Prevalence of Heart Disease and Hypertension in Adults—New Hampshire, 2011–2015
Data Brief / May 2017

Background

Nearly 30% of adults in New Hampshire reported having been told they have high blood pressure.

Heart disease and hypertension (high blood pressure) affect millions of Americans. The age-adjusted prevalence of hypertension among U.S. adults was 29.0% in 2011–14 (1). Hypertension describes a condition where a person’s blood pressure is equal to or greater than a systolic pressure of 140 mmHg or diastolic pressure of 90 mmHg on two or more clinical office visits (2).

Risk factors for developing hypertension include aging; obesity; being African American; having a family history of hypertension; a high-sodium diet; excessive alcohol consumption; being physically inactive; and having diabetes. Because uncontrolled hypertension can lead to stroke, diseases of the kidney or retina, and heart disease, diagnosis and treatment of hypertension are important.

In this data brief, “heart disease” is defined as coronary heart disease (CHD), also known as coronary artery disease. CHD involves diseased coronary arteries and can lead to angina (chest pain), myocardial infarction (heart attack), and sudden cardiac death. Heart disease is the number one cause of death in the U.S. and the number two cause of death in New Hampshire (second to cancer). Risk factors for CHD include diabetes, high cholesterol, hypertension, and smoking.

This data brief describes the prevalence of hypertension and heart disease and their associated conditions among New Hampshire adults from the New Hampshire Behavioral Risk Factor Surveillance System (NH BRFSS).

Hypertension and Heart Disease: Overall Trends in New Hampshire

From 2011 to 2015, when controlling for age, the prevalence of hypertension decreased, but the prevalence of heart disease remained stable.

The crude prevalence of high blood pressure among New Hampshire adults was 30.7%, 95% CI [29.3, 32.1], in 2011; 30.3%, [28.9, 31.8], in 2013; and, 29.1%, [27.7, 30.6], in 2015. The trend in the crude prevalence from 2011 to 2015 was not statistically significant ($P = 0.13$).

However, after adjusting for age, the prevalence of hypertension decreased, from 28.6%, [27.3, 30.0], in 2011, to 27.7%, [26.4, 29.2] in 2013, and

Key findings in this data brief

- Although the prevalence of high blood pressure decreased from 2011 to 2015, about one in three New Hampshire adults had high blood pressure.
- Compared with the rest of the State, Hillsborough County, excluding Manchester and Nashua, had a lower prevalence of hypertension and heart disease, but Coos County had a higher prevalence of heart disease than the rest of the State.
- People living in a rural county had a higher risk of hypertension than those living in a non-rural county.
- Being more active and having a normal body mass index were associated with lower rates of both high blood pressure and heart disease.
26.0%, [24.5, 27.4], in 2015 (P<0.05).

The crude prevalence of heart disease in New Hampshire adults was 6.0%, [5.4, 6.6], in 2011, 5.9%, [5.3, 6.6] in 2013, and 5.7%, [5.1, 6.3], in 2015; the changes were not statistically significant (P = 0.53). The age-adjusted prevalence was similar (Figure 1).

Figure 1. Crude and age-adjusted prevalence of hypertension and heart disease in NH adults: NH BRFSS, 2011–2015


Hypertension and Heart Disease: Socio-demographic Factors

Nearly one out of every three New Hampshire males and one out of every four New Hampshire females have ever been told they have high blood pressure. Males were 1.3 times more likely to have been told they had high blood pressure and 2.1 times more likely to have been told they had heart disease than females.

The age-adjusted prevalence (abbreviated as prevalence for the remainder of this brief; see Data Notes for details) of hypertension among males was 30.5%, [28.9, 32.1], and among females was 23.2%, [22.0, 24.4] (adjusted prevalence ratio [adjusted PR] 1.3, [1.2, 1.4]). The prevalence of hypertension was higher among older age groups, increasing from 5.1%, [3.7, 8.2], among persons 18–24 years old; 11.3%, [8.9, 14.2], among persons 25–34 years old; 18.1%, [15.6, 21.0], among persons 34–44 years old; 33.6%, [32.0, 35.2] among persons 45–64 years old; and 59.0%, [57.2, 60.8] among those 65 years or older (Figure 2). There was no difference in the prevalence of hypertension among non-whites/Hispanics (28.5%, [24.7, 32.6]) and whites (26.7%, [25.7, 27.8]) (adjusted PR 1.1, [0.9, 1.3]).

