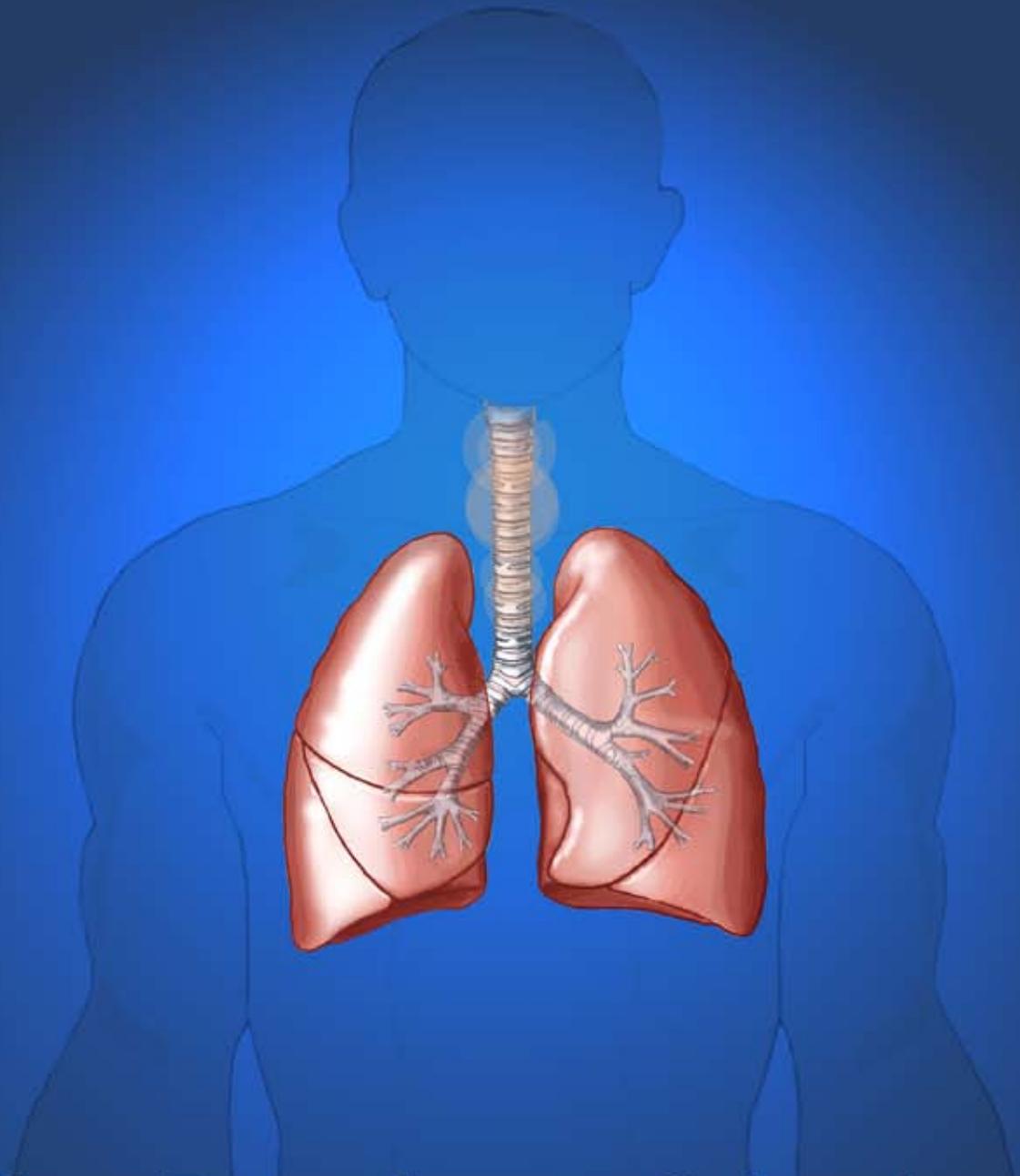


MISSISSIPPI STATE DEPARTMENT OF HEALTH



# The Burden of Asthma in Mississippi:

*Asthma Surveillance Summary Report  
2009*

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April 2009

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## **Executive Summary**

Asthma is a chronic lung disease characterized by recurrent and intermittent episodes or attacks in which the linings of the airways swell, mucus blocks the airways and the muscles around the airways tighten. During an episode, people with asthma may experience signs and symptoms such as chest tightness, difficulty breathing, wheezing, and coughing. Asthma symptoms may occur when an individual with asthma is exposed to certain triggers, such as pet dander, mold, dust mites, tobacco smoke, or wood smoke. Asthma symptoms can be controlled through appropriate use of medications and avoidance of identified triggers. However, poor management of the disease can lead to complications that result in poor health, hospitalization, and even death.

The overall goals of the Mississippi State Department of Health's Asthma Program are to:

1) reduce the burden of asthma among Mississippians; 2) reduce asthma hospitalization and emergency room visit rates among children and adults; 3) decrease asthma disparities in all Public Health Districts; 4) increase provider and patient education related to asthma; 5) encourage healthcare providers to use standard patient-specific Asthma Action Plans; and 6) enhance community health education. This report summarizes data from the Mississippi State Department of Health's Asthma Surveillance System. It is the most comprehensive source of information about asthma in this state. The data presented in this report indicate that there are five populations in Mississippi with a high burden of asthma: 1) children; 2) blacks; 3) adult women; and 4) Mississippians of low socioeconomic status. Listed below are some of the key observations of this report.

### **Asthma Mortality**

- Between 2000 and 2007, the asthma mortality rate declined in Mississippi.
- The age-adjusted mortality rate is higher for blacks compared to whites in Mississippi.
- The age-adjusted asthma mortality rate is higher for females compared to males in Mississippi.

### **Asthma Prevalence**

- Approximately 76,710 (10.4%) Mississippi children ages 0-17 years and 144,009 (6.6%) Mississippi adults ages 18 and above currently have asthma.
- The prevalence of asthma is significantly higher among adult females than adult males.
- The prevalence of asthma is significantly higher among male children than female children.
- The prevalence of asthma is significantly higher among black children compared to white children.
- Adults without a high school diploma and with an annual income less than \$25,000 have a higher prevalence rate of current asthma than those with higher levels of education and income.

## **Asthma Symptoms and Disease Management**

- Approximately 57% of adults with asthma had an attack in the past 12 months.
- Approximately 19% of adults with asthma experienced asthma symptoms every day in the past 30 days.
- Nearly one-fifth (18.3%) of adults with asthma reported difficulty sleeping because of asthma on 5 or more days in the past 30 days.

## **Asthma Comorbidities**

- Asthma prevalence is higher among adults who are overweight or obese.
- Asthma prevalence is higher among adults who are current smokers.

## **Health Care Access and Utilization**

### **Hospital Discharges with Asthma as the First Listed Diagnosis**

- Asthma hospital discharge rates are higher among black Mississippians than among white Mississippians.
- Male children have a higher asthma hospital discharge rate than female children.
- Adult females have a higher asthma hospital discharge rate than adult males.
- Children 0-4 years have the highest asthma hospital discharge rates.
- Hospital discharges with asthma as the first listed diagnosis peak in the winter months of November, December and January.
- At-risk based asthma hospital discharge rates do not significantly differ among demographic groups, indicating that differences in population-based rates may be driven by differences in disease prevalence.

### **Emergency Department Discharges with Asthma as the First Listed Diagnosis**

- Asthma emergency department discharge rates increased by 23% from 2003 to 2007.
- Asthma emergency department discharge rates are more than four times higher among black Mississippians compared to white Mississippians.
- Male children have a higher asthma emergency department discharge rate than female children.
- Adult females have a higher asthma emergency department discharge rate than adult males.
- Children ages 0-4 years have the highest asthma emergency department discharge rate of any age group.
- Asthma emergency department discharges peak in the late autumn and early winter months of October, and December.
- At-risk based asthma emergency department discharge rates do not significantly differ among demographic groups, indicating that differences in population-based rates may be driven by differences in disease prevalence.

# Introduction

## Mississippi Demographics

Mississippi (MS) is a predominately rural state with an estimated 2,906,119 residents, over half of whom live in rural areas. The estimated 2007 median household income in MS was \$35,632, compared to \$50,007 nationwide. The racial composition of the MS population is approximately 60.1% white and 37.1% black. The remaining 2.8% percent of the population are categorized as American Indian or Alaska Natives (0.4%); Asian (0.8%); Native Hawaiian and Other Pacific Islander (<0.1%); Other Race (0.7%) or Two or More Races (0.9%). An estimated 1.8% of the MS population is of Hispanic/Latino ethnicity. Although the Mississippi Asthma Surveillance System (MASS) captures data on all race and ethnicity categories listed above, the number of persons of races other than white and black captured by the MASS are too small to provide reliable estimates for measures of asthma burden among these groups. Data disaggregated by race within this report will therefore include only two racial categories: (1) white and (2) black.

## Asthma Defined

Asthma is a chronic respiratory disorder that involves reversible airflow obstruction, bronchial hyperresponsiveness and inflammation. The interaction of these features of asthma determines the clinical manifestations, severity of asthma and response to treatment<sup>1</sup>.

## Asthma Surveillance in Mississippi

The first step in addressing asthma as a public health problem is to establish a surveillance system. Public health surveillance is the “ongoing, systematic collection, analysis, interpretation, and dissemination of health data essential to the planning, implementation, and evaluation of public health practice, closely integrated with the timely dissemination of these data to those who need to know”<sup>2</sup>. The Mississippi State Department of Health (MSDH) Asthma Program has four main goals related to asthma surveillance in Mississippi:

- Annually collect data on asthma prevalence, symptoms, disease management, health care access and utilization, and mortality.
- Analyze and interpret asthma surveillance data in ways that will identify priority populations, direct program activities, and evaluate program effectiveness.
- Disseminate results to key targeted groups in a timely manner in newsletters, fact sheets, statistical briefs, and surveillance reports.
- Identify gaps in the asthma surveillance system and obtain or develop new data sources to fill these gaps.

Surveillance is important because knowledge of the epidemiologic aspects of asthma (e.g. geographic distribution, identification of groups with higher prevalence and mortality) is crucial to planning, implementation, and evaluation of programs to address the burden of asthma in the state. The Mississippi asthma surveillance system includes data from multiple sources, including

the Behavioral Risk Factor Surveillance System (BRFSS), the Youth Risk Behavior Survey (YRBS), the Mississippi Asthma Program's Hospital Discharge Database, and the Mississippi Vital Statistics System (see Appendix A for a description of all asthma data sources). The surveillance system includes data on asthma mortality, prevalence, symptoms, disease management, comorbidities, and healthcare access and utilization. In addition, the collection of multiple years of data has enabled the Mississippi State Department of Health to analyze asthma trends and calculate regional asthma prevalence estimates.

### **Purpose of this Report**

The purpose of this report is to:

- Describe the types of data that comprise the Mississippi asthma surveillance system.
- Present results that identify high burden asthma populations to be targeted for health promotion program intervention.
- Identify areas in which additional data are needed to better understand the burden of asthma in Mississippi.

The main body of this report contains figures that present rates calculated from multiple data sources. Refer to the Appendices of this report for detailed tables of the data presented in the figures, additional information about the data sources, and a discussion of the methodologies used during analysis and interpretation. All stated comparisons (e.g. higher, lower, increased, and decreased) indicate that a non-directional, 2-tailed z-test was significant at the  $p < 0.05$  level.

This report will be used by the MSDH, the Asthma Coalition of Mississippi, and key partners to guide asthma-related activities in the future years. Ultimately, it is our hope that this report will increase awareness of the health and economic burdens of asthma in Mississippi. Citizens of Mississippi, health professionals, and political leaders should know that asthma is a manageable disease and that much of the asthma mortality and morbidity described in this report are preventable and can be reduced through appropriate management practices.

## Section 1: Asthma Mortality

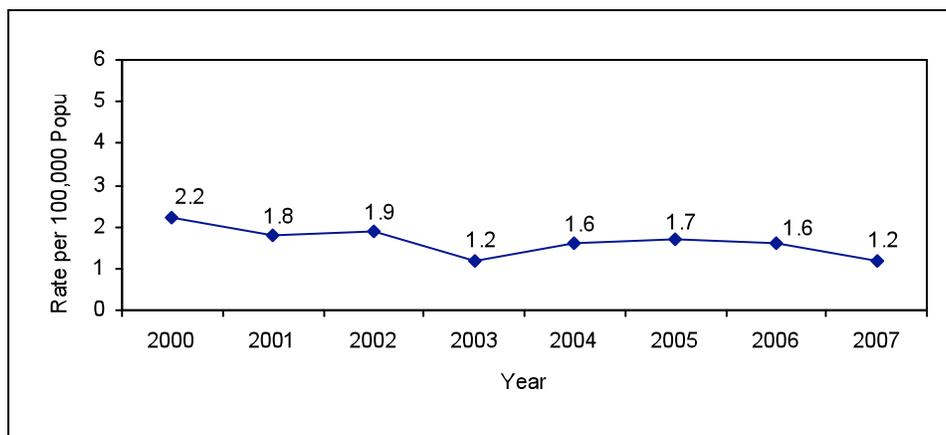
Asthma-related deaths represent the most extreme result of asthma and are usually related to improper control and treatment of the disease. This section describes mortality data of Mississippi residents who died of asthma from 2000 to 2007. An asthma-related death is defined as a death with asthma listed as the primary cause. The information on death was obtained from official records submitted to the MSDH as required by statute and regulation. Responsibility for the preparation of death certificates was shared by hospitals, nursing homes and other institutions which provide care or custody, such as funeral homes, physicians, medical examiners, and medical examiner investigators.

Asthma mortality data can answer three important surveillance questions:

- How many people die from asthma?
- How has asthma mortality changed over time?
- Does the asthma mortality rate differ by demographic characteristic?

This chapter presents asthma mortality data for Mississippi residents by demographic characteristics known to be associated with asthma deaths (e.g. sex, race and age). The following figures include mortality rates per 100,000 population. All rates are age-adjusted using the United States 2000 Standard Population. Refer to Appendix C for a discussion of the methodologies used during analysis and interpretation.

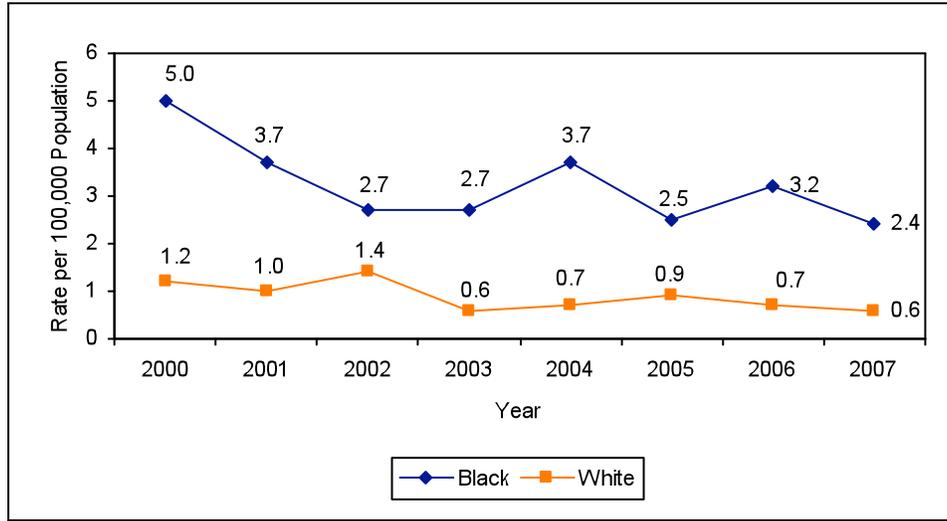
**Figure 1.1. Rate of asthma deaths per 100,000 population by year, Mississippi, 2000-2007**



Source: Mississippi Vital Statistics

Key Observations: Between 2000 and 2007, the overall asthma mortality rate in Mississippi declined.

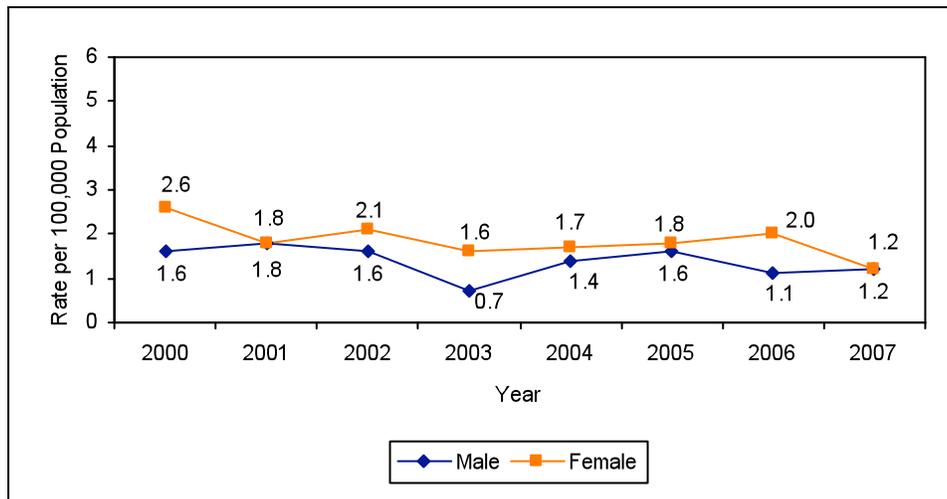
**Figure 1.2. Rate of asthma deaths per 100,000 population by year and race, Mississippi, 2000-2007**



Source: Mississippi Vital Statistics

Key Observations: The age-adjusted asthma mortality rate is higher for blacks compared to whites in Mississippi.

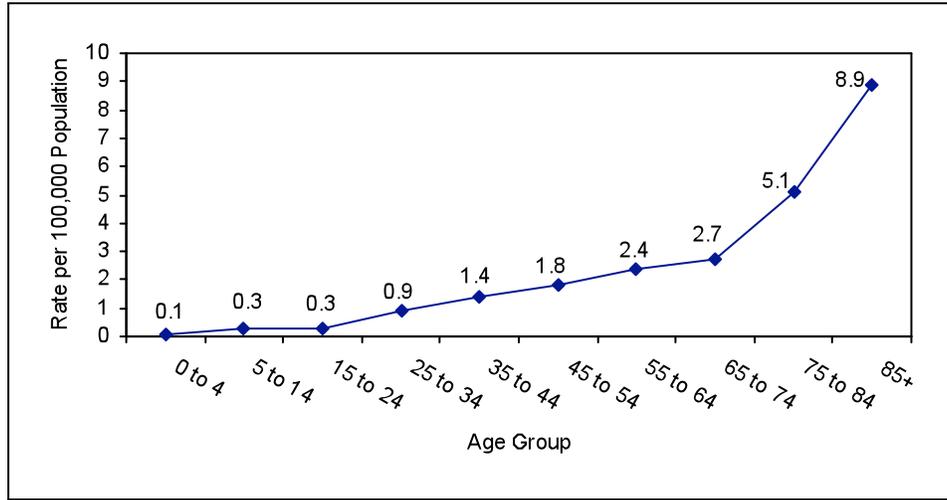
**Figure 1.3. Rate of asthma deaths per 100,000 population by year and sex, Mississippi, 2000-2007**



Source: Mississippi Vital Statistics

Key Observations: The asthma mortality rate is higher for females compared to males in Mississippi, although in 2001 and 2007 the asthma mortality rate was the same for females and males.

**Figure 1.4. Rate of asthma deaths per 100,000 population by age group, Mississippi, 2003-2007\***



\*Aggregate data used to increase reliability of estimates

Source: Mississippi Vital Statistics

Key Observations: The asthma mortality rate in Mississippi increases as age increases. Rates are age-adjusted to the 2000 US Standard Population to account for differences in the age distribution of state populations.

## Section 2: Asthma Prevalence

### Prevalence Defined

Prevalence is the proportion or percentage of a population with a particular characteristic at a specific point in time. The prevalence of a chronic disease, such as asthma, is an indicator of the burden and distribution of the disease. Asthma prevalence indicators can answer three important questions:

- How many people have asthma?
- Who has asthma?
- Does the presence of asthma differ geographically?

### Asthma Prevalence Data

Asthma, like other chronic diseases, must be diagnosed by a health professional. The only way to know the true prevalence of asthma in Mississippi is to clinically examine all residents. This is incredibly expensive and time intensive. Surveys that are designed with scientifically based questions and sampling methodologies enable researchers to reliably estimate the prevalence of virtually any characteristic of a population in a much more efficient manner. In Mississippi, the prevalence of asthma is estimated from telephone surveys of randomly selected Mississippi residents.

Asthma among Mississippi children and adolescents has been measured by the 2007 Mississippi YRBS and the 2007 BRFSS. See Appendix A for a discussion of the methodologies and limitations of these surveys.

In Mississippi, we know more about the prevalence of asthma among adults than children. Adult asthma prevalence data have been collected in a standard format since 2000, enabling us to examine trends in asthma prevalence and produce reliable estimates of the disease. In contrast, childhood asthma prevalence data have been collected intermittently and by multiple surveys, making it difficult to draw conclusions about asthma among Mississippi children.

### Asthma Definitions

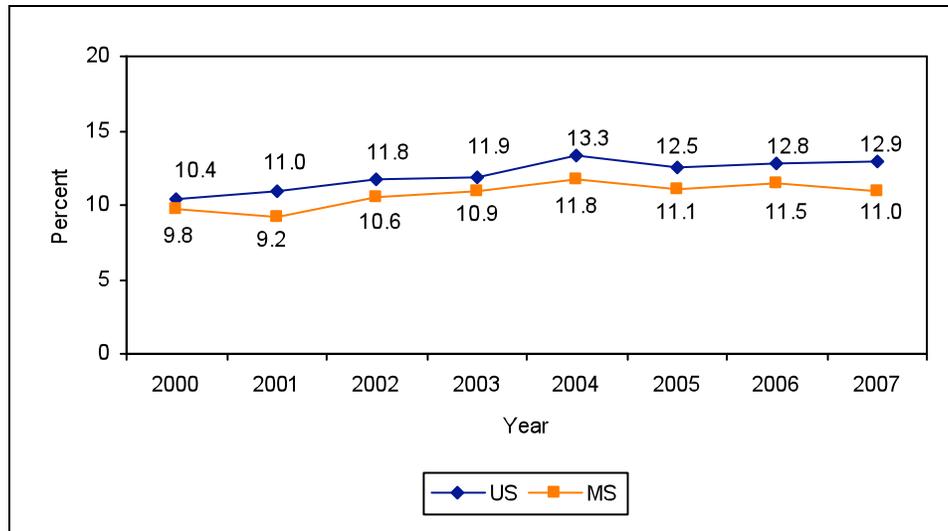
Asthma is a variable disease. Symptoms of the disease differ among individuals, can vary within an individual by time of day and year, and can change throughout the life span. This creates challenges when trying to diagnose and measure asthma. Therefore, two definitions of asthma are used to better understand the scope of the disease:

- Lifetime Asthma: Individuals who have ever been diagnosed with asthma.
- Current Asthma: Individuals who have ever been diagnosed with asthma and currently have asthma.

This chapter presents asthma prevalence data for Mississippi adults and children by demographic characteristics known to be associated with the disease (i.e., sex, age, race, and socioeconomic status). Refer to Appendix B for a discussion of the methodologies used during analysis and interpretation.

