Asthma Burden Report
Update
New Hampshire
2014

nhasthma
CONTROL PROGRAM

NH DIVISION OF
Public Health Services
Improving health, preventing disease, reducing costs *for all*
Department of Health & Human Services

Asthma Burden Report Update, New Hampshire 2014

Prepared by:

Susan Knight, MSPH — Asthma Control Program Epidemiologist/Evaluator
Bureau of Public Health Protection
Division of Public Health Services
New Hampshire Department of Health and Human Services

Asthma Control Program Manager:

Beverly Baer Drouin — Section Administrator
Healthy Homes & Environment Section
Bureau of Public Health Protection
Division of Public Health Services
New Hampshire Department of Health and Human Services

Reviewers:

Heidi Pelchat, Quality Improvement Clinical Consultant
Jessica Morton, Health Promotion Advisor
Michael Laviolette, PhD, MPH, Senior Management Analyst
John Colby, PhD, NH Asthma Control Program Epidemiologist

For More Information Contact:

New Hampshire Department of Health and Human Services
Division of Public Health Services
New Hampshire Asthma Control Program
29 Hazen Drive
Concord, NH 03301-6504
Phone: (603) 271-0856 or 1-800-852-3324 ext 0856
TDD Access: 1-800-735-2964
Web site: www.dhhs.nh.gov/dphs/cdpc/asthma

Suggested Citation:

Knight S. *Asthma Burden Report Update, New Hampshire 2014*. New Hampshire Department of Health and Human Services, Division of Public Health Services, Asthma Control Program. February 2015.

This surveillance publication was supported by Cooperative Agreement Number 5U59EH000509-05 from the Centers for Disease Control and Prevention (CDC). Its contents are solely the responsibility of the author and do not necessarily represent the official views of CDC.

Table of Contents

FREQUENTLY ASKED QUESTIONS

1. What sources were used for this report?

A description of data sources used in this report may be found in Appendix A, Description of Data Sources at this location: http://www.dhhs.nh.gov/dphs/cdpc/asthma/documents/appendixa.pdf.

Data sources include:

- Behavioral Risk Factor Surveillance Survey (BRFSS), 2012[1] and 2013[2]
- BRFSS Asthma Callback Survey (ACBS), 2011-2012 and 2006-2008[3]
- National Survey of Children's Health (2011/2012)[4]
- New Hampshire Mortality Data (2010-2012)[5]
- New Hampshire Ambulatory Hospital Discharge Data (2001-2009)[6]
- New Hampshire Inpatient Hospital Discharge Data (2001-2009)[7]
- CDC Chronic Disease Calculator[8]

2. What is "prevalence"?

Prevalence is the proportion of people in a population that have the condition or characteristic of interest at a specific point in time. For example, the proportion with asthma in 2014.

$$\text{Prevalence} = \frac{\text{Number of people with a condition}}{\text{Number of people in the population of interest}}$$

Prevalence is frequently reported as a percentage or, the number of people with the condition per 100 people in the population.

3. What are 95% Confidence Intervals (CI)?

Confidence intervals are a statistical measure of reliability of the "estimates" presented. Confidence intervals are related to the "margin of error" sometimes referred to in polling results.

For example, in the table below, 11.0 percent of New Hampshire adults had current asthma in 2013. Because this number is based on a survey sample, it is only an estimate of the true current asthma prevalence. But we are confident that 95 percent of the time, the actual prevalence of current asthma will be between 9.8% and 12.1% (the 95 percent confidence interval).

Prevalence of current asthma among New Hampshire adults, 2013 NH BRFSS	
Percent	**95% CI**
11.0	9.8-12.1

For results not based on a sample, for example mortality or hospitalization data, the reasons for presenting a confidence interval are somewhat different but the interpretation is similar. It is an indication of the reliability of the result and the degree to which a rate might be affected by random variation.[9]

4. How do I know if two results are "statistically significant?"

Frequently Asked Question #2 explains the meaning of a 95% Confidence Interval (CI). For this report, 95% CIs are used to determine if results are significantly different from a statistical perspective.

When comparing two results, the 95% CI for each result should be compared. If the 95% CIs for the two results do not have values in common or do not "overlap" we may say that their differences are "statistically significant."

In the example below, the confidence interval for current asthma prevalence among males is 6.9% to 10.1% and the confidence interval for current asthma among females is 11.8% to 14.9%. These two intervals do not have any numbers in common. For this report, we considered the current asthma prevalence among males significantly lower than the current asthma prevalence among females.

In this context, "significance" is not an indication of the "importance" of the results, it is only an indication of how reliable the result presented may be from a statistical standpoint.

Prevalence of current asthma among New Hampshire adults, 2013 NH BRFSS

Characteristics	Percent	95% CI
Male	8.5	6.9-10.1
Female	13.3	11.8-14.9

5. What is "asthma control"

Asthma control is the degree to which asthma symptoms, functional impairments, and risks of negative events are minimized and the goals of therapy are met. The goal is for people with asthma to experience few if any asthma symptoms.[10]

For the purpose of data in this report, asthma control was defined using several questions from the BRFSS Asthma Call-back Surveys (ACBS).

The impairment construct of asthma control was based on the National Heart, Lung, and Blood Institute (NHLBI) EPR-3 *Guidelines for the Diagnosis and Management of Asthma*.[10] These were: symptoms (frequency and duration), nighttime awakenings, and use of short-acting beta2-agonists (SABA):

- Nighttime awakenings due to asthma on three or more nights in the past 30 days
- Use of Short-acting Beta Agonist (rescue) medications on 3 or more days per week
- Asthma symptoms on nine or more days in the past 30 days

The Expert Panel Report-3 (EPR-3) National Guidelines divide asthma control into three categories: Well-controlled, Not Well-Controlled and Very Poorly Controlled. Due to the limited number of survey respondents, in some places this report collapses the categories into Well-Controlled and Not Well-Controlled, with the latter category including Very Poorly Controlled.

Assessing Asthma Control Symptoms Using the EPR-3 National Guidelines

Components of Control	Well Controlled			Not Well Controlled			Very Poorly Controlled		
	Ages 0-4	Ages 5-11	Ages 12+	Ages 0-4	Ages 5-11	Ages 12+	Ages 0-4	Ages 5-11	Ages 12+
Symptoms	≤ 2 days/ week but not more than once a day		≤ 2 days a week	> 2 days/week or multiple times on ≤ 2 days/week		> 2 days/ week	Throughout the day		
Nighttime awakenings	≤ 1x/ month		≤ 2x/month	> 1x/ month	≥ 2x/ month	1-3x/week	> 1x/ week	≥ 2x/ week	≥ 4x/week
Interference with normal activity	None			Some limitations			Extremely limited		
Short-acting $beta_2$-agonist use for symptom control	≤ 2 days/ week			> 2 days/week			Several times per day		
Lung function FE-V1 (predicted) or peak flow personal best	N/A	> 80%	> 80% predicted/ personal best	N/A	60-80%	60-80% predicted/ personal best	N/A	< 60%	< 60% predicted/ personal best

Source:
Figures 12 and 15 from NHLBI Guidelines for the Diagnosis and Management of Asthma - Expert Panel Report 3

Introduction

This report is provides an update to the publication, *Asthma Burden Report - New* Hampshire 2010-2011, found at: http://www.dhhs.nh.gov/dphs/cdpc/asthma/publications.htm.

Its purpose is to provide the most recently available data to support state Asthma Partners with grant writing, program planning, and evaluation of work aimed at reducing the burden of asthma in New Hampshire.

New Hampshire continues to have one of the highest prevalence rates of asthma in the U.S with 11% of adults and 10.6% of children reporting current asthma in 2013.[2] In 2013, approximately 145,000 New Hampshire residents reported they had current asthma.[2] Approximately 50% of adults and 33% of children did not have their asthma well-controlled.[3]

Asthma costs New Hampshire an estimated $188 million (in 2014 dollars) each year. These costs are due to direct medical costs and lost wages due to asthma-related absenteeism.[18,19] Among children age 0-17, costs for medical care and parents' lost wages is an estimated $32 million. An estimated 30% of these costs ($9.6 million) are attributable to outdoor air quality.[20]

New Hampshire residents with lower incomes or less education have higher prevalence rates of asthma. Higher asthma prevalence is also found in New Hampshire's North Country with 18% of adults in Coos County reporting current asthma.[1]

The NHLBI reports that "with today's knowledge and treatments, most people who have asthma are able to manage the disease. They can live normal, active lives and sleep through the night without interruption from asthma." [11]

To control asthma the NHLBI recommends:

- Assessing severity and regularly monitoring asthma control
- Educating patients for self-management
- Controlling environmental factors and comorbid conditions that affect asthma, and
- Selecting, prescribing and using appropriate medications.[10]

What is new in this report?

- Updated asthma prevalence for adults (2011, 2012 and 2013) and children (2012 and 2013). Improvements were made in survey methods to produce better estimates of prevalence for asthma and other health risks. Prevalence estimates for children and adults released in this report are based on these new survey methods.

- Updated information about adult asthma control and management for adults (2011 and 2012) based on improved survey methods.

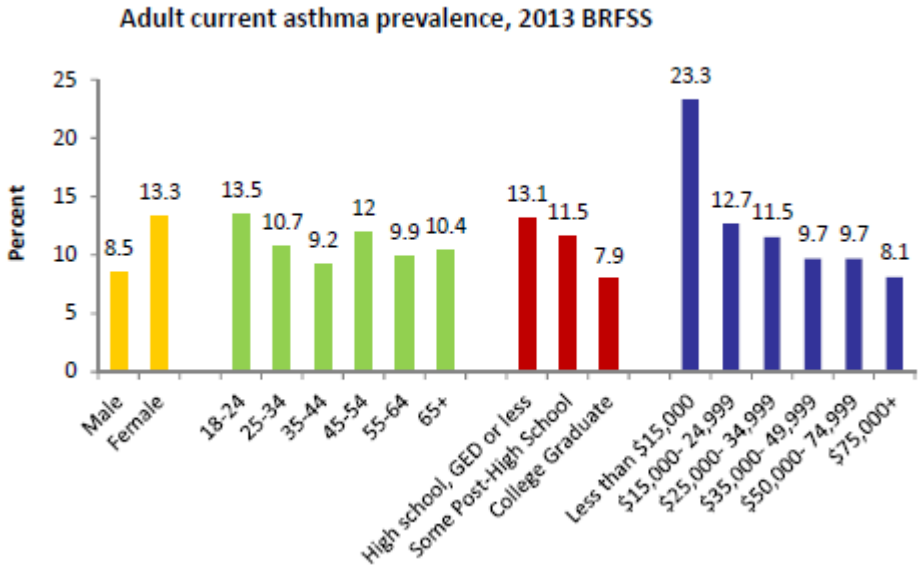
- Updated information about inpatient hospitalizations and emergency department use, including the addition of years 2007 through 2009.

- Information about the costs of asthma.

WHO HAS ASTHMA?

Adults

The New Hampshire adult current asthma prevalence rate was significantly higher than the combined average for the other 50 states and the District of Columbia in 2012 (the most recent year with data available for all BRFSS states).



In 2013, New Hampshire current asthma was significantly higher among women compared with men, among adults with less than a college degree compared with college graduates, and among adults with household incomes less than $15,000 compared to adults at higher incomes. There were no statistically significant differences by age.

