THE BURDEN OF ASTHMA IN WEST VIRGINIA

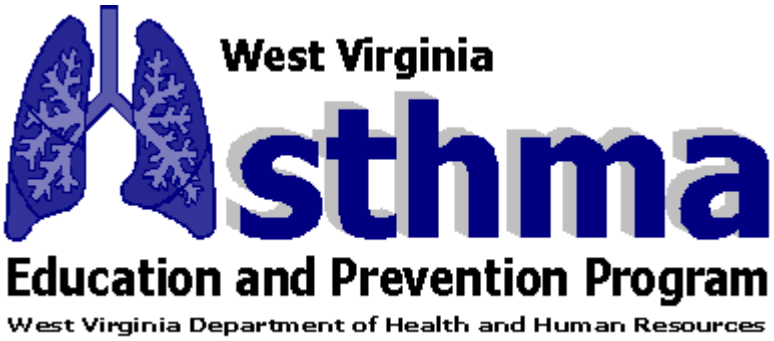
Bob Wise
Governor

Paul L. Nusbaum, Secretary
Department of Health and Human Resources

Chris Curtis, M.P.H.
Acting Commissioner, Bureau for Public Health

Catherine Slemp, M.D., M.P.H.
Acting Medical Officer, Bureau for Public Health

Joe Barker, M.S.
Director, Office of Epidemiology and Health Promotion



Acknowledgments

Project Staff
David Deutsch, M.A., Program Manager, Asthma Education and Prevention Program
West Virginia Bureau for Public Health, Division of Health Promotion

Suzie McDaniel, Administrative Assistant, Asthma Education and Prevention Program
West Virginia Bureau for Public Health, Division of Health Promotion

Editor
Eugenia Thoenen, Program Manager, Statistical Services Unit
West Virginia Bureau for Public Health, Health Statistics Center

Health Statistics Center Staff
Daniel M. Christy, M.P.A., Director, Health Statistics Center
Archana Chaudhari, M.B.B.S., M.P.H., Epidemiologist
Jim Doria, Epidemiologist
Joe Kennedy, Programmer/Analyst
Fred King, BRFSS Coordinator
Tom Leonard, M.S., Programmer/Analyst
Tom Light, Data Analyst
Phillip Simmons, M.S., Programmer Analyst

Formatting Specialist
Keith Dalton, Media Program Manager
West Virginia Bureau for Public Health, Division of Health Promotion

Cover Design
Teresa Mace, Media Coordinator
West Virginia Bureau for Public Health, Division of Health Promotion

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Charleston Area Medical Center, Charleston, West Virginia
Mary Emmett, Ph.D.
Suzanne Kemper, M.P.H.

West Virginia Health Care Authority
Mary Bee Antholz

West Virginia Health Right, Inc.
Donna Evans, M.A.

West Virginia University, Morgantown, West Virginia
Edward Doyle, M.D., M.Sc., Director and Clinic Director, Institute of Occupational and Environmental Health
Cecil Pollard, M.A., Director, Office of Health Services Research
Michael Romano, M.D., Department of Pediatrics, School of Medicine
Michael Smith, Ph.D., Pharmaceutical Systems and Policy Department, School of Pharmacy

For additional information, contact the
West Virginia Asthma Education and Prevention Program at (304) 558-0644

Executive Summary

Asthma is a chronic lung disease that affects many West Virginians. This disease is characterized by recurrent respiratory symptoms such as wheezing, breathlessness, chest tightness, coughing, and variable airflow obstruction that is reversible spontaneously or with treatment.

The 2000 Behavioral Risk Factor Surveillance System (BRFSS) reported that the prevalence of lifetime asthma among adults in West Virginia was 11.7%, which exceeds the national figure of 10.5%. In the year 2001, the prevalence in West Virginia increased to 12.5%, representing approximately 174,835 West Virginia adults. The prevalence of current asthma among adults in West Virginia was 8.5% in 2000 and increased to 9.3% in 2001 (approximately 130,118 West Virginia adults). The state now ranks 6th highest in the nation in lifetime asthma prevalence, and 5th highest in current asthma prevalence. The lifetime asthma rate for West Virginia adults was greatest among those aged 18-24 years, those who had not graduated from high school, and those with an annual income of less than $15,000.

Data from the 2002 West Virginia Youth Tobacco Survey (WVYTS) indicate that 23.2% of middle school students and 21.1% of high school students (an estimated 32,757 total) reported that they have at some point been diagnosed with asthma by a doctor. Of those students who indicated that they have been diagnosed with asthma, 14,099 reported that they have had at least one attack within the past year. This is especially concerning since having attacks indicates poorly controlled asthma. Among those students who had an attack within the last year, over 20% reported that they missed 11 or more school days in the past year due to their asthma. Data from the WVYTS also indicate that lifetime asthma prevalence and asthma attack prevalence were both significantly higher among current smokers in middle schools compared with nonsmokers.

Data from the West Virginia Health Care Authority (WVHCA) show that, from 1995-2001, the hospitalization rates for asthma in West Virginia were lower than those in the United States as measured by the National Hospital Discharge Survey (NHDS). During the same period, the total hospital charges in West Virginia for discharges with a primary diagnosis of asthma averaged approximately $10.3 million per year.

West Virginia's vital statistics database indicates that, from 1991 through 2000, about 35 West Virginians died yearly from asthma (asthma listed as the primary cause of death). This averages about two persons per 100,000 population per year.

During calendar year 1999, about 20.9 per 1,000 recipients of West Virginia Medicaid had at least one medical claim (whether for inpatient, outpatient, or emergency room treatment) with a primary diagnosis of asthma. The rate among blacks was 25% higher than that among whites; in addition, the rate was also higher in females compared with males and in the 21-64 year age group compared with other age groups. In the same year, West Virginia Medicaid incurred $2,690,777 for hospitalizations, $589,878 for outpatient visits, and $236,857 for emergency department visits with a primary diagnosis of asthma.

West Virginia's Workers' Compensation claims data indicate that during calendar years 1997-2001 there were 245 compensated cases of occupational asthma, with the maximum number of cases in services, manufacturing, and mining, oil, and natural gas industries. During the same period, over $4.3 million were paid for medical compensation and $2.7 million for indemnity (lost wages and disability) compensation (ongoing costs).

Often a person's asthma symptoms are brought on by exposure to certain environmental triggers (e.g., *irritants* such as environmental tobacco smoke, air pollution, and strong chemical odors and *allergens* such as pet dander, mold spores, pollens, cockroaches, and dust mites). Unfortunately, several West Virginia-specific circumstances work to the disadvantage of those with asthma. For example, due to the natural landscape and weather of the state, allergic triggers such as pollen and mold spores are often at significant levels. Another significant trigger for asthma attacks is smoking or exposure to secondhand smoke. West Virginia ranks poorly in most tobacco use categories: according to the 2001 BRFSS, West Virginia had the 4th highest smoking rate (28.2% compared with the United States rate of 22.9%) among 54 participant states and territories.

As this report reveals, asthma is clearly a costly disease for West Virginia's population. However, people with asthma can lead normal, productive lives with effective asthma management. For example, asthma attacks can be often be prevented by avoiding asthma triggers. The more asthmatics and their caretakers know and understand their triggers, the better able they will be to prevent and control asthma episodes. Effective management of asthma requires a comprehensive approach that includes consistent and appropriate medical treatment, comprehensive provider/patient/family education, patient compliance with drug regimens, and reduction of risk factors that exacerbate asthma. The medical community and public health personnel need to work in a concerted team effort to reduce the human and economic burden of this disease.

West Virginia Asthma Education and Prevention Program's Asthma Initiative

The West Virginia Asthma Education and Prevention Program (WV-AEPP) was created by the West Virginia Department of Health and Human Resources through a grant from the Centers for Disease Control and Prevention. The WV-AEPP is located within the Bureau for Public Health's Division of Health Promotion and Chronic Disease (Chronic Disease Section).

The mission of the WV-AEPP is to develop, implement, and evaluate a statewide strategic asthma plan in the ultimate interest of reducing the health and economic consequences attributed to asthma in West Virginia. The WV-AEPP aspires to highlight asthma as a priority health concern and to reduce suffering, disability, death, and economic costs related to asthma by:

- Developing a broad-based statewide asthma planning, implementation, and evaluation group.
- Analyzing existing data sources to determine the prevalence, cost, and burden of asthma.
- Developing a statewide asthma surveillance system.
- Publishing and disseminating a report on asthma.
- Developing a statewide plan and recommendations to address asthma.
- Developing and implementing asthma interventions.

This report constitutes one important element in our initiative, and will be utilized in the development of the state's strategic plan to address asthma.

Key West Virginia Findings

- In 2000, 11.7% of West Virginia adults indicated that they had at some point been diagnosed with asthma. This rate exceeded the national 2000 "lifetime" rate of 10.5% and ranked 9th compared with other U.S. states and territories (BRFSS).

- In 2001, 12.5% of West Virginia adults (representing an estimated 174,835 individuals) indicated that they had at some point been diagnosed with asthma. This rate again exceeded the national 2001 "lifetime" rate of 11.2% and ranked 6th compared with the other U.S. states and territories (BRFSS).

- Whereas the national "current" asthma rate remained static at 7.2% for 2000 and 2001, the West Virginia rate climbed from 8.5% in 2000 to 9.3% in 2001; West Virginia ranked 5th in this category both years (BRFSS).

- The "lifetime" asthma rate for West Virginia adults was greatest among those aged 18-24 years (18.5%), those who had not graduated from high school (15.7%), and those with an annual income of less than $15,000 (17.9%).

- In 2002, 23.2% of West Virginia middle school students and 21.1% of high school students (an estimated 32,757 total) indicated that they have at some point been diagnosed with asthma by a doctor (WVYTS).

- Among those students who indicated that they had an attack within the last year (14,099 students), over 20% reported that they missed 11 or more school days in the past year due to their asthma (WVYTS).

- Lifetime asthma prevalence and asthma attack prevalence were both significantly higher among current smokers in middle schools compared with nonsmokers (WVYTS).

- During 1995-2001, the hospitalization rates in West Virginia for a primary diagnosis of asthma were lower than the corresponding rates in the United States. Rates for individual age and gender categories were also lower than the corresponding nationwide rates. However, in 2001, the average length of stay (ALOS) for asthma-related hospital discharges was higher in West Virginia as compared with that found nationwide (WVHCA and NHDS).

- In 1999, the rate of West Virginia Medicaid recipients who had at least one medical claim for a primary diagnosis of asthma was 25% higher among blacks versus whites; in addition, the rate was also higher in females compared with males and in the 21-64 year age group compared with other age groups.

- From 1997-2001, West Virginia Workers' Compensation claims for work-related asthma were greatest in the services, manufacturing, and mining, oil, and natural gas industries and were lowest in the wholesale trade, transportation, and agricultural industries.

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An Introduction to the Problem of Asthma

Asthma is a chronic lung disease characterized by recurrent respiratory symptoms such as wheezing, breathlessness, chest tightness, coughing, and variable airflow obstruction that is reversible spontaneously or with treatment. During an asthma attack three things occur: broncho-constriction, mucous production, and inflammation.

Experts are not sure why some people develop asthma. Many factors may be involved, one of which is heredity. Some doctors believe that the airways become oversensitive because of damage to the cells caused by a viral infection such as a cold or flu. Others believe that the initial damage is caused by an allergic reaction causing the lungs to overreact to viral infections. One theory is that babies may be particularly prone to reactions caused by allergens (substances that spark allergic symptoms) because their immune systems are immature and unable to cope with airborne allergens and common asthma triggers such as house dust mites' dung, exhaust fumes, or cigarette smoke. Asthma does tend to run in families, and is more likely to exist in families prone to allergies. However, because there are so many different factors involved it can be extremely difficult to predict exactly who in a family will develop asthma. It appears that genetic predisposition interacts with environmental factors to trigger the onset of the disease. Environmental factors that seem to increase the risk of developing asthma include being exposed to cigarette smoke early in life, exposure to pet dander early in life, and certain types of infection early in life.

Asthma is a major public health problem in the United States. The disease affects approximately 20.3 million people, nearly 6.3 million of whom are under the age of 18 years. It accounts for an estimated 14.5 million lost workdays for adults and 14 million lost school days in children annually. The collective cost of the disease is estimated at $14.0 billion for the year 2002 (1).

There is a disturbing trend of increasing prevalence of asthma in the United States. Between 1980 and 1996, the prevalence of asthma in the United States increased by almost 74%. Also disturbing is amount of asthma-related health care utilization in this country. In 1999, there were an estimated 10.8 million physician office and hospital outpatient department visits, 1.9 million emergency room visits, and 478,000 hospitalizations due to asthma. The rates for such health care utilization have been disproportionately higher among blacks, women, and young children. For example, the rate of hospitalizations among African-Americans in 1999 was nearly triple that of whites (2).

Although asthma mortality in the United States is among the lowest in the world, in the year 2000 there were still approximately 4,500 asthma-related deaths in this country (1). Moreover, the asthma mortality rate has risen over the past 20 years or so, especially in African-Americans and individuals age 85 and older. This increase is of particular concern because it comes at a time when mortality rates from most natural causes in the United States are on the decline.

Secondhand smoke is being increasingly recognized as an important trigger for asthma. According to the Environmental Protection Agency, secondhand smoke exacerbates asthma in an estimated 200,000 to a million children in the United States every year (3). It also causes an estimated 8,000-26,000 *new* cases of asthma among children in the U.S. every year (4). According to a 1996 meta-analysis conducted by DiFranza and Lew, secondhand smoke (household smoking) is associated with an increased prevalence of asthma, accounting for an estimated 307,000-522,000 cases among children younger than 15 years of age; secondhand smoke also exacerbates existing asthma, being responsible for about 0.5 million visits to physicians by children every year (5).

The reasons for the increasing morbidity and mortality seen with asthma are not very clear. However, many asthma-related hospitalizations and deaths are preventable, and occur after certain "missteps" occur. For example, the patient or his/her caretaker may fail to avoid environmental factors that make asthma worse, recognize early warning signs of worsening asthma, appreciate the severity of an attack, take appropriate medication, or get prompt medical help when problems occur. The clinician may fail to diagnose asthma, initiate appropriate therapy, adequately monitor the patient's condition, recognize serious complications, and/or educate the patient to prevent symptoms and develop a crisis plan for emergencies. These issues became the impetus for the development of the National Asthma Education and Prevention Program (NAEPP) in 1988, and helped define the program's objectives:

For Patients and the Public

- Increase public awareness of asthma as a significant public health problem.
- Increase public awareness of the signs and symptoms of asthma.
- Improve the knowledge, attitudes, and skills of patients regarding the detection, treatment, and control of asthma, particularly in high-risk populations.
- Define guidelines for effective asthma education programs.
- Promote development, dissemination, and use of patient and family education materials.

For Health Professionals

- Increase knowledge, attitudes, and skills of all health professionals regarding signs, symptoms, and management strategies for asthma.
- Encourage health professionals treating patients with asthma to adequately track and monitor patient status and to use objective measures of lung function.
- Assist and encourage health professional schools and continuing education programs to include up-to-date and accurate information on diagnosis, pathogenesis, and treatment of patients with asthma.
- Promote and encourage the concept of active patient participation with the physician in the management of asthma.
- Develop resources and materials for use by health professionals.
- Promote research to answer unresolved questions about underlying causes of asthma and appropriate asthma treatment and management practices.

With the implementation of these objectives, it is thought that the effect of asthma on our population can be minimized. The working objectives for respiratory diseases are outlined in the West Virginia Healthy People 2010 Objectives for Respiratory Diseases (see Appendix A).

About the Data

Several data sources were used in this report: the Behavioral Risk Factor Surveillance System (BRFSS), West Virginia Vital Statistics, Hospital Discharge Records, the West Virginia Youth Tobacco Survey (WVYTS), Medicaid claims data, and Occupational Health (Workers' Compensation claims) data sets.

Much of the data included in the report is expressed as a rate. A rate is the number of health events (e.g., deaths) in a population or subgroup divided by the number of people in that population or subgroup within a given time period.

The hospitalization rates are reported per 10,000 population and are calculated for those cases with asthma as the primary diagnosis only. These rates are based on number of visits rather than individual patients. The variable race is not collected in the hospitalization database.

Mortality rates are reported per 100,000 population and include only primary cause of death from 1991 through 2000.

Prevalence estimates, also reported as prevalence rates, are presented for the BRFSS and the WVYTS. Prevalence is the number of people with a disease at a given point in time. In the WVYTS, weighting is done based on factors such as the probability of selecting a school and a classroom within a school. The BRFSS data are weighted on a number of fields. Some weighting is done to remove known sampling bias and to adjust data to the West Virginia adult population (ages 18 and over). Among the fields used to weight the data are age of respondent, gender of respondent, number of phone numbers reaching the household, number of adults in the household, and number of interviews completed. Due to sample size limitations, several rates are suppressed.

Prevalence Estimates among Adults
Behavioral Risk Factor Surveillance System

The Behavioral Risk Factor Surveillance System (BRFSS) is a statewide telephone survey coordinated by the Centers for Disease Control and Prevention (CDC) and conducted in all 50 states. Interviews of randomly selected, non-institutionalized adults ages 18 and older are conducted on a monthly basis and combined by calendar year and adjusted to be representative of the adult population in West Virginia. To estimate the asthma prevalence in West Virginia, the West Virginia Bureau for Public Health included asthma questions on the survey in 2000 and 2001.

There were 2,354 interviews conducted in West Virginia in 2000 and 3,093 in 2001.

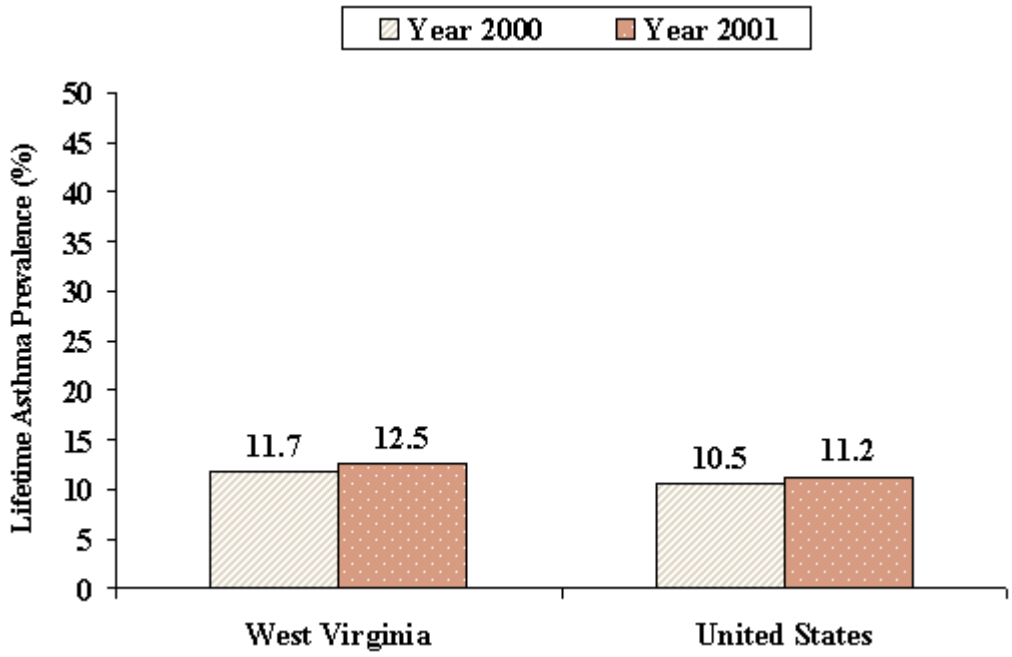
While the results of the West Virginia BRFSS are from a representative population of adults in the state, there are certain limitations of the data. Persons without phones and those that refuse to respond to telephone surveys are not represented. Any time a sample is taken from a population, sampling error is introduced, and other errors may result from omissions and inaccurate reporting. The sample sizes for both years were adequate for the state as a whole, and for certain sub-populations when data for the two years were aggregated. However, inadequate sample sizes for some counties and non-white race categories preclude the presentation of county-specific and race-specific prevalence data in this report.[1]

Data from the West Virginia BRFSS are presented on the following pages along with some nationwide comparisons (6, 7). Data are also summarized in Appendix B, Tables B-1 and B-2.

[1] Stable prevalences for individual counties and for non-white races will be determined by combining five or more years of future data for obtaining adequate sample size.

Figure 1
Lifetime Asthma Prevalence among Adults
West Virginia and United States: BRFSS, 2000 and 2001

WV Rank: #9 in 2000, #6 in 2001



The prevalence of lifetime asthma among adults in West Virginia increased from 11.7% in 2000 to 12.5% in 2001.[2] The increase was not statistically significant, but data from future years will reveal if this is a consistent trend.

