2017

A Community Committed to Health

Community Health Assessment

The City of Nashua
Division of Public Health and Community Services
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603-589-4560
nashuanh.gov/NashuaDPHCS

Greater Nashua Community Health Assessment

September 2017

City of Nashua, New Hampshire

Division of Public Health and Community Services

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Letter from Mayor Jim Donchess

Dear reader,

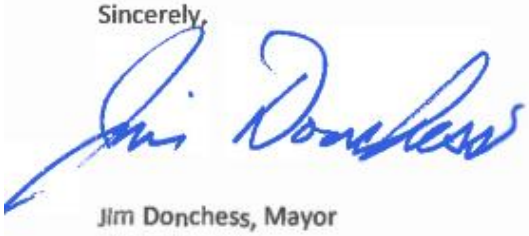
I want to express my gratitude to the City of Nashua's Division of Public Health and Community Services for its important role in the publication of the 2017 Community Health Assessment. This assessment is another reflection of the impressive work our department, the first nationally accredited health department in the State of New Hampshire, has been doing in collaboration with our many community partners and stakeholders.

A significant undertaking, the Community Health Assessment (CHA) collects primary and secondary data about the health of our city, region and the state. This year, the Division of Public Health and Community Services conducted a CASPER Survey, which seeks community feedback on access to health and oral health services and emergency and disaster preparedness. Using the information provided by the Community Health Assessment, the division will develop a new Community Health Improvement Plan to enhance prevention, treatment and recovery services.

Notably, the number one issue respondents identified was the opioid crisis. As mayor, I am working with many of our community leaders to battle the opioid epidemic. We are mobilizing all of our city's divisions to address this crisis, including police, fire, emergency responders, schools and the Division of Public Health and Community Services.

I am proud of our Division of Public Health and Community Services' leadership and efforts in fighting this battle. We will continue to provide services to help Nashua's residents live the healthiest, most fulfilling lives possible.

Sincerely,



Jim Donchess, Mayor
City of Nashua

Letter from Director Bobbie D. Bagley

Dear Community Partners,

As the Director of the City of Nashua Division of Public Health and Community Services, I wish to express my sincerest gratitude for having the opportunity to serve the City of Nashua and the Greater Nashua Public Health Region in the efforts of protecting, promoting and preserving the health of all our community members.

I am very impressed with both the quantity and quality of work that has gone into completing this third Community Health Assessment. You will find updated data in health areas identified in the previous 2011 and 2014 health assessments as well as the addition of new chapters sections covering emergent health issues. We took great efforts to collect relevant and current health data to demonstrate the assets, gaps, improvements, and resources in our community.

This assessment is a testament once again of successful collaboration with our partnering organizations and stakeholders, as we all strive to improve the health and well being of our community and region through our delivery of the core functions and essential services of public health.

I wish to thank the organizations that contributed to the work of this assessment and the data provided in the document to help better inform our community and region of its health status and areas that we can continue to work on improving. I am very grateful for your involvement as observed in the hours many of you have volunteered with the staff of the Division of Public Health and Community Services during hours of planning, data collection and reviewing of chapters.

I also want to thank Dartmouth-Hitchcock Nashua, Southern New Hampshire Health System and St. Joseph Hospital for their generous fiscal contribution to fund the Community Health Assessment. Without your support, this project would not have been possible.

And lastly, but not least, I am extremely proud of the staff contributions to this assessment and their daily work and accomplishments throughout the year. We are looking forward to continuing our partnerships as we move towards the next phase of creating a safer and healthier greater Nashua together.

Sincerely,

Bobbie D. Bagley, MS, RN, MPH, CPH
Director
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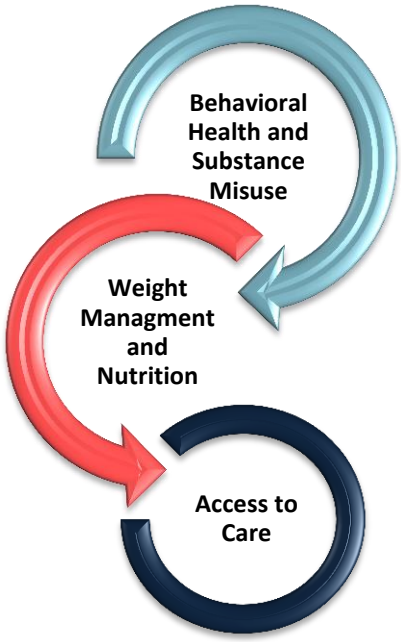
Executive Summary

This is the third Community Health Assessment (CHA) for the City of Nashua and the Greater Nashua Public Health Region (GNPHR). A CHA is a process by which community members gain an understanding of the health concerns and needs of the community by identifying, collecting, analyzing and disseminating information on the community's assets, strengths, resources and needs. There are many health topics covered in this CHA, including access to healthcare, maternal health, chronic conditions, emergency preparedness, and substance misuse. The overarching goals of the CHA are to engage community partners, identify emerging health issues, provide information to community members and set the foundation for future programs and grant opportunities for the GNPHR. As appropriate, the data in the report are compared to the New Hampshire State Health Improvement Plan objectives and the Healthy People 2020 objectives.

As part of this 2017 assessment, a community health survey was conducted. The protocol for the Health Survey was based on the Center for Disease Control and Prevention's Community Assessment for Public Health Emergency Response (CASPER) was used to collect primary data on the health of the region. This protocol was the same used to conduct the Health Survey conducted in 2010 for the 2011 Greater Nashua CHA.

In the 2010 CASPER Health Survey, the top three priority health topics identified were environmental health, physical exercise/nutrition/weight management, and access to healthcare. The 2014 CHA included primary data gathered from a series of five focus groups held throughout the region. During these focus groups, mental health/substance misuse and access to care were identified in the top three health priorities in all the focus groups, while obesity was identified as a top priority in four out of five focus groups. In this year's CASPER Heath Survey, substance misuse was by far identified as the top health priority with over 30% of respondents listing it as their main health concern. Survey respondents identified nutrition and weight management, and access to healthcare as the second and third priority health topics respectively.



The Nashua Integrated Delivery Network (IDN) is working to improve the physical and mental health and well-being of our community by focusing on personalized care for those with mental illness and substance use disorder. The IDN mission is "…to design and implement projects to build behavioral health (mental health and substance use disorder) capacity, to promote integration of primary care and behavioral health, to facilitate smooth transitions in care, and to prepare for alternative payment models for Medicaid beneficiaries in a fashion that will ensure sustainability of the model." The initiative includes health care and social service agencies throughout the Greater Nashua area working in the spirit of cooperation and collaboration to review challenges to getting quality care and developing new approaches to help make permanent changes in the way we deliver care.

Goals of the IDN include improving communication and coordination between programs and service/medical providers, increasing access to quality care when it is needed, educating community members and leaders about where people can access services, and reducing the stigma around mental illness and substance use disorder to help people live healthy lives.

A comparison of the results from the Youth Behavior Risk Surveys in 2013 and 2015 is promising, showing decreases in Substance Use Indicators for High School students.

Substance Use Indicators for High School Students, 2013 and 2015

Indicator	Year	Nashua	GNPHR	NH
Students used some form of cocaine, including powder, crack, or freebase, one or more times during their life	**2013**	6.7%	6.0%	5.9%
	2015	4.4%	4.4%	4.9%
Students sniffed glue, breathed the contents of aerosol spray cans, or inhaled any paints or sprays to get high one or more times during their life	**2013**	8.4%	8.4%	8.3%
	2015	7.5%	7.3%	6.4%
Students used heroin one or more times during their life	**2013**	2.7%	2.8%	3.0%
	2015	2.0%	2.5%	2.4%
Students used methamphetamines one or more times during their life	**2013**	3.2%	3.4%	3.5%
	2015	2.0%	2.6%	2.5%
Students used ecstasy one or more times during their life	**2013**	8.1%	7.6%	7.0%
	2015	5.2%	5.0%	4.5%
Students who were offered, sold, or given an illegal drug on school property by someone during the past 12 months	**2013**	21%	19.3%	18.7%
	2015	18.1%	16.7%	16.5%
Source: NH DHHS, 2013 and 2015 YRBS				

Following the publication of the 2017 CHA, the City of Nashua, Division of Public Health and Community Services will work with community partners and stakeholders to develop and publish the 2018 Community Health Improvement Plan (CHIP) and the 2018-2021 Community Health Improvement work plan. The Improvement Plan will identify the emerging health issues from the CHA, and choose goals, objectives, and strategies to address them.

Introduction

"The greatest wealth is health."
-Virgil

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The fundamental purpose of public health is defined by three core functions: assessment, policy development, and assurance. Community health assessments (CHAs) provide information on many health topics and help identify resources which assist health departments with policy formulation, program implementation, and evaluation. CHAs also help measure how well a public health system is fulfilling the assurance function. The CHA is part of an ongoing comprehensive community health improvement process.

The purpose of the 2017 CHA is to identify vulnerable populations using comparable data within the Greater Nashua Public Health Region and to subsequently identify trends in health issues, environmental health hazards, and social and economic factors that affect the populations' health. This is the third Community Health Assessment (CHA) for the City of Nashua and Greater Nashua Public Health Region. The two previous CHAs were published in 2011 and 2014 and highlighted priority health issues for the community at that point in time. This data will be used to identify priority issues among these communities and develop strategies for further action which are outlined in the form of a community health improvement plan (CHIP). The CHIP creates a foundation for a work plan to improve the health of the community over the course of three years' time. The CHIP is collaborative and requires participation of representatives from various sectors in the Greater Nashua Public Health Region. Figures 1 and 2 demonstrate the planning and conducting process for the CHA and CHIP.

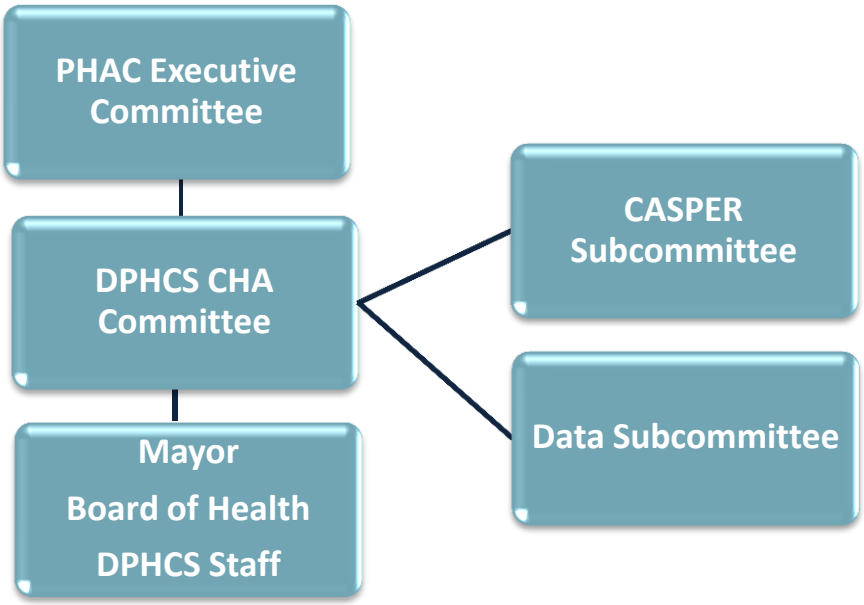
The City of Nashua Division of Public Health's achieved voluntary accreditation through the Public health Accreditation Board (PHAB) on March 14, 2017. As part of its commitment to improve and protect the health of the public by advancing the performance of health departments, PHAB requires demonstration of ongoing community health improvement planning processes. The CHA and CHIP help document the capacity of the City of Nashua, Division of Public Health and Community Services to deliver the three core functions of public health for PHAB.

Figure 1. Community Health Assessment Process

Figure 2. Steps for Conducting the CHA

In June 2016, the DPHCS formed the CHA Committee, a team of staff members from each department within the Division, that worked together to formalize a plan of action, write the CHA and perform internal duties such as scheduling and organizing events. Also during this time, the CHA Committee worked with the Greater Nashua Public Health Advisory Council Executive Committee whose priorities were to lend expertise to the DPHCS, review materials and data, become an advocate for the process, identify resources, and help disseminate the final report. Two subcommittees were developed under the Board to assist with planning: the Community Assessment for Public Health Emergency Response (CASPER) Subcommittee and the Data Subcommittee (Figure 3).

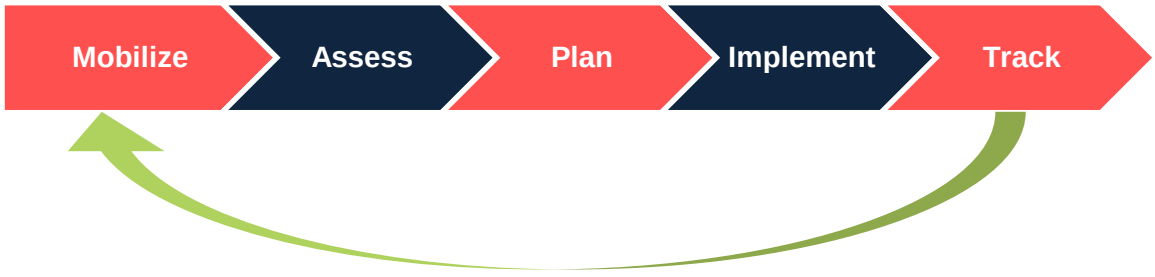
Figure 3. Organization/Communications Chart for the CHA



Healthy People 2020

A program of the Centers for Disease Control and Prevention (CDC), the Vision for Healthy People 2020 is, "A society in which all people live long, healthy lives". For three decades, Healthy People has set 10-year national objectives for improving the health of Americans. The objectives for Healthy People are to track and monitor health indicators over time to see if the targets set by Healthy People are being met. To assist organizations in implementing Healthy People 2020 (HP2020), a framework called, Mobilize, Assess, Plan, Implement, Track (MAP-IT) was developed for planning and evaluating public health interventions (Figure 4). This figure was adapted to include an arrow that shows the process is ongoing. MAP-IT follows a similar process to the one developed by the DPHCS and the steps outlined in conducting a CHA (Figure 1; Figure 2). When appropriate, the data in the CHA will be compared to the HP2020 objectives and goals.

Figure 4. Healthy People 2020's MAP-IT



New Hampshire State Health Improvement Plan

The New Hampshire Department of Health and Human Services, Division of Public Health Services released the *New Hampshire State Health Improvement Plan (CHIP) 2013-2020: Charting a Course to Improve the Health of New Hampshire* in 2013. This document highlights ten key health areas and their health outcome indicators that describe the most significant health issues currently facing New Hampshire. The plan includes goals to meet for 2015 and 2020. Where comparable, the 2017 Community Health Assessment will include these goals and will highlight if Nashua and the GNPHR meet the goals outlines in the SHIP.

Plan Priorities:

- Tobacco
- Obesity/Diabetes
- Heart Disease and Stroke
- Healthy Mothers and Babies
- Cancer Prevention
- Asthma
- Injury Prevention
- Infectious Disease
- Emergency Preparedness
- Misuse of Alcohol and Drug

Data Sources

For the CHA, primary data, or data that is collected firsthand, and secondary data, or data that is collected by another organization, was gathered from various sources within the City and the State of New Hampshire. Primary data was collected by conducting a door-to-door survey using the CASPER methodology while secondary data was collected from local agencies in Nashua, the New Hampshire Department of Health & Human Services (NH DHHS) and the New Hampshire Department of Environmental Services (NH DES). National data from organizations such as the Centers for Disease Control and Prevention were also utilized in this CHA.

GIS Project

The Nashua Assessing Department uses ArcGIS for their daily assessing needs and has the capability to broaden the use of ArcGIS to other city departments. The DPHCS has partnered with the Assessing Department to utilize ArcGIS for many projects with the most recent projects focusing on the CHA. Throughout the CHA, in particular during the CASPER, mapping was used to highlight data by census tract in Nashua.

Secondary Data

Secondary data was collected by various local agencies (reference the Acknowledgements section) the NH DHHS and NH DES. Some of the databases used by NH DHHS and NH DES are highlighted below.

Emergency Department and Inpatient Hospitalizations Database: This database includes information from emergency department visits and inpatient hospitalizations for New Hampshire residents. The data in this database is coded using the International Statistical Classification of Disease (ICD-9) codes, or codes that designate diagnosis and cause of death in the medical records.

New Hampshire Behavioral Risk Factor Surveillance System (BRFSS): This is a telephone survey of adults 18 years and over but does not include adults living in institutions or adults without a landline phone. The BRFSS is supported by the CDC and is administered in all the states and U.S. territories.

New Hampshire Youth Risk Behavioral System (YRBS): This is a national school-based survey conducted by the CDC to monitor health risk behaviors, asthma and obesity in young adults. The health risk behaviors include tobacco, alcohol and drug use, sexual risk behaviors, unhealthy diet behaviors and physical inactivity. The states, local education, health agencies and U.S. territories can also conduct the YRBS.

New Hampshire Environmental Public Health Tracking Program / Environmental Health Data Integration Network (EHDIN): Funded by the CDC, this initiative is to "improve public health by providing science-based information on the trends and distributions of environmentally-related diseases". EDHIN is the network that provides access to the data and information on environmental health.

NH Trauma and Emergency Medical Services Information System (TEMSIS): a web-based, statewide data system for collecting data on ambulance runs in New Hampshire.

U.S. Census Bureau

The U.S. Census Bureau collects a multitude of data through surveys of the American people. Information is collected every ten years for the U.S. Census with the most recent being conducted in 2010. Other surveys include the American Community Survey which is conducted every year, and the Economic Census and Census of Governments which is conducted every five years. In this report, data from the 2010 U.S. Census and 2010-2015 American Community Surveys were used.

Additional Data Sources

- 2-1-1 New Hampshire
- Centers for Disease Control and Prevention
- Harbor Care Health and Wellness Clinic
- Healthy People 2020
- Lamprey Healthcare – Nashua Center

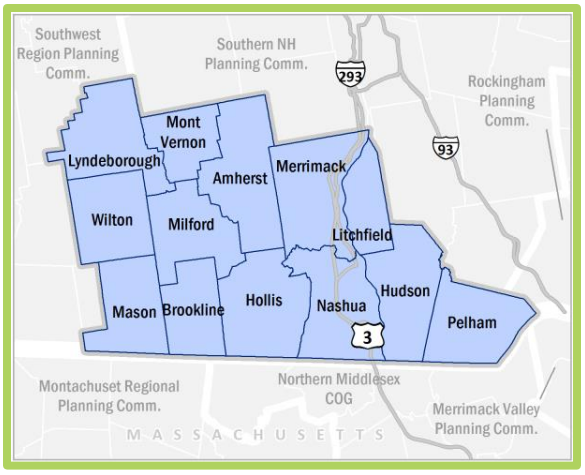
- Nashua Police Department
- Nashua Regional Planning Commission
- Nashua School District
- NH Cancer Registry
- NH Department of Education
- NH Department of Environmental Services
- NH Department of Health and Human Services
- NH Electronic Disease Surveillance System
- NH Environmental Public Health Tracking Program
- NH Trauma and Emergency Medical Services Information System
- Office of Medicaid Business and Policy
- Substance Abuse and Mental Health Administration
- ServiceLink Aging and Disability Resource Center
- Southern NH Services, Inc.
- US Department of Health and Human Services

Notes to the Reader

The following section provides additional information that may be useful to the reader.

Geography

The three geographies mentioned most often throughout the report are the City of Nashua, the Greater Nashua Public Health Region (GNPHR) and the State of New Hampshire. The City of Nashua is located in the southern portion of New Hampshire's Hillsborough County, approximately halfway between the Cities of Lowell, Massachusetts, and Manchester, New Hampshire. As of 2015, it's nearly 31 square miles are home to an estimated 87,110 people. It is the second largest city in New Hampshire, with Nashua's population more than double that of Concord, the state's capitol and third largest city. Throughout the State of New Hampshire, there are thirteen public health regions and the GNPHR is composed of thirteen towns which include the towns of Amherst, Brookline, Hollis, Hudson, Litchfield, Lyndeborough, Mason, Merrimack, Milford, Mont Vernon, Nashua, Pelham and Wilton. The 2015 population of the towns within the GNPHR, without Nashua, was 116,747.



Source: Nashua Regional Planning Commission

When possible, the data will be compared between geographies. For instance, the Nashua specific data will be compared to regional data and state data to see how they compare to one another. In some

cases, data for the region and Nashua are not available due to small sample sizes. When this occurs, data for the state or Hillsborough County will be shown.

Technical Language

Although efforts were made to reduce the amount of technical language throughout the CHA, there still remains some language that may be unfamiliar to readers. Below are definitions for the most commonly used technical language in the CHA report (adapted from the 2011 New Hampshire State Profile).

Statistical Significance: The word "significant" is a statistical term with technical meaning and does not define a health condition as important or not important. Differences calculated from small sample sizes or populations are less likely to show significance.

Confidence Intervals: A confidence interval (CI) describes the level of variability in a sample estimate and specifies the range in which the true value of the population that the sample represents is likely to fall. We use the 95% confidence level, which means that this population value falls within 95% of the confidence intervals estimated from samples of this population. If the 95% confidence intervals of these estimates do NOT overlap, these estimates differ statistically significantly from each other at the 0.05 significance level.

Rate: The number of events per 1,000, 10,000 or 100,000 population. Rates that are calculated with small sample sizes (<20 events) are unreliable. A crude rate does not factor in other variables such as age and commonly used crude rates include birth and death.

Incidence: The number of new cases revealed or diagnosed during a specific time period. Represented as a rate.

Prevalence: The number of cases existing at a specific time. Represented as a rate.

Mortality: A health event resulting in death. Represented as a rate.

Age-Adjusted: The rate that would occur if the population had the same age distribution as that of the United States. This allows for comparison between populations with different age distributions

Acronyms

There are many acronyms throughout the CHA report. To assist the reader, a list of acronyms can be found in Appendix A.

Social Determinants of Health

"Health inequalities and the social determinants of health are not a footnote to the determinants of health. They are the main issue."
-Michael Marmot

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Social Determinants of Health

The health of a community is determined by the conditions in which people work, go to school and play. These conditions, called the social determinants of health, include socioeconomics, the natural and built environment, culture, religion, family, race and ethnicity, and other characteristics that potentially affect health the health of individuals and communities.[1] Healthy People 2020 includes numerous objectives related to improvements in the social determinants of health, including decreasing the proportion of people who live below the threshold for poverty, increasing the proportion of people with medical insurance, and increasing food security.[1]

If the social determinants of health vary between groups in a community, these groups do not have the same opportunities to be healthy. Health equity, or equal access to opportunities to be healthy,[2,3] is a prerequisite for a healthy community. Improvements in the social determinants of health for disadvantaged or vulnerable populations move the community towards health equity. Poverty, discrimination, and structural racism contribute to health inequities.[2] An evaluation of the potential effect of the social determinants of health on health equity is necessary for a comprehensive community health assessment. The social determinants of health in this community health assessment include age, race and ethnicity, language, socioeconomics, housing, and sexual orientation.

The history of Nashua and the other towns in the Greater Nashua Public Health Region (GNPHR) contributed to the current socioeconomic and environmental characteristics of the region and possibly to health inequity. In 1803, Dunstable, New Hampshire was renamed Nashua, after a canal boat bearing the name.[4] Several waves of immigration between 1865 and 1900 contributed to the racial, ethnic, and religious diversity of Nashua and the surrounding towns. The textile industry in Southern New Hampshire collapsed in the first half of the twentieth century and was replaced by other employers, including small manufacturers, aerospace, and higher education.

The *Health and Equity in New Hampshire: 2013 Report Card* concluded that there are health inequities in New Hampshire and that not all racial and ethnic groups have equal opportunities to achieve good health.[5] As described below, the social determinants of health vary within the GNPHR, indicating the potential for health inequity if disparities are not acknowledged and addressed. Overall, the indicators presented here illustrate that there are residents of Nashua that may be more vulnerable and disadvantaged than the populations of the other towns in the GNPHR. The City of Nashua Division of Public Health and Community Services and a variety of non-governmental organizations strive to provide health and human services to vulnerable groups in Nashua and other towns in the GNPHR to reduce the potential for health inequities.

According to the 2010-2014 American Community Survey (ACS), 206,595 people live in the 13 towns in the GNPHR (Table 1).[6] Approximately 6.6% of the population of New Hampshire lives in Nashua. New Hampshire is an aging population and the median age in all towns in the GNPHR is greater than the median age in the United States. Overall, the populations of Amherst, Hollis, Lyndeborough, Mount Vernon, and Wilton are older than the populations of Hudson, Litchfield, and Nashua. The availability of Medicare for Americans who are at least 65 years of age and Medicaid and state health insurance plans

for children increase access to healthcare in these age groups. In Nashua, the percentage of the population without health insurance varies greatly by age (<18 years old: 4%, 18-24: 22%, 25-34: 18%, 35-44: 16%, 45-54: 13%, 55-64: 9%, ≥65: <1%).[6]

Table 1. Population and Median Age, 2010-2014

Geography	Population	Median Age
United States	316,515,021	37.4
New Hampshire	1,321,069	41.8
GNPHR		
Amherst	11,234	44.6
Brookline	5,051	41.7
Hollis	7,721	47.2
Hudson	24,584	38.5
Litchfield	8,329	38.1
Lyndeborough	1,633	46.3
Mason	1,329	43.2
Merrimack	25,563	42.5
Milford	15,133	40.7
Mont Vernon	2,508	44.0
Nashua	86,799	38.3
Pelham	13,032	40.1
Wilton	3,679	44.8

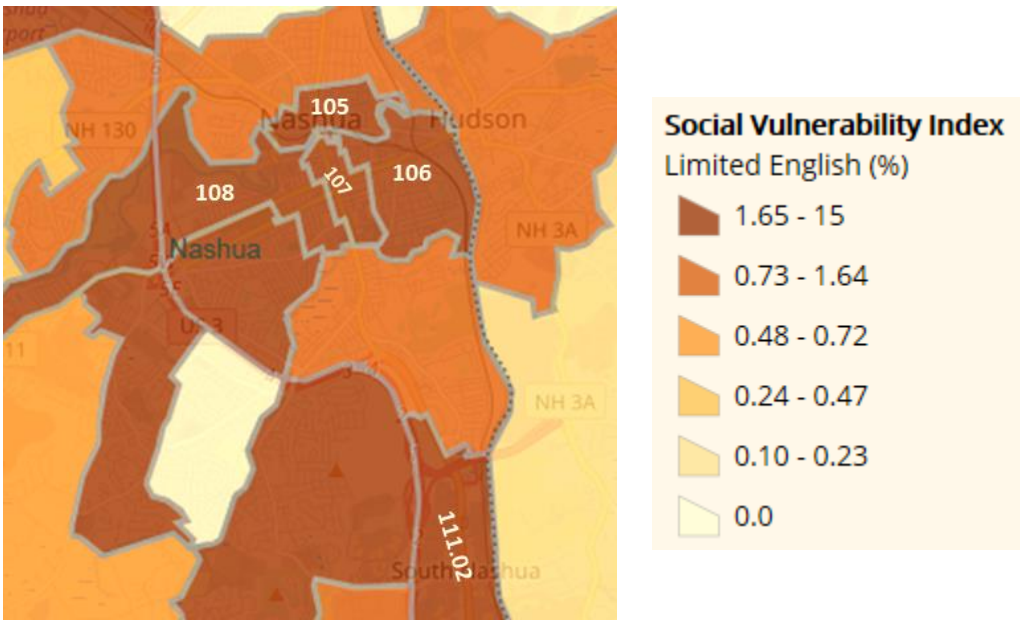
Source: US Census Bureau.
2010-2014 American Community Survey

Race, Ethnicity, and Language

> **"Race is a marker for differential exposure to multiple disease-producing social factors. Thus, racial disparities in health should be understood not only in terms of individual characteristics but also in light of patterned racial inequalities in exposure to societal risks and resources."**
>
> **David R. Williams and Pamela Braboy Jackson, 2005**

In the United States, there are substantial health inequities attributable to the constructs of race and ethnicity. There are racial inequities observed for a variety of health outcomes, including cancer, heart disease, and homicide.[7] Differences in health between racial groups are caused by socioeconomic status, environmental conditions (including residential segregation), variations in medical care and many other factors.[7] Morbidity is affected by racism and discrimination.[8] Nearly 94% of the population of New Hampshire is white. The GNPHR includes some of the more diverse towns in the state. Approximately 15% of the residents of Nashua self-identify within the constructs of racial diversity (Table 2). Eleven percent of the population of Nashua is Hispanic/Latino. More than 10% of the population (over 5 years of age) speaks a language other than English at home and speaks English "less than very well" in 5 of the 18 Nashua Census tracts. These tracts with more than 10% of the population include 105, 106, 107, 108, and 111.02. Tract 108 has the highest percentage speaking a language other than English at 24.2%. Minorities comprise 41.8% of the population within tract 108.[6] Figure 1 highlights Census tracts where households have limited English. It is a challenge to ensure linguistic diverse populations have equal access to healthcare and public health services.

Figure 1. Limited English by Census Tract, Nashua



Source: US Census Bureau. 2010-2014 American Community Survey
NH DHHS NH Vieww, 2017

Table 2. Race and Ethnicity by Town, 2010-2014

Geography	White*	Hispanic/ Latino	Black/ African American	Asian	American Indian/ Alaskan Native	Native Hawaiian/ Pacific Islander	Other Race	Two or More Races
United States	73.80%	16.90%	12.60%	5.00%	0.80%	0.20%	4.70%	2.90%
New Hampshire	93.80%	3.10%	1.20%	2.30%	0.20%	0.00%	0.60%	1.80%
GNPHR								
Amherst	94.40%	2.80%	0.40%	1.00%	0.30%	0.00%	1.30%	2.60%
Brookline	96.50%	0.30%	0.10%	0.90%	1.20%	0.00%	0.00%	1.40%
Hollis	96.30%	2.50%	0.20%	3.00%	0.30%	0.00%	0.00%	1.60%
Hudson	93.80%	7.30%	3.80%	2.60%	0.00%	0.00%	0.20%	2.20%
Litchfield	97.90%	2.50%	0.50%	0.80%	0.50%	0.00%	0.00%	0.70%
Lyndeborough	98.30%	1.20%	0.00%	2.10%	0.00%	0.70%	0.20%	1.80%
Mason	97.60%	0.50%	0.00%	0.20%	1.90%	0.20%	0.20%	2.00%
Merrimack	95.80%	2.60%	0.10%	2.60%	0.30%	0.00%	1.20%	1.30%
Milford	90.40%	3.10%	0.60%	3.30%	1.10%	0.30%	2.30%	1.00%
Mont Vernon	99.10%	0.90%	0.00%	0.30%	0.60%	0.00%	0.00%	0.60%
Nashua	84.80%	11.10%	4.80%	7.60%	0.90%	0.30%	2.20%	3.90%
Pelham	96.50%	1.60%	0.60%	0.70%	0.00%	0.50%	0.10%	1.60%
Wilton	97.60%	1.30%	0.50%	1.10%	0.60%	0.20%	0.00%	1.00%

*Includes Hispanic/Latino

Source: US Census Bureau. 2010-2014 American Community Survey

Socioeconomic Status

Disparities in socioeconomic status contribute to health inequity.[9] People who have less formal education or low income have more barriers to accessing health services and worse health outcomes compared with people of higher socioeconomic status.[9] Michael Marmot asserts that poverty affects health in two ways: "lack of material conditions" and "lack of social participation".[9] The Healthy People 2020 socioeconomic indicators include the proportion of persons living in poverty, the proportion of households experiencing a housing cost burden, and the proportion of persons with medical insurance.[1]

Overall, as shown in Table 3, the socioeconomic status of the GNPHR is higher than the average for the United States. However, this assessment also revealed that there are still disadvantaged and vulnerable groups in many of the towns.

One of the Healthy People 2020 objectives is to increase the proportion of individuals (ages 18-24) who have a high school diploma (Healthy People 2020). The proportion of the adult population without a high school diploma or equivalency is lower in all towns in the GNPHR than the United States overall (Table 3). However, the percentage of the population without a high school diploma or equivalency in three towns in the GNPHR was greater than the percentage in New Hampshire. There was a substantial disparity in this indicator in the GNPHR, with approximately a 10% difference between the Brookline (1.3%) and Hudson (11.8%) and Nashua (11.2%).

"Overcoming poverty is not a task of charity; it is an act of justice. Like Slavery and Apartheid, poverty is not natural. It is man-made and it can be overcome and eradicated by the actions of human beings."

Nelson Mandela

The Gini index is an indication of the distribution of wealth in a population. The possible range Gini index values calculated by the Census Bureau is 0 (income equality) to 1 (income inequality).[6] Overall, the Gini index values in Table 3 (Page 1-6) indicate that income in New Hampshire is more equitable distributed than in the United States. Within the GNPHR, the income distribution is most unequal in Hollis, Hudson, Mason, Milford and Nashua. It is possible that these towns also have the greatest disparities in morbidity and access to health services because lower income is associated with worse health outcomes and barriers to health care.

Table 3. Socioeconomic Indicators in the Greater Nashua Public Health Region

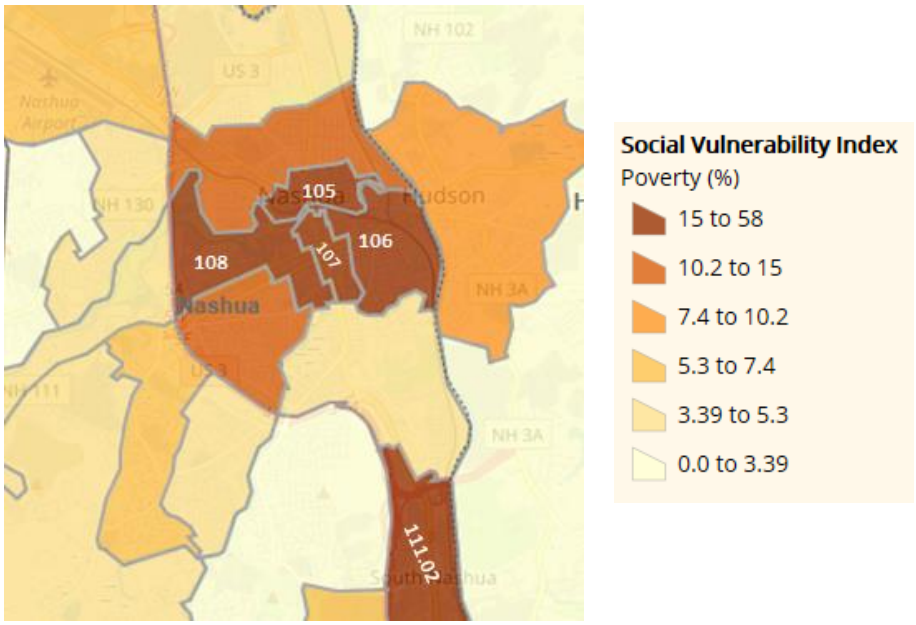
Geography	% of Population without High School Diploma or Equivalent, 25 and older	Median Household Income	% Below Poverty Level	Gini Index
United States	13.6%	$53,482.00	15.60%	0.4760
New Hampshire	8.00%	$65,986.00	8.90%	0.4340
GNPHR				
Amherst	2.40%	$115,898.00	2.70%	0.3949
Brookline	1.30%	$109,006.00	0.80%	0.3471
Hollis	2.40%	$124,318.00	1.70%	0.4142
Hudson	11.80%	$87,468.00	6.30%	0.4003
Litchfield	8.40%	$105,093.00	4.70%	0.3753
Lyndeborough	7.20%	$85,833.00	5.50%	0.3586
Mason	4.00%	$92,143.00	17.70%	0.4016
Merrimack	3.76%	$91,429.00	3.80%	0.3467
Milford	3.90%	$72,341.00	7.60%	0.4027
Mont Vernon	3.70%	$92,841.00	8.20%	0.3595
Nashua	11.20%	$66,818.00	10.70%	0.4212
Pelham	7.70%	$87,359.00	6.20%	0.3850
Wilton	4.60%	$72,250.00	4.60%	0.3729

Source: US Census Bureau. 2010-2014 American Community Survey

According to the 2010-2014 ACS, the median household income in New Hampshire is among the highest in the nation. Fewer than 9% of the households in New Hampshire are below the poverty level. The proportion of the population living below the poverty threshold varies from less than 1% in some Census tracts to nearly one-third in two Census tracts in Nashua. The socioeconomic inequity in the GNPHR is apparent in Figures 2 and 3 and Table 4a-c. Figure 2 highlights the Census tracts within Nashua

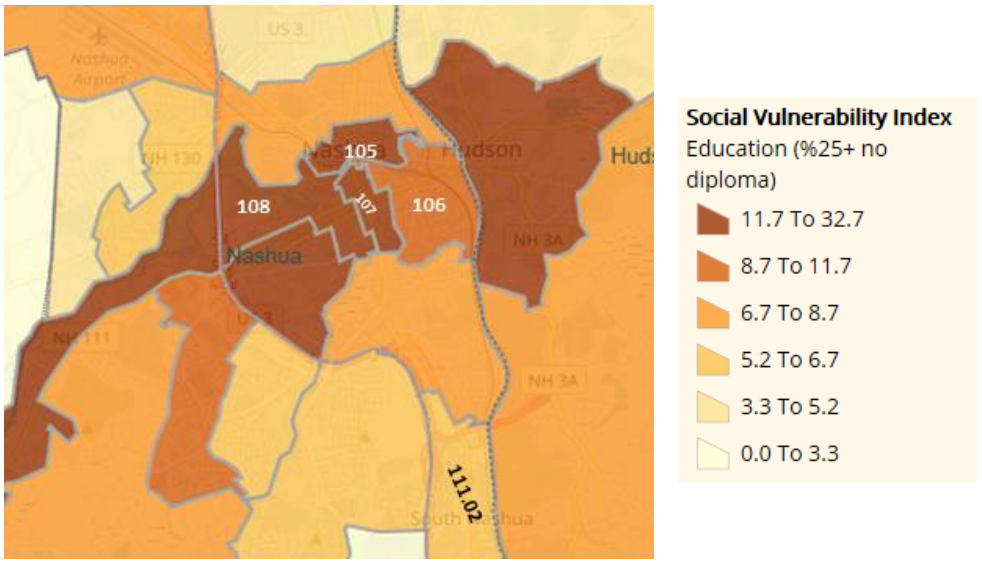
experiencing the highest poverty levels. The tracts that are most impacted by poverty are also the tracts that house the majority of minorities and those that speak English "less than well" (Labeled in Figure 1) in Nashua. These two Census tracts also have some overlap with the tracts where individuals over 25 years of age are less likely to have a high school diploma (Figure 3). Groups which are more likely to be below the poverty threshold are people less than 18 years old, those with less formal education, people who are Hispanic/Latino or black, and those who have a disability (Figure 4).

Figure 2. Poverty by Census Tract, Nashua



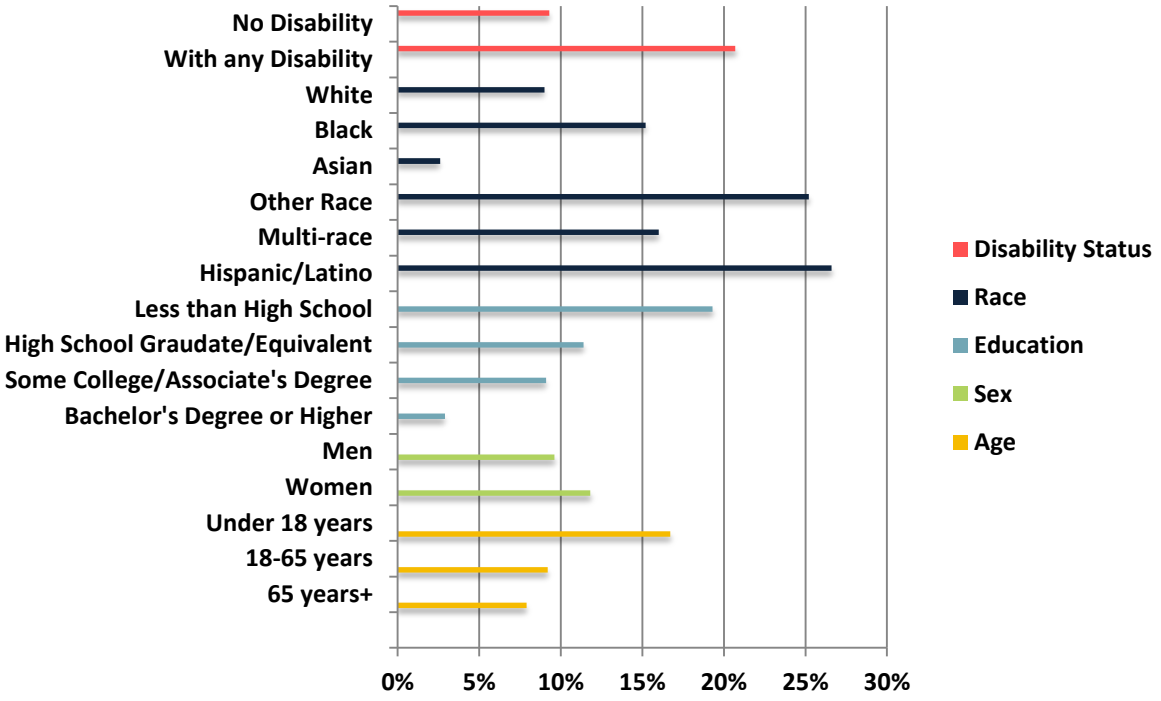
Source: US Census Bureau. 2010-2014 American Community Survey and NH DHHS NH Vieww, 2017

Figure 3. Education (No High School Diploma) by Census Tract, Nashua



Source: US Census Bureau. 2010-2014 American Community Survey and NH DHHS NH Vieww, 2017

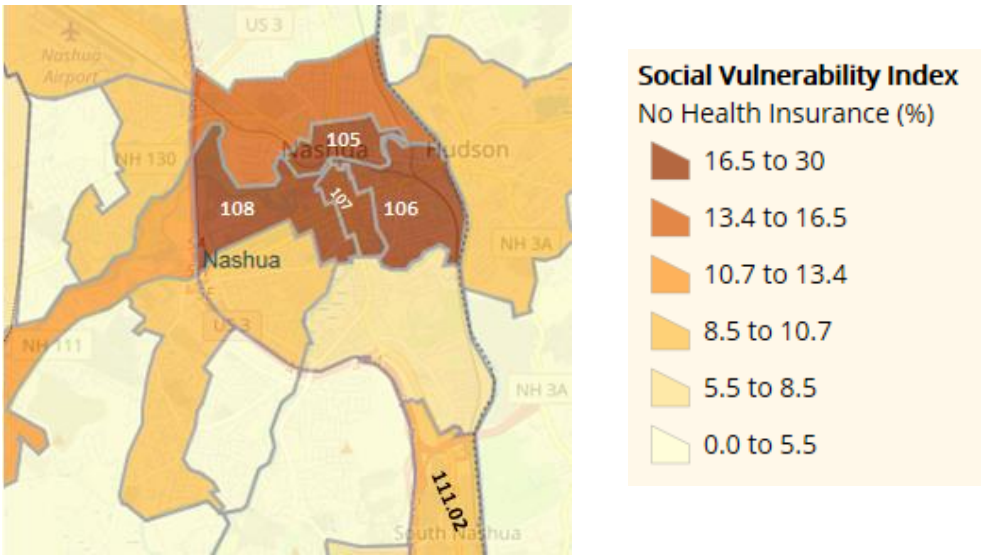
Figure 4. Percent of the Population Below the Poverty Level



Source: US Census Bureau. 2010-2014 American Community Survey

Lack of health insurance coverage is a major barrier to accessing healthcare services. More than 90% of people in most Census tracts in the GNPHR have health insurance.[6] However; more than 20% of the population in three Nashua Census tracts (105, 106, 108) do not have health insurance.

Figure 4. No Health Insurance by Census Tract, Nashua



Source: US Census Bureau. 2010-2014 American Community Survey and NH DHHS NH Vieww, 2017

A larger percentage of families with a female head of household are below the poverty threshold compared with families which include married couples, in nearly all towns in the GNPHR (Table 4a-c).[6]

Table 4a. Percent of Families Living Below the Poverty Level, Families

Geography		With Related Children Under 18
United States	11.50%	18.10%
New Hampshire	5.70%	10.00%
Hillsborough County	5.90%	9.90%
GNPHR		
Amherst	1.60%	3.40%
Brookline	0.00%	0.00%
Hollis	1.40%	1.40%
Hudson	3.20%	7.00%
Litchfield	3.80%	5.70%
Lyndeborough	4.40%	8.50%
Mason	15.90%	25.40%
Merrimack	2.30%	3.70%
Milford	5.70%	9.60%
Mont Vernon	8.10%	9.40%
Nashua	7.50%	13.10%
Pelham	4.40%	5.00%
Wilton	1.20%	2.60%

Source: US Census Bureau.
2010-2014 American Community Survey

Table 4b. Percent of Families Living Below the Poverty Level, Married-Couple Families

Geography		With Related Children under 18
United States	5.70%	8.40%
New Hampshire	2.40%	3.30%
Hillsborough County	2.30%	3.20%
GNPHR		
Amherst	0.00%	0.00%
Brookline	0.00%	0.00%
Hollis	0.80%	8.00%
Hudson	0.00%	0.00%
Litchfield	1.30%	1.30%
Lyndeborough	1.50%	0.00%
Mason	4.80%	2.70%
Merrimack	0.90%	1.00%
Milford	3.50%	7.60%
Mont Vernon	3.90%	4.70%
Nashua	2.80%	4.30%
Pelham	2.60%	1.60%
Wilton	1.40%	3.00%

Source: US Census Bureau.
2010-2014 American Community Survey

Table 4c. Percent of Families Living Below the Poverty Level, Female Household

Geography		With Related Children under 18
United States	30.90%	40.50%
New Hampshire	22.00%	31.20%
Hillsborough County	21.90%	30.10%
GNPHR		
Amherst	9.80%	19.30%
Brookline	0.00%	0.00%
Hollis	7.70%	13.00%
Hudson	15.20%	22.60%
Litchfield	15.60%	18.20%
Lyndeborough	28.30%	33.30%
Mason	82.40%	91.30%
Merrimack	16.70%	20.20%
Milford	17.40%	19.20%
Mont Vernon	0.00%	0.00%
Nashua	20.90%	31.40%
Pelham	19.10%	25.60%
Wilton	0.00%	0.00%

Source: US Census Bureau.
2010-2014 American Community Survey

The average unemployment rate in all 13 towns in the GNPHR is less than 5% (range: 2.9-4.7%) (Table 5).[10] In some towns in the GNPHR, the unemployment rate varied by age, race/ethnicity, poverty, disability, and education, pointing to potential inequities (Table 6).[6]

Table 5. Working Force by Geography

Geography	Total Labor Force (2015)	Annual Unemployment Average (2015)
New Hampshire	741200	3.40%
GNPHR		
Amherst	6130	3.20%
Brookline	3157	3.00%
Hollis	4068	3.30%
Hudson	14381	4.30%
Litchfield	4573	3.90%
Lyndeborough	990	3.10%
Mason	766	4.40%
Merrimack	15635	3.40%
Milford	8852	3.30%
Mont Vernon	1429	3.10%
Nashua	48851	4.00%
Pelham	7335	4.70%
Wilton	2057	2.90%

Source: NHES – ELMI

Table 6. Unemployment Rate Stratified by Town and Selected Social Determinants of Health

	Amherst	Brookline	Hollis	Hudson	Litchfield	Lyndeborough
Overall (≥16 years old)	3.60%	3.50%	6.30%	8.30%	6.50%	4.10%
Age						
16 to 19 years	8.00%	5.00%	25.00%	17.90%	10.10%	0.00%
20 to 24 years	6.30%	6.60%	0.00%	13.80%	17.70%	9.40%
25 to 44 years	4.60%	3.00%	6.60%	7.10%	6.20%	3.80%
45 to 54 years	2.00%	4.40%	6.70%	6.70%	5.80%	3.40%
55 to 64 years	3.80%	1.90%	2.00%	8.10%	3.50%	2.70%
65 to 74 years	0.00%	0.00%	16.50%	7.80%	4.30%	10.00%
≥75 years	0.00%	0.00%	0.00%	0.00%	-	37.50%
Race and ethnicity						
One race	3.60%	3.60%	6.00%	8.20%	6.30%	4.10%
White	3.20%	3.60%	5.60%	8.50%	6.50%	4.20%
Black or African American	-	0.00%	-	0.00%	0.00%	0.00%
American Indian and Alaska Native	0.00%	0.00%	-	-	-	-
Asian	0.00%	0.00%	20.90%	6.00%	0.00%	0.00%
Native Hawaiian and Other Pacific Islander	-	-	-	-	-	0.00%
Some other race	100.00%	-	-	-	-	-
Two or more races	0.00%	0.00%	48.40%	28.90%	52.60%	0.00%
Hispanic or Latino origin (of any race)	24.30%	0.00%	0.00%	15.80%	0.00%	0.00%
White alone, not Hispanic or Latino	3.20%	3.60%	5.70%	8.30%	6.50%	4.30%
Poverty status in the past 12 months						
Below poverty level	31.10%	88.00%	74.60%	45.90%	15.80%	0.00%
Disability status						
With any disability	2.60%	27.40%	9.50%	16.50%	25.60%	0.00%
Education						
Population 25 to 64 years	3.40%	3.30%	5.60%	7.20%	5.60%	3.30%
Less than high school graduate	59.60%	0.00%	55.00%	24.90%	23.80%	13.30%
High school graduate (includes equivalency)	2.10%	2.50%	15.90%	6.40%	3.70%	2.80%
Some college or associate's degree	6.80%	3.00%	0.00%	7.40%	5.80%	0.00%
Bachelor's degree or higher	1.80%	3.90%	4.00%	5.50%	3.60%	4.30%

Source: US Census Bureau. 2010-2014 American Community Survey

Table 6. Unemployment Rate Stratified by Town and Selected Social Determinants of Health

	Mason	Merrimack	Milford	Mont Vernon	Nashua	Pelham	Wilton
Overall (≥16 years old)	3.7%	4.6%	6.7%	4.4%	6.0%	4.10%	3.6%
Age							
16 to 19 years	15.0%	8.8%	27.3%	11.3%	25.6%	12.6%	26.9%
20 to 24 years	10.7%	6.6%	17.7%	0.0%	12.0%	8.9%	0.0%
25 to 44 years	1.9%	3.6%	4.8%	5.3%	6.8%	3.5%	4.8%
45 to 54 years	5.3%	4.2%	2.3%	3.6%	7.0%	6.4%	3.4%
55 to 64 years	0.0%	3.9%	6.2%	4.2%	6.4%	8.1%	2.7%
65 to 74 years	0.0%	9.5%	9.0%	0.0%	4.1%	5.8%	0.0%
≥75 years	0.0%	20.0%	0.0%	-	11.2%	0.0%	0.0%
Race and ethnicity							
One race	3.8%	4.6%	6.7%	4.4%	7.9%	6.0%	4.1%
White	3.8%	4.3%	6.4%	4.4%	8.1%	6.2%	4.2%
Black or African American	-	0.0%	0.0%	-	6.5%	0.0%	0.0%
American Indian and Alaska Native	-	0.0%	0.0%	-	0.0%	-	-
Asian	-	8.1%	19.2%	-	5.0%	0.0%	0.0%
Native Hawaiian and Other Pacific Islander	-	-	0.0%	-	0.0%	0.0%	-
Some other race	0.0%	29.5%	0.0%	-	6.8%	0.0%	-
Two or more races	0.0%	0.0%	0.0%	0.0%	16.9%	5.3%	0.0%
Hispanic or Latino origin (of any race)	0.0%	9.3%	8.8%	0.0%	10.1%	8.0%	0.0%
White alone, not Hispanic or Latino	3.8%	4.2%	6.3%	4.5%	7.9%	6.10%	4.3%
Poverty status in the past 12 months							
Below poverty level	7.7%	8.9%	49.1%	12.9%	36.1%	28.4%	0.0%
Disability status							
With any disability	25.0%	6.9%	6.0%	0.0%	17.2%	15.0%	0.0%
Education							
Population 25 to 64 years	2.9%	3.9%	4.4%	4.3%	6.8%	5.4%	3.9%
Less than high school graduate	20.0%	12.6%	12.2%	36.4%	18.6%	4.7%	0.0%
High school graduate (includes equivalency)	3.0%	5.0%	4.2%	2.6%	6.3%	9.2%	8.4%
Some college or associate's degree	1.8%	3.6%	5.2%	3.5%	8.2%	5.8%	0.0%
Bachelor's degree or higher	2.2%	3.0%	3.6%	4.2%	3.7%	1.8%	4.5%

Source: US Census Bureau. 2010-2014 American Community Survey

Housing Burden

Households that spend more than 30% of their income on housing are classified as experiencing a housing cost burden.[1] This is one of the social determinants of health indicators for Healthy People 2020. If a large proportion of the household income is spent on housing, the amount of money available for healthy food, medical care, and other necessities may be inadequate, particularly for low-income households. This may contribute to food insecurity, stress, and possibly health outcomes.[11] Approximately one-third of households in the United States and New Hampshire spend more than 30% of their income on housing (Table 7).[12] The percentage of burdened households is highest in Hollis, which has the highest median household income in the GNPHR, and Milford, where the median income is much lower.

Table 7. Housing Burden 2009-2013

	Household Cost Burden Less than 30%	Household Cost Burden Greater than 30%	Percentage of Burdened Households
United States	75,819,990	39,371,638	34.18%
New Hampshire	331,110	182,980	35.59%
GNPHR			
Amherst	2,675	1,360	33.71%
Brookline	1,080	640	37.21%
Hollis	1,965	1,360	40.90%
Hudson	6,080	2,640	30.28%
Litchfield	1,820	900	33.09%
Lyndeborough	434	189	30.34%
Mason	345	117	25.32%
Merrimack	6,585	3,090	31.94%
Milford	3,465	2,540	42.30%
Mont Vernon	518	296	36.36%
Nashua	22,025	12,520	36.24%
Pelham	2,800	1,590	36.22%
Wilton	910	514	36.10%

Source: U.S Department of Housing and Urban Development

Assistance with Food Insecurity, Child Development, and Other Health and Human Services

The provision of health and human services, such as food supplementation and early intervention for children, is necessary to address health inequities. The reduction of food insecurity is a Healthy People 2020 objective.[1] Fewer than 1% of households in most towns in the GNPHR receive food stamps or participate in the Supplemental Nutrition Assistance Program (SNAP) (Table 8).[6]

Table 8. Proportion of Households Receiving Food Stamps / Supplemental Nutrition Assistance Program

Geography	Percentage
United States	1.4%
New Hampshire	1.2%
GNPHR	
Amherst	0.3%
Brookline	0.0%
Hollis	0.5%
Hudson	NA
Litchfield	1.1%
Lyndeborough	1.3%
Mason	0.6%
Merrimack	0.6%
Milford	1.7%
Mont Vernon	0.6%
Nashua	1.4%
Pelham	NA
Wilton	0.0%
Source: US Census Bureau. 2010-2014 American Community Survey	

Table 9. Provision of Assistance by Southern New Hampshire Services, 2016

	Households served by child & adult care food program (%)	Households served by commodity foods program (%)	Households participating in the WIC nutrition programs (%)	Households participating in the electric assistance program (%)
Amherst		7 (0.2%)	10 (0.3%)	66 (1.7%)
Brookline			6 (0.4%)	35 (2%)
Hollis		2 (0.1%)	16 (0.6%)	39 (1.4%)
Hudson	4 (0%)	10 (0.1%)	156 (1.8%)	352 (4%)
Litchfield			36 (1.3%)	85 (3.1%)
Lyndeborough			3 (0.5%)	20 (3.1%)
Mason			6 (1.2%)	11 (2.2%)
Merrimack	2 (0%)		122 (1.3%)	237 (2.5%)
Milford	4 (0.1%)		138 (2.3%)	315 (5.2%)
Mont Vernon			8 (1%)	21 (2.5%)
Nashua	284 (0.8%)		1,584 (4.6%)	2,607 (7.6%)
Pelham			34 (0.8%)	106 (2.4%)
Wilton	2 (0.1%)		28 (2%)	76 (5.3%

Source: 2016 Southern New Hampshire Services Annual Report
Number of households from US Census Bureau. 2010-2014 American Community Survey

Southern New Hampshire Services provides assistance to low-income individuals and households. These services help to reduce inequities in the social determinants of health in the catchment area. Southern New Hampshire Services provides assistance with food security and nutrition, fuel and energy, housing, and child development. . The vendor of WIC and Head Start Services for City of Nashua and the rest of Hillsborough County is Southern New Hampshire Services (SNHS). In 2016, 2,147 households in the GNPHR received WIC services (Table 9). Nearly 75% of these households are in Nashua. There are 3,970 households in the GNPHR which participate in the electric assistance program.[13]

Source: SNHS

Head Start

Head Start is a comprehensive child development program designed to nurture healthy growth and development of preschool children. In 2016, Southern New Hampshire Services delivered Early Head Start and Head Start services to 56 and 140 children, respectively, in the GNPHR (Table 10). These services include[13]:

- **Day Head Start:** 4 hours of comprehensive preschool services including developmental, health and nutrition screenings, family support and parenting education and breakfast and lunch.
- **Head Start with Wrap-around Child Care:** For families who are working, going to school, or involved in a NH Employment Program.
- **Center Based Early Head Start:** Developmental screening, assessments and activities to enhance the development of infants and toddlers.
- **Home Based Early Head Start:** Weekly home visits for each enrolled family and child to promote parental ability to support the child's development.

Table 10. Number of Individuals Served by Early Head Start, 2016

	Early Head Start	Head Start
Amherst		
Brookline		
Hollis		
Hudson		4
Litchfield		
Lyndeborough		
Mason		
Merrimack	1	1
Milford		4
Mont Vernon		
Nashua	55	129
Pelham		
Wilton		2

Source: 2016 Southern New Hampshire Services Annual Report

Free and Reduced Lunch Program

The National School Lunch Program has provided more than 224 billion free or reduced cost meals to school children in the United States since it began in 1946.[13] The proportion of children who are eligible for free or reduced cost school lunch in the school districts in the GNPHR ranges from 2.95% in Hollis to 42.19% in Nashua (Table 11).[14] Within some of the school districts there is substantial variation in the

proportion of children who are eligible in different schools. For example, in Nashua, the proportion of children who were eligible in individual schools ranged from about 10% to 77%.[14] There is a multi-agency collaboration underway to ameliorate food insecurity for children in Nashua.[15,16] The pilot program distributed more than 1,000 meals during its first month in the summer of 2017.

Table 11. Eligibility for Free or Reduced Cost School Lunch, 2016-2017 School Year

School District	% Eligible for Free/Reduced School Lunch	School	% Eligible for Free/Reduced School Lunch
Amherst	4.71%	Amherst Middle School	4.09%
		Clark-Wilkins School	5.44%
Brookline	7.81%	Captain Samuel Douglass Academy	9.54%
		Richard Maghakian Memorial School	5.80%
Hollis	2.95%	Hollis Primary School	2.31%
		Hollis Upper Elementary School	3.47%
Hollis-Brookline Cooperative	4.49%	Hollis-Brookline High School	3.74%
		Hollis-Brookline Middle School	5.98%
Hudson	16.76%	Alvirne High School	12.23%
		Dr. H. O. Smith Elementary School	21.03%
		Hills Garrison Elementary School	19.36%
		Hudson Memorial School	16.81%
		Nottingham West Elementary School	23.09%
Litchfield	10.66%	Campbell High School	7.79%
		Griffin Memorial School	16.47%
		Litchfield Middle School	9.23%
Mason	28.81%	Mason Elementary School	28.81%
Merrimack	9.25%	James Mastricola Elementary School	9.30%
		James Mastricola Upper Elementary School	10.00%
		Merrimack High School	7.75%
		Merrimack Middle School	9.21%
		Reeds Ferry School	14.29%
		Thorntons Ferry School	7.59%
Milford	19.25%	Heron Pond Elementary School	22.05%
		Jacques Memorial Elementary School	14.71%
		Milford High School	17.27%
		Milford Middle School	20.00%

Table 11. Eligibility for Free or Reduced Cost School Lunch, 2016-2017 School Year

School District	% Eligible for Free/Reduced School Lunch	School	% Eligible for Free/Reduced School Lunch
Mont Vernon	10.00%	Mont Vernon Village School	10.00%
Nashua	42.19%	Amherst Street School	73.28%
		Bicentennial Elementary School	9.84%
		Birch Hill Elementary School	31.32%
		Broad Street Elementary School	31.25%
		Charlotte Ave Elementary School	25.24%
		Dr. Norman W. Crisp School	75.91%
		Elm Street Middle School	43.28%
		Fairgrounds Elementary School	70.69%
		Fairgrounds Middle School	44.98%
		Ledge Street School	78.59%
		Main Dunstable School	15.58%
		Mt. Pleasant School	77.00%
		Nashua High School North	41.06%
		Nashua High School South	35.33%
		New Searles School	16.67%
		Pennichuck Middle School	48.51%
		Sunset Heights School	37.82%
Souhegan Cooperative	4.21%	Souhegan Coop High School	4.21%
Wilton-Lyndeborough Cooperative	25.62%	Florence Rideout Elementary School	30.37%
		Wilton-Lyndeboro Middle School	24.46%
		Wilton-Lyndeboro Senior High School	20.59%

Does not include public charter schools.
Source: New Hampshire Department of Education, Free/Reduced School Lunch Eligibility

Lesbian, Gay, Bisexual, and Transgender Populations

Improved data collection to identify the lesbian, gay, bisexual, and transgender population is a Healthy People 2020 objective.[1] In the United States, less than 2% of the population self-identifies as gay (Table 12).[17] Data about sexual orientation in the GNPHR is not readily available. However, according to the 2010-2014 ACS, fewer than 1% of households in all towns in the GNPHR included same-sex partners (Table 13).[6] Sexual minorities are a vulnerable population that frequently experience social and

institutional discrimination and have worse health outcomes, including mental health, suicide, substance use, and HIV/AIDS, compared with heterosexuals.[18]

Table 12. Sexual Identity and Behavior for Men and Women Ages 18-44, United States, 2011-2013

Sexual Identity	Females	Males
Heterosexual or Straight	92.3%	95.1%
Homosexual (Gay or Lesbian)	1.3%	1.9%
Bisexual	5.5%	2%
Ever had Sexual Activity with Same-Sex Partner	17.4%	5.7%
Source: National Center for Health Statistics, National Survey of Family Growth		

Table 13. Percent of Households with Unmarried Same-Sex Partners

Geography	Percentage
United States	0.5%
New Hampshire	0.5%
GNPHR	
Amherst	0%
Brookline	0.5%
Hollis	0.5%
Hudson	0%
Litchfield	0%
Lyndeborough	0%
Mason	0%
Merrimack	0.2%
Milford	0.6%
Mont Vernon	0%
Nashua	0.6%
Pelham	0.4%
Wilton	0%
Source: US Census Bureau. 2010-2014 American Community Survey	

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Access to Healthcare

"Of all the forms of inequality, injustice in healthcare is the most shocking and inhuman"
-Martin Luther King Jr.

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Access to Health Care

Increasing access to healthcare is vital to increasing the health of communities, expanding health equity and increasing quality of life. Access to healthcare is not limited to having health insurance, it includes being able to access services through timely appointments, finding healthcare providers that the patient can communicate with, accessing the treatments or testing needed to maintain or increase health and being able to understand health information that is being provided. Individuals that do not have health insurance are less likely to receive medical care and are more likely to die and have a poor health status.[1] Nationally, 88% of people have a specific source of ongoing care and 10% are unable to obtain or have a delay in obtaining necessary medical care, dental care or prescription medications.[1]

The leading causes of death in the Greater Nashua Public Health Region (GNPHR) are:

1. Cancer
2. Heart Disease
3. Chronic Lower Respiratory Diseases
4. Accidents
5. Stroke

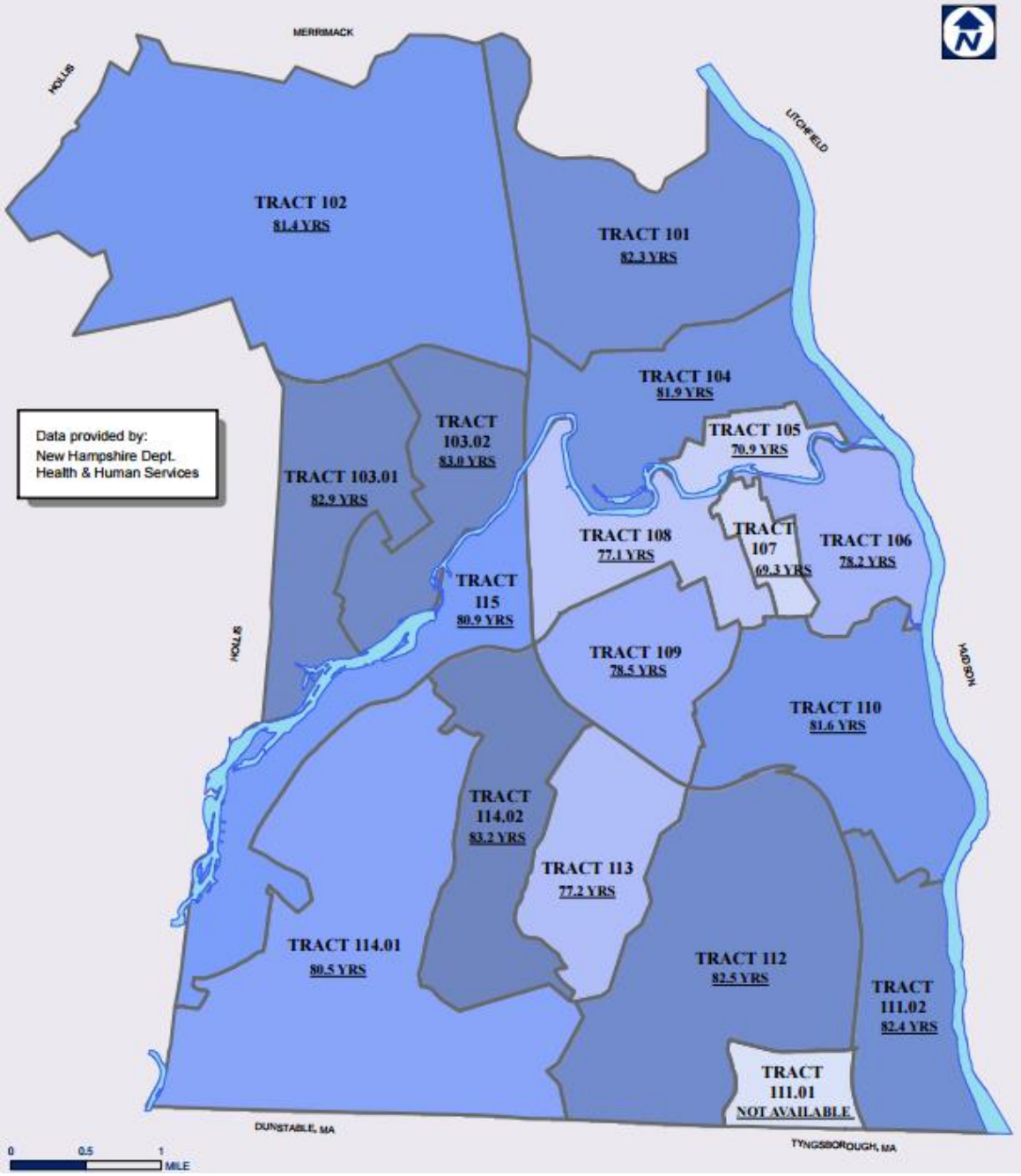
Nationally, the life expectancy is 78.8 years.[9] The life expectancy in the City of Nashua varies by census tract with the lowest life expectancy of 69 years and the highest at 83 years (Figure 1).[10]

Primary Care and Dental Health

In Nashua, there are 2 census tracts that are designated as medically underserved areas, 105 and 108 (indicated on the map with the red arrows in Figure 2). Throughout the region, health insurance coverage varies from 71% to 98%. The census tracts in the region with the lowest health insurance coverage are also the census tracts with higher rates of poverty and unemployment. The Healthy People 2020 goal is to have 100% insured.[1]

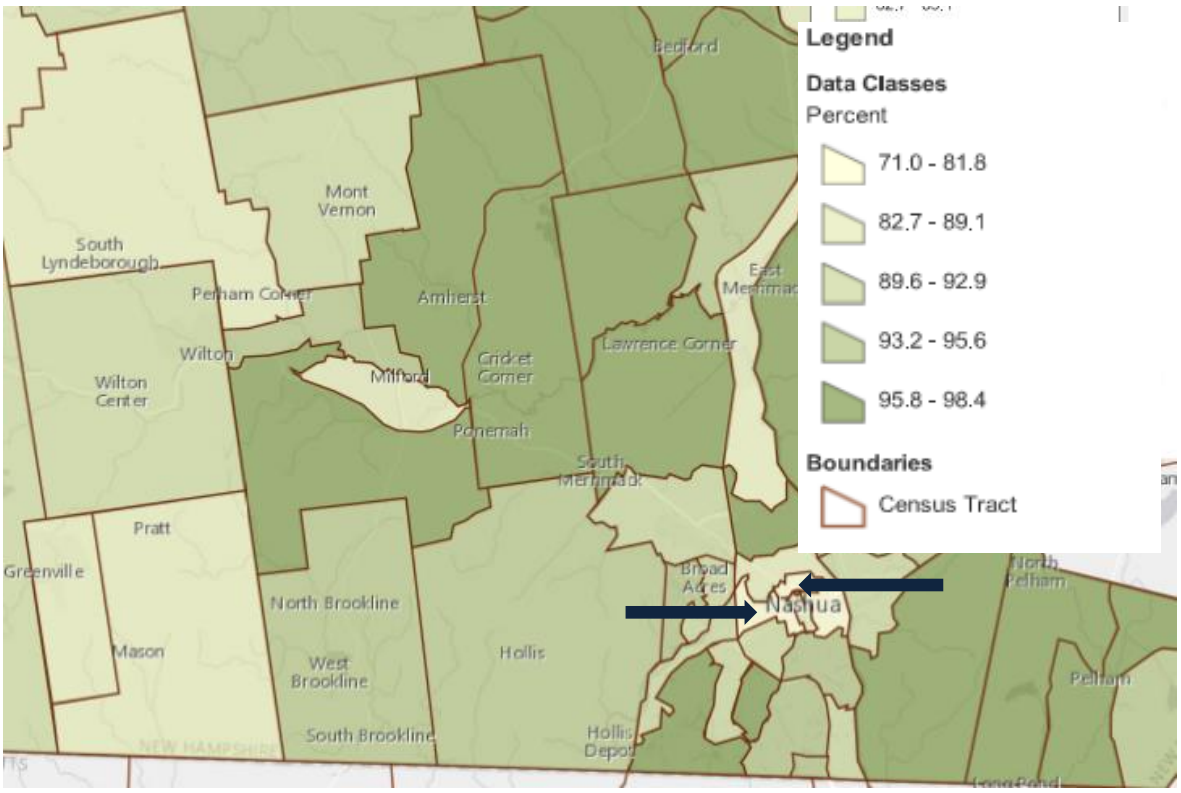
In 2012 in the United States, 76.5% of residents had a usual primary care provider but this varied when separated by race and ethnicity. In the same year, 69% of Hispanic or Latino's and 80% of Caucasians had a primary care provider. The Healthy People 2020 goal is for 83.9% of individuals to have a primary care provider.[1] In 2015 in the Greater Nashua Public Health, 84% of adults had a personal primary care provider which does meet the Healthy People 2020 goal (Figure 3). In 2014 in Nashua, between 63% and 74% of residents visited a doctor for a routine check-up within the past year. In the same year in Nashua, between 46% and 77% of residents visited a dental clinic (Figure 3).[2] Visiting a primary care provider and regularly going to the dentist is an important part of maintaining a healthy lifestyle and decreasing chronic conditions. When people are not accessing preventative care, it can affect their quality of life and health. About 16% of adults in the GNPHR rate their health as fair or poor.[8]

Figure 1. Map of Life Expectancy by Census Tract, Nashua, 2017



Source: NH DHHS, 2017

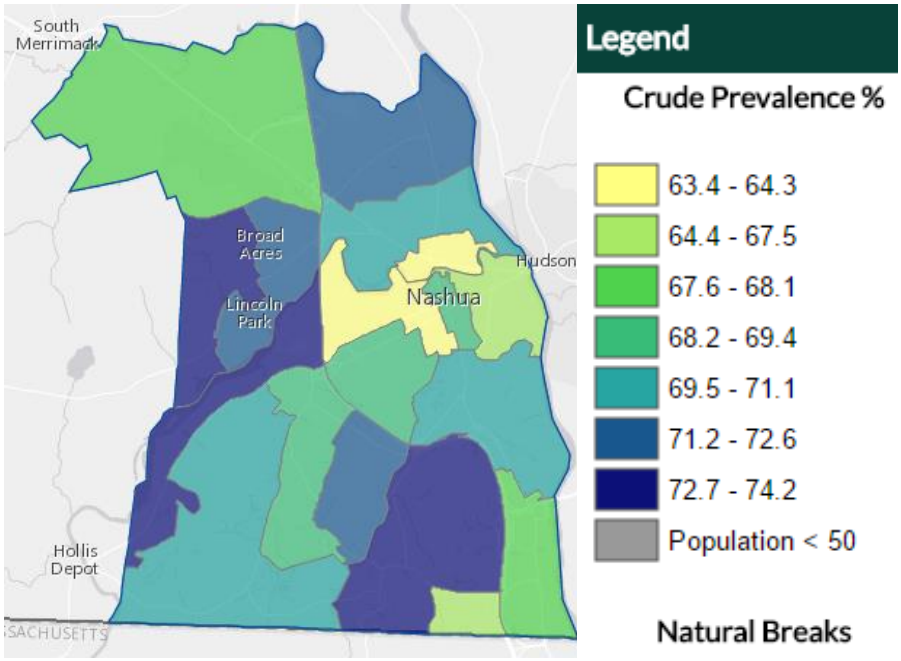
Figure 2. Map of Percent Insured by Census Tract, GNPHR, 2011-2015



Source: American Factfinder
(Arrows indicate census tracts 105 and 108 which are designated as a medically underserved area)

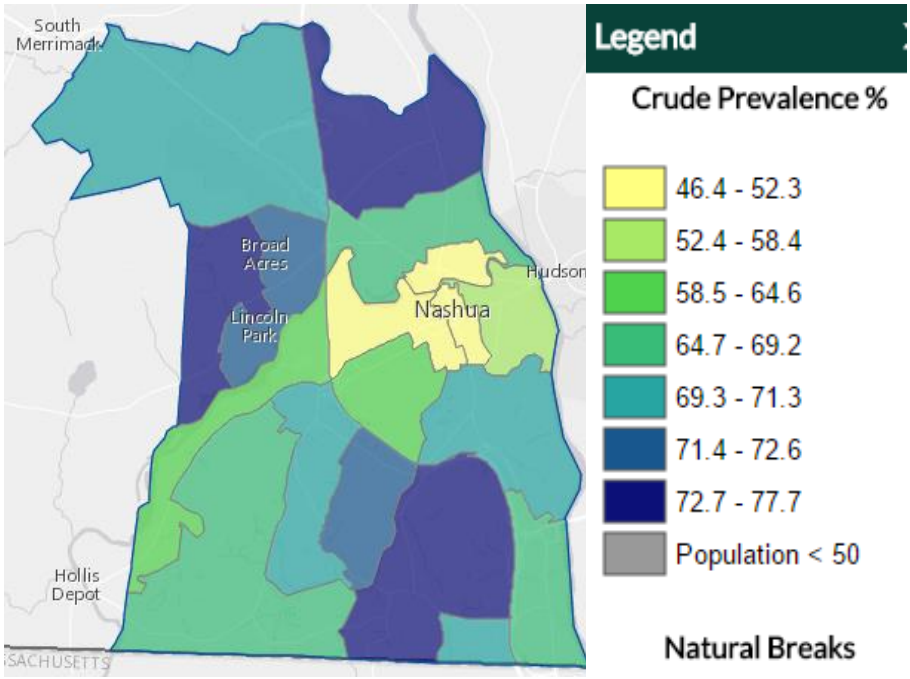
The data for the maps in figures 3-4 were obtained using the CDC's 500 Cities Project based on the Behavioral Risk Factor Surveillance Survey. The Centers for Disease Control and Prevention used a multi-level statistical modeling framework to generate small area estimates for this data. For more information on the 500 Cities project, visit https://www.cdc.gov/500cities/index.htm.[2]

Figure 3. Model-based Estimates for Visits to Doctor for Routine Check-up within the Past Year in Adults >18 years, Nashua, 2014



Source: Esri, HERE; CDC/NCCDPHP/DPH

Figure 4. Model-based Estimates for Visits to Dentist or Dental Clinic among Adults >18 years, Nashua, 2014

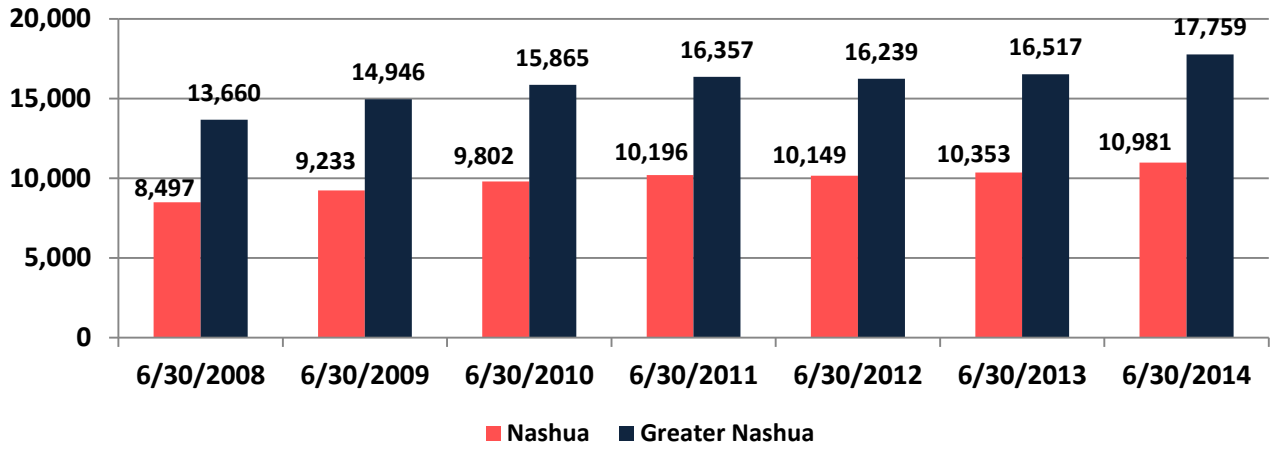


Source: Esri, HERE; CDC/NCCDPHP/DPH

Medicaid

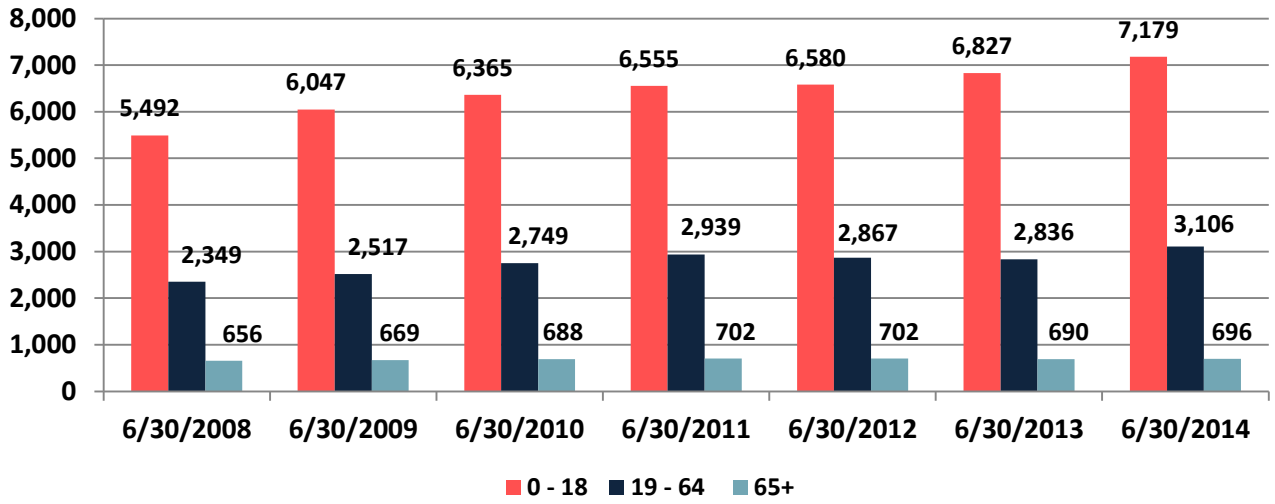
The NH Medicaid Program provides payment for healthcare services including preventative services, hospitals care, home health and prescriptions. It is a federal and state funded program for qualifying individuals, including individuals with developmental disabilities.[3] From 2008 to 2013, the number of enrollees in Nashua and the GNPHR has increased from 13,660 to 17,759. In 2014, 7,179 of the enrollees in Nashua were 0-18 years old.[3] In 2014, a change in the State Law increased coverage to low income NH residents through the New Hampshire Health Protection Plan.[4] In 2015 there were 5,135 residents from the GNPHR that were enrolled in the program and 6,251 in 2016.[3]

Figure 5. Medicaid Enrollment, Nashua and GNPHR, 2008-2014



Source: NH Medicaid Program (Note: GNPHR enrollment includes Nashua enrollees)

Figure 6. Medicaid Enrollment by Age, Nashua, 2008-2014



Source: NH Medicaid Program

Health Insurance Marketplace

The Health Insurance Marketplace "provides health plan shopping and enrollment services through websites, call centers, and in-person help" to help people enroll in affordable health insurance.[5] It was started as part of the Affordable Care Act that was passed in 2010 and since that time, 20 million people have gained health insurance coverage.[6] In Hillsborough County, 15,079 people were enrolled in a plan from the Marketplace. A demographic breakdown can be seen in Table 1.[7]

Table 1. 2016 Qualifying Health Plan Selections as of February 1, 2016, Hillsborough County

Household Income as a Percent of the Federal Poverty Level	Number (Total Plan Selections = 15,079)
<100%	300
>100% and ≤138%	849
>138% and ≤150%	1,102
>150% and ≤200%	3,265
>200% and ≤250%	2,121
>250% and ≤300%	1,517
>300% and ≤400%	1,870
>400%	683
Unknown	3,372
Race/Ethnicity	
Asian	659
African American	152
Latino	589
Multiracial	135
Caucasian	8,449
Unknown	5,080
Age Group	
0-17	1,408
18-25	1,327
26-34	2,596
35-44	2,233
45-54	3,204
55-64	4,235
65+	76
Unknown	0
Source: Multi-Dimensional Insurance Data Analytics System, CMS	

Looking Ahead

Continuing to increase access to healthcare is vital to having a healthy and vibrant community. Healthcare and health insurance is in an ever-changing state of flux and it is increasing more important that we work together to leverage resources, increase health literacy, and ensure people are accessing preventative services.