Adult current asthma prevalence, 2013 BRFSS

Characteristics	Percent	95% CI
Total	11.0	9.8-12.1
Sex		
Male	8.5	6.9-10.1
Female	13.3	11.8-14.9
Age		
18-24	13.5	8.2-18.7
25-34	10.7	7.6-13.7
35-44	9.2	6.8-11.6
45-54	12.0	9.5-14.6
55-64	9.9	8.0-11.8
65+	10.4	8.7-12.1
Education		
High school, GED or less	13.1	10.9-15.2
Some Post-High School	11.5	9.5-13.5
College Graduate	7.9	6.6-9.1
Household Income		
Less than $15,000	23.3	16.3-30.3
$15,000- 24,999	12.7	9.7-15.7
$25,000- 34,999	11.5	7.6-15.4
$35,000- 49,999	9.7	7.2-12.2
$50,000- 74,999	9.7	7.4-12.1
$75,000+	8.1	6.3-9.8

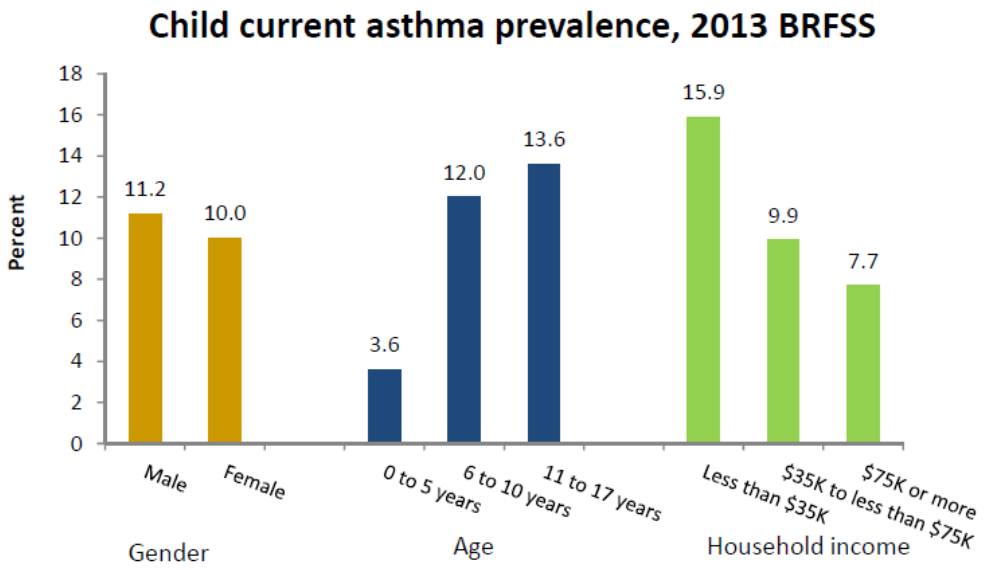
KEY FINDINGS

- New Hampshire has consistently seen one of the highest adult prevalence rates of asthma in the country.
- 11% or approximately 114,563 NH adults had current asthma in 2013.
- In 2013, current adult asthma prevalence was higher among women compared with men, and among adults with less education and lower incomes.

WHO HAS ASTHMA?

Children

The primary data sources for measuring child current asthma are two Optional Modules on the BRFSS. Not all states ask these Optional Modules each year. In 2012, the most recent year for which data from other states was available, 31 states plus the District of Columbia and Puerto Rico asked these modules. New Hampshire's child current asthma prevalence for 2012 (10.4%; 95% CI: 8.6-12.3) was not significantly different from the prevalence in other states or the mean of these states combined (9.0%; 95% CI: 8.7-9.4).



In New Hampshire the child current asthma prevalence was significantly higher among children aged 11 to 17 years compared with children aged 0 to 10 years. No statistically significant differences were found by gender or by household income.

Child current asthma prevalence, 2013 NH BRFSS

Characteristic	Percent	95% CI
Total	10.6	7.7-13.5
Sex		
Male	11.2	7.7-14.8
Female	10.0	5.4-14.6
Age		
0 to 5 years	3.6*	1.4-5.9
6 to 10 years	12.0*	4.2-19.9
11 to 17 years	13.6	9.3-17.9
Household income		
Less than $35,000	15.9	7.7-24.0
$35,0000-74,999	9.9	4.4-15.3
$75,000 or more	7.7	5.1-10.3

*Estimate is statistically unstable. Interpret this with caution.

KEY FINDINGS

- The prevalence rate of current asthma among New Hampshire children was not different from the national average.
- 10.6 percent or approximately 28,000 New Hampshire children had current asthma in 2013.
- Current asthma was more prevalent among older children. No differences were found in current asthma prevalence by household income or gender.

WHO HAS ASTHMA?

Geography

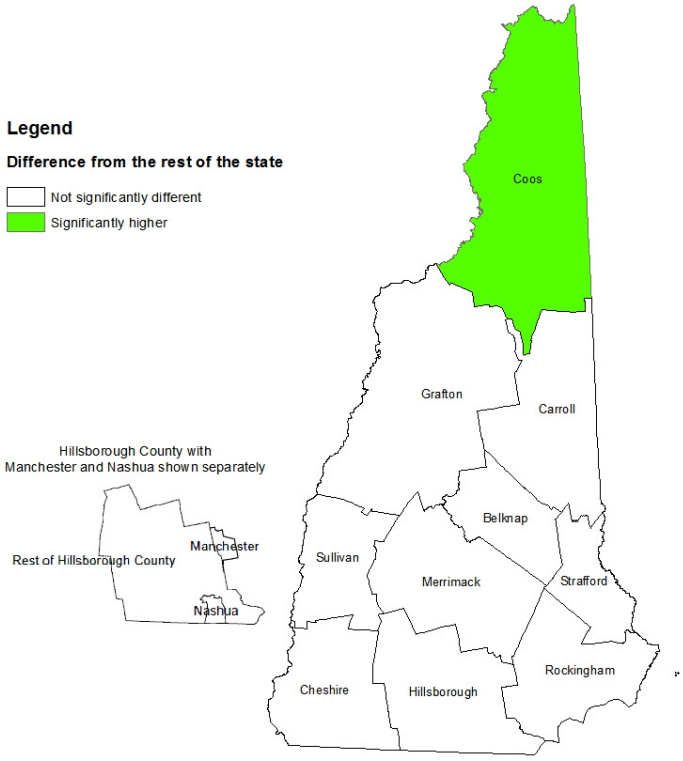
The prevalence of adult current asthma in Coos County was significantly higher than that for the rest of New Hampshire with 18% of adults in Coos County reporting current asthma. This represents the average of 2011 and 2012 BRFSS data, the most recent years for which sub-state data were available.

No other statistically significant differences were found for counties or Manchester and Nashua compared to the rest of New Hampshire.

Current adult asthma by county, Manchester & Nashua, 2011 and 2012 NH BRFSS

Town/City	Percent	95% CI
Belknap	10.1	7.1-13.2
Carroll	8.1	5.9-10.3
Cheshire	9.1	6.1-12.0
Coos	18.0	13.9-22.1
Grafton	12.5	9.5-15.6
Merrimack	10.7	8.3-13.1
Hillsborough	11.1	9.7-12.5
Rockingham	9.9	8.2-11.5
Strafford	10.6	8.1-13.1
Sullivan	10.4	7.3-13.6
Manchester	13.5	10.5-16.4
Nashua	10.9	7.9-13.9
Hillsborough not including Manchester & Nashua	9.9	8.1-11.8
New Hampshire	**10.7**	**9.9-11.5**

Prevalence of current asthma among New Hampshire adults, 2011 and 2012, NH BRFSS



KEY FINDINGS

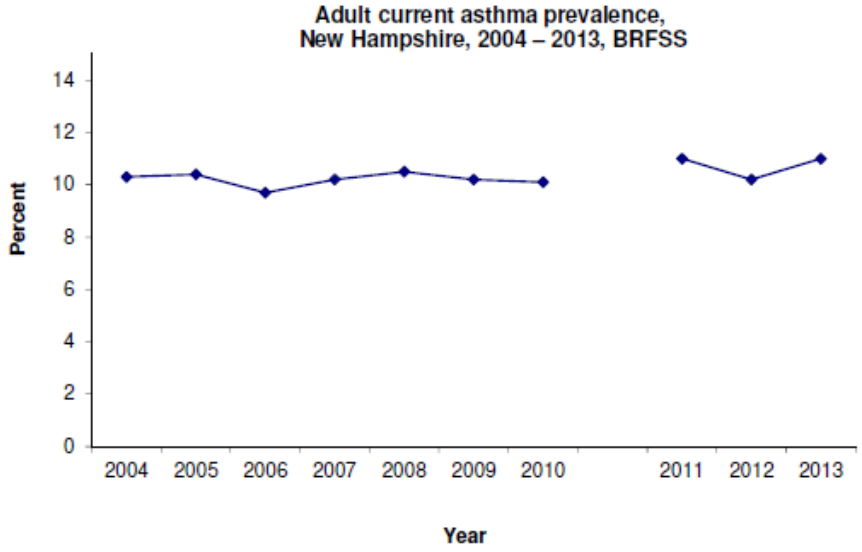
- 18% of adults in Coos County reported current asthma.
- The current adult asthma prevalence rate in Coos County was significantly higher than the state average.

WHO HAS ASTHMA?

Time Trend

Between 2004 and 2010, no significant change was seen in the prevalence of adult current asthma in New Hampshire.

In 2011, changes were made to methods to the survey used to measure asthma prevalence. As a result, data from 2011 and later years should not be compared with data from 2010 or earlier.[12] Between 2011 and 2013, no statistically significant change was found in New Hampshire's adult current asthma prevalence.



Current adult asthma prevalence, 2004 – 2013 NH BRFSS		
Year	**Percent**	**95% CI**
2004	10.3	9.3-11.3
2005	10.4	9.4-11.3
2006	9.7	8.8-10.6
2007	10.2	9.2-11.2
2008	10.5	9.5-11.5
2009	10.2	9.2-11.3
2010	10.1	9.0-11.2
Change in BRFSS survey methods		
2011	11.0	9.9-12.1
2012	10.2	9.2-11.3
2013	11.0	9.8-12.1
*Please note: Because of survey method changes, 2011 and later BRFSS data should not be compared with earlier years.		

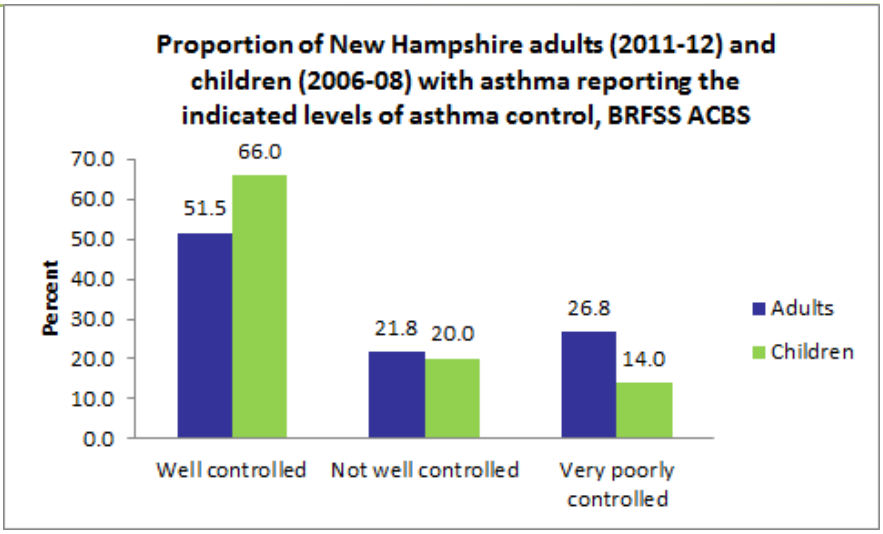
KEY FINDINGS

- The New Hampshire adult asthma prevalence rate has not changed significantly since 2004.

