

Nashoba Valley Medical Center

A STEWARD FAMILY HOSPITAL

Steward

Population Health Improvement Report 2012–2013

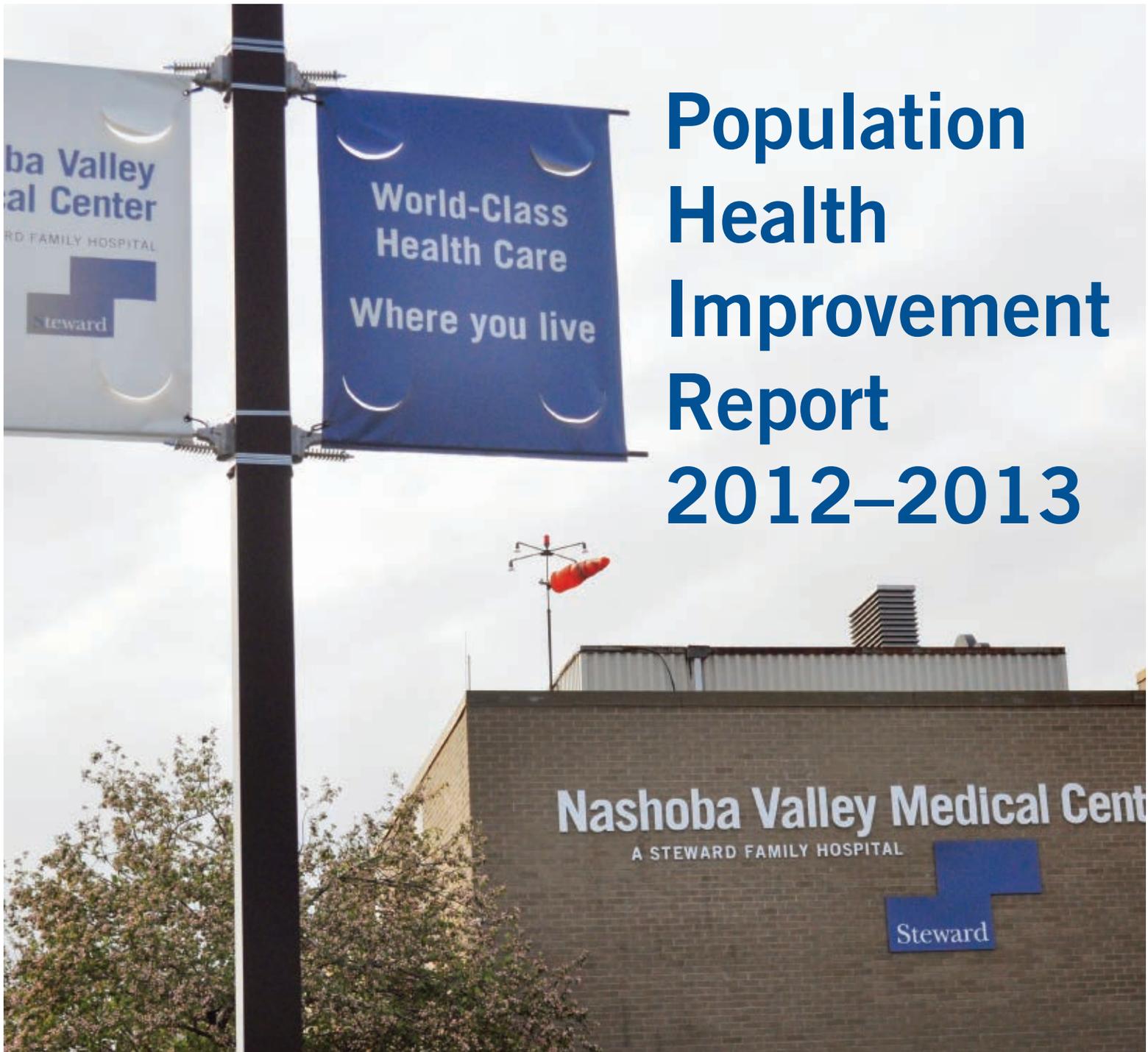


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Executive Summary

Introduction

While the full effects of health reform in the United States have yet to be realized, one thing is certain; from the largest teaching hospital to the smallest rural clinic, the assumptions that drive care delivery are changing. No longer can a patient's immediate condition be treated without consideration of the factors that have given rise to that situation or the external determinants that will continue to drive either health or illness and overpower the impact of a discrete prescription or an isolated emergency room visit. The results of such a myopic approach are evidenced by the status quo: fragmentation of care, disconnect between providers, duplication of services, and an overuse of resources that can no longer be ignored.

Recognition of this critical situation has produced a renewed commitment across the U.S. health system to focusing on three principal issues: improving the experience of patient care, providing care that improves the health of whole populations, and reducing the per capita cost of health care. Collectively referred to as the Triple Aim, these three goals create a roadmap for health systems to look both internally and externally at the conditions and drivers of health and to innovate; to discover new ways of addressing those factors. The aim of this report is to present the areas of opportunity for Nashoba Valley Medical Center (NVMC) to optimize health system quality and address cost while confronting the pressing health concerns impacting the populations in its community.

Methods

This report details the most imminent concerns in the hospital primary service area that arose through examination of secondary data on health indicators, retrieved from sources such as the U.S. Census Bureau and Massachusetts Community Health Information Profile, and from primary data, through survey of local health and human service providers, meetings of the NVMC Community Benefits Advisory Council and focus group discussions with local residents. Internally, the services and systems at Nashoba Valley Medical Center were examined for areas of improvement in quality and cost. Three areas of opportunity emerged where Nashoba Valley Medical Center is well-positioned to address population health, improving the experience of care and reducing per capita cost.

Results

Access to health services information and health education

The NVMC Community Benefits Advisory Council and participants in the focus group expressed concern that the community at large is unaware of the types of services offered at NVMC, such as advanced technology mammograms, cardiac rehabilitation, and physical therapy. Lack of this information leads to residents traveling unnecessary distances to access the same services at other hospitals. Limited distribution of information about the health education opportunities offered by the hospital impedes people from accessing these events and services.

Mental health access and support

Emergency room visits where mental disorders were the primary cause or related cause were statistically higher for both Ayer and Littleton than state average in 2009. The rate of mental disorder-related emergency room visits rose for all of service area towns except Ashby, which saw a slight drop from 2008 to 2009. The rate of mental-disorder related hospitalizations was higher than state average for Ayer and Littleton in 2009 and increasing in rate for residents of Dunstable, Lunenburg, and Townsend from 2007-2009. Focus group participants and survey respondents expressed that mental health is a concern in their communities for both young people and for the elderly.

Diabetes management and care

In Ayer, the rates of diabetes-related emergency visits and diabetes-related hospitalizations were higher than state average in 2009. Rates of emergency room visits for diabetes increased for residents of Groton, Harvard, Littleton, Pepperell, Shirley, and Townsend from 2007-2009. Members of the NVMC Diabetes Center staff who are part of the Community Benefits Advisory Council expressed concern that some of the diabetic patients seen at the center may not be able to afford both healthy food and their prescribed medications, resulting in patients having to choose between the two.

Recommendations

Access to health services information and health education

- Initiate discussions with local senior centers and community-based organizations to ascertain what health topics are of greatest concern.
- Coordinate community events at local senior centers, neighborhood councils, and other community groups to address these concerns, offering informal discussions with primary care providers and printed information about available health services.
- Assess available information channels to determine which are the most feasible and far-reaching for the hospital to utilize to disseminate information.

Mental health access and support

- Promote referral resources for outpatient mental health services.
- Provide local inpatient geriatric psychiatric services.

Diabetes management and care

- Increase access to healthy foods for patients with food insecurity through partnership with Loaves & Fishes Food Pantry.
- Raise awareness of diabetes education and support services offered at NVMC.

Introduction

Nashoba Valley Medical Center is a community hospital serving eleven towns in North Central Massachusetts, and is part of the Steward Health Care System. Steward Health Care System is a community-based accountable care organization and community hospital network with more than 17,000 employees serving more than one million patients annually in more than 150 communities in Massachusetts, New Hampshire, and Rhode Island.

Nashoba Valley Medical Center (NVMC) maintains fifty-seven acute care beds. The major clinical strengths of NVMC include emergency medicine, fully digital, state-of-the-art diagnostic imaging, cardiology, gastroenterology, oncology, orthopedics, general surgery, and occupational and physical therapy.

