The Burden of Asthma

Alabama

2013

Alabama Department of Public Health
201 Monroe Street
Montgomery, AL 36104
www.adph.org

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Bureau of Health Promotion and Chronic Disease
Alabama Asthma Program

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The Burden of Asthma in Alabama

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Letter from the State Health Officer

Asthma is a chronic disease of the airways, and it is a major health burden in Alabama. There is no cure for asthma; however, through appropriate medication use and environmental awareness, asthma can be controlled.

The Alabama Asthma Program (AAP), established in 2009, monitors the burden of asthma via a comprehensive surveillance system. This assists in understanding the reach of asthma in our state. By identifying and summarizing the main concerns and highly affected individuals with negative asthma effects, AAP will provide vital information to key stakeholders to determine the interventions that can successfully reduce the burden of asthma in Alabama.

This report will be a vital tool used to create strategies to address asthma from a public health perspective. Local and state level stakeholders will utilize this tool to develop and implement public health interventions which will have a significant impact in reducing negative asthma outcomes such as attacks or episodes, asthma hospitalizations, and asthma deaths.

It is with great pleasure that I present *The Burden of Asthma in Alabama 2013* report. Our goal is to decrease the number of asthma attacks, emergency room visits, hospitalizations, and deaths due to asthma. We invite you to read this document carefully and continue to take an active role to improve the quality of lives of individuals with asthma in the state of Alabama.

Donald E. Williamson, M.D.
State Health Officer
Alabama Department of Public Health

Introduction

Asthma is a health condition which affects airway and lung functioning. Several symptoms can develop, such as wheezing, shortness of breath, chest tightness, or coughing. One of the most common chronic conditions for children is asthma; however, adults can also have asthma. While the cause of asthma is not completely understood, there are clear recommendations on the diagnosis and treatment of asthma.

Asthma attacks or episodes cause swelling and narrowing of airway passages which make breathing difficult. Asthma attacks can be costly to a person's health. Uncontrolled asthma can lead to unnecessary hospitalizations and emergency department (ED) visits. This can place a large burden on hospitals and individuals, and this increases the number of missed school and work days. Several environmental and viral factors can cause (or exacerbate) asthma attacks. Some common triggers include tobacco smoke, dust mites, outdoor air pollution, cockroach allergen, pets, mold, smoke from burning wood, influenza, common cold, respiratory syncitial infections, allergies, some chemicals, and acid reflux.

While there is no cure for asthma, persons with asthma are able to control their condition with proper use of prescribed medication and by avoiding asthma triggers. The National Heart, Lung, and Blood Institute's Expert Panel Report (EPR-3) describes the level of asthma control as well controlled, not well controlled, and very poorly controlled. The EPR-3 recommendations are the preferred method for healthcare providers to describe and treat asthma patients. With a healthcare provider's help, a person is able to create their own personalized asthma action plan. An asthma action plan (also called a management plan) is a written plan that is developed *with a doctor* to help control asthma. This asthma action plan is shared with authorized persons who would assist in its implementation. Taking long term medicine, even when there are no symptoms, is recommended.

There are two types of asthma medication: quick-relief and control. Quick-relief medications control the symptoms of an asthma attack. If a person increasingly needs their quick-relief medications, they should visit their health care provider to determine if a different medicine is needed. Controller medications help a person have fewer and milder attacks, but they do not help during an asthma attack. Questions about asthma medications should be addressed with the appropriate health care provider.

Successful asthma management includes proper medication, environmental awareness, regular medical appointments, and development and utilization of an asthma action plan. By identifying populations and areas of high-risk for asthma, strategies can be implemented to reduce asthma attacks, emergency room visits, hospital visits, deaths, and other costly effects of not well or very poorly controlled asthma. Disparate populations are persons or groups of people affected unevenly by asthma. There are many strategies that can be introduced on a personal, community, and policy level that would benefit persons with asthma in Alabama.

Public health professionals measure the burden of asthma using survey, hospital, death certificate, and other types of data. Measurements such as prevalence, emergency room visits, hospitalizations, and deaths are defined using the previous mentioned data sources. This report will explore the prevalence, hospitalization, and mortality rates of asthma using national and state data sources. This report will also identify areas and populations of asthma burden.

Prevalence (reach) is a measure of how widespread a disease is in a population or community of interest. Prevalence can also be defined as the total number of instances of disease in a population at a given point in time.

$$\textbf{Prevalence} = \frac{\text{Asthma (i.e. reported lifetime or current asthma)}}{\text{Population at a given time (i.e. Alabama residents in 2010)}}$$

Confidence intervals (also called margins of errors) are used to make statements about the level of certainty there is around a point estimate or percentage. The most common level of confidence that public health professionals use is a 95 percent confidence level. Simply stated, this means that the true value of disease prevalence is within the calculated range 95 out of 100 times. A confidence interval describes the level of certainty of the true value. Ninety-five percent confidence intervals will be provided in the appendix of this report.

The 2013 Alabama Asthma Burden Report will present vital asthma information from various data sources. This report describes the burden of asthma for adults, children, asthma hospitalizations, and mortality rates.

This report will identify areas and populations of high asthma burden. This report is primarily intended for key asthma stakeholders such as members of the Alabama Asthma Coalition (AAC), physicians, health care professionals, and public health professionals to utilize when making decisions regarding asthma interventions and health policy decisions to create healthier lives for people with asthma in Alabama.

Asthma Prevalence in Adults

The Centers for Disease Control and Prevention (CDC) estimated that asthma affected 18.7 million adult Americans in 2010.[5] The American Lung Association (ALA) estimated that 13.2 million United States (US) adults had an asthma attack in 2011[6]. Everyday activities in adults can be limited by exacerbations of asthma such as missed work days. In 2008, the CDC estimated that there were 14.2 million missed work days caused by asthma in working adults.[5]

Many processes are in place which attempt to estimate the magnitude of asthma in a community or population of interest. This report will utilize the Behavioral Risk Factor Surveillance System (BRFSS), and the BRFSS Adult Asthma Call-back surveys to estimate asthma prevalence and other asthma measures in adults in Alabama.

Alabama primarily consists of two major racial groups: white and black residents. The standard racial and ethnic groups were included in these surveys. The number of responses in groups other than white and black in Alabama were often very small and at times statistically unreliable. Several years of data of all racial groups were combined to provide reliable estimates.

The BRFSS data presented in this report reflect telephone landline-based surveys. BRFSS asks adults 18 years and older health related questions, including questions about asthma. BRFSS results represent a self-report based survey. When interpreting this section of the report, *it is important to note that BRFSS is a sample of the population of the state and nation*; however, the sample sizes are adequate to make summary statements regarding asthma.

BRFSS includes two questions regarding asthma. The survey asks questions about both lifetime and current asthma statuses of adults in Alabama and the US (for this report the US was defined as the 50 states plus Washington, DC). The questions were:

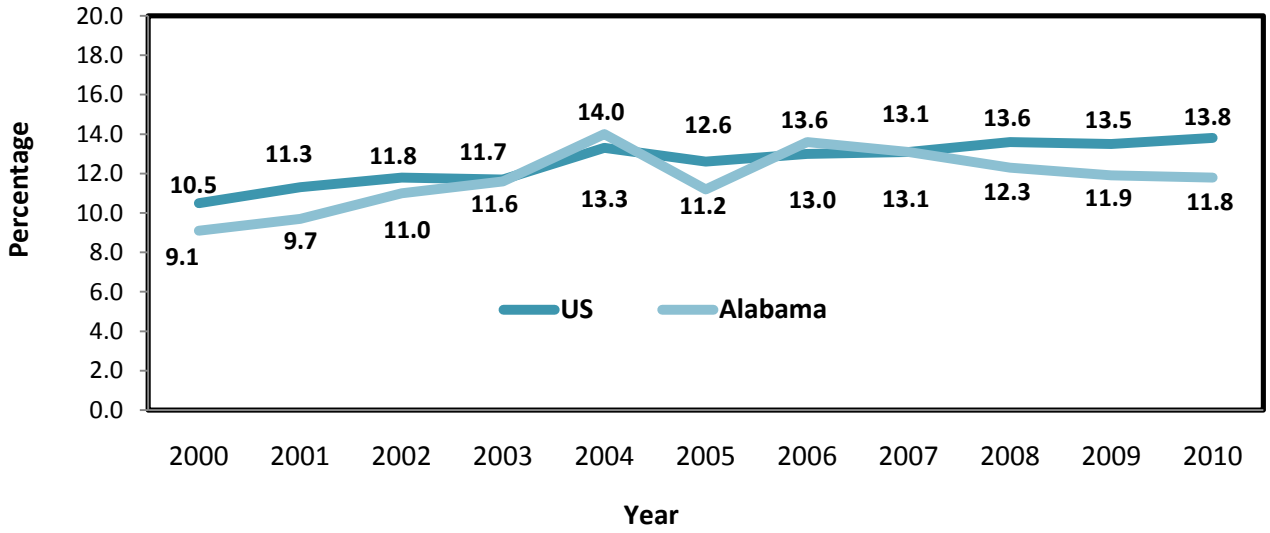
1. Have you <u>ever</u> been told by a doctor, nurse, or other health care professional that you had asthma? (lifetime asthma)
2. Do you <u>still</u> have asthma? (current asthma)

As CDC recommends, 95 percent confidence intervals are used to determine statistical significance. When these intervals do not overlap, it can be said that groups are different from one another. For this document, a disparity was defined as a higher rate of lifetime or current asthma prevalence based on statistical significance.

Lifetime Asthma

Lifetime asthma is defined as an affirmative response to the first asthma question asked in the BRFSS survey. This is when the respondents answered yes to ever having a health care professional tell the respondent he or she had asthma.

Figure 1: Lifetime Asthma by Year, Alabama and US, BRFSS, 2000-2010

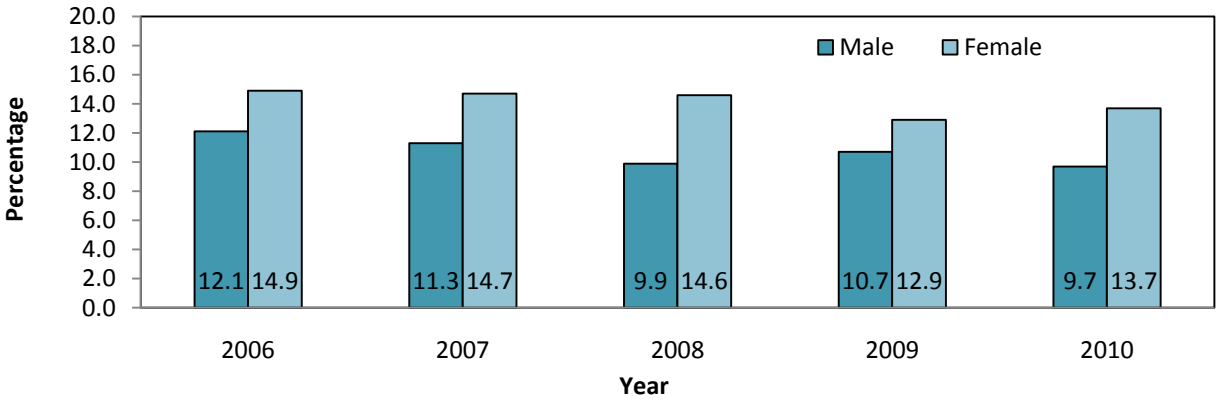


Data Source: 2000-2010 BRFSS
US includes the states plus Washington, DC

BRFSS estimates the number of adults reporting lifetime asthma. Figure 1 describes the trends of lifetime asthma for Alabama and the nation. Alabama's estimates of reported lifetime asthma for 2000-2010 were often lower than the nation's (Figure 1). The only exceptions were the years 2004 and 2006. The trend of reported lifetime asthma decreased among adults in Alabama from 13.6 percent to 11.8 percent between the years 2006-2010 (Figure 1). Reported lifetime asthma prevalence increased in the US for the same years.

In addition to comparing state to national asthma rates, this section of the report will explore differences in demographic information or groups in Alabama. This includes gender, race/ethnicity, age, education levels, and annual household income.

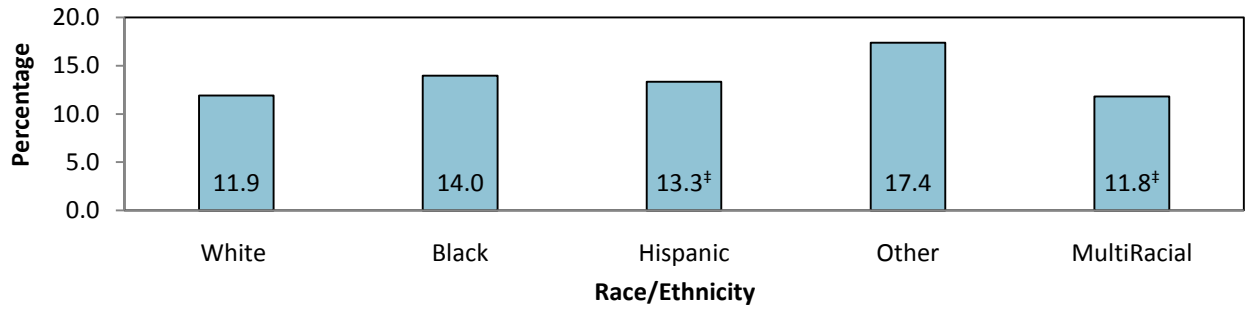
Figure 2: Lifetime Asthma by Year and Gender, BRFSS, 2006-2010



Data Source: 2006-2010 BRFSS
Do not add to 100% as these are sub population estimates

From 2006 through 2010, the largest disparity occurred in 2008 when reported lifetime asthma among women was about 50 percent higher than men (14.6 percent vs. 9.9 percent). This is depicted in Figure 2. Women represented a disparate population when compared to men with respect to reported lifetime asthma prevalence rates for 2008 and 2010.

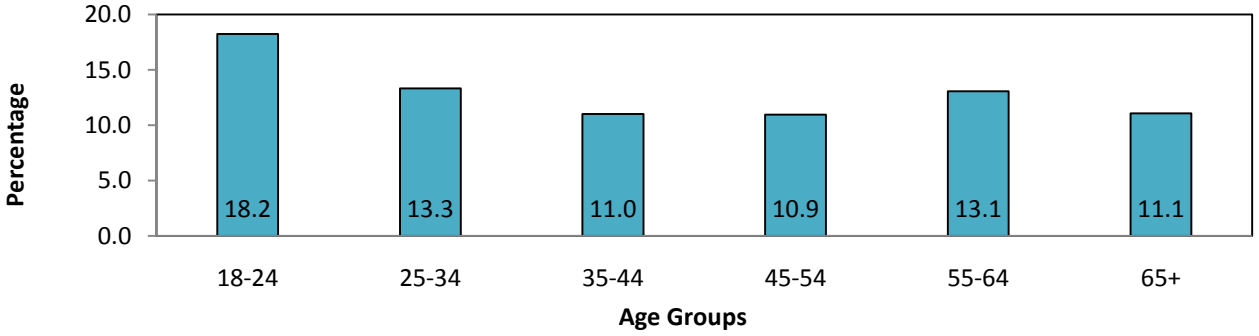
Figure 3: Lifetime Asthma by Race/Ethnicity, BRFSS, 2006-2010 (Combined Totals)



Data Source: 2006-2010 BRFSS
‡ Denotes an unreliable estimate based on a sample of less than 50. Interpret with caution.
Do not total 100% as these are sub population estimates

In order to increase the ability to make accurate statements about race and ethnicity, several years of reported lifetime asthma data were combined. Black individuals represent a disparate population when compared to white individuals (14.0 percent vs. 11.9 percent) with respect to lifetime asthma prevalence. This is shown in Figure 3. The other racial and ethnic groups were similar based on overlapping 95 percent confidence intervals.

Figure 4: Lifetime Asthma by Age Group, BRFSS, 2006-2010 (Combined Totals)

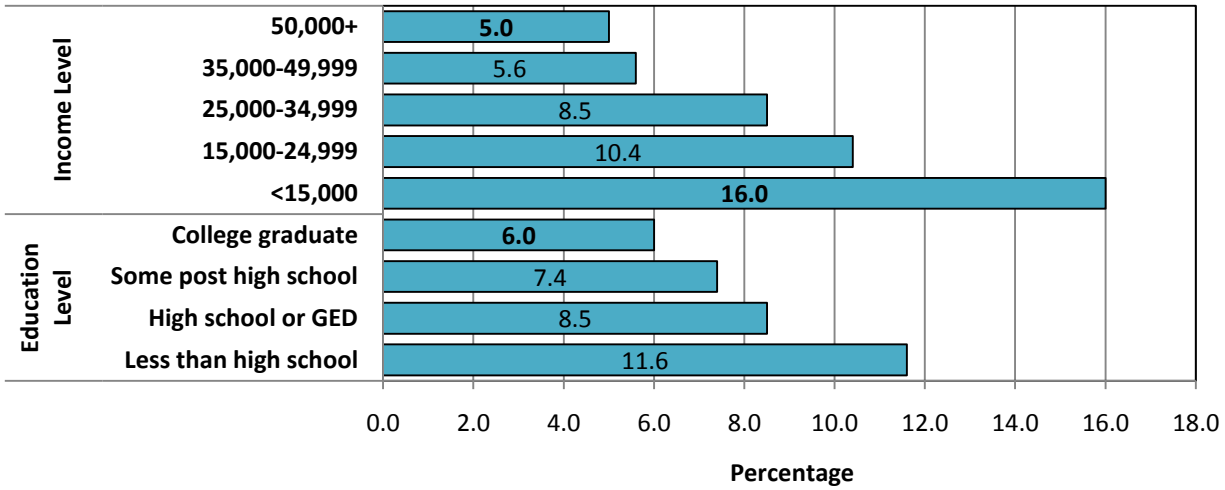


Data Source: 2006-2010 BRFSS
Do not total 100% as these are sub population estimates

In order to increase the ability to make accurate statements about age groups, several years of reported lifetime asthma data were combined. The highest reported lifetime asthma prevalence rate was among the 18-24 year olds at 18.2 percent (Figure 4). The 18-24 year old lifetime prevalence rate was higher than all the other age groups; however, their rate was not higher than the 25-34 year old age group with respect to statistical significance. The 18-24 year

olds represent a disparate population with respect to lifetime asthma prevalence when compared to the four oldest age groups.

Figure 5: Lifetime Asthma by Income and Education Level, BRFSS, 2010



Data Source: 2010 BRFSS
Do not total 100% as these are sub population estimates

Education is also a source of disparity in reported lifetime asthma. As shown in Figure 5 in 2010, those with less than a high school education reported 70 percent higher lifetime asthma than individuals with at least a college degree (16.8 percent vs. 9.9 percent). Adults with less than a high school education represent a disparate population with respect to educational status.