Figure 2. Age-adjusted prevalence of hypertension in NH adults by age group: NH BRFSS, 2013 and 2015 (combined)


For heart disease, the prevalence was higher among males (6.8%, [6.1, 7.5]) than females (3.3%, [2.9, 3.7]), adjusted PR 2.1, [1.8, 2.4]). The prevalence of heart disease was higher among older age groups, increasing from 0.8%, [0.5, 1.3], among persons 18–44 years old; 5.4%, [4.6, 6.2], among persons 45–64 years old; and 17.1%, [15.7, 18.5] among those 65 years or older.
(Figure 3).

There was no difference in the prevalence of heart disease among non-whites/Hispanics (6.9%, [4.8, 9.8]) and whites (4.8%, [4.4, 5.2], adjusted PR 1.4 [0.96, 2.1]).

In contrast, the prevalence of heart disease in Coos County was 7.1%, [5.4, 9.4]. This was 1.5 times higher than the rest of the state (adjusted PR 1.5, [1.2, 1.9], P<0.01).

Overall, the prevalence of hypertension and heart disease were the same across New Hampshire counties and cities—with two exceptions: Hillsborough County, excluding Manchester and Nashua, and Coos County.

The prevalence of hypertension in Hillsborough County, excluding Manchester and Nashua, was 24.1%, [21.4, 27.1]. This was 12% lower than the prevalence of the rest of the state (adjusted PR 0.88, [0.80, 0.98], P = 0.02).

The prevalence of heart disease in Hillsborough County, excluding Manchester and Nashua, was 3.7%, [3.0, 4.4]. This was 27% lower than the prevalence of the rest of the state (adjusted PR 0.73, [0.58, 0.90], P<0.01).

The prevalence of hypertension was higher in rural than in non-rural New Hampshire counties. The age-adjusted prevalence was 29.5%, [27.0, 32.2], among persons living in rural counties and 26.5%, [25.4, 27.5], among persons living in non-rural counties (see Data Notes for definitions of rural and non-rural). Persons living in rural counties were 1.1 times more likely to have been told they had hypertension than those in non-rural counties (adjusted PR 1.1, [1.0, 1.2]), P<0.01).

The age-adjusted prevalence of heart disease was 5.6%, [4.7, 6.7], among persons living in rural counties, and 4.8%, [4.4, 5.3], among those in non-rural counties. This difference was not statistically significant (adjusted PR 1.2 [1.0, 1.4], P = 0.06)).

**Figure 3. Age-adjusted prevalence of heart disease in NH adults by age group: NH BRFSS, 2013 and 2015 (combined)**

**Figure 4. Age-adjusted prevalence of hypertension and heart disease in NH adults by household income: NH BRFSS, 2013 and 2015 (combined)**
The prevalence of both hypertension and heart disease decreased with increasing levels of income and education.

Hypertension prevalence was 31.2%, [28.8, 33.8], among persons reporting an annual household income of <$25,000, 30.5%, [28.1, 32.9], among those with a household income of $25,000–<$50,000, and 23.3%, [22.0, 24.6], among those with a household income of ≥$50,000 (Figure 4). Persons reporting an annual household income of <$25,000 were 1.4 times more likely to have been told they had high blood pressure than those with a household income of ≥$50,000 (adjusted PR 1.4, [1.2, 1.5], P<0.01).

The prevalence of heart disease was 8.2%, [6.9, 9.7], among persons reporting an annual household income of <$25,000, 5.8%, [4.9, 6.9], among those with a household income of $25,000–<$50,000, and 3.5%, [3.0, 4.1], among those with a household income of ≥$50,000 (Figure 4). Persons reporting a household income of <$25,000 were 2.4 times more likely to have been told they had heart disease than those with a household income of ≥$50,000 (adjusted PR 2.4, [1.9, 2.9], P<0.01).