## Adult Asthma Prevalence

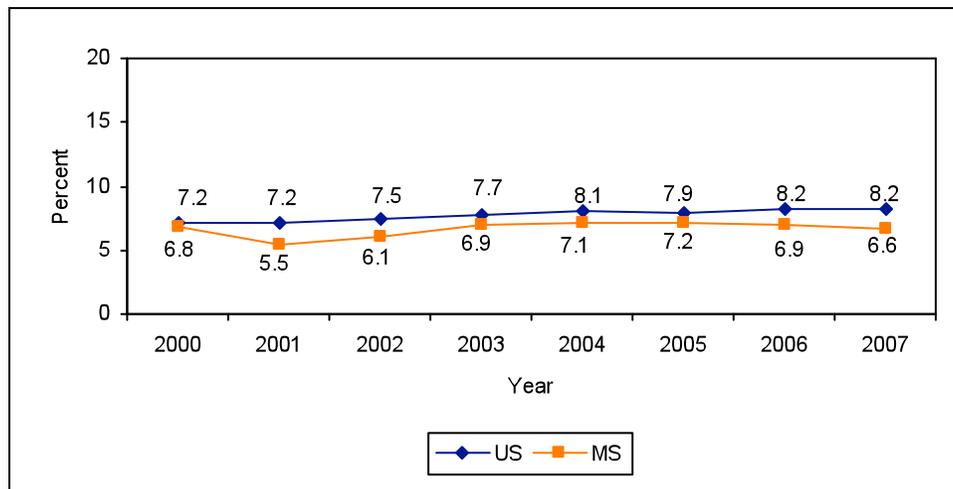
Figure 2.1. Adult lifetime asthma prevalence, Mississippi vs. United States, 2000-2007



Source: Behavioral Risk Factor Surveillance System

Key Observations: The prevalence of adult lifetime asthma in Mississippi was consistently lower than the prevalence of lifetime asthma in the overall United States from 2000 to 2007.

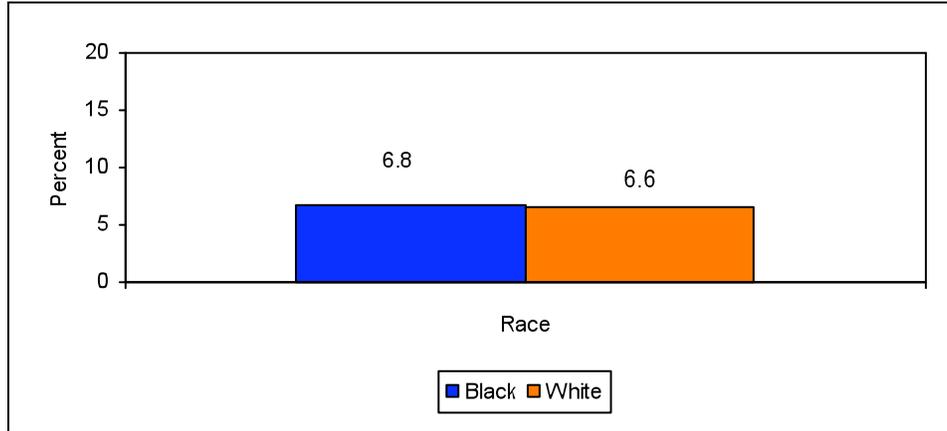
Figure 2.2. Adult current asthma prevalence, Mississippi vs. United States, 2000-2007



Source: Behavioral Risk Factor Surveillance System

Key Observations: The prevalence of adult current asthma in Mississippi was consistently lower than the prevalence of lifetime asthma in the overall United States from 2000-2007.

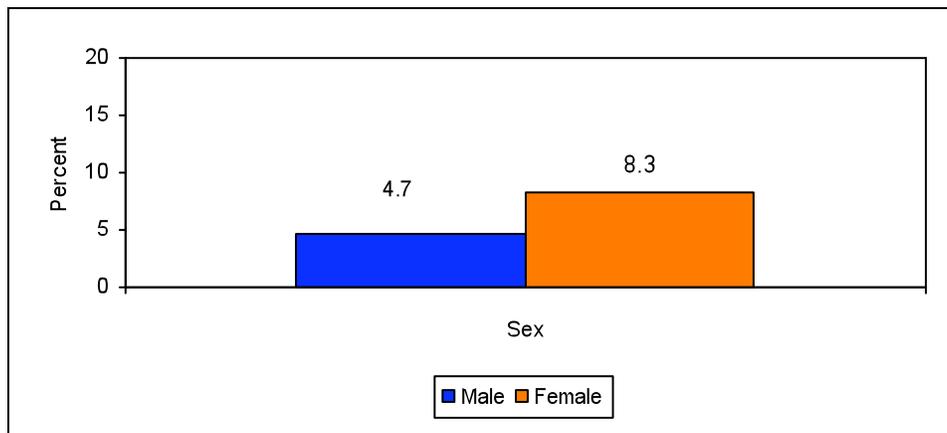
**Figure 2.3. Adult current asthma prevalence by race, Mississippi, 2007**



Source: Behavioral Risk Factor Surveillance System

Key Observations: There is no significant difference in adult current asthma prevalence based on race. This trend has remained stable from 2000-2007 (data not shown).

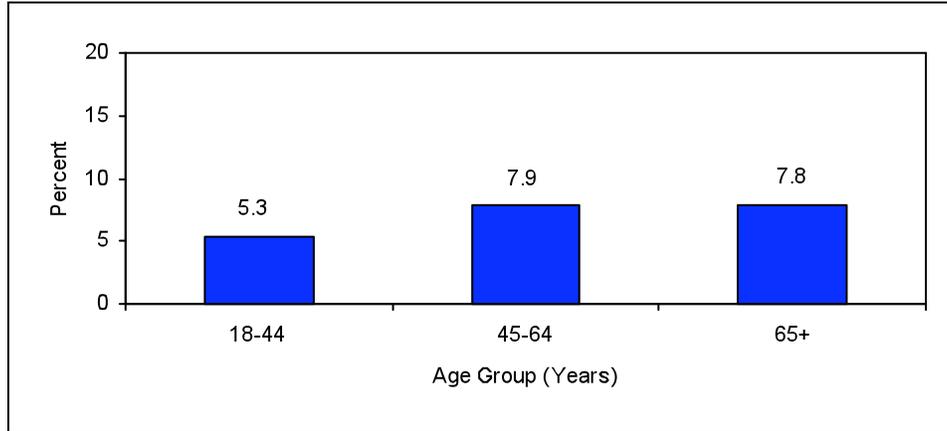
**Figure 2.4. Adult current asthma prevalence by sex, Mississippi, 2007**



Source: Behavioral Risk Factor Surveillance System

Key Observations: Current asthma prevalence is higher among adult females compared to adult males.

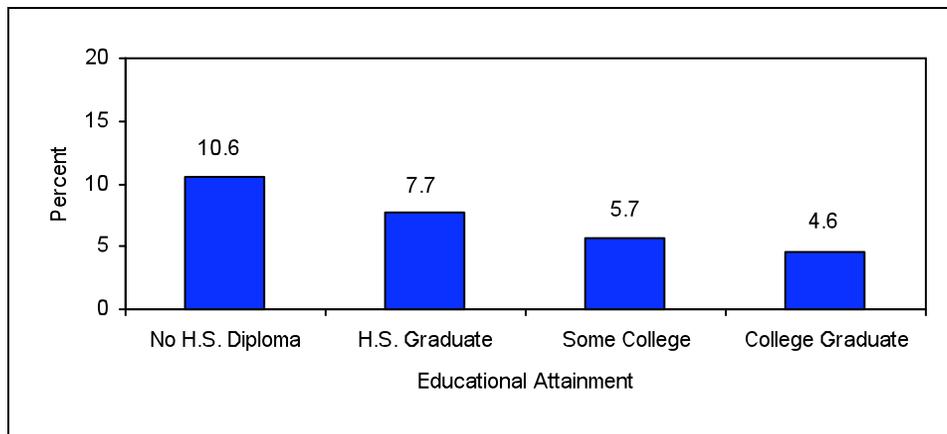
**Figure 2.5. Adult current asthma prevalence by age group, Mississippi, 2007**



Source: Behavioral Risk Factor Surveillance System

Key Observations: Current asthma prevalence is higher among adults ages 45-64 and 65+ compared to adults ages 18-44.

**Figure 2.6. Adult current asthma prevalence by educational level, Mississippi, 2003-2007\***

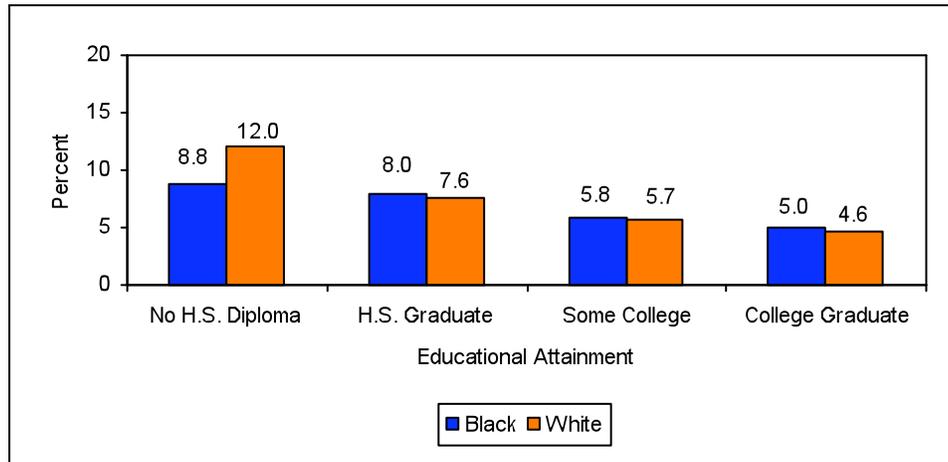


\*Aggregate data used to increase reliability of estimates

Source: Behavioral Risk Factor Surveillance System

Key Observations: Mississippi adults with a high school diploma or less have higher current asthma prevalence than adults with higher levels of education.

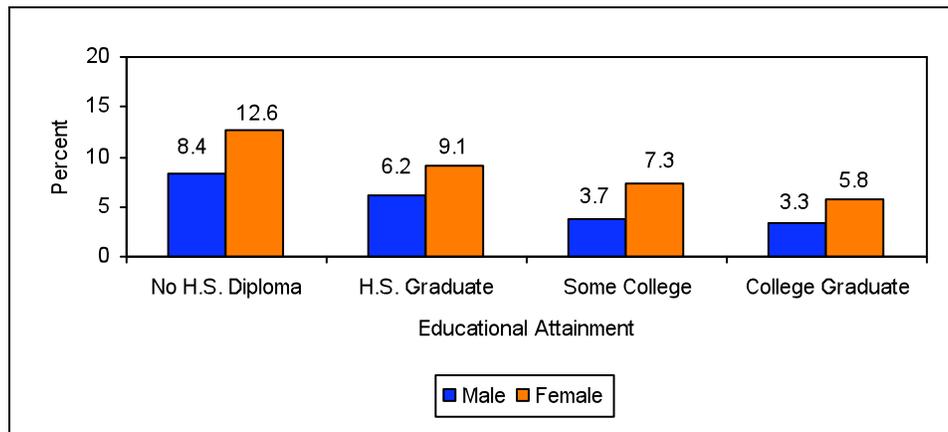
**Figure 2.7. Adult current asthma prevalence by educational level and race, Mississippi, 2003-2007\***



\*Aggregate data used to increase reliability of estimates  
 Data Source: Behavioral Risk Factor Surveillance System

Key Observations: There are no significant differences in adult current asthma prevalence by educational level and race.

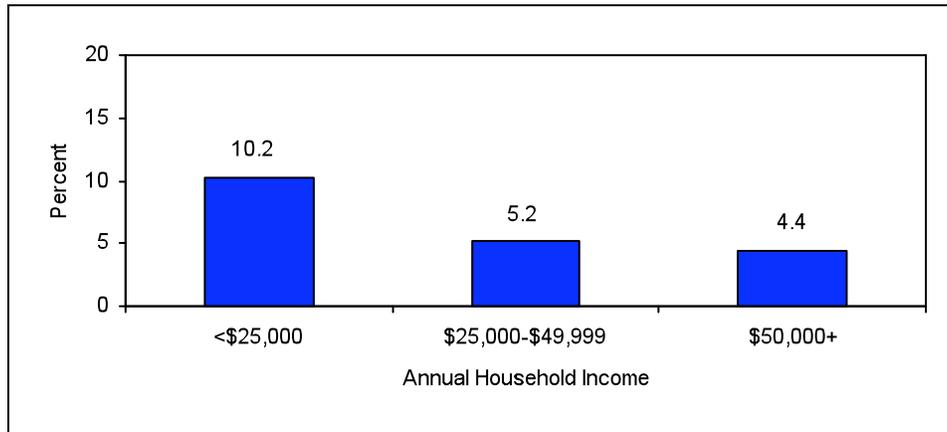
**Figure 2.8. Adult current asthma prevalence by educational level and sex, Mississippi 2003-2007\***



\*Aggregate data used to increase reliability of estimates  
 Source: Behavioral Risk Factor Surveillance System

Key Observations: Current asthma prevalence is higher among women than men in all educational level categories.

**Figure 2.9. Adult current asthma prevalence by annual household income, Mississippi, 2003-2007\***

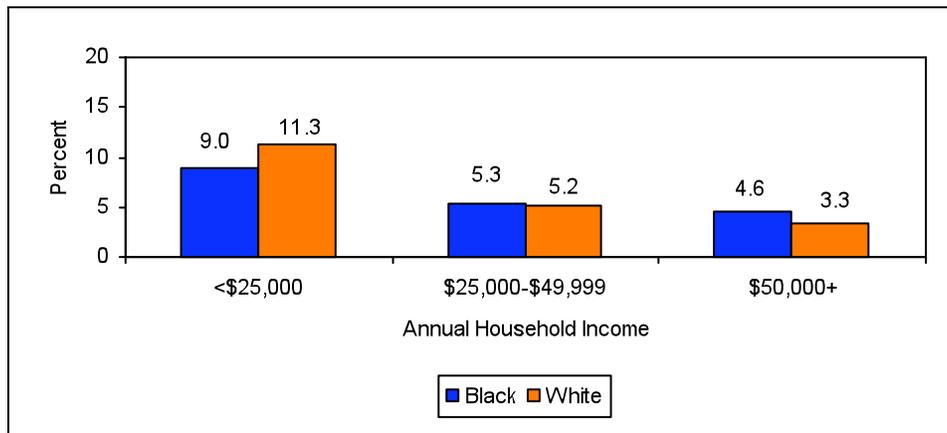


\*Aggregate data used to increase reliability of estimates

Source: Behavioral Risk Factor Surveillance System

Key Observations: Adults with an annual household income less than \$25,000 have a higher prevalence of current asthma compared to those adults with annual household incomes greater than \$25,000 in Mississippi.

**Figure 2.10. Adult current asthma prevalence by annual household income and race, Mississippi, 2003-2007\***

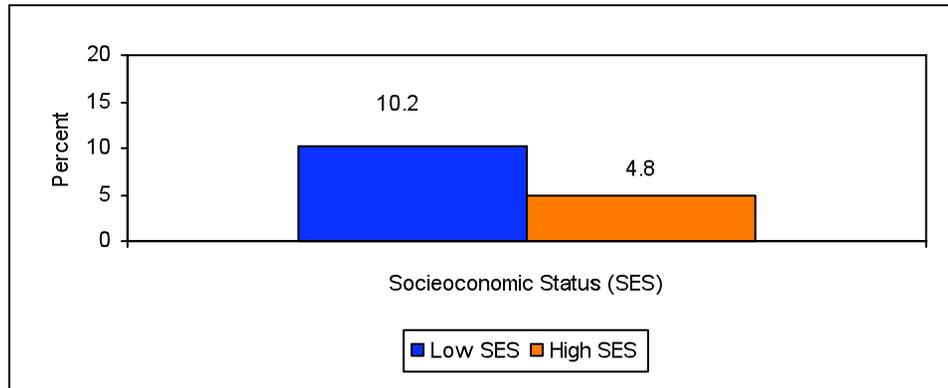


\*Aggregate data used to increase reliability of estimates

Source: Behavioral Risk Factor Surveillance System

Key Observations: Within annual household income categories, there are no significant differences in adult current asthma prevalence based on race.

**Figure 2.11. Adult current asthma prevalence by socioeconomic status (SES), Mississippi, 2003-2007\***



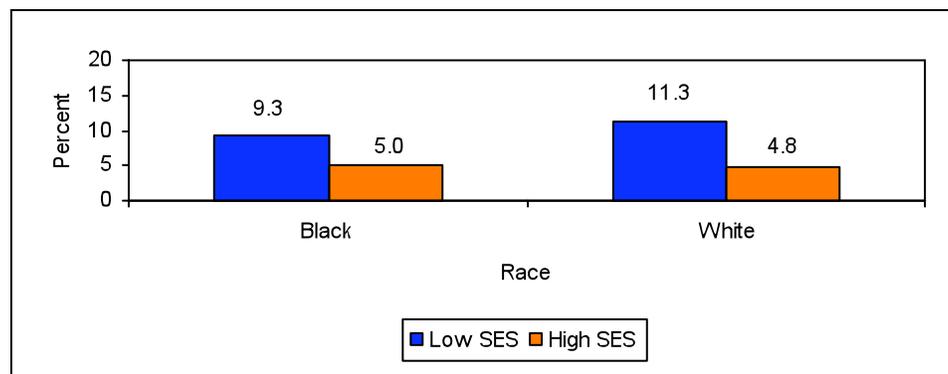
\*Aggregate data used to increase reliability of estimates

Source: Behavioral Risk Factor Surveillance System

Low SES = Fewer than 12 years of education and a household income <\$25,000; High SES = 12 or more years of education and a household income \$25,000+

Key Observations: Current asthma prevalence is higher among adults of low socioeconomic status compared to adults of high socioeconomic status.

**Figure 2.12. Adult current asthma prevalence by socioeconomic status (SES) and race, Mississippi, 2003-2007\***



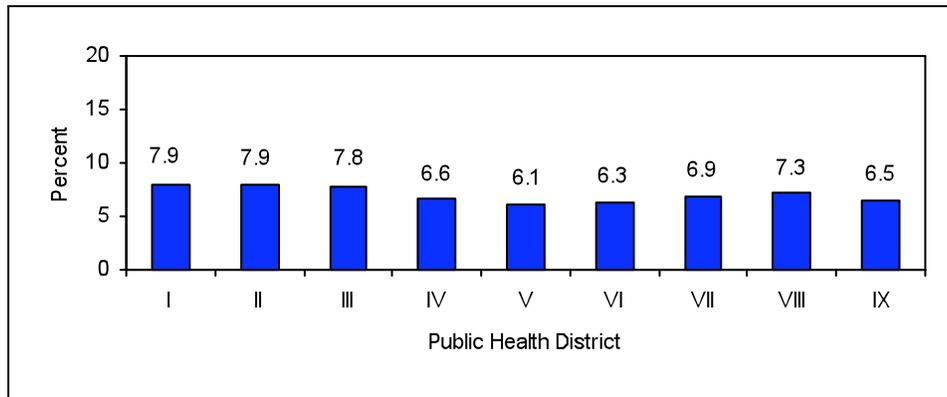
\*Aggregate data used to increase reliability of estimates

Source: Behavioral Risk Factor Surveillance System

Low SES= Fewer than 12 years of education and a household income <\$25,000; High SES= 12 or more years of education and a household income \$25,000+

Key Observations: Both white and black adults of low socioeconomic status have higher asthma prevalence than white and black adults of high socioeconomic status.

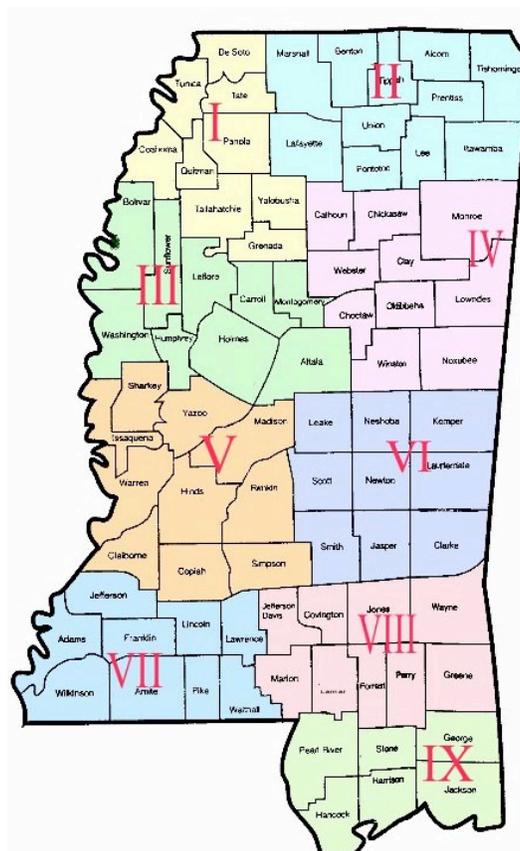
**Figure 2.13. Adult current asthma prevalence by public health district, Mississippi, 2003-2007\***



\*Aggregate data used to increase reliability of estimates  
 Source: Behavioral Risk Factor Surveillance System

Key Observations: Adult current asthma prevalence does not differ significantly by Public Health District.

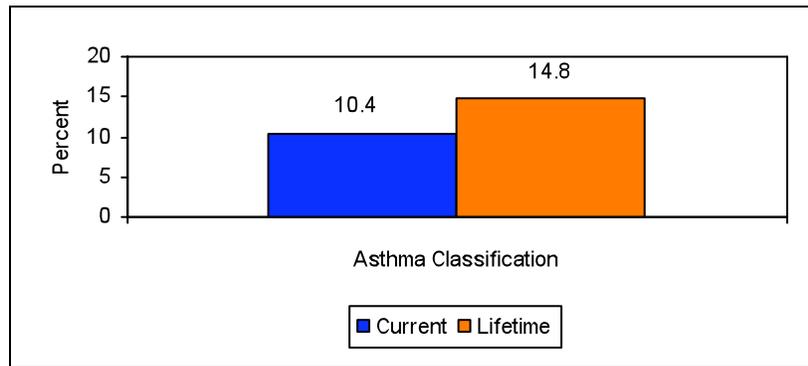
**Map 2.1. Mississippi Public Health Districts**



## Childhood Asthma Prevalence

Asthma is one of the most common childhood chronic diseases, affecting approximately 6.8 million children under 18 years of age in the United States<sup>3</sup>. To determine the prevalence of asthma among Mississippi children, the BRFSS childhood asthma module was used. This survey assesses childhood asthma by asking an adult respondent about the asthma status of a randomly selected child living in the household.

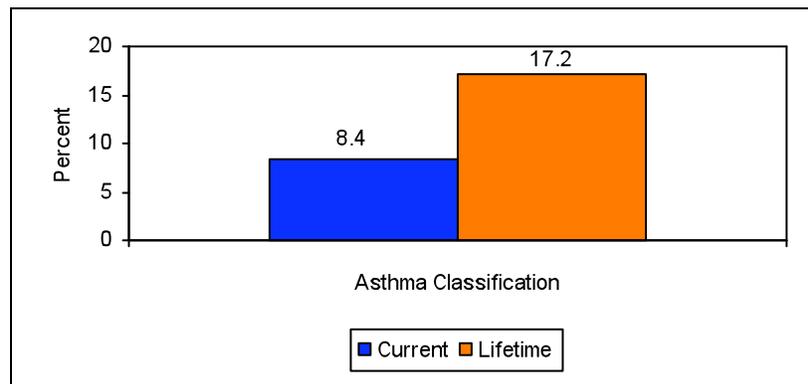
**Figure 2.17. Lifetime vs. current asthma prevalence among children ages 0-17 years, Mississippi, 2007**



Source: Behavioral Risk Factor Surveillance System

Key Observations: Lifetime asthma prevalence is higher than current asthma prevalence among children ages 0-17 years.

