

2008 Update
The Burden of Asthma
in Washington State



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The Burden of Asthma in Washington State

September 2008



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2008 Update

The Burden of Asthma In Washington State

Executive Summary

Asthma is a chronic lung disease that affects more than 9 percent of Washington adults, ages 18 and older. Adult prevalence of current asthma in Washington continues to be higher than the United States average. Nearly half of adults with current asthma reported their asthma had been caused or worsened by their work environment. Among families with children, an estimated one in nine had at least one child with current asthma. About one in 12 youth had current asthma.

Asthma can negatively affect quality of life

- Three out of four adults with current asthma experienced an asthma attack in the previous three months; most had three or more attacks.
- More than one out of four adults with current asthma had one or more urgent doctor visits for worsening asthma symptoms within the previous 12 months.
- About one out of seven adults, and one out of five youth with current asthma, had one or more asthma-related emergency department visits during the previous 12 months.
- In both, youth and adults, asthma symptoms interfered with sleep for about two in five people with current asthma.
- More than two out of five adults with current asthma had been diagnosed with depression. Youth with current asthma were more likely to have seriously considered suicide than youth without asthma.

Asthma Management: Room for improvement

- Fewer than one out of three adults younger than age 65 who had current asthma got vaccinated against flu or pneumonia.
- Fewer than half of adults or youth with current asthma met the recommended guidelines for doctor checkups or had an asthma management plan.
- Adults with current asthma under-utilized simple home environmental changes to reduce exposure to potential asthma triggers. Washing bed linens in hot water, using impermeable covers on pillows and mattresses, and keeping household pets out of sleeping areas are relatively inexpensive and simple remedies to reduce exposure to triggers. The majority of adults with asthma did not use these measures.

The news is not all bad

- Asthma hospitalization rates are gradually declining for all but the most elderly (ages 85 and older). Fewer than one in 20 adults with current asthma reported having an asthma-related hospitalization during the previous year.
- Asthma death rates from 2000 through 2006 have also declined.

Areas of Concern

Risky behavior among youth

- Youth who smoked cigarettes or used marijuana or inhalants (“huffing”) were more likely to have current asthma than those who abstained.
- About one in five 12th graders with current asthma smoked cigarettes.
- About one in five 10th and 12th grade youth with current asthma reported having used marijuana or hashish during the previous month. Marijuana smoke has been shown to be more harmful to the lungs than tobacco smoke.

Disproportionate risk

- Adults with lower income are more likely to have current asthma, and are also more likely to have severe persistent asthma symptoms than those with higher income.
- Black youth were about 30 percent more likely to have current asthma than white youth.
- Women were more likely than men to have current asthma and were at greater risk of dying from asthma.
- American Indian/Alaskan Native adults were more likely to have current asthma and were also at greater risk of dying from asthma than non-Hispanic white adults.
- Obesity was strongly associated with high asthma prevalence among adults, especially among women.
- Adults who were current smokers were also more likely to have asthma than non-smokers.

Asthma in the workplace: workers of low socioeconomic status disproportionately affected

- One in three workers with current asthma reported their current job worsened their asthma.
- Nearly half of adults with current asthma reported their asthma had been caused or worsened by their previous or current work environment.
- Workers with limited education or training are the least able to change jobs to avoid exposures that worsen their asthma. Jobs that are associated with the highest exposures to potential asthma triggers are also jobs that are the most available to workers with little education and training.

Having medical insurance not a guarantee of medical care

Adults with current asthma had similar rates of having health insurance as those without asthma. However, adults with asthma were more likely than adults without asthma to report their insurance was interrupted during the previous year. They were also more likely to report they had been unable to afford to see their primary doctor or a specialist, or to purchase asthma medication when needed.

Introduction

In June of 2005, the Washington State Department of Health published “The Burden of Asthma in Washington State,” a comprehensive description of asthma, including impact, prevalence, and risk factors. The 2005 report continues to be a valuable resource for an in-depth discussion of how asthma affects those who have it, as well as environmental factors, genetics, and other information. The 2008 update provides newer information gathered from a variety of sources including surveys of adults and youth, hospitalization discharge data, and death data. New with this update is an appendix with resources for asthma professionals. *See Appendix A.*

Methods

Purpose and audience

This report is primarily a data report with an intended audience of asthma professionals, including members of the Washington Asthma Initiative, physicians, nurses, and public health professionals.

Data sources

Data sources to gather information on adult asthma included the Behavioral Risk Factor Surveillance System (BRFSS), the Behavioral Risk Factor Surveillance System Asthma Call-Back Survey, hospitalization data, and death certificate data. Data sources to gather information on child and youth asthma included the Healthy Youth Survey, Behavioral Risk Factor Surveillance System, National Survey of Children’s Health, hospitalization data, death certificate data, and the School Health Profiles Survey. Data sources to gather information on environmental factors affecting asthma included BRFSS, BRFSS Asthma Call-Back Survey, Comprehensive Emissions Inventory Summary, and Healthy Worksite Survey. *See Appendix B for detailed descriptions of these data sources.*

Definitions of variables

Two asthma prevalence measures are reported: the percentage of those who have ever been told they have asthma (sometimes referred to as “lifetime asthma”) and the percentage of those who, having been diagnosed with asthma, continue to experience asthma symptoms or require medication to keep from having asthma symptoms (referred to as “current asthma”). In most cases, our primary focus has been on those with current asthma.

Data analysis

Data analysis was conducted using STATA /IC 10.0 software for Windows. Trend tests were conducted using Joinpoint Regression Program, Version 3.2.0. Where available, multiple years of data were combined to allow for more precision of the estimates. To control for potential confounding of age and grade, age-adjustment for adult data and grade-adjustment for youth data was performed. Age- and grade-adjusted rates were needed for comparisons between geographical areas, like county-level data. Figures using age- or grade-adjusted data are labeled. *See Appendix C: Technical Notes.*

Strengths and Limitations of Data

Survey data

Several data sources used in this report (Behavioral Risk Factor Surveillance System, Healthy Youth Survey, State and Local Area Integrated Telephone Survey/National Center for Health Statistics) are from surveys which provide a cross-sectional view or “snapshot” of the respondents’ experiences. These kinds of data do not allow us to determine cause and effect. For example, Behavioral Risk Factor Surveillance Survey data show adults who are obese are more likely to have asthma. However, we cannot determine from these kinds of cross-sectional data whether obesity occurred before or after the onset of asthma or whether there is a causal relationship.

Childhood asthma

Data on the prevalence of asthma among children are limited, and differences between the timing and sources of the data sets we do have hamper efforts to compare and validate childhood asthma prevalence statistics. The Washington State Department of Health Asthma Program expects to begin collecting new data related to childhood asthma beginning in 2009.

Adult asthma

The 2006 Behavioral Risk Factor Surveillance System Asthma Call-Back Survey provided new data related to the experience of Washington adults with asthma. Examples of these data include prevalence of use of complementary/alternative medicine, frequency of doctor and emergency department visits for worsening asthma, and environmental factors in homes of adults with asthma. These data will be valuable in future program planning to help people manage their asthma.

Hospitalization data

Hospitalization data available when this report was created did not contain information on race/ethnicity. Changes to the hospital discharge forms were recently introduced which included collection of these data.

Emergency department data

Emergency department data that include information on asthma attacks are not available in Washington. A pilot project is underway to explore ways to collect these data.

DATA KEY

Asthma Call-Back:
Behavioral Risk Factor Surveillance System Asthma-Call Back Survey

BRFSS:
Behavioral Risk Factor Surveillance System

CHARS:
Comprehensive Hospital Abstract Reporting System

HYS: Healthy Youth Survey

Asthma Prevalence

Asthma can be diagnosed at any age. Among children, boys are more likely than girls to have asthma. However, asthma prevalence increases for girls in adolescence, exceeding asthma prevalence for boys at about age 15. In adulthood, women are more likely than men to have current asthma.

Some people may think they only “have asthma” when they have asthma symptoms. Asthma is a chronic disease; there is no cure for asthma. A small proportion of those diagnosed with asthma may stop having asthma symptoms. This might happen if the original trigger for their asthma is removed. Some children stop having symptoms as they get older, perhaps because their airways get larger. It is important that those who have been diagnosed with asthma continue to monitor their symptoms and avoid asthma triggers.

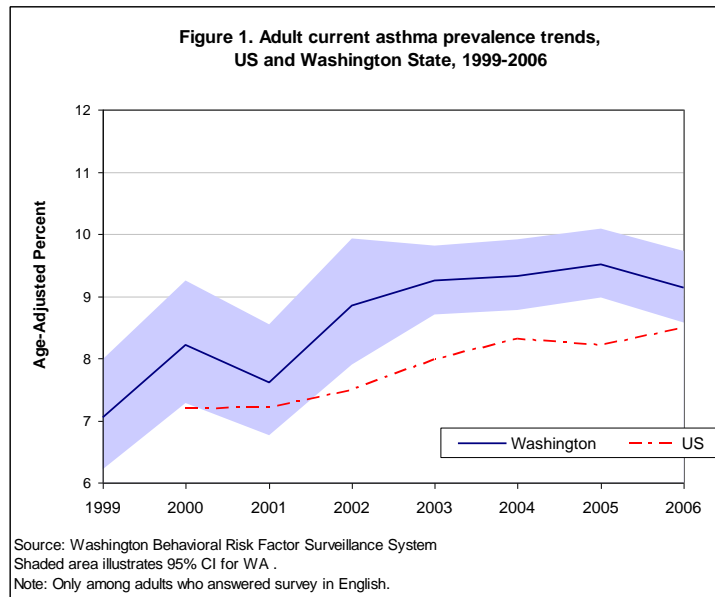
Asthma Prevalence: Adults

According to the 2006 Behavioral Risk Factor Surveillance System (BRFSS), about 14.3 percent (± 0.6 percent) of Washington adults were told by a healthcare practitioner that they had asthma at some time in their lives (lifetime asthma). This was higher than the national average of 13 percent (± 0.2 percent). The prevalence of current asthma among adults continued to rise. Although the rate appeared to be slightly lower in 2006, the change was not statistically significantly lower from 2005. We will continue to monitor these trends.

About 1 in 7 adults had never been told they had asthma; 1 in 11 adults had current asthma.

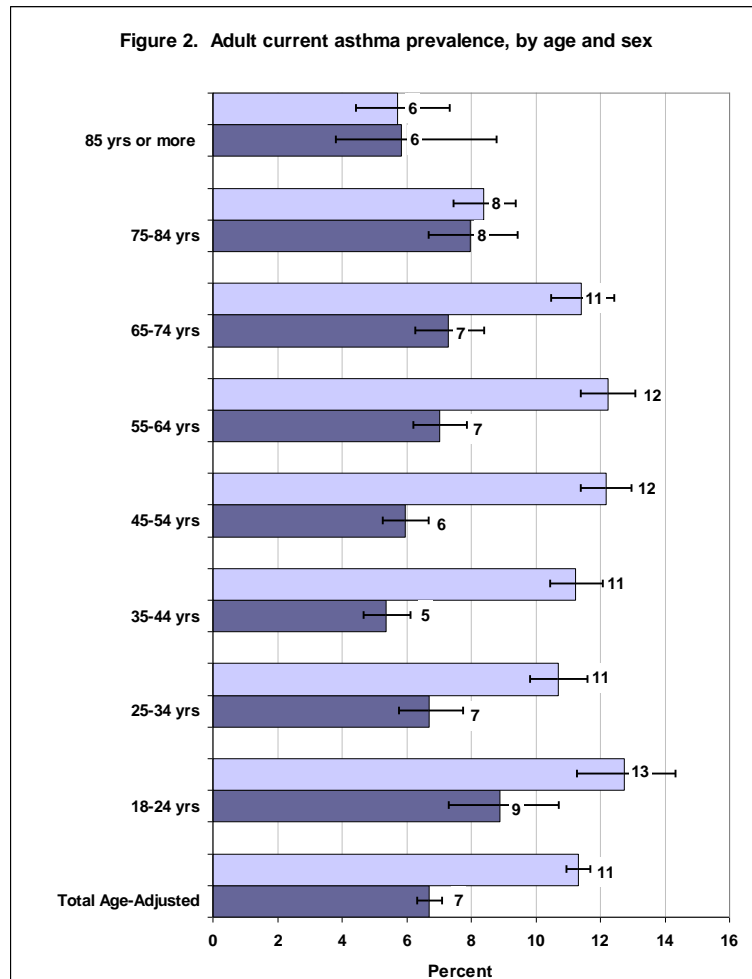
- About 9 percent of Washington adults had current asthma in 2006.
- From 1999 through 2006, the average annual increase in current asthma prevalence for both Washington and the United States was about 3 percent
- From 2002 through 2005, current asthma rates for Washington adults were higher than the national average. In 2006 the difference in prevalence was not statistically significant.

See Appendix D for data tables.



Asthma disproportionately affects women.


- Overall, women were about 69 percent more likely than men to have current asthma.
- From ages 18 through 74, women were more likely than men to have current asthma.
- From ages 35 through 54, women were twice as likely as men to have current asthma.
- There was no difference in prevalence between men and women, ages 75 and older.




Source: Washington BRFSS 2003-2006

See Appendix D for data tables.

Legend:

Women 

Men 

DATA KEY

Asthma Call-Back: Behavioral Risk Factor Surveillance System Asthma-Call Back Survey

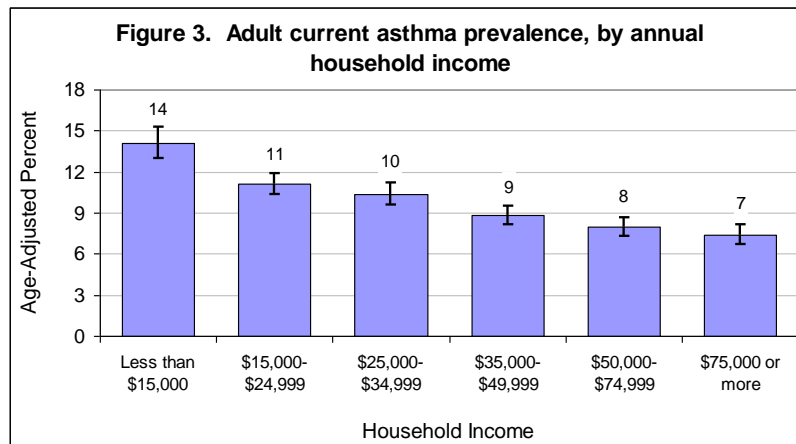
BRFSS: Behavioral Risk Factor Surveillance System

CHARS: Comprehensive Hospital Abstract Reporting System

HYS: Healthy Youth Survey

Asthma disproportionately affects people with low income.

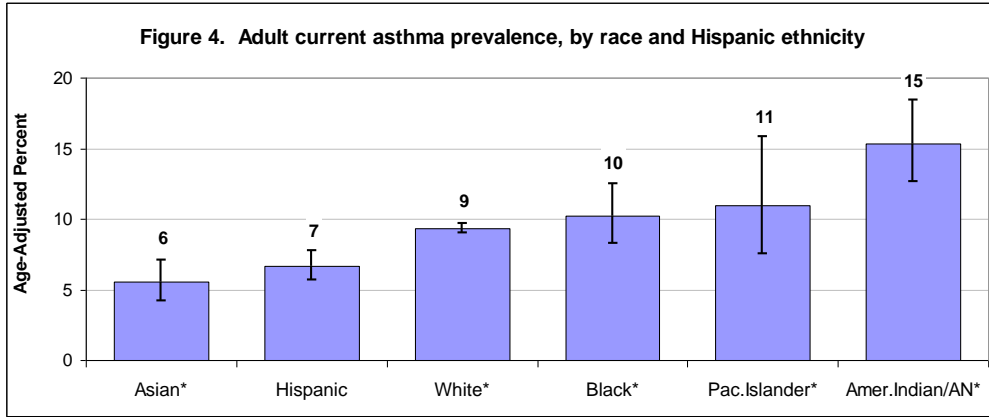
- The likelihood of having current asthma increased as annual household income decreased.
- Those with less than \$15,000 annual household income were about twice as likely to have asthma as those whose incomes were \$75,000 and above.



Source: Washington BRFSS 2003-2006
See Appendix D for data tables.

Although reasons for higher asthma prevalence among low-income people are complex, one factor may be a greater exposure to asthma triggers like mold, tobacco smoke, or hazardous chemicals.¹

Compared to whites, American Indians/Alaskan Natives are disproportionately affected by asthma.



*non-Hispanic

Source: Washington BRFSS 2003-2006

- Current asthma prevalence was lower among Asians and Hispanics, compared to non-Hispanic whites.
- Current asthma prevalence was significantly higher among American Indians/Alaska Natives, compared to whites.

See Appendix D for data tables.

DATA KEY	
Asthma Call-Back:	Behavioral Risk Factor Surveillance System Asthma-Call Back Survey
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HYS:	Healthy Youth Survey

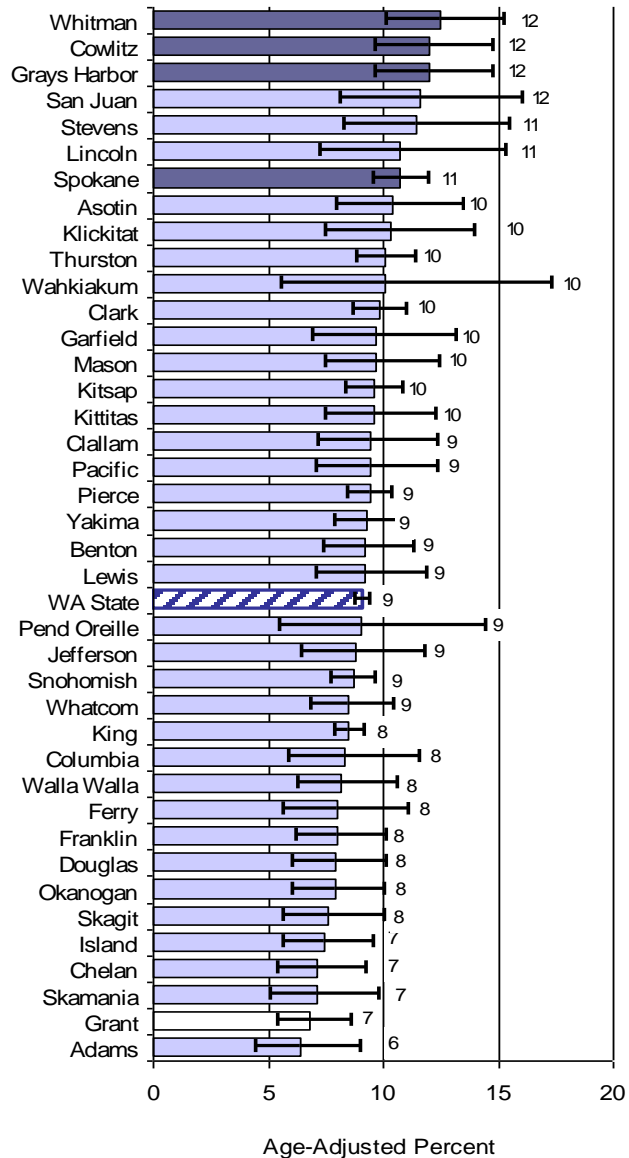
Figure 5. Prevalence of Adults Reporting Current Asthma Washington Counties

- Prevalence of current asthma among adults was higher than the state average in Whitman, Cowlitz, Grays Harbor, and Spokane counties.
- Prevalence of current asthma among adults was lower than the state average in Grant County.

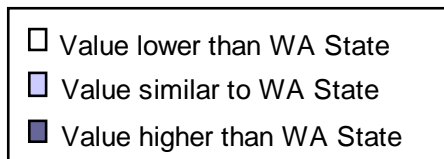
Note:

Asthma prevalence estimates within sparsely populated counties have a wide margin of error. This margin of error is illustrated by the horizontal lines extending to either side of the colored bars shown in this figure and represent the range within which the actual prevalence is likely to occur 95 percent of the time. Differences are only considered “significant” when the entire range is different from the state range.

See Appendix D for data tables.



Source: Washington BRFSS 2003-2005



Asthma Prevalence: Children and Youth

Data on the prevalence of asthma among children in Washington are limited. Differences between the timing and source of the various data sets do not support direct comparisons of the data. Nonetheless, analyses from all data sources collecting information on asthma among youth show the following similar findings:

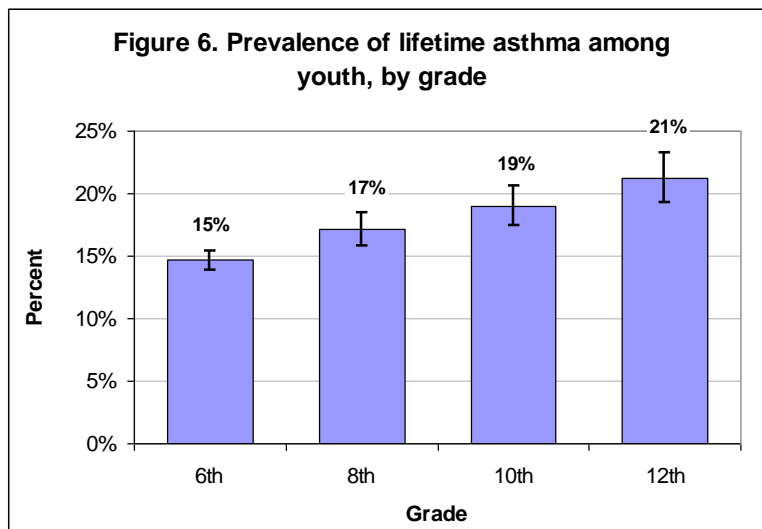
- The likelihood of having ever been told they had asthma increased with age.
- From infancy through mid-adolescence, boys were more likely than girls to have current asthma.
- From mid-adolescence on, girls were more likely than boys to have current asthma.

See Appendix B for data sources

Youth in grades 6, 8, 10 and 12

One source of asthma data is the Washington Healthy Youth Survey (HYS) given to youth in grades 6, 8, 10 and 12 in even-numbered years. The following data are from the 2006 HYS.

- Overall, the lifetime prevalence among youth was 17 percent (about one in six).
- The proportion of youth who had ever been told by a healthcare professional they had asthma (lifetime asthma) increased as the grade level increased.
- Twelfth graders were about 30 percent more likely to have been told they had asthma than sixth graders.



Source: HYS 2006
See Appendix D for data tables.

DATA KEY

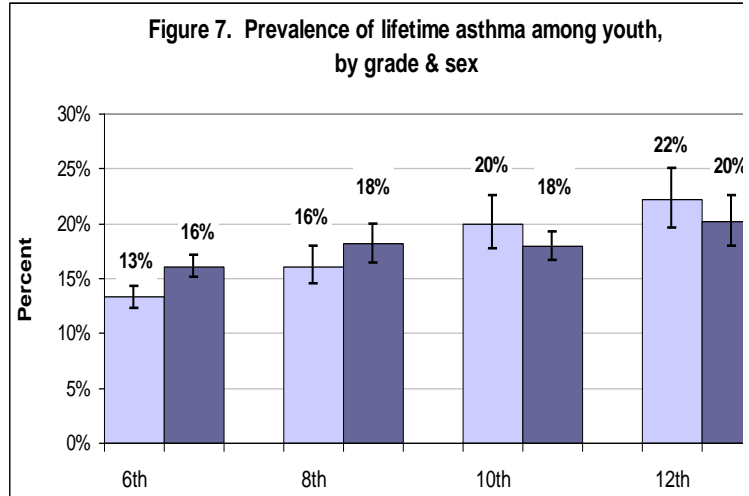
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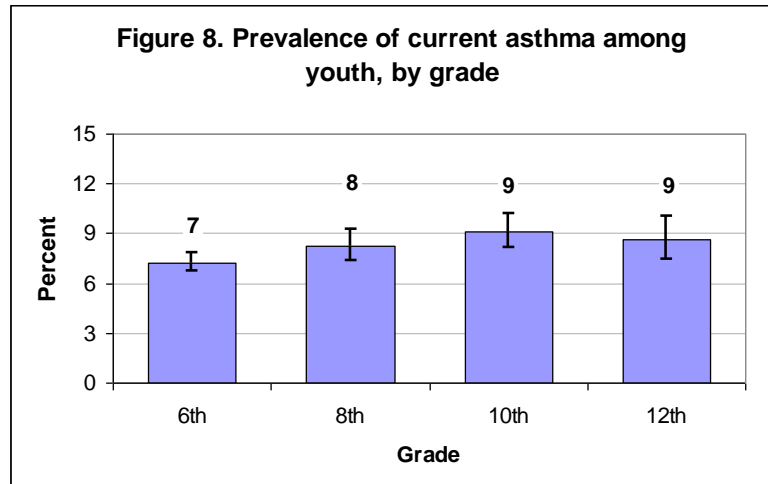
- Sixth grade girls were less likely to have been diagnosed with asthma than sixth grade boys; by 8th grade there was no significant difference by sex.
- Prevalence of lifetime asthma increased by grade.



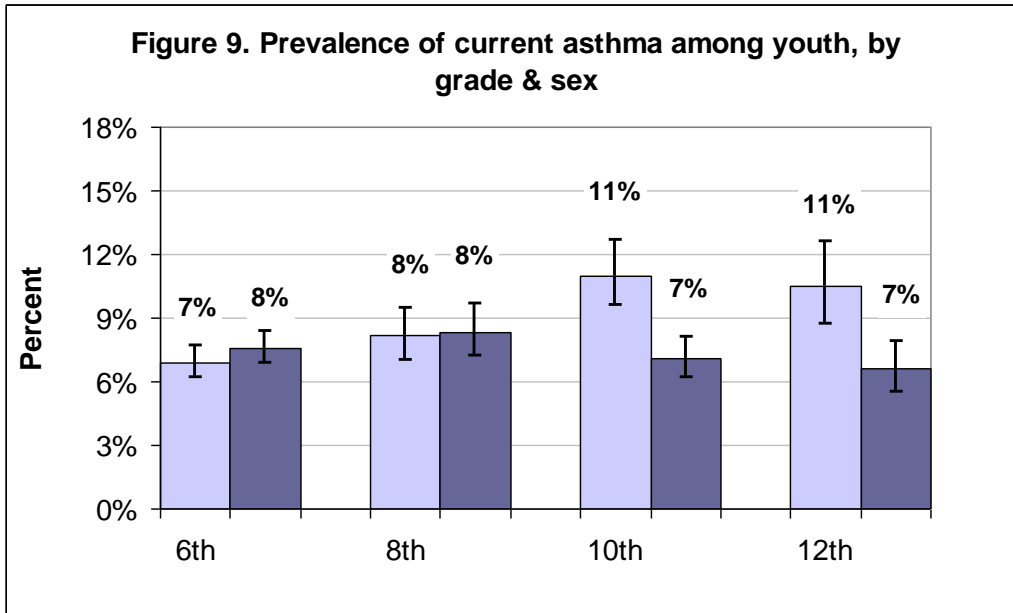
Source: Washington HYS 2006
See Appendix D for data tables.

Girls	
Boys	

- Overall, about 1 in 12 youth had current asthma in 2006.
- Youth in 10th grade were more likely to have current asthma than sixth graders.



Source: Washington HYS 2006
See Appendix D for data tables.



Source: Washington HYS 2006

Girls	
Boys	

See Appendix D for data tables.

- Girls in 10th and 12th grades were more likely to have current asthma than boys in the same grades. They were also more likely to have current asthma than sixth grade girls.
- Girls in 10th grade were also more likely to have current asthma than 8th grade girls.
- Among boys, differences in rates of current asthma by grade were not significant.

