Asthma in Maryland 2011

Maryland Department of Health and Mental Hygiene
Family Health Administration
Maryland Asthma Control Program

MARYLAND ASTHMA SURVEILLANCE REPORT

2011

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MARYLAND HIGHLIGHTS

- Statewide, in 2009, approximately 595,000 (13.9%) Maryland adults and 228,000 (17.1%) children had a history of asthma. Of those, approximately 389,000 (9.1%) adults and 159,000 (11.9%) children currently had asthma.
- In 2009, there were 39,834 asthma-related emergency department visits (72.3 per 10,000 residents) and 11,474 asthma hospitalizations* (19.8 per 10,000 residents).
- From 2005-2009, there was an average of 66.6 deaths per year due to asthma.
- Between 2007 and 2009, 12.1% of adults and 11.0% of children with asthma reported losing sleep on 3 or more days during the past month due to asthma symptoms.
- For adults and children who suffer from asthma between 2007 and 2009, 8.1% of adults and 2.5% of children reported experiencing asthma symptoms every day during the past 30 days.
- Between 2007 and 2009, almost one-third of school-aged children with asthma (28.0%) missed three or more school days during the past 12 months due to asthma symptoms.
- Between 2007 and 2009, two in ten adults with asthma (21.3%) were unable to work for at least one day during the past 12 months due to asthma.
- Between 2007 and 2009, 8.0% of adults with asthma reported having been told by a health professional that their asthma was work-related.
- Many disparities exist in asthma morbidity and mortality. Persons at increased risk for asthma and its complications include the very young, the elderly, Black racial demographic, women, individuals with low-income and lower levels of education, and individuals in certain jurisdictions, particularly Baltimore City.
- In 2009, charges for hospitalizations due to asthma totaled over $73 million. Charges for emergency department visits due to asthma totaled an additional $26 million.
- Compared to those without asthma, adults with asthma perceive their general health less favorably.

* Includes Maryland residents hospitalized in Delaware, Pennsylvania, Washington D.C., and West Virginia.

INTRODUCTION

Asthma is a controllable chronic lung disease characterized by inflammation of the airways, reversible airway constriction, and excess mucus secretion. This narrowing of the airway results in reduced airflow that may cause symptoms of wheezing, coughing, tightness of the chest, and difficulty breathing. Asthma affects both adults and children and is the most common chronic disease of childhood and the 3rd leading cause of hospitalizations for children under 15 years old.[1, 2] In 2009, approximately 10.2 million (13.9%) U.S. children under 18 years of age had been diagnosed with asthma at some point in their lifetime, and an estimated 7.1 million (9.7%) children currently had asthma.[3] An estimated 29.7 million (13.2%) U.S. adults had been diagnosed with asthma during their lifetime, and an estimated 17.5 million (7.7%) adults currently had asthma in 2009.[4] In 2007, asthma was responsible for 456,000 hospitalizations nationwide.[5]

This is the eighth annual surveillance report of the Maryland Asthma Control Program (MACP). The MACP began in 2001, with funding from the Centers for Disease Control and Prevention (CDC) to develop a State Asthma Plan and an Asthma Surveillance Program.[6] In 2002, the Maryland State Legislature established the MACP in statute (General Article §§13-1701 through 13-1706, Annotated Code of Maryland). This mandate, in conjunction with the CDC funding, has allowed the Maryland Department of Health and Mental Hygiene (DHMH), and the MACP to provide leadership for reducing morbidity and mortality due to asthma in Maryland, particularly for its most vulnerable populations. Annual surveillance of asthma morbidity and mortality informs MACP's strategic direction for program planning, targeting of interventions, and coalition building.

Like previous surveillance reports, this report presents current data on asthma prevalence, mortality, and health care utilization, comparing state data to previous years, as well as to national data. This year's report includes an analysis of data from the CDC Asthma Call-Back Survey on medication usage and use of an asthma action plan, among other self-management practices of persons with asthma. In addition, the report includes information about the burden of asthma among Marylanders in school, child care, and workplace settings.

Data sources for this surveillance report include the CDC Behavioral Risk Factor Surveillance System (BRFSS), the BRFSS Asthma Call Back Survey, the Youth Tobacco Survey (YTS), the Youth Risk Behavior Survey (YRBS), the Maryland Health Services Cost Review Commission's (HSCRC) hospital discharge dataset, and the Maryland Vital Statistics Administration dataset (VSA).[7, 8, 9, 10, 11, 12] For BRFSS data, asthma prevalence is identified by respondents' self-reports to a telephone survey. BRFSS Call-back Survey data combines years 2007-2009 to increase validity with a larger sample size. For HSCRC data, asthma is identified by the use of International Classification of Disease, 9th Edition (ICD-9) codes. Asthma includes all codes from 493.0 to 493.9. For mortality data, asthma was identified through ICD-9 codes until 1999. ICD-10 codes of J45 to J46 are used for 1999-2009 mortality data. Rates are based on 2009 population statistics from the National Center for Health Statistics.[13] Where possible, rates have been age-adjusted to the 2000 U.S. standard population in order to reliably compare populations with different age distributions.[14]

PREVALENCE

As in previous years, asthma prevalence in Maryland was measured using the Behavioral Risk Factor Surveillance System (BRFSS), an ongoing statewide telephone survey of adults that is coordinated by the CDC and conducted in all 50 states, Washington D.C., and three U.S. territories. The survey is designed to monitor the prevalence of major behavioral risk factors associated with health risk behaviors, chronic disease, injuries, and preventable infectious disease among adults. Each year prior to 2005, approximately 4,400 Maryland residents were surveyed. Between 2005 and 2009, approximately 8,600 Maryland residents were surveyed each year. Results were weighted in order to adjust for the selection probabilities and estimated responses for the entire state population. Successive years of data were combined to permit the calculation of three-year averages and more stable estimates for subgroup comparisons. The 95% confidence interval (CIs) for these estimates are provided in Appendix A. Estimates are considered significantly different from each other when they do not have overlapping CIs.

The BRFSS survey includes questions about the respondents' lifetime and current asthma prevalence. Prevalence is the proportion of individuals who have asthma at a specific point in time. Lifetime prevalence is the proportion of individuals who have **ever** been diagnosed with asthma. Current prevalence refers to the proportion of individuals who **still have a diagnosis** of asthma at the time the question is asked. Since 2001, the lifetime prevalence question has been "Have you ever been told by a doctor, nurse, or health professional that you had asthma?" Current prevalence is assessed by the question "Do you still have asthma?" The current prevalence question has been asked since 2000.

The BRFSS has contained questions about pediatric asthma prevalence since 2001. Prior to 2003, only one question about lifetime asthma prevalence was included: "How many children under 18 years old in your household have ever been diagnosed with asthma?" Beginning in 2003, the survey began to include questions about both lifetime and current prevalence for children: "How many children under 18 years old in your household have ever been diagnosed with asthma?" and "how many of these children still have asthma?" In the 2005 through 2007 surveys, those two questions were modified. Lifetime and current questions are: "Has a doctor, nurse, or other health professional EVER said that the child has asthma?" and [If Yes] "Does the child still have asthma?"

Maryland has two additional data sources to estimate the prevalence of lifetime asthma among children. These additional data sources include the Youth Tobacco Survey (YTS) and Youth Risk Behavior Survey (YRBS). The Maryland YTS is a school-based survey that collects self reported information about the prevalence of current cigarette smoking, behaviors and attitudes toward smoking, and tobacco related health issues including asthma. The Maryland YTS is administered biennially since 2000 (except 2004 due to budgetary constraints) to students in grades 6 through 12. In 2006, the YTS added two questions to assess both lifetime and current prevalence of asthma.

The Maryland YTS consists of a total of 48 sampling frames from public schools – a middle school sampling frame (schools with any grades 6-8) and a high school sampling frame (schools with any grades 9-12) for each of the 24 jurisdictions. In 2010, a total of 29,199 students from 184 middle schools and 56,899 students from 169 high schools completed a usable questionnaire. This report provides 2010 weighted estimates of current asthma prevalence separately for middle and high school students. The 95% confidence interval (CI) for these estimates are provided. Estimates are considered significantly different from each other when they do not have overlapping CIs.

PREVALENCE - Continued

Maryland began participating in the biannual YRBS survey of public high school students, grades 9 through 12 in 2005. That same year, CDC added two questions to assess both lifetime and current prevalence of asthma. The YRBS is a self-administered survey that monitors health risk behaviors affecting morbidity and mortality among high school youth. In 2009, the survey was conducted in 30 schools, resulting in 1,644 (78%) completed surveys. Weighted estimates and their corresponding 95% confidence interval (CIs) are provided. Estimates are considered significantly different from each other when they do not have overlapping CIs. Data from the YTS and the YRBS are presented at the end of the "**Prevalence of Asthma among Children Ages 0-17**" subsection. In interpreting data from the BRFSS, YTS, and YRBS on the prevalence of childhood asthma, readers should be aware that the definition of "lifetime asthma" and methods of data collection vary among these three data sources.

PREVALENCE - Continued

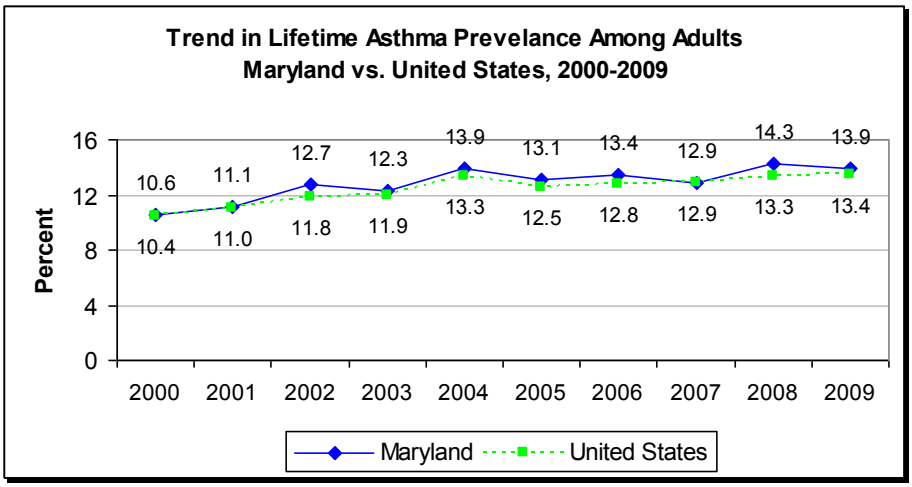
Prevalence of Asthma among Adult Ages 18+

Lifetime asthma prevalence in Maryland adults showed an increase of approximately 31% from 2000 to 2009.

In 2009, the lifetime asthma prevalence in Maryland was an estimated 13.9%, approximately 595,000 adults (18 years and older).

There's no statistically significant difference between the 2009 adult lifetime asthma prevalence in Maryland vs. the United

Figure 1-1



Maryland BRFSS, 2000-2009; CDC BRFSS, 2000-2009.

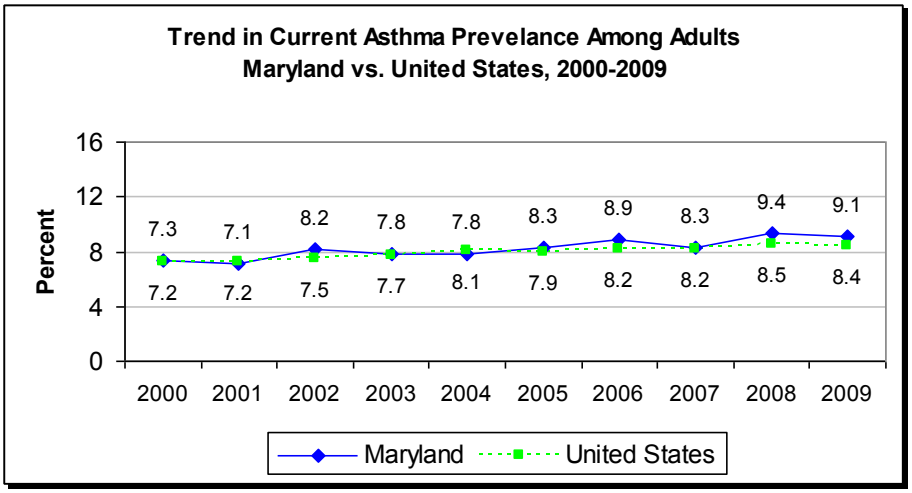
[a] U.S. includes 50 states plus Washington D.C. and excludes the three territories.