Nashoba Valley Medical Center maintains a Community Health Department that focuses on integrating care across the spectrum of hospital, primary, and community-based care. A Community Benefits Advisory Council comprised of hospital leadership, representatives of local health and human service organizations, senior and community centers, churches, and schools guides the planning and execution of community health initiatives.

This report details the health conditions and social factors affecting the people living in the eleven towns surrounding NVMC, as well as the key issues the hospital needs to address to improve quality and address cost. Evaluation of both the needs of the community and the needs of the hospital furthers the prospect of working collectively to improve both the health system and the health of the population. Opportunities are realized at the intersection of the hospital's strengths, the community's needs, and the new direction of health care in the United States.

The current U.S. health care system, characterized by fee for service payment models and widely condemned for its exorbitant per capita costs and less than optimal health outcomes, is faced with an opportunity for transformation at a critical moment of unprecedented policy change at the federal level. The prospect of shifting from a system that rewards providers for volume of services to one that rewards health systems based on the end goals of healthy populations is a highly attractive solution to the current state of affairs. Health care transformation is highly debated, particularly in terms of means and methods. Long-standing practices and cultures must be shifted to embrace the idea of caring for populations instead of individuals alone and of examining medical practices with the aim of reducing health care costs.

The Institute for Healthcare Improvement Triple Aim framework is a widely-recognized model for health care transformation. It is a paradigm that calls for improving simultaneously the experience of care, the per capita costs of health care, and the health of populations.¹ While these pursuits are all necessary to improve the current health care system, they are interrelated and must be considered in balance.² Strategies to improve the experience of care, for example, may increase per capita costs.

The challenges of widespread change, including developing infrastructure to support new models of caring for populations, require thoughtful planning, determined execution, and intentional learning from experience. This report aims to answer the call for thoughtful planning by using the triple aim framework to reveal the opportunities for health care transformation within Steward Health Care System hospitals and their communities. The results and recommendations here are designed to be the basis for strategic action for Nashoba Valley Medical Center and its community partners.

Methods

The approach for the Population Health Improvement Report (PHIR) consisted of the following steps, each of which is briefly described in the order they were implemented.

1. Extensive public data was collected and key findings were derived from the research of online data sources such as the U.S. Census and the Massachusetts Community Health Information Profile (MassCHIP). Online research of Administrative policies and legal ordinances were done to identify and analyze policies and regulations that affect population health status.
2. A Community Provider Survey was distributed to NVMC's Community Benefits Advisory Council and other key community-based organizations. Local health and human service organizations, government agencies, boards of health, community centers, and churches were among the organizations that were surveyed.
3. A focus group was conducted to capture community data on perceived health issues and barriers to health resources.

From these sources, data on health behaviors, health conditions (also referred to as health outcomes), access to and utilization of health services, and health care costs were examined for opportunities where the hospital, in partnership with local community service providers, could make a difference in lowering per capita health care costs, improving quality, and improving the health of populations.

The priority concerns to be addressed were selected based on the following criteria:

- Disease or condition rates higher than the state average
- Disease or condition rates increasing over time
- Identified as concerns by focus group participants and provider survey respondents
- Aligns with the strategic goals and objectives of SEMC
- Availability of potential resources to address the issue/problem identified
- Ability to reduce per capita costs

A detailed version of the methods is available in Appendix A. Data on demographics and additional health indicators are available in Appendix B.

Results

Access to health services information and health education

One of the principal themes that emerged from the primary data sources was the need for successful transmittance of information from the hospital to the community regarding health services and health education. The following concerns were expressed:

- The community at large is unaware of the types of services offered at NVMC, such as advanced technology mammograms, cardiac rehabilitation, and physical therapy.
- Lack of this information leads to residents traveling unnecessary distances to access the same services at other hospitals.
- Limited distribution of information about the health education opportunities offered by the hospital impedes people from accessing these events and services.

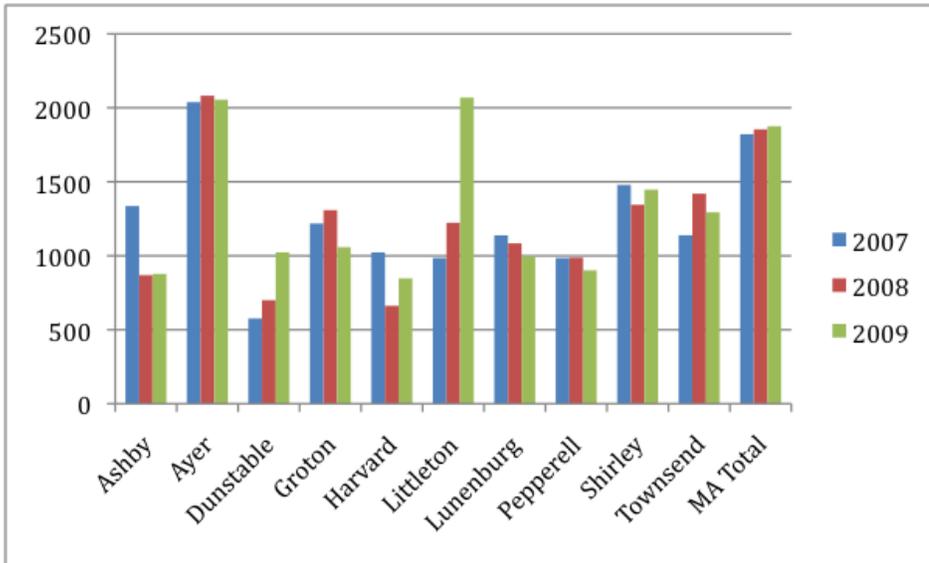
There are several factors that may be related to this expressed need for information, including the rural nature of the NVMC service towns, which have relatively low population densities, small downtown centers, and little to no public transportation. A report from the Massachusetts State Office of Rural Health notes that residents of rural towns often face a lack of inexpensive and fast telecommunications, including broadband, high speed internet, and cell phone service.³ These characteristics impede the successful dissemination of health information.

A similar matter was expressed regarding health education events. Focus group and Advisory Council members expressed that they thought the public was unaware of these events and would be interested in attending if given notice. Survey respondents and members of the Advisory Council also expressed a desire for an increase in the number of health education events offered to the community. They saw the hospital as a resource for health education that would be valuable and helpful for local residents.

Mental health access and support

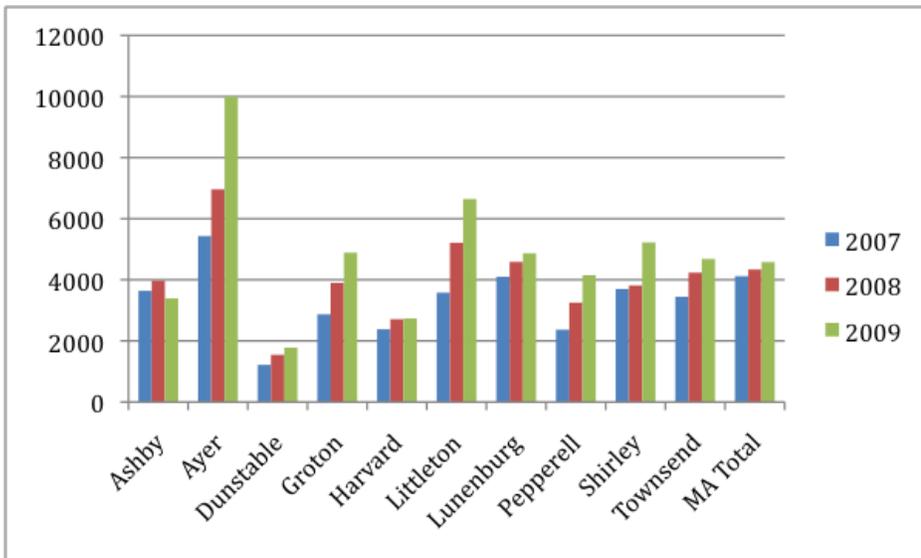
Mental health was identified as an area of concern in every source of data collection that was used. Emergency room visits where mental disorders were the primary cause (Figure 1) and emergency room visits where mental disorders were a related cause (Figure 2) were statistically higher for both Ayer and Littleton than the state average. For Dunstable, the rate of emergency visits where mental disorders were a primary cause rose for residents of Dunstable from 2007-2009 and mental disorder-related visits rose for all of service area towns except Ashby, which saw a slight drop from 2008 to 2009. Mental disorder-related visits are those for which mental disorders are the primary or an associated cause.