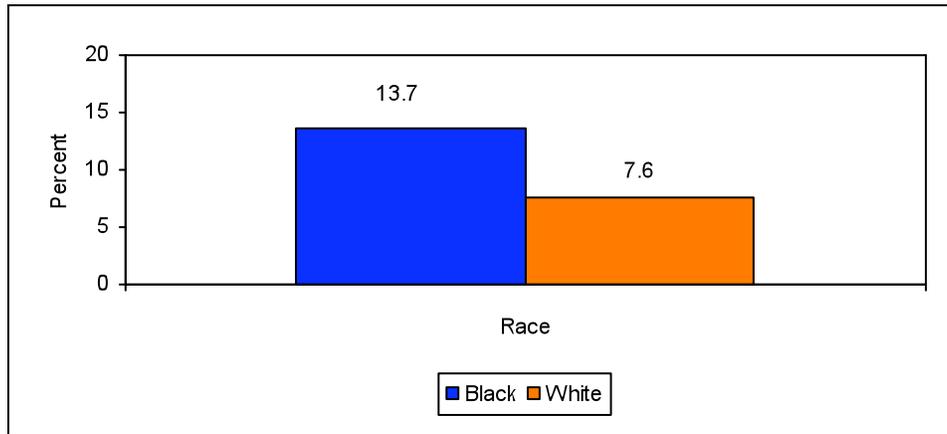
**Figure 2.18. Lifetime vs. current asthma prevalence among high school students, Mississippi, 2007**



Source: Youth Risk Behavior Survey

Key observations: Lifetime asthma prevalence is higher than current asthma prevalence among high school students.

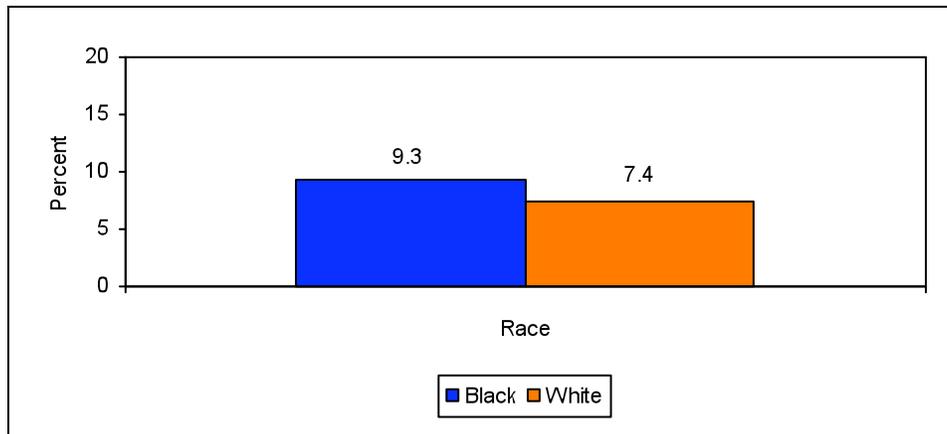
**Figure 2.19. Current asthma prevalence among children ages 0-17 years by race, Mississippi, 2007**



Source: Behavioral Risk Factor Surveillance System

Key Observations: Current asthma prevalence is higher among black children ages 0-17 years compared to white children in the same age group.

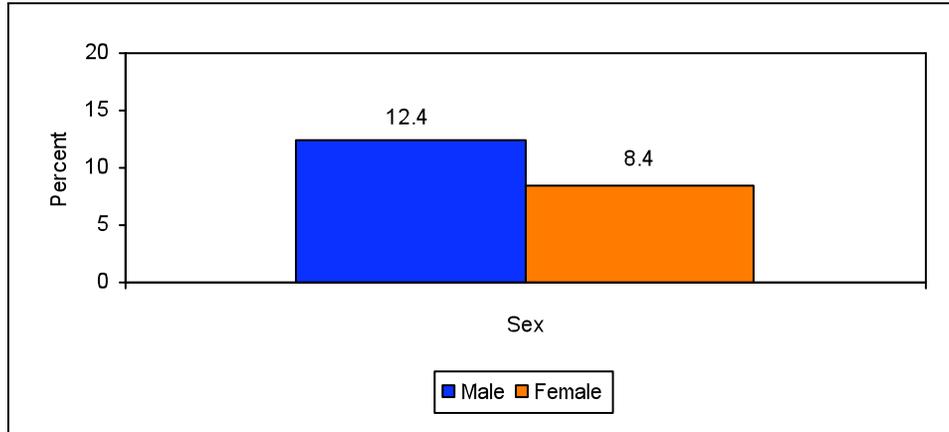
**Figure 2.20. Current asthma prevalence among high school students by race, Mississippi, 2007**



Source: Youth Risk Behavior Survey

Key Observations: There is no significant difference in current asthma prevalence among high school students based on race.

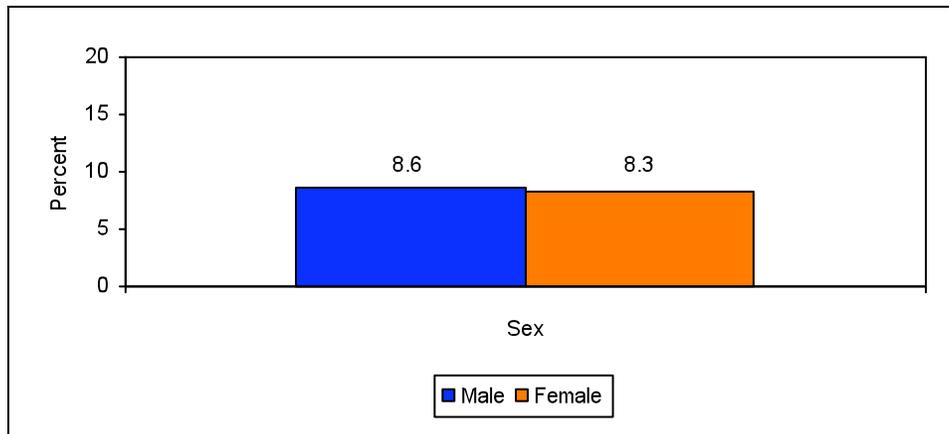
**Figure 2.21. Current asthma prevalence among children ages 0-17 years by sex, Mississippi, 2007**



Source: Behavioral Risk Factor Surveillance System

Key Observations: Current asthma prevalence is higher among boys ages 0-17 years compared to girls of the same age.

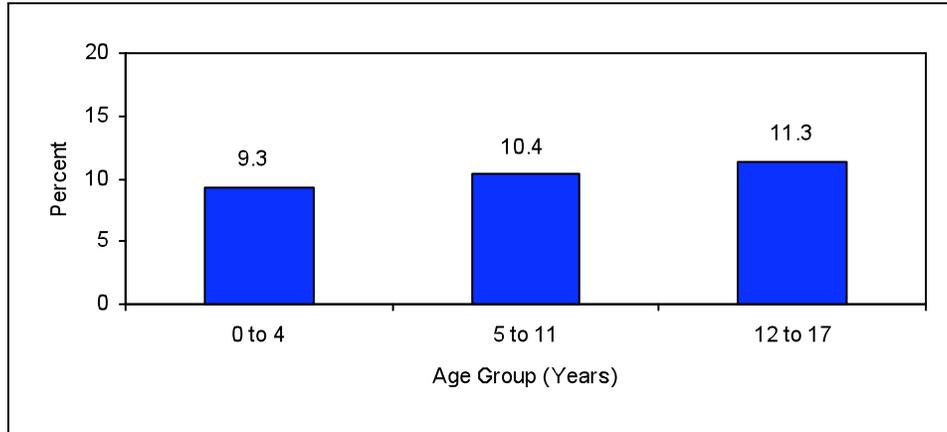
**Figure 2.22. Current asthma prevalence among high school students by sex, Mississippi, 2007**



Source: Youth Risk Behavior Survey

Key Observations: There is no significant difference in current asthma prevalence among high school students based on sex.

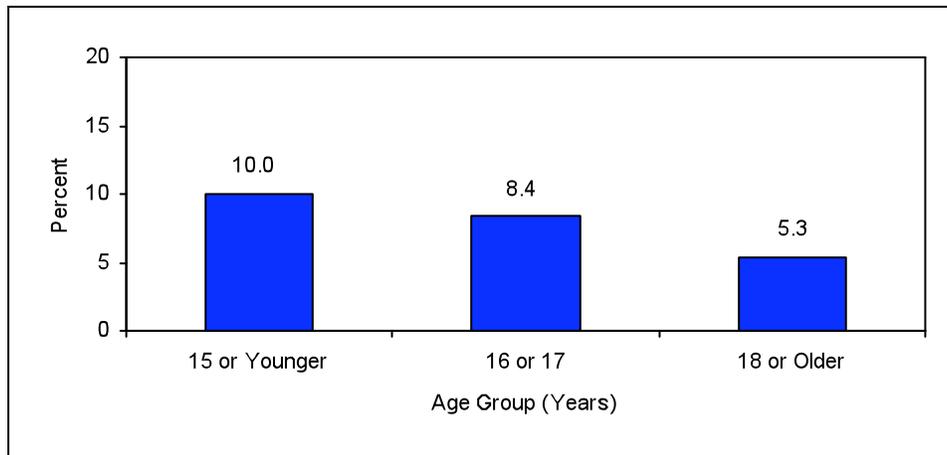
**Figure 2.23. Current asthma prevalence among children ages 0-17 years by age group, Mississippi, 2007**



Source: Behavioral Risk Factor Surveillance System

Key Observations: There is no significant difference in asthma prevalence among children based on age group.

**Figure 2.24. Current asthma prevalence among high school students by age group, Mississippi, 2007**



Source: Youth Risk Behavior Survey

Key Observations: There is no significant difference in current asthma prevalence among high school students based on age group.

## Section 3: Asthma Symptoms and Disease Management

### Asthma Symptoms and Disease Management Defined

Asthma signs and symptoms may include wheezing, coughing, difficulty breathing, and chest tightness<sup>1</sup>. Asthma symptoms occur when an individual with asthma is exposed to certain triggers, such as allergens (e.g., pet dander, pollen, and mold) or irritants (e.g., tobacco smoke and strong odors). These symptoms can vary within an individual by time of day and can change throughout one's lifetime. Fortunately, asthma symptoms can be controlled, allowing many people with asthma to live healthy, active lives. However, poor asthma management can result in frequent symptoms, activity limitations, and decreased quality of life.

There are three essential components of a successful asthma management plan:

- **Determination of asthma severity.** The National Asthma Education and Prevention Program's (NAEPP) *Guidelines for the Diagnosis and Management of Asthma*<sup>1</sup> outlines the criteria for determining asthma severity. Asthma severity classifications are assigned by health care professionals based on frequency and severity of asthma symptoms, as well as the degree of lung functioning, before medical treatment. There are four severity classifications: intermittent, mild persistent, moderate persistent and severe persistent.
- **Appropriate asthma medication use.** The NAEPP *Guidelines for the Diagnosis and Management of Asthma*<sup>1</sup> also outlines the appropriate pharmacotherapy associated with each asthma severity classification. There are two types of asthma medications: quick-relief and long-term controller. Quick-relief medications are used to relieve symptoms during an asthma attack, whereas long-term controller medications are typically taken daily to prevent asthma attacks from occurring<sup>4</sup>. The guidelines recommend that individuals with persistent asthma take a daily long-term controller medication.
- **Avoidance of identified asthma triggers.** Individuals with asthma must identify and avoid the allergens, irritants, and behaviors that trigger their asthma symptoms.

### Asthma Symptoms and Disease Management Data

Information on asthma symptoms and disease management is obtained from self-reported surveys. This information has only recently been collected in Mississippi. In 2007, the Mississippi Behavioral Risk Factor Surveillance System (BRFSS) collected data on frequency of asthma symptoms, asthma medication use, and asthma-related activity limitations from adults with asthma.

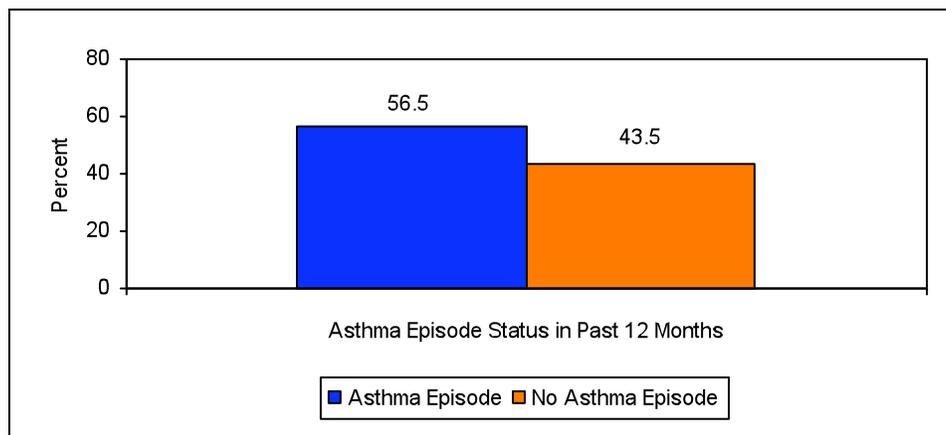
BRFSS respondents who reported that they had ever had asthma were asked to participate in a follow-up survey, containing more than 80 detailed questions about their asthma symptoms, triggers, medications, and health care utilization. Questions on asthma severity classification are not included in the BRFSS. However, asthma severity can be estimated for adults based on responses to the other BRFSS asthma symptom and disease management questions.

This chapter presents data on asthma symptoms and disease management (e.g. medication use, exposure to triggers, and quality of life) for Mississippi adults and children with asthma. The following figures include BRFSS prevalence estimates. Refer to Appendix B for a discussion of the methodologies used during analysis and interpretation.

## Asthma Symptoms

Asthma symptoms include coughing, wheezing, and chest tightness. A high frequency of symptoms indicates that asthma is poorly controlled and may require additional medication and/or improved self-management activities such as environmental trigger control.

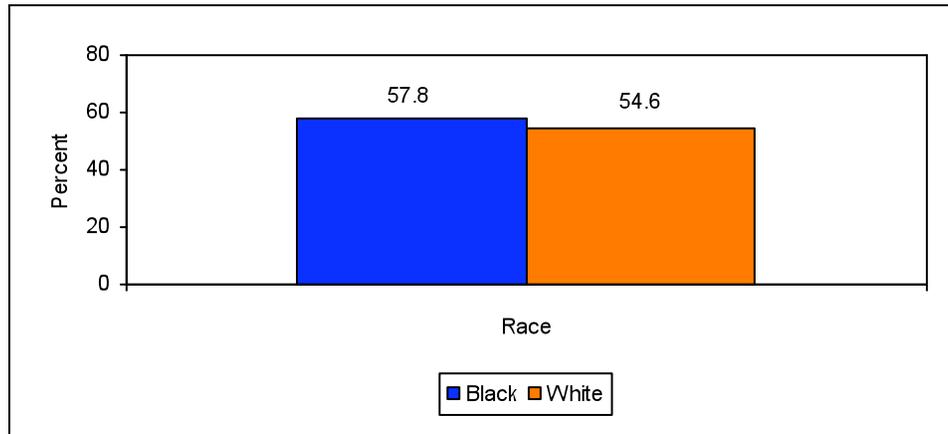
**Figure 3.1. Percent of adults with current asthma experiencing one or more asthma episodes in the past 12 months, Mississippi, 2007**



Source: Behavioral Risk Factor Surveillance System

**Key Observations:** Approximately 57% of Mississippi adults with asthma experienced one or more asthma episodes within the past year.

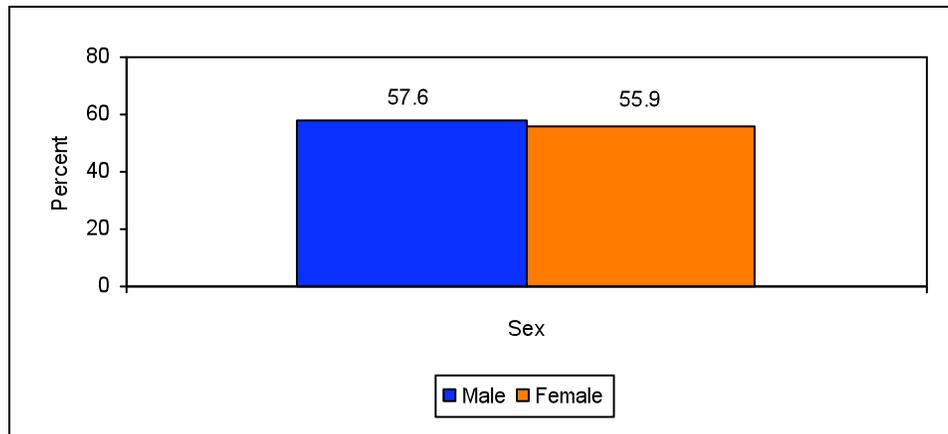
**Figure 3.2. Percent of adults with current asthma experiencing one or more asthma episodes in the past 12 months by race, Mississippi, 2007**



Source: Behavioral Risk Factor Surveillance System

Key Observations: There is no significant difference in the percent of adults with current asthma experiencing one or more asthma episodes in the past 12 months by race.

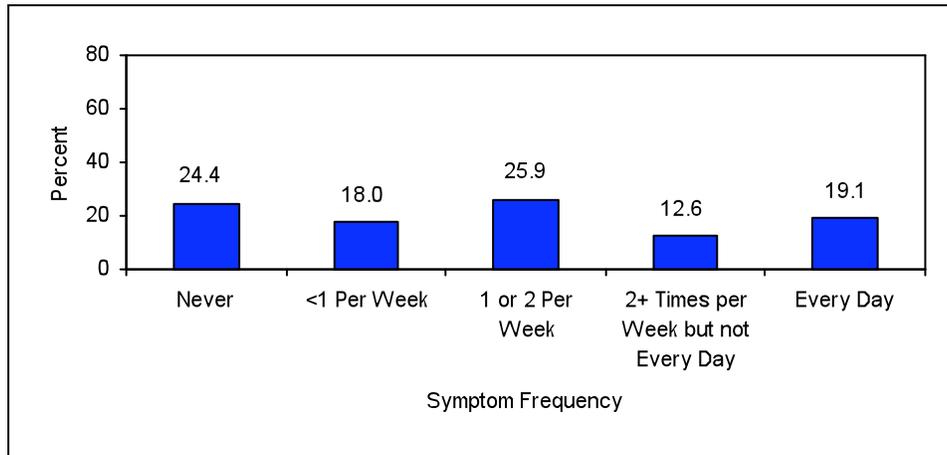
**Figure 3.3. Percent of adults with current asthma experiencing one or more asthma episodes in the past 12 months by sex, Mississippi, 2007**



Source: Behavioral Risk Factor Surveillance System

Key Observations: There is no significant difference in the percent of adults with current asthma experiencing one or more asthma episodes in the past 12 months by sex.

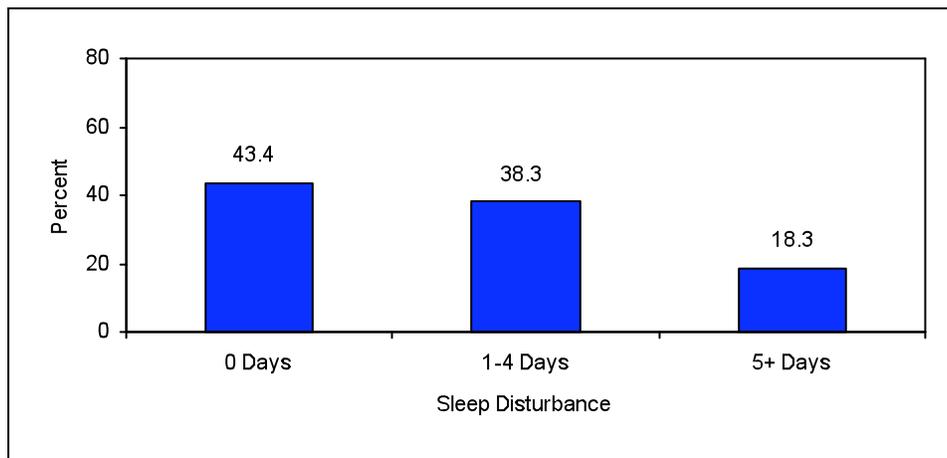
**Figure 3.4. Frequency of asthma symptoms among adults with current asthma in the past 30 days, Mississippi, 2007**



Source: Behavioral Risk Factor Surveillance System

Key Observations: In the past 30 days, approximately 58% of adults with current asthma experienced asthma symptoms one or more times per week and almost 20% reported daily asthma symptoms.

**Figure 3.5. Frequency of sleep disturbances among adults with current asthma in the past 30 days, Mississippi, 2007**



Source: Behavioral Risk Factor Surveillance System

Key Observations: Approximately 57% of adults with current asthma experienced sleep disturbances due to asthma within the past 30 days.

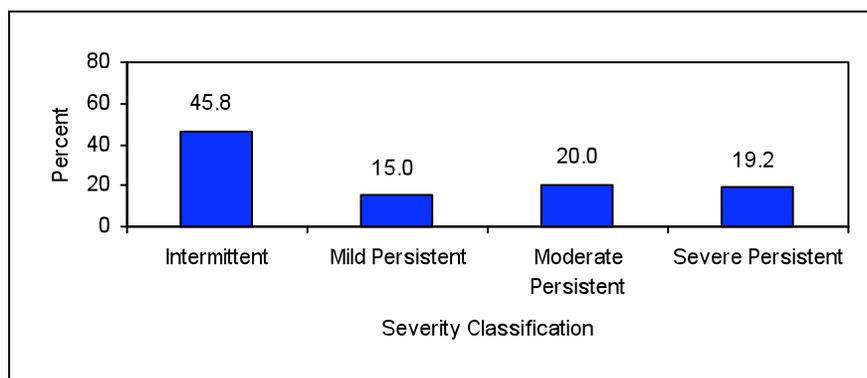
## Asthma Severity

There are four asthma severity classifications: Intermittent, mild persistent, moderate persistent and severe persistent. These classifications are based on frequency and severity of asthma symptoms and lung functioning before medical treatment. Table 3.1 outlines the asthma symptom criteria used to determine severity. BRFSS questions related to asthma symptoms, medication used and activity limitations have been used to estimate asthma severity classification.

**Table 3.1. Asthma severity classifications (youths 12+ years of age and adults)**

	<b>Intermittent</b>	<b>Mild</b>	<b>Moderate</b>	<b>Severe</b>
<b>Symptoms</b>	< 2 days/week	> 2 days/week but not daily	Daily	Throughout the day
<b>Nighttime Awakenings</b>	< 2 days/month	3-4 x/month	> 1x/week but not nightly	Often 7x/week
<b>Short-acting beta agonist use for symptom control (not prevention of Exercise-Induced Bronchospasm)</b>	<2 days/week	> 2 days/week but not > 1x/day	Daily	Several times per day
<b>Interference with normal activity</b>	None	Minor limitation	Some limitation	Extremely limited

**Figure 3.6. Severity classification among adults with current asthma, Mississippi, 2007**



Source: Behavioral Risk Factor Surveillance System

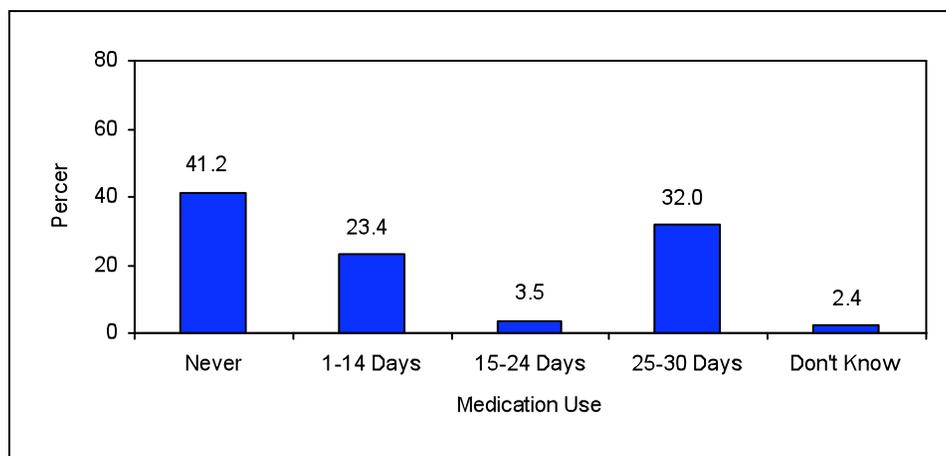
Key Observations: Approximately 39% of adults with current asthma are classified as either moderate persistent or severe persistent.