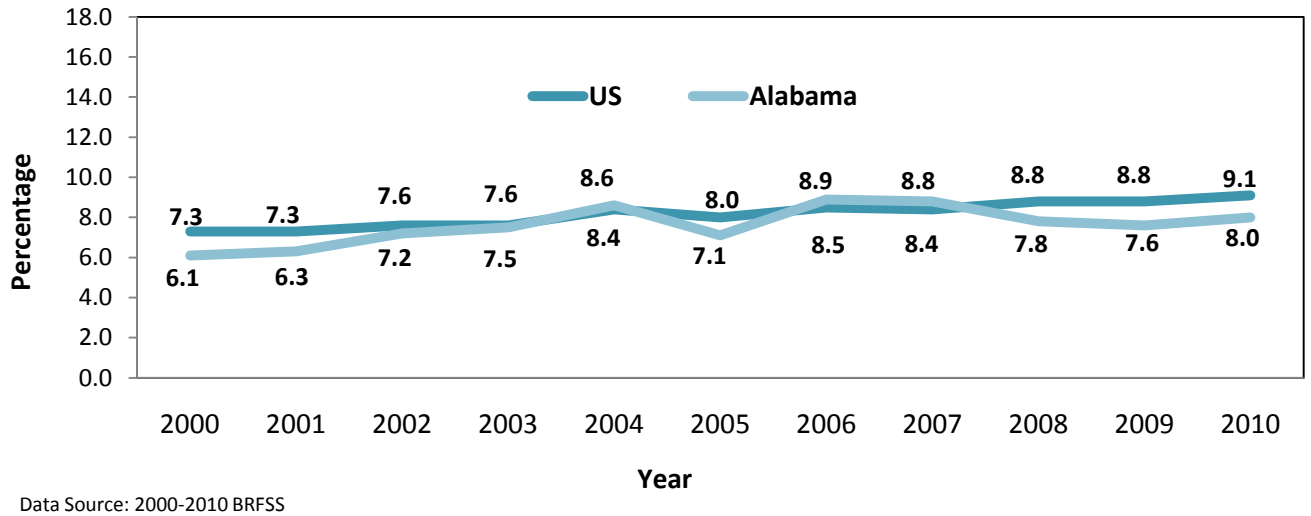
About 20.7 percent of adults who reported lifetime asthma earned less than $15,000 in annual household income (Figure 5). This figure decreased to about 8.2 percent among adults who reported at least $50,000 in annual household income. In 2010, adults who report less than $15,000 in annual household income represent a disparate population when compared to adults who reported more than $25,000 in annual household income.

Current Asthma

Current asthma is defined as affirmative responses to two asthma questions asked in the BRFSS survey. This is when the respondent answered yes to ever having a health care professional tell the respondent he or she had asthma, and the respondent also reported to currently having asthma.

BRFSS estimates the number of adults reporting current asthma (Figure 6). Alabama reported lower current asthma rates for most years when compared to the US. The years 2004, and 2006-2007 were the exceptions. From 2006-2010, Alabama's reported current asthma rates lowered about one percent while the US increased about half a percent.

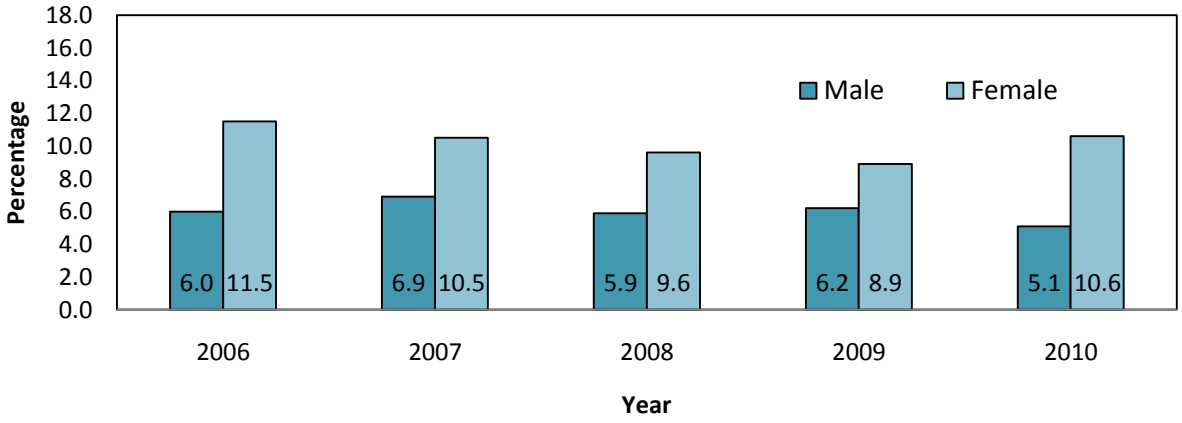
Figure 6: Current Asthma by Year, Alabama and US, BRFSS, 2000-2010



Data Source: 2000-2010 BRFSS
US includes the states plus Washington, DC

In addition to comparing state to national asthma rates, this section of the report will explore differences in demographic information in Alabama. This includes gender, race/ethnicity, age, education levels, and annual household income.

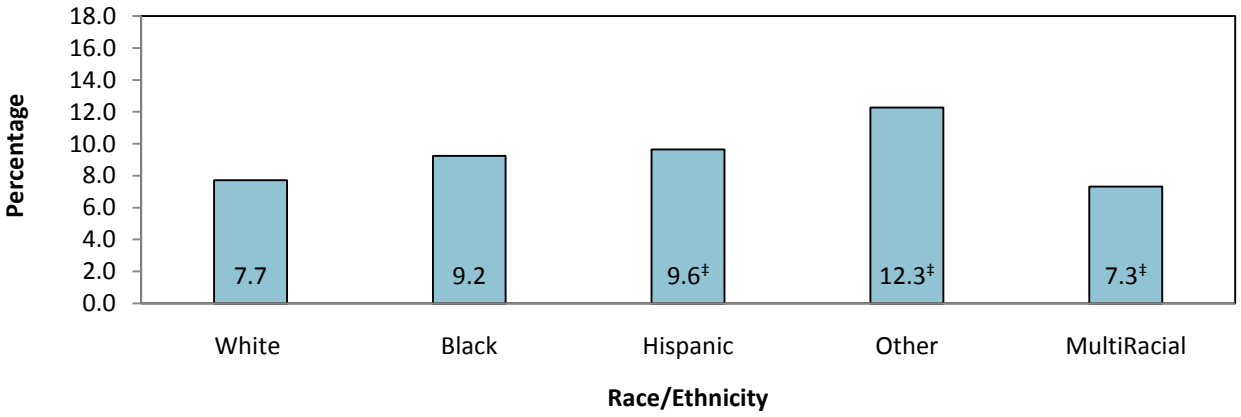
Figure 7: Current Asthma by Year and Gender, BRFSS, 2006-2010



Data Source: 2006-2010 BRFSS
Do not total 100% as these are sub population totals

Current reported asthma rates varied annually by gender. Current reported asthma rates for women ranged from 8.9 percent to 11.5 percent (Figure 7). For men, the current reported asthma rates ranged from 5.1 percent to 6.9 percent. The largest difference by gender was in 2010, when women reported two times the amount of current asthma than men (10.6 percent vs. 5.1 percent). Women represented a disparate population when compared to men with respect to reported current asthma prevalence except for 2009.

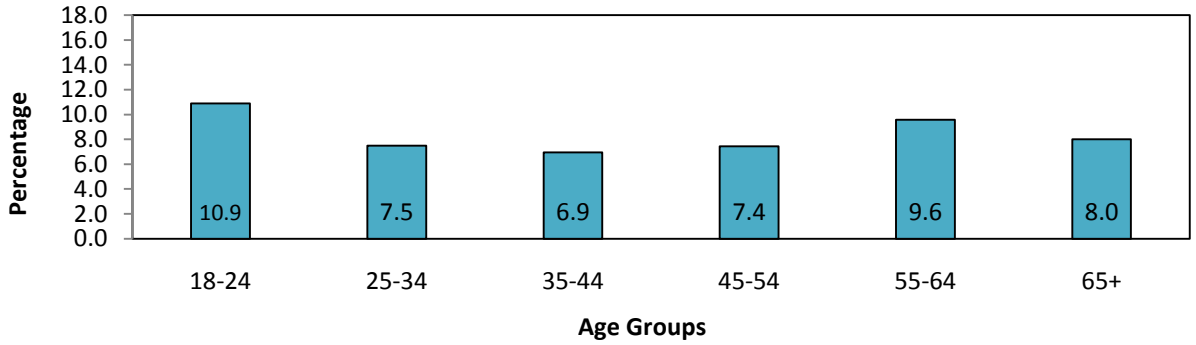
Figure 8: Current Asthma by Race/Ethnicity, BRFSS, 2006-2010 (Combined Totals)



Data Source: 2006-2010 BRFSS
‡Denotes an unreliable estimate based on a sample of less than 50. Interpret with caution.
Do not total 100% as these are sub population estimates

In order to increase the ability to make accurate statements about race and ethnicity, several years of current asthma data were combined (Figure 8). Black individuals had a higher reported current asthma prevalence rate when compared to white individuals which was statistically significant (9.2 percent vs. 7.7 percent). The other racial and ethnic groups were similar based on 95 percent confidence intervals.

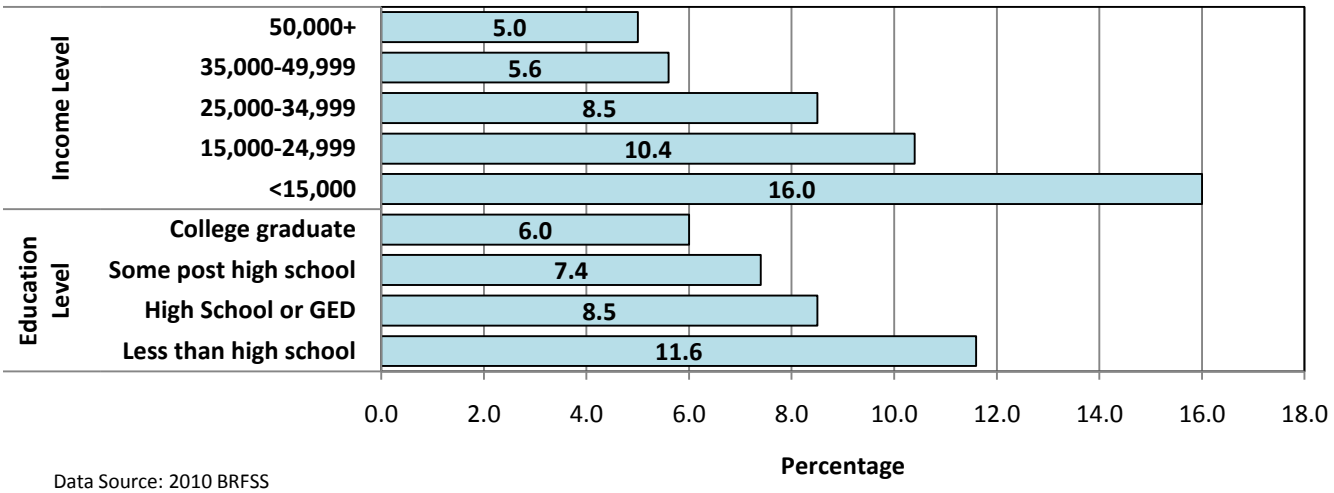
Figure 9: Current Asthma by Age Group, BRFSS, 2006-2010 (Combined Totals)



Data Source: 2006-2010 BRFSS
Do not total 100% as these are sub population estimates

In order to increase the ability to make accurate statements about age groups, several years of current asthma data were combined. The highest reported current asthma prevalence rate was among the 18-24 year olds at 10.9 percent (Figure 9). This rate was higher than the 35 - 44 year old age group based on statistical significance. The other age groups were similar based on 95 percent confidence intervals.

Figure 10: Current Asthma by Income and Education Level, BRFSS, 2010



Data Source: 2010 BRFSS
Do not total 100% as these are sub population estimates

Figure 10 shows that in 2010, adults with less than a high school education had reported approximately two times more current asthma than those with at least a college degree (11.6 percent vs. 6.0 percent). Adults with less than a high school education represent a disparate population with respect to educational status.

About 16 percent of adults who reported current asthma live in households with less than $15,000 in annual household income (Figure 10). Current asthma reports decreased to about 5 percent among adults in households who reported at least $50,000 in annual household income. In 2010, adults who report less than $15,000 in annual household income represent a disparate population when compared to adults who reported more than $25,000 in annual household income.

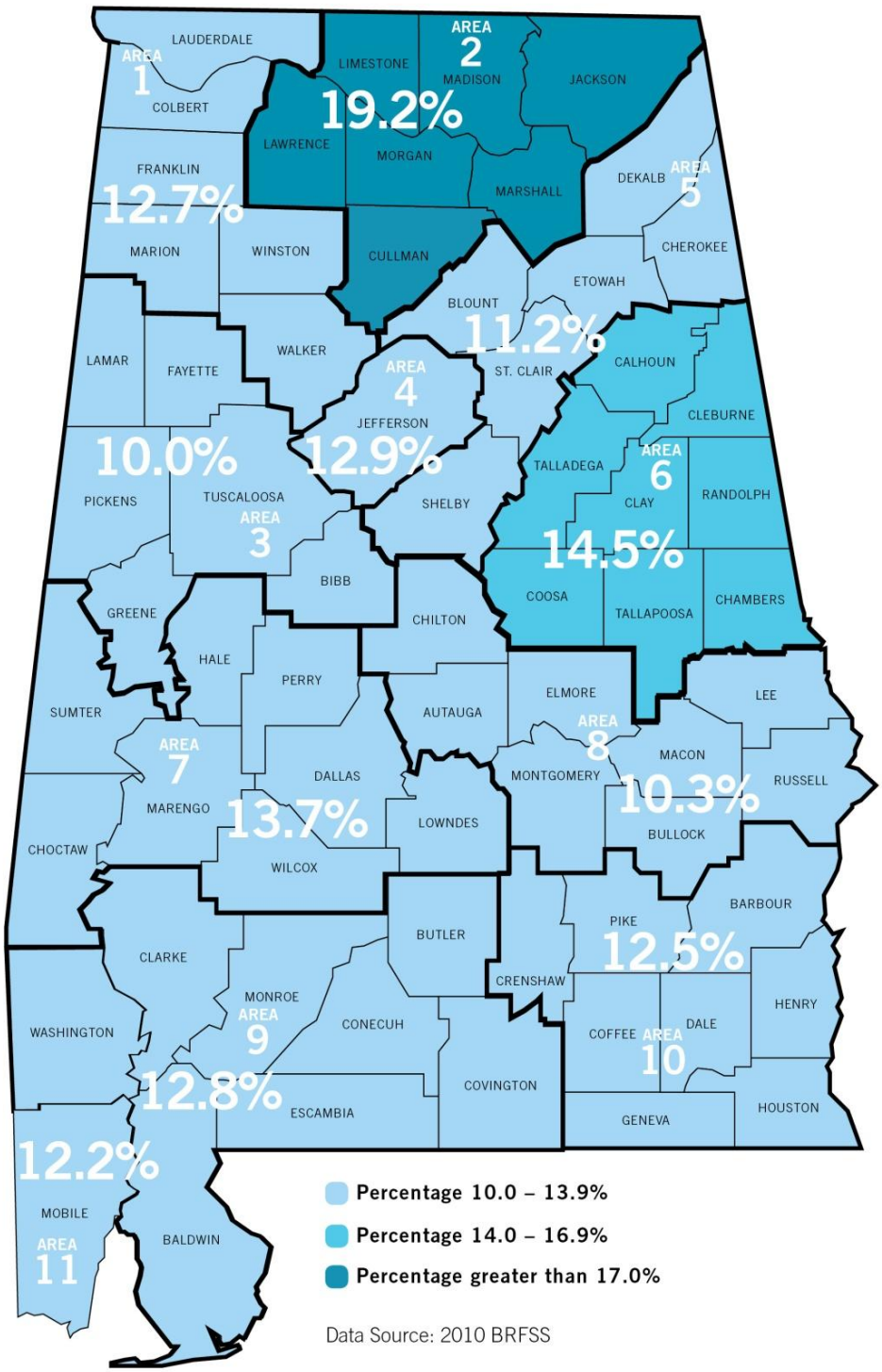
In addition to describing adults with lifetime and current asthma, this report also shows the geographic distribution of lifetime and current asthma. The maps (Figures 11 and 12) show reported lifetime and current asthma by Public Health Area (PHA). PHA is a geographic marking of a county or several counties in Alabama. The divisions are based on the total population of those areas.

In 2010, PHA 2 reported the highest amount of lifetime asthma at 19.2 percent and PHA 6 was close behind at 14.5 percent. This is shown on the map of Figure 11. In 2010, PHA 7 reported a current asthma rate of 9.8 percent and PHA 6 was also high at 9.3 percent. This is shown on the map of Figure 12.

Key findings in adult BRFSS results:

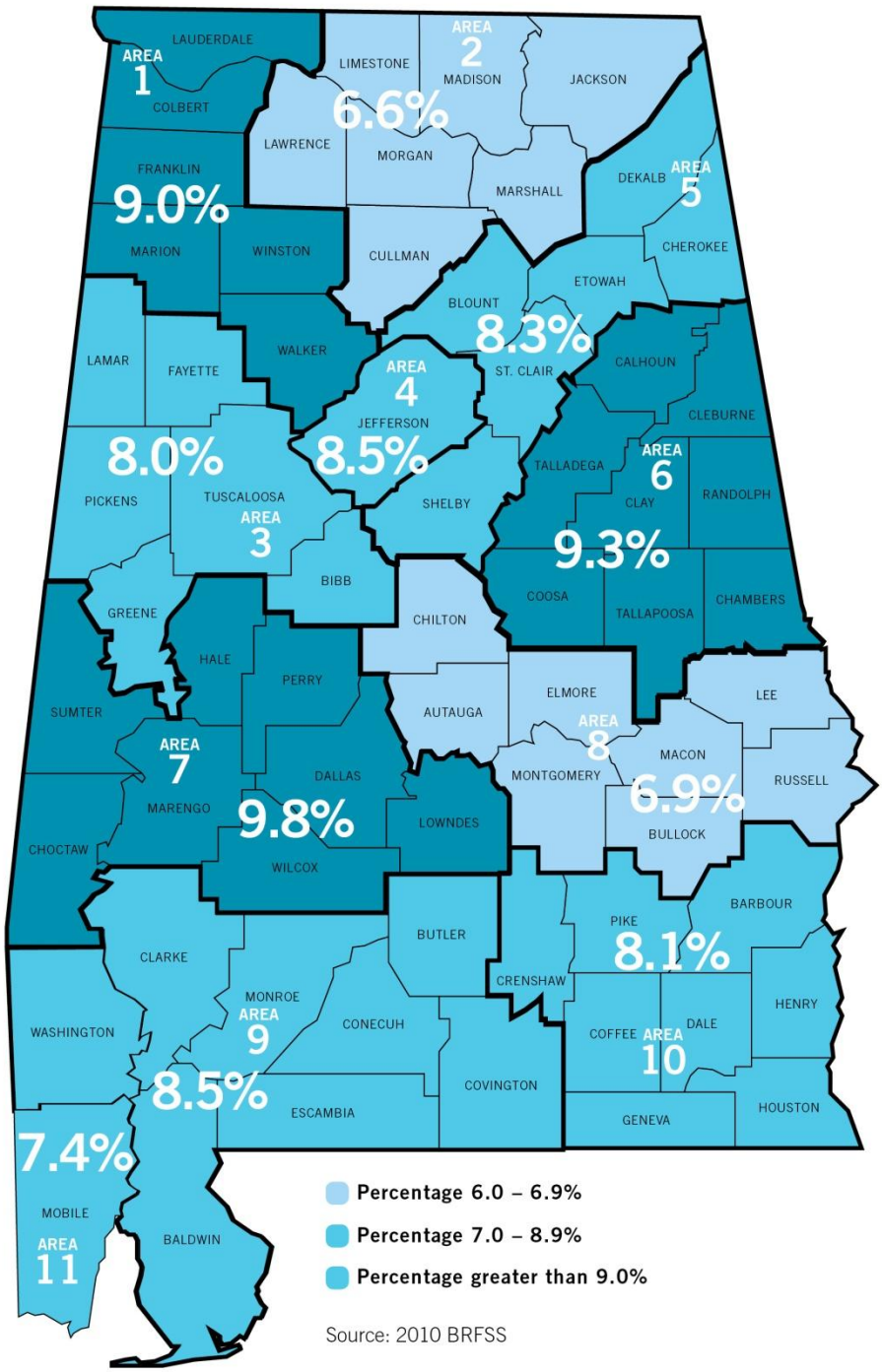
- Overall, lifetime asthma rates have decreased since 2006.
    - More women reported lifetime asthma rates than men in 2008 and 2010. They represented a disparate population for those years.
    - Black individuals had a higher lifetime asthma rate than white individuals for 2006-2010, but this was not statistically significant.
    - The 18 to 24 year olds had a higher lifetime asthma rate when compared to the age groups older than 35 years old for 2006-2010. They represented a disparate population for those years.
    - In 2010, adults with less than a high school education reported higher lifetime asthma rates than adults with at least a college degree. Adults with less than a high school education represented a disparate population.
    - In 2010, adults with less than a $15,000 annual household income reported a higher lifetime asthma rate than those who reported more than $25,000. They represented a disparate population.
    - PHAs with higher percentages of lifetime asthma include PHAs 2 and 6. According to US Census estimates, in PHA2, about 80.9 percent of the population was white and about 19.1 percent was black or in another racial group. The median household income was $42,784. In PHA 6, about 72.5 percent of the population was white and about 27.5 percent was black or in another racial group. The median household income was $34,371.
    - For a more comprehensive look at Alabama asthma disparities, please refer to page 40.