Figure 1. Mental health emergency room visits (age-adjusted rate per 100,000).



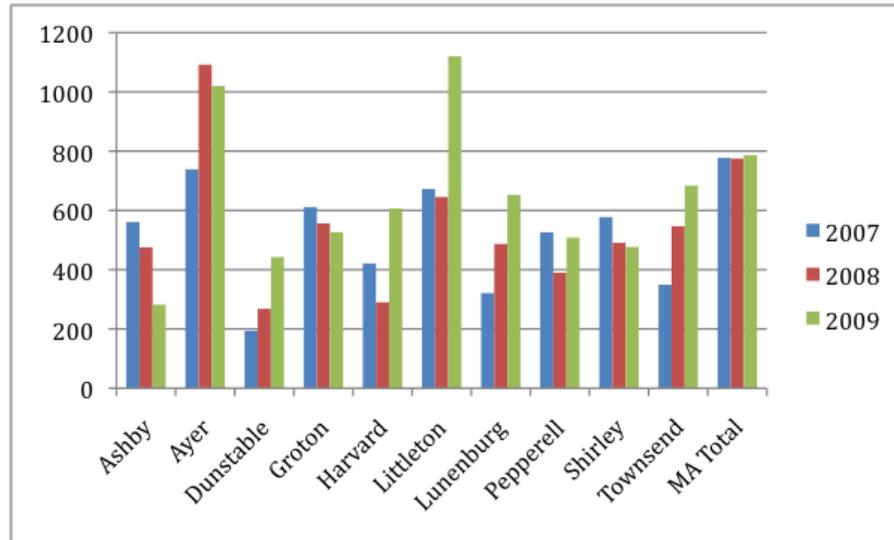
Source: MassCHIP

Figure 2. Mental health-related emergency room visits (age-adjusted rate per 100,000)



Source: MassCHIP

Rates of inpatient hospitalizations for mental health were also higher than state average for residents of Ayer and Littleton in 2009 (Figure 3) and increasing for Dunstable, Lunenburg and Townsend from 2007-2009.

Figure 3. Inpatient hospitalizations for mental health (age-adjusted rate per 100,000)

Source: MassCHIP

Suicide death is often linked to mental disorders. There were four deaths by suicide in the hospital service area in each of the years 2007, 2008, and 2009 (Table 1). Age-adjusted rates per 100,000 are higher than state average for each of these small towns that experienced a suicide. Suicide was cited as a concern by members of the Community Benefits Advisory Council and the focus group.

Table 1. Suicide deaths by hospital service town, count

Year	Town	Number of deaths	Age-adjusted rate per 100,000	95% Confidence Interval
2007	Ayer	1	15.81	(0.00-46.72)
	Littleton	1	8.3	(0.00-24.57)
	Lunenburg	1	8.31	(0.00-24.58)
	Shirley	1	12.31	(0.00-36.42)
	MA Total	504	7.44	(6.79-8.10)
2008	Ashby	1	7.44	(6.79-8.10)
	Ayer	1	31.8	(0.00-93.86)
	Lunenburg	1	12.3	(0.00-36.38)
	Pepperell	1	7.05	(0.00-20.87)
	MA Total	499	7.32	(6.67-7.97)
2009	Harvard	1	33.06	(0.00-97.52)
	Pepperell	1	15.44	(0.00-45.63)
	Shirley	1	9.95	(0.00-29.45)
	Townsend	1	8.88	(0.00-26.27)
	MA Total	531	7.68	(7.02-8.34)

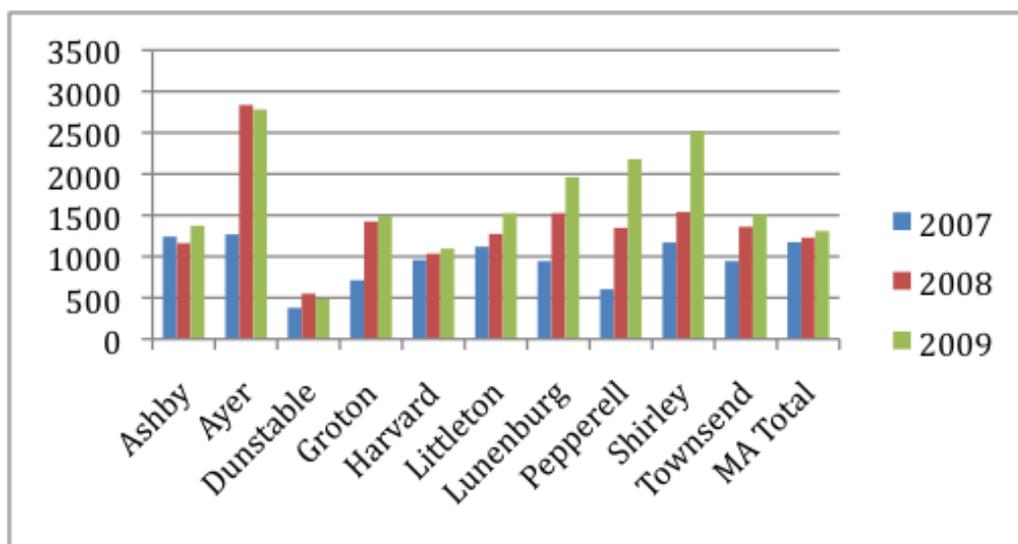
Source: MassCHIP

Survey respondents and participants of the focus group identified mental health as a concern for both young people and the elderly living in the hospital's community. For young people, lack of support in dealing with depression and anxiety and difficulty accessing outpatient mental health services were cited as important issues. For the elderly, access to local age-appropriate inpatient psychiatric care was identified. Focus group participants noted that inpatient services are not available locally and that the distance that people needed to travel to access them prohibited those who were being treated from having visitors and increased their sense of isolation.

Diabetes management and care

Several indicators pointed to diabetes management as a concern in the hospital service towns, especially in Ayer. High rates of diabetes-related emergency department visits and hospitalizations can indicate poor disease management or insufficient primary care, or both. In Ayer, the rate of diabetes-related emergency visits was statistically higher than the state average in 2009 (Figure 4). Emergency room visit rates increased for residents of Groton, Harvard, Littleton, Pepperell, Shirley, and Townsend from 2007-2009. Diabetes-related visits include all visits where diabetes mellitus is the primary cause or an associated cause of hospitalization.

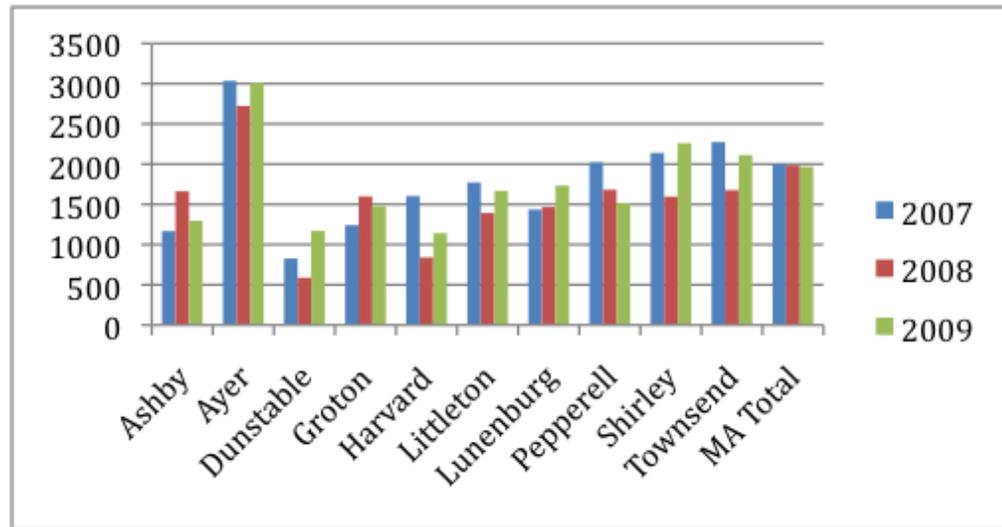
Figure 4. Diabetes-related emergency department visits (age-adjusted rate per 100,000)



Source: MassCHIP

Similarly, the rate of inpatient hospitalizations for diabetes was higher than state average in Ayer (Figure 5). In Dunstable, Groton, and Shirley, rates of inpatient hospitalization for diabetes-related causes also increased from 2007-2009.