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Healthy Moms and Babies

"Children are great imitators. So give them something great to imitate."
-Philip Johnson

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Healthy Moms and Babies

Maternal health is the health of a woman during her pregnancy, birth and postpartum period. It is also an important predictor of newborn health. Access to health care for women is vital to ensure the health of the community by preventing infant and maternal complications and death. Many factors affect maternal health including individual health behaviors such as nutrition, tobacco use, alcohol use, access to appropriate care and socioeconomic factors. Preconception health focuses on actions women can take before and between pregnancies to increase their chances of having a healthy baby. This includes thinking about their goals for having or not having children and how to achieve those goals, addressing health issues with their health care provider before getting pregnant, and adopting a healthy lifestyle. The well-being of mothers, infants, and children determines the health of the next generation and can help predict future public health challenges for families, communities and the healthcare system. Healthy birth outcomes and early identification and treatment of health conditions among infants can enable children to reach their full potential.[1]

Most newborns grow and thrive. However, for every 1,000 babies that are born, almost six die during their first year. Most of these babies die as a result of "birth defects, preterm birth (birth before 37 weeks gestation) and low birth weight, maternal complications of pregnancy, Sudden Infant Death Syndrome (SIDS), and injuries (e.g., suffocation)".[1] The top five leading causes of infant mortality together account for over half (57%) of all infant deaths that happened in the United States in 2014. In 2015, there were about "1,600 deaths due to SIDS, 1,200 deaths due to unknown causes, and about 900 deaths due to accidental suffocation and strangulation in bed."[1] The Healthy People 2020 (HP2020) goal to improve the health and well-being of infants, women, children, and families is supported by its objectives to improve national metrics around infant mortality, preconception, pregnancy and postpartum health of mothers, infant care and the reduction of impairments and access to health services.[2] In 2014, approximately 1,200 more new mothers obtained health insurance, a decrease of more than 50% in uninsured mothers. Insurance status supports improved access to reproductive and preventative care, smoking cessation, mental health services and other paramount resources which lead to improved health outcomes for mothers and babies.[3]

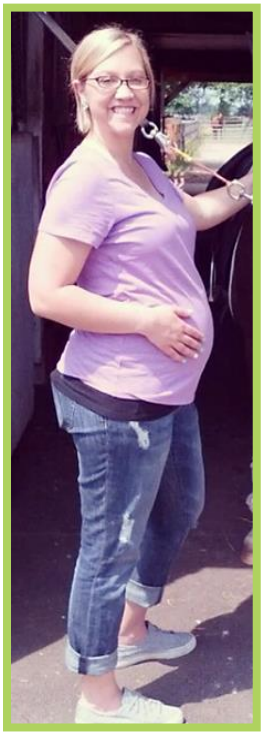


Photo courtesy of Stephanie Perreault

In 2016, the fertility rate in the United States was the lowest it has ever been. There were 62 live births per 1,000 women aged 15 to 44, a decrease of 1% from 2015, totaling 3,941,109 births.[4] There were 3,978,497 registered births in the United States in 2015, which was also a decline of 9,579 births from 2014 (3,988,076).[5] The present overall fertility rate puts the United States population below replacement level, but that does not mean the population is declining. The birthrate among unmarried women went down to 42.1 live births per 1,000 from 43.5 live births in 2015, a drop of 3% and the eighth consecutive year of decline since the peak of 51.8 in 2007 and 2008. Differences observed by race and ethnicity showed 28.4% of white babies were born to unmarried parents,

compared to 69.7% of black babies and 52.5% of Hispanic babies.[4] Birthrates per 1,000 are shown for the Greater Nashua Region and Nashua in Table 1 from 2011 to 2015 for females aged 15-44. Both Nashua and the Greater Nashua Region have seen decreases in births since 2011.[6]

Table 1. Birth rate (per 1,000) by Geography, Females Age 15-44, 2011-2015

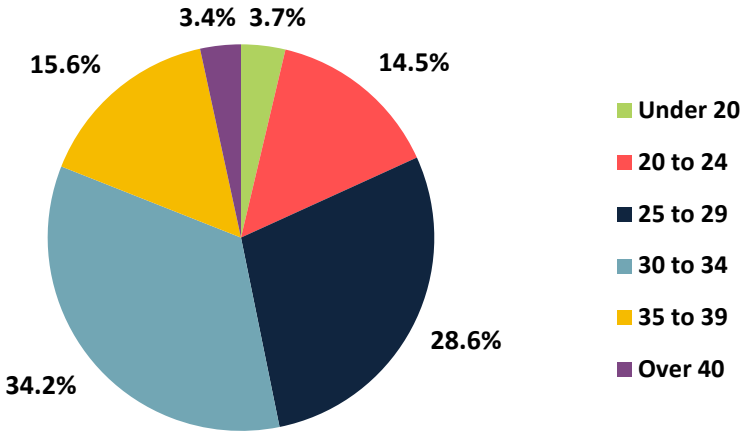
Year	Nashua	GNPHR
2011	63.2 (CI 59.5-67.1)	52.3 (CI 50.1-54.6)
2012	55.8 (CI 52.4-59.4)	48.3 (CI 46.2-50.5)
2013	58.5 (CI 55.0-62.2)	52.6 (CI 50.3-54.9)
2014	58.1 (CI 54.6-61.9)	52.7 (CI 50.4-55.0)
2015	58.4 (CI 54.8-62.2)	54.0 (CI 51.7-56.4)
Source: Bureau of Public Health Statistics and Informatics, 2011-2015		

In an analysis issued by the National Center for Health Statistics, researchers report that 2016 birthrates (in the US) declined to record lows in all groups under age 30. The birth rate for teenagers aged 15–19 decreased 9% in 2016 to 20.3 births per 1,000 women; rates declined for both younger (aged 15–17) and older (aged 18–19) teenagers. Among women ages 20 to 24, the decline was 4%. For women 25 to 29, the rate fell 2%. The decrease in the birthrate among teenagers of 9 percent from 2015 to 2016 continues a long-term decline: 67% since 1991. However, fertility increased among older women in 2016. The birthrate for women ages 30 to 34 in 2016 was 102.6 births per 1,000 women, up 1% from 2015 (101.5) to the highest rates for this age group since 1964.[4]

Advanced maternal age, defined as age 35 years and older at estimated date of delivery, has become increasingly common. Research indicates "it is likely that effective birth control, advances in assisted reproductive technology (ART), delayed marriage, increasing rates of divorce followed by remarriage, and women's pursuit of higher education and career advancement" contribute to this trend.[7] The 2016 birth rate for women aged 35–39 was 52.6 births per 1,000 women, up 2% from 2015 (51.8) to the highest rate for this age group since 1962. Women ages 40 to 44 also had more babies, up 4% from 2015 to the highest rate for this age group since 1966. The rate for women 45 to 49 increased to 0.9 births per thousand from 0.8 in 2015.[4]

Figure 1 highlights maternal age in the Greater Nashua Region from 2011-2016. The majority of births within the Greater Nashua Region were to mothers aged 30-34 (34.2%). This same age category also accounted for the majority of births in Nashua (31.3%) and NH (31.3%). Births to mothers in the Greater Nashua Region, age 30-39, have increased from 996 births (46.7%) in 2011 to 1,117 (52.6%) in 2016. From 2011-2015, mothers age 35 and older experienced higher rates (1.8%) of very low birth weight (<1500 grams) than those mothers age 20 to 34 (1.2%), in the Greater Nashua Region.[6]

Figure 1. Maternal Age, GNPHR, 2011-2016



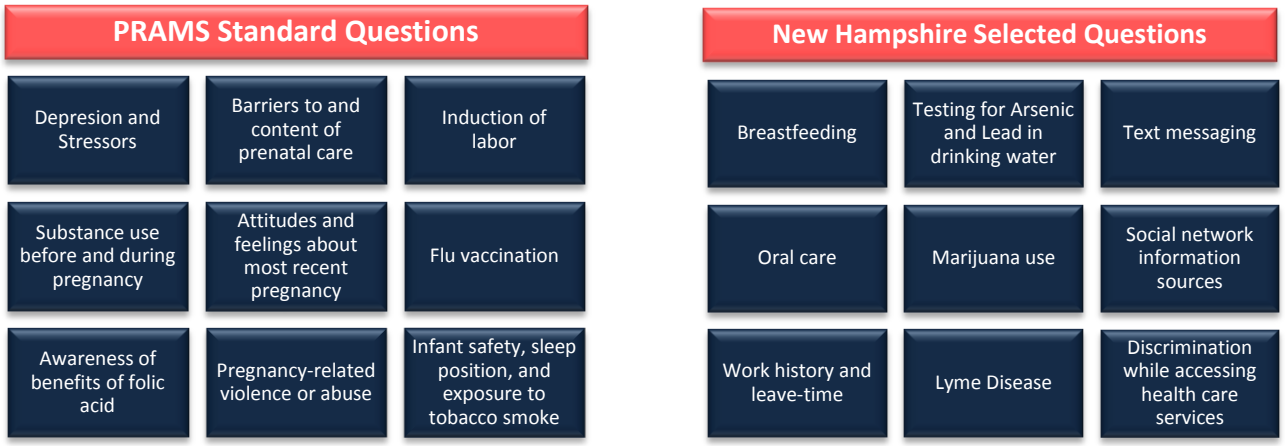
Source: Bureau of Public Health Statistics and Informatics, 2011-2016

Pregnancy Risk Assessment Monitoring System (PRAMS)

The Pregnancy Risk Assessment Monitoring System (PRAMS), is a Centers for Disease Control and Prevention (CDC) initiative aimed to reduce infant mortality and low birth weight. The survey collects state-specific, population-based data about maternal behaviors and experiencces before, during, and after pregnancy. In New Hampshire, approximately one of every twelve mothers of newborns is selected for PRAMS. The women are randomly sampled between two and six months after giving birth. The data is weighted to reflect the entire population of New Hampshire women who have had a live birth that year. PRAMS data will be used to identify groups of women and infants at high risk for health problems, monitor changes in health status, and measure progress toward goals in improving the health of mothers and infants. Findings from PRAMS are used to enhance understanding of maternal behaviors and their relationship with adverse pregnancy outcomes. PRAMS data are also used to design and evaluate health programs and to inform policymakers and the community. PRAMS includes questions asked by all participating states, as well as state-specific questions chosen or developed by the individual states.[3] Figure 2 lists the most recent questions included in NH and National PRAMS survey. Some highlights from the 2017 NH PRAMS report include:

- Nearly 90% of mothers place their baby to sleep on his or her back
- Approximately, 84% of women always used a seatbelt during pregnancy
- Over 31% of women had their prenatal care paid for by Medicaid
- Nearly 70% of women had insurance for dental care during pregnancy
- Over 60% of women were above 185% of the Federal Poverty Level (FPL), and over 20% were at or below 100% of FPL.

Figure 2. Pregnancy Risk Assessment Monitoring (PRAMS) Questions, 2016



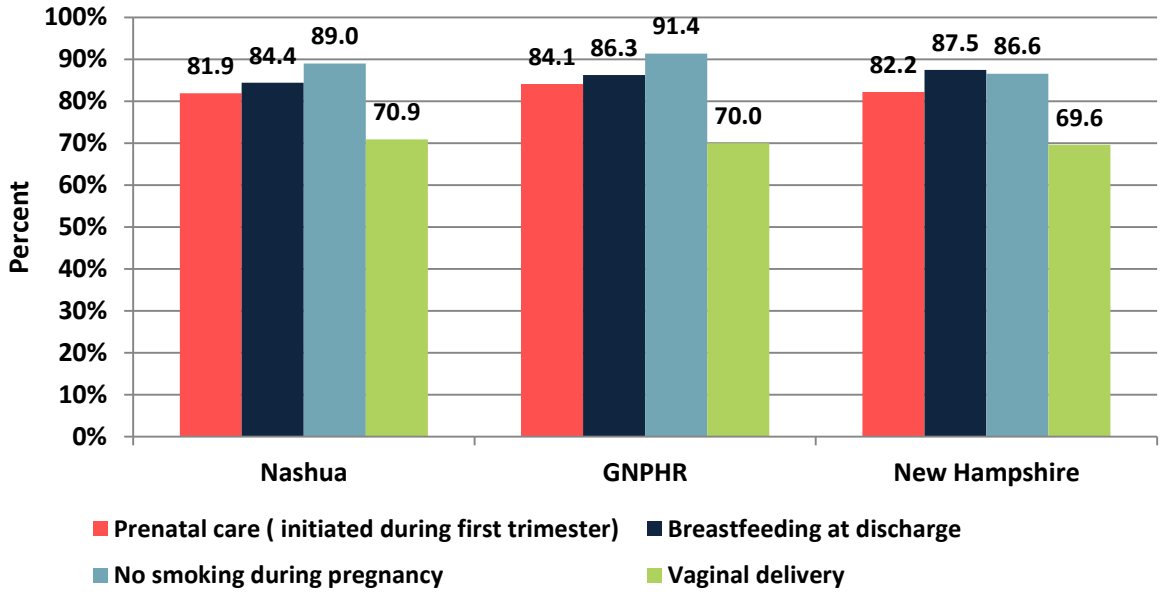
Source: PRAMS Data Report, 2017

Maternal Health Indicators

Figure 3 is a comparison of maternal health indicators for Nashua, the Greater Nashua Public Health Region, and New Hampshire from 2011-2016. These indicators include: prenatal care, breastfeeding at discharge, no smoking during pregnancy and vaginal birth. These maternal indicators are protective factors which improve the health of the mother and the baby. According to NH PRAMS, 89.2% of surveyed mothers reported seeking prenatal care in the first trimester, 71.8% reported talking to a healthcare provider about smoking, and 88.7% reported talking to a healthcare provider about breastfeeding. Method of delivery was not included in the PRAMS questionnaire.[6]

In the Greater Nashua Region, 84% of women received prenatal care in the first trimester of pregnancy, 86% of women were breastfeeding at discharge, 91% did not smoke during pregnancy and 70% had a vaginal birth. In Nashua, 81.9% of women received prenatal care in the first trimester of pregnancy, 84% of women were breastfeeding at discharge, 89% did not smoke during pregnancy, and 70.9% had a vaginal birth. In NH, 82.2% of women received prenatal care in the first trimester of pregnancy, 88% of women were breastfeeding at discharge, 87% did not smoke during pregnancy, and 69.6% had a vaginal birth.[6] All three geographies met the HP2020 goals to increase the percentage of women who receive prenatal care in the first trimester to 77.9% and to increase the percentage of infants who are ever breastfed to 81.9%. No geography met the HP2020 goal to increase the percentage of women delivering a live birth that report abstaining from smoking cigarettes during pregnancy to 98.6%. Currently, there is no HP2020 objective to increase vaginal births, only to reduce cesarean births among low risk women.[2]

Figure 3. Maternal Health Indicators by Geography, 2011-2016



Source: Bureau of Public Health Statistics and Informatics, 2011-2016

Pre-term Birth and Birth Weight

Many factors that affect the health of a mother-to-be can also influence the growth and development of her unborn child. A mother's age, weight, diet and substance use—including smoking, drug and alcohol use—can cause her baby to be smaller than average at birth. Medical problems during pregnancy, such as hypertension, anemia, and diabetes, can also contribute to low birthweight and pre-term birth. According to the March of Dimes Foundation, the average cost of medical care for a premature or low birth-weight baby in the first year of life is about $49,000. By contrast, medical care for a newborn without complications is estimated to cost approximately $4,551 in the first year of life.[8]

Photo courtesy of Amy Arnold

Babies with low birth weight, that is less than 5 lbs 8 oz, or very low birth weight, that is less than 3 lbs 4 oz, are at increased risk for infant mortality or future health complications. Mortality risk is lowest for infants weighing 7.7-9.9 pounds.[9] HP2020 goals related to birthweight include reducing low birth weight to 7.8% of live births and very low birth weight to 1.4% of live births. Nationally, the low birthweight rate was up for the second straight year to 8.16%.[4] Table 2 compares moderately low and very low birthweights for babies born in Nashua, the Greater Nashua Region, and the State of NH. When compared to the HP2020 goal of 7.8% for moderately low birth weight and 1.4% for very low birth weight, all three NH geographies have met the HP2020 goals.[2]

Table 2. Birth Weight, 2011-2015

Year	Nashua	GNPHR	New Hampshire
Moderately low birth weight (1,500-2,499 grams)	7.8%	7.4%	6.9%
Very low birth weight (<1,500)	1.3%	1.3%	1.1%
Source: NH WISDOM, 2011-2015			

Weight at birth is closely associated with gestational age and can be an important and independent predictor of short and long-term health outcomes.[10] Best birth outcomes are seen in a delivery that results from full term gestation, meaning delivery after at least 39 weeks gestation.[9] A full term delivery is preferred because the fetus has had time and nourishment to develop their health potential. The infant born is therefore less likley to have problems such as visual and hearing impairments, developmental delays, and behavioral and emotional issues. Babies who are born earlier than 39 weeks may have additional health risks due to their size and degree of gestational development. Preventing preterm birth remains a challenge because there are many factors, which may lead to preterm birth, and the reasons may be complex and not always well understood. However, pregnant women can take important steps to help reduce their risk of preterm birth and improve their general health.[10] These steps include "quitting smoking, avoiding drugs and alcohol, receiving prenatal care, seeking medical attention for any warning signs of preterm labor, and discussing progesterone treatment if there was a previous preterm birth".[10]

National preterm birth rates decreased by 8% from 2007 to 2014, and CDC research shows that this decline is due, in part, to declines in the number of births to teens and young mothers.[10] The 2016 preterm birthrate increased to 9.84 percent from 9.63 percent in 2015. This is the second consecutive year of increases in preterm birth after a decline of 8 percent from 2007 to 2014. In 2015, the rate of preterm birth among non-hispanic black women, at 13%, was about 50% higher than the rate of preterm birth among white women, at 9%. In 2016, the highest rate of preterm birth was among non-Hispanic blacks, at 13.75%, and lowest among Asians, at 8.63%.[4] Of those participating in NH PRAMS, 3.5% of babies were considered preterm at less than 37 weeks and 93.3% had an estimated gestational age of 37-42 weeks.[3] And, while it's too early to know what caused this increase or if this is the start of a trend, we do know that racial and ethnic disparities persist.

Table 3 compares gestational age at time of birth for Nashua, GNPHR, and NH for both infant genders to mothers of all ages from 2011-2015. Preterm is defined as less than 37 weeks, early term is 37-38 weeks, and full term is equal to or more than 39 weeks gestation. One and a half percent of babies in both Nashua and the region and 1.3% of babies in NH were considered very preterm (<32 weeks) from 2011-2015. Most births are considered full term deliveries, accounting for 69.2% to 70.9% of all deliveries in the three geographies from 2011-2015. In 2011, 67.4% babies were full term in Nashua and 67.8% of babies were full term in the Greater Nashua Region. Percentages of full term babies continue to rise with most recent 2015 numbers showing 73.0% of babies were full term in Nashua and 71.4% babies were full term in the region.[9] When compared to the HP2020 target to reduce the number of

preterm births to 11.4% by 2020 and NH SHIP target to reduce the number of preterm births to 9.1% in 2015, all three geographies have met the goals.[2,11]

Table 3. Gestational Age at Birth, 2011-2015

Gestational age	Nashua	GNPHR	New Hampshire
Preterm (<37 weeks)	9.1%	9.1%	8.2%
Early Term (37-38 weeks)	20.8%	20.3%	19.8%
Full term (≥39 weeks)	69.2%	69.4%	70.9%
Unknown	.9%	1.2%	1.1%
Source: NH WISDOM			

In NH, reduction of non-medically indicated early (<39 weeks gestation) elective deliveries has resulted in a shift in distribution of gestational age.[9] Induction of labor, by use of medication to begin contractions, was experienced by 41.6% of mothers participating in NH PRAMS.[8] Induction reasoning for respondent NH women is shown in Table 4.

Table 4. Reason for Induction of Labor for NH PRAMS Participants, 2014

Reason for Induction	Percentage of Mothers
Water broke, fear of infection	16.8
Past due date	36.3
Concerns about baby size	12.6
Baby not doing well	3.3
Pregancy complications	16.5
Labor stopped / not prorgressing	18.6
Wanted to schedule a delivery	-
To have a specific provider	-
Other	24.2
Source: NH PRAMS Data Book, 2017	

Teen Pregnancy

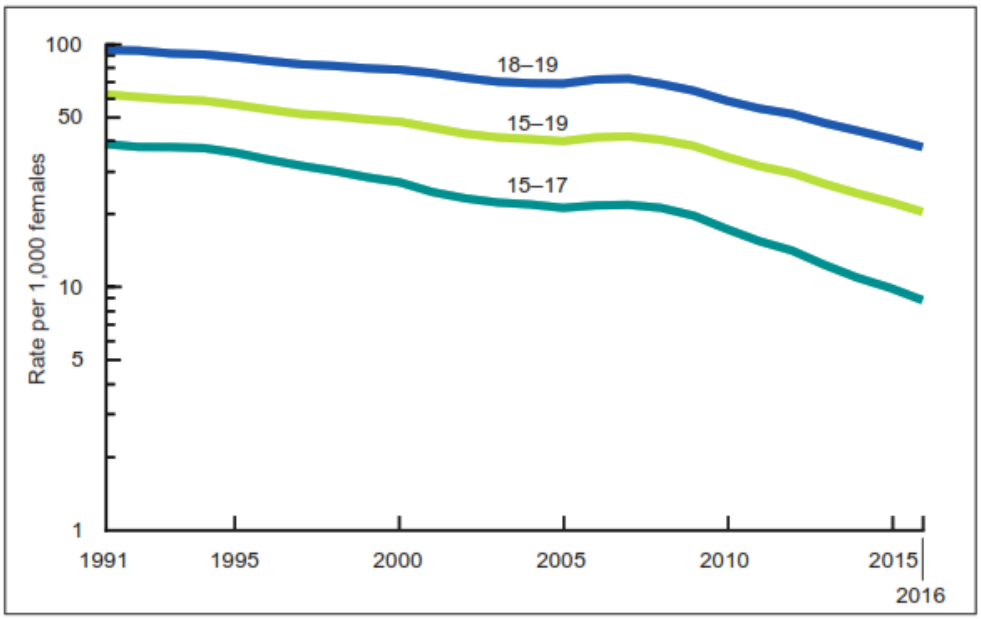
Teen pregnancy and childbearing bring substantial social and economic costs through immediate and long-term impacts on teen parents and their children. Research indicates that teen pregnancy and motherhood can have detrimental socioeconomic and psychological outcomes for the teen mother, her child and her young siblings.[9] Teen pregnancy increases the risk of health consequences, such as hypertension, pre-term birth, inadequate weight gain and sexually transmitted infections.[9]

Pregnancy and birth are significant contributors to high school dropout rates among teen moms. Only about 50% of teen mothers receive a high school diploma by 22 years of age; whereas, approximately 90% of women who do not give birth during adolescence graduate from high school. The children of

teenage mothers are more likely to have lower cognitive attainment and school achievement, drop out of high school, rely heavily on publicly funded healthcare services, be incarcerated at some time during adolescence, give birth as a teenager, and face under or unemployment as a young adult.[12]

As shown in Figure 4 below, teen birth rates in the United States have declined continuously since the early 1990s. The rate has declined by 51% since 2007. The national birth rate for teenagers aged 15–19 declined 8% in 2015, to 22.3 births per 1,000 females in all race and Hispanic-origin groups. In 2016, the provisional birth rate for teenagers was 20.3 births per 1,000 women aged 15–19; down 9% from 2015 (22.3 per 1,000 women) and another record low for this age group. The birth rate for females aged 10–14 was 0.2 births per 1,000 in 2016, which was unchanged from 2015.[4] The NH State Health Improvement Plan (NH SHIP) sought to lower the unintended birth rate for adolescents 15.7 in 2010 to 15.0 by 2015 and to 14.0 by 2020 per 1,000 women.[11]

Figure 4. Birth Rates for Females Aged 15-19 by Age Group:
United States, Final 1991-2015 and Provisional 2016



NOTE: Rates are plotted on a logarithmic scale.

Source: NCHS, National Vital Statistics System, 2017

As shown in Table 5 Nashua experienced a high teen birth rate in 2011, when the city's teen birth rate was 23 per 1,000. The regional and state rates were lower at this time, both with 13 live births per 1,000. From 2011-2015, the teen birth rate dropped for all three geographies noted in Table 5. Nashua experienced the largest decrease of the compared geographies with a change in rate from 23 births per 1,000 in 2011 to 14 births per 1,000 in 2015. Consistently, Nashua has had a higher teen birth rate per 1,000 than both the region and the State of New Hampshire. The region and state birth rates have stayed relatively similar from 2011-2015. In addition, both the region and the state have experienced smaller changes in birth rates from 2011-2015 compared to Nashua.[9] Collectively, the three geographies have met or exceeded the goal set for the by the NH SHIP.

Table 5. Teen Birth Rate (per 1,000), 2011-2015

Year	Nashua	GNPHR	New Hampshire
2011	23.6 (CI 15.7-26.4)	13.4 (CI 10.9-16.3)	13.8 (CI 12.7-14.8)
2012	22.1 (CI 17.0-28.3)	13.0 (10.5-15.9)	13.3 (CI 12.3-14.3)
2013	19.2 (CI 14.4-25.0)	11.2 (CI 9.0-14.0)	12.8 (11.3-13.3)
2014	15.6 (CI 11.2-21.1)	9.8 (CI 7.6-12.38)	10.5 (CI 9.6-11.4)
2015	14.3 (CI 10.1-19.7)	8.5 (6.5-10.9)	10.2 (CI 9.3-11.1)
Source: NH WISDOM			

By better understanding the many factors that contribute to teen pregnancy communities can better design, implement, evaluate, and improve prevention interventions and further reduce disparities. Teen pregnancy prevention is one of CDC's top seven priorities, "a winnable battle in public health," and of paramount importance to health and quality of life for our youth.[12] In addition to evidence-based prevention programs, teens need "access to youth-friendly contraceptive and reproductive health services and support from parents and other trusted adults, who can play an important role in helping teens make healthy choices about relationships, sex, and birth control."[12] This help, in turn, may improve the likelihood of success in adulthood for these young parents, and reduce the probability that they will have or father other children as teens and that their children will grow up to become teen parents.

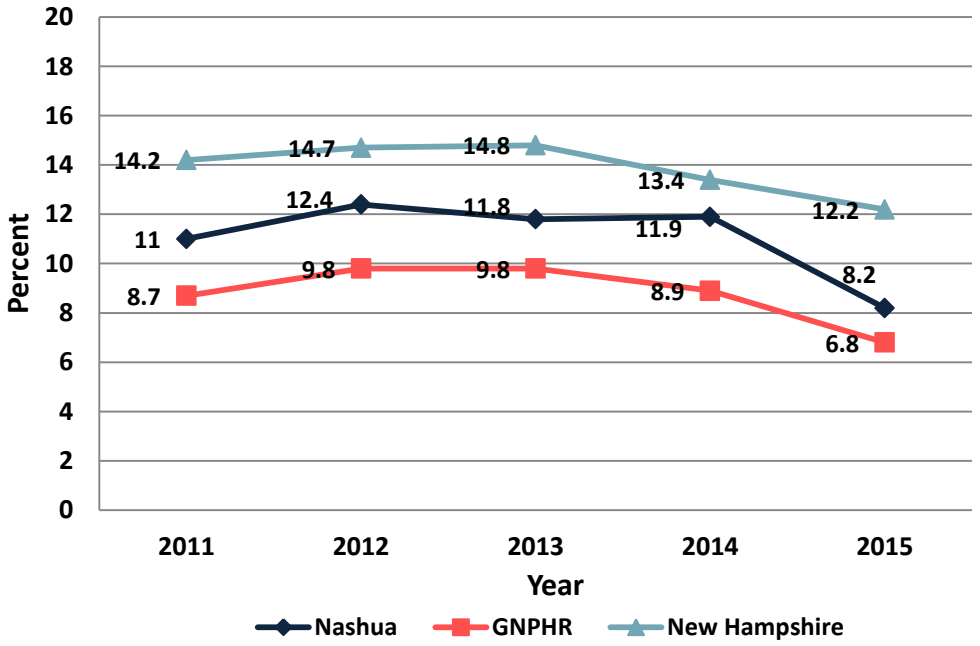
Smoking and Pregnancy

Tobacco use during pregnancy has multiple consequences for the health of a pregnant woman and her baby. According to the CDC, babies who are born to women who smoke have a greater chance of being born prematurely, are more likely to be born with low birth weight, and are more likely to die of Sudden Infant Death Syndrome (SIDS).[10] Babies of smokers weigh, on average, 200 grams less than babies born to nonsmokers.[14] A goal of Healthy People 2020 is to increase abstinence from cigarette smoking among pregnant women to 98.6%.[2] Figure 5 shows the downward trend of mothers of all ages who smoked during pregnancy from 2011 to 2015. Table 6 breaks down the rate of mothers that smoke by age. The majority of mothers that smoke fell within the 20 to 24 age group for all three geographies.[9] NH PRAMS reported that 22.7% of women reported cigarette usage in the three months *prior* to pregnancy and 11.4% reported smoking *during* the last three months of pregnancy. Of those mothers participating, during prenatal visits, 45.2% were advised

Source: CDC, 2017

on how to quit smoking, 28.1% set a date to quit smoking, 15.4% were referred to a quit line and 14.7% were suggested to try nicotine patches.[3]

Figure 5. Smoking During Pregnancy, All Ages, 2011-2015



Source: NH WISDOM

Table 6. Percent of Births to Mothers who Smoked during Pregnancy by age, 2011-2015

Age	Nashua	GNPHR	New Hampshire
15 to 19	14.7%	16.9%	26.9%
20 to 24	20.5%	19.8%	27.1%
25 to 29	10.9%	9.4%	14.6%
30 to 34	7.7%	5.0%	7.8%
35-39	6.2%	4.7%	6.4%
40 plus	6.2%	3.6%	5.7%
Source: NH WISDOM			

Neonatal Abstinence Syndrome

Nationally, the reported rise in substance use during pregnancy has increased significantly in the last decade leading to an increase in the number of newborns diagnosed with Neonatal Abstinence Syndrome (NAS).[15] NAS refers to a postnatal withdrawal syndrome caused by maternal drug use. Many factors influence the clinical presentation of NAS, including the class of drug used during pregnancy, how much of the drug was used, time of most recent use, factors impacting maternal and fetal metabolism, neonatal

NAS occurs in 55 to 94% of newborns whose mothers were addicted to or treated with opioids while pregnant.

Source: McQueen, 2016

immaturity or illness and polydrug use.[16] Although other substances have been implicated, NAS is most often attributed to in-utero opioid exposure. This exposure can result from maternal prescription opioid use, which has increased nationally in recent years, nonmedical opioid use, or medication-assisted treatment.[17] The pattern of opioid use has shifted to include a more diverse population that includes pregnant women; however, NAS affects all races, ethnicities, and socioeconomic statuses.[18]

NAS has been described as a complex disorder that primarily involves the central and autonomic nervous systems and the gastrointestinal system.[18] The class of drug used during pregnancy may affect the infant's central nervous system development, cognitive function and behavior as he or she grows.[19] Hallmark symptoms of NAS in infants usually include feeding problems, watery stools, irritability, increased muscle tone, tremors, seizures, and/or breathing concerns post-delivery. Diagnosis occurs shortly after birth based on lab testing (maternal drug screen or infant testing of urine, meconium, hair, or umbilical samples), drug exposure history and assessment of clinical signs.[15] Infants diagnosed with NAS may be treated pharmacologically and/or environmentally based on NAS severity. The main objective of pharmacologic treatment is to relieve moderate-to-severe signs of NAS such as seizures, fever, and weight loss or dehydration. The most commonly used rating of the severity of withdrawal is a modified Finnegan Neonatal Abstinence Score, which rates the signs and symptoms of CNS disturbances; metabolic, vasomotor, and respiratory disturbances; and GI disturbances on a 5-point scale, usually at birth and every four hours or after each feeding.[18]

Approximately 60 to 80% of infants with NAS do not have a response to nonpharmacological treatment and require medication.

Source: McQueen, 2016

NAS NH infant discharges have increased dramatically over the last decade. NAS discharges are accounted for using the previous ICD-9 codes (NB drug withdrawal syndrome) and current ICD-10 codes (Neonatal withdrawal symptoms from maternal use of drugs). As show in Table 7, from 2012 to 2016 in the Greater Nashua Public Health Region, there were 256 live births, resulting in a rate of 28 per 1,000 births, where newborns were diagnosed with NAS. These NAS diagnoses were based on Finnegan Neonatal Abstinence scores determined shortly after birth. [20,21]

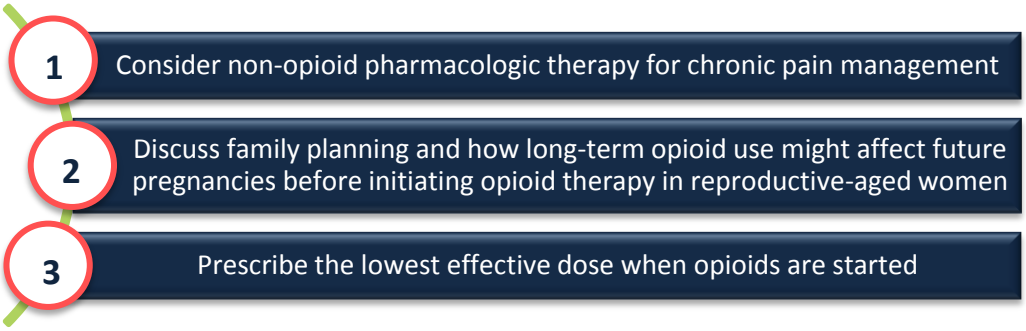
Table 7. Neonatal Abstinence Syndrome Diagnosis, 2012-2016, GNPHR

Year	Diagnoses
2012	16
2013	77
2014	60
2015	48
2016	55
Source: Southern NH Health System and St. Joseph Hospital	

The average length of stay for infants with the neonatal abstinence syndrome is 17 days overall and 23 days for those requiring treatment.[18] The prolonged hospitalization results in the use of a greater

portion of health care resources for the care of infants with the neonatal abstinence syndrome than for those without the syndrome. Three quarters of the infants diagnosed with NAS in New Hampshire are enrolled in Medicaid.[15] Previous research indicates that nationally Medicaid programs were financially responsible for approximately 80% of the estimated $1.5 billion in NAS-related annual hospital charges in 2012.[11]

Targeted initiatives to address prescribing practices may help to reduce opioid use in women of childbearing age and prevent the subsequent development of the neonatal abstinence syndrome. In 2016, the CDC released the *Guideline for Prescribing Opioids for Chronic Pain*, which recommends clinicians[17]:



HP2020 has set the goal to increase abstinence for illicit drugs among pregnant women to 100%.[2] Identification of infants at risk for the neonatal abstinence syndrome is important to ensure accurate clinical assessment, promote early intervention, and mitigate signs of withdrawal in the newborn. However, many women are reluctant to divulge substance use because of the social and legal consequences. The use of a nonjudgmental and open-ended approach to interviewing all pregnant women (versus only those with risk factors) about substance use during pregnancy, while encouraging them to report substance use, is recommended to facilitate disclosure. The increased incidence of the neonatal abstinence syndrome and soaring increases in associated health care costs warrant a consistent and comprehensive approach to mitigating the negative outcomes for affected infants, their mothers, and the health care system.[18]

The long-term neurodevelopmental outcomes of NAS on infant and toddler development are more difficult to ascertain than short-term outcomes.[18] Given the numerous confounding environmental and social factors associated with mothers using substances such as "isolating independent effects of methadone, comorbid substance exposure (e.g., alcohol, tobacco, other illicit drugs) and environmental and medical factors risk factors (e.g., low socioeconomic status, poor prenatal care, severity and treatment for NAS)" determining a definitive causation is challenging.[16] It is important to note that NAS is a treatable syndrome and with appropriate supports these babies have grown and succeeded just as well as babies that were not born with NAS. Addiction is a treatable, chronic disease that can be managed successfully. Research shows that combining behavioral therapy with medications, where available, is the best way to ensure success for most patients. Parents of infants with NAS should be

counseled on evidence-based supportive treatments to implement after hospital discharge for themselves and the baby.[22]

Breastfeeding

The cells, hormones, and antibodies in breastmilk help protect babies from illness. This protection is unique and changes every day to meet a baby's growing needs. Research shows that breastfed babies have lower risk of illness including, but not limited to, asthma, ear infections, type 2 diabetes, childhood leukemia and eczema.[23] The Maternal and Child Health Section encourages the promotion of breastfeeding not only to give the best nutritional start to infants, but to help prevent obesity and other chronic health conditions in both the mother and baby.[24] Furthermore, breastfeeding helps a mother's health and healing following childbirth. Breastfeeding has been shown to lower the risk of type 2 diabetes, certain breast cancers, and ovarian cancers in mothers.[25] The American Academy of Pediatrics (AAP) recommends breastfeeding for at least the first year of life, and the World Health Organization (WHO) recommends breastfeeding for at least the first two years of life.[24] The Healthy People 2020 goal is to increase the percentage of infants who are ever breastfed to 81.9%, exclusively through the first three months to 46.2%, at six months to 60.6%, exclusively through six months to 25.5%, and at one year to 34.1%.[2]

Nearly 90% of NH mothers report getting help or information about breastfeeding from a health care worker.
Source: NH PRAMS, 2017

Table 8 shows national and state breastfeeding information for mothers with babies born in 2013 gathered via the National Immunization Survey from 2014-2015. The survey compares percentages of those who ever breastfed, breastfed at six and 12 months, and those who exclusively breastfed at three and six months. As of 2015, 22.3% of babies were exclusively breastfed at six months old, nationally. In NH, 51.1% of babies were exclusively breastfed at three months of age and 26.8% of babies were exclusively breastfed at six months of age, exceeding the HP2020 goal of 46.2% and 25.5% respectively.[26]

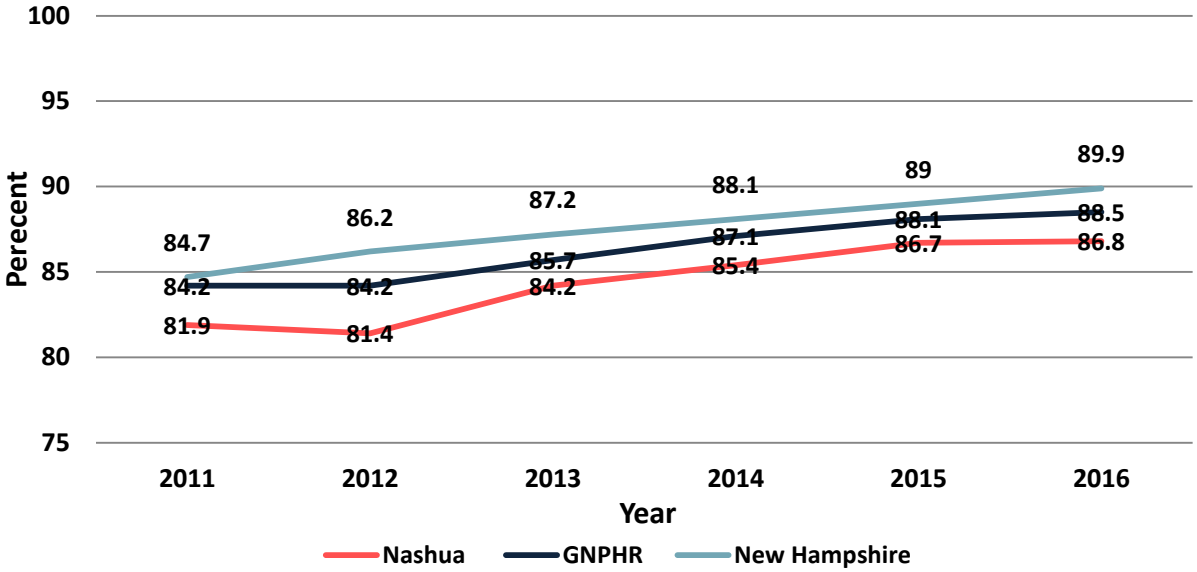
Table 8. Breastfeeding Rates by Geography, 2013

Geographical Area	Ever Breastfeed	Breastfeeding at 6 months	Breastfeeding at 12 months	Exclusive breastfeeding at 3 months	Exclusive breastfeeding at 6 months
New Hampshire	79.6	54.8	34.0	51.1	26.8
United States	81.1	51.8	30.7	44.4	22.3
Source: CDC, 2016					

As previously mentioned in the Maternal Health Indicators section, as of 2016, 86% of women were breastfeeding at discharge in the Greater Nashua Region, 84% of women were breastfeeding at discharge in Nashua, and 88% of women were breastfeeding at discharge in NH. All three geographies meet the HP2020 goal to increase the percentage of infants who are ever breastfed to 81.9%. Figure 6

illustrates rates of breastfeeding at discharge from 2011 to 20116 have improved throughout Nashua, the Greater Nashua Region, and NH.[12]

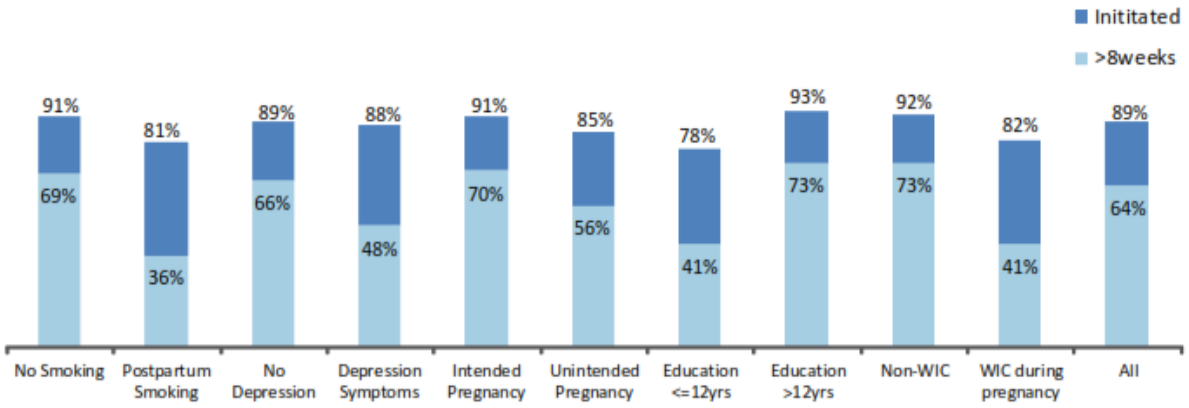
Figure 6. Breastfeeding at Discharge by Geography, 2011-2016



Source: NH Bureau of Public Health Statistics and Informatics, 2011-2016

When looking at the 2017 PRAMS Data Report, although initiation of breastfeeding among participants exceeded the Healthy People 2020 goal of 81.9%, disparities exist in continuation of breastfeeding among populations of women depending on their socioeconomic stability, age, emotional health, lifestyle factors, and education. Figure 7 compares the percentage of mothers who initiated and/or breastfed over eight weeks based on these maternal characteristics. The data showed while "85% of women under age 25 initiated breastfeeding, they were more likely than women in older age groups to discontinue breastfeeding by 8 weeks postpartum with only 44% breastfeeding longer than 8 weeks. Initiation of breastfeeding was lower among women 40 and older (68%) than among younger age groups, but these older mothers were far more likely to continue past 8 weeks, dropping only one percentage point by 8 weeks postpartum.[3] Women who report smoking postpartum had a significant decrease in breastfeeding by 8 weeks when compared to those who do not smoke (36% and 69%, respectively, continued for more than 8 weeks). Women who report symptoms of postpartum depression had a high prevalence of initiation at 88% but only 48% continued to breastfeed more than 8 weeks. Women with more than a high school education initiated breastfeeding at a significantly higher rate than those with a high school education or less (93% vs.78%) and were more likely to continue to breastfeed more than 8 weeks (73% vs. 41%)".[27] Of mothers participating in the NH PRAMS, 50.5% report they stopped breastfeeding due to lack of milk production, 37.4% said their milk didn't satisfy the baby, 29.6% had difficulty with latching, and 23.2% said it was too hard, painful, and/or time consuming. These findings may further indicate why breastfeeding rates decrease among infants who are 6 and 12 months of age.[3]

Figure 7. Disparities in Breastfeeding Initiation and Duration by Maternal Characteristics, 2014



Source: NH PRAMS Topic Brief, 2017

High breastfeeding initiation rates show that most mothers in the U.S. want to breastfeed and are trying to do so; however, despite high breastfeeding initiation rates and continued improvement in breastfeeding duration, most states are not yet meeting HP2020 breastfeeding duration and exclusivity targets. Although breastfeeding is a natural process, many moms need guidance and encouragement. These rates suggest that mothers, in part, may not be getting the support they need, such as from healthcare providers, family members, and employers.[26] The NH DHHS Maternal and Child Health (MCH) Section encourages its state-funded community health centers, prenatal programs, and home visiting programs to educate expecting families on the health and nutrition benefits of breast feeding, and support new mothers in continuing breast feeding through the first year.[24] The National Breastfeeding Helpline from the Office on Women's Health has trained breastfeeding counselors to provide support by phone. Additional resources include the Nursing Mothers Advisory Council, Nursing Mothers, Inc., and BreastfeedingUSA.org.

The Special Supplemental Nutrition Program for Women, Infants and Children (WIC) supports and promotes breastfeeding as the optimal way to feed infants. The New Hampshire WIC Program has implemented a variety of breastfeeding promotion and education initiatives to improve the rates of breastfeeding initiation and duration among mothers enrolled in WIC. Exclusive breastfeeding is rewarded in the WIC program in multiple ways, including offering a food package with a higher monetary value for breastfeeding participants than for participants who do not breastfeed or who do so only partially. Breastfeeding mothers can also participate in WIC longer than non-breastfeeding mothers.[24] According to NH PRAMS, 27.3% of mothers reported being on WIC during their most recent pregnancy.[3]

Neonatal Abstinence Syndrome and Breastfeeding

Infants with NAS have higher caloric requirements due to the energy expenditure associated with increased crying and activity, decreased sleep, and calories lost with regurgitation, vomiting, and/or diarrhea.[20,28] While somewhat controversial for infants with NAS, breastfeeding is beneficial for both the mother and the infant and is recommended by the American Academy of Pediatrics as first-line

nutrition.[29] Studies have consistently shown that infants with neonatal abstinence syndrome who are breast-fed tend to have less severe symptoms, have lower Finnegan scores, require less pharmacologic treatment and have a shorter length of stay than formula-fed infants.[28] It enhances maternal-fetal bonding, decreases the mother's stress response to the infant's withdrawal symptoms, and improves the infant's sleep patterns. Currently, breast-feeding rates among mothers receiving opioid-replacement treatment remain low.[30] Breastfeeding should be encouraged for mothers who are receiving opioid-substitute treatment, unless there are contraindications, such as human immunodeficiency virus infection (HIV) or concurrent use of illicit substances.[19]

Looking Ahead

Childbirth is a life-defining experience for many women and their families, and having healthy babies is vitally important, not only for them but for the welfare of the entire community. The economic circumstances into which mothers give birth can greatly affect both the mother's chances of having a healthy pregnancy and her baby's chances of getting off to a healthy start. Access to programs, services, and quality care play an important role in improving women's health and economic stability before, during, and after pregnancy. Organizations should consider looking at variables that may create barriers to patients accessing services such as lack of insurance, transportation, or language and cultural differences. Collaborative efforts throughout the Greater Nashua Public Health Region are of paramount importance to the health and quality of life for mothers and babies. It is important to establish and strengthen collaboration among communities, public and private non-profit agencies, as well as federal, state, and local governments.

Photo courtesy of Kayla O'Brien

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Environmental Health

"It's obvious that the key problem facing humanity in the coming century is how to bring a better quality of life without wreaking the environment entirely in the attempt"
-E.O. Wilson

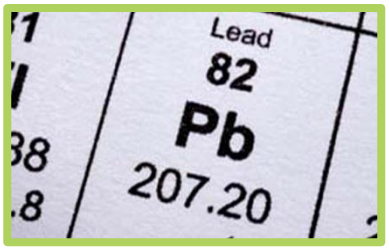
Contents

Environmental Health

Environmental health practice is the relationship between a person's environment and their health. Effective environmental health practice is achieved by controlling the agents of disease while they are still in the environment, but before they reach people. There are many elements to environmental health practice including, but not limited to, water quality management by providing safe water through effective treatment of water supplies, proper disposal of human waste through sewage treatment and septic systems, food quality management by maintaining proper surveillance of food to prevent contamination, air pollution control by reducing emissions, rodent control by removing potential pest harborage and sources of food, recreational sanitation to ensure safe swimming facilities, and house hygiene to control the effects of contaminates such as lead for occupant safety.[1] Throughout human history, reduction of disease and discomfort was largely accomplished by altering the environment, and in today's society it is no different.

Lead Poisoning

Protecting children from lead exposure is important, as exposure to lead can seriously harm a child's health. Harmful effects include an increased risk for damage to the nervous system and brain, slowed growth, hearing and speech problems, and learning and behavioral problems, such as a reduced IQ and ADHD. Children most at risk for lead exposure are generally poorer, members of racial-ethnic minority groups, recent immigrants, or live in older, poorly maintained rental properties.[2]



Source: CDC, 2017

Lead-based paint in our housing is the largest contributor to lead exposure in children, and New Hampshire has over 300,000 housing units containing potential lead hazards.[3] Renovations and repairs in homes are another common source of lead exposure for children. One in three children who have an elevated blood lead level were exposed to lead during home renovations.[5] Exposure to lead through home renovations or repairs is common if the renovations or repairs are completed by uninformed do-it-yourself homeowners or contractors not certified by the EPA in lead-safe practices.

In 1978 lead-based paints were banned for use in housing and all houses built prior to 1978 are likely to contain some level of lead-based paint, however, it is the deterioration of the lead-based paint that poses a risk to children. In the United States, approximately 24 million housing units have deteriorating paint, and more than 4 million of these are homes to young children.[1] The state of New Hampshire has some of the oldest housing stock in the United States, and Nashua has an estimated 23,329 (64%) homes built prior to 1979 and 8,807 (24%) of homes built prior to 1949 (Table 1).[4]

New Hampshire has over 300,000 housing units containing potential lead hazards.

Source: NH Healthy Homes

Table 1. Number of Houses Built in Nashua by Decade

Year Built	Estimated Number of Houses	Percentage of Total Housing
2010 or Later	800	2.2%
2000 – 2009	2,055	5.6%
1990 – 1999	2,413	6.6%
1980 – 1989	8,089	22%
1970 – 1979	6,579	17.9%
1960 – 1969	4,549	12.4%
1950 – 1959	3,394	9.3%
1940 – 1949	1,332	3.6%
1939 or Earlier	7,475	20.4%
Source: U.S. Census Bureau, 2015 American Community Survey		

A blood lead test is the best way to measure lead exposure, and the amount of lead in the blood is referred to as a blood lead level (BLL). Blood lead levels are measured in micrograms of lead per deciliter of blood (µg/dL).[1] Prior to 2015, public health intervention for lead in New Hampshire began at an elevated blood lead level (EBLL) of 10µg/dL, however, the passage of Senate Bill 135 in July of 2015 lowered the intervention level to 5µg/dL for educational purposes. At 5µg/dL or greater, parents of lead exposed children are mailed educational materials informing them how to identify and eliminate potential lead exposure hazards.[5] Public health nurse visits and case management in NH happens at an EBLL of 10µg/dL. It should be noted that although there is an intervention level for lead exposure, there is no recognizable safe blood lead level.[1] Each year from 2011 to 2015, approximately 20% of children aged 0 to 5 in Nashua were screened for lead exposure, and an average of 6% of the screened population had an EBLL of 5µg/dL or greater (Table 2).

Table 2. Blood Lead Levels in Nashua Children Aged 0-5 by Year, 2011-2015

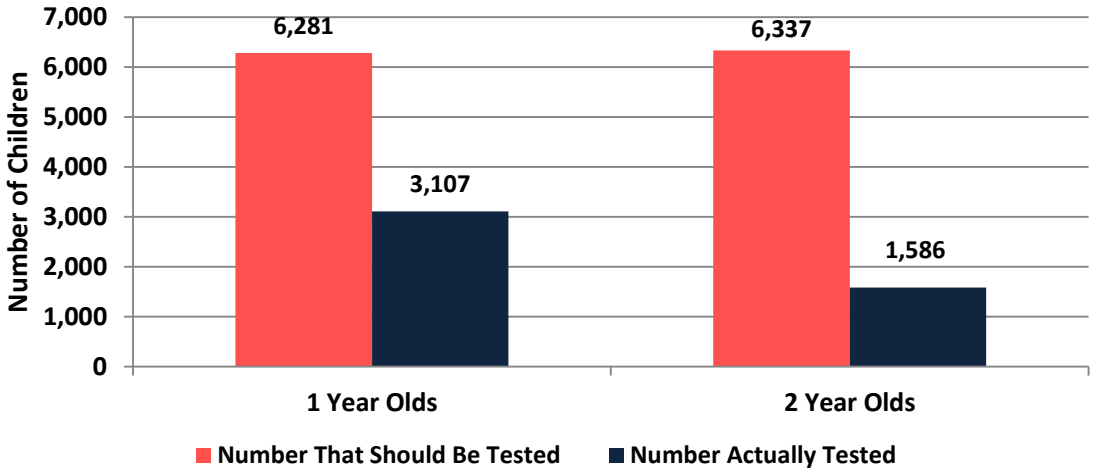
Year	Population Ages 0-5	Number Screened	Number Elevated*	% of Population Screened	% Elevated Among Population Screened
2011	6,316	1,243	77	20%	6%
2012	6,349	1,208	76	19%	6%
2013	6,488	1,225	86	19%	7%
2014	6,173	1,242	76	20%	6%
2015	6,048	1,172	56	19%	5%
*Source: NH DHHS; *5 ug/dL or greater*					

In 2014, there were 9,599 children aged 1 year old in New Hampshire that should have been tested for lead, and 7,132 (74%) were actually screened. However, out of the 9,910 children aged 2 years old, only 3,657 (31%) were screened for lead in 2014 (Table 3).[6] From 2009 to 2014, in Nashua, there were 6,281 children aged 1 year old that should have been screened for lead, but only 3,107 (49%) were actually screened. The screening rate for children aged 2 years old in Nashua was only 25% during the same period from 2009 to 2014 (Figure 1). New Hampshire has a target testing rate of 85% for all 1 and 2 year olds by the end of 2017, but these data suggests this target is unlikely, although Nashua is ranked as one of New Hampshire's 21 highest risk communities for lead poisoining.[5]

Table 3. New Hampshire Blood Lead Level Testing Rates in 1 and 2 Year Olds, 2014

Age	Number That Should Be Screened	Number Actually Screened	Percent Not Tested
1 Year Olds	9,599	7,132	26%
2 Year Olds	9,910	3,657	69%
Source: NH DHHS			

Figure 1. Nashua Blood Lead Level Testing Rates in 1 and 2 Year Olds, 2009 - 2014



Source: NH DHHS

Exposure to lead is preventable, and parents should educate themselves in the best prevention strategies to keep their children safe. Parents need to be aware of lead-based paint in older homes and ensure children do not have access to peeling paint or chewable surfaces contaminated with lead paint. Children and pregnant women should avoid being present during renovations in housing built

Parents and health care providers should follow the recommended guidelines of health officials for routine screening of all one and two year olds who may be at risk for lead exposure.

prior to 1978 because it only takes a speck of lead dust the size of a salt grain to poison a child. Children's toys should be regularly washed, and floors and window surfaces wet washed and not dry swept to reduce household dust. While outside, prevent children from playing in bare soil potentially contaminated with lead.[1]

Air Quality

Air pollution comes from multiple stationary and mobile sources, as well as natural and man-made sources. Natural sources, such as volcanic eruptions and wildfires, account for a small portion of air quality issues. The majority of air pollution comes from man-made sources such as cars, planes, trains, power plants, factories, smelters, dry cleaners, and woodstoves, to name a few. Different pollution sources can emit a variety of pollutants, classified as the six principle, or criteria, pollutants. The criteria pollutants include carbon monoxide (CO), lead (Pb), nitrogen dioxide (NO_2), ozone (O_3), particulate matter ($PM_{2.5}$ and PM_{10}), and sulfur dioxide (SO_2).[7]

Since the Clean Air Act of 1970 and the amendments to the act signed in 1990, there has been significant progress in reducing the levels of the criteria pollutants in the atmosphere. From 1970 to 2015, the combined national emissions of the six criteria pollutants has dropped an average of 70%. Improvements in air quality from 1990 to 2015 show national concentrations of lead improved by 99%, carbon monoxide by 77%, nitrogen dioxide by 54%, sulfur dioxide by 81%, PM_{10} by 39%, and ozone by 22%. Although great strides have been made, approximately 127 million people live in counties that exceed the 2015 revised ozone standard. [8]

Ozone

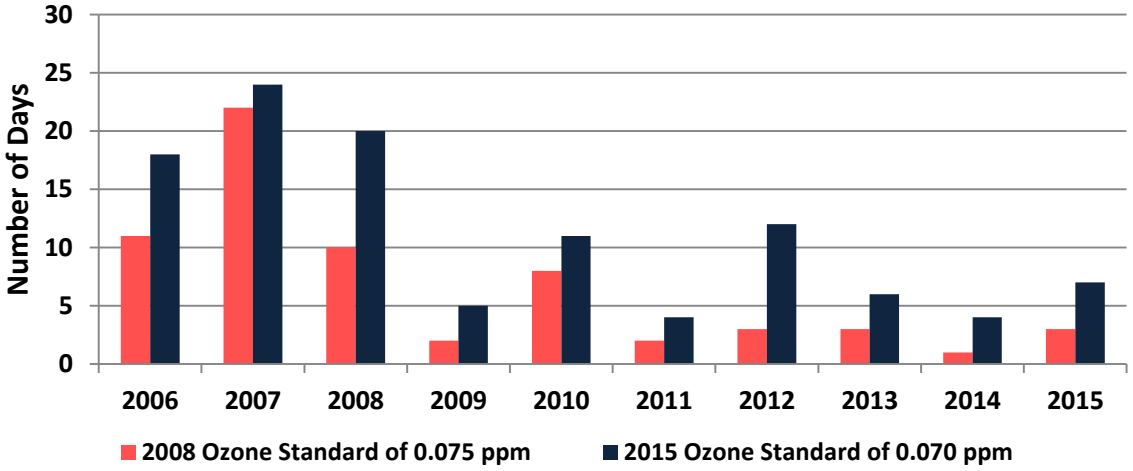
Ozone (O_3) is a gas composed of three atoms of oxygen, and occurs in the upper atmosphere (good ozone) and at ground level (bad ozone). Good ozone forms a protective layer around the Earth providing a shield from the sun's harmful ultraviolet (UV) rays. Bad ozone is created through chemical reactions between oxides of nitrogen (NOx) and volatile organic compounds (VOCs). When pollutants are emitted by cars, chemical plants, refineries, power plants, and other pollution sources, the chemicals produced (NOx and VOCs) react with sunlight creating bad ozone. Due to manmade chemicals, good ozone has partially been destroyed, but efforts through the Clean Air Act to reduce bad ozone emissions are diminishing the damaging effects to our protective shield of good ozone.[9]

Ozone in the air we breathe can have harmful effects on human health. In New Hampshire, although most people think we have clean air, there may be several days each year, especially in summer, when hot sunny days can raise air pollution to unhealthy levels for sensitive individuals such as children, older adults, asthmatics, and outdoor workers. Elevated ozone levels can limit a person's ability to breathe deeply, and can cause coughing, throat irritation, and trigger asthma symptoms.[10]

In 2015, the EPA revised the 8-hour ozone standard from the 2008 standard of 0.075 parts per million (ppm) to 0.070ppm. In New Hampshire from 2006 to 2015 there were 65 days where ozone levels exceeded the 2008 ozone standard, and 111 days where the state would have exceeded the newer 2015 standard of 0.070ppm (Figure 2). Over the same period, 2006 to 2015, Nashua had 14 days exceeding

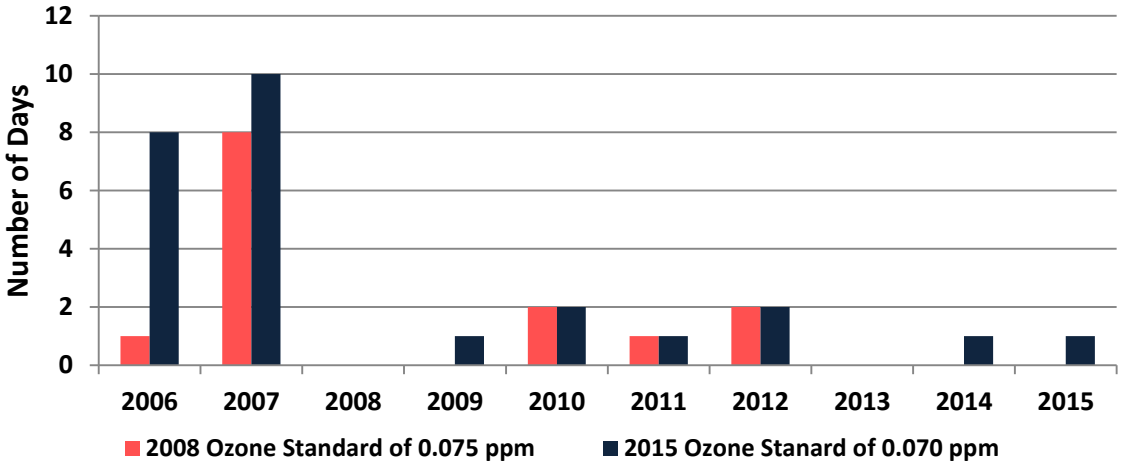
the 2008 ozone standard, and 26 days where Nashua would have been in exceedance of the 2015 standard (Figure 3).[11] Both New Hampshire and Nashua have seen a decrease in the overall number of ozone exceedance days between 2006 and 2015.

Figure 2. Number of Days in New Hampshire Exceeding the 8-Hour Ozone Standard by Year, 2006-2015



Source: U.S. EPA

Figure 3. Number of Days in Nashua Exceeding the 8-hour Ozone Standard by Year, 2006-2015



Source: U.S. EPA

Particulate Matter

In 2014, the largest contributor to fine particle pollution, $PM_{2.5}$, in New Hampshire came from fuel combustion, primarily wood burning fuel…and the largest contributor to coarse particle pollution, PM_{10}, came from unpaved road dust.

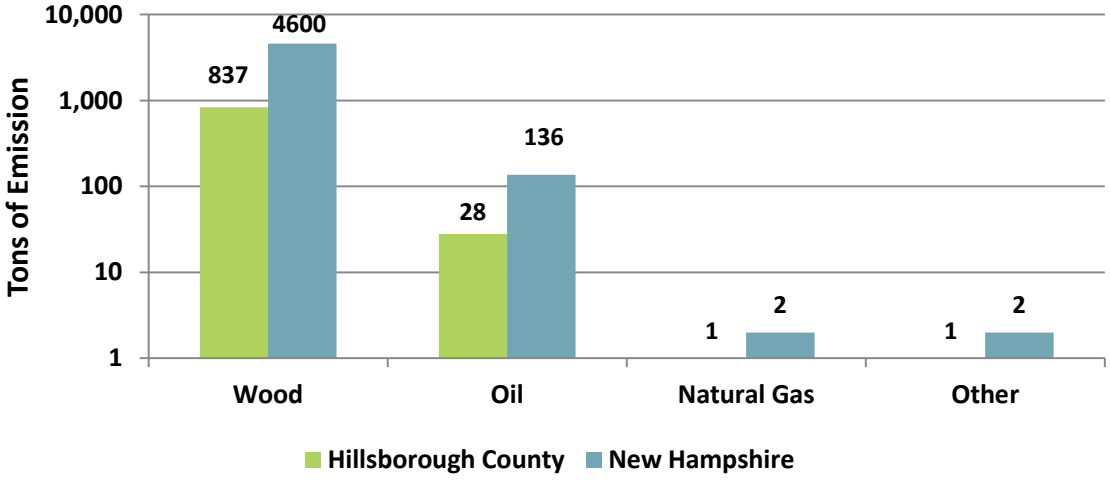
Source: EPA, 2017

Particulate matter, or particle pollution, is a mixture of solid particles and liquid droplets found in the air. Certain particles such as dirt, dust, and soot can be seen by the naked eye, but other particles are so small they can only be seen using an electron microscope. Particulate matter is broken into two categories: fine particulate matter, $PM_{2.5}$, and coarse particulate matter, PM_{10}. Fine particulate matter consists of particles 2.5 micrometers or smaller, which is approximately 30 times smaller than the diameter of one strand of human hair. Coarse particulate matter consists of particles greater than 2.5 micrometers but smaller than 10 micrometers, which is approximately 9 times smaller than a fine grain of sand.[12]

Particle size is directly linked to their potential for causing health problems, and particles smaller than 10 micrometers have been shown to pose the greatest problems because of their ability to travel deep into the lungs and can even get into the bloodstream. People with heart or lung disease, asthmatics, children, and older adults are the most likely to be affected by exposures to particulate matter.[13]

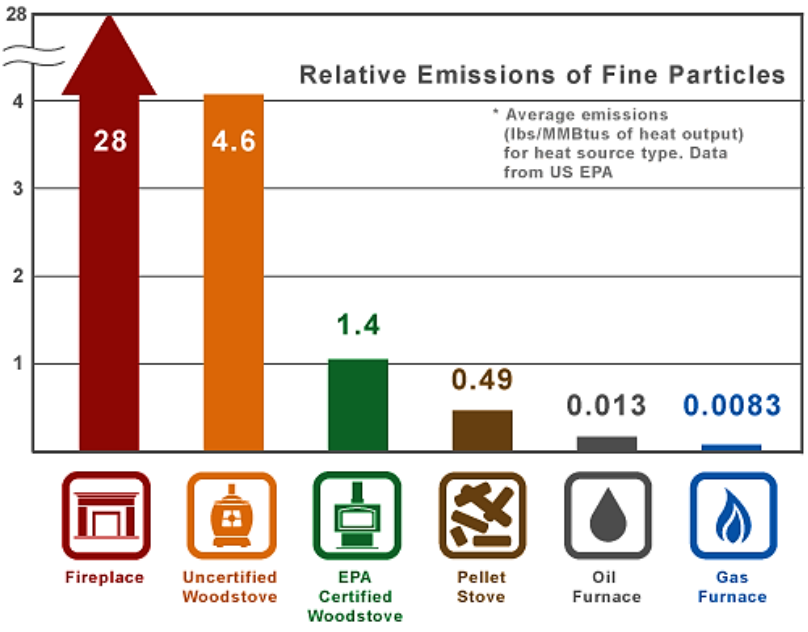
In 2014, the largest emissions of $PM_{2.5}$ in New Hampshire came from fuel combustion, primarily wood burning fuel. New Hampshire had 4,600 tons of $PM_{2.5}$ emissions from wood in 2014, and Hillsborough County accounted for 837 tons of those emissions. The second largest source of $PM_{2.5}$ emissions from fuel in New Hampshire came from oil with 136 tons of emissions in 2014 (Figure 4).[14] In New Hampshire many households use wood as a primary heating fuel. Wood, unlike oil, gas, and coal, is a renewable resource, and sustainable if harvested properly. However, wood burning also contributes to significant air pollution, and negatively impacts public health and the environment.[15] Wood burning fireplaces, and uncertified woodstoves contribute the largest amounts of $PM_{2.5}$ each time they are used (Figure 5).