THE GOAL IS WELL-CONTROLLED ASTHMA

Components of Asthma Control

The *NHLBI Expert Panel Report 3: Guidelines for the Diagnosis & Management of Asthma* recommend assessing level of asthma control by considering 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.[10]



NHLBI EPR-3 guidelines recommend four components considered essential to effective asthma management:

- Assessing and monitoring asthma severity and control
- Controlling environmental triggers
- Appropriate medication, and
- patient education.[10]

Proportion of New Hampshire adults and children with asthma reporting the indicated levels of asthma control, BRFSS ACBS

	Adults (2011-2012)		Children (2006-2008)	
Control Status	**Percent**	**95% CI**	**Percent**	**95% CI**
Well controlled	51.5	44.1-58.8	66.0	58.0 -74.0
Not well controlled	21.8	17.0-26.6	20.0	14.4 -25.6
Very poorly controlled	26.8	18.7-34.9	14.0	7.1 -20.9

Questions from the BRFSS asthma callback survey were used to approximate the level of asthma control among survey respondents.

Questions included the frequency of daily symptoms, frequency of nighttime awakenings and frequency of use of rescue medications. In 2011-2012, more than half of adults with current asthma had well-controlled asthma while in 2006-2008 (the most recent data available), 66% of children with current asthma had well-controlled asthma.

KEY FINDINGS

- With today's knowledge and treatments, most people who have asthma are able to manage the disease and have few, if any, symptoms, enabling them to live normal, active lives and sleep through the night without interruption from asthma.[11]
- In 2011 and 2012, just over half of NH adults with current asthma had well-controlled asthma.
- In 2006-2008 (the most recent data available for children's asthma control), two-thirds of NH children with current asthma had well-controlled asthma.

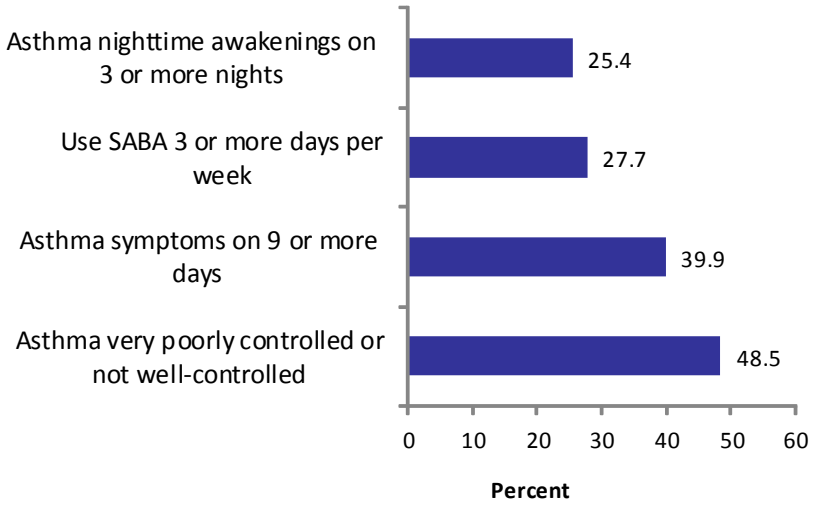
THE GOAL IS WELL-CONTROLLED ASTHMA

Components of Asthma Control

For this report, asthma was categorized as not well-controlled or very poorly controlled if the survey respondent reported:

- Nighttime awakenings due to asthma on three or more nights in the past 30 days (25.4%)
- Use of Short-acting Beta Agonist (rescue) medications on 3 or more days per week (27.7%)
- Asthma symptoms on nine or more days in the past 30 days (39.9%)

Proportion of New Hampshire adults with asthma that was not well-controlled by control components, 2011 and 2012 BRFSS ACBS



Proportion of New Hampshire adults with asthma that was not well-controlled (including poorly controlled), by control components, 2011 and 2012 BRFSS ACBS

Component of asthma control	Percent	95% CI
Asthma nighttime awakenings on 3 or more nights in the past 30 days	25.4	17.1-33.8
Use of "rescue" medication (short-acting beta agonist or SABA) 3 or more days per week	27.7	19.5-35.8
Asthma symptoms on 9 or more days in past 30	39.9	32.2-47.7
Asthma overall was not well-controlled (includes both not well-controlled and poorly controlled)	48.5	41.2-55.9

KEY FINDINGS

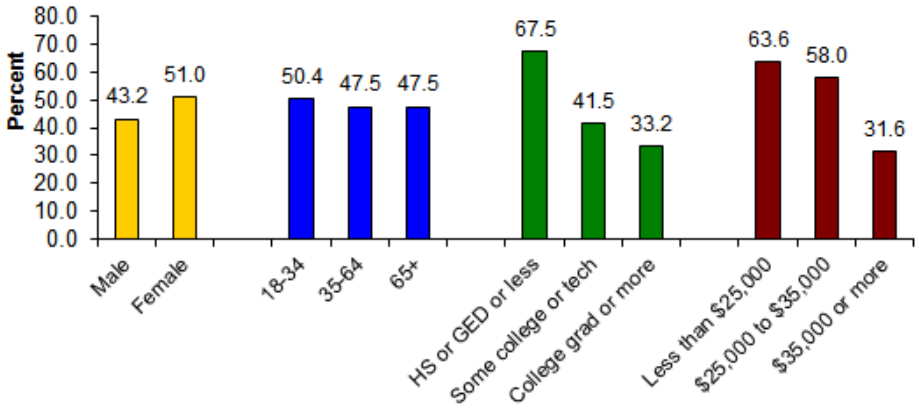
- Almost half of New Hampshire adults with current asthma had asthma that was "not well-controlled" or was "very poorly controlled."
- 25.4% reported nighttime awakenings due to asthma on three or more nights in the past 30 days.
- 27.7% reported they used Short-acting Beta Agonist (rescue) medications on 3 or more days per week.
- 39.9% reported they experienced asthma symptoms on nine or more days in the past 30 days.

THE GOAL IS WELL-CONTROLLED ASTHMA

Demographic Characteristics of Adult Asthma Control

The proportion of New Hampshire adults with asthma that was not well-controlled or very poorly controlled was significantly higher among those with a high school education, graduate equivalence exam (GED) or less compared with those with a college degree or more. The proportion of adults with asthma that was not well-controlled or very poorly controlled was also significantly higher among those with household incomes below $25,000 compared with those reporting incomes of $35,000 or more. No statistically significant differences were found by age or sex.

Percent of adults reporting current asthma that is not well-controlled, or very poorly controlled, by demographic characteristics, 2011 and 2012 BRFSS ACBS



Percent of NH adults with current asthma that was not well-controlled or was poorly controlled, 2011 and 2012 AACBS

Characteristic	Percent	95% CI
Total	48.5	41.2-55.9
Sex		
Male	43.2	31.4-54.9
Female	51.0	41.9-60.2
Age		
18-34	50.4	30.7-70.1
35-64	47.5	40.5-54.5
65+	47.5	38.3-56.6
Education		
HS or GED or less	67.5	55.5-79.4
Some college or tech school	41.5	29.2-53.8
College grad (4 years or more)	33.2	25.4-41.0
Income		
Less than $25,000	63.6	49.2-77.9
$25,000 to less than $35,000	58.0	38.6-77.4
$35,000 or more	31.6	24.7-38.6

KEY FINDINGS

- Adults with less education and lower household incomes were more likely to have asthma that was very poorly controlled or not well-controlled.

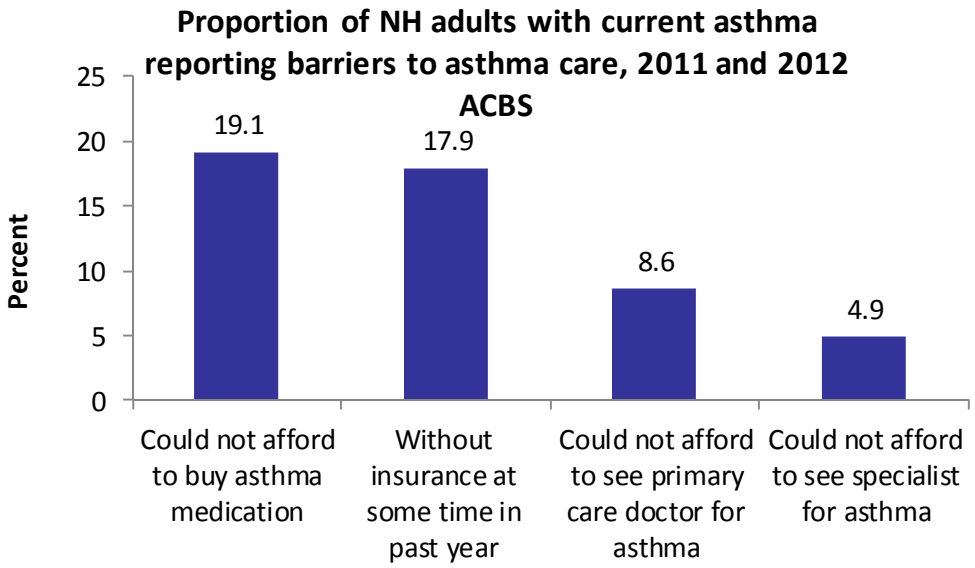
THE GOAL IS WELL-CONTROLLED ASTHMA

Barriers to Care

In 2011-2012, adults with current asthma reported that at some time in the previous year, cost prevented them from:

- Getting needed asthma medications due to cost (19.1%)
- Seeing a primary care doctor for their asthma (8.6%)
- Seeing a specialist for their asthma (4.9%)

In addition, 17.9% reported they had been without health insurance at some time in the past year.



Proportion of NH adults with current asthma reporting barriers to asthma care, 2011 and 2012 ACBS		
Potential barrier	**Percent**	**95% CI**
Could not afford to buy asthma medication	19.1	13.4-24.8
Without insurance at some time in the past year	17.9	9.5-26.2
Could not afford to primary care doctor for asthma	8.6	5.1-12.0
Could not afford to specialist for asthma	4.9*	1.3-8.4

*Estimate is statistically unreliable. Interpret with caution. (Relative standard error is more than 30%).