Figure 5. Diabetes-related hospitalizations (age-adjusted rate per 100,000)



Source: MassCHIP

High rates of diabetes-related emergency visits, which were particularly high in Ayer, are cause for concern. Successful disease self-management, including keeping up with medications, monitoring blood glucose levels, healthy eating, exercise, and regular primary care typically results in high quality of life and a low number of emergencies or hospitalizations related to diabetes. However, self-management can be impeded by any number of factors, including difficulty attending appointments, lack of access to healthy food, and affordability of medications. Poor diabetes management can result in complications such as coronary heart disease, cerebrovascular disease, retinopathy, nephropathy, which can lead to kidney failure and the need for dialysis, and neuropathy, which can lead to, among other things, ulceration of the foot requiring amputation.⁴ Diabetes-related complications result in very high per capita costs, particularly compared with the costs of preventative measures, such as glucose monitoring, education, support, and proper and timely medical care.

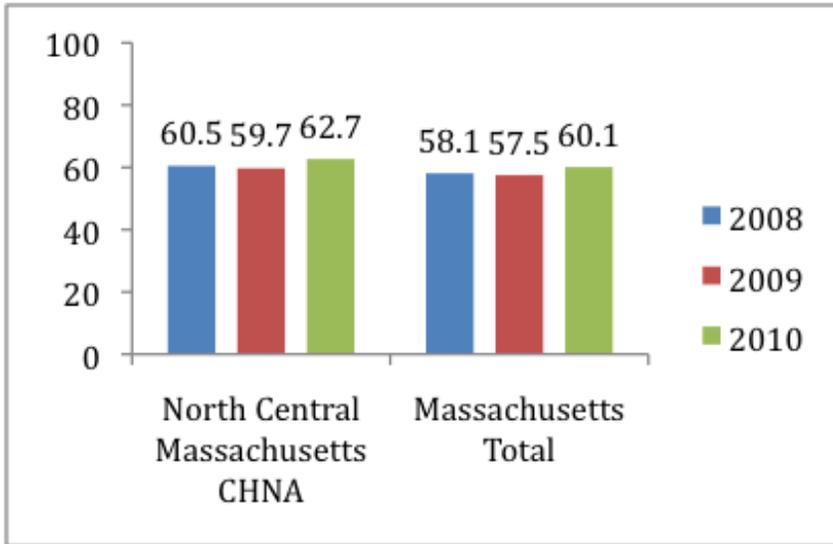
Access to both proper medication and adequate nutrition is required for successful management of diabetes. Members of the NVMC Diabetes Center staff who are part of the Community Benefits Advisory Council expressed concern that some of the diabetic patients seen at the center may not be able to afford both healthy food and their prescribed medications, resulting in patients having to choose between the two. The staff found that even those patients who expressed this difficulty were reluctant to access local food pantries for assistance.

Overweight and Obesity

Results of the 2010 Behavioral Risk Factor Surveillance Survey show that 60.5% of respondents in the North Central Massachusetts Community Health Network Area (CHNA) identified themselves as overweight (Figure 6), defined as having a body mass index (BMI) between 25 and 30, and 26.3% as obese, having a BMI greater than 30 (Figure 7). These rates are slightly higher than the state overall, at 60.1% overweight and 23.6% obese.

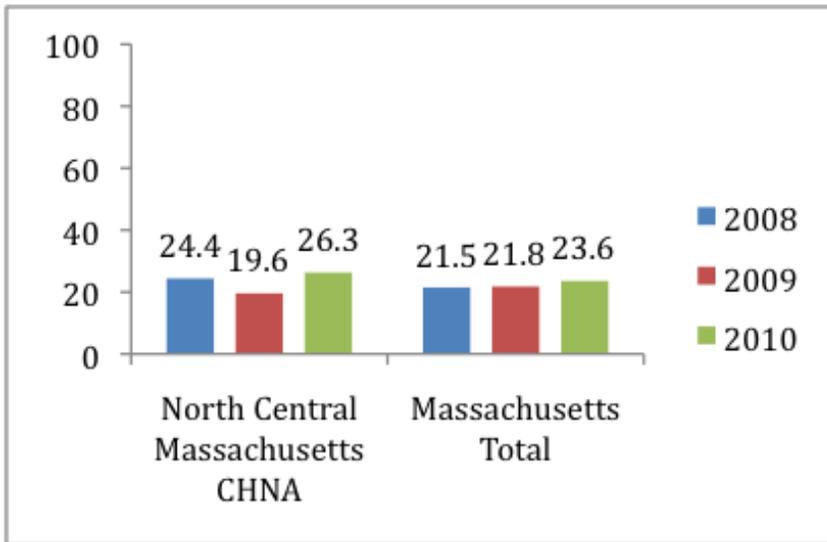
The BRFSS data are gathered through a telephone survey and represent the residents of the North Central Massachusetts CHNA. This CHNA includes seven of the eleven NVMC primary service area towns: Ayer, Groton, Harvard, Lunenburg, Pepperell, Shirley, and Townsend, along with the towns of Ashburnham, Ashby, Barre, Berlin, Bolton, Clinton, Fitchburg, Gardner, Hardwick, Hubbardston, Lancaster, Leominster, New Braintree, Oakham, Princeton, Rutland, Sterling, Templeton, Westminster, and Winchendon.

Figure 6. Adult overweight, percent of survey respondents



Source: BRFSS.

Figure 7. Adult obesity, percent of survey respondents.

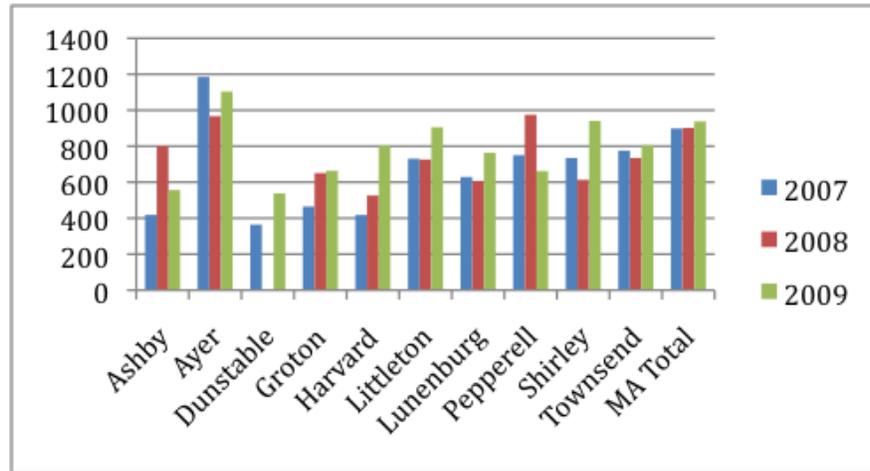


Source: BRFSS.

Asthma-related Hospitalizations

There were relatively high rates of hospitalizations for asthma in Ayer from 2007-2009 and increasing rates for Groton, Harvard, Littleton, Lunenburg, and Shirley (Figure 8).

Figure 8. Asthma-related hospitalizations,



Source: MassCHIP

Discussion and Recommendations

Nashoba Valley Medical Center is well-positioned to address the following areas:

- Access to health services information and health education.
- Mental Health Access and Support.
- Diabetes Management and Care.

These areas represent opportunities for Nashoba Valley Medical Center to address population health, improving the experience of care and reducing per capita cost. The remaining health topics detailed in the results section of this report are significant and should be addressed. Nashoba Valley Medical Center will look for ways to collaborate with community partners to support efforts to impact and improve on these areas.

Recommendations for the health system are given below. Where appropriate, community-wide recommendations are given, representing actions that are beyond the scope of the hospital but efforts in which the hospital can play a part.

Access to health services information and health education

Health System Recommendations:

- Initiate discussions with local senior centers and community-based organizations to ascertain what health topics are of greatest concern.
- Coordinate community events at local senior centers, neighborhood councils, and other community groups to address these concerns, offering informal discussions with primary care providers and printed information about available health services.
- Assess available information channels to determine which are the most feasible and far-reaching for the hospital to utilize to disseminate information.

Community-wide Recommendations:

- Investigate the most effective means of communication within the rural hospital service towns and utilize these avenues to provide information about health services and local health education events.
- Address rural communication challenges at the community level.