Current asthma prevalence in Maryland adults showed an increase of approximately 25% from 2000 to 2009.

In 2009, the current asthma prevalence was an estimated 9.1%, approximately 389,000 Maryland adults.

There's no statistically significant difference between the 2009 adult current asthma prevalence in Maryland vs. the United States.

Figure 1-2



Maryland BRFSS, 2000-2009; CDC BRFSS, 2000-2009.

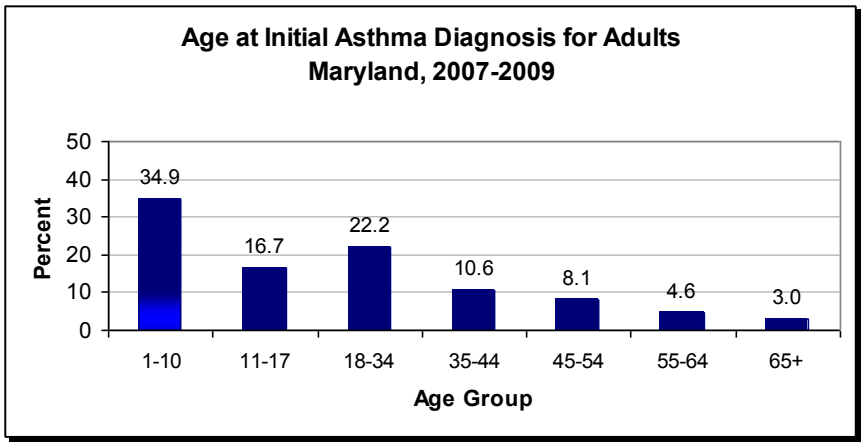
[a] U.S. includes 50 states plus the Washington D.C. and excludes the three territories.

PREVALENCE - Continued

Between 2007 and 2009, about 35% of adults with asthma were diagnosed as children between the ages of 1 to 10 years old (34.9%).

This higher prevalence in the youngest age group was found to be significantly different from the other age groups.

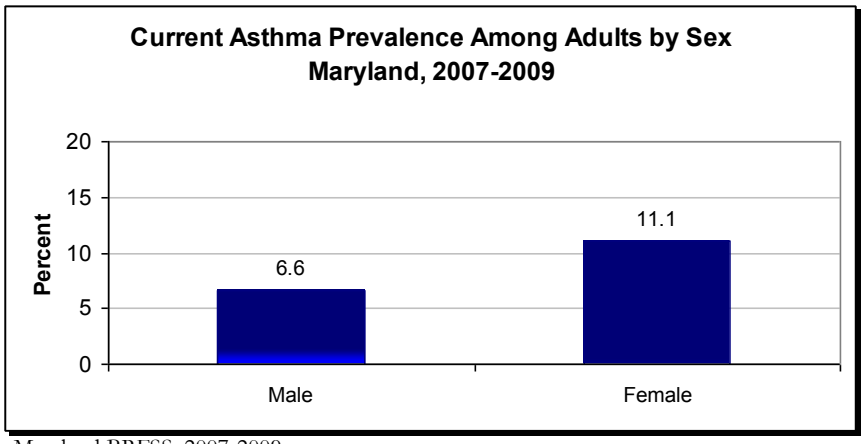
Figure 1-3



Maryland BRFSS Call-back Survey, 2007-2009.

Between 2007 and 2009, the current asthma prevalence among females (11.1%) was significantly higher than the prevalence among males (6.6%).

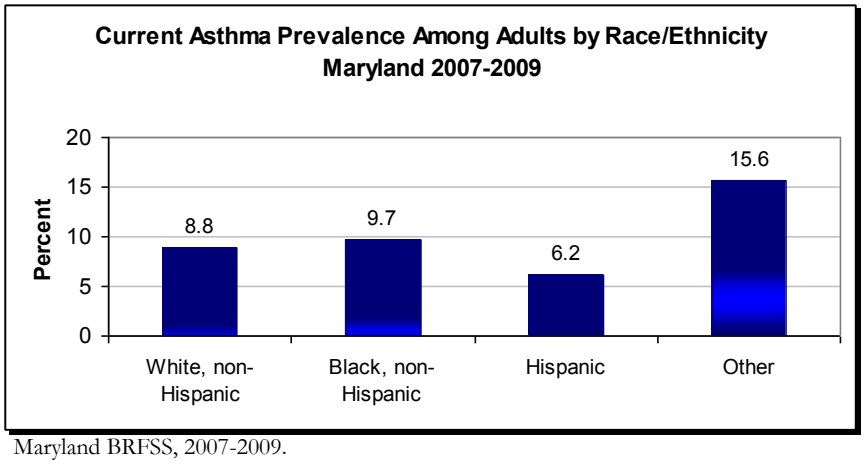
Figure 1-4



Maryland BRFSS, 2007-2009.

Between 2007 and 2009, the current asthma prevalence was significantly higher for adults who self-reported their race/ethnicity as 'Other' (15.6%) compared to all other categories of race/ethnicity.

Figure 1-5



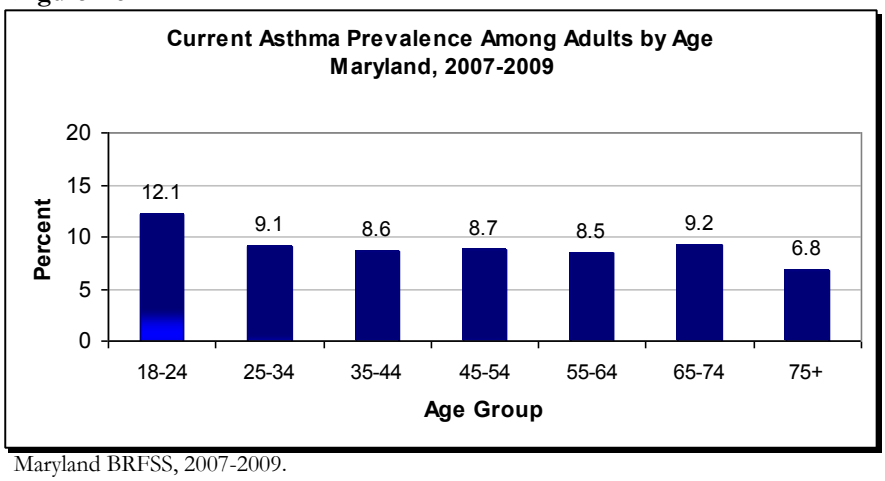
Maryland BRFSS, 2007-2009.

PREVALENCE - Continued

Between 2007 and 2009, the current asthma prevalence was highest among adults aged 18 to 24 years old (12.1%) and lowest among adults aged 75 years and older (6.8%).

The difference between these two age groups were found to be statistically significant.

Figure 1-6

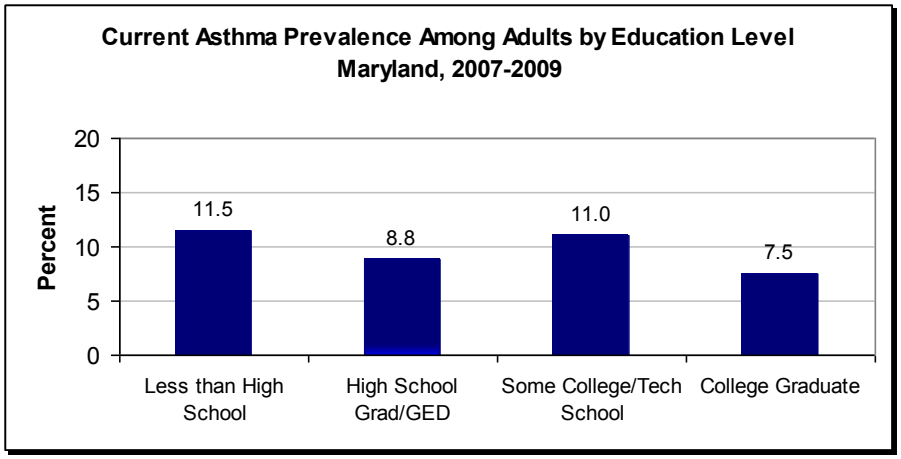


Maryland BRFSS, 2007-2009.

Between 2007 and 2009, adults that completed a college education had the lowest prevalence of asthma compared to those with less education.

The lowest level of education, 'Less than High School' had a significantly higher prevalence of current asthma compared to the 'High School Grad/GED' and 'College Graduate' categories.

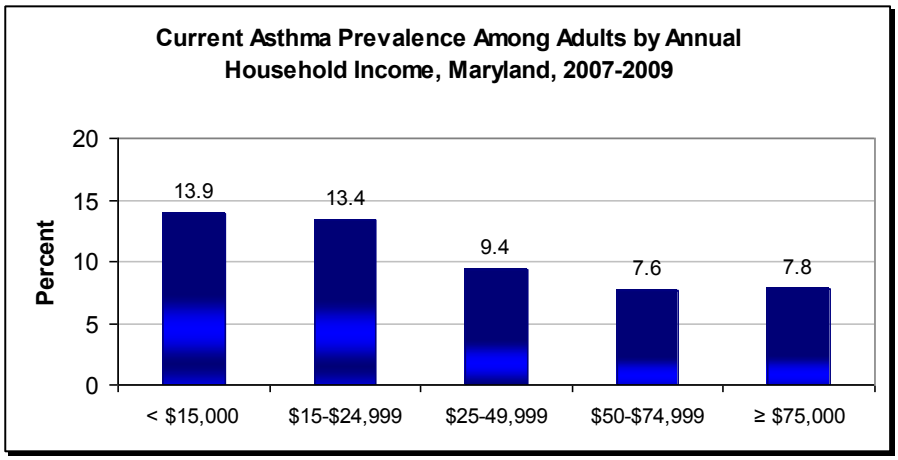
Figure 1-7



Maryland BRFSS, 2007-2009.

Between 2007-2009, adults reporting an annual household income in the lowest categories (less than $15,000 and $15-$24,999) had a significantly higher current asthma prevalence (13.9% and 13.4%) compared to adults reporting higher annual household incomes.

Figure 1-8



Maryland BRFSS, 2007-2009.

PREVALENCE - Continued

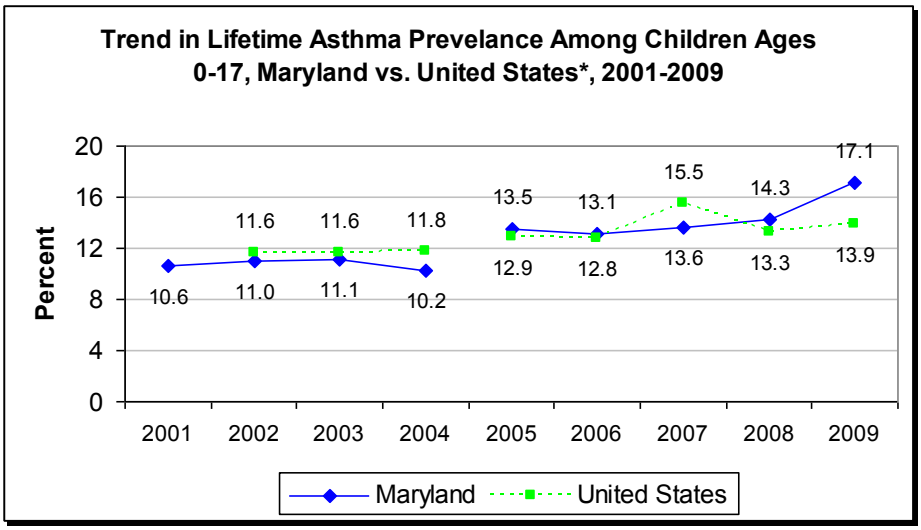
Prevalence of Asthma among Children Ages 0-17

Lifetime asthma prevalence in Maryland children showed an increase of approximately 61% from 2001 to 2009.