Figure 11: Percentage of Adults with Lifetime Asthma by Public Health Area



- Overall, current asthma rates have decreased since 2006.
    - A higher amount of women reported current asthma rates when compared to men from 2006 through 2010 with the exception of 2009. They represented a disparate population for those years.
    - Black individuals had a higher current asthma rates than white individuals for 2006-2010, but this was not statistically significant.
    - The 18 to 24 year olds had a higher current asthma rate when compared to the age groups older than 35 years old for 2006-2010. They represented a disparate population for those years.
    - In 2010, adults with less than a high school education reported a higher current asthma rate than adults with some post high school or at least a college degree. Adults with less than a high school education represented a disparate population.
    - In 2010, adults with less than a $15,000 annual household income reported a higher rate of current asthma than adults who reported more than $25,000. They represented a disparate population.
    - PHAs with higher percentages of current asthma include PHAs 6 and 7 (Figure 12). According to US Census estimates, in PHA 7, about 34.8 percent of the population was white and about 65.2 percent was black or in another racial group. The median household income was $27,971. PHAs 6 and 7 represented a few of the lower household income geographic groups in Alabama.
    - For a more comprehensive look at Alabama asthma disparities, please refer to page 40.

Figure 12: Percentage of Adults with Current Asthma by Public Health Area



Adult Asthma Education

Adult respondents who reported current asthma in the BRFSS were asked to participate in an additional survey called the BRFSS Adult Asthma Call-back. The Adult Asthma Call-back survey asks many more questions of people who reported current asthma in the first survey. Again, *it is important to note that BRFSS Adult Asthma Call-back is a sample of the population of the state and nation*; however, the sample sizes are adequate to make summary statements regarding asthma. It asks questions about asthma education provided, and the respondents' environments. This survey is important as proper medical management and reduction of exposures to asthma triggers are vital to reduce asthma attacks, visits to emergency rooms, hospital visits, and asthma deaths. Alabama participated in the 2010 Adult Asthma Call-back survey. About 394 adults completed the survey.

In 2010, among adults with current asthma:

- About 60 percent of adults reported that a doctor or other health care professional taught them how to recognize early signs or symptoms of an asthma episode/attack.
- About 65 percent of adults reported that they were taught what to do during an asthma episode/attack.
- Approximately 46 percent have been taught how to use a peak flow meter (a device which measures how quickly a person can blow air out of his or her lungs).
- Only 28 percent reported that they received an asthma action plan.

Patient Education: Adults with Current Asthma	Yes
Ever taught how to recognize early signs or symptoms of an asthma episode	60%
Ever told what to do during an asthma episode	65%
Ever taught how to use a peak flow meter to adjust daily medications	46%
Ever given an asthma action plan	28%
Ever taken a course on how to manage asthma	11%

Medication Use: Adults with Current Asthma	Yes
Used a prescription asthma medication in the past 3 months	50%

Environmental Factors: Adults with Current Asthma	Yes
Regular use of air cleaner or purifier inside home	25%
Exhaust fan used to vent air outside of house while cooking	64%

Mold sighted or smelled in home within the month	12%
Pets allowed in bedroom inside home	33%
Cockroach sighted inside home within this past month	28%
Anyone smoked inside home within this past week	25%
Mattress cover that is made especially for controlling dust mites	30%
Use of hot water to wash sheets and pillowcases	35%
Health professional advice to change things in home, school, or work to improve asthma	32%

Negative Health Outcomes: Adults with Current Asthma	Yes
Visit an emergency room or urgent care center due to asthma within the year	11%
Overnight stay in a hospital due to asthma within the year	3%
Inability to work or carry out usual activities due to asthma within the year	28%
Asthma attack or episode within the year	41%
Symptoms of asthma within the month	58%

These data show where improvements can be made to education and materials provided to asthma patients. In Alabama, more efforts can be made towards providing asthma action plans and referrals to asthma courses especially to adults who report current asthma. Another matter of concern is that only 50 percent of adults report taking their prescription asthma medication in the past 3 months. Finally, environments can also be altered to improve negative health outcome. In Alabama, areas that could be addressed would be regular use of air cleaners, use of hot water for sheets and pillows, and keeping furry pets out of the bedroom of people with asthma. Simple things like these can make great improvements to the quality of life of adults who report current asthma. For more information about positive asthma environments, consult with the primary health care provider and also visit AAP's website at: http://adph.org/asthma/.

Asthma Prevalence in Children

Asthma is a very common childhood disease; CDC estimated 7 million children had asthma in 2010.[5] ALA estimated that about 4.1 million children had asthma attacks in 2011.[7] Children are often limited by their asthma. Some limitations include sleep disturbances, classroom difficulties, and play time. In 2008, CDC estimated about 10.5 million children missed days of school due to asthma.[5] CDC estimated that the average yearly cost of care for a child with asthma was $1,039 in 2009.[5]

There are several methods to estimate the amount of asthma affecting children in Alabama. This report utilizes the childhood asthma prevalence module conducted by BRFSS, the Youth Risk Behavior Survey (YRBS), and the Alabama Youth Tobacco Survey (ALYTS) to estimate the amount of asthma prevalence and other asthma information in children. Asthma information regarding children is also located in the hospitalization section of this report. Again, *it is important to note that BRFSS is a sample of the population of the state and nation*; however, the sample sizes are adequate to make summary statements regarding asthma. Also YRBS and ALYTS also provide estimates, however the sample sizes in these surveys are also adequate to make summary statements.

As noted in the asthma prevalence adult section of this document, collecting and reporting race information in Alabama is limited. However, in this section, the prevalence rates of children identified in minority groups were presented appropriately.

In this section, non overlapping 95 percent confidence intervals were used to determine statistical significance. For this document, a disparity was defined as a higher rate of lifetime, current, or asthma attack prevalence rate based on statistical significance.

Behavior Risk Factor Surveillance Survey (BRFSS)

As mentioned in the adult section of this report, BRFSS is a nationally administered telephone survey. There is a specific module called the childhood asthma prevalence module, which questions adults about the health of a child in the household. Child was defined as a person in the household under the age of 18. *This survey relies on third party reporting which can result in a certain amount of inaccuracy; however, data were weighted and are considered reliable to make summary statements.*

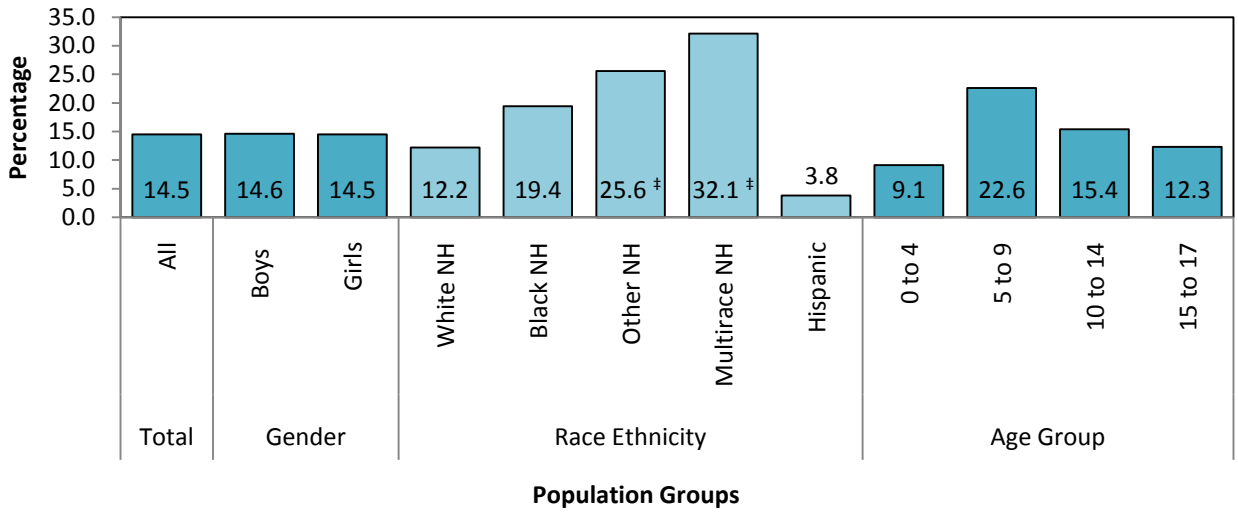
The childhood asthma prevalence module in BRFSS includes two questions about asthma. These questions ask about lifetime and current asthma.

1. Has a doctor, nurse or other health care professional ever said that the child has asthma? (lifetime asthma)
2. Does the child still have asthma? (current asthma)

Lifetime Asthma (BRFSS)

Lifetime asthma is when the respondent answered "yes" to ever having a health care professional tell the adult their child had asthma. This portion of the BRFSS survey gives an estimate of children who have ever had asthma.

Figure 13: Lifetime Asthma Among Children, BRFSS, 2010



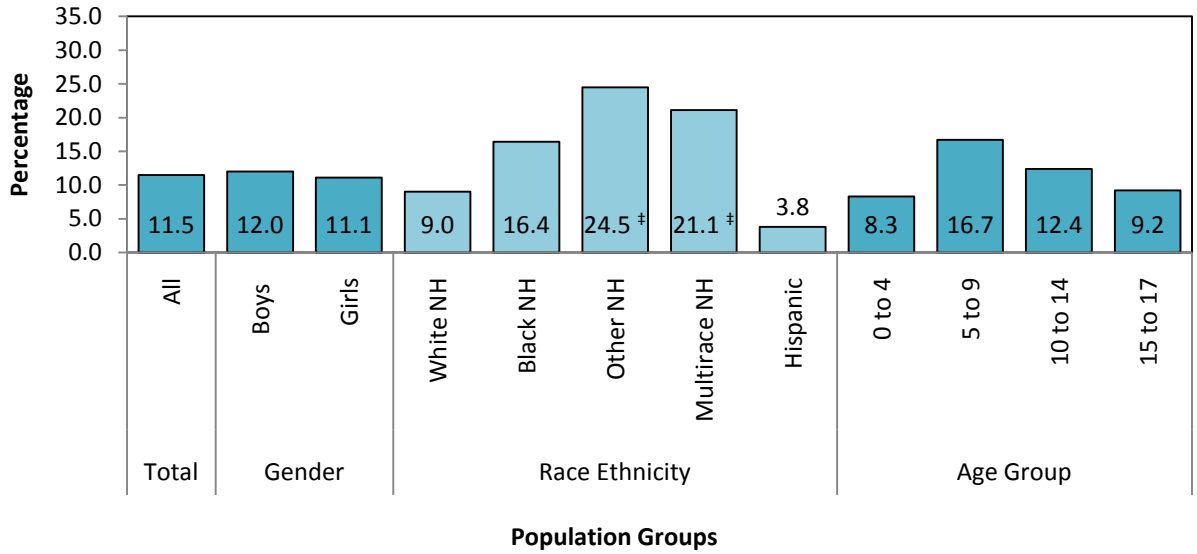
Data Source: 2010 BRFSS, Childhood Prevalence Module
NH represents non Hispanic ethnicity
‡ Denotes an unreliable estimate based on a sample of less than 50. Interpret with caution.

Figure 13 shows the prevalence rate of children who have lifetime asthma. About 14.5 percent of all children were reported to have lifetime asthma. Of all children, 14.6 percent of boys were reported to have lifetime asthma and 14.5 percent of girls were reported to have lifetime asthma. Black children have a higher reported lifetime asthma rate when compared to white children which was statistically significant (19.4 percent vs. 12.2 percent). The other race and ethnic groups were similar based on 95 percent confidence intervals. Those who were 5 to 9 years old had a statistically significant higher rate of lifetime asthma when compared to all other age groups, with the exception of 10 to 14 year olds.

Current Asthma (BRFSS)

Current asthma is when the adult answered "yes" to ever having a health care professional tell him or her that their child had asthma and when he or she reports their child still had asthma. This portion of the BRFSS survey gives an estimate of children who currently have asthma.

Figure 14: Current Asthma Among Children, BRFSS, 2010



Data Source: 2010 BRFSS, Childhood Prevalence Module
NH represents non Hispanic ethnicity
Do not total 100% as these are sub population estimates
‡ Denotes an unreliable estimate based on a sample of less than 50. Interpret with caution.

Figure 14 presents prevalence rates of children currently living with asthma. About 11.5 percent of children were reported to have current asthma. Boys were reported to have a current asthma prevalence rate of 12.0 percent. Girls were reported to have a current asthma rate of 11.1 percent. Again black children have a higher prevalence rate of current asthma than white children which was statistically significant (16.4 percent vs. 9.0 percent). The other race and ethnic groups were similar based on 95 percent confidence intervals.

Key findings in BRFSS Childhood Asthma Module results:

- Approximately 14.5 percent of all children in Alabama were reported to have lifetime asthma.
- Black children were reported to have a higher lifetime asthma prevalence rate than white children which was statistically significant.
- With respect to age, those who were 5 to 9 years old had higher lifetime asthma prevalence rates than the other age groups which were statistically significant with the exception of 10 to 14 year olds.

- Approximately 11.5 percent of all children in Alabama were reported to have current asthma.
- Black children were reported to have a higher current asthma prevalence rate than white children which was statistically significant.
- For a more comprehensive look at Alabama asthma disparities, please refer to page 40.

Youth Risk Behavioral Survey (YRBS)

YRBS is administered to public middle and high school students. There are two asthma questions. The questions are:

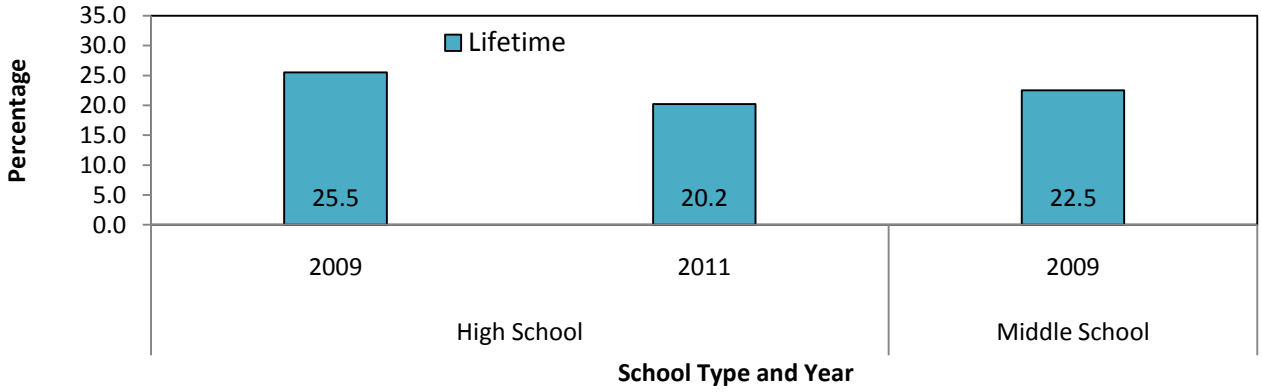
1. Has a doctor or nurse ever told you that you have asthma? (lifetime asthma)
2. Do you still have asthma? (current asthma)

This survey is given nationally every other year. For Alabama, only public schools participate in this survey. The results are provided when the level of school and student participation is above 60 percent. When participation is below this level, the results are not considered reliable. *YRBS relies on self-reporting of diseases and conditions which may lead to inaccuracies; however, data were weighted and are considered reliable to make summary statements.*

Lifetime Asthma (YRBS)

Lifetime asthma is when the student reports that a health care professional told him or her that they ever had asthma. For 2009, about 22.5 percent middle school students and 25.5 percent high school students reported they had been told that they had asthma sometime in their lives (Figure 15).

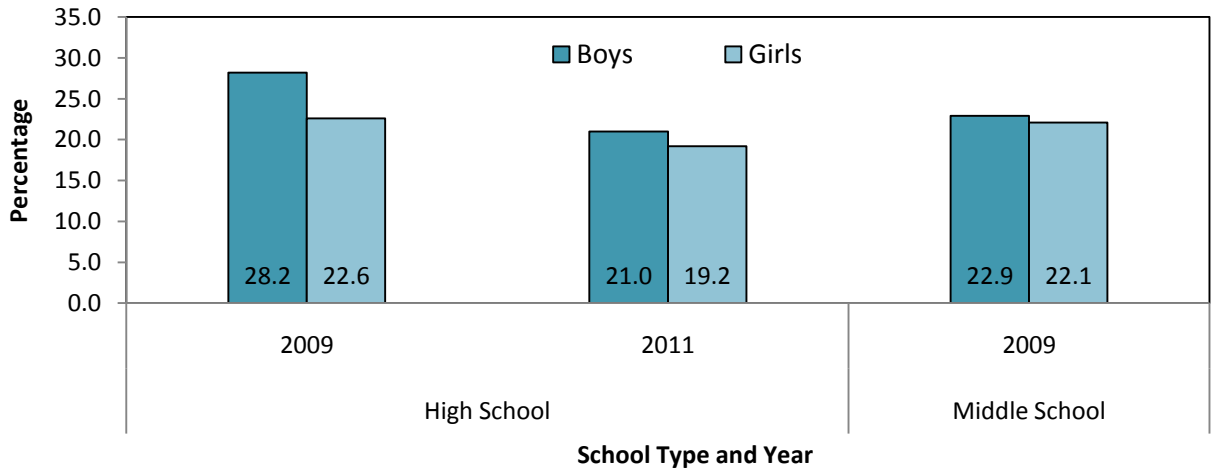
Figure 15: Lifetime Asthma by School Type, YRBS, 2009 and 2011



Data Source: 2009 and 2011 Youth Risk Behavior Survey
2011 middle school results are not available for Alabama
Do not total 100% as these are sub population estimates

In 2011, there was a drop in the number of public high school students reporting having lifetime asthma to 20.2 percent (Figure 15). This represented a statistically significant drop in the lifetime asthma prevalence rate among high school students from 2009 to 2011.