## Asthma Management

Adequate medication use is essential to proper asthma management. Overuse of short-acting quick relief medication is an indication of poorly controlled asthma.

- Asthma controller medications are prescribed for patients with persistent asthma to prevent asthma attacks from occurring.
- Quick-relief asthma medications are taken to relieve symptoms during an asthma attack. They are typically administered through a metered-dose inhaler.

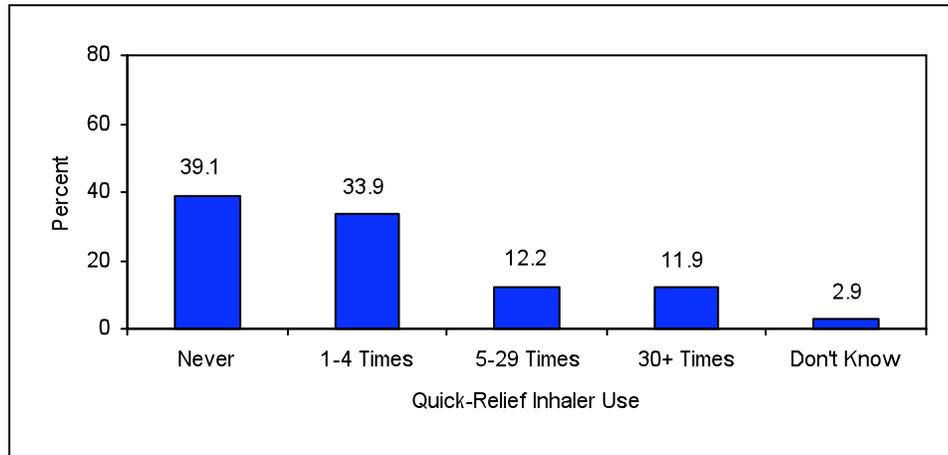
**Figure 3.7. Controller medication use among adults with current asthma in the past 30 days, Mississippi, 2007**



Source: Behavioral Risk Factor Surveillance System

**Key Observations:** About 61% of adults with current asthma used an asthma controller medication at least one day within the past 30 days to prevent asthma episodes and approximately one third of adults used controller medication on an almost daily basis to prevent asthma episodes.

**Figure 3.8. Quick-relief inhaler use among adults with current asthma in the past 30 days, Mississippi, 2007**



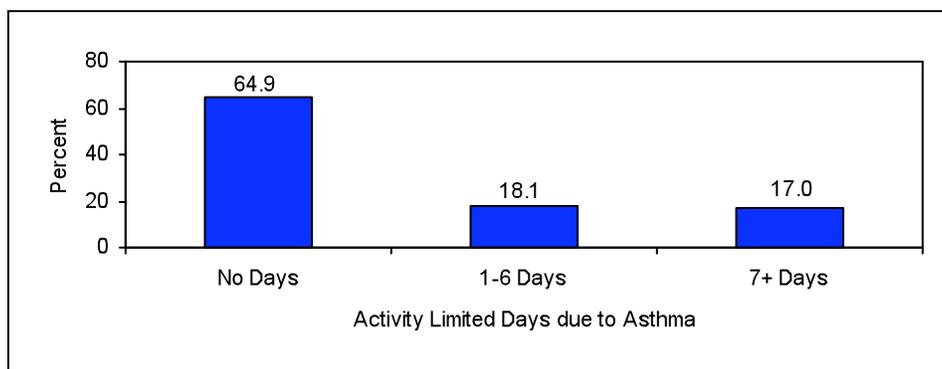
Source: Behavioral Risk Factor Surveillance System

Key Observations: Approximately 58% of adults with current asthma used a quick-relief asthma medication at least one day within the past 30 days to stop an episode. Almost one-quarter of adults with current asthma used a quick-relief asthma medication five or more times during the past 30 days to stop an attack.

## Quality of Life

Individuals with asthma can lead healthy, active lives. However, poorly controlled asthma can result in symptoms that cause activity limitations and poor health.

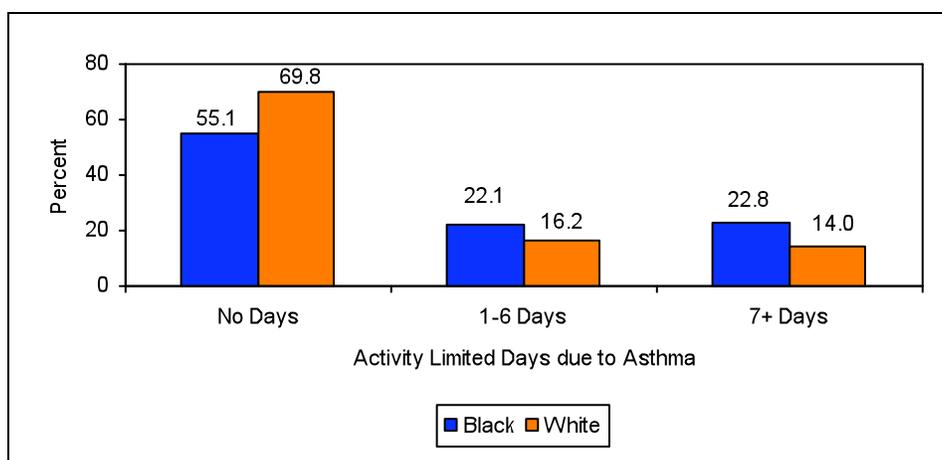
**Figure 3.9. Percent of adults with current asthma unable to work or carry out usual activities due to asthma in the past 12 months, Mississippi, 2007**



Source: Behavioral Risk Factor Surveillance System

Key Observations: About 35% of adult Mississippians were unable to work or carry out their usual activities due to asthma on one or more days in the past 12 months.

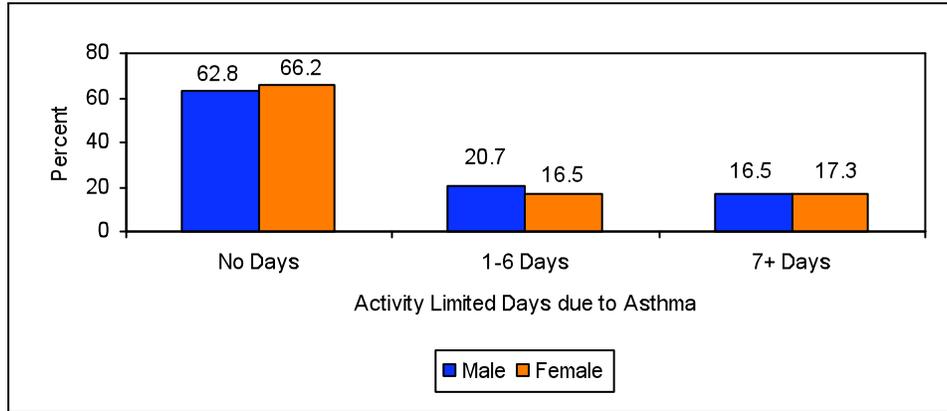
**Figure 3.10. Percent of adults with current asthma unable to work or carry out usual activities due to asthma in the past 12 months by race, Mississippi, 2007**



Data Source: Behavioral Risk Factor Surveillance System

Key Observations: Approximately of 45% black adults and 30% of white adults with current asthma were unable to work or carry out activities because of asthma on one or more days in the past 12 months.

**Figure 3.11. Percent of adults with current asthma unable to work or carry out usual activities due to asthma in the past 12 months by sex, Mississippi, 2007**



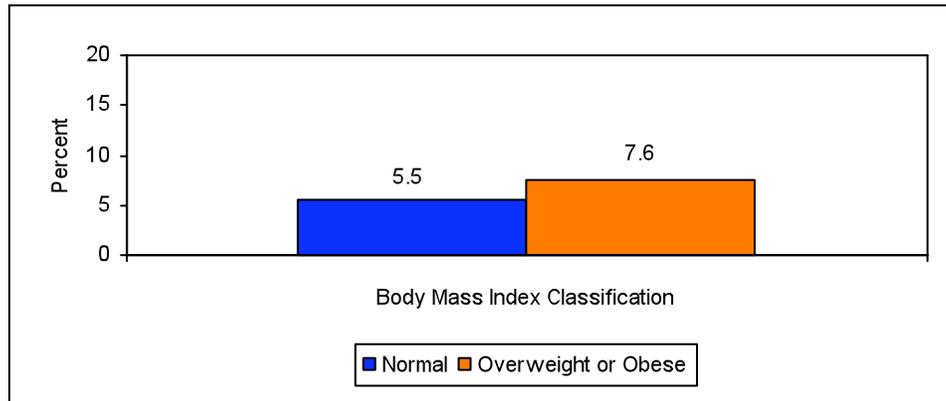
Source: Behavioral Risk Factor Surveillance System

Key Observations: Approximately 36% of adult males and 34% of adult females with current asthma were unable to work or carry out activities because of asthma on one or more days in the past 12 months.

## Asthma Comorbidities

Asthma prevalence is related to comorbid conditions and behaviors, such as overweight/obesity and smoking.

**Figure 3.12. Adult current asthma prevalence by body mass index, Mississippi, 2007**

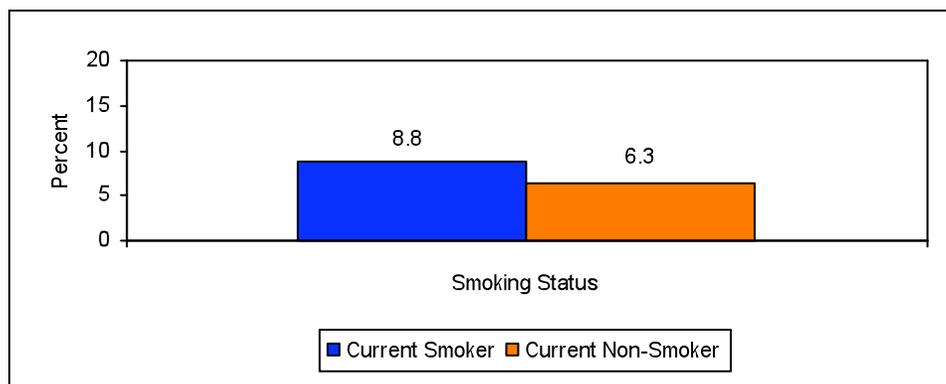


\*Aggregate data used to increase reliability of estimates. Normal body mass index = 18.5-24.9; Overweight/Obese body mass index = 25 and greater.

Source: Behavioral Risk Factor Surveillance System

Key Observations: Current asthma prevalence is higher among adults who are overweight or obese compared to adults who are a healthy weight.

**Figure 3.13. Adult current asthma prevalence by smoking status, Mississippi, 2007**



Source: Behavioral Risk Factor Surveillance System

Key Observations: Current asthma prevalence is higher among adults who are current smokers compared to adults who are not current smokers.

## **Section 4: Health Care Access and Utilization**

### **Health Care Access and Utilization Defined**

Health care access is the ability to obtain medical care, and is typically measured by indicators of health care coverage and the presence of a primary care provider. Health care utilization is the use of medical care, including routine preventive visits, emergency department (ED) visits, and hospitalizations. Access to health care and routine check-ups are essential to proper asthma management. In fact, the National Asthma Education and Prevention Program (NAEPP) recommend's primary care visits at least every six months, to assess and monitor asthma symptoms and modify management plans as needed<sup>5</sup>. However, asthma-related ER visits and hospitalizations are an indication of poorly controlled asthma. These acute care visits are often preventable through appropriate medication use and avoidance of identified triggers. Analyses of health care access and asthma-related health care visits can help us identify:

- Groups at highest risk for hospital and emergency department discharge due to poorly-controlled asthma.
- Disparities in access to health services.
- Medical costs associated with asthma.

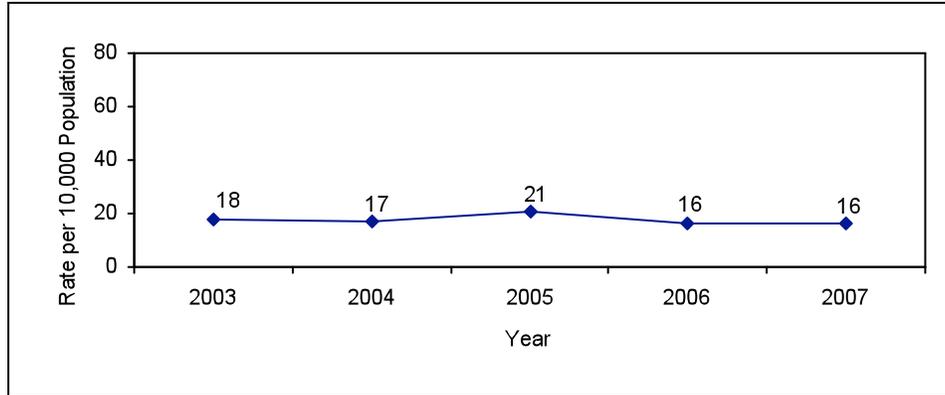
### **Health Care Access and Utilization Data**

Information on health care access and utilization is obtained through administrative and medical claims data that capture this information for billing purposes. This chapter presents data from the Mississippi Asthma Hospital Discharge Database. Administrative claims data provide comprehensive information on all health care visits among the population represented by the data. The hospital discharge database contains data on diagnosis and patient characteristics (e.g., age, sex, race, and county of residence). Asthma discharges are defined as discharges with a primary diagnosis of asthma (ICD-9-CM 493.xx).

This chapter presents data on health care access and asthma-related health care utilization for Mississippi adults and children. The following figures include asthma hospital and emergency department discharge rates calculated from the Mississippi State Department of Health's Asthma Program Hospital Discharge Database. All rates are age-adjusted to the United States 2000 Standard Population. Refer to Appendix B for a discussion of the methodologies used during analysis and interpretation.

## Hospital Discharges with Asthma as the First Listed Diagnosis

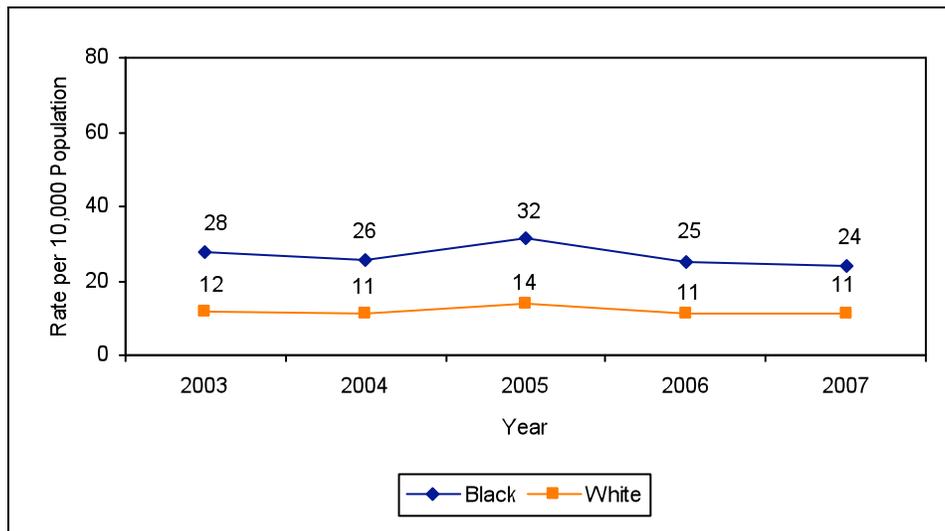
**Figure 4.1. Estimated asthma hospital discharge rate per 10,000 population by year, Mississippi, 2003-2007**



Source: Mississippi Asthma Hospital Discharge Database

Key Observations: Asthma hospital discharge rates did not change significantly from 2003 to 2007.

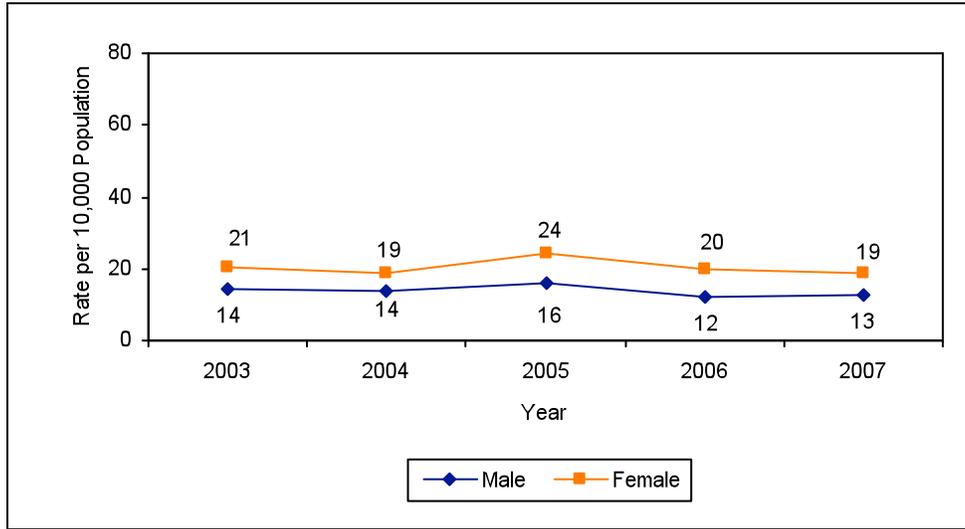
**Figure 4.2. Estimated asthma hospital discharge rate per 10,000 population by year and race, Mississippi, 2003-2007**



Source: Mississippi Asthma Hospital Discharge Database

Key Observations: From 2003 to 2007, asthma hospital discharge rates among black persons were more than 2 times higher than among white persons.

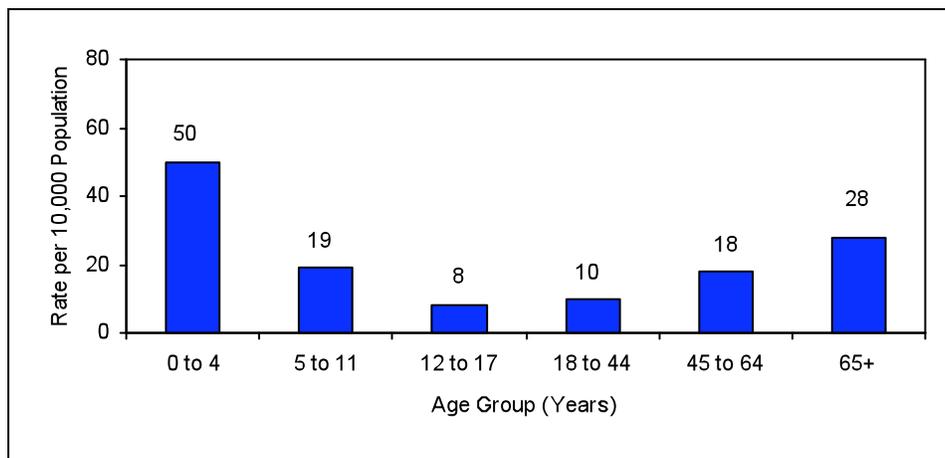
**Figure 4.3. Estimated asthma hospital discharge rate per 10,000 population by year and sex, Mississippi, 2003-2007**



Source: Mississippi Asthma Hospital Discharge Database

Key Observations: From 2003 to 2007, asthma hospital discharge rates were higher among females than males.

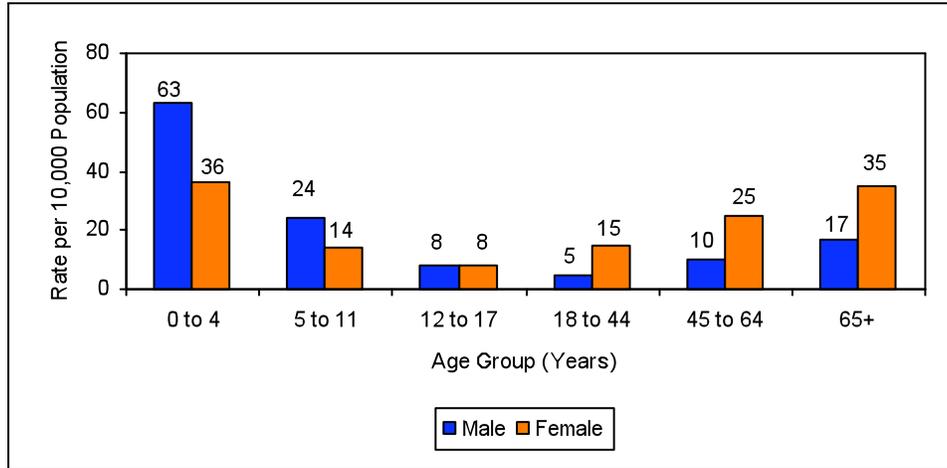
**Figure 4.4. Estimated asthma hospital discharge rate per 10,000 population by age group, Mississippi, 2003-2007\***



\*Aggregate data used to increase reliability of estimates  
Source: Mississippi Asthma Hospital Discharge Database

Key Observations: Children ages 0-4 have the highest asthma hospital discharge rate of any age group.

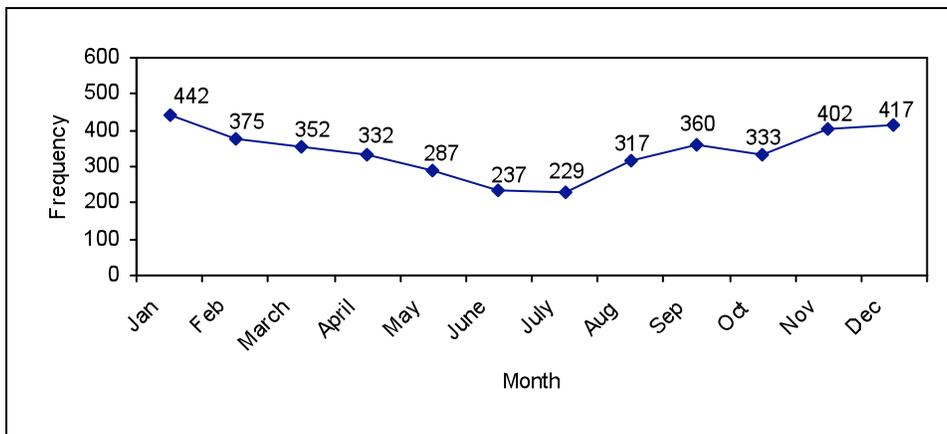
**Figure 4.5. Estimated asthma hospital discharge rate per 10,000 population by age and sex, Mississippi, 2003-2007\***



\*Aggregate data used to increase reliability of estimates  
 Source: Mississippi Asthma Hospital Discharge Database

Key Observations: Asthma hospital discharge rates are higher among males ages 0-11 than among females ages 0-11. Asthma hospital discharge rates were higher among females ages 18 and above than males ages 18 and above.