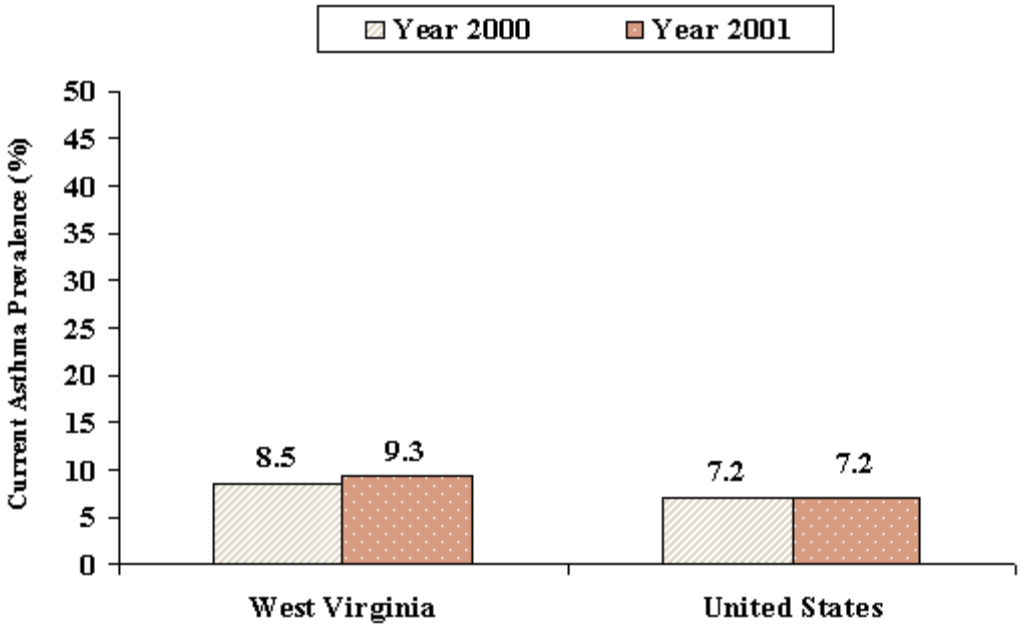
West Virginia ranked 6th highest in the nation in 2001, with a rate that was almost 12% higher than the U.S. median.[3] In the year 2000, it was ranked 9th highest, which could mean that the state is moving in a worse direction compared with other states.

[2] The prevalence of lifetime asthma was based on the question "Have you ever been told by a doctor, nurse, or other health professional that you had asthma?"

[3] U.S. percentages reported in this document are median prevalences for lifetime asthma and overall prevalences for current asthma.

Figure 2
Current Asthma Prevalence among Adults
West Virginia and United States: BRFSS, 2000 and 2001

WV Rank: #5 in 2000, #5 in 2001

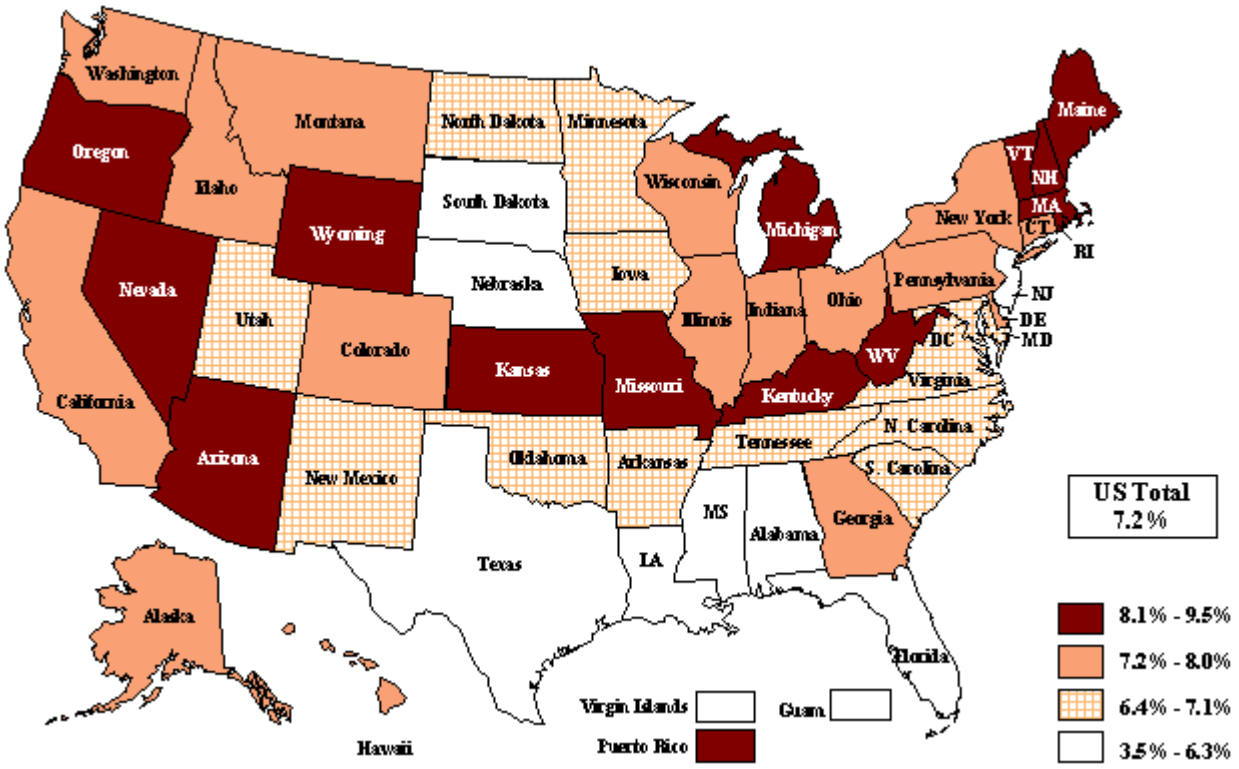


The prevalence of current asthma among adults in West Virginia increased from 8.5% in 2000 to 9.3% in 2001 (8, 9).[4] West Virginia was ranked 5th highest in the nation in both years. In 2001, the prevalence in West Virginia was 29% higher than the overall U.S. prevalence and this was statistically significant [WV 9.3% (95% CI: 8.2-10.4); US overall 7.2% (95% CI: 7.0-7.4)].

From the above prevalences of lifetime and current asthma, it is estimated that, as of 2001, 174,835 adults in West Virginia had ever been diagnosed with asthma. Of these, about 74% or 130,118 adults still had asthma.

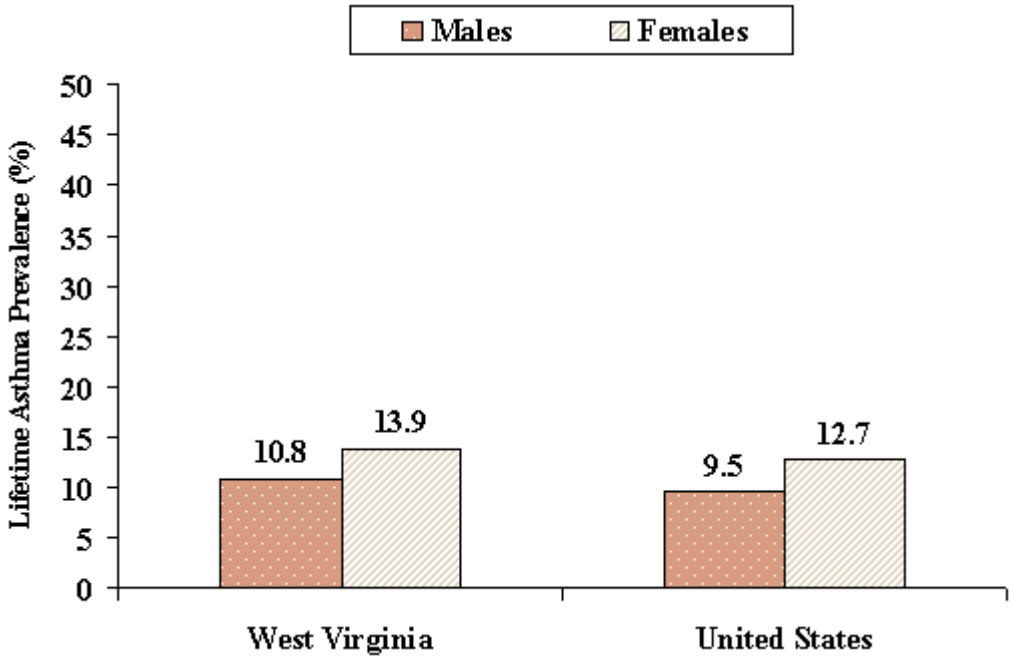
[4] The prevalence of current asthma was based on two questions: "Have you ever been told by a doctor, nurse, or other health professional that you had asthma?" and "Do you still have asthma?"

Figure 3
Current Asthma Prevalence among Adults
United States BRFSS, 2001



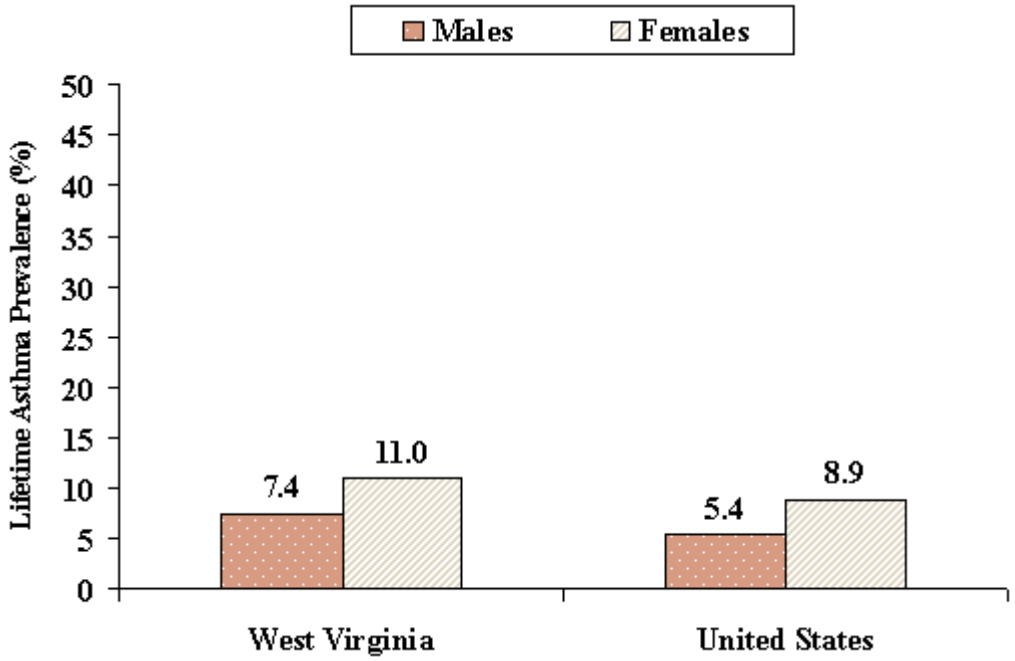
West Virginia ranked 5th highest in the nation in the prevalence of current asthma in both 2000 and 2001.

Figure 4
Lifetime Asthma Prevalence among Adults by Gender
West Virginia and United States: BRFSS, 2001



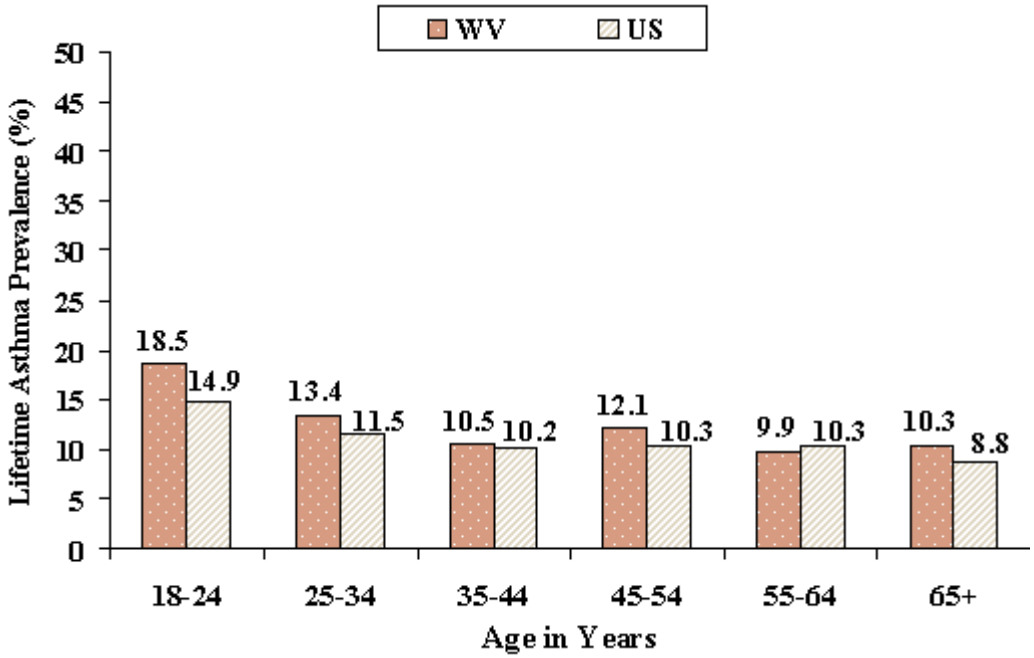
The prevalence of *lifetime* asthma in West Virginia was greater for females compared with males. Though not statistically significant, this was similar to the pattern seen nationwide. The rates for both males and females in West Virginia were higher than the corresponding U.S. median prevalences.

Figure 5
Current Asthma Prevalence among Adults by Gender
West Virginia and United States: BRFSS, 2001



Females in West Virginia were significantly more likely to *currently* have asthma as compared with males in 2001. The rates for both females and males in West Virginia were also significantly higher than the corresponding U.S. prevalences in the same year.

Figure 6
Lifetime Asthma Prevalence among Adults by Age
West Virginia BRFSS, 2000-2001[a] and United States BRFSS, 2001

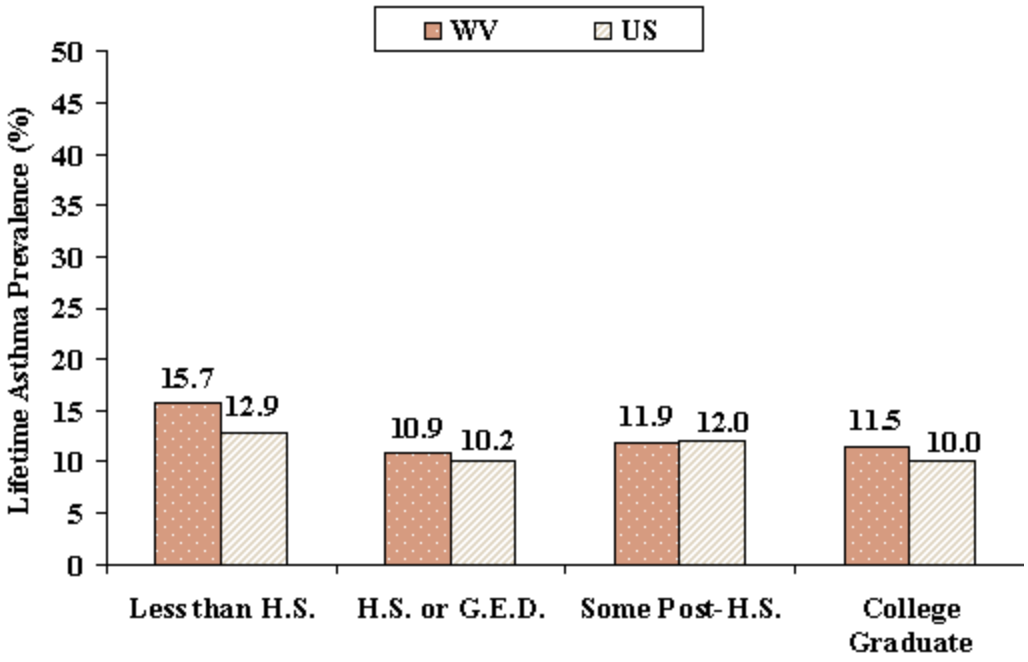


a. Data for West Virginia were combined for the years 2000 and 2001 to obtain adequate sample sizes.

In 2000-2001, the prevalence of *lifetime* asthma in West Virginia was greatest in the youngest age category of 18-24 years and declined with increasing age. The rates for almost all age categories were greater than the corresponding U.S. medians for 2001.

The differences between some of the age categories were statistically significant – the 18-24 year age group in West Virginia had a significantly higher rate than each of the other age groups except 25-34 years.

Figure 7
Lifetime Asthma Prevalence among Adults by Education
West Virginia BRFSS, 2000-2001[a] and United States BRFSS, 2001

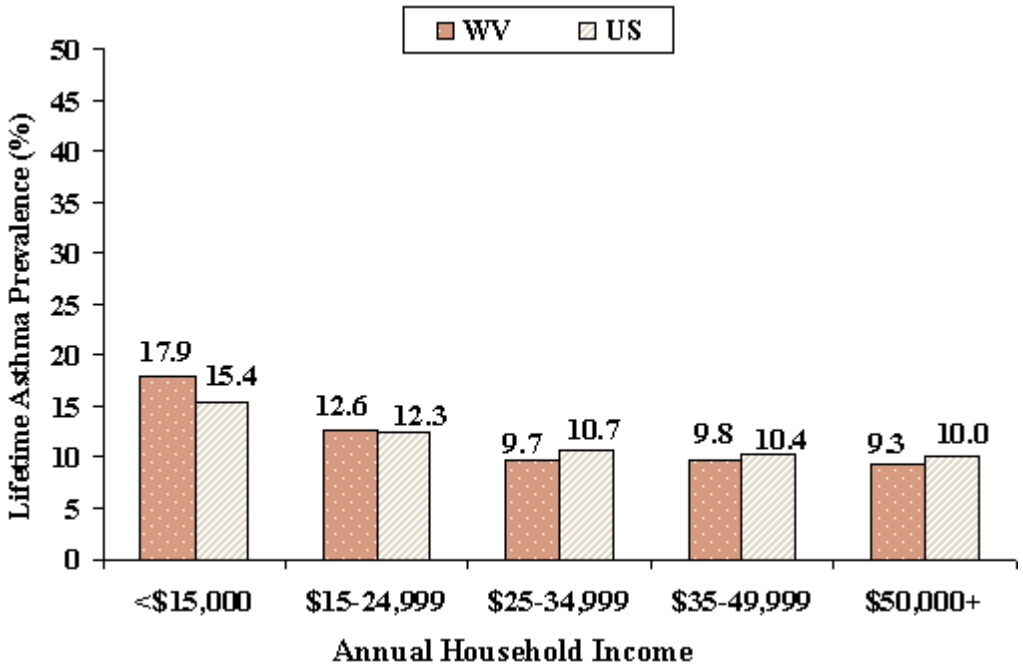


a. Data for West Virginia were combined for the years 2000 and 2001 to obtain adequate sample sizes.

In 2000-2001, the prevalence of *lifetime* asthma in West Virginia was greatest among those who had never graduated from high school. The rates for almost all education categories were greater than the corresponding U.S. medians for 2001.

High school non-graduates in West Virginia had a significantly higher rate of lifetime asthma than high school graduates. Other differences in prevalences between the education categories were not statistically significant.

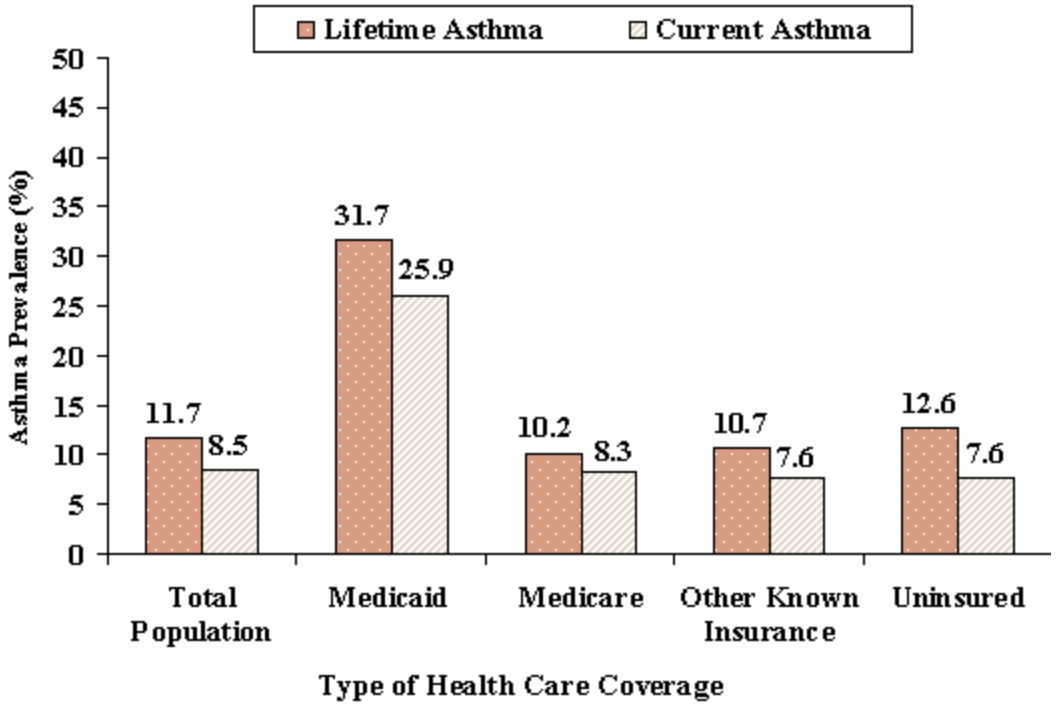
Figure 8
Lifetime Asthma Prevalence among Adults by Income
West Virginia BRFSS, 2000-2001[a] and United States BRFSS, 2001



a. Data for West Virginia were combined for the years 2000 and 2001 to obtain adequate sample sizes.

In 2000-2001, the prevalence of lifetime asthma in West Virginia was clearly the greatest (17.9%) in the lowest income category (i.e., <$15,000) and decreased with increasing income. This was statistically significant. The contrast with the 2001 national medians was also most notable in the <$15,000 category.