Figure 4. Particulate Matter 2.5 Fuel Combustion Emissions in Tons by Source and Geography, 2014



Source: U.S. EPA

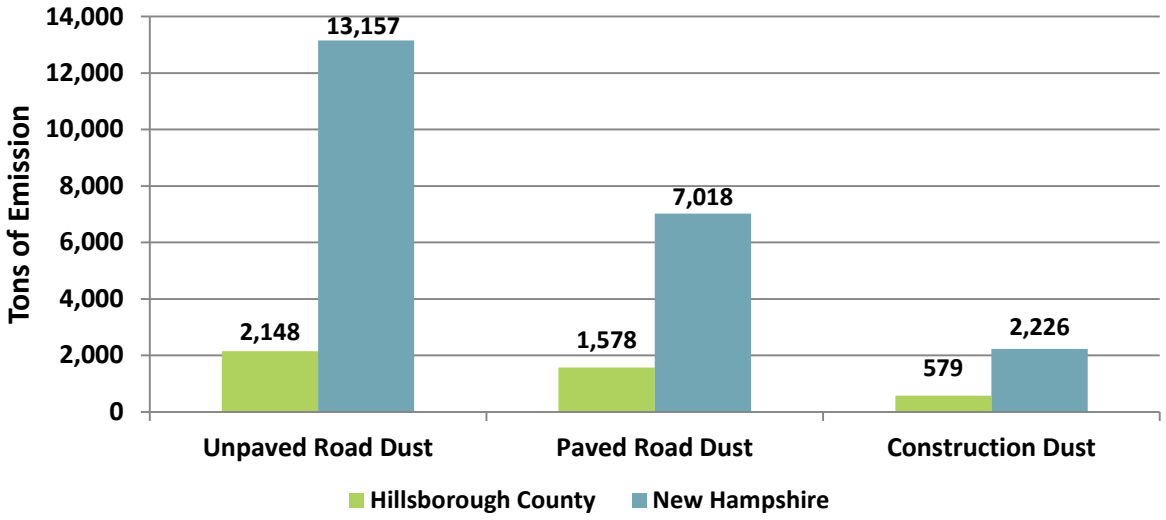
Figure 5. Relative Emissions of Fine Particles by Heat Source



Source: U.S. EPA

In 2014, the largest emissions of PM_{10} in New Hampshire came from dust, primarily unpaved road dust. Hillsborough County accounted for 2,148 tons of PM_{10} emissions from unpaved road dust in 2014, and New Hampshire had 13,157 tons of emission. Paved road dust accounted for the second highest PM_{10} emissions from dust with 1,578 tons of emission in Hillsborough County (Figure 6).[13]

Figure 6. Particulate Matter 10 Dust Emissions in Tons by Source and Geography, 2014



Source U.S. EPA

Radon

Radon is a naturally occurring, radioactive gas that is tasteless, odorless, and colorless. Radon is produced from the breakdown of uranium in rocks and soil. Once produced, radon gas can seep into homes through cracks in the foundation, but can also be found in well water and be released into the air when showering, doing laundry, and washing dishes.[16]

In the U.S. the average indoor radon level is 1.25 picocuries per liter (pCi/L), however, in NH it is estimated that 50% of homes have an average indoor radon level of 2.3 pCi/L, and action should be taken to mitigate radon levels at concentrations at or above 4.0 pCi/L.[17] Radon risk from air poses a much greater danger than radon risk from a water supply, and there are no federal or NH state standards for radon in drinking water, although it is estimated every 10,000 pCi/L of radon in water is equivalent to 1 pCi/L of radon in air.

The New Hampshire Department of Environmental Services (NH DES), along with the NH Environmental Public Health Tracking (EPHT) Program evaluated data on samples collected throughout the state on radon testing. From 1988 to 2011, there were 25,476 tests through the program and approximately 30% had a radon level at or above 4.0 pCi/L. In Nashua, approximately 35% of homes had elevated radon levels, and in Hillsborough County, excluding Nashua, approximately 32% of homes had elevated radon levels (Table 4). Data collected throughout the NH EPHT showed the towns of Wilton, Mason, Hollis, Hudson, and Pelham had a 50% chance of elevated radon levels, compared to the rest of the Greater Nashua Public Health Region with a 33% chance of elevated radon levels.[17]

Table 4. Radon Testing in NH Homes by Geography, 1988-2011

Geography	Number of Tests	Number of Elevated Tests	Percent Elevated
Nashua	259	90	35%
Hillsborough*	5,421	1,727	32%
New Hampshire	25,476	7,695	30%
*Source: NH DES; *Excludes Nashua*			

Radon is the leading environmental cause of cancer deaths in the U.S. and the leading cause of lung cancer in non-smokers.[15] In NH, it is estimated that long-term radon exposure will cause 100 deaths every year, and since NH law does not mandate testing for real estate transactions, it becomes the burden of the buyer to be aware of the possibility of elevated radon when purchasing a new home. It is recommended that homes be tested for radon, and mitigation systems are installed if radon levels are elevated. Since January 1, 2015 all radon-in-air mitigation installers and designers must be nationally certified to perform services in the state of New Hampshire.[18]

Carbon Monoxide

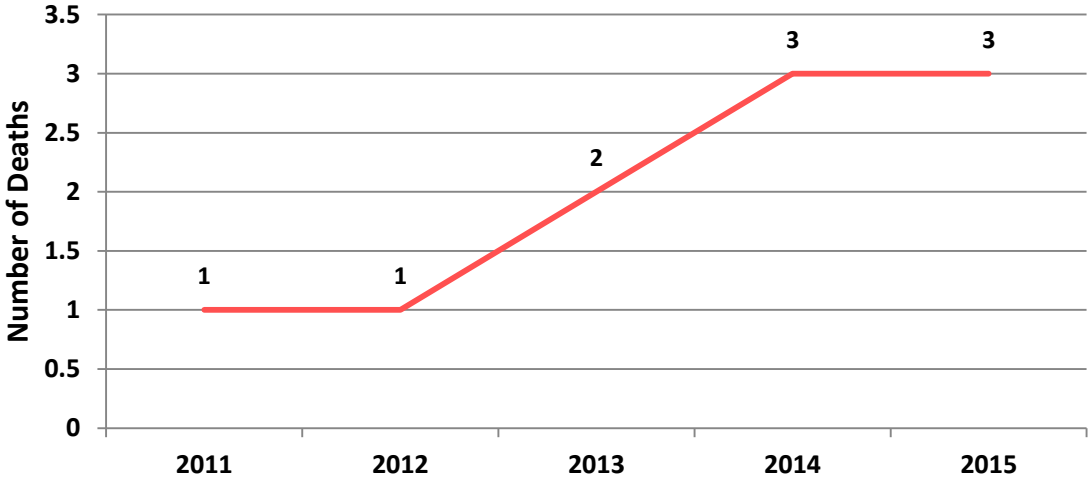
Carbon Monoxide (CO) is a colorless, odorless gas that can cause sudden illness and death. Carbon Monoxide gas is produced when fuels like wood, oil and coal are burned. Common household items producing CO are fireplaces, furnaces, generators, grills, and space heaters. People experiencing low-dose effects of CO poisoning may have a headache, feel tired, and have trouble breathing. High exposure could impair thinking, trigger a heart attack, and kill someone.[19]

In Nashua, approximately 80% of households have working carbon monoxide detectors.

Source: 2017 Nashua Community Health Survey

Every year in the United States, more than 400 people die from unintentional CO poisoning, 20,000 will visit an emergency room, and 4,000 will be hospitalized. Among individuals who die from CO poisoning, persons aged 65 and older account for the majority of fatalities. In 2013, there were 186 emergency room visits due to CO poisoning in NH.[20] In NH, from 2011 to 2015, there were 10 deaths from CO poisoning (Figure 7).[21]

Figure 7. Number of Deaths by Carbon Monoxide Poisoning in New Hampshire, 2011-2015



Source: NH DHHS

Carbon Monoxide poisoning can be prevented in and around the home by ensuring major appliances such as the furnace, hot water heater, and stove are professionally checked annually; using fuel burning outdoor equipment, such as grills and gas-powered tools, away from windows and doors; safely using generators; ensuring all outdoor heating vents are properly cleared after a snowfall; and placing carbon monoxide detectors on each floor of the home and outside each sleeping area[18] In Nashua, according to the 2017 Community Health Survey, approximately 80% of households have a working carbon monoxide detector.[22]

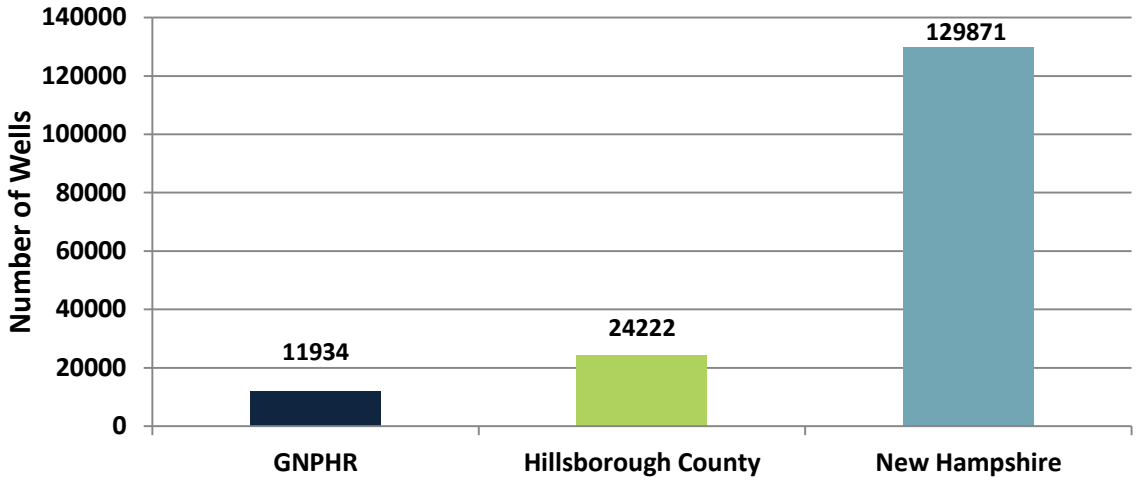
Water Quality

The Safe Drinking Water Act (SDWA) is a federal law that ensures American's have access to safe drinking water; however drinking water standards only apply to public water systems, and not individual private wells. In the United States there are over 150,000 public water systems that serve more than 300 million people.[23] In New Hampshire, approximately 64% of the population is served by a public water system and the remaining 36% rely on private wells for drinking water.[24] Quality drinking water is a crucial public health issue because a single contaminate, as recently encountered with perfluorooctanoic acid (PFOA), can have an impact on many people at the same time. Drinking water may become contaminated through natural or man-made causes. Natural causes, including arsenic and uranium, can enter groundwater from bedrock; plumbing fixtures can leech lead and copper into drinking water; humans can add chemicals into the water through intent or accident; and runoff from failing septic systems or animal waste can alter bacteria and nitrate levels in the water.[25]

Public water systems are highly regulated and tested to ensure quality, safe drinking water reaches the consumer, but 36% of NH residents use a private water source, and many do not have regular testing conducted for water quality and safety. Beginning in 1984, the NH water well inventory was initiated

with the purpose of increasing the state's knowledge of its water resources. To date, the Water Well Board has identified nearly 130,000 wells in NH, and 11,934 of those wells, or approximately 9%, reside in the Greater Nashua Public Health Region (Figure 8).[26]

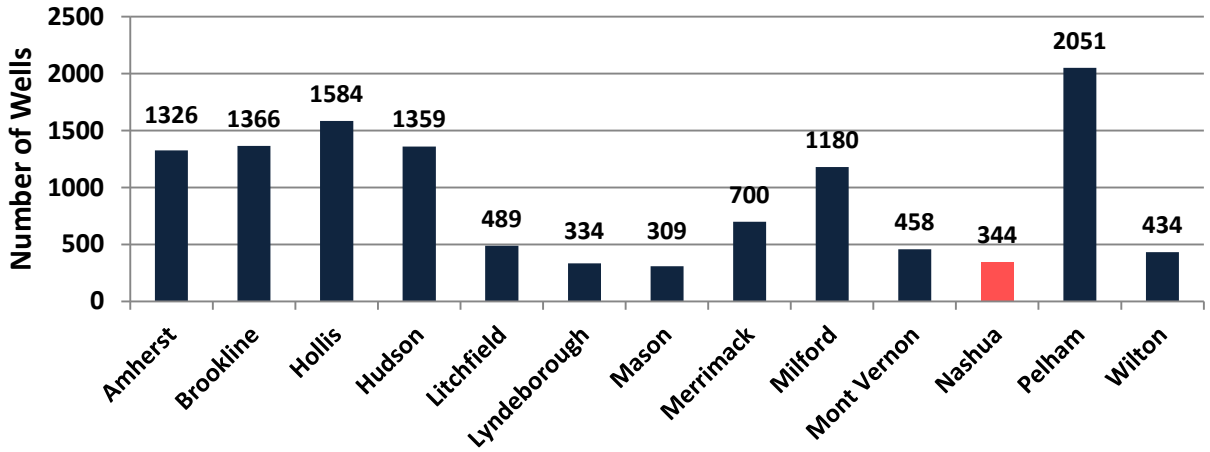
Figure 8. Estimated Number of Wells by Geography, 2017



Source: NH DES OneStop

In the Greater Nashua Region there are six communities that are estimated to have over 1,000 wells and the remaining seven communities, including Nashua, have less than 1,000 (Figure 9). Although private wells are unregulated, and there is no state requirement to have well water tested, the NH Department of Environmental Services encourages all homeowners with private wells have their well tested on a regular basis to ensure safe drinking water.[27]

Figure 9. Estimated Number of Wells in the Greater Nashua Public Health Region By Geography, 2017



Source: NH DES OneStop

Rabies

Rabies is a viral illness that infects the central nervous system, and is almost always fatal once an individual shows signs of the disease. Wild animals such as raccoons, skunks, bats, and foxes, account for most of the animal rabies cases in the U.S., however any mammal is susceptible to the disease.[28] Transmission of the rabies virus most commonly happens through the bite of an infected host animal, as the virus is contained in the saliva. Viral transmission, although rarer, can also happen through non-bite exposures such as a scratch from an infected animal and contact with infectious material through human mucosa (i.e. eyes, nose, and mouth) or skin wounds.[29]

Transmission of the rabies virus most commonly happens through the bite of an infected animal.

Source: CDC, 2011

The Greater Nashua Public Health Region had 11 animal positive rabies cases from 2012 to 2016, with Nashua accounting for 36% of all animal rabies positive cases in the region. In 2014 the Greater Nashua Region had 5 of the 23 animal positive rabies cases (22%) in NH, and accounted for approximately 17% of all positive cases in 2015. Both Nashua and the Greater Nashua Region had no animal rabies cases detected in 2016 (Table 5).

Table 5. Animal Positive Rabies by Geography, 2012-2016

Geography	2012	2013	2014	2015	2016
Nashua	0	0	2	2	0
Greater Nashua Region	1	1	5	4	0
New Hampshire	28	34	23	24	23

Source: NH DHHS

To Protect You and Your Family from Rabies

- **Do not touch, feed, handle, or adopt wildlife or stray animals**
- **Teach children to avoid wildlife, and to tell an adult if an animal bites them**
- **Vaccinate your pets! In New Hampshire it is required for all dogs, cats, and ferrets to be vaccinated**
- **If your pet has been into a fight with another animal, contact your veterinarian**
- **Bat proof your house and call a pest professional if you have bats**
- **If an animal is acting strangely call your local animal control officer**

Nashua residents can reach the Animal Control Officer by calling the Nashua Police Department at 603-594-3500

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Chronic Disease

"Most people have no idea how good their body is designed to feel."
- Kevin Trudeau

Contents

Heart Disease

Heart disease is a term that refers to several types of heart conditions and the most common type of heart disease in the United States is coronary artery disease. Coronary heart disease (CHD) occurs when there is a decreased blood flow to the heart. When blood flow to the heart is decreased due to cholesterol plaques which build up on the arterial blood vessels, it can cause a heart attack.[1]

Heart disease was reported as the *second cause of death in the Greater Nashua Public Health Region (GNPHR), in 2014.* In 2015, Medicare recipients in Hillsborough County diagnosed with Heart Disease had total costs of $17,844-$19,452 per person.[1] According to the Center for Disease Control and Prevention (CDC) Cardiovascular disease, including heart disease and stroke, is the leading cause of death in the United States. Together, heart disease and stroke kill nearly 800,000 Americans each year costing the nation approximately $312.6 billion annually in healthcare cost and loss of productivity. According to CDC, Dr. Janet Wright, MD, FACC, it is also the leading contributor to racial disparities in life expectancy.[3] The US spends 1/6th of healthcare dollars on treatment for cardiovascular disease.[3]

The national Healthy People 2020 goal for CHD is to reduce coronary heart disease death rates to 103.4 deaths per 100,000.[4] The NH State Health Improvement Plan 2020 goal is to reduce coronary heart disease deaths from 101.3 deaths per 100,000 (2010) to 98 deaths per 100,000 by 2015 and 95 deaths per 100,000 by 2020.[1] For Nashua the age adjusted death rate for CHD in 2014 was 78.8 deaths per 100,000 (CI 62.38-98.20) population; the GNPHR, was 70.27 deaths per 100,000 (CI 58.8-81.73) population; and in NH it was 90.92 deaths per 100,000 (CI 86.21-95.62) population.[5]

23.4 people per 100,000 die from Heart Attacks each year in Nashua

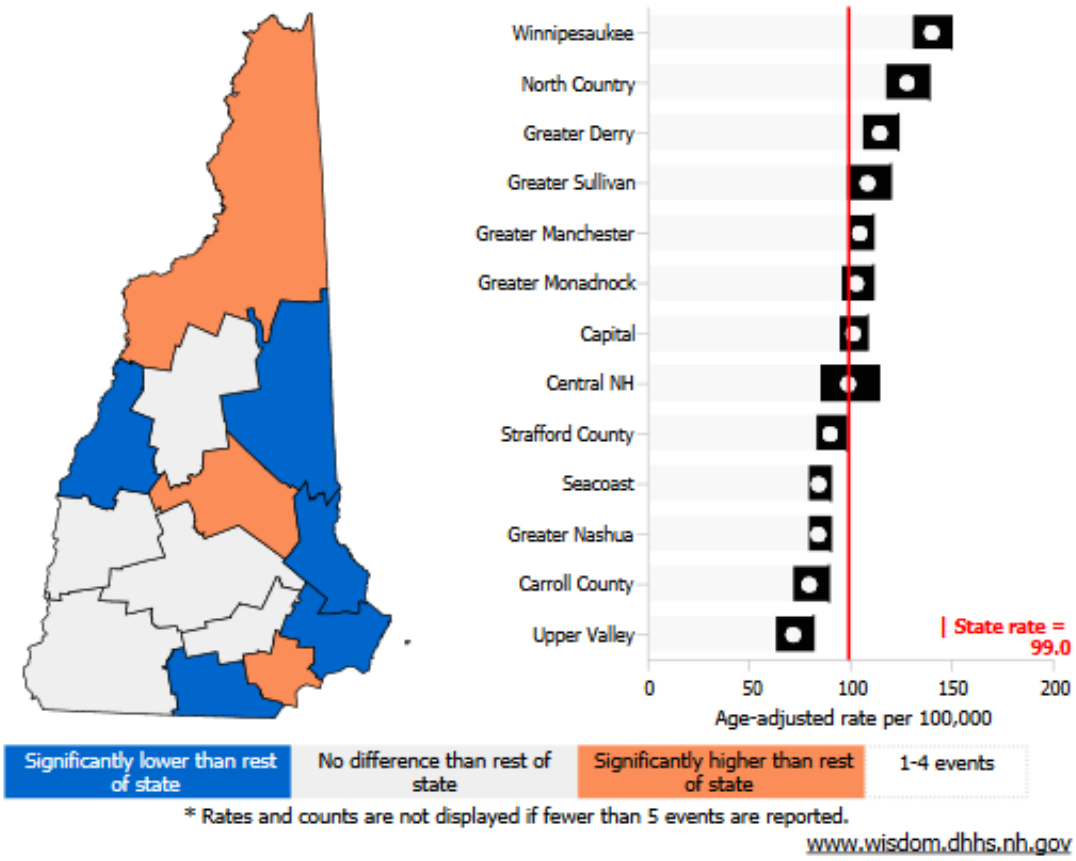
Diseases of the heart is the 2nd leading cause of death in the GNPHR

3.6 % of adults in the GNPHR have Coronary Heart Disease

Source: NH WISDOM

As shown in Figure 1, all three regions, NH, GNPHR, and Nashua have met the 2020 Healthy People and NH State Health Improvement Plan goals.

Figure 1. Coronary Heart Disease Mortality, Age-Adjusted, Both Genders, All Ages, GNPHR

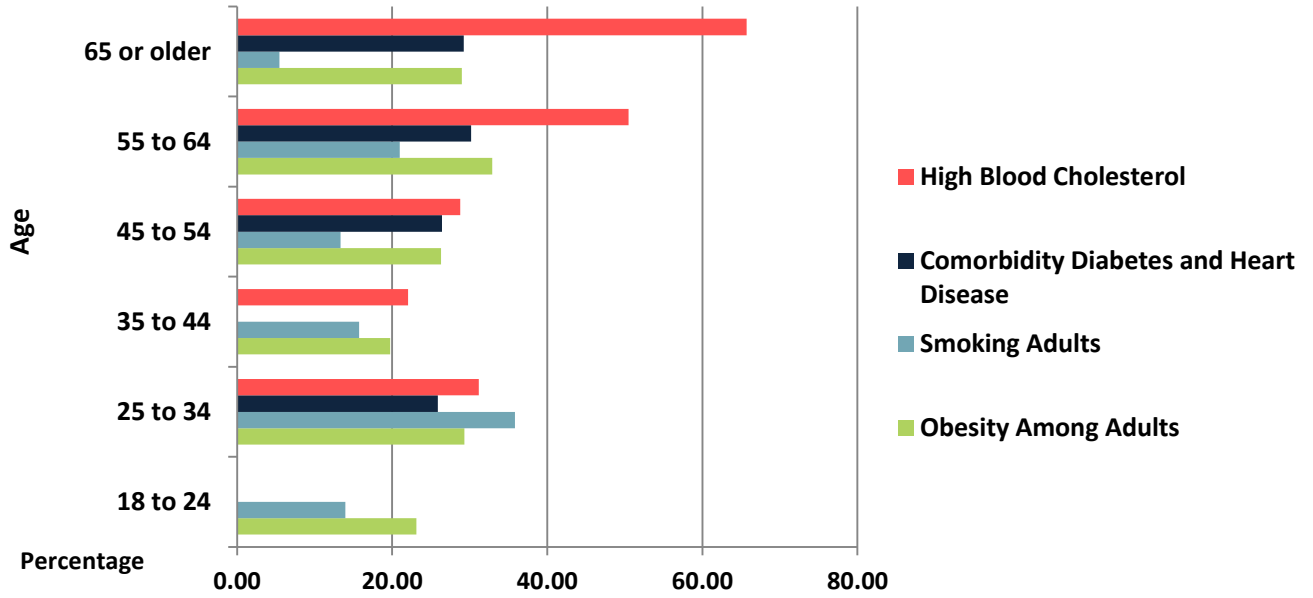


Source: NH WISDOM

Risk Factors

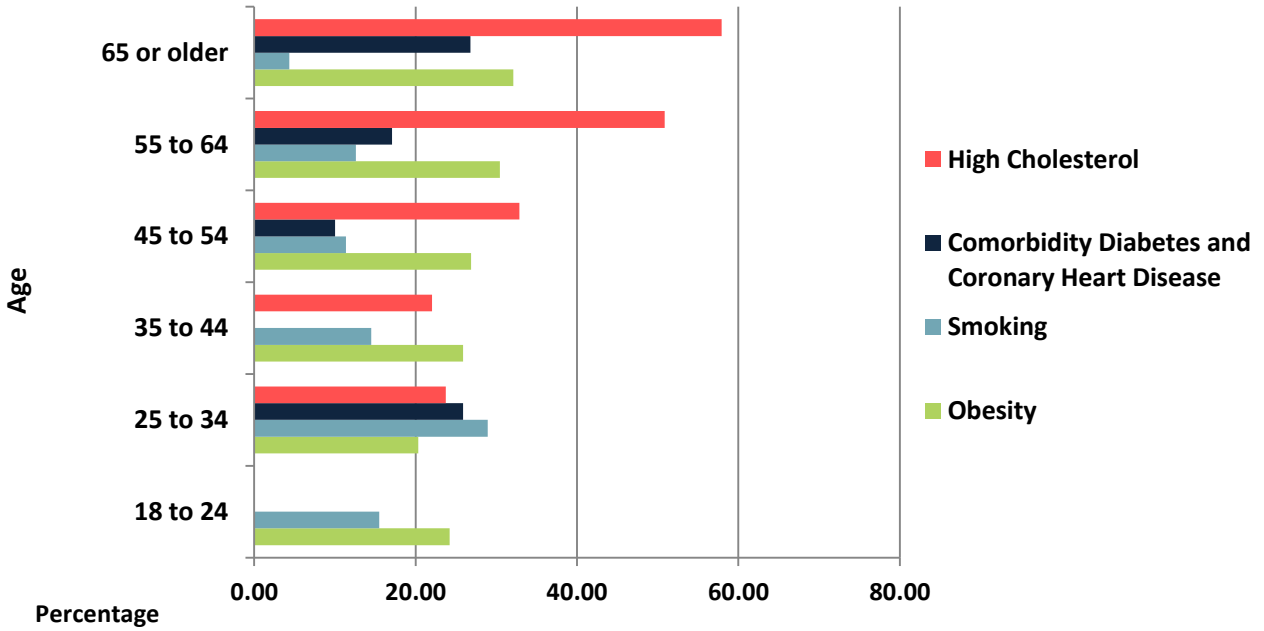
Nearly half of all Americans (47%) have at least one of the three key risk factors for heart disease which include high blood pressure, high cholesterol and smoking.[6] Other risk factors include diabetes, overweight, obesity, alcohol use, and physical inactivity. Figure 2 and Figure 3; show the percentage of people by age, with risk factors for CHD in Nashua and GNPHR respectively. Risk factors include high blood cholesterol, comorbidity of diabetes and heart disease, smoking among adults, and obesity among adults.

Figure 2. CHD Risk Factors, Nashua, 2015



Source: NH WISDOM

Figure 3. CHD Risk Factors, GNPHR, 2015



Source: NH WISDOM

High Cholesterol and Cholesterol Screening

The build-up of cholesterol in the artery walls puts one at risk for heart disease and stroke. Cholesterol is a fatty waxy build up that stops the blood flow to the heart. The good news is that steps can be taken to control cholesterol levels. Since there are no signs and symptoms to detect high cholesterol, the only way to know if you are at risk for Heart Disease and Stroke is to check your cholesterol by having a blood test.[7] To prevent and manage high cholesterol it is recommended by the CDC to:

- practice healthy living habits such as eating a healthy diet
- maintaining a healthy weight
- doing enough physical activity
- not smoke
- limiting alcohol use

The CDC also recommends treating the medical conditions by checking cholesterol, managing diabetes and taking Cholesterol-Lowering medication.[8]

Adults with hypertension in Nashua and GNPHR are on target to meet the goals of the NH SHIP for 2020 with significantly lower rates than the rest of NH. The NH SHIP goals are to reduce the percentage of adults with hypertension from 31% (2011) to 26% by 2015 and 22% by 2020[1]. As of 2015, NH's prevalence of hypertension was 29.2% (CI 27.68-30.55); GNPHR had a prevalence of 27.12% (CI 23.57-30.67); and Nashua had a prevalence of 26.01% (CI 20.86-31.16)[5].

Adults with high blood cholesterol in Nashua and GNPHR need to be reduced in order to meet the goals of the NH SHIP 2020. Those goals are to reduce the percentage of adults with high blood cholesterol from 39% (2011) to 35% by 2015 and 30% by 2020[1].

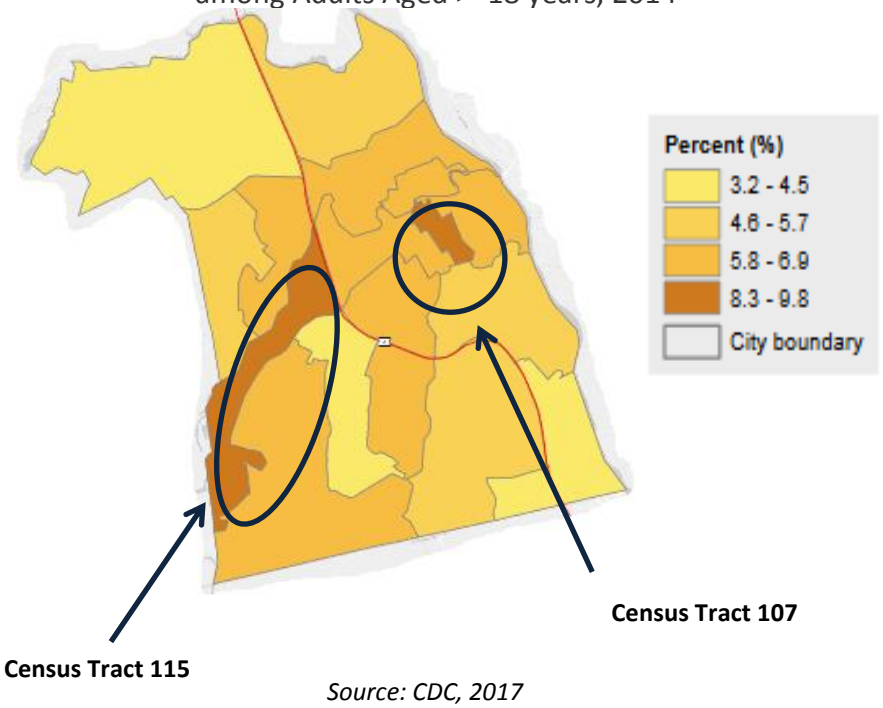
The percentage of adults with high blood cholesterol is still an area of focus as a contributing factor to CHD and deaths from CHD. In 2015, men ages >65 years old in GNPHR had the highest rate of hypertension at 63.4%, while 78.1% of females in Nashua >65 years old had hypertension. Currently, in Nashua 4.46% (CI 2.31-6.61) of the population have a prevalence of CHD compared to 3.6% in GNPHR and 3.84% (CI 3.37-4.30) in NH[5]. High blood cholesterol, diabetes, smoking tobacco, and obesity are all factors that contribute to CHD. In Nashua people aged 55 and older present these risk factors more predominately. What is striking regarding the co-morbidity data is the increased percentage of the population aged 25-34; 31.17% with high blood cholesterol, 25.88% with diabetes and with heart disease, 35.83% smoke, and 29.31% are obese[5]. These heightened percentages show cause for concern of the future health and healthcare costs of this young population.

CHD by Census Tract

CDC's 500 Cities project highlights the health data by census tract of 500 US cities. Nashua was one of the cities selected for this project. Breaking down health data for heart disease and its risk factors by census tract reveals the areas in Nashua that have the highest need for interventions. The data in the table and maps in Figure 4 and 5 were obtained using the CDC's 500 Cities Project based on the Behavioral Risk Factor Surveillance Survey (BRFSS). The Centers for Disease Control and Prevention used

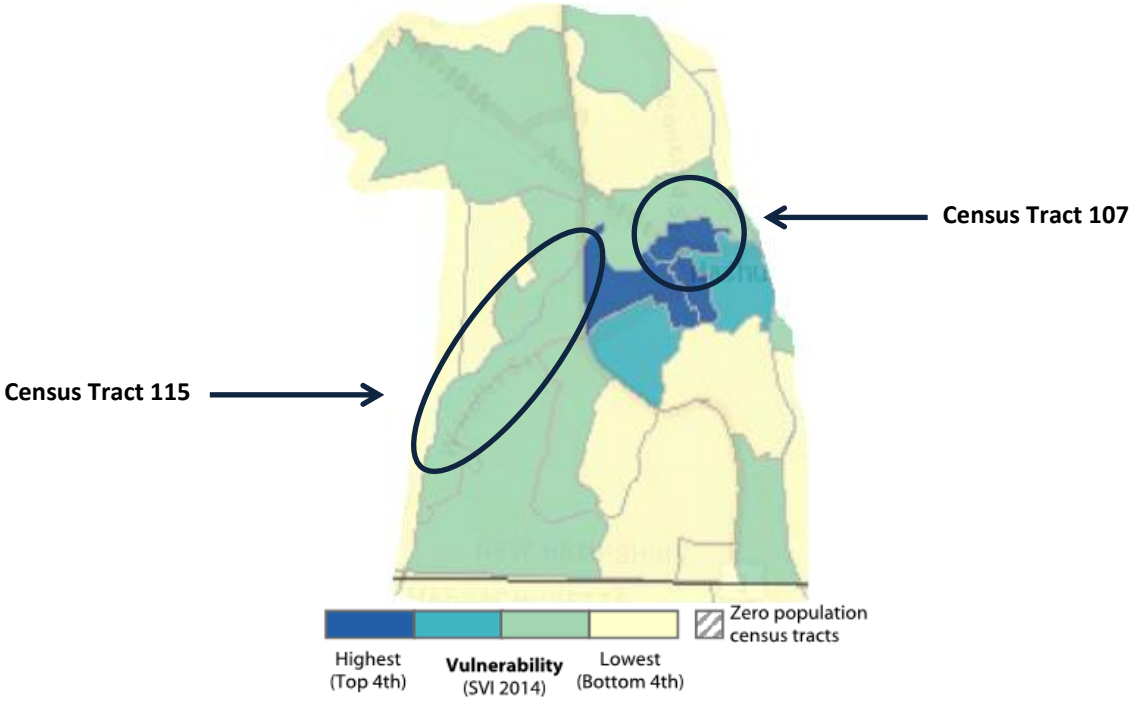
a multi-level statistical modeling framework to generate small area estimates for this data. For more information on the 500 Cities project, visit https://www.cdc.gov/500cities/index.htm[9]

Figure 4. Model-Based Estimates for Coronary Heart Disease among Adults Aged >=18 years, 2014



Source: CDC, 2017

Figure 5. Social Vulnerability Index, Nashua, 2014



Source: CDC, 2017

Comparing the maps for social vulnerability and CHD, the areas of highest social vulnerability also experience the highest crude prevalence of CHD. The areas of the highest crude prevalence are indicated by the darker blue colors on the map for CHD.

Census tract 107 has the highest crude prevalence of CHD at 9.2% of a 1,570 population. The next highest prevalence of CHD is located in census tract 115 with a crude prevalence of 8.3% for CHD in a population of 2,430.[9] These census tracts have the highest need for intervention in preventing the prevalence of CHD.

CDC 500 Cities Data

Data collected from CDC's ATSDR (Agency for Toxic Substances & Disease Registry) Social Vulnerability Index (SVI) and CDC's 500 Cities Project. The data in the table below identifies the relationship between SVI and various health outcomes in Nashua.[9, 10]

Table 1 shows Nashua's health data using crude prevalence from CDC's 500 cities to express relationships between SVI and health outcomes. The table shows a relationship to each health outcome with SVI. When comparing SVI to health outcomes, there are very strong relationships between SVI and obesity and SVI and no health insurance (shown in green). The relationships between HBP, High Cholesterol and CHD are also very strong. Although the relationships between SVI and some health outcomes are strong they do not explain the cause of these health outcomes.

Table 1. Relationship of SVI to Health Outcomes, Nashua

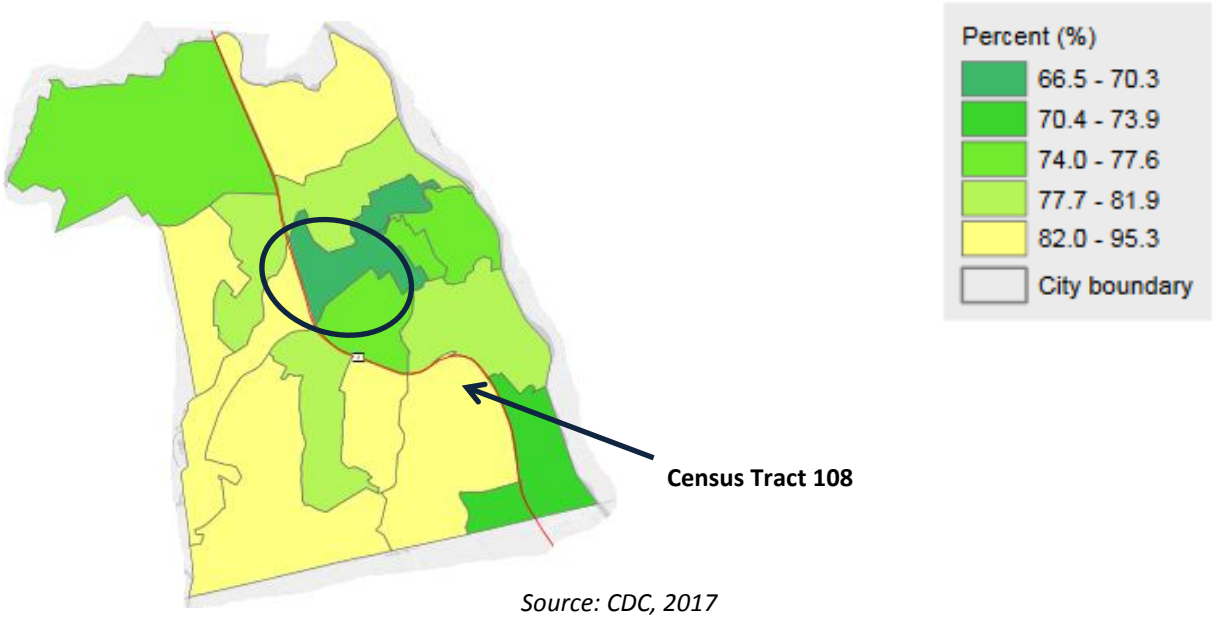
	SVI	HBP	High Chol	CHD	Diabetes	Obesity	No Health Insurance
SVI							
HBP	Weak						
High Chol	Very Weak	Very Strong					
CHD	Moderate	Very Strong	Very Strong				
Diabetes	Strong	Very Strong	Strong	Very Strong			
Obesity	Very Strong	Moderate	Weak	Moderate	Strong		
No Health Insurance	Very Strong	Weak	Weak	Moderate	Strong	Very Strong	

Source: CDC, 2016

Limitations: As with all self-reported sample surveys, BRFSS data might be subject to systematic error resulting from non-coverage, nonresponse, or measurement bias. In an effort to address non-coverage issues related to phone use, BRFSS began including cell phone interviews in the 2011 data collection. Due to changes in sampling and weighting methodology, 2011 is a new baseline for BRFSS, and comparisons with prior year data are inappropriate[11].

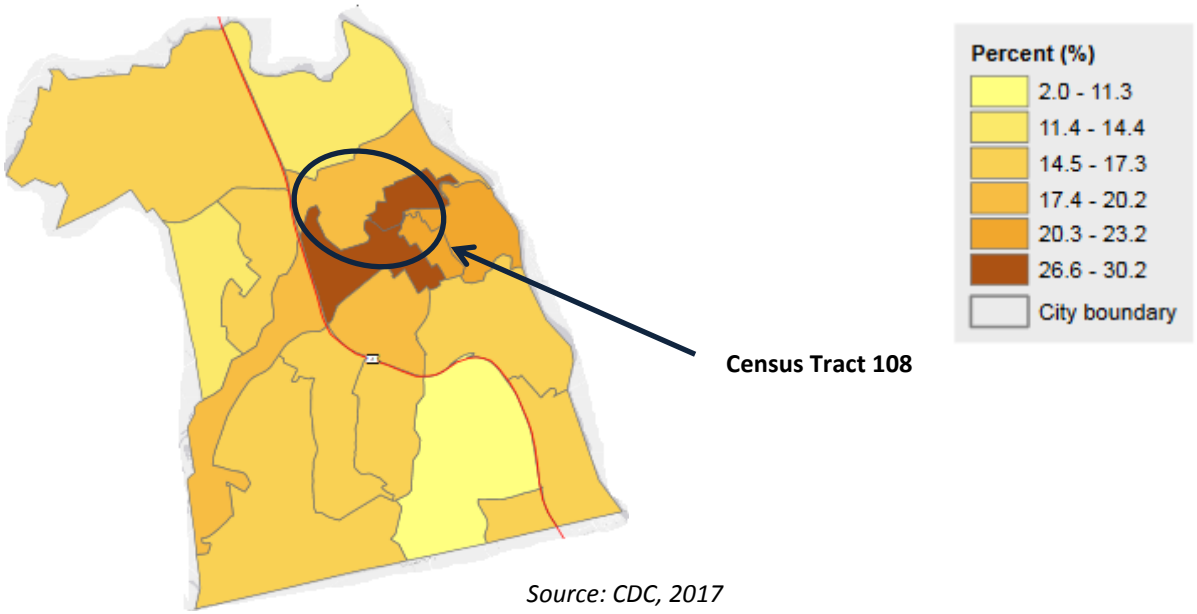
In the following three maps Census tract 108 has the highest risk factors for CHD. Census tract 108 has the lowest percent of adults 18 and over who are screened for high cholesterol, the highest percent of population who currently smoke and the lowest percentage of population that takes medicine for high blood pressure. Each of these factors increases the risk of CHD in this population.

Figure 6. Model-based Estimates for Cholesterol Screening among Adults Aged >=18 years, 2013



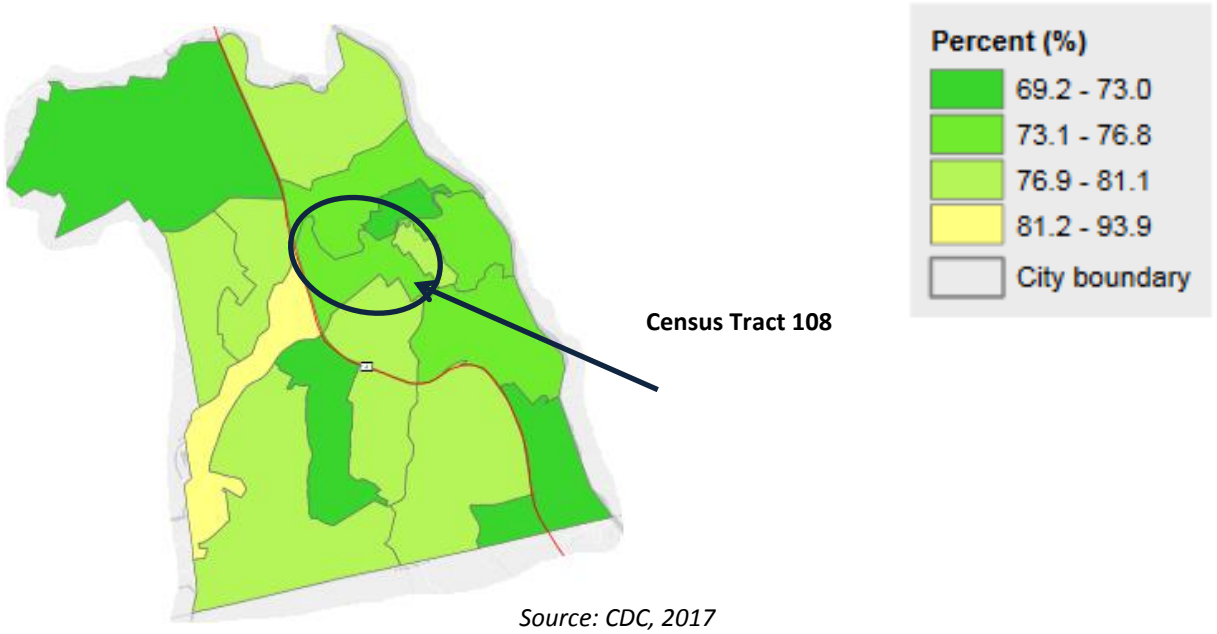
Source: CDC, 2017

Figure 7. Model-Based Estimates for Current Smoking among Adults Aged >=18 years, 2014[9]



Source: CDC, 2017

Figure 8. Model-Based Estimates for Taking Medicine for High Blood Pressure Control among Adults Aged >=18 Years with High Blood Pressure, 2013[9]



Source: CDC, 2017

The ability to break the crude prevalence of risk factors down by census tracts helps to identify the areas in Nashua that are in need of the most intervention. CHD and its risk factors are preventable and affect populations with high social vulnerability and limited access to health care according the data presented in this chapter.

Stroke

Both the Healthy People 2020 and the NH SHIP for 2020 have goals to reduce the stroke death rates. The national goal is to reduce the stroke death rate to 34.8 per 100,000 and the NH SHIP goal is to reduce stroke death rates from 34 per 100,000 (2011) to 32 per 100,000 by 2015 and 28 per 100,000 by 2020[1,4]. In 2014, the stroke death rates were 26.8 per 100,000 in NH, 19.9 per 100,000 in the GNPHR, and 19 per 100,000 in Nashua[12]. The goals for stroke deaths have been achieved for Healthy People 2020 and the NH SHIP in the state, region and city. Continuing to reduce the prevalence of co-morbidities, obesity, smoking, diabetes, and hypertension, which increased risk of stroke, will continue to improve the stroke death rate.

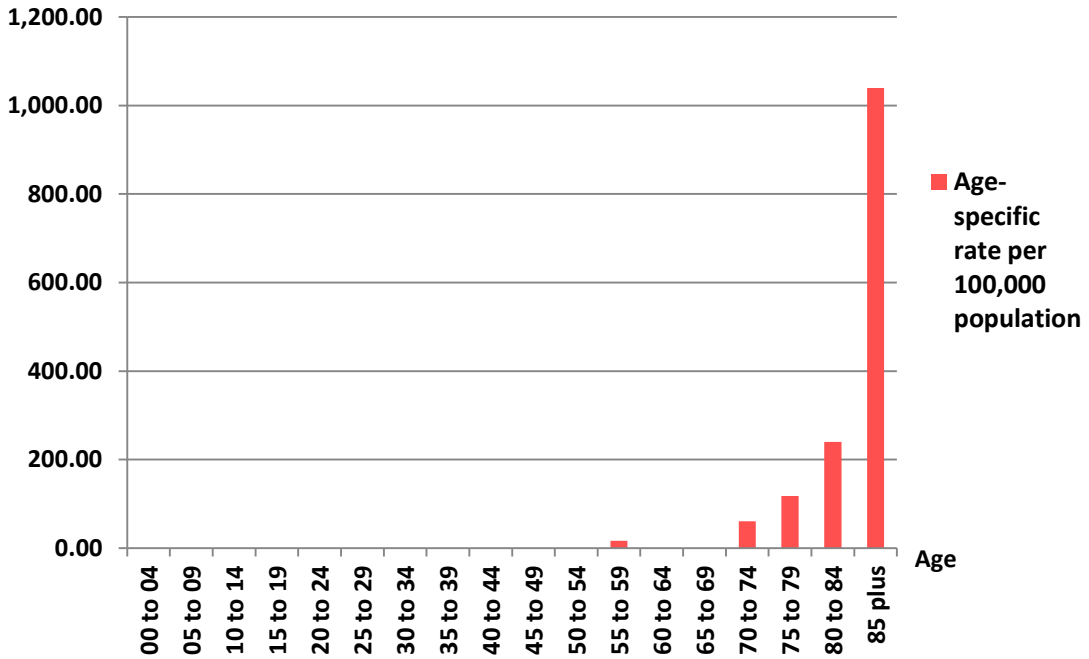
Table 2. The population Aged 70 and Older Has the Highest Incidence of Stroke Mortality Rates in Nashua, 2011-2015[12]

Age	Stroke Rates
70-74	60.50 per 100k (CI 26.12, 119.20)
75-79	118.05 per 100k (CI 61, 206.21)
80-84	240.15 per 100k (CI 146.69, 370.90)
85 plus	1039.18 per 100k (CI 832.34, 1,281.82)
Source: NH Wisdom	

Table 3. The Population Aged 70 and Older Has the Highest Incidence of Stroke Mortality Rates in GNPHR, 2011-2015[12]

Age	Stroke Rates
70-74	69.15 per 100k (CI 43.34, 104.69)
75-79	118.45 per 100k (CI 77.38, 173.56)
80-84	273.38 per 100k (CI 197.85, 368.24)
85 plus	884.13 per 100k (CI 733.30, 1,034.95)
Source: NH Wisdom	

Figure 9. Stroke Mortality Age-Specific Rate per 100,000 Population, Both Genders, All Ages, Nashua, 2010-2014

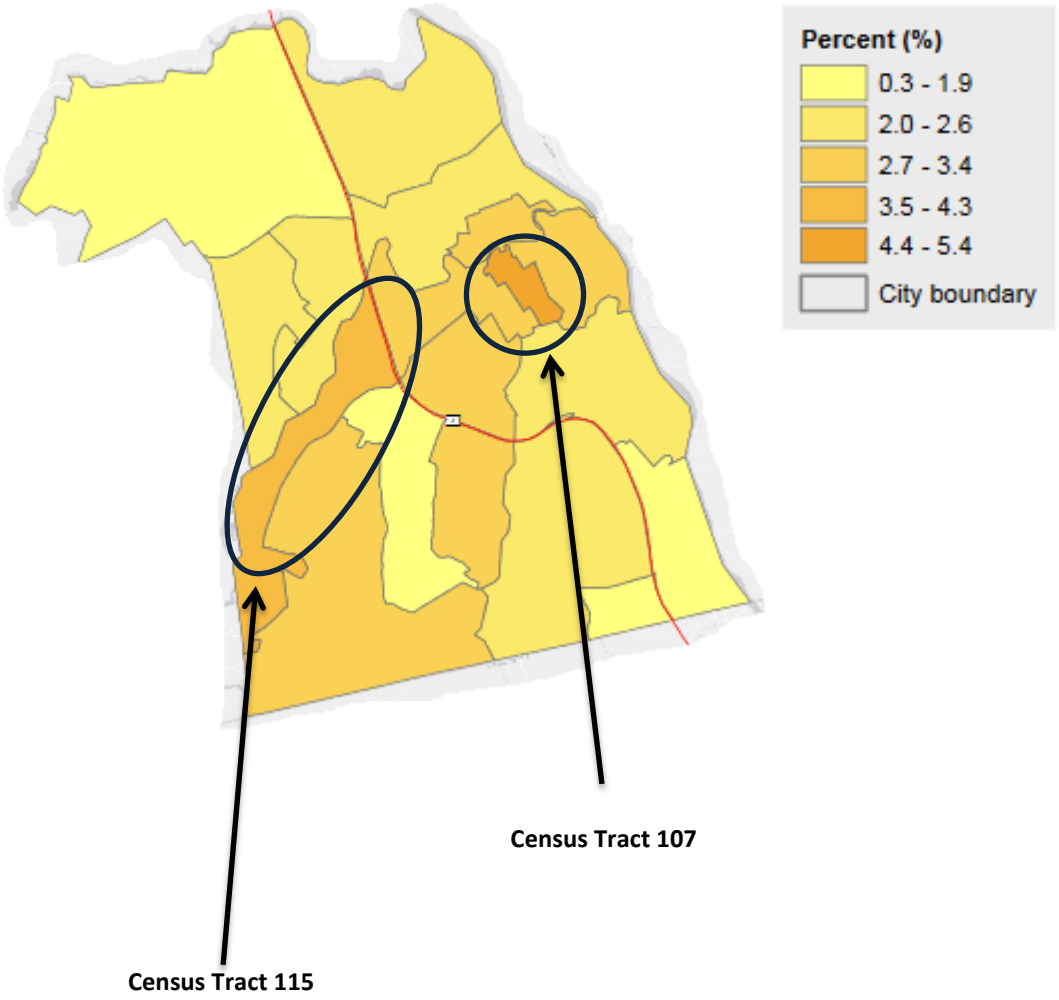


Source: NH WISDOM

Stroke prevalence of people who have ever been told they had a stroke in 2015 was 2.12% (CI 0, 5.09) and under for ages 45 to 64 and 4.72% (CI 1.52, 7.91) for people aged 65 and older living in Nashua.[12] The population aged 45-64 who have ever had a stroke and who are at high risk for a stroke would benefit most from prevention strategies to reduce co-morbidities related to stroke.

The data in Figure 10 was obtained using the CDC's 500 Cities Project based on BRFSS. The Centers for Disease Control and Prevention used a multi-level statistical modeling framework to generate small area estimates for this data. For more information on the 500 Cities project, visit https://www.cdc.gov/500cities/index.htm[9]. This data shows certain census tracts, 107 and 115, experience higher crude prevalence of stroke, when adjusted for age, in Nashua. The relationships based on census tract are strong for risk factors associated with stroke and social vulnerability. Identifying the populations that experience the highest risk factors for stroke and stroke mortality will give direction to providing prevention interventions for specific populations.

Figure 10. Model-Based Estimates for Stroke Among Adults Aged >=18 years, 2014[8]



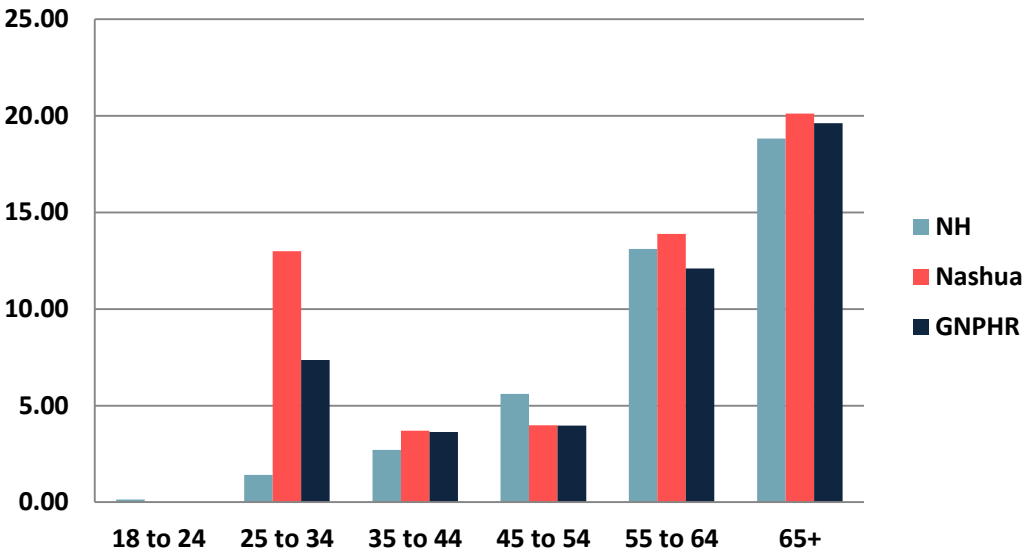
Source: CDC, 2017

Diabetes

Diabetes is a chronic disease where the body's capacity to create or react to the hormone insulin is compromised resulting in an irregular metabolism of carbohydrates. The majority of food consumed is converted into glucose, or sugar, that the body uses as fuel to function. Normally, the pancreas makes a hormone called insulin which guides glucose into cells so it can be utilized. People with type-1 diabetes do not make enough insulin while people with type-2 cannot use insulin correctly leading glucose to build up in the blood. High blood sugar levels can lead to heart disease, stroke, blindness, kidney failure, and amputation of toes, feet, or legs. An estimated 90% to 95% of those diagnosed with diabetes have type-2 while only 5% have type-1.[13] Type-2 diabetes is caused by several risk factors including being overweight, having a family history of the disease and a sedentary lifestyle.

In 2015, the CDC released their latest National diabetes Statistic Report. This stated about 29 million or 9.1% [13] of Americans had been diagnosed with diabetes. Comparatively, in the same year, the rate of diabetes among adults in the state of New Hampshire was 8.1%.[14] The city of Nashua reported 10.02% and the Greater Nashua Public Health region 8.4%. Additionally, nearly 1 in 4 adults is unaware they may have diabetes so these numbers may be underreported.[15] Rates of diabetes in the city of Nashua are also higher than the state and public health region when data is broken down by age as shown in Figure 11.

Figure 11. Diabetes Prevalence by Age, 2015



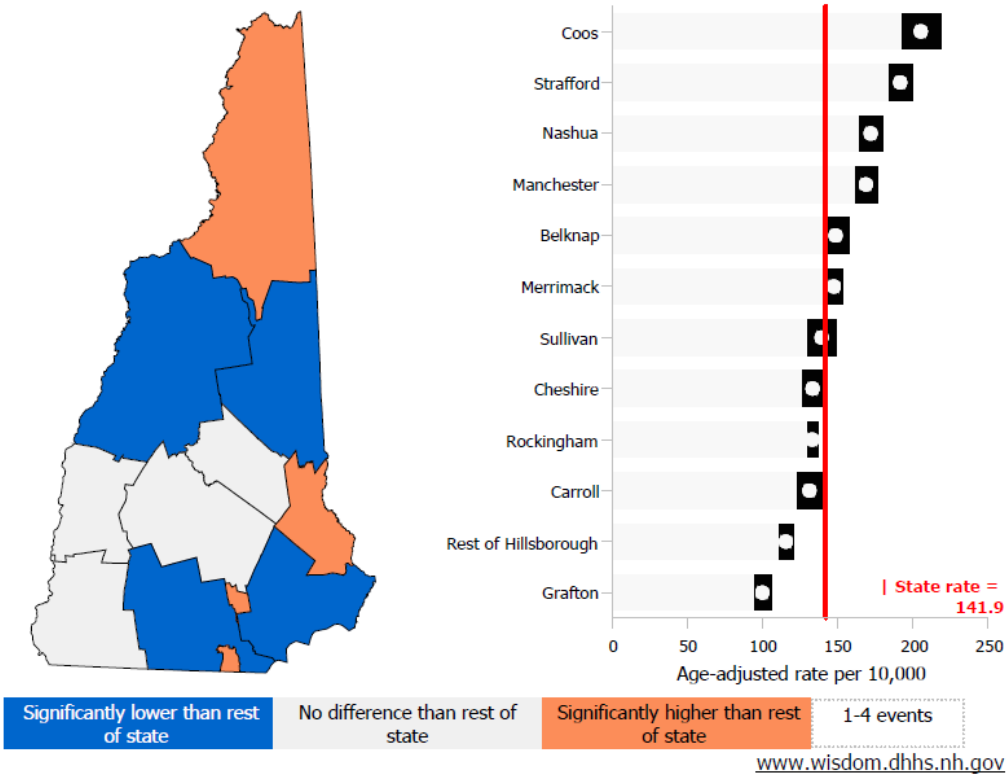
Source: NH WISDOM

**no information avaliable for 18-24 year olds in Nashua & GNPHR*

The cost of diabetes is astronomical. Total medical costs, lost work and wages associated with diabetes came to $245 billion in 2014.[13] People with diabetes are estimated to spend double what a person without the disease would.[15] The cost of diabetes also includes an increased risk of death. As of 2015, diabetes was the seventh leading cause of death in the U.S. and the number one cause of kidney failure,

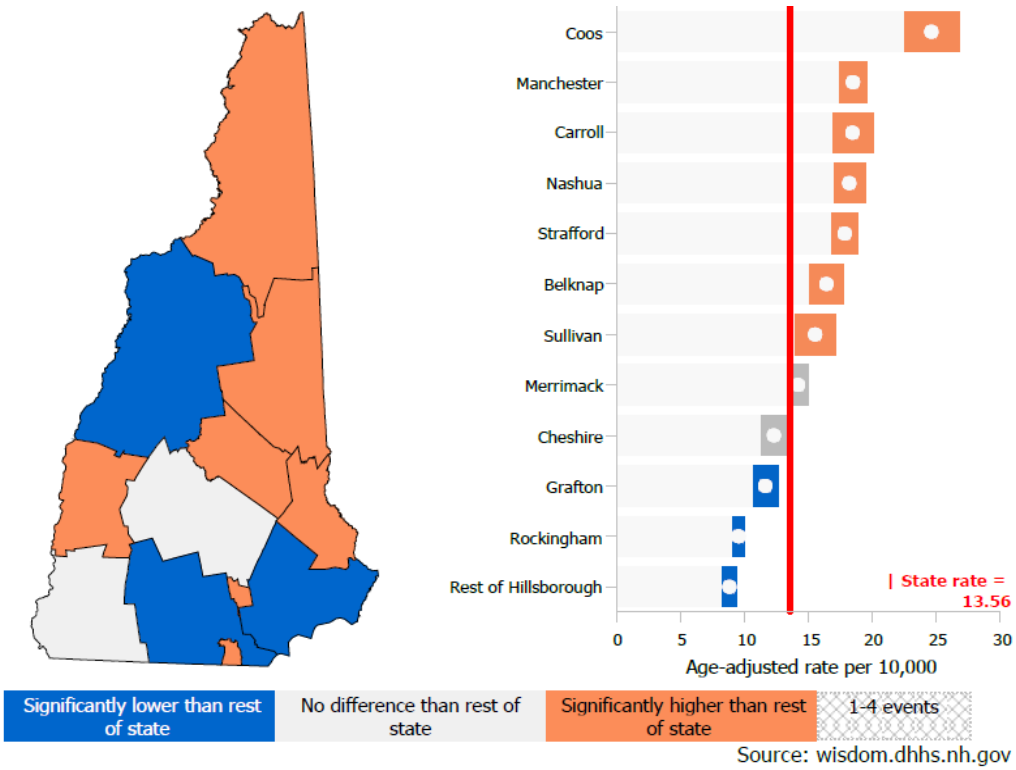
lower-limb amputations and adult-onset blindness.[13] People with diabetes are also twice as likely to have heart disease or a stroke.[13] The hospitalization rate due to diabetes in Nashua is higher than the state of New Hampshire as a whole (Figure 12). Hospital visits for diabetes ambulatory care sensitive conditions in Nashua are also higher compared to the rest of the state (Figure 13).

Figure 12. Diabetes Hospitalizations, Age-Adjusted Rate, 2009



Source: NH WISDOM

Figure 13. Diabetes Hospital Visits for Ambulatory Care Sensitive Conditions, Age-Adjusted Rate, 2009



Source: NH WISDOM

Current rates of diabetes are expected to grow. More than 86 million adults in the U.S. have pre-diabetes, a condition identified by higher than normal blood sugar levels. [16] Blood sugar readings are not high enough for a type-2 diagnosis but still require intervention. Sadly, 9 out of 10 people with pre-diabetes are unaware of the condition and without mediation, are likely to develop type-2 diabetes within 5 years.[17] Prevalence of pre-diabetes in Nashua for adults 18 years and older in 2013 was 9.32% which is higher than the public health region (8.18%) and the state (6.77%). [14] It is recommended that those with pre-diabetes enroll in a CDC-recognized diabetes prevention lifestyle change program to help prevent or delay type 2 diabetes. These year-long courses focus on implementing behavior-changes such as a healthy, low-fat diet and exercising for at least 150 minutes each week. Persons with pre-diabetes who lose 7-10% of their body weight can cut their risk of developing type-2 diabetes by more than half.[17]

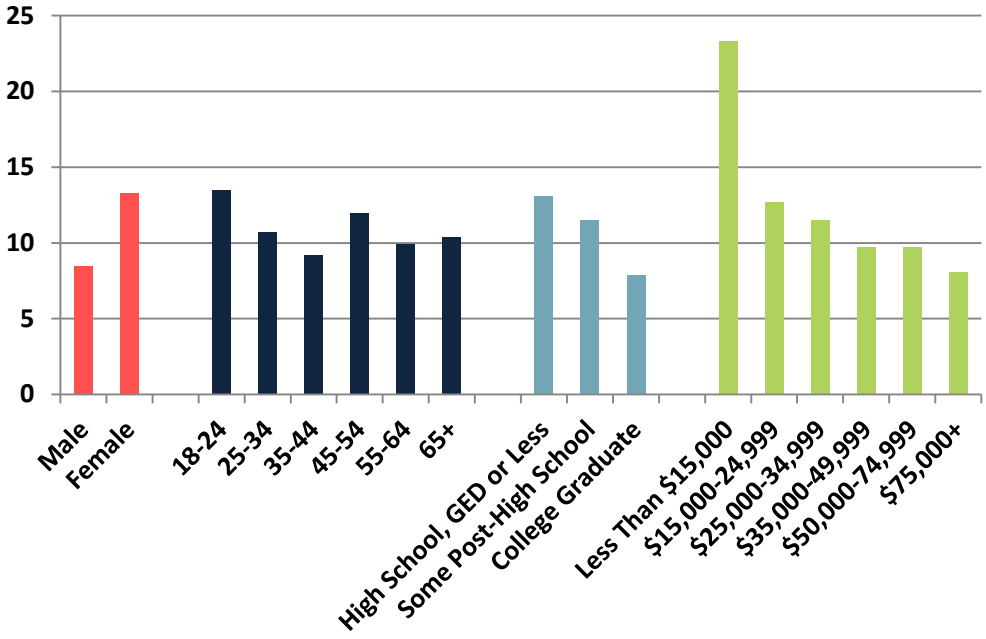
Asthma Burden

Limitations exist in this section due to limited current data for Nashua and GNPHR. Data was used from years 2000-2009. Current data will be updated on the following website when it is available: https://wisdom.dhhs.nh.gov/wisdom/#Topic_6E5FA17DEFD54C779A510CC289F8499B_Anon

Nationally, 1 in 11 children have asthma and 1 in 12 adults have asthma (Figure 14). Asthma is a "chronic disease that affects the airways in the lungs". Each year, asthma costs the United States about $56 billion and in 2008, there were 14.2 million missed days of work due to asthma. In 2013, students missed 13.8 million days of school. Asthma is a public health priority because in the last decade the proportion of people with asthma in the United States grew by nearly 15%". There are gaps in education for asthmatics on how to control their asthma triggers and in accessing lifesaving medications to control asthma. Less than 50% of children with asthma get an asthma action plan and less than 7 in 10 adult asthmatics are taught how to recognize asthma symptoms. More drastic is the number of people that cannot afford asthma medication with 1 in 5 Hispanic adults unable to afford their asthma medication. Nationally, there are 9 deaths a day due to asthma and women and African Americans are more likely to die from asthma. Many of the reasons for hospital visits and deaths due to asthma are preventable with education, an asthma action plan, minimizing triggers and accessing affordable medication.[18]

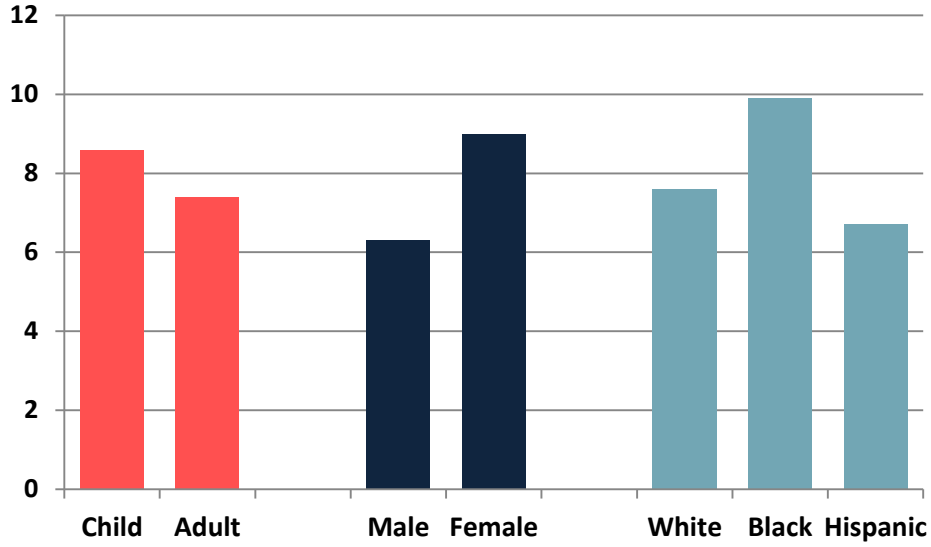
In 2014, asthma in NH cost an estimated $167 million annually in direct medical costs and $21 million in additional costs were associated with lost wages.[19] New Hampshire has one of the highest prevalence rates for asthma in the country and in 2013, 11% of adults currently had asthma. For adults, there is statistical significance for asthma by education and household income. For adults with a high school diploma or less, the asthma prevalence is 13% (CI 10.9-15.2) compared to college graduates at 8% (CI 6.6-9.1). Adult asthmatics with a household income of $15,000-$24,999 had an asthma prevalence of 13% (CI 9.7-15.7) compared to 8% (CI 6.3-9.8) in households with an income above $75,000 (Figure 15).[20]

Figure 14. Adult Current Asthma Prevalence, NH, 2013 BRFSS



Source: CDC, 2016

Figure 15. Current Asthma Prevalence by Age, Sex, Race/ Ethnicity
United States, 2014



Source: National Health Interview Survey,
National Center for Health Stats, CDC

In 2013 in New Hampshire, about 10% or 28,000 children, had asthma but there were no statistically significant differences by education or household income (Table 4).[21]

Table 4. Child Current Asthma Prevalence, NH, 2013 BRFSS

Characteristic	Percent	95% Confidence Interval
Total	**10.6%**	**7.7-13.5**
Sex		
Male	11.2%	7.7-14.8
Female	10%	5.4-14.6
Household Income		
Less than $35,000	15.9%	7.7-24
$35,000-74,999	9.9%	4.4-15.3
$75,000 or more	7.7%	5.1-10.3
Source: 2013 BRFSS		

In 2014 in the GNPHR, 10% (CI 7.6-13.49) of adults had asthma and in Nashua 12% (CI 7.2-16.86) of adults had asthma. In the same year in the GNPHR, 4% (CI 1.03-6.98) of children had asthma and in Nashua 8% (CI 0.58-15.66) of children had asthma.[21]

Nashua has a statistically significant higher hospitalization rate and emergency department visit rate for asthma compared to NH. The GNPHR without Nashua has a statistically significantly lower hospitalization rate and emergency department visit rate for asthma compared to NH (Figure 16).[21] There has been an increasing trend in inpatient hospital admissions in both the GNPHR and Nashua from 2000-2009 (Figure 17). In 2009 in Nashua, the inpatient discharge rate for asthma was 13 per 10,000 (CI 10.9-15.85) and for the GNPHR it was 11 per 10,000 (CI 9.25-12.12) compared to NH at 8 per 10,000 (CI 8.29-7.79). Starting at age 20, females have a higher rate of hospitalization than males; however for children under 5 years of age, males have a higher rate of hospitalization than females. Similarly to what is seen in NH, the hospitalization rate varies by season with the higher rates in the winter months and lower rates in the summer months.[22] NH, the GNPHR and Nashua meet the Healthy People 2020 goal for reducing inpatient hospitalization for children under 5 years of age (Table 5).[21, 23]

Table 5. Healthy People 2020 and Inpatient Hospitalizations

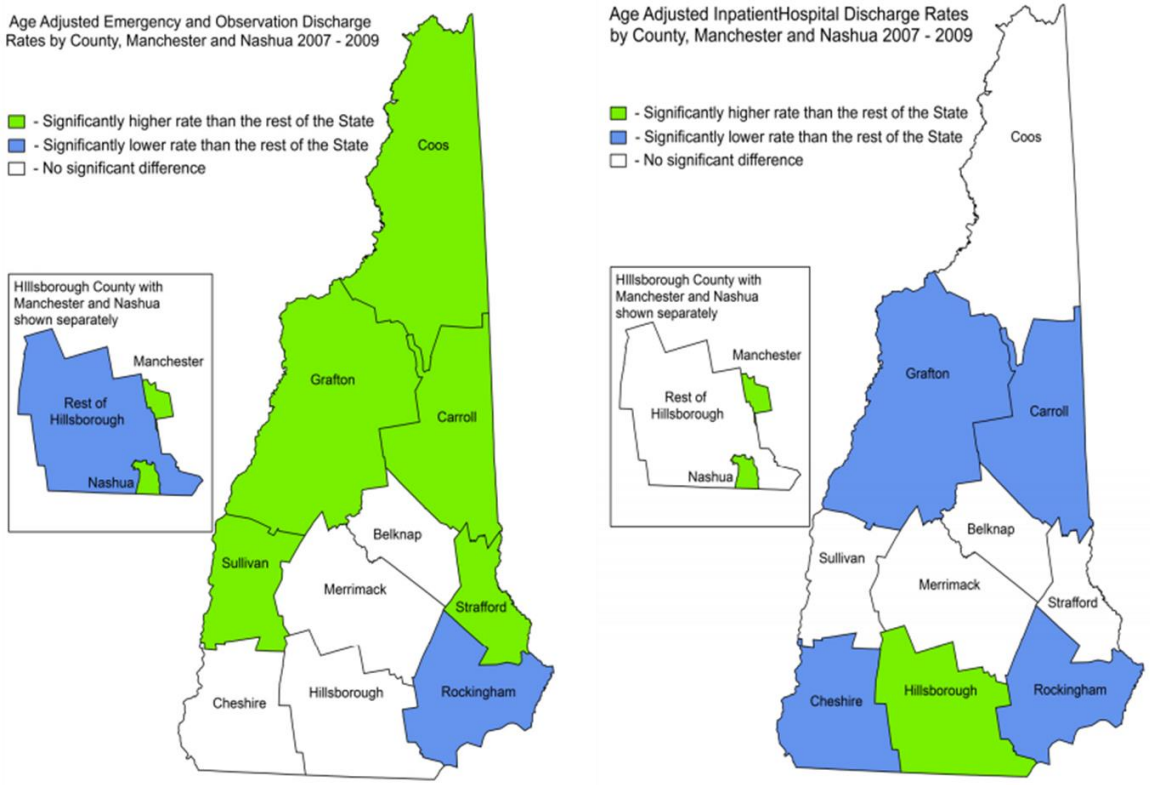
	Meet the goal	Inpatient Hospitalization Rate for Children Under 5 Years
Healthy People 2020 Goal		**18 inpatient hospitalizations per 10,000**
NH	👍	8 per 10,000 (CI 8.29-7.79)
GNPHR	👍	11 per 10,000 (CI 9.25-12.12)
Nashua	👍	13 per 10,000 (CI 10.9-15.85)
Source: HP2020 and 2014 Asthma Burden Report Update		

Each year in NH there are about 6,000 emergency department visits due to asthma and in the GNPHR there are about 1,000 emergency department visits.[21, 23] In 2009 in Nashua, emergency department visits for asthma was 59 per 10,000 (CI 54.55-65.20) and for the GNPHR it was 44 per 10,000 (CI 41.50-46.95) visits compared to NH which was 50.9 per 10,000 (CI 49.7-52.2). From 2000 to 2009, there was a decreasing trend of emergency department visits due to asthma in the GNPHR and in Nashua from 2000-2009 (Figure 5).[3] NH, the GNPHR and Nashua meet the Healthy People 2020 goal for reducing emergency department visits for children under 5 years of age (Table 2).[21, 23]

Table 6. Healthy People 2020 and Emergency Department Visits

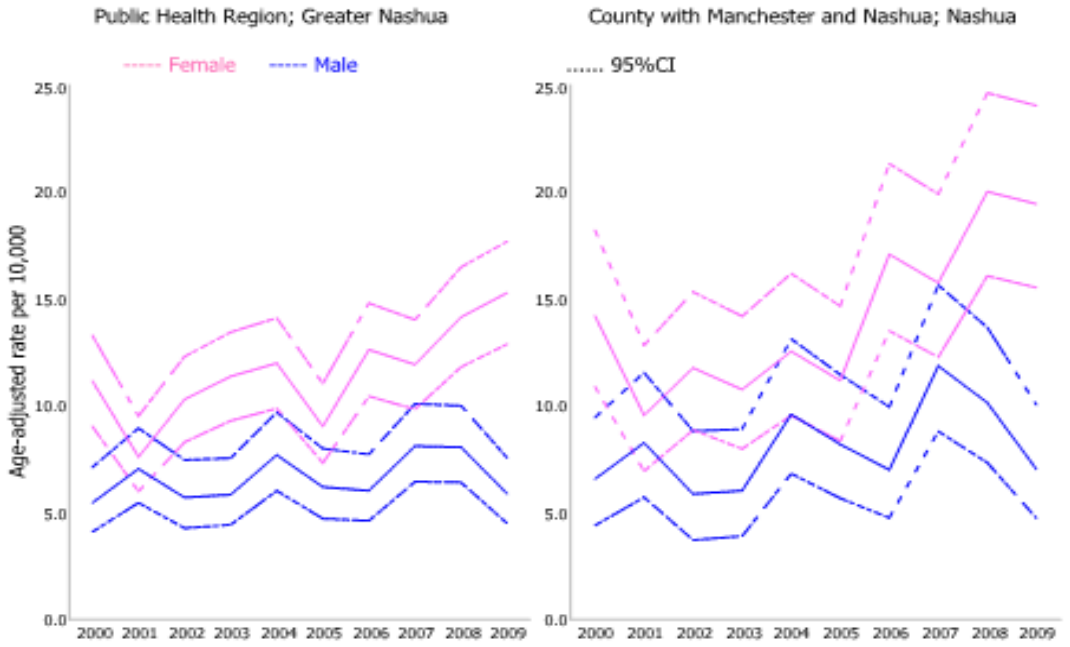
	Meet the goal	Emergency Department Visit Rate for Children Under 5 Years
Healthy People 2020 Goal		**95.7 ED visits per 10,000**
NH	👍	50.9 per 10,000 (CI 49.7-52.2)
GNPHR	👍	44 per 10,000 (CI 41.50-46.95)
Nashua	👍	59 per 10,000 (CI 54.55-65.20)
Source: HP2020 and 2014 Asthma Burden Report Update		