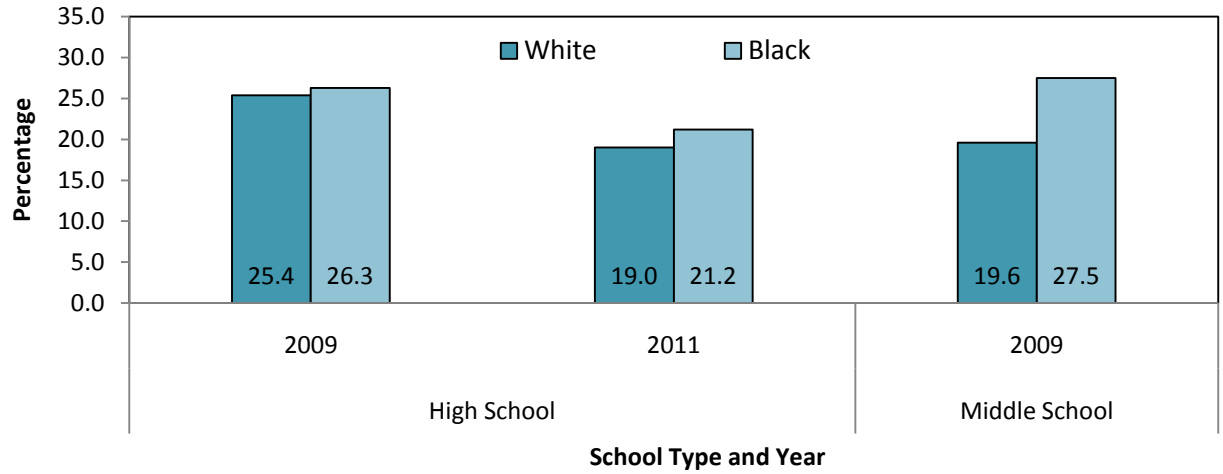
Figure 16: Lifetime Asthma by School Type and Gender, YRBS, 2009 and 2011



Data Source: 2009 and 2011 Youth Risk Behavior Survey
2011 middle school results are not available for Alabama
Do not total 100% as these are sub population estimates

In 2009, about 22.9 percent of middle school boys reported lifetime asthma vs. 22.1 percent of girls (Figure 16). In 2009, public high school boys reported slightly higher lifetime asthma prevalence rates than girls (28.2 percent vs. 22.6 percent). In 2011, high school boys still reported higher lifetime asthma prevalence rates, but the difference between genders was less (21.0 percent vs. 19.2 percent). These differences were not statistically significant.

Figure 17: Lifetime Asthma by School Type and Race, YRBS, 2009 and 2011



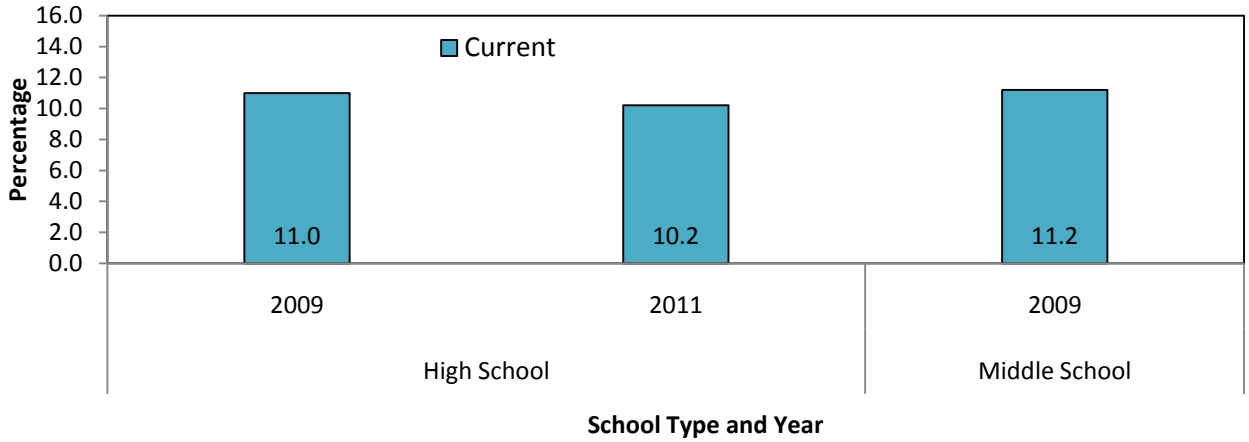
Data Source: 2009 and 2011 Youth Risk Behavior Survey
Prevalence rates were not provided when there were less than 100 respondents for subgroups
Do not total 100% as these are sub population estimates

Minor racial health disparities were seen among students. In 2009, about 25 percent of white high school students and 26 percent of black students reported lifetime asthma (Figure 17). In 2011, high school students reported 19 percent and 21 percent respectfully. In 2009, about 20 percent of white middle school students and 28 percent of black students reported lifetime asthma (Figure 17). None of these differences were statistically significant.

Current Asthma (YRBS)

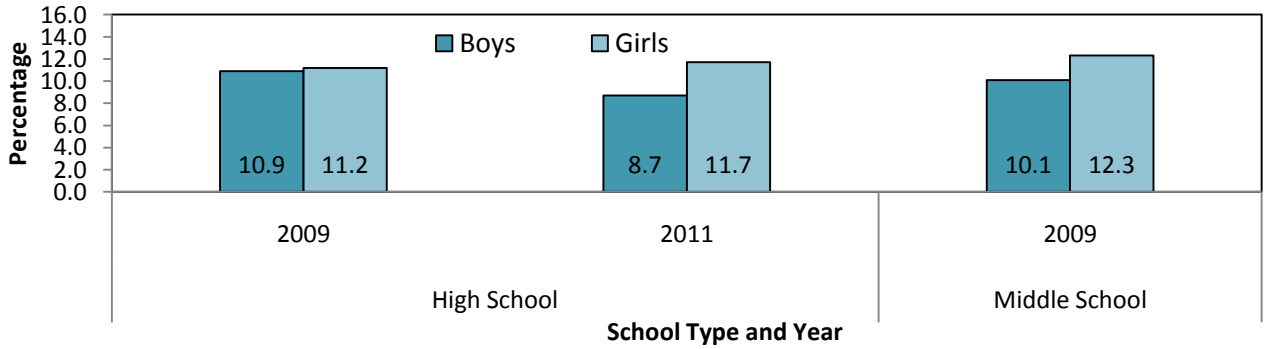
Current asthma is when the student reports that they still have asthma. In 2009, about 11 percent of public high school and middle school students reported current asthma (Figure 18). In 2011, about 10.2 percent of public high school students reported current asthma.

Figure 18: Current Asthma by School Type, YRBS, 2009 and 2011



Data Source: 2009 and 2011 Youth Risk Behavior Survey
2011 middle school results are not available for Alabama
Do not total 100% as these are sub population estimates

Figure 19: Current Asthma by School Type and Gender, YRBS, 2009 and 2011

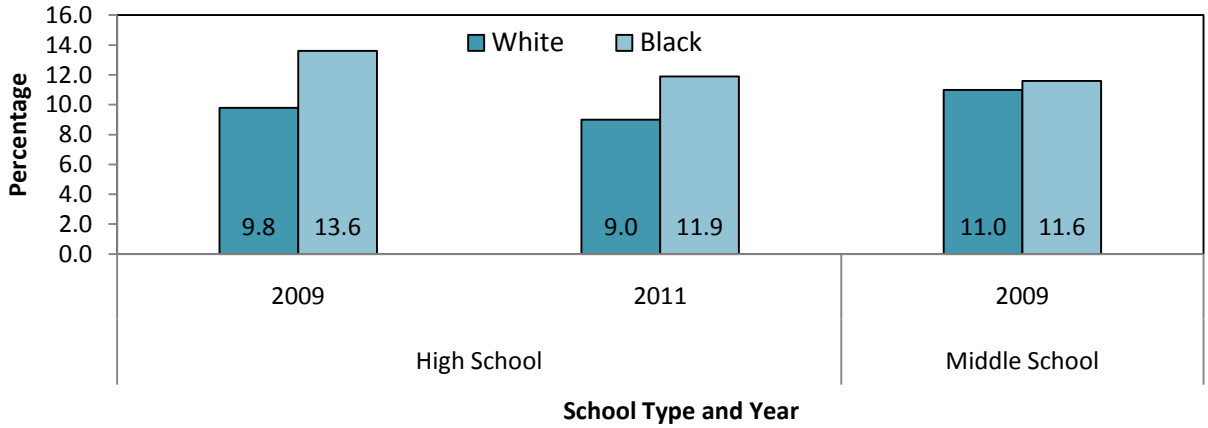


Data Source: 2009 and 2011 Youth Risk Behavior Survey
2011 middle school results are not available for Alabama
Do not total 100% as these are sub population estimates

Figure 19 shows that more middle school girls reported current asthma than boys (12.3 percent vs. 10.1 percent). In high schools for 2009, current asthma prevalence rates were

similar between boys and girls (10.9 percent vs. 11.2 percent). In 2011, more high school girls reported current asthma than boys (11.7 percent vs. 8.7 percent). Again, these differences did not show statistical significance.

Figure 20: Current Asthma by School Type and Race, YRBS, 2009 and 2011



Data Source: 2009 and 2011 Youth Risk Behavior Survey
2011 middle school results are not available for Alabama
Prevalence rates were not provided when there were less than 100 respondents for subgroups
Do not total 100% as these are sub population estimates

Current asthma prevalence rates for middle school and high school students were similar across racial groups. These reported rates are listed in Figure 20. None of these differences were statistically significant.

Key findings in YRBS results:

2009

- Approximately 22.5 percent of middle school students and 25.5 percent of high school students reported that a doctor or nurse had told them during their lifetime that they had asthma.
- Approximately 11.2 percent of middle school students and 11.0 percent of high school students reported that they currently have asthma.

2011

- Approximately 20.2 percent of public high school students responding to the YRBS survey reported that a doctor or nurse had told them during their lifetime that they had asthma.
- Approximately 10.2 percent of public high school students responding to the YRBS survey in 2011 reported that they currently have asthma.
- For a more comprehensive look at Alabama asthma disparities, please refer to page 40.

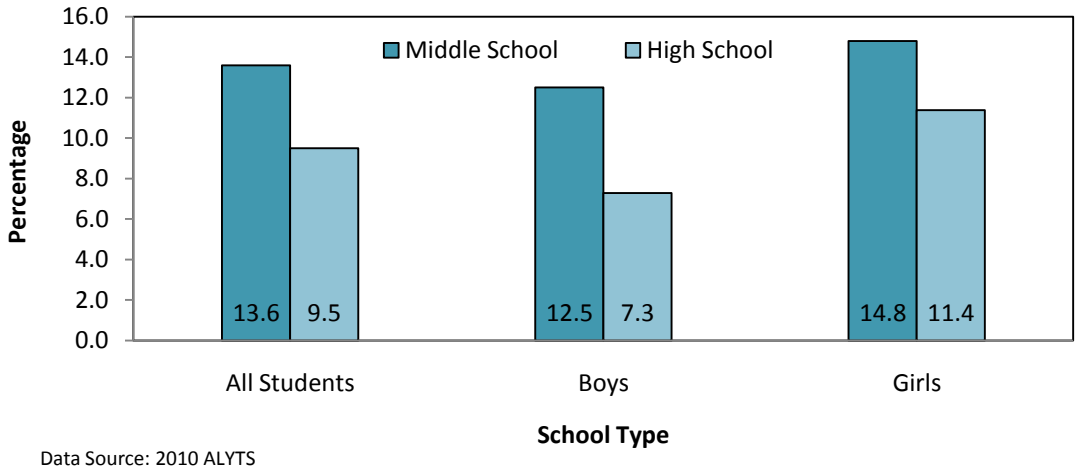
Alabama Youth Tobacco Survey (ALYTS)

ALYTS is administered to public middle and high school students every two years. ALYTS asks several important questions about the behaviors, environments, and attitudes of students. Alabama began to survey public middle and high school students in 2000 and continues to administer this survey every two years. An asthma question was introduced in 2008. This section will focus on 2010 data to establish a baseline measure for asthma attack prevalence among public school students in Alabama. *ALYTS relies on self-reported responses which can result in a certain amount of inaccuracy; however, data were weighted and are considered reliable to make summary statements.*

Asthma and Tobacco (ALYTS)

In total, 1,350 high school and 1,172 middle school students completed the survey in 2010. There was one question in the ALYTS which refers to asthma. That question was, "During the past 12 months, have you had an episode of asthma or an asthma attack?" (attack prevalence). This question addresses uncontrolled asthma, and gives a rough indicator of how many public school students have uncontrolled asthma. About 13.6 percent (157) of middle school and 9.5 percent (126) of high school students reported having an asthma attack or episode in 2010.

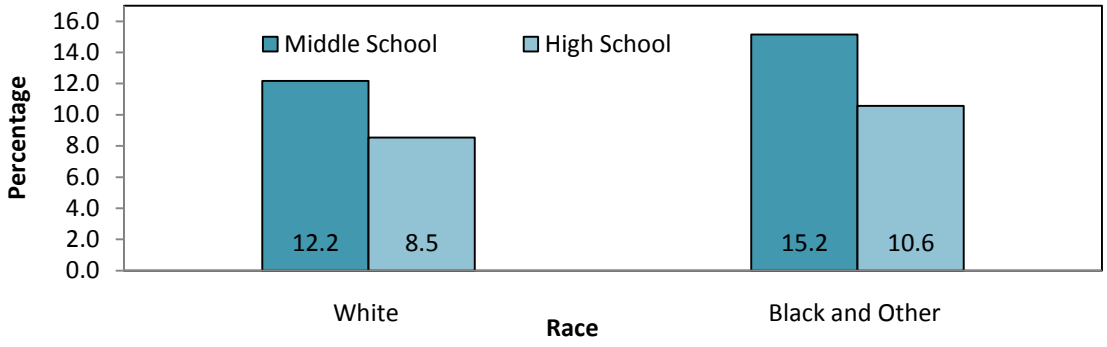
Figure 21: Students With Asthma Episode, School Type and Gender, ALYTS, 2010



Data Source: 2010 ALYTS

First, this section will explore the characteristics of students with asthma by gender and race. More students reported asthma attacks in middle school than in high school (Figure 21). This was statistically significant. The prevalence of all boys who reported asthma attacks decreased from 12.5 percent in middle school to 7.3 percent in high school. Overall, girls report more asthma episodes than boys (Figure 21). However, this was not statistically significant.

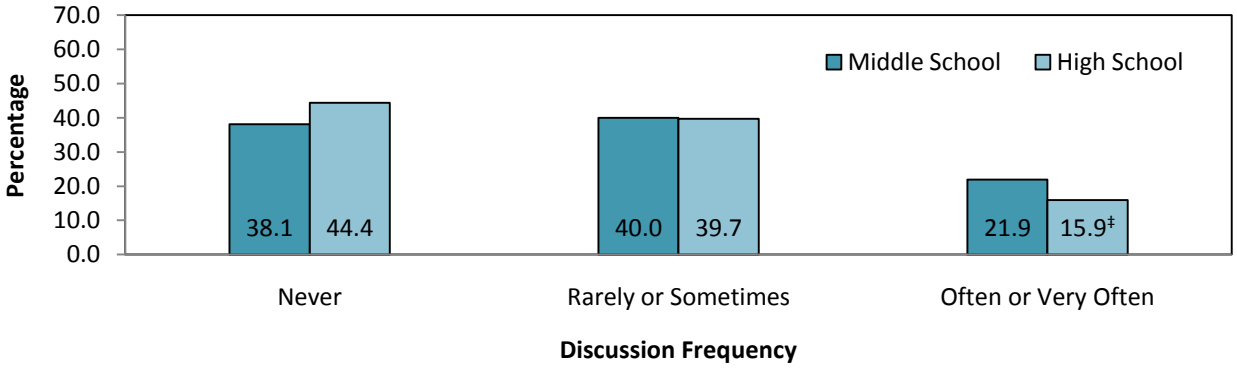
Figure 22: Students With Asthma Episode by Race, ALYTS, 2010



Data Source: 2010 ALYTS

At times, health disparities may exist across racial groups. In middle school populations, about 12.2 percent of white students and 15.2 percent of black and other students reported an asthma attack or episode within the year the survey was taken (Figure 22). Among high school students, approximately 8.5 percent of white students reported an asthma attack, versus 10.6 percent of black and other students (Figure 22). However, differences were not statistically significant.

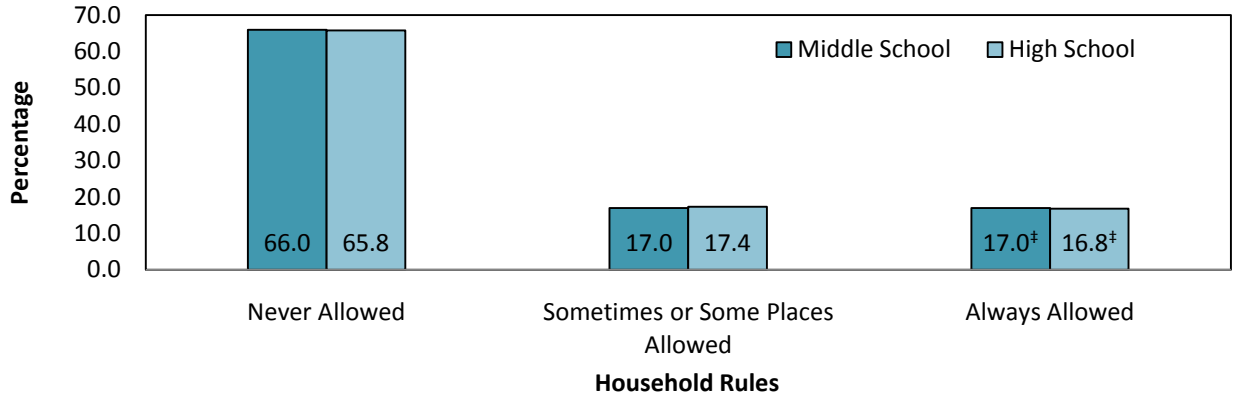
Figure 23: Parental Discussions About the Dangers of Tobacco Use Among Students with Asthma Episode, ALYTS, 2010



Data Source: 2010 ALYTS
‡Denotes an unreliable estimate based on a sample of less than 35. Interpret with caution.

Figure 23 shows that about 21.9 percent of middle school and 15.9‡ percent of high school students who report asthma episodes regularly talk with their parents or caregivers about the dangers of tobacco use. However, about 38.1 percent of middle school and 44.4 percent of high school students who report asthma episodes never talk with their parents or caregivers about the dangers of tobacco use.

Figure 24: Household Rules About Smoking Among Students With Asthma Episodes, ALYTS, 2010



Data Source: 2010 ALYTS

‡ Denotes an unreliable estimate based on a sample of less than 35. Interpret with caution.

Figure 24 shows that among students who report asthma episodes, about 66.0 percent of middle school and 65.8 percent of high school students live in primarily nonsmoking households. However, about 17.0 percent‡ of middle school and 16.8 percent‡ of high school students who report asthma episodes live in households where smoking is always allowed.

Key findings in the 2010 ALYTS:

- Approximately 13.6 percent of Alabama public middle school students responding to ALYTS reported that they had an asthma attack or episode in 2010.
- Approximately 9.5 percent of Alabama public high school students responding to ALYTS reported that they had an asthma attack or episode in 2010.
- For a more comprehensive look at Alabama asthma disparities, please refer to page 40.

Asthma Hospitalizations

Uncontrolled asthma may lead to asthma hospitalizations. These events are serious, costly, and emotionally taxing to all involved. Asthma hospitalizations can be avoided through good asthma management techniques, appropriate education efforts, and supportive environments for persons with asthma. In 2009, CDC estimated that there were 479,300 asthma-related hospitalizations in the US.[5]

Alabama did not have access to asthma hospitalization data when AAP was created in 2009. AAP worked towards collecting this vital information. AAP and the Alabama Hospital Association (AlaHA) agreed to 13 variables which would be included in asthma reports compiled by appropriate hospitals to AAP. Age, date of birth, gender, race and ethnicity, city, county, state, admission date, discharge date, primary insurer name *(payer)*, and primary, secondary, and tertiary diagnoses are the variables provided to the surveillance system. Certain hospitals were not included in data collection activities. These include military and veteran hospitals,

specialty hospitals (such as rehabilitation or substance abuse centers), psychiatric facilities, and prison hospitals.