DATA KEY

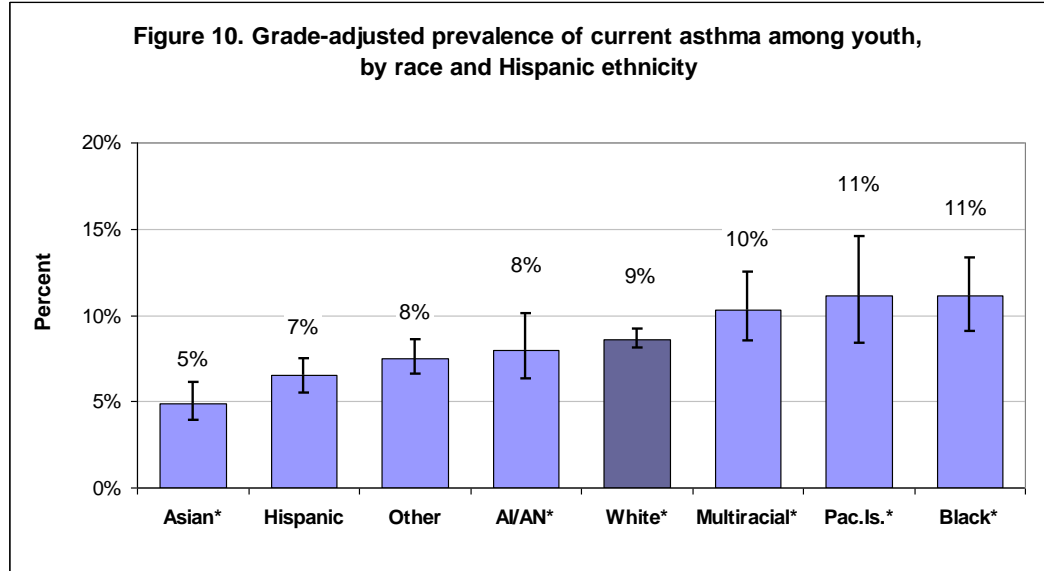
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Black youth were about 30 percent more likely to have current asthma than white youth.



Source: HYS 2006
See Appendix D for data tables.

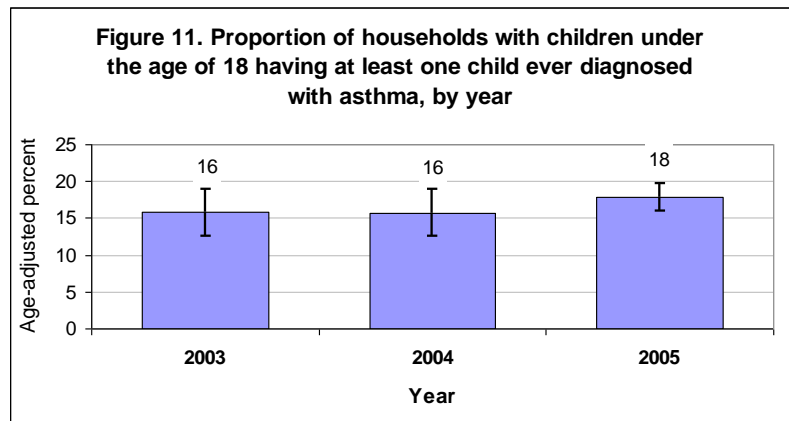
- The prevalence of current asthma was lower among Hispanic and Asian youth, compared to whites.
- Black youth had higher prevalence of current asthma, compared to whites.

All Children and Youth under 18

Adults who responded to the BRFSS were asked whether there were children under the age of 18 living in their household. If children were present, they were asked if any child was ever diagnosed with asthma (Figure 11) and whether they still had asthma (Figure 12).

Among adults with children under the age of 18 in their household, about one in six had at least one child who had been diagnosed with asthma.

See Appendix D for data tables.

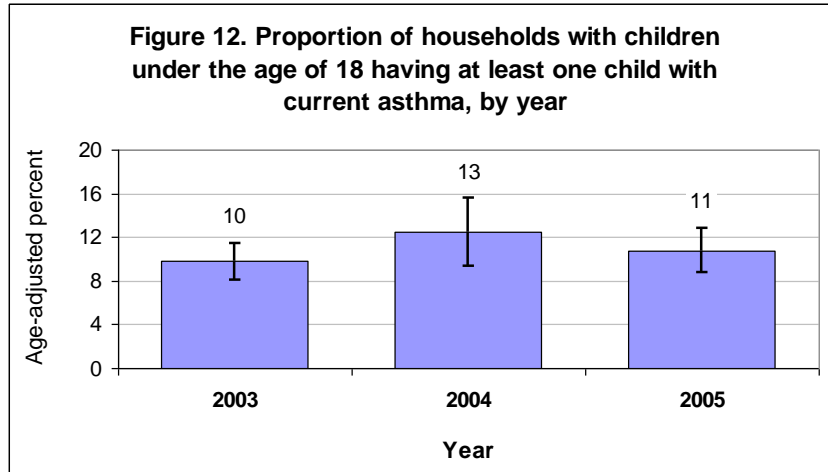


Source: Washington BRFSS 2003-2005

About 1 in 9 households with children have at least one child with current asthma.

Among adults with children under the age of 18 in their household, about one in nine had at least one child who *currently* had asthma.

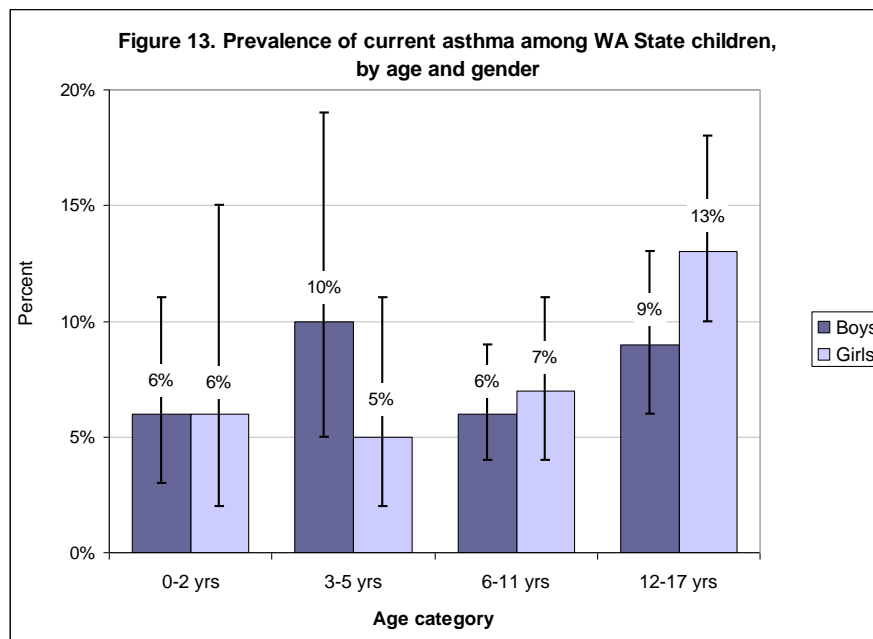
See Appendix D for data tables.



Source: Washington BRFSS 2003-2005

The 2003 National Survey of Children’s Health included a total of 1,932 Washington children, ages one to 18. Of these, 218 (11.3 percent) were reported to have ever been diagnosed with asthma. A total of 155 of these were determined to have current asthma. The overall prevalence of current asthma among Washington children in this survey was 8.2 percent (6.8 to 9.8 percent).²

Prevalence of current asthma, by age and gender, from the 2003 National Survey of Children’s Health is shown in Figure 13, below.



Source: 2003 State and Local Area Integrated Telephone Survey/National Survey of Children’s Health. See Appendix D for data tables.

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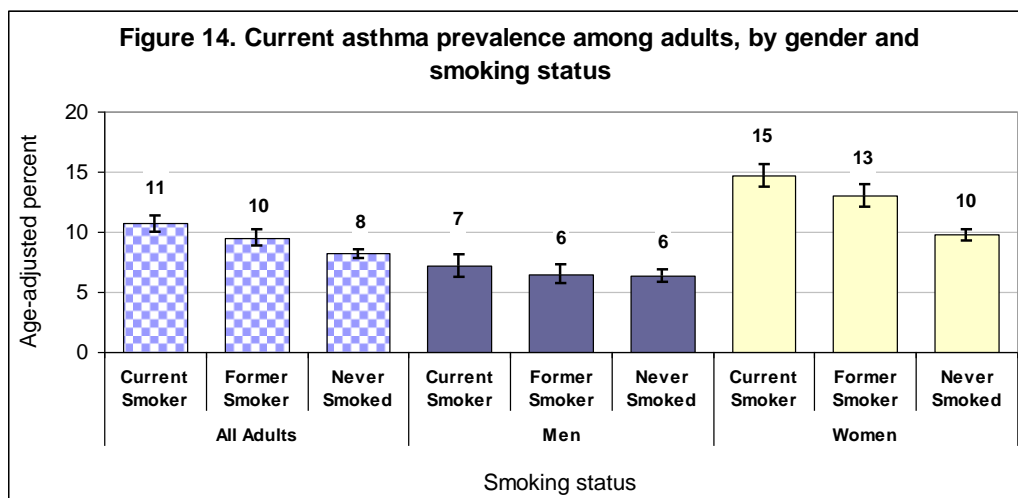
Risk Factors

Smoking

Smoking is associated with greater likelihood of having current asthma. Children whose parents smoke are much more likely to get asthma than children of non-smokers.³ Tobacco smoke is also a probable cause of new asthma cases among adolescents and adults who smoke.⁴ Prenatal exposure to tobacco smoke has also been implicated as a factor in later development of asthma in children.⁵ Studies also suggest greater disease severity in children exposed to smoking in the home.⁴ Studies of adults with asthma show smokers have more severe asthma symptoms and greater likelihood of being hospitalized for asthma.⁶ Reductions in daily smoking coincided with reduced asthma symptom severity.⁷

Smoking: Adults

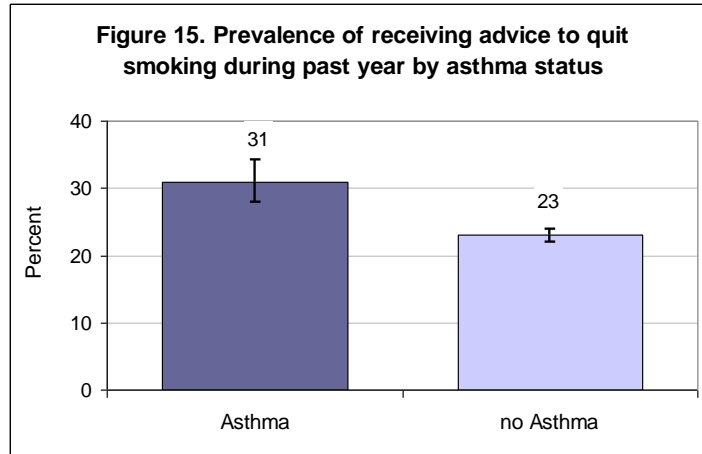
Adults who smoked were more likely to have current asthma than non-smokers.



Source: Washington BRFSS 2003-2006
See Appendix D for data tables.

- Overall, about 18 percent of adults were current smokers, 26 percent were former smokers and 56 percent had never smoked over four years of BRFSS data, 2003-2006 (not shown in figure).
- Among all adults, current smokers were about 30 percent more likely to have asthma compared with those who never smoked.
- Among women, current smokers were about 50 percent more likely to have asthma compared with those who never smoked.

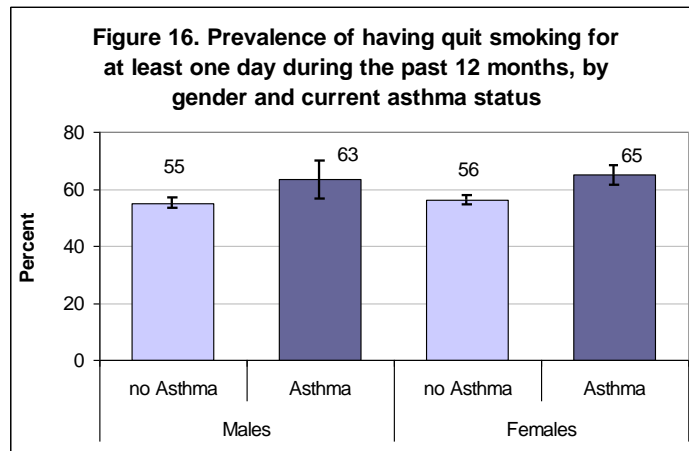
- Only about 30 percent of adults with current asthma who smoked received advice to quit smoking from their healthcare provider in the previous year.
- Adult smokers were 30 percent more likely to receive smoking cessation counseling from their healthcare provider if they had asthma.



Source: Washington BRFSS 2003-2006
See Appendix D for data tables.

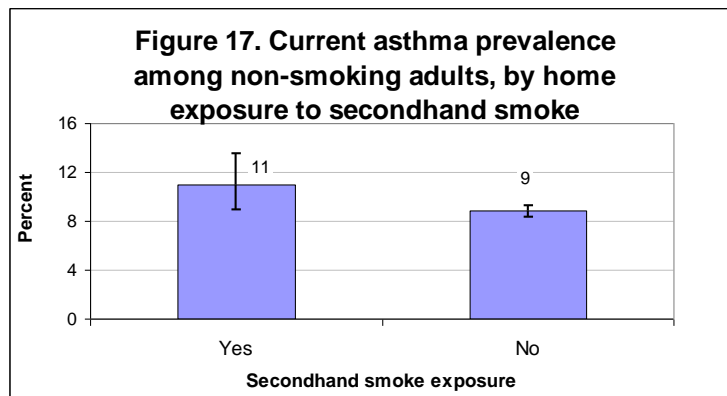
- About two in three adult smokers with asthma quit smoking for at least one day during the previous 12 months.
- Smokers with asthma were more likely to quit than adults who did not have asthma.

Differences by gender were not significant.



Source: Washington BRFSS 2003-2006
See Appendix D for data tables.

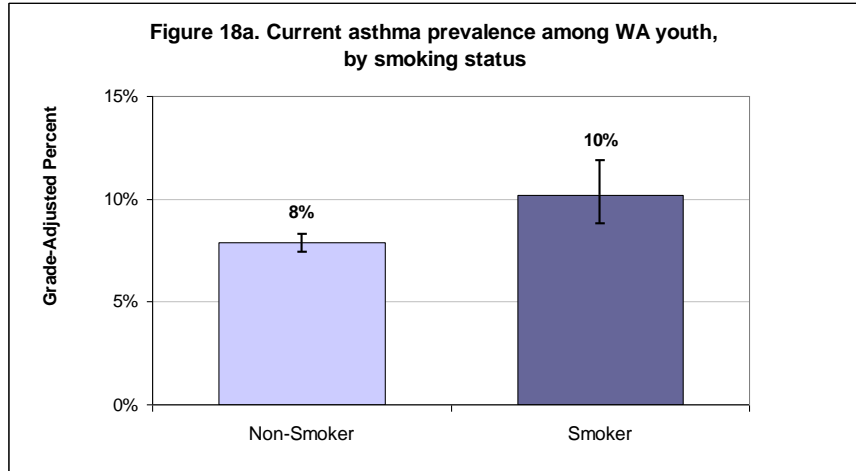
There was no significant difference in current asthma prevalence among non-smokers based on their exposure to secondhand smoke at home.



Source: Washington BRFSS 2003-2006
See Appendix D for data tables.

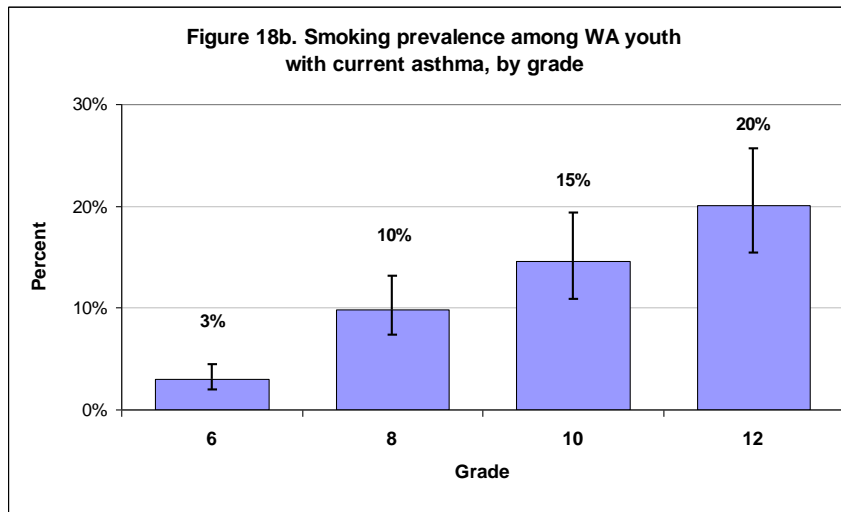
Youth who smoked cigarettes were about 30 percent more likely to have asthma than non-smokers. About one in five 12th graders who had asthma smoked cigarettes.

Youth who smoked were about 30 percent more likely to have asthma than youth who didn't smoke.



Source: Washington HYS 2006
See Appendix D for data tables.

- The prevalence of smoking increased as grade increased among students with current asthma.
- About one in five 12th graders who had asthma were smokers.



Source: Washington HYS 2006
See Appendix D for data tables.

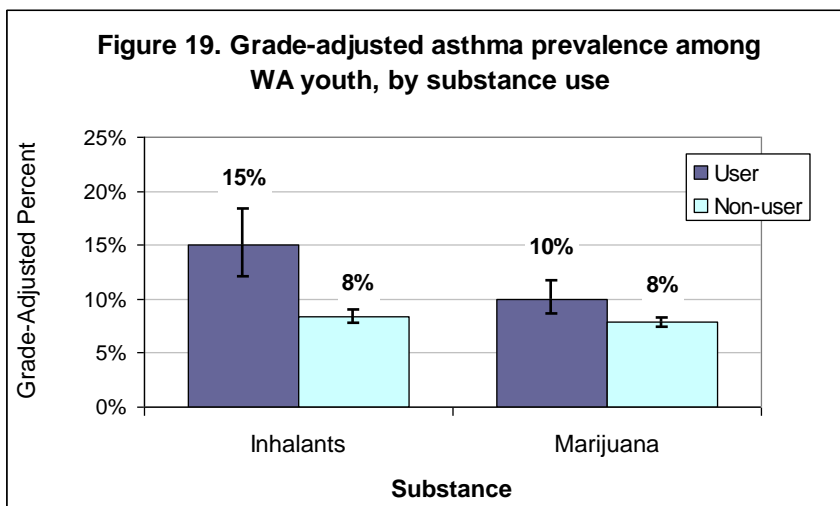
About one in three non-smoking youth with current asthma reported that they lived with a smoker. There was no significant difference in exposure to secondhand smoke between youth with current asthma compared to youth without asthma in the 2006 Healthy Youth Survey (31 percent \pm 2 percent versus 33 percent \pm 4 percent, respectively).

Other inhaled substances: Youth

Tobacco smoke was not the only substance youth deliberately inhaled into their lungs. Overall, 5 percent of youth reported using inhalants, or “huffing”. About 8 percent of youth with current asthma used inhalants. Overall, about 8 percent of youth (grades 6, 8, 10 and 12 combined) reported they used marijuana or hashish. Among students in grades 10 and 12, about one in five used marijuana. The risk of harm to the lungs from smoking marijuana has been shown to be much greater than from tobacco.⁸

Youth who used inhalants (“huffing”) were more likely than non-users to have current asthma.

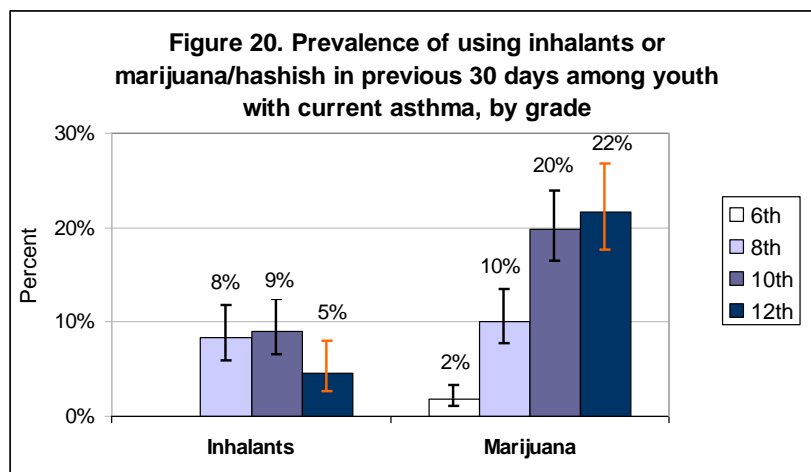
- Students who used inhalants were about 80 percent more likely to have asthma than non-users.
- Students who used marijuana were about 27 percent more likely to have asthma than non-users.



Source: Washington HYS 2006
See Appendix D for data tables.

About one in five 10th and 12th graders with current asthma used marijuana.

- Marijuana use increased as grade increased. About one out of five 10th and 12th grade youth with current asthma used marijuana.
- About as many eighth graders used inhalants as used marijuana. (Sixth graders were not asked about inhalant use).



Source: Washington HYS 2006

DATA KEY

Asthma Call-Back:
Behavioral Risk Factor Surveillance System Asthma-Call Back Survey

BRFSS:
Behavioral Risk Factor Surveillance System

CHARS:
Comprehensive Hospital Abstract Reporting System

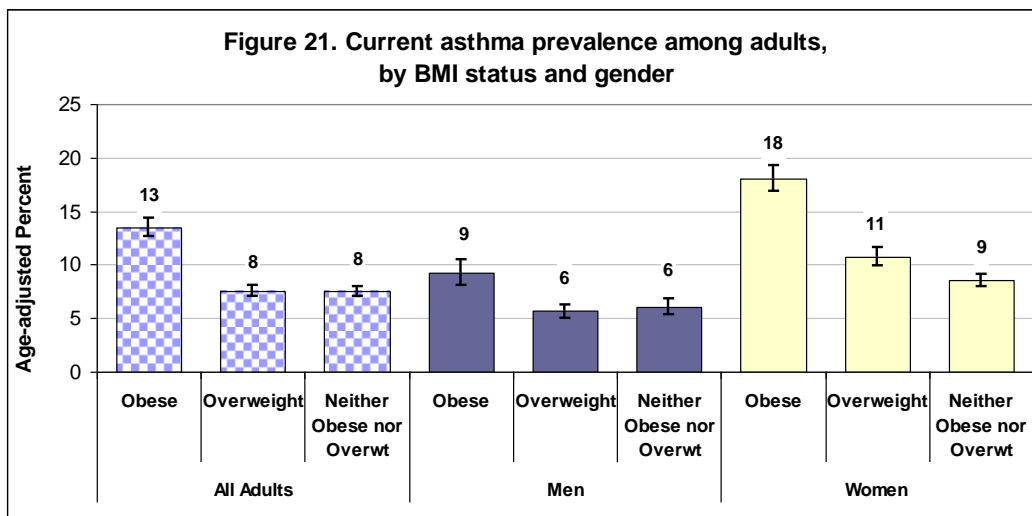
HYS: Healthy Youth Survey

Risk Factor – Obesity

Obesity: Adults

People who are obese are at increased risk for asthma.⁹ The asthma rate for obese adults in Washington was 13 percent (± 1 percent) compared with a rate of 8 percent (± 1 percent) for adults who were not obese. Studies have also shown increased asthma severity among obese adults.^{10,11} Adult obesity was determined by computing body mass index (BMI) from weight and height reported by survey respondents (see technical notes).

Women who were obese were twice as likely to have current asthma as women who were neither overweight nor obese.

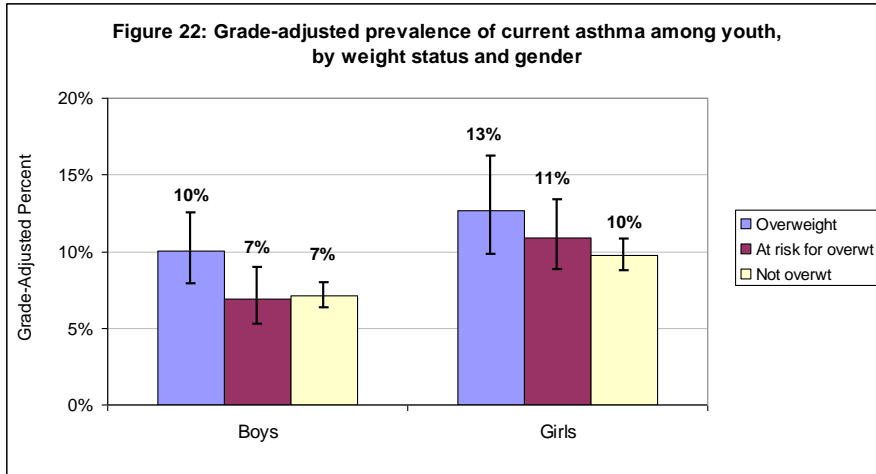


Source: Washington BRFSS 2004-2006
See Appendix D for data tables

- Among all adults, those who were obese were more likely to have current asthma than adults who were not obese.
- Men who were obese were more likely to have current asthma than men who were not obese.
- Prevalence of current asthma among women increased with increasing body mass index.
- Women were twice as likely to have current asthma if they were obese than if they were neither obese nor overweight.

Overweight: Youth

Weight status for youth who took the Healthy Youth Survey was assigned based on self-reported height and weight; it is unclear how accurately youth report these measurements.



Source: Washington HYS 2006
See Appendix D for data tables.

Among youth in grades 8, 10 and 12 who provided data on height and weight, there appeared to be a higher prevalence of asthma among youth who were overweight, compared to youth who were not overweight. However, the differences were not statistically significant.

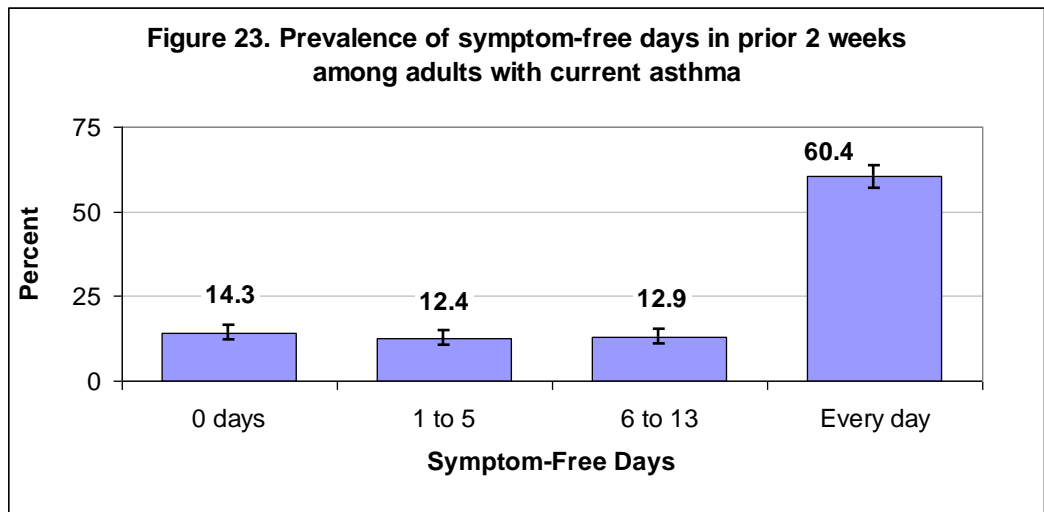
DATA KEY	
Asthma Call-Back:	Behavioral Risk Factor Surveillance System Asthma-Call Back Survey
BRFSS:	Behavioral Risk Factor Surveillance System
CHARS:	Comprehensive Hospital Abstract Reporting System
HYS:	Healthy Youth Survey

Living with Asthma

Quality of Life: Adults

Having asthma can negatively affect quality of life. Symptoms such as coughing, wheezing, or shortness-of-breath might interrupt sleep or cause sufferers to limit their activities. Unexpected asthma attacks might require use of multiple asthma medications. Asthma can affect not only the person who has asthma, but other family members as well, with unscheduled trips to the doctor or emergency department, making changes in the home environment, or increased caregiver responsibilities. When asthma is well-controlled, symptoms are minimal or absent.

One measure of quality of life for people with asthma is their number of days without symptoms.