Figure 16. Maps of Asthma ED and Inpatient Discharges, NH, 2007-2009



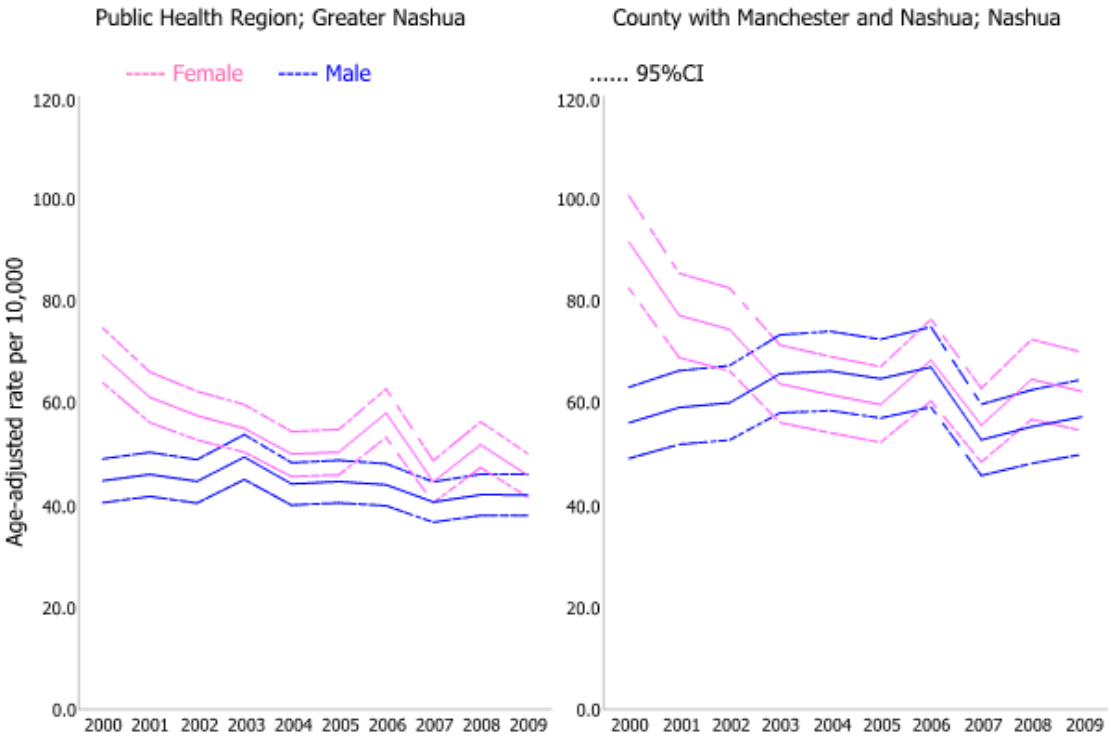
Source: NH WISDOM

Figure 17. Inpatient Hospitalization, GNPHR and Nashua, Age-Adjusted, Both Genders, 2000-2009



Source: NH WISDOM

Figure 18. ED Visits, GNPHR and Nashua, Age-Adjusted, Both Genders, 2000-2009



Source: NH WISDOM

According to data collected by the NH Department of Health and Human Services, the "direct medical costs associated with asthma are estimated at $167 million ($2,175 per person) annually in New Hampshire." About $24 million are related to children with an estimated $7 million due to poor air quality.[21]

Components of Asthma Control

The National Heart, Lung and Blood Institute (NHLBI) developed guidance for the diagnosis and management of asthma. Factors that are included into the assessment of asthma control in patients include "daily asthma symptoms, nighttime awakenings due to asthma, frequency of use of rescue medications, lung function, interference with normal activity and exacerbations requiring oral corticosteroids".[24] To control asthma, the NHBLI Expert Panel recommends four components to asthma management:

1. Assessing and monitoring asthma severity and control
2. Controlling environmental triggers
3. Appropriate medication
4. Patient education [24]

From 2011 to 2012, only 51.5% of NH adults with asthma had well controlled asthma and only 66% of NH children with asthma had well controlled asthma (Table 7). About 40% (CI 32.2-47.7) of NH adults with not well controlled or very poorly controlled asthma had asthma symptoms on 9 or more days in the past 30 days and 27% (CI 19.5%-35.8%) used a rescue medication, such as a short-acting beta agonist, 3 or more days per week. Additionally, adults with less education (high school diploma or less) and lower household incomes (<$25,000) were more likely to have asthma that was very poorly controlled or not well controlled (statistical significance). For example, of adult asthmatics in NH with a household income less than $25,000, 63% (49.2-77.9) have not well controlled or very poorly controlled asthma compared to those with a household income above $35,000 (31% CI 24.7-38.6).[21]

Table 7. Proportion of Adults and Children with Asthma Reporting the Indicated Levels of Asthma Control, BRFSS

Control Status	Adults (2011-2012)	Children (2006-2008)
NH Control Status	**Percent**	**Percent**
Well controlled	51.5% (CI 44.1-58.8)	66% (CI 58-74)
Not well controlled	21.8% (CI 17-26.6)	20% (CI 14.4-25.6)
Very poorly controlled	26.8% (CI 18.7-34.9)	14% (CI 7.1-20.9)
GNPHR Control Status	**2013**	
Not well controlled and very poorly controlled	51.1% (CI 28.4-74)	N/A
Nashua Control Status	**2013**	
Not well controlled and very poorly controlled	74.3% (CI 45.65-100)	N/A
Source: NH WISDOM and Asthma Burden Report Update		

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Weight Management, Physical Activity, Nutrition

"The food you eat can either be the safest form and most powerful form of medicine or the slowest form of poison."
- Ann Wigmore

Contents

Obesity

Obesity is a nationwide epidemic that has led to increased medical costs and a reduced quality of life for nearly 72 million adults. Obesity is a contributing cause of some of the leading causes of death in the U.S including heart disease, stroke, diabetes, and some types of cancer. Being obese can also cause sleep apnea, breathing problems and make being active more difficult.[1]

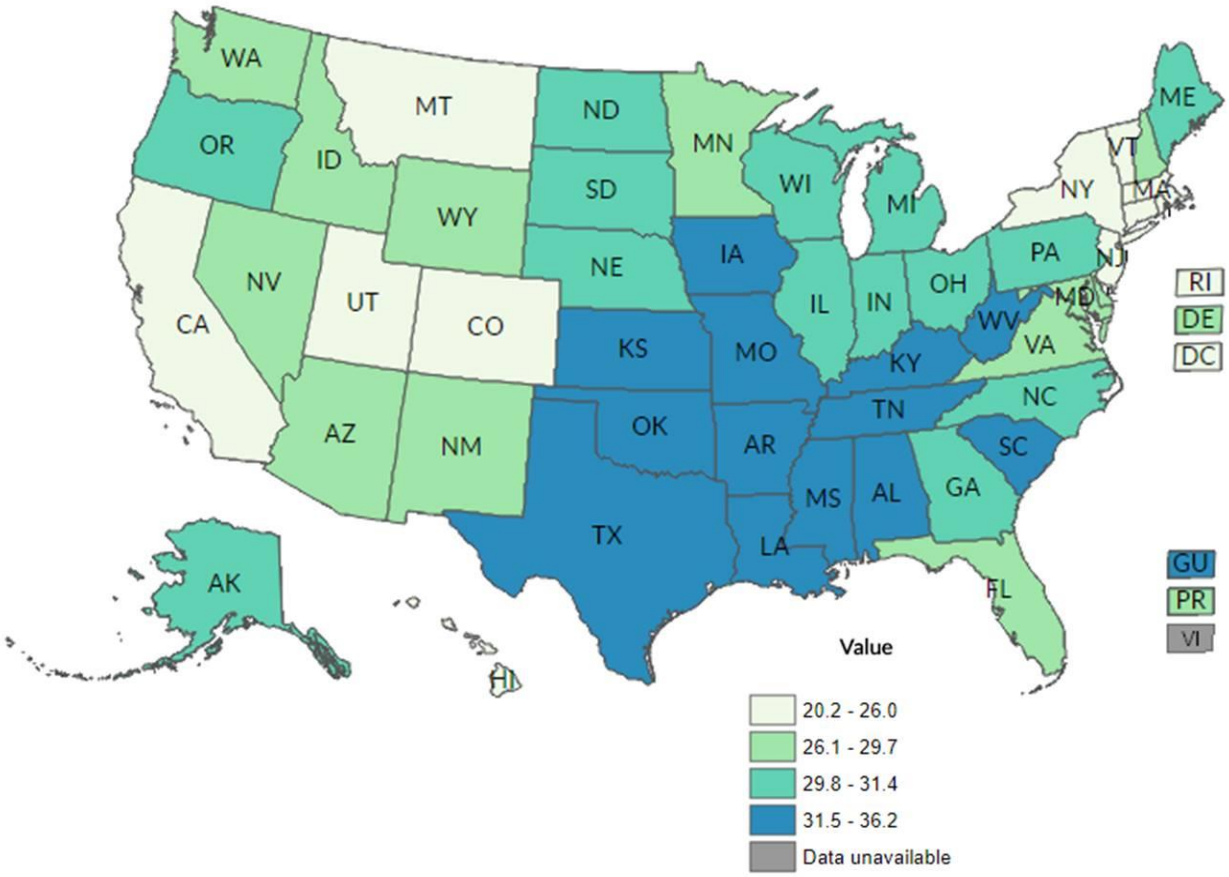
The CDC uses Body Mass Index (BMI) to categorize weight status. This formula uses a person's weight in relation to their height to determine if they are of a healthy weight or not. It should be mentioned that BMI is only a screening tool and is not diagnostic of the body fatness or health of an individual. Adults whose BMI falls with 25-29.0 are considered overweight while those who have a BMI of 30 or greater are obese. Children can also be assed using BMI in conjunction with growth charts designed by the CDC. Adolescents between the ages of 2 and 19 are considered overweight if they fall into the 85th percentile for height and weight and obese if they fall into the 95th percentile.[2]

Weight gain occurs when people consume too many calories and not enough physical activity. Changes as a society have accompanied the rise in obesity. For example, some Americans have reduced access to stores and markets that offer wholesome, reasonably priced food such as fruits and vegetables. This is especially true in rural, minority and lower-income neighborhoods. Fast food, convenience stores, and vending machines offer choices that are cheap, tasty and quick. However, these selections are often higher in calories and fat versus if the food was cooked at home. Many communities are developed in ways that make it challenging or risky to be physically active. Access to parks and recreation centers may be problematic or lacking and public transportation may not obtainable. Safe routes for walking or biking to school, work, or play may not exist. In schools, gym and recess times are being shortened or cut altogether.

Healthy People 2020 (HP2020) is a program of the US Department of Health and Human Services working towards "a society in which all people live long, healthy lives."[3] For the past 30 years, Healthy People has set goals to be achieved over a 10-year span that aim to improve the health of our country. New Hampshire's State Health Improvement Plan (SHIP) as well as the City of Nashua's Community Health Improvement Plan (CHIP) mirror HP2020's goals. All three plans aim to create communities that endorse good health and lead to high-quality, longer lives free of preventable disease, disability, injury, and premature death.[2]

More than one-third (36.5%) of U.S. adults are obese.[4] The State of New Hampshire's rate is lower with 26.33%[5] of adults falling into the category of being obese. According to the SHIP, the "state ranks 35th lowest in the nation for adults who are obese; 15 other states have a lower prevalence of obese adults"[6] (Figure 1). Comparatively, Nashua's rate of adult obesity is higher than the state at 27.23% but similar to the public health region which is 27.03%.[4]

Figure 1. Percent of Adults Aged 18 years and Older Who Have Obesity, US, 2015



Source: CDC, 2017

The costs of obesity are astronomical; in 2008, the Centers for Disease Control (CDC) estimated obesity related medical costs were $147 billion**.** Individuals who are obese spend an average of $1429 more on medical costs than a person of healthy weight thanks to more doctor visits, lab testing and medications.[2]

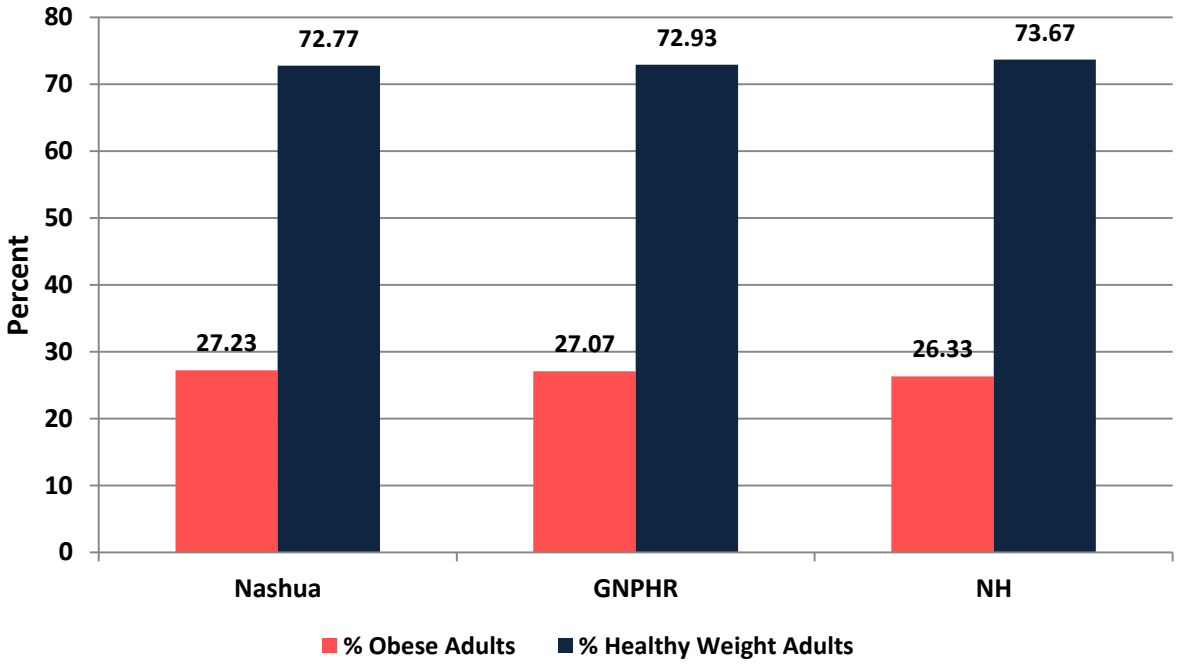
Weight Management

The rise in weight among Americans has led to a rise in weight management solutions. These range from fad diets to pharmaceuticals to policy changes making it easier for people to access safe areas to exercise and everything in between. However, the key to attaining and sustaining a healthy weight is not about short-term nutritional modifications. It requires a total lifestyle change that incorporates healthy eating and regular physical activity that balances the number of calories consumed with the number of calories burned.

Adults

The Healthy People 2020 goal is to reduce national obesity from 35.3% to 30.5% for adults ages 20 and older. In NH, the SHIP has a goal to reduce it to 20% by 2020.[5] In the GNPHR, 27.07% of adult's 18 years or older are considered obese. In Nashua, 27.23% of adults are obese.[4] According to this data; the GNPHR and Nashua meet the Healthy People 2020 goal but do not meet the SHIP 2020 goal (Figure 2).

Figure 2. Obesity in Adults by Geography, 2015



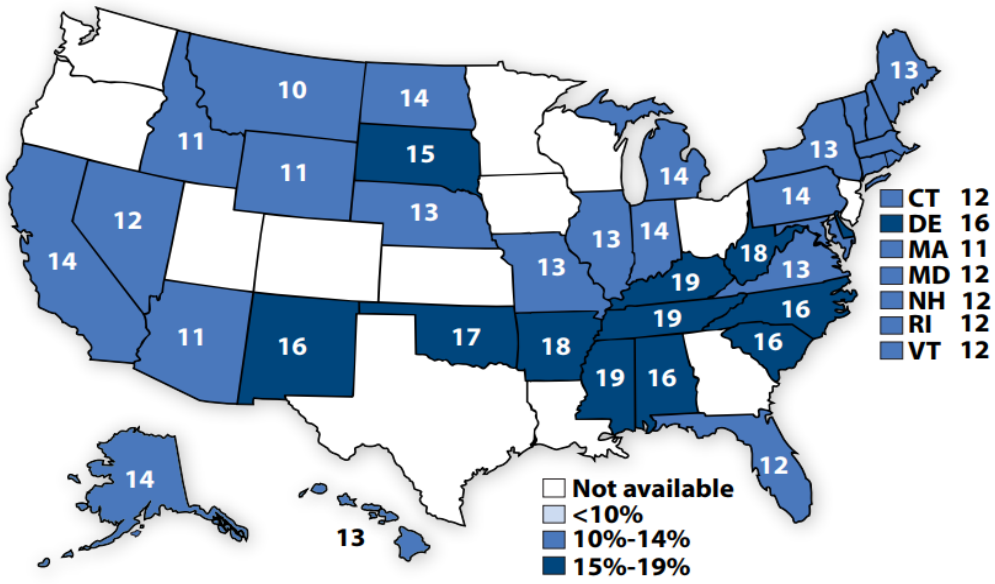
Source: NH WISDOM

Adolescents

The rate of childhood obesity in the United States has more than tripled since the 1970s. Despite recent declines, about one in five school-aged children (ages 6–19) are obese. Health professionals use growth charts to see whether a child's weight falls into a healthy range for their height, age, and gender. Categorizing BMI into a percentile is the preferred method for measuring patients ages 2–20 because it takes into account that they are still growing, and maturing at different rates depending on their age and gender.[7]

Approximately 17% of the children in the United States are obese which is higher than that HP2020 goal of 16.1%.[7,8] Figure 3 illustrates the percent of high school students who were obese in 2015, with New Hampshire at 12%.[9] In the GNPHR, 9.5% of high school students were considered obese that same year, a rate much lower than the HP2020 goal.

Figure 3. Percentage of High School Students Who Had Obesity, 2015



Source: Youth Risk Behavior Survey, 2015

The 2015 Youth Risk Behavior Survey (YRBS) surveying students in grade 9 to 12 revealed that in the New Hampshire, 44.1% of students are trying to lose weight. This is similar to the GNPHR (44.7%) but less than in Nashua where 47.8% of students are trying to lose weight.[10]

Youth

Childhood obesity has instant and long-term impacts on physical, social, and emotional health. Adolescents with obesity are at higher risk for having other chronic health conditions and diseases such as asthma, sleep apnea, bone and joint problems, type 2 diabetes, and risk factors for heart disease. Children with obesity are bullied and teased more than their normal weight peers, and are more likely to suffer from social isolation, depression, and lower self-esteem. Some data suggests that children with obesity are absent more in school compared to students with normal weights. Missed days of school, whether due to obesity related illness or to avoid weight-based bullying, can make it challenging to keep up academically. In the long term, childhood obesity also is associated with having obesity as an adult, which is linked to serious conditions and diseases such as heart disease, type 2 diabetes, metabolic syndrome, and several types of cancer.[8]

Many of the factors that contribute to adults being obese also have a hand in childhood obesity including genetics, metabolism, eating and physical activity behaviors, and environmental factors. What children eat and how often they exercise is often influenced by many sectors of society, including families, communities, schools and child care establishments, the media, and the food, beverage and entertainment industries.[14]

The HP2020 goal aims to reduce the proportion of children ages 6-11 years old that are considered obese to 15.7% and the NH SHIP goal aims to reduce that proportion to 17.2%.[7]

Physical Activity

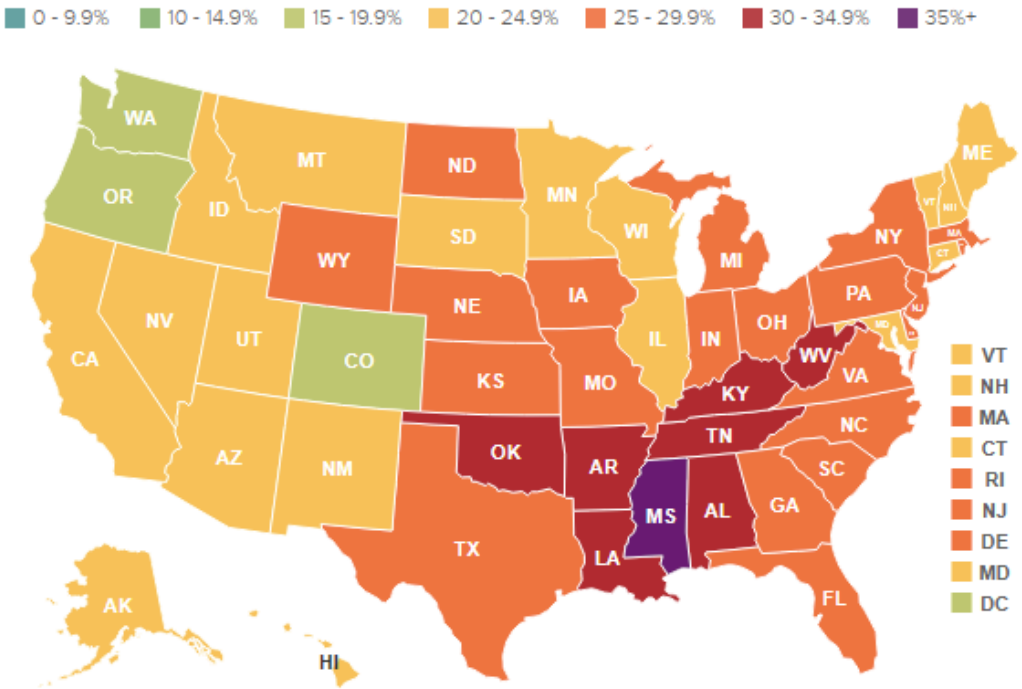
Regular physical activity is one of the most important things you can do for your health. It can help control your weight, reduce risk of cardiovascular disease, type 2 diabetes and some cancers, boost mood and increase the chances of a longer life.[9] Physical activity encompasses both aerobic and muscle strengthening activities. Aerobic activity, also called endurance activity, improves cardiorespiratory fitness by utilizing the entire body to move in a rhythmic manner for a sustained period of time such as walking, running or swimming. Exercises such as strength training, resistance training or endurance training increases muscle strength, power, endurance, and mass.[10]

Adults

The CDC recommends different amounts of physical activity for different age groups. Adults and seniors need a minimum of 150 minutes of aerobic activity plus two days of muscle strengthening exercise each week.[11] Adults who are physically active are less likely to develop several chronic diseases compared to those who are inactive. Older adults are also less likely to experience bone fractures and falls.

Eighty percent of American adults do not meet the national physical activity recommendations and about 45% of adults are not sufficiently active to achieve health benefits. An estimated $117 billion in healthcare costs are associated with inadequate physical activity with adults who are inactive paying $1,437 more per year in healthcare costs than physically active adults.[12] Figure 4 shows rates of physical inactivity among adults by state for 2015. In New Hampshire, 22.6% of adults were physically inactive.

Figure 4. Physical Inactivity by State, 2015



Source: Trust for America's Health and the Robert Wood Johnson Foundation, 2015

Adolescents

The CDC recommends children and adolescents exercise for at least 60 minutes every day. Additionally, three of those seven days should include vigorous aerobic activity, muscle strengthening activity and bone strengthening activity which is important in preventing fractures and breaks as bones grow. Some activities are better-suited for children compared to adolescents. For example, children do not usually need strict muscle-strengthening programs, such as weight lifting routines. Young children typically strengthen their muscles when they do gymnastics, play on a jungle gym or climb trees. As children grow older, they may start structured weight programs in conjunction with other activities such as spending time in the weight room during basketball or football practice.[13]

Students who are physically active tend to have better grades, attendance, cognitive performance and behavior in the classroom. Unfortunately, only 21.6% of 6 to 19-year-olds in the Unites States exercise for 60 or more minutes at least five days per week. The national average for high school students participating in the recommended 60 minutes of activity seven days per week is only 27.1%.[14]

School-aged children and adolescents should be able to obtain the majority of their physical activity requirements through school. Recess, physical education classes and afterschool sports provide opportunities for safe, age appropriate exercise. However, in 2015, only 51.6% of U.S. high school students attended a physical education class each week, and only 29.8% attended physical education class daily.[20] In Nashua, the 2015 YRBS reported that 61.4% of high school students were physically inactive meaning they were getting less than 60 minutes of physical activity each week. High school students in the GNPHR reported 56.5% physical inactivity while 53.1% of high school students in the state were physically inactive.[13]

Community Spotlight

5-2-1-0 is a nationally recognized childhood obesity prevention program. Last winter, the Community Health Improvement Plan's (CHIP) Chronic Disease work-group distributed the first 5-2-1-0 kits to all 12 Nashua elementary schools and the three middle schools. These kits contained posters that were hung within the school building in an effort to start discussion around the healthy eating and active living messaging.

Thanks to 36 staff members, approximately 7,800 children were reached with the motivating idea to eat five or more fruits or vegetables, engage in two hour or less of recreational screen time, be active for a solid hour and drink zero sugary beverages each day.

Staff members, who were designated "champions", not only involved children in discussion but created a variety of activities to really drive home the messaging. In addition to the posters, the 2017 kit also included a collection of those staff created activities as well as a healthy reading list.

Doctor Crisp, a Nashua Elementary school, is focusing on reducing the intake of sugary beverages with its students and will be sending home a healthy newsletter to parents with tips on how to do so. Additionally, on the 100th day of school, instead of celebrating with cupcakes or cookies, students completed 100 exercises over the course of the school day.

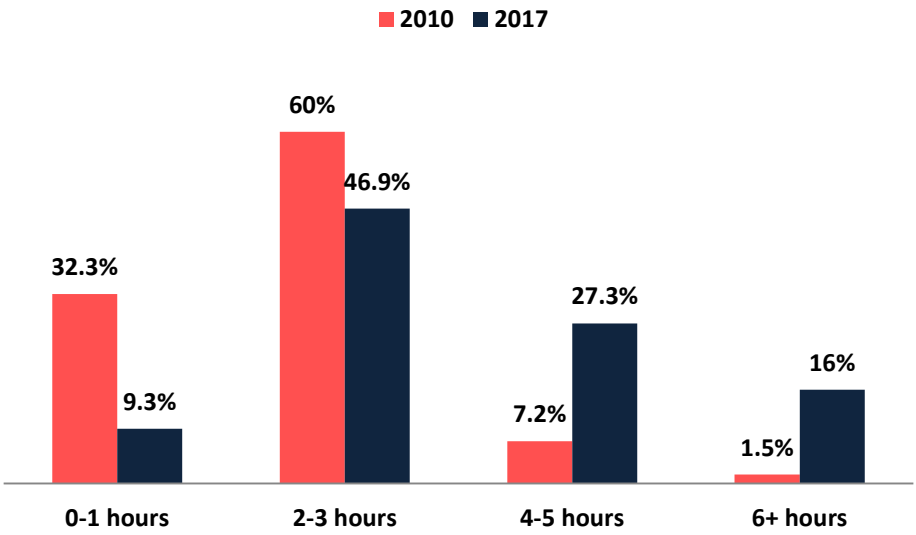
The rise in technology has greatly attributed to the lack of physical activity in adolescent's lives. Screen time has grown beyond just sitting in front of a television or computer. Cell phones, tablets and video game consoles all provide the opportunity for the user to sit, inactive, for extended periods of time. According to the 2015 YRBS, 23.6% of Nashua high school students watched television for three or more hours each day and 48.4% played on the computer or video games for more than three hours each day.[13] Table 1 shows the comparison between physical activity and screen time for high school students in Nashua, the state and GNPHR.

Table 1. Youth Risk Behavior Survey (YRBS) Indicators by Geography, 2015

	Nashua High Schools	GNPHR	New Hampshire
Weren't physically active >= 60 minutes per day, past 7 days	61.4%	56.5%	53.1%
Played video games or used a computer 3+ hours per day	48.4%	41.8%	38.9%
Watched television 3+ hours per day	23.6%	18.7%	19.1%
Source: NH DHHS			

Additionally, in the 2017 Community Assessment for Public Health Emergency Response (CASPER) survey, 16% of Nashua residents spent six or more hours in front of some type of screen each day. This number has dramatically increased since the 2010 CASPER survey. Figure 1 illustrates the results of the survey question; "How many hours per day do members of this household watch TV, play video games, or use a computer for recreation that is not work related" and compares them to the 2010's outcomes.[17]

Figure 1. Screen Time Among Nashua Residents by Year



Source: 2017 Nashua Community Health Survey

Nutrition

Individuals of all ages have diverse nutrition needs as their bodies change. Throughout a person's life, maintaining wholesome habits is an important way to lower the risk of cancers, diabetes, heart disease, hypertension and other chronic diseases. A healthy diet should include plenty of fruits, vegetables, whole grains, and fat-free or low-fat dairy products are excellent choices. It's also important to eat enough protein foods such as poultry, fish, beans, eggs, nuts and lean meats and to pick foods that are low in saturated fats, sodium, and added sugars.

Healthy People 2020 has several targets they hope to achieve when it comes to the U.S. population's diet including increasing the amount of fruits, vegetables and whole grains while also decreasing the amount of fats, sugars and salt. Table 2 displays the current baseline and the goals the organization hopes to accomplish by 2020.

Table 2. Healthy People 2020 Nutrition and Weight Status Goals

	Baseline (2005-2008)	Target
Increase the contribution of fruits*	0.53 cups per 1,000 calories	0.93 cups per 1,000 calories
Increase the contribution of vegetables*	0.76 cups per 1,000 calories	1.16 cups per 1,000 calories
Increase the contribution of whole grains*	0.34 ounces per 1,000 calories	0.66 ounces per 1,000 calories
Reduce consumption of solid fats*	16.6% of total daily calories	14.2% of total daily calories
Reduce consumption of added sugars*	15.1% of total daily calories	9.7% of total daily calories
Reduce consumption of sodium (salt)*	3,658 mg of sodium from foods, supplements, water and salt at the table	2,300 mg of sodium from foods, supplements, water and salt at the table

Source: Healthy People 2020
**Diet for the population aged 2 years or older*

Conclusion

There is no one solution to America's growing weight problem. A balanced diet and regular physical activity can certainly help an individual lose weight or remain at a healthy weight but implementing those changes can take time. This summary of weight status, physical activity and nutrition highlights can influence larger change in communities through policy, new development and plans that will directly affect the health of the GNPHR.

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Communicable Diseases and Microbial Threats

"Antibiotics are truly miracle drugs that have saved countless millions of lives. But antibiotic resistance is a critical public health issue that is eroding the effectiveness of antibiotics and may affect the health of each and every one of us."
-Betsy Bauman

Contents

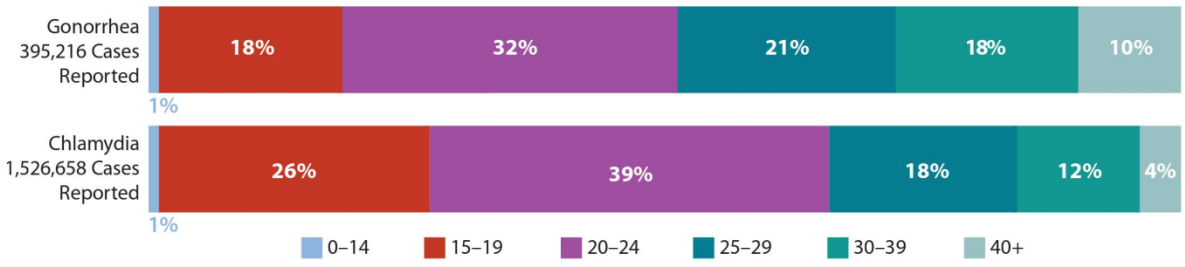
Sexually Transmitted Infections

Each year in the United States there are an estimated 20 million new sexually transmitted infections (STIs), and half of these new STIs are among persons aged 15-24 years. Recent years have shown increasing rates of STIs in the U.S. such as chlamydia, gonorrhea, and syphilis. In 2012, over half of state and local sexually transmitted disease (STD) programs had experienced budget cuts contributing to a deteriorating public health infrastructure for these programs as well as increasing national rates.[1] It is the goal of Division of Public Health and Community Services', Community Health Department to ensure all residents of Nashua and the Greater Nashua Public Health Region have adequate access to education and preventive services.

Chlamydia is the most common notifiable disease in the U.S. and in 2015 there were 1,526,658 cases reported to the CDC corresponding to a rate of 478.8 cases per 100,000. The majority of reported chlamydia cases are seen in adolescents and young adults aged 15-24 years with 65% of all cases attributed to this age group in 2015 (Figure 1). Females carry the burden of chlamydia cases and infections in women are usually asymptomatic and are a major cause of infertility if left untreated.[1] In NH, females are most affected with 369.3 cases per 100,000 compared with NH males with 182.5 per 100,000. Hillsborough County carries the highest burden of chlamydia in NH with 308.8 cases per 100,000 while Nashua has a rate of 324 cases per 100,000.[2]

The national rate of gonorrhea had reached a historic low in 2009 with 98.1 cases per 100,000. However, since 2009 rates have been increasing, and in 2015 the national rate was reported to be 123.9 per 100,000, marking a 12.9% increase over the 2014 rate. As with chlamydia, the majority of gonorrhea cases are seen in persons aged 15-24.[3] In NH, gonorrhea rates were 18.6 per 100,000 in 2015 and Nashua with 23.9 cases per 100,000. The state of New Hampshire has seen increasing case counts of 82% from 2011-2015, higher than the national increase of 22% over the same period. New Hampshire males account for 27.7 cases per 100,000 while NH female rates are 9.8 per 100,000. The highest burden of gonorrhea in NH is in Hillsborough County with 27.3 cases per 100,000.[2]

Figure 1. Percentages of Gonorrhea and Chlamydia Cases in the United States by Age, 2015



Source: CDC

The national rate of reported primary and secondary syphilis in the United States in 2000 and 2001 was 2.1 cases per 100,000 people. This was the lowest reported rate since 1941 when reporting of syphilis began. Since 2001, however, the rates of syphilis have increased nearly every year, and in 2015 the rate in the U.S. has increased to 7.5 cases per 100,000 people, an increase of 19% from 2014.[1] There were 47 cases of syphilis in NH in 2015, 14 cases in Hillsborough County, and 4 cases in Nashua. The rate of syphilis in NH is 3.5 per 100,000 (Table 1).

Table 1. Rates of Sexually Transmitted Diseases by Geography and Gender, 2015^

	Chlamydia (per 100,000)	Gonorrhea (per 100,000)	Syphilis (per 100,000)	HIV (per 100,000)
Geography				
US	478.8	123.9	7.5	12.6 (2014)
Northeast †	425.9	94.2	6.6	12.5 (2014)
NH	276.9	18.6	3.5	1.7
Hillsborough	308.8	27.3	3.4	1.7
Nashua	324.0	23.9	*	*
Gender				
NH Males	182.5	27.7	6.5	3.2
NH Females	369.3	9.8	*	*

** = number of cases too small to release or calculate; ^=unless otherwise indicated; †Northeast: Connecticut, Maine, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, and Vermont*
Source: NH DHHS; CDC

The annual number and rate of diagnoses of HIV in the United States has seen an overall decrease from 2010-2014, with the exception of persons aged 25-29 years in which there was an increase. The majority of all HIV diagnoses in the U.S. in 2015, 81%, were attributed to adult and adolescent males with a rate of 24.4 per 100,000 compared with a rate of 5.4 per 100,000 for adult and adolescent females.[4] In NH, HIV rates have remained relatively stable over a similar 5 year period with most cases attributed to males with a rate of 3.2 per 100,000 and the majority of cases occurring in southern NH, including Hillsborough County.[2]

Adolescents and Sexual Behavior

A 2015 Youth Risk Behavior Survey (YRBS) revealed approximately 39% of Nashua High School students have had sexual intercourse and about 30% are currently sexually active. This compares with 36% of Greater Nashua students and 39% of NH high school students who have had sexual intercourse with 29% and 31% currently sexually active, respectively. The YRBS data also shows that about 71% of Greater Nashua high school students didn't use birth control and 40% didn't use a condom during their last sexual intercourse (Table 2).[5]

About 40% of high school students in the Greater Nashua Public Health Region didn't use a condom during their last sexual intercourse.

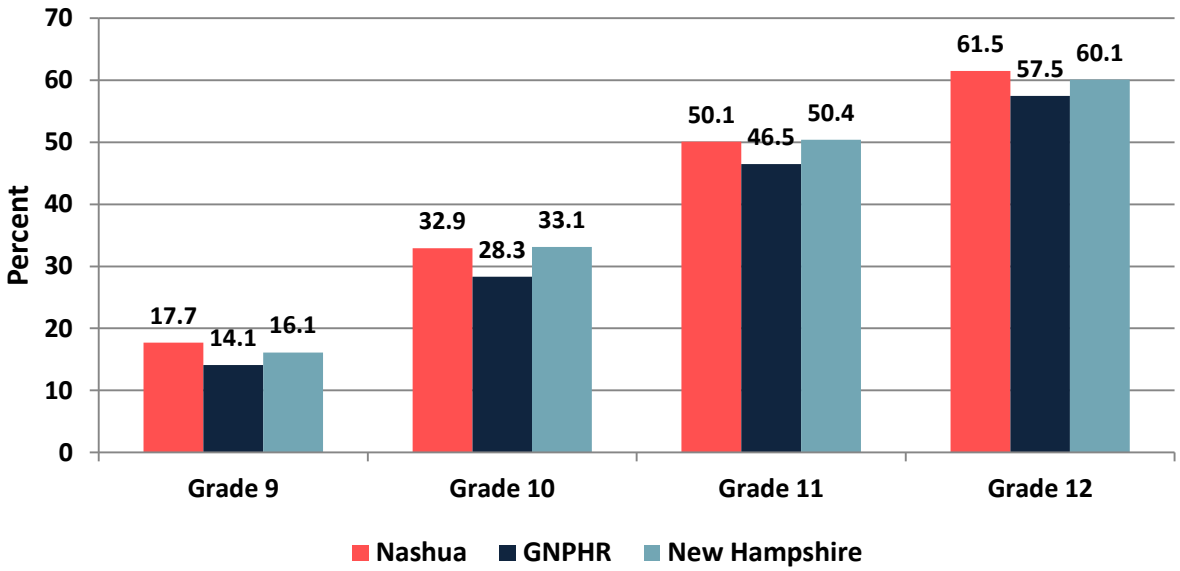
Source: 2015 YRBS

Table 2. Sexual Behavior for High School Students, 2015

	Nashua	GNPHR	New Hampshire
Percentage of students who have had sexual intercourse	39.3	36.3	39.4
Percentage of students who are currently sexually active	29.5	28.9	31.3
Percentage of students who had drank alcohol or used drugs before last sexual intercourse	19.8	21.2	18.9
Percentage of students who didn't use birth control pills during last sexual intercourse	75.9	70.7	67.3
Percentage of students who didn't use a condom during last sexual intercourse	36.8	40.1	39.8
Source: 2015 YRBS; NH DHHS			

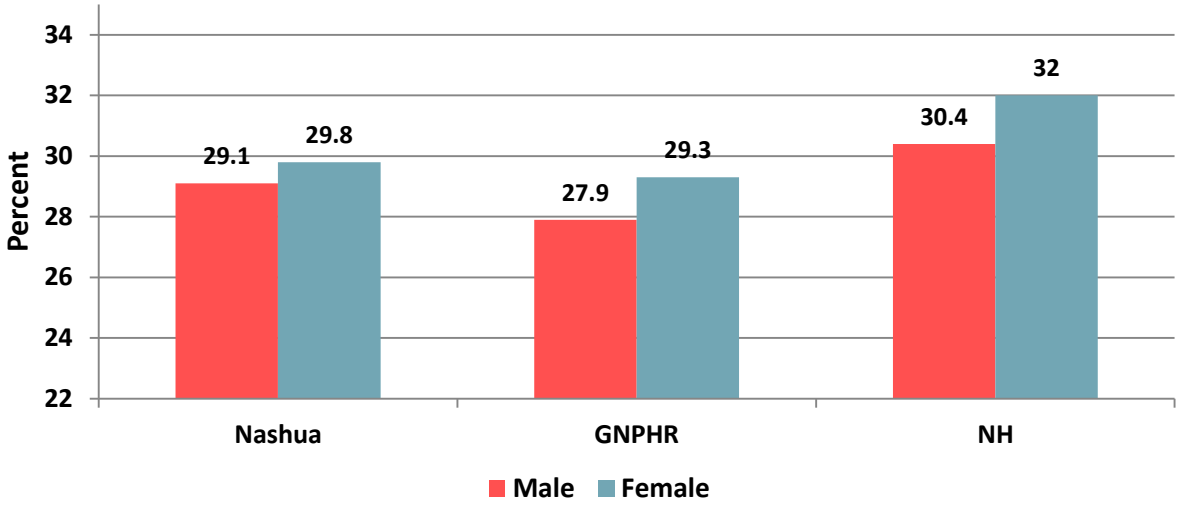
Sexual activity by grade varies with 18% of 9th grade students reporting ever having had sexual intercourse compared with nearly 62% of 12th graders (Figure 2). Approximately 30% of males and 32% of females are currently sexually active in NH high schools (Figure 3). Properly educating students on sexually transmitted infections remains an important component of reducing STIs in the state and region.

Figure 2. Percent of High School Students Who Had Sexual Intercourse by Grade



Source: 2015 YRBS

Figure 3. Percent of High School Students Currently Sexual Active by Geography and Gender



Source: 2015 YRBS

Hepatitis C

Hepatitis C is a liver infection caused by the Hepatitis C virus (HCV). Hepatitis C is a blood-borne virus and the most common current route of infection is by sharing needles or other instruments used in injection drug use. Hepatitis C, for some individuals, is a short-term disease, but for approximately 75% of people, Hepatitis C will become a chronic, long term illness, which can result in complicated health problems, including death.

Of Every 100 Persons Infected with Hepatitis C

- **75-85 will develop a chronic infection**
- **60-70 will develop chronic liver disease**
- **5-20 will develop cirrhosis of the liver over 20-30 years**
- **1-5 will die from the consequences of the disease**

Source: CDC

The prevalence of chronic HCV in the U.S is estimated to be between 2.7-3.9 million people. From 2011-2015 reported acute (new) cases and estimated actual new cases has been steadily on the rise (Figure 3).[6] As of November 16th 2016, Hepatitis C has been added to the New Hampshire reportable infectious disease list.[7]

Table 3. Hepatitis C Virus (HCV) Cases in the United States 2011-2015

Year	Reported Acute (New) Cases	Estimated Actual New Cases*	Confidence Interval
2011	1,230	16,500	7,200 - 43,400
2012	1,778	24,700	19,600 - 84,400
2013	2,138	29,700	23,500 - 101,400
2014	2,194	30,500	24,200 - 104,200
2015	2,436	33,900	26,800 - 115,000

** Actual acute cases estimated to be 13.9 times the number of reported cases in any year*
Source: CDC

Tuberculosis

Tuberculosis (TB) is caused by a bacteria called *Mycobacterium tuberculosis* that usually infects the lungs. There are two TB-related conditions that exist due to the nature of the disease: latent TB and active TB, or TB disease. People with latent TB infection have no symptoms, don't feel sick, cannot spread the disease, usually have a positive TB skin or blood test, and may develop active TB if treatment is not received for the latent infection. However, many people with latent TB may never develop active TB. Active TB develops when the person's immune system is incapable of stopping the TB bacteria from growing in their body. A person with active TB will have symptoms, feel sick, and may spread the bacteria to others. If not treated properly, TB can be fatal.[8]

From 2006-2015, there were 132 cases of active TB in NH. Hillsborough County accounted for 43% of all cases.

Source: DHHS

In the United States, TB cases were on the decline from 1993-2014, however, 2015 marked the first year since 1993 the numbers of cases have increased. Although the number of TB cases has seen an increase in 2015, the rate of TB in the U.S. has been approximately 3.0 per 100,000 since 2013.[9] From 2006-2015 there were 132 cases of active TB in NH representing a rate of 1.0 case per 100,000. Hillsborough County accounted for 43% of all NH cases from 2006-2015. From 2011-2015 there were 29 cases of active TB in Hillsborough County and 23 (79%) were in foreign-born individuals.[10] In Nashua, there were seven cases of active TB from 2013-2015.[11]

Healthcare Associated Infections

Healthcare Associated Infections (HAIs) are infections patients can acquire while receiving medical treatment in a healthcare facility. Studies have also linked HAIs to outpatient care, and treatment received while residing in assisted living or a nursing home. However, HAIs, a major threat to a patient's health and safety, are often preventable. In 2011, there were an estimated 722,000 HAIs in acute care hospitals, with approximately 75,000 hospital deaths of patients with HAIs.[12] Common HAIs include central line-associated bloodstream infections (CLABSI), catheter-associated urinary tract

infections (CAUTI), select surgical site infections (SSI), hospital-onset methicillin-resistant *Staphylococcus aureus* (MRSA) infections, and hospital-onset *Clostridium difficile* infections (CDI).

The most recent national and state HAI progress report, 2014 data, among national acute care hospitals showed a 50 decrease in CLABSI between 2008 and 2014, a 17% decrease in select SSI between 2008 and 2014, a 13% decrease in MRSA between 2011 and 2014, an 8% decrease in CDI between 2011 and 2014, and no change in CAUTI between 2009 and 2014. New Hampshire acute care hospitals, in the 2014 national and state HAI progress report, was shown to have had 45% fewer CLABSI and MRSA when compared to the national baseline.[12] Although there has been significant strides made in preventing some types of HAIs, much more works needs to accomplished.

Clostridium difficile

One type of HAI is *Clostridium difficile*, a toxin-producing bacterium capable of causing diarrhea, kidney failure, sepsis, and death. In 2011, *C. difficile* infections (CDIs) were estimated to have caused nearly half a million infections in the United States, with approximately 83,000 of patients with *C. difficile* experiencing at least one recurrence, and 29,000 patients dying within 30 days of the initial diagnosis.[13] Patients most at risk for CDIs are those who take antibiotics, as more than half of all hospitalized patients will receive an antibiotic at some point during a hospitals stay, and between 30 and 50 percent of prescribed antibiotics in hospitals are either unnecessary or incorrect. *Clostridium difficile* infections are estimated to cost $4.8 billion dollars in excess health care costs for hospitals each year.[14] In NH from 2011 to 2015 there were 301 deaths with infection due to *C. difficile* as an underlying or contributing cause in adults aged 65 and older. The Greater Nashua Region accounted for 40 of the 301 deaths in NH, or 13% of CDI deaths for persons 65 and older (Table 4).

Table 4. Deaths from *Clostridium difficile* as a Primary or Secondary Cause of Death, Age 65 and Older, 2011-2015

Geography	Deaths	Rate (per 100,000)	Confidence Interval
Nashua	22	37.7	24.8 - 57.2
GNPHR	40	30.6	22.5 - 41.7
New Hampshire	301	30.8	27.5 - 34.5
Source: NH DHHS			

From July 1, 2015 to June 30, 2016 the standardized infection ratio (SIR), a statistic used to track healthcare associated infections over time, was used to compare the actual number of hospital onset *Clostridium difficile* infections (CDIs) in both Nashua hospitals, 53 infections, with the predicted number of infections for both hospitals, 34.6 infections. The SIR for the Greater Nashua Public Health Region is 1.53, showing approximately 53% more hospital-onset CDIs than the national baseline during this same period.[15]

Antibiotic Stewardship

The unnecessary or inappropriate prescription of antibiotics has led to the increasing problem of antibiotic resistance, a large threat to public health. Antibiotic resistant organisms are estimated to cause more than two million infections, resulting in 23,000 deaths annually.[16] In 2009, the Centers for Disease Control and Prevention (CDC) launched the "Get Smart for Healthcare Campaign." The campaign aimed to improve the usage of antibiotics through Antibiotic Stewardship Programs (ASPs) designed to ensure patients were receiving the proper antibiotic at the right dose, time, and duration.[17]

In the United States, drug resistant bacteria cause two million illnesses and 23,000 deaths annually.

Source: CDC, 2017

Dedication to improving responsible antibiotic use through ASPs has been shown to help clinicians improve patient care and safety through increased infection cure rates and reduction in treatment failure. Antibiotic Stewardship Programs have reduced CDIs, have had positive impacts on reducing rates of antibiotic resistance, and have saved healthcare dollars. In 2014, the CDC recommended that all acute care hospitals implement an Antibiotic Stewardship Program while effectively utilizing the seven core elements of success. Nationally, as of 2015, 48% of all hospitals have ASPs, while only 27% of New Hampshire hospitals have implemented an ASP. The national goal is to have 100% of hospitals utilizing an Antibiotic Stewardship Program by 2020.[16]

Core Elements of Hospital Antibiotic Stewardship Programs

- **Leadership by dedicating necessary human, financial, and technology resources**
- **Accountability by appointing a single leader for program outcomes**
- **Drug Expertise by appoint a single pharmacist leader to work on improving antibiotic use**
- **Take action by implementing a program or policy to improve prescribing**
- **Track and monitor prescribing and resistance patterns**
- **Report information on antibiotic use and resistance to doctors, nurses, and support staff**
- **Educate clinicians and patients about resistance and appropriate prescribing**

For more information on Antibiotic Stewardship Programs, visit the CDC:

https://www.cdc.gov/getsmart/healthcare

Vaccines and Preventable Illnesses

Immunizations against vaccine preventable diseases are one of the most successful public health intervention efforts in public health history in the United States. From 1994-2013, vaccinations prevented an estimated 322 million illnesses, 21 million hospitalizations and 732,000 deaths.[18]

Sustained vaccine coverage has resulted in reductions in morbidity and mortality from childhood diseases and continues to keep disease levels low. In 2015, vaccine coverage was the highest for ≥ 3 doses of poliovirus vaccine (93.7%) and ≥ 3 doses for Hepatitis B (HepB) vaccine (92.6%) in children by age two, meeting the Healthy People 2020 target of 90% coverage[19]. Despite meeting the target of 90% coverage, disparities exist when comparing vaccination coverage by race/ethnicity, poverty, and Metropolitan Statistical Area (a measure of urbanicity). Children found to be living below the poverty level had lower coverage with all vaccines compared with children who lived at or above poverty. Children identified as non-Hispanic white had higher coverage than non-Hispanic black children with the full series of Haemophilus influenzae type b (HiB) and rotavirus. Non-white children had higher vaccine coverage rates with HepB birth dose than white children.[19] As seen in Table 5, NH has higher immunization coverage rates than the US overall. Regional and local data for vaccines was not obtainable.

Table 5. Estimated Vaccination Coverage with Selected Individual Vaccines and a Combined Vaccine Series* among Children Aged 19–35 Months, by Geography

Geography	MMR (≥1 dose)	DTaP (≥4 dose)[§]	Hep B (birth dose) [¶]	Hep A (≥2 doses)	Rotavirus**	Combined Vaccine Series
	(95%/CI)[§]					
United States	91.9% (CI ± 0.8)	84.6% (CI ± 1.1)	72.4% (CI ± 1.4)	59.6% (CI ± 1.5)	73.2% (CI ± 1.4)	72.2% (CI ± 1.4)
New Hampshire	93.4% (CI ± 3.9)	88.4% (CI ± 5.4)	72.0% (CI ± 7.0)	60.2% (CI ± 7.7)	80.9% (CI ± 6.2)	74.1% (CI ± 7.1)

Abbreviations: CI = confidence interval; DTaP = diphtheria, tetanus toxoids and acellular pertussis vaccine; HepA = hepatitis A vaccine; HepB = hepatitis B vaccine; Hib = *Haemophilus influenzae* type b vaccine; MMR = measles, mumps, and rubella vaccine; PCV = pneumococcal conjugate vaccine.

[§] Includes children who might have been vaccinated with diphtheria and tetanus toxoids vaccine, or diphtheria, tetanus toxoids and pertussis vaccine

[¶] One dose HepB administered from birth through age 3 days.

** Either ≥2 or ≥3 doses of rotavirus vaccine, depending on product type received (≥2 doses for Rotarix [RV1] or ≥3 doses for RotaTeq [RV5]).

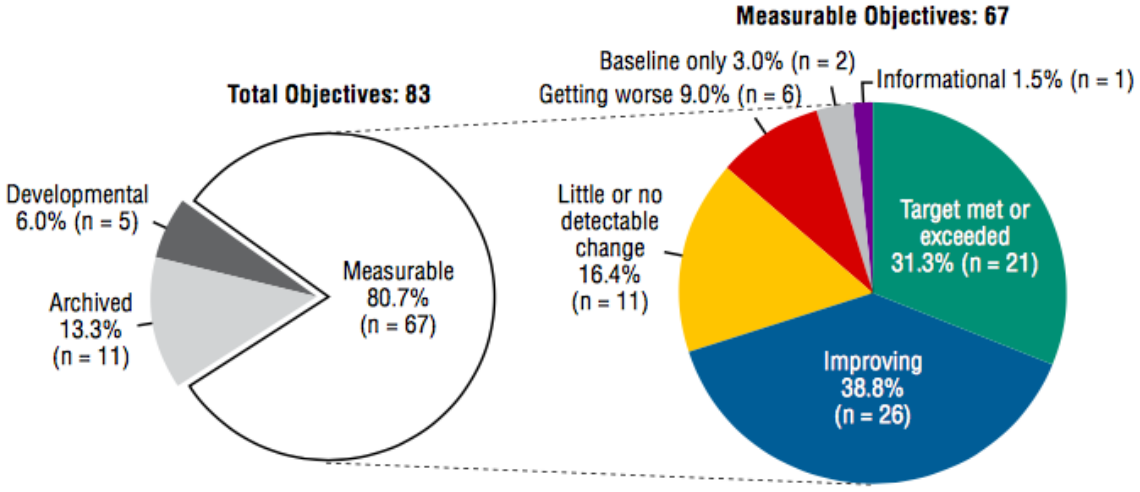
No data available for Nashua or GNPHR

Source: US National Immunization Survey, 2015

Healthy People 2020 identified 83 objectives under the Immunization and Infectious Disease Topical Area.[20] Figure 4 shows the status of 67 measurable objectives at midcourse review with the following measures being noted:

- 21 objectives met or exceeded the 2020 targets
- 26 objectives were improving
- 11 objectives demonstrated little to no detectable change
- 6 objectives were getting worse
- 2 objectives had baseline data only
- 1 objective was informational

Figure 4. Healthy People 2020 Midcourse Review



Source: Healthy People 2020

Continued prevention against vaccine-preventable diseases will increase with clinicians' consistent recommendation and administering of Tdap, MenACWY and HPV vaccines at age 11-12 years.

Source: CDC

According to the Center for Disease Control and Prevention diseases such as polio and diphtheria are becoming rare in the United States. Although the US has seen an increase in life expectancy in the 21st century as a result of improvements to childhood survival rates due to immunizations, infectious diseases are still considered a public health issue causing illness, disability, and death. Each year in the US, there is an estimated 31,500 cancer diagnoses in men and women that are attributed to HPV. Ninety percent of which can be prevented through vaccination of HPV vaccine.[21] Vaccination coverage for adolescents has improved; however, there remains the opportunity to increase HPV-associated cancer prevention. HPV vaccine was

introduced in 2006 for females and in 2011 for males. HPV vaccine rates have increased more gradually for females than for males. The variation in vaccine rates can be increased and closing of gaps can be closed using effective strategies. As seen in Table 6, NH has higher immunization coverage rates in adolescents aged 13-17 years than the US overall.

Table 6. Estimated Vaccination Coverage with Selected Vaccines and Doses* among Adolescents Aged 13–17 Years[†], by Geography

Geography	≥1 Tdap ¶	≥1 MenACWY**	≥1 HPV[††] (9vHPV)	HPV UTD[§§]	≥1 HPV[††] (4vHPV)	HPV UTD[§§]	≥1 HPV[††] (2vHPV)	HPV UTD[§§]
	(95%/CI)[§]							
United States	88.0% (87.1-88.9)	82.2% (81.2–83.2)	60.4% (59.2–61.6) [¶¶]	43.4% (42.1–44.7)	65.1% (63.3–66.8)	49.5% (47.6–51.4)	56.0% (54.3–57.7) [¶¶]	37.5% (35.8–39.2)
New Hampshire	95.3% (91.5–97.5)	88.0% (83.1–91.6)	69.9% (63.7–75.5)	51.2% (44.6–57.8)	70.6% (61.9–78.1)	56.5% (47.3–65.2)	69.3% (60.1–77.1)	46.3% (36.9–55.9)

Abbreviations: CI = confidence interval; HHS = U.S. Department of Health and Human Services; HPV = human papillomavirus; MenACWY = quadrivalent meningococcal conjugate vaccine; NIS-Teen = National Immunization Survey–Teen; Tdap = tetanus toxoid, reduced diphtheria toxoid, and acellular pertussis vaccine; UTD = up to date.

[†] Adolescents (N = 20,475) in the 2016 NIS-Teen were born during January 1998—February 2004.

[§] Estimates with 95% CI half-widths >10 might not be reliable.

[¶] ≥1 dose Tdap vaccine at age ≥10 years.

** ≥1 dose of MenACWY or meningococcal-unknown type vaccine.

[††] HPV vaccine, nine-valent (9vHPV), quadrivalent (4vHPV), or bivalent (2vHPV). For ≥1-, ≥2-, and ≥3-dose measures, percentages are reported among females and males combined (n = 20,475) and for females only (n = 9,661) and males only (n = 10,814).

[§§] HPV UTD includes those with ≥3 doses, and those with 2 doses when the first HPV vaccine dose was initiated before age 15 years and time between the first and second dose was at least 5 months minus 4 days.

No data available for Nashua or GNPHR

Source: US National Teen Immunization Survey, 2016

The mission of the NH Immunization Program, which funds the Division of Public Health and Community Services' Community Health Department Immunization program, is to reduce or eliminate all vaccine preventable diseases. Recommended vaccines are offered to approximately 342,000 children under the age of 19 at no cost for the vaccine. The Nashua Community Health Department is dedicated to improving immunization rates and vaccine coverage throughout the Greater Nashua Region.

Vector-borne Diseases

Vector-borne diseases are infections that are transmitted by the bite of an infected arthropod, such as a mosquito or tick.[22] New Hampshire is home to the blacklegged tick, dog tick, winter tick, and more recently, although rare, the lone star tick. The primary tick of concern in NH is the blacklegged tick, as this tick can carry and transmit Lyme disease to humans. New Hampshire is also home to forty-seven species of mosquitos, however, only a few of these species present the risk of transmitting West Nile Virus (WNV) and Eastern Equine Encephalitis (EEE), diseases of concern in NH.[23]

There are 47 species of mosquitoes in the state of New Hampshire, however only a few of these spices are critical in the spread of EEE and WNV

Source: NH DHHS

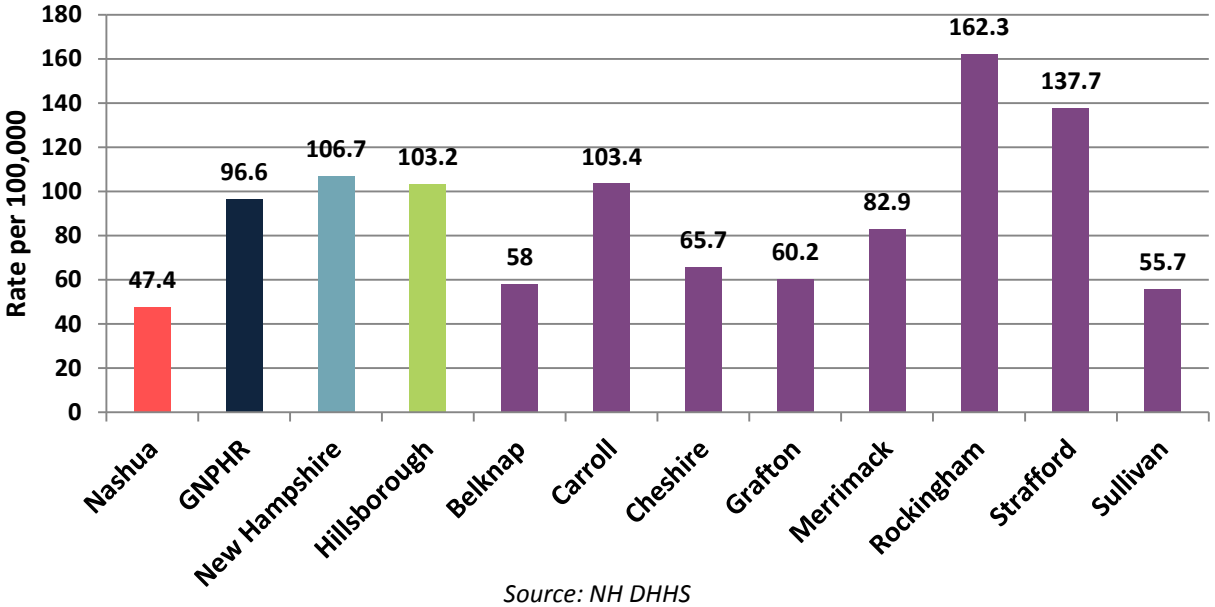
Vector-borne diseases are some of the most complex infectious diseases to control as it can be difficult to predict the habits of ticks and mosquitos and many vector-borne bacteria and viruses infect both animals and humans.[12] Environmental factors such as changing climate and temperature, amount of rainfall, humidity levels, and human migration all contribute to difficulties in predicting the impact of vector-borne diseases in a given year.[24]

Tick-borne

Lyme disease is transmitted to humans through the bite of an infected blacklegged tick, or deer tick. The highest risk of being infected occurs during late spring and summer seasons, however, ticks can be active year round during the colder months if weather permits and temperatures are above freezing conditions. Deer ticks can also carry other illnesses such as bacteria that cause Babesiosis and Anaplasmosis and the virus responsible for Powassan. Each year in the United States more than 30,000 cases are reported, however, studies show the actual number of people infected is approximately 300,000. In 2015, Lyme disease was the sixth most common nationally notifiable disease, and 95% of all confirmed Lyme disease cases were reported from 14 states, New Hampshire among them.[14] In 2014, the Greater Nashua Public Health Region had an incident rate of 96.6 cases per 100,000 people which was significantly higher than the incidence in Nashua, 47.4 cases per 100,000, during the same year (Figure 5).

Prevention of tick bites and quick removal of attached deer ticks are essential in keeping safe from tick-borne diseases. When going outside, wear light colored clothing and long pants to easily spot ticks and provide a barrier between ticks and your skin. Avoid woody areas and areas with high grass, remain on trails, wear an appropriate insect repellent such as repellents containing 20-30% DEET, and treating outdoor clothing with products containing permethrin. Ensure to conduct tick checks on yourself, family, pets, and outdoor gear and remove any ticks that are found. Showering after coming indoors and putting clothing in a dryer on a high heat cycle are effective in removing and killing ticks not attached to your body. Education and awareness of tick-borne disease prevention is critical to keeping you, your family, and your pets safe year round.

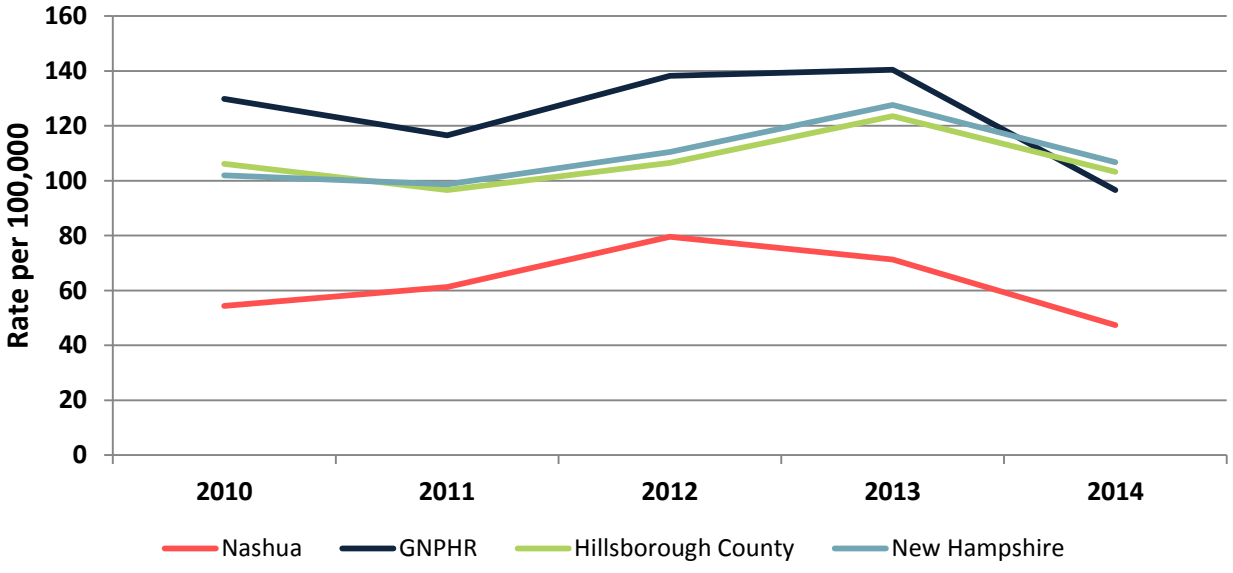
Figure 5. Incidence of Lyme Disease by Geography, 2014



Source: NH DHHS

Incidence rates in Nashua have been significantly lower compared to the rates in the Greater Nashua Public Health Region, Hillsborough County, and the State of New Hampshire over the five year period from 2010-2014 (Figure 6). In 2014, the Greater Nashua Public Health Region had 200 new cases of Lyme disease, of which 41 were in Nashua, and accounting for 14% of the 1,416 new cases in New Hampshire.[25]

Figure 6. Lyme Disease Incidence by Geography, 2010-2014



Source: NH DHHS

Mosquito-borne

The virus Eastern Equine Encephalitis (EEE) is maintained in a cycle between birds and *Culiseta melanura*, a species of mosquito. Although *Cs. Melanura* feeds nearly exclusively on birds, other mosquito species can feed on an infected bird and acquire the EEE virus. Once acquired, the virus can then be transmitted to humans.[26] In New Hampshire eighteen batches of mosquitos tested positive for EEE in 2014, two batches in 2015, but no EEE was identified in NH in 2016. Nashua had no EEE activity in mosquitos over the same three year period, 2014-2016 (Table 7).

Table 7. Mosquito Batches Positive for EEE by Geography, 2014-2016

Geography	2014	2015	2016
Nashua	0	0	0
GNPHR	1	0	0
New Hampshire	18	2	0
Source: NH DHHS; City of Nashua DPHCS			

West Nile Virus (WNV) was first detected in the North America in 1999, and has since spread across the United States. People become infected when bitten by a mosquito carrying the virus. Mosquitos acquire the virus when feeding on infected birds and then can transmit the disease when feeding on humans.[27] In 2016, Nashua had the only mosquito positive batch in New Hampshire. There have only been 5 mosquito batches that have tested positive in NH from towns and cities conducting surveillance from 2014-2016 (Table 8).

Table 8. Mosquito Batches Positive for WNV by Geography, 2014-2016

Geography	2014	2015	2016
Nashua	0	0	1
GNPHR	0	0	1
New Hampshire	1	3	1
Source: NH DHHS; City of Nashua DPHCS			

The best prevention for WNV and EEE is to take a proactive approach in eliminating mosquito breeding grounds, reducing adult mosquito resting sites, and protecting ourselves and our homes from mosquitos. Outdoor breeding sites can be controlled by discarding any outdoor containers capable of holding water; removing old and discarded tires; drilling holes in the bottom of flower pots and recycling bins; ensuring items such as canoes, wheel barrels, and plastic wading pools are turned over; changing birdbath water at least twice a week; aerating water gardens; chlorinating swimming pools; cleaning roof gutters, and ensuring rain barrels have intact, tightly screened lids. Inside the home can be made safe by ensuring doors and windows have tight fitting screen in good repair, and doors have a tight seal. Outside protection such as wearing repellent, and protective clothing such as a long-sleeved shirt, pants, and socks.[28]

Foodborne and Waterborne Diseases

Each year in the U.S. about 1 in 6 people will experience a foodborne illness, 128,000 people will require hospitalization, and 3000 people will die. Although there are 31 known pathogens to cause foodborne illness, only a handful are responsible for the majority of illnesses including *Salmonella, Campylobacter, E.coli,* and *Norovirus.*[29]

In 2016, FoodNet, which collects data on 15% of the U.S. population, reported *Campylobacter* and *Salmonella* caused the most foodborne illnesses in the United States, with 8,547 and 8,172 infections reported, respectively.[30] The majority of foodborne outbreaks in the U.S. from 2009-2015 can be attributed to fish, dairy, chicken, and beef (Figure 7). In Nashua, *Campylobacter* and *Salmonella,* are the most frequently reported foodborne illness, with 25 cases of *Campylobacter* and 13 cases of *Salmonella* in 2015 (Table 9).[11]

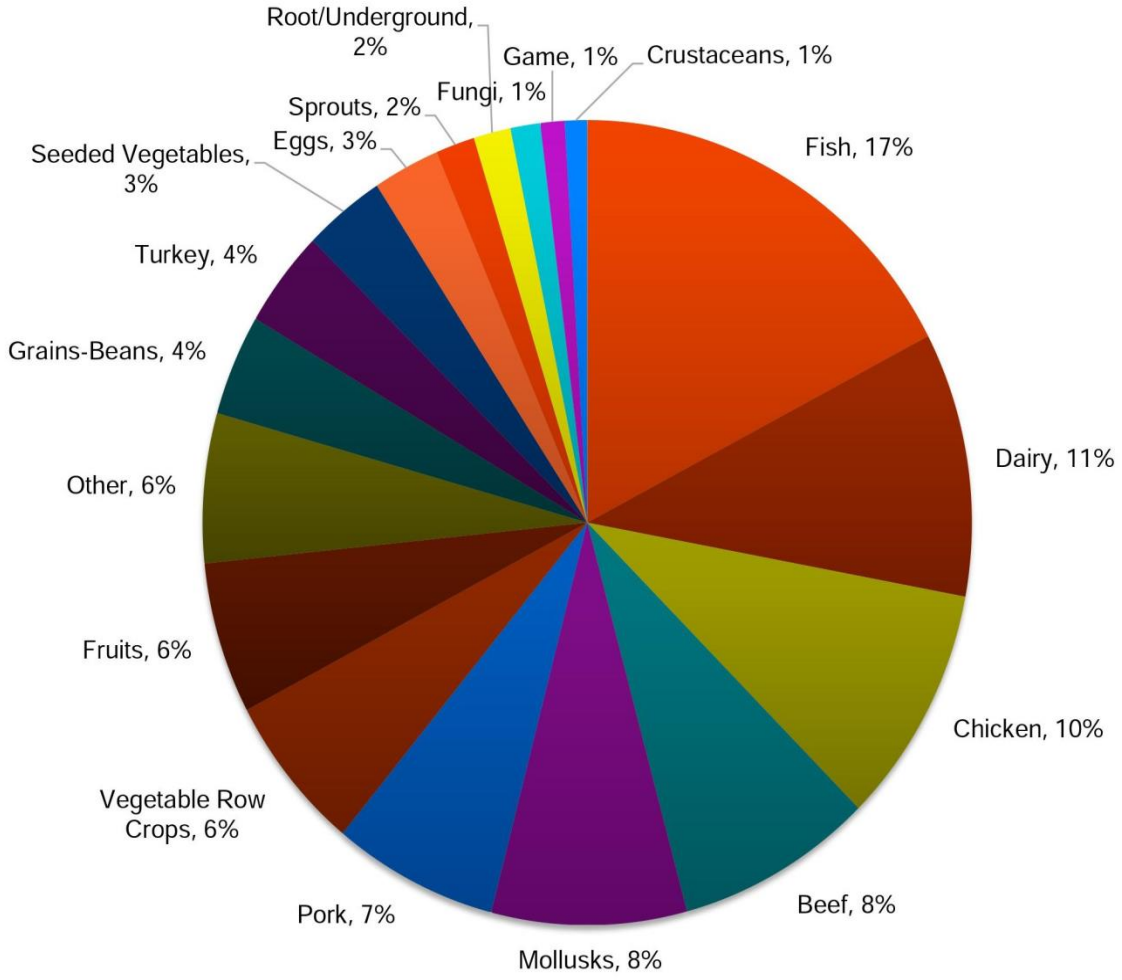
Washing hands is one of the most important things we can all do to stay healthy and stop the spread of germs.
Source: CDC

Certain preventative measures can be implemented to better protect against foodborne illnesses: washing hands and surfaces frequently help to reduce the number of germs that survive on surfaces; ensuring fruits and vegetables are washed under running water; separating raw foods, such as beef, chicken, eggs, and seafood, from ready-to-eat foods; cooking food to the correct internal temperature (145°F for whole meats, 155°F for ground meats, and 165°F for all poultry); and ensuring proper refrigeration temperature of less than 41°F, as many foods will begin to grow germs if not properly cooled down within two hours of being cooked.[31]

Table 9. Foodborne and Waterborne Diseases and Conditions in Nashua, 2011-2015

Condition / Disease	2011	2012	2013	2014	2015
Campylobacteriosis	17	9	14	17	25
Cryptosporidiosis	2	1	1	2	3
Cyclospora infection	0	0	0	0	0
***E. coli*, Shiga toxin**	2	1	2	2	1
Giardiasis	6	3	2	9	2
Hepatitis A	0	0	0	0	0
Listeriosis	0	0	0	0	0
Salmonellosis	11	8	12	13	13
Shigellosis	0	0	0	3	1
Vibriosis	0	1	1	1	0
Yersiniosis	0	1	0	0	0
Source: City of Nashua DPHCS; NH DHHS					

Figure 7. Foods Responsible for Outbreaks, 2009-2015



Source: CDC Outbreak Reporting System, 2009-2015

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Behavioral Health

"There is no health without mental health."
-David Satcher

Contents

Behavioral Health

Behavioral Health is one of the priorities of the Greater Nashua Public Health Region's 2015 Community Health Improvement Plan (CHIP). For the purpose of this chapter behavioral health encompasses mental health, substance misuse, and suicide prevention. There are many reasons why behavioral health is a priority in the region. These reasons include the high prevalence of substance misuse in the region, the high rate of opioid overdose fatalities, the high rate of suicide attempts and completed suicides in the region, the lack of access to timely treatment for those seeking behavioral health services and limited mental health promotion and awareness. Approximately one in eight visits to emergency departments in the United States involves mental and substance use disorders.[1] The goal for the region is to reach the Healthy People 2020 goals for each of the categories under Behavioral Health. The following pages will take a detailed look at the behavioral health of the Greater Nashua Region.

Key Terms

Substance Use
The use, even one time, of any substance discussed within this chapter.

Substance Misuse
The use of any substance in a manner, situation, amount or frequency that could cause harm to the user or to those around them.

