



**ALABAMA ASTHMA BURDEN DOCUMENT**

A Report from the  
**ALABAMA DEPARTMENT  
OF PUBLIC HEALTH**  
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**ALABAMA DEPARTMENT OF PUBLIC HEALTH**

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## INTRODUCTION

Asthma, a chronic lung disease that inflames and constricts the narrow passageways of the lungs, has a long history. Documents tracing back to the ancient Egyptians, Chinese, and Greeks, describe the symptoms of asthma and sometimes offer rudimentary suggestions for treatment. A number of medical practitioners and writers during subsequent centuries provided clinical descriptions of asthma and speculated on its causes, culminating in the recognition of asthma as a disease in the medical literature in the mid-1800s. During the early years of the 20th century, asthma was widely considered to be a psychosomatic disorder, but research eventually established the physiological basis of the disease and lay to rest the notion that it was purely a “manifestation of the mind.” Indeed, it was not until the 1960s that the inflammatory component of the disease became firmly established and anti-inflammatory medications became the principal method of treatment.<sup>1</sup>

Today, asthma is recognized as one of the most common chronic diseases in the United States. Over 16 million adults reported they currently had asthma in 2006, totaling 7.3 percent of the population aged 18+. The number of children with asthma, at approximately 6.8 million, was nearly half as many as the number of adult sufferers from the disease in that year.<sup>2</sup> Given that 23 million people in the United States currently have asthma, it can be expected that asthma places a significant burden on the health-care delivery system in the United States. Thus, visits to office-based physicians for asthma treatment numbered 10.5 million in 2006, while hospital outpatient department visits totaled 6.3 million. Hospital emergency room admissions numbered 217,000.<sup>3</sup>

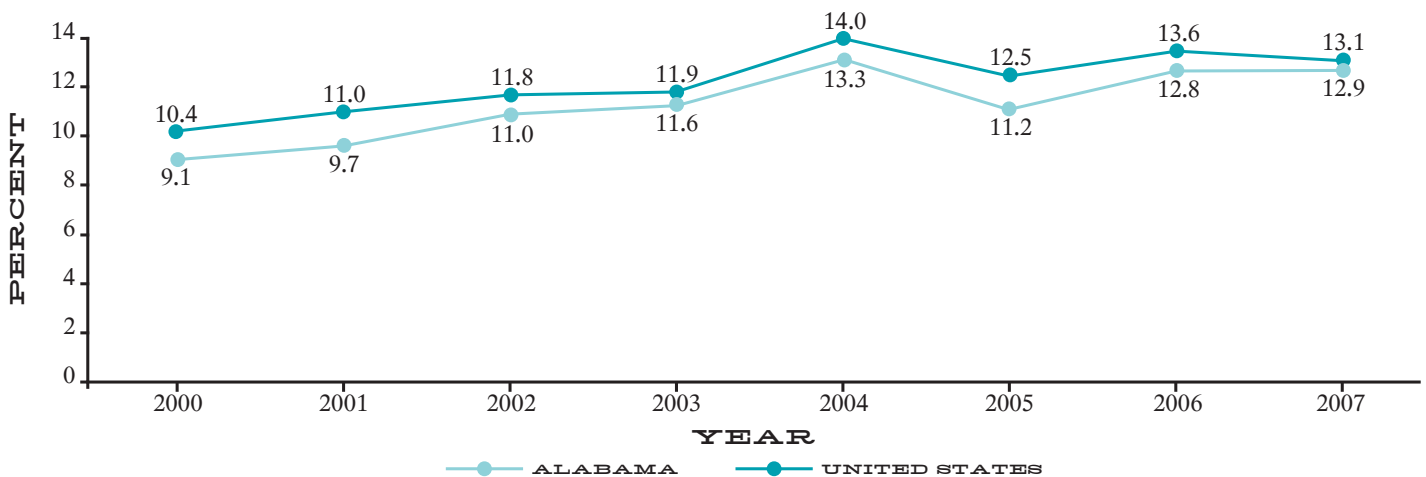
Asthma typically begins early in life, specifically during the childhood years. This places an especially onerous toll on the youthful segment of the population, both in terms of the human suffering and the monetary costs. This includes the millions

of school days lost to asthma attacks each year (12.8 million in 2003), the estimated yearly cost of treating asthma for those under 18 (\$3.2 billion), and the emergence of asthma as the third-ranking cause of hospitalization among children under 15.<sup>4</sup> While asthma is difficult to diagnose during the early years, it is estimated that 5.6 million children of school age currently suffer from the disease.<sup>5</sup> Of the 3,884 recorded deaths from asthma in the U.S. in 2005, 269 (or 6.9 percent) were to children and young adults under 25 years of age.<sup>6</sup>

Alabama is hardly immune from the patterns that mark asthma for the rest of the country. Indeed, its relatively youthful population (one-fourth under 18), large minority representation (29 percent nonwhite), lower socioeconomic population (17 percent below the poverty level), high smoking rate (22 percent of all adults), and negative environmental conditions (such as high humidity and mold), place the Alabama population particularly at risk for elevated rates of asthma and associated respiratory diseases.<sup>7</sup> In 2007, Alabama ranked in the worst half of the 50 states both in terms of its lifetime asthma prevalence rate (tied for 26th lowest) and its current asthma prevalence rate (tied for 34th lowest).<sup>8</sup>

The following report presents data concerning lifetime and current asthma prevalence rates in Alabama, trends in self-reported asthma cases, variations in susceptibility to asthma among various subcategories of the state’s population, and asthma mortality. Selected environmental conditions that may trigger asthma are also considered. While the bulk of the data used in the report are drawn from annual surveys conducted through the Behavioral Risk Factor Surveillance System (BRFSS), the analysis is supplemented with data from the Youth Risk Behavioral Survey (YRBS), Alabama Medicaid Agency, Children’s Health Insurance Program (Alabama Department of Public Health), Center for Health Statistics (Alabama Department of Public Health), and the Alabama Department of Environmental Management. Data collected and analyzed through the BRFSS and the YRBS

**FIGURE 1: ADULT SELF-REPORTED LIFETIME ASHTMA PREVALENCE RATE (%). ALABAMA AND THE UNITED STATES, 2000-2007**



Source: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, Behavioral Risk Factor Surveillance System, Survey Data for 2000-2007.

health surveillance systems are the result of a collaborative effort among the Alabama Department of Public Health, University of Alabama at Birmingham (BRFSS data collection), Alabama State Department of Education (administration of YRBS surveys), and the Centers for Disease Control and Prevention (CDC), which spearheaded questionnaire development and the processing and analysis of survey data.