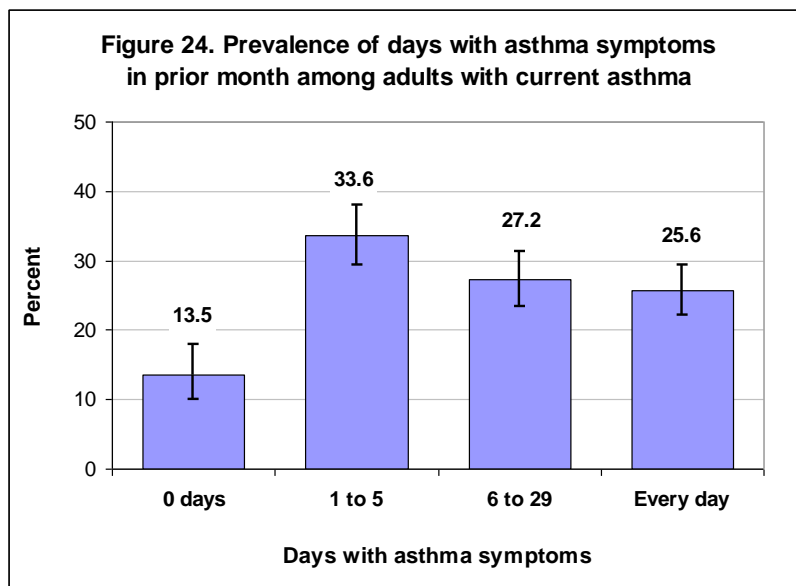
Source: Washington BRFSS 2006 Asthma Call-Back
See Appendix D for data tables.

Among adults with current asthma:

- About 1 in 7 had asthma symptoms every day during the prior two-week reference period.
- About 3 in 5 had no symptoms in the prior two-week period.

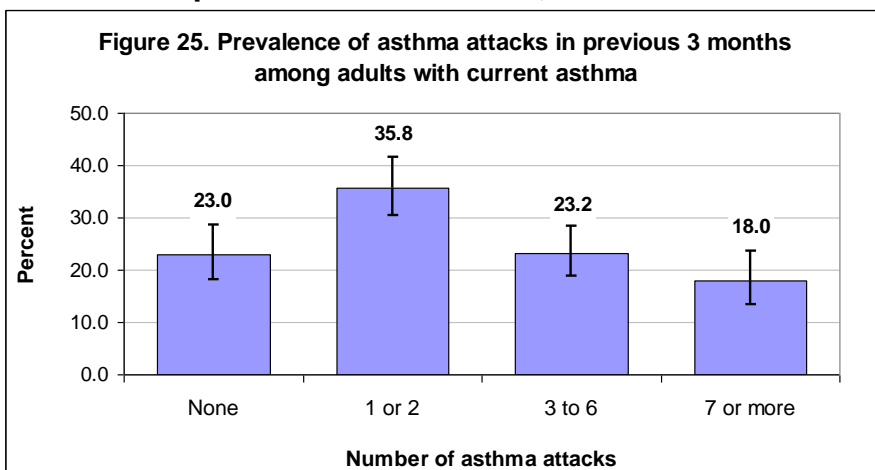
Fewer adults with current asthma were without symptoms when a longer time period was used. When asked on how many days during the previous 30 days they experienced asthma symptoms, only 14 percent reported having had no asthma symptoms. Figure 24 shows the number of days in the previous month that adults with current asthma experienced symptoms.

- About one in four adults with current asthma experienced symptoms every day during the previous month.
- Over half of adults with current asthma had symptoms more than five days per month.



Source: Washington BRFSS 2006 Asthma Call-Back
See Appendix D for data tables.

Three out of four adults with current asthma experienced an asthma attack in the previous three months; most had three or more attacks.



Source: Washington BRFSS 2006 Asthma Call-Back
See Appendix D for data tables

DATA KEY

Asthma Call-Back:
Behavioral Risk Factor Surveillance System Asthma-Call Back Survey

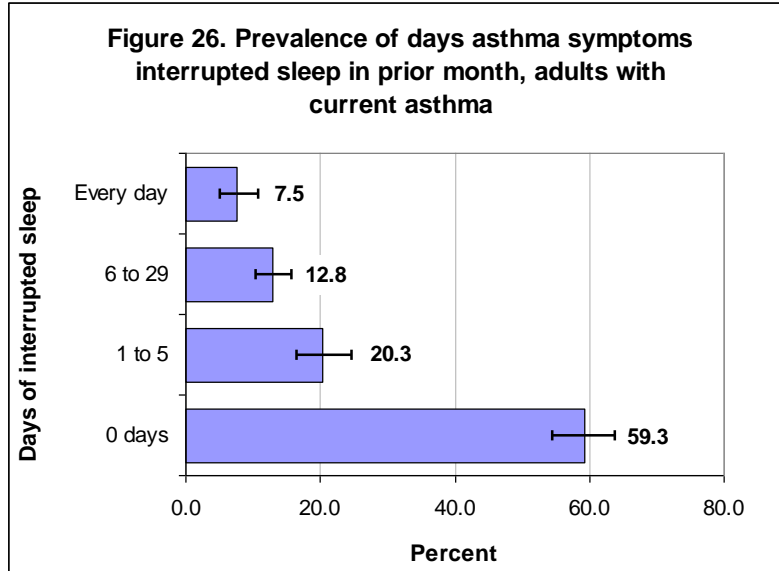
BRFSS:
Behavioral Risk Factor Surveillance System

CHARS:
Comprehensive Hospital Abstract Reporting System

HYS: Healthy Youth Survey

When symptoms of asthma suddenly become more severe, it can be referred to as an asthma attack. Fewer than one in four adults with current asthma reported having no asthma attacks in the previous three months.

People who have asthma often have their sleep interrupted by asthma symptoms.



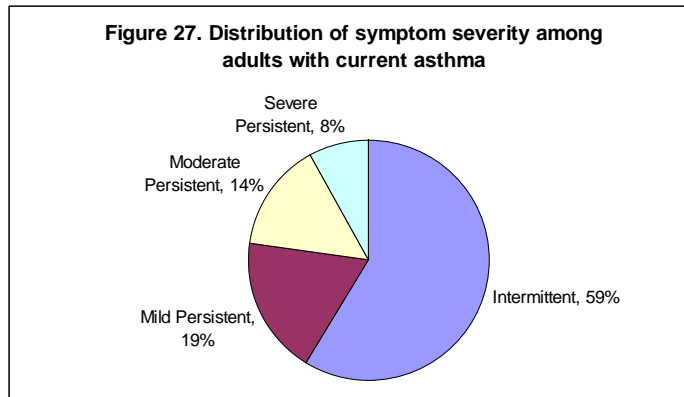
Source: Washington BRFSS 2006 Asthma Call-Back
See Appendix D for data tables.

- About 2 in 5 adults with current asthma reported their sleep had been disrupted by asthma symptoms during the previous month.
- About 1 in 12 adults with current asthma reported their sleep had been disrupted by asthma symptoms every day

Symptom Severity – Adults

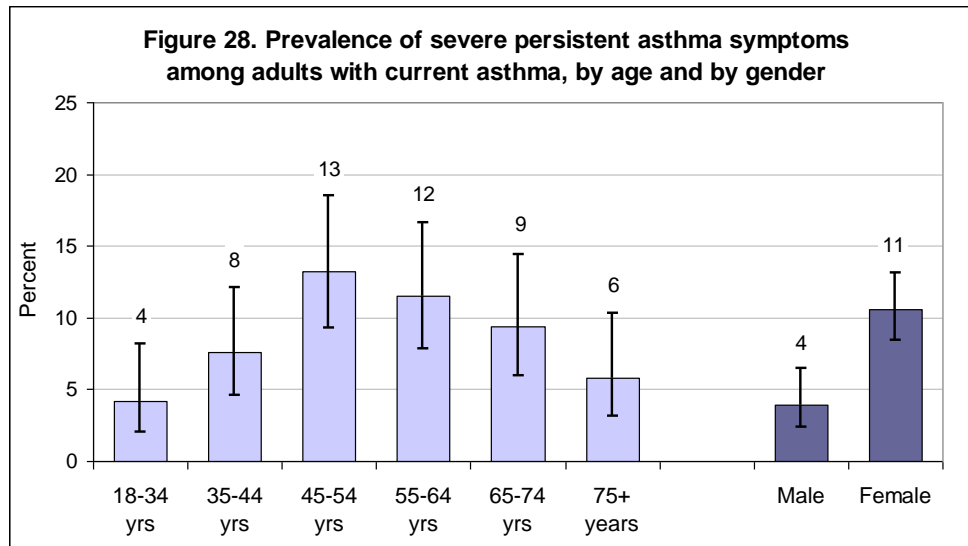
We classified symptom severity based on National Asthma Education and Prevention Program guidelines¹² and classification labels. The severity classification accounted for asthma-related emergency department or urgent doctor visits, degree of activity limitation, days with asthma symptoms, and days in which asthma symptoms interfered with sleep. Without having clinical data that are also factored into the National Asthma Education and Prevention Program classification system, it is unknown how closely our scores match what would be assigned by a clinician.

- More than half of adults with current asthma had intermittent asthma symptoms.
- Nearly one in four adults with current asthma had moderate persistent or severe persistent asthma symptoms.



Source: Washington BRFSS 2006 Asthma Call-Back
See Appendix D for data tables.

Women were more likely than men to have severe persistent asthma symptoms.



Source: Washington BRFSS 2006 Asthma Call-Back
See Appendix D for data tables.

DATA KEY

Asthma Call-Back:
Behavioral Risk Factor Surveillance System Asthma-Call Back Survey

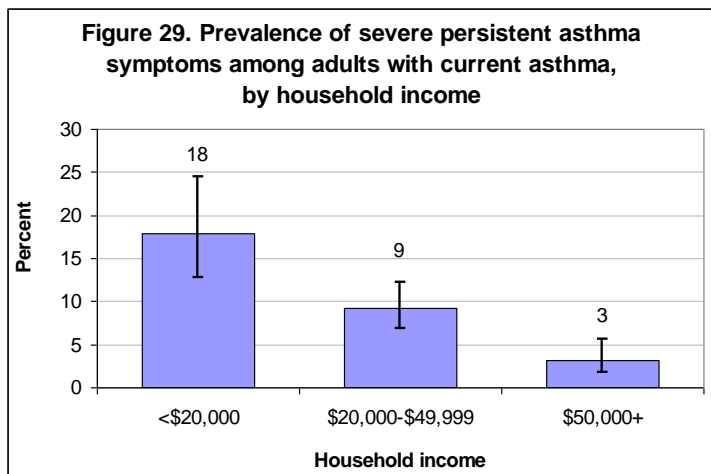
BRFSS:
Behavioral Risk Factor Surveillance System

CHARS:
Comprehensive Hospital Abstract Reporting System

HYS: Healthy Youth Survey

- Women were nearly three times more likely than men to have severe persistent asthma symptoms.
- Adults with current asthma who were ages 45 through 54 were about three times more likely to have severe persistent asthma symptoms than adults ages 18 through 34.

Adults with low income were significantly more likely to have severe persistent asthma symptoms than adults with high income.

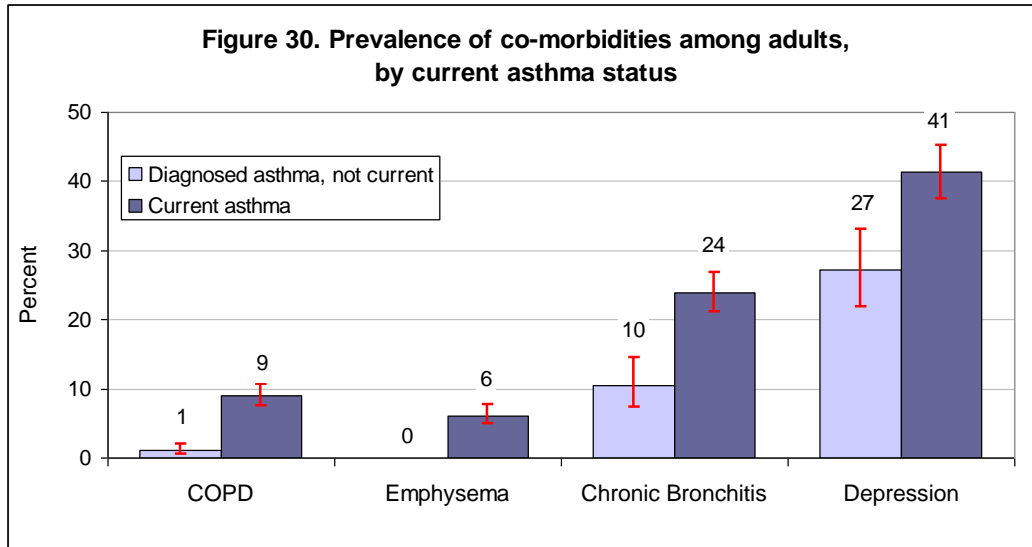


Source: Washington BRFSS 2006 Asthma Call-Back
See Appendix D for data tables.

- Adults with current asthma, who had less than \$20,000 per year income, were about twice as likely to have severe persistent asthma symptoms as adults with \$20,000 to \$49,999 per year income.
- Adults with less than \$20,000 per year income were also about six times more likely than adults with incomes of \$50,000 or more to have severe persistent symptoms.
- As income increased, the prevalence of severe persistent asthma symptoms decreased.

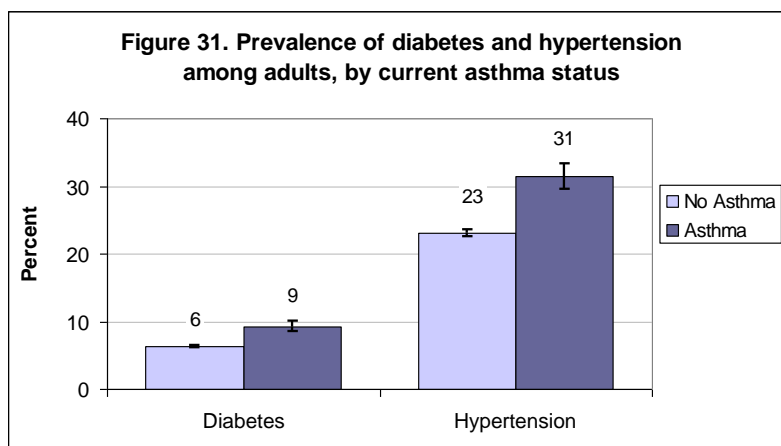
Co-morbidities: Adults

Over 40 percent of adults with current asthma had been diagnosed with depression.



Source: Washington BRFSS 2006 Asthma Call-Back
See Appendix D for data tables.

- Adults with current asthma were more likely to have been diagnosed with chronic obstructive pulmonary disease (COPD), emphysema, chronic bronchitis or depression than adults who were diagnosed but did not currently have asthma.
- Depression had been diagnosed in two out of five respondents with current asthma.



Source: Washington BRFSS 2003-2006
See Appendix D for data tables.

Adults with current asthma were more likely to have diabetes or hypertension than adults who did not have asthma.

DATA KEY

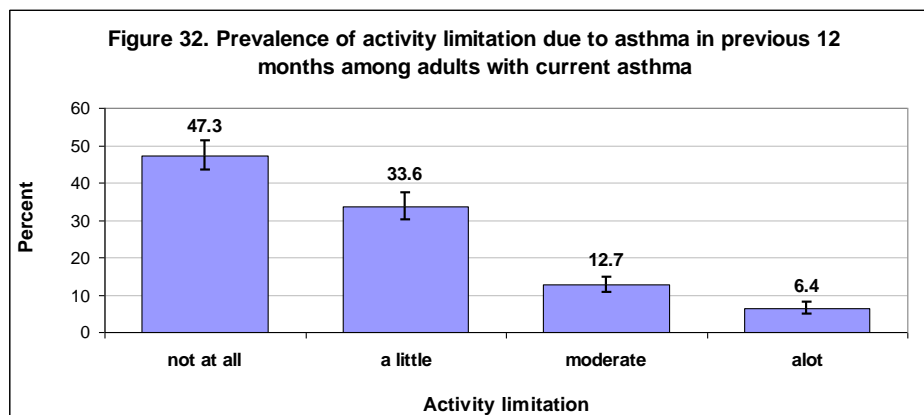
Asthma Call-Back:
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Activity Limitation: Adults

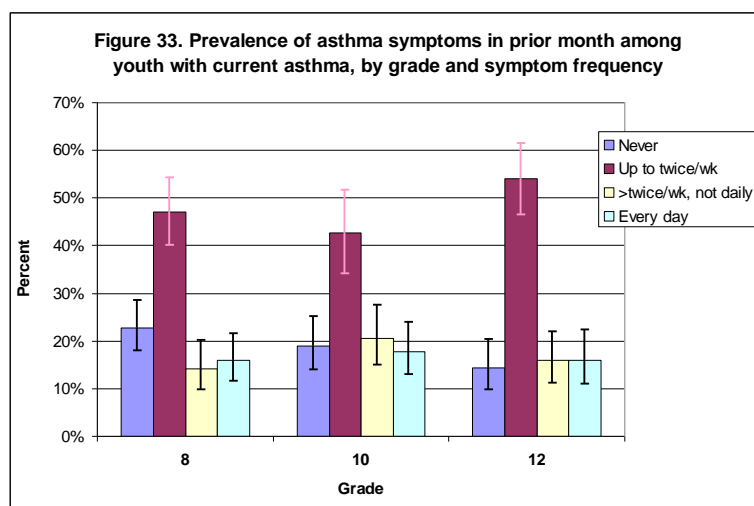


Source: Washington BRFSS 2006 Asthma Call-Back
See Appendix D for data tables.

- Over half of adults with current asthma reported some degree of activity limitation due to asthma in the previous year.
- About 1 in 5 adults with current asthma described their activity limitation as “moderate” or “a lot.”

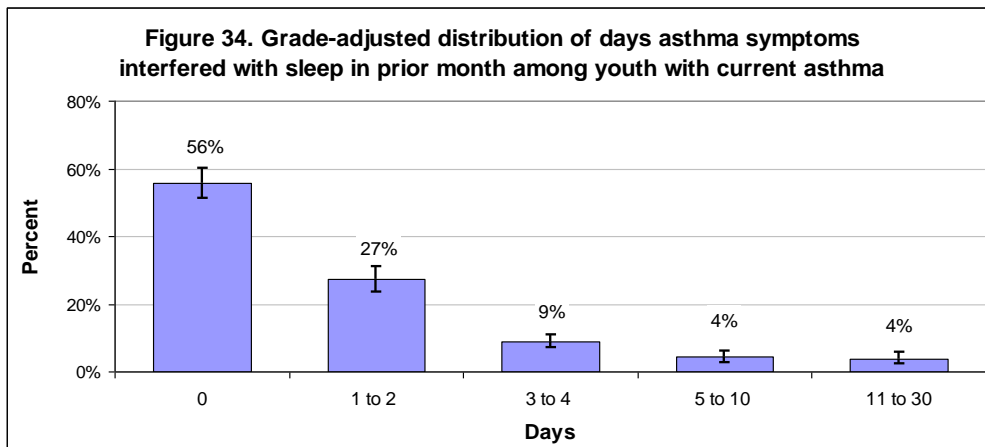
Quality of Life: Youth

Youth with current asthma experienced frequent asthma symptoms which could affect their daily activities or interrupt their sleep. Youth with asthma were significantly more likely than youth without asthma to experience depression or thoughts of suicide.



Source: Washington HYS 2006

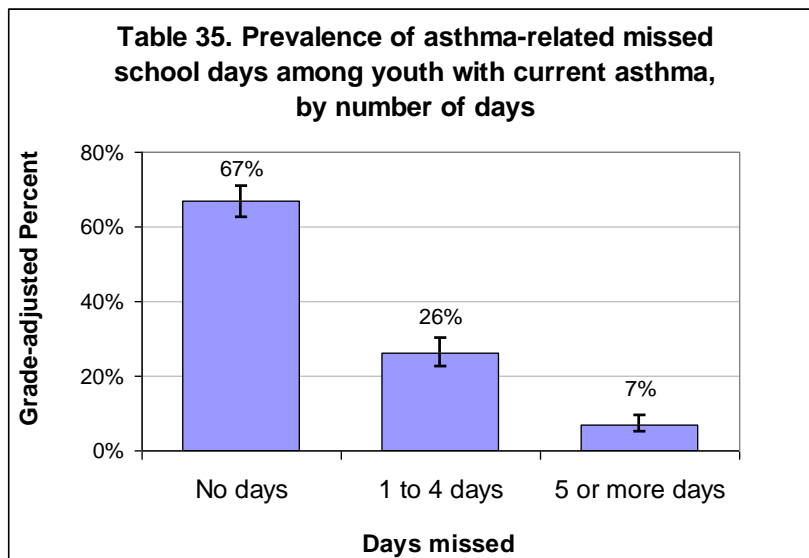
- About 1 in 3 youth with current asthma had symptoms more than twice per week during the previous month.
- About 1 in 5 youth with current asthma had no symptoms.
- Compared with adults, youth with current asthma reported less symptom frequency (see Figure 24). Differences between grades were not significant.



Source: Washington HYS 2006
See Appendix D for data tables.

About 2 in 5 youth with current asthma reported that asthma symptoms had interfered with their sleep during the previous month.

One in three youth with current asthma missed one or more school days because of their asthma.



Source: Washington HYS 2006
See Appendix D for data tables.

- Among youth with current asthma, one in three missed at least one school day in the previous 12 months because of their asthma.
- About 1 in 13 youth with asthma missed five or more days of school because of asthma.

DATA KEY

Asthma Call-Back:
Behavioral Risk Factor Surveillance System
Asthma-Call Back Survey

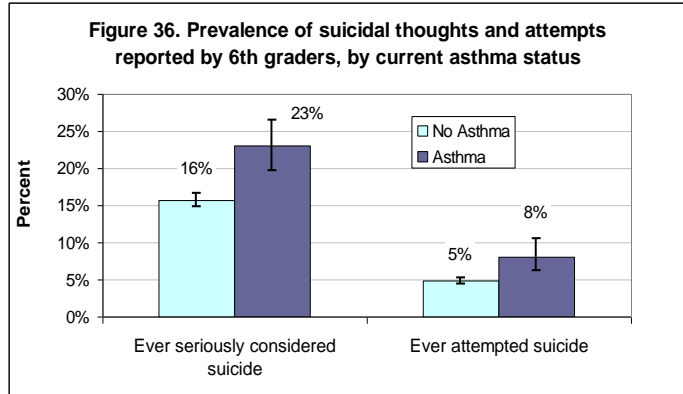
BRFSS:
Behavioral Risk Factor Surveillance System

CHARS:
Comprehensive Hospital Abstract Reporting System

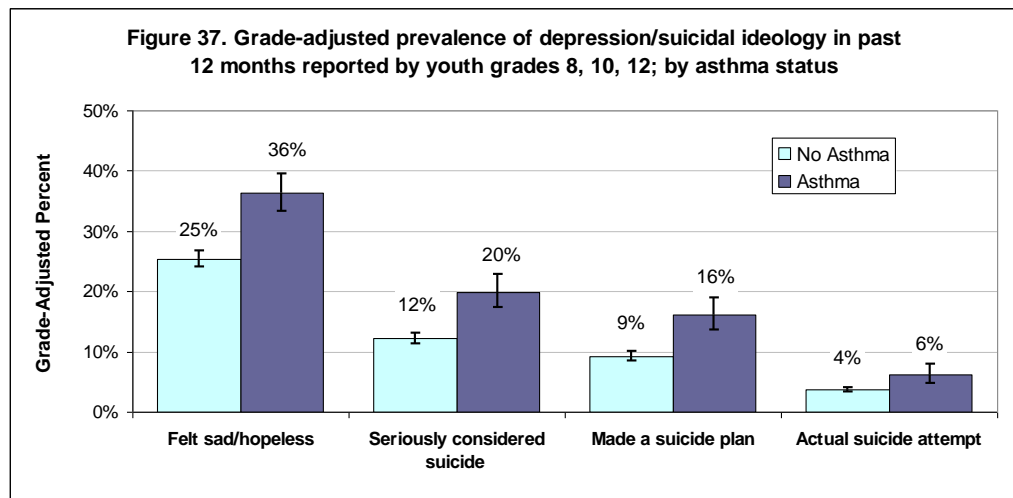
HYS: Healthy Youth Survey

Youth with current asthma were more likely than youth without asthma to have seriously considered suicide.

- Sixth graders were asked if they had *ever* seriously considered or attempted suicide.
- Sixth graders with current asthma were about 50 percent more likely to report having considered suicide than those without asthma.
- Sixth graders with current asthma were about 70 percent more likely to report having attempted suicide than those without asthma.



Source: Washington HYS 2006



Source: Washington HYS 2006
See Appendix D for data tables.

Youth in grades 8, 10 and 12 were asked about their experiences with depression or suicide within the previous 12 months.

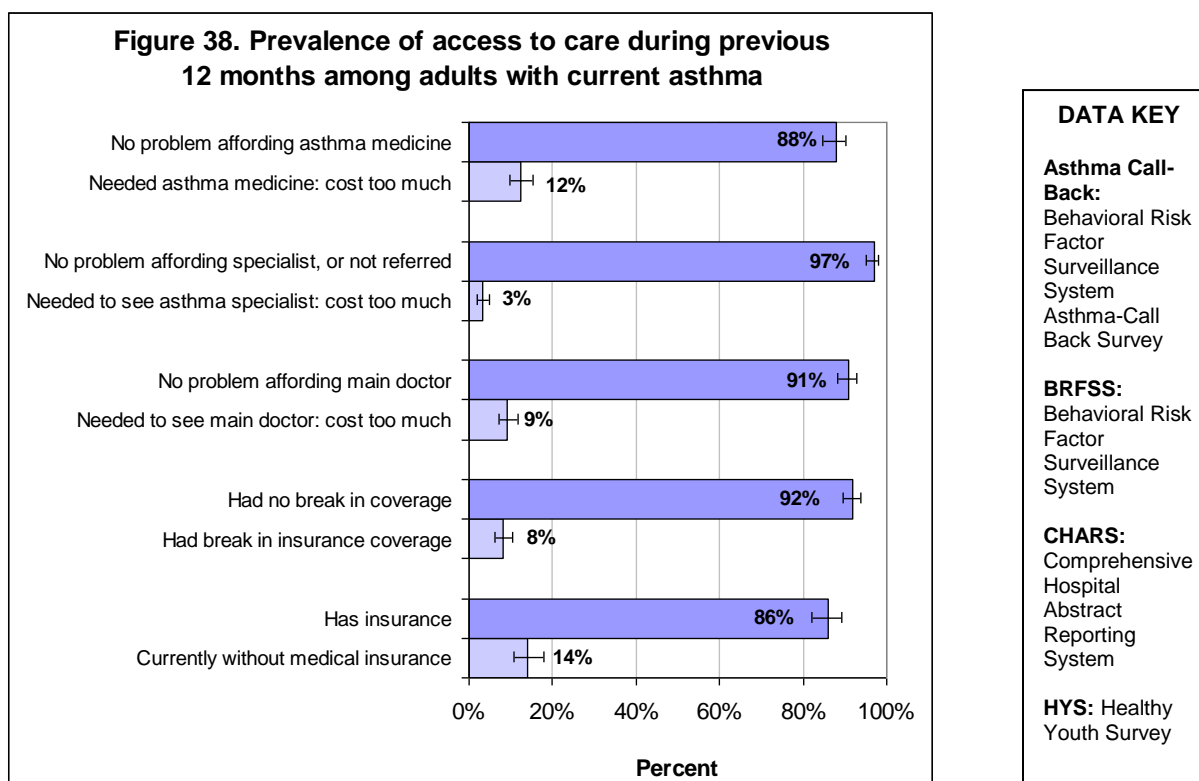
- Youth with current asthma were more likely than youth without asthma to have experienced feeling so sad or hopeless almost every day for two or more weeks in a row that they stopped doing some of their usual activities.
- Youth with current asthma were more likely than youth without asthma to have seriously considered suicide, made a suicide plan, or actually attempted suicide.