Hypertension prevalence was 35.5%, [29.6, 41.8], among persons reporting they did not graduate high school, 29.9%, [27.9, 31.9], among those who graduated high school, 26.7%, [25.0, 28.5], among those with some college, and 21.7%, [20.5, 23.0], among those who were college graduates (Figure 5). Persons reporting they did not graduate from high school were 1.5 times more likely to have ever been told they had hypertension than persons who were college graduates (adjusted PR 1.5, [1.3, 1.7], P<0.01).

Heart disease prevalence was 8.9%, [7.0, 11.3], among persons reporting they did not graduate high school, 5.5%, [4.7, 6.3], among those who graduated high school, 4.5%, [3.9, 5.2], among those with some college, and 3.6%, [3.0, 4.2], among college graduates (Figure 5).

Persons reporting they did not graduate from high school were 2.5 times more likely to have ever been told they had heart disease than college graduates (adjusted PR 2.5, [1.9, 3.3], P<0.01).

Compared with persons who were employed or self-employed, persons reporting being unable to work\(^1\) were 1.8 times more likely to have been told they had hypertension (adjusted PR 1.8, [1.6, 2.0]) and 4.0 times more likely to have been told they had heart disease (adjusted PR 4.0, [3.1, 5.3]).

Hypertension, Heart Disease, and Risk Factors

Persons who were overweight were 1.6 times more likely to have been told they had high blood pressure than persons with normal

\(^{1}\) Self-report of being unable to work; being retired was reported separately.
weight. Persons with obesity were 2.3 times more likely than persons with normal weight to have been told they had high blood pressure than persons with normal weight.

The prevalence of hypertension was 16.3%, [15.0, 17.7], among persons with a body mass index (BMI) of 18.5–<25 kg/m$^2$ (normal weight), 26.8%, [24.9, 28.7], among persons with a BMI of 25–<30 kg/m$^2$ (overweight), and 39.3%, [37.0, 41.6], among persons with a BMI ≥30 kg/m$^2$ (Figure 6). Persons who were overweight were 1.6 times more likely to have been told they had high blood pressure than persons who were normal weight (adjusted PR 1.6, [1.5, 1.8], $P<0.01$). Persons who were obese were 2.3 times more likely to have been told they had high blood pressure than persons who were normal weight (adjusted PR 2.3, [2.1, 2.6], $P<0.01$).

The prevalence of heart disease was 3.3%, [2.7, 4.0], among persons with a body mass index (BMI) of 18.5–<25 kg/m$^2$ (normal weight), 5.4%, [4.7, 6.1], among persons with a BMI of 25–<30 kg/m$^2$ (overweight), and 6.2%, [5.5, 7.1], among persons with a BMI ≥30 kg/m$^2$ (Figure 6). Persons who were overweight were 1.7 times more likely to have been told they had heart disease than persons who were normal weight (adjusted PR 1.7, [1.3, 2.0], $P<0.01$). Persons who were obese were 1.9 times more likely to have been told they had heart disease than persons who were normal weight (adjusted PR 1.9, [1.6, 2.4], $P<0.01$).

The prevalence of hypertension was 24.7%, [23.2, 26.1], among persons reporting ≥150 minutes or more of physical activity each week, compared with 31.9%, [29.6, 34.3] among those reporting 0 minutes (Figure 7). Persons reporting ≥150 minutes of physical activity each week were 23% less likely to have been told they had high blood pressure (adjusted PR 0.77, [0.71, .82], $P<0.01$).

The prevalence of heart disease was 3.9%, [3.4, 4.4], among persons reporting ≥150 minutes of physical activity each week, compared with 6.6%, [5.7, 7.5] among those reporting 0 minutes (Figure 7). Persons reporting ≥150 minutes of physical activity each week were 42% less likely to have been told they had heart disease (adjusted PR 0.58, [0.48, 0.69], $P<0.01$).