### THE PREVALENCE OF ASTHMA

The 2007 BRFSS survey indicated that 458,000 adult Alabamians, or 13.1 percent of all Alabama residents aged 18+, had been characterized by asthma at some point in their lives.<sup>9</sup> Furthermore, the data suggest that self-reported lifetime asthma prevalence for adults is on the increase. According to the data presented in Figure 1, the percentage of the adult population reporting asthma at some point in their lives increased from 9.1 percent in 2000 to 13.1 percent in 2007, for a 44 percent increase. However, the increase from 2000-2007 is not continuous. Although statewide rates increased each year from 2000-2004, attaining a high of 14.0 percent of the adult population in 2004, they moderated slightly from 2005-2007. The pattern for the U.S. as a whole also closely mirrors that for Alabama (Figure 1), although annual rates for Alabama are marginally lower for most years than those for the U.S. generally.

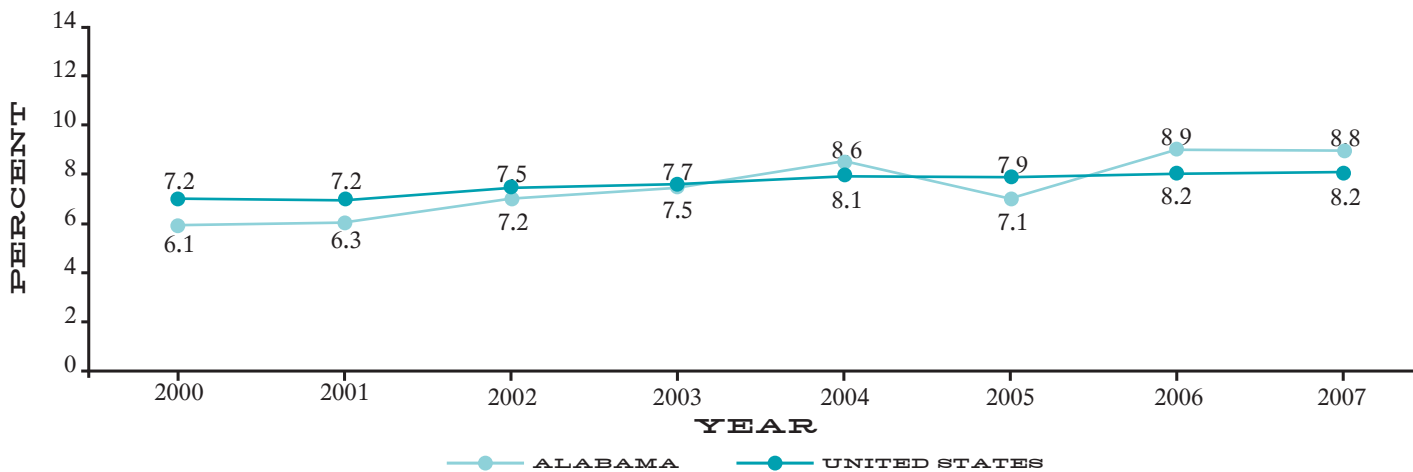
In contrast to lifetime instances of self-reported asthma, the BRFSS survey also includes questions designed to establish the number and rate of adults who currently have asthma. Based on self-reports, the data indicate that almost one in every ten adults in Alabama, or 306,000 people, currently cope in varying degrees with the symptoms of asthma (Figure 2). Furthermore, the percentage of adults currently with asthma is on the upswing, increasing from 6.1 percent of the 18+ population in 2000 to 8.8 percent in 2007. Although annual prevalence rates for current asthma cases are typically higher for the U.S. than for Alabama

from 2000-2007, the state's rates have clearly eclipsed U.S. rates during the two most recent years of the survey.

As indicated in the introduction to the report, children in the United States are more likely to be characterized by asthma than adults. A recent CDC report, for example, indicated that the current asthma prevalence rate for children during 2001-2003 was 8.5 percent versus 6.7 percent for adults.<sup>10</sup> Unfortunately, asthma prevalence data for children are quite limited in Alabama. The only reliable data for children of all ages for the state as a whole are from a 2002 BRFSS survey in which information is reported on lifetime (11.4 percent) and current (7.6 percent) asthma prevalence for the under 18 population.<sup>11</sup> Since these percentages are several years old, it is not possible to make valid comparisons with more recently reported adult rates. Nor is it possible to make any direct inferences concerning trends in childhood asthma. At the time these data were reported, the lifetime prevalence rate for Alabama's children was slightly lower (but not significantly) than the 11.6 percent reported for the U.S. (based on 25 states). The current childhood prevalence rates for Alabama and the U.S. in 2002 (at 7.6 percent) were the same.<sup>12</sup>

In addition to the 2002 BRFSS survey, YRBS surveys in 2005 and 2007 included questions on lifetime and current asthma prevalence for youth enrolled in grades 9-12, while the Alabama Youth Tobacco Survey in 2008 queried students in these same grades concerning asthma episode/attack prevalence. The YRBS survey results revealed a reported lifetime asthma prevalence rate of 25.5 percent in 2007 and a current asthma rate of 18.2 percent for that same year. The YRBS survey data for 2005 (at 24.0 percent for lifetime asthma and 21.7 percent for current asthma) closely matched the 2007 rates.<sup>13</sup> Compared to survey results for the U.S. as a whole, both lifetime and current asthma rates for Alabama's high school students in 2007 were several percentage points higher.<sup>14</sup> Overall, it appears that this sector of the youthful population is especially prone toward high rates of asthma prevalence.

**FIGURE 2: ADULT SELF-REPORTED CURRENT ASTHMA PREVALENCE RATE (%), ALABAMA AND THE UNITED STATES, 2000-2007**



Source: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, Behavioral Risk Factor Surveillance System, Survey Data for 2000-2007.

The 2008 Alabama Youth Tobacco Survey, on the other hand, reported that 12.2 percent of the statewide sample of 9-12 graders who participated in the research reported an asthma episode/attack during the previous year. The rate was slightly higher for females than males (12.0 percent versus 10.0), highest for students enrolled in the 10th grade (12.9 percent) and lowest for those in the 12th grade (8.9 percent), and higher for minority students than for whites. The “other” race/ethnicity category (at 15.9 percent) reported the highest prevalence of asthma episodes/attacks, followed by Hispanics (12.9), African Americans (12.2), and whites (10.3).<sup>15</sup>

No matter how asthma is measured (lifetime prevalence or current prevalence), it is a disease that impacts a significant segment of the state’s population. Indeed, as many as one in ten Alabama residents may be affected, with children (especially older children) impacted to a greater extent than adults. The presence of asthma is growing across the state and, while U.S. rates (both lifetime and current prevalence) have typically been higher than those for Alabama, the state’s rates have now inched ahead of U.S. benchmarks.