Figure 9
Lifetime and Current Asthma Prevalence among Adults by Type of Health Care Coverage
West Virginia BRFSS, 2000

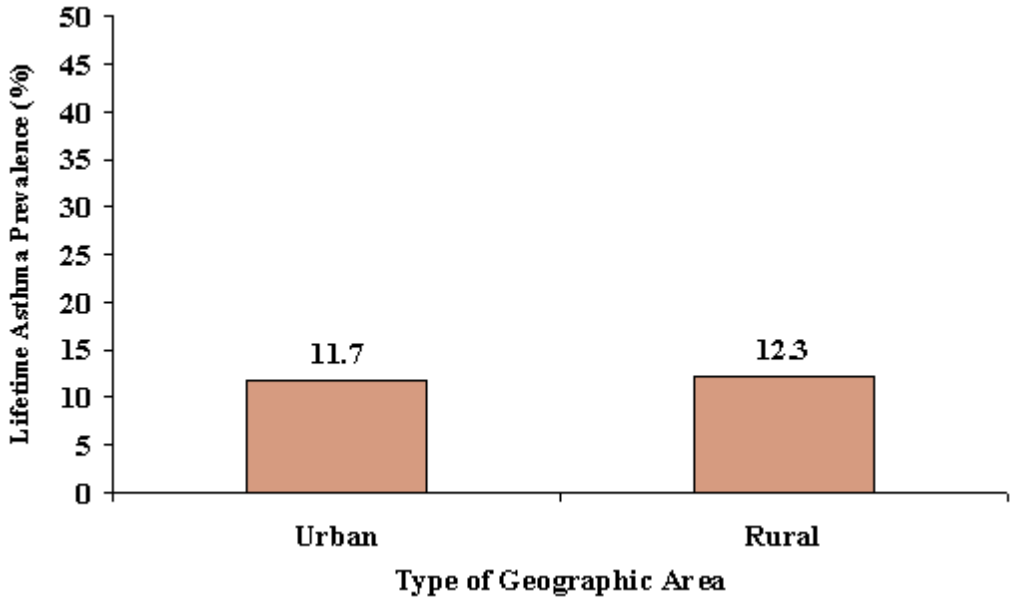


In the year 2000, respondents covered by Medicaid had the highest rates of both lifetime and current asthma.[5] These were significantly higher than the corresponding rates in other insured respondents (either Medicare or other known insurance).

Respondents who were uninsured, however, had significantly lower rates of both lifetime and current asthma compared with the Medicaid population. This could reflect the inability on the part of uninsured respondents to go to a doctor for diagnosis and care, hence resulting in lower rates.

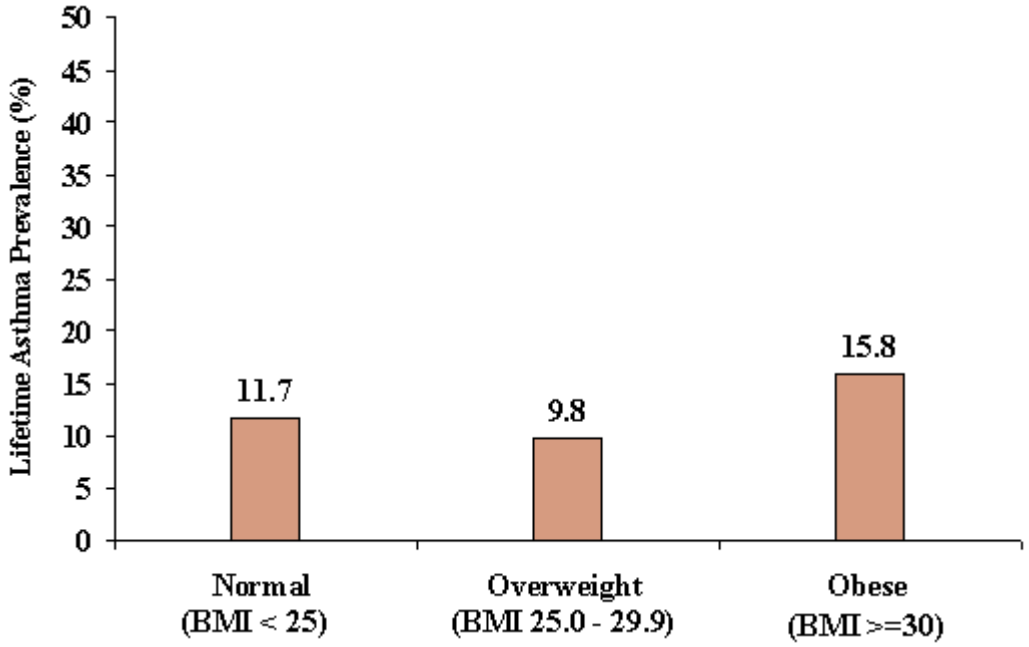
[5] Detailed information regarding health care coverage was not available for the year 2001.

Figure 10
Lifetime Asthma Prevalence among Adults by Geographic Area
West Virginia BRFSS, 2000-2001



The prevalence of lifetime asthma was somewhat elevated in rural versus urban areas of West Virginia; however, this was not statistically significant.

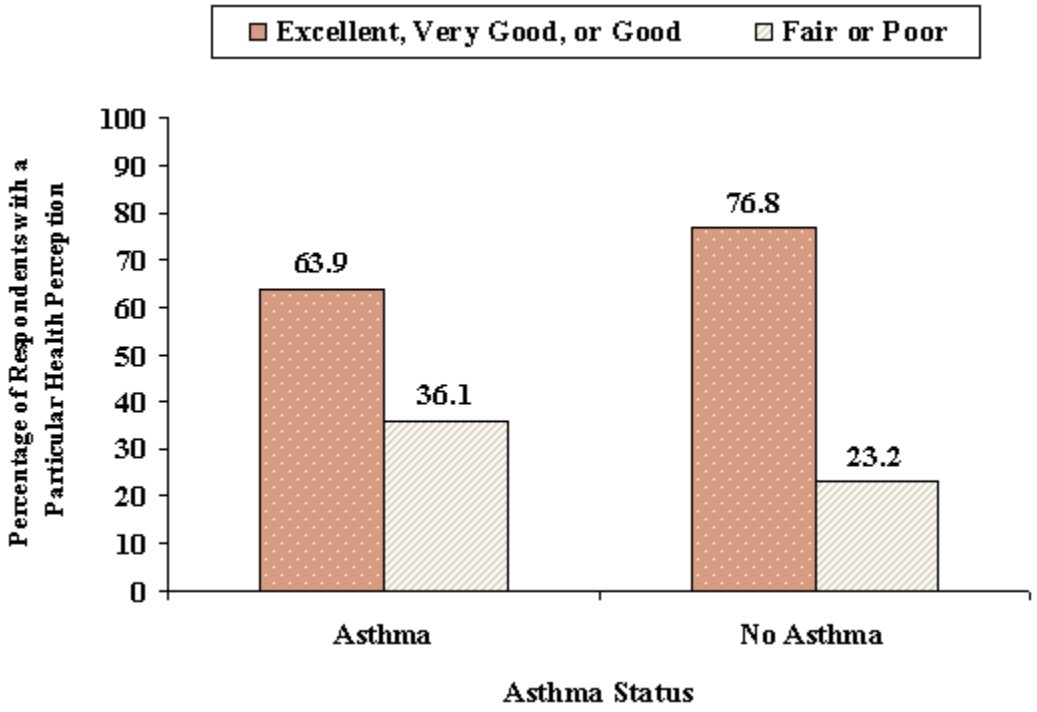
Figure 11
Lifetime Asthma Prevalence among Adults by Body Mass Index (BMI)
West Virginia BRFSS, 2000-2001



Respondents were divided into three categories based on their body mass index or BMI – normal (BMI <25), overweight (BMI 25.0-29.9), and obese (BMI >=30).

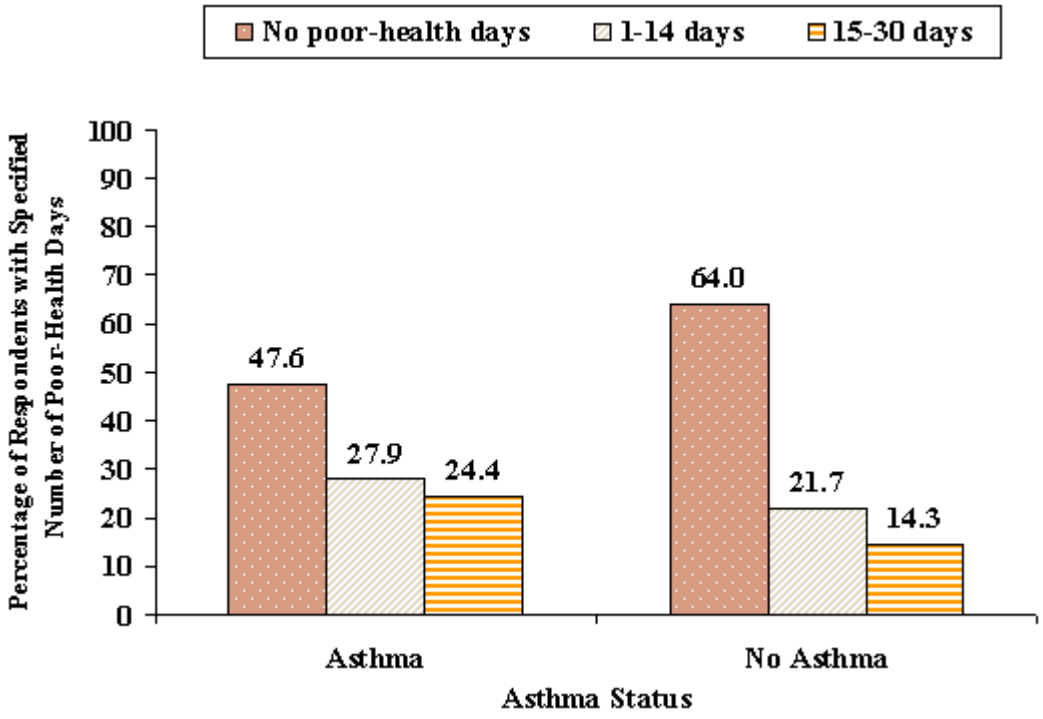
The prevalence of lifetime asthma was found to be significantly higher in obese respondents compared with respondents with a normal BMI. Overweight respondents were not found to have a significantly different prevalence of asthma from the other two categories.

Figure 12
Lifetime Asthma Status among Adults and General Health Perception
West Virginia BRFSS, 2000-2001



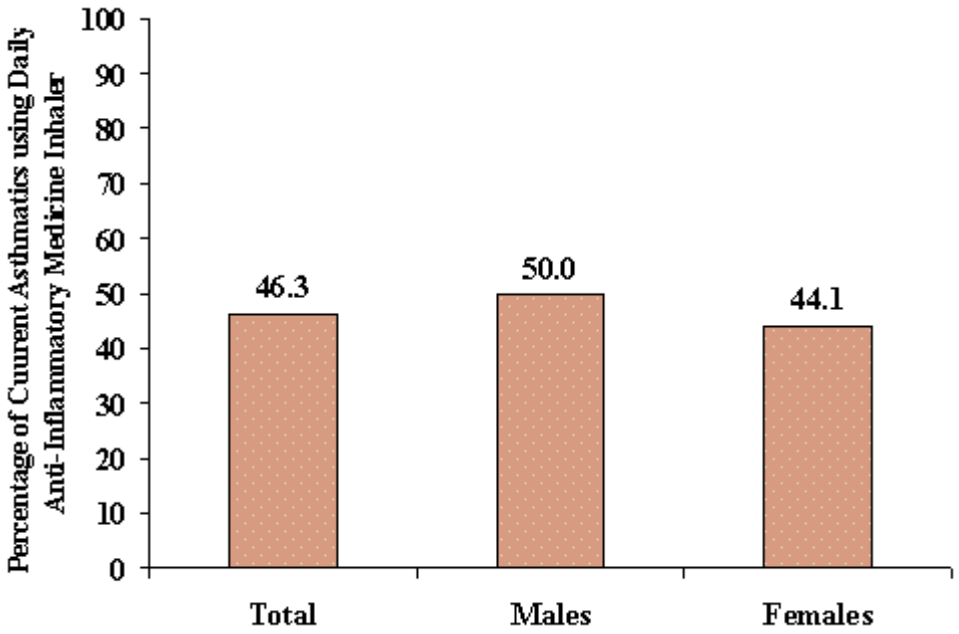
When asked to describe their general health, adults with asthma were significantly less likely than those without asthma to report having "excellent," "very good," or "good" health. Similarly, those with asthma were also significantly more likely to report having "fair" or "poor" health than those without asthma.

Figure 13
Lifetime Asthma Status among Adults and Poor-Health Days in the Past 30 Days
West Virginia BRFSS, 2000-2001



Respondents with asthma were significantly less likely than those without asthma to report that they had no poor-health days during the past 30 days. In fact, those with asthma were significantly more likely to report 1-14 and 15-30 poor-health days in the past 30 days than those without asthma.

Figure 14
Use of Daily Anti-Inflammatory Medicine Inhaler
among Adults with Current Asthma by Gender
West Virginia BRFSS, 2000



A little less than half of all adults (46.3%) who said they currently have asthma reported that they use a prescription anti-inflammatory inhaler such as a corticosteroid on a daily basis.[6] There were no significant differences between males and females regarding the use of such an inhaler.

[6] These percentages were obtained using a state-added question in the 2000 BRFSS questionnaire, "Do you use any prescribed anti-inflammatory inhaler on a daily basis, such as a corticosteroid?"

Summary Points: Behavioral Risk Factor Surveillance System

- ❑ Within West Virginia, the prevalence of asthma among adults was significantly greater among the following demographic categories:

  - Females
  - Age category 18-24 years
  - High school non-graduates
  - Annual household income <$15,000
  - Medicaid population
  - Obese respondents

- ❑ Within West Virginia, those with asthma were:

  - Less likely to report their general health as "excellent," "very good," or "good," and more likely to describe it as "fair" or "poor."
  - More likely to report 1-14 and 15-30 poor-health days during the previous 30 days.

Prevalence Estimates among School Children
West Virginia Youth Tobacco Survey

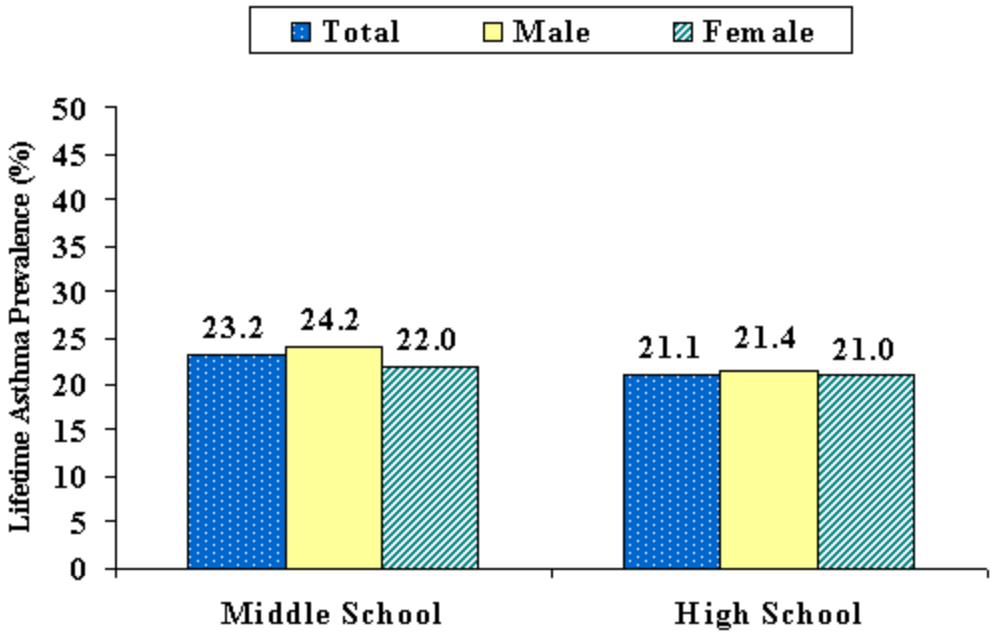
The Youth Tobacco Survey (YTS) is a nationwide standardized survey administered to sampled middle school and high school students in all states. The West Virginia Youth Tobacco Survey (WVYTS) is conducted by the Department of Education in collaboration with the Office of Smoking and Health at the Centers for Disease Control and Prevention and the West Virginia Bureau for Public Health, Office of Epidemiology and Health Promotion.

Questions on asthma were added to the core questionnaire of the WVYTS for the first time in 2002. Hence prevalence data from the survey are available for one year only and no trends in prevalence could be analyzed. Criteria for defining different prevalences related to asthma were adopted such that they closely paralleled the definitions used by the National Health Interview Survey (10). Definitions and detailed prevalence tables are shown in Appendix C, Tables C-1 and C-2.

The WVYTS results are from a representative sample of students across the state; however, similar to the BRFSS, these data too have some limitations. First, the YTS data are self-reported data by adolescents aged mainly 12-17 years old. It is possible that teenagers could misinterpret questions regarding diagnosis and prescription medicines. Second, the survey is administered only in public schools, so it does not represent children in private schools, school dropouts, and home-schooled children. Finally, while statewide data were available for both middle school and high school students, more local regional data were available only for middle school students in the year 2002.

The asthma-related results of the WVYTS are presented on the pages that follow.

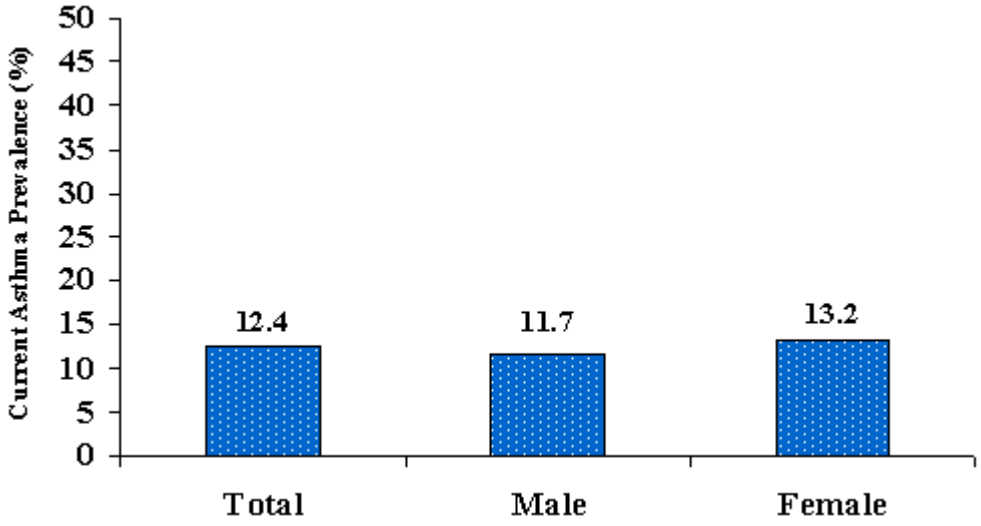
Figure 15
Lifetime Asthma Prevalence among Students by School and Gender
WVYTS, 2002



The prevalence of lifetime asthma was 23.2% among middle school students and 21.1% among high school students in West Virginia. This amounts to an estimated 32,757 students in West Virginia who have ever been diagnosed with asthma.

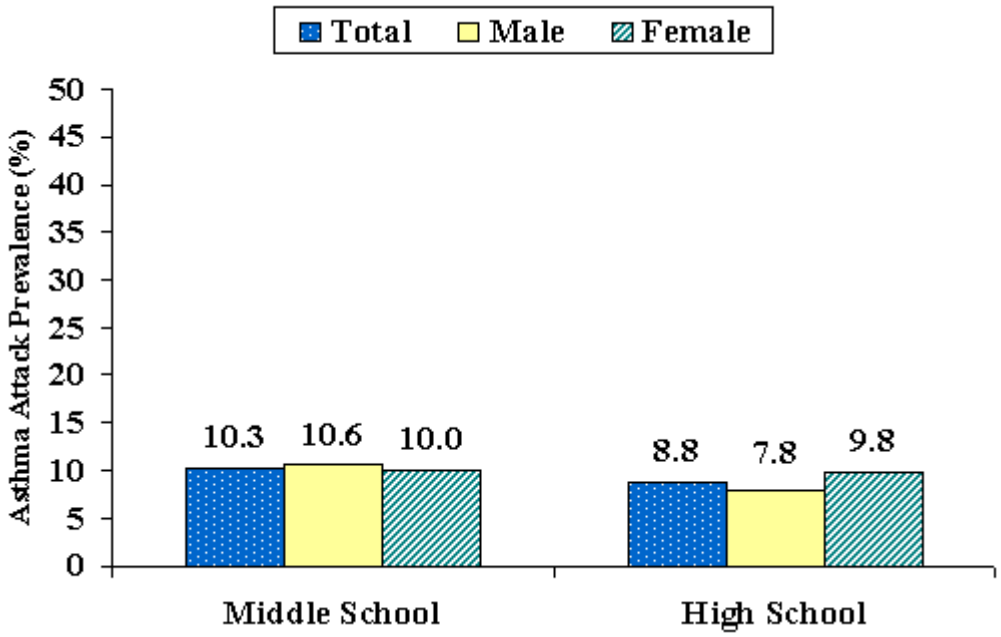
There were no significant differences between males and females, or between middle school and high school students.

Figure 16
Current Asthma Prevalence among High School Students by Gender
WVYTS, 2002



The prevalence of current asthma was 12.4% among high school students. This comprised 66% of high school students who had ever been diagnosed with asthma. There were no significant differences between boys and girls. This rate was available for high school students only.