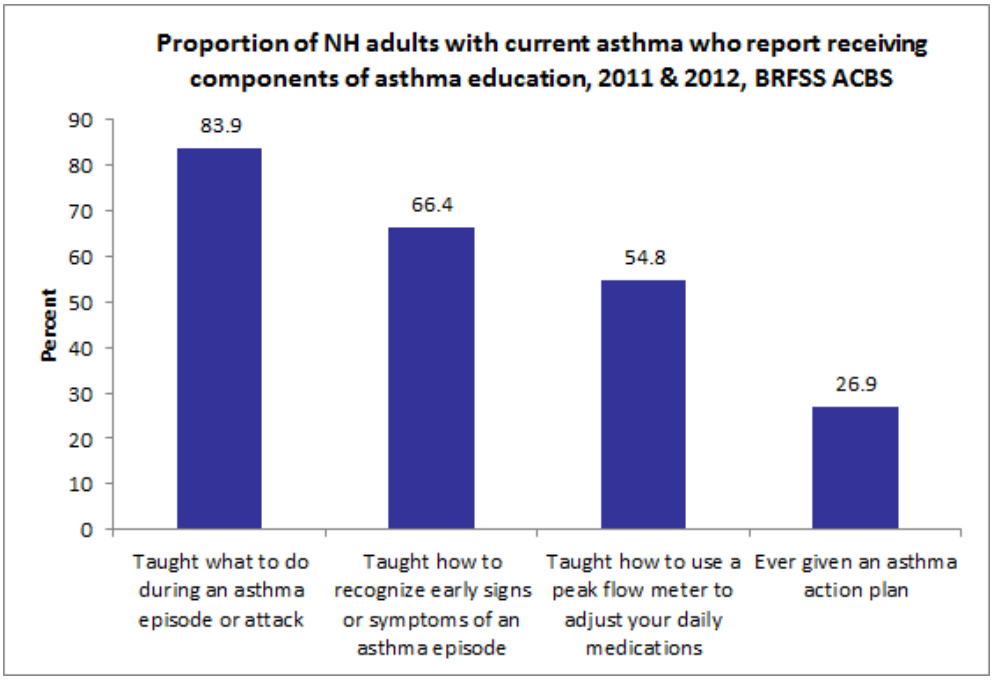
KEY FINDINGS

Once asthma control is achieved, the NHLBI guidelines recommend asthma visits to a medical provider at 1- to 6-month intervals to monitor whether asthma control is maintained.

- An average of 2011 and 2012 BRFSS data found the most common barrier encountered was an inability to afford asthma medication due to cost.
- Almost one-fifth of New Hampshire adults with asthma reported they could not afford asthma medication at some time in the past 12 months.

THE GOAL IS WELL-CONTROLLED ASTHMA
Education for Self-Management

NHLBI EPR-3 guidelines report "abundant" evidence supporting the effectiveness of patient asthma self-management education in improving control and preventing exacerbations, reducing urgent care visits and hospitalizations, reducing asthma-related health care costs, and improving healthy outcomes.



Proportion of NH adults with current asthma reporting receiving components of asthma education, 2011 and 2012 AACBS

Asthma education component	Percent	95% CI for percent
Taught what to do during an asthma episode or attack	83.9	79.6-88.2
Taught how to recognize early signs or symptoms of an asthma episode	66.4	58.6-74.3
Taught how to use a peak flow meter to adjust daily medications	54.8	47.4-62.1
Ever given an asthma action plan	26.9	20.7-33.1

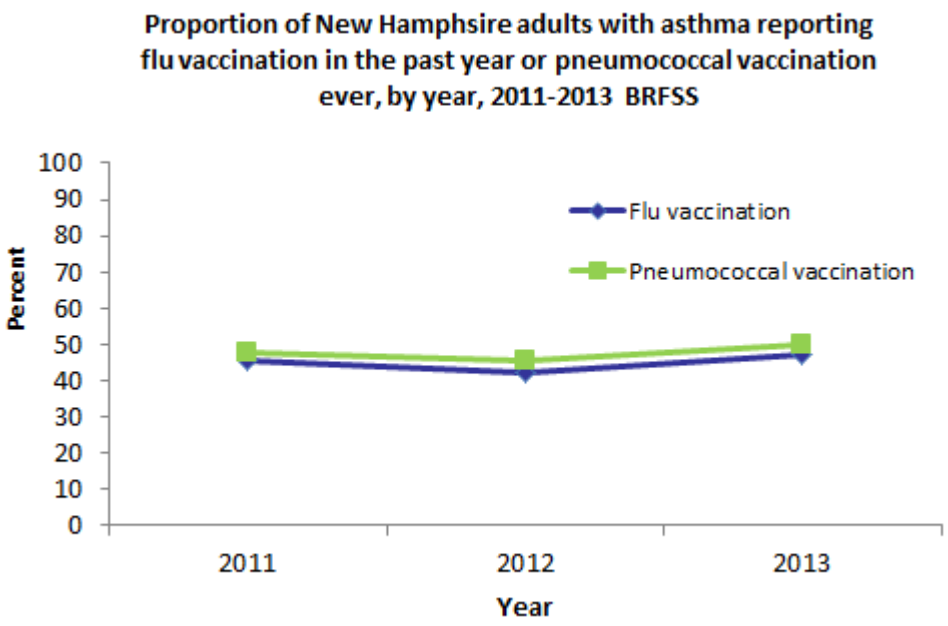
KEY FINDINGS

- While 83.9% of New Hampshire adults with current asthma reported that a doctor or other health professional had taught them what to do during an asthma episode or attack, only 26.9% reported a doctor or other health professional had ever given them a written asthma action plan to guide them in their asthma care.

THE GOAL IS WELL-CONTROLLED ASTHMA

Immunization

No significant difference was found between 2011 and 2013 in the proportion of adults with current asthma reporting they had received influenza vaccination in the past year or had ever received a pneumococcal vaccination.



CDC recommends an annual influenza vaccination for all people aged 6 months or older who do not have contraindications. Vaccination to prevent flu is particularly important for persons with asthma, who are at increased risk for severe complications.

CDC also recommends that any adult 19 through 64 years of age who has asthma and all adults older than 65 years should receive a pneumococcal vaccination.

Proportion of New Hampshire adults with current asthma reporting flu vaccination in the past year or pneumococcal vaccination ever, by age, 2011-2013 BRFSS

	Flu vaccination in the past year		Pneumococcal vaccination, ever	
Year	Percent	95% CI	Percent	95% CI
2011	45.5	39.9-51.0	47.9	42.2-53.7
2012	42.2	36.9-47.4	45.7	40.2-51.3
2013	47.2	41.6-52.9	49.7	44.0-55.4

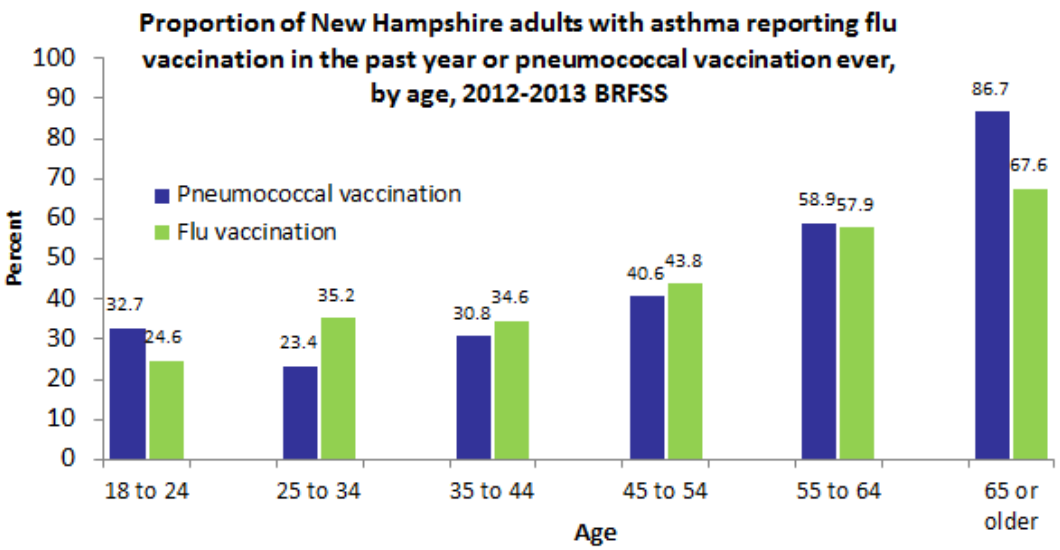
KEY FINDINGS

- In 2013, less than half of New Hampshire adults with current asthma reported they had received a flu vaccination in the past 12 months.
- Less than half of New Hampshire adults with current asthma in 2013 reported ever receiving a pneumococcal vaccination.
- These proportions were similar to those for the years 2011 and 2012.

THE GOAL IS WELL-CONTROLLED ASTHMA

Immunization

The proportion of New Hampshire adults with current asthma who reported receiving a flu vaccination in the past year increased significantly with age from 24.6% among 18 to 24 year olds to 67.6% among those 65 years or older.



A similar age-related pattern was seen for New Hampshire adults with current asthma who reported ever receiving a pneumococcal vaccination. The percentage who reported ever receiving a pneumococcal vaccination increased from 32.7% among those aged 18 to 24 to 86.7% among those 65 years or older.

Proportion of New Hampshire adults with current asthma reporting flu vaccination in the past year or pneumococcal vaccination ever, by age, 2011-2013 NH BRFSS

	Flu vaccination in the past year		Pneumococcal vaccination, ever	
Age	Percent	95% CI	Percent	95% CI
18 to 24	24.6	12.8-36.4	32.7	15.8-49.6
25 to 34	35.2	24.5-46.0	23.4	12.9-33.9
35 to 44	34.6	25.8-43.4	30.8	21.6-40.1
45 to 54	43.8	35.9-51.6	40.6	33.2-48.0
55 to 64	57.9	50.9-64.9	58.9	51.7-66.1
65 or older	67.6	61.6-73.5	86.7	82.4-91.0

KEY FINDINGS

- While CDC recommends an annual influenza vaccination and a pneumococcal vaccination for adults with asthma, less than half of adults with asthma under the age of 55 years reported being appropriately vaccinated.

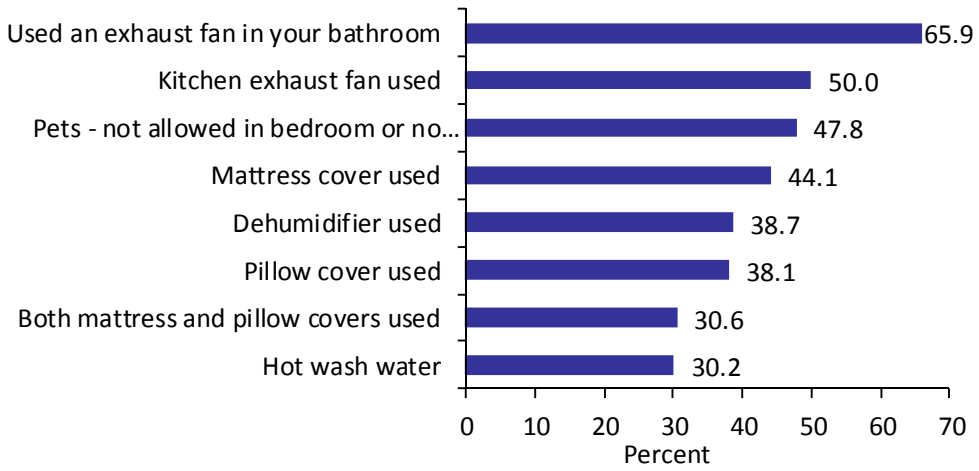
ASTHMA & ENVIRONMENT

Home Environmental Controls

The NHLBI Guidelines recommend several steps to help people with asthma avoid allergens and irritants that might worsen asthma symptoms. These steps include:

- Avoiding smoke from tobacco and burning wood
- Keeping pets outside or, if this is not possible, out of bedrooms
- Encasing pillows and mattresses in dust mite proof covers
- Washing pillows and bed linens in hot water to kill dust mites

New Hampshire adults with current asthma reporting the indicated home environmental controls, 2011 and 2012 ACBS