There are several ways in which this type of community-based event can benefit both the hospital and the community. Over the past year, NMVC has recruited two new primary care physicians to the area, representing an opportunity to meet the need of the hospital by introducing new providers to the community and the need of the community to obtain health-related information. Informal interaction between providers and patients, or potential patients, can improve the experience of health care. Equipped with real-time, grassroots information, providers and hospitals can better shape care in ways that are important to patients. An atmosphere of discussion and openness can encourage residents to voice their concerns and needs and can help providers understand what is going on in the community. Information about the social determinants of health, such as income constraints, housing availability, and health literacy are useful for providers to understand how to best address the health needs in their community, but are often not addressed during a typical health care visit.

Mental Health Access and Support

Health System Recommendations:

- Promote referral resources for outpatient mental health services.
- Provide local inpatient geriatric psychiatric services.

Community-wide recommendations:

- Utilize locally-available resources to equip community members to recognize the signs of mental illness and to know where to go for help.

One method by which the hospital Community Health department spans the spectrum of hospital, primary, and community-based care is to connect community members and patients to available resources. The MSPP Interface Referral Service, a program of the Massachusetts School of Professional Psychology, links people who are looking for outpatient mental health services with local providers who are appropriate to the person's insurance coverage and preferences. The hospital is well-positioned to increase access to this service for NVMC patients through distribution of information and encouraging patients to utilize this service at primary care offices and in the emergency department.

In 2014, Nashoba Valley Medical Center will open a state-of-the-art geriatric psychiatric unit, offering inpatient mental health care for older adults. This service will allow residents to access mental health services at their local hospital, reducing the social isolation caused by travel to other facilities that are farther from the NVMC service towns.

Through partnership with Teen Anxiety and Depression Solutions (TADS) and the MSPP Interface Referral Service, the community should expand the number and reach of educational events and resources in local public schools and other venues that empower individuals to recognize signs of mental health issues and to seek help for themselves and others. The local organization TADS offers presentations and workshops to help people to recognize signs of mental illness and to seek care, including "Signs of Suicide Training" and "Removing Obstacles to Help and Treatment". Other related resources that should be engaged are the Gardner Coalition for Suicide Prevention and the Gardner Suicide Prevention Task Force.

Diabetes Management and Care

Health System Recommendations:

- Increase access to healthy foods for patients with food insecurity through partnership with Loaves & Fishes Food Pantry.
- Raise awareness of diabetes education and support services offered at NVMC.

The Diabetes and Endocrine Center clinicians at NVMC should promote the use of the Loaves & Fishes Food Pantry to patients with diabetes who are experiencing food insecurity. The Loaves & Fishes food pantry in Devens, MA, serves six of the hospital's service towns and is supplied with fresh produce and other nutritious food as well as household items. Although it is a well-respected service in the community, the stigma associated with accessing a food pantry was considered by the Diabetes and Endocrine Center to be a barrier for some of their patients. The hospital should address this by reinforcing the recommendation message with a referral card, issued by a clinician, which would be used to encourage and track food pantry use. Patients may be more likely to attend the food pantry if they are engaged in a specialized program and their usage is being tracked.

The acceptability and feasibility of this program should be established through collecting data on the utilization of the card and the patient's experience during a pilot of the program. Tracking patient outcomes for those who utilize the food pantry, such as reduced food insecurity and better disease management, would demonstrate the program's success. In the long term, improving access to nutritious food may prove a feasible disease management strategy for low-income diabetes patients. Since better disease management for patients is linked to lower rates of complications, better population health and reduced health care costs would result.

Nashoba Valley Medical Center should provide information about the diabetes education and support services available at the NVMC Diabetes and Endocrine Center through community outreach events, targeting Ayer in particular. The NVMC Diabetes and Endocrine Center offers comprehensive disease management services. Through individual assessments and consultations with diabetes nurse educators and dietitians, patients are equipped to manage their disease and prevent downstream

complications. Group education sessions are also offered on a regular basis. These types of interventions have been shown to help patients to avoid more costly care such as inpatient hospitalization and emergency room visits.⁵

Limitations

Certain secondary data was not available for all towns in the primary service area.

The survey was limited to those hospital staff and organizational representatives who are members of the Community Benefits Advisory Council, and does not represent the opinions of all of the health and human service providers in the primary service area. Additionally, the sample size of surveys was small, with just four completed surveys received.

The opinions expressed by the focus group members do not represent the opinions of the residents of the PSA in general, due to the relatively small number of participants (five) and the lack of random selection associated with recruitment methods. Additional focus groups would be useful to get a better understanding of the health conditions and driving factors.

Appendix A. Methods

Secondary data was collected by Steward Health Care community health managers for the hospital primary service area as defined by the Massachusetts Department of Public Health. Sources included:

- United States Census Bureau www.census.gov
- US Census Bureau American Community Survey www.factfinder2.census.gov
- Massachusetts Community Health Information Profile (MassCHIP), available at <http://www.mass.gov/eohhs/researcher/community-health/masschip/>
- Federal Reserve Bank of Boston website <http://www.bos.frb.org/economic/dynamicdata/module1/bmap.html#>
- Massachusetts Department of Elementary and Secondary Education school district profiles <http://www.doe.mass.edu/>
- Massachusetts Department of Public Health Bureau of Health Information, Statistics, Research and Evaluation
 - Status of Childhood Weight in Massachusetts, 2011 www.mass.gov/eohhs/docs/dph/.../status-childhood-obesity-2011.pdf
 - A Profile of Health Among Massachusetts Adults, 2010 BRFSS results <http://www.mass.gov/eohhs/docs/dph/behavioral-risk/report-2010.pdf>
- City of Haverhill website www.ci.haverhill.ma.us/
- Massachusetts State Crime Reporting Unit <http://www.ucrstats.com/>

The Massachusetts Department of Public Health defined primary service area for Nashoba Valley Medical Center was used as the geographical area for this report. Data was not available for Fort Devens for the MassCHIP-derived indicators. Data was not available for any of the primary service area towns for the indicators of health insurance coverage, adult obesity or childhood obesity. For Ashby (01431), Harvard (01451), and Dunstable (01827), five-digit zip codes were used to collect data from the U.S. Census Bureau American Community Survey, and show data from the 2000 census. For the remaining towns (Ayer, Groton, Littleton, Lunenburg, Pepperell, and Townsend), census-designated places (CDPs) were used to collect American Community Survey data. For Littleton, the Littleton Common CDP was used.

Census designated places (CDPs) were used to collect census data for Ayer, Fort Devens, Groton, Littleton (Littleton Common CDP), Lunenburg, Pepperell, Shirley, and Townsend. The U.S. Census Bureau uses CDPs as the statistical counterpart of incorporated places. Census designated places are delineated to provide data for settled concentrations of population that identifiable by name but are not legally incorporated under the laws of the state in which they are located. Census data for Ashby (01431), Harvard (01451), and Dunstable (01827) were retrieved by zip code.

The Community Provider Survey was sent via email to the members of the NVMC Community Benefits Advisory Council. The Council is comprised of mostly representatives of local health and human service organizations, along with hospital staff. The group was created by invitation but is open to all community leaders. The Council meets bimonthly at NVMC. Fourteen surveys were sent and five responses were received. Survey responses were treated entirely as qualitative data. Four of the five survey responses were from community representatives, and one was from a hospital staff member.

The focus group was held at Nashoba Valley Medical Center. Participants were recruited via flyers, word of mouth and personal invitation. Five people participated in the focus group. Refreshments were provided and a free raffle was held, where one participant received a \$50 Visa gift card. All of the participants lived in one of the hospital primary service towns. The focus group participants completed a demographic questionnaire (Table 2), and informed consent form and an evaluation of the focus group experience.

Table 2. Focus group participant characteristics.