Hospitals were not required to report a variable which would specify an ED visit, office visit, or an inpatient asthma hospitalization. This required the formulation of a case definition for an *asthma hospitalization*. A *hospitalization with a primary diagnosis of asthma* was an in-state resident who stayed at least one night in the facility and where asthma was listed in the primary diagnosis position of the medical record. Another important factor to take into account would be that these data represent *discharge hospital data* rather than any other form of records. Due to the unique nature of hospital data collection and hospitalization definitions in Alabama, comparisons to other states' hospitalization data may not be appropriate.

These records are *de-identified* (names or other identifiers were not provided). As data represent de-identified hospitalizations, it is important to note that one individual could have been reported several times in one year. Examples of fictitious asthma visits are provided below (payer information is not included). The first and second diagnostic rows represent asthma hospitalizations. The first row would be included in the primary cause analysis while the second row would not be included based on the selection criteria.

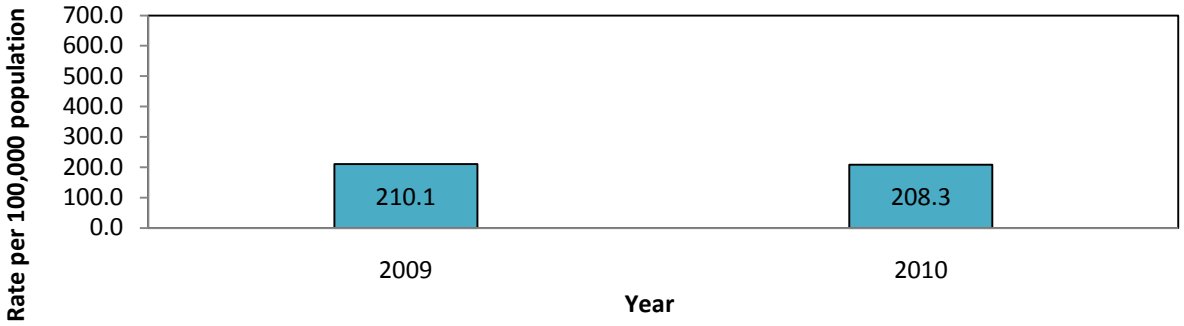
Table 1: Example of Alabama Asthma Hospitalization Data

AGE	DOB	GENDER	RACE	CITY	COUNTY	STATE	1	2	3
64	7/1/1944	F	W	LINEVILLE	Lee	AL	49301	27651	25002
6	1/19/2002	M	W	ASHLAND	Dale	AL	341	49300	

In 2009, there were 9,878 reported primary asthma hospitalizations based on discharge records. Eighty-one of the 103 (or 78.6 percent) identified hospitals participated in 2009 surveillance activities. In 2010, there were 9,933 reported primary asthma hospitalizations based on discharge records. Seventy-nine of the 99 (or 79.8 percent) identified hospitals participated in 2010 surveillance activities.

To determine disparities between groups, rates of asthma hospitalizations were utilized. A disparity was defined as a higher rate of asthma hospitalizations based on statistical significance. Statistical significance was determined via non-overlapping 95 percent confidence intervals. Please note that 95 percent confidence intervals are provided in the appendix of this report.

Figure 25: Asthma Hospitalization Rates by Year, 2009 and 2010



Data Source: Alabama Asthma Surveillance System and US Census Bureau
These age-adjusted rates represent total hospitalizations rather than unique individuals
This analysis is based on hospital discharge records

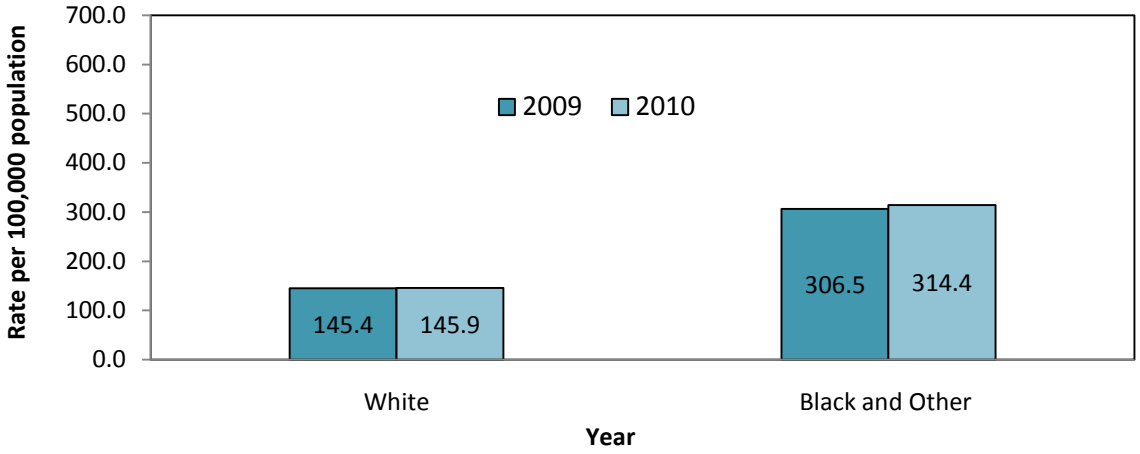
Figure 25 shows that the asthma hospitalization rate for 2009 was 210.1 per 100,000 individuals. The asthma hospitalization rate for 2010 was 208.3 per 100,000 individuals. These rates were similar with respect to statistical significance.

Figure 26: Asthma Hospitalization Rates by Gender, 2009 and 2010

Data Source: Alabama Asthma Surveillance System
These age adjusted rates represent total hospitalizations rather than unique individuals
This analysis is based on hospital discharge records

Figure 26 shows the rates of primary hospitalizations by gender for both 2009 and 2010. This graph shows that men had about 175.3 hospitalizations per 100,000 individuals, while women hospitalization rates were at 239.2 per 100,000 individuals in 2009. The 2010 hospitalization rate for men was about 170.8 per 100,000 population, while it was 240.0 per 100,000 population for women. Women represented a disparate population in 2009 and 2010. Rates did not differ within gender from 2009 to 2010.

Figure 27: Asthma Hospitalization Rates by Race, 2009 and 2010

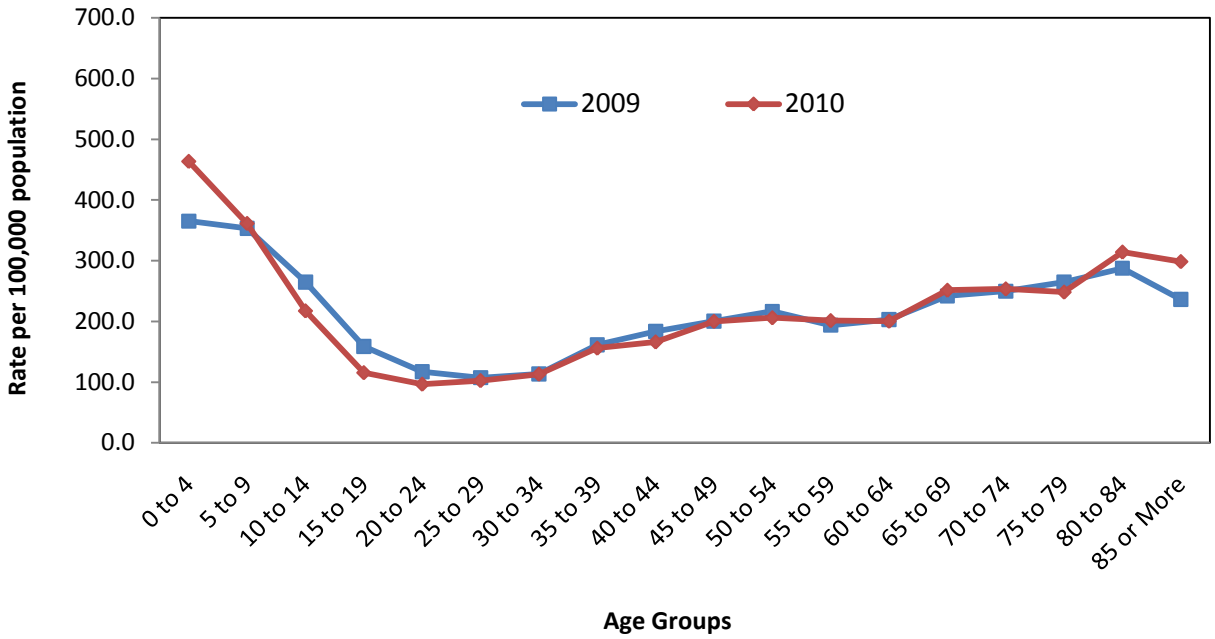


Data Source: Alabama Asthma Surveillance System and US Census Bureau
These age-adjusted rates represent total hospitalizations rather than unique individuals
This analysis is based on hospital discharge records

In Alabama, individuals who do not identify themselves as either white or black only make up about 2 percent of the state's population. For this analysis, black individuals and other minority groups were combined into one category to provide reliable estimates. Please note that this analysis includes information about how the patient reported their race.

Figure 27 describes the rates of asthma hospitalizations based on race for 2009 and 2010. The black and other racial group hospitalization rates were at 306.5 in 2009 and 314.4 per 100,000 individuals in 2010. This group's rates were higher when compared to the white asthma hospitalization rates of 145.4 and 145.9 per 100,000 individuals respectfully. The black and other racial individuals represented a disparate group for both years when compared to white individuals.

Figure 28: Asthma Hospitalization Rates by Age Group, 2009 and 2010

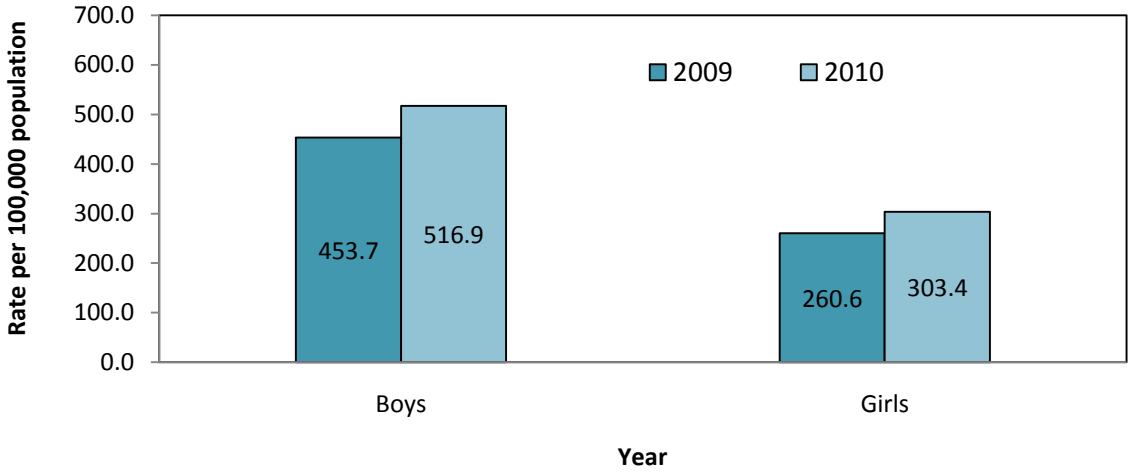


Data Source: Alabama Asthma Surveillance System and US Census Bureau
These rates represent total hospitalizations rather than unique individuals
This analysis is based on hospital discharge records

Figure 28 shows trends of asthma hospitalizations for 2009 and 2010 based on age. The blue line represents asthma hospitalization rates by age in 2009, and the red line represents rates in 2010. Both years have very similar patterns of hospitalization rates by age group. In infancy, children's rates are highest, declining until ages 15-19, where they stay relatively stable until ages 30-34. Rates climb slowly to peak again at 80-84 years of age. Essentially, these trend lines show that there were much higher rates of asthma hospitalizations in younger groups and fairly high rates of hospitalizations at the end of the age spectrum. More years of hospitalization data will need to be obtained to determine if this pattern in hospitalizations by age group continues.

This analysis of all asthma hospitalizations brought into question the demographics of the infants through 4 year olds and the 5 - 9 year olds. The infants through 4 year olds and 5 - 9 year olds represented disparate groups when compared to the older age groups. Further analysis was conducted on these vulnerable populations to better understand their demographic composition.

Figure 29: Asthma Hospitalization Rates of Infants - 9 Year Olds by Gender, 2009 and 2010



Data Source: Alabama Surveillance System and US Census Bureau
These rates represent hospitalizations rather than unique individuals
This analysis is based on hospital discharge records

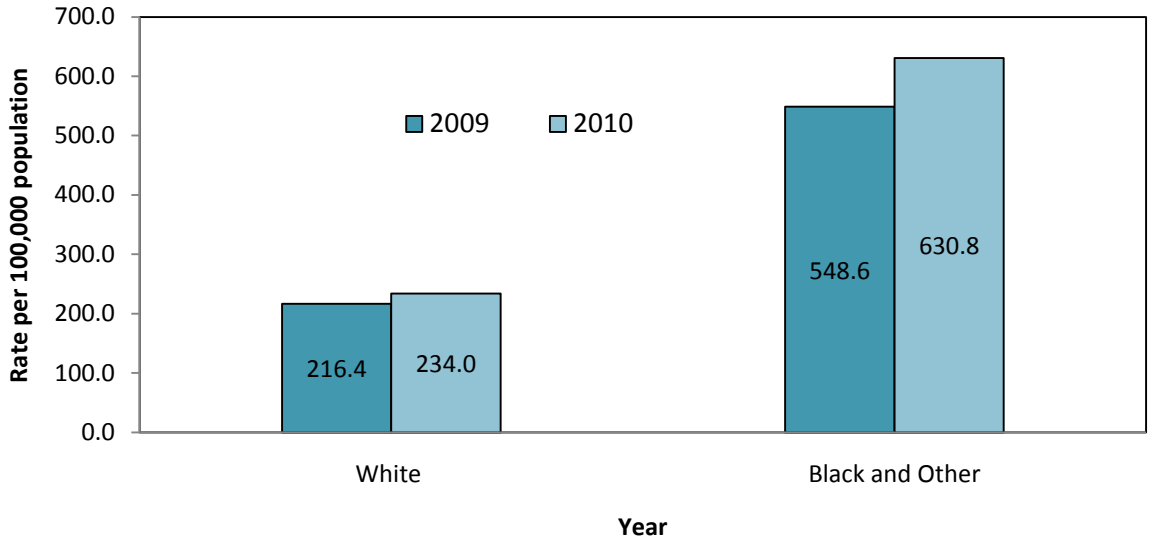
Based on the higher rates of asthma hospitalizations in younger ages shown previously, this report will also investigate differences in gender for these younger population age groups. Specifically, this section will report on children from infancy - 9 years old with a reported asthma hospitalization. In 2009, boys had an asthma hospitalization rate of about 453.7 asthma hospitalizations per 100,000, and girls had a rate of about 260.6 per 100,000 individuals (Figure 29). In 2010, boys had an asthma hospitalization rate of about 516.9 per 100,000 and for girls the rate was 303.4 per 100,000 individuals (Figure 29).

For both years, boys represented a disparate group when compared to girls, and this held true for both years of surveillance data. It is important to note that when all ages were included in the analysis, women had higher rates of asthma hospitalizations, but in this younger age group analysis, boys had higher rates of asthma hospitalizations.

Disparities also exist by race in these younger age groups as illustrated in Figure 30. White children presented asthma hospitalization rates of 216.4 and 234.0 hospitalizations per 100,000 population for both years. Children in the black and other racial group presented asthma hospitalization rates of 548.6 and 630.8 hospitalizations per 100,000 population for both years.

Children in the black and other racial groups represented a disparate group when compared to white children. It is important to note that the disparity seen in black and other racial groups in the infants - 9 year olds was also seen when all age groups were included in the analysis.

Figure 30: Asthma Hospitalization Rates of Infants - 9 Year Olds by Race, 2009 and 2010

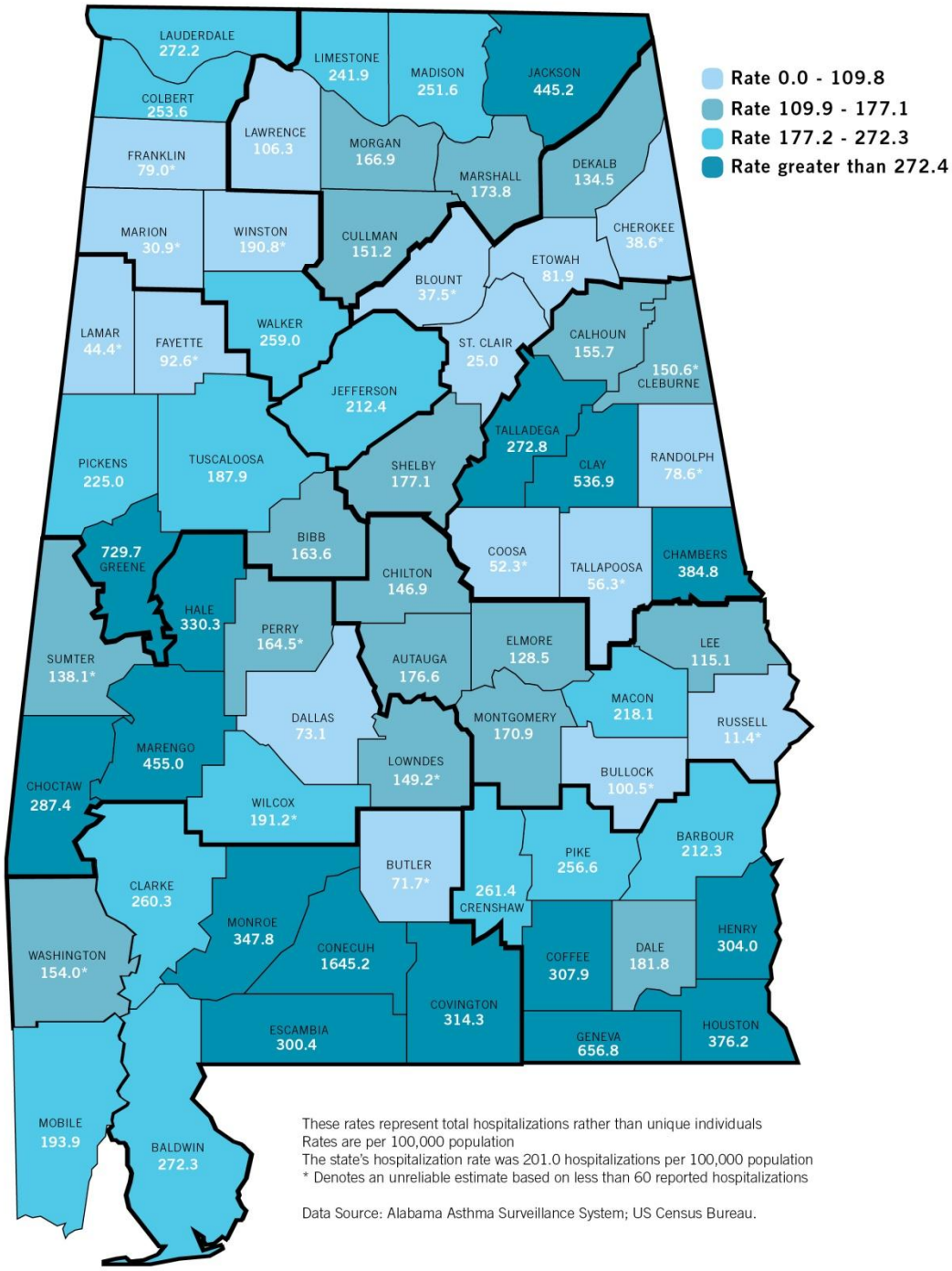


Data Source: Alabama Surveillance System
These rates represent hospitalizations rather than unique individuals
This analysis is based on hospital discharge records

Environments can have a large effect on asthma. Patient county information was used to shed light on asthma hospitalizations burden based on geography. Alabama is composed of 67 counties. As a reminder, it is important to note that one individual could have been reported several times in one year. Some of these counties have very small population sizes. Counting one person several times in one year could greatly inflate the rate of a sparsely populated county.