## THE UNEVEN BURDEN OF ASTHMA

The chances of having asthma are not the same for everyone. Using data from various national studies, the CDC reports that rates tend to be higher for children (as previously indicated), females, African Americans, the Northeast region of the country, and persons below the poverty level than their cross-category counterparts (i.e., adults, males, whites).<sup>16</sup> The BRFSS survey data presented in Figure 3 address variations in current asthma prevalence rates among various sectors of the Alabama population beginning with age, followed by several other demographic and socioeconomic characteristics.

### Age

For various age categories, limited to the adult sector of the population, the highest percentages reporting that they currently have asthma are associated with the 18-24, 45-54, and 55-64 age groups (Figure 3). Thus, asthma in Alabama in 2007 was more closely associated with being young and older middle age than the prime (25-44) and senior (65+) years. Although not reported in Figure 3, BRFSS data for these same age categories are also reported for 2000-2006 yielding seven additional years of data (or “data points”) for analysis.<sup>17</sup> Examining data for those years reveals a pattern similar to that reported for 2007. During all seven years, for example, the highest rates were in the 18-24 (two years), 45-54 (one year), and 55-64 (four years) age groups. In contrast, the lowest rates were in the 25-44 age category during four of the seven years.

Regrettably, there are no data for the individual age categories that comprise the under 18 age group in Alabama other than those from the YRBS for students enrolled in grades 9-12 (discussed above). However, limited information concerning the treatment

of children with asthma for specified age categories is presented under “Asthma Treatment Data” (pages 6-7) of this report.

### Gender

The current prevalence rate for adult females (at 10.5 percent) in Alabama in 2007 was 1.5 times higher than that for the male rate (6.9 percent). (See Figure 3). Indeed, for every year from 2000-2007 (years 2000-2006 not reported in Figure 3) the female rate was notably higher than the male rate, ranging from 5.5 percentage points in 2006 to 2.3 in 2000.<sup>18</sup> Clearly, females are substantially more likely to report that they currently have asthma than their male counterparts. While males may be less likely to visit physicians for health-related maladies and be diagnosed with asthma and/or report that they have it even if they do, it appears that the female rate (perhaps in part because of physiological/hormonal differences between the sexes) may be intrinsically higher than the male rate.

### Race and Ethnicity

Data reported in Figure 3 suggest that the current asthma prevalence rate for non-Hispanic whites in Alabama is lower than that for non-Hispanic African Americans (or 8.2 percent vis-à-vis 10.1 in 2007). Although the lowest percentage of the various race-ethnic categories is for Hispanics and the highest percentage is for people of other races who are non-Hispanic, the small numbers on which percentages for these groups are based introduce the possibility of greater measurement error. Thus, the data reported for Hispanics, people of mixed races, and the “other race” category should be treated with caution.

The African American-white differences reported in 2007, however, are based on a larger sample of respondents and would appear to be more suggestive of an actual difference between the races. Adding data from the 2000-2006 BRFSS surveys (not reported in Table 3), the African American-white discrepancy was subjected to additional analysis. For five of the seven data points during the 2000-2006 timeframe, the African American prevalence rate was higher than that for whites, ranging from 3.7 percentage points greater in 2006 to 0.3 percentage points higher in 2004. There was an absence of an African American-white differential in 2001 (both races at 6.3 percent), while the white rate was higher than the African American rate in 2002 (7.1 percent as opposed to 6.6).<sup>19</sup>

In addition, the YRBS surveys of youth enrolled in grades 9-12 in both 2005 and 2007 indicate significantly higher asthma prevalence rates (both lifetime and current) for African American youth than white youth. In the 2007 survey, for example, the current self-reported asthma rate for African American high school students was 31 percent higher than that reported by their white counterparts (or 19.5 percent versus 14.9).<sup>20</sup>

One reason for the higher African American rate is the elevated poverty and lower incomes that are associated with this segment

of the population. The poverty rate for African Americans in Alabama is 2.7 times higher than that for whites, while the median household income for African Americans is just 56 percent of the white median.<sup>21</sup> Various studies have, in turn, demonstrated that asthma is more prevalent among persons with incomes below the poverty level than those who are above, a subject that will be considered in more detail under “Income” (see below).<sup>22</sup>

**Educational Attainment**

The 2007 BRFSS data indicate a strong inverse relationship between educational attainment level and current asthma prevalence rates for the adult sector of the population (i.e., the higher the level of educational attainment the lower the asthma prevalence rate, and vice versa). (See Figure 3.) Thus, the prevalence rate for persons who have not graduated from high school (at 12.8 percent) is over twice as high as the rate for persons with a college degree (5.5 percent) and the rates decline continuously from one step to the next on the educational ladder. Adding BRFSS survey results from 2000-2006 (not reported in Figure 3) to those for 2007 also reveals a similar pattern.<sup>23</sup> For all seven data points covered by those years, the highest current asthma prevalence rates were associated with those who had not completed high school. However, for four of the seven data points, the lowest prevalence rates were observed for college graduates (three years) and persons with some college (one year). In three instances, high school graduates had slightly lower rates than any of the other educational attainment categories. While the correlation is not perfect over the individual years under consideration, the data nevertheless suggest that educational attainment is rather consistently and fairly strongly associated with current asthma prevalence.

**Income**

BRFSS survey results for income in 2007 mirror those for educational attainment. The highest current asthma prevalence

rate (or 16.2 percent) is associated with the under \$15,000 income category, while the lowest rate (4.6 percent) is observed in the \$75,000 income group (Figure 3). Again, prevalence rates decrease continuously from the lowest income level to the highest, with the rate for the lowest income group over three times higher than that for the highest income category.