Figure 17
Asthma Attack Prevalence among Students by School and Gender
WVYTS, 2002

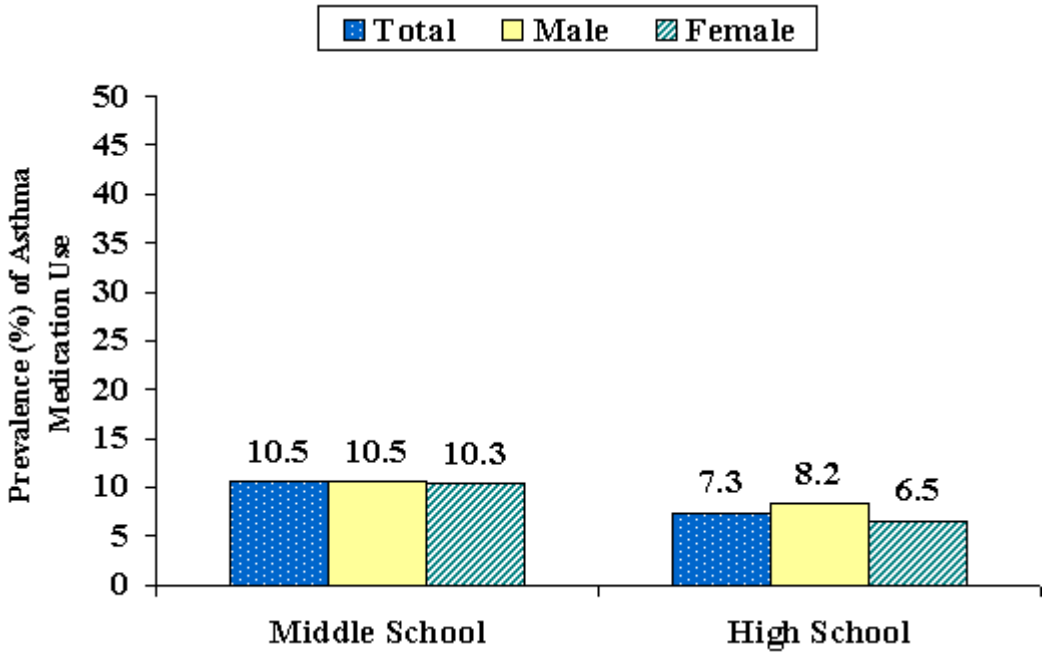


Approximately 10.3% of middle school students and 8.8% of high school students had an attack of asthma in the past one year – amounting to an estimated 14,099 students in West Virginia. This accounted for about 49% and 48% of *lifetime* asthmatics in middle and high schools, respectively.

There were no significant differences between boys and girls, or between middle school and high school students.

The asthma attack prevalence is an indicator of ill-controlled asthma – it specifically identifies adolescents who have recently had asthma exacerbations and who therefore might be at high risk for the same in the future unless treated appropriately. For the same reason, this rate is also a better indicator of the current burden of asthma among school-going adolescents in the state.

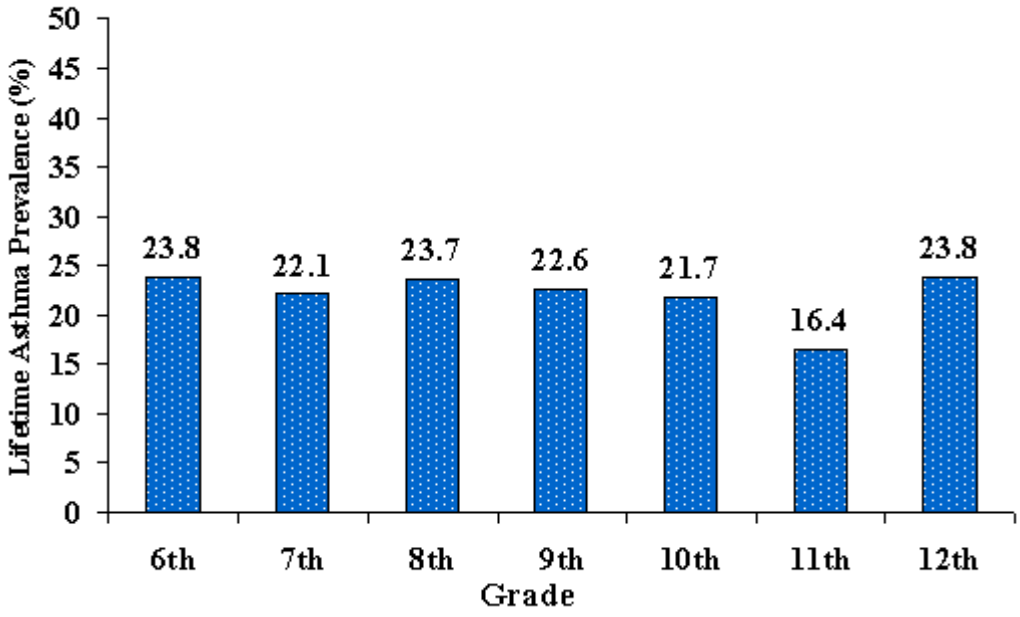
Figure 18
Current Use of Asthma Medication among Students by School and Gender
WVYTS, 2002



About 10.5% of middle schools students and 7.3% of high school students said that they currently take prescription medication for asthma. This comprised 72% of all asthmatics who had an attack in the past year in middle schools and 59% in high schools.

Middle school students were significantly more likely to be taking prescription medication for asthma than high school students. This was especially significant for girls. It is possible that middle school students need more frequent therapy, suggesting more severe asthma in younger students.

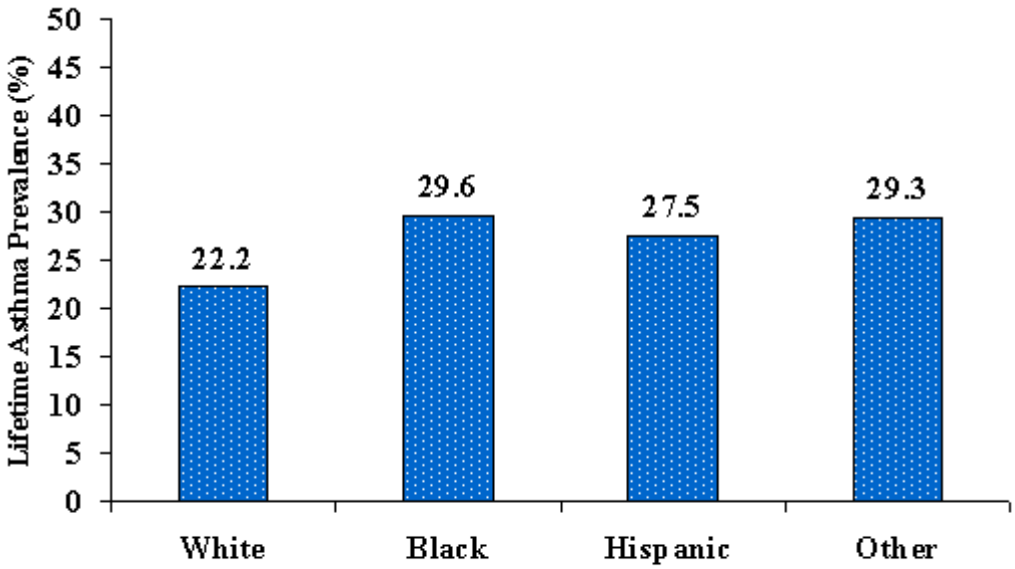
Figure 19
Lifetime Asthma Prevalence among Students by School Grade
WVYTS, 2002



The prevalence of *lifetime asthma* was uniform across school grades – however, 11th graders were found to have a significantly lower prevalence than middle school students.[7] Differences in the prevalence of *asthma attacks* could not be assessed across grades because of low sample sizes.

[7] The sample size for 11th and 12th graders was slightly low: 47 out of 284 students in the 11th grade and 35 out of 154 students in the 12th grade said that they had ever been diagnosed with asthma. Sample sizes in other high school grades were approximately twice these or more.

Figure 20
Lifetime Asthma Prevalence among Middle School Students by Race
WVYTS, 2002

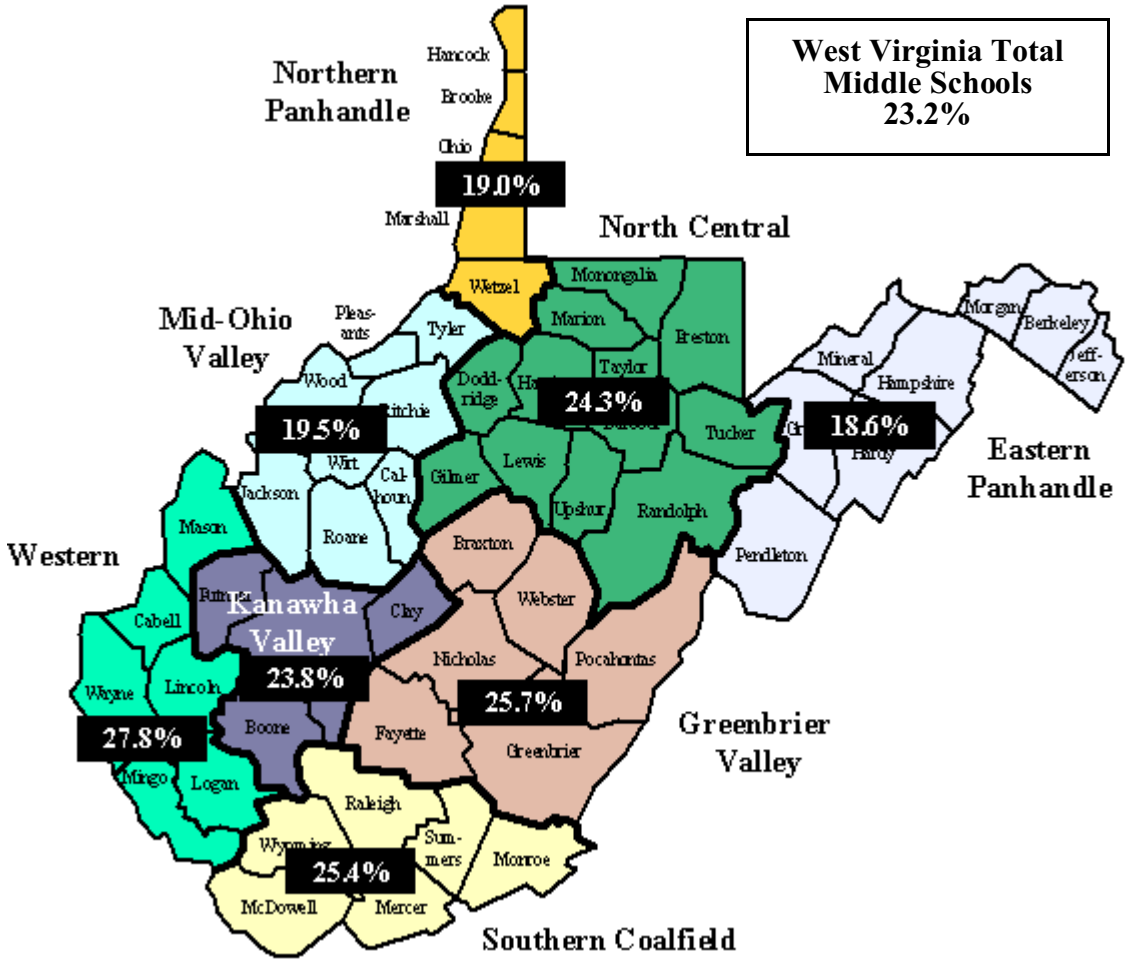


Significantly higher rates of lifetime asthma were seen in black students in middle schools as compared with white students.

Black students were also significantly more likely than white students to have had an asthma attack in the past year (13.8% in blacks vs. 9.6% in whites, data not shown).

There were insufficient data to determine differences in prevalence by race among high school students.

Figure 21
Lifetime Asthma Prevalence among Middle School Students
by Geographic Region
WVYTS, 2002

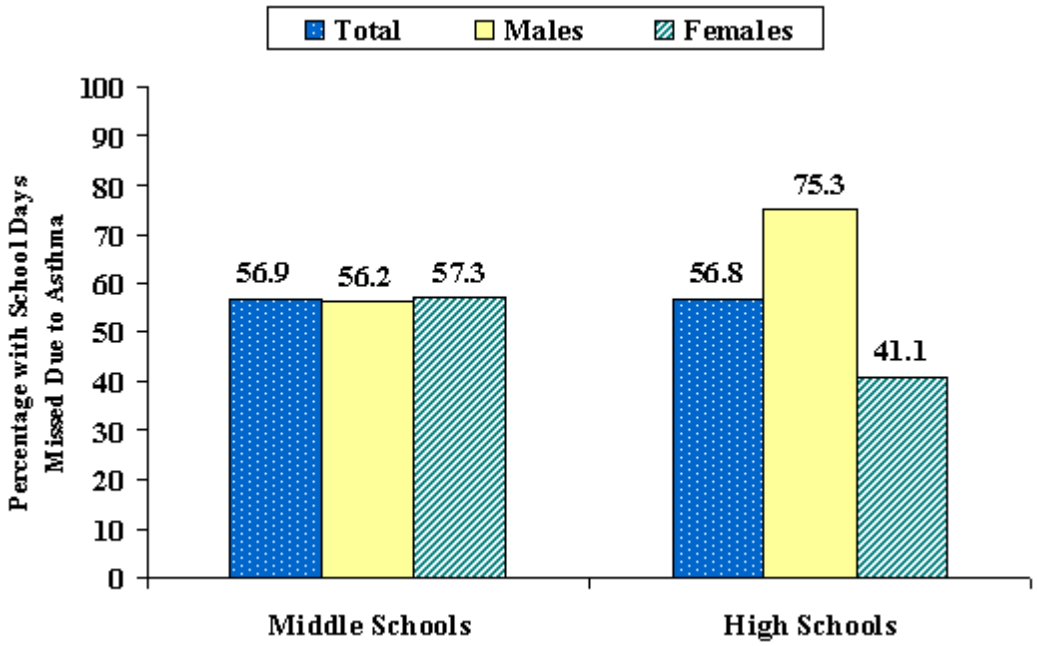


Regional data were available only for middle school students. The following regions were found to have significantly different prevalences of *lifetime asthma* as compared with the state overall middle school prevalence:

Significantly higher than state overall – Western region
Significantly lower than state overall – Mid-Ohio, Northern Panhandle, and Eastern Panhandle

Significant differences were also found between some regions in the prevalence of *asthma attacks* (see Table C-3 in Appendix C) – the Western region had a significantly higher rate compared with the Northern and Eastern Panhandle regions.

Figure 22
One or More School Days Missed due to Asthma
among Students with Past-Year Asthma Attacks by School and Gender
WVYTS, 2002

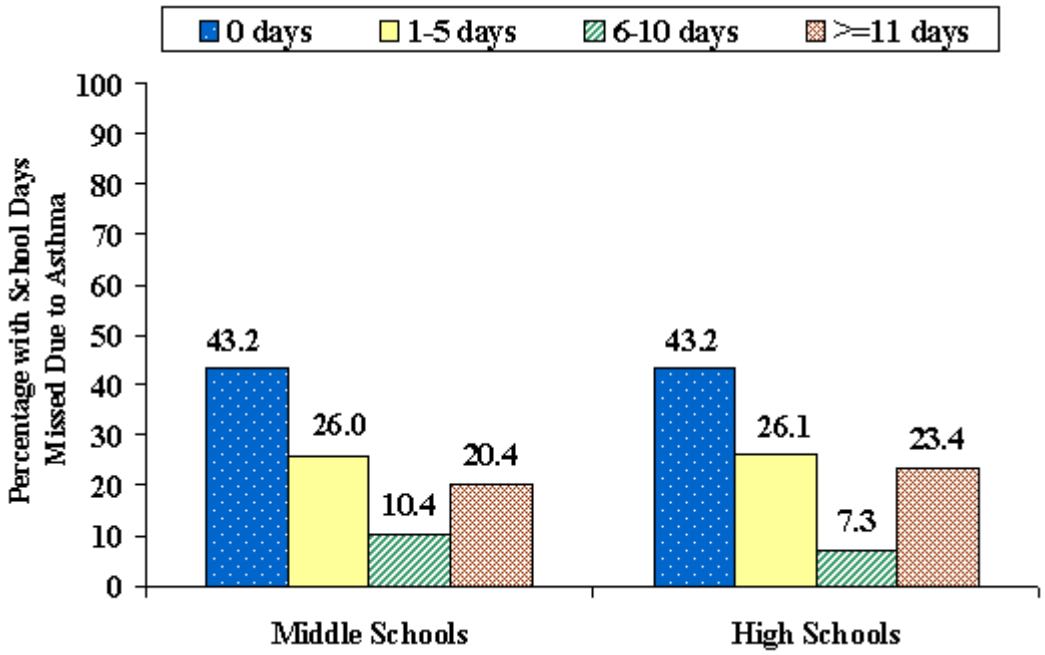


In both middle and high schools, about 57% of all students who had asthma attacks in the past year missed one or more school days in that year due to their asthma.

In high schools, boys were significantly more likely to have lost one or more school days due to their asthma in the past year than girls.

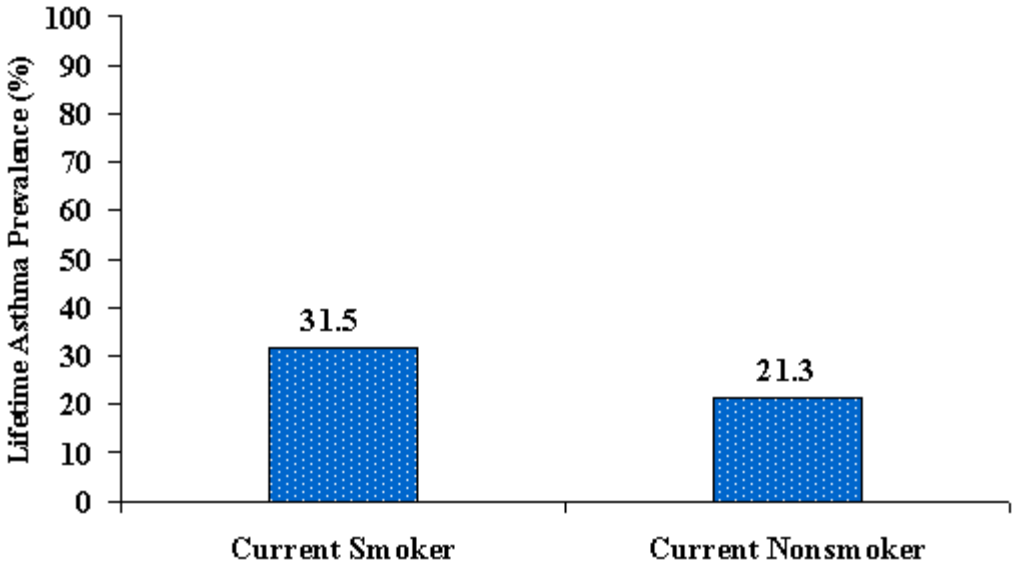
Further, high school boys were also significantly more likely than middle school boys to have lost one or more school days due to their asthma in the past year.

Figure 23
Number of School Days Missed due to Asthma
among Students with Past-Year Asthma Attacks by School
WVYTS, 2002



Among students who had an asthma attack in the past year, about 26% in both middle schools and high schools missed 1-5 days. Another 20% and 23% in middle and high schools, respectively, lost 11 or more days of school in the past year due to their asthma.

Figure 24
Cigarette Smoking and Prevalence of Lifetime Asthma
among Middle School Students
WVYTS, 2002

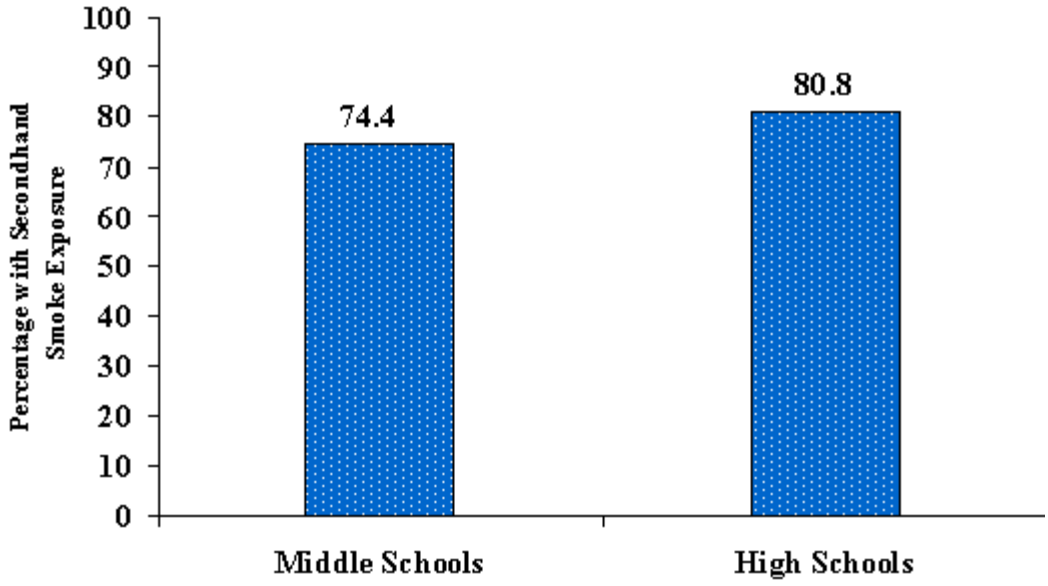


Current smokers in middle schools were significantly more likely than nonsmokers to have ever been diagnosed with asthma (31.5% vs. 21.3%), as shown in the above figure. In high schools, the pattern was similar but not significant. This is a major concern, since West Virginia has long ranked among the top five states nationwide in cigarette smoking among adolescents (10).

In middle schools, current smokers with lifetime asthma were also significantly more likely than nonsmokers with lifetime asthma to have had an attack of asthma in the past year (55.0% vs. 46.8%, respectively; data not shown).