Demographic Questionnaire	
Q1. What is your current age?	Frequency
18-25	0
26-35	0
36-45	0
46-55	1
56-65	2
66-75	1
76+	1
Total	5
Q2. What is your biological sex?	
Male	0
Female	5
Intersex	0
Total	5
Q3. What is your gender identity?	
Male	0
Female	5
Transgendered	0
Other (Specify if you choose)	0
Total	5
Q4. Which group below most accurately describes your racial background (check all that apply)	
Code 1: Alaskan Native/Native American/Indigenous	0
Code 2: Asian	0
Code 3: Black/African American	0
Code 4: Latino(a)/Hispanic (Non-White)	0
Code 5: Pacific Islander/Native Hawaiian	0
Code 6: White	5
Code 7: Multiracial	0
Code 1, 2, 3 and 6	0
Code 2, 5, 6 and 7	0
Other (Please Specify)	0
Total	5

Continued on next page

Code 1: Less than high school	0
Code 2: 9th to 12th Grade (No Diploma)	0
Code 3: High school graduate or equivalency	0
Code 4: Some College (No Degree)	1
Code 5: Associate's Degree	0
Code 6: Bachelor's Degree	2
Code 7: Graduate/Professional Degree	1
Code 1 and 4	0
Code 3 and 4	0
Other (Please Specify)	
:First Year College	0
:Second Year College and Code 3	0
:Third Year College	1
Total	5

Appendix B. Supplemental Demographic Data and Health Indicators

1. Populations of Geographic Areas
2. Race and Ethnicity – General Population
3. Race and Ethnicity – Public School Population
4. Age Distribution
5. Nativity
6. Place of Birth of Foreign Born Population
7. English Language Usage - Native Population
8. Highest Educational Attainment
9. Poverty Status in the Past 12 Months
10. Grade 9-12 Dropout Rate
11. Hospital Admissions for Opioid Use
12. Hospitalizations for Alcohol or Substance Abuse
13. Adequacy of Prenatal Care
14. Leading Causes of Death

1. Populations of geographic areas included in report, 2010

Town	Number of Residents
Ayer	7,427
Fort Devens	NA
Groton	10,646
Littleton	8,924
Lunenburg	10,086
Pepperell	11,497
Shirley	7,211
Townsend	8,926
Ashby	3,074
Harvard	6,520
Dunstable	3,179

Source: US Census Bureau

2. Race and Ethnicity – General Population.

Town	White %	Black or African American %	American Indian and Alaska Native %	Asian %	Native Hawaiian and Other Pacific Islander %	Some Other Race %	Two or more races %
Ayer	94.7	0.5	0.5	2.0	0.0	0.0	2.4
Fort Devens	65.6	20.4	3.2	2.1	0.0	5.2	3.5
Groton	99.3	0.0	0.0	0.7	0.0	0.0	0.0
Littleton Common	92.3	0.2	0.4	6.2	0.0	0.0	0.9
Lunenburg	94.7	2.8	0.0	1.7	0.0	0.0	0.7
Pepperell	99.7	0.0	0.0	0.0	0.0	0.0	0.3
Shirley	91.9	0.0	0.0	0.2	0.0	2.5	5.3
Townsend	92.3	0.0	1.6	0.0	0.0	0.0	6.1
Ashby	98.0	0.3	0.2	0.4	0.0	0.1	1.0
Harvard	95.8	0.6	0.1	2.1	0.1	0.2	1.2
Dunstable	97.5	0.1	0.0	1.5	0.0	0.1	0.8

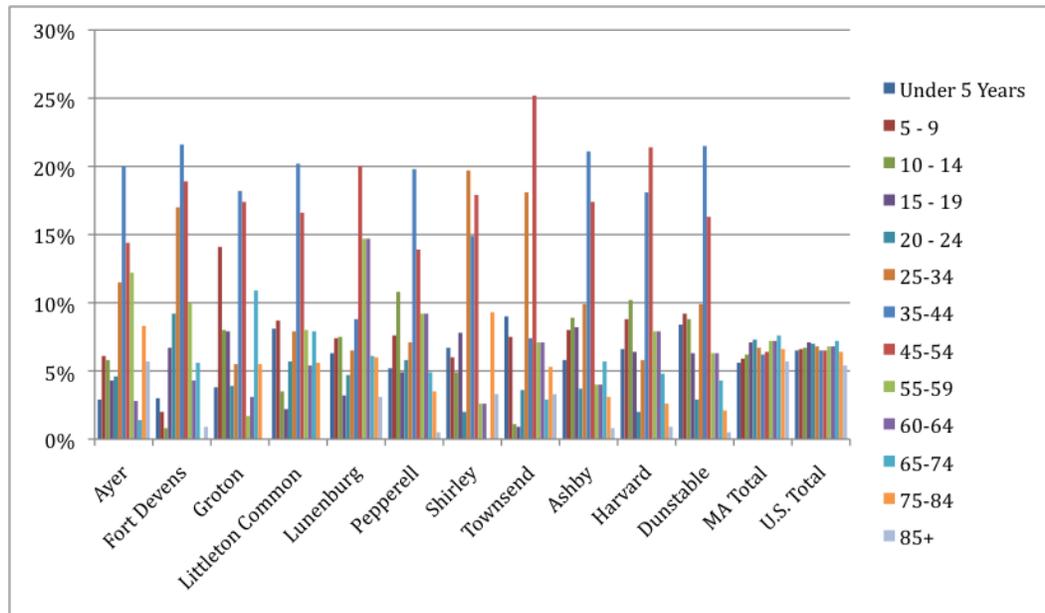
Source: US Census Bureau

3. Race and Ethnicity – Public School Population, 2010. Source: MA Department of Elementary and Secondary Education District Profiles.

School District	White %	African American %	Native American %	Asian %	Native Hawaiian and Other Pacific Islander %	Multi Race %	Hispanic %
Ayer/Shirley	77.3	5.9	0.7	2.4	0.2	4.1	9.4
Groton/Dunstable	93.1	0.6	0.0	4.5	0.2	0.4	1.2
Littleton	92.0	1.4	0.1	3.9	0.4	1.2	1.1
Lunenburg	91.8	2.0	0.9	1.5	0.4	0.5	3.0
Harvard	86.4	2.1	0.1	7.6	0.1	1.7	2.0

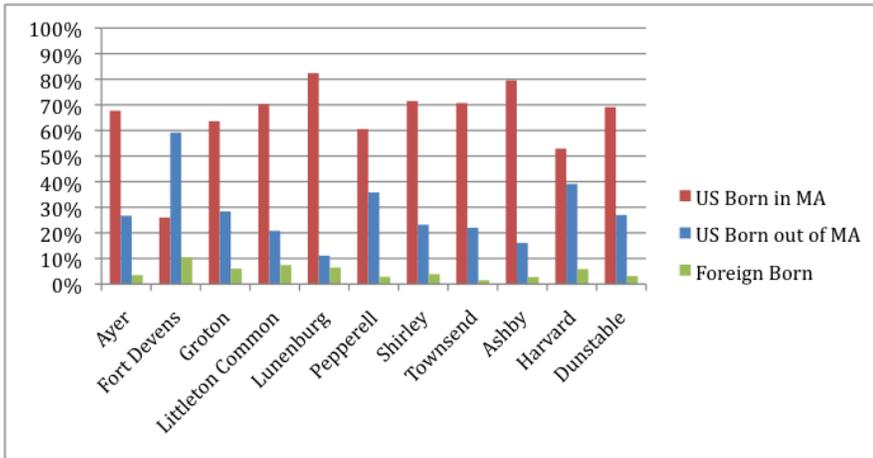
Source: MA Department of Elementary and Secondary Education District Profiles.

4. Age Distribution.



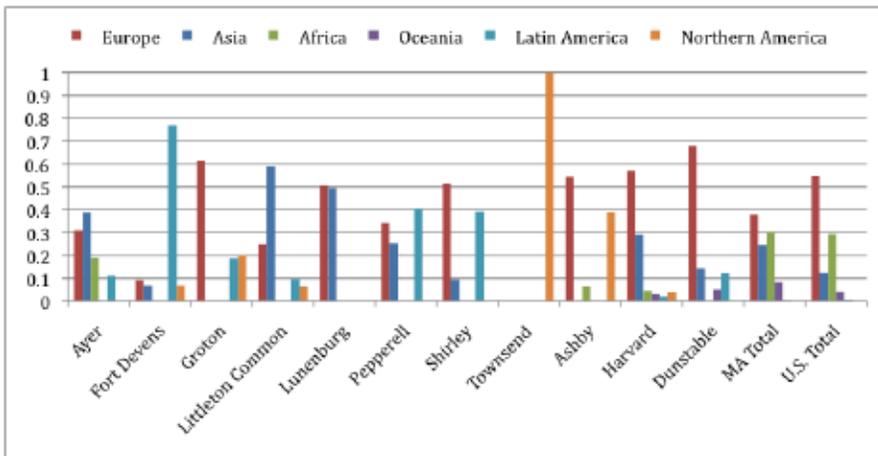
Source: U.S. Census Bureau, American Community Survey, 2005-2009 estimates