Among Maryland children less than 18 years of age, the lifetime asthma prevalence was 17.1% in 2009 - approximately 228,000 children.

There has been no statistically significant difference between child lifetime asthma prevalence in Maryland vs. the United States.

Figure 1-9



Maryland BRFSS, 2001-2009; CDC BRFSS, 2002-2009.

[a] Survey question for lifetime asthma prevalence changed in 2005, data from 2001-2004 are not comparable to 2005-2009 data.

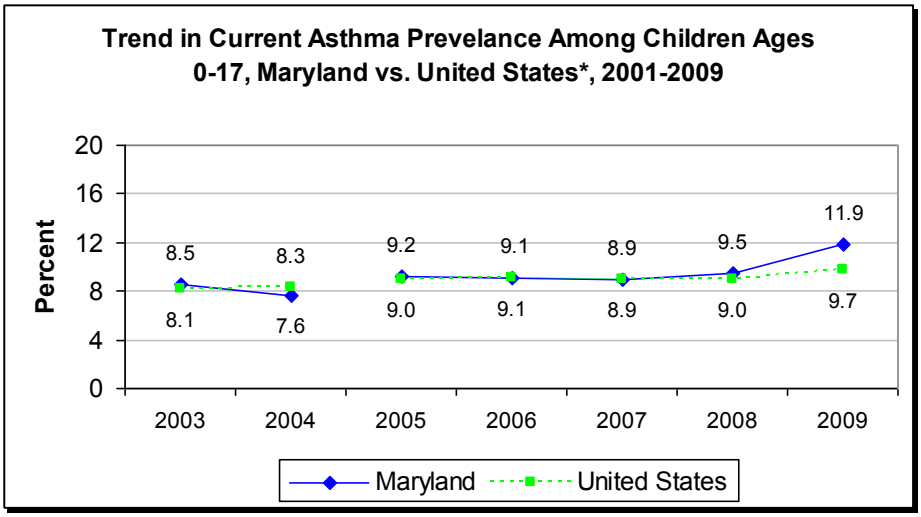
[b] BRFSS data for children is not collected in all states, each year the number of states collecting data on child asthma prevalence has been between 22 and 37 states.

Lifetime asthma prevalence in Maryland children showed an increase of approximately 40% from 2003 to 2009.

Among Maryland children less than 18 years of age, the current asthma prevalence was 11.9% in 2009 - approximately 158,500 children.

There has been no statistically significant difference between child current asthma prevalence in Maryland vs. the United States.

Figure 1-10



Maryland BRFSS, 2001-2009; CDC BRFSS, 2003-2009.

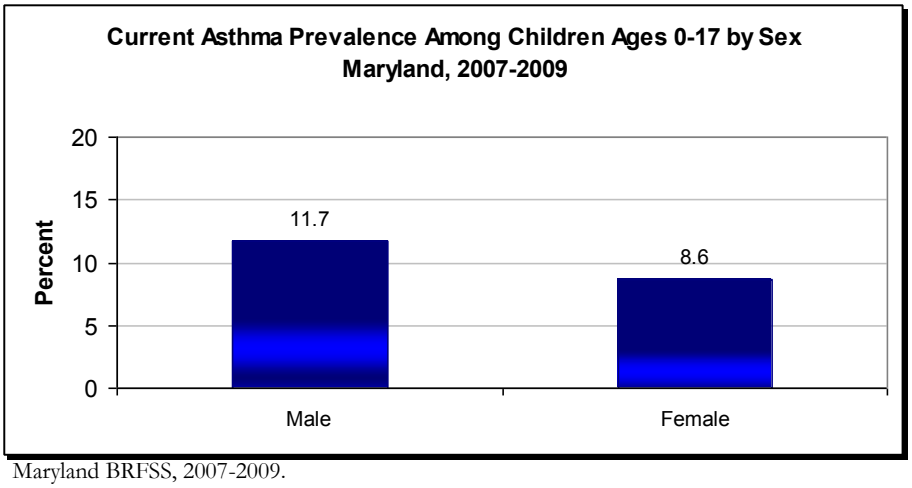
[a] Survey question for current asthma prevalence changed in 2005, data from 2001-2004 are not comparable to 2005-2009 data.

[b] BRFSS data for children is not collected in all states, each year the number of states collecting data on child asthma prevalence has been between 22 and 37 states.

PREVALENCE - Continued

In 2007-2009, the current asthma prevalence for male children (11.7%) in Maryland was significantly higher than the prevalence among female children (8.6%).

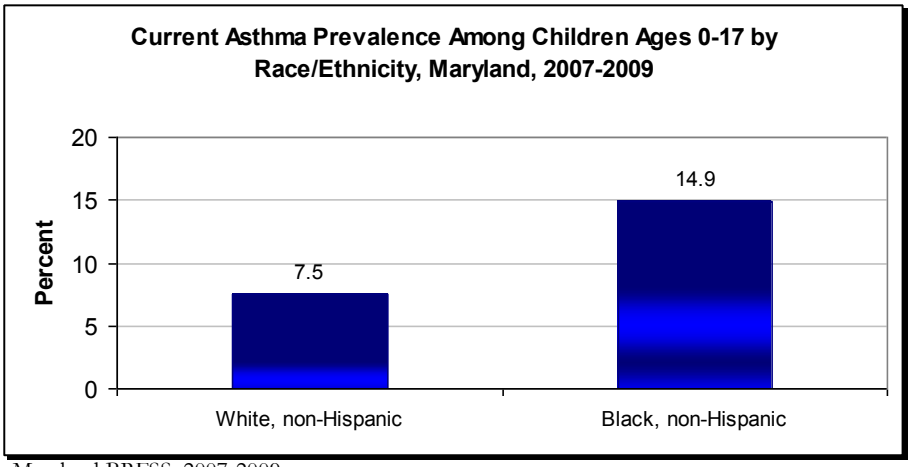
Figure 1-11



Maryland BRFSS, 2007-2009.

Between 2007 and 2009, the current asthma prevalence was significantly higher for Black, non-Hispanic children (14.9%) compared to White, non-Hispanic children (7.5%).

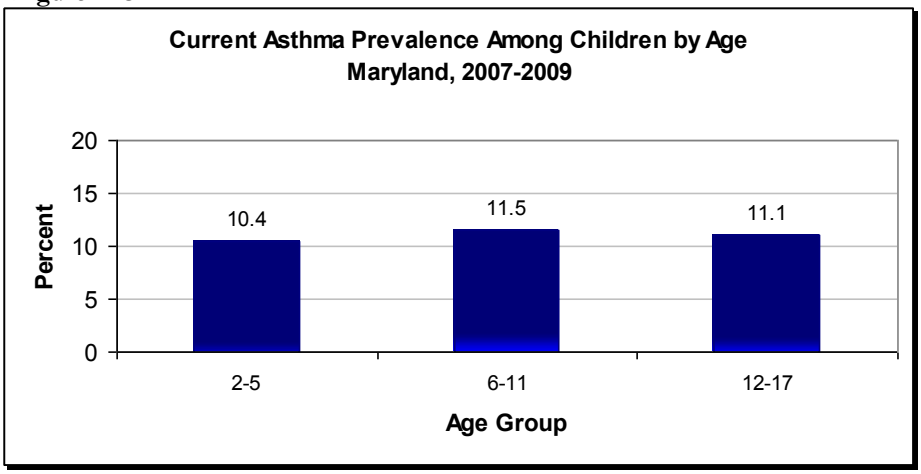
Figure 1-12



Maryland BRFSS, 2007-2009.

Between 2007 and 2009, the prevalence of current asthma was lowest among children aged 2 to 5 years old (10.4%); however, this age group was not statistically different from the older age groups.

Figure 1-13



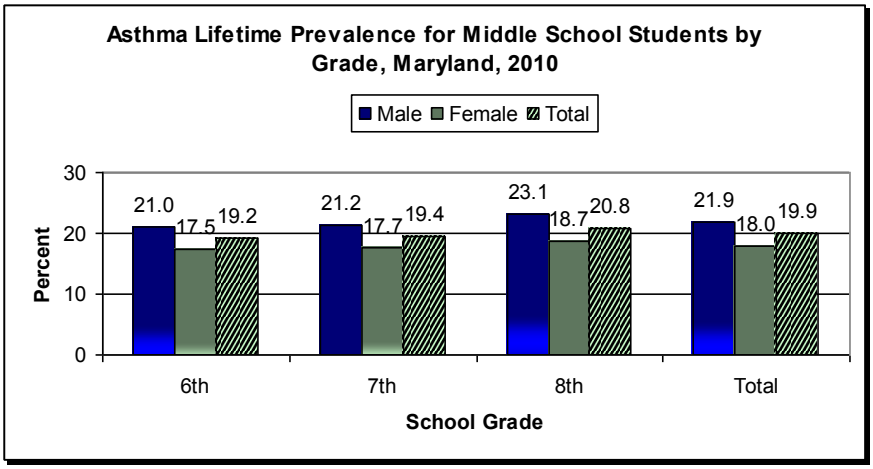
Maryland BRFSS, 2007-2009.

PREVALENCE - Continued

In 2010, approximately 19.9% of middle school children reported having ever been diagnosed with asthma.

There were significant differences between the sexes for every middle school grade, with males having a higher prevalence than females.

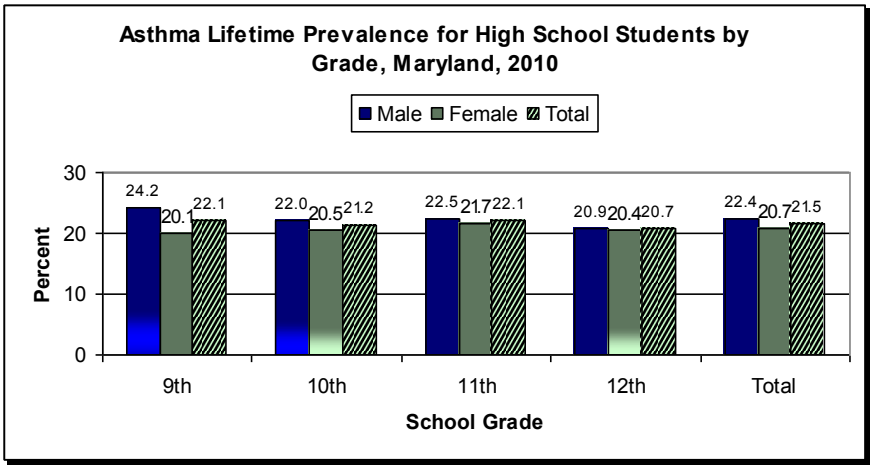
Figure 1-14



Maryland Youth Tobacco Survey, 2010.