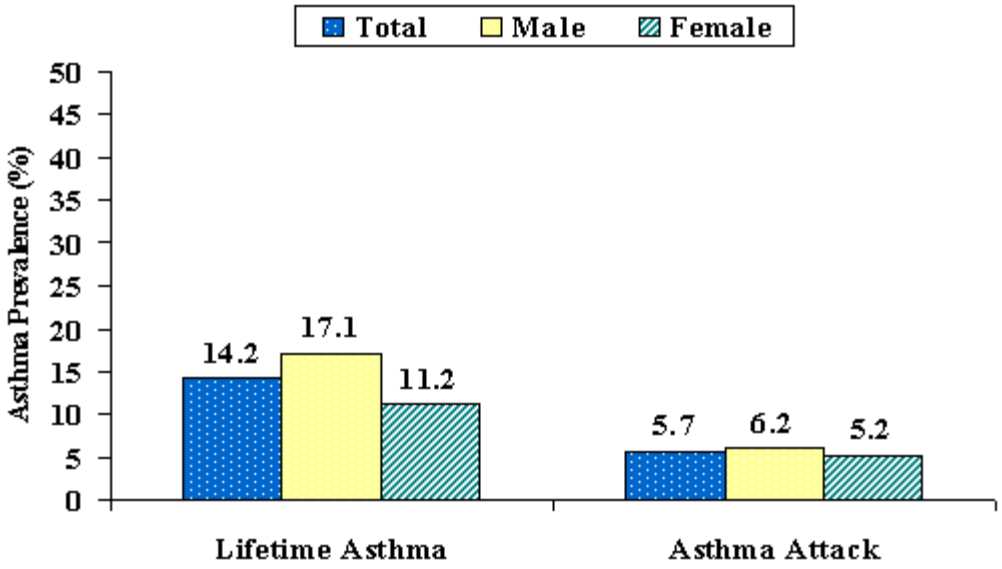
The converse was also true, that is, middle school students with lifetime asthma smoked at significantly higher rates than those without asthma. The higher rate of smoking among students who have ever been diagnosed with asthma is a further cause for concern.

Figure 25
Secondhand Smoke Exposure among Students with Past-Year Asthma Attacks
WVYTS, 2002



Of students who had an asthma attack in the past year, 75% in middle schools and 81% in high schools were exposed to secondhand smoke on at least one occasion in the past week. Since secondhand smoke is known to cause asthma exacerbations in children, this is of great concern especially for children who have recently had an episode of asthma.

Figure 26
Asthma Prevalence in United States Adolescents (12-17 year olds)
National Health Interview Survey, 1998



Nationwide data for adolescents (12-17 year olds) are available from the National Health Interview Survey (NHIS) conducted by the National Center for Health Statistics, CDC (11).

According to the 1998 NHIS, 14.2% of adolescents in the United States had ever been diagnosed with asthma and 5.7% of adolescents had an episode or attack of asthma in the past 12 months. This is shown in the figure above. Males had a significantly higher rate of lifetime asthma as compared with females. However, there were no significant differences between males and females in the prevalence of past-year asthma attacks.

The NHIS is a door-to-door interviewer survey with a proxy (adult) respondent for the child, while the YTS is a classroom-based questionnaire survey with self-reported data. The results from the two surveys are therefore not directly comparable. Further, the YTS can only reach children at school, while the NHIS can reach children at home. Lastly, the question for lifetime asthma is worded slightly differently in the YTS. In the absence of any other nationwide data for adolescents, however, these data from the NHIS are shown graphically above.

Summary of Results from the West Virginia Youth Tobacco Survey

- ❑ There were no significant differences in prevalence of lifetime asthma or past-year asthma attacks between boys and girls.

- ❑ Significantly higher prevalence of lifetime asthma (and past-year asthma attacks in some cases) was seen in:
  - Black students in middle schools
  - Middle school students in the Western region of the state

- ❑ Significantly lower prevalence of lifetime asthma (and past-year asthma attacks in some cases) was seen in:
  - Middle school students in the Mid-Ohio, Northern Panhandle, and Eastern Panhandle regions
  - Students in the 11th grade

- ❑ Other significant differences:
  - Higher prevalence of prescription drug use for asthma among middle school students, especially girls.
  - Higher prevalence of school days missed due to asthma among boys, especially high school boys.
  - Higher lifetime asthma and asthma attack prevalence among current smokers in middle schools compared with nonsmokers.

Hospital Discharge Data
West Virginia Health Care Authority

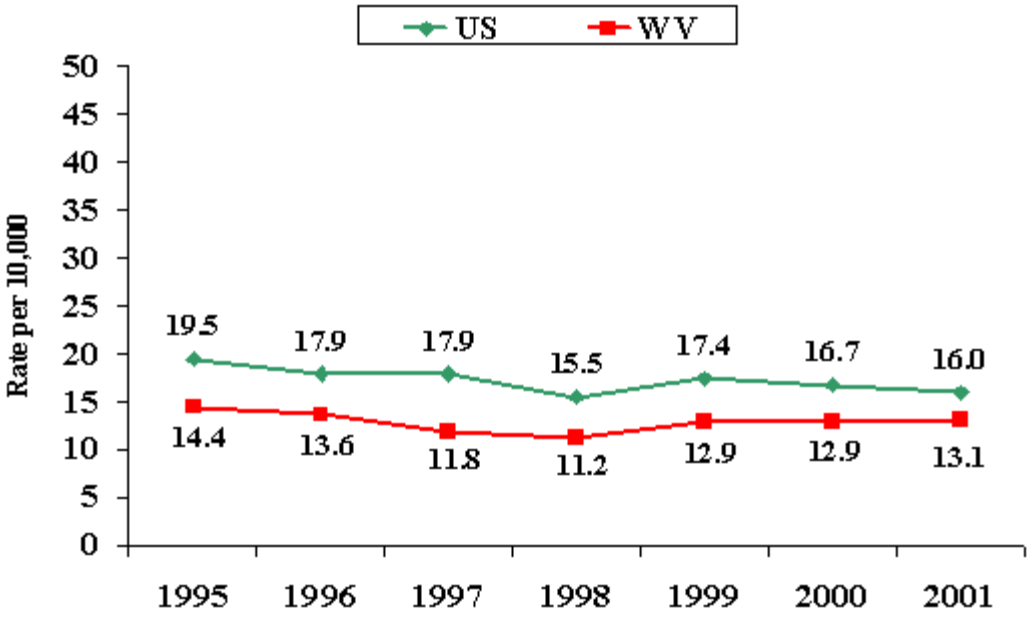
Hospitalization data were obtained from the West Virginia Health Care Authority's (WVHCA) hospital discharge database. Data are submitted by hospitals under the Freedom of Information Act using the Uniform Bill (UB) claims form.[8] The database contains information on all discharges regardless of payer status including patients without insurance coverage. Data elements in the public data set include International Classification of Diseases, Ninth Revision, Clinical Manual (known as ICD-9-CM) diagnosis and procedures codes, gender, date of birth, admission date, discharge date, admission priority, length of stay, discharge status, total charges (based on specific items such as prescriptions), admission source, payer source, and county of origin.

Hospitalization data in this report are for West Virginia residents for the years 1995 through 2001 and were obtained for the ICD-9-CM code of 493 for asthma as a primary diagnosis (first-listed diagnosis). Corresponding rate estimates for the United States were obtained from the National Hospital Discharge Survey (12).[9] Comparisons between West Virginia and the United States for the year 2001 are summarized in Appendix D.

[8] The WVHCA collects hospital discharge data from all non-federal licensed hospitals in the state and Medicare data on West Virginia residents hospitalized in out-of-state hospitals.

[9] The National Hospital Discharge Survey (NHDS) is a national survey conducted annually since 1965. The NHDS collects data from a sample of approximately 270,000 inpatient records acquired from a national sample of about 500 non-federal short-stay hospitals.

Figure 27
Asthma Hospitalization Rates in United States and West Virginia Residents
Primary Diagnosis of Asthma[a,b,c]
1995-2001

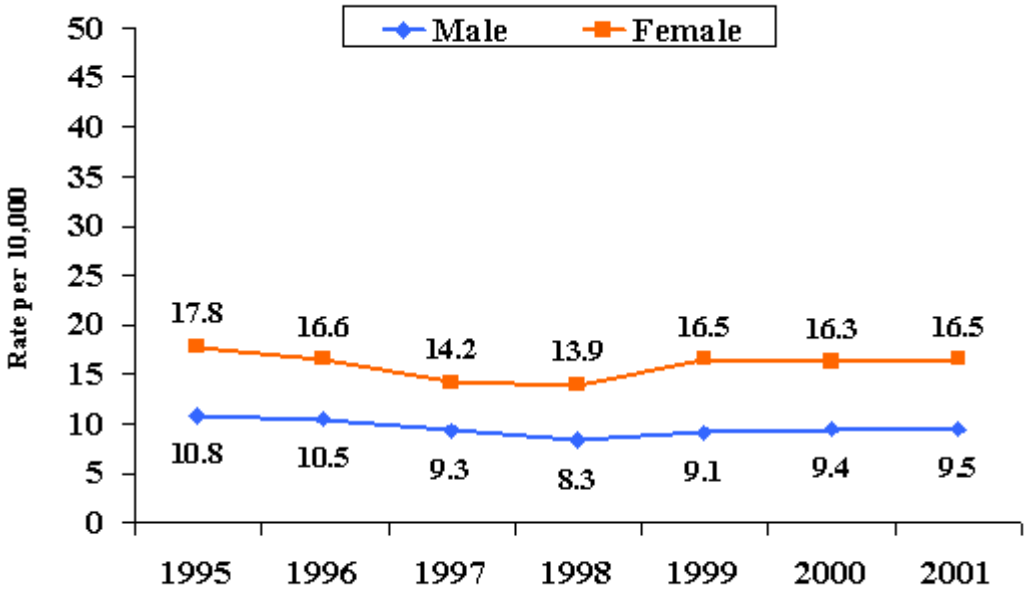


a. Rates exclude newborns, defined as patients admitted to the hospital by birth. Rates are not age-adjusted.
b. U.S. rates are estimates from the National Hospital Discharge Survey.
c. Year 2000 denominator data for West Virginia were from the 2000 Census; denominator data for all other years were estimated using the 1990 and 2000 Census data.

During the period 1995-2001, hospitalization rates for asthma as a primary diagnosis in West Virginia were lower than the corresponding U.S. rates. It is interesting to note that the prevalence of asthma in West Virginia as estimated by the BRFSS is higher than the U.S. prevalence, but the hospitalization rates are lower.

The actual number of hospitalizations for asthma as a primary diagnosis in West Virginia decreased from 2,598 in 1995 to 2,356 in 2001.

Figure 28
Trends in Asthma Hospitalization Rates by Gender[a]
Primary Diagnosis of Asthma
West Virginia Residents, 1995-2001

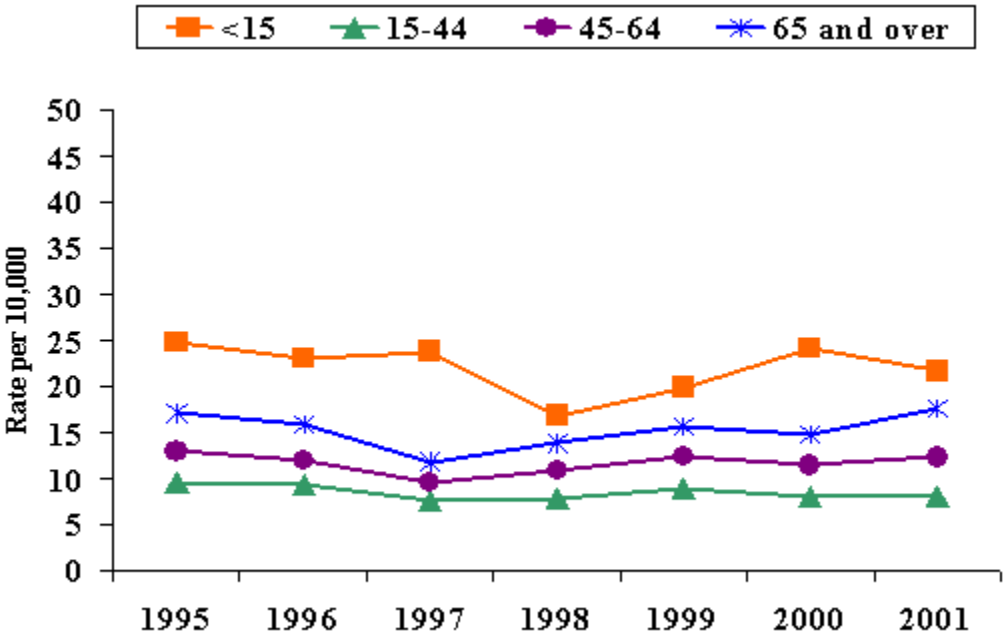


a. Excludes newborns, defined as patients admitted to the hospital by birth.

Hospitalization rates for males ranged from10.8 to 8.3 per 10,000 over the seven-year period of 1995 – 2001. Rates for females were higher than males and ranged from 17.8 to 13.9 per 10,000. After a dip in 1998, the rates for both males and females have increased.

Both males and females in West Virginia had substantially lower rates of asthma-related hospitalizations than their counterparts nationwide each year during the seven-year period (see data for year 2001 in Appendix D).

Figure 29
Trends in Asthma Hospitalization Rates by Age Group[a]
Primary Diagnosis of Asthma
West Virginia Residents, 1995-2001



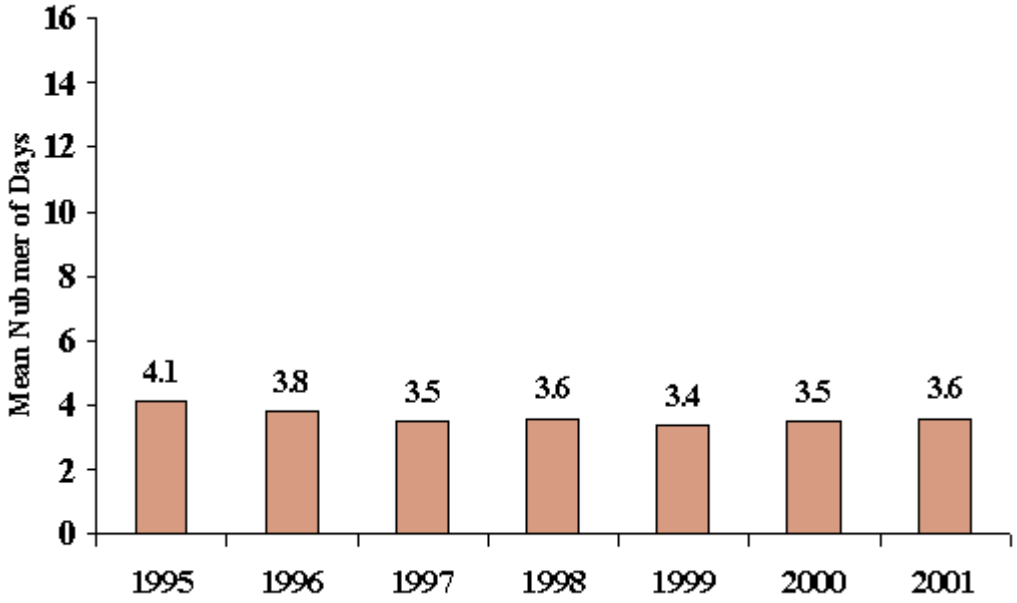
a. Age category <15 years excludes newborns, defined as patients admitted to the hospital by birth.

During 1995-2001, the hospitalization rate was the lowest in the 15-44 year age group. Currently, the highest rate is among children (aged <15 years) followed by the elderly (aged 65 years and older) – this is similar to the pattern seen nationwide. However, the rate for each individual age group in West Virginia was substantially lower than the corresponding rate in the United States each year (see data for year 2001 in Appendix D).

According to the National Asthma Education and Prevention Program's *Expert Panel Report*, underdiagnosis of asthma and its subsequent undertreatment are key problems in infants and children younger than 5 years (13). This is because the most common cause of asthma-like symptoms in this age group is viral bronchitis rather than asthma. It is therefore possible that the above rates for infants and young children are underestimated and the true rates may be even higher.[10]

[10] The Expert Panel recommends that long-term control therapy for asthma be started for infants and young children who in the past year had more than three episodes of wheezing that lasted more than one day and affected sleep *and* who have additional risk factors for asthma such as history of allergic disorders or parental asthma.

Figure 30
Average Length of Stay (ALOS) in Hospital for Discharges with a Primary Diagnosis of Asthma[a]
West Virginia Residents, 1995-2001



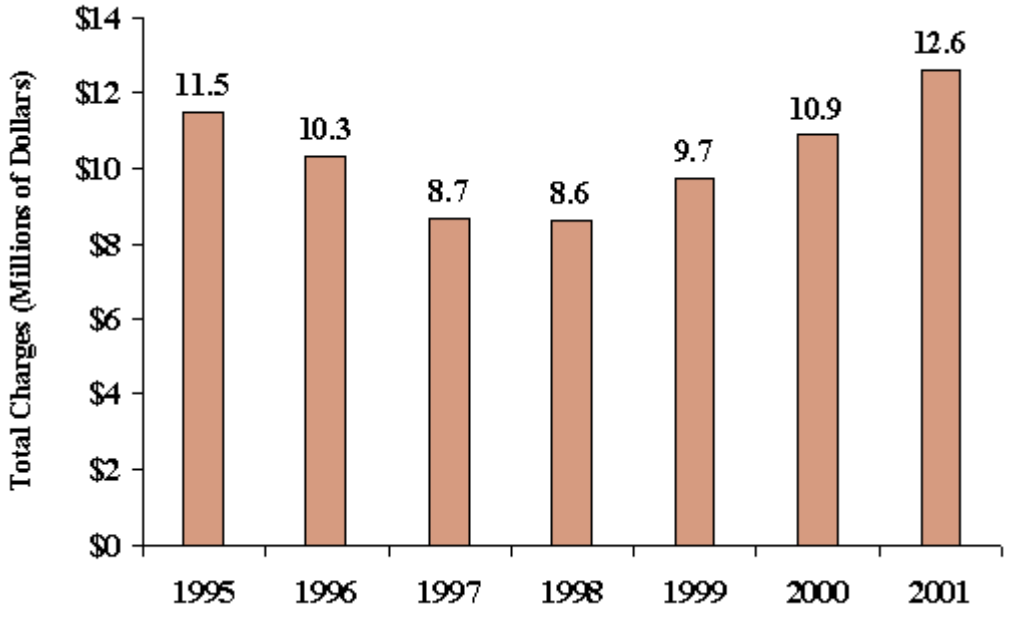
a. Excludes newborns, defined as patients admitted to the hospital by birth.

The average length of stay (ALOS) for asthma-related hospitalizations decreased from 4.1 days in 1995 to 3.6 days in 2001.

In the year 2001, the highest ALOS among all age groups was in the elderly population aged 65 years and older (5.3 days), while the lowest was among children aged 1-14 years (2.1 days). Females had a slightly higher ALOS (3.9 days) compared with males (3.1 days).

These patterns were similar to those seen nationwide (see Appendix D). However, the ALOS for asthma-related discharges in West Virginia was higher in most age and gender categories as compared with the corresponding categories nationwide. Thus, West Virginians tend to have fewer but longer hospitalizations (lower rate but higher ALOS) for asthma as compared with their counterparts nationwide.

Figure 31
Total Hospital Charges for Discharges with a Primary Diagnosis of Asthma[a]
West Virginia Residents, 1995-2001

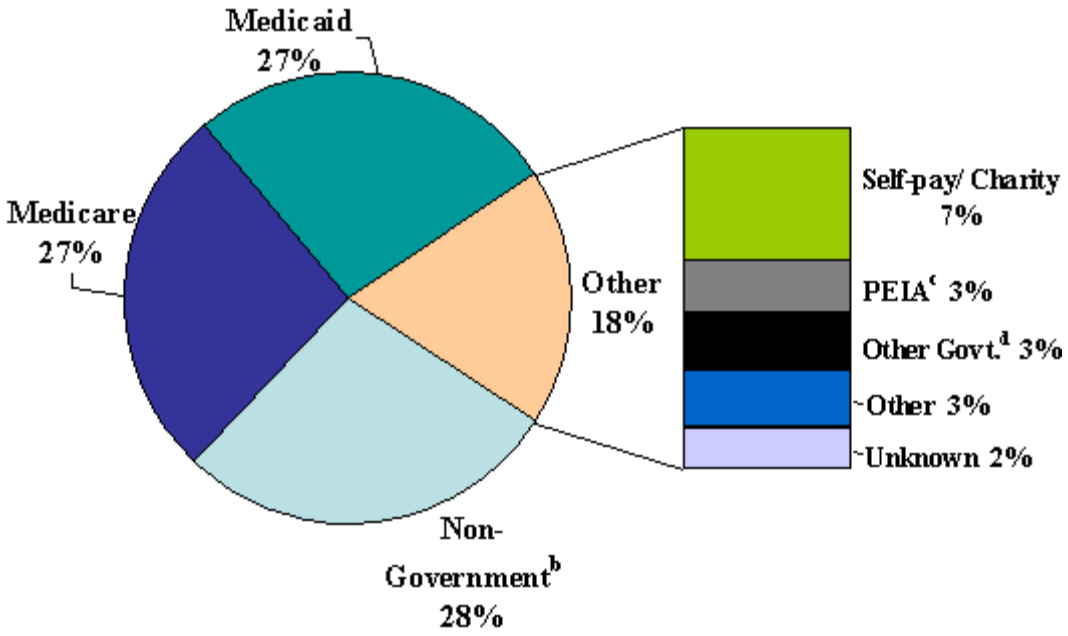


a. Excludes newborns, defined as patients admitted to the hospital by birth.