Taking that into account, Figure 31 shows the rates of hospitalizations by county. This analysis combined two years of hospitalization data by county. This was done to increase the ability (power) to make statements about differences by county. The range of hospitalization rates by county was lowest at 11.4 visits and highest at 1,626.3 visits per 100,000 individuals. Conecuh County had the highest rate at 1,645.2 per 100,000 individuals, followed by Greene County at 729.7 visits per 100,000 individuals, and finally Geneva County at 656.8 visits per 100,000 individuals.

Figure 31: Asthma Hospitalization Rates by County of Residence, 2009-2010 (Combined Totals)



Primary asthma hospitalizations are often the result of uncontrolled asthma. Asthma hospitalizations are usually preventable through appropriate health management techniques. Continued monitoring of these events is important to understand burden caused by asthma hospitalizations on Alabama's hospital system. Vulnerable groups, areas, and other major findings are described below.

Key findings in hospitalizations results:

- Women had higher asthma hospitalization rates than men for 2009 and 2010.
- Black and the other racial group had higher asthma hospitalization rates than white residents for 2009 and 2010.
- Infants - 9 year olds had higher asthma hospitalization rates than older age groups for 2009 and 2010.
- Among infants - 9 year olds, boys had higher asthma hospitalization rates than girls for 2009 and 2010.
- Among infants - 9 year olds, children who were identified in the black and other racial group had higher asthma hospitalization rates than white children.
- Conecuh, Greene, and Geneva counties represented the highest rates of primary asthma hospitalizations for 2009 and 2010.
- All differences mentioned were statistically significant.
- For a more comprehensive look at Alabama asthma disparities, please refer to page 40.

Asthma Deaths

According to the 2011 National Vital Statistics report, there were 3,388 primary asthma deaths in the United States in 2009.[13] This is equal to nine American asthma deaths daily.

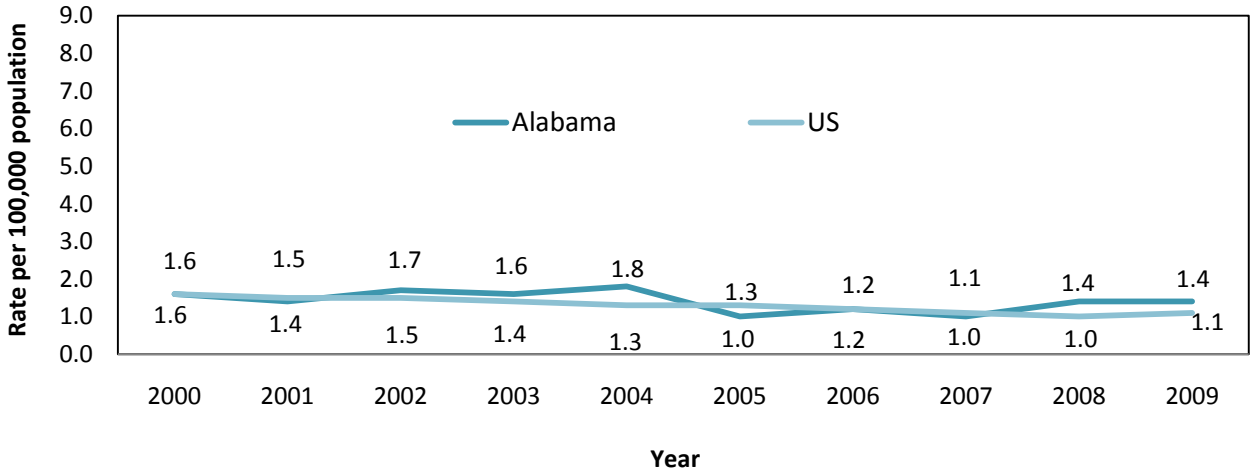
The Alabama Center for Health Statistics collects all death certificates in Alabama. The National Center for Health Statistics receives these data from all states and has a query system which provides statistical information. This tool is the CDC's Wide-ranging Online Data for Epidemiologic Research also called CDC WONDER. Information regarding where data are obtained is listed in the technical notes of this report.

These analyses include information where asthma was listed as the underlying (single cause) or multiple cause of death on the CDC WONDER system. Additional analyses will include all asthma deaths by public health areas. For this section, non-overlapping 95 percent confidence intervals were used to determine statistical significance. For this document, a disparity was defined as a higher asthma mortality rate based on statistical significance.

Underlying or Primary Cause of Death

Underlying cause of death or primary cause of death is when the main cause of death is asthma.

Figure 32: Underlying Cause of Asthma Death Rates by Year, Alabama and US, 2000-2009



Data Source: Centers for Disease Control and Prevention, National Center for Health Statistics. Underlying Cause of Death 1999-2009 on CDC WONDER Online Database, released 2012
US includes the states plus Washington, DC

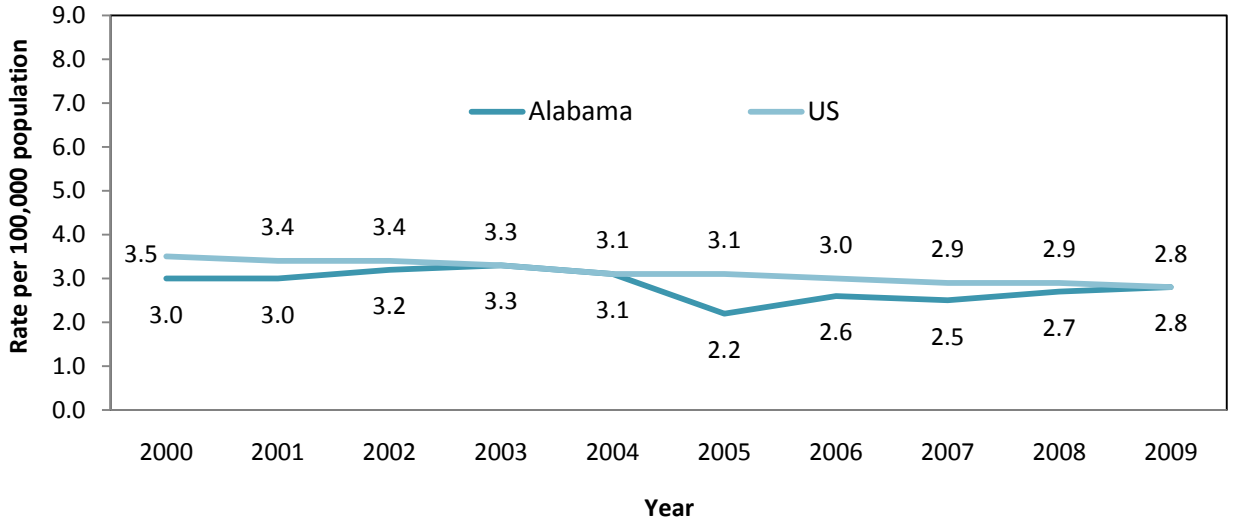
From 2000 until 2009, primary asthma deaths in Alabama decreased from 1.6 to 1.4 deaths per 100,000 individuals. The national asthma death rates fell from 1.6 to 1.1 deaths per 100,000 individuals (Figure 32). In 2009, Alabama reported 71 primary asthma deaths.

This report will now discuss the multiple cause of death analysis. State stakeholders have indicated interest in asthma deaths where asthma played a part, but was not necessarily considered the main cause of death. Scientific literature also suggests that multiple cause of death analysis provides extremely useful information.[14, 15] Other states commonly report underlying cause of death data. Please *do not* compare multiple causes of death rates to other states' underlying cause of death rates.

Multiple or Contributory Cause of Death

Multiple cause of death is when *asthma played a role* but was not the main cause of the death. Each death certificate contains a single underlying cause of death, up to twenty additional multiple causes, and demographic data. Multiple cause of death is indicated when there is "any mention" of death attributed to asthma on the death certificate.

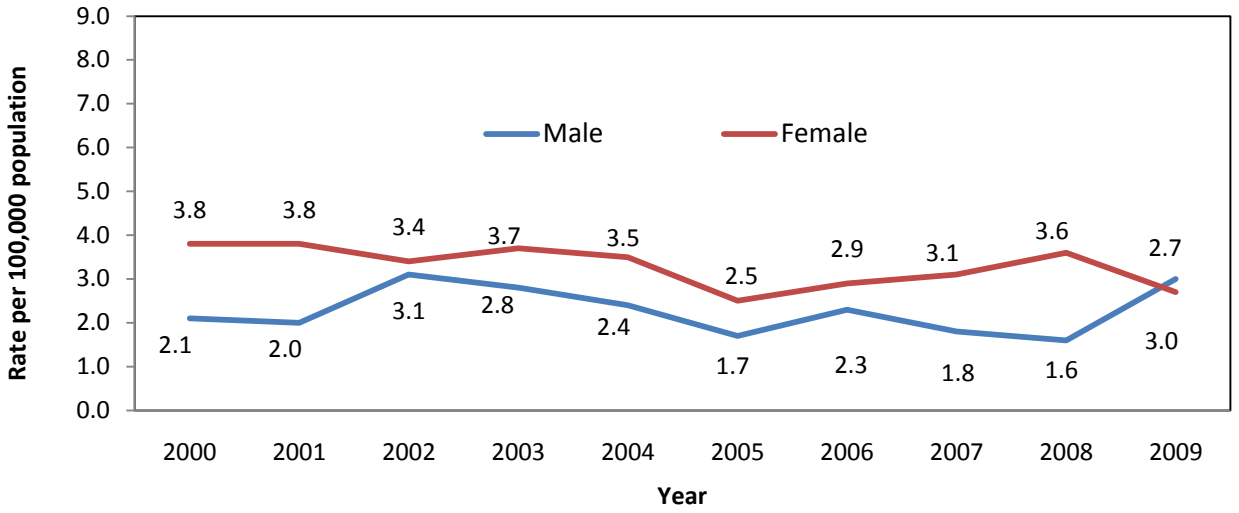
Figure 33: Multiple Cause of Asthma Death Rates by Year, Alabama and US, 2000-2009



Data Source: Centers for Disease Control and Prevention, National Center for Health Statistics. Multiple Cause of Death 1999-2009 on CDC WONDER Online Database, released 2012
US includes the states plus Washington, DC

Multiple causes of death rates went from 3.0 to 2.8 deaths per 100,000 population in Alabama as shown in Figure 33. The national asthma death rates dropped from 3.5 to 2.8 deaths per 100,000 individuals. There were no statistical differences in Alabama and US death rates for any of the years presented. There was more variation in Alabama death rate data when compared to the steady decrease in US asthma death rates.

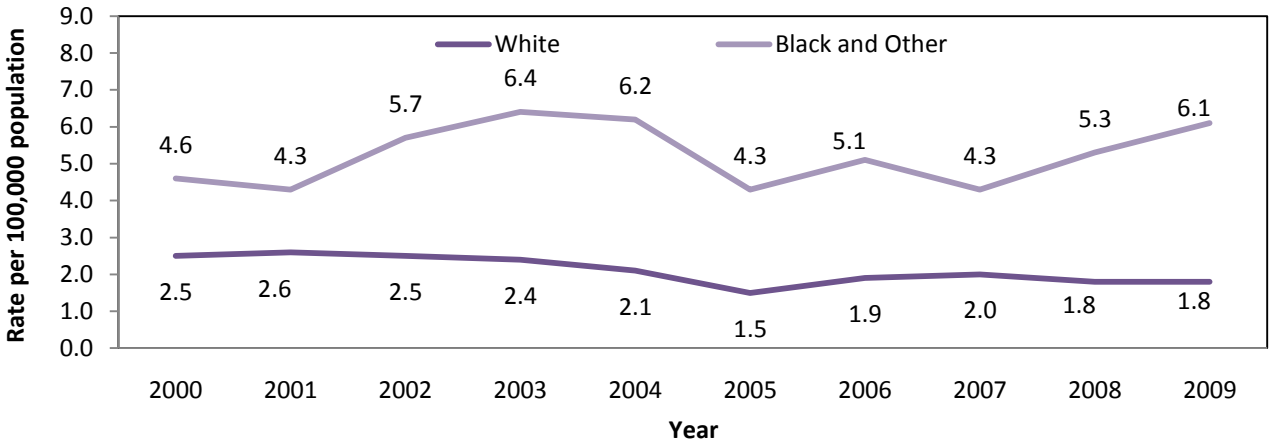
Figure 34: Multiple Cause of Asthma Death Rates by Year and Gender, 2000-2009



Data Source: Centers for Disease Control and Prevention, National Center for Health Statistics. Multiple Cause of Death 1999-2009 on CDC WONDER Online Database, released 2012

Overall, women had higher rates of contributory asthma deaths (Figure 34). In fact, asthma death rates in women were two times higher than men in 2001 and 2008. However in 2009, men had a higher death rate than women. More years of asthma death data will need to be collected to determine if this was a true change in trend.

Figure 35: Multiple Cause of Asthma Death Rates by Year and Race, 2000-2009

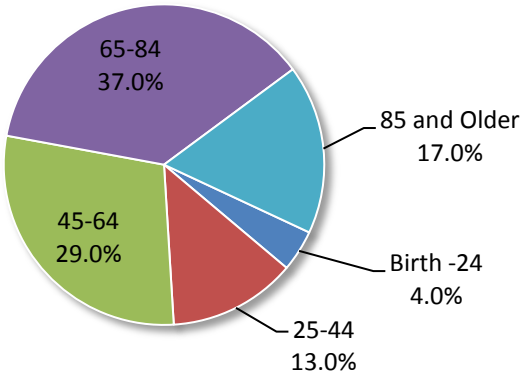


Data Source: Centers for Disease Control and Prevention, National Center for Health Statistics. Multiple Cause of Death 1999-2009 on CDC WONDER Online Database, released 2012

For this analysis, black and other minority groups were combined into one category based on limited racial data collected on death certificates. From 2000 through 2009, black and other minority individuals had a higher asthma death rate which was statistically significant when compared to white individuals with the exception of 2001 (Figure 35). Overall death rates for black and other minority group individuals increased from 4.6 in 2000 to 6.1 in 2009.

The largest disparity was seen in 2009 when black and other minority group individuals had a three times higher rate of death (6.1 vs. 1.8).

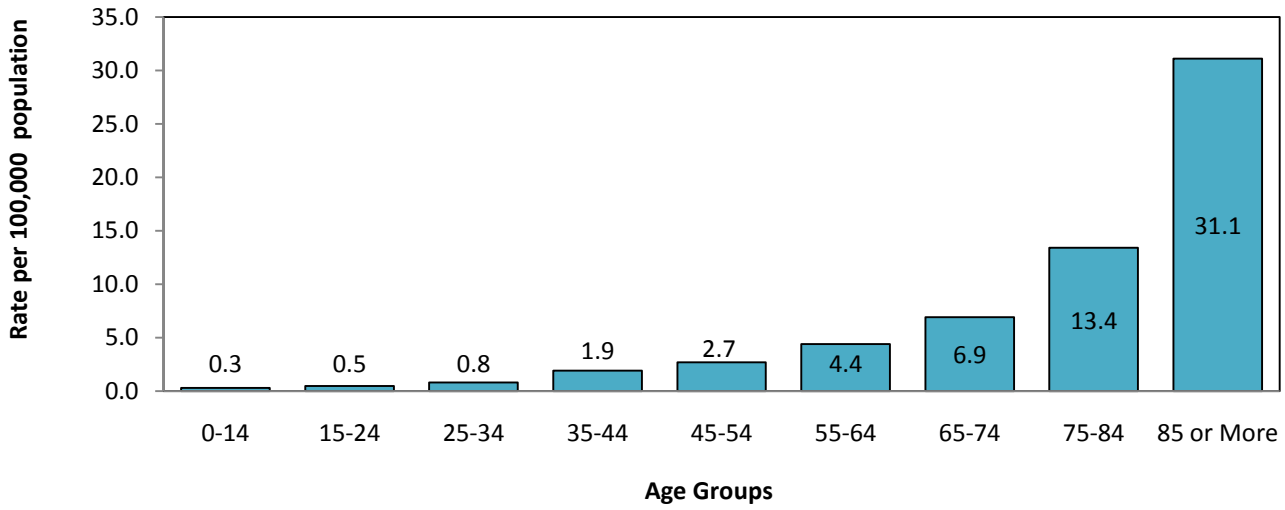
Figure 36: Multiple Cause of Asthma Deaths by Age Group, 2000-2009



Data Source: Centers for Disease Control and Prevention, National Center for Health Statistics. Multiple Cause of Death 1999-2009 on CDC

Figure 36 shows the total percentages of multiple cause asthma deaths by age group from 2000-2009. This figure shows adults who are 65 years and older represented 54 percent of all asthma deaths.

Figure 37: Multiple Cause of Asthma Death Rates by Age Group, 2000-2009



Data Source: Centers for Disease Control and Prevention , National Center for Health Statistics. Multiple Cause of Death 1999-2009 on CDC WONDER Online Database, released 2012

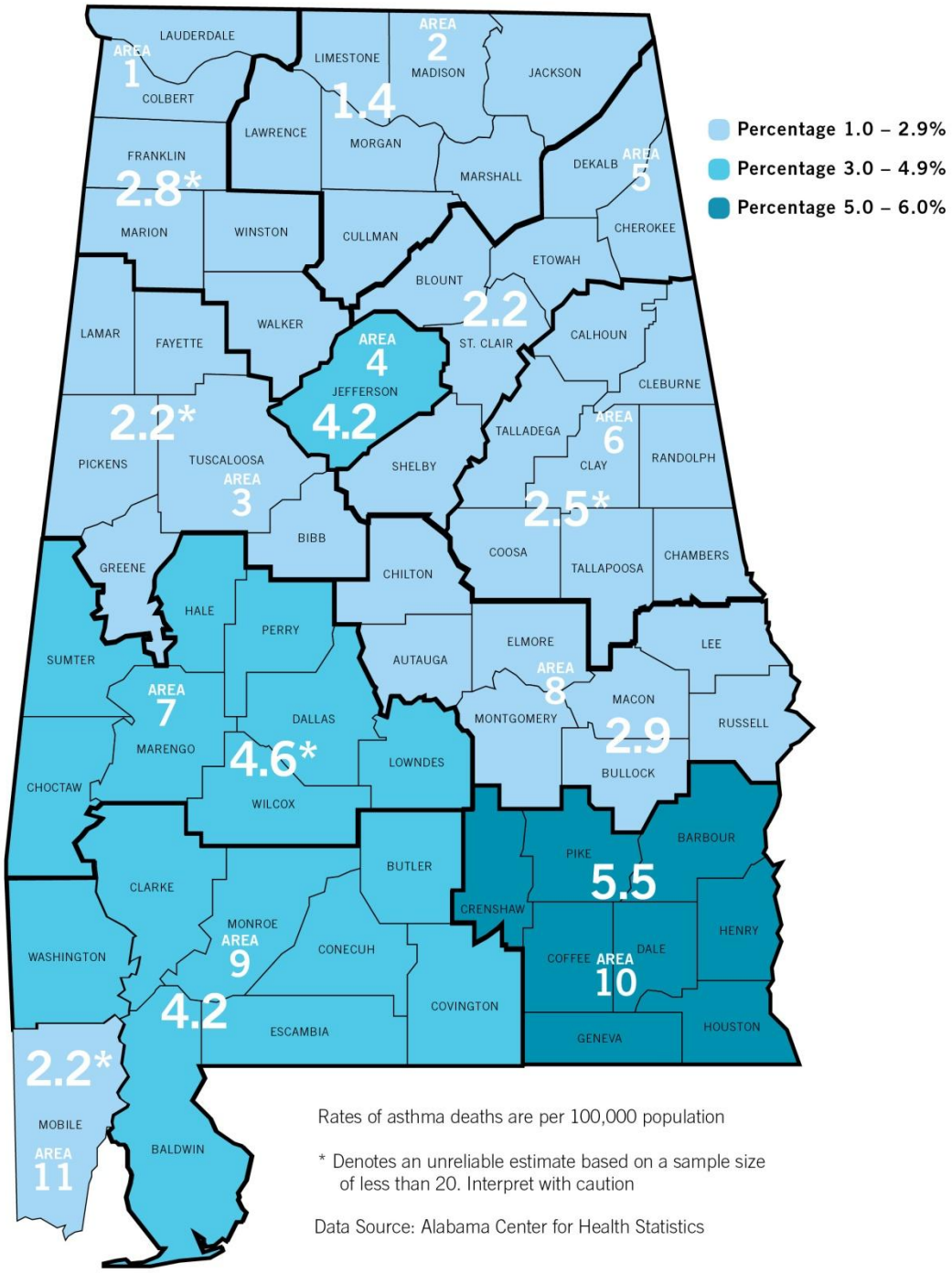
The ten year review of multiple cause asthma deaths shown in Figure 37 revealed that with increasing age, the rate of death by asthma also increased. Many contributory asthma deaths occurred among individuals who were older than 65, especially affecting those who are older than 85 years (Figures 36 and 37). The results of this review showed that the highest rate of asthma deaths was among those who were 85 years and older (Figure 37). This was statistically significant. This vulnerable group has a rate of 31.1 deaths per 100,000 individuals (Figure 37).