Health Care: Adults

Adults with asthma were significantly more likely to have a personal doctor than adults who did not have asthma. This could be explained by their need for ongoing medical care. Data from adults who responded to the 2003 through 2006 Washington BRFSS showed that:

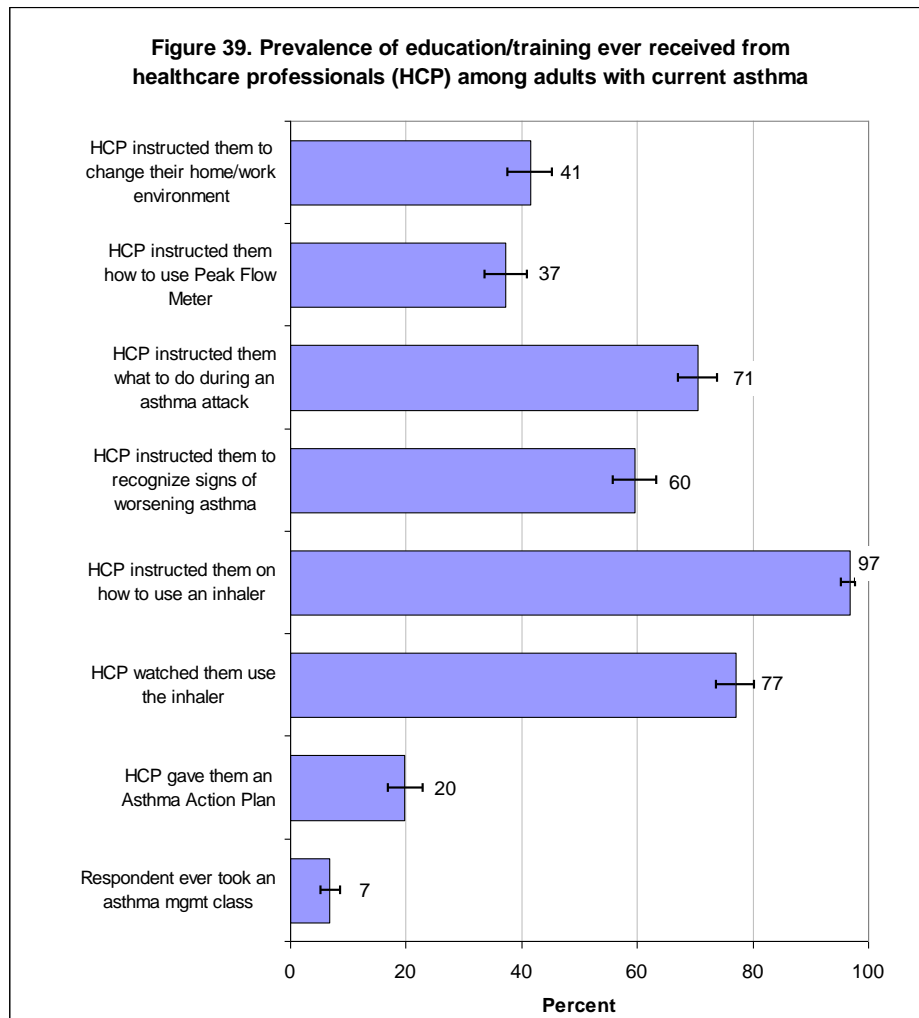
- Only about 14 percent (13.1-15.7) of adults with current asthma were without a personal doctor compared to 22.3 percent (21.9-22.8) of adults without asthma.
- About 86 percent (84.9-87.4) of adults with asthma had current health insurance coverage, a rate similar to adults without asthma.
- Adults with asthma were more likely to report not being able to afford to see a doctor during the previous year than adults without asthma, 18.9 percent (17.7-20.1) versus 12.6 percent (12.2-12.9), respectively.

Having medical insurance did not guarantee being able to afford asthma care.



Source: Washington BRFSS 2006 Asthma Call-Back
See Appendix D for data tables.

- About 1 in 8 adults with current asthma were unable to afford their asthma medication at some time in the previous 12 months.
- About 1 in 7 were without insurance coverage and an additional 1 in 12 had experienced a break in coverage during the prior 12 months.

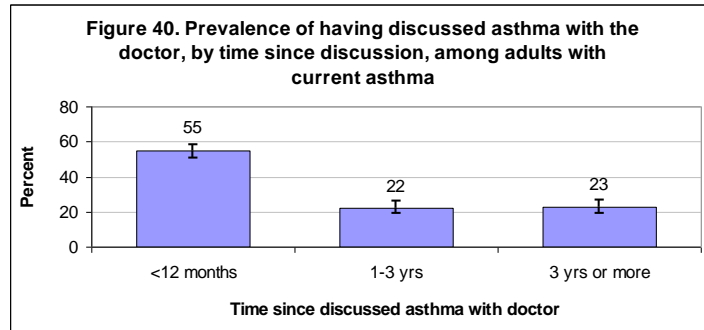


Source: Washington BRFSS 2006 Asthma Call-Back
 See Appendix D for data tables.

- Nearly all adults with current asthma reported receiving instructions on how to use an inhaler; about three out of four reported a healthcare professional had watched them use an inhaler.
- Only 1 in 5 adults with current asthma had received an asthma action plan.
- Fewer than half of adults with current asthma reported they were instructed in the use of a peak flow meter or given instruction on changing their home or work environment.
- Totals add up to more than 100 percent because respondents could choose more than one response.

The 2007 National Asthma Education and Prevention Program guidelines recommend checkups every six months for asthma that has been under control for at least three months. Those with severe persistent asthma or uncontrolled asthma need more frequent checkups. They also recommend all asthma patients be given an asthma action plan, an assessment of environmental triggers, and trigger reduction counseling.¹²

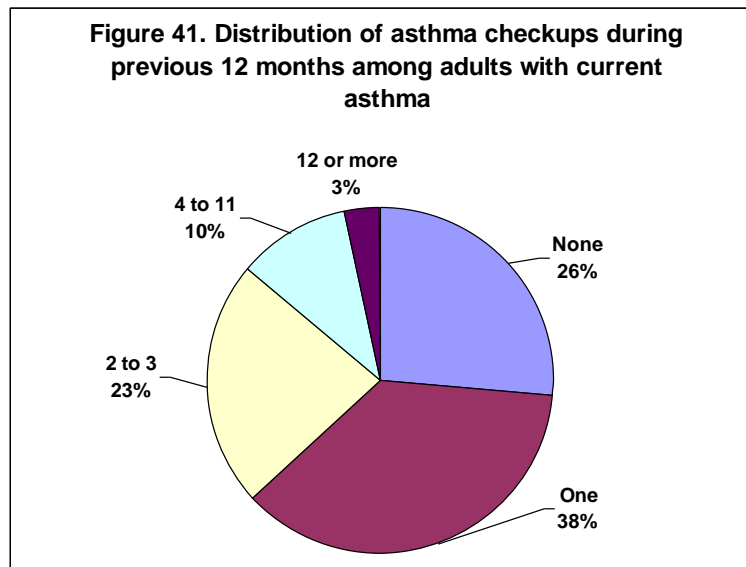
About 45 percent of adults with current asthma reported it had been over a year since they had discussed asthma with their doctor.



Source: Washington BRFSS 2006 Asthma Call-Back
See Appendix D for data tables.

Few adults with current asthma met the recommended guidelines for doctor checkups.

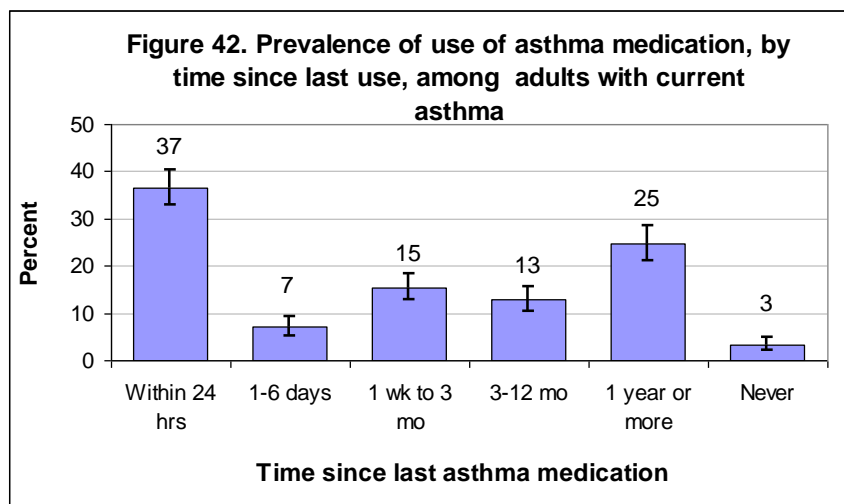
About one in three adults with current asthma reported having two or more asthma checkups during the previous 12 months.



Source: Washington BRFSS 2006 Asthma Call-Back
See Appendix D for data tables.

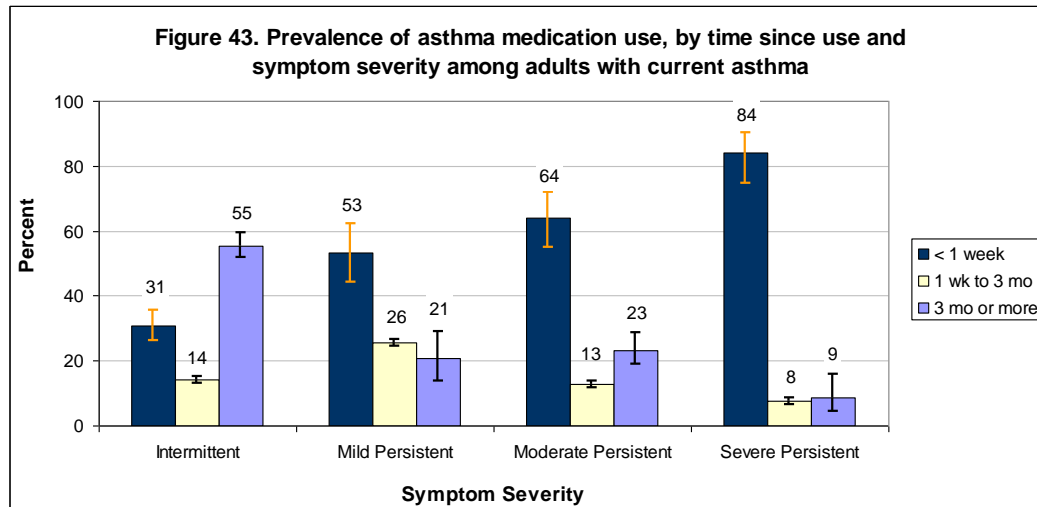
DATA KEY

- Asthma Call-Back:** Behavioral Risk Factor Surveillance System Asthma-Call Back Survey
- BRFSS:** Behavioral Risk Factor Surveillance System
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- HYS:** Healthy Youth Survey



Source: Washington BRFSS 2006 Asthma Call-Back
 See Appendix D for data tables.

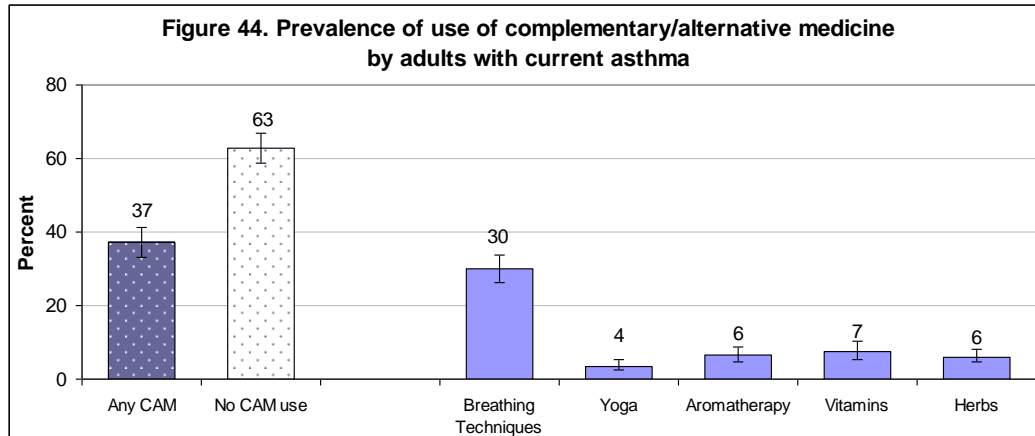
- More than 1 in 3 adults with current asthma reported taking asthma medication within the previous 24 hours.
- One in four adults with current asthma reported they had not taken asthma medication for a year or more.



Source: Washington BRFSS 2006 Asthma Call-Back
 See Appendix D for data tables.

- The proportion of adults with current asthma who reported using asthma medication within the previous week increased with increasing asthma severity.
- More than 4 in 5 adults with severe persistent asthma symptoms reported using asthma medication within the previous week.
- Fewer than one in three adults with intermittent asthma reported taking asthma medication within the past week.

Research on the usefulness of complementary or alternative medicine for asthma is very limited. Herbal medicines may be beneficial but further study is needed.¹³ A recent study of an integrated breathing and relaxation method showed improvements in respiratory symptoms of adults with asthma. Improvements were also noted in dysfunctional breathing and adverse mood, compared to usual care.¹⁴ Additional studies to confirm these findings are needed.

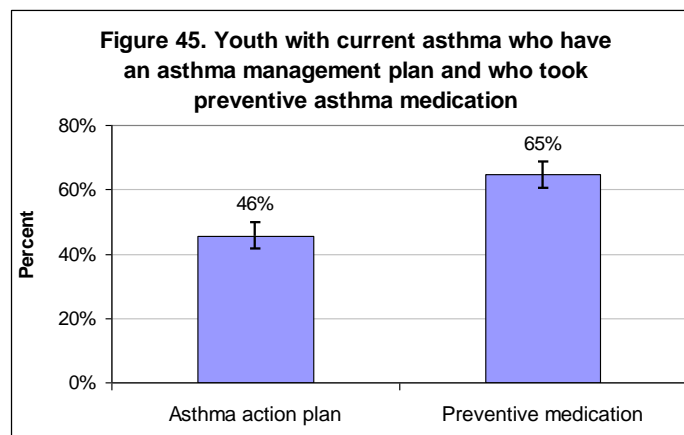


Source: Washington BRFSS 2006 Asthma Call-Back
See Appendix D for data tables.

- More than one-third of adults who responded to the survey use some form of complementary or alternative medicine (CAM) to help control their asthma.
- Included in “Any CAM” but not shown were acupuncture (1 percent), acupressure (1 percent), homeopathy (1 percent), reflexology (1 percent) and naturopathy (1 percent). Respondents could choose more than one therapy.

Health Care: Youth

- About two in three youth with current asthma reported taking preventive asthma medication in the previous 12 months.
- Fewer than one in two youth with current asthma reported they had an asthma plan from their health care provider.
- Youth with asthma were more than twice as likely as adults with asthma to have an asthma action plan. (see Figure 39).



Source: Washington HYS 2006
See Appendix D for data tables.

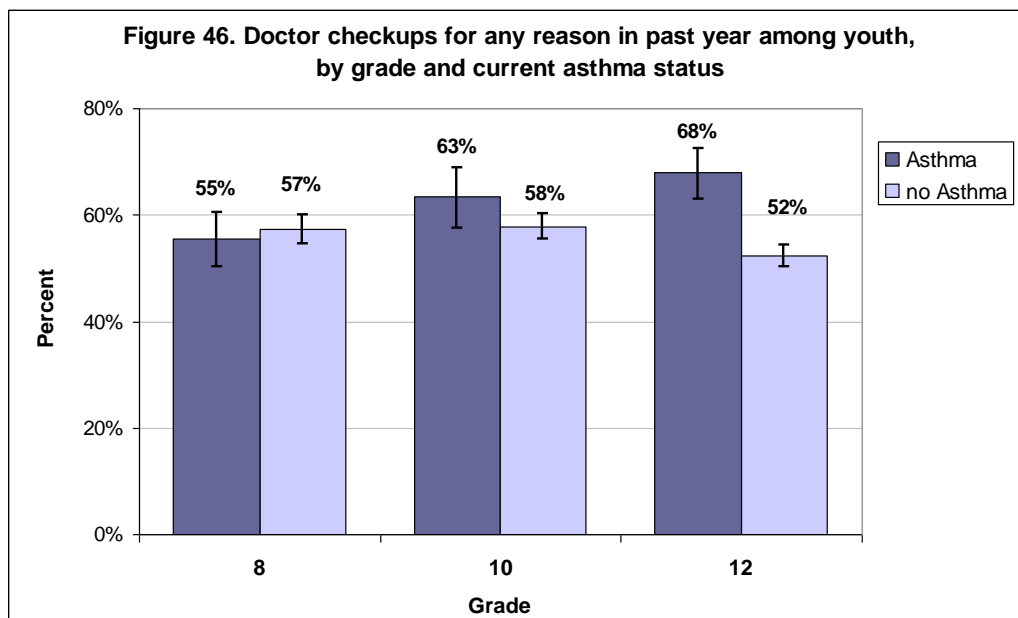
DATA KEY

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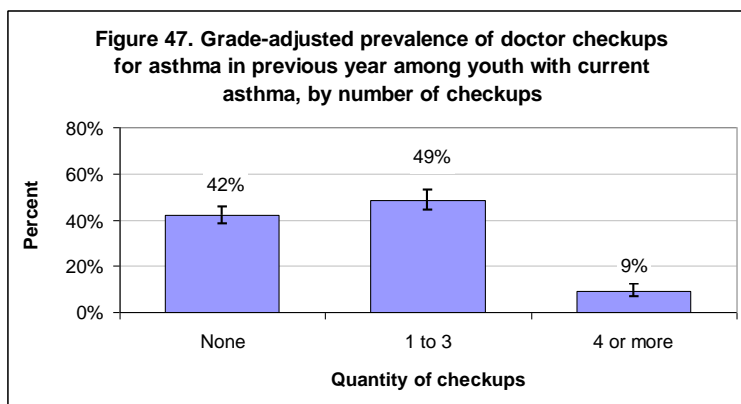


Source: Washington HYS 2006
See Appendix D for data tables

Twelfth grade students, but not those in grades 8 or 10, with current asthma were more likely to have had a checkup within the past 12 months than students without asthma.

Few youth with current asthma met the guidelines for recommended doctor checkups or had an asthma management plan.

About 2 in 5 youth with current asthma (grades 8, 10 and 12) had no asthma checkups in the previous 12 months.



Source: Washington HYS 2006
See Appendix D for data tables.

Environmental Factors Affecting Asthma

Environment: Homes

The following information comes from the Indoor Air Quality chapter in the 2007 edition of the Health of Washington State. For more information and technical notes, see the chapter at: <http://www.doh.wa.gov/HWS/EH2007.shtm>

An important factor in managing asthma is avoidance of asthma “triggers” – substances in the environment that can worsen asthma symptoms. Smoking tobacco indoors is a major source of combustion particles and irritant gases. Gas cook tops and ovens and room-vented gas or kerosene heaters are sources of combustion gases, particularly carbon monoxide, nitrogen oxides, excess moisture, and sulfur oxides. Fine particles from outdoor air pollution can travel indoors. Other environmental factors can also have a substantial effect on asthma symptom control. Indoor exposure to allergens like cat dander, dust mites, molds, and cockroach particles can contribute to asthma symptoms, particularly in children.¹⁵

Mold exposure has been associated with increased risk of asthma.¹⁶ Mold growth in buildings results from moisture intrusion (like a leaking roof or plumbing problems) and condensation due to ventilation that is inadequate to remove excess indoor moisture generated by activities like cooking and showering. The 2004 Washington BRFSS (most recent data available) asked questions about water damage, the presence of a moldy or musty smell, and visible mold in the home. Among people who responded to the 2004 BRFSS and whose homes had signs of mold, 13 percent (± 2 percent) had asthma compared to 8 percent (± 1 percent) of those whose homes did not have signs of mold.¹⁷

Methods to reduce indoor air pollutants include providing adequate ventilation, eliminating indoor tobacco smoking, properly venting and maintaining combustion appliances like furnaces, controlling moisture, and thorough cleaning using cleaners, paints, and building materials that have low emissions of volatile organic compounds (known as VOCs). Volatile organic compounds are organic compounds that evaporate at a relatively low temperature and contribute to air pollution. Examples include ethylene, propylene, benzene, or styrene. Replacing older wood-burning stoves with certified stoves can also reduce pollutants.

Low-income people may have fewer resources to address asthma triggers in the home that might mean replacing carpeting, repairing ventilation fans, or fixing leaks where mold is an issue. Unresponsive landlords, neighborhoods with higher levels of air pollution, and greater use of wood for home heating can also contribute to the problem.

The 2006 BRFSS Asthma Call-Back collected data on environmental factors present in the homes of adults with current asthma. Results from this survey are shown in Figures 48 and 49.

DATA KEY

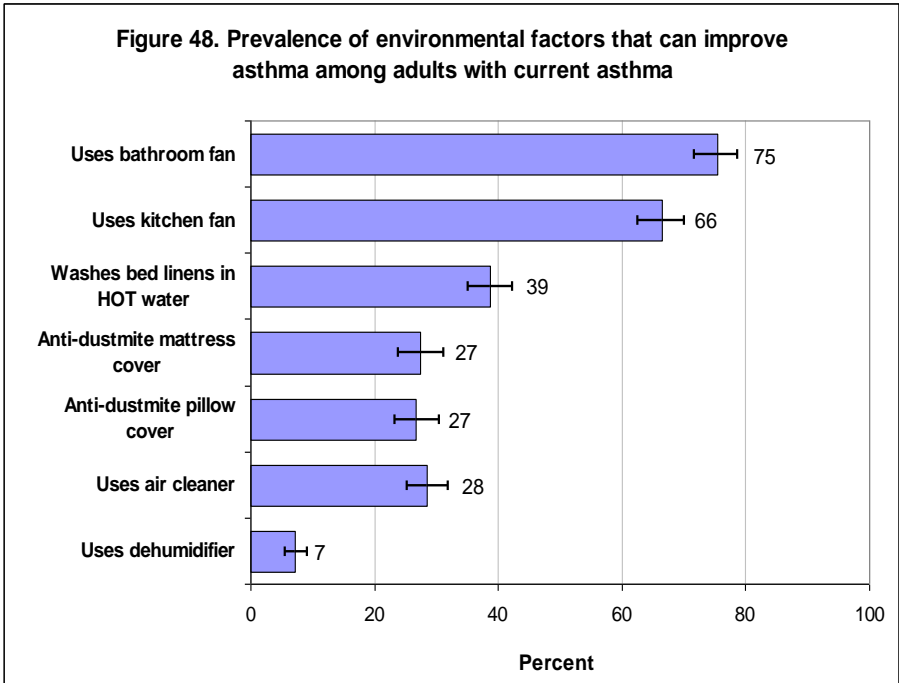
Asthma Call-Back:
Behavioral Risk Factor Surveillance System Asthma-Call Back Survey

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HYS: Healthy Youth Survey

Simple remedies to help avoid dust mite exposure, like washing bed linens in hot water and using impermeable covers on pillows and mattresses, were under-utilized by adults with current asthma.



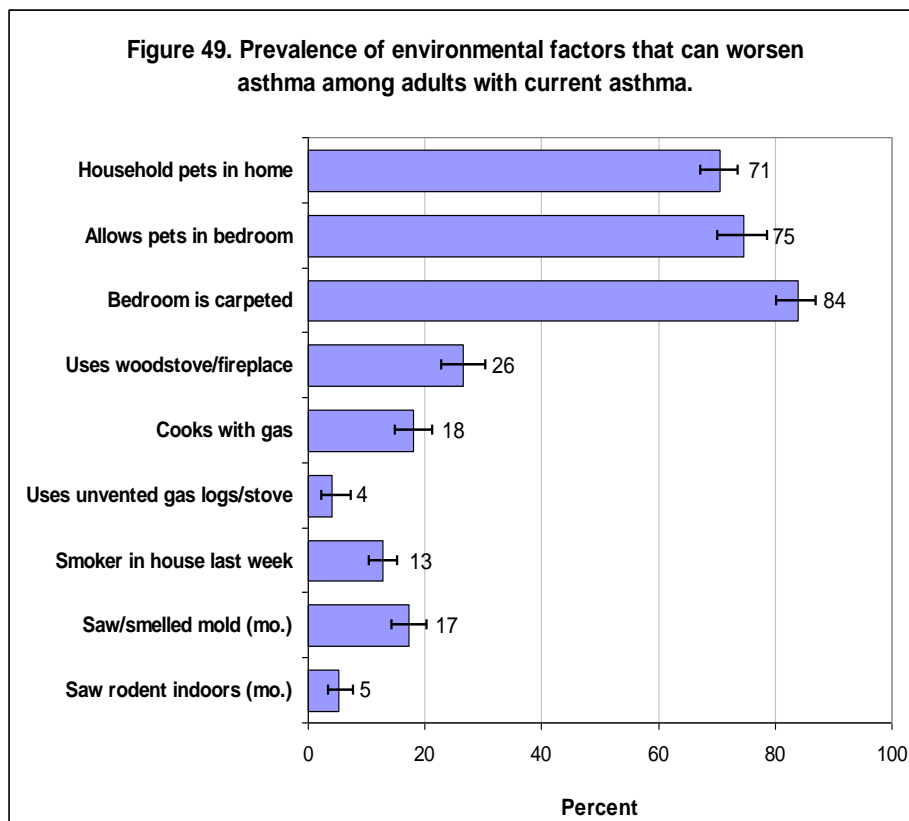
Source: Washington BRFSS 2006 Asthma Call-Back
See Appendix D for data tables.

- Fewer than half of adults with current asthma washed bed linens in hot water.
- Three out of four adults with current asthma did not use anti-dust mite covers.
- About 1 out of 4 adults with current asthma failed to use kitchen and bathroom fans.
- Totals add up to more than 100 percent because respondents could choose multiple responses.

Keeping household pets out of sleeping areas can reduce asthma symptoms.

Nearly 3 in 4 adults with current asthma had household pets.

Most pets were allowed in the bedroom and most bedrooms were carpeted.



DATA KEY

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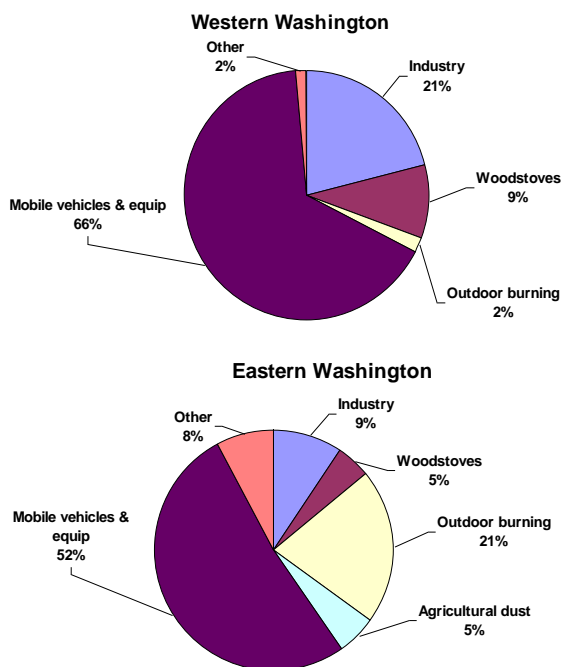
Source: Washington BRFSS 2006 Asthma Call-Back
See Appendix D for data tables.

- Nearly 3 in 4 adults with current asthma had pets in their home.
- About 3 of 4 adults with current asthma with pets allowed them in the bedroom.
- About 1 of 4 adults with current asthma use a wood-burning stove or fireplace.
- About 1 of 6 adults with current asthma saw or smelled mold in their home in the previous 30 days.
- About 1 of 8 adults with current asthma reported someone had smoked in their home in the previous week.
- Totals do not add up to 100 percent because respondents could choose more than one response.

Environment: Air Pollution

Exposure to outdoor air pollutants like ground-level ozone (ozone) and fine particulate matter (PM_{2.5}) can trigger asthma attacks and lead to asthma development. Physical exercise can increase symptoms in some people who have asthma. This is especially likely when air quality is poor; those who exercise outdoors will breathe more air pollution. People who live near major highways have higher rates of asthma-related emergency department use and hospitalizations.¹⁸

Figure 50. Distribution of factors that contribute to poor air quality in Washington.



Source: Washington State Department of Ecology, 2005 Comprehensive Emissions Inventory Summary
See Appendix D for data tables.