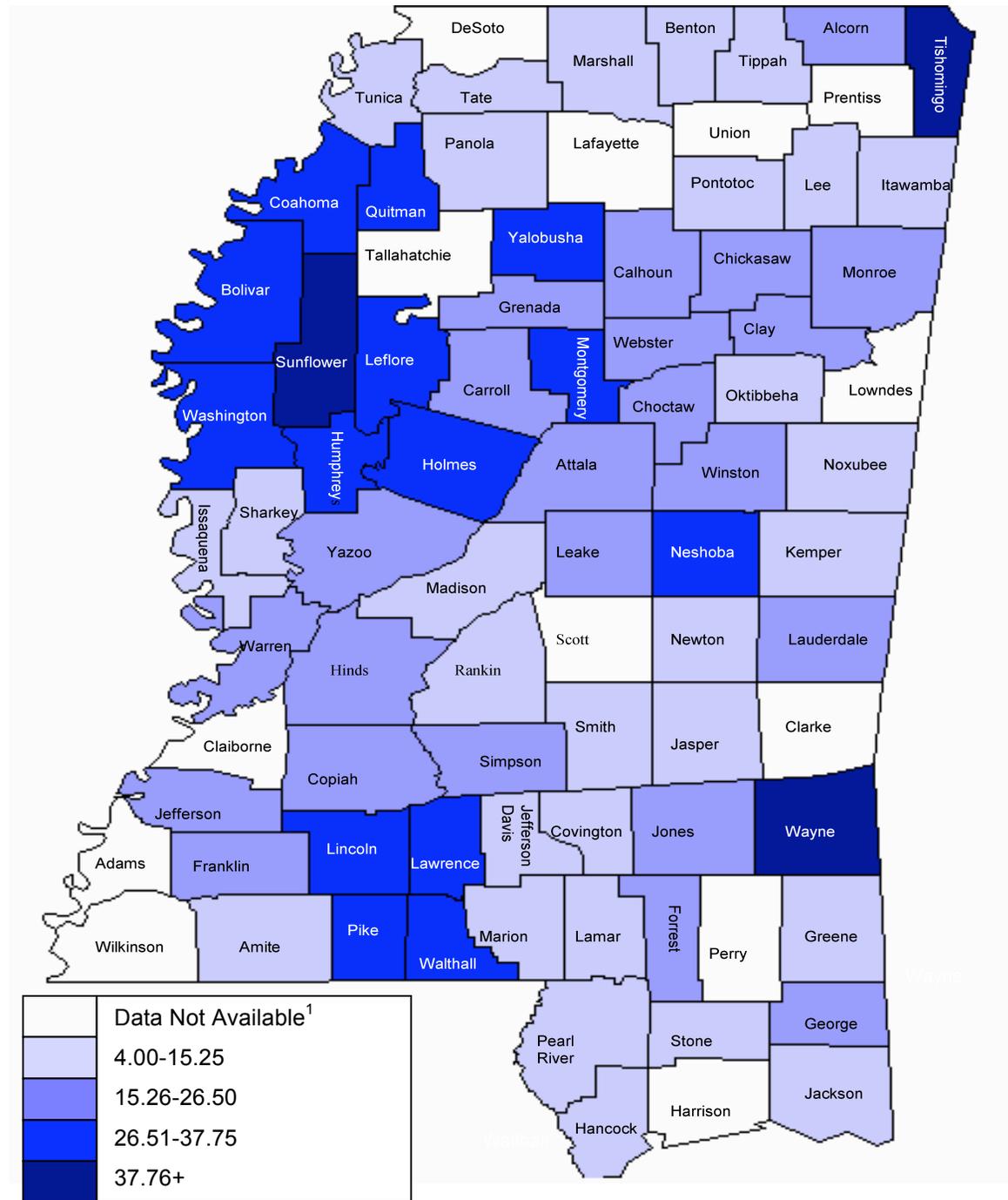
**Figure 4.6. Estimated number of hospital discharges with asthma as the first listed diagnosis, by month, Mississippi, 2007\***



\*Aggregate data used to increase reliability of estimates  
 Source: Mississippi Asthma Surveillance System

Key Observations: Asthma hospital discharges peak in the winter months of November, December, and January.

**Map 4.1. Estimated asthma hospital discharge rate per 10,000 population by county of residence, Mississippi, 2003-2007\***



Data Source: Mississippi Asthma Hospital Discharge Database

Key Observations: Of the 69 Mississippi counties with available data, the five counties with the highest asthma hospital discharge rates are (1 is highest): (1) Sunflower; (2) Wayne; (3) Tishomingo; (4) Humphreys and (5) Neshoba.

<sup>1</sup>Data not available due to a non-reporting hospital(s) located within the county.

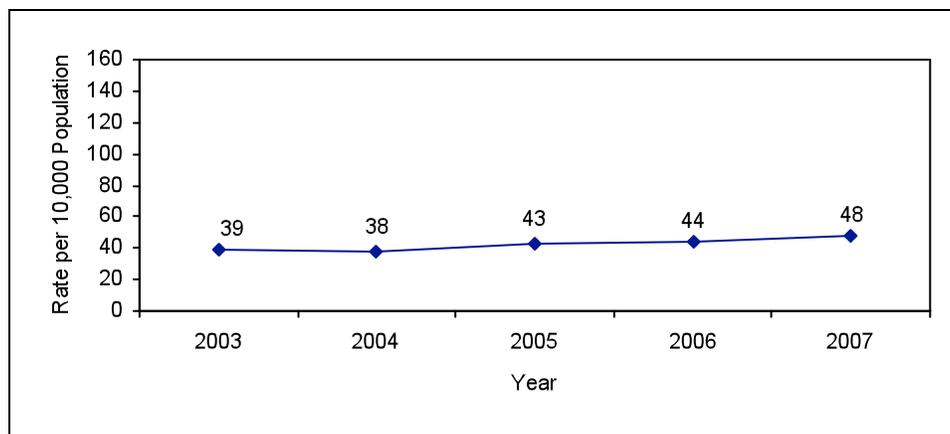
\*Aggregate data used to increase reliability of estimates and rates are age-adjusted to the US 2000 standard population. Rates are per 10,000 population.

## Emergency Department Discharges with Asthma as the First Listed Diagnosis

Like hospital discharges, emergency department discharges for asthma provide an important public health surveillance endpoint. Emergency department discharges can be used to determine the severity of asthma in specific populations and geographic areas, which can be used to help direct prevention and intervention efforts. Emergency department discharges are preventable with routine healthcare visits to primary care providers or asthma specialists, use of proper medication and trigger recognition and reduction.

Asthma is one of the leading causes for emergency department discharges nationwide, accounting for approximately 1.8 million visits in the United States in 2005<sup>6</sup>. This section examines asthma emergency department discharges in Mississippi from 2003 through 2007.

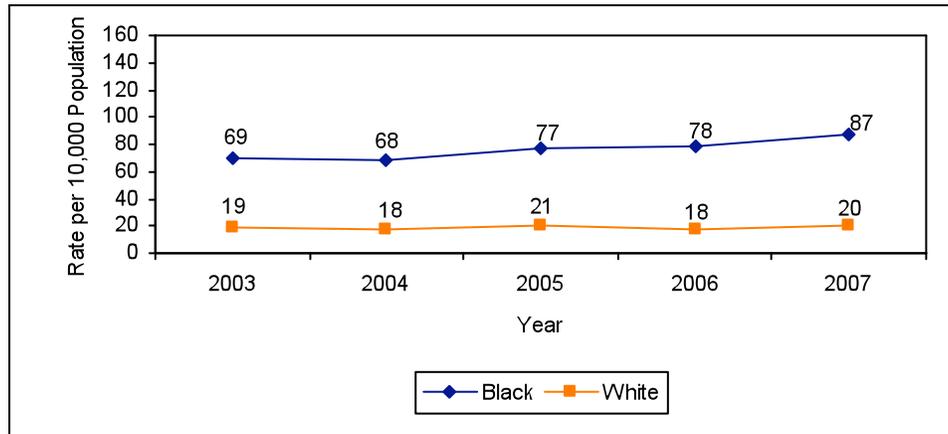
**Figure 4.7. Estimated asthma emergency department discharge rate per 10,000 population by year, Mississippi, 2003-2007**



Source: Mississippi Asthma Hospital Discharge Database

Key Observations: Asthma emergency department discharge rates increased by 23% from 39 per 10,000 in 2003 to 48 per 10,000 in 2007.

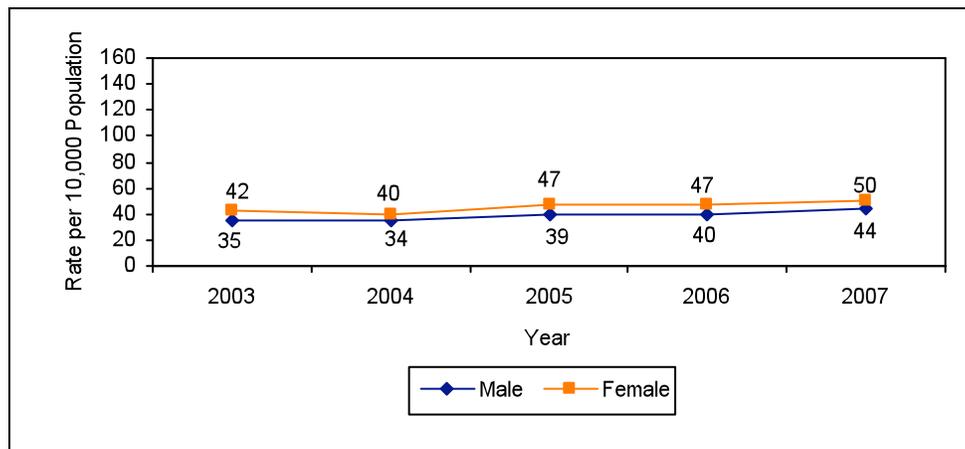
**Figure 4.8. Estimated asthma emergency department discharge rate per 10,000 population by year and race, Mississippi, 2003-2007**



Source: Mississippi Asthma Hospital Discharge Database

Key Observations: From 2003-2007, asthma emergency department discharge rates among blacks living in MS were more than four times higher than among whites. Asthma emergency department discharge rates among blacks increased from 2003 to 2007, while rates among whites did not significantly change.

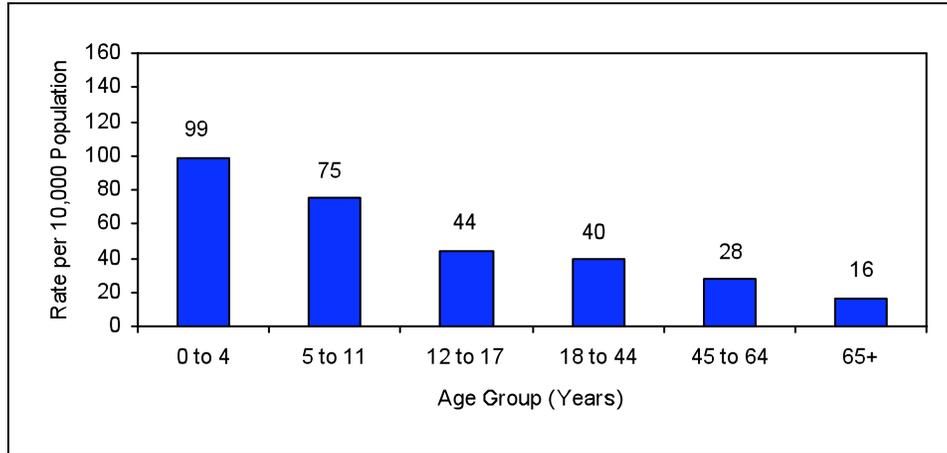
**Figure 4.9. Estimated asthma emergency department discharge rate per 10,000 population by year and sex, Mississippi, 2003-2007**



Source: Mississippi Asthma Hospital Discharge Database

Key Observations: From 2003 to 2007, more females than males were discharged from MS emergency departments with a primary diagnosis of asthma. Rates increased from 2003 to 2007 among both males and females.

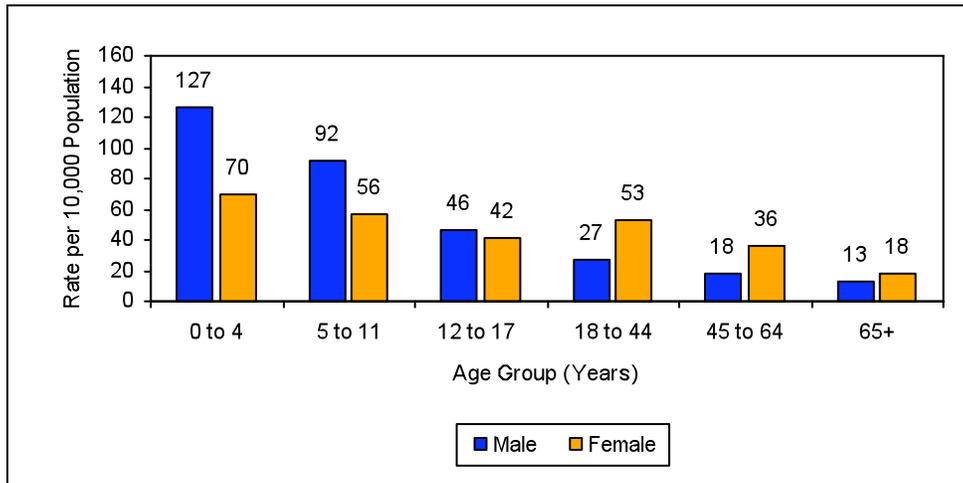
**Figure 4.10. Estimated asthma emergency department discharge rate per 10,000 population by age group, Mississippi, 2003-2007\***



\*Aggregate data used to increase reliability of estimates  
 Source: Mississippi Asthma Hospital Discharge Database

Key Observations: Children ages 0-4 have the highest asthma emergency department visit rate of any age group.

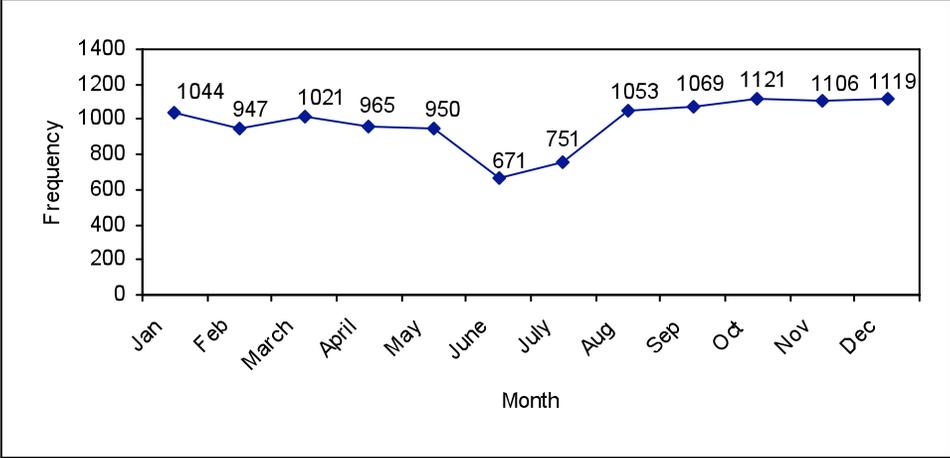
**Figure 4.11. Estimated asthma emergency department discharge rate per 10,000 population by age and sex, Mississippi, 2003-2007\***



\*Aggregate data used to increase reliability of estimates  
 Source: Mississippi Asthma Hospital Discharge Database

Key Observations: Males ages 0-17 have higher rates of asthma emergency department discharges than females ages 0-17. Females ages 18 and above have higher rates of asthma emergency department discharges than males ages 18 and above.

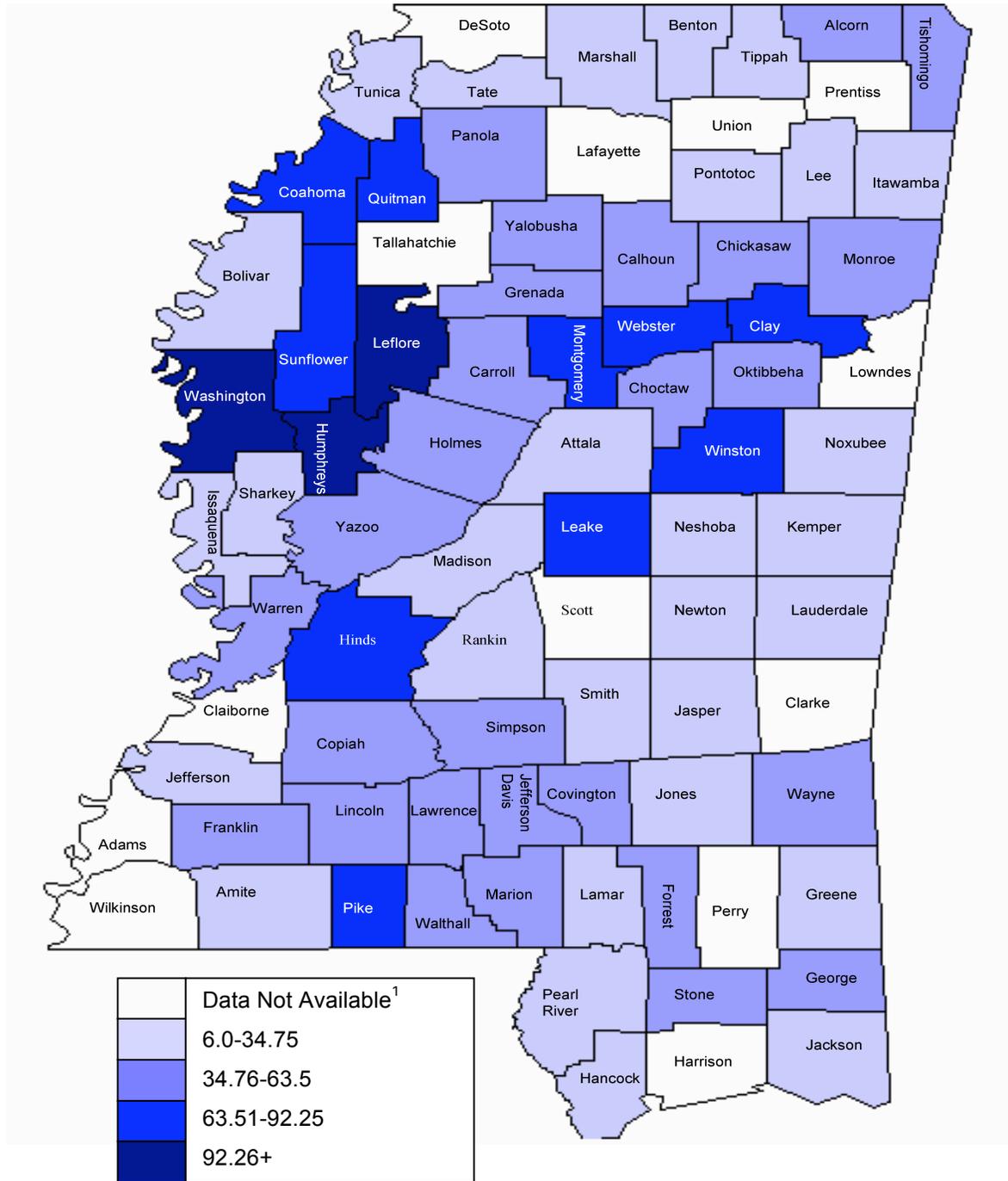
**Figure 4.12. Estimated number of emergency department discharges with asthma as the first listed diagnosis, by month, Mississippi, 2007**



Source: Mississippi Asthma Surveillance System

Key Observations: Asthma emergency department discharges peak in the months of October and December.

**Map 4.2. Estimated asthma emergency department discharge rate per 10,000 population by county of residence, Mississippi, 2003-2007\***



Data Source: Mississippi Asthma Hospital Discharge Database

Key Observations: Of the 69 Mississippi counties with available data, the five counties with the highest asthma emergency department visit rates were (1 is highest): (1) Humphreys; (2) Washington; (3) Leflore; (4) Sunflower and (5) Winston (Map 2).

<sup>1</sup>Data not available due to a non-reporting hospital(s) located within the county.

\*Aggregate data used to increase reliability of estimates and rates are age-adjusted to the US 2000 standard population. All rates are per 10,000 population.

## At-Risk Based Asthma Discharge Rates

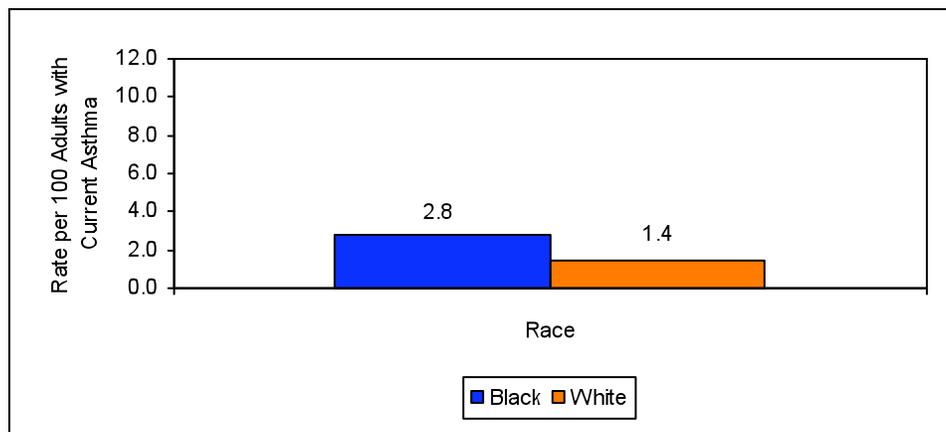
Unlike population-based asthma hospital and emergency department discharge rates, which are calculated using state population estimates, at-risk based asthma hospital and emergency department discharge rates are calculated using the estimated number of persons with asthma in Mississippi. At-risk based rates therefore take into account differences in asthma prevalence among demographic groups that may drive differences in health care access and utilization.

### At-Risk Based Asthma Hospital Discharge Rates

At-risk based asthma hospital discharge rates show trends similar to population-based rates. Among adults, at-risk based hospital discharge rates are highest among females, blacks, and persons ages 65 years and older. Among children, males, blacks, and children ages 0-4 years had the highest at-risk based rates in 2007. However, unlike differences in population-based rates, none of the differences in at-risk based asthma hospital discharge rates were statistically significant ( $p > 0.05$  for all comparisons), indicating that differences in asthma hospital discharges may be driven by disease prevalence.

### Adult At-Risk Based Asthma Hospital Discharge Rates

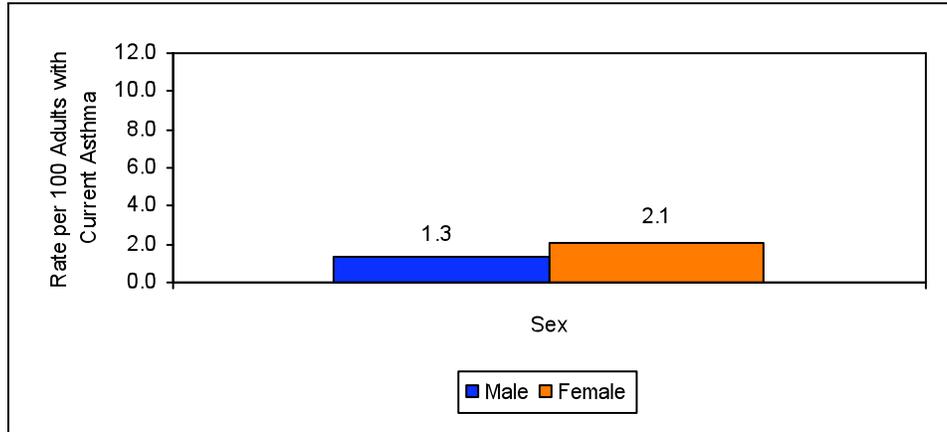
**Figure 4.13. Estimated asthma hospital discharge rate per 100 adults ages 18 years and above with current asthma by race, Mississippi, 2007**



Source: Mississippi Asthma Hospital Discharge Database

Key Observations: Though adult at-risk based asthma hospital discharge rates appear to differ by race, the difference is not statistically significant.