Illicit Drug
Illicit drug use includes the use of marijuana, cocaine (including crack), heroin, hallucinogens, inhalants, or methamphetamine.

Substance Use Disorder
A medical illness caused by repeated misuse of a substance or substances. According to the Fifth Edition of the Diagnostic and Statistical Manual of Mental Health Disorders (DSM-5)[7], substance use disorders are characterized by clinically significant impairments in health, social function, and impaired control over substance use and are diagnosed through assessing cognitive, behavioral and psychological symptoms.

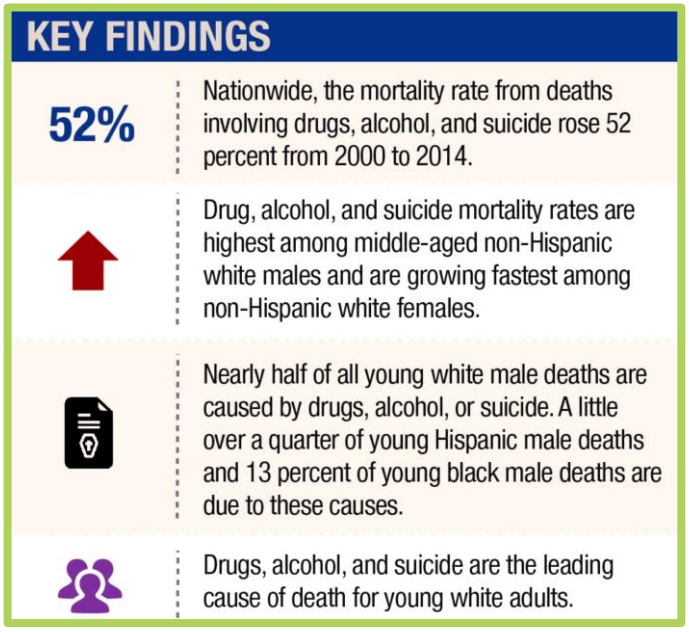
Substance Misuse

Substance misuse is a national concern. Substance misuse is the use of alcohol or drugs in a manner, situation, amount or frequency that could cause harm to the user or to those around them.[2] Millions of Americans are affected by alcohol or drug misuse incurring an emotional and financial burden on the society at large. In 2015, 66.7 million people in the United States reported binge drinking in the past month and 27.1 million people were current users of illicit drugs or misused prescription drugs.[3] The burden of substance misuse is more than financial and extends beyond the person using substances to their families and community. The consequences of substance use can include compromised physical and mental health, increased spread of infectious disease, loss of productivity, reduced quality of life, increased crime and violence, increased motor vehicle crashes, abuse and neglect of children, and health care costs.[2] As draining as these consequences are to a community, the most devastating consequence of substance misuse is death. Alcohol misuse contributes to 88,000 deaths in the United States each year; 1 in 10 deaths among working adults is due to alcohol misuse.[4] In 2014, there were 47,055 drug overdose deaths including 28,647 people who died from drug overdoses involving some type of opioid, which includes prescription pain relievers and heroin – this is more than in any previous year on record.[5] The impact of the substance misuse problem in the United States is observed in increasing mortality rates within one specific population. Recent research shows an increase in

mortality in middle aged White Americans between 1999 and 2014 that was driven by alcohol, drug misuse and suicides.[6]

Many people are unable to comprehend why or how other people become addicted to drugs. They may wrongly assume that people who use drugs lack moral standards or resolve and that they could stop their drug use merely by electing to. In reality, drug addiction is a complex disease, and refraining from use usually takes more than good intentions or a strong will. Drugs alter the brain in ways that make quitting hard, even for those who want to. Fortunately, researchers know more than ever about how drugs alter the brain and have found treatments that can help people recover from drug addiction and lead productive lives.[7]

The annual National Survey on Drug Use and Health (NSDUH) gathers data on the prevalence of substance use, misuse, and related health outcomes, as well as substance use disorder treatment usage, among Americans 12 years of age and older. The 2015 NSDUH data reports 27.1 million Americans over 12 years of age were current illicit drug users. The most prevalent substance of use was marijuana, which was reported as used by 22.2 million people in the population over 12 years of age. Prescription pain relievers were the second most common used substance with 3.8 million people reporting use. See Figure 1 for a breakdown of all categories asked by the NSDUH.[8]

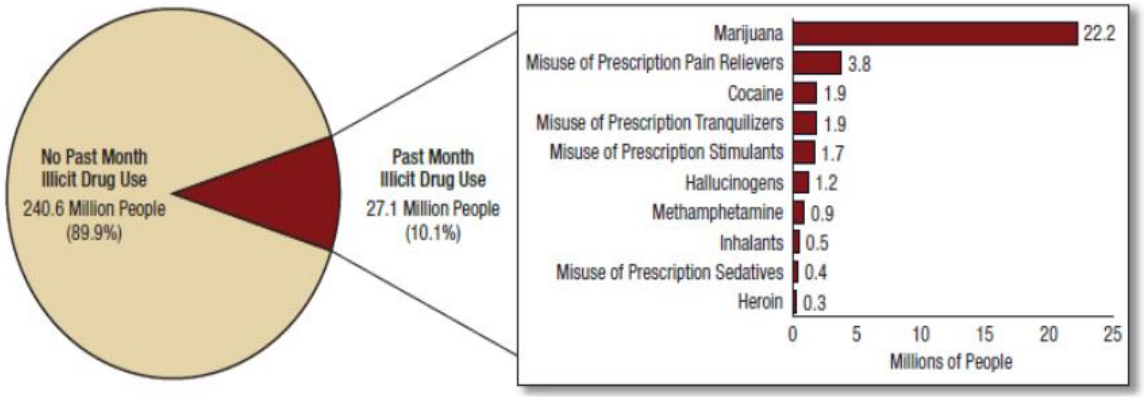


Source: NSDUH, 2015

The demographics for the 27.1 million people over 12 years of age who reported illicit substance use in 2015 can be broken down as follows:

- 10.1% (one in ten) of Americans used an illicit substance in the past month
- 8.8% of adolescents used an illicit substance in the past month
- 22.3% (one in five) of American 18 to 25-years-old used an illicit substance in the past month.
- 8.2% of Americans 26-years-old or older used an illicit substance in the past month.[8]

Figure 1. Numbers of Past Month Illicit Drug Users among People Aged 12 or Older, 2015

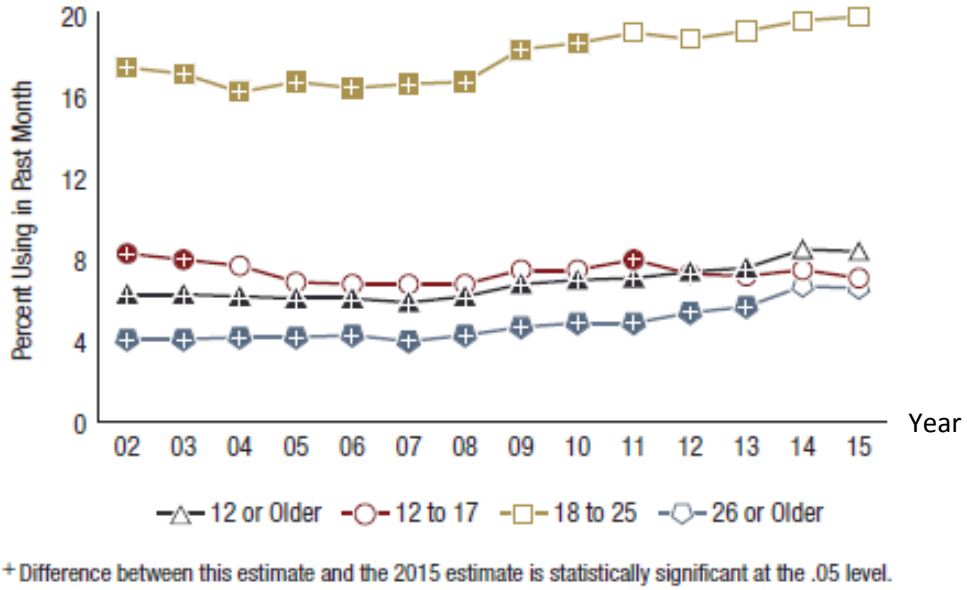


Source: NSDUH, 2015

Marijuana Use

Marijuana is the most commonly used substance under the category of illicit drug. Out of the 27.1 million Americans that use illicit drugs, 22.2 million use Marijuana. Nationally the percentage of people 12 years and older that who were currently using marijuana in 2015 was almost the same as the percentage in 2014, but higher than the percentages from 2002 to 2013 (See figure 2). Due to the fact that many States have legalized the use of marijuana for therapeutic purposes and for recreation purposes for those over 21 years of age, this section will mostly focus on adolescent marijuana use.[8]

Figure 2. Past Month Marijuana Use among People Aged 12 or Older by Age Group, 2002-2015



Source: NSDUH, 2015

Schools within the Greater Nashua Public Health Region (GNPHR) participated in the 2015 YRBS, in which New Hampshire's high school students were asked about drug use and other risky behaviors. In New Hampshire, marijuana use in adolescence is of concern. In 2015, 22.2% of high school students in the State reported current use of marijuana. In the same year 6.1% of high school students reported trying marijuana before the age of thirteen. When the same students were asked if they ever arrived at school high on marijuana, 15.3% reported they had. Perception of risk of marijuana is also decreasing in the State. In 2015, less than 40% of high school students in NH perceived moderate or great risk in marijuana use.[9] Table 1 and 2 below represent the results for marijuana related questions across different geographical groups of high school students.

The Healthy People 2020 objective for high school students reporting use of marijuana in the past 30 days, is to lower the rate to 6% by 2020.[10] The current rate for the GNPHR is 23.3% which is far from the Healthy People 2020 goal. Many communities of the GNPHR have formed local coalitions to work towards lowering substance use among adolescents. There are multiple coalitions focused on substance misuse prevention within the communities of the GNPHR.

Table 1. Marijuana Use Compared by Area

	Nashua	GNPHR	New Hampshire
Tried marijuana before age 13 years	7.7%	5.9%	6.1%
Current marijuana use	25.5%	23.3%	22.2%
Arrived at school high on marijuana	16.8%	15.8%	15.3%
Source: NH DHHS, 2015 YRBS			

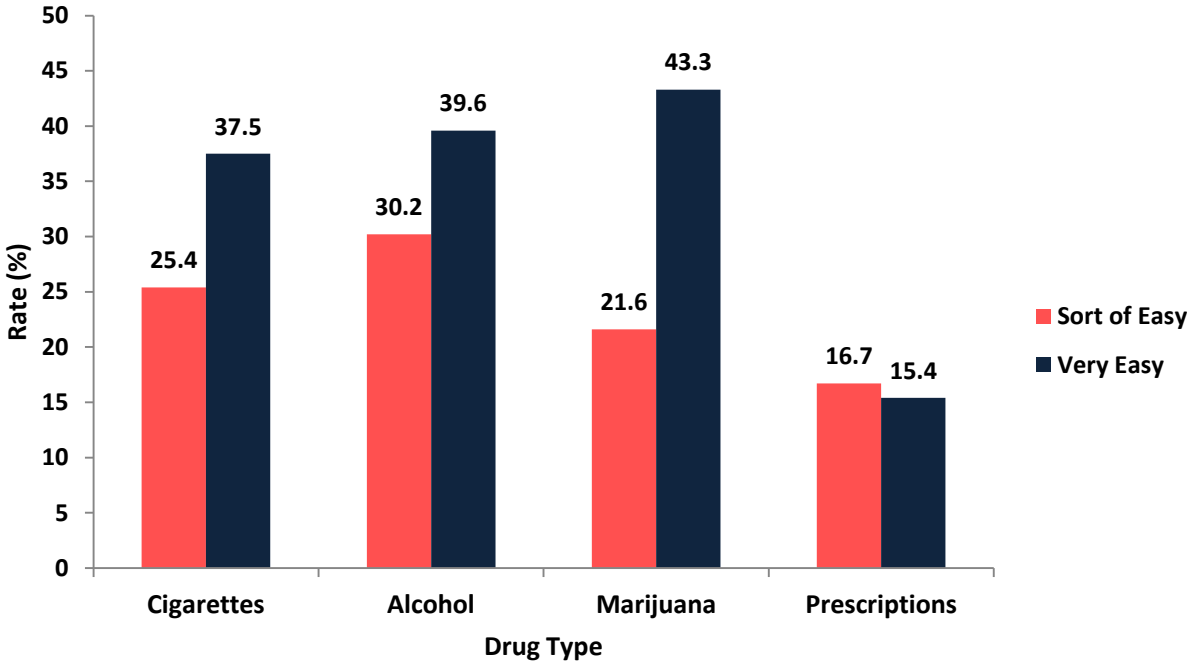
When GNPHR students were asked about access to marijuana, 64.9% of students think it would be easy or very easy for them to get some marijuana if they wanted to. When asked about perception of harm, 60.3% of students don't think people are at great risk of harming themselves (physically or in other ways) if they smoke marijuana once or twice a week (see Table 2).[9]

Table 2. Perception of Risk and Access of Marijuana by Area

	Nashua	GNPHR	New Hampshire
Don't perceive parental wrongness of marijuana use	17.7%	16.4%	17.0%
Don't perceive moderate/great risk from marijuana use	61.8%	60.3%	60.3%
Perceive easy or very easy access to marijuana	65.0%	64.9%	63.3%
Source: NH DHHS, 2015 YRBS			

Between 10% and 44% of high school students in the GNPHR have used marijuana at least once in their lifetime and between 19% and 29% have used it within the past 30 days.[9] Perception of risk is low among adolescents, while reported ease of access is high for marijuana. When compared to other substances the reported ease of access in 2015 of marijuana was higher than other substances including cigarettes, alcohol and prescription drugs as seen in Figure 3.

Figure 3. Reported Ease of Access by Drug for High School Students, GNPHR, 2015

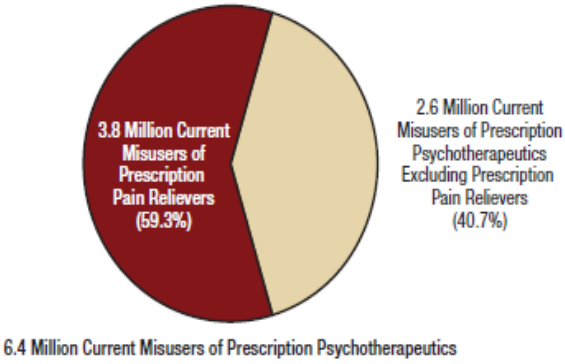


Source: NH DHHS, 2015 YRBS

Prescription Drug Misuse

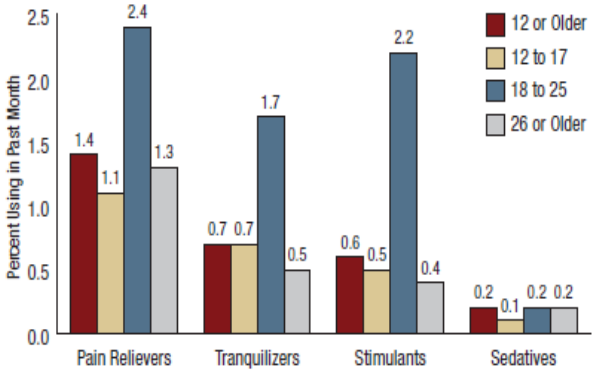
In 2015, 6.4 million Americans 12 years of age or older were estimated to misuse prescription psychotherapeutic drugs, this represents 2.4 percent of people 12 years of age or older. An estimated 492,000 adolescents 12 to 17 years of age misused psychotherapeutic drugs, which equates to 1 in 50 or 2 percent of adolescents in that age group. For ages 18 to 25 it's estimated that 1.8 million young adults currently misused prescription psychotherapeutic drugs in 2015 or 5.1 percent of the age group. For those 26 years of age and older the current misuse rate was estimated at 4.1 million adults or 2 percent of that age group. Out of the 6.4 million American 12 years of age an older that misused psychotherapeutic drugs 3.8 million misused pain relievers as seen in Figure 4. Pain relievers are misused at higher rates than tranquilizers, stimulants and sedative as seen in Figure 5.[8]

Figure 4. Misuse of Prescription Pain Relievers and Other Prescription Psychotherapeutics among People Aged 12 or Older Who Were Current Misusers of Any Prescription Psychotherapeutics, 2015



Source: NSDUH, 2015

Figure 5. Past Month Misuse of Prescription Pain Relievers, Tranquilizers, Stimulants, and Sedatives among People Aged 12 or Older by Age Group, 2015



Source: NSDUH, 2015

In 2015, when New Hampshire high school students were asked about prescription drug misuse 6.8% reported current misuse while 13.4% reported misused at least once in their life time. In New Hampshire 29.9% of high schoolers perceived access to prescriptions drugs without a prescription as easy or very easy.[9] Tables 3 and 4 display the results of the prescription drug related questions on the 2015 Youth Risk Behavior Survey by geographical region.

Table 3. Prescription Misuse Indicators for High School Students, 2015

Indicator	Nashua	GNPHR	New Hampshire
Students have taken prescription drug (such as OxyContin, Percocet, Vicodin, Adderall, Ritalin, or Xanax) without a doctor's prescription one or more times during their life	15.7%	15.2%	13.4%
Students have taken a prescription drug (such as OxyContin, Percocet, Vicodin, Adderall, Ritalin, or Xanax) without a doctor's prescription one or more times during the past 30 days	8.0%	7.7%	6.8%
Source: NH DHHS, 2015 YRBS			

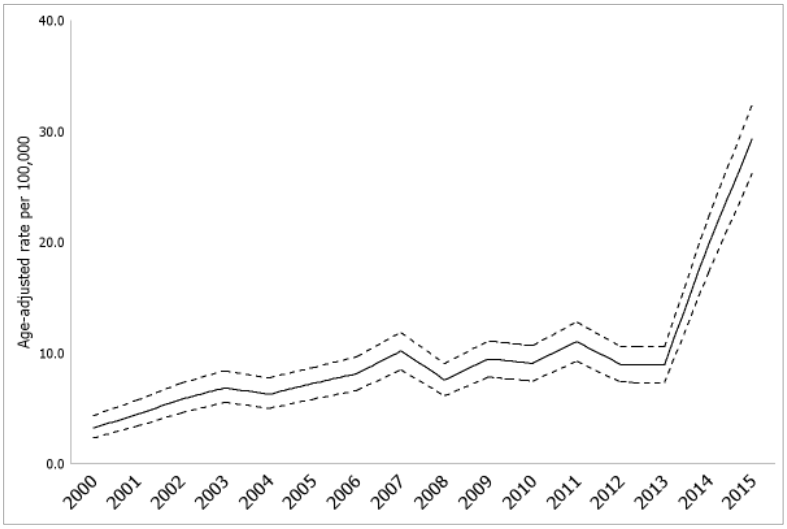
Table 4. Perception of Risk for High School Students, 2015

Indicator	Nashua	GNPHR	New Hampshire
Don't perceive parental wrongness of taking Rx drug without a doctor's Rx	6.2%	5.4%	5.1%
Don't perceive moderate/great risk from taking Rx drug without a doctor's Rx	14.5%	13.8%	13.1%
Perceive easy or very easy access to Rx drugs without a Rx	32.5%	32.0%	29.9%

Source: NH DHHS, 2015 YRBS

In New Hampshire overdoses involving prescription drugs has been on the rice since 2000 with a steep increase starting in 2013 as seen in the graph (Figure 6) below. There have been multiple strategies established through legislation, such as the prescription monitoring program which established a database for prescribers, to reduce duplicate prescriptions. Other, more local strategies, such as the "Lock it Up" campaign, are geared towards the general population to inform the community about the dangers of having unsecured prescriptions in their homes.

Figure 6. All Drug Overdose Deaths Involving One or More Prescription Drugs, Age-Adjusted Rate, All Ages, 2000-2015



----- Both genders 95%CI

Source: NH WISDOM

Although there has been an increase is drug overdoses involving prescription drugs in the state, on a positive note, both 30 day past use and lifetime use are on a downward trend for high school students in New Hampshire since 2011 as seen in Figures 7.1 and 7.2. The Healthy People 2020 objective for nonmedical use of psychotherapeutic drugs is to reduce misuse to 5.5 percent.[10] In New Hampshire the rate of use among high school students is 6.8% for past 30 day use which is higher than the objective.

Reduction of prescription drug misuse must continue to decline to reach the Healthy People 2020 goal for this population.

Figure 7. High School Age Youth Who Have Used Prescription Drugs without a Prescription, All Grades, 2007-2015

Figure 7.1 High School Age Youth Who Have Ever Used Prescription Drugs without a Prescription

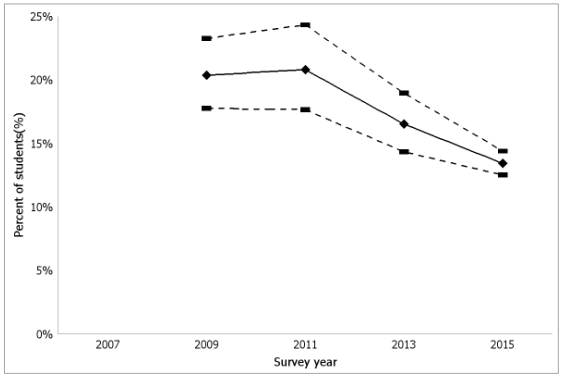
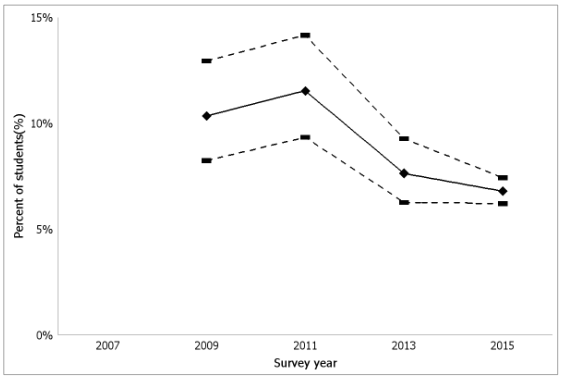


Figure 7.2 High School Age Youth Who Have Used Prescription Drugs without a Prescription in Past 30 Days



Both genders --- 95%CI ♦ Percent

Source: NH WISDOM

Heroin/Illicit Opioid Use

Illicit drug use includes the use of marijuana, cocaine (including crack), heroin, hallucinogens, inhalants, or methamphetamine. "Heroin is a highly addictive opioid that is illegal and has no accepted medical use in the United States".[2] In 2015, around 329,000 American 12 years of age or older currently used heroin and 828,000 had used heroin in the past year.[3] The numbers of people who used heroin in 2015 by age groups are listed below (Also see Figure 8).

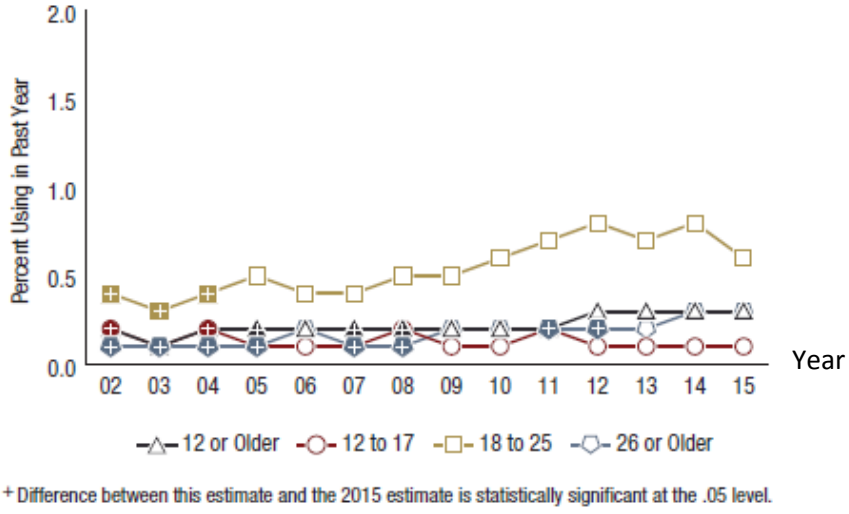
Past year use:

- 21,000 adolescents ages 12 to 17 used heroin within the past year in 2015
- 217,000 young adults ages 18-25 used heroin within the past year in 2015
- 591,000 adults ages 26 and over used heroin within the past year in 2015

Current use:

- 5,000 adolescents ages 12 to 17 currently used in 2015
- 88,000 young adults ages 18-25 currently used in 2015
- 236,000 adults ages 26 and over currently used in 2015[8]

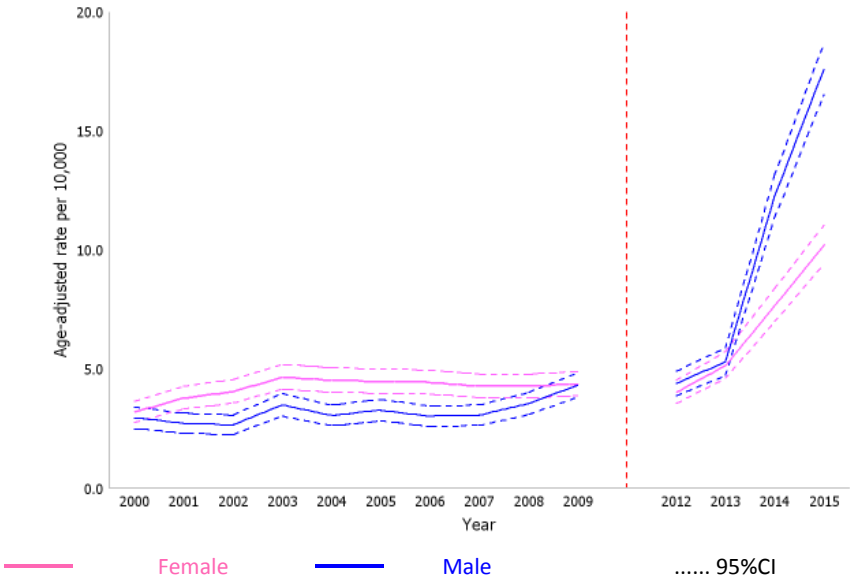
Figure 8. Past Year Heroin Use among People Ages 12 or Older, 2002-2015



Source: NSDUH, 2015

In New Hampshire the number of opioid related hospital visits has risen sharply since 2013 (See figure 9).[11] The rise in hospital visits is significant in both males and females. Due to the high number of opioid related hospital visits and deaths, some communities have established new treatment access points. For example, the City of Nashua created a Safe Stations model whereby people who are ready for treatment can go to any of the City of Nashua's Fire Stations to be linked to treatment.

Figure 9. Opioid Related Hospital Visits (Emergency Dept.), 2000-2015

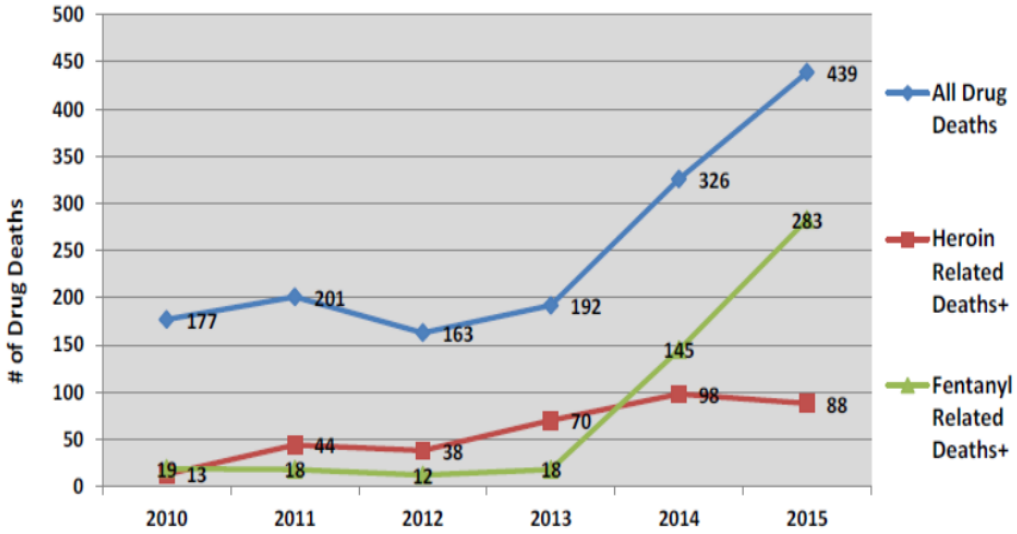


Due to data quality issues, the 2010 and 2011 data are not available.
Source: NH WISDOM

In 2016, the National Drug Early Warning System (NDEWS), a National Institute of Drug Abuse (NIDA) supported public health surveillance report, was created for the State of New Hampshire. This report was created due to concern about the number of fentanyl related overdoses in the state. The report indicated that fentanyl related deaths surpassed those related to heroin in both 2014 and 2015. It also indicated that fentanyl related overdose deaths rose from 145 in 2014 to 283 in 2015 as seen in Figure 10. Before 2014, there were less than 20 fentanyl related death each year from 2010 to 2013. After 2015, fentanyl related deaths account for almost two thirds of all drug related deaths in NH.[12]

In Nashua, opioid overdoses more than doubled from the first part of 2015 to the first part of 2016 and fatal opioid overdoses during the same time increased by 70% (See figure 10). There were 521 total opioid overdoses, including both fatal and non-fatal overdoses, in the City of Nashua from January 2015 through October 4th, 2016 (See Figure 11 for a monthly overdose count of the City of Nashua). Of the reported overdoses more than half (60%) of the cases of overdose involved males. Almost one in ten (close to 10%) of overdoses occurred in a public space while 78% occurred in a place of residence .[12]

Figure 10. Overdose Deaths by Year, 2010-2015

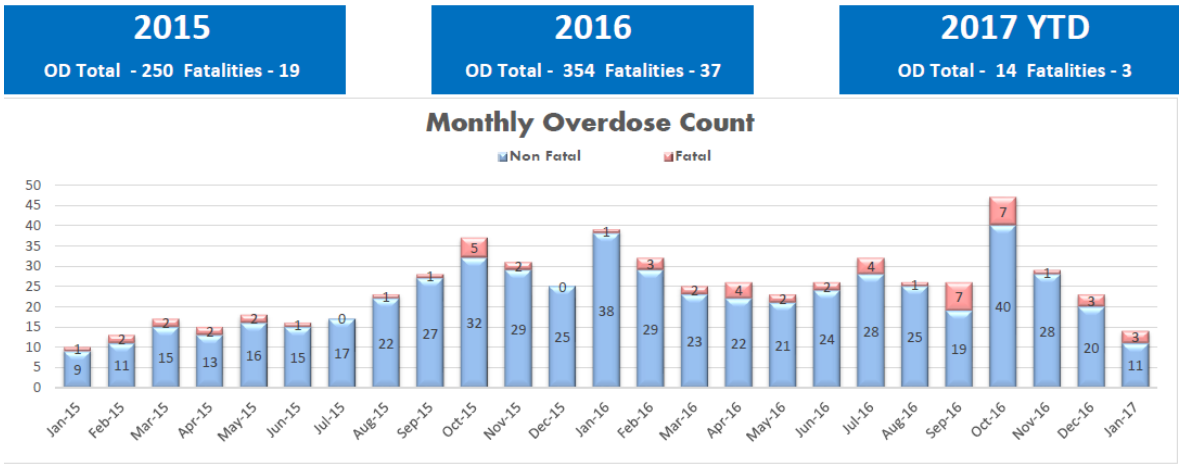


2015 Numbers are finalized

+ Heroin & Fentanyl Related deaths are not mutually exclusive, several deaths involved both drugs

Source: NH Medical Examiner's Office

Figure 11. Monthly Overdose Count, 2015-2017 YTD



Source: AMR

Most people who use drugs begin using as teenagers**.** Nationally, there were over 2.2 million current users of illicit drugs in 2015 that were between the ages of 12 and 17. In New Hampshire in 2015, 2.4% of high school students reported using heroin at least once in their life[8]. There are other illicit substances that adolescent are using at higher rates than heroin that cannot be overlooked. See Table 5 for high school students use rates reported by substance and place of residence in 2015. As seen in Table 5 substances like cocaine, ecstasy and inhalants are reported to be used at higher rates than heroin. Also seen in Table 5 methamphetamines are reported at the same rate of use as heroin. Additional data may be required to track trends from adolescents to adults regarding substances other than heroin/opioids.

Table 5. Substance Use Indicators for High School Students, 2015

Indicator	Nashua	GNPHR	New Hampshire
Students used some form of cocaine, including powder, crack, or freebase, one or more times during their life	4.4%	4.4%	4.9%
Students sniffed glue, breathed the contents of aerosol spray cans, or inhaled any paints or sprays to get high one or more times during their life	7.5%	7.3%	6.4%
Students used heroin one or more times during their life	2.0%	2.5%	2.4%
Students used methamphetamines one or more times during their life	2.0%	2.6%	2.5%
Students used ecstasy one or more times during their life	5.2%	5.0%	4.5%
Students who were offered, sold, or given an illegal drug on school property by someone during the past 12 months	18.1%	16.7%	16.5%
Source: NH DHHS, 2015 YRBS			

Alcohol Use

In 2015, 138.3 million people 12 years of age or older in the United Sates reported current alcohol use, 66.7 million reported binge drinking and 17.3 million reported heavy drinking in the past month as seen in Figure 12. Almost half (48.2 percent) of all people who reported alcohol use reported binge drinking. While about one in eight people (12.5 percent) who reported alcohol use also reported heavy drinking. For adults 26 years of age and older, 55.6 percent reported current alcohol use.[8]

The percentage of adolescents reporting current alcohol use was 9.6 percent in 2015 which means about 2.4 million people ages 12 to 17 had an alcoholic beverage in the past month. The percentage of adolescents reporting alcohol use in 2015 was lower than the percentages in 2002 through 2014 as seen in Figure 13. Even though the percentage of use is lower, there were still about one in 10 adolescents ages 12 to 17 currently using alcohol in 2015.[8]

Nationally, 58.3 percent of young adults 18 to 25 years of age reported current alcohol use, which is about 20.4 million young adults. The percent of young adults using alcohol corresponds to about three fifths of all young adults.[8] In New Hampshire a survey of young adults was conducted in 2015, the results shown in Table 6 below lists perception of harm in the young adult population.[13]

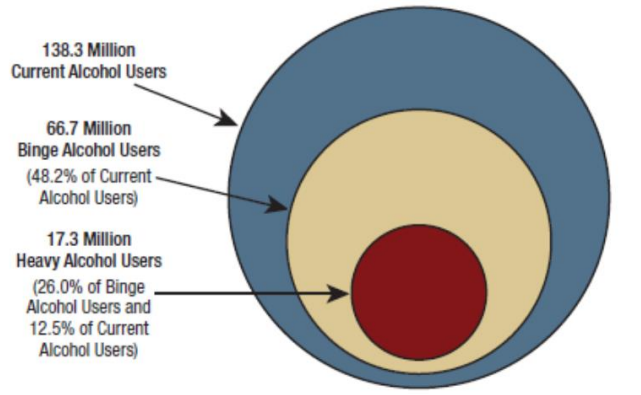
Key Terms

Binge Drinking
Defined for males as drinking five or more drinks on one occasion.
For women it is defined as drinking four or more drinks on one occasion.

Heavy Drinking
Defined as binge drinking on 5 or more days in the in past 30 days.

Underage Drinking
All 50 states and the District of Columbia currently prohibit possession of alcoholic beverages by individuals under the age of 21 and most prohibit underage consumption.

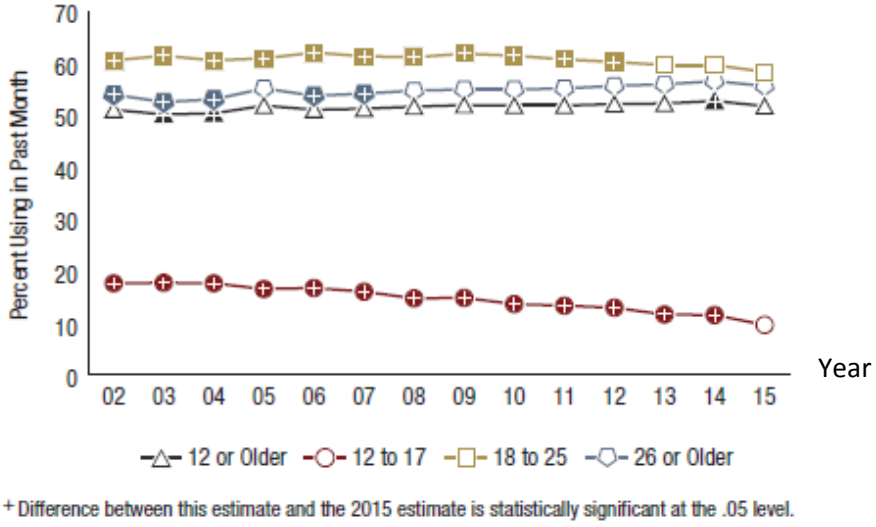
Figure 12. Current, Binge, and Heavy Alcohol Use among People Aged 12 or Older, 2015



Note: In 2015, the threshold for determining binge alcohol use for females changed from five or more drinks on an occasion to four or more drinks on an occasion.

Source: NSDUH, 2015

Figure 13. Past Month Alcohol Use among People Aged 12 or Older, 2002-2015



+ Difference between this estimate and the 2015 estimate is statistically significant at the .05 level.

Source: NSDUH, 2015

Table 6. Risk of Harm from Binge Drinking 1-2 Times per Week

Risk of harm from binge drinking 1-2 times per week		*n (unweighted)*	%
Region	No risk	.	5.7
	Slight risk	.	35.4
	Moderate risk	.	39.5
	Great risk	.	19.5
	Total	577	100.0
State-wide	No risk	.	6.3
	Slight risk	.	33.8
	Moderate risk	.	42.4
	Great risk	.	17.5
	Total	3749	100.0
p = 0.5774			

Binge drinking was defined as "having five or more drinks of alcohol in a row, that is, within a couple of hours."

Source: NH Young Adult Survey, 2015

Alcohol consumption among youth of high school age in New Hampshire and the GNPHR is described in Table 7. The data demonstrates that the incidence of binge drinking and alcohol consumption in general, is similar in NH and the GNPHR. In NH, the 16.8 of High School students are reporting binge drinking, the number for Nashua is higher.[9] The Healthy People 2020 goal is to lower the percentage of adolescent binge drinking of alcohol to 8.6%.[10] The percentage for NH and Nashua are almost double the objective. The percentage for Nashua in 2013 for binge drinking among high school students was 21.6% and the

percentage for 2015 was 17.3%.[9] Though the 2015 percentage is not close to the Healthy People 2020 goals, it is lower than in 2013, which is a trend being observed across the state.

Table 7. Alcohol Use Indicators for High School Students, 2015

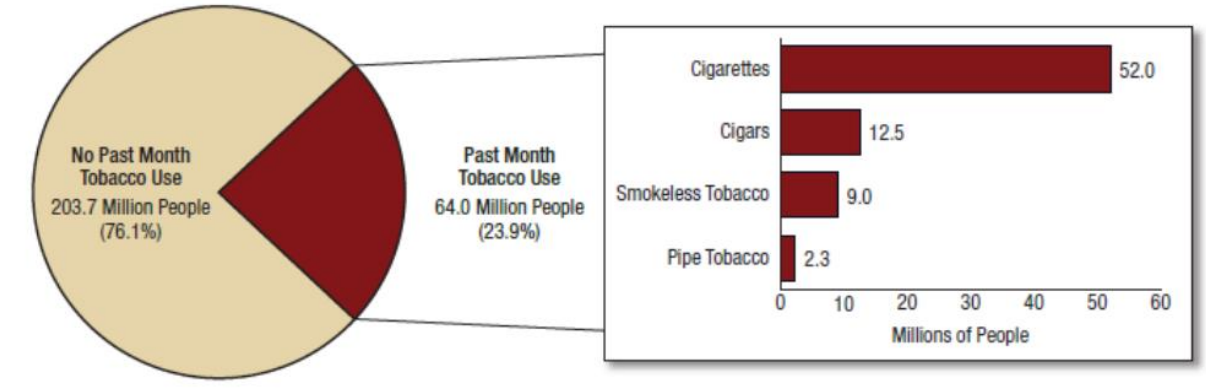
Indicator	Nashua	GNPHR	New Hampshire
Drank alcohol before age 13 years	13.0%	10.5%	10.8%
Had five or more drinks in a row	17.3%	16.8%	16.8%
Current alcohol use	32.8%	30.3%	29.9%
Rode with a driver who had been drinking alcohol	17.5%	16.4%	15.8%
Don't perceive parental wrongness of alcohol use	10.7%	9.5%	10.7%
Don't perceive moderate/great risk from alcohol use	32.3%	33.8%	33.5%
Perceive easy or very easy access to alcohol	67.2%	69.8%	68.3%

Source: NH DHHS, 2015 YRBS

Tobacco

Tobacco use remains the leading cause of preventable death in the United States. Tobacco use, particularly cigarette smoking, contributes to substantial health and financial costs in the United States. Almost a quarter of the population of the country reported tobacco use in 2015 as seen in Figure 13. The majority of people who use tobacco use it in the form of cigarettes. In 2015, 64 million people 12 years of age or older used tobacco nationally (See Figure 13). Of the people who use tobacco, 66.3 percent only smoke cigarettes and use no other tobacco products, 15 percent used cigarettes and other tobacco products, and 18.8 percent only used other tobacco products.[8]

Figure 13. Past Month Tobacco Use among People Aged 12 or Older, 2015



Note: The estimated numbers of current users of different tobacco products are not mutually exclusive because people could have used more than one type of tobacco product in the past month.

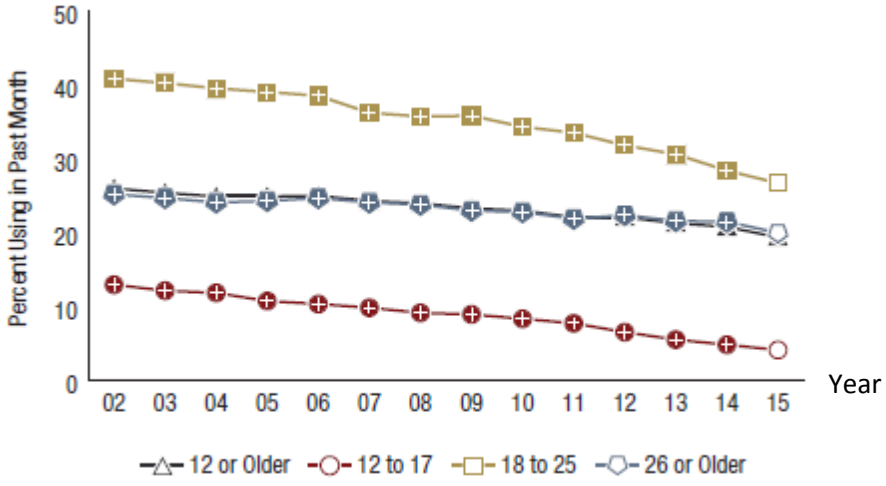
Source: NSDUH, 2015

According to research published in the Tobacco Control Journal, the "cost per smoker" averages $517 per year for productivity lost due to absenteeism, $3077 per year for productivity lost due to smoke breaks, and $205 per year in additional health care cost.[12]

Tobacco affects the human body in many ways. With more than 7,000 toxic chemicals found in a cigarette, tobacco use will damage the body, compromise the immune system and cause premature death. Ninety percent of all lung cancer deaths are caused by smoking. Lung cancer, heart disease, chronic obstructive pulmonary disease (COPD), and stroke are the common causes of death that can be attributed to cigarette smoking in the United States.[14]

In 2015, about 52 million people in the United States 12 years of age or older were using cigarettes. In other words, 19.4 percent of the populations in 2015 were cigarette smokers. About one in five people in the United States smoked cigarettes as reported in 2015 compared to one in four people in 2002. As Seen in Figure 14 below, the percentage of people smoking cigarettes is on the decline for all age groups since 2002. The same decline in percentages of use is observed for people who smoke cigars. Pipe tobacco is a less common method of use for tobacco; about 2.3 million people 12 years of age or older in the United States use pipe tobacco. Unlike other tobacco uses, pipe tobacco use did not show a decline in use from 2002 to 2015. The 2015 rate of reported use was similar to the percentage in most years between 2002 and 2014.[8]

Figure 14. Past Month Cigarette Use among People Aged 12 or Older by Age Group, 2002-2015



+ Difference between this estimate and the 2015 estimate is statistically significant at the .05 level.

Source: NSDUH, 2015

22.1% percent of students in Nashua middle schools have used an electronic vapor product (N=1311)

Source: 2015 YRBS

Even though the percent of youth tobacco use has decreased in the past years there is still work to be done regarding tobacco prevention. Young people are subject to marketing with pro-tobacco messages via movies, magazines, peers etc. There is also the introduction of new tobacco products that young people may not associate with the same harmful effects of smoking tobacco, such as electronic cigarettes. Table 8 shows rates of tobacco use and tobacco perception of harm in youth of Nashua, the GNPHR, and New Hampshire. In 2015, about 8.1% of Nashua high schools students reported smoking one or more cigarettes in the past 30 days, which is down from 12% in 2013. Over 60% of Nashua high school students believe it would be easy or very easy to access tobacco products. The Healthy People 2020 objective is to reduce youth smoking to 16%.[9] New Hampshire and the GNPHR have already surpassed this national goal, but tobacco prevention needs to continue in New Hampshire to provide information about the harmful effects of tobacco smoke and new tobacco products, and to reduce the number of youth who have ever smoked or are current smokers. It is important to note the reported rate of electronic vapor product use in the GNPHR for high school students is 29.5%. For middle schoolers in Nashua, the rate of use of vaping products is 22.1%.[15]

Table 8. Tobacco Use Indicators for High School Students, 2015

Indicator	Nashua	GNPHR	New Hampshire
Smoked a whole cigarette before age 13 years	6.0%	5.0%	5.5%
Currently smoked cigarettes	8.1%	8.6%	9.3%
Smoke more than 10 cigarettes per day	14.3%	15.6%	14.2%
Currently use electronic vapor products	27.0%	29.5%	25.0%
Usually obtain their own cigarettes by buying them in a store or gas station	17.9%	17.7%	13.6%
Don't perceive parental wrongness of tobacco use	8.8%	9.3%	9.7%
Don't perceive moderate/great risk from tobacco use	11.5%	10.5%	10.2%
Perceive easy or very easy access to tobacco	60.9%	62.9%	61.3%
Source: NH DHHS, 2015 YRBS			

Treatment for Substance Use Disorders

Nationally in 2015, about 21.7 million people 12 years of age or older needed treatment for substance use, or about 1 in 12 people (8.1 percent).[8] The need for substance use treatment in 2015 separated by age group is as follows:

- 1.3 million adolescents ages 12-17 in 2015 needed treatment
- 5.4 million young adults ages 18-26 in 2015 needed treatment
- 15 million adults 26 and older in 2015 needed treatment

The National Survey on Drug Use and Health asked questions regarding receipt of treatment. In 2015, 10.8 percent of people 12 years of age or older that needed treatment for substance use received that treatment in a specialty facility in the past year. The receipt of substance use treatment separated by age group is as follows:

- 6.3 percent of the adolescents that needed treatment received it within the past year at a specialty facility in 2015.
- 7.7 percent of young adults that needed treatment received it within the past year at a specialty facility in 2015.
- 12.3 percent of adults that needed treatment received it within the past year at a specialty facility in 2015.[8]

"In New Hampshire, among individuals aged 12 or older with illicit drug dependence or abuse about 5,000 individuals (14.6%) per year from 2010 to 2014 received treatment for their illicit drug use within the year prior to being surveyed."

Source: SAMHSA, NSDUH, 2010-2014

Substance use and tobacco use cause lifelong health effects and are mostly preventable. There is much work to be done in prevention, treatment and recovery services in the region to lower the incidence of substance use disorders. Through the work of local and regional substance misuse prevention coalitions, task forces and regional partners in prevention efforts, we will continue to work towards the Healthy People national objectives, and New Hampshire State Health Improvement Plan (SHIP) goals of reducing substance misuse and tobacco use in the region. Prevention involves everyone in the community to be effective. The community includes parents, businesses, schools, safety officials, government and healthcare providers. No one group has sole responsibility for this problem. It is a community problem and as such needs the entire community's participation in implementing effective interventions to decrease substance misuse. Treatment for addictions can lead to sustained recovery. Long term recovery is possible. People can recover from addiction and live productive lives.

NH State Statewide Addiction Crisis Line

1-844-711-HELP (4357)

Mental Health

Mental illness can be explained as any disorder that alters thinking, mood, and/or impairs function.[16] However, similar to how health is more than the absence of disease or infirmary, mental health is more than the absence of mental disorders.[17] The World Health Organization (WHO) (2017) defines mental health as "A state of well-being in which every individual realizes his or her own potential, can cope with the normal stressors of life, can work productively and fruitfully, and is able to make a contribution to her or his community."

Many factors can contribute to an individual's mental health status. These factors can include both biological and environmental factors.[19] Studies have shown that certain biological factors, such as genetics and brain chemistry, can play a role in certain mental health disorders.[19] Additional research shows that some mental health disorders, like Post-Traumatic Stress Disorder, can be linked to traumatic life experiences and an individuals' environment.[19] Most of the time it is not a single factor that causes a mental illness, but a combination of biological and environmental factors.[19]

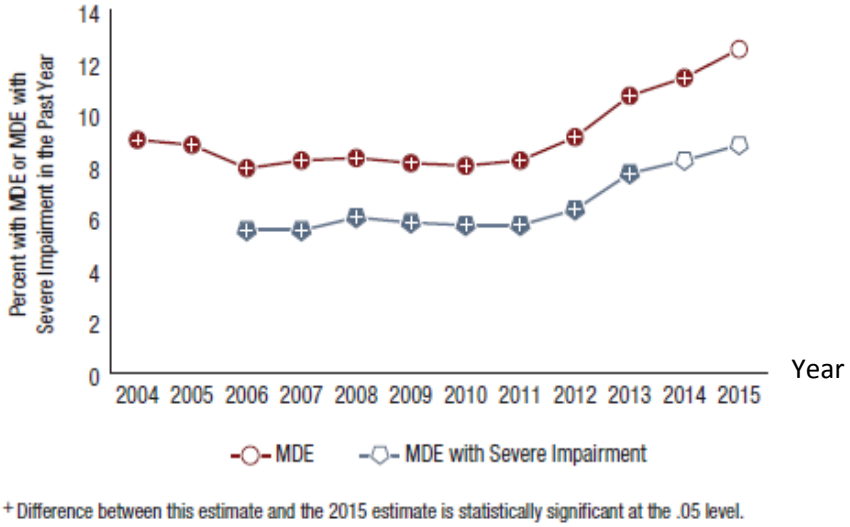
Achieving mental health has also been proven to have a positive impact on an individual's overall well-being. Research shows that there is a very clear and powerful mind-body connection.[17] This connection explains why having certain physical ailments can negatively affect your mental health, and how some mental aliments can have a negative impact on your physical health. For example, a study conducted by Kings College London (2017) shows that individuals with severe mental illness including schizophrenia, bi-polar disorder, or major depressive disorder have a 53% higher risk of developing cardiovascular disease.[20] Their risk of dying from cardiovascular disease was also significantly higher than individuals with cardiovascular disorder that did not also suffer from a severe mental illness.[20]

However; data suggests that only 17% of adults living in the United States have achieved the state of ideal mental health described by the World Health Organization (WHO).[21] As of 2015, over 43 million adults 18 years or older were suffering from a mental illness.[22] The various diagnosable mental illnesses account for the highest rate DALY's in the United States.[23] DALYs measure the burden of disease by calculating the years of life lost due to death and the number of years lost due to disability.[9] One DALY can be compared to one year of "healthy" life lost.[24] Neuropsychiatric disorders, including mental and behavioral illnesses account for more than 10% of all global DALYs.[24] Over 27% of all mental health DALYs are attributed to Major Depressive Disorder.

YLDs, or years lived with disability, measure the number of years an individual lives with a disability, on average.[24] YLDs are used to measure the overall burden of disease by calculating the disability weight by both the short and long term loss of health.[24] Neuropsychiatric disorders obtain a rate of 28.2 YLDs, higher than any other global disease.[24] Of which, Major Depressive Disorder and Anxiety Disorders are the largest contributors.[24]

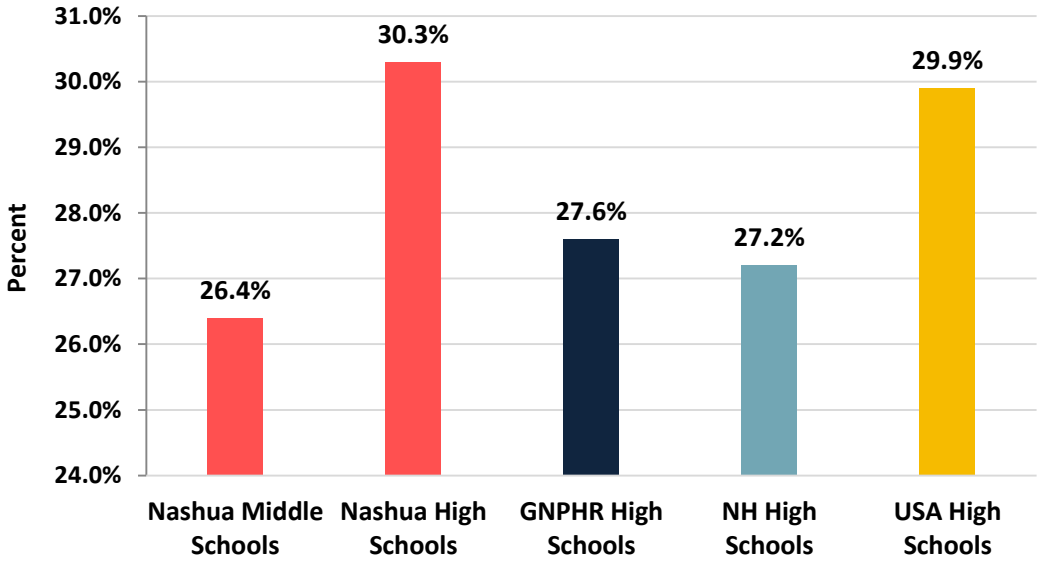
According to data collected in 2015 form the Youth Risk Behavior Surveillance System (YRBS), the number of students in New Hampshire that reported feeling "sad or hopeless" every day for two weeks continues to hover around 25%.[25] This statistic has remained relatively unaffected for the past decade among the state's youth (See Figures 16 and 17).[25]

Figure 16. Major Depressive Episode (MDE) and MDE with Severe Impairment in the Past Year among Youths Aged 12 to 17, 2004-2015



Source: NSDUH, 2015

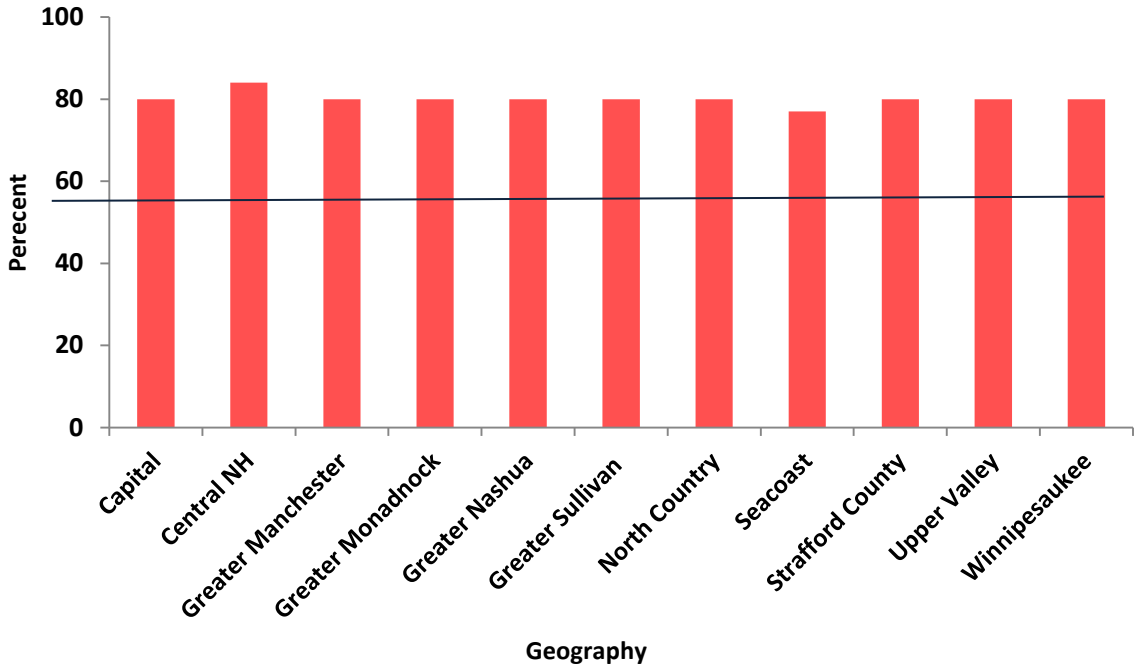
Figure 17. Youth who have Felt Hopeless for at Least Two Weeks Straight in the Last 12 Months



Source: NH YRBS, 2015

In addition to the prevalence of symptoms of depression among the youth, on average 70-80% of students in New Hampshire "would not talk to parents about negative emotions".[25] The Greater Nashua Public Health Region's (GNPHR) YRBS data are similar to the state's average mentioned above (See Figure 18).

Figure 18. Comparison of High School Youth in New Hampshire Who Would Not Talk to Parents about Negative Emotions



NH YRBS, 2015

Suicide

In 2014, suicide was the 10th leading cause of death for all ages in the United States with 42,826 suicides that year.[26] Suicide results in an estimated $51 billion in combined medical and loss of productivity costs. In 2013, it was estimated that 9.3 million adults had suicidal thoughts in the past year, which is 3.9% of the United States adult population. The same year, about 2.7 million people reported to have made a plan to attempt suicide in the past year.[8] The Healthy People 2020 objective is to reduce the suicide rate to 10.2 per 100,000, which the State of New Hampshire does not currently meet as seen in the Table 9.[9] Nationally adults 18 to 25 years of age have the highest rate of adults who made a suicide plan.

You are not alone…

National Suicide Prevention Lifeline

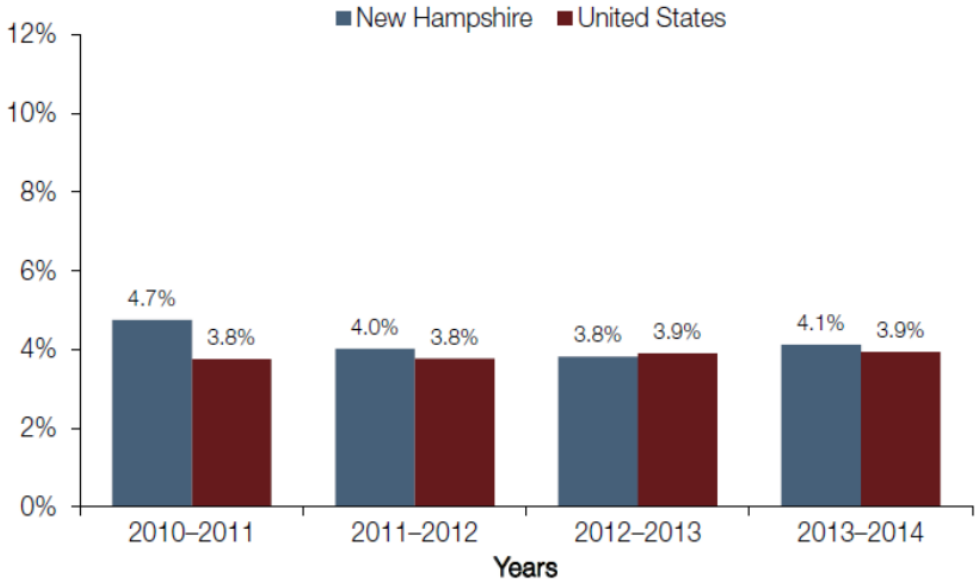
1-800-273-TALK (8225)

Table 9. Suicide Mortality, Both Genders, All Ages, New Hampshire, 2000-2015

Year	Sex	Number of Deaths	Population Count	Crude Rate per 100,000 Population	Age-Adjusted Rate per 100,000 Population	Age-Adjusted rate LCL	Age-Adjusted rate UCL
2010	Female	39	670,817	5.81	5.33	3.79	7.29
	Male	151	652,741	23.13	22.37	18.72	26.02
2011	Female	39	670,405	5.82	5.2	3.7	7.11
	Male	154	651,511	23.64	21.97	18.41	25.54
2012	Female	42	675,471	6.22	5.75	4.14	7.77
	Male	157	656,248	23.92	22.68	19.03	26.33
2013	Female	42	669,165	6.28	5.71	4.11	7.71
	Male	139	650,498	21.37	19.82	16.41	23.24
2014	Female	54	670,142	8.06	7.87	5.91	10.27
	Male	182	653,424	27.85	26.36	22.38	30.33
2015	Female	61	671,601	9.08	8.81	6.74	11.32
	Male	162	654,919	24.74	23.95	20.12	27.78

Rates and counts are not displayed if fewer than 5 events are reported.
Source: NH WISDOM

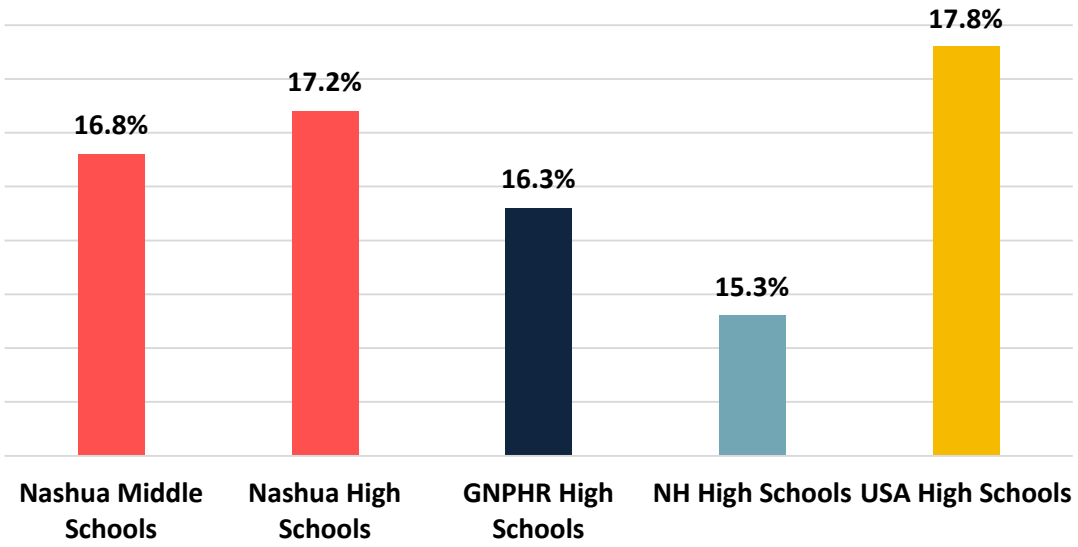
Figure 19. Adults Aged 18 or Older with Suicidal Thoughts, New Hampshire, 2013-2014



Source: Behavioral Health Barometer NH, 2015

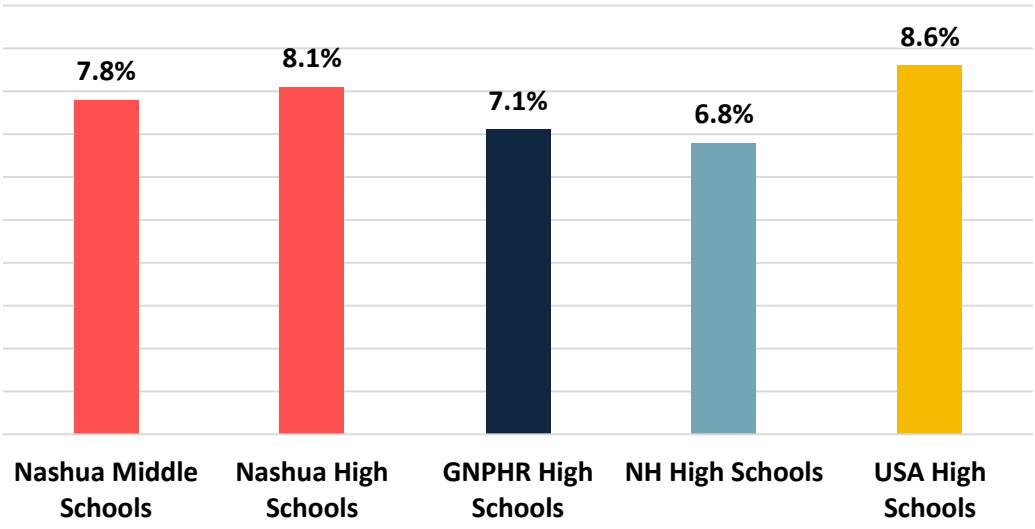
In the GNPHR, 16.3% of high school students seriously considered attempting suicide, 7.1% actually attempted suicide one or more times in the past year and 2.8% had to be treated by a doctor or nurse. See Figures 20 and 21 for more detailed youth rates regarding suicide.[9]

Figure 20. Youth who have Seriously Considered Suicide in the Last 12 Months



NH DHHS: YRBS, 2015

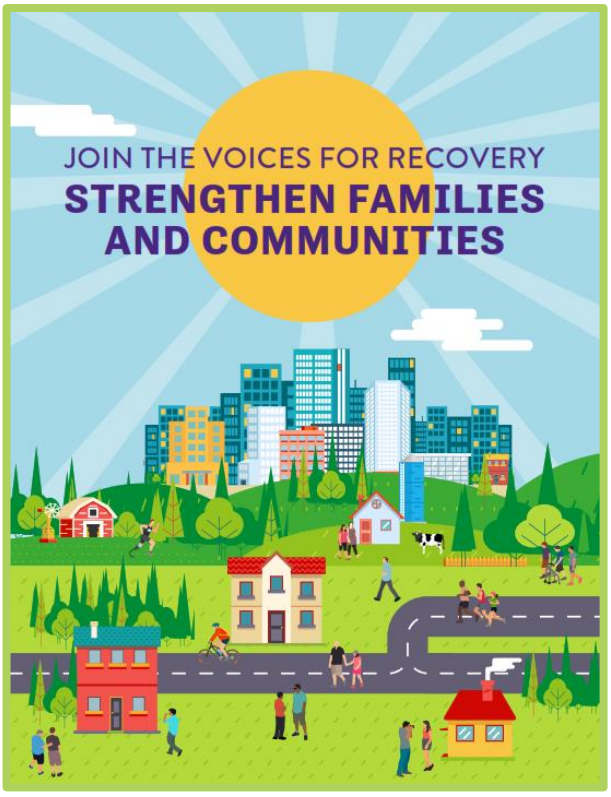
Figure 21. Youth who have Attempted Suicide in the Last 12 Months



NH DHHS: YRBS, 2015

Hope for the Future

In Nashua, the number of overdose deaths increased from 19 in 2015 to 37 in 2016. According to the Nashua Police Department Annual Report, the number of Drug Offenses has increased from 404 offenses in 2015 to 574 in 2016. Hope is not lost to turn the tide on the substance use crisis facing the Greater Nashua Community. People are accessing treatment through new access points, like the Nashua Safe Stations. The City of Nashua now has a recovery resource center on Main Street (Re-vive Recovery Center). Additional funding is being provided by the State to treatment providers to expand treatment capacity.



Source: Recoverymonth.org

There are new initiatives being implemented in the GNPHR for mental health and suicide prevention. The region has been awarded funds to start a Mobil Crisis Response Team that will be able to respond to community members who are in a mental health crisis. There are also established agencies that have warm lines that people can access when they need talk about mental health stressors and resources within the community.

As part of the last Community Health Improvement Plan (CHIP), there has been a coordinated effort to increase the community's awareness of mental health through Mental Health First Aide and of Suicide Prevention Awareness through the Suicide CONNECT program. The Integrated Delivery Network (IDN) is an initiative that is working on integrating behavioral health and primary care services for the Medicaid eligible population. The GNPHR is working through the IDN to increase collaboration between agencies that provide medical care and behavioral health services. We are confident that these and other initiatives being implemented in the GNPHR will move us towards our goal of a healthier and safer community for all.

New Hampshire is responding to the substance misuse crisis as well as increasing Mental Health and Suicide awareness. All citizens have a role to play in addressing substance misuse within the community and raising awareness of mental health and suicide prevention. Prevention works, treatment is effective and people recover! If you want to become part of the solution, learn more about the substance misuse prevention and behavioral continuum of care efforts in the Region.

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Emergency Preparedness

"Preparation through education is less costly than learning through tragedy."
-Max Mayfield

Contents

Emergency Preparedness

What makes an incident an emergency? What makes an emergency a disaster? An incident becomes and emergency when there is an immediate risk to health, life, property, or the environment.[1] During this time, normal day-to-day activities can be suspended and extra-ordinary measures are taken in order to mitigate the situation from becoming a disaster. An emergency can become a disaster when an incident has already caused loss of life, health detriments, damage to property or the environment, or if there is a high chance of escalation to immediate danger to life, health, property, or the environment.[2] Disasters can be naturally occurring, such as a hurricane, blizzard or earthquake. They can also result from man-made hazards, such as explosions, terrorist attacks or chemical or biological attacks.

Almost any emergency can impact the public's health in some way. Disasters can bring about loss of life, significant damage to infrastructure and the environment. Disasters can aggravate existing health conditions, and biological hazards can threaten the health of millions. The best way to protect life and mitigate harm is through emergency preparedness.[3]

"It is the people who matter most, and without the people we have no disaster."

World Health Organization (WHO)

Emergency preparedness includes the activities that take place before an emergency occurs. The National Department of Homeland Security Federal Emergency Management Agency describes emergency preparedness as a "continuous cycle of planning, organizing, training, equipping, exercising, evaluating, and taking corrective action in an effort to ensure effective coordination during an incident response."[4] Preparedness can happen at all levels of society, from international planning to personal or household preparedness. Nations, states, regions, municipalities, and ordinary citizens need to understand what existing hazards they are exposed to in order to prepare for emergencies and disasters. Once these hazards are identified, steps can be taken to prepare for an emergency and how to mitigate the effects of an emergency or disaster within a community.[5]

The Federal Emergency Management Agency identifies four preparedness actions that individuals and households should take to become more prepared to handle a large-scale disaster or emergency. These actions include staying informed, making a plan, building a kit, and getting involved.[6] According to the United States Department of Homeland Security, the percentage of individuals taking the recommended preparedness actions remains largely unchanged since 2007.[6]

Throughout the Greater Nashua Public Health Region, the City of Nashua and 12 surrounding towns of Amherst, Brookline, Hollis, Hudson, Litchfield, Lyndeborough, Mason, Merrimack, Milford, Mont Vernon, Pelham, and Wilton are at risk of any natural disaster, except for volcanic eruptions and a tsunami.[7] For this reason, collaborative, all-hazards planning and response to emergencies is an important public health priority.

Public Health Emergency Preparedness

According to the Centers for Disease Control and Prevention Model State Health Emergency Powers Act, a public health emergency is, "an occurrence or imminent threat of an illness or health condition, caused by bioterrorism, epidemic or pandemic disease, or a novel and highly fatal infectious agent or biological toxin, that poses a substantial risk of a significant number of human fatalities or incidents or permanent or long-term disability."[8] In other words, public health emergencies are emergencies that pose a larger risk of harm to the health of a population, most times because the nature of the incident itself has the ability to overwhelm existing healthcare and emergency response resources.

Through the Public Health Emergency Preparedness cooperative agreement, leaders can coordinate day-to-day public health practices, policies, and systems to deliver an integrated and collaborative response that can be scaled to meet the demands of most emergencies.[9] The core concepts of public health emergency preparedness include developing, maintaining and testing realistic all-hazards emergency plans that are integrated into existing practices and services in an effort to enrich pre-planned and coordinated rapid-response abilities.[8]

Public health emergency responses are not always swift, like responses to a tornado or earthquake. Public health emergency responses can last weeks, months, or even years at a time. In August 2016, the United States Department of Health and Human Services determined that a public health emergency exists due to outbreaks of Zika Virus. This emergency declaration has been renewed several times, and additional emergency declarations in response to Zika Virus outbreaks continue through July 2017, nearly a year after the initial public health emergency declaration.[10]

This photo was taken during an exercise testing plans for medical evacuations by helicopter from a local hospital in 2015.

The State of New Hampshire has also issued Public Health Emergency Declarations. Most recent emergency declarations that affected the Greater Nashua Public Health Region include, the 2009 H1N1 influenza pandemic, the 2011 "Snowtober," Hepatitis C and Hepatitis A outbreaks.[11] In August 2013, a case of Hepatitis A was identified in a food worker in New Hampshire. After epidemiological investigation, the determination was made to give medications to patrons who visited the food establishments where the worker was employed. The Commissioner within the NH DHHS declared the event a public health incident and activated regional Multi-Agency Coordinating Entities to mobilize public health clinics to provide prophylactic vaccinations to the food establishments' patrons. More than 11000 individuals were vaccinated against Hepatitis A. Several weeks later, an additional employee was identified with Hepatitis A, and an additional 109 patrons were vaccinated through mobile clinics or Points of Dispensing.[12]

Regional Emergency Preparedness

The Greater Nashua Public Health Network works collaboratively across all community sectors to plan for, mitigate, respond to, and recover from emergencies. The Greater Nashua Regional Emergency Response Annex details plans and protocols for emergency operations and coordination and recovery with respect to man-made and natural emergencies. The Greater Nashua Public Health Network public health emergency preparedness coordinator and program coordinators work across sectors to ensure that the all-hazards plan encompasses subject matter expertise and best practices from organizations in the Public Health Advisory Council. Organizations come together to lend expertise in a number of areas, including medical surge, public information and warning, infection prevention, and volunteer management.

Healthcare Emergency Response Coalition

The HERC is responsible for healthcare response during an emergency. Members share resources, staffing, and information to enhance public health and healthcare response.

Infection Prevention and Control Coalition

IPCC is made up of Infection Preventionists throughout the region. The goal of this group is to identify and implement best practices, such as Antibiotic Stewardship and Healthcare-Assiciated Infection control programs.

Media Advisory Group

The MAG has members from accross all community sectors with skills in public information and communication. They are responsible for coordinating and advising on communications best pracices and crisis emergnecy risk communication.

Public Health Advisory Council

The Greater Nashua PHAC is a network of organizations and individuals that work collaboratively to improve the health of the Greater Nashua Public Health region and its residents.

Local Emergency Planninng Committee

LEPCs are tasked with community all-hazards emergency planning, hazard mitigation planning and emergency response in regard to hazardous materials within a community. LEPCs work independently and regionally to develop comprehensive hazard mitigation plans, emergency operations plans, hazardous materials plans, and provide information about hazardous chemicals to communities.

Voluntary Organizations Active in Disaster

VOADs are groups of organizations that work together to mitigate and alleviate the impact of disasters. VOAD provides a forum for non-profits, community-based organizations, faith-based organizations, businesses, and government promoting cooperation, communication, coordination and collaboration to foster more effective delivery of services to communities affected by disaster.

Annually, representatives from all community sectors train and exercise together in order to test response plans and target planning regionally. Most recent exercises have focused on active shooter events in schools, hospitals and other healthcare establishments. Exercises are also conducted with healthcare, police, fire, EMS, schools, volunteers and public health officials to test plans on mass antibiotic dispensing and medical countermeasure receipt from the Centers for Disease Control and Prevention Division of Strategic National Stockpile.