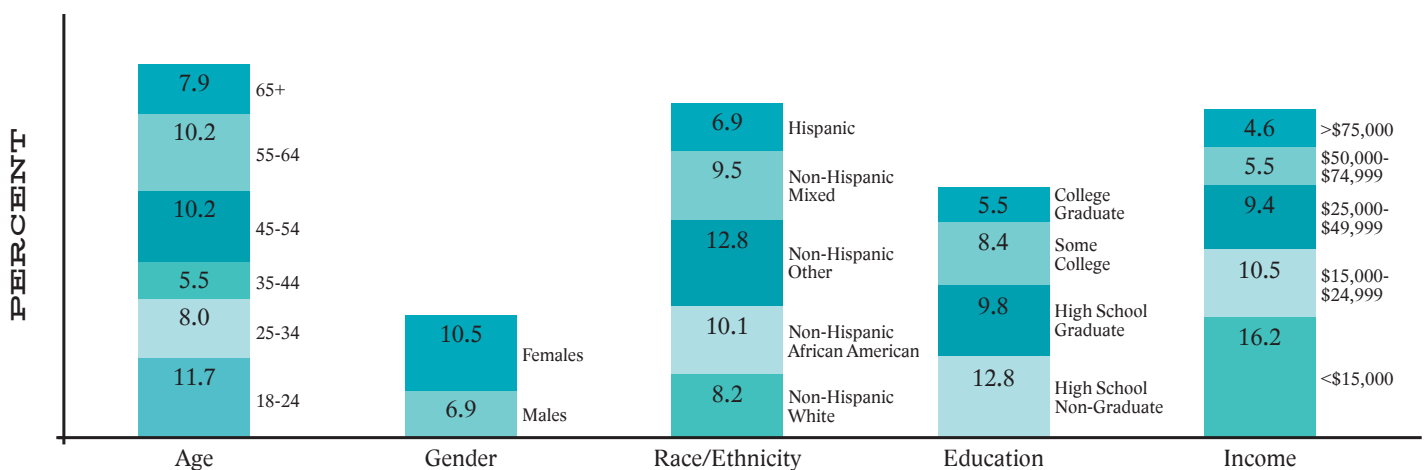
The inverse relationship between income and asthma prevalence in previous BRFSS surveys is as strong, if not stronger, than that observed for educational attainment. Hence, for all seven years/data points covered by the 2000-2006 timeframe (not reported in Figure 3), the highest current prevalence rates are associated with the under \$15,000 income category (five of the years) and \$15,000-\$24,999 income level (two of the years). On the other hand, the lowest rates for all seven years were either in the \$50,000-\$74,999 income category (five of the years) or the \$75,000+ level (three of the years).<sup>24</sup> Prevalence rates were the same for both of these categories in 2004. Therefore, both years of schooling and income level appear to be more than casual predictors of the likelihood of having asthma.

**TRENDS IN ASTHMA PREVALENCE**

As indicated previously, both lifetime and current asthma rates for the adult segment of the Alabama population are on the upswing. This section of the report will probe more deeply into longer-term trends by examining changes in asthma rates for various subcategories of the population over time. Specifically, the analysis will focus on the asthma risk factors described in the previous section, with asthma trend data presented for males and females separately, following by a similar examination of various age, race, education, and income categories.

A summary regarding current asthma rate trends for various population subcategories is presented in Table 1. Those subcategories wherein current asthma rates are clearly on the rise are labeled “increasing,” while a dash (-) is placed beside

**FIGURE 3: ADULT SELF-REPORTED CURRENT ASTHMA PREVALENCE RATE (%) BY SELECTED CHARACTERISTICS, ALABAMA, 2007**



Source: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, Behavioral Risk Factor Surveillance System, Survey Data for 2000-2007.



the subcategory if no discernable trend was revealed by the analysis. The methodology is based on a time-series analysis using eight data points (self-reported current prevalence rates derived from BRFSS surveys for 2000-2007) for each of the 19 subcategories appearing in the table. Prevalence rates are labeled only in instances where the change in rates over the 2000-2007 timeframe is statistically significant at the 0.05 level of probability (indicating that there is a 95.0 percent chance that the observed change in the data is, in fact, a “real” change).

The results indicate that current asthma prevalence rates for seven of the 19 adult population subcategories are clearly on the rise in Alabama. These include males, whites, African Americans, high school graduates, people with “some college,” and the under \$15,000 and \$25,000-\$49,999 income brackets. For the other subcategories, the magnitude of the change was not sufficient to produce a statistically significant result, although the 18-24 and 45-54 age groups were borderline statistically significant. None of the 19 subcategories displayed a downward slope in current asthma prevalence rates.

Given the state’s overall rise in current asthma prevalence rates from 2000-2007 (see Tables 1 and 2), it is hardly surprising that increases are also associated with various subcategories of the population (Table 1). Indeed, it is these increases that drive the rise in general prevalence rates. One benefit of the above analysis

is that it allows policy makers and other interested observers to obtain a better grasp of the specific sectors of the population that are experiencing the most rapid rates of increase in asthma prevalence.

## ENVIRONMENTAL RISK FACTORS

There are a number of airborne allergens (such as those found in dust, animal fur, cockroaches, mold, and various pollens) and environmental irritants (e.g., cigarette smoke, air pollution [such as ground-level ozone], chemicals or dust in the workplace, compounds in home decor products, and aerosol sprays) that may trigger an asthma attack.<sup>25</sup> The Alabama Department of Environmental Management (ADEM) monitors the amount of ground-level ozone and the concentration of “particulate matter” in the atmosphere (including acids, organic chemicals, metals, and soil and dust particles), both of which may precipitate the onset of asthma in persons who are susceptible.<sup>26</sup>

### Ground-Level Ozone

Upper-level ozone (6-30 miles above the earth) provides protection to humans from the sun’s harmful ultraviolet rays; hence, is “good.” Ground-level ozone, on the other hand, is formed when pollutants from the air (such as those emitted by cars, power plants, industrial plants) react chemically in the

**TABLE 1: TRENDS IN ADULT SELF-REPORTED CURRENT ASTHMA PREVALENCE RATES BY SELECTED CHARACTERISTICS AND SUBCATEGORIES, ALABAMA, 2000-2007**

CHARACTERISTIC/ SUBCATEGORY	TREND 2000-2007
<b>Sex</b>	
Male	Increasing
Female	-
<b>Age Category</b>	
18-24	-
25-34	-
35-44	-
45-54	-
55-64	-
65+	-
<b>Race</b>	
White	Increasing
Black	Increasing

CHARACTERISTIC/ SUBCATEGORY	TREND 2000-2007
<b>Educational Attainment</b>	
Not High School Graduate	-
High School Graduate	Increasing
Some College	Increasing
College Graduate	-
<b>Income</b>	
Under \$15,000	Increasing
\$15,000-\$24,999	-
\$25,000-\$49,999	Increasing
\$50,000-\$74,999	-
\$75,000+	-

Note: A dash (-) indicates the absence of a clearly defined trend.

Source: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, Behavioral Risk Factor Surveillance System Survey Data for 2000-2007.

Note: A dash (-) indicates the absence of a clearly defined trend.