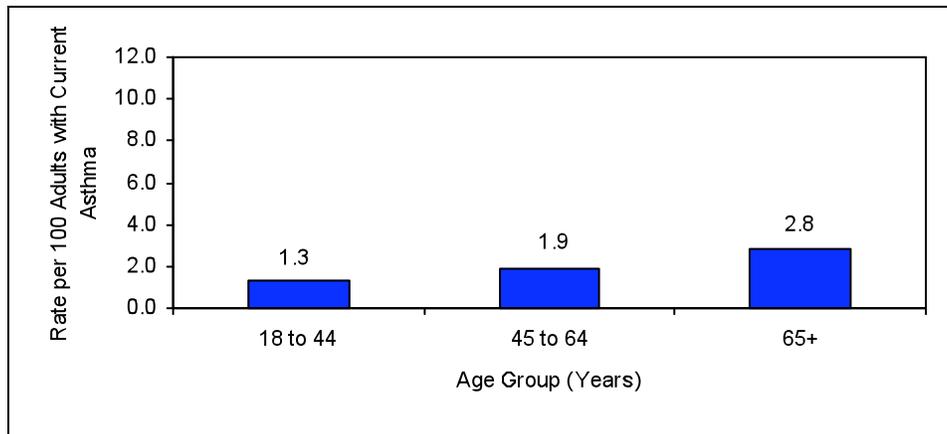
**Figure 4.14. Estimated asthma hospital discharge rate per 100 adults ages 18 years and above with current asthma by sex, Mississippi, 2007**



Source: Mississippi Asthma Hospital Discharge Database

Key Observations: Though adult at-risk based asthma hospital discharge rates appear to differ by sex, the difference is not statistically significant.

**Figure 4.15. Estimated asthma hospital discharge rate per 100 adults ages 18 years and above with current asthma by age group, Mississippi, 2007**

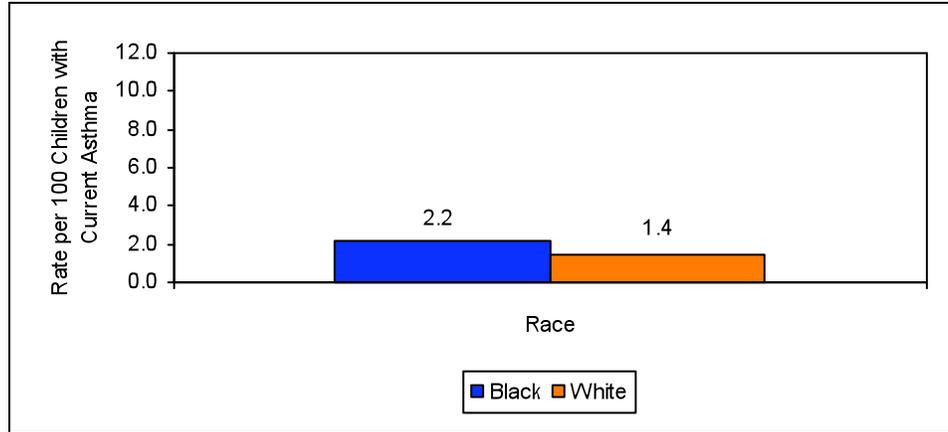


Source: Mississippi Asthma Hospital Discharge Database

Key Observations: Though adult at-risk based asthma hospital discharge rates appear to differ by age group, the difference is not statistically significant.

## Childhood At-Risk Based Asthma Hospital Discharge Rates

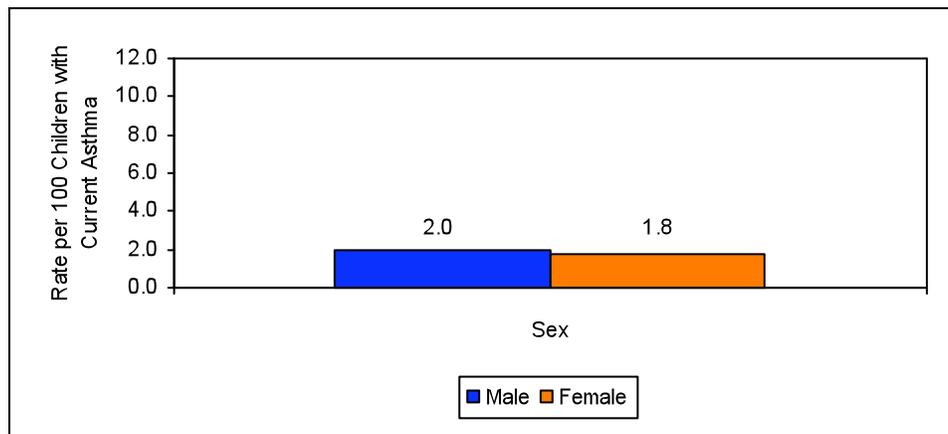
**Figure 4.16. Estimated asthma hospital discharge rate per 100 children ages 0-17 years with current asthma by race, Mississippi, 2007**



Source: Mississippi Asthma Hospital Discharge Database

Key Observations: Though childhood at-risk based asthma hospital discharge rates appear to differ by race, the difference is not statistically significant.

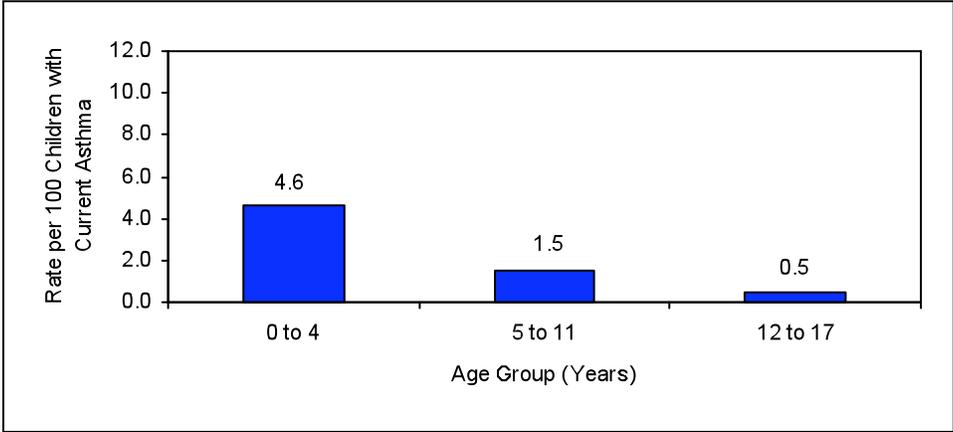
**Figure 4.17. Estimated asthma hospital discharge rate per 100 children ages 0-17 years with current asthma by sex, Mississippi, 2007**



Source: Mississippi Asthma Hospital Discharge Database

Key Observations: Though childhood at-risk based asthma hospital discharge rates appear to differ by sex, the difference is not statistically significant.

**Figure 4.18. Estimated asthma hospital discharge rate per 100 children ages 0-17 years with current asthma by age group, Mississippi, 2007**



Source: Mississippi Asthma Hospital Discharge Database

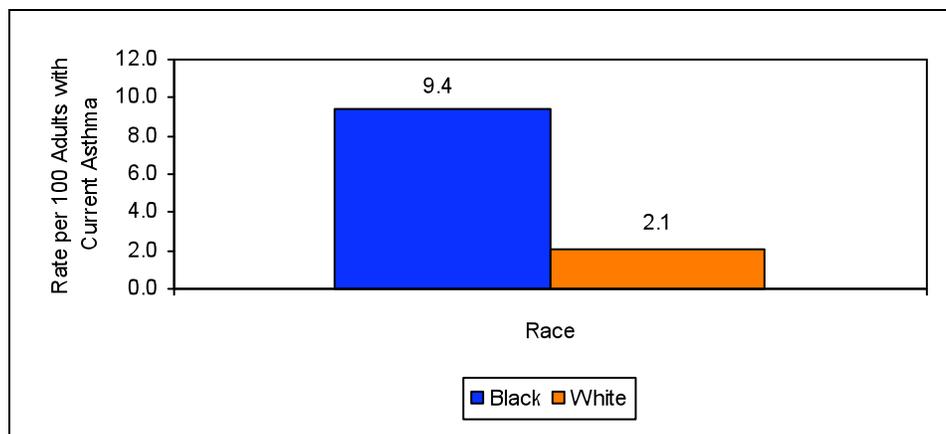
Key Observations: Though childhood at-risk based asthma hospital discharge rates appear to differ by age group, the difference is not statistically significant.

### At-Risk-Based Asthma Emergency Department Discharge Rates

At-risk based asthma emergency department rates among adult males and females are identical (4.6 per 100) indicating that the sex difference in population-based rates may be driven by disease prevalence (e.g. more adult females than males have asthma). At-risk based asthma emergency department rates by race and age group among adults show similar trends as population-based rates. At-risk based asthma emergency department rates were highest among black adults and adults ages 18-44 years. Males, blacks, and children ages 0-4 years had the highest at-risk based asthma emergency department rates among children. Unlike differences in population-based rates, none of the differences in at-risk based asthma emergency department rates were statistically significant ( $p > 0.05$  for all comparisons), indicating that differences in asthma emergency department rates may be driven by disease prevalence.

### Adult At-Risk Based Asthma Emergency Department Discharge Rates

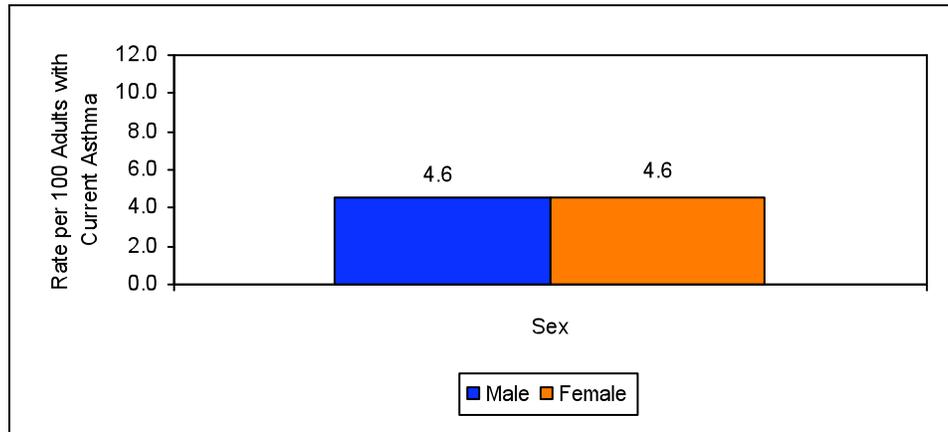
Figure 4.19. Estimated asthma emergency department discharge rate per 100 adults ages 18 years and above with current asthma by race, Mississippi, 2007



Source: Mississippi Asthma Hospital Discharge Database

Key Observations: Though adult at-risk based asthma emergency department discharge rates appear to differ by race, the difference is not statistically significant.

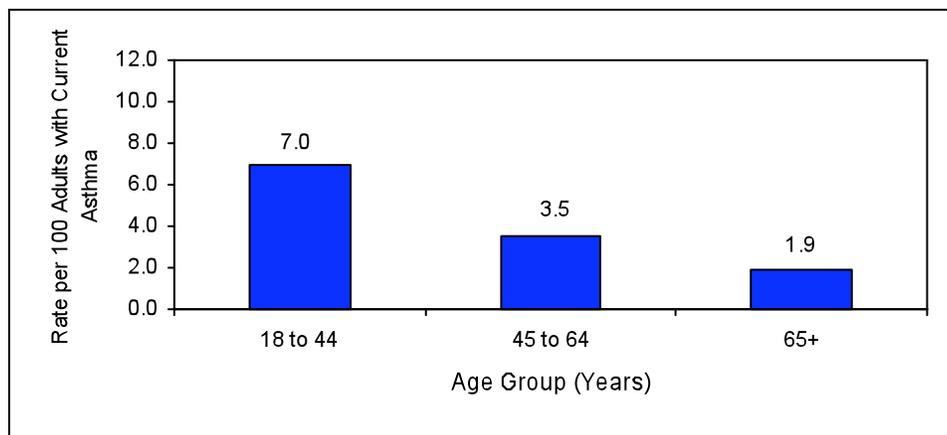
**Figure 4.20. Estimated emergency department discharge rate per 100 adults ages 18 years and above with current asthma by sex, Mississippi, 2007**



Source: Mississippi Asthma Hospital Discharge Database

Key Observations: There is no difference in adult at-risk based asthma emergency department discharge rates by sex.

**Figure 4.21. Estimated asthma emergency department discharge rate per 100 adults ages 18 years and above with current asthma by age group, Mississippi, 2007**

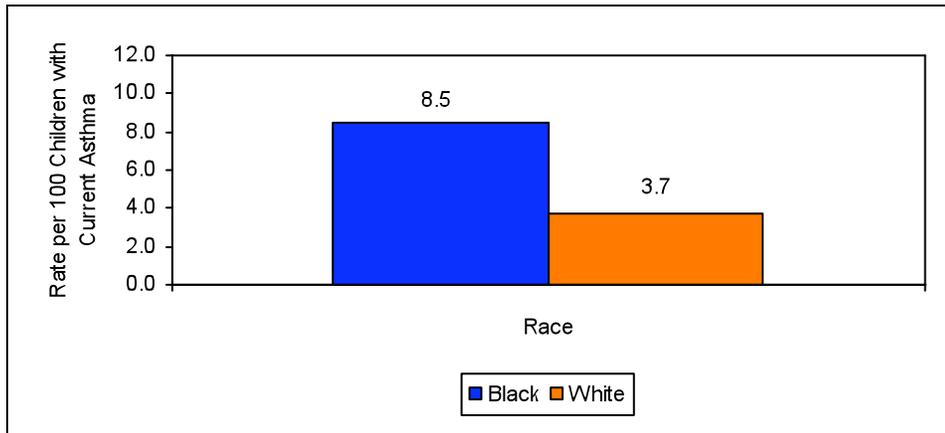


Source: Mississippi Asthma Hospital Discharge Database

Key Observations: Key Observations: Though adult at-risk based asthma emergency department discharge rates appear to differ by age group, the difference is not statistically significant.

## Childhood At-Risk Based Asthma Emergency Department Discharge Rates

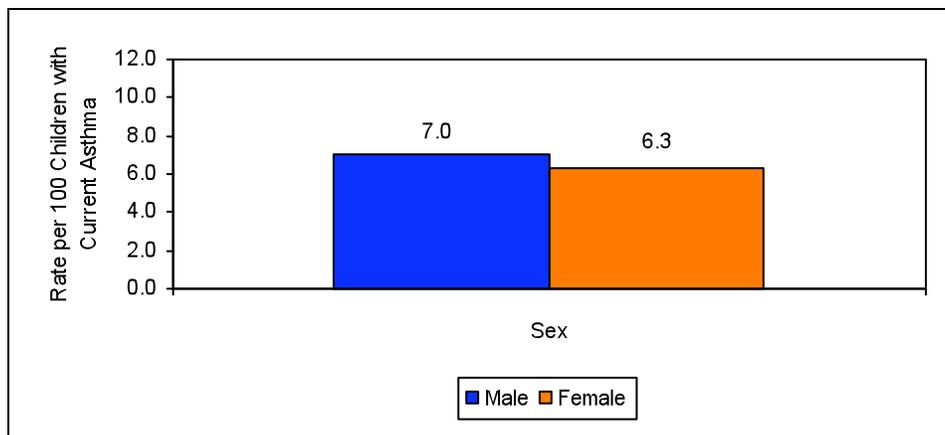
Figure 4.22. Estimated asthma emergency department discharge rate per 100 children ages 0-17 years with current asthma by race, Mississippi, 2007



Source: Mississippi Asthma Hospital Discharge Database

Key Observations: Key Observations: Though childhood at-risk based asthma emergency department discharge rates appear to differ by race, the difference is not statistically significant.

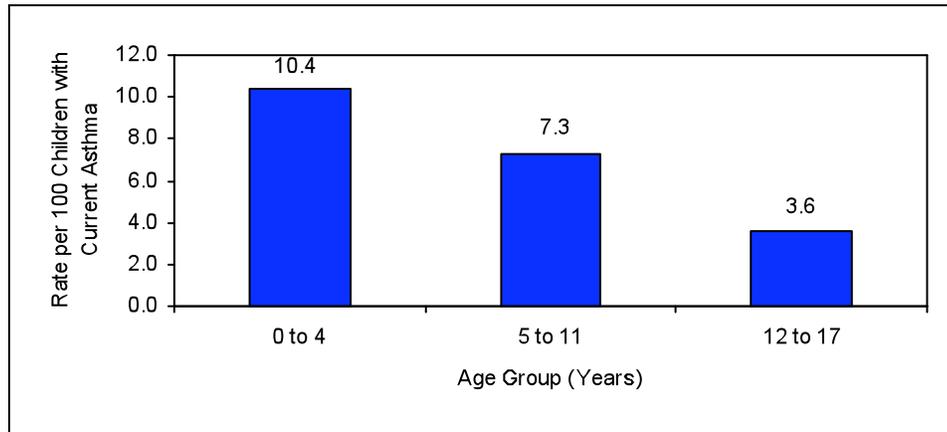
Figure 4.23. Estimated asthma emergency department discharge rate per 100 children ages 0-17 years with current asthma by sex, Mississippi, 2007



Source: Mississippi Asthma Hospital Discharge Database

Key Observations: Though childhood at-risk based asthma emergency department discharge rates appear to differ by sex, the difference is not statistically significant.

**Figure 4.24. Estimated asthma emergency department discharge rate per 100 children ages 0-17 years with current asthma by age group, Mississippi, 2007**



Source: Mississippi Asthma Hospital Discharge Database

Key observations: Though childhood at-risk based asthma emergency department discharge rates appear to differ by age group, the difference is not statistically significant.

## Conclusion

The data included in this report indicate that there are four populations experiencing a high burden of asthma in Mississippi. A summary of the data pertaining to each group is outlined below. To decrease the burden of asthma among the groups with the highest burden, the diverse group of partners represented by the Asthma Coalition of Mississippi should target evidence-based interventions to groups disproportionately affected by asthma.

### **Populations experiencing a high burden of asthma in Mississippi:**

**Children** – Approximately 77,000 Mississippi children ages 0-17 years have current asthma. Current asthma prevalence is higher among children (10.4%) than adults (6.6%). Current asthma prevalence is higher among black children (13.7%) than white children (7.6%) and higher among boys ages 0-17 years (12.4%) than girls of the same age group (8.4). Children ages 0-4 years experience the highest hospital and emergency department discharge rates due to asthma of any age group.

**Recommendations:** Evidence-based interventions should target parents and caregivers of children ages 0-4 years, the group with the highest asthma hospital discharge and emergency department rates.

**Blacks**– The asthma mortality rate is higher among blacks (2.4 per 100,000) compared to whites (0.6 per 100,000). Current asthma prevalence is higher among black children ages 0-17 (13.7%) compared to white children of the same age (7.6%), although current asthma prevalence does not differ among black adults ages 18 and above (6.8%) compared to white adults of the same age (6.6%). The asthma hospital discharge rate among black Mississippians of all ages (24 per 10,000) is more than two times higher than among white Mississippians (11 per 10,000). Asthma emergency department discharge rates among black Mississippians of all ages (87 per 10,000) were more than four times higher than among white Mississippians (20 per 10,000). In addition, asthma emergency department discharge rates among blacks increased from 2003-2007 while rates among whites did not change significantly during the same period (see figure 4.8).

**Recommendations:** Evidence-based interventions should target black Mississippians discharged from the emergency department with a primary diagnosis of asthma. Asthma emergency department rates among black Mississippians increased from 2003-2007, while rates among whites stayed the same. Additional surveillance is necessary to determine the reason for the increase, which may be affected by factors such as lack of access to primary care, environmental predictors, and/or asthma management skills.

**Adult Women** – Current asthma prevalence is higher among adult women ages 18 and above (8.3%) compared to adult men of the same age (4.7%). The asthma hospital and emergency department discharge rates among adult women are higher than the asthma hospital and emergency department discharge rates among adult men (see figures 4.5 and 4.11).

**Recommendations:** Evidence-based interventions should target adult women discharged from hospitals and emergency departments with a primary diagnosis of asthma.

**Mississippians of Low Socioeconomic Status** – Adults ages 18 years and above of low socioeconomic status have higher current asthma prevalence (10.2%) than adults of high socioeconomic status (4.8%). Low socioeconomic status predicts higher current asthma prevalence among both black and white adults. Additional data sources are needed to explore the effects of socioeconomic status on childhood asthma.

**Recommendations:** Evidence-based interventions should target adults with less than a high school diploma and/or a household income less than \$25,000.

**Residents of Humphreys, Leflore, Neshoba, Sunflower, Tishomingo, Washington, Wayne, and Winston Counties** – Residents of these eight counties experience the highest asthma hospital discharge and emergency department discharge rates in the state. The five counties with the highest asthma hospital discharge rates of the 69 (of 82) counties with available data are (1=highest) (1) Sunflower; (2) Wayne; (3) Tishomingo; (4) Humphreys and (5) Neshoba. The five counties with the highest asthma emergency department discharge rates of the 69 (of 82) counties with available data are (1=highest) (1) Humphreys; (2) Washington; (3) Leflore; (4) Sunflower; (5) Winston.

**Recommendations:** Interventions addressing access to and utilization of primary healthcare services for asthma, designed to prevent hospital and emergency department discharges, should be developed in partnership with healthcare providers located in and targeted to residents of Humphreys, Leflore, Neshoba, Sunflower, Tishomingo, Washington, Wayne, and Winston Counties.

### **Future Asthma Surveillance in Mississippi:**

The MSDH has identified five priorities for expanding asthma surveillance activities in the state:

**Improved childhood asthma data:** Since 2007, the MSDH has collected data through the BRFSS childhood callback module. This module includes questions on asthma symptoms, medication use, and activity limitations among children with asthma. Due to small response rates, three years of data need to be collected prior to analysis. Analysis will therefore begin in 2009.

**School-based data:** In 2008, the Mississippi Department of Education piloted data collection in a limited sample of school health offices. Data included information on asthma policies and procedures in school health offices as well as rates of school health office visits due to asthma. Data collection will be refined and expanded statewide in 2009.

**Cost data:** The current Hospital Discharge Database does not include cost data for asthma hospital and emergency department discharges. An updated, centralized system for hospital reporting to the MSDH is under development and will be operational in late 2009. This system will include cost of hospital visit data. In addition, in 2008 the MSDH partnered with the Mississippi Division of Medicaid to obtain data for the Mississippi population served by

Medicaid. Preliminary analysis of the Medicaid data, which includes asthma hospital, emergency department, primary care, and prescription costs, will be available in 2009.

**Pharmacological data:** In addition to the Medicaid data referenced above, the MSDH plans to work with Blue Cross and Blue Shield of Mississippi, which also manages SCHIP and government employee health plans, to obtain asthma pharmacological data.

**Expanded health services data:** The MSDH began expanding its asthma health services data with asthma hospital and emergency department discharge data in 2003 and Medicaid data in 2008. The Department plans to pursue additional partnerships with public and private insurers and with the Mississippi Community Health Centers to collect asthma patient data. In addition, the MSDH plans to conduct qualitative data collection investigating factors contributing to disparate asthma emergency department discharges among various demographic groups.