In 2010, approximately 21.5% of high school children reported having ever been diagnosed with asthma. 9th grade males had a significantly higher prevalence of asthma compared to 9th grade females.
Another data source for lifetime asthma is the Maryland Youth risk Behavior Survey (YRBS). In 2009, high school youth in Maryland reported a 26.1% lifetime asthma prevalence rate, which was higher than national YRBS rate at 22.0% (data not shown).[16]

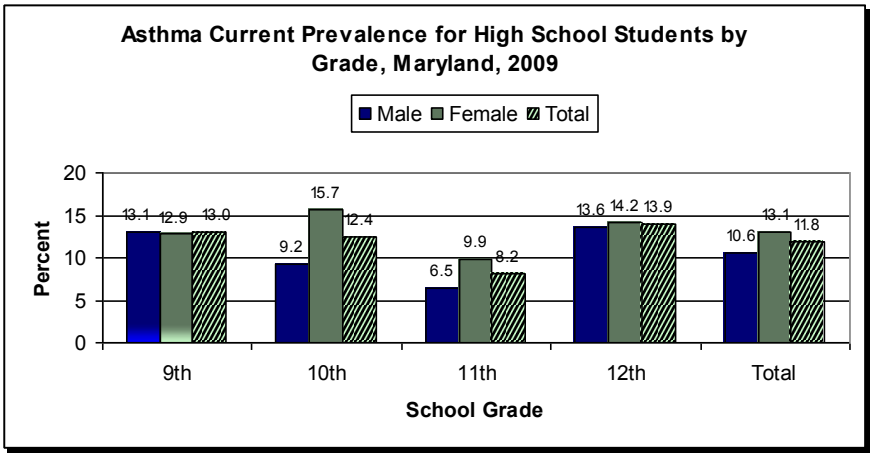
Figure 1-15



Maryland Youth Tobacco Survey, 2010.

Current asthma prevalence rates in Maryland (Figure 1-16) were higher than national rates, but were not statistically significant (11.8% vs. 10.8%, p=0.24).

Figure 1-16



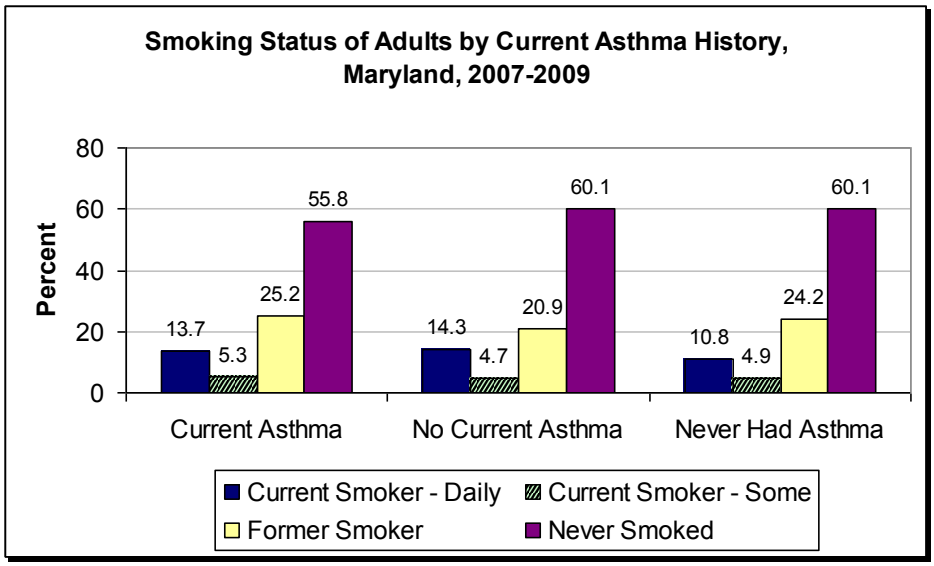
Maryland Youth Risk Behavior Survey, 2009.

RISK FACTORS AND PREVENTIVE BEHAVIORS

Tobacco is a risk factor associated with asthma. Maryland adults with asthma reported being a current smoker 'daily' (13.7%) or 'some' (5.3%) significantly more than adults who never had asthma (10.8%, 4.9%).

A cause/effect relationship cannot be determined with cross-sectional data; therefore, the directional relationship between asthma and smoking cannot be summarized by this figure.

Figure 2-1

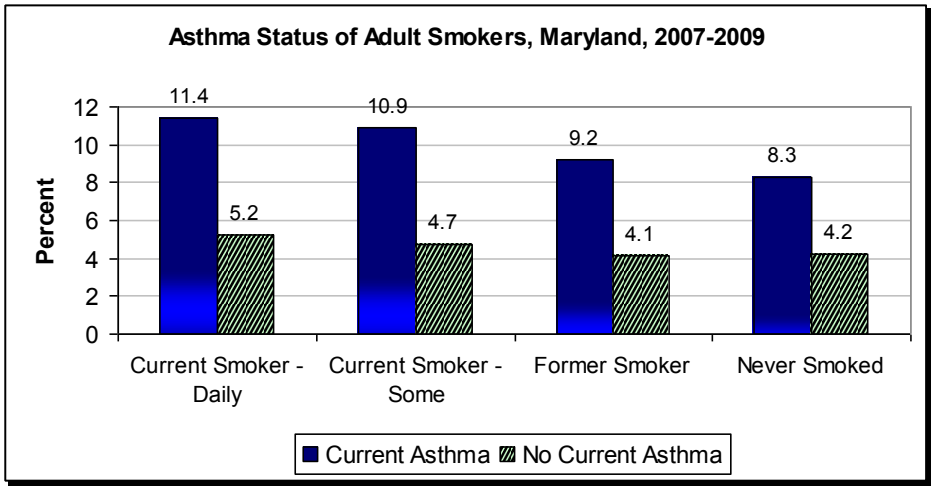


Maryland BRFSS, 2007-2009.

The prevalence of current asthma is statistically higher among adults who smoke daily (11.3%) than among those who have never smoked (8.3%).

Again, because this data is cross-sectional, it is not possible to determine whether smoking caused asthma among adults.

Figure 2-2



Maryland BRFSS, 2007-2009.

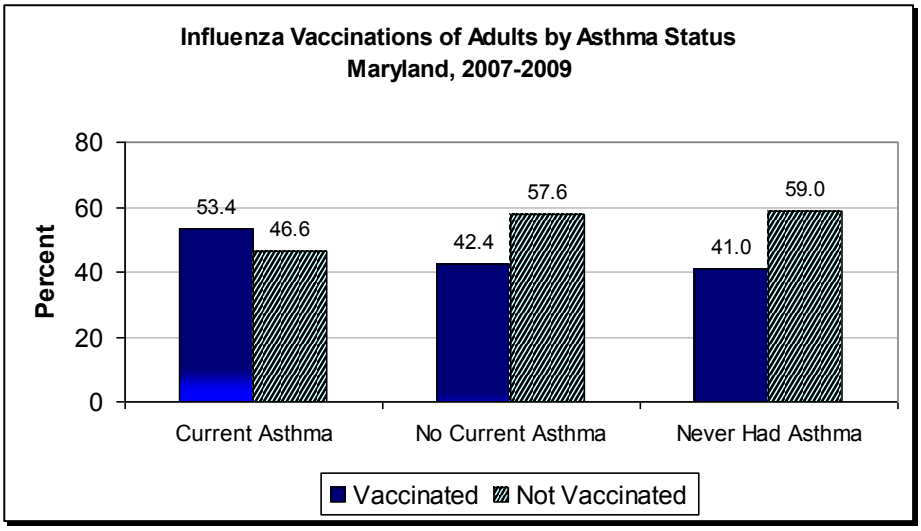
[a] Asthma status 'Never Had Asthma' not included in figure; data available in Appendix A.

RISK FACTORS AND PREVENTIVE BEHAVIORS - Continued

Influenza is associated with substantial morbidity especially among people with asthma. The CDC recommends persons with asthma receive vaccination against influenza to reduce morbidity and mortality.

In 2009, the percent of adults with current asthma that received the influenza vaccination was significantly higher than adults receiving the vaccine with no current asthma and adults that never had asthma.

Figure 2-3

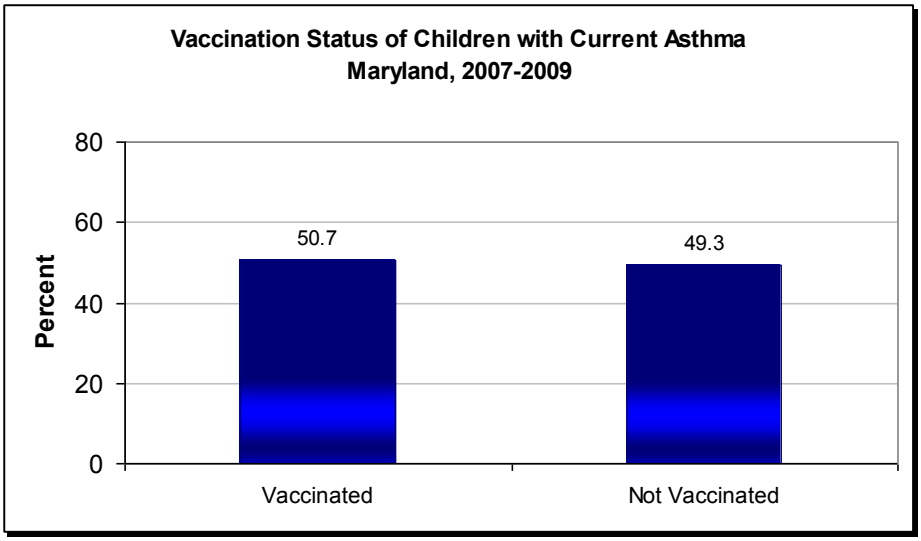


Maryland BRFSS, 2009.

More than half the children ages 0 to 17 with current asthma received a flu vaccination during the past 12 months (50.7%).

There was no statistical difference between the percentage of children with current asthma receiving a vaccination and children with current asthma not receiving a vaccination.

Figure 2-4



Maryland BRFSS Call-back Survey, 2007-2009.

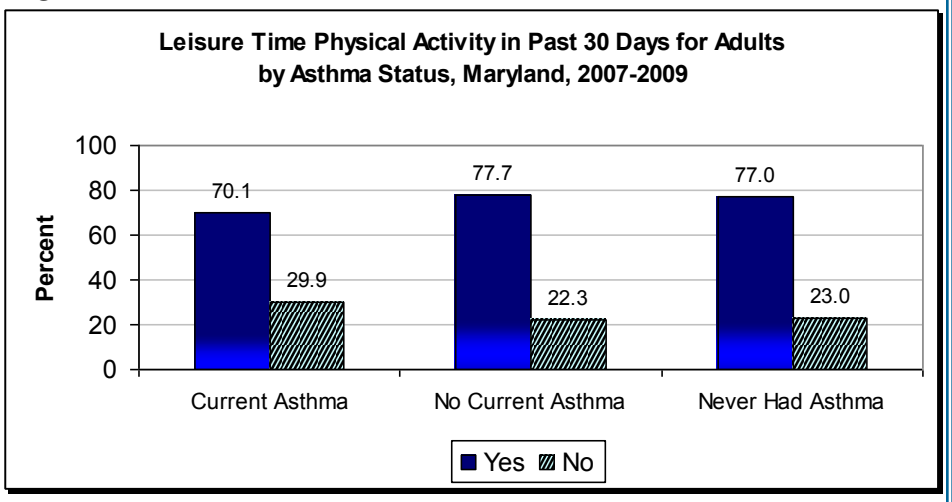
RISK FACTORS AND PREVENTIVE BEHAVIORS - Continued

Individuals with asthma should not be limited in their ability to participate in physical activities. Additionally, physical activity levels may be a potential indicator of how well asthma is under control.

Adults with asthma had statistically less leisure time physical activity in the past 30 days than adults without asthma in Maryland.

29.9% of adults with current asthma and 22.3% of adults with no current asthma reported that they had no leisure time physical activity in the past 30 days.