Emissions of particulate matter (PM_{2.5}), volatile organic compounds, nitrogen oxides, and sulfur-dioxide were used as surrogate measures of air quality for eastern and western Washington. Ozone, a known respiratory irritant, is not included in the chart because it is not directly released as an air pollutant. It forms secondarily when sunlight reacts with nitrogen oxides and volatile organic compounds. See Appendix C: Technical Notes

- Vehicles and equipment (forklifts, chainsaws, tractors, etc.) were the highest source of emissions in eastern and western Washington.
- Outdoor burning and woodstoves were responsible for over one-fourth of the emissions in eastern Washington.
- Industry and woodstoves were responsible for nearly one-third of the emissions in western Washington.

The following information comes from the Outdoor (Ambient) Air Quality chapter in the 2007 edition of the Health of Washington State. For more information see: <http://www.doh.wa.gov/HWS/EH2007.shtm>

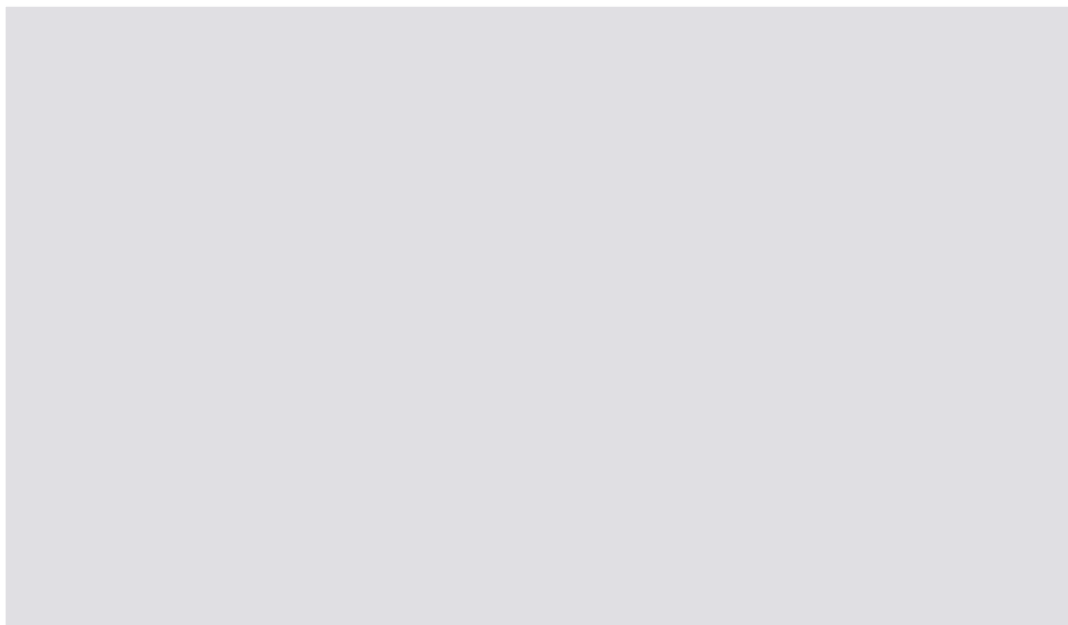
Particulate matter. Air pollution from particulate matter, especially PM_{2.5}, is associated with development and worsening of lung and cardiovascular disease. Death rates from these diseases increase as particulate matter levels rise. Even very low levels of PM_{2.5}, below the current federal standard, have been linked to health effects in some people.¹⁹

Particulate matter air pollution includes several types of particles with different chemical compositions. Fine particles less than 2.5 microns in diameter (PM_{2.5}) come from combustion, while course particles from 2.5 to 10 microns in diameter (PM_{2.5-10}) include wind-blown dust as well as bacteria, pollen, and mold spores. In the winter, when PM_{2.5} pollution is highest, wood stoves and fireplaces account for 56 percent of this pollution.^{20,21}

In 2006, the United States Environmental Protection Agency lowered the daily standard for PM_{2.5} from 65 to a more protective limit of 35 micrograms per cubic meter (µg/m³). The Washington State Department of Ecology and regional clean air agencies monitor PM_{2.5} in 25 Washington counties. (Fourteen counties have no monitors.)

Based on a review of 2005 data, the following map shows that 11 counties (Benton, Clallam, Chelan, Cowlitz, King, Pierce, Snohomish, Spokane, Stevens, Thurston, and Yakima) experienced days in which PM_{2.5} levels in parts of the county were above the level of 35 micrograms per cubic meter (µg/m³).

Figure 51. Number of days during 2005 when PM_{2.5} levels were 20µg/m³ or higher, by county



DATA KEY

Asthma Call-Back:
Behavioral Risk Factor Surveillance System
Asthma-Call Back Survey

BRFSS:
Behavioral Risk Factor Surveillance System

CHARS:
Comprehensive Hospital Abstract Reporting System

HYS: Healthy Youth Survey

Source: Washington State Department of Health.
See Appendix C for technical notes and Appendix D for data tables.

People are more likely to have health symptoms or medical problems on days when PM_{2.5} levels are elevated. Of about a million Washingtonians living within 2.5 miles of an air monitor, 59 percent live in an area where PM_{2.5} measurements were above 35µg/m³ on at least one day in 2005. Presently, the Wapato Hills Puyallup River Valley (including Edgewood, Fife, Fircrest, Lakewood, Milton, Puyallup, Ruston, Sumner, Tacoma, and University Place) is not meeting the standard for PM_{2.5}. The Environmental Protection Agency may determine that Vancouver does not meet the standard. Monitoring data suggest that four other communities – Yakima, Marysville, Darrington, and South Park – may also fail to meet the new standard unless PM_{2.5} emissions are reduced during winter months.²⁰

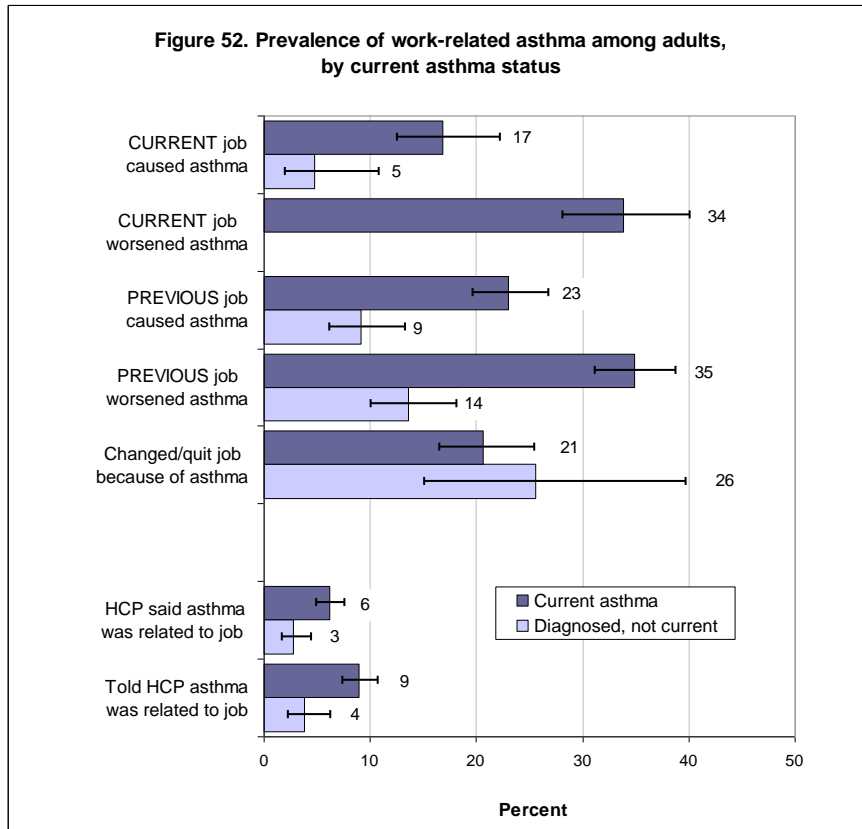
Environment: Worksites

There are many allergens and irritants in the workplace that can cause or aggravate asthma. About 15 percent of all adult-onset asthma is thought to be caused by workplace exposures.²²

Workers' compensation claims. Based on 2001-2005 data from the Washington Department of Labor and Industries, about 205 workers per year filed workers' compensation claims for work-related asthma. The rate of asthma-related claims dropped significantly from 2001 to 2005 – 162 to 97 per million full-time equivalent employees, respectively.

The 2006 BRFSS Asthma Call-Back Survey collected data on work-related asthma from adults with current asthma. Figures 52 and 53 show results from that survey.

One in three workers with current asthma reported their current job worsened their asthma.



Source: Washington BRFSS 2006 Asthma Call-Back
See Appendix D for data tables.

- While many adults reported that their work environment caused or worsened their asthma, few reported discussing this issue with their health care provider.
- One in three workers with current asthma reported their current job worsened their asthma.
- No adults with diagnosed, but not current asthma reported their current job worsened their asthma.

In many cases, the jobs with the highest exposures to potentially harmful substances are jobs that require little education or training and pay the least.²³ Workers with limited education or training may have little choice in available employment and be unable to change jobs to avoid asthma triggers in the workplace.

DATA KEY

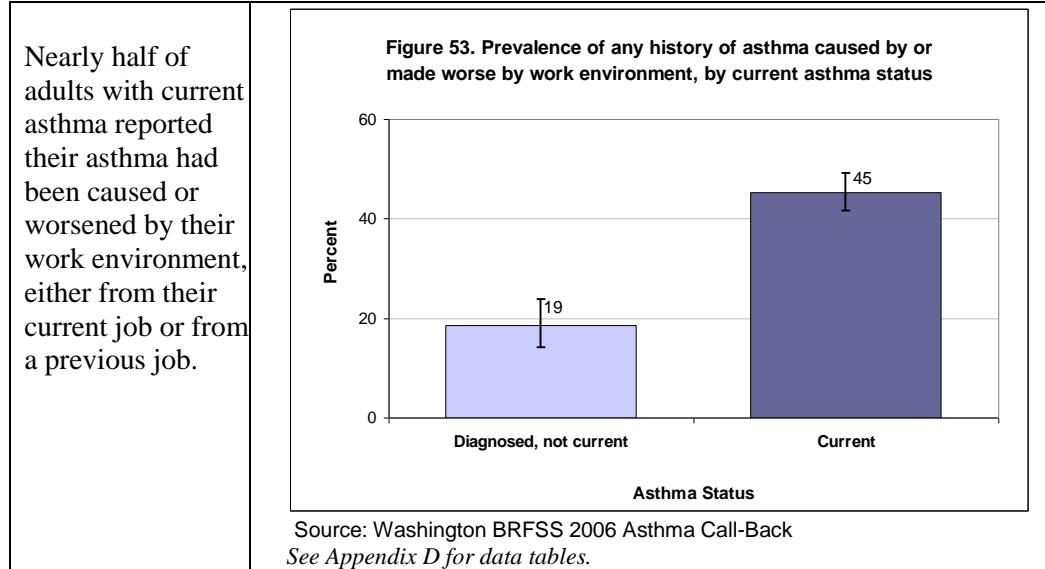
Asthma Call-Back: Behavioral Risk Factor Surveillance System Asthma-Call Back Survey

BRFSS: Behavioral Risk Factor Surveillance System

CHARS: Comprehensive Hospital Abstract Reporting System

HYS: Healthy Youth Survey

Nearly half of adults with current asthma reported their asthma had been caused or worsened by their work environment.



Worksite policies can have a significant effect on the presence or absence of potential asthma triggers. In 2006, a sample of Washington worksites was surveyed about policies and practices related to air quality. The table below shows results from that survey. Hospitals, healthcare facilities, and retirement homes were the most likely to have policies that supported improved air quality.

Prevalence of indoor air policies or practices by business type

	Office	Store	Warehouse, factory, construction	Restaurant	Hospital, health care facility, retirement	Other	All Businesses
Has a 'scent free' or 'perfume free' policy	12.9%	7.1%	12.5%	19.3%	39.8%	10.3%	16.8%
Someone responsible for checking HVAC airflow	76.0%	68.0%	78.3%	89.1%	88.3%	89.1%	79.8%
Someone responsible for checking indoor air quality	48.7%	42.7%	52.7%	46.4%	60.0%	46.1%	50.2%
Has a policy or requirement to use only non-irritating cleaning agents	18.9%	36.5%	18.5%	27.2%	54.0%	26.1%	28.7%

Source: Washington State 2006 Healthy Worksite Survey

Environment: Schools

Youth spend a large part of their time in schools. School nurses are required to develop emergency care plans for students with serious health conditions. These plans help schools to be ready to respond when a student experiences an asthma attack.

About 88 percent of public school students attend schools in Class I districts – districts with more than 2,000 students. Of the 296 public school districts in Washington, 106 are Class I districts. The School Nurse Study, a 2006 report on health services in 79 Washington Class I districts,²⁴ reported the following data:

Asthma in Washington Class I Districts

Number of Diagnosed Cases	Percent of Student Population	Number of Life-Threatening Cases	Percent of Diagnosed Cases Reported as Life-Threatening
41,853	6.3%	3,128	13%

A 2005 law (RCW 28A.210.370) requires schools to allow children to carry asthma rescue medications, as authorized by their parents and a health care provider. Schools are also required to adopt policies for asthma rescue procedures, and conduct staff training. According to the 2006 School Health Profiles, about 81 percent (± 5 percent) of junior and senior high schools had action plans for all students with asthma.

Just as policies and practices related to air quality are important in the workplace, these policies play an important role in helping young people manage their asthma in schools. Policies that discourage idling of buses and other vehicles at schools reduce exposure to diesel exhaust, another asthma trigger. The percentage of schools that restricted school bus idling during pick-up or drop-off of students was 43 percent (± 7 percent). Only 9 percent (± 4 percent) restricted other vehicles from idling.

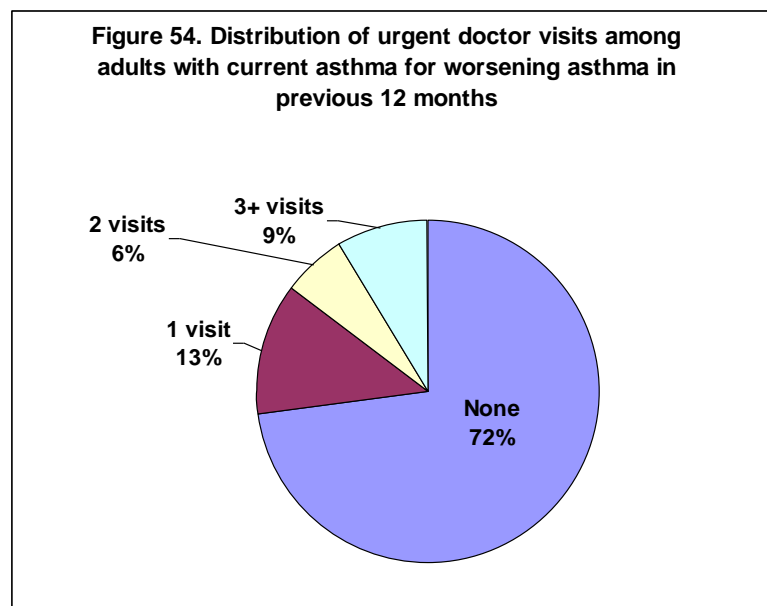
DATA KEY	
Asthma Call-Back:	Behavioral Risk Factor Surveillance System Asthma-Call Back Survey
BRFSS:	Behavioral Risk Factor Surveillance System
CHARS:	Comprehensive Hospital Abstract Reporting System
HYS:	Healthy Youth Survey

Asthma Exacerbation: Prevention and Control

The goal of asthma management is for symptoms to be as well controlled as possible for the individual with asthma. Well-controlled asthma can be distinguished by few, if any, unscheduled doctor visits for worsening asthma symptoms, and a lack of emergency department visits or hospitalizations. Although deaths from asthma are rare, they do occur. In some cases, deaths could be prevented by a combination of better disease management and avoidance of asthma triggers.

Asthma Urgent/Emergency Events

More than one out of four adults with current asthma had at least one urgent doctor visit for worsening asthma symptoms within the previous 12 months.

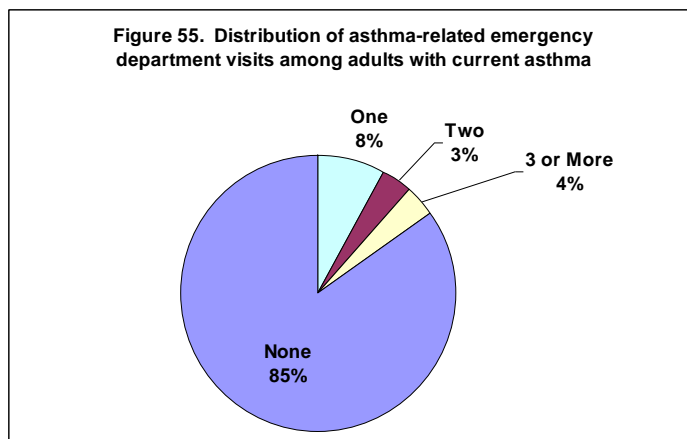


Source: Washington BRFSS 2006 Asthma Call-Back
See Appendix D for data tables.

- Over one-fourth of adults with current asthma had one or more urgent doctor visits for worsening asthma symptoms.
- Among adults who had urgent doctor visits, over half had more than one such visit.

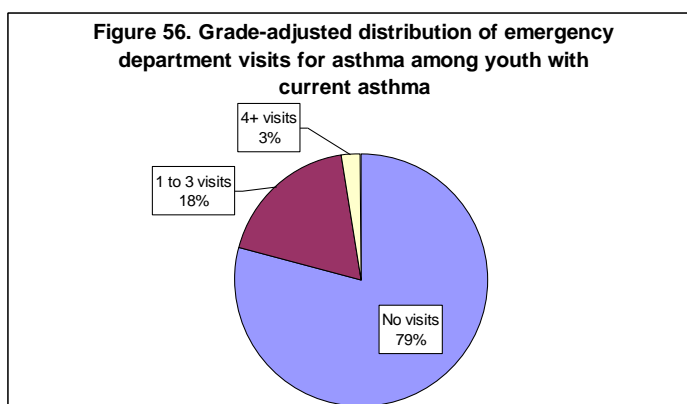
About 15 percent of adults and 21 percent of youth with current asthma had one or more asthma-related emergency department visits during the previous 12 months.

- About 15 percent of adults with current asthma had one or more emergency department visits for worsening asthma symptoms.
- Nearly half of those who had asthma-related emergency department visits had more than one such visit.



Source: Washington BRFSS 2006 Asthma Call-Back
See Appendix D for data tables.

- About 1 in 5 youth with current asthma had at least one emergency department visit for asthma during the previous 12 months.



Source: Washington HYS 2006
See Appendix D for data tables.

DATA KEY

Asthma Call-Back: Behavioral Risk Factor Surveillance System Asthma-Call Back Survey

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Behavioral Risk Factor Surveillance System

CHARS: Comprehensive Hospital Abstract Reporting System

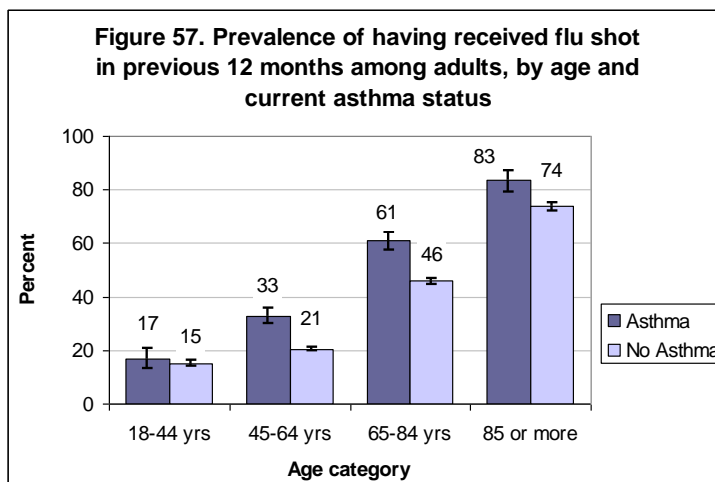
HYS: Healthy Youth Survey

Prevention of Hospitalizations and Deaths

Avoidance of respiratory infections can play an important role in preventing asthma hospitalizations and deaths. In a study of multiple causes of death, asthma-related deaths were “over four times more likely than non-asthma deaths to have acute upper respiratory infections, influenza, or acute bronchitis listed on the death record.”²⁵ The American College of Allergy, Asthma & Immunology recommends an annual flu shot for asthma patients.²⁶

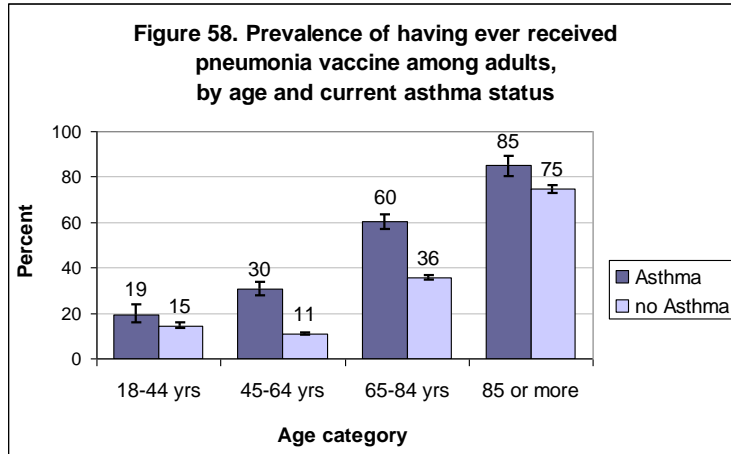
Few adults with current asthma who were younger than age 65 were vaccinated against flu or pneumonia.

- Adults ages 45 and older with asthma were more likely to have had a flu shot in the previous 12 months than those without asthma.
- Only 1 in 3 adults with current asthma ages 45 to 64 got flu shots.
- Fewer than 2 in 3 adults with asthma ages 65 to 84 reported having had a flu shot.
- Adults ages 85 and older who had asthma were the most likely to have had a flu shot; however, nearly 1 in 5 was still unvaccinated.



Source: Washington BRFSS 2003-2006
See Appendix D for data tables.

- Adults ages 45 and older, with asthma, were more likely to have received the pneumonia vaccine than those without asthma.
- About 2 in 5 adults with current asthma ages 65 through 84 had not received the pneumonia vaccine.
- About 1 in 7 adults with current asthma, ages 85 or older, had not received the pneumonia vaccine.



Source: Washington BRFSS 2003-2006
 See Appendix D for data tables.

DATA KEY

Asthma Call-Back:
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Inpatient Asthma Hospitalizations

The number of asthma hospitalizations may be related to the number of people who have asthma. When more people have asthma, asthma-related hospitalizations could reasonably be expected to increase. However, many such hospitalizations could be prevented with proper asthma management.²⁷ From 2000 to 2004, Washington averaged about 5,200 asthma hospitalizations per year, but hospitalization rates dropped significantly from 95 per 100,000 in 2002 to 77 per 100,000 in 2004. Children younger than five were the most likely to be hospitalized for asthma. People ages 15–24 were least likely to be hospitalized with asthma.

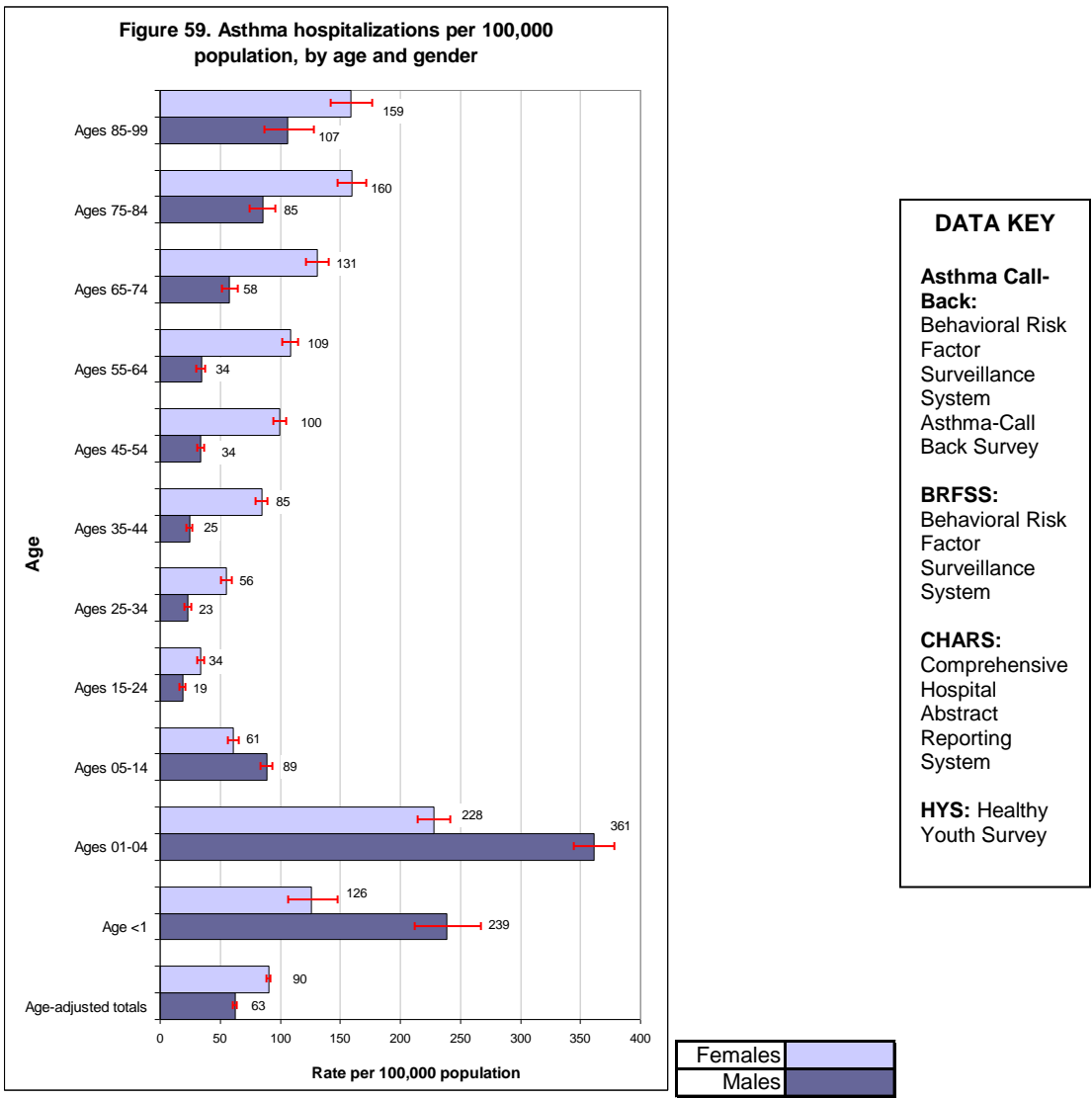
Healthy People 2010 (Midcourse Review) set national targets for reducing asthma hospitalizations in three age groups: children younger than five; children and adults ages 5–64; and adults ages 65 and older. The table below shows Washington’s age-adjusted hospitalization rates for asthma by age group for 2000 and 2004, and includes the *Healthy People 2010* target.

**Healthy People 2010:
Age-Adjusted Hospitalization Rates for Asthma
Per 100,000 Population**

Age Group	Washington 2000	Washington 2004	U.S. Target
Children younger than 5 years	376	277	250
Children/adults ages 5–64 years	66	54	77
Adults ages 65 and older	111	114	110

- Washington asthma hospitalizations for children younger than five dropped from 376 to 277 per 100,000 population. If this trend continues, Washington should meet the *Healthy People 2010* target of 250 for this age group.
- Asthma hospitalizations among children and adults ages 5–64 also declined from 66 per 100,000 in 2000 to 54 per 100,000 in 2004, already a better rate than the national target for 2010.
- Asthma hospitalization rates among adults ages 65 and older have remained relatively steady since 2000 and are close to the national target.