5. Nativity



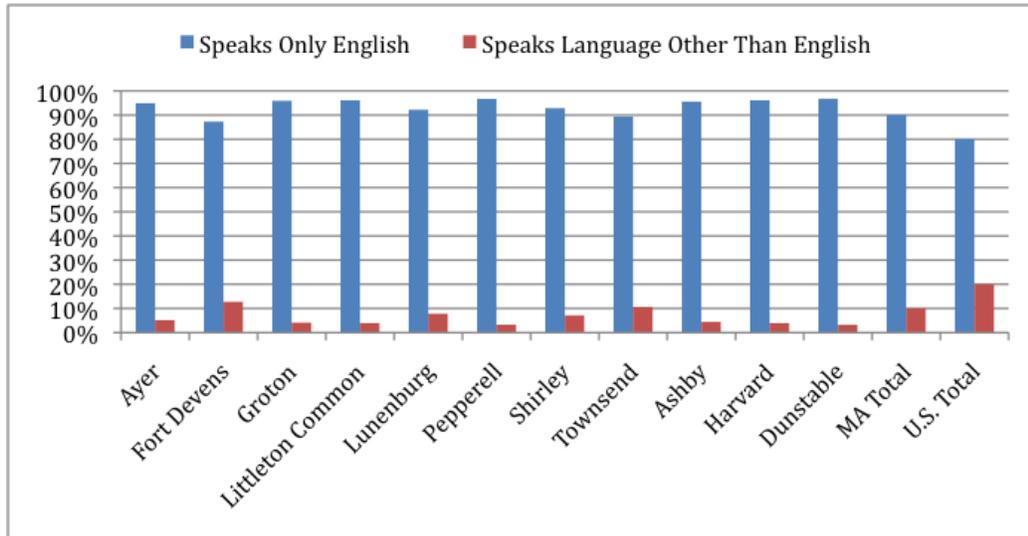
Source: US Census Bureau, American Community Survey, 2000 and 2005-2009 estimates

6. Place of birth of foreign born population by percent of total foreign born population



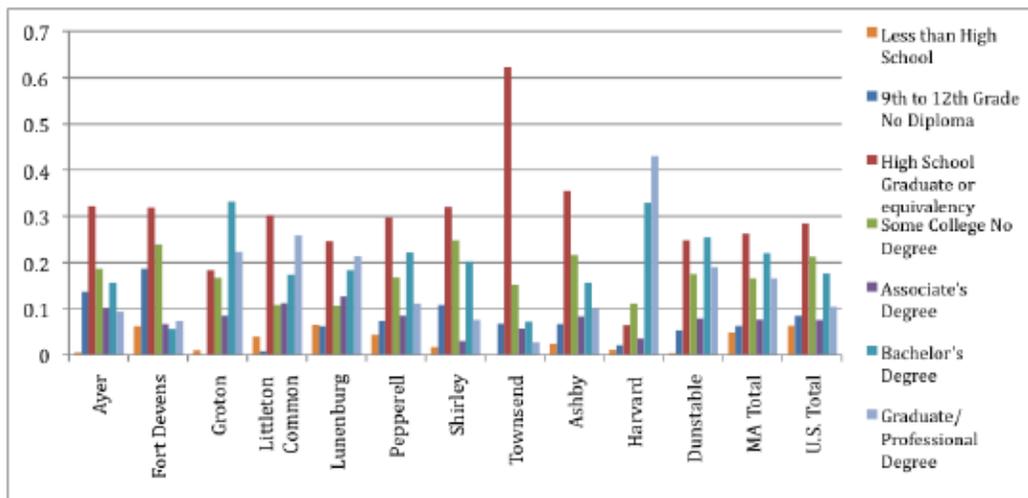
Source: US Census Bureau, American Community Survey, 2000 and 2006-2010 estimates

7. English Language Usage - Native Population



Source: US Census Bureau, American Community Survey, 2000 and 2005-2009 estimates

8. Highest Educational Attainment



Source: US Census Bureau, American Community Survey, 2000 and 2005-2009 3-year estimates

9. Poverty Status in the Past 12 Months, under 100 percent of the federal poverty level

	Ayer		Fort Devens		Groton		Littleton Common		Lunenburg	
	Total	% under poverty level	Total	% under poverty level	Total	% under poverty level	Total	% under poverty level	Total	% under poverty level
Unrelated Individuals	908	28.40	0	0.00	184	0.00	348	31.30	262	35.90
Families	586	8.70	53	15.10	291	0.00	704	5.50	431	0.00
Families with children under 18	284	18.00	28	28.60	192	0.00	308	0.00	149	0.00
Female headed families	116	44.00	8	100.0	42	0.00	60	0.00	28	0.00

	Pepperell		Shirley		Townsend		MA Total		US Total	
	Total	% under poverty level	Total	% under poverty level	Total	% under poverty level	Total	% under poverty level	Total	% under poverty level
Unrelated Individuals	437	19.00	300	6.70	338	12.40	1,303,689	21.7	54,205,102	24.8
Families	567	0.00	619	7.80	149	0.00	1,600,588	7.5	76,254,318	10.1
Families with children under 18	298	0.00	242	11.20	43	0.00	792,555	11.5	38,237,101	15.7
Female headed families	31	0.00	216	9.70	29	0.00	305,861	24.4	14,383,956	28.9

Source: U.S. Census Bureau, American Community Survey, 2000 and 2006-2010 five-year estimates

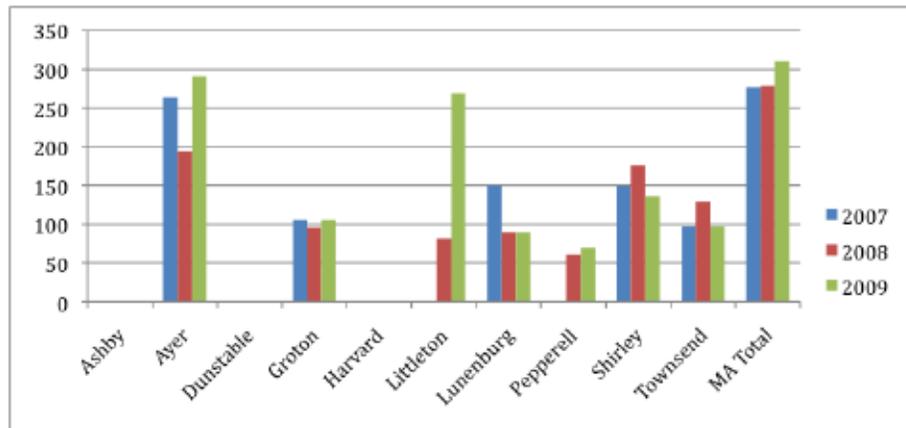
Note: For service area towns, sample sizes are very small and margins of error are large.

10. Grade 9-12 Dropout Rate, 2008-2011

	Groton/ Dunstable	Littleton	Lunenburg	Harvard
2008	2.4	3.0	8.4	3.7
2009	1.0	7.0	2.6	5.5
2010	0.5	4.0	11.3	5.7
2011	1.0	3.1	3.8	2.7

Source: Massachusetts Department of Elementary and Secondary Education, District Profiles, 2011

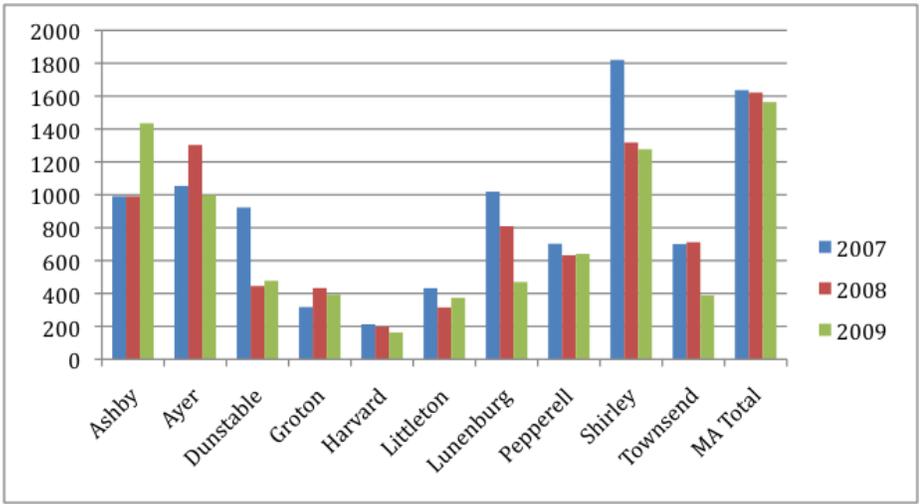
11. Hospital Admissions for Opioid Use, age-adjusted rate per 100,000