Figure 2-5



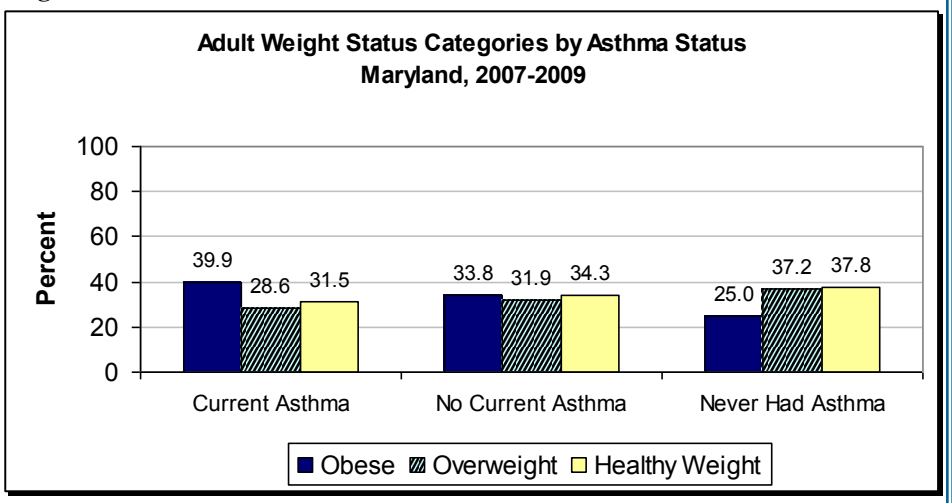
Maryland BRFSS, 2007-2009.

Body mass index (BMI) is a measure of body fat based on height and weight. For the data associated with the figure below, BMI is based on the BRFSS respondent's self-reported height and weight. The CDC defines overweight as a BMI between 25.0 and 29.9, and obese as a BMI greater than or equal to 30.[17]

In Maryland, adults with current asthma are statistically more likely to be obese or overweight compared to adults with no current asthma.

From this data, it cannot be determined whether people who are overweight/obese are more likely to develop asthma or whether people with asthma are more likely to become overweight/obese because asthma has caused them to limit their activities.

Figure 2-6



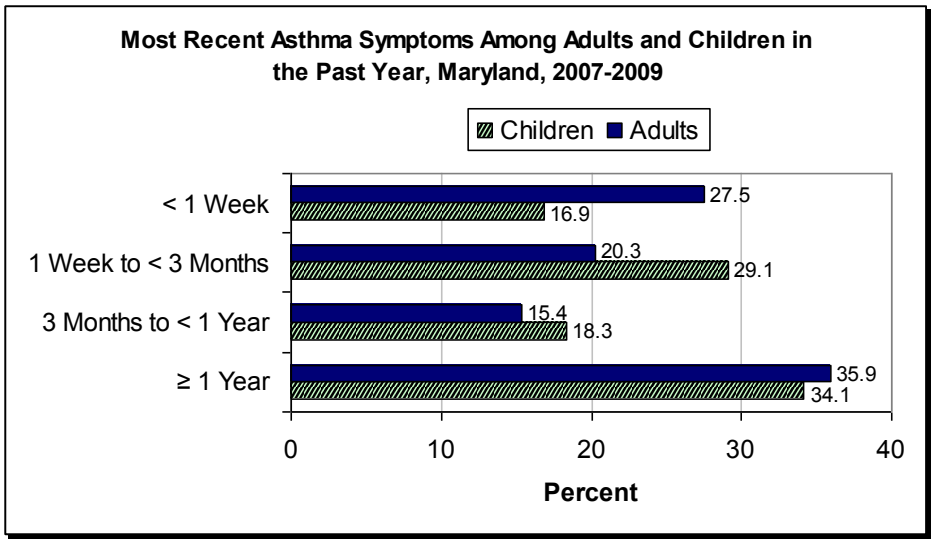
Maryland BRFSS, 2007-2009.

HEALTH STATUS OF MARYLAND ASTHMATICS

In 2009, Maryland began participating in the BRFSS Asthma Call-back Survey sponsored by the Centers for Disease Control and Prevention and the National Asthma Control Program. Respondents to the Maryland BRFSS who had ever been diagnosed with asthma or whose randomly selected child had ever been diagnosed with asthma were asked at the end of the Maryland BRFSS interview if they would be willing to participate in an additional interview focused on asthma. Those who agreed were called back and asked more extensive questions about their experience with the disease. About 450 Maryland adults aged 18 and up and about 250 Maryland children participated in the Asthma Call-back Survey each year. Results were weighted to reflect statewide demographics. Data from 2007, 2008, and 2009 BRFSS Asthma Call-back Surveys were combined in order to increase the total sample size and decrease the range of error. However, due to the nature of responses for asthma, the sample size is low, especially for children. Therefore, data presented in this report represent estimates of actual rates and should be interpreted with caution.* The survey provides a more extensive number of measures related to the burden of asthma in Maryland including asthma management and quality of life, healthcare utilization, access to care, disease co-morbidities, and work related asthma.

Between 2007-2009, almost one in three adults (27.5%) and approximately one in five children (16.9%) with asthma experienced their most recent asthma symptom less than one week ago.

Figure 3-1



Maryland BRFSS Call-back Survey, 2007-2009.

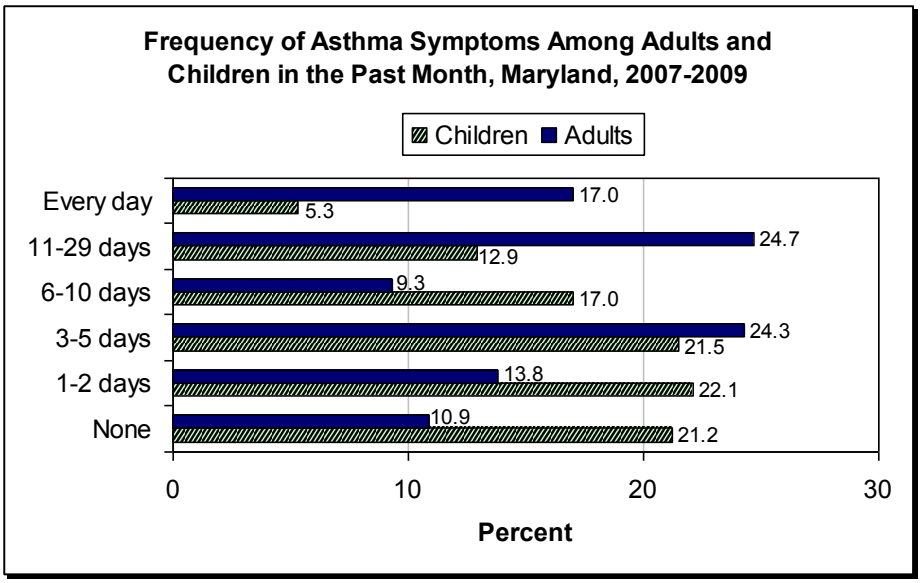
* Even though the overall number of responses may be adequate for statistical inference purposes, sub-analysis of particular questions can lead to estimators that are unreliable. Consequently, particular attention should be paid to the subgroup sample size. Small sample sizes may produce unreliable estimates. Interpreting rates based on a small number of respondents can mislead the reader into overestimating the validity of the results. Interpretation of data with only a small number of respondents should be done with caution.

HEALTH STATUS OF MARYLAND ASTHMATICS - Continued

Between 2007 and 2009, only 10.9% of adults with asthma were symptom free during the past month and 17.0% of adults had symptoms every day during the past month.

For children, 21.2% were symptom free during the past month and 5.3% had symptoms everyday.

Figure 3-2

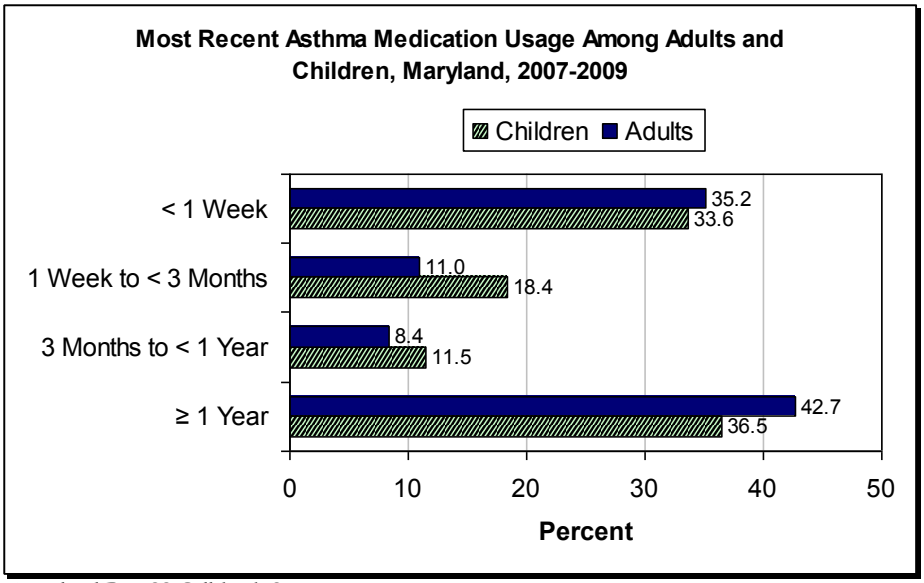


Maryland BRFSS Call-back Survey, 2007-2009.

Between 2007-2009, 42.7% of adults and 36.5% of children with asthma hadn't used prescription asthma medication in over a year.

Only 2.6% of adults and 0.1% of children have never taken asthma medication.

Figure 3-3



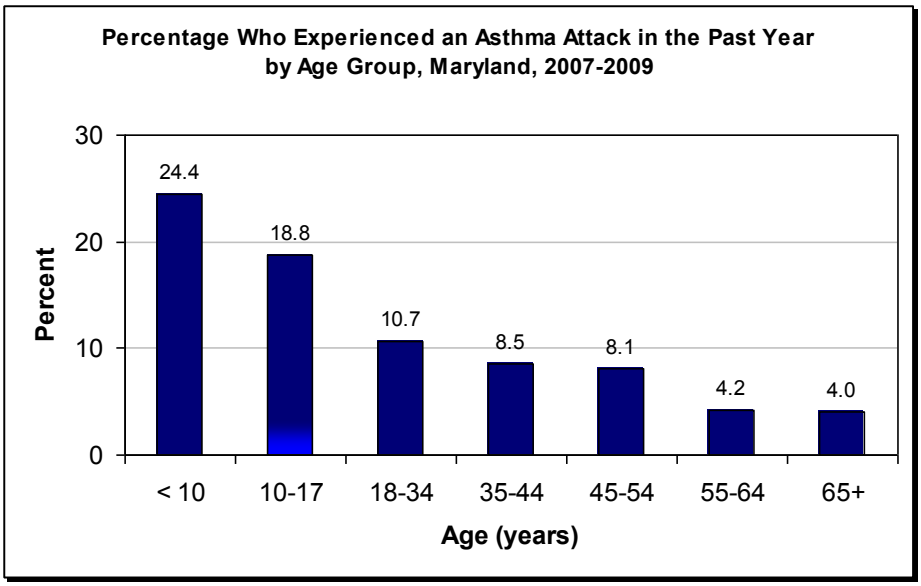
Maryland BRFSS Call-back Survey, 2007-2009.

HEALTH STATUS OF MARYLAND ASTHMATICS - Continued

Between 2007 and 2009, almost one in four children (24.4%) experienced an asthma attack during the past year.

A significantly higher percentage of adults in the age groups of 18-34 (10.7%), 35-44 (8.5%), and 45-54 (8.1%) experienced an asthma attack in the past year compared to adults in the age groups of 55-64 (4.2%) and 65 years and older (4.0%).