The total hospital charges for inpatient care related to a primary diagnosis of asthma appear to be increasing. After a dip in 1998 ($8,613,459), charges increased to $12,589,384 by 2001. During 1995-2001, the charges have averaged about $10.3 million per year.

During 1995-2001, the total asthma-related hospital charges for females in West Virginia exceeded those for males in each year. For example, in the year 2001, these charges were about $8.6 million for females, compared with about $3.9 million for males.

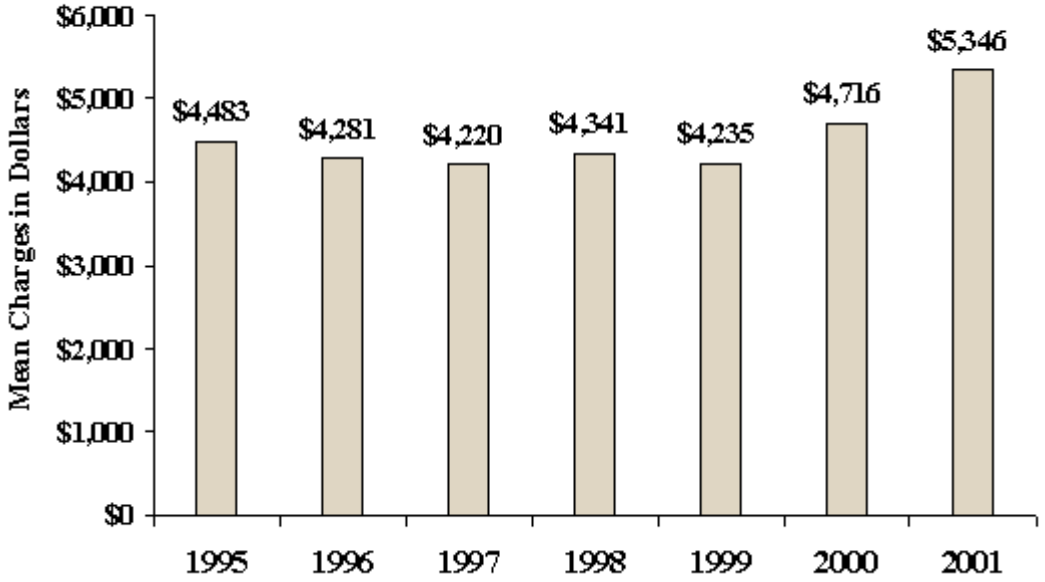
Figure 32
Distribution of Hospital Charges for Discharges with a Primary Diagnosis of Asthma by Payer[a]
West Virginia Residents, 2001



a. Excludes newborns, defined as patients admitted to the hospital by birth.
b. Commercial, non-profit, employer/union.
c. Public Employees Insurance Agency.
d. Workers' Compensation, other federal government, other WV government, other states government.

The hospitalization charges for a primary diagnosis of asthma were approximately equally billed between Medicaid, Medicare, and non-government payers. Other payer categories had relatively smaller contributions.

Figure 33
Mean Charge per Discharge for Hospitalizations with a Primary Diagnosis of Asthma[a]
West Virginia Residents, 1995-2001



a. Excludes newborns, defined as patients admitted to the hospital by birth.

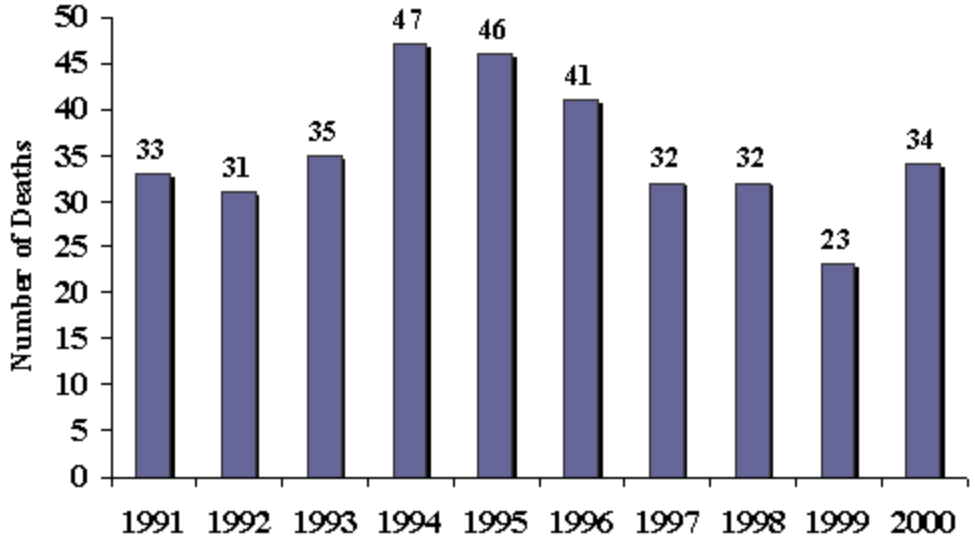
The mean charge per discharge for hospitalizations related to a primary diagnosis of asthma has increased in the two most recent years, 2000 and 2001. During 1995-2001, the mean charge per discharge has averaged about $4,517 per year.

The mean charge was higher for females in West Virginia as compared with males throughout the 1995-2001 period. For example, in the year 2001, it was $5,679 for females and $4,735 in males.

Asthma Mortality Data
West Virginia Vital Statistics

West Virginia's vital statistics database contains mortality records both for events that occur within the state and those that occur among residents. Most of the publications produced by this office pertain to residential data with the following being no exception. Causes of death from 1991 through 1998 were coded using the 9th revision of the International Classification of Disease (known as ICD-9). Beginning in 1999, there was a 10th revision. The ICD-9 code for asthma is 493, while the ICD-10 code is J45. Data are presented only for the primary cause of death from 1991 through 2000.

Figure 34
Asthma Mortality by Year
West Virginia Residents, 1991-2000



Although the graph indicates that asthma mortality has fluctuated over the 10-year span in West Virginia, it has averaged around 35 deaths per year comparable to the first and last years.

The tables that follow show the asthma mortality rates by race and age. Mortality rates are presented per 100,000 population.[11]

[11] Population figures are computed from the average difference between the 1990 and 2000 Censuses (known as interpolation) for each age group and race. For example, if the population in 1990 of a particular age group was 11,000 and in 2000 it was 10,500, the 500 decrease averages to 50 per year. Thus, the population would be 10,950 in 1991, 10,900 in 1992, etc. This provided the mid-point population (1995 and 1996 combined average) to calculate the average asthma mortality crude rates from 1991-2000.

Table 1

Asthma Deaths by Race
West Virginia and United States, 1991-2000

Race							
West Virginia (1991-2000)				United States (1991-1998)			
	Deaths	Rate*			Deaths	Rate*	
		Crude	Adj.†			Crude	Adj.†
All	354	2.0	1.8	All	42,900	2.0	2.2
White	338	2.0	1.8	White	32,015	1.8	1.8
Black	15	2.6	2.7	Black	9,439	3.6	4.5
Other	1	0.4	0.5	Other	1,446	1.6	2.6

* Mortality rate per 100,000 population.
† Age-adjusted to the 2000 U.S. Standard Million.

The table indicates that African-Americans die more often from asthma than any other race. Although the actual number of deaths among blacks was lower compared with whites, the mortality rate was higher.

Table 2

West Virginia Asthma Death Rates by Age
1991-1995, 1996-2000, and 1991-2000

Age Group	1991-1995	1996-2000	1991-2000
<1	0.0	2.0	1.1
1-4	0.0	0.2	0.1
5-14	0.1	0.2	0.1
15-24	0.4	0.2	0.3
25-34	0.2	0.6	0.4
35-44	1.0	0.7	0.8
45-54	1.5	1.3	1.4
55-64	3.1	2.2	2.6
65-74	7.3	4.9	6.1
75-84	9.1	8.6	8.9
85+	21.2	15.7	18.3
Total	2.1	1.8	2.0

The table indicates a higher rate of West Virginians dying from asthma in the first five years (1991-1995) than in the last five years (1996-2000). The relatively low number of deaths each year from asthma makes rates for each individual year unstable.

Asthma and the Uninsured/Impoverished

Nationally, approximately 41.2 million people had no health insurance in 2001. Of these, 234,000 were in West Virginia (14). The *West Virginia County Health Profiles* (15) documented that, in 1997, the percentage of West Virginians without any health insurance, ages 18-64, was 21.5%. This is an increase over 1993 (20.8%) and is 27.2% higher than the United States average. People who are uninsured, underinsured, or impoverished are less likely to go to a doctor to be diagnosed and seek treatment, and are generally less healthy than their insured peers.

People in the lower socioeconomic stratum also have a higher prevalence of tobacco use, which in turn can lead to more frequent asthma exacerbations in this population due to exposure to secondhand smoke. In the year 2001, West Virginia ranked 4th in the nation in cigarette smoking with a rate of 28.2% (7). Smoking rates were higher among uninsured persons (45.4%) and among persons with an annual income of less than $15,000 (35.4%). Therefore, the medically underserved population needs to be considered in the overall picture of asthma prevalence in West Virginia.

Figure 9 shows a wide disparity in the estimated prevalence of asthma among the Medicaid population (31.7%) and people with other known insurance coverage (10.6%) for the year 2000. The high prevalence of asthma in the Medicaid population reflects what was discussed above – that is, persons of lower socioeconomic strata have a higher asthma prevalence. On the contrary, the uninsured population, also belonging to a lower socioeconomic group, has a deceptively low rate of asthma (12.4%). As discussed before, this is possibly because uninsured people are often unable to go to a doctor to be diagnosed and to receive medical care. This group needs to be actively identified for preventive measures related to smoking, and also for treatment of any undiagnosed asthma.

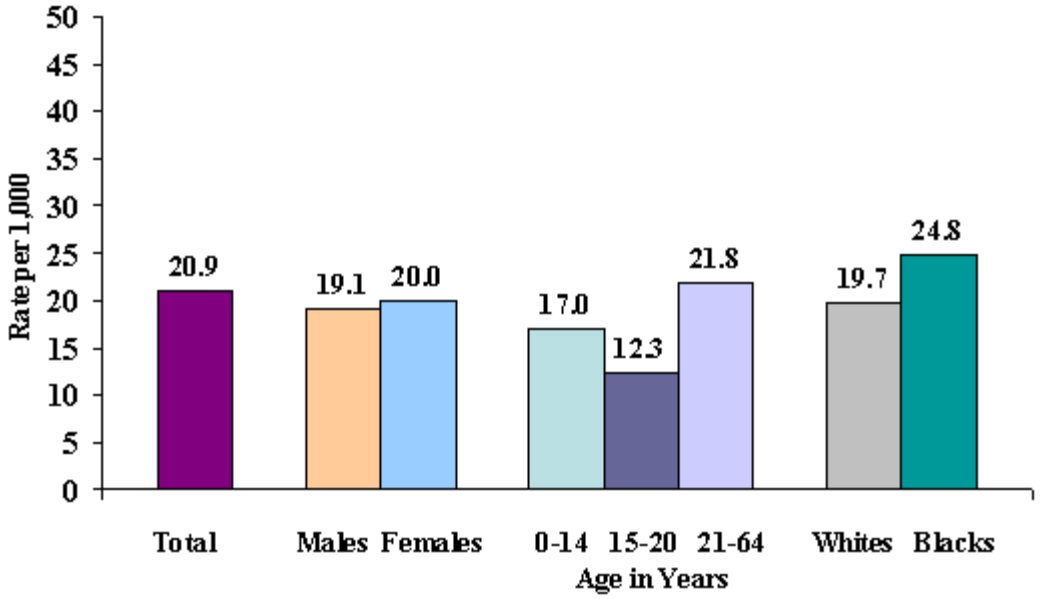
Asthma among Recipients of West Virginia Medicaid (1999)

Presented in this section are the results of a descriptive analysis of West Virginia Medicaid claims data for calendar year 1999 as obtained from the West Virginia University, School of Pharmacy research team headed by Dr. Michael Smith. The original data set was provided by Affiliated Computer Services, Incorporated, with approval from the West Virginia Department of Health and Human Resources, Bureau for Medical Services.

Cases of asthma were identified from the inpatient and outpatient Medicaid claims files using only claims with a primary ICD-9-CM code for asthma (493.00 to 493.99). Recipients of West Virginia Medicaid who were less than 65 years of age and who were continuously enrolled in that year were selected for analysis. Rates of asthma-related events were calculated based on the recipient Medicaid population in the state of West Virginia for the fiscal year 1998 (9/98-8/99).

Asthma-related events and costs incurred by recipients of West Virginia Medicaid for calendar year 1999 are shown on the pages that follow. Additional details regarding proportions of recipients and costs are presented in Appendix E.

Figure 35
Rates of Recipients of West Virginia Medicaid with at Least One Medical Claim with a Primary Diagnosis of Asthma by Gender, Age, and Race[a,b]
Medicaid Claims Data, 1999



a. Rates based on the number of recipients of West Virginia Medicaid under 65 years old during fiscal year 1998 in each demographic category (Total N = 289,760).

b. The total rate exceeds the rate reported for both males and females due to missing gender data for approximately 12% of the recipients.

About 20.9 per 1,000 recipients of West Virginia Medicaid had at least one medical claim (whether for inpatient, outpatient, or emergency room treatment) with a primary diagnosis of asthma during calendar year 1999. This equaled a total of 6,051 Medicaid recipients with at least one such medical claim.

The rate was higher among female recipients, among adults aged 21-64 years, and among blacks compared with other groups within each respective demographic category. In fact, the rate among blacks was 25% higher than that among whites.[12] Rates of recipients identified with asthma by different demographic categories are shown in Appendix E, Table E-1.

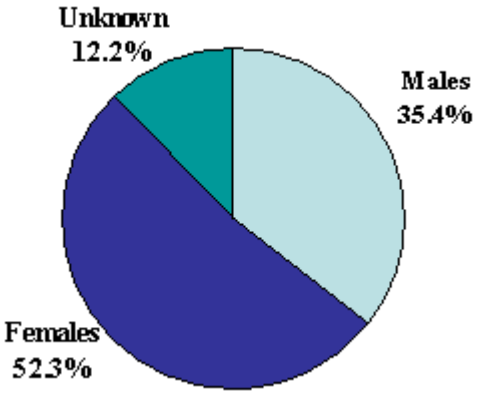
The above rates widely differ from the prevalences estimated by BRFSS in the Medicaid population, viz., 31.7% lifetime asthma prevalence and 25.9% current asthma prevalence (Figure 9). Prevalence rates estimated from the BRFSS reflect respondents who report that they still have asthma, but may not have had an attack in the past year or may not have received medical care for the same. In contrast, the rates shown above from the Medicaid claims data set reflect recipients who actually sought medical treatment for asthma in 1999.

Figure 35 above represents rates of recipients of West Virginia Medicaid who had at least one medical claim with a primary diagnosis of asthma. The proportions of the total 6,051 recipients identified with asthma by different demographic categories are shown in Figure 36 and in Appendix E, Table E-2.

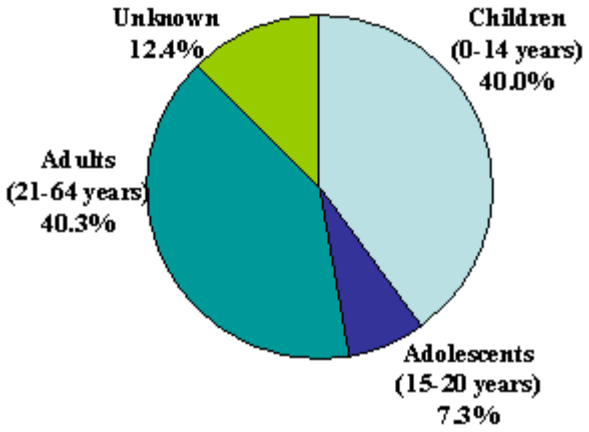
[12] Independent efforts by the West Virginia University, Office of Health Services Research (OHSR) directed by Cecil Pollard yielded closely similar results of asthma rates to those presented in Figure 35 above for combined West Virginia Medicaid claims data for 1999-2001.

Figure 36
Proportions of Recipients of West Virginia Medicaid with at Least One Medical Claim with a Primary Diagnosis of Asthma by Gender, Age, and Race
Medicaid Claims Data, 1999

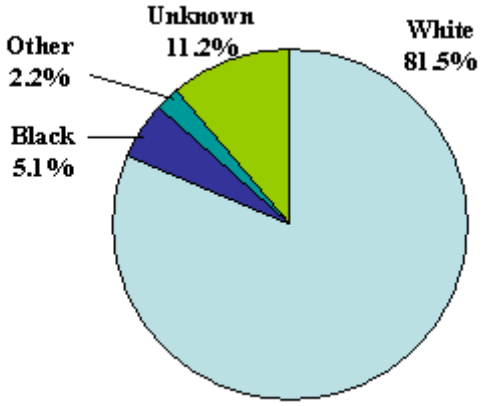
BY GENDER



BY AGE GROUP

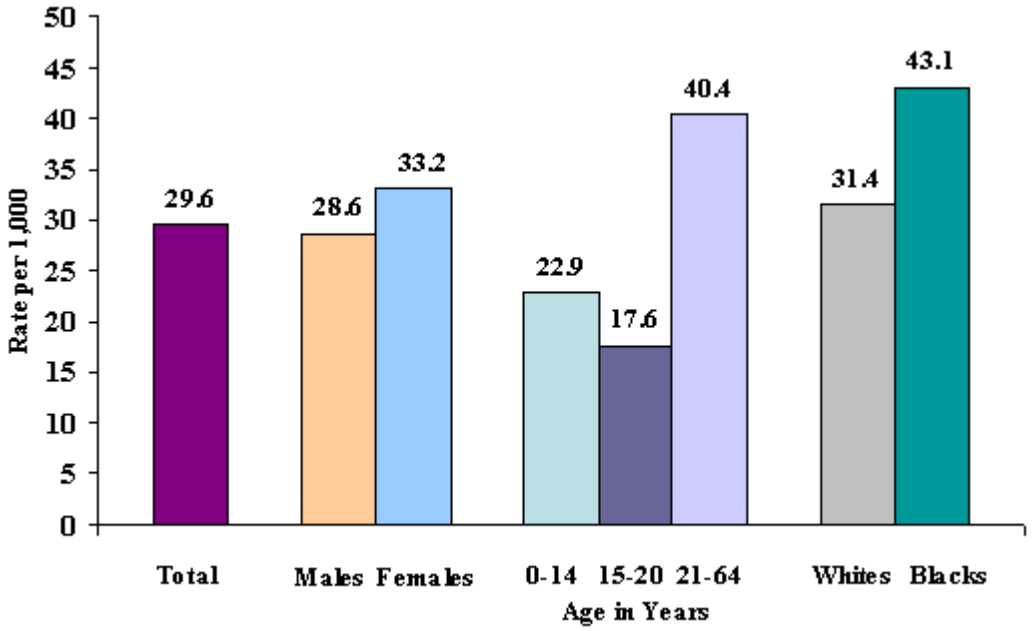


BY RACE



Of the total 6,051 recipients of West Virginia Medicaid who had at least one medical claim with a primary diagnosis of asthma, females and whites comprised the majority compared with males and other ethnic groups. Children aged 0-14 years and adults aged 21-64 years comprised approximately an equal number of recipients.

Figure 37
Rates of Outpatient Visits with a Primary Diagnosis of Asthma among Recipients of West Virginia Medicaid by Gender, Age, and Race[a,b]
Medicaid Claims Data, 1999[c]



a. Rates based on number of visits divided by the number of recipients of West Virginia Medicaid under 65 years old during fiscal year 1998 in each demographic category (Total N = 289,760).

b. The total rate is lower than the rate reported for both whites and blacks because rates for ethnic groups classified as "other" were not able to be calculated.

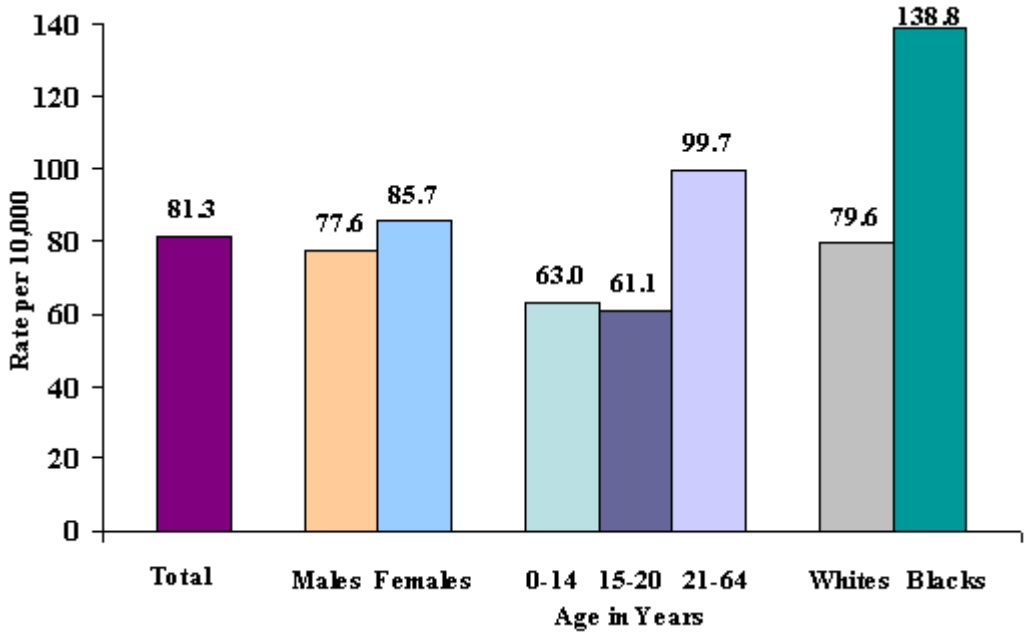
c. Excludes outpatient claims related to independent laboratory services, DOH screening, and transportation.

