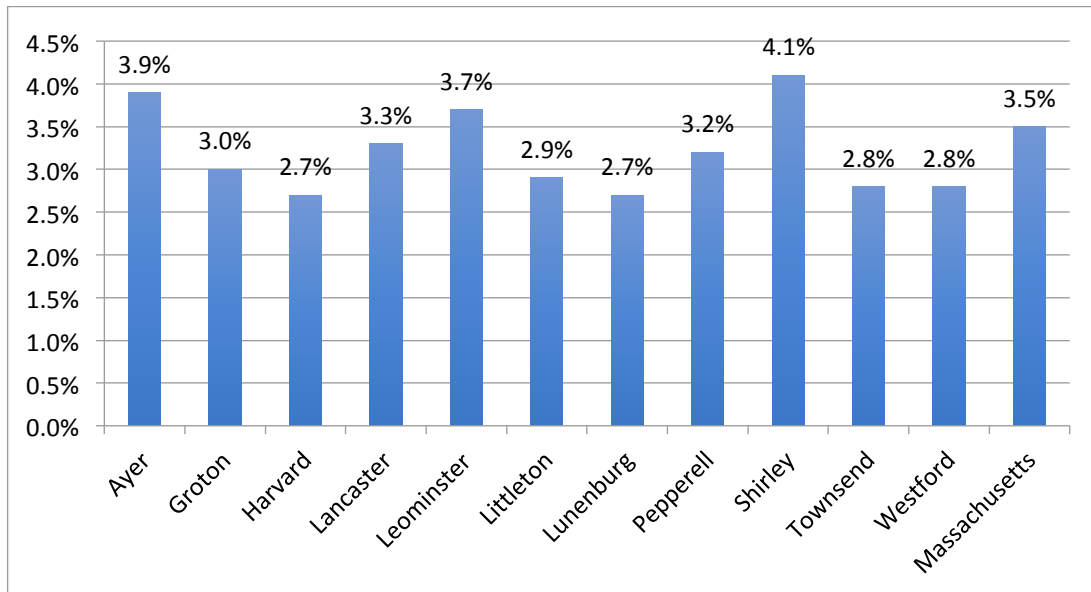
High School Graduation Rates Over Time 2012-2017



(Source: MA Dept. of Elementary and Secondary Education, 2018, Graduate Rates)

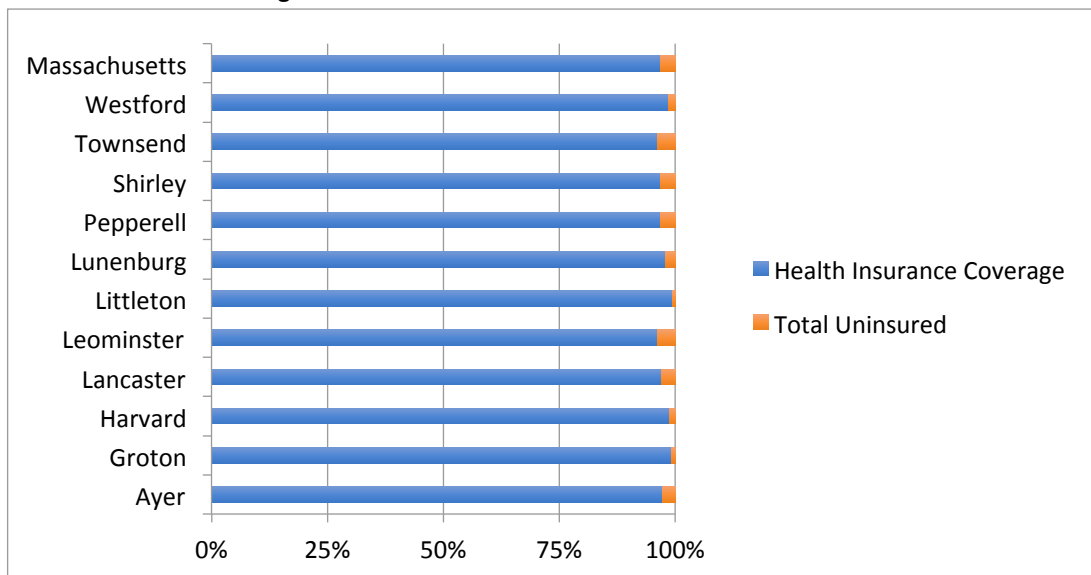
Economics

Unemployment May 2018 (percent of total population)



(Source: US Census Bureau, 2012-2016 American Community Survey 5-Year Estimates)

Health Insurance Coverage 2012-2016



(Source: US Census Bureau, 2012-2016 American Community Survey 5-Year Estimates)

Appendix B. Key Informant Survey

Community Health Needs Assessment- Key Informant Survey*

1. In what county (or counties) does your organization primarily provide services?
2. In what city does your organization provide the majority of services?
3. What kind of services does your organization primarily provide?
4. Name of the organization you work for?
5. To the best of your knowledge, from what county (or counties) do the majority of your consumers come from?
6. To the best of your knowledge, what are the general social demographics of consumers served by your organization?
7. In what city or town(s) do the majority of your consumers reside?
8. What do you perceive as the major health concerns of your consumers?
9. In your opinion, what are the major health concerns in the community where you provide services?
10. Please rank what you believe to be the biggest obstacles to healthy living among your consumers (1 being the greatest obstacle).
11. Please rank what health and wellness services would most benefit your consumers (1 being of greatest benefit).
12. How knowledgeable are you of the community health services Nashoba Valley Medical Center provides in your community?
13. Overall, how satisfied are you with the way Nashoba Valley Medical Center is addressing community health in your community?
14. Please provide any suggestions you may have as to how Nashoba Valley Medical Center could best address community health issues.

** For a complete copy of aggregated survey responses contact Nashoba Valley Medical Center*

Appendix C. Focus Group Questions

Focus Group Questions*

Pepperell:

INTRODUCTION

Virginia Leonard welcomed the Senior Center participants and explained the purpose of the focus group. Authorization to record was received and the group was informed that their responses would be kept in confidence. Participants were also advised that they could leave the group at any time.

Information collected from this Focus group will be used in the report and names will not be used. Participants were invited because Nashoba Valley Medical Center values the opinion of the community because the information gathered will help the hospital better serve them and the community.

QUESTIONS

1. Is there a sense of community where you live? Why or why not?
2. What is healthy about your community?
3. What kinds of health and human services are easily accessible in the community?
4. What kinds of health and human services do you feel are missing and would be beneficial in the community?
5. In your view, what are the top three areas of health concerns within the community?
6. What are some strategies that could address these concerns?
7. What populations would you identify as underserved within the community?
8. What do you feel are the biggest obstacles to health access for your community?
9. Is behavioral health a major issue within your community?
10. Are chronic diseases a major issue within your community, among friends, and neighbors?
11. How do these issues affect the way you work/live/play?
12. What services do you perceive as being most needed in the community?
13. In what ways is Nashoba Valley Medical Center serving the community well?
14. In what ways could Nashoba Valley Medical Center serve the community better?
15. What is the number one thing that Nashoba Valley Medical Center can do to improve the health and quality of life in the community?

** For complete copies of the focus group summaries please contact Good Samaritan Medical Center*

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