Figure 3-4

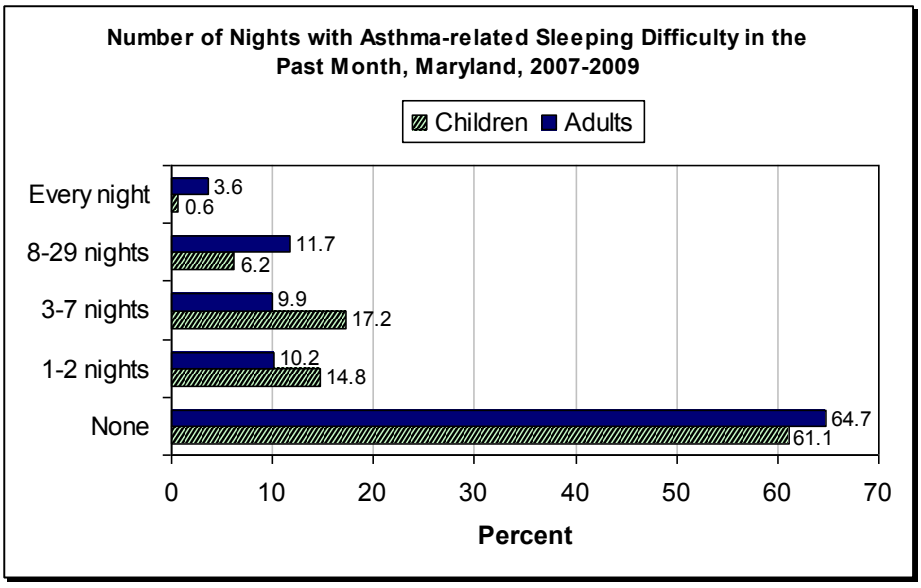


Maryland BRFSS Call-back Survey, 2007-2009.

Between 2007 and 2009, 64.7% of adults and 61.1% of children reported no difficulty sleeping over the past month as a result of their asthma.

3.6% of adults and 0.6% of children reported difficulty sleeping every night over the past month.

Figure 3-5



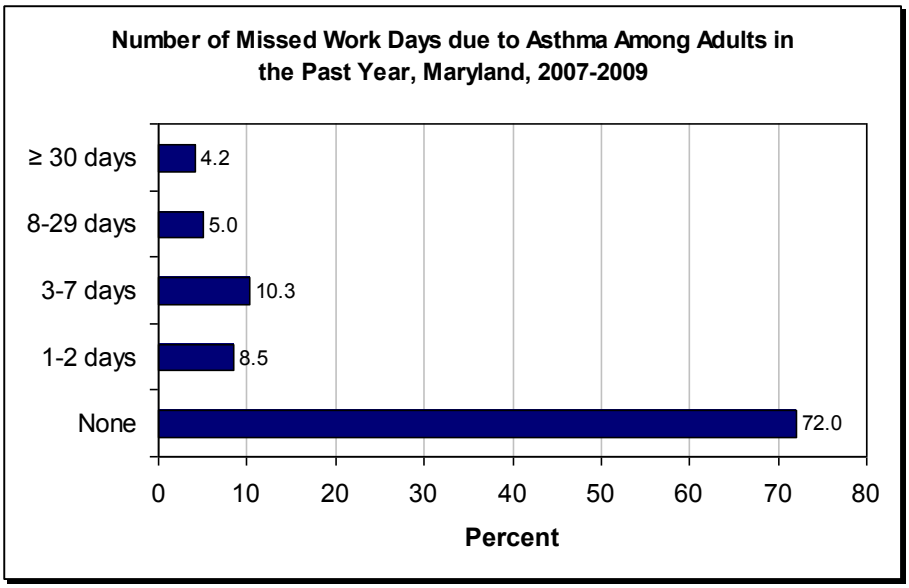
Maryland BRFSS Call-back Survey, 2007-2009.

HEALTH STATUS OF MARYLAND ASTHMATICS - Continued

Between 2007 and 2009, 72.0% of Maryland adults with asthma had no symptoms in the past year that interfered with work or usual activities.

Only 4.2% of Maryland adults with asthma had 30 or more days of asthma symptoms in the past year that interfered with their work or usual activities.

Figure 3-6

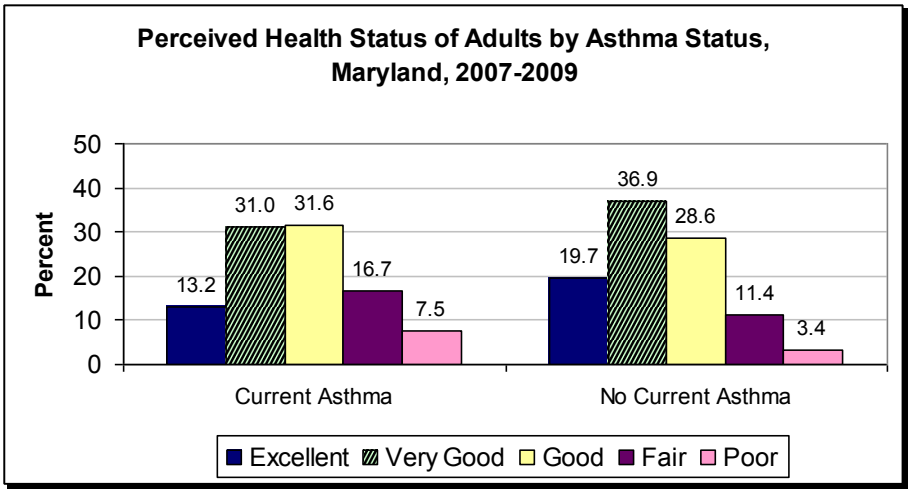


Maryland BRFSS, 2007-2009.

[a] Survey question asks 'how many days were you unable to work or carry out your usual activities'.

From 2007 to 2009, adults in Maryland with current asthma reported their health to be significantly less excellent and significantly more Fair and Poor than those without current asthma.

Figure 3-7

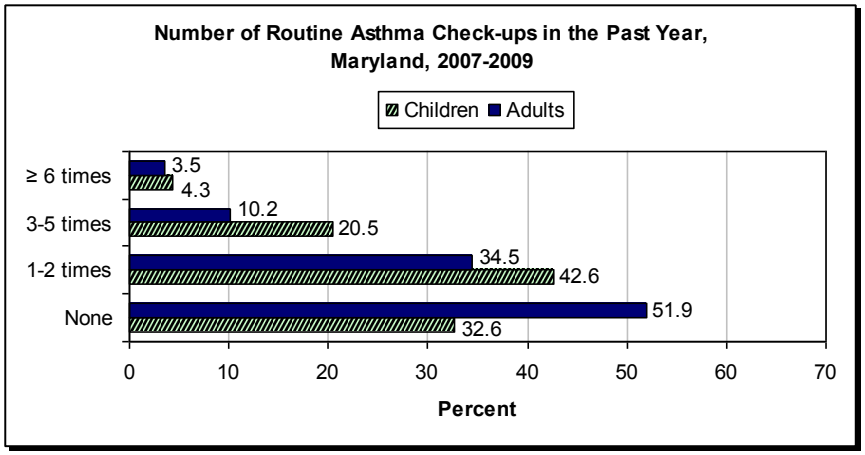


Maryland BRFSS, 2007-2009.

HEALTH STATUS OF MARYLAND ASTHMATICS - Continued

Between 2007-2009, 34.5% of adults and 42.6% of children had 1-2 routine check-ups for their asthma in the past year.

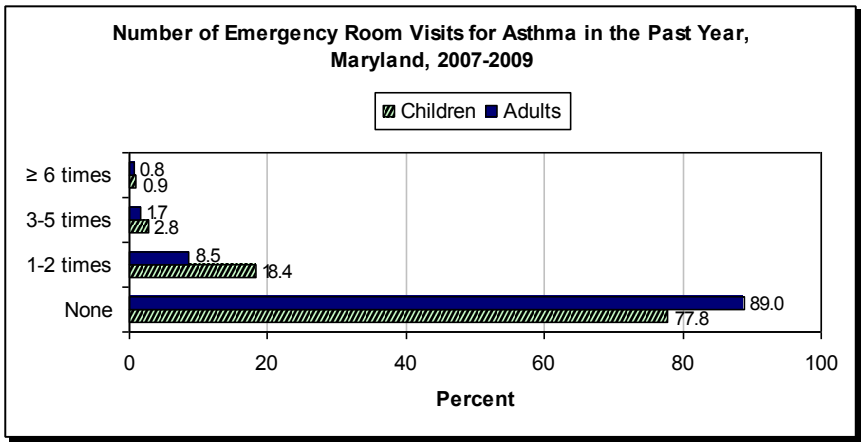
Figure 3-8



Maryland BRFSS Call-back Survey, 2007-2009.

Between 2007-2009, 89.0% of adults and 77.8% of children had no visits to the emergency room for their asthma during the past year.

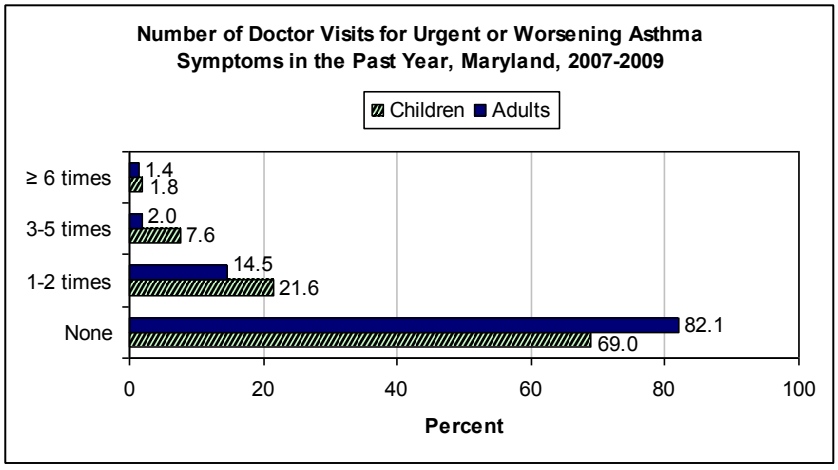
Figure 3-9



Maryland BRFSS Call-back Survey, 2007-2009.

Between 2007 and 2009, 82.1% of adults and 69.0% of children with asthma did not see a doctor at least once during the past year for urgent or worsening asthma symptoms.

Figure 3-10



Maryland BRFSS Call-back Survey, 2007-2009.

ASTHMA SELF-MANAGEMENT KNOWLEDGE

Table 4.1: Asthma Self-Management Knowledge Among Adults and Children with Current Asthma, Maryland, 2007-2009

	Adult (18+) 2007-2009 Weighted Percent (95% CI)	Child (0-17) 2007-2009 Weighted Percent (95% CI)
Taught to recognize early signs or symptoms.	41.8 (37.5 - 46.1)	56.5 (49.8 - 63.1)
Taught what to do during an asthma episode or attack.	49.6 (45.3 - 54.0)	60.2 (53.7 - 66.7)
Taught to use a peak flow meter to adjust daily medication.	32.0 (27.9 - 36.1)	27.5 (21.8 - 33.3)
Given an asthma action plan.	19.8 (16.0 - 23.5)	28.8 (22.7 - 35.0)
Taken a course or class on how to manage asthma.	5.2 (3.1 - 7.2)	7.5 (4.4 - 10.5)

Maryland BRFSS Call-back Survey, 2007-2009.

[a] Adults and children with no current asthma were included in this descriptive analysis, but percentage results for the no current asthma group are not displayed.