The rate of outpatient visits with a primary diagnosis of asthma was 29.6 per 1,000 recipients of West Virginia Medicaid during calendar year 1999. There were a total of 8,585 outpatient visits identified. There were 3,180 Medicaid recipients with at least one outpatient visit (thus, some recipients had more than one outpatient visit for asthma in that year).

Females had a slightly higher rate of outpatient visits with a primary diagnosis of asthma than males. The rate among the 21-64 year age group was the highest of all age groups. The rate was higher in blacks compared with whites.

The proportions of the total 3,180 recipients with at least one outpatient visit with a primary diagnosis of asthma by gender, age, and race are shown in Appendix E, Table E-2.

Figure 38
Rates of Emergency Department (ED) Visits with a Primary Diagnosis of Asthma among Recipients of West Virginia Medicaid by Gender, Age, and Race[a]
Medicaid Claims Data, 1999



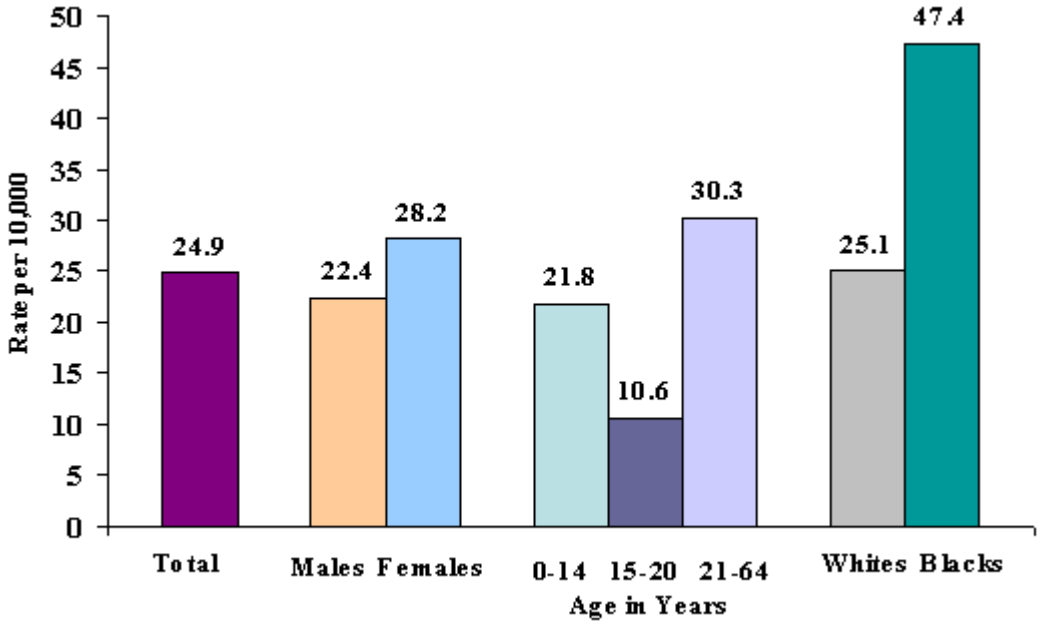
a. Rates based on number of visits divided by the number of recipients of West Virginia Medicaid under 65 years old during fiscal year 1998 in each demographic category (Total N = 289,760).

The rate of ED visits with a primary diagnosis of asthma was 81.3 per 10,000 recipients of West Virginia Medicaid during calendar year 1999. A total of 2,356 ED visits were identified. There were 1,881 Medicaid recipients with at least one ED visit (thus, some recipients had more than one ED visit for asthma in that year).

Higher rates were seen in females, in the 21-64 year age group, and in blacks compared with other groups within each respective demographic category. This was similar to the patterns observed for outpatient visits. The rate of ED visits among blacks was in fact 74% higher than that among whites.

The proportions of the total 1,881 Medicaid recipients with at least one ED visit by gender, age, and race are shown in Appendix E, Table E-2.

Figure 39
Rates of Hospitalizations with a Primary Diagnosis of Asthma among Recipients of West Virginia Medicaid by Gender, Age, and Race[a,b]
Medicaid Claims Data, 1999



a. Rates based on number of visits divided by the number of recipients of West Virginia Medicaid under 65 years old during fiscal year 1998 in each demographic category (Total N = 289,760).

b. The total rate is lower than the rate reported for both whites and blacks because rates for ethnic groups classified as "other" were not able to be calculated.

The rate of hospitalizations with a primary diagnosis of asthma was 24.9 per 10,000 recipients of West Virginia Medicaid during calendar year 1999. There were a total of 721 hospital admissions identified. There were 620 recipients with at least one hospitalization (thus, some recipients had more than one hospital admission for asthma in that year).

Higher rates were seen in females, in the 21-64 year age group, and in blacks compared with other groups within each respective demographic category. This was similar to the patterns observed for outpatient and ED visits.

The proportions of the total 620 Medicaid recipients with at least one hospital admission with a primary diagnosis of asthma by gender, age, and race are shown in Appendix E, Table E-2.

Medicaid-Incurred Costs for Medical Services with a Primary Diagnosis of Asthma

The total costs incurred by Medicaid in calendar year 1999 for medical services with a primary diagnosis of asthma are shown in Table 3.

Table 3
West Virginia Medicaid-Incurred Costs for Medical Services with a Primary Diagnosis of Asthma
Medicaid Claims Data, 1999

Category	Total Costs[a] ($)	Mean Costs Per Event ($)
Outpatient visits	589,878[b]	53.60
Emergency department (ED) visits	236,857	100.50
Hospitalizations	2,690,777	3,737.20

a. Cost estimates for outpatient and ED visits based on actual amounts paid by Medicaid. Hospitalization costs were estimated using national average DRG reimbursements from the HCFA files for the year 1999.

b. Outpatient costs include claims for transportation, DOH screening, and laboratory services, although these types of claims were excluded earlier for the calculation of the numbers of outpatient visits.

The majority of the costs was related to medical-care resources use among females (about 60% of the costs) as compared with males (37% of the costs). Among different age groups, costs as a percent of the whole were approximately similar among children aged 0-14 years and adults aged 21-64 years, with a very small proportion constituted by adolescents and young adults aged 15-20 years. Approximately 90% of the costs were attributable to medical-care resources use among whites (see Table E-3 in Appendix E).

Work-Related Asthma Data
West Virginia Workers' Compensation Claims Data

According to the Occupational Safety and Health Administration (OSHA), an estimated 11 million workers in a wide range of industries and occupations are potentially exposed to at least one of the numerous agents known to be associated with the development of occupational asthma. Occupational factors have been associated with up to 15% of the disabling asthma cases in the United States, including 558,000 workers exposed to grain dust and 1.4 million heath care workers potentially exposed to latex products (16).

There are many agents in the workplace that can cause occupational asthma. Most commonly, these include protein molecules (wood dusts, grain dusts, animal dander, fungal substances, latex) or other chemicals (especially di-isocyanates). Workers at an especially increased risk include plastic workers, metal workers, bakers, millers, farmers, grain elevator workers, laboratory and health care workers, wood-workers, drug manufacturers, and detergent manufacturers. With occupational asthma, symptoms of asthma may develop for the first time in a previously healthy worker, or pre-existing asthma may be aggravated by exposures within the workplace.

Presented in the following section are data on work-related asthma in West Virginia from the Workers' Compensation claims database as provided by the Institute of Occupational and Environmental Health (IOEH) at West Virginia University.

West Virginia has a state-mandated Workers' Compensation insurance system. Most employers are regular subscribers to the West Virginia Workers' Compensation Fund (17). Work-related injury and illness claims from these employers are evaluated and compensated by the Workers' Compensation Division. A small percentage (<15%) of employers are self-insured, but submit all work-related claims to the Workers' Compensation Division (medical claims may not be submitted by self-insured employers). Thus, the Workers' Compensation claims database has information about claims of most work-related injuries and illnesses in the state.[13]

[13] Some exceptions include: federal employees, railroad workers (covered under Federal Employers' Liability Act or FELA), workers involved in interstate commerce on navigable waterways (covered under the Longshoremen's and Harbor Workers' Compensation Act), and workers in voluntary philanthropic organizations and grant-funded organizations.

Table 4
Number of Compensated Claims of Work-Related Asthma[a]
West Virginia Workers' Compensation Claims Data
1997-2001

	1997	1998	1999	2000	2001	Total
All Claims[b]	***54***	***58***	***48***	***40***	***45***	***245***
Temporary Total Disability (TTD) Claims[c]	30	33	25	24	18	***130***
Permanent Partial Disability (PPD) Claims[c]	27	20	16	7	13	***83***
Medical Only Claims	18	18	18	7	23	***84***

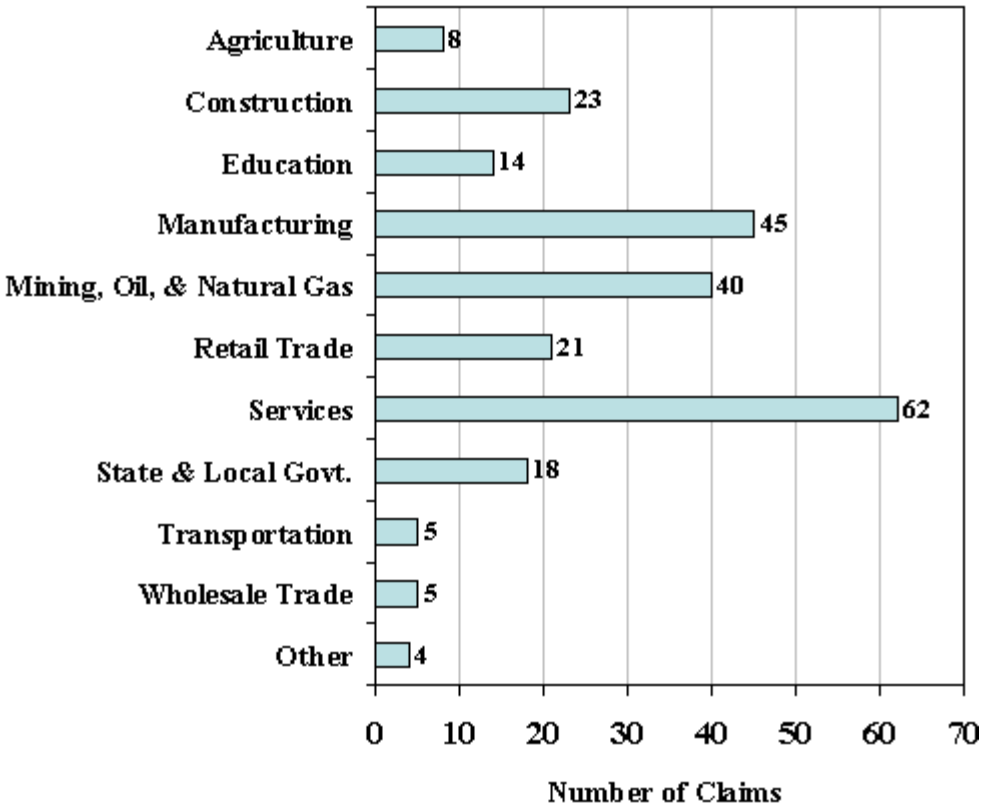
a. ICD-9-CM codes for work-related asthma: 491.20, 491.21, 493.0, 493.1, 493.9, 495.8, 506.4, 506.9, 507.8. Data updated as of July 2003.

b. Includes claims that have received either indemnity or medical compensation. Indemnity compensation includes salary replacement for lost wages, and compensation for permanent partial, temporary total, permanent total, and temporary partial disability (PPD, TTD, PTD, and TPD, respectively). Most indemnity claims are either TTD or PPD; therefore, PTD and TPD claims are not shown in the table.

c. TTD and PPD claims are not mutually exclusive.

As seen in Table 4 above, it appears that compensated claims for work-related asthma are on the decrease. The number of claims decreased from 54 in 1997 to 45 in 2001. Future data will reveal if this is a continuing downward trend. The decreasing trend could be due to improved ventilation in high-risk work areas that have contributed to asthma in the past, such as the mining industry. In fact, the number of claims in the mining industry decreased from 12 in 1997 to 2 in 2001. However, the decrease seen may not be real because of the time lag associated with the acceptance of claims and delayed filing of claims related to an earlier exposure.

Figure 40
Compensated Occupational Asthma Claims by Industry Group
West Virginia Workers' Compensation Claims Data
1997-2001

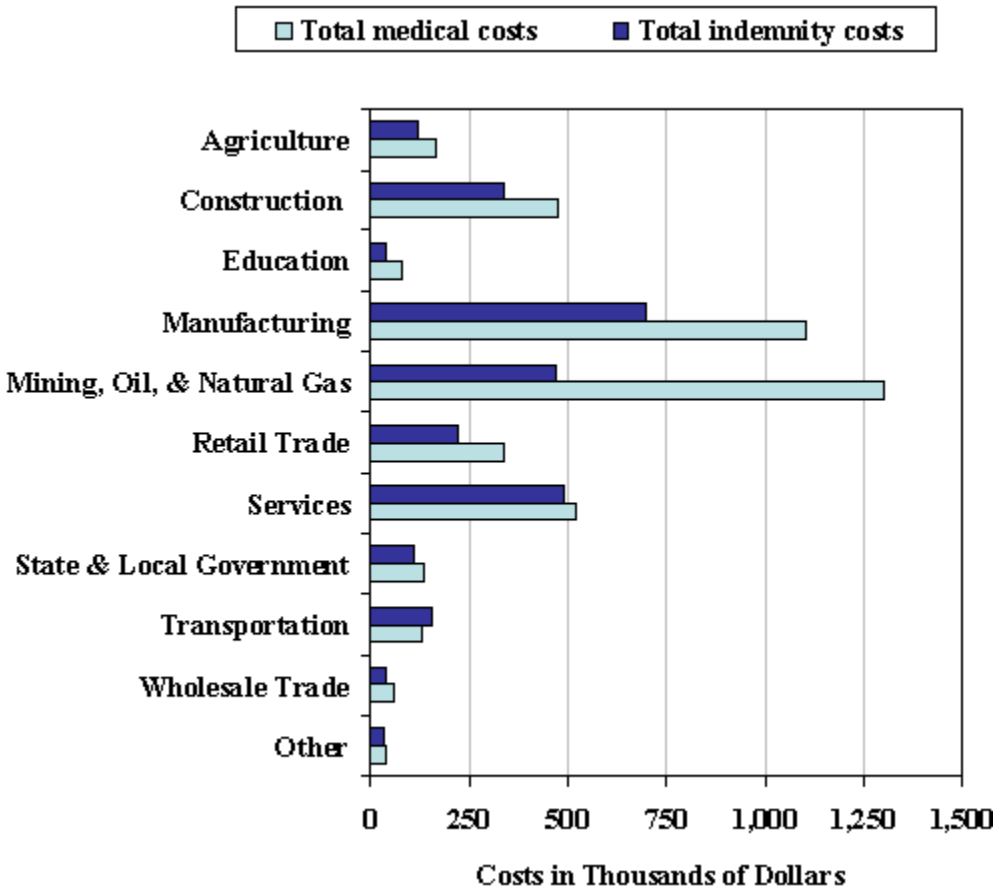


The greatest number of claims in the five-year period were in the services industry (62 claims out of 245, or 25%), followed by the manufacturing industry (45 claims, 18%), and the mining, oil, and natural gas industry (40 claims, 16%). The services industry includes several industries such as business services, health services, legal services, social services, hotel industry, auto repair, etc. Often, the sheer size of the services industry results in a large number of occupational claims. For example, in the year 2001, the services industry had an employment of 190,185 while the agriculture industry had only 4,292 (18). This could explain the low number of cases in the agriculture industry where grain dusts and animal dander are known to be important factors in causing occupational asthma.[14]

From the above data, it appears that West Virginia workers in the manufacturing industry and the mining, oil, and natural gas industry are at an increased risk of developing occupational asthma.

[14] Further studies are needed to examine industry-specific rates of work-related asthma.

Figure 41
Total Compensation Costs[a] for Work-Related Asthma by Industry Group
West Virginia Workers' Compensation Claims Data
1997-2001



a. Costs incurred as of June 20, 2003. Indemnity costs include salary replacement for lost wages and compensation for permanent partial, temporary total, permanent total, and temporary partial disability (PPD, TTD, PTD, and TPD, respectively).

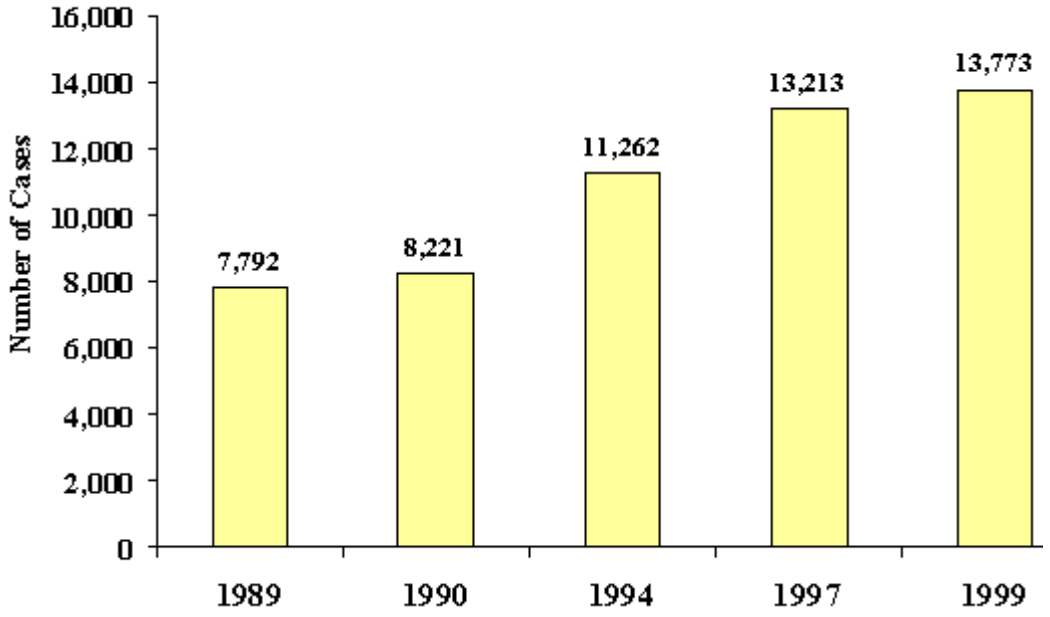
For the period 1997-2001, the greatest compensation costs occurred in the mining and manufacturing industries, as shown in the above figure. The services industry had fewer costs although it had the highest number of compensated claims (62) in the five-year period.

The total medical compensation costs for the five-year period were $4,338,379. The total indemnity compensation costs for the five-year period were $2,712,562. The above costs, however, are an underestimate of the true costs, because several claims were still medically active at the time the above data were obtained; further, indemnity (lost wages and disability) costs are slow to develop.

School-Based Data
West Virginia School Nurse Needs Assessment

West Virginia Code §18-5-22 requires the employment of school nurses and the formation of a Council of School Nurses. Each county school nurse is required to perform a needs assessment, and these data are collected periodically, compiled at the county level, collected by the Council of School Nurses, and sent to the West Virginia Department of Education for analysis and compilation into a report. The Council of School Nurses reviews the data for accuracy and trends. The data reflect the health status of West Virginia students and are used to determine which essential services are being provided to students. The information is used by program planners and policymakers at both the state and local levels. Data in this report are reflective of responses from 53 of the 55 local schools districts.

Figure 42
Cases of Asthma among Students in West Virginia
Council of School Nurses Data, 1989-1997



In the past decade, cases of asthma in schools have ranged from 7,792 in 1989 to 13,773 in 1999, and are thus on the increase.

Table 5
Cases of Asthma among West Virginia Students by Grade
Council of School Nurses Data, 1999

School	Grade	Number of Asthma Cases
Elementary (Grades PreK-4)	PreK	221
	K	922
	1st	1,052
	2nd	988
	3rd	1,130
	4th	1,133
Middle (Grades 5-8)	5th	1,122
	6th	1,157
	7th	1,151
	8th	1,109
Secondary (Grades 9-12)	9th	1,089
	10th	969
	11th	831
	12th	899
	TOTAL	**13,773**

In the year 1999, as seen in the table above, there were more cases among middle school students (grades 5-8) compared with students in most other grades. These numbers are considerably lower than the estimates obtained from the West Virginia Youth Tobacco Survey (14,099 students with asthma attacks in grades 6-12). This does not necessarily mean, however, that the WVYTS has overestimated prevalences. The WVYTS does not specifically ask for attacks of asthma that occurred only at school; instead it asks about attacks in the past one year. Therefore, in the WVYTS, students might report any attacks they had in the past one year even if they were at home or during holidays, in contrast to the Council of School Nurses data. Further, not all students may report an attack to a school nurse.

Discussion

Asthma increasingly is a public health issue in the United States. This report summarizes data in asthma prevalence, morbidity, and mortality in West Virginia from data sources such as BRFSS, YTS, and others. The information contained in this report represents the most comprehensive look at asthma in West Virginia. This data will be used to guide the development of our state's strategic plan to address asthma, and will also serve as a source of baseline data to be used for tracking trends in asthma and for evaluating the effectiveness of interventions to reduce the burden of asthma in West Virginia.