From Washington State Department of Health, Health of Washington State, Asthma Chapter.²⁸



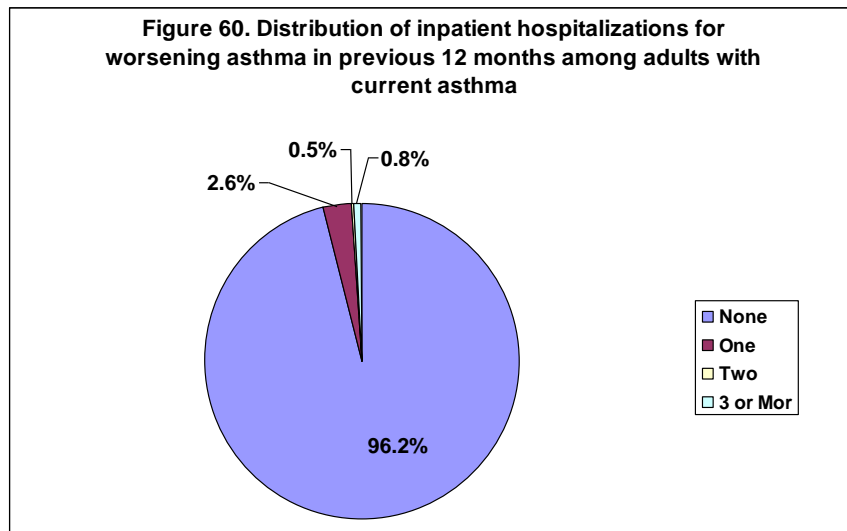
Source: Washington CHARS 2004-2006
 See Appendix D for data tables.

- The very young had the highest risk of being hospitalized for asthma followed by adults aged 75 and older.
- Through age 14, boys were more likely than girls to be hospitalized with asthma.
- Women age 15 and older were more likely than men to be hospitalized with asthma.
- Hospitalization rates were lowest among ages 15 through 24, then increased with age for both sexes.

NOTE: Accuracy of diagnosing asthma in infants is controversial; asthma hospitalization rates among children younger than one year are not considered reliable. Many conditions can cause similar symptoms in very young children due to the small size of their airways. Doctors often avoid applying a diagnosis of asthma until the child is mature enough for more reliable testing.²⁹

Adults who responded to the 2006 BRFSS Asthma Call-Back Survey were asked about their history of asthma hospitalizations during the 12 months prior to the survey.

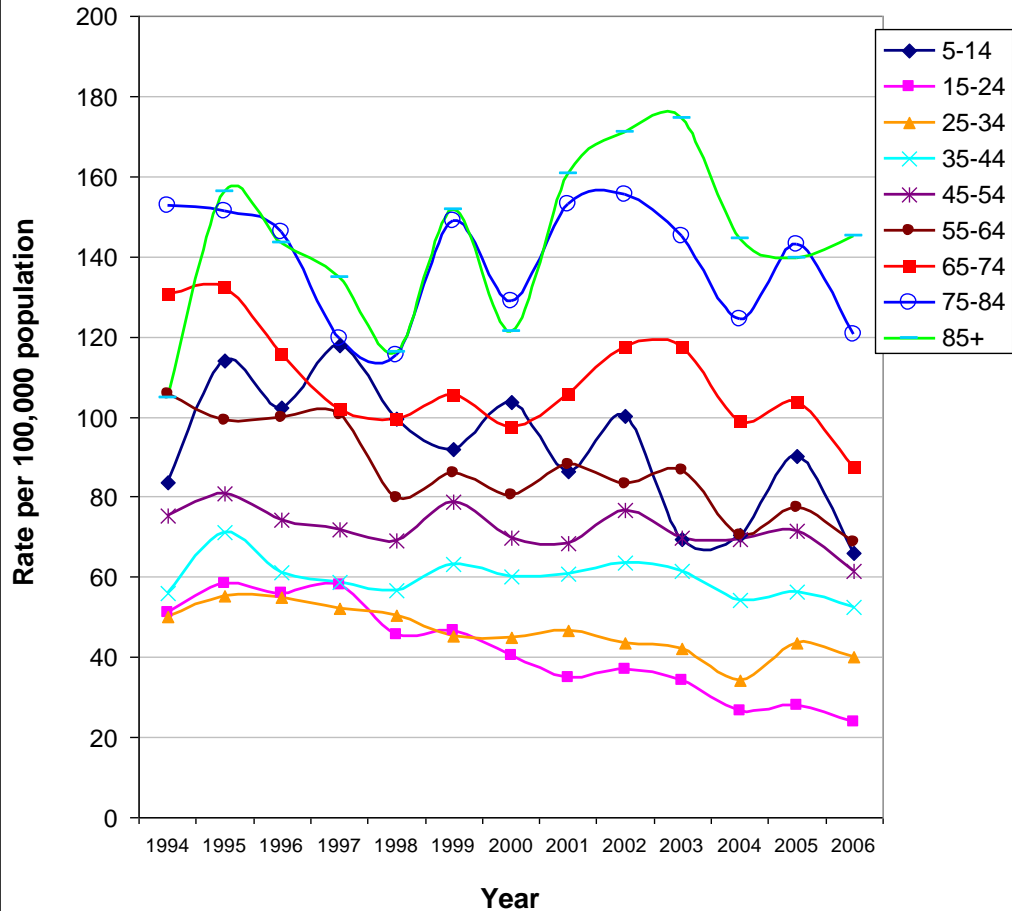
Fewer than 4 percent of adults with current asthma reported having had an asthma-related hospitalization during the previous year.



Source: Washington BRFSS 2006 Asthma Call-Back
See Appendix D for data tables.

- Among adults with current asthma, fewer than 1 in 20 had asthma-related hospitalizations during the previous year.
- Of adults with asthma who were hospitalized, about 1 in 3 were hospitalized more than once.

Figure 61. Annual asthma hospitalizations per 100,000 population, 1994-2006, by age category, ages 5-99



All age groups shown in the graph above experienced an overall downward trend in rate of asthma-related hospitalizations from 1994 through 2006, except adults ages 85 and older. The slight upward trend in asthma hospitalizations for the oldest adults coincides with a decrease in asthma-related deaths for that age group for the same time period.

Figure 61 does not include data for children ages four and younger to allow better view of trends for other ages, and because of the difficulty of diagnosing asthma in very young children.

Source: Washington CHARS, 1994-2006
See Appendix D for data tables.

DATA KEY

- Asthma Call-Back:** Behavioral Risk Factor Surveillance System Asthma-Call Back Survey
- BRFSS:** Behavioral Risk Factor Surveillance System
- CHARS:** Comprehensive Hospital Abstract Reporting System
- HYS:** Healthy Youth Survey

Figure 62. Age adjusted asthma hospitalizations per 100,000 population, by county, 2003-2005



Note: Rates not reported for counties with fewer than 10 asthma hospitalizations.
 Source: Washington CHARS, 2003-2005
 See Appendix D for data tables.

ASTHMA HOSPITALIZATIONS (Age-adjusted)

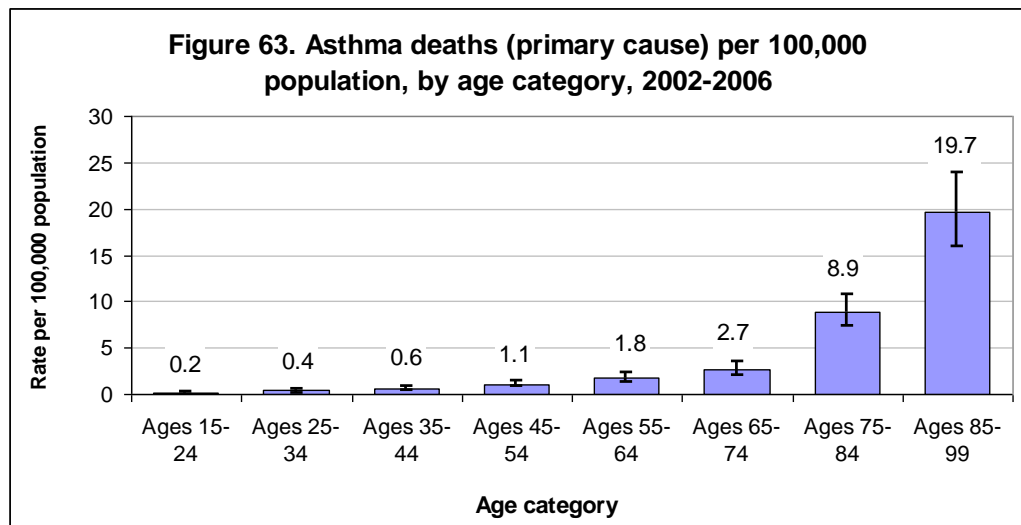
PLACE	RATE	(95% c.i.)
State Total	81	(79 - 82)
Adams	109	(84 - 141)
Asotin	38	(24 - 58)
Benton	85	(77 - 94)
Chelan	78	(67 - 91)
Clallam	119	(103 - 136)
Clark	46	(42 - 51)
Cowlitz	110	(98 - 123)
Douglas	74	(59 - 93)
Ferry	62	(30 - 117)
Franklin	89	(75 - 105)
Grant	88	(77 - 101)
Grays_Harbor	92	(80 - 106)
Island	32	(25 - 40)
Jefferson	85	(63 - 113)
King	84	(81 - 86)
Kitsap	80	(73 - 87)
Kittitas	42	(30 - 58)
Klickitat	91	(67 - 120)
Lewis	86	(74 - 99)
Lincoln	99	(67 - 144)
Mason	69	(56 - 84)
Okanogan	52	(39 - 67)
Pacific	76	(55 - 104)
Pend_Oreille	98	(66 - 143)
Pierce	91	(87 - 95)
Skagit	54	(47 - 63)
Skamania	88	(51 - 142)
Snohomish	60	(57 - 64)
Spokane	105	(99 - 111)
Stevens	120	(100 - 145)
Thurston	81	(74 - 88)
Wahkiakum	167	(92 - 287)
Walla_Walla	75	(62 - 90)
Whatcom	98	(90 - 108)
Whitman	51	(38 - 69)
Yakima	108	(100 - 116)

- Adams, Clallam, Cowlitz, Pierce, Spokane, Stevens, Wahkiakum, Whatcom, and Yakima counties had higher asthma hospitalization rates than the state average.
- Asotin, Clark, Island, Kittitas, Okanogan, Skagit, Snohomish, and Whitman counties had lower asthma hospitalization rates than the state average.

Asthma Deaths

Asthma deaths are rare. Since 1998 an average of 86 Washington residents have died of asthma each year. Washington's asthma death rate was about 1.9 per 100,000 during the 1990s and gradually declined to about 1.4 per 100,000 in 2001. The rate has remained at that level. Adults ages 85 and older had the highest asthma death rates, with an average of 20 per 100,000 population from 2000 through 2006.

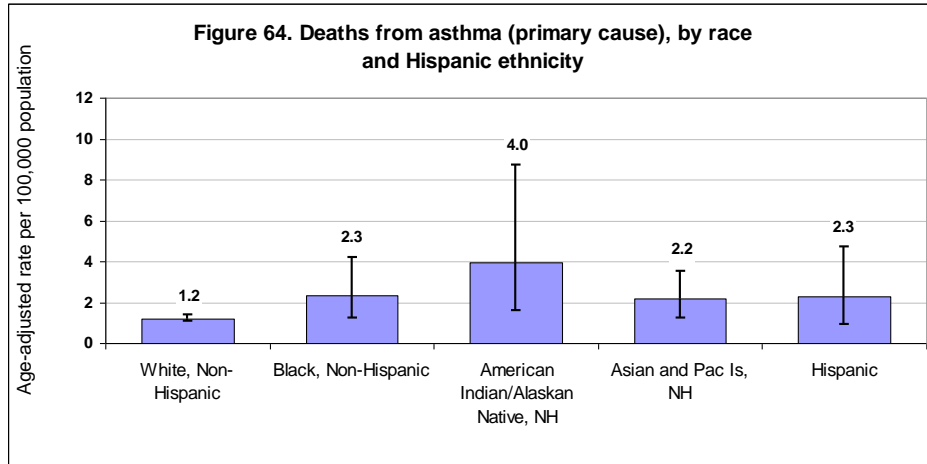
Senior adults, ages 75 and older, were at higher risk of dying from asthma than younger adults.



Source: Washington State Death Certificate Data, 2002-2006
See Appendix D for data tables.

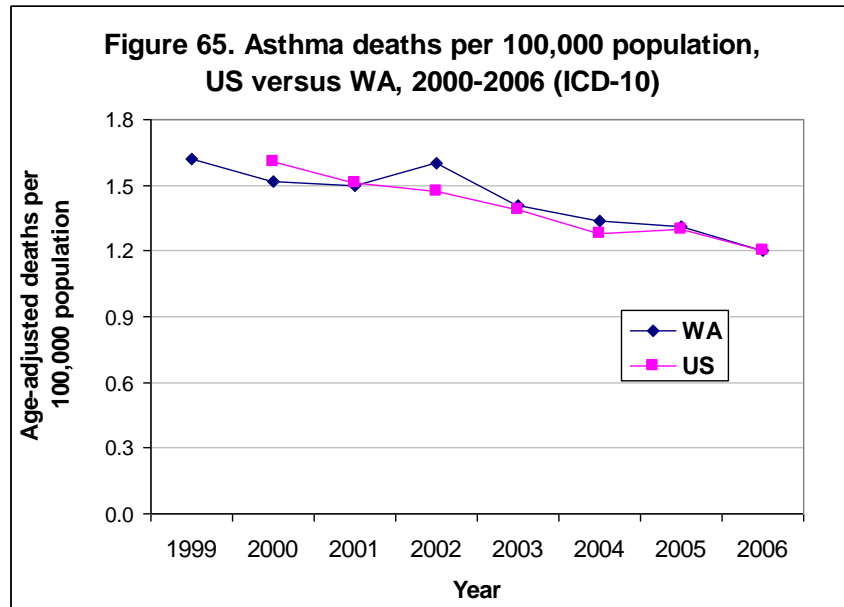
The likelihood of dying from asthma increased with age and rose dramatically at ages 75 and older. (There was only one death among children younger than 15, data not shown).

American Indians/Alaskan Natives were significantly more likely to die from asthma than whites.



Source: Washington State Death Certificate Data, 2003-2006
See Appendix D for data tables.

- Although American Indians accounted for only 3 percent of all asthma deaths from 2003 through 2006, they were significantly more likely to die from asthma than were non-Hispanic whites.
- The risk of dying from asthma was more than three times higher among American Indians than among non-Hispanic whites.



Sources: Washington State Death Certificate Data, 2000-2006 and National Vital Statistics System ^{30,31}

DATA KEY

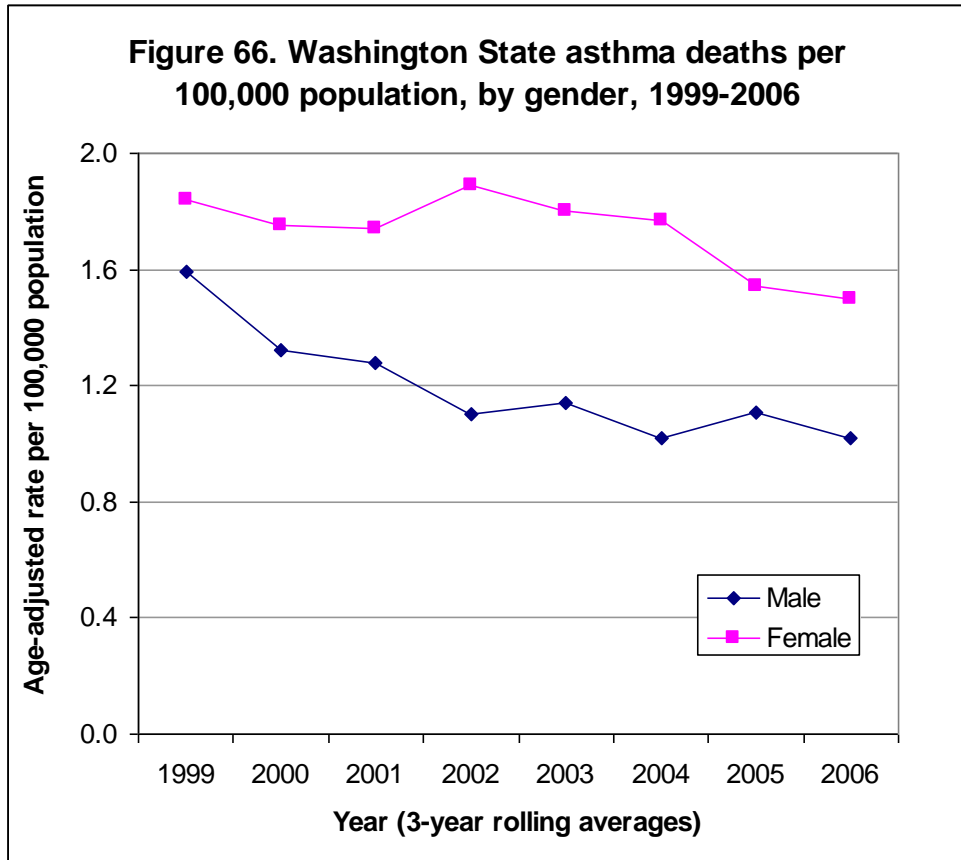
Asthma Call-Back:
Behavioral Risk Factor Surveillance System Asthma-Call Back Survey

BRFSS:
Behavioral Risk Factor Surveillance System

CHARS:
Comprehensive Hospital Abstract Reporting System

HYS: Healthy Youth Survey

Asthma mortality rates for both Washington and the United States have decreased since 2000. The rate of decrease for Washington was about 3.4 percent annually.



Source: Washington State Death Certificate Data, 1997-2006
See Appendix D for data tables.

Asthma mortality rates for both men and women have declined since 1999.

References

- ¹ Krieger J, Takaro T, Allen C, et al. The Seattle-King County Healthy Homes Project: Implementation of a comprehensive approach to improving indoor environmental quality for low-income children with asthma. *Environ Health Perspect.* 2002;110(Suppl. 2):311-322.
- ² Asthma among Washington's Children: A Report from the 2003 National Survey of Children's Health, August 2006. http://www.doh.wa.gov/cfh/asthma/publications/asthma_children_update.doc, accessed 3/6/08.
- ³ DiFranza JR, Aligne CA, Weitzman M. Prenatal and postnatal environmental tobacco smoke exposure and children's health. *Pediatrics.* 2004;113(Suppl. 4):1007-1015.
- ⁴ U.S. Department of Health Human Services. (2006). *The health consequences of involuntary exposure to tobacco smoke: A report of the Surgeon General.* Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service, Centers for Disease Control and Prevention.
- ⁵ Goksör E, Amark, M, Alm B, Gustafsson PM, Wennergren G. The impact of pre- and post-natal smoke exposure on future asthma and bronchial hyper-responsiveness. *Acta Paediatr.* 2007;96(7):1030-1035.
- ⁶ Eisner MD, Iribarren C. The influence of cigarette smoking on adult asthma outcomes. *Nicotine Tob Res* 2007; 9(1):53-56.
- ⁷ Stein MD, Weinstock MC, Herman DS, Anderson BJ. Respiratory symptom relief related to reduction in cigarette use. *J Gen Intern Med.* 2005; 20(10):889-894.
- ⁸ Aldington S, Williams M, Nowitz M, et al. Effects of cannabis on pulmonary structure, function and symptoms. *Thorax.* 2007;62(12):1036-1037.
- ⁹ Schaub B, von Mutius E. Obesity and asthma, what are the links? *Curr Opin Allergy Clin.* 2005; 185-193.
- ¹⁰ Akerman MJH, Calacanis CM, and Madsen MK. Relationship between asthma severity and obesity. *J Asthma,* 2004;41:521-526.
- ¹¹ Taylor B, Mannino D, Brown C, Crocker D, Twum-Baah N, Holguin F. Body mass index and asthma severity in the National Asthma Survey. *Thorax,* 2008;63(1):14-20.
- ¹² National Heart Lung and Blood Institute, National Asthma Education and Prevention Program (NAEPP) Guidelines on Asthma, August 2007, Section 3, page 67. <http://www.nhlbi.nih.gov/guidelines/asthma/asthgdln.htm>
- ¹³ Singh BB, Khorsan R, Vinjamury SP, Der-Martirosian C, Kizhakkeveetil A, Anderson TM. Herbal treatments of asthma: a systematic review. *J Asthma.* 2007;44:685-698.
- ¹⁴ Holloway EA, West RJ. Integrated breathing and relaxation training (the Papworth method) for adults with asthma in primary care: a randomised controlled trial. *Thorax.* 2007;62:1039-1042.
- ¹⁵ Illi S, von Mutius E, Lau S, Niggemann B, Gruber C, Wahn U. Perennial allergen sensitization early in life and chronic asthma in children: a birth cohort study. *The Lancet.* 2006;368:763-770.
- ¹⁶ Thorn J, Brisman J, Toren K. Adult-onset asthma is associated with self-reported mold or environmental tobacco smoke exposures in the home. *Allergy.* 2001;56:287-292.
- ¹⁷ Asthma Update: Data from the 2004 Washington State Behavioral Risk Factor Surveillance System (BRFSS). http://www.doh.wa.gov/cfh/asthma/publications/data-update_march06.doc.
- ¹⁸ Meng Y-Y, Rul, RP, Wilhelm M, et al. (2006). *Living near heavy traffic increases asthma severity.* UCLA Center for Health Policy Research. <http://www.healthpolicy.ucla.edu/pubs/publication.asp?pubID=181#download>. Accessed November 7, 2006.
- ¹⁹ U.S. Environmental Protection Agency. (2004). *Air Quality for Particulate Matter (Volume II).* <http://cfpub2.epa.gov/ncea/cfm/recordisplay.cfm?deid=87903>. Accessed March 5, 2007.
- ²⁰ Wood Smoke Work Group report to the governor and the legislature. (2007). Reducing the impacts of wood smoke from solid fuel burning devices.
- ²¹ WA State Dept of Ecology, Air Quality. A New Federal PM_{2.5} Air Quality Standard: How Does it Affect Washington? http://www.ecy.wa.gov/programs/air/Nonattainment/WapatoPuyallup_Nonattainment.htm. Accessed April 22, 2008.
- ²² Lombardo LJ, Balmes JR. Occupational asthma: a review. *Environ Health Perspect.* 2000;108(Suppl. 4):697-704.
- ²³ CDC, National Institute for Occupational Safety and Health, NIOSH Program Portfolio, Occupational Health Disparities. <http://www.cdc.gov/niosh/programs/ohd/>. Accessed 4/24/08.
- ²⁴ School Nurse Study, Report on Health Services in Washington State Class I Districts. Washington State Department of Health and Washington State Office of Superintendent of Public Instruction, June 2006.

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- ²⁵ McCoy L, Redelings M, Sorvillo F, Simon P. A multiple cause-of-death analysis of asthma mortality in the United States, 1990-2001. *J Asthma*. 2005;42(9):757-763.
- ²⁶ American College of Allergy Asthma Immunology, Asthma topics, flu shots and asthma. <http://www.acaai.org/public/bulletins/Flu+Vaccinations.htm>. Accessed 4/22/08.
- ²⁷ Peters SP, Ferguson G, Deniz Y, Reisner C. Uncontrolled asthma: a review of the prevalence, disease burden and options for treatment. *Respir Med*. 2006;100(7):1139-1151.
- ²⁸ Washington State Department of Health. Health of Washington State, Asthma Chapter. Olympia, WA, 2007 Dec <http://www.doh.wa.gov/HWS/CD2007.shtm>. Accessed 6/19/08.
- ²⁹ Weiss LN. The diagnosis of wheezing in children. *Am Fam Physician*. 2008;77(8):1109-14.
- ³⁰ MMWR, *National Surveillance for Asthma --United States, 1980--2004*. October 19, 2007/56(SS08):1-14,18-54.
- ³¹ Heron MP, Hoyert DL, XU J, Scott C, Tejada-Vera B. Deaths: Preliminary Data for 2006. *National Vital Statistics Reports*, 56(16). Hyattsville, MD: National Center for Health Statistics. 2008.

Appendix A: Resources

American Lung Association of Washington: <http://www.alaw.org/>

American Lung Association of Washington report, "State of the Air in Washington"
http://www.alaw.org/about-us/news-center/publications/state-of-the-air/state_of_the_air_in_washington_2007_report.pdf

Asthma & Allergy Foundation of America: <http://www.aafa.org/>

Centers for Disease Control and Prevention: Asthma and Allergies
<http://www.cdc.gov/health/asthma.htm>

National Surveillance for Asthma --- United States, 1980-2004
<http://www.cdc.gov/mmwr/preview/mmwrhtml/ss5608a1.htm>

National Institute for Occupational Health and Safety, Safety and Health Topic: Asthma and Allergies: <http://www.cdc.gov/niosh/topics/asthma/>

Summary Health Statistics for U.S. Children: National Health Interview Survey, 2004:
http://www.cdc.gov/nchs/data/series/sr_10/sr10_227.pdf

Youth Risk Behavior Surveillance --- United States, 2005
<http://www.cdc.gov/mmwr/preview/mmwrhtml/ss5505a1.htm>

Environmental Protection Agency: America's Children and the Environment (ACE)
<http://www.epa.gov/envirohealth/children/>

Environmental Protection Agency: Mold: <http://www.epa.gov/mold/>

Global Initiative for Asthma : <http://www.ginasthma.com/>

National Heart, Lung and Blood Institute: <http://www.nhlbi.nih.gov/>

National Jewish Medical and Research Center Lung, Allergic and Immune Diseases:
<http://www.njc.org/>

Physician Asthma Care Education:
<http://www.nhlbi.nih.gov/health/prof/lung/asthma/pace/index.htm>

PediatricAsthma.Org: Models for Advancing Asthma Care:
<http://www.pediatricasthma.org/>

Regional Clean Air Agencies

- Benton Clean Air Authority: <http://www.bcaa.net>
- Northwest Clean Air Agency (*Island, Skagit, Whatcom Counties*):
<http://www.nwcleanair.org>

- Olympic Region Clean Air Agency (*Clallam, Grays Harbor, Jefferson, Mason, Pacific, Thurston Counties*): <http://www.orcaa.org/>
- Puget Sound Clean Air Agency (*King, Kitsap, Pierce, Snohomish Counties*): <http://www.pscleanair.org>
- Spokane Regional Clean Air Agency: <http://www.spokanecleanair.org/>
- Southwest Clean Air Agency (*Clark, Cowlitz, Lewis, Skamania, Wahkiakum Counties*): <http://www.swcleanair.org>
- Yakima Regional Clean Air Authority: <http://www.co.yakima.wa.us/cleanair>

Seattle King County Public Health: Allies Against Asthma Initiative:
<http://www.metrokc.gov/health/asthma/allies.htm>

Washington State Department of Ecology Air Quality Program:
<http://www.ecy.wa.gov/programs/air/airhome.html>

Washington State Department of Labor and Industries,
 Safety and Health Assessment and Research for Prevention:

New publications on work-related asthma from Washington State's Safety & Health Assessment & Research for Prevention Program:

- "Your Lungs, Your Work, Your Life" (available in English, Spanish, and Russian)
- Information for physicians on diagnosing work-related asthma
- Information for workers, employers and physicians on Food Flavoring Lung Disease (including asthma) and exposure to Diacetyl, a butter flavor.

<http://www.lni.wa.gov/Safety/Research/Pubs/default.asp#WorkAsthma>

Washington State Office of the Superintendent of Public Instruction, Coordinated School Health, School Health Profiles:
<http://www.k12.wa.us/CoordinatedSchoolHealth/pubdocs/Asthma.pdf>

Washington State University Extension, Indoor Air Quality in Schools:
<http://www.energy.wsu.edu/pubs/>

Appendix B: Data Sources

Behavioral Risk Factor Surveillance System (BRFSS)

Washington State Behavioral Risk Factor Surveillance System data: 1990–2006. The data for 2003–2006 were also weighted to reflect the county population estimates from the Washington State Office of Financial Management. Data release for 2003–2005: November 2006; data release for 2006: June 2007.