Asthma self-management education is an integral part of effective asthma care and improves patient outcomes by empowering patients to self-manage their asthma in accordance with healthcare provider's management and medication instructions for daily and emergency care. It is recommended that health care providers teach self-management skills by providing every asthma patient with a written asthma action plan and encouraging self-monitoring and self-management of asthma symptoms.

Between 2007 and 2009, 56.5% of parents of children with current asthma reported that either they or their children were taught by a health professional to recognize early signs or symptoms of an asthma episode. This is significantly higher than the percent of adults with current asthma who reported being taught to recognize signs or symptoms of an asthma episode (41.8%).

ASTHMA MEDICATION USE

Table 5-1: Asthma Medication Use Among Adults and Children, Maryland, 2007-2009

	Adult (18+) 2007-2009 Weighted Percent (95% CI)	Child (0-17) 2007-2009 Weighted Percent (95% CI)
Ever used over-the-counter-medication.	28.8 (24.6 - 33.0)	14.5 (9.9 - 19.2)
Ever used a prescription inhaler.	93.9 (91.1 - 95.3)	84.5 (79.5 - 89.5)
Taught to use a prescription inhaler.	96.4 (95.1 - 97.7)	96.1 (93.4 - 98.8)
Taken prescription asthma medication using an inhaler during the past 3 months.	86.5 (81.4 - 91.5)	90.6 (84.3 - 96.8)
Taken asthma medication in pill form during the past 3 months.	26.8 (21.9 - 31.6)	33.6 (25.1 - 42.1)
Taken asthma medication using a nebulizer during the past 3 months.	21.6 (16.5 - 26.7)	48.2 (38.9 - 57.5)

Maryland BRFSS Call-back Survey, 2007-2009.

The BRFSS Call-back Survey asked adults and children with asthma about their medication usage. Adults and children that had never taken asthma medication were not included in the results above.

A significantly higher percentage of adults with current asthma have used over-the-counter asthma medications when compared to children (28.8% vs. 14.5%). Reported prescription inhaler usage was also significantly higher among adults compared to children (93.9% vs. 84.5%). However, adults and children were not significantly different in being taught by health professional how to use a prescription inhaler.

During the past 3 months, significantly more children were reported taking asthma medication using a nebulizer (48.2%) compared to adults (21.6%). Taking asthma medication using an inhaler and in pill form were comparable in adults and children during the past 3 months.

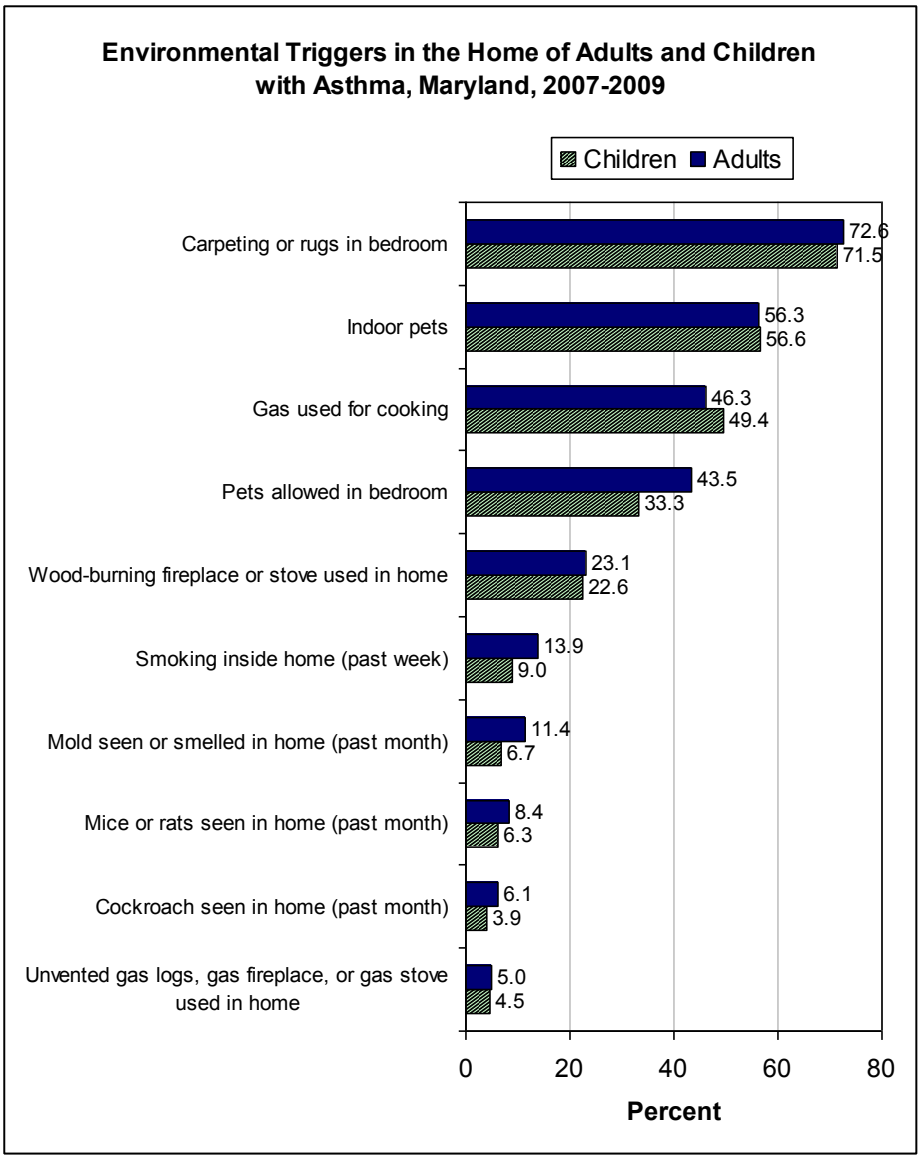
INDOOR ENVIRONMENTAL EXPOSURES

People generally spend the majority of their time indoors, therefore indoor environmental factors in the home and workplace can play a significant role in asthma morbidity. Common indoor asthma triggers include secondhand smoke, dust mites, mold, cockroaches and other pests, household pets, and combustion by-products. Gas cook tops and ovens, wood stoves and fireplaces, and room-vented gas or kerosene heaters are sources of combustion gases, particularly carbon monoxide, nitrogen oxides, sulfur oxides, and excess moisture.

The majority of adults and children in Maryland reported the highest exposure to the following environmental triggers: carpeting/rugs, having pets inside the home, using gas for cooking, and pets allowed in bedroom.

Less than 25% of respondents reported exposure to the other indoor triggers. Exposure to indoor asthma triggers was similar for adults and children.

Figure 6-1



Maryland BRFSS Call-back Survey, 2007-2009.

INDOOR ENVIRONMENTAL EXPOSURES - Continued

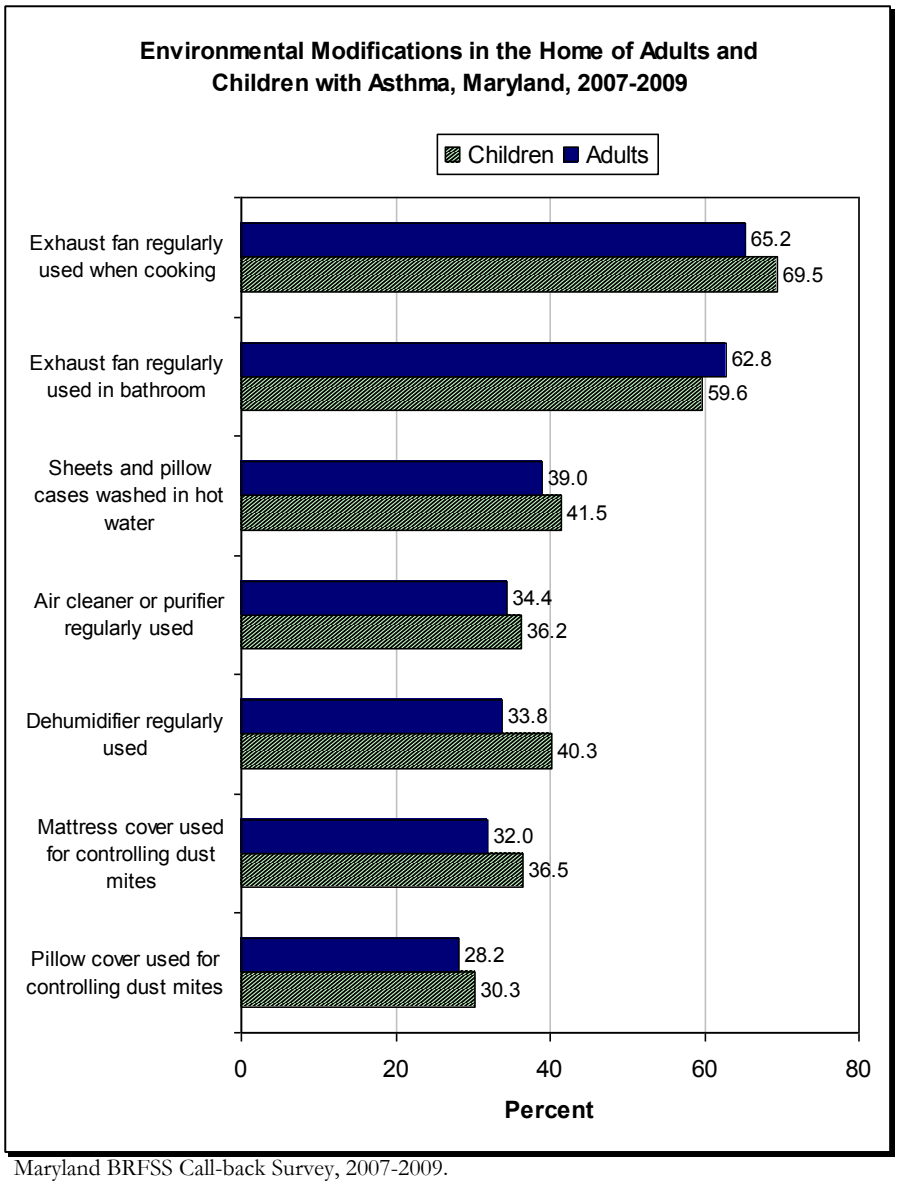
Environmental modifications can be made in the home to increase indoor air quality and reduce exposure to indoor asthma triggers and thus improve asthma symptoms.

Methods to increase indoor air quality include providing adequate ventilation, eliminating indoor tobacco smoking, properly venting and maintaining combustion appliances like furnaces, controlling moisture, and using cleaners, paints, and building materials that have low emissions of volatile organic compound (VOCs). VOCs are organic compounds that evaporate at a relatively low temperature and contribute to air pollution. Examples of VOCs include ethylene, propylene, benzene, and styrene.

More than half of adults and children with asthma lived in homes where exhaust fans were regularly used in the bathroom or when cooking.

The other environmental modifications were implemented in approximately two-fifth or fewer homes. Environmental modifications were similar in homes of adults and children with asthma.

Figure 6-2



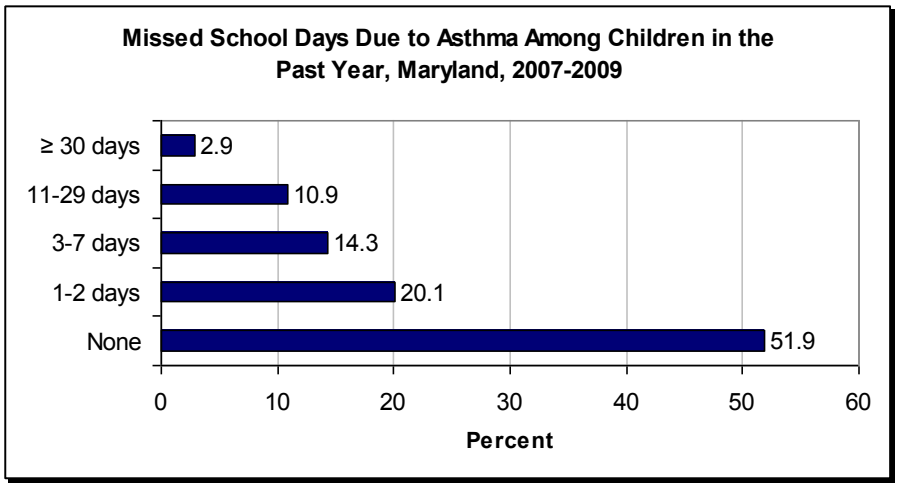
Maryland BRFSS Call-back Survey, 2007-2009.