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Figure 6. Age-adjusted prevalence of hypertension and heart disease in NH adults by BMI: NH BRFSS, 2013 and 2015 (combined)

Figure 7. Age-adjusted prevalence of hypertension and heart disease in NH adults by weekly minutes of physical activity: NH BRFSS, 2013 and 2015 (combined)

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The prevalence of hypertension was higher among both current (28.1%, [25.5, 30.9]) and former (29.5%, 27.2, 32.0) smokers compared with never smokers (24.2%, 23.0, 25.5). The prevalence of heart disease was also higher among both current (7.0%, [5.7, 8.6]) and former (5.7%, 5.0, 6.4) smokers compared with never smokers (3.4%, 3.1, 3.9)). However, former smokers were 30% less likely than current smokers to have been told they have heart disease (adjusted PR 0.7, [0.58, 0.93], P = 0.01) (Appendix A).

The prevalence of hypertension was 1.9 times higher among persons with diabetes (48.9%, [41.7, 56.1]) compared with persons without diabetes (24.6%, [23.5, 25.6]) (adjusted PR 1.9, [1.8, 2.0], P<0.01). The prevalence of heart disease was 2.5 times higher among persons with diabetes (11.7%, [8.6, 15.8]) compared with persons without diabetes (4.1%, [3.7, 4.5]) (adjusted PR 2.5, [2.1, 2.9], P<0.01) (Appendix A).

For heavy alcohol use (defined as adult men reporting >14 drinks or adult women reporting >7 drinks per week) as a risk factor, there was no difference in the prevalence of hypertension among persons who report heavy alcohol use or not (25.9%, [24.4, 27.5] and 27.6%, [22.9, 32.8]; adjusted PR 0.92, [0.77, 1.1]). However, persons reporting heavy alcohol use had a higher prevalence of heart disease (4.9%, [4.4, 5.4], than those not reporting heavy use (2.4%, [1.4, 4.1]) (adjusted PR 2.0, [1.1, 3.6], P = 0.03) (Appendix A).

**Hypertension, Heart Disease, and Poor Mental Health**

Persons reporting 14 or more days of poor mental health were 1.4 more likely to report being told they had high blood pressure and 1.8 times more likely to report being told they had heart disease than persons reporting less than 14 poor mental health days per month.

The prevalence of hypertension was higher among persons reporting 14 or more days per month of poor mental health (36.0%, [32.8, 39.4]) compared with those reporting fewer than 14 days per month of poor mental health (25.3%, [24.3, 26.4]) (adjusted PR 1.4, [1.3, 1.6], P<0.01). The prevalence of heart disease was also higher among persons reporting 14 or more days per month of poor mental health (7.9%, [6.6, 9.6]) compared with those reporting fewer than 14 days per month of poor mental health (4.6%, [4.2, 5.0]) (adjusted PR 1.8, [1.5, 2.2], P<0.01).

**Exploring Associations among Counties and Hypertension and Heart Disease**

Because of the association between residence in Hillsborough County, excluding Manchester and Nashua, and lower hypertension (adjusted PR 0.88, [0.80, 0.98], P = 0.02), we modeled potential covariates to better assess this association. When controlling for age, sex, and having health insurance, the association between Hillsborough County and hypertension remained stable (adjusted PR 0.89, [0.80, 0.98], P = 0.02). However, when also controlling for income and education, the association of lower prevalence of hypertension with Hillsborough County, excluding Manchester and Nashua, disappeared (adjusted PR 0.93, [0.84, 1.0])

When controlling for age, sex, and having health insurance, income, and education, the association between Hillsborough County, excluding Manchester and Nashua, and lower heart disease persisted (adjusted PR 0.73, [0.56, 0.94], P = 0.02). When also controlling for hypertension, Hillsborough County, excluding Manchester and Nashua, remained independently associated with a lower prevalence of heart disease (adjusted PR 0.74, 0.57, 0.96], P = 0.03).

To explore the association of residence in Coos County and higher prevalence of heart disease,
we modeled heart disease, county, and select covariates. When controlling for age, sex, and having health insurance, the association of higher prevalence of heart disease and Coos County persisted (adjusted PR 1.5, [1.1, 1.9], P<0.01). However, when also controlling for income and education, Coos County was no longer independently associated with heart disease (adjusted PR 1.2, [.88, 1.6]).