Proportion of NH adults with current asthma reporting using the indicated asthma environmental management tools, 2011 and 2012 ACBS

Environmental management tool	Percent	95% CI
Used an exhaust fan in your bathroom	65.9	57.9-74.0
Kitchen exhaust fan used	50.0	42.7-57.2
Pets - not allowed in bedroom or no pets	47.8	40.1-55.6
Mattress cover used	44.1	36.7-51.6
Dehumidifier used	38.7	30.8-46.6
Pillow cover used	38.1	31.1-45.1
Both mattress and pillow covers used	30.6	24.2-37.1
Hot wash water	30.2	24.2-36.3

KEY FINDINGS

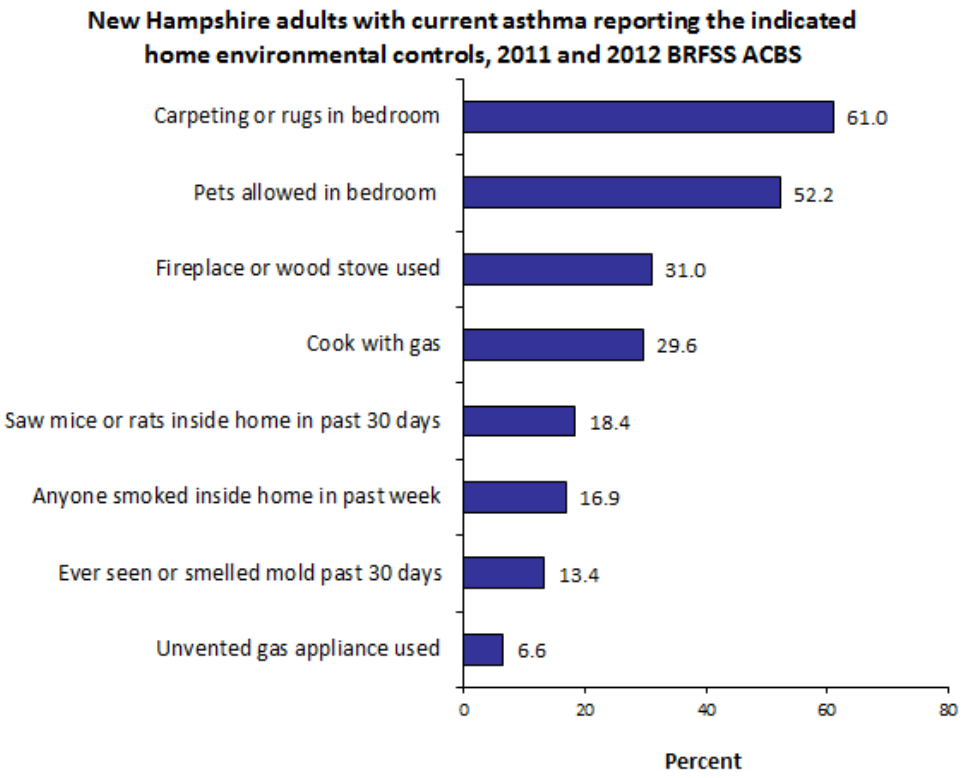
- The most frequently reported home environmental control reported by New Hampshire adults with current asthma was use of an exhaust fan in the bathroom (65.9%) and kitchen (50.0%).
- 47.8% of New Hampshire adults with current asthma reported that they either did not have pets or did not allow them in the bedroom.
- 44.1% reported use of a mattress cover and 38.1% reported use of a pillow cover while 30.6% used both.
- 38.7% reported use of a dehumidifier and 30.2% reported washing pillows and linens in hot water.
- 30.2% reported use of hot water for washing sheets and pillowcases.

Asthma & Environment

Home Triggers

A majority of New Hampshire adults with current asthma reported having carpets or rugs in the bedroom (61.0%) and allowing pets in the bedroom (52.2%). Other leading asthma triggers reported included use of fireplace or wood stove (31.0%) and cooking with gas (29.6%).

Less commonly reported asthma triggers included seeing mice or rates in the house, someone smoking in the home, recently seeing or smelling mold, and using an unvented gas appliance.



Proportion of NH adults with current asthma reporting potential asthma triggers in their homes, 2011 and 2012 AACBS

Potential trigger	Percent	95% CI
Carpeting or rugs in the bedroom	61.0	53.1-68.9
Pets allowed in bedroom	52.2	44.4-59.9
Fireplace or wood stove used	31.0	22.9-39.1
Cook with gas	29.6	23.5-35.7
Saw mice or rats inside your home past 30 days	18.4	10.0-26.8
Anyone smoked inside the home in the past week	16.9	11.0-22.9
Ever seen or smelled mold past 30 days	13.4	8.9-17.8
Unvented gas appliance used	6.6	2.7-10.5

Key Findings

Among New Hampshire adults with current asthma, the most common sources of potential asthma allergens reported were:

- Carpeting or rugs in the bedroom (61%) and
- Pets allowed in the bedroom (52%).

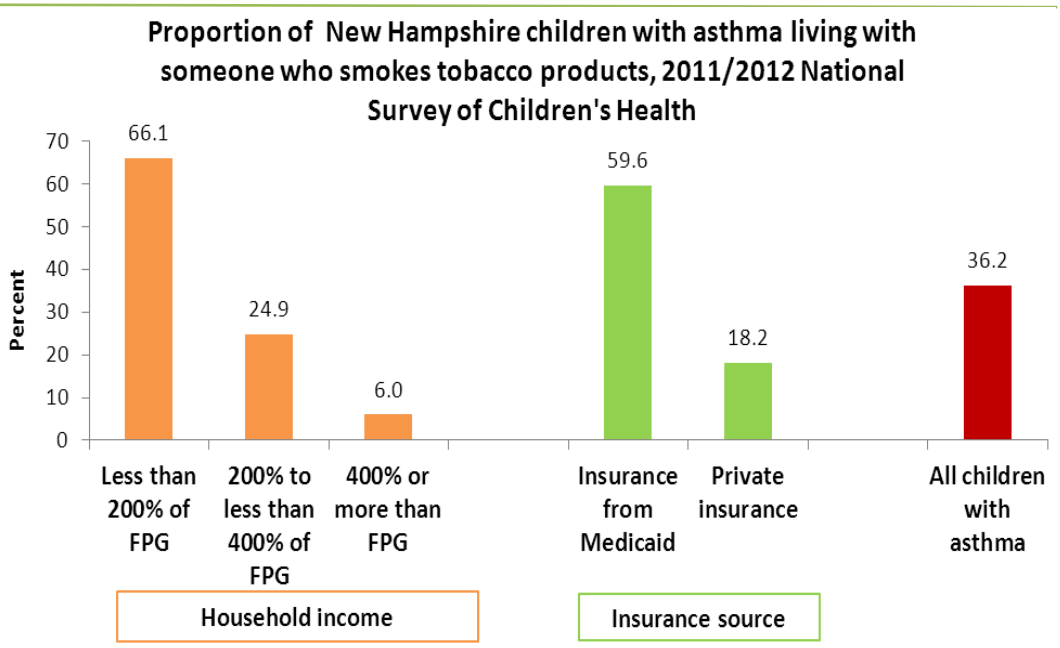
The most frequently reported potential irritants were:

- Wood stoves or fireplaces that could produce smoke and particulates (31%) and
- Gas cooking (29.6%)(associated with the release of nitrous oxide).

ASTHMA & ENVIRONMENT

Tobacco Smoke

Results from the National Survey of Children's Health (NSCH) found that 36.2% of New Hampshire children with current asthma lived in a home where someone smoked tobacco during 2011/2012. This proportion varied significantly by income and insurance source. (Note: "Living with someone who smoked" in this section is distinct from "Anyone smoked inside the home" on page 20.)



The proportion of children with current asthma living in a household with a smoker was more than ten times higher in the lowest income group (66.1%) than in the highest income group (6.0%). The proportion of children with current asthma living with a smoker was about three times higher among those with Medicaid compared with those having private health insurance.

Proportion of New Hampshire children with current asthma living in a household where someone smoked cigarettes, cigars, or pipe tobacco, by Federal Poverty Guidelines (FPG)* and Insurance coverage, NSCH, 2011/2012

Characteristic	Percent living with tobacco smoker	95% CI
Income		
Household income less than 200% of FPG	66.1	49.6-82.7
Household income 200% to less than 400% of FPG	24.9	6.9-42.9
Household income 400% or more than FPG	6.0	1.8-10.3
Insurance source		
Insurance source was Medicaid	59.6	42.5-76.7
Private health insurance	18.2	7.0-29.3
Total		
All children with current asthma	36.2	25.8-46.5

*Federal Poverty Guidelines for 2011. Available at: http://aspe.hhs.gov/poverty/11poverty.shtml

KEY FINDINGS

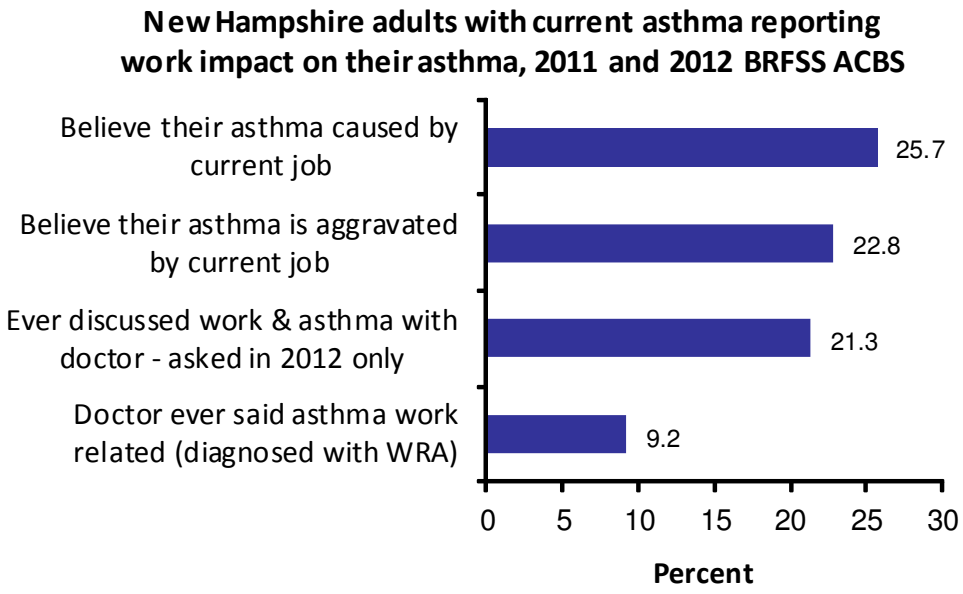
In addition to an increase in asthma symptoms and episodes, medical research has found that tobacco smoke exposure causes the *development* of new asthma cases among children, with the strongest effect from prenatal maternal smoking.[15]

- More than a third of New Hampshire children with current asthma lived in a home with someone who smoked cigarettes, cigars or pipe tobacco.
- The proportion of New Hampshire children with current asthma living with a tobacco smoker was significantly higher among those living in lower income households and among those having Medicaid.