Source: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, Behavioral Risk Factor Surveillance System Survey Data for 2000-2007.



presence of sunlight and can trigger asthma attacks and aggravate other breathing conditions. When ground-level ozone levels are high, people may be more susceptible to allergens which, in turn, can serve as triggers for asthma attacks.<sup>27</sup>

As of July 2009, there were 23 ozone monitors in 14 counties across Alabama that were under the jurisdiction of ADEM. Data are available for each of the 23 ozone-measuring sites expressed in terms of three-year averages beginning in 2001-2003. The U.S. Environmental Protection Agency (EPA) standard for ground-level ozone concentration is 75 molecules of ozone per billion (ppb) air molecules averaged over an eight-hour period. During 2006-2008, 10 of the 23 Alabama sites that were monitored were in noncompliance with the 75 ppb ozone standard set by the EPA (including monitors in Colbert, Elmore, Etowah, Houston, Montgomery, Morgan, Russell, Sumter, and Tuscaloosa counties and one monitor in Jefferson County (Leeds). However, 13 sites were in compliance with the standard, including, one each in Baldwin, Madison, and Shelby counties, two in Mobile County, and eight in Jefferson County. Examining data for these 23 monitoring sites from 2001-2003 through 2006-2008 reveals a relatively high degree of consistency in ozone concentration levels at the various monitoring sites. Thus, the areas of the state most likely to be in noncompliance with the EPA ozone standard have been/continue to be the Gulf Coast area, the Huntsville area, and Jefferson County (with the exception of Leeds). One monitoring site where ozone levels have been historically above the EPA standard but are now in compliance is Decatur in Morgan County.<sup>28</sup>

### ***Particulate Matter***

“Particulate matter” (also known as “particle pollution”) is a mixture of extremely small particles (such as organic chemicals, metals, soil and dust particles, soot, and smoke) and liquid droplets. Particle pollution includes “inhalable coarse particles” (diameters larger than 2.5 micrometers and smaller than 10 micrometers) and “fine particles” (diameters of 2.5 micrometers and smaller). While inhalable coarse particles continue to raise health concerns, fine particles, according to the EPA, “are believed (because they lodge deeply in the lungs) to pose the greatest health risks.”<sup>29</sup> The current EPA annual, fine-particle standard is an average of 15 micrograms per cubic meter ( $\mu\text{g}/\text{m}^3$ ) of air.

The most recent three-year averages of particulate concentration provided by ADEM for this report are for 2005-2007. Comparable three-year averages were also provided for 2001-2003 through 2004-2006. The data are reported for 25 monitoring sites located in 18 Alabama counties. The 2005-2007 data reveal that 18 of the 25 sites were in compliance with the fine particle standard of 15  $\mu\text{g}/\text{m}^3$ . One of the seven sites that exceeded the EPA fine particle standard was located in Etowah County (Gadsden), one in Russell County (Phenix City), and five in Jefferson County (Hoover, Leeds, McDory, North Birmingham, and Wylam).<sup>30</sup>

## **ASTHMA TREATMENT DATA**

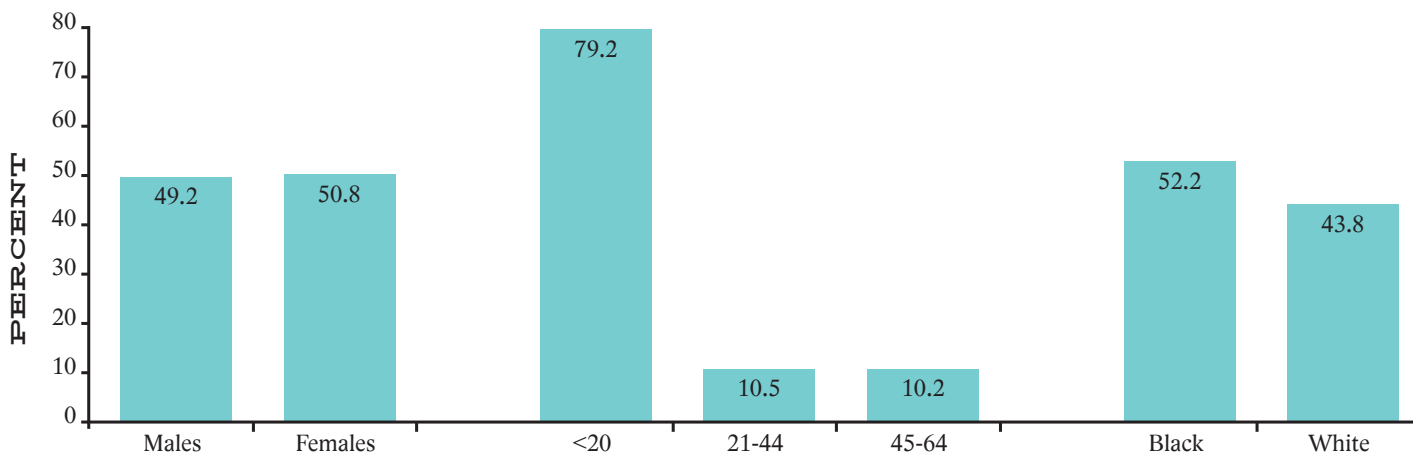
### ***Alabama Medicaid Agency***

Data supplied by the Alabama Medicaid Agency for low-income clients receiving medical services from 3/1/06-2/28/07 indicate that 59,223 patients aged one year and older either had a diagnosis of asthma alone or asthma in combination with some other medical condition. For data reporting and programmatic purposes, asthma clients are classified into various categories encompassing the following: (1) those who are admitted to an emergency room or are hospitalized and are patients who have not been prescribed, or have not filled, prescriptions for an asthma controller (inhaled steroid) in the three months previous to the emergency room/hospital visit (5,978 clients in 2006-2007, or 10.1 percent of all clients); (2) patients using short-acting asthma medications only and who have either not received, or have not properly filled, prescriptions for longer-term asthma controllers (12,948 clients in 2006-2007, or 21.9 percent of all clients); (3) patients making asthma-related hospital emergency visits, but who may not meet all of the criteria for placement in the first category (5,494 clients in 2006-2007, or 9.3 percent of all clients); (4) patients who are hospitalized for asthma, but who may not meet all of the criteria for placement in the first category (1,910 clients in 2006-2007, or 3.2 percent of all clients); and (5) clients receiving annual influenza immunizations (12,896 clients in 2006-2007, or 21.8 percent of all clients). The first two categories (which together total 32 percent of all Medicaid clients with asthma) represent asthma patients who are not utilizing controllers correctly, hence, increasing the likelihood of hospitalization and emergency room visits. The Medicaid asthma treatment goal is to reduce the numbers in the first four categories as much as possible, but to maximize the number of asthma clients who are receiving influenza immunizations (the fifth category).