## **Appendix A**

### **Data Sources**

#### **Mississippi Vital Statistics**

The definition of death was adopted by the Mississippi Legislature in 1982, statute number 41-36-3.

**Death:** An individual who has sustained either (a) irreversible cessation of circulatory and respiratory functions or (b) irreversible cessation of all functions of the entire brain, including the brain stem, is dead. A determination of death must be made in accordance with accepted medical standards.

**Strengths:** Death counts from vital records are very accurate since virtually all deaths in Mississippi and the United States are reported. These records have been collected by states using standards outlined by NCHS, allowing for state-to-state comparisons.

**Limitations:** Cause of death is reported on death certificates by medical professionals using codes and rules outlined in the International Classification of Diseases (ICD) developed by the World Health Organization. These codes are periodically revised and these revisions sometimes result in changes to the way in which primary cause of death is determined and recorded. Therefore, trend analysis for certain causes of death are not possible across ICD versions. The new ICD-10 system, implemented in 1999, included new rules for recording respiratory deaths. The conversion from ICD-9 to ICD-10 accounts for an 11% decrease in asthma deaths between 1998 and 1999.

#### **Asthma Hospital Discharge Database**

From 2003 to 2007, the Asthma Hospital Discharge Database included a voluntary reporting system for hospital and emergency department discharge data. Discharge data was included in this report if a hospital reported to the MSDH for a minimum of three years between 2003 and 2007. Due to the voluntary nature of the system, from 2003 to 2007 13 of 94 hospitals failed to report three or more years of asthma data to the MSDH. State and county population estimates were obtained from the United States Census Bureau. Due to non-reporting hospitals, state population estimates were adjusted using the proportion of hospital beds accounted for by the hospitals reporting asthma data to the MSDH. Adjustments varied by year due to changes in reporting and hospital bed counts. The proportion of beds accounted for by hospitals reporting asthma data to the MSDH, by year, are as follows: 2003, 90.5%; 2004, 84.7%; 2005, 86.1%; 2006, 85.0%; 2007, 85.0% and 2003-2007 aggregate, 86.3%. Yearly and aggregate population estimates used to calculate asthma hospital and emergency department discharge rates were adjusted by the preceding percentages in order to estimate statewide asthma hospitalization rates.

An asthma hospital or emergency department discharge was defined as having a principal discharge diagnosis with an International Classification of Diseases, 9<sup>th</sup> Revision, Clinical Modification (ICD-9-CM) code of 493. Asthma discharge rates for a specific year were calculated by dividing the number of asthma emergency department discharges by the estimated population of that year and then multiplying by 10,000. Age-specific rates were calculated as crude rates and all other rates were age-adjusted to the 2000 United States Standard Population. Standard errors for the age-adjusted population-based rates were calculated as weighted linear combinations, assuming the population denominator was a constant<sup>7,8</sup>. Standard errors for the at-risk based rates, which used estimates of the number of persons with asthma in the denominator, were calculated using the formula for ratios and assumed independent observations<sup>9</sup>. Relative standard errors were calculated by dividing the standard errors by the estimates and multiplying by 100. Standard errors were used in significance tests, and relative standard errors were used to indicate unreliable estimates. Estimates were considered unreliable if the relative standard error of the estimate was 30%-50%. Estimates with a relative standard error exceeding 50% were not included in this report. All stated comparisons (e.g. higher, lower, increased, and decreased) indicate that a non-directional, two-tailed z-test was significant at the  $p < 0.05$  level<sup>8</sup>.

Five-year trends (2003-2007) are presented by state total, race, and sex. Aggregate 2003-2007 (calculated as the total number of asthma discharges over the five year period divided by the summed five-year population) asthma discharge rates are presented by state total, race, sex, age group, and county of residence. Race-specific rates for 2003-2007 were calculated for the categories 'white' and 'black'. Estimates for other races were unreliable and are not reported due to small population and numbers of asthma hospital discharges among these groups.

**Strengths:** The hospital discharge database contains information from hospitals representing 85% of acute hospital beds in the state. The information is collected and reported in a standard format.

**Limitations:** Reporting to the hospital database was voluntary until July 2008.

### **Behavioral Risk Factor Surveillance System (BRFSS)**

The BRFSS conducts interviews with adult Mississippi residents (18 years of age or older) whose household telephone number is included in the sampling frame. Since 2003, BRFSS has utilized a strategy known as Disproportionate Stratified Random sampling (DSS). Using this sampling method, telephone numbers are drawn from two strata (lists) that are based on the presumed density of known telephone household numbers. In this design, telephone numbers are classified into strata that are either high density (listed 1+ block telephone numbers) or medium density (not listed 1+ block telephone numbers) to yield residential telephone numbers. Telephone numbers in the high density stratum are sampled at the highest rate. The rate at which each stratum is sampled is called the sampling rate. The ratio of the sampling rate of one stratum to sampling rate of a reference stratum is called the sampling ratio.

The DSS design attempts to find a way of differentiating, before sampling begins, between a set of telephone numbers that contains a large proportion of target numbers (the high-density block) and a set that contains a smaller proportion of target numbers (the medium-density block). It is

possible to create more than two groups, but for BRFSS, only two groups are used. In this way, sampling telephone numbers is more efficient compared to simple random sampling.

**Strengths:** Data on multiple topics are collected, allowing for analysis of associations between asthma and other risk behaviors, health conditions, and demographic characteristics. BRFSS data have been collected in a standard, reliable format for 23 years, allowing for analysis of time trends. BRFSS data are collected using a standard methodology in all states, allowing for state-to-state comparisons.

**Limitations:** Only civilian, non-institutionalized persons 18 years of age and older who reside in households with telephones are eligible to be called for the survey. Therefore, state residents not included in this population are not represented in the prevalence estimates. In addition, BRFSS data must be interpreted with caution because they are self-reported. Individuals may have difficulty recalling past behavior or may understate behaviors known to be unhealthy, socially acceptable, or illegal.

## **Appendix B**

### **Methodology**

#### **Rates**

A rate is a measure of some event, disease or condition in relation to a unit of population, along with some specification of time. Rates are calculated by dividing the number of events in a given period by the number of people at risk of experiencing the event in that time period. Counts of events or conditions are obtained or estimated from multiple sources such as surveys and vital records. Population counts are obtained from the U. S. Census Bureau. Rates can be affected by changes and/or differences in the number of events and/ or the size of the population.

Age adjustment is a common method for standardizing rates to eliminate the effects of population changes or differences. Age-adjusted rates are computed by applying age-specific rates in a population of interest to a standardized age distribution.

#### **At-risk based rates**

At-risk based rates were calculated by dividing the number of asthma hospitalizations/Emergency Department visits among a given population by the estimated number of persons with current asthma in the population. At-risk based rates allow for comparison of asthma hospitalizations and emergency department visits among groups with varied asthma prevalence. Standard errors for at-risk-based rates, which use estimates of the number of persons with asthma in the denominator rather than a population constant, were calculated using the formula for ratios and assumed independent observations (covariance = 0)<sup>9</sup>. Relative standard errors were calculated by dividing the standard errors by the estimates and multiplying by 100. Standard errors were used in significance tests, and relative standard errors were used to indicate unreliable estimates. Estimates with a relative standard error of 30%-50% were considered unreliable and estimates with a relative standard error of greater than 50% were suppressed<sup>8</sup>.

#### **Estimates and Confidence Intervals**

Rates calculated from surveys are considered estimates since they are based on responses from a sample of the population of interest, rather than the entire population. Confidence intervals account from sampling and non-sampling errors in data collection and are an indication of reliability and precision of an estimate. They represent the range of values among which the true value would be found. This report represents 95% confidence intervals (95% CIs), meaning that the true value would be within the given interval 95% of the time.

## Confidence Intervals for BRFSS Estimates

- Confidence intervals for BRFSS were derived from the survey procedures in SAS, a statistical software package.

## Significance

Significant is a term used to describe rates that have been tested and found to be statistically different. In this report, two rates are said to be significantly different when the 95% confidence limits associated with each of the rates do not overlap.

## Reliability of Rates

Reliability refers to the precision of a rate. If a rate is termed reliable, there is a confidence that the same or a very similar rate would be obtained if the data were collected again within the same time period and under similar conditions. Rates that are determined to be unreliable may not reflect the true prevalence; therefore, they should be reported and interpreted with caution.

The CDC recommends the following criteria for assessing the reliability of rates.

1. The number of responses or events that the rate is based on. Rates calculated from BRFSS should be based on at least 50 survey responses. Mortality rates should be based on at least 20 deaths.
2. The width or range of the 95% CI. Rates in which the width of the corresponding 95% CI is greater than 20 should be interpreted with caution.
3. The magnitude of the relative standard error (RSE). The RSE of the rate should be less than 30.0. The RSE is obtained by dividing the standard error of the estimate by the estimate itself.

Several analysis techniques can be used to increase the reliability of rates. When doing subgroup analysis, categories can be collapsed. For example age can be collapsed into 3 categories instead of 6. This option is ideal when it is important to report individual year estimates. Another method is to calculate a multi-year estimate by combining two or more years of data. This technique is useful for 1) producing a stable estimate when the yearly estimates are highly variable and 2) obtaining a large enough number of responses to produce an estimate for a small population or uncommon event. Both of these methods have been used throughout this report.

**APPENDIX C**

**ASTHMA MORTALITY  
DETAILED TABLES**

**Table 1.1. Rate of asthma deaths per 100,000 population by year, Mississippi, 2000-2007**

Year	Number	Rate
2000	60	2.2
2001	50	1.8
2002	52	1.9
2003	34	1.2
2004	46	1.6
2005	49	1.7
2006	46	1.6
2007	35	1.2
Total	476	1.7

**Table 1.2. Rate of asthma deaths per 100,000 population by year and race, Mississippi, 2000-2007**

Year	White		Black		Other		Total	
	Number	Rate	Number	Rate	Number	Rate	Number	Rate
2000	22	1.2	38	5	0	0	60	2.2
2001	20	1	30	3.7	0	0	50	1.8
2002	25	1.4	25	2.7	2	7.7	52	1.9
2003	12	0.6	22	2.7	0	0	34	1.2
2004	13	0.7	33	3.7	0	0	46	1.6
2005	18	0.9	31	3.5	0	0	49	1.7
2006	16	0.7	30	3.2	0	0	46	1.6
2007	12	0.6	23	2.4	0	0	35	1.2
Total	174	0.9	300	3.6	2	0.7	476	1.7

\*Rates in the shaded cells shaded are based on less than 20 events and are unreliable.

**Table 1.3. Rate of asthma deaths per 100,000 population by year and sex, Mississippi, 2000-2007**

Year	Male		Female		Total	
	Number	Rate	Number	Rate	Number	Rate
2000	20	1.6	40	2.6	60	2.2
2001	22	1.8	28	1.8	50	1.8
2002	19	1.6	33	2.1	52	1.9
2003	9	0.7	25	1.6	34	1.2
2004	20	1.4	26	1.7	46	1.6
2005	21	1.6	28	1.8	49	1.7
2006	14	1.1	32	2	46	1.6
2007	16	1.2	19	1.2	35	1.2
Total	141	1.4	231	1.8	372	1.6

Source: MS Vital Statistics

\*Rates in the shaded cells shaded are based on less than 20 events and are unreliable.

**Table 1.4. Rate of asthma deaths per 100,000 population by age group, Mississippi, 2000-2007**

Age Group (Years)	Rate
0-4	0.1
5-14	0.3
15-24	0.3
25-34	0.9
35-44	1.4
45-54	1.8
55-64	2.4
65-74	2.7
75-84	5.1
85 +	8.9

Source: MS Vital Statistics

\*Rates in the shaded cells shaded are based on less than 20 events and are unreliable.

**ADULT ASTHMA PREVALENCE  
DETAILED TABLES**

**Table 2.1. Adult lifetime asthma prevalence, Mississippi vs. United States, 2000-2007**

	US	95% CI		MS	95% CI	
Year	%	Lower	Upper	%	Lower	Upper
2000	10.4	10.2	10.7	9.8	8.3	11.3
2001	11.0	10.8	11.2	9.2	8.0	10.4
2002	11.8	11.6	12.0	10.6	9.3	11.9
2003	11.9	11.6	12.1	10.9	9.8	12.0
2004	13.3	13.1	13.6	11.8	10.7	12.9
2005	12.5	12.2	12.7	11.1	9.9	12.3
2006	12.8	12.5	13.0	11.5	10.4	12.6
2007	12.9	12.7	13.2	11.0	10.0	12.0

Source: Behavioral Risk Factor Surveillance System

**Table 2.2. Adult current asthma prevalence, Mississippi vs. United States, 2000-2007**

	US	95% CI		MS	95% CI	
Year	%	Lower	Upper	%	Lower	Upper
2000	7.2	7.0	7.4	6.8	5.5	8.1
2001	7.2	7.0	7.4	5.5	4.6	6.4
2002	7.5	7.3	7.7	6.1	5.3	6.9
2003	7.7	7.5	7.9	6.9	6.0	7.8
2004	8.1	7.9	8.3	7.1	6.3	7.9
2005	7.9	7.7	8.0	7.2	6.3	8.1
2006	8.2	8.0	8.4	6.9	6.1	7.7
2007	8.2	8.1	8.4	6.6	5.8	7.4

Source: Behavioral Risk Factor Surveillance System

**Table 2.3. Adult current asthma prevalence by race, Mississippi, 2007**

Race	Weighted Frequency	%	95% CI	
			Lower	Upper
White	89,032	6.6	5.7	7.5
Black	79,910	6.8	5.3	8.3

Source: Behavioral Risk Factor Surveillance System

**Table 2.4. Adult current asthma prevalence by sex, Mississippi, 2007**

Sex	Weighted Frequency	%	95% CI	
			Lower	Upper
Male	48,944	4.7	3.6	5.8
Female	95,065	8.3	7.3	9.3

Source: Behavioral Risk Factor Surveillance System

**Table 2.5. Adult current asthma prevalence by age group, Mississippi, 2007**

Age Group (Years)	Weighted Frequency	%	95% CI	
			Lower	Upper
18-44	59,104	5.3	4.1	6.6
45-64	56,397	7.9	6.8	9.0
65+	28,507	7.8	6.5	9.0

Source: Behavioral Risk Factor Surveillance System

**Table 2.6. Adult current asthma prevalence by educational level, Mississippi, 2003-2007**

Educational Level	Weighted Frequency	%	95% CI	
			Lower	Upper
No H. S. Diploma	196,559	10.6	9.5	11.6
H. S. Graduate	272,942	7.7	7.0	8.5
Some College	156,831	5.7	5.0	6.3
College Graduate	117,726	4.6	4.0	5.2

Source: Behavioral Risk Factor Surveillance System

**Table 2.7. Adult current asthma prevalence by educational level and race, Mississippi, 2003-2007**

Educational Level	Whites		95% CI		Black		95% CI	
	Weighted Frequency	%	Lower	Upper	Weighted Frequency	%	Lower	Upper
No H. S. Diploma	104,050	12.0	10.4	13.5	75,312	8.8	7.3	10.2
H. S. Graduate	157,951	7.6	6.6	8.5	100,328	8.0	6.6	9.4
Some College	103,593	5.7	4.8	6.5	47,633	5.8	4.6	6.9
College Graduate	85,343	4.6	4.0	5.2	26,855	5.0	3.5	6.5

Source: Behavioral Risk Factor Surveillance System

**Table 2.8. Adult current asthma prevalence by educational level and sex, Mississippi, 2003-2007**

Educational Level	Males		95% CI		Females		95% CI	
	Weighted Frequency	%	Lower	Upper	Weighted Frequency	%	Lower	Upper
No H. S. Diploma	75,705	8.4	6.7	10.1	120,851	12.6	11.3	13.9
H. S. Graduate	106,310	6.2	5.0	7.4	166,632	9.1	8.2	10.1
Some College	46,018	3.7	2.8	4.6	110,813	7.3	6.3	8.3
College Graduate	41,138	3.3	2.6	4.1	76,588	5.8	5.0	6.7

Source: Behavioral Risk Factor Surveillance System

**Table 2.9. Adult current asthma prevalence by annual household income, Mississippi, 2003-2007**

Income (US Dollars)	Weighted Frequency	%	95% CI	
			Lower	Upper
<\$25,000	356,031	10.2	9.4	11.0
\$25,000-\$49,999	147,339	5.2	4.6	5.9
\$50,000+	123,944	4.4	3.8	5.0

Source: Behavioral Risk Factor Surveillance System

**Table 2.10. Adult current asthma prevalence by annual household income and race, Mississippi, 2003-2007**

Income (US Dollars)	Whites		95% CI		Blacks		95% CI	
	Weighted Frequency	%	Lower	Upper	Weighted Frequency	%	Lower	Upper
<\$25,000	178,109	11.3	10.1	12.4	153,666	9.0	7.9	10.1
\$25,000-\$49,999	95,593	5.2	4.5	6.0	44,209	5.2	4.0	6.6
\$50,000+	101,157	4.3	3.7	5.0	17,325	4.6*	2.7	6.5

Source: Behavioral Risk Factor Surveillance System

\*Unweighted sample size is less than 50; results may be unreliable.

**Table 2.11. Adult current asthma prevalence by socioeconomic status (SES), 2003-2007**

Socioeconomic Status	Weighted Frequency	%	95% CI	
			Lower	Upper
Low	356,031	10.2	9.4	11.0
High	271,283	4.8	4.4	5.2

Source: Behavioral Risk Factor Surveillance System

Low SES= “Fewer than 12 years of education and a household income < \$25,000”; High SES= “12 or more years of education and a household income ≥ \$25,000”

**Table 2.12. Adult current asthma prevalence by socioeconomic status (SES) and race, Mississippi, 2003-2007**

Socioeconomic Status	Whites		95% CI		Blacks		95% CI	
	Weighted Frequency	%	Lower	Upper	Weighted Frequency	%	Lower	Upper
Low	186,521	11.3	10.2	12.5	162,323	9.3	8.1	10.4
High	202,111	4.8	4.3	5.2	62,528	5.0	4.0	6.1

Source: Behavioral Risk Factor Surveillance System

Low SES= “Fewer than 12 years of education and a household income < \$25,000”; High SES= “12 or more years of education and a household income ≥ \$25,000”

**Table 2.13. Adult current asthma prevalence by public health district, Mississippi, 2003-2007**

District	%	95% CI	
		Lower	Upper
I (Northwest)	7.9	6.5	9.3
II (Northeast)	7.9	6.8	9.0
III (Delta)	7.8	6.3	9.3
IV (Tombigbee)	6.6	5.4	7.9
V (West Central)	6.1	5.3	6.9
VI (East Central)	6.3	5.1	7.6
VII (Southwest)	6.9	5.5	8.4
VIII (Southeast)	7.3	6.1	8.5
IX (Coast)	6.5	5.5	7.5

Source: Behavioral Risk Factor Surveillance System

**CHILDHOOD ASTHMA PREVALENCE  
DETAILED TABLES**

**Table 2.17. Lifetime vs. current asthma prevalence among children ages 0-17 years, Mississippi, 2007**

Asthma Classification	Weighted Frequency	%	95% CI
Lifetime	109,587	14.8	12.8-16.6
Current	76,710	10.4	8.7-11.9

Source: Behavioral Risk Factor Surveillance System

**Table 2.18. Lifetime vs. current asthma prevalence among high school students, Mississippi, 2007**

Asthma Classification	%	95% CI
Lifetime	17.2	15.4-19.3
Current	8.4	7.2-9.8

Source: Youth Risk Behavior Survey

**Table 2.19. Current asthma prevalence among children ages 0-17 years by race, Mississippi, 2007**

Race	Weighted Frequency	%	95% CI
White	28,282	7.6	5.8-9.3
Black	45,696	13.7	10.7-16.6

Source: Behavioral Risk Factor Surveillance System

**Table 2.20. Current asthma prevalence among high school students by race, Mississippi, 2007**

Race	Lifetime		Current	
	%	95% CI	%	95% CI
Black	18.1	15.5-21.0	9.3	7.3-11.8
White	16.5	13.0-20.8	7.4	5.6-9.8

Source: Youth Risk Behavior Survey,

**Table 2.21. Current asthma prevalence among children ages 0-17 years by sex, Mississippi, 2007**

Sex	Weighted Frequency	%	95% CI
Males	46,572	12.4	9.8-14.9
Females	30,138	8.4	6.3-10.4

Source: Behavioral Risk Factor Surveillance System

**Table 2.22. Current asthma prevalence among high school students by sex, Mississippi, 2007**

Sex	Lifetime		Current	
	%	95% CI	%	95% CI
Male	18.9	17.0-21.0	8.6	6.7-11.0
Female	15.7	12.9-19.0	8.3	6.7-10.2

Source: Youth Risk Behavior Survey

**Table 2.23. Current asthma prevalence among children ages 0-17 years by age group, Mississippi, 2007**

Age Group (Years)	Weighted Frequency	%	95% CI
0-4	19,097	9.3*	6.0-12.6
5-11	29,388	10.4	7.8-13.1
12-17	28,225	11.3	8.7-14.0

Source: Behavioral Risk Factor Surveillance System

\*Unweighted sample size less than 50; results may be unreliable.