ASTHMA & ENVIRONMENT

Workplace

Work-related asthma (WRA) includes preexisting asthma made worse by factors related to the workplace environment and occupational asthma (new onset asthma attributed to the workplace environment). WRA is a preventable occupational lung disease associated with serious adverse health and socioeconomic outcomes.[16]



New Hampshire adults with current asthma reporting work impact on their asthma, 2011 and 2012 BRFSS ACBS

	Percent	95% CI
Believe their asthma caused by current job	25.7	12.9-38.4
Believe their asthma is aggravated by current job	22.8	9.7-35.8
Ever discussed work & asthma with doctor - asked in 2012 only	21.3	13.5-29.0
Doctor ever said asthma work related	9.2	5.6-12.9

KEY FINDINGS

Among New Hampshire adults with current asthma:

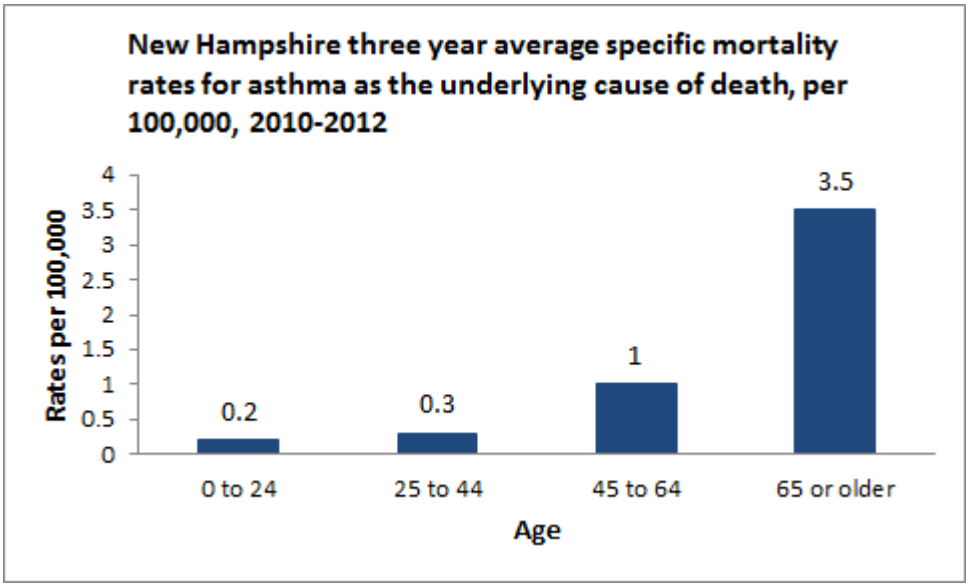
- About a quarter reported that they thought their asthma had been caused by their current job.
- About 23% said they thought their asthma was made worse by something at their current job.
- About 21% reported they had ever discussed work and asthma with their health care provider.
- About 9% reported they had been diagnosed with work-related asthma (told by a doctor that they had work-related asthma)

Asthma Deaths

Although there is substantial variation year to year in the number of New Hampshire residents who die from asthma, on average, 12 New Hampshire residents die each year with asthma as the underlying cause.

The asthma three-year average mortality rate for New Hampshire (2010-2012) was 0.8 per 100,000 (95% CI: 0.6-1.1).

New Hampshire's asthma mortality rate was significantly higher for residents aged 65 or older compared to younger residents.



During the three year period 2010-2012, there were three asthma deaths among residents younger than 25 years.

During the most recent years for which both U.S. and N.H. asthma mortality data were available, New Hampshire's asthma mortality rate was significantly lower than the rate for the U.S.[13]

New Hampshire three year average age specific mortality rates for asthma as the underlying cause of death, per 100,000, 2010 - 2012

Age	Age specific rate per 100,000	95% CL
0 to 24	0.2	0.0-0.7
25 to 44	0.3	0.1-0.9
45 to 64	1.0	0.5-1.8
65 or older	3.5	2.1-5.4

Age adjusted three year average mortality rate per 100,000 for asthma as the underlying cause, New Hampshire and the U.S., 2008-2010 (CDC WONDER)

	Age adjusted rate	95% CI
US	0.9	0.0 - 0.9
New Hampshire	0.5	0.3 - 0.8

KEY FINDINGS

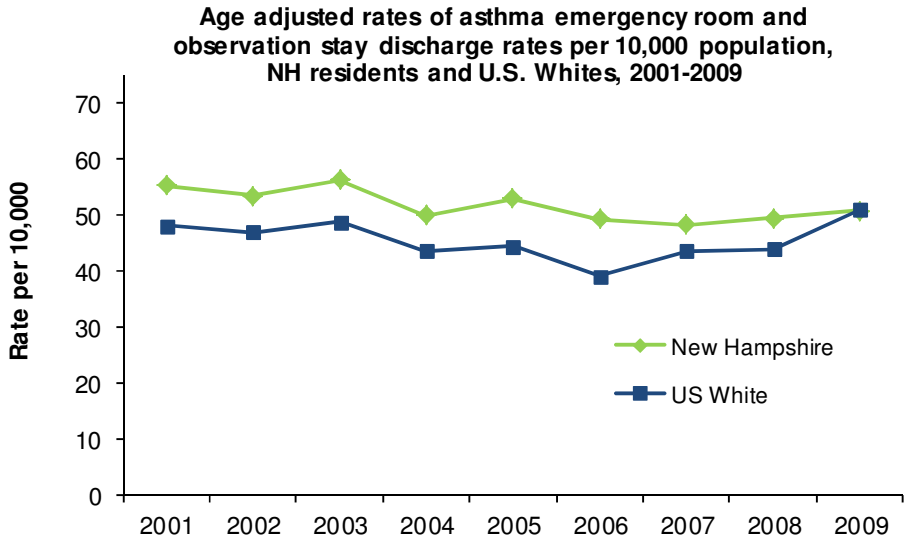
- On average, 12 New Hampshire residents die each year with asthma as the underlying cause
- Residents aged 65 years or older had the highest rate of asthma deaths.
- New Hampshire's asthma death rate was lower than that for the rest of the U.S.

THE IMPACT OF ASTHMA
Emergency Department and Observation Stays

A statistically significant decline was found in the rate of New Hampshire ED and observation discharges between 2001 and 2009 from 55.5 to 51.0.

No significant change was found in the rate of ED discharges for U.S. Whites between 2001 and 2009.

The New Hampshire rate was significantly higher than the U.S.-White rate in 2005 and 2006, after which the New Hampshire and U.S. rates converged and were identical in 2009.



Age adjusted rates of asthma emergency department and observation stay discharges per 10,000 residents, 2001-2009

	New Hampshire Residents[17]			U.S.-Whites[13]	
Year	**Number of discharges**	**Age adjusted rate**	**95% CI**	**Age adjusted rate**	**95% CI**
2001	6,849	55.5	54.2-56.8	48.2	41.3-55.1
2002	6,689	53.6	52.4-54.9	46.9	39.6-54.2
2003	7,063	56.5	55.2-57.8	48.9	41.8-56.0
2004	6,297	50.1	48.8-51.3	43.6	36.7-50.5
2005	6,688	53.1	51.8-54.4	44.4	37.3-51.5
2006	6,248	49.5	48.3-50.8	39.1	32.4-45.8
2007	6,149	48.4	47.2-49.7	43.7	36.4-51.0
2008	6,266	49.7	48.5-51.0	44.0	36.7-51.3
2009	6,410	51.0	49.7-52.3	51.0	42.4-59.6

Please note: New Hampshire rates are compared to U.S.-White rates due to the racial composition of the New Hampshire population.

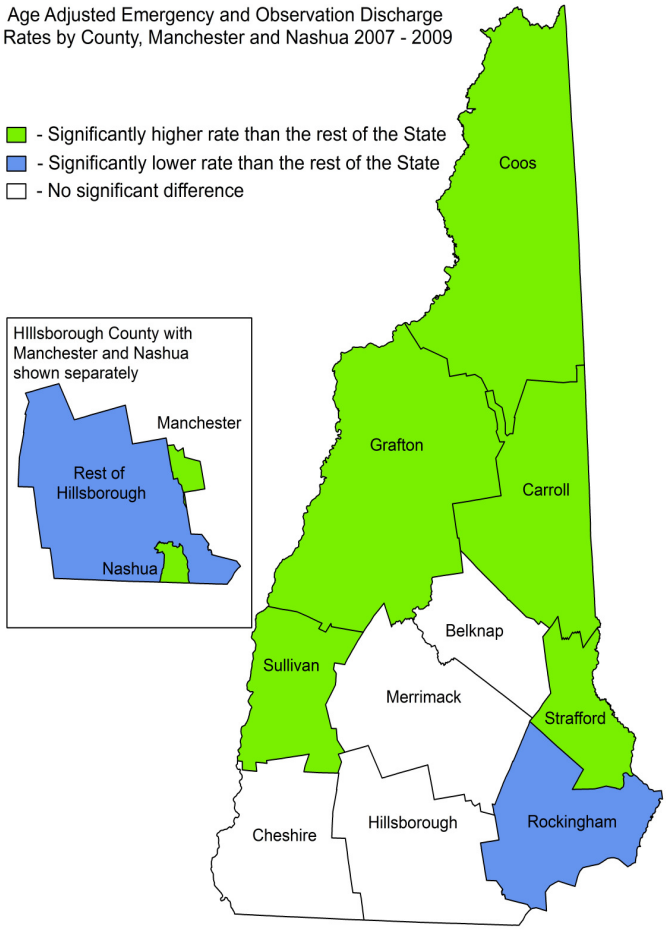
KEY FINDINGS

- New Hampshire's asthma ED rate declined significantly from 2001 to 2009 to a point where it was no longer higher than the U.S. White rate in 2009.

The Impact of Asthma
Emergency Department and Observation Stays

For the period 2007-2009, age adjusted rates of ED and observation discharges with asthma as the principal diagnosis, were significantly higher than the state average for five of the ten New Hampshire counties (Coos, Carroll, Grafton, Strafford and Sullivan) and for the cities of Manchester and Nashua.

Taken as a whole, the rate for Hillsborough County was not significantly different from the New Hampshire average. However, when the cities of Manchester and Nashua were separated from the rest of Hillsborough County, the rates for the two cities were significantly higher than the state average while the rate for the remainder of Hillsborough County was significantly lower than the state average.



Age adjusted rates of emergency and observation discharges, 2007, 2008 and 2009 (per 10,000), NH Ambulatory Hospital Discharge Data NH Health WISDOM

Area	Age-adjusted rate per 10,000 population	95% CI
Belknap	51.6	48.1-55.0
Carroll	61.8	57.4-66.2
Cheshire	47.2	44.2-50.1
Coos	67.8	62.1-73.4
Grafton	54.1	51.1-57.1
Merrimack	50.0	47.8-52.1
Hillsborough	49.5	48.2-50.8
Rockingham	41.0	39.6-42.4
Strafford	53.6	51.2-56.1
Sullivan	74.5	69.5-79.4
Hillsborough not including Manchester and Nashua	32.6	31.1-34.0
Manchester	75.2	72.2-78.2
Nashua	58.0	55.0-61.0
New Hampshire	**49.7**	**49.0-50.4**

Key findings

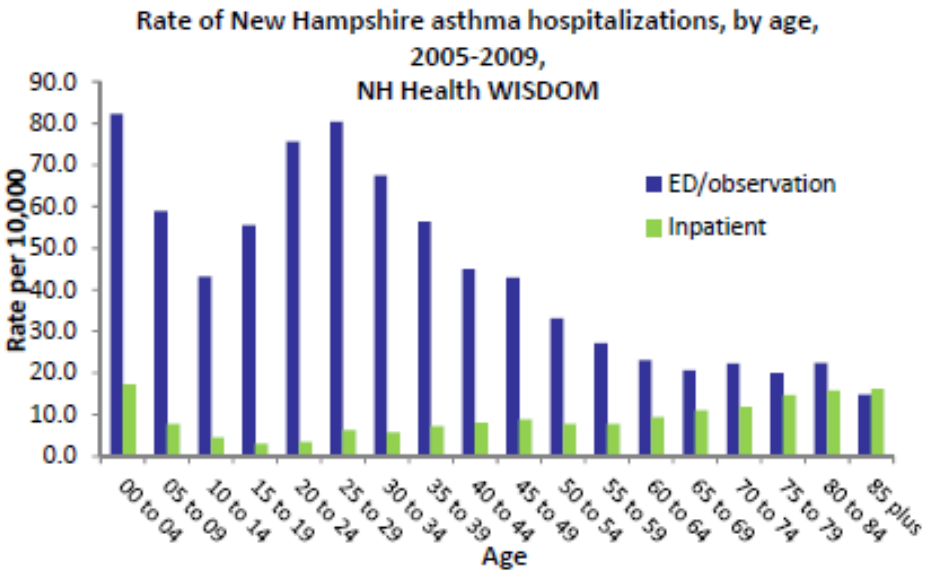
- Coos, Carroll, Grafton, Strafford and Sullivan Counties and the cities of Manchester and Nashua had higher rates of emergency department and observation stays compared to the rest of New Hampshire.