It is noted that the above percentages do not add to 100.0, for which there are two reasons. Firstly, the various categories are not mutually exclusive (i.e., some Medicaid clients fit into more than one category) and, secondly, some people receiving medical services do not meet the criteria (e.g., short-term asthma medications only, hospitalization, emergency room visits, immunizations) for placement in any of the above categories.

Additional data supplied by the Alabama Medicaid Agency for 2006-2007 (Figure 4) reveal that most (79.2 percent) of the clients with an asthma diagnosis were under 20 years of age. Fifty-two percent were African American (compared to 44 percent for whites), but the male/female differential was negligible. Also, hospitalizations/EM visits (not reported in Figure 4) were greatest for persons under 20 (79.1 percent of all Medicaid asthma patients who had hospital/EM visits during 2006-2007) and African Americans (63.8 percent versus 33.2 percent for whites); physician visits as a result of relying on short-term inhalers highest for children under 20 (67.0 percent), African Americans

**FIGURE 4: PERCENT OF MEDICAID ASTHMA PATIENTS WITH ASTHMA DIAGNOSIS BY SELECTED CHARACTERISTICS, ALABAMA, 2007**



Source: Data provided by the Alabama Medicaid Agency.

(51.9 percent as opposed to 45.1 percent for whites), and females (52.3 percent); emergency room visits greatest for children under 20 (77.9 percent) and African Americans (65.0 percent versus 32.2 percent for whites); hospitalizations greatest for children under 20 (84.4 percent), African Americans (66.5 percent vis-à-vis 29.9 percent for whites), and males (56.4 percent); and annual influenza immunizations highest for children under 20 (86.2 percent), African Americans (48.4 percent versus 44.9 percent for whites), and males (52.8 percent). Thus, from the perspective of the Medicaid population, the greatest asthma vulnerability resides in clients under 20 (all of the negative service indicators), African Americans (all negative service indicators), and males (rates of hospitalization for asthma).

**Alabama Children’s Health Insurance Program**

Of the 93,437 children enrolled in the Alabama Children’s Health Insurance Program(CHIP) in 2007, 5,340 (or 5.7 percent of the total membership) received medical services for asthma. Office visits totaled 7,920 (including multiple visits by the same patients), with emergency room visits numbering 647, and hospital admissions totaling 196. The total cost to CHIP for asthma-related treatment services in 2007 was approximately \$2.2 million, or 2.7 percent of total service expenditures for the program.

Additional data supplied by the CHIP for 2007 are presented in Figures 5 and 6. Figure 5 provides data by gender and age from the perspective of children with asthma vis-à-vis all children enrolled in CHIP. Thus, 6.6 percent of all males enrolled in CHIP were asthma patients, while the corresponding percentage for females was 4.8. Of the various age categories, the under six group posted the highest percentage (at 7.3) of all CHIP enrollees who were asthma patients, followed by those aged 6-14 (5.8 percent) and 15-18 (3.0 percent). Therefore, asthma rates for CHIP-enrolled males and the very young are noticeably higher than those for females and children who are older.

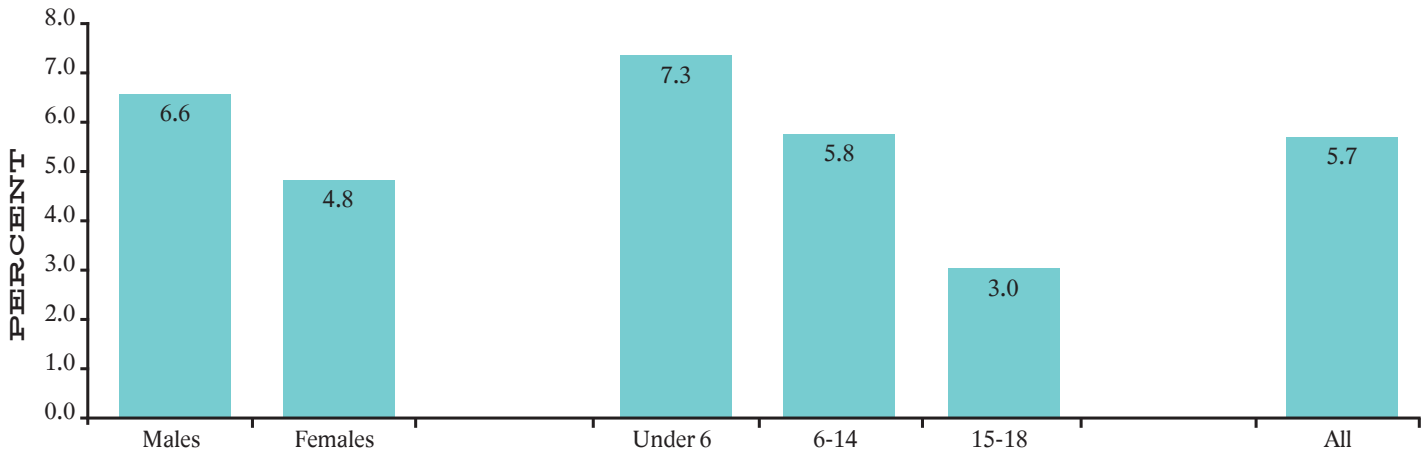
Figure 6 focuses directly on data for the asthma population served by CHIP according to gender, age, and the type of service required (i.e., office visit or emergency room visit). Irrespective of the particular category (all asthma patients, office visits for asthma, or emergency room admissions), the highest asthma prevalence is associated with males (approximately three-fifths of all asthma cases) and the 6-14 age category (approaching two-thirds of all asthma cases). Other research has likewise shown that among children males have higher asthma prevalence than females.<sup>31</sup> It is also noted that one reason for the high concentration of cases in the 6-14 age category is the large number of individual ages that lie within this range.

**DEATHS FROM ASTHMA**

Fortunately, the modern day treatment of asthma has progressed to the point that only a small number of Alabama residents die from asthma each year. During the latest year for which data are available (2007), the number was 47. This number, however, represents an eight-year low, except for the 46 deaths that were reported in 2005 (Figure 7). For reasons that are unclear, there were nearly twice as many deaths from asthma in 2004 (85) as in 2005 (46). During most of the present decade, the number of asthma deaths has been elevated, ranging from 63-85 from 2000-2004. It has only been since 2005 that there has been a perceptible drop in asthma mortality.