The Behavioral Risk Factor Surveillance System is an annual telephone survey that provides indicators of health risk behavior, preventive practices, attitudes, health care use and access, and prevalence of selected diseases in Washington. It is supported in part by the National Centers for Disease Control and Prevention. Interviews are conducted in English or Spanish by a survey firm under contract to the Department of Health, following survey administration protocols established by the Centers for Disease Control and Prevention. Data from both English and Spanish language surveys was analyzed and presented except where indicated in figures or text.

For more information on Washington BRFSS, visit: <http://www.doh.wa.gov/brfss>. For more information on national BRFSS, visit: <http://www.cdc.gov/brfss>

Behavioral Risk Factor Surveillance System Asthma Call-Back Survey

Respondents to the 2006 Behavior Risk Factor Surveillance System who had ever been told they had asthma were invited to participate in an additional survey to collect in-depth information about their asthma history. Over 2,000 adults participated in Washington's Behavioral Risk Factor Surveillance System Asthma Call-back in 2006. The Behavioral Risk Factor Surveillance System Asthma Call-back was supported in part by the National Centers for Disease Control and Prevention. Interviews were conducted in English or Spanish by a survey firm under contract to the Department of Health, following survey administration protocols established by the Centers for Disease Control and Prevention. Data from both English and Spanish language surveys was analyzed and presented except where indicated in figures or text.

Comprehensive Hospitalization Abstract System

Washington Hospitalization Data: Dataset compiled by the Washington State Department of Health, Center for Health Statistics from the Washington Comprehensive Hospitalization Abstract System 1994-2006, Oregon Hospital Discharge data, and Veterans Hospital Administration datasets, December 2006. We used cases where the primary diagnosis listed was asthma (ICD-9; 493). We age-adjusted rates using the United States age distribution for the year 2000 (U.S. Census Bureau). Figures shown represent hospitalizations, rather than individuals who were hospitalized. Some patients experience more than one asthma-related hospitalization in the same year. Data for race and ethnicity is not available in the Comprehensive Hospital Abstract Reporting System data.

Comprehensive Emissions Inventory Summary

The 2005 Comprehensive Emissions Inventory Summary is a three-year inventory developed by the Department of Ecology. It includes the large business inventory and many other source types such as motor vehicles, woodstoves, outdoor burning, agricultural sources, and natural sources. For more information, visit: <http://www.ecy.wa.gov/programs/air/EmissionInventory/AirEmissionInventory.htm>

Death Certificate Data

Washington State Death Certificate Data: Washington State Department of Health, Vital Registration System Annual Statistical Files, Deaths 1997–2006. We used cases where the underlying cause of death was listed as asthma (ICD-10; J45). Reports of race/ethnicity on death certificates are sometimes based on observing the decedent rather than questioning of next of kin. This practice causes underestimation of deaths for some groups, particularly Native Americans, some Asian sub-groups, and Hispanics. Thus the actual death rates for these groups are likely higher than reported in death certificate data.

Healthy Worksite Survey Data

The Department of Health conducted a survey in the summer and fall 2004 (Phase I) and 2005 (Phase II) to evaluate the health policy improvement work in Washington State worksites. The Healthy Worksite Survey addressed questions regarding policies around tobacco use, nutrition, physical activity, and asthma. County-level samples were used to collect tobacco-specific policy information for more than 1,600 businesses in Phase I. Phase II was a follow-up survey of a sub-sample of about 500 of the same businesses to provide statewide estimates for measures related to nutrition, physical activity and asthma. The survey was administered again in 2006.

Healthy Youth Survey Data

The Washington State Healthy Youth Survey is a school-based survey of students in grades 6, 8, 10 and 12 in a random sample of Washington public schools. It is administered every other year during class time and contains questions about behaviors that result in unintentional and intentional injury (like seat belt use, fighting, and weapon carrying); physical activity and dietary behaviors (like fruit and vegetable consumption); alcohol, tobacco, and other drug use; and related risk and protective factors. The survey includes items from the Centers for Disease Control and Prevention-sponsored Youth Risk Behavior Survey and Youth Tobacco Survey, the National Institute on Drug Abuse-sponsored Monitoring the Future Survey, and the Social Development Research Group's Risk and Protective Factor Assessment instrument. In fall 2006, 198,312 students anonymously participated in the survey. Youth asthma prevalence was determined from responses to the question "Have you ever been told by a doctor or other health professional that you had asthma?" Youth who responded "yes" were coded as having lifetime asthma. Those who responded "no" or "not sure" were coded as not having asthma. Youth with lifetime asthma who also indicated they had experienced an asthma attack or had taken asthma medication in the previous 12 months were coded as having current asthma. This is the standard methodology used to analyze responses to this question in the National Youth Risk Behavior Survey.¹ For more information, visit: <http://www3.doh.wa.gov/HYS>

National Survey of Children's Health

National Survey of Children's Health, Health Resources and Services Administration, U.S. Maternal and Child Health Bureau. The National Survey of Children's Health was a national telephone-based random survey conducted in 2003 and 2004 in English and in Spanish. Respondents were parents or caregivers of one randomly chosen child per household. Data from both English and Spanish language surveys were analyzed and presented. For more information, visit: <http://www.nschdata.org/Content/Default.aspx>

¹ 2007 National Youth Risk Behavior Survey (YRBS) Data Users Manual, Department of Health and Human Services, Centers for Disease Control and Prevention

2006 School Health Profiles

The School Health Profiles is a survey of school principals and lead health educators in secondary schools. This survey, developed by the Centers for Disease Control and Prevention, collects information on school health policies and activities.

For more information on the School Health Profiles, visit:

<http://www.k12.wa.us/CoordinatedSchoolHealth/SchlHealthProfiles.aspx>

Workers Compensation Data

Data for workers compensation claims rates in Washington are from the Washington State Department of Labor and Industries, Labor and Industries Industrial Insurance System .

For more information

Washington State Department of Health Asthma Program, 360-236-3851

<http://www.doh.wa.gov/cfh/asthma/default.htm>

Appendix C: Technical Notes

Air Pollution Sources in Washington

Emissions of particulate matter (PM), nitrogen oxides, sulfur-dioxide and volatile organic compounds, were used as surrogate measures of air quality for eastern and western Washington. The Department of Ecology 2005 Comprehensive Emissions Inventory Summary listed each substance by county and by source in tons per year. We assigned total tons for each substance, by source, to either eastern or western Washington, according to county. We totaled the tons of emissions from all sources for each half of the state and calculated the proportion from each source. Ozone, a known respiratory irritant, is not included in the chart because it is not directly released as an air pollutant, but forms secondarily when sunlight reacts with nitrogen oxides and volatile organic compounds. Only volatile organic compounds from human sources were included in this model.

Particulate Matter (PM_{2.5})

Counties that do not have a PM monitoring site include: Asotin, Douglas, Ferry, Garfield, Island, Kitsap, Klickitat, Lewis, Lincoln, Pacific, Pend Oreille, San Juan, Skamania, and Wahkiakum.

The Department of Health reviewed monitoring information from 2005 to evaluate PM_{2.5} levels in the various counties on all days in the year where data for PM_{2.5} levels were available. The 24-hour average daily level of PM_{2.5} monitoring site information was examined in each county. In counties where there was more than one monitor, the highest monitor reading for that day was used. That monitoring value was assigned to one of four categories: >35 µg/m₃ (i.e., above the current EPA standard); 30-35 µg/m₃; 25-30 µg/m₃; and 20-25 µg/m₃ (i.e., all below the current EPA standard). The number of days that PM_{2.5} levels fell in these four categories can be found in the chart “Highest PM_{2.5} Measures by Day by County Washington State, 2005.” Most monitors provide measurements that cover a radius of only 2.5 miles. Monitors therefore give only an approximate level for a county. Levels may vary depending on local pollution sources, land characteristics, and weather conditions.

Body Mass Index (BMI)

Body mass index, also known as BMI, is a measure used to determine body fatness. BMI has been shown to be a reliable alternative to direct measure of body fat for most adults. Calculate BMI by dividing weight in pounds (lbs) by height in inches (in) squared and multiplying by a conversion factor of 703. A BMI of 30 and above is considered obese; BMI of 25 to 29.9 is considered overweight; BMI of 18.5 to 24.9 is considered normal weight; and BMI of less than 18.5 is considered underweight.

Youth weight status: Youth weight status was calculated using BMI with cut points for “at risk for overweight”, and “overweight”. The cut points are based on the U.S. Centers for Disease Control and Prevention growth curves. Individuals in the top 5 percent for BMI, based on age- and gender-specific growth charts, are considered overweight. Those in the top 15 percent, but not the top 5 percent, are considered at risk for becoming overweight.

Charts and Graphs

Where possible, authors used line graphs to portray changes in health status or risk, and protective factors over time and bar charts to present differences among subgroups by age and gender, race and Hispanic origin, income, education, and county. On the line graphs, shaded areas around lines represent 95-percent confidence intervals for the point estimates represented by the line. On the bar charts, horizontal lines with short vertical lines at either end represent the 95-percent confidence interval for the point estimate

represented by the top of the bar. Authors described variation depicted in the graphs and charts as differences only if the differences were statistically significant, based on examining 95-percent confidence interval and significance testing using t-test. Thus, while two lines or two bars might not look very different, if the text or county charts highlighted them as different, this meant that the differences were statistically significant. Conversely, sometimes two lines or bars might look different, but the differences were not statistically significant.

To increase the number of events or survey respondents, where possible, bar charts depict data for three years combined. Charts do not depict subpopulations with fewer than 20 events or fewer than about 50 survey respondents. Even when omitting subpopulations with small numbers of events or few survey respondents, rates for some subpopulations may fluctuate from one year to the other, thus precluding meaningful conclusions for policy decisions.

Confidence Intervals and Statistical Significance

Confidence Intervals

Confidence intervals provide a measure of how much a rate, percent, or other point estimate might vary due to random factors or chance. They do not account for several other sources of uncertainty, including missing or incomplete data, bias resulting from non-response to a survey, or inaccurate data collection.

Confidence intervals are used with survey data to account for the difference between a sample from a population and the population itself. With few exceptions, authors included 95 percent confidence intervals for all survey data, such as data from the BRFSS and the Healthy Youth Survey. A 95 percent confidence interval captures the true value of the point estimate in 95 out of 100 cases. For ease of reading the line graphs, survey data for the United States does not include confidence intervals. The confidence intervals for U.S. data were often very small because of large national sample sizes. (Confidence intervals are generally large for small sample sizes and decrease as the sample size increases). Additionally, the reader can observe the amount of annual variation on a line graph showing annual point estimates.

Unlike surveys that select a sample of the population to represent the population as a whole, population data capture nearly all events in a population. For example, death certificates record information on almost every death in Washington. Although population data are not subject to random fluctuation due to differences between the sample and the population it represents, confidence intervals can be used with population data to account for uncertainty that arises from natural variation, such as the random variation that occurs when analyzing the continuous phenomenon of time as discrete years. Most often, authors did not include confidence intervals on time trend line graphs. The annual point estimates depict year-to-year variation, and the confidence intervals were relatively small. Authors included confidence intervals on bar graphs, because variation could be large due to the relatively small sizes of some subgroups and variation over time is not evident from the bars themselves. Data analysts used STATA software packages to calculate confidence intervals. Methods used to calculate confidence intervals were consistent with the Washington State Department of Health Guidelines for Using Confidence Intervals for Public Health Assessment (<http://www.doh.wa.gov/Data/Guidelines/ConfIntguide.htm>)

Statistical Significance Testing

Statistical tests can be used to determine whether differences between two rates, percents, or other point estimates might have occurred by chance. Unless otherwise noted, authors considered differences to be statistically significant when statistical testing indicated that in 95 cases out of 100, the difference would not be due to chance or coincidence. Authors reported only statistically significant differences as differences. If two estimates were not statistically significantly different, the estimates were treated as similar.

For time trend analysis, authors used the statistical tests built into the Joinpoint software. Authors used statistical tests that assumed independence between groups. This assumption was violated in comparing counties to the state as a whole and Washington to the United States. Because Washington is relatively small compared to the United States, lack of independence should not substantively affect the findings. For large counties in Washington, especially King County, there could be instances where these tests failed to find statistical significance where differences really existed.

Relationship between Confidence Intervals and Statistical Testing

Confidence intervals can sometimes substitute for statistical testing in determining statistical significance. Two estimates are statistically significantly different if the confidence intervals do not overlap. When the confidence intervals overlap and the interval for one estimate includes the other estimate, the two estimates are not statistically significantly different. If the confidence intervals overlap, but neither interval includes the other estimate, a formal test of statistical significance is needed to determine whether the two estimates are statistically significantly different.

Asthma Status

Two asthma prevalence measures are reported: the percentage of those who have ever been told they have asthma (sometimes referred to as “lifetime asthma”) and the percentage of those who, having been diagnosed with asthma, continue to experience asthma symptoms or require medication to keep from having asthma symptoms (referred to as “current asthma”). Respondents were determined to have “current” asthma if they either reported that they still had asthma or they had asthma activity within the preceding 12 months. Asthma activity included reports of symptoms, exacerbations, or the taking of asthma medication.

Race and Hispanic Origin

Most often, differences in health by race and ethnic origin result not from genetic differences but from the effects of complex social, cultural, economic, and political factors. Where possible, *the Asthma Burden Report 2008 Update* highlights disparities in health status or risk factors by race and Hispanic origin. The Washington State Department of Health supports the national *Healthy People 2010* goal of eliminating these disparities. To achieve this goal, we first need to know the extent of the disparities and which groups are most affected.

The U.S. Census Bureau uses the concept of race to reflect self-identification and not to denote any clear-cut scientific definition of biological stock. As with the U.S. Census, race as collected by the systems used to generate data for *the Asthma Burden Report 2008 Update* does not denote a scientific definition of biological stock. For some data systems, the race data reflect self-classification by people according to the race with which they most closely identify.

For other data systems, someone else reports race. Reports by someone else vary in how well they reflect the race of the person, him or herself, would have chosen. There is often good correspondence when those reporting know or knew the person well, such as when next-of-kin report race on death certificates. At times, someone who does not know the person well makes a judgment, such as when a health care worker records race in a medical chart without first asking. In these instances, the race might not represent the race with which the person most closely identifies.

Ethnicity, as used by the U.S. Census Bureau, refers to “the ancestry, nationality group, lineage, or country of birth of the person or the person’s parents or ancestors before their arrival in the United States.” People of Hispanic origin have their ancestry or come from a Spanish-speaking country such as Mexico, Cuba, Spain, or the Spanish-speaking countries of Central or South America. People of Hispanic origin can be of any race.

Following national guidelines, most data systems in Washington first ask about Hispanic origin and then ask about race, and most data systems allow people to select more than one race. For example, the BRFSS asks, “Are you Hispanic or Latino?” and then asks “Which one or more of the following would you say is your race?” The *Asthma Burden Report 2008 Data Update* presents data for people of Hispanic origin and divides non-Hispanics into five race groups: American Indians and Alaska Natives, Asians, Pacific Islanders, blacks, and whites. In death certificate data, Asians and Pacific Islanders are grouped because of the relatively small numbers of Pacific Islanders and uncertainty about the accuracy of the population counts needed to develop rates for Pacific Islanders.

Rates

Crude Rates

A crude rate is the number of events (such as deaths) in a specified time period divided by the number of people at risk of these events (typically, a state or county population) in that period. This figure is generally multiplied by a constant like 1,000 or 100,000 to get a number that is easy to read and compare, and the rate is reported as “per 1,000” or “per 100,000.” A rate per 100 is the same as a percent. Crude rates adjust for differences in population size but not differences in population characteristics, such as age. Authors age-adjust rates when age varied between groups to be compared. Figures in this report which have not been labeled as age-adjusted can be assumed to use crude rates.

Age-Adjusted Rates

People of different ages are more or less susceptible to different diseases. People of different ages are also more or less likely to engage in healthy or unhealthy behaviors. Adjusting rates for differences in age distributions helps us understand whether there are differences among groups independent of their age structures. Age-adjustment also allows us to compare rates in the same population over a period of time during which the population structure might have changed. Rates that have been age-adjusted are labeled as such on the figures.

Data analysts computed age-adjusted rates by the direct method; they multiplied the rate for a specific age group in a given population by the proportion of people in the same age group in the 2000 United States standard population and then added across age groups. Authors used the “10-year” standard age groups as follows: <1, 1-4, 5-14, 15-24, 25-34, 35-44, 45-54, 55-64, 65-74, 75-84, and 85+.

Most national, state, and local organizations in the United States adjust to the 2000 United States standard population. Documents published in the United States before

2000, however, often used the 1940 or 1970 United States standard populations, and documents published outside the United States generally use other standards. When making comparisons, readers must be careful to compare age-adjusted rates that use the same standard population. Moreover, age-adjusted rates should not be compared to rates that are not age-adjusted. Age-adjusted rates have no absolute meaning; they are derived from hypothetical populations and are useful only for comparing with other rates calculated in the same manner.

For more information on crude and age-adjusted rates see Washington State Department of Health Guidelines for Using and Developing Rates for Public Health Assessment (<http://www.doh.wa.gov/Data/Guidelines/Rateguide.htm>).

Small Numbers

Statistics developed when there are few events or when the population in which the events occurred is relatively small risk breaching confidentiality. In addition, interpreting data based on few survey respondents or a small number of events can be difficult, because random fluctuation can be relatively large. As the amount of random fluctuation increases, the predictive value of a statistic generally decreases. For example, with a large annual fluctuation, knowing a rate for one year might not allow us to reliably anticipate the rate for another year. This instability makes it difficult to use rates based on small numbers for program planning or policy development. In fact, considerable caution should be used in interpreting any data where the number of events is small.

To ensure confidentiality and provide relatively stable estimates, where possible, authors only presented statistics for subpopulations (such as county or race group) that had a minimum of about 20 events or 50 survey respondents. For additional information, see the Washington State Department of Health Guidelines for Working with Small Numbers (<http://www.doh.wa.gov/Data/Guidelines/SmallNumbers.htm>).

Software

Stata/IC 10.0 software for Windows was used for data analysis.

Trend tests were conducted using *Joinpoint Regression Program*, Version 3.2.0. January 2008; Statistical Research and Applications Branch, National Cancer Institute.

Symptom severity

We classified symptom severity based on National Asthma Education Prevention Program guidelines and classification labels.² Without having clinical data that are also factored into the National Asthma Education Prevention Program classification system, it is unknown how closely our scores match what would be assigned by a clinician. We assigned points to various elements to determine asthma symptom severity as follows:

- Asthma attack in previous 12 months. (0-1 points)
- Emergency department visits in previous 12 months. (0-2 points)
- Urgent doctor visits in previous 12 months. (0-2 points)
- Days of activity limitation. (0-2 points)
- Days in which respondent experienced asthma symptoms. (0-4 points)
- Days in which symptoms interrupted sleep. (0-4 points)

² National Heart Lung and Blood Institute, National Asthma Education and Prevention Program (NAEPP) Guidelines on Asthma, August 2007, Section 3, page 67. <http://www.nhlbi.nih.gov/guidelines/asthma/asthgdln.htm>

We totaled the points and assigned severity labels to correspond to National Asthma Education Prevention Program Severity classification as follows:

- Intermittent: (0-3 total points)
- Mild, persistent: (4-5 total points)
- Moderate, persistent: (6-9 total points)
- Severe, persistent: (10-15 total points)

Time Trends

To determine changes of estimates over time, we used the Joinpoint software, version 3.2.0, developed by the National Cancer Institute. (<http://srab.cancer.gov/joinpoint>). Trends were described as increasing or decreasing only if the changes over time were statistically significant with a P value of < 0.05.

Tobacco Use: Adults

An adult is classified as a “current smoker” if he or she reported having smoked more than five packs (100 cigarettes) in his/her lifetime, and also reported currently using tobacco “every day” or “some days” in the BRFSS. “Former smokers” were those who had smoked more than 100 cigarettes, but did not currently smoke. Due to the nature of self-reported data, there may be some underestimation of risk factors that are seen as socially unacceptable.

Tobacco Use: Youth

A youth is classified as a “current smoker” if he or she reported using tobacco within the past 30 days in the 2006 Healthy Youth Survey. Due to the self-reported nature of the data, certain behaviors may be under-reported.

Year 2010 Goals

Healthy People 2010 (<http://www.healthypeople.gov/>) provides national health promotion and disease prevention objectives. These objectives were developed under the guidance of the U.S. Department of Health and Human Services in collaboration with other federal, state, and local agencies. The *Asthma Burden Report 2008 Update* provided information on whether Washington is on track for reaching the national 2010 targets for asthma hospitalizations. *Healthy People 2010* first established targets in 2000, but the *2005 Midcourse Review* revised some targets (<http://www.healthypeople.gov/data/midcourse/html/default.htm>).

Appendix D: Data Tables

Tables correspond to charts, graphs or maps in the report and are labeled with the same figure numbers.

Table 1: Adult current asthma prevalence trends, age-adjusted, US and WA, BRFSS 1999-2006

Year	US	95% CI	WA	95% CI
1999	*	*	7.0	(6.2-8.0)
2000	7.2	(7.0-7.4)	8.2	(7.3-9.2)
2001	7.2	(7.0-7.4)	7.6	(6.8-8.5)
2002	7.5	(7.3-7.7)	8.9	(7.9-9.9)
2003	8.0	(7.8-8.2)	9.2	(8.7-9.8)
2004	8.3	(8.1-8.5)	9.3	(8.8-9.9)
2005	8.2	(8.0-8.4)	9.5	(9.0-10.1)
2006	8.5	(8.3-8.7)	9.1	(8.6-9.7)

* Data not available

Table 2: Adult current asthma prevalence, by age and sex, BRFSS 2003-2006

Age Group	Men		Women	
	%	95% CI	%	95% CI
18-24 yrs	8.9	(7.3-10.7)	12.7	(11.3-14.4)
25-34 yrs	6.7	(5.8-7.8)	10.7	(9.8-11.6)
35-44 yrs	5.3	(4.7-6.1)	11.2	(10.5-12.1)
45-54 yrs	5.9	(5.3-6.7)	12.2	(11.4-13.0)
55-64 yrs	7.0	(6.2-7.9)	12.2	(11.4-13.1)
65-74 yrs	7.3	(6.3-8.4)	11.4	(10.5-12.4)
75-84 yrs	8.0	(6.7-9.5)	8.4	(7.5-9.4)
85 years	5.8	(3.8-8.8)	5.7	(4.4-7.4)
Total Age-Adjusted	6.7	(6.3-7.1)	11.3	(11.0-11.7)

Table 3: Adult current asthma prevalence, by household income, BRFSS 2003-2006

Household Income	%	95% CI
Less than \$15,000	14.1	(13.0-15.3)
\$15,000-\$24,999	11.1	(10.4-11.9)
\$25,000-\$34,999	10.4	(9.6-11.2)
\$35,000-\$49,999	8.8	(8.2-9.5)
\$50,000-\$74,999	8.0	(7.3-8.7)
\$75,000 or more	7.4	(6.7-8.2)

Table 4: Adult current asthma prevalence, by race and Hispanic ethnicity, BRFSS 2003-2006

Race/Ethnicity	%	95% CI
Asian*	5.5	(4.3-7.1)
Hispanic	6.7	(5.7-7.8)
White*	9.4	(9.1-9.7)
Black*	10.2	(8.3-12.5)
Pacific Islander*	11.0	(7.5-15.8)
American Indian/ Alaskan Native*	15.3	(12.7-18.5)
*non-Hispanic		

Table 5: Prevalence of adults reporting current asthma, Washington Counties, BRFSS 2003-2005

Place	%	95% CI
State Total	9.1	(8.6-9.4)
Adams	6.4	(4.5-9.0)
Asotin	10.4	(7.9-13.4)
Benton	9.2	(7.4-11.5)
Chelan	7.1	(5.5-9.3)
Clallam	9.5	(7.2-12.3)
Clark	9.8	(8.8-11.0)
Columbia	8.3	(5.9-11.6)
Cowlitz	12	(9.7-14.8)
Douglas	7.9	(6.1-10.2)
Ferry	8	(5.7-11.1)
Franklin	8	(6.2-10.2)
Garfield	9.7	(7.0-13.2)
Grant	6.8	(5.4-8.6)
Grays Harbor	12	(9.7-14.7)
Island	7.1	(5.5-9.2)
Jefferson	8.8	(6.5-11.8)
King	8.5	(7.8-9.2)
Kitsap	9.6	(8.4-10.9)
Kittitas	9.5	(7.4-12.1)
Klickitat	10.3	(7.5-14.0)
Lewis	9.2	(7.1-11.9)
Lincoln	10.7	(7.3-15.5)
Mason	9.7	(7.5-12.5)
Okanogan	7.9	(6.1-10.1)
Pacific	9.4	(7.1-12.4)
Pend Oreille	9	(5.5-14.5)
Pierce	9.3	(8.4-10.3)
San Juan	11.6	(8.2-16.1)
Skagit	7.6	(5.6-10.0)
Skamania	6.9	(4.9-9.7)
Snohomish	8.6	(7.7-9.6)
Spokane	10.6	(9.4-11.8)
Stevens	11.4	(8.3-15.6)
Thurston	10.1	(8.9-11.4)
Wahkiakum	10.1	(5.7-17.5)
Walla Walla	8.2	(6.4-10.6)
Whatcom	8.5	(6.8-10.5)
Whitman	12.5	(10.2-15.2)
Yakima	9.3	(7.9-10.9)

Table 6: Prevalence of lifetime asthma among youth, by grade, HYS 2006

Grade	%	95% CI
6	14.7	(13.9-15.4)
8	17.1	(16.1-18.1)
10	19.0	(17.4-20.6)
12	21.2	(19.3-23.3)

Table 7: Prevalence of lifetime asthma among youth, by grade and sex, HYS 2006

Grade	Boys		Girls	
	%	95% CI	%	95% CI
6	16.1%	(15.1-17.1)	13.3%	(12.3-14.3)
8	18.2%	(16.4-20.0)	16.1%	(14.5-17.9)
10	17.9%	(16.6-19.2)	20.0%	(17.7-22.5)
12	20.2%	(18.0-22.6)	22.2%	(19.6-25.0)

Table 8: Prevalence of current asthma among youth, by grade, HYS 2006

Grade	%	95% CI
6	7.3%	(6.7-7.8)
8	8.3%	(7.4-9.3)
10	9.1%	(8.2-10.2)
12	8.7%	(7.5-10.0)

Table 9: Prevalence of current asthma among youth, by grade and sex, HYS 2006

Grade	Boys		Girls	
	%	95% CI	%	95% CI
6	7.6%	(6.9-8.4)	6.9%	(6.2-7.7)
8	8.3%	(7.2-9.7)	8.2%	(7.0-9.5)
10	7.1%	(6.2-8.1)	11.0%	(9.6-12.7)
12	6.6%	(5.5-7.9)	10.5%	(8.7-12.6)

Table 10: Grade-adjusted prevalence of current asthma among youth, by race and Hispanic ethnicity, HYS 2006

Race/Ethnicity	%	95% CI
Asian*	4.9%	(3.9-6.1)
Hispanic	6.5%	(5.5-7.6)
Other*	7.5%	(6.5-8.6)
White*	8.6%	(8.1-9.2)
American Indian/ Alaskan Native*	8.0%	(6.4-10.1)
Multiracial*	10.3%	(8.6-12.4)
Pacific Islander*	11.1%	(8.4-14.6)
Black*	11.1%	(8.8-13.8)

*non-Hispanic

Table 11: Proportion of households with children under age 18 having at least one child ever diagnosed with asthma, by year, BRFSS 2003-2005

Year	%	95% CI
2003	15.8	(12.6-18.9)
2004	15.7	(12.6-18.9)
2005	17.9	(16.0-19.7)

Table 12: Proportion of households with children under age 18 having at least one child with current asthma, by year, BRFSS 2003-2005

Year	%	95% CI
2003	9.8	(8.1-11.5)
2004	12.5	(9.4-15.6)
2005	10.8	(8.8-12.8)

Table 13: Prevalence of WA children with current asthma, by age and gender, NSCH 2003

Age	Boys		Girls	
	%	95% CI	%	95% CI
0-2 yrs	0.06	(0.03-0.11)	0.06	(0.02-0.15)
3-5 yrs	0.1	(0.05-0.19)	0.05	(0.02-0.11)
6-11 yrs	0.06	(0.04-0.09)	0.07	(0.04-0.11)
12-17 yrs	0.09	(0.06-0.13)	0.13	(0.10-0.18)