The Impact of Asthma

Emergency Department, Observation, and Inpatient Discharges by Age

Comparing rates of asthma emergency department and observation discharges with those for inpatient discharges by patient age:

- Asthma emergency department/ observation (ED) rates were highest for ages 0 to 4 years then declined for ages 5 to 14, rising again for late adolescence and young adulthood years (15 to 29). ED rates then declined through the rest of the lifespan.



- Inpatient rates were highest for the young (0 to 4 years) and lowest for adolescent and young adult years (ages 15 to 19), and gradually but significantly increased through the rest of the lifespan.

Rate of New Hampshire asthma hospitalizations, 2005-2009, by age, New Hampshire Hospital Discharge Data, NH Health WISDOM

	Inpatient		ED/observation	
Age	Rate	95% CI	Rate	95% CI
00 to 04	17.3	15.9-18.6	82.2	79.3-85.2
05 to 09	7.7	6.9-8.6	58.9	56.5-61.3
10 to 14	4.4	3.8-5.0	43.2	41.2-45.1
15 to 19	3.0	2.5-3.5	55.5	53.4-57.6
20 to 24	3.4	2.8-3.9	75.6	73.1-78.2
25 to 29	6.2	5.4-7.0	80.4	77.5-83.3
30 to 34	5.7	5.0-6.5	67.5	64.9-70.1
35 to 39	7.2	6.5-8.0	56.3	54.2-58.5
40 to 44	8.0	7.3-8.8	44.9	43.2-46.7
45 to 49	8.8	8.0-9.5	42.9	41.2-44.6
50 to 54	7.7	6.9-8.5	33.1	31.5-34.7
55 to 59	7.8	7.0-8.6	27.1	25.6-28.7
60 to 64	9.4	8.4-10.4	23.0	21.4-24.6
65 to 69	11.0	9.6-12.3	20.6	18.8-22.4
70 to 74	11.9	10.3-13.4	22.2	20.1-24.3
75 to 79	14.6	12.8-16.5	20.0	17.8-22.2
80 to 84	15.8	13.6-18.0	22.4	19.7-25.0
85 plus	16.2	13.9-18.4	14.8	12.6-17.0

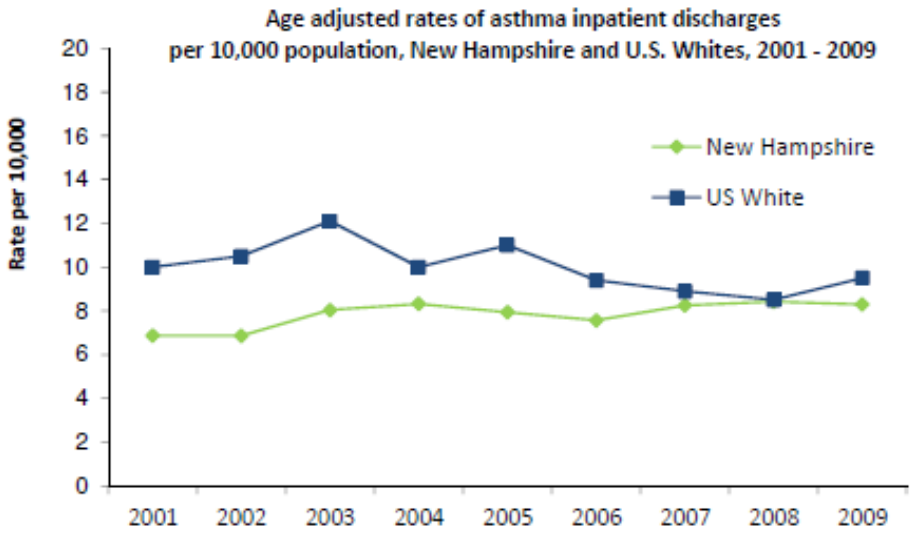
Key findings

- There were approximately 6,000 emergency department (ED) or observation discharges due to asthma each year for New Hampshire residents.
- As noted earlier (p. 24), the New Hampshire rate of ED and observation discharges declined significantly between 2001 and 2009.

THE IMPACT OF ASTHMA

Inpatient Discharges

New Hampshire's age adjusted rate of inpatient asthma discharges increased significantly from 2001 through 2009. No significant differences were found for rates of asthma inpatient discharges for U.S. Whites between 2001 and 2009.



In 2001, 2002, 2003, and 2005 the New Hampshire asthma inpatient rate was significantly lower than the U.S.-White rate. Since 2006, no statistically significant differences were seen between the New Hampshire and U.S. asthma inpatient rates.

Age adjusted rates of inpatient discharges with asthma as the principal diagnosis, per 10,000 residents, 2001 - 2009

	New Hampshire			U.S. Whites	
Year	Number of discharges	Age adjusted rate	95% CI	Age adjusted rate	95% CI
2001	857	6.9	6.4-7.4	10.0	8.6-11.4
2002	868	6.9	6.3-7.4	10.5	8.9-12.1
2003	1,028	8.0	7.5-8.6	12.1	10.5-13.7
2004	1,083	8.3	7.7-8.9	10.0	8.6-11.4
2005	1,033	7.9	7.5-8.4	11.0	9.6-12.4
2006	1,003	7.6	7.1-8.0	9.4	8.0-10.8
2007	1,088	8.3	7.8-8.8	8.9	7.3-10.5
2008	1,110	8.4	7.9-8.9	8.5	6.9-10.1
2009	1,110	8.3	7.8-8.8	9.5	7.9-11.1

Please note: New Hampshire rates are compared to U.S.-White rates due to the racial composition of the New Hampshire population.

KEY FINDINGS

- On average, there were more than 1,000 inpatient asthma discharges for New Hampshire residents each year.
- The New Hampshire rate of inpatient asthma discharges increased significantly between 2001 and 2009.
- Early in the decade, the New Hampshire asthma inpatient rate was significantly lower than that of U.S. Whites. Since 2006 there has been no significant difference between the two rates.

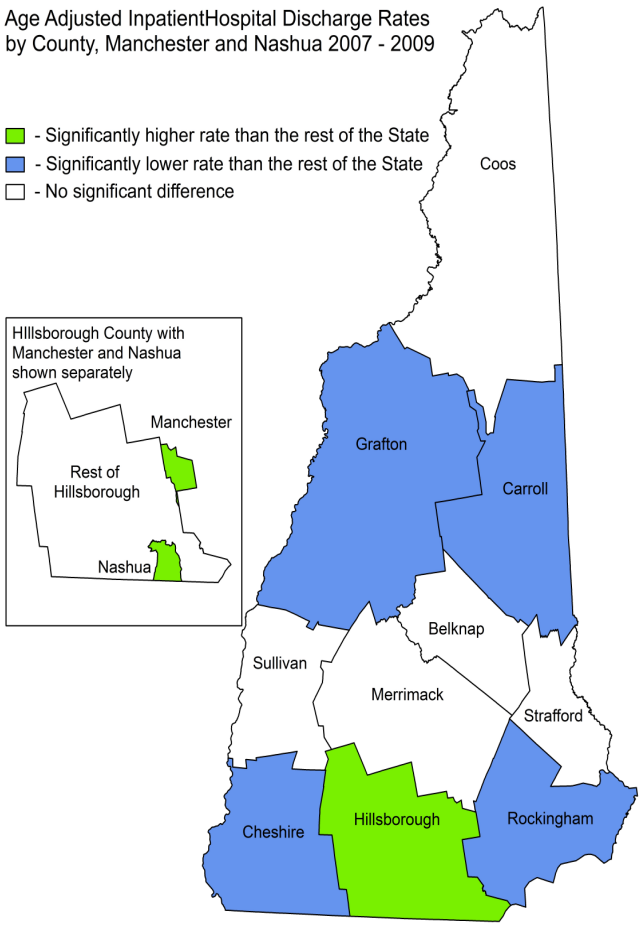
The Impact of Asthma

Inpatient Discharges

The age adjusted rate of inpatient discharges with asthma as the principal diagnosis in Hillsborough County was significantly higher than the rest of the state.

However, when Manchester and Nashua were considered separately, Manchester and Nashua rates were significantly higher than the rest of the state while the rate for the rest of Hillsborough County was not significantly different from the rest of New Hampshire.

Asthma inpatient discharge rates were significantly lower in Grafton, Carroll, Cheshire and Rockingham Counties compared with the rest of New Hampshire. Asthma inpatient rates for the remaining counties did not differ significantly from the rest of New Hampshire.



Age-adjusted rate of asthma inpatient hospital discharges (per 10,000), NH Inpatient Hospital Discharge Data, 2007-2009, NH Health WISDOM

Area	Rate per 10,000	95%CI
Belknap	8.1	6.8-9.4
Carroll	4.5	3.5-5.8
Cheshire	6.0	4.9-7.0
Coos	7.0	5.4-8.9
Grafton	6.3	5.3-7.2
Hillsborough	11.2	10.6-11.8
Merrimack	8.4	7.5-9.3
Rockingham	6.9	6.4-7.5
Strafford	7.6	6.6-8.5
Sullivan	8.7	7.1-10.4
Manchester	15.9	14.6-17.3
Nashua	14.1	12.7-15.6
Hillsborough County not including Manchester and Nashua	7.5	6.8-8.2
New Hampshire	**8.3**	8.1-8.6

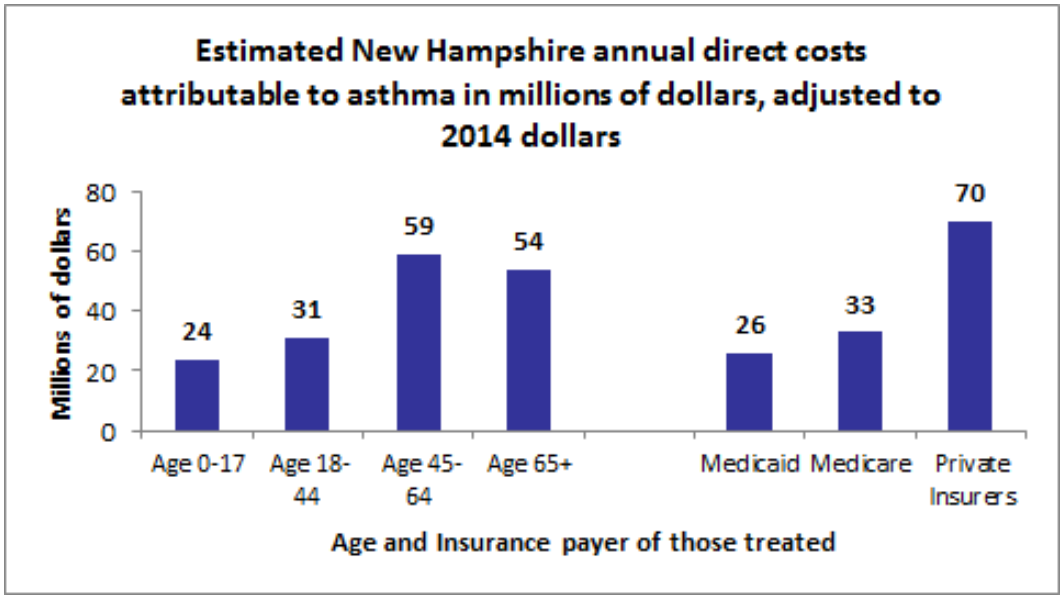
Key findings

- Inpatient discharge rates for asthma were higher in Manchester and Nashua compared with the rest of the state.
- Asthma inpatient discharge rates were lower in Grafton, Carroll, Cheshire and Rockingham Counties compared with the rest of New Hampshire.