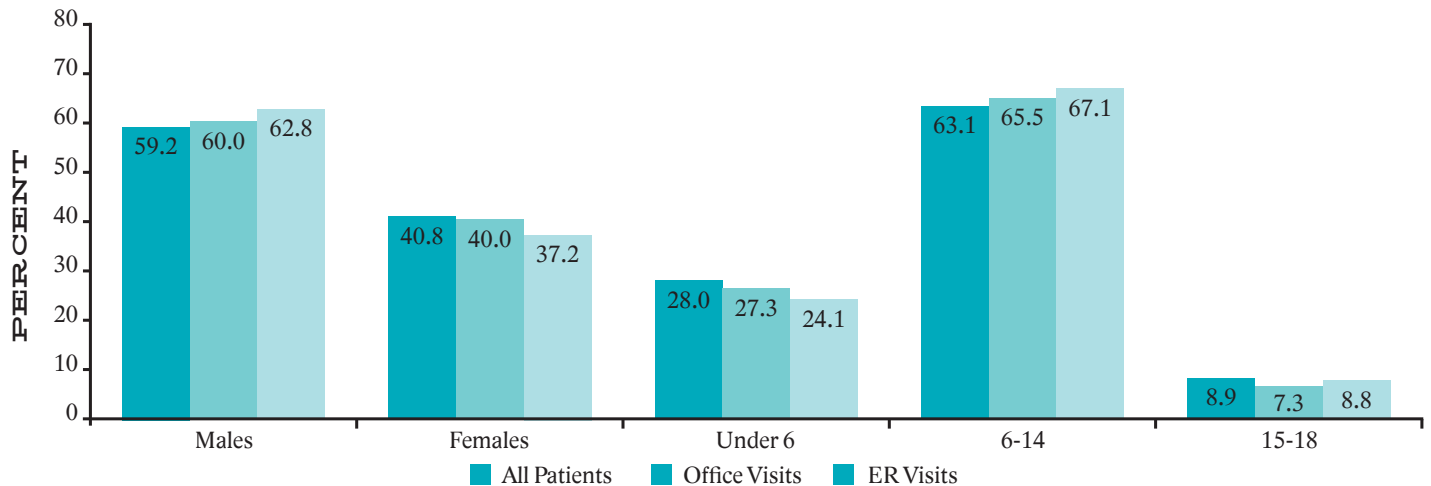
Of the 475 documented deaths from asthma in Alabama from 2000-2006, 57.3 percent (272) were to whites and 42.1 percent (200) to African Americans. Nearly two-thirds of the asthma deaths over that period were to females, leaving only 37.1 percent of the deaths from that cause to males. Asthma deaths over the 2000-2006 period were more closely associated with white females (at 38.7 percent of all deaths) than any of the other race-gender categories. African American females (at 24.0 percent of all asthma deaths) posted the second highest percentage.

**FIGURE 5: PERCENT OF CHIP ENROLLEES WITH ASTHMA DIAGNOSIS BY GENDER AND AGE, ALABAMA, 2007**



Source: Data provided by the Alabama Children's Health Insurance Program, Alabama Department of Public Health.

**FIGURE 6: PERCENT OF ALL CHIP ASTHMA PATIENTS AND CHIP ASTHMA PATIENTS WITH OFFICE AND EMERGENCY ROOM VISITS BY GENDER AND AGE, ALABAMA, 2007**



Source: Data provided by the Alabama Children's Health Insurance Program, Alabama Department of Public Health.

Regarding age, 51.7 percent of all deaths attributed to asthma from 2005-2007 in Alabama were to persons aged 65+. Another 41.7 percent were to those aged 25-64, but just 6.6 percent to residents under 25 years of age.<sup>32</sup>

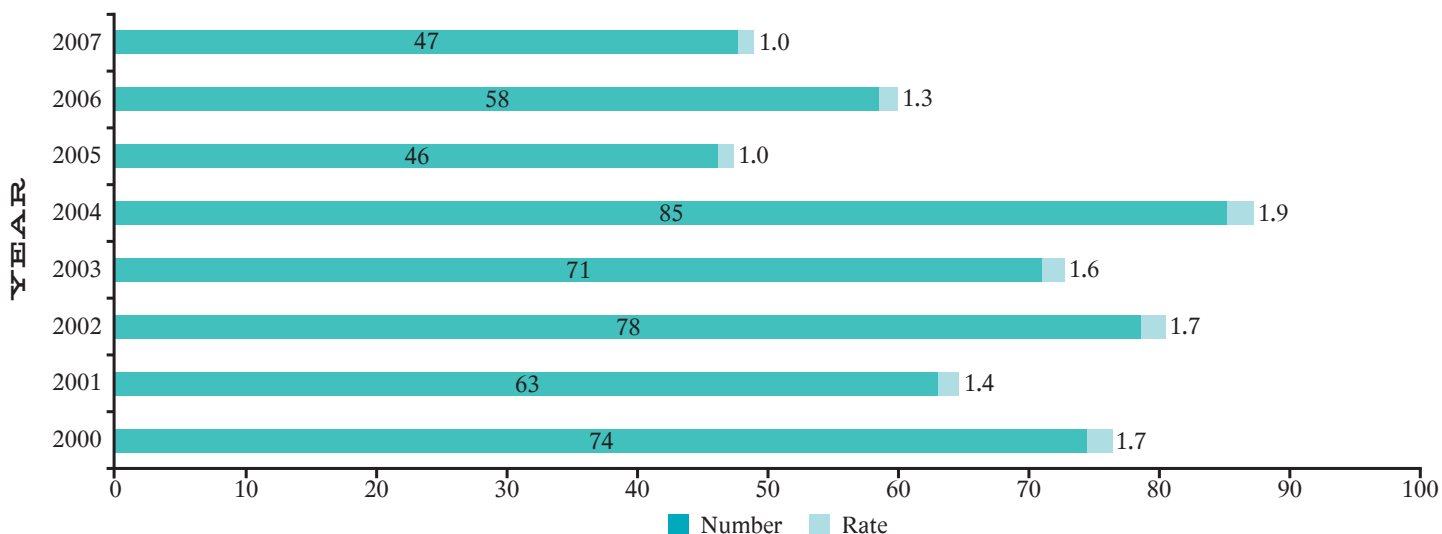
### SUMMARY AND CONCLUSIONS

Using data from BRFSS and YRBS surveys, along with data provided by the Alabama Department of Public Health (Center for Health Statistics and CHIP), Alabama Medicaid Agency, and the Alabama Department of Environmental Management, this report has examined the prevalence of asthma in Alabama,

the differential impact that asthma has on various sectors of the state's population, and selected environmental factors that may precipitate the onset of asthmatic symptoms. In addition, it has examined multi-year trends in asthma prevalence rates for various subcategories of the Alabama population, as well as deaths from asthma.