**Table 2.24. Current asthma prevalence among high school students by age group, Mississippi, 2007**

Age Group (Years)	%	95% CI	%	95% CI
15 or younger	18.2	14.8-22.2	10.0	7.4-13.3
16 or 17	17.8	15.4-20.6	8.4	6.9-10.2
18 or older	12.6	8.8-17.7	5.3	3.6-7.7

Source: Youth Risk Behavior Survey, 2007

### ASTHMA SYMPTOMS DETAILED TABLES

**Table 3.1. Percent of adults with current asthma experiencing one or more asthma episodes in the past 12 months, Mississippi, 2007**

Asthma Attack Status	Weighted Frequency	%	95% CI
Asthma Attack	74,814	56.5	50.7-62.3
No Asthma Attack	57,597	43.5	37.7-49.3

Source: Behavioral Risk Factor Surveillance System

**Table 3.2. Percent of adults with current asthma experiencing one or more asthma episodes in the past 12 months by race, Mississippi, 2007**

Race	Weighted Frequency	%	95% CI
White	49,135	57.8	50.7-64.9
Black	22,649	54.6	43.2-65.9

Source: Behavioral Risk Factor Surveillance System

**Table 3.3. Percent of adults with current asthma experiencing one or more asthma episodes in the past 12 months by sex, Mississippi, 2007**

Sex	Weighted Frequency	%	95% CI
Male	26,793	57.6	45.4-69.8
Female	48,021	55.9	49.9-62.0

Source: Behavioral Risk Factor Surveillance System

**Table 3.4. Frequency of asthma symptoms among adults with current asthma in the past 30 days, Mississippi, 2007**

Asthma Symptom Frequency	2007		
	Weighted Frequency	%	95% CI
Never	31,072	24.4	18.6-30.2
Less than Once a Week	22,903	18.0	13.6-22.3
Once or twice a week	33,027	25.9	20.5-31.4
2+ times a week but not every day	16,016	12.6	8.6-16.6
Every day	24,329	19.1	15.0-23.2

Source: Behavioral Risk Factor Surveillance System

**Table 3.5. Frequency of sleep disturbances among adults with current asthma in the past 30 days, Mississippi, 2007**

Sleep Disturbance Frequency	Weighted Frequency	%	95% CI
0 Days	42,115	43.4	37.0-49.8
1-4 Days	37,153	38.3	31.5-45.0
5 or More Days	17,782	18.3	13.9-22.7

Source: Behavioral Risk Factor Surveillance System

**ASTHMA SEVERITY  
DETAILED TABLES**

**Table 3.6. Severity classifications among adults with current asthma, Mississippi, 2003-2007**

Severity Classification	Weighted Frequency	%	95% CI
Intermittent	141,066	45.8	41.6-50.0
Mild persistent	46,072	15.0	12.0-17.9
Moderate persistent	61,476	20.0	16.9-23.1
Severe persistent	59,215	19.2	16.2-22.3

Source: Behavioral Risk Factor Surveillance System

**ASTHMA MANAGEMENT  
DETAILED TABLES**

**Table 3.7. Controller medication use among adults with current asthma in the past 30 days, Mississippi, 2007**

Controller Medication Use	Weighted Frequency	%	95% CI
Never	52,728	41.2	35.3-47.0
1-14 Days	29,925	23.4	17.4-29.3
15-24 Days	4,466	3.5	1.3-5.6
25-30 Days	40,969	32.0	26.9-37.1

Source: Behavioral Risk Factor Surveillance System

**Table 3.8. Quick-relief inhaler use among adults with current asthma in the past 30 days, Mississippi, 2007**

Quick-relief Inhaler Use	Weighted Frequency	%	95% CI
None	112,778	42.3	37.8-46.7
1-4 times	91,311	34.2	29.6-39.0
5-29 times	31,214	11.7	9.3-14.1
30 or more times	31,492	11.8	9.5-14.1

Source: Behavioral Risk Factor Surveillance System

**QUALITY OF LIFE  
DETAILED TABLES**

**Table 3.9. Percent of adults with current asthma unable to work or carry out usual activities due to asthma in the past 12 months, Mississippi, 2007**

Days	Weighted Frequency	%	95% CI
No days	249,650	64.9	61.3-68.5
1-6 days	69,484	18.1	14.9-21.3
Greater than or equal to 7 days	65,437	17.0	14.4-19.6

Source: Behavioral Risk Factor Surveillance System

**Table 3.10. Percent of adults with current asthma unable to work or carry out usual activities due to asthma in the past 12 months by race, Mississippi, 2007**

Days	Whites			Blacks		
	Weighted Frequency	%	95% CI	Weighted Frequency	%	95% CI
No days	176,272	69.8	65.5-74.1	69,210	55.1	48.3-62.0
1-6 days	40,842	16.2	12.3-20.1	27,711	22.1	16.2-27.9
Greater than or equal to 7 days	35,357	14.0	11.3-16.7	28,649	22.8	17.3-28.3

Source: Behavioral Risk Factor Surveillance System

**Table 3.11. Percent of adults with current asthma unable to work or carry out usual activities due to asthma in the past 12 months by sex, Mississippi, 2007**

Days	Males			Females		
	Weighted Frequency	%	95% CI	Weighted Frequency	%	95% CI
No days	90,435	62.8	55.4-70.2	159,214	66.2	62.5-69.9
1-6 days	29,806	20.7*	13.7-27.7	39,679	16.5	13.7-19.3
Greater than or equal to 7 days	23,805	16.5	11.4-21.6	41,632	17.3	14.5-20.1

Source: Behavioral Risk Factor Surveillance System

\*Unweighted sample size less than 50; data may be unreliable

**ASTHMA COMORBIDITIES  
DETAILED TABLES**

**Table 3.12. Adult current asthma prevalence by body mass index, Mississippi, 2007**

Body Mass Index Classification	Weighted Frequency	%	95% CI
Normal	191,308	5.5	4.9-6.2
Overweight/Obese	523,859	7.6	7.1-8.1

Source: Behavioral Risk Factor Surveillance System

**Table 3.13. Adult current asthma prevalence by smoking status, Mississippi, 2007**

Body Mass Index Classification	Weighted Frequency	%	95% CI
Normal	191,308	5.5	4.9-6.2
Overweight/Obese	523,859	7.6	7.1-8.1

Source: Behavioral Risk Factor Surveillance System

**ASTHMA HOSPITAL DISCHARGE  
DETAILED TABLES**

**Table 4.1. Estimated asthma hospital discharge rate per 10,000 population by year, Mississippi, 2003-2007\***

Year	Estimated Frequency	Rate*	95% CI
2003	5,059	17.7	17.2-18.2
2004	4,753	16.7	16.2-17.2
2005	5,926	20.6	20.1-21.2
2006	4,709	16.3	15.8-16.8
2007	4,695	16.1	15.6-16.6

Source: Mississippi Asthma Hospital Discharge Database

\*Age-adjusted rate per 10,000 population

**Table 4.2. Estimated asthma hospital discharge rate per 10,000 population by year and race, Mississippi, 2003-2007\***

Year	Black			White		
	Estimated Frequency	Rate*	95% CI	Estimated Frequency	Rate*	95% CI
2003	2,870	27.7	26.6-28.8	2,086	11.6	11.1-12.2
2004	2,666	25.7	24.6-26.7	1,464	11.1	10.6-11.7
2005	3,292	31.8	30.6-33.0	2,496	13.7	13.1-14.3
2006	2,851	24.8	23.7-25.9	1,926	10.6	10.1-11.1
2007	2,576	24.1	23.0-25.1	2,018	11.0	10.4-11.5

Source: Mississippi Asthma Hospital Discharge Database

\*Age-adjusted rate per 10,000 population

**Table 4.3. Estimated asthma hospital discharge rate per 10,000 population by year and sex, Mississippi, 2003-2007**

Year	Male			Female		
	Estimated Frequency	Rate*	95% CI	Estimated Frequency	Rate*	95% CI
2003	1,991	14.2	13.5-14.9	3,068	20.5	19.8-21.3
2004	1,947	13.9	13.2-14.6	2,806	18.8	18.1-19.6
2005	2,256	16.1	15.4-16.8	3,670	24.4	23.6-25.3
2006	1,739	12.3	11.7-12.9	2,970	19.6	18.9-20.4
2007	1,799	12.5	11.9-13.1	2,896	18.9	18.2-19.6

Source: Mississippi Asthma Hospital Discharge Database

\*Age-adjusted rate per 10,000 population

**Table 4.4. Estimated asthma hospital discharge rate per 10,000 population by age group, Mississippi, 2003-2007\***

Age (Years)	Estimated Frequency	Rate*	Lower 95% CI
0-4	5,227	49.8	48.4-51.3
5-11	2,696	19.0	18.2-19.7
12-17	1,019	7.9	7.4-8.4
18-44	5,301	10.0	9.7-10.3
45-64	6,126	18.1	17.6-18.5
65+	4,773	27.6	26.8-28.5

Source: Mississippi Asthma Hospital Discharge Database

\*Age-adjusted rate per 10,000 population

**Table 4.5. Estimate asthma hospital discharge rate per 10,000 population by age and sex, Mississippi, 2003-2007\***

Age (Years)	Male			Female		
	Estimated Frequency	Rate*	95% CI	Estimated Frequency	Rate*	95% CI
0-4	3,379	63.0	60.8-65.3	1,848	36.0	34.2-37.7
5-11	1,703	23.5	22.3-24.6	993	14.3	13.4-15.2
12-17	537	8.1	7.4-8.9	482	7.6	6.9-8.3
18-44	1,332	5.1	4.8-5.4	3,969	14.7	14.3-15.2
45-64	1,637	10.0	9.5-10.6	4,489	25.4	24.6-26.2
65+	1,144	16.7	15.7-17.7	3,629	35.0	33.8-36.2

Source: Mississippi Asthma Hospital Discharge Database

\*Age-adjusted rate per 10,000 population

**Map 4.1. Estimated asthma hospital discharge rate per 10,000 population by county of residence, Mississippi, 2003-2007**

County	Total**	White*	Black*	Male*	Female*
Adams	Data not available due to non-reporting hospital				
Alcorn	19.6	16.0	49.0	14.7	23.7
Amite	9.3	7.3	13.5	7.1	11.3
Attala	18.6	10.1	34.3	14.9	21.4
Benton	4.1	2.7	7.3	3.2	4.7
Bolivar	33.6	26.8	44.5	28.0	41.5
Calhoun	20.4	16.4	29.0	11.7	27.2
Carroll	18.6	13.1	31.4	17.1	20.3
Chickasaw	15.6	7.5	27.5	11.5	19.0
Choctaw	22.3	15.2	38.2	5.0	45.4
Claiborne	Data not available due to non-reporting hospital				
Clarke	Data not available due to non-reporting hospital				
Clay	21.8	15.7	29.0	16.2	25.9
Coahoma	34.3	15.0	44.8	29.4	37.5
Copiah	16.1	12.5	23.0	13.3	17.8
Covington	13.6	12.5	19.5	13.8	16.5
DeSoto	Data not available due to non-reporting hospital				
Forrest	26.5	26.9	24.8	22.7	29.2
Franklin	17.4	15.6	24.4	14.2	19.6
George	18.4	15.6	46.5	13.1	22.9
Greene	10.6	7.3	26.4	7.7	13.6
Grenada	17.4	14.0	25.2	10.3	23.2
Hancock	8.3	7.8	15.3	7.2	13.7
Harrison	Data not available due to non-reporting hospital				
Hinds	19.2	9.0	28.1	94.4	99.5
Holmes	28.7	16.8	34.8	25.2	30.4

Humphreys	37.2	15.9	49.2	20.4	51.1
Issaquena	9.5	2.0	18.3	11.6	7.9
Itawamba	10.5	9.0	27.9	8.6	12.0
Jackson	9.1	5.9	14.7	8.6	9.4
Jasper	13.3	8.3	16.3	12.6	13.7
Jefferson	23.0	5.2	29.5	19.1	26.9
Jefferson Davis	9.8	9.1	11.6	8.2	11.2
Jones	21.6	13.3	45.1	17.1	25.4
Kemper	11.7	8.1	15.0	13.2	10.3
Lafayette	Data not available due to non-reporting hospital				
Lamar	6.2	5.3	13.7	4.1	8.1
Lauderdale	15.6	13.0	20.5	13.7	16.6
Lawrence	31.6	30.9	33.7	22.7	39.2
Leake	18.3	12.3	27.3	15.4	20.8
Lee	12.4	8.6	24.1	9.9	14.6
Leflore	36.0	24.9	47.4	37.5	34.2
Lincoln	29.6	22.4	54.5	23.6	35.1
Lowndes	Data not available due to non-reporting hospital				
Madison	10.8	6.0	21.0	8.3	12.4
Marion	13.9	13.0	16.0	12.2	15.2
Marshall	3.7	2.0	6.4	2.8	4.5
Monroe	16.0	12.5	27.2	15.0	16.1
Montgomery	35.8	19.4	66.7	27.9	42.1
Neshoba	36.6	13.9	41.5	13.2	12.8
Newton	14.5	9.2	27.8	11.5	17.1
Noxubee	12.9	3.6	18.9	10.9	14.4
Oktibbeha	7.4	4.1	14.0	7.0	7.5
Panola	8.4	5.7	12.9	7.2	9.2
Pearl River	6.9	5.6	12.4	5.2	8.5
Perry	Data not available due to non-reporting hospital				
Pike	31.7	20.7	43.2	20.5	41.1
Pontotoc	7.8	7.7	9.7	5.0	10.4
Prentiss	Data not available due to non-reporting hospital				
Quitman	27.7	16.6	32.6	26.3	28.4
Rankin	13.1	12.4	18.1	9.3	16.6
Scott	Data not available due to non-reporting hospital				
Sharkey	10.3	5.1	15.3	13.0	7.8
Simpson	21.7	14.4	33.8	20.7	22.2
Smith	11.9	6.8	21.3	12.1	11.5
Stone	7.4	7.2	10.7	3.3	11.2
Sunflower	49.0	28.1	64.9	39.4	58.0
Tallahatchie	Data not available due to non-reporting hospital				
Tate	10.3	2.7	13.2	8.2	12.1
Tippah	12.8	13.2	10.6	7.8	17.1
Tishomingo	38.0	37.2	53.2	37.5	48.8

Tunica	4.6	2.1	6.4	2.0	6.9
Union	Data not available due to non-reporting hospital				
Walthall	33.9	24.1	49.5	23.0	43.4
Warren	24.8	18.3	36.8	13.9	33.4
Washington	34.4	22.6	45.7	30.2	36.5
Wayne	39.8	29.9	54.3	23.9	52.3
Webster	22.1	20.3	31.0	14.4	29.1
Wilkinson	Data not available due to non-reporting hospital				
Winston	17.2	13.8	23.5	13.7	20.7
Yalobusha	29.4	29.7	30.0	22.3	35.2
Yazoo	22.5	17.8	26.1	34.5	21.2

Source: Mississippi Asthma Hospital Discharge Database

\*Rates are age-adjusted to the US 2000 standard population

+ Total includes 'other' and 'unknown' races

### ASTHMA EMERGENCY DEPARTMENT DISCHARGE DETAILED TABLES

**Table 4.7. Estimated asthma hospital discharge rate per 10,000 population by county of residence, Mississippi, 2003-2007\***

Year	Estimated Frequency	Rate*	95% CI
2003	11,046	38.7	37.9-39.4
2004	10,668	37.7	37.0-38.5
2005	12,374	43.4	42.7-44.3
2006	12,439	43.9	43.1-44.7
2007	13,592	47.7	46.9-48.6

Source: Mississippi Asthma Hospital Discharge Database

\*Age-adjusted rate per 10,000 population

**Table 4.8. Estimated asthma emergency department discharge rate per 10,000 population by year and race, Mississippi, 2003-2007\***

Year	Black			White		
	Estimated Frequency	Rate*	95% CI	Estimated Frequency	Rate*	95% CI
2003	7,967	69.2	67.6-70.9	3,223	19.2	18.5-19.8
2004	7,543	68.4	66.7-70.0	2,955	17.8	17.2-18.5
2005	8,517	77.1	75.4-78.9	3,443	20.5	19.8-21.2
2006	8,702	78.2	76.4-79.9	2,953	17.9	17.2-18.6
2007	9,763	87.2	85.4-89.1	3,373	20.4	19.6-21.1

Source: Mississippi Asthma Hospital Discharge Database

\*Age-adjusted rate per 10,000 population

**Table 4.9. Estimated asthma emergency department discharge rate per 10,000 population by year and sex, Mississippi, 2003-2007\***

Year	Male			Female		
	Estimated Frequency	Rate*	95% CI	Estimated Frequency	Rate*	95% CI
2003	4,958	34.7	33.7-35.7	6,088	42.1	41.0-43.2
2004	4,874	34.3	33.3-35.4	5,794	40.3	39.2-41.4
2005	5,545	38.9	37.8-40.0	6,829	47.3	46.1-48.5
2006	5,701	40.1	38.9-41.2	6,738	47.1	45.9-48.3
2007	6,343	44.3	43.2-45.5	7,249	50.3	49.0-51.5

Source: Mississippi Asthma Hospital Discharge Database

\*Age-adjusted rate per 10,000 population

**Table 4.10. Estimated asthma emergency department discharge rate per 10,000 population by age group, Mississippi, 2003-2007\***

Age (Years)	Estimated Frequency	Rate*	95% CI
0-4	10,381	99.0	96.9-101.0
5-11	10,613	74.7	73.2-76.2
12-17	5,601	43.9	42.7-45.2
18-44	21,291	40.0	39.5-40.6
45-64	9,433	27.8	27.2-28.4
65+	2,800	16.2	15.6-16.8

Source: Mississippi Asthma Hospital Discharge Database

\*Age-adjusted rate per 10,000 population

**Table 4.11. Estimated asthma emergency department discharge rate per 10,000 population by age and sex, Mississippi, 2003-2007\***

Age (Years)	Estimated Frequency	Male	95% CI	Estimated Frequency	Female	95% CI
0-4	6,785	126.6	123.4-129.8	3,596	69.7	67.3-72.2
5-11	6,676	91.9	89.6-94.3	3,937	56.4	54.5-58.2
12-17	3,031	46.0	44.2-47.7	2,570	41.7	40.0-43.4
18-44	7,054	26.8	26.2-27.5	14,237	52.8	51.9-53.7
45-64	3,005	18.4	17.7-19.1	6,428	36.4	35.4-37.3
65+	870	12.9	12.1-13.8	1,930	18.4	17.5-19.3

Source: Mississippi Asthma Hospital Discharge Database

\*Age-adjusted rate per 10,000 population

**Map 4.2. Estimated asthma emergency department discharge rate per 10,000 population by county of residence, Mississippi, 2003-2007**

<b>County</b>	<b>Total**</b>	<b>White*</b>	<b>Black*</b>	<b>Male*</b>	<b>Female*</b>
Adams	Data not available due to non-reporting hospital				
Alcorn	44.9	29.3	158.5	40.8	48.5
Amite	26.8	16.1	45.1	21.1	32.1
Attala	10.2	4.8	20.6	9.8	10.5
Benton	16.9	10.6	30.0	18.5	15.5
Bolivar	19.8	11.3	29.7	20.5	21.3
Calhoun	38.3	21.5	74.4	31.5	45.2
Carroll	43.7	23.3	95.0	40.8	46.6
Chickasaw	47.1	18.5	94.1	46.5	47.3
Choctaw	63.0	22.4	186.1	50.3	82.8
Claiborne	Data not available due to non-reporting hospital				
Clarke	Data not available due to non-reporting hospital				
Clay	70.8	35.3	107.1	70.0	73.0
Coahoma	77.7	17.8	111.6	87.6	68.4
Copiah	55.8	27.6	93.7	54.5	56.6
Covington	40.4	26.0	75.4	33.1	47.0
DeSoto	Data not available due to non-reporting hospital				
Forrest	56.6	46.9	79.4	51.5	60.4
Franklin	54.6	30.7	112.2	53.2	53.9
George	43.1	37.3	102.9	38.5	48.0
Greene	15.2	10.0	46.9	15.4	15.8
Grenada	57.2	28.2	115.2	60.9	52.4
Hancock	16.4	15.2	39.5	14.6	18.1
Harrison	Data not available due to non-reporting hospital				
Hinds	70.8	16.5	111.1	67.5	72.5
Holmes	46.1	19.9	62.7	46.5	44.8
Humphreys	121.1	33.4	169.3	107.4	131.1
Issaquena	13.4	5.8	22.4	7.7	20.2
Itawamba	22.6	17.4	98.7	19.1	25.7
Jackson	24.7	12.0	38.7	23.7	25.4
Jasper	8.3	2.5	13.5	6.1	10.4
Jefferson	10.6	4.1	12.6	8.6	13.2
Jefferson Davis	61.4	30.4	95.0	48.6	72.5
Jones	17.5	9.6	43.0	15.9	19.0
Kemper	22.5	7.5	35.7	23.1	21.5
Lafayette	Data not available due to non-reporting hospital				
Lamar	14.3	10.6	37.7	11.8	16.4
Lauderdale	32.6	13.6	63.9	27.9	36.7
Lawrence	48.0	33.2	94.5	43.9	51.9
Leake	71.6	33.7	136.4	41.2	102.1
Lee	32.6	15.1	88.7	28.3	36.3

Leflore	93.8	36.0	138.4	87.8	98.2
Lincoln	35.0	22.7	71.3	28.2	41.3
Lowndes	Data not available due to non-reporting hospital				
Madison	29.9	8.3	72.5	27.4	31.6
Marion	45.0	34.0	76.9	42.4	46.9
Marshall	23.0	5.4	47.4	28.4	17.9
Monroe	59.5	42.2	106.2	54.7	63.5
Montgomery	76.4	39.0	143.2	73.6	76.5
Neshoba	29.7	19.2	74.6	21.9	21.5
Newton	18.3	12.8	29.0	20.2	15.9
Noxubee	18.6	4.7	29.6	18.0	18.8
Oktibbeha	41.3	12.9	97.6	41.2	41.3
Panola	47.2	19.8	87.5	44.2	51.9
Pearl River	26.9	18.7	61.4	22.9	30.4
Perry	Data not available due to non-reporting hospital				
Pike	68.5	32.4	105.4	55.1	81.9
Pontotoc	24.0	17.7	64.7	18.8	28.7
Prentiss	Data not available due to non-reporting hospital				
Quitman	73.3	40.7	102.9	62.0	81.6
Rankin	26.1	20.3	56.5	21.3	31.0
Scott	Data not available due to non-reporting hospital				
Sharkey	12.1	6.1	18.5	10.4	13.4
Simpson	60.7	37.3	104.9	58.2	62.7
Smith	22.9	15.2	54.8	19.8	25.9
Stone	46.6	36.7	98.0	38.9	54.6
Sunflower	89.4	24.5	132.4	79.7	98.4
Tallahatchie	Data not available due to non-reporting hospital				
Tate	16.5	3.5	18.3	16.6	16.0
Tippah	33.4	29.1	64.0	27.3	39.2
Tishomingo	35.4	33.1	99.1	34.1	36.6
Tunica	6.0	3.9	7.6	2.9	8.6
Union	Data not available due to non-reporting hospital				
Walthall	61.3	33.1	107.3	50.5	70.8
Warren	60.5	32.6	105.2	55.8	63.8
Washington	113.4	49.7	159.0	100.5	122.0
Wayne	43.0	24.5	81.8	40.7	44.9
Webster	81.2	42.5	242.7	59.5	101.7
Wilkinson	Data not available to non-reporting hospital				
Winston	83.9	32.4	150.6	62.2	105.0
Yalobusha	36.7	27.2	59.3	30.6	42.1
Yazoo	53.3	16.4	92.8	54.0	50.0

\*Rates are age-adjusted to the US 2000 standard population

+ Total includes 'other' and 'unknown' races

**AT-RISK BASED ASTHMA DISCHARGES  
DETAILED TABLES**

**Table 4.13-15. Estimated rate of hospital discharges with asthma listed as the first diagnosis per 100 adults with asthma by sex, race and age group, Mississippi, 2007**

Characteristic	Rate per 100 with Asthma
<b>Total</b>	1.8
<b>Sex</b>	
Male	1.3
Female	2.1
<b>Race</b>	
White	1.4
Black	2.8
<b>Age Group (Years)</b>	
18-44	1.3
45-64	1.9
65+	2.8

Source: Mississippi Asthma Hospital Discharge Database

**Table 4.16-18. Estimated rate of hospital discharges with asthma listed as the first diagnosis per 100 children with asthma, by sex, race, and age group, 2007**

Characteristic	Rate per 100 with Asthma
<b>Total</b>	1.9
<b>Sex</b>	
Male	2.0
Female	1.8
<b>Race</b>	
White	1.4
Black	2.2
Other	1.7*
<b>Age Group (Years)</b>	
0-4	4.6
5-11	1.5
12-17	0.5

Source: Mississippi Asthma Hospital Discharge Database

\*The estimate is unreliable because the relative standard error of the estimate is 30%-50%. All other relative standard errors are less than 30%.

**Table 4.19-21. Estimated rate of emergency department discharges with asthma listed as the first diagnosis per 100 adults with asthma by sex, race and age group, Mississippi, 2007**

<b>Characteristic</b>	<b>Rate per 100 with Asthma</b>
<b>Total</b>	4.6
<b>Sex</b>	
Male	4.6
Female	4.6
<b>Race</b>	
White	2.1
Black	9.4
Other	3.3
<b>Age Group (Years)</b>	
18-44	7.0
45-64	3.5
65+	1.9

Source: Mississippi Asthma Hospital Discharge Database

**Table 4.22-24. Estimated rate of emergency department discharges with asthma listed as the first diagnosis per 100 children with asthma by sex, race and age group, Mississippi, 2007**

<b>Characteristic</b>	<b>Rate per 100 with Asthma</b>
<b>Total</b>	6.7
<b>Sex</b>	
Male	7.0
Female	6.3
<b>Race</b>	
White	3.7
Black	8.5
Other	6.9
<b>Age Group (Years)</b>	
0-4	10.4
5-11	7.3
12-17	3.6

Source: Mississippi Asthma Hospital Discharge Database

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