Understanding rates of asthma deaths by geographic region was also of interest. Providing this analysis by county would not have yielded a map with much information. PHAs represent regions in Alabama which were created to develop public health services in those regions, but they are also good areas to describe diseases such as asthma on a geographic level. Information regarding geographic location of all asthma deaths was obtained from Alabama Center for Health Statistics death certificates. According to 2009 and 2010 records, PHAs 4, 8, and 10 had the highest number (numerical count) of asthma deaths (Appendix 21). However, Figure 38, on the next page, shows that PHAs 7 and 10 have the highest rates of deaths, when population was taken into account, from the rest of the PHAs (4.6 and 5.5 individuals per 100,000). The death rate for PHA 10 was higher than the rates for PHAs 2, 5, and 11, with respect to statistically significance.

Key findings in asthma deaths:

- Primary asthma death rates have increased since 2007.
- In 2009, black and other minority groups had a higher rate of contributory asthma deaths than white individuals. This difference was statistically significant.
- From 2000 through 2009, individuals over the age of 85 had a higher rate of contributory asthma deaths than the younger age groups. This difference was statistically significant.
- For 2009 and 2010, more asthma deaths occurred among those who lived in Jefferson County (PHA 4) and PHA 8. For the same years, PHAs 7 and 10 had the highest rates of asthma deaths. The death rate for PHA 10 was higher than PHAs 2, 5, and 11. This difference was statistically significant.
- For a more comprehensive look at Alabama asthma disparities, please refer to page 40.

Figure 38: All Asthma Deaths by Public Health Area, 2009-2010 (Combined Totals)



Health Disparities

Adult prevalence (lifetime or current asthma)

Among adults who reported lifetime and current asthma, vulnerable groups included women, 18-24 year olds, adults who reported less than a high school education, and adults who reported less than $15,000 in annual household income. Adult prevalence rates showed that socioeconomic factors such as gender, educational level, and income disparities existed with statistical significance.

Childhood prevalence (lifetime or current asthma and asthma attack prevalence)

Among children who were reported to have lifetime and current asthma, vulnerable groups included black children which did not include other minority groups. Both lifetime and current childhood prevalence rates showed statistical significance with respect to race.

Among public school students who reported an asthma attack or episode, vulnerable students were those in middle schools. Middle school students reported more asthma attacks or episodes than older high school students which was statistically significant.

Hospitalizations

Among all ages and all racial groups, vulnerable groups included women, black or other racial groups, and infants - 9 year olds.

Among infants - 9 year olds, vulnerable groups included children who were in the black and other racial group. Hospitalization rates showed that disparities existed with respect to gender, race, and age with statistical significance.

Mortality

Asthma multiple cause death rates showed black and other racial groups, and adults over the age of 55 were vulnerable groups. Mortality rates showed that statistically significant differences existed with respect to race and age.

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Technical Notes

Adult Section

For adult prevalence, data were obtained from two asthma questions in the core component of the BRFSS survey. Prevalence rates, frequencies, and 95 percent confidence intervals were obtained from the CDC's BRFSS online interactive databases. For special analysis by public health area or multiple years, prevalence rates, frequencies, and 95 percent confidence intervals were generated using SAS 9.2. For adult education and other asthma information for adults, data were obtained from the BRFSS Adult Asthma Call-back survey for 2010.

Child Section

For child prevalence, data were obtained from the Childhood Asthma Prevalence Module of the BRFSS survey and the online database called Youth Online from the Youth Risk Behavior Survey (YRBS). Prevalence rates, frequencies, and 95 percent confidence intervals were obtained from the CDC's YRBS Youth Online.

For asthma attack prevalence among children, data were obtained from Alabama Youth Tobacco Survey (ALYTS). Prevalence rates, frequencies, and 95 percent confidence intervals were generated using SAS 9.2 or Microsoft Excel 2007.

Hospitalization Section

For asthma hospitalizations, data were obtained from the Alabama Asthma Surveillance System. Hospitalization rates, frequencies, and 95 percent confidence intervals were generated using SAS Enterprise Guide 4.2 or Microsoft Excel 2007.

It is important to note that there are certain limitations in the data collection. These data represent the total number of asthma hospitalizations (where asthma was listed in the primary diagnoses field of the record) reported in the state. In other words, asthma hospitalizations cannot be determined on an individual level. These represent de-identified data. Due to this limitation, the distribution of asthma hospitalizations in Alabama cannot be tested accurately. Confidence intervals were calculated based on the assumptions of independence and normality (normal approximation method). Finally, due to the unique nature of hospital data collection and hospitalization definitions in Alabama, comparisons to other states' hospitalization data may not be appropriate.

Mortality Section

For asthma deaths, data were obtained from the CDC WONDER system and the Alabama Center for Health Statistics. Mortality rates, frequencies, and 95 percent confidence intervals were obtained from the online tool CDC Wonder. For special analysis by PHA, mortality rates,

frequencies, and 95 percent confidence intervals were generated using SAS Enterprise Guide 4.2 or Microsoft Excel 2007 and data were obtained from Alabama Center for Health Statistics. Appropriate confidence intervals were age adjusted using 2000 US standard population.

Age adjustment

Age adjusting was employed when appropriate to adjust for differences in the age distributions between groups being compared.

Definitions

Age-adjusted rates or proportions: rates that are calculated in a manner that allows for the comparison of populations with different age structures.

Asthma triggers: environmental or viral factors which can exacerbate asthma via an asthma attack or episode. Common asthma triggers are listed in the introduction of this report.

Confidence intervals: ranges that are calculated around a point estimate or percentage which represent margin of error. These intervals provide information of the level of confidence a researcher has concerning a specific point estimate or percentage. For this report, 95 percent confidence intervals were calculated.

Current asthma: individuals who either report or are told that they currently have asthma. Many public health surveys define this as an individual who has ever been told by a health care professional that he or she has asthma and that individual responds positively to that survey question.

Disparity: a lack of similarity or equality. It marks a difference in things, people, or groups. For this report, a disparity was defined as a group that has a higher reported asthma prevalence, hospitalization, or mortality rate, based on statistical significance.

Lifetime asthma: individuals who have ever been told by a health care professional or believe that they have ever had asthma. Many public health surveys define this as a person who has ever been told by a health care professional that he or she had asthma.

Prevalence: the percentage (proportion) of a population of interest that has a disease or a risk factor at a given point in time.

Statistical significance: refers to determining the true differences between groups or populations of interest through the use of statistical methods. For this report, statistical significance was defined as groups having non-overlapping 95 percent confidence intervals.

Data Tables

Appendix 1: Lifetime and Current Asthma by Year, BRFSS, 2000-2010

Year	Lifetime (%)	95% Confidence Interval	Current (%)	95% Confidence Interval
2000	9.1	(7.8-10.4)	6.1	(5.0-7.2)
2001	9.7	(8.5-10.9)	6.3	(5.3-7.3)
2002	11.0	(9.7-12.3)	7.2	(6.2-8.2)
2003	11.6	(10.3-12.9)	7.5	(6.4-8.6)
2004	14.0	(12.7-15.3)	8.6	(7.6-9.6)
2005	11.2	(9.8-12.6)	7.1	(5.9-8.3)
2006	13.6	(11.9-15.3)	8.9	(7.6-10.2)
2007	13.1	(11.7-14.5)	8.8	(7.6-10.0)
2008	12.3	(11.1-13.6)	7.8	(6.7-8.9)
2009	11.9	(10.7-13.0)	7.6	(6.7-8.6)
2010	11.8	(10.7-12.9)	8.0	(7.1-8.8)

Appendix 2: Lifetime Asthma by Year and Gender, BRFSS, 2006-2010

Year	Gender	Lifetime (%)	95% Confidence Interval	Adults who reported lifetime asthma	Adults who responded to question
2006	**Male**	12.1	(9.4-14.8)	130	1,128
	Female	14.9	(12.9-16.9)	324	2,160
2007	**Male**	11.3	(9.1-13.5)	222	2,329
	Female	14.7	(13.1-16.3)	708	4,900
2008	**Male**	9.9	(7.9-11.8)	192	2,086
	Female	14.6	(12.9-16.3)	631	4,387
2009	**Male**	10.7	(8.7-12.7)	224	2,103
	Female	12.9	(11.6-14.3)	632	4,661
2010	**Male**	9.7	(8.0-11.5)	237	2,404
	Female	13.7	(12.4-15.1)	723	5,244

Appendix 3: Lifetime Asthma by Race/Ethnicity and Age Group, BRFSS, 2006-2010

Type of Analysis	Level of Analysis	Lifetime (%)	95% Confidence Interval	Adults who reported lifetime asthma	Adults who responded to question
Race/Ethnicity	**White**	11.9	(11.3-12.6)	2,674	21,823
	Black	14.0	(12.6-15.3)	1,104	8,064
	Hispanic	13.3‡	(4.5-22.2)	19	140
	Other	17.4	(10.6-24.2)	71	345
	MultiRace	11.8‡	(6.9-16.8)	46	326
Age Group	**18-24**	18.2	(14.9-21.5)	169	1,002
	25-34	13.3	(11.7-14.9)	394	2,959
	35-44	11.0	(9.8-12.2)	503	4,313
	45-54	11.0	(10.0-11.9)	796	6,296
	55-64	13.1	(12.1-14.1)	1,002	7,041
	65 and older	11.1	(10.3-11.9)	1,159	9,882

‡Denotes an unreliable estimate based on a sample of less than 50. Interpret with caution.

Appendix 4: Lifetime Asthma by Income and Education, BRFSS, 2010

Type of Analysis	Level of Analysis	Lifetime (%)	95% Confidence Interval	Adults who reported lifetime asthma	Adults who responded to question
Income	Less than $15,000	20.7	(16.7-24.6)	215	1,053
	$15,000-24,999	15.7	(12.5-18.9)	207	1,428
	$25,000-34,999	11.6	(8.5-14.8)	92	770
	$35,000-49,999	8.8	(6.0-11.6)	78	832
	$50,000 or more	8.2	(6.5-9.9)	174	1,928
Educational Level	Less than high school	16.8	(13.3-20.4)	199	1,186
	At least high school or GED	11.4	(9.6-13.2)	318	2,589
	Some post high school	11.8	(9.7-13.9)	235	1,921
	At least college graduate	9.9	(7.9-11.9)	206	1,930

Appendix 5: Current Asthma by Year and Gender, BRFSS, 2008-2010

Year	Gender	Current (%)	95% Confidence Interval	Adults who reported current asthma	Adults who responded to question
2006	Male	6.0	(4.1-7.9)	72	1,123
	Female	11.5	(9.7-13.3)	241	2,151
2007	Male	6.9	(5.1-8.7)	144	2,324
	Female	10.5	(9.1-11.9)	522	4,879
2008	Male	5.9	(4.3-7.4)	113	2,082
	Female	9.6	(8.1-11.1)	438	4,374
2009	Male	6.2	(4.6-7.8)	123	2,090
	Female	8.9	(7.8-10.0)	446	4,642
2010	Male	5.1	(3.9-6.2)	150	2,399
	Female	10.6	(9.4-11.8)	551	5,224

Appendix 6: Current Asthma by Race/Ethnicity and Age Group, BRFSS, 2006-2010

Type of Analysis	Level of Analysis	Current (%)	95% Confidence Interval	Adults who reported current asthma	Adults who responded to question
Race/Ethnicity	White	7.7	(7.2-8.2)	1,835	21,745
	Black	9.2	(8.1-10.4)	792	8,036
	Hispanic	9.6‡	(2.9-16.3)	16	140
	Other	12.3‡	(5.7-18.8)	49	343
	MultiRace	7.3‡	(3.9-10.7)	33	323
Age Group	18-24	10.9	(8.2-13.6)	100	997
	25-34	7.5	(6.3-8.7)	242	2,942
	35-44	6.9	(5.9-8.0)	329	4,304
	45-54	7.4	(6.6-8.3)	569	6,272
	55-64	9.6	(8.7-10.5)	718	7,014
	65 and older	8.0	(7.3-8.7)	842	9,850

‡Denotes an unreliable estimate based on a sample of less than 50. Interpret with caution.

Appendix 7: Current Asthma by Income and Education, BRFSS, 2010

Type of Analysis	Level of Analysis	Current (%)	95% Confidence Interval	Adults who reported current asthma	Adults who responded to question
Income	Less than $15,000	16.0	(12.4-19.5)	173	1,046
	$15,000-24,999	10.4	(8.2-12.5)	159	1,424
	$25,000-34,999	8.5	(5.8-11.3)	65	768
	$35,000-49,999	5.6	(3.4-7.8)	52	830
	$50,000 or more	5.0	(3.6-6.3)	109	1,925
Educational Level	Less than high school	11.6	(9.2-14.1)	162	1,181
	At least high school or GED	8.5	(7.0-10.0)	245	2,579
	Some post high school	7.4	(5.9-8.9)	162	1,916
	At least college graduate	6.0	(4.4-7.6)	130	1,925

Appendix 8: Lifetime Asthma by Demographic Information, BRFSS, 2010

Level of Analysis	Lifetime (%)	95% Confidence Interval	Total Count
All	14.5	(12.4-16.8)	1,775
Boys	14.6	(11.8-18.0)	895
Girls	14.5	(11.6-18.0)	861
0-4	9.1	(5.8-13.9)	385
5-9	22.6	(17.5-28.6)	391
10-14	15.4	(11.8-19.9)	485
15-17	12.3	(8.6-17.2)	369
White NH†	12.2	(9.9-15.0)	1,073
Black NH†	19.4	(15.1-24.5)	557
Other NH†	25.6‡	(10.3-50.9)	30
Multirace NH†	32.1‡	(15.7-54.5)	23
Hispanic	3.8	N/A	68

‡Denotes an unreliable estimate based on a sample of less than 50. Interpret with caution.
†NH represents non Hispanic ethnicity

Appendix 9: Current Asthma by Demographic Information, BRFSS, 2010

Level of Analysis	Current (%)	95% Confidence Interval	Total Count
All	11.5	(9.6-13.7)	1,772
Boys	12.0	(9.4-15.3)	893
Girls	11.1	(8.6-14.3)	860
0-4	8.3	(5.1-13.2)	384
5-9	16.7	(12.3-22.3)	391
10-14	12.4	(9.1-16.8)	483
15-17	9.2	(6.0-13.8)	369
White NH†	9.0	(7.0-11.6)	1,071
Black NH†	16.4	(12.4-21.4)	556
Other NH†	24.5‡	(9.4-50.2)	30
Multirace NH†	21.1‡	N/A	23
Hispanic	3.8	N/A	68

‡Denotes an unreliable estimate based on a sample of less than 50. Interpret with caution.
†NH represents non Hispanic ethnicity

Appendix 10: Lifetime and Current Asthma in Public School Systems, YRBS, 2009 and 2011

School Type	Year	Demographic Characteristic	Lifetime Asthma (%)	95% Confidence Interval	Total Count	Current Asthma (%)	95% Confidence Interval	Total Count
Middle School	2009	All	22.5	(19.4-25.9)	1,000	11.2	(8.5-14.5)	995
		Boys	22.9	(19.4-26.8)	469	10.1	(6.5-15.4)	464
		Girls	22.1	(17.3-27.7)	529	12.3	(9.3-16.2)	529
		White NH†	19.6	(15.5-24.6)	599	11.0	(7.3-16.3)	598
		Black NH†	27.5	(20.4-35.9)	279	11.6	(8.0-16.6)	276
		7th	21.6	(18.2-25.3)	402	12.3	(7.8-18.7)	400
		8th	22.8	(18.1-28.4)	584	10.2	(8.0-12.8)	581
High School	2009	All	25.5	(22.9-28.4)	1,416	11.0	(9.3-13.0)	1,410
		Boys	28.2	(25.3-31.3)	648	10.9	(9.0-13.2)	644
		Girls	22.6	(19.5-26.0)	760	11.2	(8.9-13.9)	758
		White NH†	25.4	(21.4-29.8)	744	9.8	(8.0-11.9)	743
		Black NH†	26.3	(23.1-29.7)	481	13.6	(10.0-18.1)	477
		9th	26.1	(20.7-32.3)	354	8.9	(5.8-13.4)	352
		10th	30.2	(24.5-36.7)	321	14.3	(10.3-19.4)	317
		11th	21.1	(17.5-25.1)	387	10.7	(7.9-14.2)	387
		12th	23.4	(18.1-29.7)	338	10.8	(7.8-14.7)	338
High School	2011	All	20.2	(17.8-22.9)	1,343	10.2	(8.8-11.7)	1,347
		Boys	21.0	(17.1-25.4)	643	8.7	(6.7-11.2)	639
		Girls	19.2	(15.9-23.0)	698	11.7	(9.7-14.1)	696
		White NH†	19.0	(15.9-22.6)	799	9.0	(7.3-11.1)	795
		Black NH†	21.2	(17.4-25.5)	393	11.9	(8.9-15.8)	391
		9th	22.7	(18.8-27.1)	366	13.4	(9.9-17.8)	363
		10th	21.7	(17.7-26.3)	346	10.3	(7.4-14.0)	345
		11th	20.2	(15.8-25.3)	337	7.5	(4.9-11.1)	335
		12th	15.4	(10.8-21.6)	287	8.8	(5.9-12.8)	287

When there were less than 100 respondents in a subgroup, data were not provided
†NH represents non Hispanic ethnicity

Appendix 11: Asthma Attack Prevalence for Middle School Students by Demographic Information, ALYTS, 2010

Type of Analysis	Level of Analysis	Attack Prevalence (%)	95% Confidence Interval	Total Count
All	Students	13.6	(11.7-15.6)	157
Gender	Boys	12.5	(9.8-15.2)	70
	Girls	14.8	(11.9-17.7)	87
Grade Level	6th	13.8	(10.7-17.0)	63
	7th	15.4	(11.9-18.9)	62
	8th	10.9‡	(7.3-14.5)	31
Race/Ethnicity	White	12.2	(9.6-14.8)	73
	Black and Other	15.2	(12.1-18.2)	82

‡Denotes an unreliable estimate based on a sample of less than 35. Interpret with caution.