Conclusions

Similar to patterns nationwide, as of 2015, approximately 29% (310,000) of adults in New Hampshire had been told that they had high blood pressure, and 6% (60,000) of adults had been told they have heart disease (3). Since 2011, although the crude prevalence of hypertension has remained stable, the age-adjusted prevalence has decreased, suggesting that there has been some decrease in hypertension but that this decrease is “masked” by an overall aging statewide population.

Hypertension was associated with increasing age, being male, lower annual household income, and less formal education. Socioeconomic disparities in Coos County appear to contribute to higher prevalence of heart disease in that county, although the data showed that income- and education-based disparities were present statewide.

Both hypertension and heart disease were also associated with being overweight or obese, being less physically active, having a history of smoking, and having diabetes. NH adults can lower their risk of developing hypertension or heart disease by losing weight or maintaining a healthy weight, being physically active, quitting or not starting smoking, and preventing the development of diabetes. The association between hypertension and heart disease and poor mental health days highlights the association between mental and physical health.

This analysis had several limitations. First, New Hampshire BRFSS is a cross-sectional survey, so causality between the disease and socio-demographic or risk factor could not be assessed. Second, New Hampshire BRFSS contains self-reported responses, so reporting bias might exist. Third, New Hampshire BRFSS does not capture whether persons currently have hypertension or heart disease. Finally, New Hampshire BRFSS questions do not capture control or clinical management of hypertension or heart disease, so what might be driving the decrease in age-adjusted prevalence of hypertension could not be assessed.

In conclusion, hypertension and heart disease continue to affect thousands of New Hampshire adults. Although there has been a decrease in the prevalence of hypertension, the overall aging New Hampshire population is likely to keep hypertension as one of the chronic disease challenges facing the state. Income- and education-based disparities in hypertension and heart disease exist throughout the State.

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References


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### Data Notes:

The New Hampshire Behavioral Risk Factor Surveillance System (NH BRFSS) is an annual, random digit-dial survey of non-institutionalized New Hampshire adults. Cell phone users have been included since 2011. Questions about high blood pressure and heart disease were asked in 2011 and 2013. Data from 2013 and 2015 were combined to increase statistical power for sub-population estimates. Analysis used SAS-callable SUDAAN® to account for complex survey design. Estimates might differ from those reported by CDC because state-specific weights were used to calculate prevalence at the sub-state level. For consistency, the same weights were used for the entire analysis. A rural county was defined using the 2013 USDA ERS Rural-Urban Continuum Codes 6–9 (i.e., population <20,000). To account for possible variation in population age structures by county and for subsequent reporting consistency, age-adjusted prevalence estimates were calculated for socio-demographic, behavioral, and comorbid condition variables. Chi-square test was performed for estimates with overlapping confidence intervals. An adjusted prevalence ratio (adjusted PR) was calculated using a generalized linear model with a log link function (PROC LOGLINK) and adjusted for age and other covariates. P value of <.05 was considered to be statistically significant. For age adjustment, US 2000 Standard Population (distribution 9) was used. NH BRFSS data from 2013 and 2015 were combined to increase power for calculation of county-level and subpopulation estimates. Results were verified using R survey package.

### Abbreviations:

CI = confidence interval

### Appendix A. Age-adjusted prevalence of hypertension and heart disease by select risk factors: NH BRFSS, 2013 and 2015 (combined)

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<td>adjusted PR (95% CI)</td>
<td>P value</td>
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<td>1.4 [1.3, 1.6] &lt;0.01</td>
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1Hypertension defined as reporting yes to question, “Have you ever been told by a doctor, nurse, or other health professional that you have high blood pressure?” Responses reporting only borderline, pre-hypertensive, or hypertension during pregnancy were coded as no.

2Heart disease defined as reporting yes to question, “Has a doctor, nurse, or other health professional...ever told you had angina or coronary heart disease?”

3Adjusted prevalence ratio was adjusted for age; 4P-value testing used generalized linear model and controlled for age distribution; 5Diabetes defined as reporting yes to question, “Have you ever been told by a doctor, nurse, or other health professional that you have diabetes?” Responses reporting only borderline, pre-diabetes, or diabetes during pregnancy were coded as no; 6Heavy alcohol use was defined as more than 14 drinks per week for adult men and more than 7 drinks per week for adult women.