Source: MassCHIP

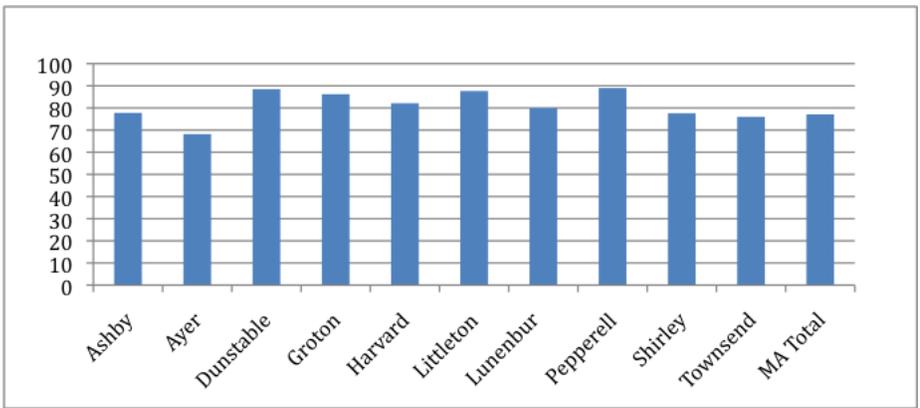
Note: There were no reported hospitalizations for opioid use for Dunstable (2008) and Ashby (2009). The remaining zeros represent no data available.

12. Hospitalizations for Alcohol or Substance Abuse



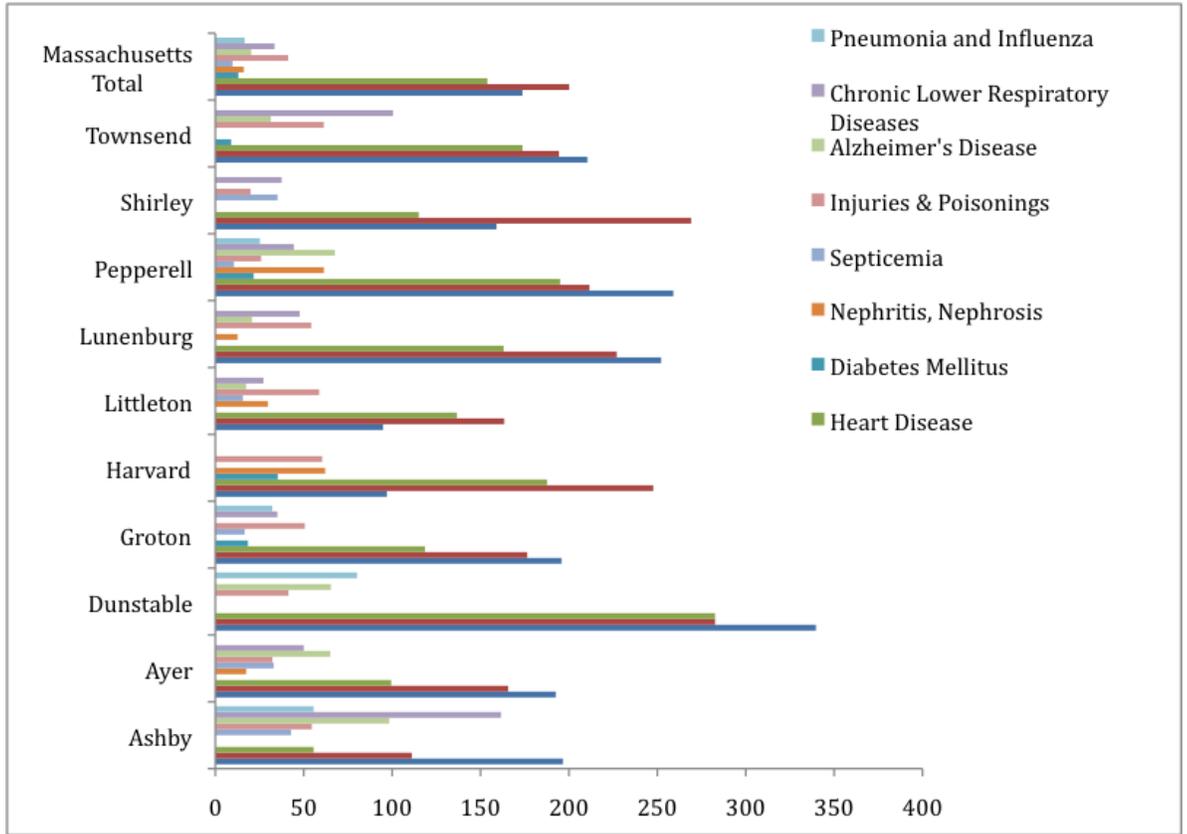
Source: MassCHIP

13. Adequacy of Prenatal Care, percent of total births receiving adequate care, Kessner index, 2009



Source: MassCHIP

14. Leading Causes of Death, age-adjusted rate per 100,000 (2009)



Source: MassCHIP

Appendix C. Provider Survey Questions

1. How would you identify your geographic service area (town, city, zip code, etc.)?
2. How would you identify the community that you work with?
3. What is healthy about the community you work with?
 - a. What is unhealthy?
4. What are the top three areas of concern within the community that you work with?
 - a. What are some strategies that could address these concerns?
5. What are the top three health concerns within the community you work with?
 - a. What are some strategies that could address these concerns?
6. What do you feel are the biggest obstacles to health access within the community you work with?
7. What populations would you identify as underserved or underrepresented within the community?
8. What services do you perceive as being most needed within the community?
 - a. Which population would most benefit from this service?
9. In what ways is Nashoba Valley Medical Center serving the community well?
10. In what ways could Nashoba Valley Medical Center serve the community better?
11. What is the number one thing that Nashoba Valley Medical Center can do to improve the health and quality of life of the community?
12. Is mental health a primary concern within the community?
 - a. What about mental health is a concern?
 - b. How might this concern be addressed?
13. Is nutrition a primary concern within the community?
 - a. What about nutrition is a concern?
 - b. How might this concern be addressed?
14. Is there any other concern that you would like to address?

Appendix D. Focus Group Questions

1. What is healthy about your community?
2. What are the top three areas of concern within the community?
 - a. What are some strategies that could address these concerns?
3. What populations would you identify as underserved or underrepresented within the community?
4. What do you feel are the biggest obstacles to health access for your community?
5. What do you feel are the biggest obstacles to having health insurance in your community?
6. Do you feel that mental health is a concern in your community?
 - a. Why?
 - b. What are some strategies that could address these concerns?
7. Do you feel that diabetes is a concern in your community?
 - a. Why?
 - b. What are some strategies that could address these concerns?
8. In general, what services do you perceive as being most needed within the community?
9. In what ways is Nashoba Valley Medical Center serving the community well?
10. In what ways could Nashoba Valley Medical Center serve the community better?
11. What is the number one thing that Nashoba Valley Medical Center can do to improve the health and quality of life of the community?

Appendix E. References

- ¹ DM Berwick, et al., “The Triple Aim: Care, Health, And Cost,” *Health Affairs* 27, no. 3 (2008): 759–769
- ² DM Berwick, et al., “The Triple Aim: Care, Health, And Cost,” *Health Affairs* 27, no. 3 (2008): 759–769
- ³ McElligott, C., “The Massachusetts Rural Health Landscape,” http://www.umassmed.edu/uploaded-Files/fmch/Community_Health/Rural_Health_Scholars/MA%20Rural%20Health%20Landscape%20Presentation%209-11.pdf (accessed 2 Jan 2013)
- ⁴ McCulloch, DK. “Patient information: Preventing complications in diabetes mellitus (Beyond the Basics),” *Wolters Kluwer* <http://www.uptodate.com/contents/preventing-complications-in-diabetes-mellitus-beyond-the-basics?view=print> (accessed 2 Jan 2013)
- ⁵ Ko, S.-H. “Long-term effects of a structured intensive diabetes education programme (SIDEPE) in patients with Type 2 diabetes mellitus—a 4-year follow-up study,” *Diabetic Medicine* 24, no. 1 (2007): 55–62
- ⁶ US Census Bureau, http://factfinder2.census.gov/help/en/glossary/c/census_designated_place_cdp.htm (accessed 2 Jan 2013)

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