THE IMPACT OF ASTHMA

Costs

Direct medical costs associated with asthma include hospital discharges, medical office visits, testing, and medications. Absenteeism due to asthma includes missed work days due to asthma symptoms or care for someone with asthma.



Both total and per-person direct medical costs increased with the age of the person treated. Direct medical costs were higher for private insurers (reflecting a larger number of persons covered) but per person medical costs were higher for those covered by Medicaid and Medicare.

Costs were calculated from rates estimated from national surveys and from New Hampshire population data. Costs were adjusted to 2014 dollars using the U.S. Bureau of Labor Statistics Inflation Calculator.

Estimated annual direct medical costs attributable to asthma in New Hampshire, by age, adjusted to 2014 dollars (CDC, BLS)

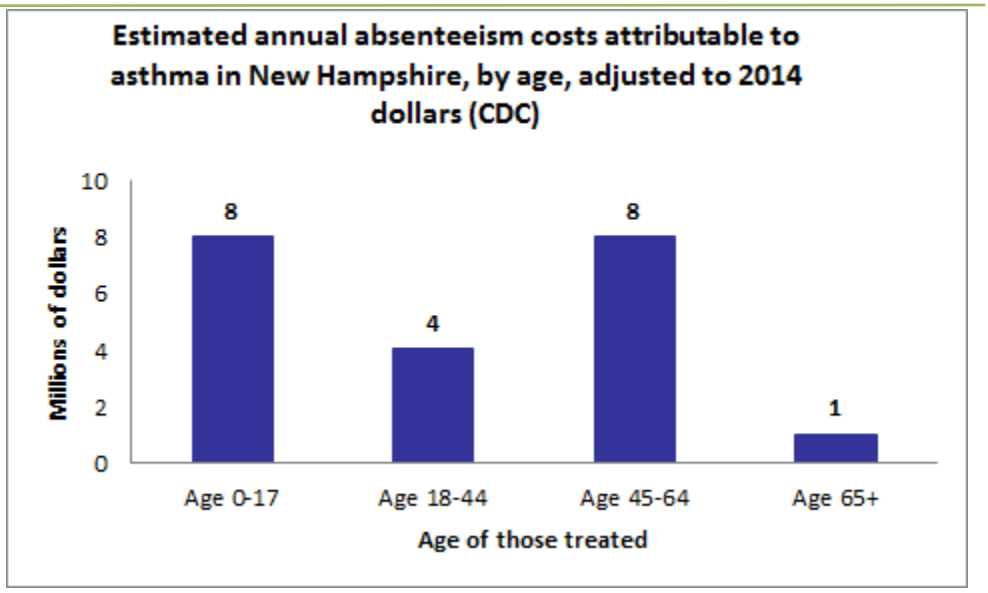
	Cost per person treated	Total costs
Age		
Age 0-17	$ 973	$ 24 million
Age 18-44	$ 1,530	$ 31 million
Age 45-64	$ 2,645	$ 59 million
Age 65+	$ 5,312	$ 54 million
Payer		
Medicaid	$ 2,088	$ 26 million
Medicare	$ 2,284	$ 33 million
Private Insurers	$ 1,224	$ 70 million
Total	**$ 2,175**	**$ 167 million**

KEY FINDINGS

- Direct medical costs associated with asthma are estimated at $167 million annually in New Hampshire, or $2,175 per person treated for asthma
- According to a report by the New Hampshire Environmental Public Health Tracking Program, 30% of asthma in children is attributable to outdoor air quality. This means that an estimated $7.2 million of the $24 million in direct medical costs in this age group are due to poor air quality.[20]

Costs

Total costs of asthma related absenteeism were highest for (parents of) those aged 0 to 17 years and for those aged 45 to 64 years. However, per person costs for asthma-related absenteeism were highest for those aged 65 or older.



Estimated annual absenteeism costs attributable to asthma in New Hampshire, by age, adjusted to 2014 dollars (CDC)		
	Cost per person treated	**Total costs**
Overall	$ 424	$ 21 million
Age		
Age 0-17	$ 442	$ 8 million
Age 18-44	$ 278	$ 4 million
Age 45-64	$ 528	$ 8 million
Age 65+	$ 781	$ 1 million

KEY FINDINGS

- Costs associated with lost wages due to absenteeism related to asthma care are estimated at $21 million annually in New Hampshire.
- According to a report by the New Hampshire Environmental Public Health Tracking Program, 30% of childhood asthma is attributable to outdoor air quality. This means that an estimated $2.4 million of the $8 million in parents' absenteeism costs are due to poor air quality.

REFERENCES

1. Centers for Disease Control and Prevention (CDC). *Behavioral Risk Factor Surveillance System Survey Data.* Atlanta, Georgia: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, 2012.
2. Centers for Disease Control and Prevention (CDC). *Behavioral Risk Factor Surveillance System Survey Data.* Atlanta, Georgia: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, 2013.
3. Centers for Disease Control and Prevention (CDC). *Behavioral Risk Factor Surveillance System Survey Data, Asthma Callback Survey.* Atlanta, Georgia: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention.
4. Child and Adolescent Health Measurement Initiative (CAHMI). 2011/2012 National Survey of Children's Health Indicator Data Set. Data Resource Center for Child and Adolescent Health. www.childhealthdata.org
5. Bureau of Data and Systems Management (BDSM), Office of Medicaid Business and Policy (OMBP), Office of Health Statistics and Data Management (HSDM), Bureau of Public Health Statistics and Informatics (BPHSI), New Hampshire Department of Health and Human Services (NH DHHS), *New Hampshire Mortality Data.* 2010-2012.
6. Centers for Disease Control and Prevention, National Center for Health Statistics. Underlying Cause of Death 1999-2010 on CDC WONDER Online Database, released 2012. Data are from the Multiple Cause of Death Files, 1999-2010, as compiled from data provided by the 57 vital statistics jurisdictions through the Vital Statistics Cooperative Program. Accessed at http://wonder.cdc.gov/ucd-icd10.html on May 8, 2013 1:12:01 PM
7. Bureau of Data and Systems Management (BDSM), Office of Medicaid Business and Policy (OMBP), Office of Health Statistics and Data Management (HSDM), Bureau of Public Health Statistics and Informatics (BPHSI), New Hampshire Department of Health and Human Services (NH DHHS), New Hampshire Ambulatory Hospital Discharge Data. 2001-2009.
8. Bureau of Data and Systems Management (BDSM), Office of Medicaid Business and Policy (OMBP), Office of Health Statistics and Data Management (HSDM), Bureau of Public Health Statistics and Informatics (BPHSI), New Hampshire Department of Health and Human Services (NH DHHS), New Hampshire Inpatient Hospital Discharge Data. 2001-2009.
9. Murphy SL, Xu JQ, Kochanek KD. Deaths: Final data for 2010. National vital statistics reports; vol 61 no 4. Hyattsville, MD: National Center for Health Statistics. 2013.
10. U.S. Department of Health and Human Services, National Institutes of Health, National Heart Lung and Blood Institute. *Expert Pane Report-3, Guidelines for the Diagnosis and Management of Asthma*. August 28, 2007. Available at: NHLBI EPR-3 *Guidelines for the Diagnosis and Management of Asthma*. Accessed July 2014.
11. U.S. Department of Health and Human Services, National Institutes of Health, National Heart Lung and Blood Institute. What is Asthma? Available at: http://www.nhlbi.nih.gov/health/health-topics/topics/asthma/. Accessed July 2014.
12. Centers for Disease Control and Prevention. Methodologic Changes in the Behavioral Risk Factor Surveillance System in 2011 and Potential Effects on Prevalence Estimates. MMWR 2012;61:401-413. Available at: http://www.cdc.gov/mmwr/pdf/wk/mm6122.pdf. Accessed July 2014.
13. Moorman JE, Akinbami LJ, Bailey CM, et al. National Surveillance of Asthma: United States, 2001–2010. National Center for Health Statistics. Vital Health Stat 3(35). 2012.
14. Akinbami LJ, Kit BK, Simon AE. Impact of Environmental Tobacco Smoke on Children With Asthma, United States, 2003–2010. Academic Pediatrics 2013;13:508–516.

15. Burke H, Leonardi-Bee J, Hashim A, Pine-Abata H, Chen Y, Cook DG, Britton JR, McKeever TM. Prenatal and passive smoke exposure and incidence of asthma and wheeze: systematic review and meta-analysis. Pediatrics. 2012 Apr;129(4):735-44.

16. Centers for Disease Control and Prevention. Work-Related Asthma — 38 States and District of Columbia, 2006–2009. MMWR 2012;61:375-378.

17. NH Department of Health and Human Services, Division of Public Health Services. NH Health WISDOM, Public Health Priority Areas, Asthma. Available at: http://wisdom.dhhs.nh.gov/wisdom/. Accessed July, 2014.

18. Centers for Disease Control and Prevention, Chronic Disease Cost Calculator version 2. Available at: http://www.cdc.gov/chronicdisease/resources/calculator/. Accessed June 2014.

19. U.S. Department of Labor, Bureau of Labor Statistics. CPI Inflation Calculator. Available at: http://www.bls.gov/data/inflation_calculator.htm. Accessed June 2014.

20. Chawla C, Economic Burden of Environmentally Attributable Illness in Children in New Hampshire. New Hampshire Department of Health and Human Services, Division of Public Health Services, Environmental Public Health Tracking Program. July 2014.

nhasthma
CONTROL PROGRAM

Contact Information

NH Asthma Control Program
Telephone: 603-271-0855
NH Department of Health and Human Services
Division of Public Health Services
29 Hazen Drive
Concord, NH 03301
TDD Access Relay: 800-735-2964

www.dhhs.nh.gov/dphs/cdpc/asthma/

This project was supported by grant number 5U60OH009853-02 from CDC, NIOSH and Grant number 5U59EH000509-05 from CDC's National Asthma Control Program. The contents are solely the responsibility of the authors and do not necessarily represent the official views of CDC.