The data indicate that (based on self-reports) approximately one in every ten Alabama residents currently has asthma, that asthma prevalence rates are increasing, and that the state's rates for both lifetime and current asthma now exceed those for the U.S. as a whole. The data also reveal that the burden of asthma is not

**FIGURE 7: NUMBER AND RATE OF DEATHS, ALABAMA, 2000-2007**



Note: Rate reported is per 100,000 population.  
 Sources: Alabama Department of Public Health, Center for Health Statistics, Alabama Department of Public Health Web Site, <http://adph.org/healthstats/>, Mortality Statistical Query System; and Alabama Vital Statistics, 2007, Table 35, Alabama Department of Public Health Web site.

equally distributed across the population. Asthma prevalence rates appear to be particularly high for students enrolled at the upper grade levels (i.e., 9-12), but are also elevated for people in the 18-24 age group and those aged 45-64. Given the scarcity of recent information concerning asthma rates for Alabama’s children, it is not possible to make valid inferences concerning asthma prevalence for children below high school age.

In addition to age, significant gender and race differences are observed in self-reported asthma prevalence within the adult population, with rates for females nearly twice as high as those for males. Rates for African Americans during the two most recent years for which data are available have averaged about three percentage points higher than those for whites. Finally, the data strongly suggest that asthma prevalence in Alabama is inversely associated with both educational attainment and income (i.e., people who rank higher in either education or income exhibit lower asthma rates, and vice versa).

Trends regarding asthma prevalence were analyzed in the report for various subcategories of the adult population. Trends provide insight into the extent to which asthma prevalence is improving or worsening within individual demographic and socioeconomic groupings, including various age, gender, race, education, and income categories. Of the 19 population subcategories that were analyzed, asthma prevalence rates for seven are clearly on the rise (males, whites, African Americans, high school graduates, people with some college, people with incomes under \$15,000, and those with incomes in the \$25,000-\$49,999 bracket). While all of the other 12 subcategories are in the direction of higher prevalence rates, they did not meet the standard that was set for statistical significance.

Environmental factors, such as the amount of ozone and particulate matter in the air, may also influence asthma prevalence in that they may serve as “triggers” for the disease. Current and historical data supplied by the Alabama Department of Environmental Management suggest that ground-level ozone levels (defined as “bad ozone” in contrast to the “good ozone” that is found several miles above the earth) are highest on the Gulf Coast (Mobile and Baldwin counties), the Birmingham area (Jefferson and Shelby counties), and the Huntsville area. As was true for ozone concentration, current and historical data from ADEM also indicate higher than normal levels of fine particulate matter in the Jefferson County area. Fine particle concentration at ADEM monitoring sites in Etowah (Gadsden) during 2005-2007 and Russell County (Phenix City) from 2001-2003 through 2005-2007 also exceeded the Environmental Protection Agency compliance standard.

In addition to general asthma prevalence and disparity rates, data supplied by the Alabama Medicaid Agency and the CHIP were analyzed in this report. Both of these entities target the low-income population. The Alabama Medicaid Agency served approximately 59,000 asthma patients in 2006-2007, while the number of asthmatic children served by the CHIP during 2007 was in excess of 5,000 (totaling 5.7 percent of all CHIP enrollees). About four-fifths of the asthma clients served by Medicaid in 2006-2007 were children, while 52 percent of all patients were African American and 44 percent were white. The data also suggest that many asthma patients served by Medicaid may not be using their controllers properly, leading to the increased likelihood of emergency room visits and hospitalization. Of children enrolled in CHIP in 2007 who were asthmatic, the largest proportions by far were male and in the 6-14 age category.

The report concludes with an examination of asthma mortality. While the number deaths attributed to asthma was elevated during the earlier part of the present decade, the frequency has leveled off since 2005. Of the 475 documented deaths in Alabama from asthma from 2000-2006, 39 percent were to white females. African American females account for another one-fourth of all asthma deaths from 2000-2006. Regarding age, a majority of the asthma deaths from 2005-2007 (or 52 percent) were associated with persons aged 65+.

Asthma is a serious chronic disease that directly impacts a significant number of people across the state. Although it is found within all subcategories of the population, the burden of asthma is unequally borne by children, females, African Americans, and those with low income and educational levels. For the population as a whole, as well as many of its individual sectors, asthma prevalence is on the rise. It is increasingly mandatory that greater attention be given to this age-old disease and the substantial human and monetary costs that it places on Alabama and its residents.

Indeed, much of the data contained in this report will be used in the development of a statewide plan by the Alabama Department of Public Health to address the continuing impact of asthma on the state's population. Furthermore, the bulk of the data appearing herein will be utilized as a benchmark for evaluating the impact of the numerous asthma-prevention and treatment initiatives that will be implemented through the statewide plan. Included are data from: (1) the BRFSS (current and lifetime asthma prevalence rates among adults, risk-associated behavioral among adults [e.g., smoking], asthma prevalence rates disaggregated by gender, age, race, income, and education, and multi-year trends in asthma prevalence for adults and various subcategories of the adult population); (2) YRBS (current and lifetime asthma prevalence rates among youth, risk associated behavioral among youth [such as smoking], and multi-year trends in asthma prevalence rates for youth and various subcategories of the youthful population); (3) Alabama Youth Tobacco Survey (asthma attack prevalence rates for youth enrolled in grades 9-12 [composite rates and rates disaggregated by gender, race, and grade in school]); (4) Alabama Center for Health Statistics (asthma-related mortality for the total population, asthma-related mortality disaggregated by age and race, and multi-year trends in asthma mortality); (5) Alabama Department of Emergency Management (environmental risk factors, including ground-level ozone levels and particulate matter concentration); (6) Alabama Medicaid Agency (asthma treatment data, including location of treatment administration (physician offices, hospitals, and emergency rooms) and treatment data disaggregated by various socio-demographic characteristics); and (7) Alabama Children's Health Insurance Program (asthma treatment data for children under 18 years of age). In addition, program generated data will supplement the benchmark data that have been presented in this report in assessing various components of Alabama's statewide asthma initiative.

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Note: Universal Resource Locator codes (“URLs”) cited in conjunction with the references used in this report were valid as of January, 2009. However, because of frequent alterations in Website composition, some URLs may not work properly at a later date. Even so, the attempt has been made to supply enough information about the original sources that they can be independently accessed without using current URLs. Also, questions about reference citations and sources of data used in this report can be addressed to the author through contacting the Healthy Communities Branch, Alabama Department of Public Health.

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