Community Preparedness

Disasters start and end at the local level, and for this reason, whole community preparedness is an essential component of the disaster cycle.[13] It is up to organizations, first responders, business, and healthcare to prepare, respond, and recover together. In order to effectively respond and recover from disasters and emergencies, community members should take actions with assistance from professional responders to increase their own preparedness. The more that a community can prepare for a disaster, the more quickly the community can respond and recover together.

The National Response Framework emphasizes that families and households play an important role in emergency management. Families and households have the responsibility to contribute to the community's preparedness by reducing hazards in and around their home; preparing an emergency supply kit and household emergency plan; monitoring emergency communications carefully; volunteering with an established organization; and enrolling in emergency response training courses. [11]

One action that community members can take to increase their own preparedness is to sign up for emergency alerts and warnings. Public safety officials utilize a number of different systems to be able to alert individuals, families, and businesses of an event or emergency.[11] These systems have the capability of broadcasting critical information quickly through a variety of information channels. Subscriptions to a community emergency alerts and warning system can be the difference between life and death during an emergency. By following the directions of emergency alerts and notifications, individuals and households can reduce risk of injury, keep emergency routes clear for responders, and minimize demand on cellular and landline communication networks.[11] For more information about emergency alerts, visit Ready.gov/alerts.

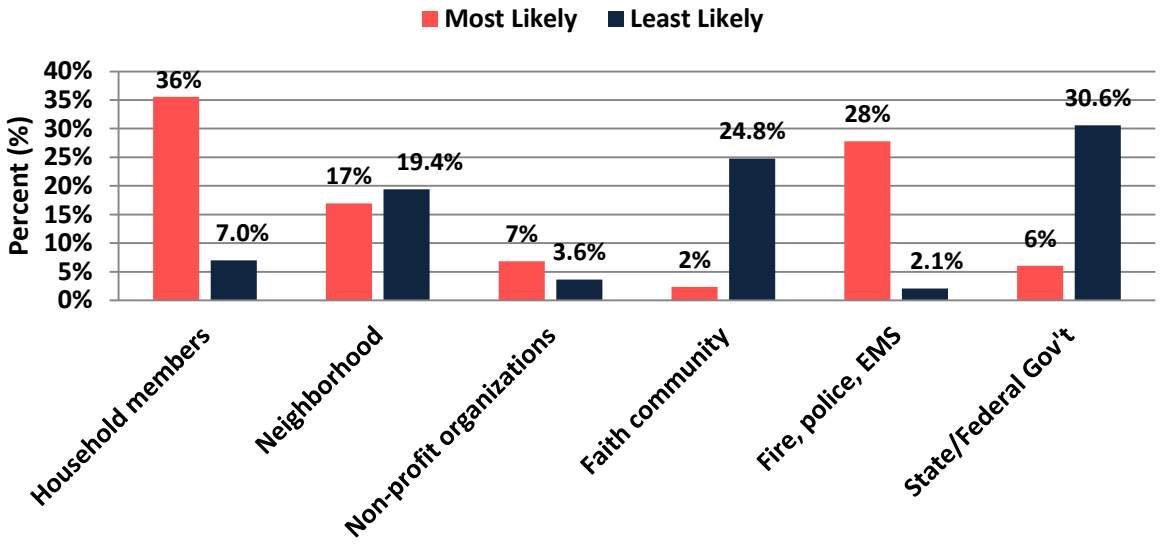
"When disaster strikes the time to prepare has passed."

Steven Cyros

Following a major disaster or emergency, local capacity to assist individuals and families is low, and response times could be hours instead of minutes. Emergency management objectives are to stabilize the incident, protect imminent threats to life, and to preserve the environment. Through these objectives, first responders can be transporting the critically ill, extinguishing large fires, and conducting search and rescue operations. It is unlikely that first responders will be available to respond to non-life threatening situations. The 2017 Nashua Community Health Survey asked participants which entity their household would most and least rely on for assistance during the first 72 hours following a disaster. Figure 1 indicates residents in the City of Nashua would

most rely on members of their own household and first responders in the first 72 hours following a major emergency or disaster. Respondents would least likely rely on the State or Federal Government Agencies, such as FEMA, and their faith community following a major disaster or emergency. Nationally, 71% of Americans would depend on their households and 48% also would rely on people in their neighborhood for assistance in the first 72 hours following a major disaster.[14]

Figure 1. Entities that Households Would Most and Least Rely on in the First 72 Hours Following a Disaster, Nashua, 2017



Source: 2017 Nashua Community Health Survey

Disaster Training

There are a number of training programs throughout the United States for unskilled individuals and families that are aimed at increasing personal and household preparedness. By participating in training, residents will be able to learn how to take the initial response actions necessary to protect themselves and their households. By ensuring household preparedness, families can relieve some burden on first responders and allow them to focus on more critical tasks that affect the larger community.[11] According to the 2017 Nashua Community Health Survey, 15.3% (95%CI: 14.8-15.8%) of participants had at least one member of the household who has attended training on how to be better prepared for an emergency within the past two years.[11] Nationally, 46% of individuals had participated in a preparedness training within the last two years in 2012.[6]

Volunteerism

Volunteering with an established organization or community group can also increase community-level preparedness and resiliency. Once a household is secure and safe, trained volunteers can work with established organizations, such as a Community Emergency Response Team or the American Red Cross as part of the overall emergency management system throughout disaster response and recovery. Volunteering with a recognized organization also ensures that volunteer efforts are utilized efficiently

Community Spotlight

Nashua Community Emergency Response Team

Between July 1, 2016 and June 30, 2017, the Nashua Community Emergency Response Team (CERT) participated in 26 events and contributed over 1,140 volunteer hours throughout the Greater Nashua Public Health Region.

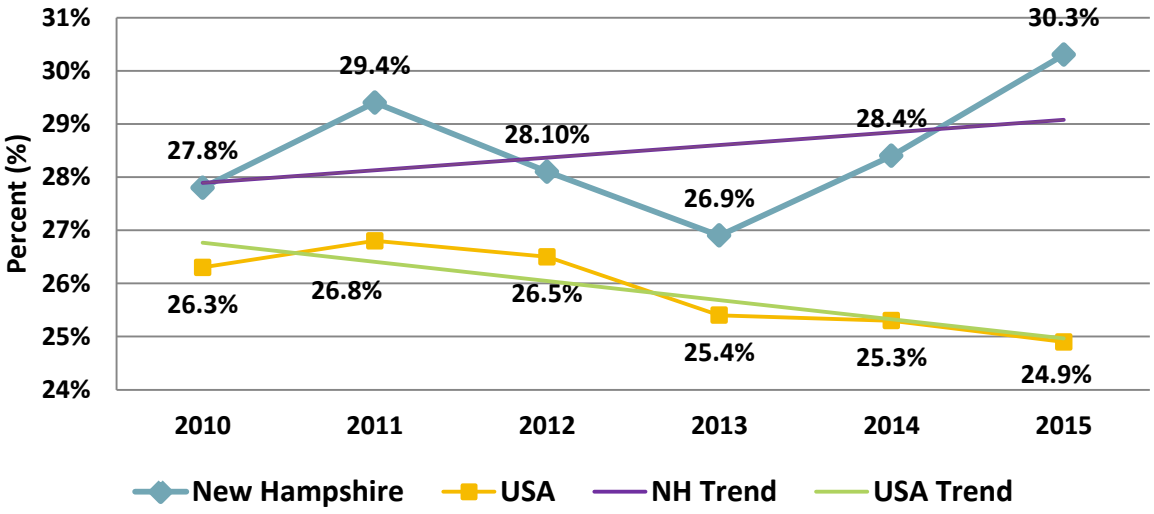
For more information about how to get involved: Nashuanh.gov/CERT

and directed to where the need is greatest.[11] The efficient and effective use of trained, affiliated volunteers is a recognized best-practice in fostering community resilience.

Large-scale disasters and high-profile events attract volunteers as a way to contribute to the relief of the affected areas or as a coping strategy if the volunteer is a survivor of the event.[15] After Superstorm Sandy, more than 173,000 volunteers came to the affected areas to lend assistance and contributed nearly one million volunteer hours.[16] After the Joplin tornado in 2013, AmeriCorps members coordinated over 75,000 volunteers who collectively contributed over 520,000 volunteer hours.[17]

Despite dramatic increases in volunteerism after a major disaster, the national rate of volunteerism has decreased over time according to the Corporation for National and Community Service.[18] Since 2010, volunteerism has decreased from 26.3% to 24.9% in 2015. New Hampshire, however, has seen an increase in volunteerism from 27.8% to 30.3% between 2010 and 2015.[19] Figure 2 shows that the overall trend of volunteerism has increased in waves over time whereas nationally, rates of volunteerism have been steadily declining.

Figure 2. Rate of Volunteerism by Year and Geography, 2010-2015



Source: Corporation for National and Community Service, 2015

Personal Preparedness

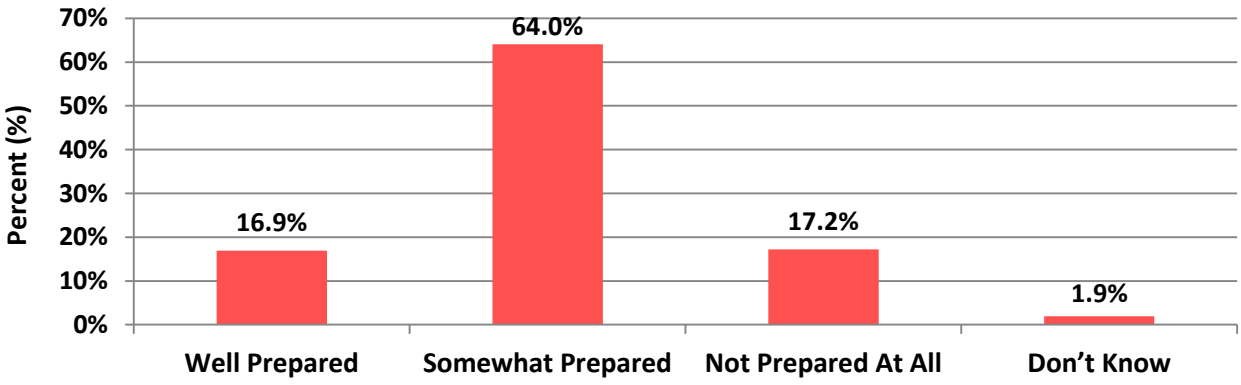
According to the 2017 Nashua Community Health Survey, 53% of respondents indicated that they would most expect to rely on members of their household (36%, 95%CI: 33.75-37.45%) and neighbors (17%, 95%CI: 15.5-18.4%) for emergency assistance in the first 72 hours following a major disaster (See Figure 1 in Community Preparedness).[20]

The 2017 Nashua Community Health Survey asked participants to rate their household preparedness level as well prepared, somewhat prepared, or not prepared at all. More than half of participants (64%, 95%CI: 62.2-65.9%) indicated their household was somewhat prepared to handle a large scale disaster or emergency.[17] The remaining surveyed households report being well prepared (10.0%, 95%CI: 8.8-11.2%) or not prepared at all (17.2%, 95%CI: 2.1-3.4%) to handle a large-scale disaster or emergency.[17] Figure 3 indicates the results of the question "How prepared is your household to handle a large-scale disaster or emergency?".

"We know of the great capacity of individuals to care for their families, friends, neighbors and fellow community members, making our citizens force multipliers rather than liabilities. Together, we make up the whole community, and we all have an important role to play."

Craig Fugate,
Former FEMA administrator

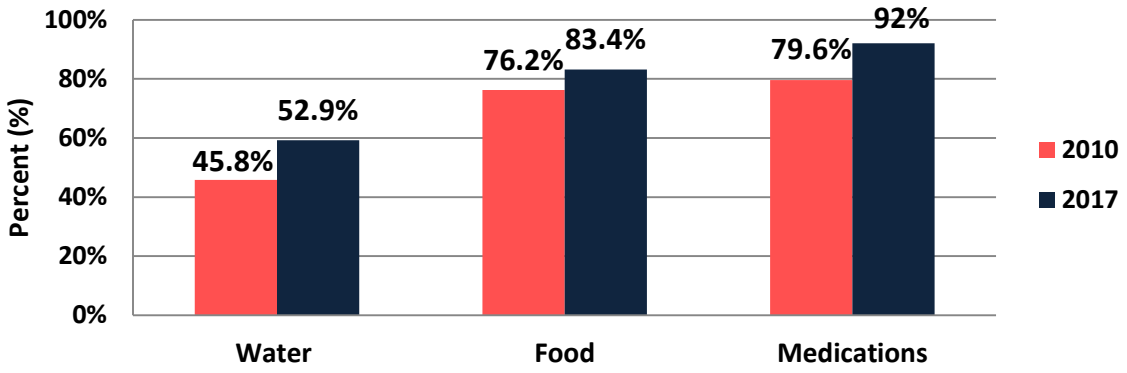
Figure 3. Self-Reported Preparedness Level to Handle a Large-Scale Disaster or Emergency of Nashua Residents, 2017



Source: 2017 Nashua Community Health Survey

Personal and household preparedness can be measured by a number of factors, including the presence of emergency supplies and equipment, the existence of an emergency plan for evacuations and communications plans. Figure 4 indicates the presence of a three-day supply of food, water, and medications for each member of the household. Overall, prevalence of having a three-day supply of water, non-perishable food, and prescription medications for each person who takes prescribed medicines has increased in the City of Nashua between 2010 and 2017.

Figure 4. Prevalence of Nashua Residents who Report Having a Three-day Supply of Emergnecy Supplies, 2010 and 2017

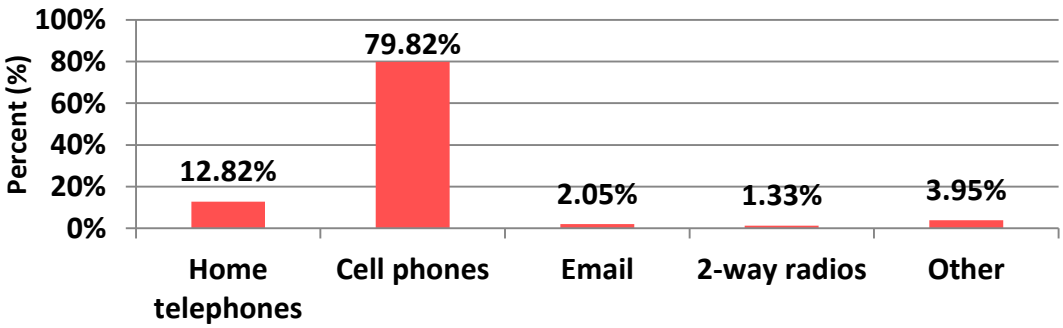


Source: 2010 and 2017 Nashua Community Health Survey

Personal preparedness also includes making a written plan for how households will leave or evacuate their homes in addition to how members of the household will be able to communicate with each other and other family members and friends following a large-scale disaster or emergency.

The Department of Homeland Security, Federal Emergency Management Agency recommends that households establish an out-of-state point of contact for family members to call, outside of the impacted area, for information regarding effected family and friends. An out-of-state contact will be able to coordinate updates and pass on information to concerned family and friends without overloading communications systems in the disaster area. It may also be easier to make a long-distance call than a local call during an emergency. If possible, FEMA recommends using short text messages along with alternate means of communication, such as email or social media to communicate with family and friends. During an emergency, text is best.[21] Figure 5 describes the methods residents of Nashua would use to communicate during a disaster.

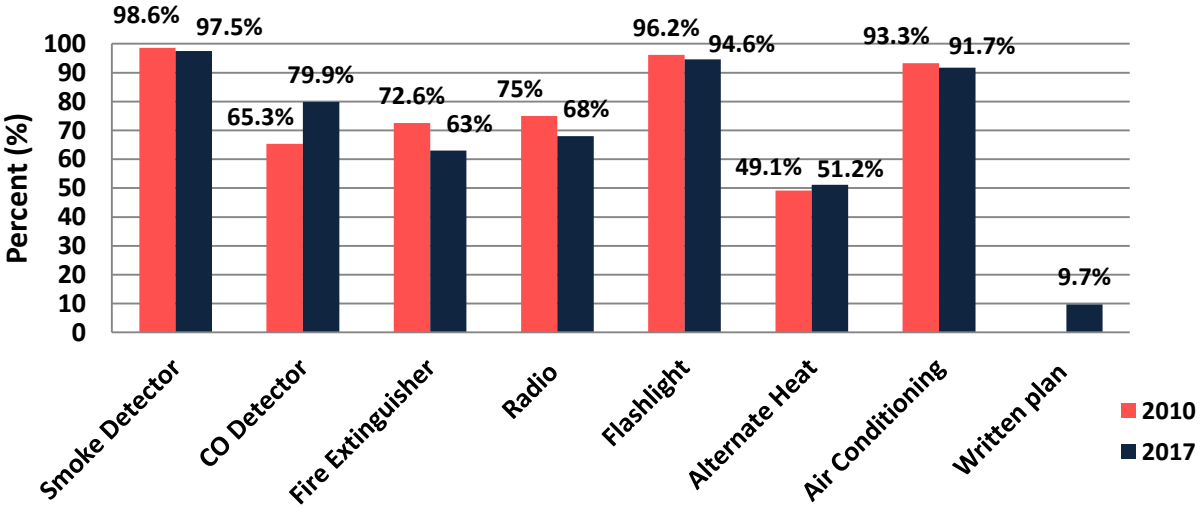
Figure 5. Main Method of Communicating with Family and Friends After a Large-Scale Disaster, Nashua, 2017



Source: 2017 Nashua Community Health Survey

In addition to a written disaster evacuation and communication plan, households are also encouraged to maintain an emergency supply kit with essential emergency items, including a flashlight, battery-operated radio, fire extinguisher, non-perishable food, potable water and essential medications. Figure 6 specifies the prevalence of emergency supplies and hazard mitigation measures within a household in the City of Nashua.

Figure 6. Percentage of Nashua Housholds with Emergency Supplies and Hazard Mitigation Measures, 2010 and 2017



Source: 2010 and 2017 Nashua Community Health Survey

Evacuations

At times, the best way to mitigate risks or harm from a hazard, such as a hurricane or wild fire, is to encourage or mandate evacuations from the hazardous area. According to the 2017 Nashua Community Health Survey, 9.9% (95%CI: 8.8-11.2%) of households would require assistance through public transportation or the government in order to evacuate from the area.[17] According to the 2015 American Community Survey, 92% of households own at least one vehicle. Some participants of the 2017 Nashua Community Health Survey cited reasons for reliance on public transit or the government for transportation assistance in the event their primary mode of transportation would be compromised or the roads would be somehow impassable. With this knowledge taken into account, it is far more likely that the true proportion of residents needing assistance through public transportation or the government would be lower than reported. Nationally, 39% of households had emergency plans that were discussed with the household in 2012.[6]

The Nashua Community Health Survey also found 90% of households (95%CI: 88.6-91.0%) would evacuate if public authorities announced a mandatory evacuation due to a large-scale disaster or emergency in 2017. This is a decrease from the 2010 Nashua Community Health Survey which found 94.2% (95%CI: 94.0-94.5%) of households in Nashua would evacuate in a mandatory evacuation. When asked where households would evacuate to, 55% indicated that they would go to a relative or friend's home (a decrease from 63% in 2010) and 15% would evacuate to an emergency shelter (an increase from 11% in 2010). In 2017, the Nashua Community Health Survey found that 8% of Nashua households

are unsure of where they would evacuate to if needed due to a large-scale disaster or emergency.[17] Table 1 indicates the destinations that households would evacuate to if mandated bypublic authorities.

Table 1. Evacuation Destinations if Required to Evacuate, Nashua, 2010 and 2017

	2010		2017	
Evacuation Destination	**Rate**	**95% CI**	**Rate**	**95% CI**
Relative or friend's home	63%	62.9-63.9%	55%	52.93-56.77%
Hotel	13%	12.2-12.9%	13%	11.33-13.90%
Emergency Shelter	11%	10.7-11.4%	15%	13.8-16.58%
Other	10%	9.8-10.4%	9%	8.33-10.60%
Don't Know	3%	2.7-3.4%	8%	7.01-9.12%
Source: 2010 and 2017 Nashua Community Health Survey				

According to the 2017 Nashua Community Health Survey, only 9.7% (95%CI: 8.59-10.88%) of households in Nashua have a written disaster plan for how they will leave their home due to a large-scale disaster or emergency. However, many households surveyed also indicated that they had discussed what to do during a large-scale disaster or emergency with household members, but they did not have the plan written down, disqualifying the household from the cohort answering in the affirmative for a written evacuation plan. Nationally, 46% of adults have a household emergency plan that includes instructions for household members about where to go and what to do in the event of a disaster in 2011. The Healthy People 2020 target is to increase the rate of households with emergency plans to 51.2%.[22]

The national target does not indicate that this plan needs to be written down. Moreover, it is important to note that an evacuation plan is only a small subset of an overall comprehensive emergency plan, which should also include communication plans, emergency alert subscriptions, the household's emergency support network contacts, shelter-in-place plan, and medical information for household members, including prescription information, medical orders, and care providers.

Becoming more prepared can be difficult, and there are many factors that influence a household or individual's preparedness for a large-scale disaster or emergency. Preparedness includes taking training, developing plans, gathering supplies, and staying informed about threats or hazards in an area. When asked what the main reason why a household may not be prepared in the 2017 Nashua Community Health Survey, participant answers fell into several categories. Most households had just never thought about preparing for a large-scale disaster or emergency (44.6%) or did not feel like they needed training to know how to respond during a large-scale disaster or emergency (12.9%).[17] Table 2 outlines the main reasons why a household might not be prepared to handle a large-scale disaster or emergency. Nationally, 26% of surveyed individuals believed preparing is too expensive, 24% do not know how to get prepared, 18% don't have time to prepare and 17% thought getting information about what to do in an emergency was too hard in 2012.

Table 2. Perceived Barriers to Preparedness in Nashua, 2017

What is the Main Reason Why Your Household Might Not be Prepared?		
Barrier	**Rate**	**95% CI**
Getting information on what to do in emergency, too hard	4.40%	3.66-5.27%
Don't know how to get prepared	7.70%	6.73-8.8%
Don't have time	7.66%	6.69-8.76%
Preparing is too expensive	2.31%	1.79-2.98%
Don't want to think about it	4.89%	4.12-5.81%
Never have thought about it	44.61%	42.71-46.54%
Police/fire department will take care of my needs	6.83%	5.91-7.88%
Don't need training on how to react during an emergency	12.94%	11.69-14.29%
Don't Know	8.16%	7.15-9.28%
Source: 2017 Nashua Community Health Survey		

When asked what would most motivate a household to take steps to become more prepared, 43.4% (95%CI: 41.5-45.4%) of Nashua households took ownership of their safety and responded they believed that it was their own responsibility to take care of their household in the first 72 hours following large-scale disaster or emergency.[17] Furthermore, 19.2% (95%CI: 17.7-20.7%) or survey participants felt they would prepare because their job, school, or community service organization encouraged or required them to take training to be more prepared for emergencies. Twelve percent (95%CI: 10.9-13.4%) of participants also would feel motivated to prepare if people they had known had already taken steps to become more prepared.[17]

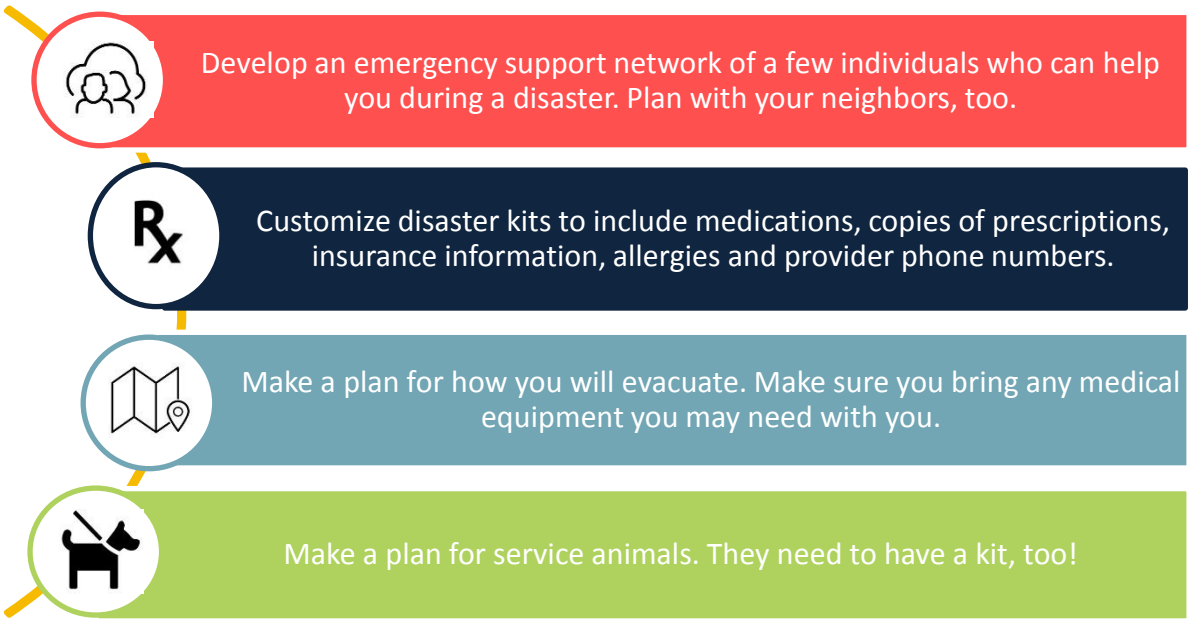
Inclusive Disaster Planning

Disasters can happen anywhere, at any time and can affect anyone. People with disabilities may be especially vulnerable during and after emergencies. In an emergency, many systems that individuals rely on may not function as well as they usually do. Familiar landmarks and usual travel routes may be altered, making it difficult for service animals or those with low visual acuity to navigate. Utilities like electricity, water, gas and phone service may be disrupted. People may need to temporarily evacuate to an emergency shelter.[23] It is important that regional plans for response facilities address a variety of disability challenges through a concerted effort to plan collaboratively for inclusive emergency response and recovery services to meet the needs of the community.

The Office of Disability Integration and Coordination under the Federal Emergency Management Agency aims to encourage emergency management practices to include people with disabilities throughout every step of the disaster cycle: preparedness, response, recovery, and mitigation. By planning for those with disabilities at the beginning, emergency plans can better serve our communities when disaster strikes.[24] Figure 7 outlines key steps that those with disabilities can take in order to become more prepared for a large-scale emergency. Communities can incorporate those with disabilities into the

disaster planning process and encourage those with disabilities to take additional steps to mitigate the effects of a disaster. These steps include customizing an emergency kit, creating a disaster support network, and developing an evacuation plan.[25]

Figure 7. Emergency Planning Recommendations



Source: US Department of Homeland Security, Federal Emergency Management Agency, Office of Disability Integration and Coordination

Regional planning often places emphasis on developing inclusive disaster plans and encourages those with disabilities to take a seat at the table during the planning process. Often, emergency managers will exercise to test plans for inclusiveness and accessibility. Steps have been taken throughout the Greater Nashua Public Health Region to incorporate considerations for those with disabilities in emergency shelters, evacuation strategies, medical surge, and mass antibiotic dispensing.

According to the US Census Bureau, the 2015 American Community Survey, 1-Year Estimate, 12% of Nashua residents have a disability. Disabilities by Town within the Greater Nashua Public Health Region are shown in Table 3. Inclusive planning is essential to provide resources and services before, during, and after an emergency to those who may need extra assistance or have a functional or access need as a result of a disaster or emergency.

"My experience tells me if we wait and plan for people with disabilities after we write the basic plan, we fail."

Craig Fugate
Former FEMA administrator

Table 3. Prevalence of Individuals with at Least One Disability in the Greater Nashua Public Health Region, by Town, All Ages, 2015

Town	Overall Rate	Hearing	Vision	Cognitive	Ambulatory	Self-Care	Independent Living
Amherst	9.3%	3.7%	1.8%	3.1%	4.0%	2.0%	4.8%
Brookline	4.8%	1.3%	1.0%	2.1%	1.4%	0.5%	1.5%
Hollis	6.6%	1.8%	1.4%	2.7%	2.3%	0.7%	2.2%
Hudson	9.6%	3.1%	1.5%	3.6%	4.6%	2.2%	3.3%
Litchfield	12.4%	3.5%	2.3%	5.0%	7.0%	2.7%	5.8%
Lyndeborough	6.9%	2.5%	1.6%	2.2%	4.2%	0.4%	1.4%
Mason	10.6%	3.0%	0.5%	3.7%	4.9%	1.1%	3.2%
Merrimack	8.5%	2.5%	0.7%	3.5%	4.6%	1.3%	3.7%
Milford	11.8%	3.2%	1.7%	3.9%	6.4%	2.1%	5.1%
Mont Vernon	4.4%	2.4%	0.8%	0.9%	1.3%	0.6%	1.4%
Nashua	12.0%	1.9%	0.6%	5.7%	4.6%	0.4%	3.8%
Pelham	8.4%	2.8%	1.1%	2.8%	4.2%	1.8%	3.8%
Wilton	12.0%	5.3%	1.1%	5.3%	5.9%	3.1%	3.6%

Source: American Community Survey 5-Year Estimates, 2017

Community Resilience

According to the United States Department of Health and Human Services Office of the Assistant Secretary for Preparedness and Response, community resiliency is "the sustained ability of communities to withstand, adapt to, and recover from adversity."[26] Human-caused and natural disasters today can bring about additional risks to larger numbers of people due to increases in globalization, urbanization and climate change.[24] Strengthening day-to-day health and well-being can enhance community health resilience and help mitigate the risks to health from disasters.

Research demonstrates community-level preparedness and resilience can be developed over time through an informed and empowered community, social interconnectedness, robust and prepared healthcare infrastructures, non-governmental assistance after a disaster, and pre-planning with citizens and at-risk individuals.[27]

Community resilience to disasters focuses on the capacity of neighbors, neighborhoods, and communities to come together and assist one another during a disaster rather than relying solely on first responders.[28] Communities can engage in preparedness activities together that can help mitigate the risk of disasters and promote resilience following a disaster. Some of these tasks can include the development of family reunification plans, building disaster kits and creating continuity of operations plans for key community services and organizations can all develop whole-community disaster resilience.[29]

Conclusion

Emergencies and disasters all begin and end at the local level. It is the responsibility of everyone in the community, social service organizations, schools, municipal governments, faith-based organizations, private businesses, first responders, healthcare facilities and average citizens to prepare. When we all prepare together, we develop a more resilient community. We must prepare and plan now for the disasters that make us most vulnerable. It is not if a disaster will occur, it is only a matter of when.

One of the easiest ways to become more prepared is to get informed. Stay up to date on preparedness activities throughout the region, local events, hazards and preparedness trainings available in your area by following the Greater Nashua Public Health Network on Facebook at GreaterNashuaPH.

Source: Midtownpaloaltoca.com

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Burden of Cancer

"An ounce of prevention is worth a pound of cure"
- Benjamin Franklin

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Burden of Cancer

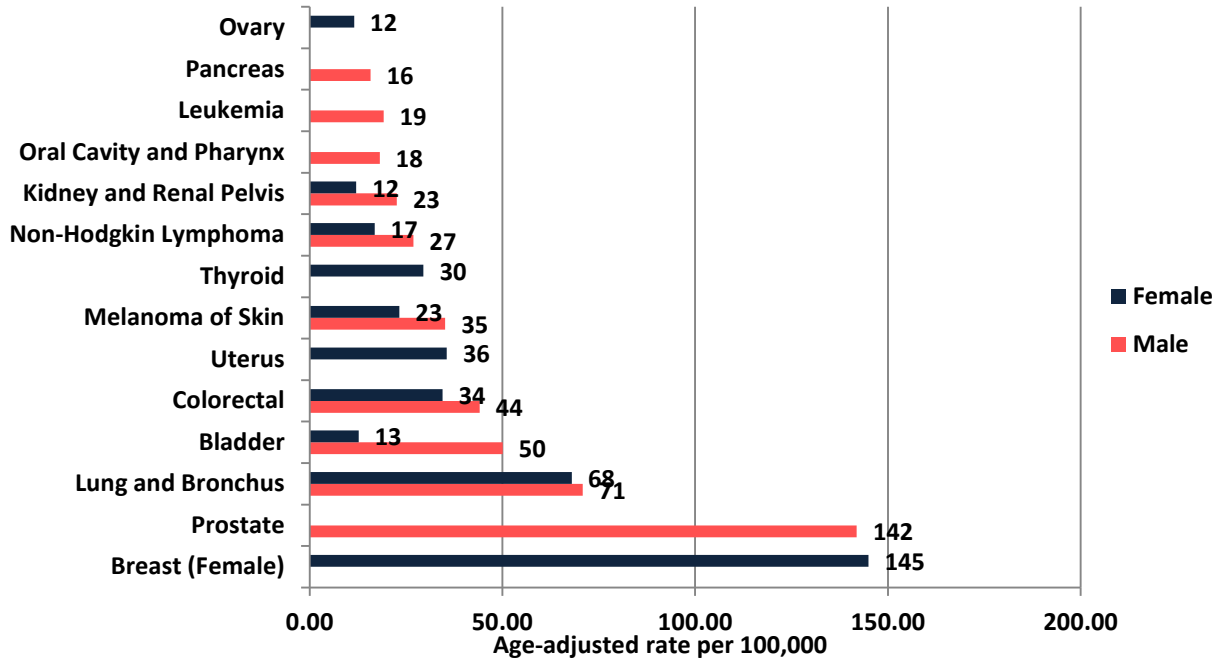
On January 1, 2016, there were more than 15.5 million Americans with a history of cancer that were alive. Most of these American survivors have no current evidence of cancer.[1] Although cancer is the leading cause of death in New Hampshire[2] there are known risk factors that can be avoided to reduce cancer risk such as not using tobacco, maintaining a healthy weight, minimizing alcohol intake, not using tanning beds, going into the sun sensibly and increasing physical activity. In the United States, there are expected to be about 1,688,780 new cancer cases in 2017 and about 600,920 are expected to die of cancer in 2017; about 1,650 deaths per day. Approximately, 41 out of 100 men and 38 out of 100 women will develop cancer during their lifetime.[1] Health disparities are apparent in the prevention, detection, and treatment of cancer and the ultimate survivorship of cancer patients. Access to health care services, access to healthy food, not getting enough physical activity and engaging in risky behaviors such as tobacco and alcohol relate to where a person lives, works, and accesses services.[3]

New Hampshire is expected to have 8,670 new cancer cases in 2017[1] and there are approximately 20 new cancer diagnoses and 7 deaths per day from cancer in residents.[2] An estimated 14% of lung cancer cases in New Hampshire is from high radon exposure from the bedrock in homes and the melanoma incidence rate is higher than the national average.[2] From 2010-2014, there were 9,620 cancer cases in the Greater Nashua Public Health Region (GNPHR). Table 1 shows the number of cases from 2010-2014 and Figure 1 shows the age-adjusted rate for the most common cancers for males and females in the region.[4]

Table 1. Cancer Case Counts by Type, GNPHR, 2010-2014

Type of Cancer (Both Genders)	Number of Cases in the GNPHR
Lung and Bronchus	1,226
Colorectal	718
Bladder	524
Melanoma of Skin	519
Non-Hodgkin Lymphoma	391
Thyroid	342
Kidney and Renal	327
Leukemia	267
Oral Cavity and Pharynx	238
Pancreas	231
Brain	138
Liver and Hepatic Bile Duct	129
Esophagus	122
Source: NH WISDOM[4]	

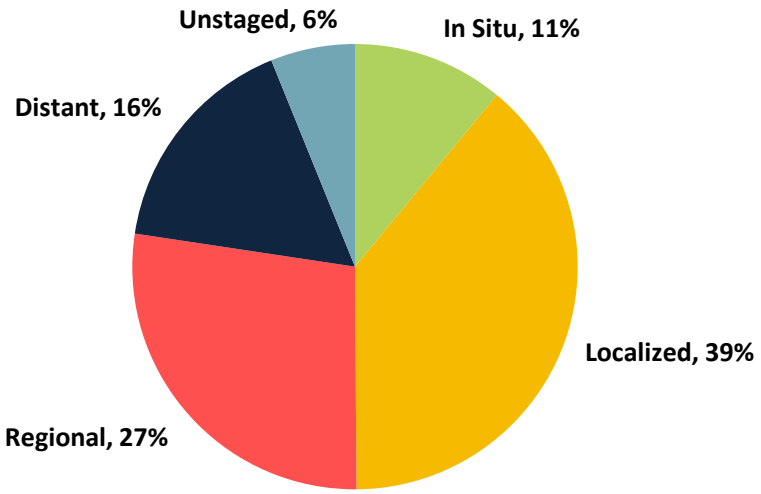
Figure 1. Top 10 Cancers for each Gender by Type, 2010-2014



Source: NH WISDOM[4]

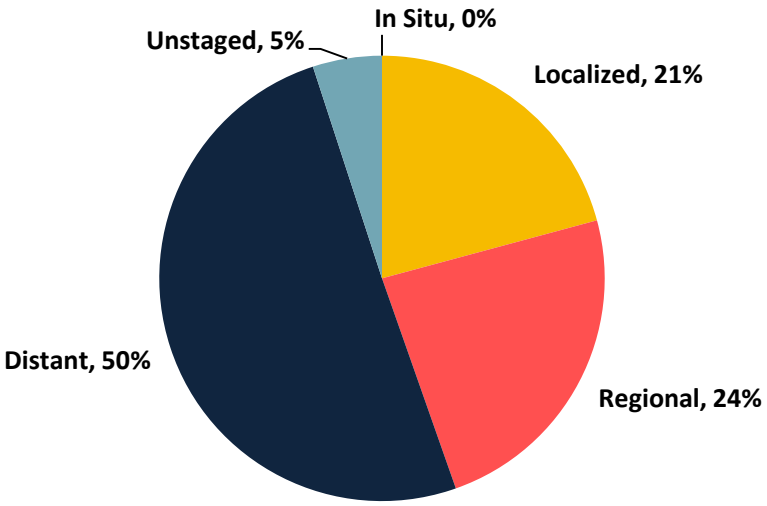
Cancer is better controlled when diagnosed early and is grouped into five categories when it is staged which includes: In situ, localized, regional, and distant. In situ describes cancer cells that are only present in layer of cells where they developed, localized is when the cancer is limited to the organ where it started, regional cancer spreads beyond the primary site to nearby tissue and distant is when the cancer has spread from the primary site to distant tissues and organs.[4] In the GNPHR, 40% of colorectal cancer patients had their cancer staged at in situ or localized (Figure 2) compared to lung cancer where 50% of patients had their cancer staged at distant (Figure 3) demonstrating the need to continue to educate high risk patients on the need for lung cancer screening.[4] According to the American Cancer Society guidelines, lung cancer screening is recommended among adults that are current or former smokers who are 55 to 74 years of age and have a 30 pack-year history of smoking. Screening uses low-dose spiral computed tomography and "has been shown to reduce lung cancer mortality by 20% compared to standard chest x-rays".[1] The 2 acute care hospitals in the GNPHR have lung cancer screening programs and patients should discuss their options for lung cancer screening with their primary care physician. Individuals that smoke and are exposed to radon have 7 to 10 times greater risk for developing lung cancer and these individuals often are the most economically disadvantaged without being able to afford radon mitigation in their housing.[2]

Figure 2. Stage at Diagnosis of Colorectal Cancer, GNPHR, 2009-2013



Source: NH WISDOM, NH State Cancer Registry

Figure 3. Stage at Diagnosis of Lung Cancer, GNPHR, 2009-2013



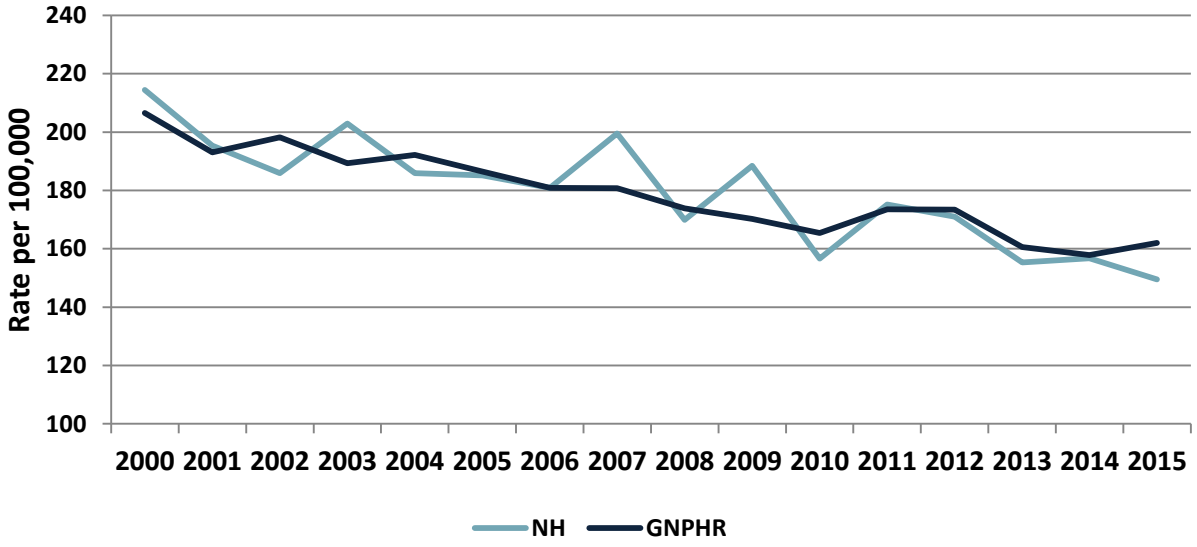
Source: NH WISDOM, NH State Cancer Registry

Cancer Mortality

Nationally, African American women have the highest death rate compared to other women and are "40% more likely to die of breast cancer than white women" and Hispanic and African American women have the highest rates of cervical cancer and cervical cancer deaths. African American men have the

highest rates of lung cancer and prostate cancer. To reduce the disparities in cancer mortality, access to cancer screenings and early detection needs to be enhanced in coordination with high-quality treatment.[3] In NH in 2015, there were 2,718 deaths from cancer and from 2010-2014 in the GNPHR, 27% of cancer deaths were from lung and bronchus cancer followed by 8% from colorectal cancer which remains common despite the ability to prevent its onset if detected early. [4] The overall cancer death rate in the GNPHR in 2015 was 161 per 100,000 and in Nashua it was 149.5 per 100,000. The Healthy People 2020 goal is to reduce the overall cancer death rate to 161 deaths per 100,000 which both the region and city meet[7] although these national averages mask the fact that in some neighborhoods, disparities are widening. Figure 3 shows the overall cancer mortality trend from 2000 to 2015 which demonstrates there has been a slow, decreasing trend over the past 15 years.

Figure 3. Cancer Mortality Trend, 2000-2015



Source: NH WISDOM, NH Vital Records Death Data

The NH State Health Improvement Plan (SHIP) goal is to reduce lung cancer death from 49.8 to 45.5 per 100,000 by 2020.[2] Healthy People 2020 has the same target for reducing lung cancer deaths.[7] In 2015, the NH age adjusted death rate was 56.39 per 100,000 (CI 43.8-40.5). In the same year, the age adjusted death rate in the GNPHR was 46.55 per 100,000 (CI 37.5-55.6) and 54.17 per 100,000 (CI 40.8-70.5) in Nashua. [4] The GNPHR is close to meeting the goal but there is still work to do in Nashua.

For melanoma, the SHIP goal is to reduce the melanoma cancer death rate from 3.1 to 2.5 per 100,000 by 2020.[2] The Healthy People 2020 goal is very similar, to reduce the death rate to 2.4 per 100,000.[7] In 2014, the NH age adjusted death rate was 2.7 per 100,000 (CI 2-3.7). In the same year, the age adjusted death rate in the GNPHR was 4.22 per 100,000 (CI 1.8-8.3) and In Nashua was 8.3 per 100,000 (CI 3.3-17.1). [4] Risk factors for melanoma include exposure to UV radiation from sunlight and indoor tanning, family history and individuals with sun sensitivity. Prevention includes reducing exposure to UV radiation by avoiding tanning beds and wearing sunscreen.[1] In NH, the percent of adolescents using indoor

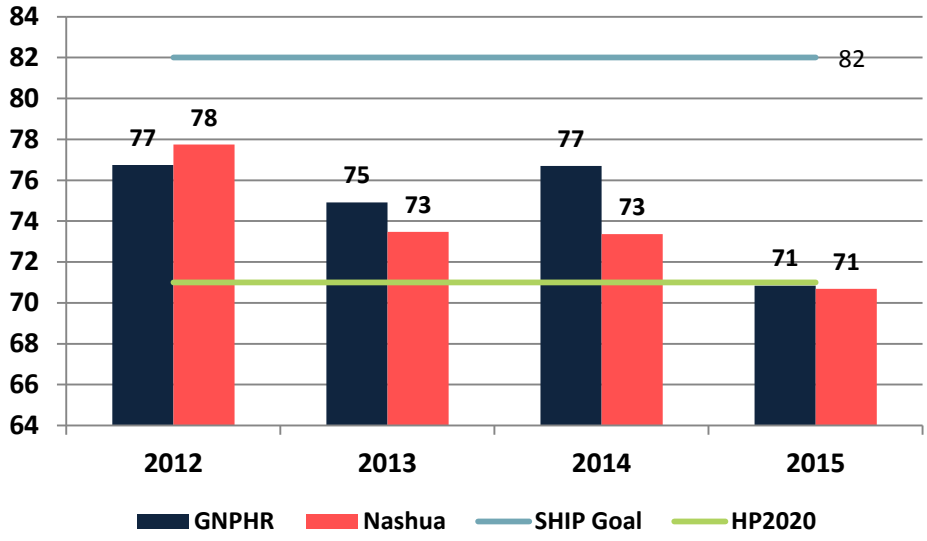
tanning decreased from 2011 to 2015, especially amongst females with a drop from 16% to 9%. Adolescent females in 12th grade have the greatest percent of indoor tanning use with 20% of them using indoor tanning beds in 2015.[4]

Colorectal Cancer and Cancer Screening

In a study published by Weir, et al, in *Cancer Epidemiology, Biomarkers & Prevention*, "Educational attainment disparities contributed to a large number of potentially avoidable colorectal cancer-related deaths…Of the 100,857 colorectal cancer deaths in lower educational attainment counties, [they] estimated that more than 21,000 was potentially avoidable and resulted in nearly $2 billion annual productivity loss." Colorectal cancer deaths in the GNPHR and Nashua have slowly declined over the past 15 years. In 2000, the age-adjusted colorectal cancer death rate was 28 per 100,000 (CI 20.5-38) and in 2015 it was cut in more than half to 10.2 per 100,000 (CI 6.4-15.3).[4]

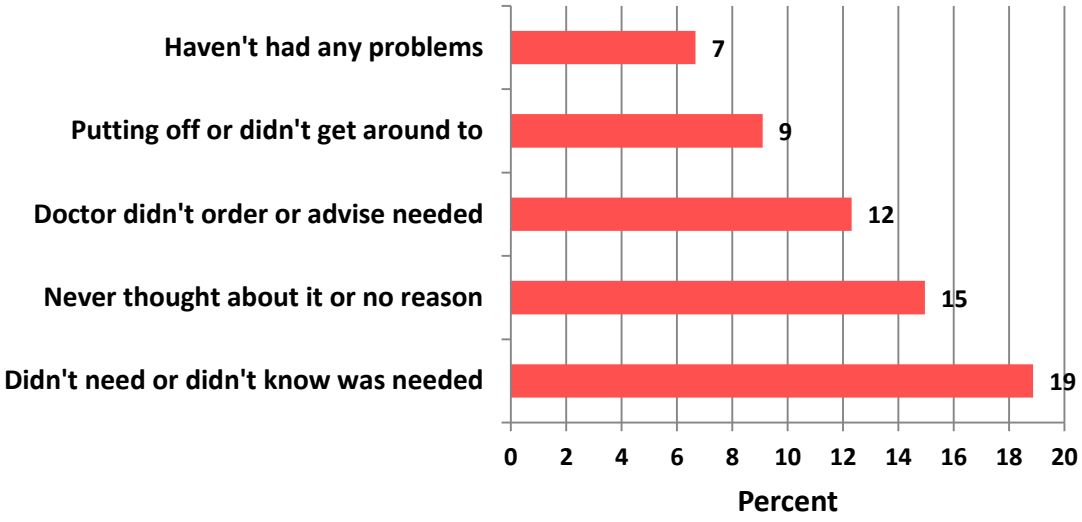
Colorectal cancer screenings can prevent the progression to cancer and identify cancers during early stages of diagnosis. Increasing colorectal cancer screening in low socioeconomic status communities, especially with low educational attainment, can decreased colorectal cancer deaths. In a white paper from the New Hampshire Comprehensive Cancer Collaboration Equity Task Force, employment type was viewed as a social determinant of health and data showed certain occupations have lower screening rates than others. The lowest screening rates were in Arts/Entertainment/Rec (48%), food service (39%) and construction (39%).[5] In the GNPHR and Nashua, the colorectal cancer screening rate dropped from 2014-2015 (Figure 4).[4] Barriers identified by residents in the GNPHR for not getting colorectal cancer screenings include not knowing the screening was needed and not having a reason to get it (Figure 5).[4] Addressing these barriers are achievable if the community works together to increase knowledge and the importance of screening. Adults in the GNPHR with an income less than $25,000 have the lowest screening rate at 54% (Figure 6). The NH SHIP goal is to increase the percent of adults age 50 and older screened from 75% to 82% which the GNPHR and Nashua do not currently meet.[2] The Healthy People 2020 goal is to increase to 71% which the region and city currently meet.[7] However, when you look at the census tracts in Nashua using the CDC's Model-based estimates for colorectal cancer, in some census tracts only 50%-53% have been screened (Figure 7). The data for the maps in figures 7-9 were obtained using the CDC's 500 Cities Project based on the Behavioral Risk Factor Surveillance Survey. The Centers for Disease Control and Prevention used a multi-level statistical modeling framework to generate small area estimates for this data. For more information on the 500 Cities project, visit https://www.cdc.gov/500cities/index.htm.[8]

Figure 4. Colorectal Cancer Screening in Adults aged 50+ per USPSTF Guidelines, GNPHR & Nashua, 2012-2015



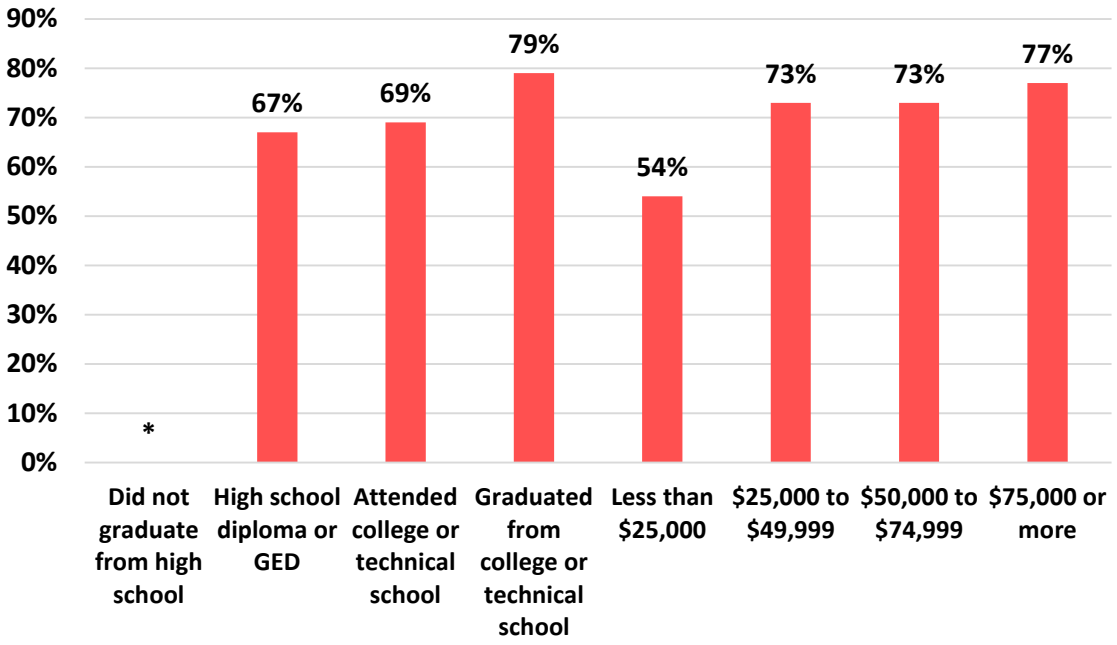
Source: NH WISDOM, BRFSS

Figure 5. Barriers to Colonoscopy, GNPHR, 2014



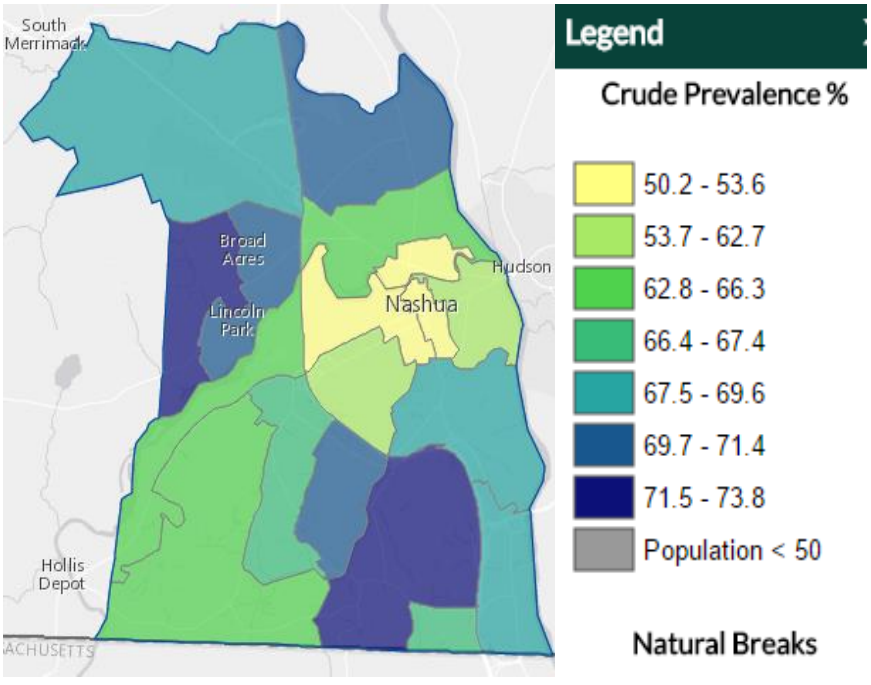
Source: NH WISDOM, BRFSS

Figure 6. Up to date on Colorectal Cancer Screening (Ages 50-75), GNPHR, 2015



Source: NH BRFSS (= data not available)*

Figure 7. Model-based Estimates for Fecal Occult Blood Test, Sigmoidoscopy, or Colonoscopy among Adults 50-75 years, Nashua, 2014

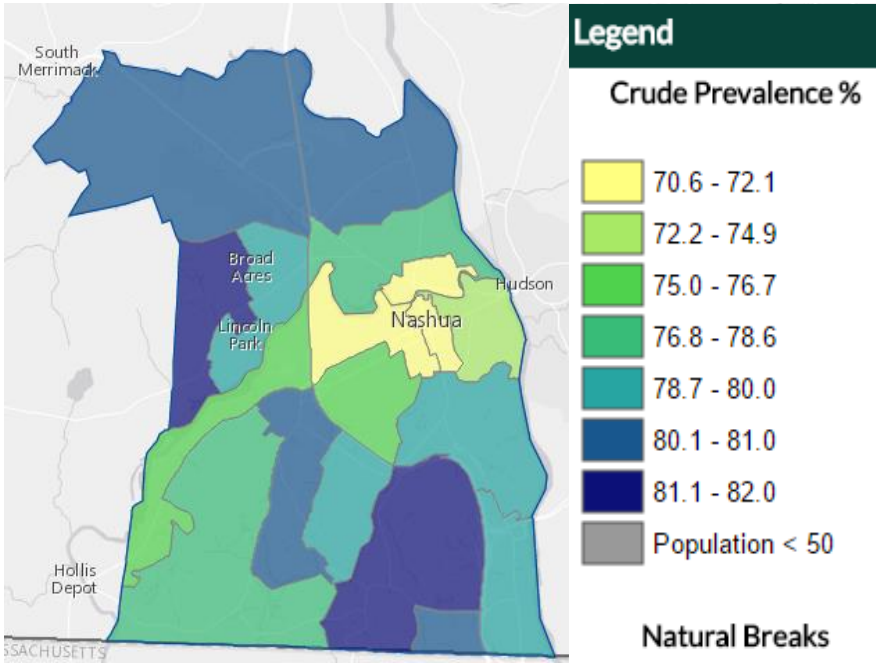


Source: Esri, HERE; CDC/NCCDPHP/DPH

Breast Cancer and Cancer Screening

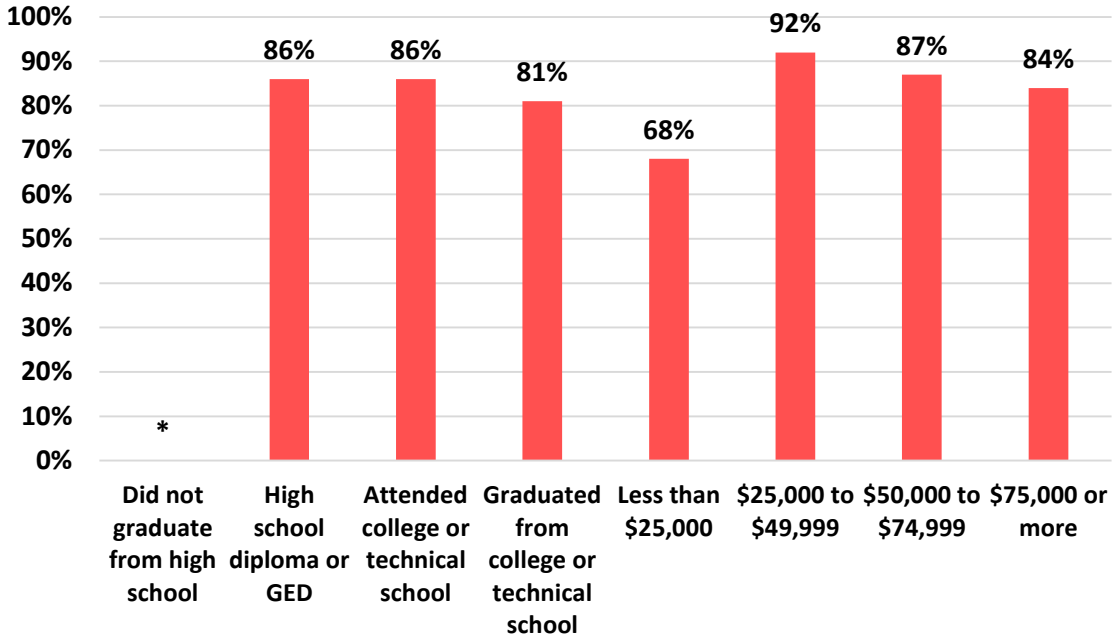
Breast cancer incidence in the GNPHR and Nashua has remained steady since 2000 and breast cancer mortality has steadily decreased since 2000. The age-adjusted mortality rate in 2015 in the GNPHR was 14 per 100,000 (8.6-21.9) and in Nashua it was 13.1 per 100,000 (CI 5.2-27).[4] The Healthy People 2020 goal is to decrease to 20.7 per 100,000 which the region and city meet.[7] The goal for mammograms in the NH State Health Improvement Plan is to increase screening from 80% to 84% by 2020 and the Healthy People 2020 goal is to increase to 81%. Nashua comes close to meeting the NH SHIP with 83% (CI 76.7-90.3) of women over 50 years of age screened but the GNPHR has not met this goal with 80% (CI 74-86.8) screened.[4] When you look at the City of Nashua by census tract, the census tracts with higher rates of poverty and increases social vulnerability have lower rates of mammography at ~70% (Figure 8).[8] Women with an income less than $25,000 have the lowest screening rate at 68% (Figure 9).[4]

Figure 8. Model-based Estimated for Mammography Use Among Women Aged 50-74 years, Nashua, 2014



Source: Esri, HERE; CDC/NCCDPHP/DPH

Figure 9. Had a Mammogram within the Past Two Years, GNPHR, 2015

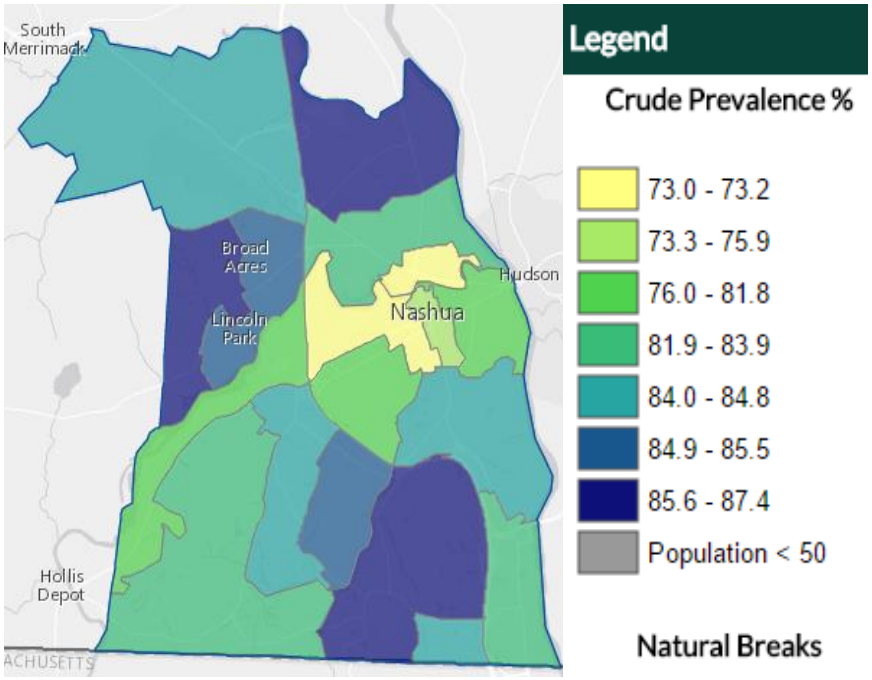


In a white paper from the New Hampshire Comprehensive Cancer Collaboration Equity Task Force, occupations with the lowest mammography screenings include Arts/Entertainment/Rec (48%), food service (39%) and retail (31%).[5] Similar to colorectal cancer screening, individuals with limited education have a lower screening rate.[6] The New Hampshire Breast and Cervical Cancer Program is available to income eligible women aged 21 to 64 years to get free breast cancer screenings. Over 29,000 women have been screened in this program since 1997.[4]

Cervical Cancer and Cancer Screening

About 70% of cervical cancers are caused by the human papillomavirus (HPV)[4] and use of the HPV vaccine is the best prevention method. However, HPV vaccine coverage is low with about 42% of adolescent girls completing the series in the United States. Screening using the Pap test can prevent cervical cancer by identifying precancerous lesions and it is recommended to combine the Pap test with an HPV test to identify women at risk for cervical cancer that can be missed by Pap tests. [1] In Nashua, similar to mammography, women in census tracts with higher poverty have lower pap smear use at about 73% compared to other census tracts that are over 85% (Figure 10).[8]

Figure 10. Model-based Estimates for Papanicolaou Smear Use among Women 21-65 years, Nashua, 2014



Source: Esri, HERE; CDC/NCCDPHP/DPH

Moving Forward

In March 2017, healthcare partners and local organizations met at St. Joseph Hospital to discuss current efforts in the region relating to cancer prevention. As part of this meeting, the group discussed the greatest needs and priorities for cancer prevention in the region and tobacco prevention and cessation was ranked as the greatest need. Currently, there are efforts in tobacco prevention and cessation but with the low screening rates for lung cancer and high mortality rate for lung cancer, the group felt more could be done in this arena. Other topics focused on increasing HPV vaccination rates, health literacy and education and increasing colorectal cancer screening. As organizations move forward with cancer prevention efforts, breaking down silos and working collaboratively in the community will be important to making a dent in cancer in the GNPHR.

"Women of all ages should listen to their bodies. If something is not quite right, don't dismiss it. Tell your doctor."

Janet K., Ovarian Cancer Survivor

Source: CDC

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Climate Change & Health

"For the sake of our children and our future, we must do more to combat climate change."
-Barack Obama

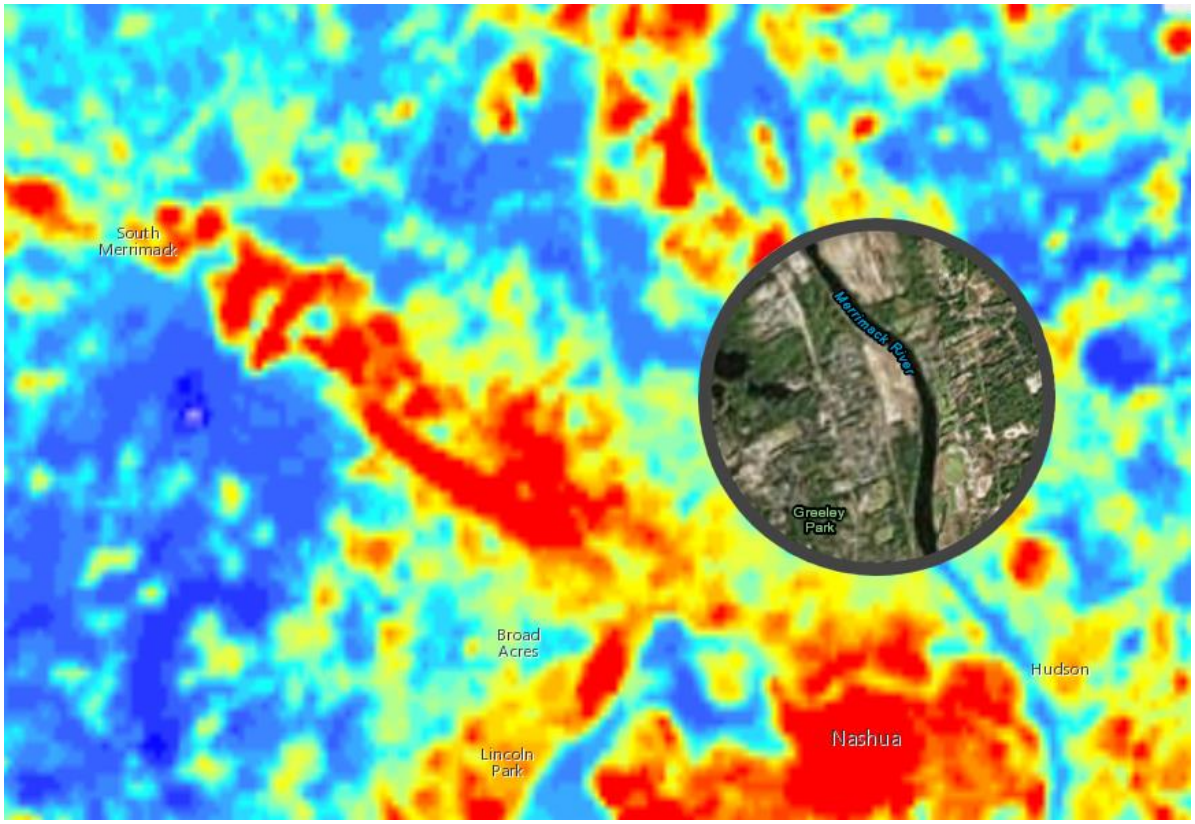
A Climate and Health Adaptation Plan for the Greater Nashua Region

Prepared by the Nashua Regional Planning Commission

May 2017

HOT TOPIC

A Climate and Health Adaptation Plan for the Greater Nashua Region



Prepared by: Nashua Regional Planning Commission

May 2017

NRPC

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Executive Summary

The Greater Nashua Region is a great place for people to work, live, and recreate in every season throughout the year. With a diverse population and landscape, thousands of people have made this region their home; they stroll around their neighborhoods, hike along trails, and play sports. However, changes in our region's climate may have a severe impact on the health and quality of life of many of the region's residents.

This project, designed to examine the impact climate has on health, was initiated by the Greater Nashua Regional Public Health Network; it is one portion of a multi-part effort to advance Public Health Initiatives funded by the Centers for Disease Control through a competitive grant program administered and supported by the NH Department of Health and Human Services Division of Public Health Services. The ultimate goal of the project is to create a region that is more aware of and resilient to the regional impacts of a changing climate. This Plan was modeled after similar projects done by the Upper Valley Lake Sunapee Regional Planning Commission and by the Lakes Region Partnership for Public Health (with assistance from the Lakes Region Planning Commission).

A robust review of available data sources, including local and regional hazard mitigation plans, climate reports, and social vulnerability studies were used to determine major weather hazards and the associated vulnerable populations. This information was then presented at work sessions with the Public Health Advisory Council (PHAC), emergency responders, health and welfare officers, and professional planners. Through their input, the severe weather risks, (including extreme temperature, air quality, extreme precipitation, and vector habitat) were prioritized based on where the most impact could be made.

Heat-related illness was identified as the primary health impact affecting the region, because of the anticipated increase of number of days with a heat index above 90˚F, particularly in the more urban areas of the region. This plan identifies and prioritizes opportunities to mitigate the effects of extreme heat. The anticipated outcome is a reduction in Emergency Department visits and associated cost savings and improved health.

The second phase of this grant-funded process is to begin implementation of the prioritized goals, objectives, and strategies. These actions are primarily short-term in length in order for them to be achievable within the constraints of available resources, as well as being able to measure their success. Medium and long term actions are also included in this plan, but will require further funding in order to complete.

Acknowledgements

This plan is the product of strong regional and statewide collaboration. Particular thanks are owed to the following organizations and individuals:

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- Bobbie Bagley, Director of Public Health and Community Services at City of Nashua
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- Justin Kates, Director of Emergency Management at City of Nashua
- Kelly Neugent, Research Assistant at NH DHHS
- Alice Ely, Public Health Council of the Upper Valley, Mascoma Vallley Health Initiative (MVHI)
- Sophia Japhet, Environmental Health Specialist at the City of Manchester Health Department

Partner Organizations assisting throughout the process include:

- Greater Nashua Public Health Advisory Council
- Nashua Local Emergency Planning Committee
- Planners in the Municipalities throughout the Nashua Region
- NH Climate and Health Working group
- Upper Valley Lake Sunapee Regional Planning Commission
- The Lakes Region Partnership for Public Health

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Introduction

Be it the rising temperatures, increased storm events or fewer snow-covered days, it is evident that the climate in New Hampshire is changing. The trend of warmer and wetter weather will impact the plants, animals, people, and landscape of the Granite State. With such wide-sweeping effects, there are health implications for many residents of the Nashua Region, putting additional stress on the finances and resources of health care providers and emergency responders.

To assess and reduce the public health effects from severe weather events resulting from a changing climate in the Nashua Region, the Nashua Regional Planning Commission (NRPC) partnered with the Greater Nashua Regional Public Health Network (GNRPHN). Using the CDC Building Resilience Against Climate Effects (BRACE) framework to create this Climate Change and Health Adaptation Plan allows health officials to develop strategies and programs to prepare for the health effects of climate change. By targeting vulnerable populations, this plan seeks to mitigate health impacts exacerbated by extreme weather events related to a changing climate.

The goals of the Plan are to:

- Identify weather hazards that will likely be exacerbated by climate change
- Evaluate various sources of data to project the impact that climate change will have on weather events and health
- List the priority climate and health impacts, and vulnerable populations related to weather and climate for the region
- Determine the highest priority climate and health topic area
- Identify any gaps in current preparedness resources within local, regional, and state plans
- Identify intervention strategies with baseline measures and targets to improve the resilience of vulnerable areas and populations
- Develop a tool kit for public health professionals to further promote the goals and strategies of this plan

Plan Process

The Building Resilience Against Climate Effects (BRACE) framework is a five-step process that allows health officials to develop strategies and programs to help communities prepare for the health effects of climate change. Part of this effort involves incorporating complex atmospheric data and both short and long range climate projections into public health planning and response activities. Combining atmospheric data and projections with epidemiologic analysis allows health officials to more effectively anticipate, prepare for, and respond to a range of climate sensitive health impacts:[i]

1. Anticipate Climate Impacts and Assess Vulnerabilities

2. Project the Disease Burden
3. Assess Public Health Interventions
4. Develop and Implement a Climate and Health Adaptation Plan
5. Evaluate Impact and Improve Quality of Activities

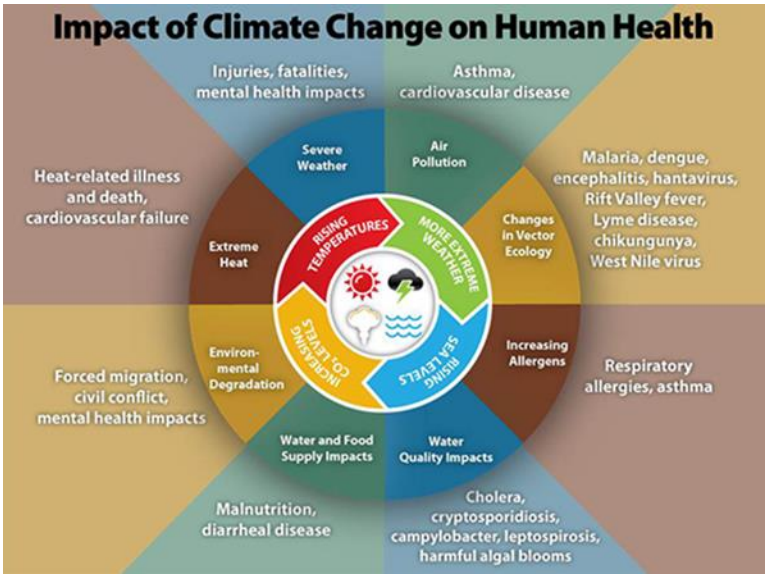


Figure 1: Climate change can impact human health in myriad ways. Source: U.S. Center for Disease Control and Prevention

NRPC applied the BRACE framework in order to complete this plan. The first step was to identify all potential relevant hazards due to severe weather and climate change by reviewing local hazard mitigation plans, emergency operation plans, the Regional Community Health Assessment and Improvement Plan, and the Regional Water Resiliency Planning effort. DHHS provided trainings to help staff plan, assess climate-related vulnerabilities, measure climate-related preparedness, and implement the BRACE framework. Through facilitated work sessions with the Public Health Advisory Council (PHAC), emergency responders, health and welfare officers, and professional planners, hazards were prioritized. By focusing on the most impactful extreme weather related exposure and related health outcomes, and the associated vulnerable populations, this Plan will help to implement one intervention strategy appropriate to the local communities and populations.

Regional Assessment

Geography

With over 200,000 residents, the Greater Nashua region comprises 13 communities in the southern half of Hillsborough County. Embodying both the second largest city in New Hampshire as well a number of rural communities, the Nashua Region is perhaps best characterized by the diversity of its landscapes. Situated among the foothills of the Merrimack River Valley, the geography of the region varies from higher elevation forestland in the west to low-lying riverbeds in the east.

Much of the Region's history has been defined by its industrial past, with many mills and the associated housing being constructed along the Merrimack, Nashua, and Souhegan Rivers. Housing development trends have left many of these historic homes intact, while leaving large swaths of forests preserved in outlying communities.

Based on 2010 U.S. Census, 61% of the region's housing stock is single-family, and there is at least some multi-family development across most of the region. However, in terms of overall numbers, Nashua has 72%, or almost three quarters, of the regions multi-family housing units. The greatest diversity of housing options or largest share of multifamily housing as a proportion of all housing choices are found in Nashua (38%), Milford (29%), Merrimack (11%), and Hudson and Wilton (9% each).