Appendix 12: Asthma Attack Prevalence for High School Students by Demographic Information, ALYTS, 2010

Type of Analysis	Level of Analysis	Attack Prevalence (%)	95% Confidence Interval	Total Count
All	**Students**	9.5	(7.9-11.0)	126
Gender	**Boys**	7.3	(5.3-9.3)	46
	Girls	11.4	(9.0-13.7)	79
Grade Level	**9th**	9.4	(7.3-11.5)	39
	10th	11.3	(8.0-14.6)	40
	11th	8.6‡	(5.3-11.9)	24
	12th	8.0‡	(4.8-11.3)	22
Race/Ethnicity	**White**	8.5	(6.4-10.6)	58
	Black and Other	10.6	(8.2-13.0)	68

‡Denotes an unreliable estimate based on a sample of less than 35. Interpret with caution.

Appendix 13: Hospitalizations by Demographic Information, Alabama Asthma Surveillance System, 2009

Type of Analysis	Level of Analysis	Hospitalizations	Population	Crude Rate per 100,000 (95% Confidence Interval)	Age Adjusted Rate per 100,000 (95% Confidence Interval)
Gender	Male	3,957	2,281,612	173.4 (147.6-199.2)	175.3 (163.3-185.3)
	Female	5,919	2,427,096	243.9 (213.3-274.5)	239.2 (228.4-250.0)
Race	White	4,960	3,340,085	148.5 (124.6-172.4)	145.4 (135.9-154.9)
	Black and Other	4,211	1,368,623	307.7 (273.3-342.1)	306.5 (295.0-318.0)
Age Group	0 to 4	1,151	315,210	365.2 (327.7-402.6)	N/A
	5 to 9	1,100	311,229	353.4 (316.6-390.3)	N/A
	10 to 14	816	308,117	264.8 (232.9-296.7)	N/A
	15 to 19	522	328,967	158.7 (134.0-183.4)	N/A
	20 to 24	387	330,590	117.1 (95.9-138.3)	N/A
	25 to 29	349	325,093	107.4 (87.0-127.7)	N/A
	30 to 34	334	294,278	113.5 (92.6-134.4)	N/A
	35 to 39	496	307,170	161.5 (136.6-186.4)	N/A
	40 to 44	567	308,968	183.5 (157.0-210.1)	N/A
	45 to 49	684	340,952	200.6 (172.9-228.4)	N/A
	50 to 54	723	333,898	216.5 (187.7-245.4)	N/A
	55 to 59	576	297,147	193.8 (166.6-221.1)	N/A
	60 to 64	520	256,040	203.1 (175.2-231.0)	N/A
	65 to 69	478	197,607	241.9 (211.4-272.4)	N/A
	70 to 74	388	155,330	249.8 (218.8-280.8)	N/A
	75 to 79	327	123,565	264.6 (232.8-296.5)	N/A
	80 to 84	266	92,489	287.6 (254.4-320.8)	N/A
	85 or More	194	82,058	236.4 (206.3-266.6)	N/A
Total	Year	9,878	4,708,708	209.8 (181.4-238.2)	210.1 (199.7-220.6)

‡ Percentages and number of hospitalizations are best estimates based on hospital data collection methods and participation rates. There are assumptions of independence and normality for these data.

Appendix 14: Hospitalizations by Demographic Information, Alabama Asthma Surveillance System, 2010

Type of Analysis	Level of Analysis	Hospitalizations	Population	Crude Rate per 100,000 (95% Confidence Intervals)	Age Adjusted Rate per 100,000 (95% Confidence Interval)
Gender	Male	3,872	2,320,188	166.9 (141.6-192.2)	170.8 (160.9-180.7)
	Female	6,061	2,459,548	246.4 (215.7-277.2)	240.0 (229.2-250.8)
Race	White	4,905	3,362,877	149.8 (125.8-173.7)	145.9 (136.4-155.5)
	Black and Other	4,730	1,352,575	314.4 (279.7-349.2)	314.4 (302.9-326.0)
Age Group	0 to 4	1,414	304,957	463.7 (421.5-505.9)	N/A
	5 to 9	1,114	308,229	361.4 (324.2-398.7)	N/A
	10 to 14	695	319,655	217.4 (188.5-246.3)	N/A
	15 to 19	397	343,471	115.6 (94.5-136.7)	N/A
	20 to 24	324	335,322	96.6 (77.4-115.9)	N/A
	25 to 29	319	311,034	102.6 (82.7-122.4)	N/A
	30 to 34	337	297,888	113.1 (92.3-134.0)	N/A
	35 to 39	481	308,430	156.0 (131.5-180.4)	N/A
	40 to 44	517	311,071	166.2 (140.9-191.5)	N/A
	45 to 49	693	346,369	200.1 (172.4-227.8)	N/A
	50 to 54	716	347,485	206.1 (177.9-234.2)	N/A
	55 to 59	628	311,906	201.3 (173.5-229.2)	N/A
	60 to 64	553	276,127	200.3 (172.5-228.0)	N/A
	65 to 69	527	209,637	251.4 (220.3-282.5)	N/A
	70 to 74	408	160,864	253.6 (222.4-284.8)	N/A
	75 to 79	305	122,836	248.3 (217.4-279.2)	N/A
	80 to 84	279	88,771	314.3 (279.5-349.0)	N/A
	85 or More	226	75,684	298.6 (264.7-332.5)	N/A
Total	Year	9,933	4,779,736	207.8 (179.6-236.1)	208.3 (197.9-218.7)

‡ Percentages and number of hospitalizations are best estimates based on hospital data collection methods and participation rates. There are assumptions of independence and normality for these data.

Appendix 15: Hospitalizations for Infants - 9 Year Olds, 2009 and 2010

Year	Level of Analysis	Hospitalizations	Population	Rate per 100,000	95% Confidence Interval
2009	**Boys**	1,452	319,833	453.7	(411.9-495.4)
	Girls	799	306,606	260.6	(229.0-292.2)
	White	897	414,428	216.4	(187.6-245.3)
	Black and Other	1,336	212,011	548.6	(502.7-594.5)
2010	**Boys**	1,616	312,605	516.9	(472.4-561.5)
	Girls	912	300,581	303.4	(269.3-337.6)
	White	876	374,300	234.0	(204.1-264.0)
	Black and Other	1,507	238,886	630.8	(581.6-680.1)

‡ Percentages and number of hospitalizations are best estimates based on hospital data collection methods and participation rates. There are assumptions of independence and normality for these data.

Appendix 16: Underlying Asthma Deaths by Year, Alabama and United States, CDC WONDER, 2000-2009

Location	Year	Deaths	Population	Crude Rate per 100,000 (95% Confidence Interval)	Age Adjusted Rate per 100,000 (95% Confidence Interval)	Percent of Total Deaths
Alabama	2000	73	4,447,100	1.6 (1.3-2.1)	1.6 (1.3-2.1)	11.0
	2001	63	4,468,912	1.4 (1.1-1.8)	1.4 (1.1-1.8)	9.5
	2002	78	4,486,508	1.7 (1.4-2.2)	1.7 (1.3-2.1)	11.8
	2003	72	4,500,752	1.6 (1.3-2.0)	1.6 (1.2-2.0)	10.9
	2004	85	4,530,182	1.9 (1.5-2.3)	1.8 (1.4-2.2)	12.8
	2005	48	4,557,808	1.1 (0.8-1.4)	1.0 (0.8-1.4)	7.2
	2006	58	4,599,030	1.3 (1.0-1.6)	1.2 (0.9-1.6)	8.7
	2007	48	4,627,851	1.0 (0.8-1.4)	1.0 (0.7-1.3)	7.2
	2008	67	4,661,900	1.4 (1.1-1.8)	1.4 (1.0-1.7)	10.1
	2009	71	4,708,708	1.5 (1.2-1.9)	1.4 (1.1-1.8)	10.7
Total		**663**	**45,588,751**	**1.5**	**1.4**	**100.0**
US	2000	4,487	281,421,906	1.6 (1.5-1.6)	1.6 (1.6-1.6)	11.6
	2001	4,269	285,317,572	1.5 (1.5-1.5)	1.5 (1.5-1.5)	11.0
	2002	4,261	288,368,706	1.5 (1.4-1.5)	1.5 (1.4-1.5)	11.0
	2003	4,099	290,810,789	1.4 (1.4-1.5)	1.4 (1.3-1.4)	10.6
	2004	3,816	293,655,404	1.3 (1.3-1.3)	1.3 (1.3-1.3)	9.9
	2005	3,884	296,410,404	1.3 (1.3-1.4)	1.3 (1.2-1.3)	10.0
	2006	3,613	299,398,484	1.2 (1.2-1.2)	1.2 (1.1-1.2)	9.3
	2007	3,447	301,621,157	1.1 (1.1-1.2)	1.1 (1.0-1.1)	8.9
	2008	3,397	304,059,724	1.1 (1.1-1.2)	1.0 (1.0-1.1)	8.8
	2009	3,388	307,006,550	1.1 (1.1-1.1)	1.1 (1.0-1.1)	8.8
Total		**38,661**	**2948,070,696**	**1.3**	**1.3**	**100.0**

Appendix 17: Multiple Causes of Asthma Deaths by Year, Alabama and United States, CDC WONDER, 2000-2009

Location	Year	Deaths	Population	Crude Rate per 100,000 (95% Confidence Interval)	Age Adjusted Rate per 100,000 (95% Confidence Interval)	Percent of Total Deaths
Alabama	2000	136	4,447,100	3.1 (2.5-3.6)	3.0 (2.5-3.5)	10.1
	2001	137	4,468,912	3.1 (2.6-3.6)	3.0 (2.5-3.5)	10.1
	2002	146	4,486,508	3.3 (2.7-3.8)	3.2 (2.7-3.7)	10.8
	2003	153	4,500,752	3.4 (2.9-3.9)	3.3 (2.8-3.8)	11.3
	2004	144	4,530,182	3.2 (2.7-3.7)	3.1 (2.6-3.6)	10.6
	2005	104	4,557,808	2.3 (1.8-2.7)	2.2 (1.8-2.6)	7.7
	2006	128	4,599,030	2.8 (2.3-3.3)	2.6 (2.2-3.1)	9.5
	2007	125	4,627,851	2.7 (2.2-3.2)	2.5 (2.1-3.0)	9.2
	2008	136	4,661,900	2.9 (2.4-3.4)	2.7 (2.2-3.1)	10.1
	2009	144	4,708,708	3.1 (2.6-3.6)	2.8 (2.4-3.3)	10.6
Total		**1,353**	**45,588,751**	**3.0**	**2.8**	**100.0**
US	2000	9,653	281,421,906	3.4 (3.4-3.5)	3.5 (3.4-3.6)	10.2
	2001	9,757	285,317,572	3.4 (3.4-3.5)	3.4 (3.3-3.5)	10.3
	2002	9,740	288,368,706	3.4 (3.3-3.4)	3.4 (3.3-3.4)	10.3
	2003	9,673	290,810,789	3.3 (3.3-3.4)	3.3 (3.2-3.3)	10.2
	2004	9,215	293,655,404	3.1 (3.1-3.2)	3.1 (3.0-3.1)	9.7
	2005	9,429	296,410,404	3.2 (3.1-3.2)	3.1 (3.0-3.2)	10.0
	2006	9,456	299,398,484	3.2 (3.1-3.2)	3.0 (3.0-3.1)	10.0
	2007	9,119	301,621,157	3.0 (3.0-3.1)	2.9 (2.8-2.9)	9.6
	2008	9,271	304,059,724	3.0 (3.0-3.1)	2.9 (2.8-2.9)	9.8
	2009	9,238	307,006,550	3.0 (2.9-3.1)	2.8 (2.8-2.9)	9.8
Total		**94,551**	**2,948,070,696**	**3.2**	3.1	**100.0**

*Other states often report underlying cause of death. Please use caution when making comparisons to other states' reported data.

Appendix 18: Multiple Causes of Asthma Deaths by Gender, CDC WONDER, 2000-2009

Gender	Year	Deaths	Population	Crude Rate per 100,000 (95% Confidence Interval)	Age Adjusted Rate per 100,000 (95% Confidence Interval)	Percent of Total Deaths
Female	2000	98	2,300,596	4.3 (3.5-5.2)	3.8 (3.1-4.6)	7.2
	2001	101	2,309,859	4.4 (3.5-5.2)	3.8 (3.1-4.6)	7.5
	2002	87	2,317,373	3.8 (3.0-4.6)	3.4 (2.7-4.2)	6.4
	2003	98	2,321,588	4.2 (3.4-5.1	3.7 (3.0-4.5)	7.2
	2004	95	2,333,974	4.1 (3.3-5.0)	3.5 (2.8-4.3)	7.0
	2005	69	2,346,146	2.9 (2.3-3.7)	2.5 (1.9-3.2)	5.1
	2006	80	2,369,561	3.4 (2.7-4.2)	2.9 (2.3-3.6)	5.9
	2007	88	2,385,726	3.7 (3.0-4.5)	3.1 (2.4-3.8)	6.5
	2008	101	2,403,813	4.2 (3.4-5.0)	3.6 (2.9-4.3)	7.5
	2009	77	2,427,096	3.2 (2.5-4.0	2.7 (2.1-3.4)	5.7
Subtotal		**894**	**23,515,732**	**3.8**	**3.3**	**66.1**
Male	2000	38	2,146,504	1.8 (1.3-2.4)	2.1 (1.5-2.9)	2.8
	2001	36	2,159,053	1.7 (1.2-2.3)	2.0 (1.4-2.8)	2.7
	2002	59	2,169,135	2.7 (2.1-3.5)	3.1 (2.4-4.1)	4.4
	2003	55	2,179,164	2.5 (1.9-3.3)	2.8 (2.1-3.7)	4.1
	2004	49	2,196,208	2.2 (1.7-2.9)	2.4 (1.8-3.2)	3.6
	2005	35	2,211,662	1.6 (1.1-2.2)	1.7 (1.2-2.4)	2.6
	2006	48	2,229,469	2.2 (1.6-2.9)	1.8 (1.2-2.4)	3.5
	2007	37	2,242,125	1.7 (1.2-2.3)	1.8 (1.2-2.4)	2.7
	2008	35	2,258,087	1.5 (1.1-2.2)	1.6 (1.1-2.2)	2.6
	2009	67	2,281,612	2.9 (2.3-3.7)	3.0 (2.3-3.8)	5.0
Subtotal		**459**	**22,073,019**	**2.1 (1.9-2.3)**	**2.3 (2.1-2.5)**	**33.9**
Total		**1,353**	**45,588,751**	**3.0**	**2.8**	**100.0**

*Other states often report underlying cause of death. Please use caution when making comparisons to other states' reported data.

Appendix 19: Multiple Causes of Asthma Deaths by Race, CDC Wonder, 2000-2009

Group	Year	Deaths	Population	Crude Rate per 100,000 (95% Confidence Interval)	Age Adjusted Rate per 100,000 (95% Confidence Interval)	Percent of Total Deaths
Black and Other	2000	47	1,228,882	3.8 (2.8-5.1)	4.6 (3.4-6.1)	3.5
	2001	44	1,244,983	3.5 (2.6-4.7)	4.3 (3.1-5.8)	3.3
	2002	58	1,257,175	4.6 (3.5-6.0)	5.7 (4.3-7.4)	4.2
	2003	68	1,266,362	5.4 (4.2-6.8)	6.4 (4.9-8.1)	5.0
	2004	67	1,271,352	5.3 (4.1-6.7)	6.2 (4.8-7.9)	4.9
	2005	49	1,280,145	3.8 (2.8-5.1)	4.3 (3.2-5.7)	3.6
	2006	57	1,296,237	4.4 (3.3-5.7)	5.1 (3.9-6.7)	4.2
	2007	49	1,313,189	3.7 (2.8-4.9)	4.3 (3.1-5.7)	3.6
	2008	62	1,320,960	4.7 (3.6-6.0)	5.3 (4.1-6.8)	4.5
	2009	71	1,337,920	5.3 (4.1-6.7)	6.1 (4.7-7.7)	5.2
Subtotal		**572**	**12,817,205**	**4.5**	**5.2**	**42.0**
White	2000	89	3,218,218	2.8 (2.2-3.4)	2.5 (2.0-3.1)	6.6
	2001	93	3,223,929	2.9 (2.3-3.5)	2.6 (2.1-3.2)	6.9
	2002	88	3,229,333	2.7 (2.2-3.4)	2.5 (2.0-3.0)	6.5
	2003	85	3,234,390	2.6 (2.1-3.2)	2.4 (1.9-2.9)	6.3
	2004	77	3,258,830	2.4 (1.9-3.0)	2.1 (1.7-2.6)	5.7
	2005	55	3,277,663	1.7 (1.3-2.2)	1.5 (1.1-2.0)	4.1
	2006	71	3,302,793	2.1 (1.7-2.7)	1.9 (1.5-2.4)	5.2
	2007	76	3,314,662	2.3 (1.8-2.9)	2.0 (1.5-2.5)	5.6
	2008	74	3,340,940	2.2 (1.7-2.8)	1.8 (1.4-2.3)	5.5
	2009	73	3,370,788	2.2 (1.7-2.7)	1.8 (1.4-2.3)	5.4
Subtotal		**781**	**32,771,546**	**2.4**	**2.1**	**57.7**
Total		**1,353**	**45,588,751**	**3.0**	**2.8**	**100.00**

*Other states often report underlying cause of death. Please use caution when making comparisons to other states' reported data.

Appendix 20: Multiple Causes of Asthma Deaths by Age Group, CDC WONDER, 2000-2009

Age Groups	Deaths	Population	Crude Rate per 100,000 (95% Confidence Interval)	Percent of Total Deaths
0-14 years	26	9,192,421	0.3 (0.2-0.4)	2.0
15-24 years	30	6,442,605	0.5 (0.3-0.7)	2.2
25-34 years	51	6,044,470	0.8 (0.6-1.1)	3.8
35-44 years	123	6,492,234	1.9 (1.6-2.2)	9.1
45-54 years	175	6,473,009	2.7 (2.3-3.1)	12.9
55-64 years	216	4,862,687	4.4 (3.8-5.0)	16.0
65-74 years	225	3,283,776	6.9 (6.0-7.7)	16.6
75-84 years	276	2,054,685	13.4 (11.8-15.0)	20.4
85 or more years	231	742,864	31.1 (27.1-35.1)	17.1
Total	**1,353**	**45,588,751**	**3.0**	**100.0**

*Other states often report underlying cause of death. Please use caution when making comparisons to other states' reported data.

Appendix 21: All Asthma Deaths by Public Health Area, Alabama Center for Health Statistics, 2009 and 2010

Public Health Area (PHA)	Deaths	Population	Crude Rate per 100,000 (95% Confidence Interval)	Percent of Total Deaths
1	17	602,349	2.8‡ (1.6-4.5)	6.1
2	23	1,589,550	1.4 (0.9-2.2)	8.2
3	12	554,895	2.2‡ (1.1-3.8)	4.3
4	55	1,316,907	4.2 (3.1-5.4)	19.6
5	24	1,071,543	2.2 (1.4-3.3)	8.6
6	17	680,500	2.5‡ (1.5-4.0)	6.1
7	13	284,511	4.6‡ (2.4-7.8)	4.6
8	36	1,259,203	2.9 (2.0-4.0)	12.9
9	30	715,199	4.2 (2.8-6.0)	10.7
10	35	638,031	5.5 (3.8-7.6)	12.5
11	18	824,986	2.2‡ (1.3-3.4)	6.4
Total	**280**	**9,537,674**	**3.1**	**100.0**

*Other states often report underlying cause of death. Please use caution when making comparisons to other states' reported data.
‡Denotes an unreliable estimate based on a sample of less than 20. Interpret with caution.

Figure 39: Map of Alabama Counties by Public Health Areas