Table 14: Age-adjusted prevalence of current asthma among adults, by gender and smoking status, BRFSS 2003-2006

Smoking Status	All Adults		Men		Women	
	%	95% CI	%	95% CI	%	95% CI
Current Smoker	10.7	(10.0-11.4)	7.2	(6.3-8.2)	14.6	(13.7-15.6)
Former Smoker	9.5	(8.9-10.2)	6.4	(5.7-7.3)	13.0	(12.0-14.0)
Never Smoked	8.2	(7.9-8.5)	6.3	(5.8-6.9)	9.8	(9.3-10.2)

Table 15: Prevalence of having received advice to quit smoking during past year, by current asthma status, BRFSS 2003-2006

Asthma Status	%	95% CI
No Asthma	23.0	(22.0-24.0)
Current Asthma	31.0	(27.9-34.2)

Table 16: Prevalence of having quit smoking for at least one day during the past 12 months, by gender and current asthma status, BRFSS 2003-2006

Asthma Status	Men		Women	
	%	95% CI	%	95% CI
No Asthma	55.1	[53.3-56.9]	56.1	[54.5-57.7]
Current Asthma	63.4	[56.5-69.8]	64.9	[61.4-68.2]

Table 17: Current asthma prevalence among non-smoking adults, by home exposure to secondhand smoke, BRFSS 2003-2006

SHS Exposure	%	95% CI
No	8.8	(8.4-9.3)
Yes	11.0	(8.9-13.5)

Table 18a: Grade-adjusted current asthma prevalence among WA youth in grades 8, 10 and 12, by smoking status, HYS 2006

Smoking status	Asthma	
	%	95% CI
Non-Smoker	7.9%	(7.4-8.3)
Smoker	10.2%	(8.8-11.9)

Table 18b: Smoking prevalence among WA youth with current asthma, by grade, HYS 2006

Grade	Smoking	
	%	95% CI
6	3.0%	(2.0-4.4)
8	9.8%	(7.3-13.1)
10	14.6%	(10.9-19.3)
12	20.1%	(15.4-25.7)

Table 19: Grade-adjusted asthma prevalence among WA youth, by substance use, HYS 2006

Substance use	Inhalants		Marijuana	
	%	95% CI	%	95% CI
Non-user	8.5%	(8.2-8.8)	7.9%	(7.4-8.3)
User	15.0%	(12.1-18.4)	10.0%	(8.6-11.7)

Table 20: Prevalence of using inhalants or marijuana/hashish in previous 30 days among youth with current asthma, by grade, HYS 2006

Grade	Inhalants		Marijuana	
	%	95% CI	%	95% CI
6	*	*	1.8%	(1.0-3.2)
8	8.4%	(5.9-11.8)	10.1%	(7.3-13.6)
10	9.0%	(6.5-12.4)	19.8%	(16.1-24.2)
12	4.6%	(2.6-8.0)	21.6%	(17.0-27.1)

* no data

Table 21: Current asthma prevalence among adults by BMI status and gender, BRFSS 2003-2006

BMI Status	All Adults		Men		Women	
	%	95% CI	%	95% CI	%	95% CI
Obese	13.4	(12.7-14.1)	9.0	(8.0-10.0)	18.1	(17.1-19.2)
Overweight	7.6	(7.1-8.0)	5.6	(5.0-6.2)	10.7	(9.9-11.5)
Neither Obese nor Overweight	7.8	(7.3-8.4)	6.6	(5.8-7.6)	8.7	(8.1-9.3)

Table 22: Grade-adjusted asthma prevalence among youth, by weight status and gender, HYS 2006

Grade	Boys		Girls	
	%	95% CI	%	95% CI
Overweight	10.0%	(8.0-12.5)	12.7%	(9.6-16.5)
At Risk for Overweight	6.9%	(5.3-8.9)	10.9%	(8.8-13.4)
Not Overweight	7.1%	(6.3-8.0)	9.8%	(8.9-10.7)

Table 23: Prevalence of symptom-free days in prior 2 weeks among adults with current asthma, 2006
BRFSS Asthma call-back

Symptom-free Days	%	95% CI
0	14.3	(12.4-16.4)
1 to 5	12.4	(10.4-14.8)
6 to 13	12.9	(10.9-15.3)
Every day	60.4	(57.1-63.6)

Table 24: Prevalence of days with asthma symptoms in prior month among adults with current asthma, 2006 BRFSS Asthma call-back

Days with Symptoms	%	95% CI
0	13.5	(10.0-18.0)
1 to 5	33.6	(29.5-38.1)
6 to 29	27.2	(23.5-31.3)
Every day	25.6	(22.2-29.5)

Table 25: Prevalence of asthma attacks in previous 3 months among adults with current asthma, 2006
BRFSS Asthma call-back

Asthma Attacks	%	95% CI
None	23.0	(18.3-28.6)
1 or 2	35.8	(30.4-41.6)
3 to 6	23.2	(18.8-28.4)
7 or more	18.0	(13.4-23.7)

Table 26: Prevalence of days asthma symptoms interrupted sleep in prior month, adults with current asthma, 2006 BRFSS Asthma call-back

Days Interrupted Sleep	%	95% CI
None	59.3	(54.6-63.9)
1 to 5	20.3	(16.6-24.7)
6 to 29	12.8	(10.4-15.8)
Every day	7.5	(5.2-10.9)

Table 27: Distribution of symptom severity among adults with current asthma, 2006 BRFSS Asthma call-back

Severity	%	95% CI
Intermittent	58.7	(54.9-62.4)
Mild Persistent	18.7	(15.8-22.0)
Moderate Persistent	14.5	(12.2-17.1)
Severe Persistent	8.2	(6.6-10.0)

Table 28: Prevalence of severe persistent asthma symptoms among adults, by age and by gender, 2006 BRFSS Asthma call-back

Age or Gender	%	95% CI
18-34 yrs	4.2	(2.1-8.2)
35-44 yrs	7.6	(4.6-12.1)
45-54 yrs	13.2	(9.3-18.5)
55-64 yrs	11.5	(7.8-16.7)
65-74 yrs	9.4	(6.0-14.5)
75+ years	5.8	(3.2-10.4)
Male	3.9	(2.4-6.5)
Female	10.6	(8.4-13.1)

Table 29: Prevalence of severe persistent asthma symptoms among adults by household income, 2006 BRFSS Asthma call-back

Income	%	95% CI
<\$20,000	17.9	(12.8-24.5)
\$20,000-\$49,999	9.2	(6.9-12.2)
\$50,000+	3.2	(1.7-5.7)

Table 30: Co-morbidities among adults, by current asthma status, 2006 BRFSS Asthma call-back

Co-morbid Condition	Diagnosed, not Current Asthma		Current Asthma	
	%	95% CI	%	95% CI
COPD	1.0	(0.5-2.1)	9.0	(7.6-10.6)
Emphysema	-	-	6.2	(4.9-7.7)
Chronic Bronchitis	10.4	(7.3-14.6)	23.9	(21.1-26.8)
Depression	27.1	(21.9-33.1)	41.3	(37.6-45.2)

Table 31: Prevalence of diabetes and hypertension among adults, by current asthma status, BRFSS 2003-2006

Co-morbid Condition	No Asthma		Current Asthma	
	%	95% CI	%	95% CI
Diabetes	6.3	(6.1-6.5)	9.3	(8.5-10.1)
Hypertension	23.0	(22.5-23.6)	31.4	(29.5-33.3)

Table 32: Prevalence of activity limitation due to asthma in previous 12 months among adults with current asthma, 2006 BRFSS Asthma call-back

Activity limitation	%	95% CI
not at all	47.3	(43.4-51.3)
a little	33.6	(30.1-37.3)
moderate	12.7	(10.8-14.9)
alot	6.4	(5.0-8.1)

Table 33: Prevalence of asthma symptoms in prior month among youth with current asthma, by grade and symptom frequency, HYS 2006

Symptom Frequency	8		10		12	
	%	95% CI	%	95% CI	%	95% CI
Never	22.8%	(17.9-28.6)	18.9%	(14.0-25.1)	14.3%	(9.8-20.4)
Up to twice/wk	47.0%	(40.0-54.2)	42.7%	(34.1-51.7)	54.0%	(46.4-61.4)
>twice/wk, not daily	14.2%	(9.7-20.1)	20.5%	(14.9-27.6)	15.9%	(11.2-22.0)
Every day	16.0%	(11.6-21.6)	17.8%	(13.0-24.0)	15.9%	(10.0-22.4)

Table 34: Grade-adjusted prevalence of days asthma symptoms interfered with sleep in prior months among youth with current asthma, HYS 2006

Days Sleep Interrupted	%	95% CI
None	55.7%	(51.5-59.9)
1 to 2	27.3%	(23.7-31.2)
3 to 4	8.9%	(6.8-11.6)
5 to 10	4.3%	(2.9-6.4)
11 to 30	3.7%	(2.4-5.8)

Table 35: Grade-adjusted prevalence of asthma-related missed school days among youth with current asthma, by number of days, HYS 2006

Missed school days	%	95% CI
No days	66.8%	(62.6-70.8)
1 to 4 days	26.2%	(22.5-30.1)
5 or more days	7.0%	(5.1-9.6)

Table 36: Prevalence of suicidal thoughts and attempts reported by 6th graders, by current asthma status, HYS 2006

Suicide	No Asthma		Current Asthma	
	%	95% CI	%	95% CI
Ever seriously considered suicide	15.7	(14.9-16.6)	23.0	(19.7-26.5)
Ever attempted suicide	4.8	(4.4-5.3)	7.9	(6.2-10.6)

Table 37: Grade-adjusted prevalence of depression/suicidal ideology in past 12 months among youth grades 8, 10, 12; by asthma status, HYS 2006

Depression/Suicide	No Asthma		Current Asthma	
	%	95% CI	%	95% CI
felt sad/hopeless	25.4%	(24.1-26.7)	36.3%	(33.3-39.5)
seriously considered suicide	12.2%	(11.3-13.1)	19.9%	(17.4-22.8)
made a suicide plan	9.3%	(8.5-10.1)	16.1%	(13.7-18.9)
actual suicide attempt	3.7%	(3.3-4.1)	6.2%	(4.7-8.0)

Table 38: Prevalence of access to care problems among adults with current asthma, 2006 BRFSS Asthma call-back

Access to Care Issue	%	95% CI
Currently without medical insurance	14.0	(10.8-17.9)
Has insurance	86.0	(82.1-89.2)
Had break in insurance coverage	8.0	(6.1-10.4)
Had no break in coverage	92.0	(89.6-93.9)
Needed to see main doctor: cost too much	9.2	(7.1-11.9)
No problem affording main doctor	90.8	(88.1-92.9)
Needed to see asthma specialist: cost too much	3.2	(2.1-4.9)
No problem affording specialist, or not referred	96.8	(95.1-97.9)
Needed asthma medicine: cost too much	12.3	(9.9-15.2)
No problem affording asthma medicine	87.7	(84.8-90.2)

Table 39: Prevalence of education/training ever received from healthcare professionals (HCP) among adults with current asthma, 2006 BRFSS Asthma call-back

Healthcare Professional Instructed:	%	95% CI
Respondent ever took an asthma mgmt class	6.8	(5.3-8.7)
HCP gave them an Asthma Action Plan	19.8	(17.0-23.0)
HCP watched them use the inhaler	77.1	(73.6-80.3)
HCP instructed them on how to use an inhaler	96.8	(95.3-97.8)
HCP instructed them to recognize signs of worsening asthma	59.6	(55.8-63.4)
HCP instructed them what to do during an asthma attack	70.6	(67.1-73.8)
HCP instructed them how to use Peak Flow Meter	37.2	(33.6-41.0)
HCP instructed them to change their home/work environment	41.5	(37.7-45.4)

Table 40: Prevalence of having discussed asthma with the doctor, by time since discussion, among adults with current asthma, 2006 BRFSS Asthma call-back

Time since discussed asthma w/doctor	%	95% CI
<12 months	54.7	(50.7-58.6)
1-3 yrs	22.5	(19.2-26.2)
3 yrs or more	22.9	(19.5-26.6)

Table 41: Distribution of asthma checkups during previous 12 months among adults with current asthma, 2006 BRFSS Asthma call-back

Asthma Checkups	%	95% CI
None	26.3	(22.1-30.9)
One	36.8	(32.2-41.6)
2 to 3	23.2	(19.6-27.2)
4 to 11	10.4	(8.4-13.0)
12 or more	3.3	(2.3-4.8)

Table 42: Prevalence of use of asthma medication, by time since last use, among adults with current asthma, 2006 BRFSS Asthma call-back

Most Recent Asthma Medication	%	95% CI
Never	3.4	(2.3-5.1)
Within 24 hrs	36.6	(33.1-40.3)
1-6 days	7.1	(5.4-9.4)
1 wk to 3 mo	15.4	(12.9-18.4)
3-12 mo	12.8	(10.5-15.6)
1 year or more	24.6	(21.1-28.5)

Table 43: Prevalence of asthma medication use, by time since use and symptom severity among adults with current asthma, BRFSS 2006 Asthma call-back

Most Recent Asthma Medication	Intermittent		Mild Persistent		Moderate Persistent		Severe Persistent	
	%	95% CI	%	95% CI	%	95% CI	%	95% CI
<1 week	30.6	(26.1-35.6)	53.4	(44.2-62.4)	64.0	(55.2-71.9)	84.0	(74.8-90.3)
1 week to 3 months	14.1	(10.7-18.4)	25.7	(18.9-34.0)	12.9	(8.9-18.5)	7.5	(3.7-14.8)
More than 3 months	55.2	(49.9-60.5)	20.8	(14.3-29.4)	23.1	(16.1-32.1)	8.5	(4.1-16.8)

Table 44: Prevalence of use of complementary/alternative medicine (CAM) by adults with current asthma, 2006 BRFSS Asthma call-back

Complementary/Alternative Medicine	%	95% CI
Any CAM	37.1	(33.1-41.3)
No CAM use	62.9	(58.7-66.9)
Breathing Techniques	29.9	(26.3-33.8)
Yoga	3.5	(2.4-5.2)
Aromatherapy	6.5	(4.8-8.7)
Vitamins	7.4	(5.2-10.3)
Herbs	6.1	(4.6-8.0)

Table 45: Grade-adjusted prevalence of having an asthma management plan and having taken preventive asthma medication among youth in grades 8, 10 and 12 with current asthma, HYS 2006

Asthma Plan or Preventive Medication	%	95% CI
Asthma mgmt plan	45.6	(40.9-50.5)
Preventive medication	66.7	(62.2-70.9)

Table 46: Prevalence of doctor check-ups for any reason in past year among youth, by grade and current asthma status, HYS 2006

Grade	No Asthma		Current Asthma	
	%	95% CI	%	95% CI
8	57.5%	(54.7-60.1)	55.5%	(50.4-60.4)
10	57.9%	(55.4-60.3)	63.5%	(57.7-68.9)
12	52.3%	(50.3-54.4)	68.0%	(63.0-72.5)

Table 47: Grade-adjusted prevalence of doctor check-ups for asthma in previous year among youth with current asthma, by number of checkups, HYS 2006

Check-ups	%	95% CI
None	42.0%	(38.4-45.8)
1 to 3	48.6%	(44.3-53.0)
4 or more	9.3%	(7.0-12.3)

Table 48: Prevalence of environmental factors that can improve asthma among adults with current asthma, 2006 BRFSS Asthma call-back

Factor	%	95% CI
Uses dehumidifier	7.08	(5.5-9.1)
Uses air cleaner	28.44	(25.2-31.9)
Anti-dust mite pillow cover	26.7	(23.3-30.4)
Anti-dust mite mattress cover	27.37	(23.9-31.2)
Washes bed linens in HOT water	38.68	(35.1-42.4)
Uses bathroom fan	75.4	(71.8-78.7)
Uses kitchen fan	66.44	(62.5-70.2)

Table 49: Prevalence of environmental factors that can worsen asthma among adults with current asthma status, 2006 BRFSS Asthma call-back

Factor	%	95% CI
Saw rodent indoors (mo.)	5.2	(3.5-7.7)
Saw/smelled mold (mo.)	17.2	(14.4-20.4)
Smoker in house last week	12.7	(10.5-15.3)
Uses unvented gas logs/stove	4.2	(2.3-7.4)
Cooks with gas	18.0	(15.0-21.4)
Uses woodstove/fireplace	26.5	(22.9-30.4)
Bedroom is carpeted	83.9	(80.2-87.1)
Allows pets in bedroom	74.7	(70.1-78.7)
Household pets in home	70.6	(67.3-73.7)

Table 50: Distribution of factors that contribute to poor air quality in Washington State, Washington State Department of Ecology, 2005 Comprehensive Emissions Inventory Summary

	Eastern WA	Western WA
Source of Pollution	%	%
Industry	3.0	20.4
Woodstoves	1.8	7.3
Outdoor burning	20.7	2.7
Agriculture	25.5	0.9
Mobile (vehicles)	42.7	66.6
Other	6.2	-

Table 51. Number of days during 2005 when PM_{2.5} levels were 20µg/m³ or higher, by county

County	<20	20<25	25<30	30<35	35+
Adams	365	0	0	0	0
Benton	239	6	5	0	1
Chelan	323	14	7	2	2
Clallam	342	15	3	1	1
Clark	219	9	1	0	0
Columbia	349	2	1	0	0
Cowlitz	296	9	1	0	1
Franklin	361	4	0	0	0
Grant	364	1	0	0	0
Grays Harbor	365	0	0	0	0
Jefferson	359	5	1	0	0
King	318	24	7	4	12
Kittitas	343	6	2	1	0
Mason	356	4	5	0	0
Okanogan	348	16	1	0	0
Pierce	318	15	14	9	9
Skagit	182	0	0	0	0
Snohomish	321	14	12	10	8
Spokane	325	24	11	2	3
Stevens	302	40	14	7	2
Thurston	337	14	7	5	2
Walla Walla	333	12	3	2	0
Whatcom	365	0	0	0	0
Whitman	365	0	0	0	0
Yakima	313	22	8	8	14

Source: Washington State Department of Health.
See Appendix C for technical notes.

Table 52: Prevalence of work-related asthma among adults, by current asthma status, 2006 BRFSS Asthma call-back

Work-related asthma	Diagnosed, Not Current		Current Asthma	
	%	95% CI	%	95% CI
Told HCP asthma was related to job	3.8	(2.3-6.2)	8.9	(7.4-10.7)
HCP said asthma was related to job	2.7	(1.7-4.4)	6.2	(5.0-7.6)
Changed/quit job because of asthma	25.5	(15.1-39.8)	20.7	(16.6-25.4)
PREVIOUS job worsened asthma	13.6	10.1-18.1)	34.9	(31.2-38.7)
PREVIOUS job caused asthma	9.1	(6.1-13.3)	23.0	(19.6-26.8)
CURRENT job worsened asthma	-	-	33.9	(28.1-40.1)
CURRENT job caused asthma	4.7	(2.0-10.9)	16.9	(12.6-22.2)

Table 53: Prevalence of any history of asthma caused by or made worse by work environment, by current asthma status, 2006 BRFSS Asthma call-back

Asthma Status	%	95% CI
Diagnosed, not Current Asthma	18.5	(14.2-23.8)
Current Asthma	45.4	(41.6-49.2)

Table 54: Distribution of asthma-related urgent doctor visits in previous 12 months among adults with current asthma, 2006 BRFSS Asthma call-back

Urgent Doctor Visits	%	95% CI
None	72.9	(68.9-76.5)
1 visit	12.5	(10.0-15.5)
2 visits	6	(4.5-8.1)
3+ visits	8.6	(6.6-11.1)

Table 55: Distribution of asthma-related emergency department visits in previous 12 months among adults with current asthma, 2006 BRFSS Asthma call-back

Emergency Department Visits	%	95% CI
One	8.2	(5.9-11.2)
Two	3.4	(2.3-5.0)
3 or More	3.6	(2.3-5.6)
None	84.9	(81.4-87.8)

Table 56: Grade-adjusted distribution of emergency department visits for asthma among youth with current asthma, HYS 2006

Emergency Department Visits	%	95% CI
No visits	79.1	(75.4-82.4)
1 to 3 visits	18.4	(15.3-21.9)
4+ visits	2.5	(1.4-4.0)

Table 57: Prevalence of having received flu shot in previous 12 months, by age and current asthma status, BRFSS 2003-2006

Age	No Asthma		Current Asthma	
	%	95% CI	%	95% CI
18-44 yrs	15.1	(13.9-16.2)	16.8	(13.4-20.9)
45-64 yrs	20.6	(19.7-.21.4)	32.9	(30.0-35.9)
65-84 yrs	46.0	(44.9-47.1)	60.8	(57.6-64.0)
85 or more	73.7	(72.1-75.2)	83.4	(79.0-87.1)

Table 58: Prevalence of having ever received pneumonia vaccine among adults, by age and current asthma status, BRFSS 2003-2006

Age	No Asthma		Current Asthma	
	%	95% CI	%	95% CI
18-44 yrs	14.6	(13.3-15.9)	19.4	(15.6-23.9)
45-64 yrs	10.9	(10.2-11.6)	30.5	(27.5-33.6)
65-84 yrs	35.6	(34.6-36.7)	60.3	(56.9-63.6)
85 or more	74.6	(73.0-76.1)	85.2	(80.2-89.2)

Table 59: Asthma hospitalizations per 100,000 population, by age and gender, CHARS 2004-2006

Age	Males		Females	
	Rate	95% CI	Rate	95% CI
Age <1	239	(212.2-267.5)	126	(106.7-148.2)
Ages 01-04	361	(344.9-378.4)	228	(214.8-242.1)
Ages 05-14	89	(83.8-94.1)	61	(57.0-65.7)
Ages 15-24	19	(16.5-21.2)	34	(31.0-37.4)
Ages 25-34	23	(20.7-26.1)	56	(51.4-59.8)
Ages 35-44	25	(22.2-27.4)	85	(79.9-89.6)
Ages 45-54	34	(31.0-37.2)	100	(94.8-105.3)
Ages 55-64	34	(30.8-38.3)	109	(102.2-115.1)
Ages 65-74	58	(51.6-65.0)	131	(121.7-140.7)
Ages 75-84	85	(75.3-96.3)	160	(148.2-172.2)
Ages 85-99	107	(87.4-128.8)	159	(142.3-176.7)
Age-Adjusted Total	63	(61.2-64.6)	90	(88.6-92.4)

Table 60: Distribution of inpatient hospitalizations for worsening asthma in previous 12 months among adults with current asthma, 2006 BRFSS Asthma call-back

Inpatient Hospitalizations	%	95% CI
None	96.2	(94.2-97.6)
One	2.6	(1.4-4.6)
Two	0.5	(0.2-1.1)
3 or More	0.8	(0.4-1.5)

Table 61: Annual asthma hospitalization per 100,000 population, by age category, ages 5-99, CHARS 1994-2006

Age Group	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
5-14	83.7	113.9	102.3	117.7	99.5	91.9	103.6	86.4	100.3	69.5	70.5	90.3	66.0
15-24	51.2	58.4	56.0	57.9	45.7	46.6	40.5	34.9	37.1	34.3	26.7	28.0	24.0
25-34	50.2	55.3	55.0	52.1	50.3	45.3	44.8	46.7	43.7	42.3	34.1	43.5	40.0
35-44	56.1	71.2	61.3	58.6	56.6	63.2	60.1	60.9	63.5	61.4	54.1	56.3	52.5
45-54	75.3	80.7	74.1	71.8	68.9	78.9	69.9	68.5	76.5	69.7	69.5	71.3	61.4
55-64	105.8	99.1	99.9	100.4	79.9	86.2	80.3	88.2	83.4	86.7	70.6	77.5	68.7
65-74	130.7	132.4	115.9	102.1	99.4	105.5	97.3	105.8	117.4	117.5	98.7	103.7	87.4
75-84	152.6	151.2	146.0	119.5	115.2	148.8	128.7	153.1	155.4	145.0	124.3	143.0	120.6
85+	104.5	156.1	143.4	134.7	116.1	151.8	121.3	160.7	171.0	174.4	144.5	139.6	145.0

Table 62. Age-adjusted asthma hospitalizations per 100,000 population, by county, 2003-2005

PLACE	RATE	(95% c.i.)
State Total	81	(79 - 82)
Adams	109	(84 - 141)
Asotin	38	(24 - 58)
Benton	85	(77 - 94)
Chelan	78	(67 - 91)
Clallam	119	(103 - 136)
Clark	46	(42 - 51)
Cowlitz	110	(98 - 123)
Douglas	74	(59 - 93)
Ferry	62	(30 - 117)
Franklin	89	(75 - 105)
Grant	88	(77 - 101)
Grays_Harbor	92	(80 - 106)
Island	32	(25 - 40)
Jefferson	85	(63 - 113)
King	84	(81 - 86)
Kitsap	80	(73 - 87)
Kittitas	42	(30 - 58)
Klickitat	91	(67 - 120)
Lewis	86	(74 - 99)
Lincoln	99	(67 - 144)
Mason	69	(56 - 84)
Okanogan	52	(39 - 67)
Pacific	76	(55 - 104)
Pend_Oreille	98	(66 - 143)
Pierce	91	(87 - 95)
Skagit	54	(47 - 63)
Skamania	88	(51 - 142)
Snohomish	60	(57 - 64)
Spokane	105	(99 - 111)
Stevens	120	(100 - 145)
Thurston	81	(74 - 88)
Wahkiakum	167	(92 - 287)
Walla_Walla	75	(62 - 90)
Whatcom	98	(90 - 108)
Whitman	51	(38 - 69)
Yakima	108	(100 - 116)

Table 63: Asthma deaths (primary cause) per 100,000 population, by age category, CHARS 2002-2006

Age	Rate	95% CI
Ages 15-24	0.2	(0.1-0.3)
Ages 25-34	0.4	(0.2-0.6)
Ages 35-44	0.6	(0.4-0.9)
Ages 45-54	1.1	(0.8-1.4)
Ages 55-64	1.8	(1.4-2.4)
Ages 65-74	2.7	(2.0-3.6)
Ages 75-84	8.9	(7.3-10.8)
Ages 85-99	19.7	(16.0-24.0)

Table 64: Age-adjusted asthma deaths (primary cause) per 100,000 population, by race and Hispanic ethnicity, CHARS 2003-2006

Race/Ethnicity	Rate	95% CI
White *	1.2	(1.1-1.4)
Asian and Pacific Islander*	2.2	(1.3-3.5)
Hispanic	2.3	(0.9-4.7)
Black*	2.3	(1.2-4.2)
Native American/Alaskan Native*	4.0	(1.6-8.8)

* Non-Hispanic

Table 65: Age-adjusted asthma deaths per 100,000 population, US versus WA, 1999-2006 (ICD-10)

Year	WA		US
	Rate	95% CI	Rate
1999	1.6	(1.3-2.0)	*
2000	1.5	(1.2-1.9)	1.6
2001	1.5	(1.2-1.9)	1.5
2002	1.6	(1.3-2.0)	1.5
2003	1.4	(1.1-1.8)	1.4
2004	1.3	(1.1-1.7)	1.3
2005	1.3	(1.0-1.6)	1.3
2006	1.2	(0.9-1.5)	1.2

*Data not available

Table 66: Washington State age-adjusted asthma deaths per 100,000 population, by gender, 1999-2006

Year	Males		Females	
	Rate	95% CI	Rate	95% CI
1999	1.5	(1.0-2.1)	1.7	(1.2-2.2)
2000	1.1	(0.7-1.7)	1.8	(1.4-2.4)
2001	1.2	(0.8-1.7)	1.7	(1.3-2.3)
2002	1.0	(0.6-1.5)	2.1	(1.6-2.7)
2003	1.2	(0.8-1.8)	1.6	(1.2-2.1)
2004	0.9	(0.6-1.3)	1.7	(1.3-2.2)
2005	1.2	(0.9-1.8)	1.4	(1.0-1.9)
2006	0.9	(0.6-1.4)	1.4	(1.1-1.9)