Like all other structures, housing units have a useful life. As a rule of thumb, housing units that are more than 60 years old are viewed as being those most likely to be in substandard condition. Due to these factors the proportion of housing units built prior to 1950 is an indicator of housing stock condition. A large percentage of older units are found in two types of situations within the region: rural communities with relatively slow growth rates and the older town and city centers that developed in the early years of the 20th century.

Within the region, communities that have experienced relatively less growth have the greatest percentage of older homes built before 1950, including, Wilton (42%), Lyndeborough (28%), Nashua (24%), and Mont Vernon (23%). The typical pattern is that the older stock is more often available for rent. Center of Nashua has the highest percentage of units built prior to 1950 as well as those built during the 1950s. In Census Tract 105 within Downtown Nashua, 80% of the housing stock was built before 1950.The newer, formerly rapidly developing suburbs of Litchfield and Hudson had some of the lowest percentages of older units, with median year built after 1985. The Town of Brookline had the most recent year for median age of 1989 for owner occupied units. Furthermore, while slightly more than a quarter of the region's housing stock is rental units, the majority of those are located within the City of Nashua, the center of Milford, and along Route 3 in Merrimack.

Demographics

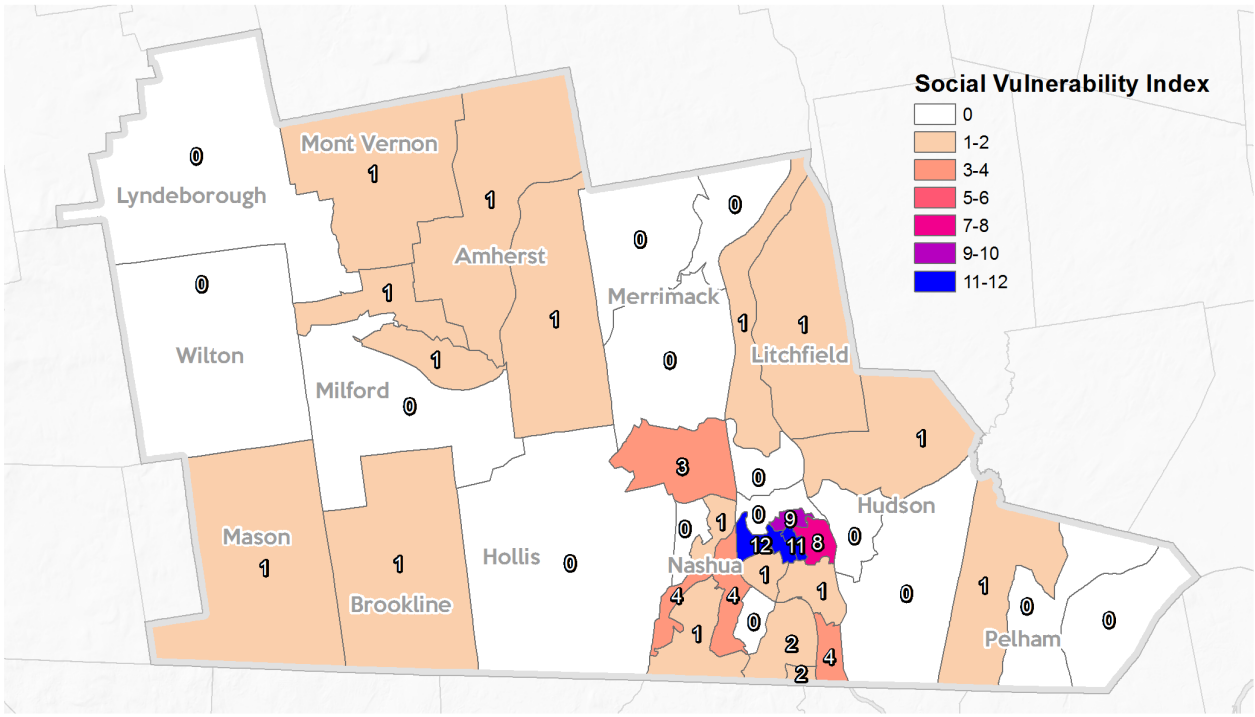


Figure 2: Map of the Nashua Region showing areas with the most vulnerable populations to external stressors Map source: NRPC. Data source New Hampshire Health and Human Services (NHHS) SVI (http://nhvieww.maps.arcgis.com/apps/PublicGallery/index.html?appid=38764e6f2a894165a60dd5c983543221) based on 2010-2014 American Community Survey estimates.

The people that make up the Nashua Region are just as diverse as its landscape. Figure 2 is a map that depicts the NH social vulnerability index within the Region. By compiling 16 factors at the Census Tract level related to socioeconomic status, household profiles, disabilities, minority, and non-English speaking populations, and limited transportation options, this map shows areas of communities most vulnerable to external stressors such as floods, forest fires, power outages and winter storms. While the majority of the communities within the region have low vulnerabilities, Nashua, especially within the downtown area shown in blue, has high scores of vulnerability factors.

Although the region is predominantly Caucasian, Nashua specifically has a high percentage of minorities relative to the rest of the region, including significant populations of people who identify as African-American, Indian-American or Latino. According to the 2006-2010 American Community Survey, the three communities in the Nashua region with the highest percentages of families living below the poverty level are Mason (7.2%, or 28 out of 387 families), Nashua (5.3%, or 1,165 out of 21,965 families) and Lyndeborough (5%, or 21 out of 417 families).

Regionally, 1.8% of the population does not speak English at all or cannot speak it well. Residents 65 and older have the highest rates of individuals with limited English proficiency at 2.4%. About 2% of those aged 18-64 have limited proficiency, and just over 1% of 5-17 year olds are limited. The majority of those who

are not proficient in English speak Spanish as their native language; European languages are the next most common.

Across the Nashua region, 6.2% of residents live below the poverty level, 6.9% of all families with children and 5.9% of all elderly are living in poverty. The portion of residents who are Black or African American living below the poverty line is 18.4%, second to Hispanics or Latinos who rank highest in the region at 22.6%.

An important issue facing the region is the significant increase of those 65 and older as a percent of total population. Population projections (Figure 3) indicate that the age 65 and over cohort, which is currently about 12 percent of the region's population, will double by 2040 to about 25% or an increase of approximately 31,100 vulnerable people in the region.

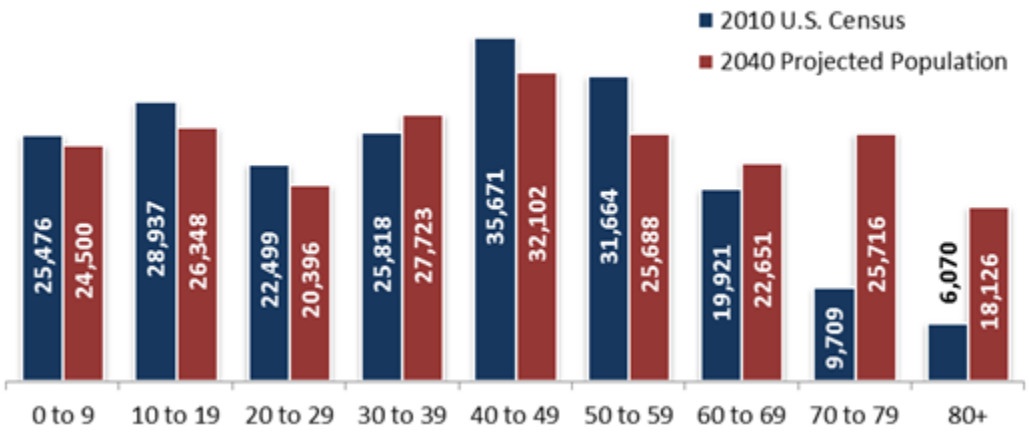


Figure 3: Population by Age – 2010-2040 Comparison. Image Source: NRPC. Data source: 2010 U.S. Census.

Weather Hazards and Climate Risk

Current and projected effects of climate change are well documented, and are described in the section below. While the scope of the studies have ranged from the United States to New England and even areas within New Hampshire, the consensus is that southern New Hampshire is getting warmer and wetter. These impacts are being felt by municipal workers, healthcare employees, and most importantly, the residents in the region.

Based upon an analysis of climate change-focused reports, community health assessments, and hazard mitigation plans within the region, this plan will assess four weather-related health impacts of climate change:

Extreme Heat

One of the consequences of the greenhouse effect (i.e. emitting carbon dioxide & other gases into the atmosphere) is the global rise in temperatures. In southern New Hampshire, overall temperatures have been steadily rising, with a marked increase since the 1970s.

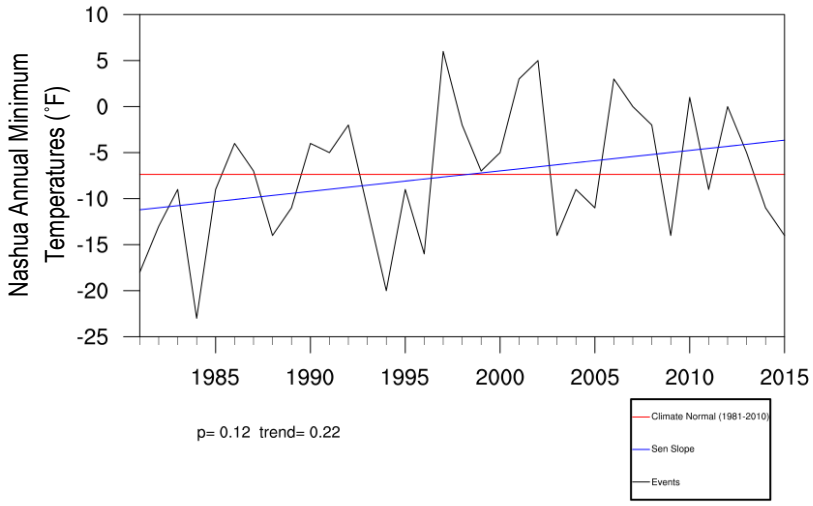
Taken from Cameron Wake's *Climate Change in Southern New Hampshire*, Table 1 details historical and projected temperature data from the Global Historical Climatology Network-Daily (GHCN-Daily) meteorological station in North Nashua. The data clearly demonstrate there is a projected increase in the number of days that are above 90˚F and 95˚F. Historically, through 2009, Nashua usually experiences about 9 days that are above 90˚F. In 2016 Nashua experienced 19 days with temperatures above 90˚F. Summers similar to 2016 could become the norm according to modeled predictions. For example under low carbon emission scenarios in the long-term through 2070 modeled predictions suggest 19 days above 90˚F will be normal.[ii]

Nashua (2), New Hampshire

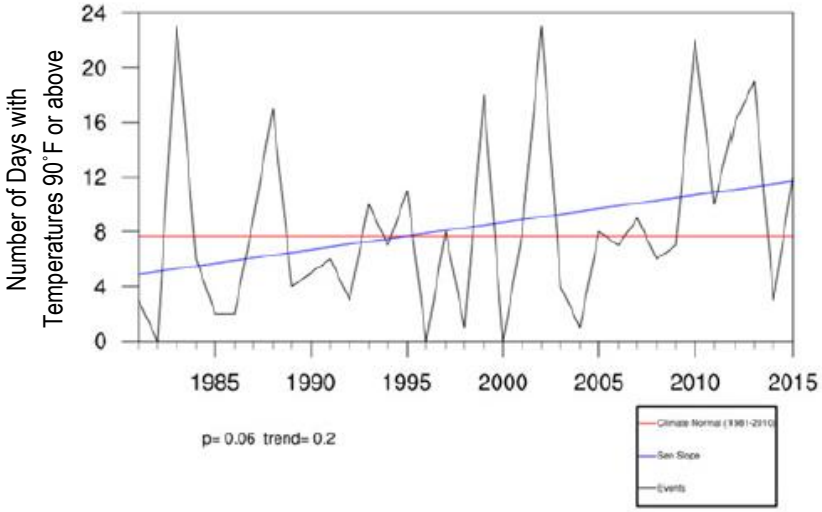
Indicators	Historical* 1980–2009	Change from historical (+ or -)					
		Short Term 2010–2039		Medium Term 2040–2069		Long Term 2070–2099	
		Low Emissions	High Emissions	Low Emissions	High Emissions	Low Emissions	High Emissions
Minimum Temperature (°F)							
Annual TMIN	36.2	1.7	1.9	2.8	5.0	3.6	8.6
Winter TMIN	15.3	2.1	2.3	3.4	5.1	4.6	8.5
Spring TMIN	33.8	2.8	1.5	4.4	4.1	5.6	7.2
Summer TMIN	56.5	1.6	2.1	2.8	5.7	3.5	10.4
Fall TMIN	38.7	0.3	1.7	0.6	5.1	1.0	8.5
Maximum Temperature (°F)							
Annual TMAX	59.0	1.7	1.7	3.0	4.8	4.0	8.2
Winter TMAX	36.0	1.7	1.5	2.5	3.5	3.6	6.1
Spring TMAX	57.1	2.6	1.6	5.0	4.8	6.7	8.8
Summer TMAX	80.8	1.7	2.1	3.3	5.8	4.2	9.6
Fall TMAX	61.6	0.9	1.6	1.3	5.3	1.5	8.5
Temperature Extreme (days per year)							
<32°F	157	-10	-11	-16	-25	-19	-43
<0°F	10	-4	-4	-6	-7	-7	-10
>90°F	9	5	7	14	26	19	54
>95°F	1	1	2	4	10	7	29
TMAX on hottest day of year	94.2	1.7	1.3	2.8	4.3	4.4	7.9
TMIN on coldest day of year	-11.9	3.8	4.3	6.1	9.7	7.7	16.4

Table 1: Climate projections for heat-related indicators analyzed from historical trends in North Nashua. Source: Climate Change in Southern New Hampshire, 2014.

Another important way to see how climate change is changing exposure to extreme heat is by looking at the maximum temperature recorded during each season. In an analysis conducted by Plymouth State graduate student Kelly Neugent (publication of final report forthcoming),[iii] climate trends are normalized from 1981 to 2010, to show that there is an overall increase in the number of days each year where the temperature reaches 90˚F or above in the Nashua area. A similar analysis was also done of temperature minimums trends in the same timeframe, which indicates that there is also a slight increase in the annual minimum temperature since 1980 (Figure 4).



Temperature Minimums: In the chart on the left, the red line shows the climate normal from 1981-2010, overlaid with the annual temperature minimums in black. The blue Sen Slope shows a positive trend, demonstrating an increase in minimum temperature in Nashua.



Number of Days with Temperatures 90˚F or above: In the chart on the left, the red line shows the average number of days 90˚F or above from 1981-2010, overlaid with the annual count of days 90˚F or above. The blue Sen Slope shows a positive trend, demonstrating an increase in the number of extreme heat days in Nashua.

Figure 4: In a study conducted using data in Nashua, climatological trends suggest the minimum temperature and the number of days 90F or above are both increasing. Source: Presentation by Kelly Neugent, 2016. Source: Neugent, 2016.

Geographic variations also play an important role in the effect of heat on human health. Urban areas tend to have warmer temperatures than their rural counterparts due to greater levels of impervious surface and less tree cover. This phenomenon is called the heat island effect, and is more likely to be found in Nashua and more developed parts of the region rather than towns like Mason or Lyndeborough.

Figure 5 is a geographic analysis of the Nashua Region's heat islands. This remote sensing map shows land surface temperature as detected by the LandSat8 OLI_TIRS sensor on August 30, 2016 at approximately 10:30 am. Thermal bands 10 and 11 wavelengths were averaged, converted to satellite temperatures, and then adjusted according to land surface emissivity as estimated from proportion of vegetated land cover. An interactive version of this map can be found at: http://arcg.is/2eFGq7m.

From this map, it is clear that the heat islands exist within central and south Nashua and extend northward into Merrimack along the F.E. Everett Turnpike Corridor and westward into Merrimack, Amherst, Milford, and Wilton along the NH101A Corridor. Small pockets also exist in Hudson, Pelham, and Litchfield.

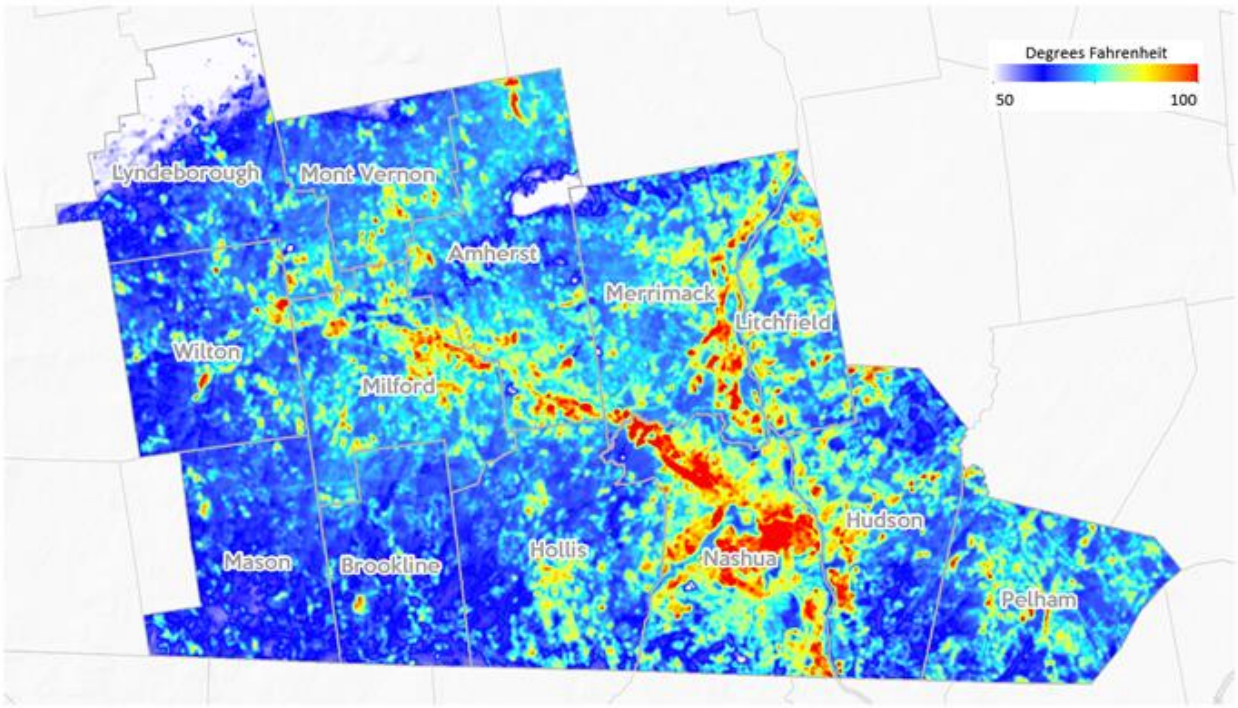


Figure 5: Urban heat islands, NRPC Region. Map Source: NPRC. Data source: LandSat8.

Air Quality

The air quality of southern New Hampshire may also be affected by climate change. As evidenced in Table 2, growing seasons are expected to be extended. This phenomenon may be due to overall temperature increases. In the short-term scenario, there is expected to be 14 additional days added to the historic 168 day growing season. In the long term, this could extend from 21 to 48 days, depending on the level of carbon emissions emitted over the next 50 years. The extended growing season means that greater amounts of pollen will be released into the air over longer periods of time[iv].

Nashua (2), New Hampshire

Indicators	Historical* 1980–2009	Change from historical (+ or -)					
		Short Term 2010–2039		Medium Term 2040–2069		Long Term 2070–2099	
		Low Emissions	High Emissions	Low Emissions	High Emissions	Low Emissions	High Emissions
Growing Season (days)	168	14	14	18	29	21	48

Table 2: Climate projections for air quality indicators analyzed from historical trends in North Nashua. Source: Climate Change in Southern New Hampshire, 2014.

Another potential by-product of a warmer climate is reduced air quality due to ground level ozone. Ground level ozone formation occurs when nitrogen oxides (NOx), carbon monoxide (CO) and volatile organic compounds (VOCs), react in the atmosphere in the presence of sunlight. Higher temperatures enhance the ozone formation chemistry and increase the evaporative emissions of volatile organic compounds. With more days expected to exceed 90˚F, increases in the number of days where ground level ozone exceeds EPA standards are probable. In addition to the local formation of ground level ozone, ozone that forms in neighboring metropolitan areas can be transported into the Nashua region under certain atmospheric conditions. In Nashua, temperatures in excess of 90˚F occur most often when a ridge of high pressure builds off the east coast resulting in a light southwesterly wind. This wind direction generally results in warm humid conditions and transport ozone formed in the large metropolitan areas to the south and west.

Table 3: Ozone and Particulate Matter in Hillsborough County

Year	Number of 8-Hour Ozone Exceedance Days in Hillsborough County	Number of 24-Hour PM2.5 Exceedance Days in Hillsborough County
2000	2	
2001	13	
2002	16	2
2003	8	2
2004	5	1
2005	10	1
2006	5	1
2007	14	1
2008	5	
2009		
2010	4	
2011	1	
2012	3	
2013		

Note: Blank cells may indicate either zero exceedances or lack of monitoring data from that county.

Source New Hampshire Department Of Environmental Services

Table 4 compares Hillsborough County ozone and particulate matter to the rest of the state from 2000-2013. Hillsborough County is consistent with the number of state wide exceedance days. There were 16 exceedance days in 2002, the highest of the 13 year data period. The statewide average and Hillsborough County was the highest from 2001-2007 and has declined since. The decrease is largely due to improved motor vehicle technology and reduced tailpipe emissions combined with a number of cooler summers.

Extreme Precipitation

The Nashua region is not unfamiliar with major storm events hitting its region with subsequent flooding and infrastructure damage. The Federal Emergency Management Agency (FEMA) has declared disasters in Hillsborough County during Hurricane Bob (1991) and Hurricane Irene (2011) due to intense flooding. One of the most significant floods in recent memory was the Mother's Day Flood (2006), where portions of the Merrimack River were 10 feet above the flood stage.[v]

Figure 6: Evidence of drought in Purgatory Brook in Lyndeborough in Fall 2016. Source: NRPC

One possible reason for the increase in precipitation events is that the atmosphere can hold more water as it warms, which in turn results in heavier rain events. There are two measures of extreme precipitation: when 1" of rain falls in 24 hours or when 2" falls in 48 hours. Historically, Nashua has had approximately 12 events where 1" of rain fell in 24 hours, and 5 of the more severe 2" in 48 hours. Projections suggest that these events will increase by 1.5 events within the short– and medium-term (Table 4). By 2100, the number of extreme precipitation events in the summertime could increase by more than 200% across New Hampshire, according to a study by Prein et al. The study also found that the intensity of summertime extreme rainfall events could increase up to 70% in the Northeast.[vi]

Nashua (2), New Hampshire

Indicators	Historical* 1980–2009	Change from historical (+ or -)					
		Short Term 2010–2039		Medium Term 2040–2069		Long Term 2070–2099	
		Low Emissions	High Emissions	Low Emissions	High Emissions	Low Emissions	High Emissions
Precipitation (inches)							
Annual mean	46.3	4.3	3.3	4.3	4.9	6.9	7.3
Winter mean	10.8	1.3	0.9	1.6	1.2	2.2	2.8
Spring mean	12.2	0.6	1.1	0.4	1.3	1.2	1.9
Summer mean	11.2	1.8	1.1	1.2	2.1	2.0	2.1
Fall mean	12.2	0.5	0.2	1.1	0.2	1.3	0.4
Extreme Precipitation (events per year)							
1" in 24 hrs	12.3	1.5	1.5	1.5	2.3	2.4	3.4
2" in 48 hours	5.4	1.5	0.9	1.5	1.7	2.7	3.6
Extreme Precipitation (events per decade)							
4" in 48 hours	5.3	1.6	-0.1	4.5	3.0	6.0	6.4
Snow-Covered Days	77	-14	-15	-19	-34	-27	-45

Table 4: Climate projections for extreme precipitation indicators analyzed from historical trends in North Nashua. Source: Climate Change in Southern New Hampshire, 2014.

Paradoxically, the National Center for Atmospheric Research (NCAR) study also found that extreme precipitation events are also associated with drought events. This is because, as extreme precipitation events are expected to increase in frequency and intensity, summertime light to moderate rainfall events are projected to drastically decrease. As a result, it will be possible to have below normal rainfall despite an increase in extreme flooding events. In other words, when it rains, it pours.

Since 2013 New Hampshire has experienced drier than normal conditions and entered into a period of severe to extreme drought. Previously, the most recent drought for New Hampshire was in 2002. Southern New Hampshire has been classified as being in a state of extreme drought from June to November 2016. The region has a deficit of 13.86 inches of rainfall since April, equivalent to 58% of the normal amount.[vii]

Vector Habitat

The combination of the rising temperatures and increased moisture will have a dramatic effect on the landscape, impacting many different types of environments. Habitat change can be one of the main drivers of insect population patterns, who are transmitters of vector borne illness like Lyme, Eastern equine encephalitis (EEE), and West Nile virus. Two of the most prominent vectors in the region are ticks and mosquitos.

As described in Table 5, the number of snow-covered days is estimated to be reduced by 14 days in the short term (by 2039) and further reduced to between 27 and 45 days by 2099, which will also contribute to the pervasiveness of insects. Since, ticks are active any time the temperature is above 40˚F and there is not dense snow cover,[viii] the reduction in number of days with snow cover will increase the period when

these vectors are active. Later frost and freeze dates can also extend the mosquito season. All of this results in increased exposure to these insects and vector-borne illness.

Furthermore, mice are one of the major hosts for ticks. Mice populations tend to thrive in fragmented forests, which have fewer natural predators, such as foxes. Due to a climb in mice populations in the summer of 2016, experts predict that the number of Lyme disease cases will increase in 2017.[ix]

Nashua (2), New Hampshire

Indicators	Historical* 1980–2009	Change from historical (+ or -)					
		Short Term 2010–2039		Medium Term 2040–2069		Long Term 2070–2099	
		Low Emissions	High Emissions	Low Emissions	High Emissions	Low Emissions	High Emissions
Growing Season (days)	168	14	14	18	29	21	48
Snow-Covered Days	77	-14	-15	-19	-34	-27	-45

Table 5: Climate projections for habitat change indicators analyzed from historical trends in North Nashua. Source: Climate Change in Southern New Hampshire, 2014.

Regional Health Risks and Vulnerable Populations

It is evident that climate change will have wide-reaching effects on the weather and vector habitats. But it is also important to consider how these effects will impact human health. While the following health risks are related to the weather hazards described above, impacts on mental health (i.e. stress, anxiety) cross-cut all of these health risks.

Heat-related Illness

Prolonged exposure to high temperatures can impact people's health in a variety of ways. The health impacts of heat illness ranges from mild (e.g., heat rash, cramps, and fatigue) to moderate (e.g., heat syncope and heat exhaustion) to life-threatening (e.g., heat stroke).[x] Further, heat illness can also exacerbate pre-existing medical conditions. People living with diabetes may have damaged blood vessels or nerves, which can affect sweat glands, thus diminishing the body's capacity to cool.[xi] Recurrent physical activity in high temperature situations coupled with poor hydration can also lead to kidney damage.

A study in California[xii] found that for every 10˚F increase above the mean ambient temperature, there was a 393% increase in hospitalization for heat exposure, a 3% increase in ischemic stroke hospitalizations, and a 15% increase in acute renal failure hospitalizations. This finding is supported by a national study that also found a strong correlation between an increase in emergency room visit rates and temperature anomalies.[xiii]

It is important to note that the maximum temperature during the day has a major impact on health, but it is also vital to consider the minimum temperature of that day. If the temperature does not fall below the upper 70s and 80s˚F during the night, people (who may not live in well insulated homes or lack air conditioning) may not be able to cool down and may succumb to the stresses of heat. The most extreme example of this phenomenon was a five day period in Chicago in 1995 where the temperature did not fall below 76˚F at night and rose up to 106˚F during the day, resulting in the death of over 700 people.[xiv]

Another example closer to home is the Heatwave of 1911. In early July, temperatures topped 100˚F, with overnight highs in the 80s. The historic date of July 4, 1911 is considered one of the hottest days in New England, with Nashua holding the state record at 106˚F (Figure 7). Over 1,000 people died throughout New England and New York City during this event.

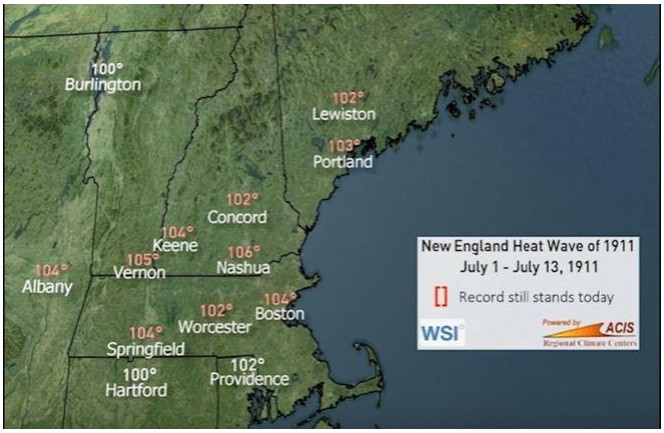


Figure 7: Temperature maximums during the Heatwave of 1911.Source: Weather Services International, NOAA Regional Climate Centers.

Furthermore, heat's effect on health is not confined solely to the day with high temperatures. Preliminary findings from research conducted by Kathleen Bush at DHHS found that on a day when the maximum heat index (the combination of temperature and humidity) was 95˚F (compared to 75˚F) all-cause emergency department (ED) visits increased by 7.5% over the following 7 days, heat-related ED visits increased by ~200% over the following 7 days, and deaths increased by 5.1% over the following 7 days. This study is due to be published in Spring 2017, and findings are available via NH DHHS.

There is evidence to support a correlation between the intensity of the heat index and emergency department visits. Table 6 shows that Nashua has approximately 334 heat-related emergency room visits annually at a heat index of 90˚F. However, National Weather Service (NWS) heat advisories only go out when the Heat Index is between 100˚F and 104˚F for a two hour period, at which point it is estimated that hundreds of people have already suffered a heat-related illness at 90˚F and 95˚F and go to the emergency department. A new NWS policy will issue an Excessive Heat Advisory when the Heat Index is 95˚F and above for two or more days or greater than 99˚F for one or more days.

	Annual ED Visits by Heat Index Category (2001-2010)

Study Area	*90˚F*	*95 ˚F*	*100 ˚F*	*Total*
Concord	121	50	13	121
Keene	45	14	4	45
Laconia	69	25	7	69
Lebanon	29	11	3	29
Manchester	251	95	27	251
*Nashua	334	167	68	334
Portsmouth	146	70	20	146
Total	994	432	143	994

Table 6: Estimated Annual Emergency Department Impacts at HI > 90˚F. Note that the emergency room visits at 95 ˚F and 100 ˚F represent a portion of the totals represented in the previous column. Source: Bush, NH DHHS, Environmental Public Health Tracking Program & Cahillane, NH DHHS, Climate and Health Program, 2016

Heat-related illnesses are not only a cost to human health, but also a financial cost. One study[xv] found that the adjusted mean cost of heat-related illnesses was $5,539 per hospitalization. However, the study also concluded that costs for heat-related hospitalizations were higher for minority populations, low-income populations and the elderly. Human health is not the only cost associated with heat-related illnesses.

Vulnerable Populations

The elderly and very young are usually considered the most at risk for heat-related illnesses. Also, there is evidence to support that people in the Northeast are not conditioned to experience such high temperatures, unlike people in warmer climates, therefore residents of southern New Hampshire are less likely to alter their behavior to cope, or know the symptoms of when they should seek a cooling center or medical care.

Furthermore, as Figure 5 showed the Nashua region also has many urban heat islands in parts of Nashua (especially the Tree Streets and French Hill neighborhoods), Merrimack, Milford, and downtown Wilton that contain an older, denser housing stock. These areas typically have fewer green spaces and more blacktop resulting in the “heat island effect”. Income level is also an issue to be considered within these regions because the populations within these heat islands may not be able to afford upgrades to their house, an air conditioner, or the expense to run the air conditioner.

NRPC created a simplified heat-specific vulnerability index (Figure 8) to describe areas in the region that maybe contain populations susceptible to the effects of heat stress. The approach is based on a modification of a publicized study that concluded on the national level, heat vulnerability is most strongly influenced by educational attainment, poverty, race, proximity to green space, social isolation, availability of air conditioning, and elderly/diabetes status.[xvi]

The modified NRPC Heat Vulnerability Index considered the following block-group level variables obtained from the American Community Survey 5-year estimates (2011-2015):

- Population living below poverty level
- Age 25+ without a high school diploma
- Black or African American race
- Age 65+ living alone
- Pre-1970 housing as a proxy for lack of central Air Conditioning

Black or African American populations were included as the only racial variable in this heat index because several heatwave studies in the United States have shown that they are particularly vulnerable compared to other racial and ethnic demographics.[xvii]

Additionally, the amount of impervious surface was captured from the 2011 National Land Cover database and aggregated by the same block-group geography.

The range of values in the NRPC region for each of these six measures was then divided up into five classes based on Natural Breaks (Jenks) classification. Block groups were then assigned sub-scores between 1 and 5 for each of these six measures, and then a cumulative Heat Vulnerability Index score from the summation of each of the 6 sub-scores. That is to say, no one measure was weighted more heavily than the others in this analysis.

The NRPC Heat Vulnerability Index ranged from between 6 and 27 inclusive. Mapping of the values shows that the most vulnerable populations exist in central Nashua, with medium at risk populations in eastern Merrimack and Milford Center.

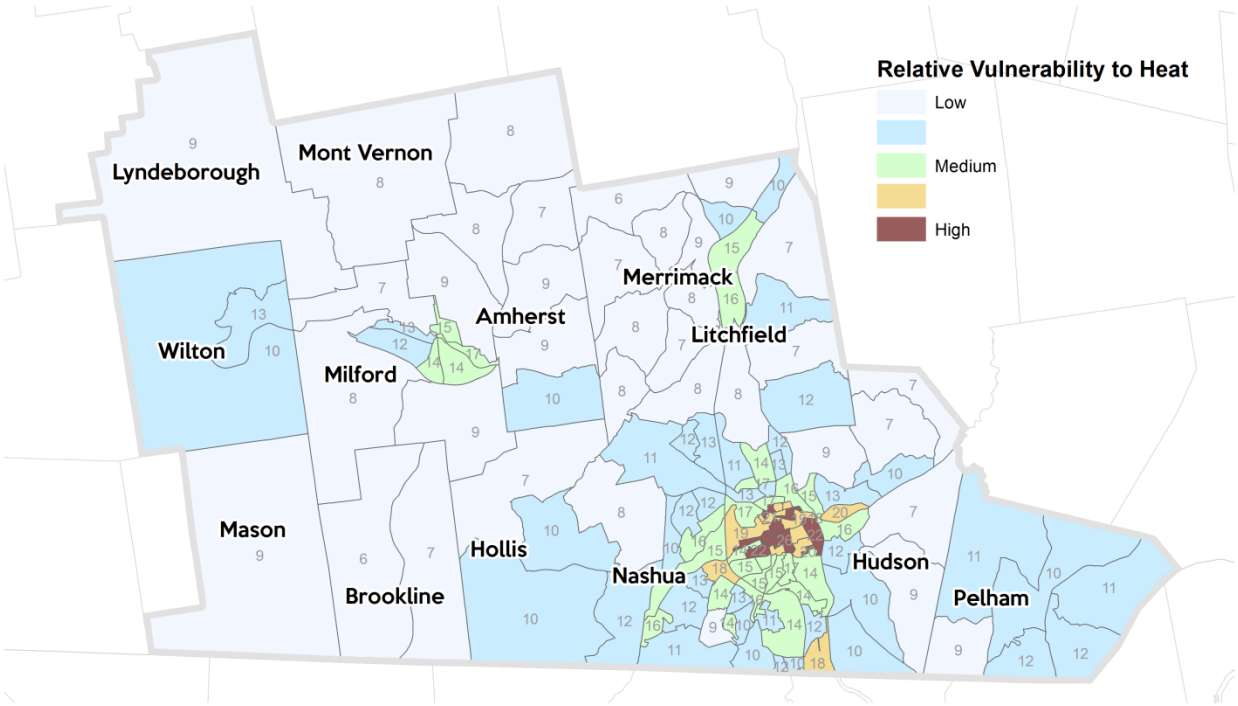


Figure 8: NRPC Heat Vulnerability Index by census block group. Labels represent overall composite score that ranged in value between 6 and 27. Map Source: NRPC.

Respiratory Illness

Poor air quality can have many effects on health. Higher temperatures could increase air pollution in the state, creating more days when national air-quality standards cannot be met. Poor air quality resulting from increased ground level ozone will exacerbate the risk of respiratory, cardiovascular, and other ailments.

Allergy sufferers can expect rising temperatures, carbon dioxide levels and pollen levels across New Hampshire.[xviii] Due to a number of factors, New Hampshire has one of the highest asthma rates in the nation. Air quality indoors and outdoors may explain some of this excess asthma burden. Particulate Matter and ozone that forms in neighboring metropolitan areas can be transported into the Nashua region under certain atmospheric conditions. In Nashua temperatures in excess of 90˚F occur most often when a ridge of high pressure builds off the east coast resulting in a light southwesterly wind. This wind direction generally results in warm humid conditions and transport ozone formed in the large metropolitan areas to the south and west.

Ozone can cause the muscles in the airways to constrict, trapping air in the alveoli, which leads to wheezing and shortness of breath. Other short-term effects of ground level ozone are coughing, painful breathing, temporary loss of lung function, aggravating asthma, emphysema, and bronchitis. Long-term effects include lung inflammation, impairment of lungs, changes in lung structure, and premature aging of lungs.

Vulnerable Populations

Populations with asthma and other respiratory illnesses are most at risk from poor air quality. Approximately eight percent of children in Hillsborough County have asthma.[xix] As data collected by the Greater Nashua Public Health Region shows, asthma hospitalizations primarily are the elderly and children below the age of four (Figure 9). However, it is a common finding that males are hospitalized in greatest number at the lowest and highest age ranges, while female hospitalization (although skewed toward children and elderly), tend to be more evenly distributed across the age spectrum. Past studies indicate that testosterone may have a protective effect on the lungs and may explain these patterns.[xx]

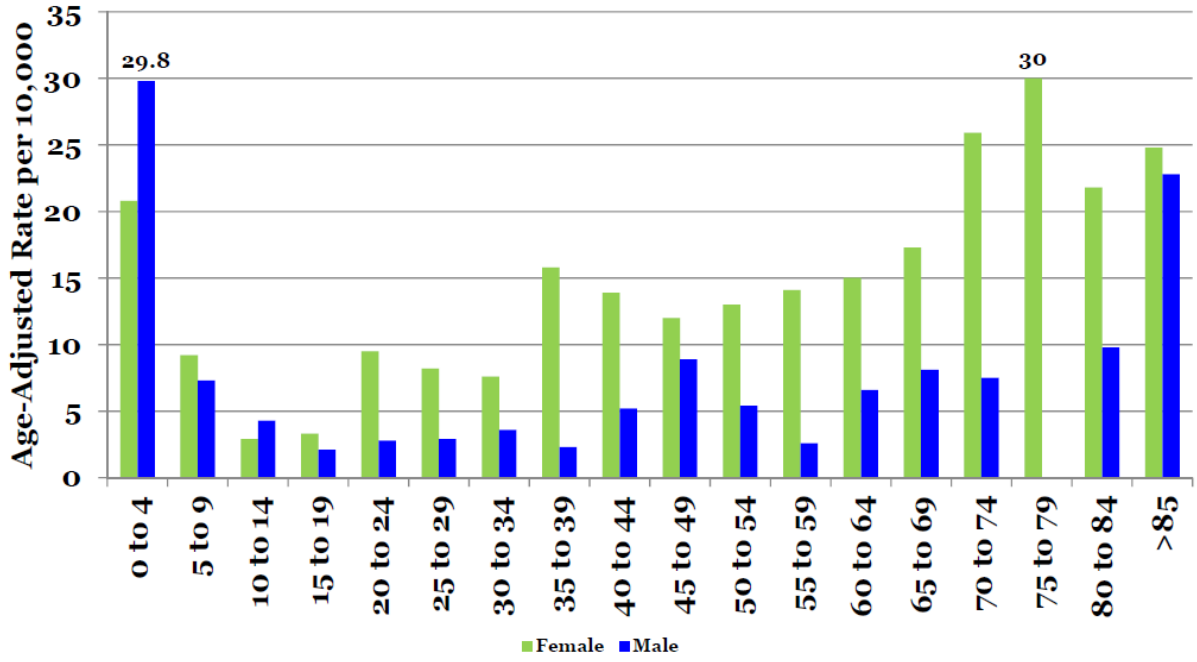


Figure 9: Rate of Asthma Hospitalizations by Age from 2005-2009. Source: Greater Nashua Regional Public Health Network.

Flood and Drought–related Health Outcomes

The health risks of extreme precipitation vary depending on whether there are drought or flood conditions.

There are many health risks due to flooding or storm events. One of the more extreme results is when storm events directly cause fatalities and when they damage infrastructure (roads, bridges, etc.) that cut people off from emergency responders and necessary resources. Figure 10: Summary of fatalities associated with different weather phenomena. Source: National Weather Service shows that flooding was the leading cause for weather fatalities for 2015. Also, when flooding occurs in buildings, there is an increased chance of mold growth, which can cause respiratory issues, and throat and eye irritation. Flooding can also contaminate wellheads with runoff and other chemicals. Destruction of public water systems and broken pipes can affect public water supplies. Floodwaters that top a wellhead or other piping system can contaminate groundwater with chemical runoff, hazardous waste, fuel runoff and pathogens.

Increased risk of gastrointestinal diseases caused by viruses, bacteria and protozoa in contaminated water is the most likely health impact.

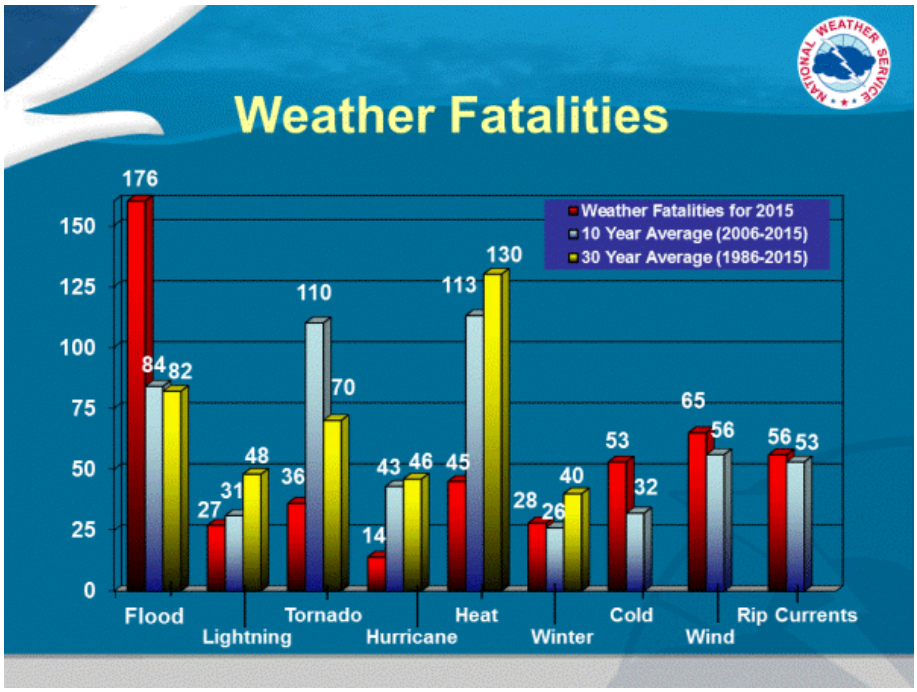


Figure 10: Summary of fatalities associated with different weather phenomena. Source: National Weather Service

In a drought scenario, threats to water and food supplies will usually lead to water restrictions or bans. There are hypotheses that these restrictions can affect hygiene as people are less likely to bathe regularly or wash their hands as frequently.[xxi] Worldwide, drought-related famine has major impacts on health, including nutritional deficiencies and dehydration. Within New Hampshire, droughts can lead to an increase in the cost of produce, forcing a greater number of people to rely on processed foods. Loss of well water also forces people out of their homes, increasing stress and anxiety. Future work should look at how drought conditions impact well water quality since over 37.2% of the Region relies on private well water.

Vulnerable Populations

For drought conditions, people on well water within aquifer regions are most at risk. Forty four percent (44%) of the Nashua Region relies on groundwater as a primary source of drinking water. Roughly 63% of the region's population uses public water; however, 8 of the 13 communities have 50% or more of their population served by household wells.[xxii]

Figure 11 below demonstrates the region's groundwater supplies. Stratified drift aquifers provide the majority of the water supplies. Additionally, dug wells, bed rock wells and surface waters support residential and commercial operations. The largest confluence of resources exists at the intersection of Amherst, Hollis and Nashua along the Souhegan River corridor where the stratified drift aquifer exceeds 8,000 feet

squared per day and gravel well analysis of 150 gallons per minute. A gravel well analysis is the minimum well yield required by the community water system. The Merrimack and Nashua River corridors provide lower level of gravel well analysis but significant water resources reside under the City of Nashua.

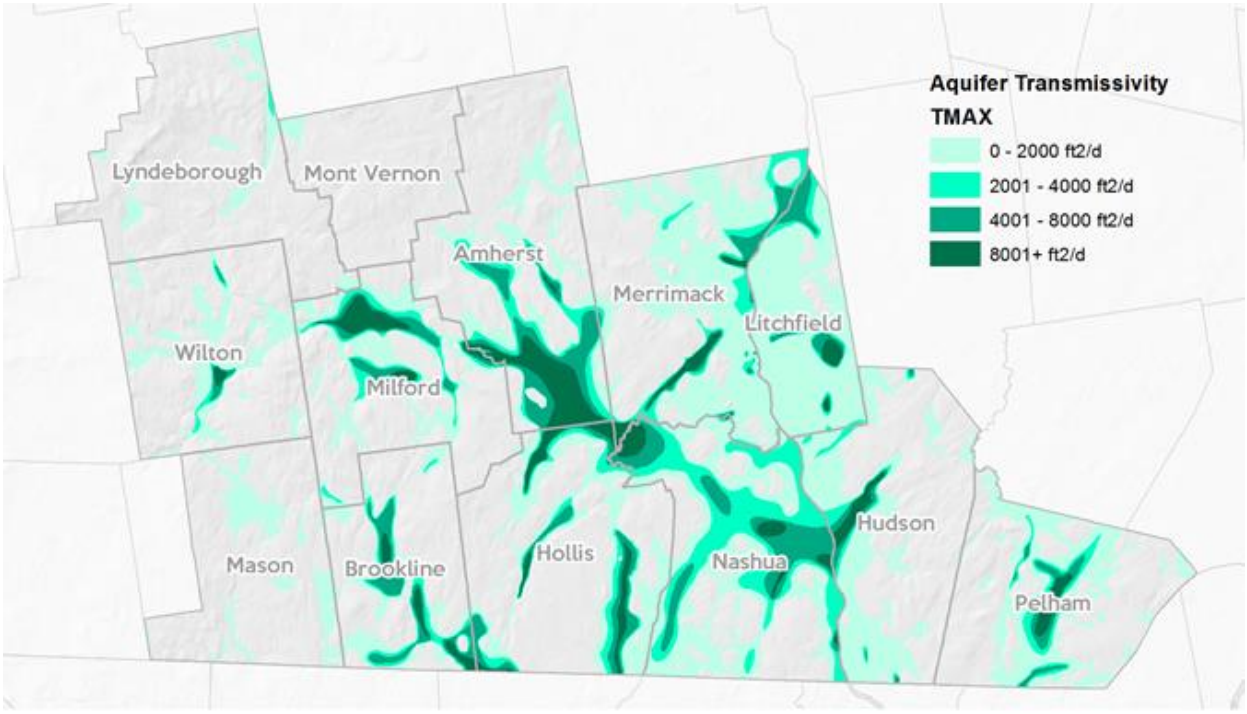


Figure 11: Drought-vulnerable groundwater areas. Map Source NRPC. Data source: Aquifer Transmissivity provided by NH GRANIT.

For storm events, people living in floodplains or near waterbodies are most at risk (see Figure 12), especially those living on well water. The Nashua region contains 413.6 miles of rivers and streams and 3,296 acres of open water. In the Nashua Region, some 74% of the water bodies with documented water quality problems are related to the pollutants commonly found in stormwater. An additional 23 percent of water bodies have problems related to an intermingling of stormwater and other types of pollutants sources.[xxiii]

Floods can lead to Combined Sewer Overflows into local rivers, thereby depositing stormwater, and sewage directly into water bodies which contaminate water systems resulting in beach closures and infected areas. The Merrimack River receives raw sewage periodically from the City of Manchester and City of Nashua CSO's resulting in heavy contamination and infected waters. Additionally, the Merrimack and Nashua Rivers receive a number of industrial discharges from local manufacturing operations, as detailed in the Non-point Source Discharge Elimination Systems (NPDES) section.[xxiv]

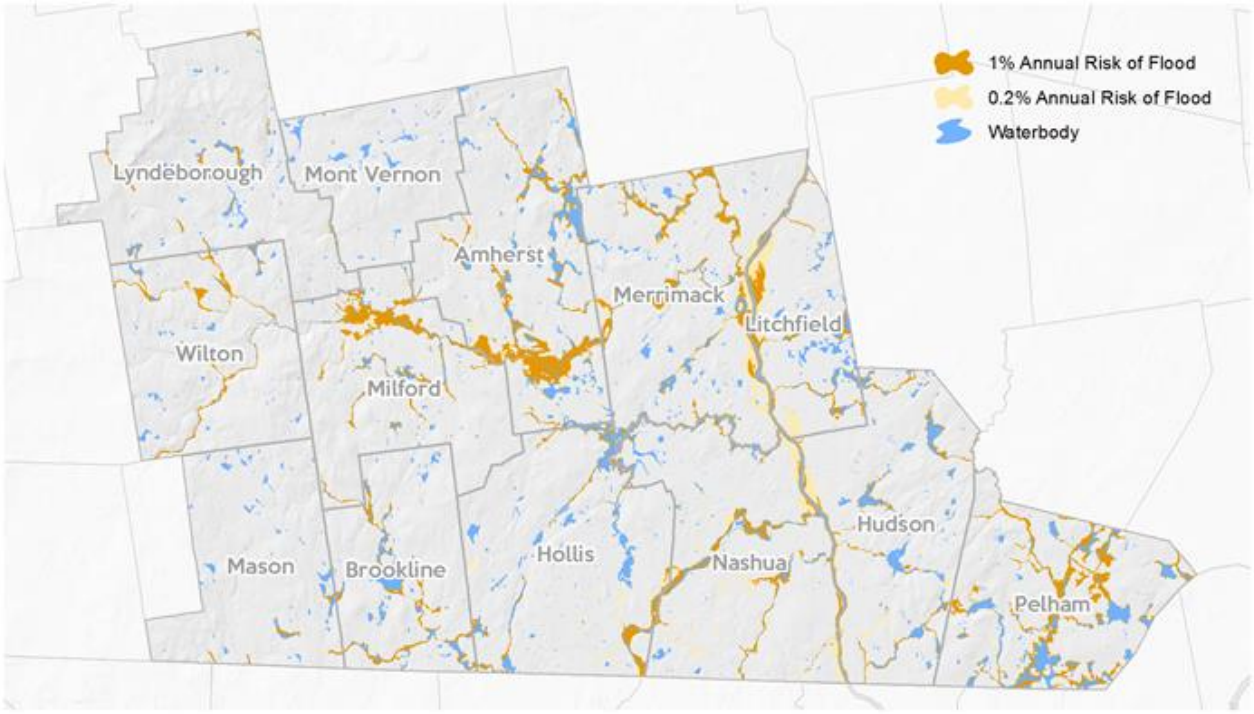


Figure 12: Flood-Prone Areas. Map Source: NRPC. Data source FEMA Digital Flood Insurance Maps obtained from NH GRANIT.

Vector-borne Illnesses

The reduction in snow-cover days, the extended growing season, and increasing temperature all contribute to mosquito and tick population growth. Deer ticks can act as the carriers of Lyme Disease, while mosquitos can be vectors for West Nile Virus and Eastern Equine Encephalitis (EEE).

As Figure 13 shows, Hillsborough County as a whole has a relatively lower rate of Lyme disease compared to Rockingham, Strafford, and Carroll Counties. However, the Greater Nashua Region's rate of Lyme (highlighted in green) is much higher compared to the rest of Hillsborough County, even exceeding the overall rate of New Hampshire.

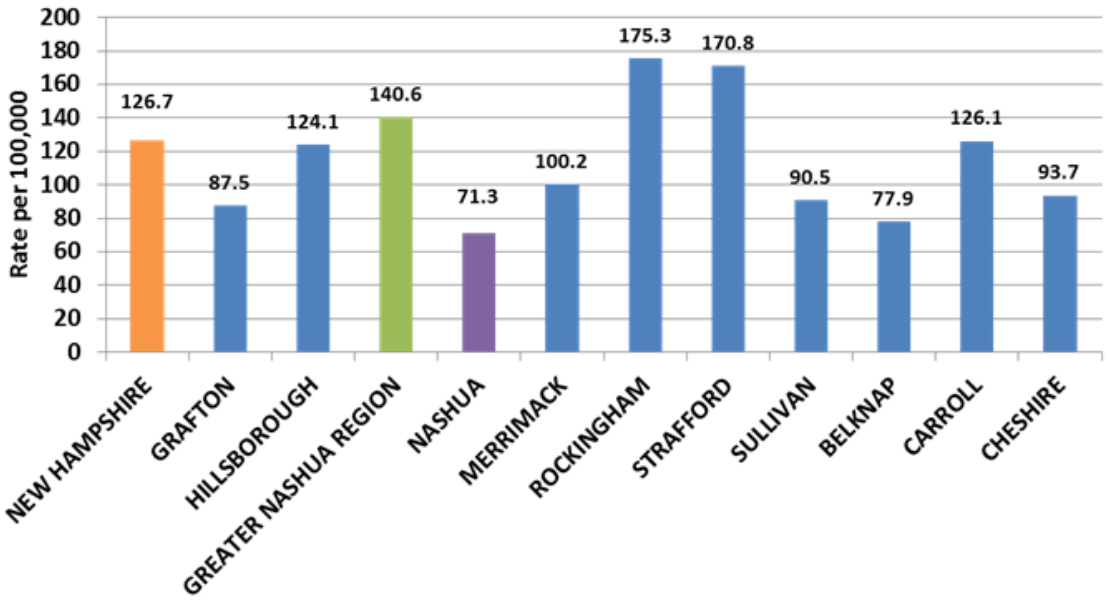


Figure 13: Incidence Rate of Lyme Disease Cases by Geography – 2013. Source: NH DHHS

West Nile Virus was first identified in mosquitos in New Hampshire in August 2000. In 2016, mosquitos in Nashua tested by the New Hampshire Public Health Lab were positive for West Nile Virus, although no mosquitos tested had EEE. In 2015, three mosquito batches tested positive for West Nile Virus in the state and there were two positive batches for EEE.[xxv]

Vulnerable Populations

In terms of vulnerable human populations, Lyme Disease is most common, is highest among the 5-14 year age group, but is high for all primary and secondary aged children in New Hampshire. The onset of symptoms is most commonly seen from June to August.[xxvi] Children are particularly vulnerable since they spend more time outside and are more likely to be exposed. They also usually have to rely on an adult to provide insect repellant and check for ticks.

Also, living in a rural area puts one at greater risk than living in an urban area; yet, this risk is not equal across all areas.[xxvii] Ticks live in moist and humid environments, particularly in or near wooded or grassy areas. Since deer and mice are two major hosts for ticks, tracking their habitats helps identify areas where people's exposure to tick population (and potentially Lyme Disease) is increased (see Figure 14 for these areas within the Nashua Region). Forest fragmentation is also an important factor in identifying areas that ticks inhabit. Although Figure 14 does not include fragmentation, the Wildlife Action Plan has recently developed the Index of Ecological Integrity (IEI) to measure this, which will be utilized for any future research into Lyme Disease by NRPC. This explains why the Greater Nashua Region has a high rate of Lyme Disease, but the City of Nashua has a much lower rate due to urban development. In addition to the people who live within these types of habitats, people who recreate and work in these environments are more at risk. There is some evidence to show that general outdoor workers, forestry workers, gardeners, people with pets, and those who recreate, such as hikers, and runners are at a higher risk of exposure.[xxviii]

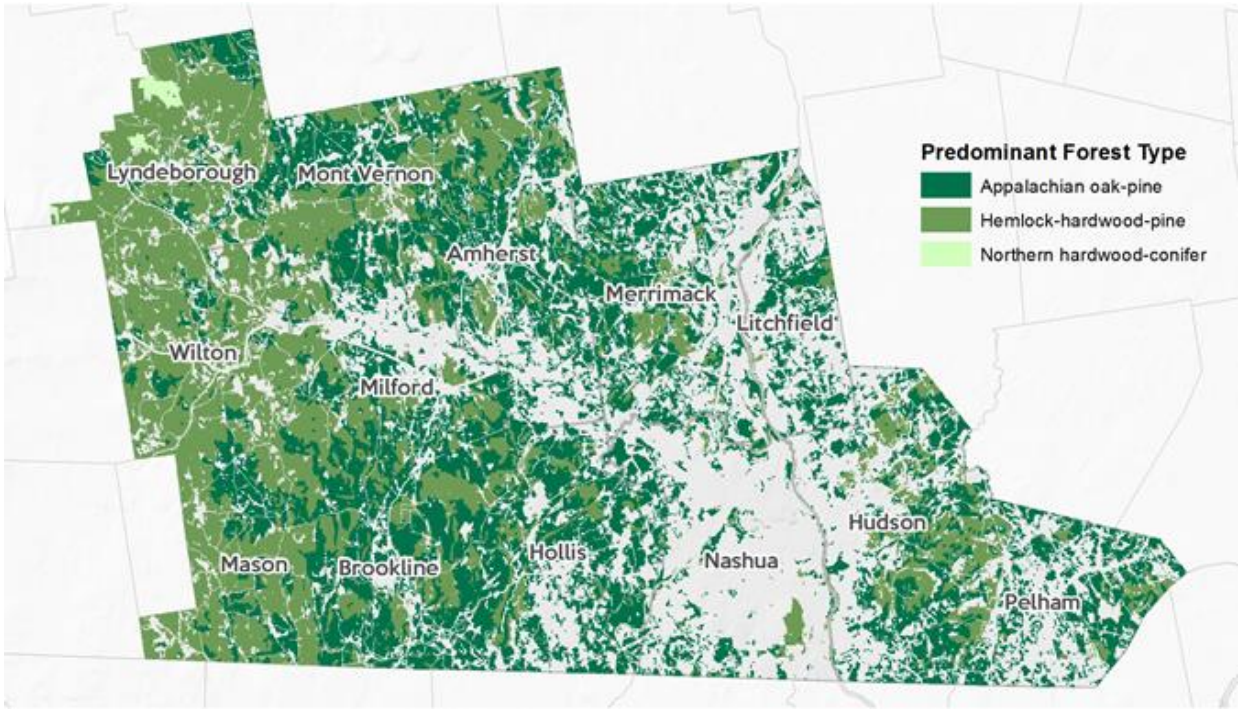


Figure 14: Potential Deer and Mouse Habitats in the Nashua Region. Map Source: NRPC. Data source 2015 Wildlife Action Plan provided by New Hampshire Department of Fish and Game.

The vulnerable populations most susceptible to the effects mosquitos are pregnant women, children, people with compromised immune systems, and the elderly.[xxix] Diseases transmitted by mosquitos can severely affect children, especially EEE. In fact, these demographics are more likely to suffer fatalities, and more intense systems from the diseases carried by mosquitos.[xxx]

Geographically, since mosquitos prefer stagnant water within which to lay their eggs, vulnerable populations are those who live or recreate near infest ponds, marshes, swamps and other wetland habitats. Figure 15 shows that the Nashua Region has many impaired and unimpaired wetlands, which may affect people living nearby or people who actively recreate in the wilderness. Farmers are considered one of the occupations more susceptible to mosquito-transmitted diseases.[xxxi] Pelham and Amherst contain the most wetlands in the region at 12 and 13% each. Wilton has the least number of wetlands at just 3%.[xxxii]

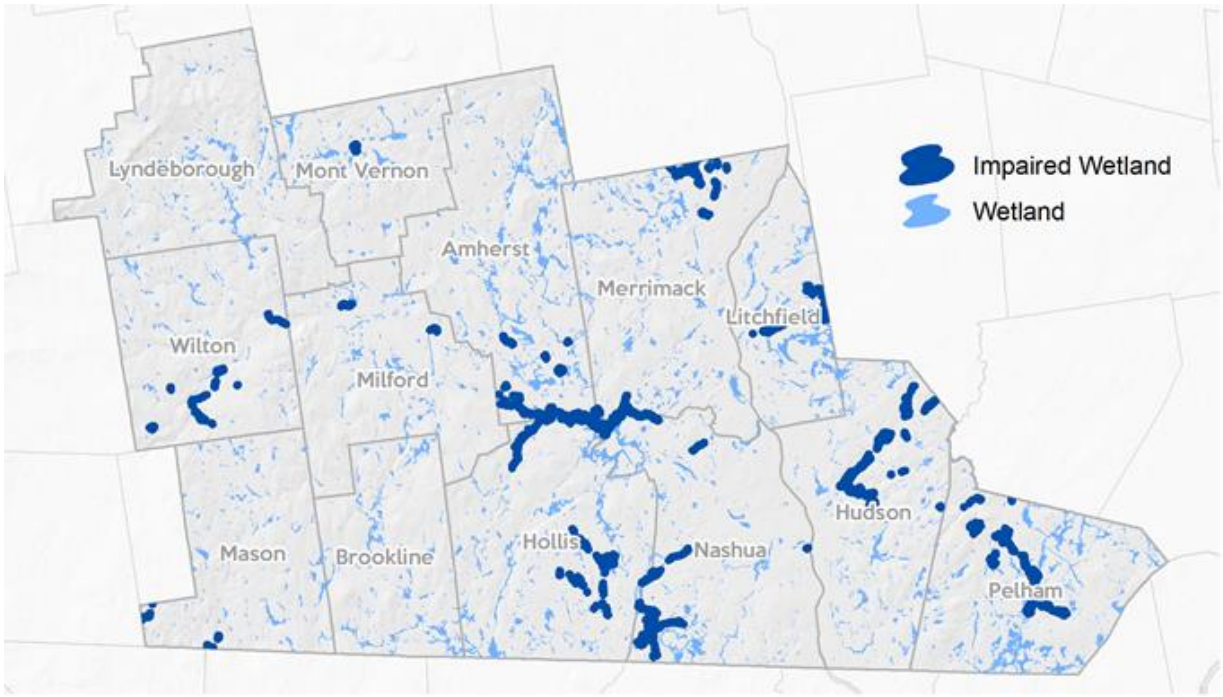


Figure 15: Potential Mosquito Breeding Areas. Map Source: NRPC. Data sources: New Hampshire Department of Environmental Services (NH DES) and National Wetlands Inventory provided by NH GRANIT.

Prioritization Process

In order to determine which singular intervention strategy would be most effective, the regional health risks and vulnerable populations identified above were analyzed to determine the focus of the remainder of this plan.

Table 7: Health Vulnerability Assessment is a detailed assessment of climate-related health burdens, or vulnerabilities. Project partners participated in this evaluation process and provided input and guidance. The prioritization process was based on a qualitative assessment process that considered likely impacts of the region considering characteristics in the regional overview.

Table 8: Vulnerable Populations analyzes the populations most vulnerable to the weather hazards exacerbated by climate change. This assessment relied on geographic and demographic information, obtained from a variety of federal, state, regional, and local sources.

Climate Exposure or Vulnerability	Pathways: Direct & Indirect	Health Effects & Impacts	Evidence for Relevance to the Nashua Region	Data Source	Priority for the Nashua Region
Increase in extreme heat events (days over 90˚F)	Increase in outdoor and indoor temperature. People without adequate cooling or outdoor workers suffer heat stress. Increased heat and humidity traps more ground level ozone, thus reducing air quality.	Heat stroke, heat exhaustion, cramps and dehydration, and potentially death. Exasperation of chronic respiratory, renal and cardiovascular illnesses	Climate models forecast that the number of days 90˚F or above may double or triple by 2040 depending on emission scenarios. 2016 already exceeded short-term estimates for number of extreme heat events.	Climate Change in Southern New Hampshire (2014), National Weather Service	**High:** Health impacts likely for the overall population and severe health risks for vulnerable populations.
Longer Growing Season	Increase in the number of days over 32˚F, allergic plants bloom earlier and later, which increases people's exposure to pollen.	Increase in respiratory diseases, increased asthma rates and severity.	Climate models indicate that the growing season will extend 11-17% by 2040. By 2100, the growing season will be expected to be 13-29% longer.	Climate Change in Southern New Hampshire (2014)	**Low:** Health risk is high, yet the state asthma program is strong. Many different factors contribute to asthma, hard to make focus of plan.
Increase in extreme precipitation events	Increase in the number of days with heavy rain or snowfall. This could result in flooding, power outages, infrastructure damage, contaminated water supplies by bacteria or hazardous materials	Injury, drowning, death, water– and food-borne infectious diseases, respiratory illnesses from mold, exposure to hazardous materials, cut out from emergency services or needed resources.	There has been an increased frequency of storm events in New Hampshire. New England's weather, overall, is projected to get wetter.	Climate Change in Southern New Hampshire, 2014	**Medium:** Can have major short-term and long-term effects. Floodplain regulations and FEMA response is strong.
Increase in drought events	Warmer temperatures increase water demands and evaporation. Arid soils also lead to more particulate matter in the air.	Increase in dehydration, overheating, and respiratory diseases. Also increased risk of Dry Well and decreased hygiene.	The Greater Nashua Region had record drought conditions during the summer and fall of 2016.	New Hampshire DES, 2016; NOAA, 2016; National Weather Service Climate Prediction Center	**Low:** 2016 is an anomaly to projected weather for the New England region.
Fewer snow-covered days	Snow and cold weather acted as population check for disease vectors (e.g., ticks and mosquitos) so vector season extends	Increase exposure to and incidence of vector-borne diseases.	Greater Nashua Region has one of the highest rates of Lyme Disease in the state.	Climate Change in Southern New Hampshire, 2014; GNRPHN, 2014	**Medium** for Lyme Disease, **Low** for other vector diseases.

Table 7: Health Vulnerability Assessment

Climate Exposure or Vulnerability	Pathways: Direct & Indirect	Health Effects & Impacts	Vulnerable Populations & Places	Evidence of Risk for Focus Populations	Locations of Populations at Risk
Increase in extreme heat events (days over 90 F)	Increase in outdoor and indoor heat. People without adequate cooling or outdoor workers suffer heat stress.	Heat stroke, heat exhaustion, cramps and dehydration, and potentially death. Exasperation of chronic respiratory, renal and cardiovascular illnesses.	People with lower incomes, elderly, those living alone or isolated without air conditioning. People with chronic illnesses. FOCUS POPULATIONS: Lower income population.	Social Vulnerability Index (SVI), NH WISDOM	Nashua (Tree Streets and French Hill neighborhoods); Merrimack, Milford, and downtown Wilton.
Longer Growing Season	Increase in the number of days over 32 F, allergic plants bloom earlier and later, which increases people's exposure to pollen. Increased heat and humidity traps more ground level ozone, thus reducing air quality.	Increase in respiratory diseases, increased asthma rates and severity.	The elderly and children aged four and below. People with asthma and other respiratory illnesses.	Asthma Burden in New Hampshire, 2014; SVI	Lyndeborough, Wilton, Mason, Mont Vernon, Brookline, Milford, Hollis, Amherst, Merrimack
Increase in extreme precipitation events	Increase in the number of days with heavy rain or snowfall. This could result in flooding, power outages, infrastructure damage, contaminated water supplies by bacteria or hazardous materials.	Injury, drowning, death, water– and food-borne infectious diseases, respiratory illnesses from mold, exposure to hazardous materials, cut out from emergency services or needed resources.	People living within the floodplain. Elderly people. Those with limited transportation options (no vehicle). People with low incomes.	SVI, local Hazard Mitigation Plans & National Flood Insurance Program	Milford, Amherst, Merrimack, Litchfield, Nashua, Pelham
Increase in drought events	Warmer temperatures increase water demands and evaporation. Arid soils also lead to more particulate matter in the air.	Increase in dehydration, overheating, and respiratory diseases.	People on well water living in aquifer areas. Low income populations.	Local Hazard Mitigation Plans, recent events	Brookline, Milford, Amherst, Merrimack, Nashua, Litchfield, Pelham
Fewer snow-covered days	Snow and cold weather acted as population check for disease vectors (e.g., ticks and mosquitos) so vector season extends.	Increase in incidence of vector-borne diseases.	Children aged five to nine. People who live, work and recreate in rural areas.	State of New Hampshire Tick-borne Disease Prevention Plan, 2015; SVI	Lyndeborough, Wilton, Mason, Mont Vernon, Brookline, Milford, Hollis, Amherst, Merrimack

Table 8: Vulnerable Populations

Interventions and Outcomes

The next step is to develop a plan of action to implement the findings of the early BRACE hazard assessment process and disease burden estimates. This assessment and review process identified a number of intersecting hazards that prioritized rising temperatures, heat stress, and vulnerable people in the Nashua area. Since extreme heat events are related to air quality, habitat change, and certain extreme precipitation events (i.e., drought), the partners of this plan directed the focus of this plan toward **heat stress**. The target populations for this implementation strategy are the elderly and low income people. To begin the process of implementation, we also worked with the DHHS on an exposure pathway (Figure 16) that highlights some of the key points where we may be able to break the cycle that leads to heat stress.

Since the pathway shows that knowledge is very important to reducing the effects of heat stress, this plan emphasizes education as part of its intervention and action strategies. In order to most effectively target the populations of concern, this plan recommends educating service providers and emergency managers, as it has been an effective strategy in other locations, such as Philadelphia. The following section elaborates on the details of the action plan.

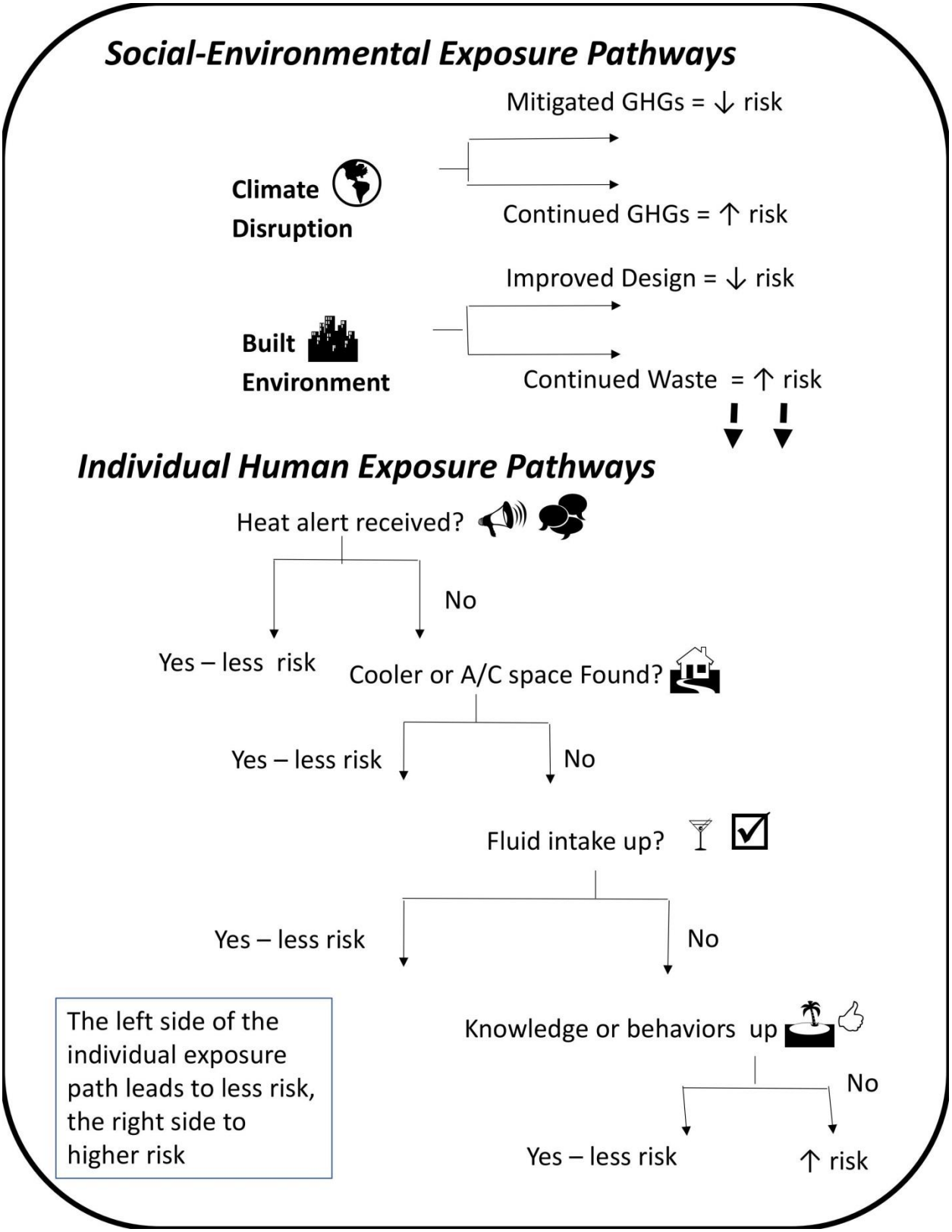


Figure 16: Exposure Pathway Diagram for Heat Stress that shows intervention points to break the cycle of heat stress. Source: DHHS

Action Plan

To create a feasible and effective implementation strategy considering the available resources, the following goal with associated objectives and strategies was established:

Goal	Increase community and individual resilience to the impacts of heat-related illness (among vulnerable populations) in the Greater Nashua region
Objective 1	**The Nashua PHN partners will use an outreach or education intervention to reach regional emergency managers and work to ensure that at least 75% have a proficient understanding of policy changes and tips that better prevent or mitigate heat-related and heat stress risk factors by 6/30/17.**
Strategy 1	Work with regional emergency managers and first responders to develop alert system for forthcoming revised NWS heat advisory and for events when there are high overnight temperatures. Ensure notification uses a variety of media platforms to target at-risk populations.
Strategy 2	Conduct further research on similar policies in other areas to determine which thresholds (temperature at night, duration of nights, etc.) would be most effective considering Nashua Region's environment and emergency management resources.
Strategy 3	Coordinate with NH DHHS, emergency managers, health officers, and GNPH Media Advisory Group to develop educational materials to clarify roles and responsibilities of cooling centers and shelters.
Strategy 4	Coordinate with emergency managers and health officers to identify facilities designated as cooling centers within the region and ensure they understand the responsibility and requirements associated with being designated a cooling center.
Strategy 5	Coordinate with key stakeholders to communicate new NWS heat advisory policies and list of cooling centers.
Objective 2	**The Nashua PHN partners will use a single educational intervention (a 30-60 minute training session) to reach service providers to low income households, and ensure that at least 75% have a proficient understanding of the risk factors or protective actions to prevent heat stress by 6/30/17.**
Strategy 1	Identify partner organizations that work with target populations (e.g. Meals on Wheels, Outreach Programs, Nashua Housing Authority, Home Health & Hospice, Faith-Based Organizations, SHARE Outreach, Property Owners Association, etc.).
Strategy 2	Gauge the extent of current practices, heat stress mitigation programs in comparable locations, and other public health intervention programs (e.g. asthma programs).
Strategy 3	Work with DHHS, GNRPHN, and NH DPHS High Heat group to develop educational program about extreme heat, heat-related illnesses, and protective actions for people who work with target population.
Strategy 4	Work with DHHS, GNRPHN, and NH DPHS High Heat group to create outreach materials as part of extreme heat educational program (e.g., magnets with thermometer, tumblers with messaging, brochures).
Strategy 5	Distribute educational materials with other material that reaches targeted populations (e.g. prescriptions for illnesses with symptoms exacerbated by heat, municipal tax bill, Eversource bills).
Strategy 6	Present information to those who work with target populations ("train the trainers").
Strategy 7	Conduct pre- and post- assessment of heat-related illness knowledge on those who attend training session.
Objective 3	**Within 18 months, expand tracking health impacts of heat-related illness tracking data**
Strategy 1	Add to Community Health Assessment Questionnaire questions about whether homes have air conditioners, whether people have enough money to power air conditioners, and if people know their options during extreme heat events.
Strategy 2	Work with DHHS to identify appropriate resources and methodology to expand upon state initiatives.