The image that has come into focus shows that West Virginia is particularly hard-hit by asthma. Data from 2001 BRFSS indicates that West Virginia ranked 5th nationally for "current" asthma and 6th nationally for "lifetime" asthma. Lifetime asthma was greatest among those aged 18-24 (18.5%), those who did not graduate from high school (15.7%), and those with an annual income of less than $15,000 (17.9%). Data from WVYTS shows that 23.2% of West Virginia middle school students and 21.1% of high school students (an estimated 32,757 total) indicated that they have at some point been diagnosed with asthma by a doctor. Over 20% of those students who indicated that they had an attack in the past year (14,099) reported that they missed 11 or more days in the past year due to their asthma. Lifetime asthma prevalence and asthma attack prevalence were both significantly higher among current smokers in middle schools compared with nonsmokers. Other data gleaned from this report include: In recent years, hospitalization rates in West Virginia for asthma have been lower than the U.S. average, but the average length of stay (ALOS) for asthma-related discharges was higher than the U.S. average; West Virginia Worker's Compensation claims for work-related asthma were greatest in the services, manufacturing, mining, oil, and natural gas industries (1997-2001); in 1999 the number of West Virginia Medicaid recipients with one or more claims for asthma was 25% higher among blacks than whites, and was higher in males versus females.

Further analyses may help to explain some of the findings in this report. For example, work should be done to discover the reason for and meaning of the aforementioned discrepancy between hospitalization rates versus ALOS in West Virginia compared to U.S. averages. In addition, it will be important to expand surveillance activities to track asthma management, environmental factors on asthma, and access to care.

The West Virginia Asthma Education and Prevention Program (WV-AEPP) is pleased to be able to provide this report on the status of asthma in West Virginia. It is the hope of WV-AEPP that this document will be used to assist with the development of a broad public health approach to addressing asthma.

References

1. American Lung Association. *Trends in Asthma Morbidity and Mortality.* March 2003. Available online at http://www.lungusa.org/data/asthma/asthma1.pdf

2. Centers for Disease Control and Prevention. Surveillance for Asthma – United States, 1980-1999. *MMWR* 51 (SS01); 1-13. March 29, 2002.

3. United States Environmental Protection Agency (EPA). *Respiratory Health Effects of Passive Smoking: Lung Cancer and Other Disorders.* EPA Pub. No. EPA/600/6-90/006F. Washington, DC: EPA, 1992.

4. California Environmental Protection Agency. *Health Effects of Exposure to Environmental Tobacco Smoke. Final Report.* Sacramento, CA: California Environmental Protection Agency, Office of Environmental Health Hazard Assessment; September 1997. Available online at http://www.oehha.org/air/environmental_tobacco/finalets.html

5. DiFranza JR, Lew RA. Morbidity and Mortality in Children Associated with the Use of Tobacco Products by Other People. *Pediatrics*. 1996; 97:560-568.

6. Centers for Disease Control and Prevention. Behavioral Risk Factor Surveillance System. Data available at http://www.cdc.gov/brfss/

7. West Virginia Department of Health and Human Resources. Bureau for Public Health. Office of Epidemiology and Health Promotion. Health Statistics Center. West Virginia Behavioral Risk Factor Surveillance System. 2000-2001.

8. Self-Reported Asthma Prevalence among Adults – United States, 2000. *MMWR* 50 (32); 682-6. August 17, 2001.

9. Self-Reported Asthma Prevalence and Control among Adults – United States, 2001. *MMWR* 52 (17); 381-384. May 2, 2003.

10. West Virginia Department of Education. West Virginia Department of Health and Human Resources, Bureau for Public Health, Office of Epidemiology and Health Promotion, Division of Tobacco Prevention and Health Statistics Center. 2002 West Virginia Youth Tobacco Survey. Published 2003.

11. Blackwell DL, Tonthat L. *Summary Health Statistics for U.S. Children: National Health Interview Survey, 1998*. National Center for Health Statistics. Vital Health Stat 10 (208). 2002.

12. Centers for Disease Control and Prevention. National Center for Health Statistics. Vital and Health Statistics. National Hospital Discharge Survey. 1995-2001. Data summaries available online at http://www.cdc.gov/nchs/about/major/hdasd/listpubs.htm

13. National Asthma Education and Prevention Program. Expert Panel Report: Guidelines for the Diagnosis and Management of Asthma. Update on Selected Topics – 2002. *J Allergy Clin Immunol* 110(5 Suppl): S147-160. Nov 2002.

14. Morgan K. and Morgan S. (Eds.). *Health Care State Rankings 2003. Health Care in the 50 United States.* Lawrence, KS: Morgan Quitno Press.

15. West Virginia Department of Health and Human Resources, Bureau for Public Health, Office of Epidemiology and Health Promotion, Health Statistics Center. *West Virginia County Health Profiles*. 1997 and 2000.

16. United States Department of Labor. Occupational Safety and Health Administration. Detailed information available online at http://www.osha-slc.gov/SLTC/occupationalasthma/

17. Islam SS, Doyle EJ, Velilla A, Martin CJ, Ducatman AM. Epidemiology of compensable work-related ocular injuries and illnesses: incidence and risk factors. *J Occup Environ Med* 42 (6):575-81. Jun 2000.

18. West Virginia Bureau of Employment Programs. Research, Information and Analysis. West Virginia Employment and Wages – 2001. Available at http://www.state.wv.us/bep/LMI/ew2001/default.HTM

Appendix A
West Virginia Healthy People 2010 Objectives for Respiratory Diseases Including Asthma (Revised)

OBJECTIVE 24.1. Maintain the asthma death rate at no more than 0.6 per 100,000 population 0-64 years of age. (Baseline: 1.0 per 100,000 in 1998. Subsequent years: 0.9 per 100,000 in 2001).

Baseline and Target:

Objective	Age Group	Rate per 100,000	
		1998 Baseline	2010 Target
24-1a.	0-14 years	0.3	0.2
24-1b.	15-34 years	0.4	0.3
24-1c.	35-64 years	1.7	1.5
24-1d.	65 years and older	6.2	5.6

Data Source: *West Virginia Bureau for Public Health (WVBPH), Office of Epidemiology and Health Promotion (OEHP), Health Statistics Center (HSC).*

OBJECTIVE 24.2. Reduce overall asthma morbidity as measured by a reduction in asthma hospitalization rate (primary or secondary diagnosis) to no more than 10.1 per 10,000 (excluding newborns). (Baseline: 11.2 per 10,000 in 1998. Subsequent years: 12.9 per 10,000 in 1999, 12.9 per 10,000 in 2000, 13.1 in 2001).

Baseline and Target:

Objective	Age Group	Rate per 10,000	
		1998 Baseline	2010 Target
24.2a.	<15 years	16.9	15.2
24.2b.	15-44 years	7.8	7.0
24.2c.	45-64 years	11.0	9.9
24.2d.	65 years and older	13.8	12.4

Data Source: *West Virginia Health Care Authority, Uniform Billing (UB-92) data.*

OBJECTIVE 24.3. (Developmental) Reduce asthma morbidity as measured by a reduction in the annual rate of emergency department (ED) visits by 10%. (Statewide baseline data may become available in 2005-2007).

Data Source: *West Virginia does not currently collect ED data. Should collection begin it would be undertaken by the West Virginia Health Care Authority.*

FLAGSHIP OBJECTIVE

OBJECTIVE 24.4. Reduce the chronic lower respiratory disease (CLRD) death rate to no more than 67 per 100,000 population. (**Baseline:** Crude rate of 74.8 in 2000. Subsequent years: 71.6 in 2001).

Data Source: *WVBPH, OEHP, HSC.*

OBJECTIVE 24.5. Reduce the prevalence of current asthma among adults aged 18 years and older to 7.7% or lower. (**Baseline:** 8.5% in 2000. Subsequent years: 9.3% in 2001).

Data Source: *WVBPH, OEHP, HSC – Behavioral Risk Factor Surveillance System (BRFSS).*

OBJECTIVE 24.6. Reduce the prevalence of current asthma among adults with an annual income of less than $15,000 to 12% or lower. (**Baseline:** 13.3% in 2000. Subsequent years: 14.2% in 2001).

Data Source: *WVBPH, OEHP, HSC – BRFSS.*

OBJECTIVE 24.7. (Developmental) Reduce by 10% the prevalence of lifetime asthma among African-American adults. (**Baseline:** 18.2% in 2000. Subsequent years: 10.6% in 2001. Stable baseline to be determined by combining five or more years of data in future for obtaining adequate sample size).

Data Source: *WVBPH, OEHP, HSC – BRFSS.*

OBJECTIVE 24.8a. Reduce the proportion of youth in grades 6-8 who report asthma attacks in the past year to 9.3% or lower. (**Baseline:** 10.3% in 2002)

Data Source: *WV Department of Education and WVBPH, OEHP – Youth Tobacco Survey (YTS).*

OBJECTIVE 24.8b. Reduce the proportion of youth in grades 9-12 who report asthma attacks in the past year to 7.9% or lower. (**Baseline:** 8.8% in 2002)

Data Source: *WV Dept. of Education and WVBPH, OEHP – YTS.*

OBJECTIVE 24.9. Reduce the proportion of African-American youth in grades 6-8 who report asthma attacks in the past year to 12.4% or lower. (**Baseline:** 13.8% in 2002)

Data Source: *WV Dept. of Education and WVBPH, OEHP – YTS*.

OBJECTIVE 24.10a. Reduce the proportion of youth in grades 6-8 with previous-year asthma attacks who report one or more school days missed due to asthma in the past year to 51% or lower. (**Baseline:** 57% in 2002).

Data Source: *WV Dept. of Education and WVBPH, OEHP – YTS.*

OBJECTIVE 24.10b. Reduce the proportion of youth in grades 9-12 with previous-year asthma attacks who report one or more school days missed due to asthma in the past year to 51% or lower. (**Baseline:** 57% in 2002).

Data Source: *WV Dept. of Education and WVBPH, OEHP – YTS*.

Appendix B
Behavioral Risk Factor Surveillance System (BRFSS)

Table B-1

Prevalence of Lifetime and Current Asthma among Adults: Total and by Gender
West Virginia and United States BRFSS, 2001

	Lifetime Asthma % [95% CI[a]]		Current Asthma % [95% CI]	
	WV	**US**	**WV**	**US**
WV Rank	#6	–	#5	–
TOTAL	**12.5** **[11.1-13.8]**	**11.2** **(median)**	**9.3** **[8.2-10.4]**	**7.2** **[7.0-7.4]**
GENDER				
Males	10.8 [8.8-12.7]	9.5 (median)	7.4 [5.7-9.0]	5.4 [5.1-5.6]
Females	13.9 [12.1-15.6]	12.7 (median)	11.0 [9.4-12.6]	8.9 [8.7-9.2]

a. CI = Confidence Interval.

Table B-2

Prevalence of Lifetime and Current Asthma among Adults by Selected Demographic Characteristics
West Virginia BRFSS, 2000-2001[a]

	Lifetime Asthma %	Current Asthma %
Total	**12.1**	**8.9**
AGE		
18-24 years	18.5	11.7
25-34 years	13.4	9.1
35-44 years	10.5	7.4
45-54 years	12.1	9.5
55-64 years	9.9	8.5
65 years and older	10.3	8.2
EDUCATION		
Less than H.S.	15.7	12.4
H.S. or G.E.D.	10.9	8.1
Some Post-H.S.	11.9	8.6
College Graduate	11.5	7.3
INCOME		
<$15,000	17.9	13.7
$15,000-$24,999	12.6	9.5
$25,000-$34,999	9.7	7.0
$35,000-$49,999	9.8	6.8
$50,000+	9.3	6.4

a. In order to obtain adequate sample sizes for age-specific, education-specific, and income-specific prevalences, West Virginia data were combined for the years 2000 and 2001.0

Appendix C
West Virginia Youth Tobacco Survey (WVYTS)

Table C-1

Definitions of Asthma-Related Prevalences
WVYTS, 2002

Prevalence	Question(s) or Criteria used for Defining	Comments
Lifetime Asthma	"Have you ever been told by a doctor that you have asthma?"	1) This rate was available for both middle school and high school students. 2) An additional question "Have you ever been told by any health care professional that you have asthma?" was asked to high school students only. This question was ignored while determining the prevalence of lifetime asthma in order to have consistent definitions for middle and high school students.[15]
Current Asthma	"Have you ever been told by a doctor that you have asthma?" AND "Do you still have asthma?"	1) Expressed as a percent of all students. 2) This rate was available for high school students only.
Asthma Attack	"Have you ever been told by a doctor that you have asthma?" AND "Have you had an asthma attack or episode of asthma in the past 12 months?"	1) This was expressed as a percent of all students. 2) This rate was available for both middle school and high school students.
Current Use of Prescription Medicines for Asthma	"Have you ever been told by a doctor that you have asthma?" AND "Are you currently taking prescription medicine for asthma?"	1) This was expressed as a percent of all students. 2) This rate was available for both middle school and high school students.
Cigarette Smoking	Smoked on one or more days in the past 30 days	These data were available for both middle and high school students.
Secondhand Smoke Exposure	Students who were in the same room or same car with someone who was smoking cigarettes on at least one occasion in the past one week.	These data were available for both middle and high school students.

[15] Considering both questions for high school students, viz., "Have you ever been told by a doctor that you have asthma" OR "Have you ever been told by any health care professional that you have asthma" the prevalence of lifetime asthma among high school students was slightly higher – 23.8% (95% CI: 20.2-27.4).

Table C-2

Asthma-Related Prevalences among Students by School and Gender WVYTS, 2002[a]

	Middle Schools % [95% CI[b]]	High Schools % [95% CI]
Lifetime Asthma Prevalence		
Total	23.2 [22.0-24.4]	21.1 [18.1-24.1]
Males	24.2 [22.5-25.8]	21.4 [17.8-25.0]
Females	22.0 [20.5-23.5]	21.0 [17.5-24.5]
Current Asthma Prevalence		
Total	--	12.4 [9.5-15.3]
Males	--	11.7 [8.4-15.0]
Females	--	13.2 [10.0-16.4]
Asthma Attack Prevalence		
Total	10.3 [9.7-10.9]	8.8 [6.9-10.7]
Males	10.6 [9.7-11.4]	7.8 [5.4-10.3]
Females	10.0 [9.0-11.0]	9.8 [7.9-11.8]
Currently Taking Prescription Medicine for Asthma		
Total	10.5 [9.8-11.2]	7.3 [5.1-9.5]
Males	10.5 [9.5-11.5]	8.2 [5.4-10.9]
Females	10.3 [9.1-11.6]	6.5 [4.4-8.6]

a. See Table C-1 in Appendix C for definitions of prevalences.
b. CI = Confidence Interval.

Table C-3

Asthma-Related Prevalences among Middle School Students by Geographic Region WVYTS, 2002

Region	Lifetime Asthma % [95% CI[a]]	Asthma Attack % [95% CI]
Southern Coalfield	25.4 [20.7-30.2]	11.4 [9.7-13.1]
Western	27.8 [25.3-30.2]	12.3 [10.6-14.0]
Kanawha Valley	23.8 [21.0-26.6]	10.0 [8.5-11.4]
Greenbrier Valley	25.7 [20.4-30.9]	11.3 [8.5-14.1]
Mid-Ohio Valley	19.5 [18.2-20.9]	9.2 [7.5-10.8]
Northern Panhandle	19.0 [16.7-21.3]	8.3 [6.9-9.7]
North Central	24.3 [20.8-27.7]	10.9 [8.9-12.8]
Eastern Panhandle	18.6 [16.1-21.0]	8.5 [7.1-9.8]
Overall West Virginia Middle Schools	***23.2 [22.0-24.4]***	***10.3 [9.7-10.9]***

a. CI = Confidence Interval.

Appendix D
West Virginia Hospital Discharge Data

Number and Rates of Hospital Discharges and Average Length of Stay per Discharge Related to a Primary Diagnosis of Asthma by Selected Demographic Characteristics West Virginia Residents and United States, 2001[a, b, c]

	Number and Rate of Discharges				Average Length of Stay (ALOS)	
	WV		US		WV	US
	Number	Rate per 10,000	Number	Rate per 10,000	Number of days	Number of days
TOTAL	2,356	13.1	454,000	16.0	3.6	3.2
GENDER						
Males	832	9.5	186,000	13.4	3.1	2.7
Females	1,524	16.5	268,000	18.5	3.9	3.6
AGE						
<15 years	711	21.7	182,000	30.1	--[d]	2.3
15-44 years	603	8.1	104,000	8.4	3.3	3.0
45-64 years	556	12.3	92,000	14.3	4.1	3.7
65 years and above	486	17.6	76,000	21.4	5.3	5.2

a. Source of West Virginia Data: West Virginia Health Care Authority (WVHCA).
b. Source of United States Data: Centers for Disease Control and Prevention. National Center for Health Statistics. Vital and Health Statistics. 2001 National Hospital Discharge Survey. Advance Data. No. 332. April 9, 2003.
c. Excludes newborns, defined as patients admitted to the hospital by birth.
d. ALOS for age group <1 year (excluding newborns) = 2.9 days, ALOS for age group 1-14 years = 2.1 days.

Appendix E
West Virginia Medicaid Claims Data

Table E-1

Rates of Medical Services Utilization with a Primary Diagnosis of Asthma among Recipients of West Virginia Medicaid Medicaid Claims Data, 1999

	RATES			
	Medical Claims	**Outpatient Visits**	**ED Visits[a]**	**Hospitalizations**
	Recipients with at least one asthma-related medical claim per 1,000 Medicaid recipients	Outpatient visits for asthma per 1,000 Medicaid recipients	ED visits for asthma per 10,000 Medicaid recipients	Hospitalizations for asthma per 10,000 Medicaid recipients
TOTAL	**20.9[b]** **(6,051 total recipients with at least one medical claim)**	**29.6[c]** **(8,585 total outpatient visits)**	**81.3[c]** **(2,356 total ED visits)**	**24.9[c]** **(721 total hospitalizations)**
GENDER				
Males	19.1	28.6	77.6	22.4
Females	20.0	33.2	85.7	28.2
AGE				
Children (0-14 years)	17.0	22.9	63.0	21.8
Adolescents (15-20 years)	12.3	17.6	61.1	10.6
Adults (21-64 years)	21.8	40.4	99.7	30.3
RACE				
White	19.7	31.4	79.6	25.1
Black	24.8	43.1	138.8	47.4

a. ED = Emergency Department.
b. Rates based on the number of recipients of West Virginia Medicaid under 65 years old during fiscal year 1998 in each demographic category (Total N = 289,760).
c. Rates based on number of visits divided by the number of recipients of West Virginia Medicaid under 65 years old during fiscal year 1998 in each demographic category (Total N = 289,760).

Table E-2

Proportions of Recipients of West Virginia Medicaid with at Least One Medical Claim with a Primary Diagnosis of Asthma Based on Type of Medical Service Utilization and Demographic Variables
Medicaid Claims Data, 1999

	Medical Claims	Outpatient Visits	ED Visits[a]	Hospitalizations
TOTAL	**6,051 total recipients with at least one asthma-related medical claim**	**3,180 total recipients with at least one asthma-related outpatient visit**	**1,881 total recipients with at least one asthma-related ED visit**	**620 total recipients with at least one asthma-related hospital admission**
PROPORTIONS OF TOTAL RECIPIENTS BY DEMOGRAPHIC CHARACTERISTICS				
GENDER (%)				
Males	35.4	39.2	37.3	34.7
Females	52.3	59.7	56.6	61.9
Unknown	12.2	1.1	6.1	3.4
Total	*100.0*	*100.0*	*100.0*	*100.0*
AGE (%)				
Children (0-14 years)	40.0	44.4	40.8	42.6
Adolescents (15-20 years)	7.3	8.0	8.8	5.8
Adults (21-64 years)	40.3	45.3	44.0	46.6
Unknown	12.4	2.3	6.4	5.0
Total	*100.0*	*100.0*	*100.0*	*100.0*
RACE (%)				
White	81.5	90.8	84.1	87.4
Black	5.1	6.6	7.3	7.9
Other	2.2	2.6	3.6	2.6
Unknown	11.2	0.0	5.1	2.1
Total	*100.0*	*100.0*	*100.0*	*100.0*

a. ED = Emergency Department.

Table E-3

West Virginia Medicaid-Incurred Costs for Medical Services with a Primary Diagnosis of Asthma
Medicaid Claims Data, 1999

	Outpatient Visit Costs[b]	ED Visit Costs[c]	Hospitalization Costs
TOTAL COSTS[a]	**$ 589,878**	**$236,857**	**$2,690,777**
Mean cost per visit or per hospitalization	$53.60	$100.50	$3,737.20
PROPORTIONS OF TOTAL COSTS BY DEMOGRAPHIC CHARACTERISTICS			
GENDER (%)			
Males	38.3	34.3	39.3
Females	60.8	59.6	57.8
Unknown	0.9	6.1	2.9
Total	*100.0*	*100.0*	*100.0*
AGE (%)			
Children (0-14 years)	43.6	32.0	53.3
Adolescents (15-20 years)	8.3	7.8	5.3
Adults (21-64 years)	45.8	53.8	37.3
Unknown	2.3	6.4	4.0
Total	*100.0*	*100.0*	*100.0*
RACE (%)			
White	90.9	82.7	87.8
Black	6.3	7.3	8.5
Other	2.8	5.2	2.1
Unknown	0.0	4.8	1.6
Total	*100.0*	*100.0*	*100.0*

a. Cost estimates for outpatient and ED visits based on actual amounts paid by Medicaid. Hospitalization costs were estimated using national average DRG reimbursements from the HCFA files for the year 1999.

b. Outpatient costs include claims for transportation, DOH screening, and laboratory services, although these types of claims were excluded earlier for the calculation of the numbers of outpatient visits.

c. ED = Emergency Department.

For additional information, contact the
West Virginia Asthma Education and Prevention Program
(304) 558-0644

West Virginia
Asthma
Education and Prevention Program
West Virginia Department of Health and Human Resources