Appendix

I. Preparedness Resources

The following represents a list of current preparedness resources for weather hazards in the Nashua Region:

Extreme Heat

1. A number of adaptation strategies are described in the *New Hampshire's Excessive Heat Plan* http://www.dhhs.nh.gov/dphs/climate/documents/nh-excessive-heat-plan.pdf.
2. Hospitals and health centers that treat heat stress
3. Hospitals – Southern New Hampshire Medical Center and St. Joseph's Hospital in Nashua
4. Municipal Cooling Centers
5. Local Programs
   - 5.1. City beaches and pools
   - 5.2. School Athletic Programs
6. Parks & Recreation Department Directors
7. Hazard Mitigation Plans that directly address heat
   - 7.1. Nashua HMP, 2013
   - 7.2. Amherst HMP 2015
   - 7.3. Litchfield HMP, 2013
   - 7.4. Merrimack HMP, 2015
   - 7.5. Milford HMP, 2014
   - 7.6. Mont Vernon HMP, 2015
8. Publications
   - 8.1. New Hampshire, the Resilient Granite State
   - 8.2. Greater Nashua Community Health Assessment, 2014: http://www.nashuanh.gov/DocumentCenter/View/2478
   - 8.3. Article Summary "Heat-related morbidity and mortality in New England: Evidence for local policy" https://tinymce.nhwis.net/plugins/moxiemanager/data/files/docs/Meetings/heat-article-summary.pdf
   - 8.4. Staying Safe During Extreme Heat by Greater Nashua Public Health http://nashuanh.gov/DocumentCenter/View/8770
   - 8.5. Extreme Heat Precautions by City of Nashua Division of Public Health & Community Services: http://milfordnh.info/milford/HeatWavePrecautionsNashua.pdf
   - 8.6. Heat and Health: Understanding Community Risk by NH DHHS: https://www.nh.gov/epht/highlights/documents/heat-health.pdf

Air Quality

1. Asthma Burden Report Update New Hampshire, 2014

2. *State Asthma Plan 2015-2019:* https://www.dhhs.nh.gov/dphs/cdpc/asthma/documents/state-plan.pdf

Extreme Precipitation

Consensus from advisory committees was that local hazard mitigation plans (HMP) are the best tool for addressing concerns related to flooding and drought conditions. Most communities in the Nashua Region do have up-to-date HMPs (Table 9); to remain valid, plans are updated every five years. NRPC is currently working with Mason, Brookline, and Pelham on updating their plans. Local information about participation in the National Flood Insurance Program (NFIP) and efforts to mitigate flooding in floodplains are required elements of the hazard mitigation plan.

Municipality	FEMA Formal Approval Date	Plan Expiration Date	NFIP Participant
Amherst	June 8, 2015	June 8, 2020	Y
Brookline	August 21, 2012	August 21, 2017	Y
Hollis	November 28, 2012	November 28, 2017	Y
Hudson	July 16, 2012	July 16, 2017	Y
Litchfield	August 22, 2013	August 22, 2018	Y
Lyndeborough	April 1, 2015	April 1, 2020	Y
Mason	September 1, 2011	September 1, 2016	Y
Merrimack	August 6, 2015	August 6, 2020	Y
Milford	June 9, 2015	June 9, 2020	Y
Mont Vernon	June 3, 2015	June 3, 2020	Y
Nashua	December 19, 2013	December 19, 2018	Y
Pelham	June 18, 2012	June 18, 2017	Y
Wilton	June 12, 2015	June 12, 2020	Y

Table 9: List of municipalities within the Nashua Region and the status of their Hazard Mitigation Plans

Vector Habitat

1. Local recreation plans
2. Hospitals and health centers may be a resource to educate the population about risk reduction strategies, identify ticks, and treat exposures
3. Outdoor clubs may be a resource for at-risk populations
4. The Cornell Integrated Pest Management program is a resource for reducing ticks through landscape management practices: http://nysipm.cornell.edu/%5C/whats_bugging_you/ticks/default.asp

5. The New Hampshire Tickborne Disease Prevention Plan (2015) is a resource for understanding tickborne disease, changes in risk factors, prevention and control, educational outreach, and surveillance http://www.dhhs.state.nh.us/dphs/cdcs/lyme/documents/tbdpreventionplan.pdf
6. City of Nashua Lyme Disease Toolkit: http://www.nashuanh.gov/DocumentCenter/View/2707
7. VT webpage http://lymediseaseguide.org/

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Appendix A: Acronyms

Contents

Acronyms

AIDS	Acquired Immune Deficiency Syndrome
APNCU	Adequacy of Prenatal Care Utilization Index
BRFSS	Behavioral Risk Factor Surveillance System
BMI	Body Mass Index
CDC	Centers for Disease Control and Prevention
CHA	Community Health Assessment
CHIP	Community Health Improvement Plan (Introduction)
CHIP	Children's Health Insurance Program (Chapter 2)
CI	Confidence Interval
DES	Department of Environmental Services
DHHS	Department of Health and Human Services
DPHCS	Division of Public Health and Community Services
DPHS	Division of Public Health Services
DUI	Driving Under the Influence
DWI	Driving While Intoxicated
FEMA	Federal Emergency Management Agency
GNPHR	Greater Nashua Public Health Region
HCC	Harbor Care Clinic, a program of Harbor Homes, Inc
HCV	Hepatitis C Virus
HIV	Human Immunodeficiency Virus
HP2020	Healthy People 2020
MSM	Men who have sex with men
NAMI	National Alliance on Mental Illness
NCHS	National Center for Health Statistics

NIDA	National Institute on Drugs and Alcohol
NH	New Hampshire
PCP	Primary Care Provider
PNC	Pre-natal Care
SAMHSA	Substance Abuse and Mental Health Services Administration
SDI	Social Determinants of Health
SHIP	State Health Improvement Plan
STD	Sexually Transmitted Disease
TB	Tuberculosis
TEMSIS	Trauma and Emergency Medical Services Information System
USDA	United States Department of Agriculture
WIC	Women, Infant and Children
YRBS	Youth Risk Behavioral System

Appendix B: Demographic Snapshot

Contents

Demographic Data Snapshot

Greater Nashua (Excludes Nashua Census Tracts)

Table 1. Greater Nashua Region Demographics by Age (Years), by Town and Census Tract, Percent (%)

Town	Census Tract	Total Pop. (n)	Under 5	5 - 17	18 - 24	25 - 44	45 - 54	55 - 64	65- 74	75 and over	Median age
Amherst	151	5198	5.9	22.5	6.6	14.5	21.9	14.6	10.3	3.8	45.3
Amherst	152	6049	5.3	21.8	7.4	17.9	16.5	16	9.5	5.6	44.2
Brookline	180	5100	4	24	8.3	20.5	20.1	14.9	5.9	2.3	41.7
Hollis	171	7733	4.4	18.3	5.9	15.6	23	18.4	8.4	6.1	47.8
Hudson	121	8233	3	21.1	8.5	26.2	18.9	11.1	7.7	3.6	40.1
Hudson	122	7388	4.6	15.9	11.5	23.5	16.2	9.8	9.6	8.8	40.4
Hudson	123	9061	6.1	19.7	4.9	28.8	17.1	10.8	5.6	7	40.3
Litchfield	131	8366	4.3	21.9	7.6	21.8	21.2	11.4	9.3	2.5	41.2
Litchfield	141	5142	3.1	11.1	5.2	30.3	17	13.3	12.4	7.6	45.1
Lyndeborough	195.01	1707	7.7	11.1	4.2	22.1	16.8	21.6	11.5	5	49
Mason	185.02	1390	5.7	17	6	18.3	21.9	18.7	8.6	4	45.7
Merrimack	142.01	6072	5.1	18.8	8.5	22	21.4	15.5	6	2.7	41.6
Merrimack	142.02	6060	5.2	20.8	5.5	25.7	15.1	16.7	7.9	3	40.5
Merrimack	143	8321	7.2	16.1	7.7	22	21.4	14.3	6.8	4.5	42
Milford	161	3131	4.5	22.1	5.5	22.6	21.1	10.6	8.7	4.9	40.8
Milford	162.01	6885	5.1	15.5	5.8	28.6	14.8	15.6	8.1	6.6	41.3
Milford	162.02	5178	5.1	19.4	10.4	20.6	18.9	13.8	9	2.9	40.8
Mont Vernon	195.02	2620	4.4	21.4	7.3	18.2	23.3	13.5	8.7	3.2	44.3
Pelham	2001	4762	7.5	19.1	6.1	25.3	19.7	10.2	6.2	5.8	38.6
Pelham	2002	4242	3.3	19	9.9	20.2	16.8	17.6	7.7	5.6	43.7
Pelham	2003	4109	5	19.1	7.9	21.2	22.5	12.5	6.4	5.5	42.7
Wilton	190	3681	5	16.5	5	23.2	21.9	13.4	8.5	6.7	45.4

Source: US Census Bureau, 2011-2015 American Community Survey 5- Year Estimate

Table 2. Greater Nashua Region Demographics by Gender and Race/Ethnicity, by Town and Census Tract, Percent (%)

Town	Census Tract	Male	Female	White	Black or African American	American Indian and Alaska Native	Asian	Native Hawaiian and Other Pacific Islander	Some other race	Two or more races	Hispanic or Latino origin (of any race)	Not Hispanic or Latino
Amherst	151	49.9	50.1	92.8	1.1	0	1.2	0	0.5	4.4	2.8	90.6
Amherst	152	49.1	50.9	95	0	0.3	0.9	0	1.6	2.2	2.6	94.4
Brookline	180	49.7	50.3	96.7	0	0	0.9	0	0	2.4	0.1	96.6
Hollis	171	51.9	48.1	95	0.5	0.1	2.6	0	0	1.8	1.5	93.7
Hudson	121	47.8	52.2	95.2	1.3	0	3	0	0	0.5	0	95.2
Hudson	122	49.4	50.6	93.1	2.1	0	1.8	0.2	0	2.8	7	86.7
Hudson	123	50.4	49.6	94.5	0.5	0	4.1	0	0.2	0.6	1.1	93.6
Litchfield	131	51.5	48.5	97.9	0.2	0.5	0.4	0	0	1	2.7	95.3
Litchfield	141	47.4	52.6	96.8	0	0.2	1.8	0	0	1.1	1.3	95.5
Lyndeborough	195.01	52.5	47.5	96.8	0.4	0	0.9	0.6	0.2	1.1	1.6	95.4
Mason	185.02	51.1	48.9	96.9	0	0	0.2	0	0.4	2.5	3.8	93.9
Merrimack	142.01	50.1	49.9	92.9	0.6	0	1.5	0	1.1	3.9	5.1	90.4
Merrimack	142.02	50.1	49.9	97.2	0.8	0	1.2	0	0.3	0.5	0.5	96.9
Merrimack	143	51	49	94.1	0	0.1	3.1	0.3	1.8	0.7	3.2	91.2
Milford	161	50.1	49.9	86.7	0.8	0	7.7	0	4.1	0.7	5.5	85.3
Milford	162.01	44.7	55.3	92.8	1.1	0.2	1.9	0	3.6	0.4	1.8	91.9
Milford	162.02	51.9	48.1	98.1	0	0	0.9	0	0	1	2.6	95.5
Mont Vernon	195.02	50.1	49.9	99.2	0	0	0.4	0	0	0.4	1.5	97.7
Pelham	2001	49.8	50.2	96.6	0.6	0	0.9	0	0	1.9	1.2	95.3
Pelham	2002	48.6	51.4	96.6	0	0	0.6	0	0.4	2.4	3	94.4
Pelham	2003	48.2	51.8	96	1.1	0	0.5	0	0.9	1.5	2.1	93.9
Wilton	190	54.7	45.3	98.3	0.5	0	0.4	0.2	0	0.7	0.6	97.7

Source: U.S. Census Bureau, 2011-2015 American Community Survey 5-Year Estimates

Table 3. Greater Nashua Region Demographics by Lanugage, by Town and Census Tract, Percent (%)

Town	Census Tract	Population 5 years and over (n)	Speak language other than English	Speak language other than English - Speak English "very well"	Speak language other than English - Speak English less than "very well"
Amherst	151	4890	3.7	3.3	0.5
Amherst	152	5731	5.8	5.8	0
Brookline	180	4897	3.9	3.6	0.3
Hollis	171	7395	5.2	4.2	1
Hudson	121	7990	5.4	4.8	0.6
Hudson	122	7047	14.2	8.8	5.4
Hudson	123	8508	13.6	9.9	3.7
Litchfield	131	8009	8.5	6.2	2.2
Litchfield	141	4984	7.2	3.2	4
Lyndeborough	195.01	1575	2.1	2.1	0
Mason	185.02	1311	3.1	2.4	0.8
Merrimack	142.01	5763	5.4	4.2	1.2
Merrimack	142.02	5744	4	2.6	1.3
Merrimack	143	7722	8.6	6.6	1.9
Milford	161	2989	12.9	10.3	2.7
Milford	162.01	6534	5.9	3	3
Milford	162.02	4916	8.7	7.5	1.2
Mont Vernon	195.02	2504	4.1	3.8	0.3
Pelham	2001	4404	5.4	4.2	1.3
Pelham	2002	4103	7.3	4.9	2.3
Pelham	2003	3905	4.9	3.7	1.2
Wilton	190	3498	2.9	2.6	0.4

Source: U.S. Census Bureau, 2011-2015 American Community Survey 5-Year Estimates

Table 4. Greater Nashua Region Demographics by Education, by Town and Census Tract, Percent (%)

Town	Census Tract	Population 25 years and over (n)	Less than high school graduate	High school graduate (includes equivalency)	Some college or Associate's degree	Bachelor's degree	Graduate or professional degree
Amherst	151	3376	1	14.8	19.8	35.2	29.2
Amherst	152	3960	2.9	11.8	20.1	35.6	29.7
Brookline	180	3249	2.1	23.2	29.1	26.8	18.7
Hollis	171	5525	2.4	16.9	18.6	31.4	30.6
Hudson	121	5557	4.9	23.6	26.1	33.1	12.3
Hudson	122	5019	11.9	31.4	34	16	6.7
Hudson	123	6281	7.5	26.9	28.8	24.3	12.5
Litchfield	131	5543	10.2	25.2	31	25.4	8.2
Litchfield	141	4146	5.2	30.2	28.9	25.6	10.2
Lyndeborough	195.01	1314	7.6	31.6	25.2	23.7	11.9
Mason	185.02	992	3.5	30.2	27.4	25.1	13.7
Merrimack	142.01	4106	2.5	23.1	24.4	33	17
Merrimack	142.02	4150	5.9	30.5	30.1	24.5	8.9
Merrimack	143	5743	2	23.8	26.3	31.6	16.4
Milford	161	2125	4.1	32.4	26.7	25.1	11.7
Milford	162.01	5069	7	35.5	29.1	21.1	7.4
Milford	162.02	3377	4.3	21	33.3	23.7	17.6
Mont Vernon	195.02	1753	3.1	24.1	22	33.5	17.3
Pelham	2001	3204	6.7	33.4	29.8	20.9	9.1
Pelham	2002	2878	11.2	34.2	28.1	16.9	9.6
Pelham	2003	2796	6.7	32.9	28.7	21.9	9.9
Wilton	190	2709	4.7	31.2	36.1	18.3	9.7

Source: U.S. Census Bureau, 2011-2015 American Community Survey 5-Year Estimates

Table 5. Greater Nashua Region Demographics by Income and Poverty, by Town and Census Tract Percent (%)

Town	Census Tract	Population (n)	$1 to $9,999	$10,000 to $14,999	$15,000 to $24,999	$25,000 to $34,999	$35,000 to $49,999	$50,000 to $64,999	$65,000 to $74,999	$75,000 or more	Median Income (USD)	Below 100% of poverty level	100 - 149% of poverty level	At or above 150% of poverty level
Amherst	151	3946	16.1	5	8.3	5	8	9.9	4	32.3	(X)	2.9	1.2	96
Amherst	152	4755	16.2	7.6	7	8.3	12.1	10.1	4	25.5	44937	2.9	1.7	95.4
Brookline	180	4006	11.7	6.9	9.2	7.5	11	8.9	6.4	24.4	(X)	1.1	1.3	97.5
Hollis	171	6343	12.5	11.1	9.2	4.3	10.6	7.2	2.1	31.1	42794	2.1	3.5	94.5
Hudson	121	6716	14.9	5.1	9.9	9.5	11.2	11.6	7.2	21.7	42521	3.1	1.1	95.8
Hudson	122	6076	11.8	10	13.2	13.4	16.6	11.4	5.8	9.3	(X)	8.2	5	86.8
Hudson	123	7089	10.5	6.4	9.7	9.9	13.8	8.1	3.7	25.3	42582	2.4	3	94.7
Litchfield	131	6691	11.5	8.2	8.6	9.8	12.7	11.4	6.6	19.3	41589	4.2	1.7	94.1
Litchfield	141	4558	11.2	4.4	12	12.1	21.3	12.6	6.1	13.6	39586	5.5	2.5	92
Lyndeborough	195.01	1436	12.7	7.4	11.8	13.4	12	11.4	4.2	19.6	(X)	5.7	3.3	91
Mason	185.02	1135	17.4	5.6	10.4	10	9.7	11.6	5.8	21.9	(X)	12.8	2.9	84.4
Merrimack	142.01	4907	14.1	4.8	12.1	6	11.3	11	4.4	23.7	45315	3.2	1	95.8
Merrimack	142.02	4843	12.8	4.6	9.9	8.7	21.6	10	4.3	18.7	41528	3	4.2	92.8
Merrimack	143	6662	12.9	8.1	9.8	8.3	12.5	7.8	5.2	27.5	(X)	4.3	2.3	93.4
Milford	161	2464	13.3	4.5	13.4	11.1	12.8	6.5	8.9	18.8	37212	2.5	4.7	92.9
Milford	162.01	5650	9.7	9.7	19.6	16	15.9	10.4	2.7	7.7	30653	9.4	6.6	84
Milford	162.02	4157	13.7	7.2	13.1	11.7	11.5	8.6	4.8	21.9	35569	3.1	4.9	92
Mont Vernon	195.02	2170	15	6	9.6	7.1	12.4	8.8	5.6	23.1	40197	9.4	0.4	90.2
Pelham	2001	3719	11.8	8.7	12.7	10.2	12.3	11.8	3.9	20.8	(X)	5.5	3.7	90.7
Pelham	2002	3498	13.8	5.8	11	9	17.1	9	4.9	20.8	41130	2	0.1	97.9
Pelham	2003	3331	15	4.9	12.3	7.1	12.8	9.3	6.2	19.9	40815	8.9	1.5	89.6
Wilton	190	3043	12.2	7.6	15.3	17.1	11.9	10.4	4.2	15.1	30998	4.3	5.1	90.7

Source: U.S. Census Bureau, 2011-2015 American Community Survey 5-Year Estimates

City of Nashua Census Tracts

Table 6. City of Nashua Demographics by Age (Years), by Census Tract, Percent (%)

Census Tract	Total pop. (n)	Under 5	5 to 17	18 to 24	25 - 44	45-54	55 - 64	65 - 74	75 and over	Median age
101	5193	5.7	17.4	8.2	18.5	16.8	18.9	9	5.5	45.1
102	7575	7.2	15.3	12.5	30.6	15.2	12.7	4.8	1.8	33.7
103.01	4196	6.1	14.3	2.5	30.2	13.8	16.3	9.4	7.4	42.4
103.02	4255	7.2	13.9	6.1	29.8	12.1	13.4	7.8	9.8	41.2
104	4990	5.8	15.6	7.8	25.5	20.1	12.8	8	4.4	40.4
105	4130	9.1	12.4	11.4	35.2	14.9	10.8	3.1	3.2	31.6
106	5447	6.5	12.3	13.8	29.8	18.5	7.6	6	5.5	35.5
107	1432	4.8	11.3	9.6	24.4	14.4	11.3	7.1	17	44.7
108	7711	8.3	18.7	8.7	34.4	11.2	11.3	3.2	4.2	30.2
109	7013	8.4	16.1	8.7	26.5	19.3	9.5	5.2	6.1	36.4
110	5057	5.2	12.3	14.2	23.3	15.6	13.2	8.1	8.1	39.8
111.01	3492	8.2	11.1	10.5	41.6	9.2	13.2	4.3	1.9	34
111.02	3226	4.2	7	12.8	44	12.1	6.7	9.1	3.9	32.9
112	6270	4.7	16.2	8.5	18.9	18.1	16	9.1	8.5	45.8
113	4513	4.4	15.4	8.3	20.7	14	16.2	11	10.1	45.7
114.01	5368	4.7	15.7	5.5	27	16.9	13.8	7.4	9	42.5
114.02	5006	6.1	19.2	7.7	26.6	19.1	10.5	6.8	4	39.2
115	2236	1.5	11.3	5.1	17.8	15.9	19.6	14.7	14.1	53.4

Source: U.S. Census Bureau, 2011-2015 American Community Survey 5-Year Estimates

Table 7. City of Nashua Demographics by Gender and Race/Ethnicity, Percent (%)

Census Tract	Male	Female	White	Black or African American	American Indian/ Alaska Native	Asian	Native Hawaiian/ Other Pacific Islander	Some other race	Two or more races	Hispanic or Latino origin (of any race)	Not Hispanic or Latino
101	46.8	53.2	90.1	2.1	0	4.3	0	0.9	2.6	8.2	83.1
102	50	50	83.4	2.6	0	10.8	0	1.6	1.6	8.6	75.7
103.01	51.4	48.6	89.2	0	0.2	5.6	0	0.2	4.7	2.7	86.7
103.02	44.3	55.7	94.9	0.5	0	3.3	0	0.8	0.5	9.1	86.4
104	48.6	51.4	90.5	2.7	0	2.8	0	0.4	3.5	6.6	85
105	51.8	48.2	82.9	5	0	0	0	4.4	7.7	32.9	59.4
106	46.4	53.6	79.8	11.2	0	3.2	0	1.9	3.7	20.2	70.4
107	45	55	76.2	8.8	0.5	3.6	0	3.5	7.4	21	62.2
108	53.8	46.2	81.9	5.3	0.5	0.9	0	3.2	8.2	36.2	52.7
109	46.8	53.2	86.8	2.7	0	4.9	0.2	2	3.4	6.5	82.2
110	47.4	52.6	91.8	1.8	0	3.1	0	1	2.2	5.2	88.8
111.01	45.1	54.9	73.6	1.9	0.1	19	0	0.6	4.7	3.9	70.5
111.02	56.5	43.5	65	3.6	0.7	25.5	0.3	0.5	4.4	7.3	58.5
112	49.6	50.4	78	2.5	0	17.4	0	0	2.1	4.7	74.7
113	47.4	52.6	91.2	0.7	0.1	4.9	0	1.2	2	2.4	89.7
114.01	51.5	48.5	83.3	0.6	0	11.9	0	0	4.2	8.9	75.8
114.02	51.8	48.2	78.4	3.9	0	16.2	0	0.5	1	7.8	70.9
115	44.2	55.8	90.3	0	0	1.8	0	2.2	5.7	8.3	89.3

Source: U.S. Census Bureau, 2011-2015 American Community Survey 5-Year Estimates

Table 8. City of Nashua Demographics by Language, Percent (%)

Census Tract	Speak language other than English	Speak language other than English - Speak English "very well"	Speak English less than "very well"
101	6.6	5.4	1.1
102	21.7	14.5	7.2
103.01	13.6	11.1	2.5
103.02	12.5	7.2	5.2
104	13.4	11.9	1.4
105	30.1	16.8	13.3
106	20.1	11.3	8.8
107	28.2	14.7	13.6
108	36.2	12.1	24.1
109	16.9	8.9	8
110	11.5	9.3	2.2
111.01	26.9	18.4	8.5
111.02	37	17.5	19.5
112	20.9	13.1	7.8
113	11.2	9.6	1.6
114.01	15.2	11	4.1
114.02	25.4	20.6	4.8
115	14.3	9.8	4.5
Source: U.S. Census Bureau, 2011-2015 American Community Survey 5-Year Estimates			

Table 9. City of Nashua Demographics by Education, Percent (%)

Census Tract	Less than High School graduate	High School graduate (includes equivalency)	Some college or Associate's degree	Bachelor's degree	Graduate or professional degree
101	4.2	17.7	33.8	27.5	16.8
102	8.5	25.5	21.9	28.9	15.2
103.01	3.8	13.6	26.2	36.4	20
103.02	5.4	32	27.7	23	12
104	8.3	22.1	31.8	22.3	15.5
105	18.1	29.2	40.4	8.6	3.6
106	11.7	37.3	34	12.3	4.7
107	24.2	33.5	28.6	9.6	4.1
108	27.1	35.8	22.1	10.9	4
109	11.8	37.2	28.9	15.7	6.4
110	7.2	20.9	34.5	23.6	13.7
111.01	3.1	19.3	26.7	30.6	20.3
111.02	6.6	21.9	28.4	23.5	19.6
112	6.3	9.7	25.1	32	27
113	6.1	28.5	31.6	19.3	14.5
114.01	8.2	21.5	32.5	23.1	14.7
114.02	9.6	19.1	25.2	32.5	13.6
115	15.5	31.9	29.8	16.1	6.8

Source: U.S. Census Bureau, 2011-2015 American Community Survey 5-Year Estimates

Table 10. City of Nashua Demographics by Income and Poverty, Percent (%)

Census Tract	$1 to $9,999 or less	$10,000 to $14,999	$15,000 to $24,999	$25,000 to $34,999	$35,000 to $49,999	$50,000 to $64,999	$65,000 to $74,999	$75,000 or more	Median Income (USD)	Below 100% of the poverty level	100 to 149% of the poverty level	At or above 150% of the poverty level
101	12.9	5.5	11	6.6	13.7	11.7	5.2	23.1	43379	4.7	2.6	92.7
102	19.3	5.1	12.3	10.9	16.6	5.2	4.3	15.3	(X)	6.9	3.3	89.8
103.01	6.2	4.1	12.8	10.4	14.2	12	5	26.5	47898	1.8	2.9	95.3
103.02	10.9	8.2	13.2	15.2	18.1	8.5	5.3	13.5	34000	5.3	6.6	88
104	19.5	9.4	15	8.7	15.4	8	2.8	15.4	29125	10.4	7.2	82.4
105	26.2	14.3	21.2	12.6	11	3.6	1.7	2.9	16842	31.5	20.5	48
106	19.9	8.6	15.8	18.4	14.5	7.8	2.8	4	(X)	17.7	8.9	73.4
107	18.4	15.9	27.5	9.1	13.4	3.2	1.4	2.4	(X)	29.3	18.6	52.1
108	20.7	14.1	19.9	13	12.1	3	1.3	6.1	18746	34.5	17.8	47.7
109	20.3	6.5	16.2	12	15.7	8.5	3.3	9.9	(X)	11.7	9.3	79
110	20.9	6.8	10.7	11.7	14.5	11.7	4.2	12.3	(X)	4.2	5.2	90.6
111.01	8.2	5.1	11.7	12.3	16.2	10.1	6	20.5	40260	6.5	10.1	83.5
111.02	6.9	6.9	12.7	12.4	10.6	10.9	6.9	14.8	37441	16.4	6.1	77.5
112	11.7	6.7	8.3	4.5	12.5	11.3	4.7	30.5	52035	0.4	1.3	98.3
113	16	9	11.9	7.1	11.2	7.3	5.6	22.1	36540	3.4	3.4	93.1
114.01	10	6.9	14.3	9.6	11.5	12.1	6.1	23.9	42361	3.9	13.4	82.7
114.02	15.1	6.8	11.5	10	15.7	8.5	6.1	16.8	(X)	5.9	3.4	90.7
115	12.7	10.8	20.2	16.9	13.8	6.3	2.9	8.8	26288	4.5	10	85.5

Source: U.S. Census Bureau, 2011-2015 American Community Survey 5-Year Estimates

Appendix C:
Community Assessment for Public Health Emergency Response (CASPER)

Contents

Purpose

The purpose of this study was to conduct an efficient, low-cost health survey for the City of Nashua's Community Health Assessment and to exercise a rapid needs assessment for use in disaster response. An operations-based functional exercise was developed to test communications capabilities, emergency operations center management, and epidemiological surveillance and investigation capabilities. The Health Survey Committee was composed of Division of Public Health and Community Services staff and Community Health Assessment Advisory Board members. Volunteers were from a number of regional partners, including the City of Nashua Division of Public Health and Community Services, Nashua Office of Emergency Management, Nashua GIS and Assessing, Lamprey Health Care, St. Joseph Hospital, Southern New Hampshire Health System, the United Way, Rivier University, Nashua CERT and interns with the DPHCS. The CASPER sub-committee determined the content and length of the health survey, qualifications for volunteers, avenues to publicize the survey, and the structure of the public health emergency operations center to ensure the safety of volunteers and efficiency of the survey. The following objectives were developed for the 2017 Nashua Community Health Survey (2017 NCHS):

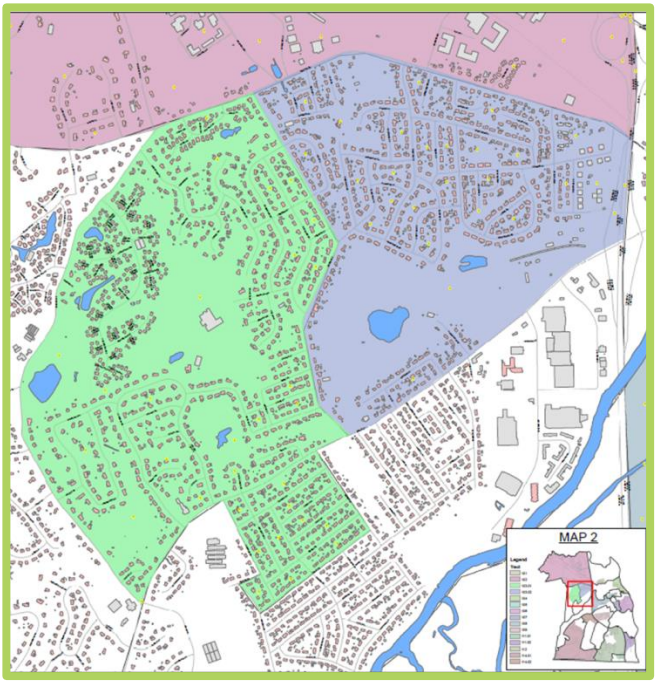
- **Objective 1:** Coordinate the health survey, allocate resources, provide support and maintain communications with volunteers.
- **Objective 2:** Test communication plans using landlines, social media, cell phones and radios.
- **Objective 3:** To gather health data from 210 residents using the Centers for Disease Control and Prevention's Community Assessment for Public Health Emergency Response (CASPER) protocol.
- **Objective 4:** Issue public information alerts, warnings and notifications of the CASPER health survey.

The Director of the Nashua Division of Public Health and Community Services got to lace up her shoes to lend a hand conducting the door-to-door survey. Also pictured is DPHCS's Nurse Manager. All hands on deck!

The assessment protocol was based on the Centers for Disease Control and Prevention's Community Assessment for Public Health Emergency Response (CASPER). A two-stage random cluster sampling technique, based on the World Health Organization's Expanded Program on Immunizations, was used to identify thirty randomly selected census block groups based on probability proportionate to the number of housing units within the block group. Seven randomly selected households from each block group were selected to be interviewed by teams of volunteers with the forty-one question health survey. Survey questions targeted various health and emergency preparedness topics and data was collected using a paper-based system. Maps with a pre-determined, random walking path of each block group were generated using ESRI's ArcGIS software and the 2010 random walk protocol. Prior to deployment, survey volunteers received just-in-time training on survey methodology, the questionnaire, use of maps, safety and

communications protocols.

The City of Nashua is located in the southern portion of New Hampshire's Hillsborough County, approximately halfway between the Cities of Lowell, Massachusetts, and Manchester, New Hampshire. Its nearly 31 square miles are home to an estimated 86,494 people, according to the 2010 US Census, or roughly 6.6% of New Hampshire's total population of 1,316,470 people. The second largest city by population in New Hampshire, Nashua's population is more than double that of Concord, the state's capital and third largest city. There are 36,825 occupied housing units in the city of Nashua, with an average household size of 2.45 people. Assessment teams approached 587 households and completed 183 surveys for a 31.2% response rate. Of the 587 households visited, contact was made with 217 residents, yielding a 37.0% cooperation rate.



Sample ArcGIS map developed by City of Nashua Assessing Department staff for walking route selection and mapping.

The rapid needs assessment tool successfully gathered health and emergency preparedness data for the Community Health Assessment while training volunteers and exercising the ability to operate this protocol in the event of a disaster. An HSEEP After Action Report and Improvement Plan were developed by the Public Health Emergency Preparedness Coordinator with the Greater Nashua Public Health Network and are available upon request from the City of Nashua, Division of Public Health and Community Services.

Survey Methods

The survey consisted of forty-one questions from a variety of health topics, with a majority of the questions focused on emergency preparedness and personal health. Most of the survey questions were gathered from existing national surveys, such as the Centers for Disease Control's Behavioral Risk Factor Surveillance System (BRFSS). The survey was translated into Spanish and Portuguese, and translators were sent to the block groups within the City with the highest percentage of Spanish speakers. To record the survey results, the volunteers tracked the answers to the

Team backpacks and equipment are ready to go!

survey on an answer sheet. Prior to starting the survey, verbal consent from respondents was obtained and personal identifiers were not collected in an effort to make surveys anonymous. Survey completion times ranged from ten to thirty minutes, depending on the interviewer and the respondent.

Acting Incident Commander and CASPER project coordinator gets a turn out in the field with the Public Health Network Services Program Assistant.

For this two-stage cluster sampling technique, the City of Nashua was divided into block groups of which 30 clusters were randomly selected using probability proportionate to the estimated number of housing units. Maps of the selected block groups were printed using ESRI's ArcGIS by the Nashua Assessing Department. Next, a random walking path was plotted in each cluster for the volunteers to follow. The starting point was predetermined at the most south western portion of the block group. The direction of the walking path was determined by rolling a die. Due to low cooperation rates, survey methods were changed in the field to allow interview teams to visit every third house to conduct a survey. Teams were instructed to document the houses that were surveyed, refused, had no one home, and those that had a language barrier.

Interview teams, consisting of two members each, were deployed into the field and assigned a team leader. Team leaders were stationed at the public health emergency operations center with the project coordinator acting as the Incident Commander.

The CASPER toolkit includes templates for orienting and debriefing teams, consent forms and tracking forms which were used as guides for the health survey. Following the protocol, the necessary supplies were organized and the teams were provided a red vest, identification badges, handheld radios, clipboards, and supporting documentation. Prior to deployment, 25 volunteers received two hours of training on the survey methodology, the questionnaire, and the maps with their walking path. After completing the surveys, volunteers were debriefed, completed an evaluation form and were provided a certificate of appreciation. A debriefing meeting was held with the evaluator, team leaders, and support staff to gather the highlights and challenges of the day after each survey day.

Data Analysis

Information from the answer sheets was entered into Microsoft Excel and analyzed using EpiInfo. To account for the lack of a simple random sample, each housing unit was assigned a weight so the estimates could be generalized to every housing unit from the sampling frame. Weighted frequencies were calculated with 95% Confidence Intervals. Data collected through the 2017 survey process used duplicative methods as the survey in 2010. For this reason, data were weighted in the same way as data from the 2010 health survey in order to develop trend data and to make comparisons.

Results

Demographics

A total of 183 (87.1%) out of a possible 210 health surveys were completed. In 2010, 98.6% of the possible 210 surveys were completed. Table 1 indicates demographic data collected from survey participants in the 2017 Nashua Community Health Survey. This data is compared to the 2010 Nashua Community Health Survey and the 2015 American Community Survey, Overall, the respondents were a good representation of the community and were comparable by gender, age, race and income.

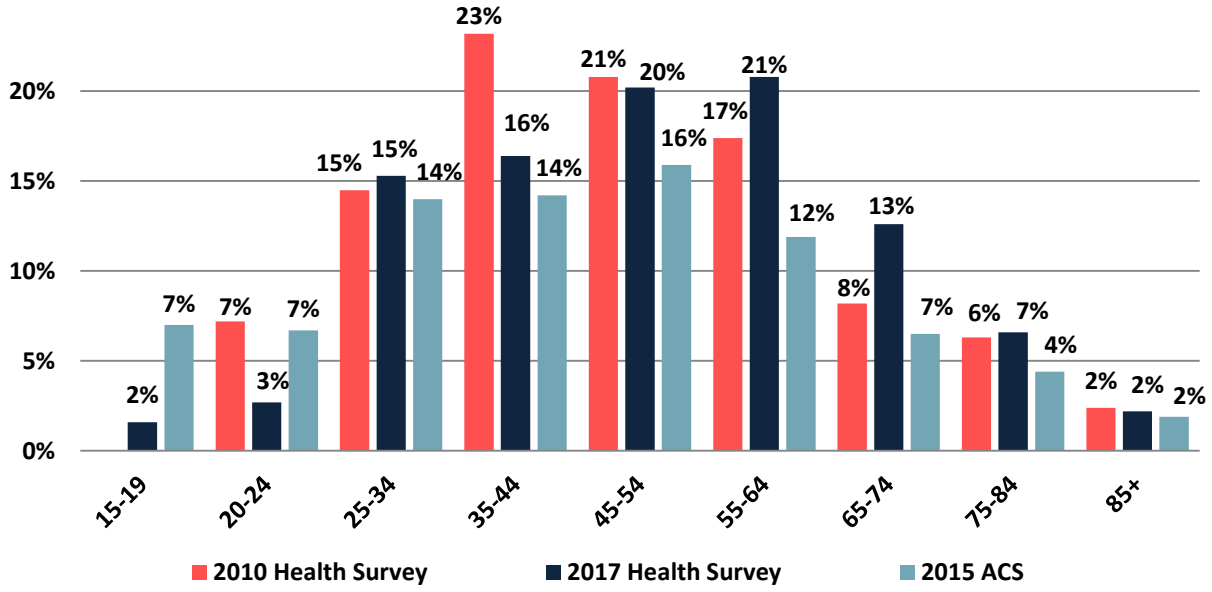
Table 1. Demographic Information by Survey and ACS

Respondent Demographics of the Nashua Community Health Survey, 2010 and 2017			
Gender	**2010 Health Survey**	**2017 Health Survey**	**US Census**
Male	44%	45.9%	49.4%
Female	56%	53.9%	50.8%
Ethnicity	**2010 Health Survey**	**2017 Health Survey**	**US Census**
Hispanic	7%	14.7%	9.8%
Not Hispanic	93%	81.4%	91.2%
Refused	0.5%	0.5%	*
Race	**2010 Health Survey**	**2017 Health Survey**	**US Census**
Caucasian	81%	77.7%	73.6%
Asian	7%	8.6%	5.1%
Black / African American	*	1.2%	12.6%
Income	**2010 Health Survey**	**2017 Health Survey**	**US Census**
Less than $10,000	2%	3.5%	5%
$10,000-$14,999	3%	3.8%	3.4%
$15,000- $24,999	8%	4.5%	9.8%
$25,000- $34,999	9%	5.3%	8.3%
$35,000- $49,999	9%	10%	11.6%
$50,000- $74,999	16%	15.6%	16.2%
$75,000- $99,999	14%	10%	15%
$100,000 or more	24%	30%	30.7%
Education	**2010 Health Survey**	**2017 Health Survey**	**US Census**
Less than 9th grade	4.3%	0.7%	4.3%
9th - 12th, no diploma	2.4%	2.7%	5.8%
High School Grad.	18.8%	18.3%	25.2%
Some college, no degree	17.9%	11.%	20.1%
Associate's Degree	16.4%	16.1%	8.9%
Bachelor's Degree	23.2%	25.3%	22.5%
Graduate or professional degree	16.4%	25.8%	13.2%

Source: 2011-2015 American Community Survey, 2010 NCHS, 2017 NCHS

Figure 2 outlines the ages of respondents from the 2010 and 2017 Nashua Community Health Survey compared to the 2011-2015 American Community Survey 5-Year Estimate. CASPER surveys generally tend to oversample age brackets over 35 years, and an undersampling can be seen in the 15-19 and 20-24 year age brackets.

Figure 2. Distribution of Participants in the 2017 Community Health Survey by Age Range, 2017

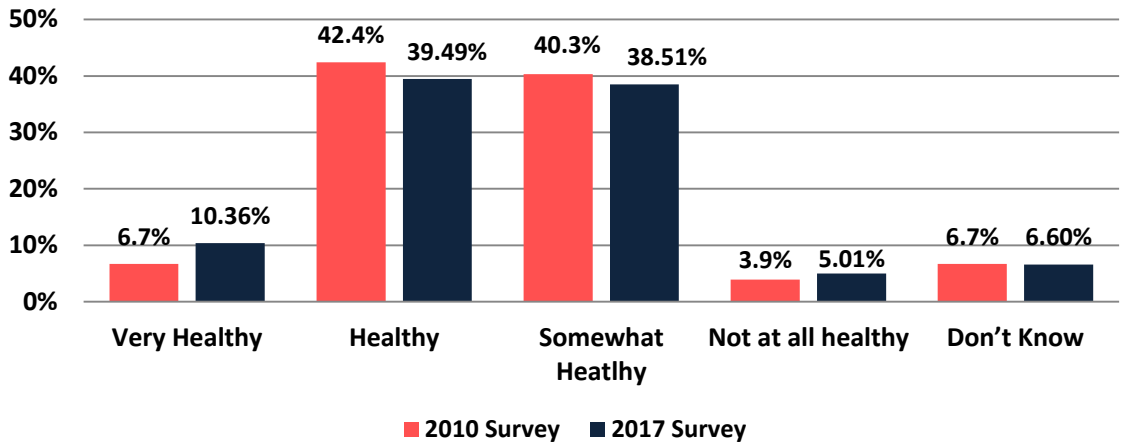


Source: 2010 and 2017 NCHS, 2015 American Community Survey

Community Health

These questions asked residents about the health of the Nashua community. When respondents were asked how they would rate the health of the Nashua community in 2017, 49.9% responded the community was either very healthy (10.4%, 95%CI: 9.23-11.6%) or healthy (39.5%, 95%CI: 37.6-41.4%). There is a statistically significant increase in the rate of respondents indicating their community is very healthy from 2010 and 2017 and a statistically significant increase in respondents who rated their community as Not at all healthy from 2010 to 2017.

Figure 3. Ratings of Overall Health of the Community by Survey Year



Source: 2010 and 2017 NCHS

When survey participants were asked what one health issue their household would fix in order to make Nashua a healthier place to live, 30.1% of respondents indicated substance misuse, 9.8% wanted to have better nutrition and weight management, 7.7% would create better access to healthcare, 5.5% cited an environmental health issue, and 4.4% specifically wanted more recreation and opportunities for physical activity. Almost all of the top health priorities from 2010 have remained in the top five health priorities cited by residents in 2017. However, the increase in substance misuse from 7% in 2010 to 30% in 2017 and delineated needs for nutrition and weight and physical activity or recreational opportunities are important to note.

Table 2. Perceived Health Issues in Nashua by Residents, 2011 and 2017

Respondent- Selected Health Priorities			
2010		2017	
Priority	Rate	Priority	Rate
Environmental Health	16%	Substance Misuse	30.1%
Physical Exercise, Nutrition, Weight Management	15.5%	Nutrition and Weight Management	9.8%
Access to Healthcare	12.1%	Access to Healthcare	7.7%
Education and Youth	7.2%	Environmental Health	5.5%
Substance Abuse	7.0%	Physical Activity and Recreation	4.4%
Source: 2010 and 2017 NCHS			

Personal Health

This section of the survey focused on the health of residents and access to healthcare. It also aimed to identify trends in referral patterns for different health issues, including substance misuse, smoking cessation and mental health. 97.2% of Nashua households have at least one person who seen a doctor for a routine check-up within the past two years and 0.1 % have never been to a doctor for a routine check-up. There is a statistically significant increase in the number of households who have received a physical in the past year than in 2010. Additionally, 89.9% of households have one person they think of as their personal doctor. When looking at access to healthcare, 90.7% of surveyed households did not have trouble accessing medical care or surgery in the past 12 months.

When asked how long it has been since their last routine oral cleaning, 86.9% of residents have visited a dentist or dental hygienist for a cleaning within the past year and 4.9% responded their last cleaning was five or more years ago. 1.1% of households report having never visited a dentist for a cleaning. 88.5% of residents did not have trouble accessing dental care.

Respondents were also asked how many hours per day (on average) members of the household watch TV, play video games, or use a computer for recreation that is not work related. Table 3 compares reported screen time from the 2010 NCHS and the 2017 NCHS. There is a statistically significant increase in households who report 2-3 hours, 4-5 hours, and more than 6 hours of screen time per day.

Table 3. Reported Screen Time of Nashua Households

Reported Average Screen Time per Day				
	2010		2017	
Hours	Rate	95% CI	Rate	95% CI
0-1	32.3%	26-38.7%	9.3%	8.2-10.48%
2-3	60%	53.2-66.6%	46.9%	44.9-48.78%
4-5	7.2%	3.7-10.8%	27.3%	25.6-29.1%
6+	1.5%	0-1.9%	16%	14.6-17.5%
Source: 2010 and 2017 NCHS				

Both the 2010 and 2017 Nashua Community Health Surveys asked respondents who they would tell a friend or family member to go see or talk to for a mental health issue, substance misuse and to quit smoking. In 2010, substance misuse and mental health were addressed in the same question. However, due to the increase in concern for substance misuse, a question was added to identify referral patterns specifically for substance misuse. When residents were asked where they would send a friend that wanted to quit smoking, 56.3% would tell them to talk to a doctor and 11.2% would suggest the NH Quitline. 5% of respondents would refer a friend or family member to the Nashua Health Department if they wanted to quit smoking. This is a statistically significant increase from 1% in 2010. The Nashua Division of Public Health and Community Services is no longer host to a smoking cessation program.

If referring a friend or family member with a substance misuse problem, 34.1% of households would refer the individual to a doctor, and 19.2% would refer this individual to a private counselor or therapist. 18.2% of households would tell a friend or family member to go to a mental health center for a mental health issue. Only 6.6% would refer a friend or family member to a fire station, which is considered a Safe Station in the City of Nashua. Safe Stations are access points for anyone, anytime to gain entry into the continuum of care for substance use disorder.

To access counseling for a mental health problem, 57% of households would refer a friend or family member to the hospital, 32.5% would send them to a doctor, and 28.7% would refer them to a private counselor or therapist.

In 2017, households that participated in the survey indicated that they get most of their health related information from a healthcare professional (67.8%) or the internet and social media (17%). In 2010, 50.9% of respondents would get most of their health information from a healthcare provider, and 26% would get most of their health information from a faith-based organization.

Survey participants were also questioned about receiving the annual influenza vaccine. In 58% of households surveyed, every member of the household received a flu shot in the prior year, and 15% had at least one member who received a flu shot. This is a statistically significant increase from 51% in 2010.

73% of households in Nashua have at least one member of the household who has received a flu shot within the past year.

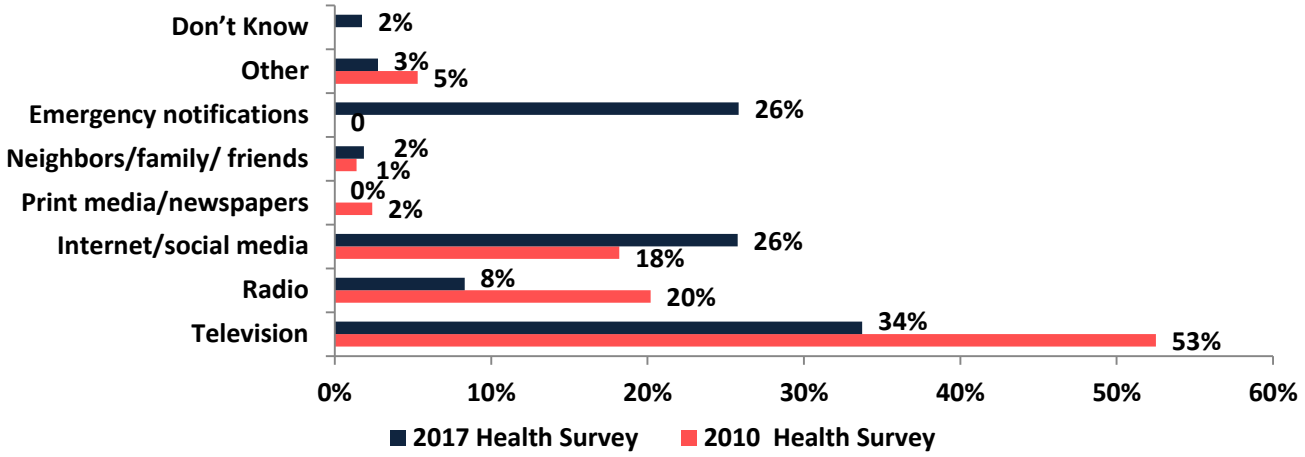
Source: 2017 NCHS

Emergency Preparedness

The final section of the health survey was dedicated to emergency preparedness and included questions relating to evacuation, safety in the household, and communications.

When asked what would be the main method or way of getting information from authorities in a large-scale disaster or emergency, 34% of households would get information through the television, 26% would look to the internet or social media and 26% would rely on emergency notifications. Figure 4 compares the 2010 Nashua Community Health Survey results and 2017 Nashua Community Health Survey in terms of how households would receive information from authorities in a large-scale disaster or emergency.

Figure 4. Main Method of Receiving Emergency Information from Authorities, 2010 and 2017



Source: 2010 and 2017 NCHS

The main reasons households might not evacuate when asked to do so were due to concerns about leaving property behind (16.2%) and concern about family safety (12.8%). 16.7% of respondents indicated that there was some other reason why they would not evacuate if asked to do so. Table 4 compares the 2010 Nashua Community Health Survey and 2017 Nashua Community Health Survey responses to the question "What would be the main reason why your household would evacuate if asked to do so."

Table 4. Perceived Barriers to Following a Mandatory Evacuation Order

	2010		2017	
Reason	**Rate**	**95%CI**	**Rate**	**95%CI**
Lack of transportation	3.9%	3.7-4.1%	6.8%	5.9-7.9%
Lack of trust in public officials	6.3%	6.0-6.5%	4.1%	3.4-4.9%
Concern about leaving property behind	20.7%	20.3-21.1%	16.2%	14.8-17.7%
Concern about personal safety	13.8%	13.5-14.2%	9.5%	8.4-10.7%
Concern about family safety	*	*	12.8%	11.6-14.2%
Concern about leaving pets behind	13.5%	13.1-13.8%	9.2%	8.1-10.4%
Concern about traffic jams and inability to get out	17.8%	17.4-18.2%	10.3%	9.2-11.6%
Health problems (could not be moved)	5.3%	5.1-5.5%	8.1%	7.1-9.2%
Other	12%	11.7-12.4%	16.7%	15.3-18.2%
Don't Know	6.7%	6.5-7.0%	6.3%	5.5-7.4%

Source: 2010 and 2017 NCHS

For additional information regarding emergency preparedness topics, including evacuation destinations, training, communication techniques, emergency equipment and supplies, and perceptions of preparedness and reliable entities, please view the Emergency Preparedness Chapter.

Limitations of Data

There are a number of limitations of this study. Selection bias, or only surveying individuals who were at their home and willing to participate in the survey, is an inherent limitation of the study due to the door-to-door survey method.

Also, survey teams encountered a large proportion of households that did not answer the door, resulting in the extension of pre-determined walking routes. This extension increased selection bias. The dates and times of subsequent survey days also can contribute to selection bias, which may result in an overrepresentation of households that have an individual over the age of 18 years that are home during the traditional work hours. There is the possibility that an over-sampling of individuals who work alternate shifts, unemployed individuals, or retired individuals occurred during the survey process.

Demographic data collected indicates that there is indeed an over-representation of those over 35 years of age when compared to population parameter estimates. There is also an under-representation of participating households where the respondent identifies as Black or African American and an over-representation of individuals who identify as White or Caucasian. The additional survey dates and times also could lead to increase bias in the sample due to possible variations in the population sampled over the course of several months.

Conclusion

The rapid needs assessment successfully gathered health and emergency preparedness data for the Community Health Assessment while training volunteers and exercising the ability to operate this rapid needs assessment protocol in the event of a disaster. The collected health data provides additional situational awareness on the current health and well-being of Nashua residents and the emergency preparedness data will assist emergency management officials with enhancing existing plans and protocols prior to an incident. This collaborative effort demonstrated the ability for community partners to prepare for and respond to emergencies in a pre-disaster setting. Leveraging public health and emergency management tools for the collection of primary data has shown to be a valuable opportunity for community partners, organizations and residents.

Acknowledgements

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City of Nashua, GIS Department
City of Nashua, Office of Emergency Management
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Greater Nashua YMCA
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St. Joseph Hospital
Southern New Hampshire Health System
United Way & One Greater Nashua

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City of Nashua, Board of Health
City of Nashua, Division of Public Health and Community Services
City of Nashua, Police Department
City of Nashua, Office of Emergency Management
Community members
Dartmouth-Hitchcock
Greater Nashua Public Health Network
Greater Nashua YMCA
Lamprey Health Care- Nashua Center
Nashua Community Emergency Response Team
NH Department of Health and Human Services
Rivier University
Southern New Hampshire Health System
St. Joseph Hospital
University of New England
United Way of Greater Nashua

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United Way of Greater Nashua
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Whitney Tave

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Sam Lane
John Watkins
Diana Zuleta

Thank you to our community members. Without you, this project would not be possible.

2017 Nashua Community Health Survey Press Releases

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FOR IMMEDIATE RELEASE

Nashua Community Health Survey

Teams to go into Nashua's neighborhoods

Nashua, NH – May 18, 2017 –

On Saturday, May 20th, teams of volunteers with the City of Nashua Division of Public Health and Community Services will go out into communities within the City of Nashua in a collaborative effort to collect health and preparedness information from city residents. A total of 210 households have been randomly selected to complete this survey, and information that is collected is completely anonymous.

The "CASPER" Community Health Survey has been used historically within the city of Nashua to help policy makers, organizations, and social service organizations understand the current health concerns residents and to identify gaps in resources or services for health problems. What better way is there to find out about community needs than to talk to the residents themselves? All the information collected through this anonymous door-to-door survey will be analyzed and organized into meaningful measures for organizations throughout the Greater Nashua area to use when considering current or new health programs and services for the people they serve. The information collected will be highlighted in the 2017 Greater Nashua Community Health Assessment, which will be published in September 2017 and may be found by visiting the City of Nashua website at www.nashuanh.gov. Additionally, households that complete the survey will be entered to win a prize sponsored by the Greater Nashua Public Health Network and the City of Nashua Division of Public Health and Community Services.

For more information please contact Chelsea St. George, Public Health Emergency Preparedness Coordinator and survey organizer at (603) 589-4569 or by email at StGeorgeC@NashuaNH.gov.

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FOR IMMEDIATE RELEASE

Nashua Community Health Survey

Teams to go into Nashua's neighborhoods

Nashua, NH – July 7, 2017 – On Wednesday, July 12th, teams of volunteers with the City of Nashua Division of Public Health and Community Services will go out into communities within the City of Nashua in a collaborative effort to collect health and preparedness information from city residents. Information that is collected is completely anonymous, and participating households can be entered to win a raffle prize.

The "CASPER" Community Health Survey has been used historically within the city of Nashua to help policy makers, healthcare providers, and social service organizations understand the current health concerns of residents and identify gaps in resources or services. What better way is there to find out about community needs than to talk to the residents themselves? All the information collected through this anonymous door-to-door survey will be analyzed and organized into meaningful measures for organizations throughout the Greater Nashua area to develop better programs and provide effective services for the people they serve. The information collected will be highlighted in the 2017 Greater Nashua Community Health Assessment, which will be published in September 2017 and may be found by visiting the City of Nashua website at www.nashuanh.gov. Additionally, households that complete the survey will be entered to win a prize sponsored by the Greater Nashua Public Health Network and the City of Nashua Division of Public Health and Community Services.

For more information please contact Chelsea St. George, Public Health Emergency Preparedness Coordinator and survey coordinator at (603) 589-4569 or by email at StGeorgeC@NashuaNH.gov.

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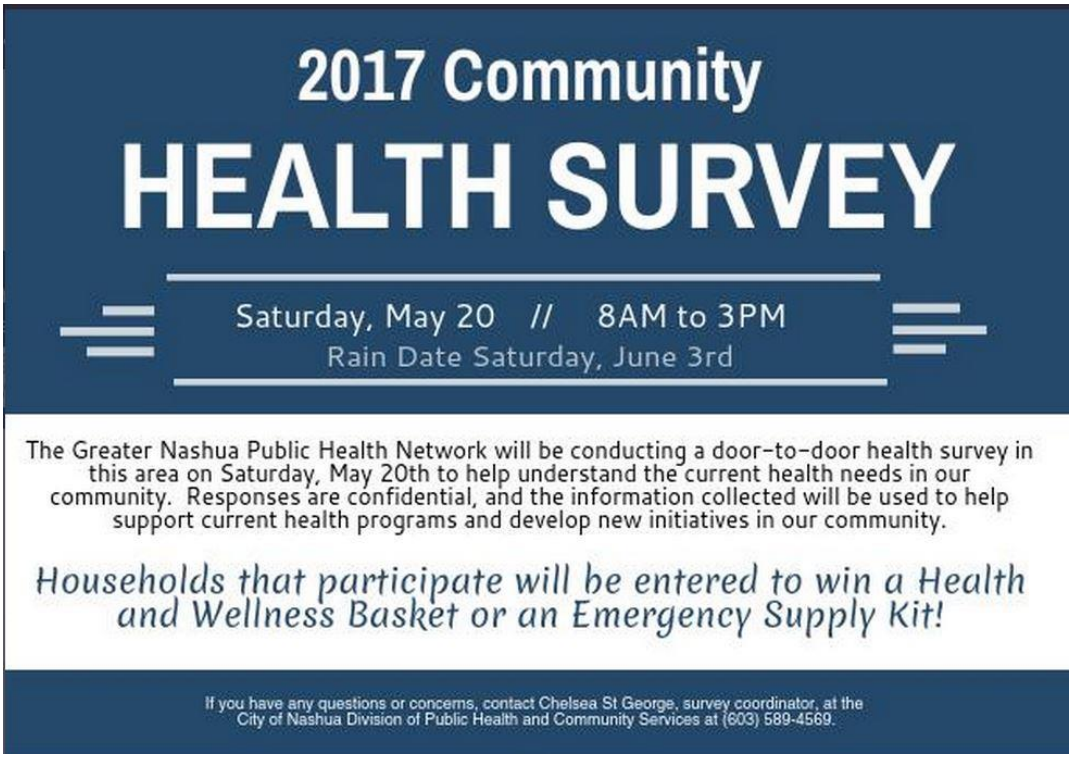
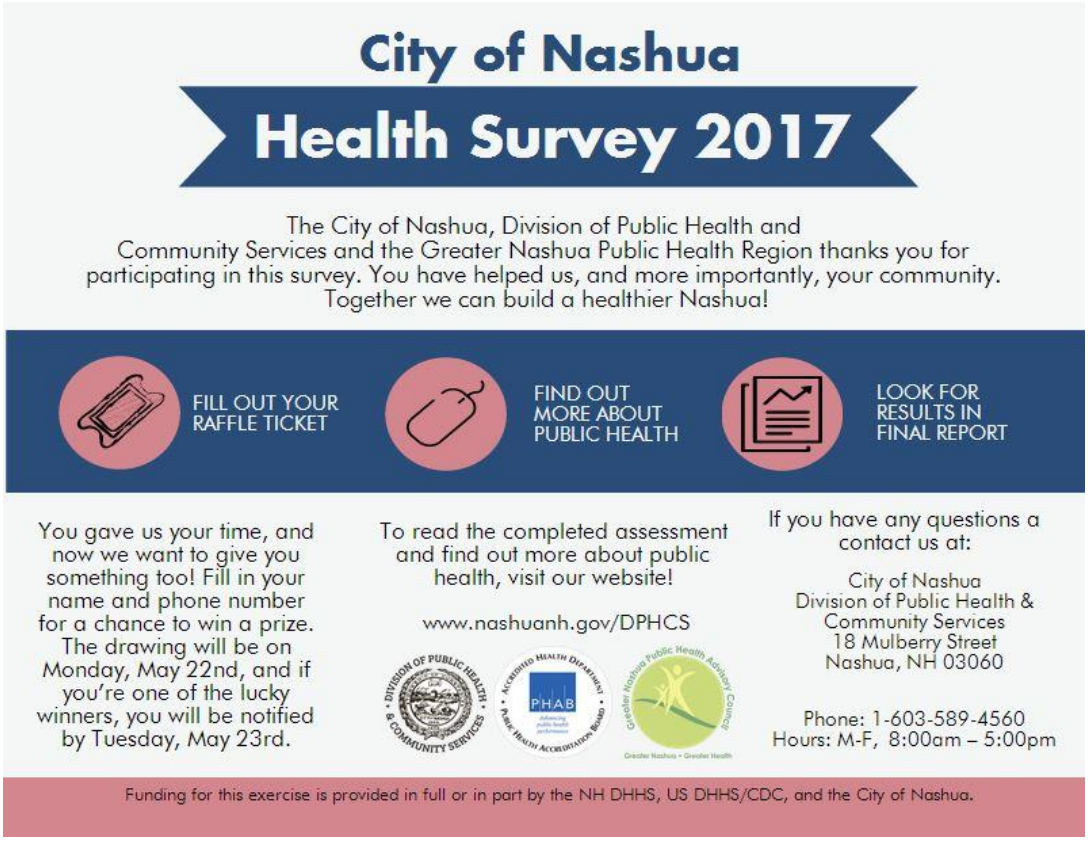
2017 Community Health Survey Flyers





2017 CASPER Community Health Survey – English

2017 Community Health Survey

Read *the following to the individual that answers the door.* ***Fill in the blanks*** *with your names.*

"Hello,

My name is _____, and this is_____. We are working with the Nashua Health Department to complete a survey on the health of our city.

This household was randomly chosen to be a part of the survey. The survey will help us develop health programs and make Nashua a healthier place to live.

The survey is voluntary, and all the information that you give us will remain anonymous, and it will not be linked to you or this household in any way. The time to complete this survey is about 20 minutes."

Ask *the following questions:*

Is this where you live?	**YES**	**NO**
Would you be willing to complete the survey for your household?	**YES**	**NO**
Are you at least 18 years of age? (*If not, ask if someone else is*.)	**YES**	**NO**

If **"YES"** to all**, start** the survey.

If "**NO**" to any, politely thank them and **move to the next selected household**.

FOR INTERNAL USE ONLY

Date: _____

Names of Interviewers: _____ | _____

Team Number: _____

In an emergency, dial 9-1-1.

Nashua Police Department: 594- 3500

Headquarters: 589-4560

Part 1: Demographic Questions

"The first set of questions is general questions about you and your household. Your answers are anonymous and will not be linked to you or your household."

#	Question	Answer Options
Q1	What is your age?	____ years 99 Refused
Q2	May I ask, do you identify as male or female?	1 Male 2 Female 99 Refused
Q3	Do you identify as Hispanic or Latino?	1 Yes 2 No 99 Refused
Q4	Which of the following from this list would you say describes your race? *Please check one answer. Give the card, read question, read answers.*	1 Black or African American 2 American Indian or Alaskan Native 3 Asian 4 Native Hawaiian or Other Pacific Islander 5 White or Caucasian 6 Multiracial 7 Other 98 Don't Know 99 Refused
Q5	What is the highest level of school, college, or vocational training that you have completed? *Please check one answer. Give the card, read question, read answers*	1 Less than 9th grade 2 9-12th grade, no diploma 3 High School graduate (or GED equivalent) 4 Associate's Degree or Vocational training 5 Some college (no degree) 6 Bachelor's Degree 7 Graduate or professional degree 8 Other 98 Don't know 99 Refused

Q6	What is your annual household income from all sources…? *Please check one answer. Give the card, read question, read answers.*	1 Less than $10,000 2 $10,000 - $14,999 3 $15,000 - $24,999 4 $25,000 - $34,999 5 $35,000 - $49,999 6 $50,000 - $74,999 7 $75,000 - $99,999 8 $100,000 or more 98 Don't know 99 Refused
Q7	How many people does this income support?	____ Number of people 98 Don't Know 99 Refused
Q8	Do you have working internet access in your household?	1 Yes 2 No 98 Don't Know 99 Refused

Part 2: Community Health

"Next, I am going to ask you a couple of questions about the health of our community. Remember, the answers you give will not be linked to you or this household in any way. You can choose not to answer any questions if you feel uncomfortable."

#	Question	Answer Options
Q9	How would you rate the overall health of our community? *Read answers.*	1 Very healthy 2 Healthy 3 Somewhat healthy 4 Not at all healthy 98 Don't know 99 Refused
Q10	What one health issue would your household fix in order to make Nashua a healthier place to live?	Answer: 98 Don't Know 99 Refused

Part 3: Personal Health

"Now I am going to ask you some questions about the health of the members of your household. Remember, you can choose not to answer a question if you feel uncomfortable."

#	Question	Answer Options
Q11	A routine checkup is a general physical exam, not an exam for a specific injury, illness, or condition. About how long has it been since you or a member of your household has last visited a doctor for a routine checkup? *Read answers.*	1 Within the past year 2 Within the past 2 years 3 Within the past 5 years 4 More than 5 years ago 5 Never 98 Don't know 99 Refused
Q12	Does each member of your household have a single person that they think of as their personal doctor or healthcare provider?	1 Yes 2 No 98 Don't know 99 Refused
Q13	Sometimes people have difficulties in getting medical care when they need it. During the past 12 months, was there any time when you or a member of this household needed medical care or surgery but did not get it?	1 Yes 2 No 98 Don't know 99 Refused
Q14	How long has it been since you or any member of this household has had your/their teeth cleaned by a dentist or dental hygienist?	1 Within the past year 2 Within the past 2 years 3 Within the past 5 years 4 More than 5 years ago 5 Never 98 Don't know 99 Refused
Q15	During the past 12 months, was there a time when you or another member of this household needed dental care but could not get it at that time?	1 Yes 2 No 98 Don't Know 99 Refused
Q16	If a friend or family member needed counseling for a mental health problem, who would you tell them to call or talk to? *Please check one answer. Give the card, read question, read answers.*	1 Private counselor or therapist 2 Doctor 3 Support group 4 Minister/ religious leader 5 School counselor 6 Mental Health Center 7 Hospital 8 Other 98 Don't Know 99 Refused
Q17	If a friend or family member needed counseling for substance misuse, who would you tell them to call or talk to? *Please check one answer. Give the card, read question, read answers.*	1 Private counselor or therapist 2 Doctor 3 Support group 4 Minister/ religious leader 5 School counselor 6 Mental Health Center 7 Hospital 8 Fire Station 9 Other 98 Don't Know 99 Refused

Q18	How many hours per day do members of this household watch TV, play video games, or use a computer for recreation that is not work related? *Read answers.*	1 0-1 hours 2 2-3 hours 3 4-5 hours 4 6^{+} hours 98 Don't know 99 Refused
Q19	If a friend or family member wanted to quit smoking, where would you or members of this household tell them to go get help? *Please check one answer. Give the card, read question, read answers.*	1 NH Quitline 2 Doctor or Medical Provider 3 Faith-based Organization 4 Pharmacy 5 Hospital 6 Private counselor/ therapist 7 Health Department 8 NH Addiction Crisis Line 9 Other 98 Don't know 99 Refused
Q20	Where do you and the members of the household get most of your health-related information? *Please check one answer. Give the card, read question, read answers.*	1 Friends and family 2 My child's school 3 Doctor/Health Care Professional 4 Pharmacist 5 Help lines 6 Faith based Organization 7 Internet/social media/mobile apps 8 Books/magazines 9 Health Department 10 Other 98 Don't Know 99 Refused
Q21	This next question is about the seasonal flu. A flu vaccine is a shot that is injected into your arm. Last year did you and the members of the household (who could) get a flu shot?	1 Yes 2 No 3 Some, but not all members 98 Don't know 99 Refused

Part 4: Emergency Preparedness

"Our last set of questions asks about being prepared for emergencies and disasters."

#	Question	Answer Options
Q22	What would be your household's main method or way of getting information from authorities in a large-scale disaster or emergency? *Read answers.*	1 Television 2 Radio 3 Internet/social media 4 Print media (newspaper) 5 Neighbors/family/friends/coworkers 6 Emergency Notifications 7 Other 98 Don't Know 99 Refused
Q23	If public authorities announced a mandatory evacuation from your community due to a large-scale disaster or emergency, would your household evacuate?	1 Yes 2 No 98 Don't Know 99 Refused
Q24	If your household needed to evacuate, where would you go? *Read answers.*	1 Relative or friend's home 2 Hotel 3 Emergency Shelter 4 Other 98 Don't Know 99 Refused
Q25	What would be the MAIN reason why your household might not evacuate if asked to do so? *Please check one answer. Give the card, read question, read answers.*	1 Lack of transportation 2 Lack of trust in public officials 3 Concern about leaving property behind 4 Concern about personal safety 5 Concern about family safety 6 Concern about leaving pets 7 Concern about traffic jams and inability to get out 8 Health problems (could not be moved) 9 Other 98 Don't Know 99 Refused
Q26	In the event of a disaster that required you to leave the area, would your household need to rely on public transportation or the government for transportation?	1 Yes 2 No 98 Don't know 99 Refused
Q27	How prepared do you feel your household is to handle a large-scale disaster or emergency? *Read answers.*	1 Well prepared 2 Somewhat prepared 3 Not prepared at all 98 Don't know 99 Refused
Q28	Does your home have ─	A. A working smoke detector? 1 Yes 98 Don't Know 2 No 99 Refused

	Note: Carbon monoxide (CO) detectors check the level of CO in your home. It is not a smoke detector.	B. A working carbon monoxide detector? 1 Yes 98 Don't Know 2 No 99 Refused C. A working fire extinguisher? 1 Yes 98 Don't Know 2 No 99 Refused D. An alternate source of heat if the power goes out? 1 Yes 98 Don't Know 2 No 99 Refused E. A working air conditioner or central air? 1 Yes 98 Don't Know 2 No 99 Refused F. A battery operated radio with extra batteries? 1 Yes 98 Don't Know 2 No 99 Refused G. A working flashlight and working batteries? 1 Yes 98 Don't Know 2 No 99 Refused H. A Written disaster evacuation plan for how you will leave your home, in case of a large-scale disaster or emergency that requires evacuation? 1 Yes 2 No 98 Don't Know 99 Refused
Q29	Does your household have adequate heating for the winter?	1 Yes 2 No 98 Don't Know 99 Refused
Q29a	If your home does not have adequate heating in the winter, what is the MAIN reason why you do not? *Read answers.*	1 I cannot afford to buy a heating unit 2 I cannot afford to run it (oil/electricity cost) 4 I don't want it/need it 98 Don't Know 99 Refused
Q30	Does your household have adequate cooling/air conditioner for the summer?	1 Yes 2 No 98 Don't know 99 Refused
Q30a	If your household does not have adequate cooling/air conditioning in the summer, what is the MAIN reason why you do not? *Read answers.*	1 I cannot afford to buy a unit 2 I cannot afford to run one (electricity cost) 3 My landlord does not allow tenants to have one 4 I don't want/need one 98 Don't know 99 Refused
Q31	How prepared do you feel your household is to handle a large-scale disaster or emergency? *Read answers.*	1 Well prepared 2 Somewhat prepared 3 Not prepared at all 98 Don't know 99 Refused
Q32	Does your household have a 3-day supply of water for everyone who lives there? A 3-day supply of water is 1	1 Yes 2 No

	gallon of water per person per day.	98 Don't know 99 Refused
Q33	Does your household have a 3-day supply of nonperishable food for everyone who lives there? By non-perishable we mean food that does not require refrigeration or cooking.	1 Yes 2 No 98 Don't know 99 Refused
Q34	Does your household have a 3-day supply of prescription medication for each person who takes prescribed medicines?	1 Yes 2 No 98 Don't know 99 Refused
Q35	In a large-scale disaster or emergency what would be your main method or way of communicating with relatives and friends? *Read answers.*	1 Regular home telephones 2 Cell phones 3 Email 4 Pager 5 2-way radios 6 Other 98 Don't know 99 Refused
Q36	Have you signed up for your community's emergency alerts and warning system?	1 Yes 2 No 98 Don't know 99 Refused
Q37	In the past 2 years, have you attended training on how to be better prepared for an emergency?	1 Yes 2 No 98 Don't know 99 Refused
Q38	What is the MAIN reason why your household might not be prepared? *Read answers. Please check one answer. Give the card, read question, read answers.*	1 Getting information about what to do in an emergency is too hard 2 I don't know how to get prepared 3 I don't have time to prepare 4 Preparing is too expensive 5 I don't want to think about preparing for disasters 6 I have just never thought about preparing for disasters 7 If there were a disaster, the police and fire department would take care of my needs 8 I don't need training to know how to react in an emergency 98 Don't know 99 Refused
Q39	Disaster preparedness includes buying disaster kits and making specific plans, but it also includes participating in training or drills and learning what to do in a disaster. Which of the following would be the MOST LIKELY reason your household would prepare? *Please check one answer. Give the card, read question,*	1 My job or school encourages me to have a family disaster plan 2 My job, school, or community service organization *encourages or requires* me to take training to

	read answers.	prepare for emergencies 3 People I know have taken steps to get prepared 4 During the first 72 hours of a disaster, I fell it is my responsibility to take care of my family in a disaster 98 Don't know 99 Refused
Q40	In the first 72 hours following a disaster, please choose the entity you would MOST expect to rely on for assistance. *Please check one answer. Give the card, read question, read answers.*	1 Household members 2 People in my neighborhood 3 Non-profit organizations (American Red Cross or Salvation Army) 4 My faith community 5 Fire, Police, EMS 6 State and Federal Government Agencies, Including FEMA 98 Don't know 99 Refused
Q41	In the first 72 hours following a disaster, please choose the entity you would LEAST expect to rely on for assistance. *Please check one answer. Give the card, read question, read answers.*	1 Household members 2 People in my neighborhood 3 Non-profit organizations (American Red Cross or Salvation Army) 4 My faith community 5 Fire, Police, EMS 6 State and Federal Government Agencies (FEMA) 98 Don't know 99 Refused

"That is the end of the survey! Thank you for your time. We appreciate your help in making Nashua a healthier place to live. Here is a packet of information that you may find useful. Have a great day!"

Hand them the information packet, bag of items, and raffle ticket. Remember to SMILE!