ASTHMA AMONG SCHOOL-AGED CHILDREN

Nationally, asthma is one of the leading causes of school absenteeism - 10.5 million school days are missed each year due to asthma.[18]

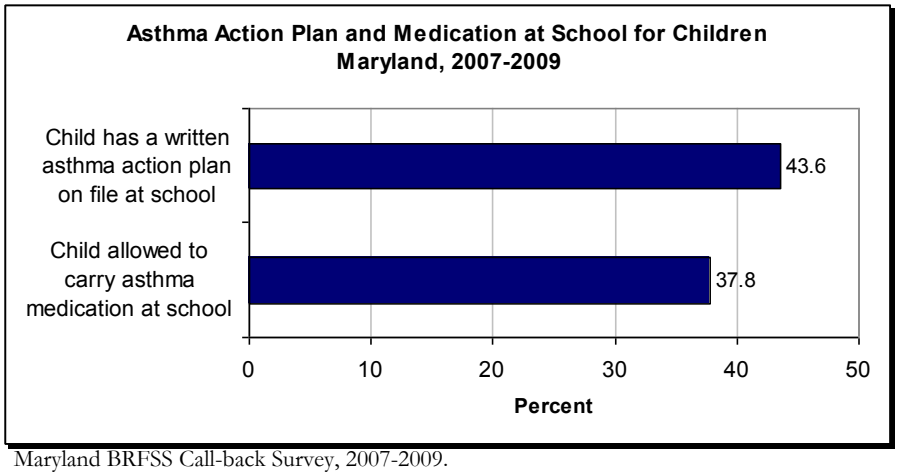
Asthma contributes to school absenteeism in Maryland. 20.1% of parents reported that their child missed 1-2 days of school because of asthma during the past year and 12.9% said their child missed over 7 days due to asthma (8-29 days and 30+ days combined). Over half of parents (51.9%) reported that their child missed no days of school due to asthma.

Figure 7-1



Maryland BRFSS Call-back Survey, 2007-2009.

Figure 7-2



Maryland BRFSS Call-back Survey, 2007-2009.

The Maryland Asthma Control Program encourages schools to maintain a written asthma action plan on file for all students with current asthma.

Between 2007 and 2009, only 43.6% of parents of children with current asthma reported that their children had an asthma action plan on file at their school.

In 2005, the Maryland General Assembly passed legislation (House Bill 143) creating a new statute, §7-421 of the Education Article, Annotated Code of Maryland, which requires public school systems to adopt policies authorizing students to possess and self-administer an asthma inhaler or other emergency medication for treatment of asthma or other airway constricting disease. However, between 2007 and 2009, only 37.8% of parents reported that their children were allowed to carry their asthma medications at school.

WORK-RELATED ASTHMA

Work-Related Asthma is defined as:

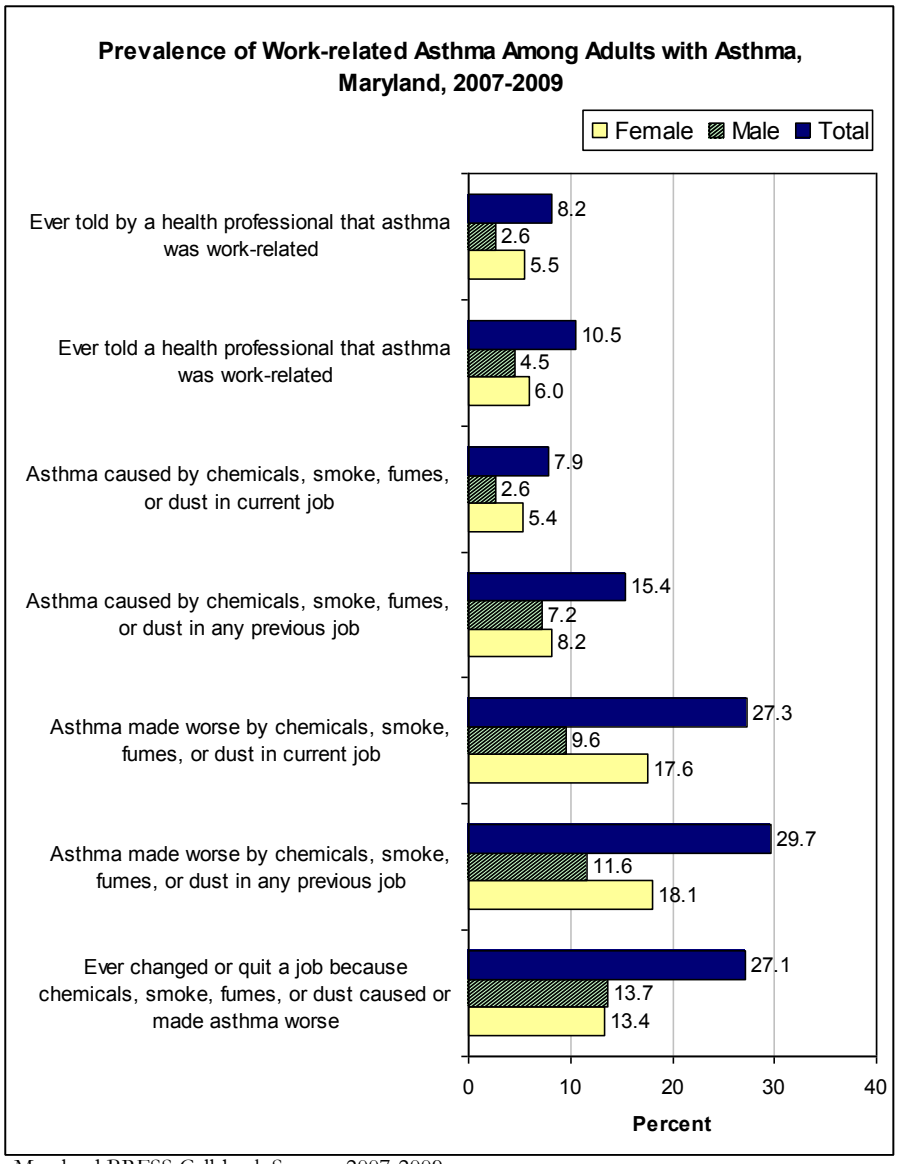
1) Asthma that is caused by exposure to substances in the work environment.
2) Pre-existing asthma that is triggered or made worse by exposure to one or more substances in the work environment.

Between 2007 and 2009, 8.2% of adults with asthma said that a health professional has told them their asthma was work-related and 10.5% said they have told a health professional that their asthma was work-related.

A higher percentage of females with asthma believed that their asthma was made worse by their jobs (17.6%) when compared to males (9.6%).

Nearly one-third of individuals reported having left a job because it caused or worsened their asthma symptoms (27.1%).

Figure 8-1



Maryland BRFSS Call-back Survey, 2007-2009.

COMORBID CONDITIONS

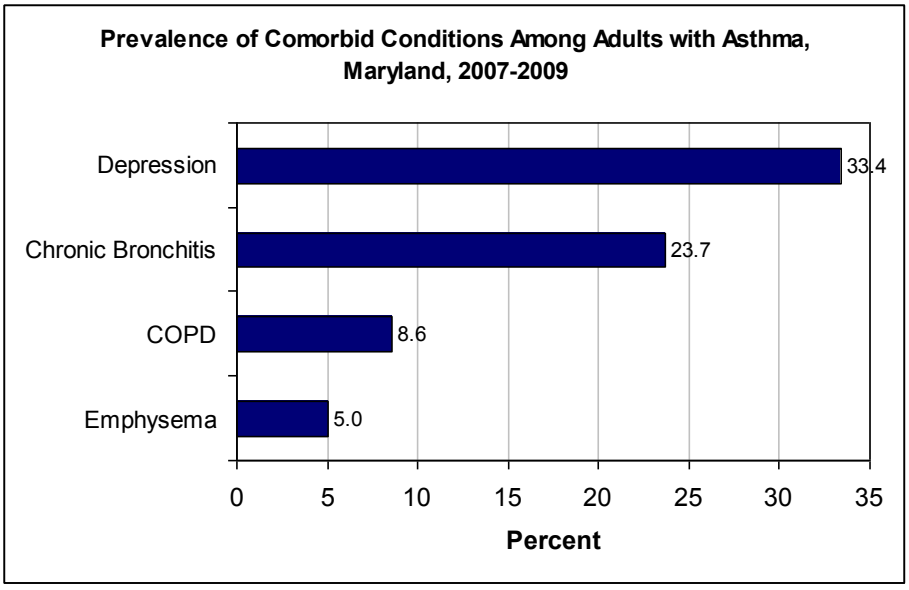
Asthma commonly coexists with other major health problems, particularly in older age groups. This coexistence is associated with significant adverse effects on physical health and accounts for significant morbidity and cost. Comorbidity can influence the quality of life and the functional status of people with asthma.

COPD is a broad term that encompasses both emphysema and chronic bronchitis. Because COPD is a relatively new term and because some individuals may know the condition by different names (COPD, emphysema, or chronic bronchitis), the Asthma Call-back Survey includes separate questions about the respondent's history of COPD, emphysema, and chronic bronchitis.

Overall, 37.3% of adults with asthma reported that they have been diagnosed with some form of COPD (chronic bronchitis, COPD, and/or emphysema). Chronic bronchitis alone was reported in almost a quarter of adults with current asthma.

About 33.4% of adults with asthma had been diagnosed with depression.

Figure 9-1



Maryland BRFSS Call-back Survey, 2007-2009.

The directional relationship between asthma and these comorbid conditions cannot be summarized by this figure. A cause/effect relationship cannot be determined with cross-sectional data; therefore, these findings do not imply that having asthma leads to any of these conditions or having a comorbid condition leads to asthma. It is clear that there is an association between these conditions, but more research is needed to determine exactly how they are related.

EMERGENCY DEPARTMENT VISITS

Individuals with asthma can usually manage their condition through the avoidance of triggers, appropriate use of medications, and appropriate health care by a primary care provider and specialty consultation as needed. Emergency department (ED) visits occur when persons with asthma develop symptoms that cannot be managed at home. This may be due to lack of appropriate care or failed self-management.

Information regarding ED visits for asthma is obtained from the Maryland Health Services Cost Review Commission (HSCRC) ambulatory care file. HSCRC currently collects health record level detail on patient demographics, diagnoses, services, residence location, and charges for every ED visit in Maryland. Data have been collected for non-federal hospitals within Maryland since April 1997. Although these data do not represent all persons with asthma, they provide a picture of individuals with the most severe or poorly controlled asthma and those who may not have adequate access to preventive or specialty care.

Data presented here are for all Maryland residents who visited the ED with a principal diagnosis of asthma from 2002 to 2009. The data are based upon the number of visits to the ED and not the number of unique individuals who visited the ED. The crude and age-adjusted rates for asthma ED visits can be found in Appendix C, Table C-1.

An asthma ED visit is defined as an ED visit with a principal diagnosis of asthma; an ICD-9 CM code of 493-493.9. ED visit numbers and rates presented in this report may differ from prior reports due to changes in data collection and analysis methods.*,†

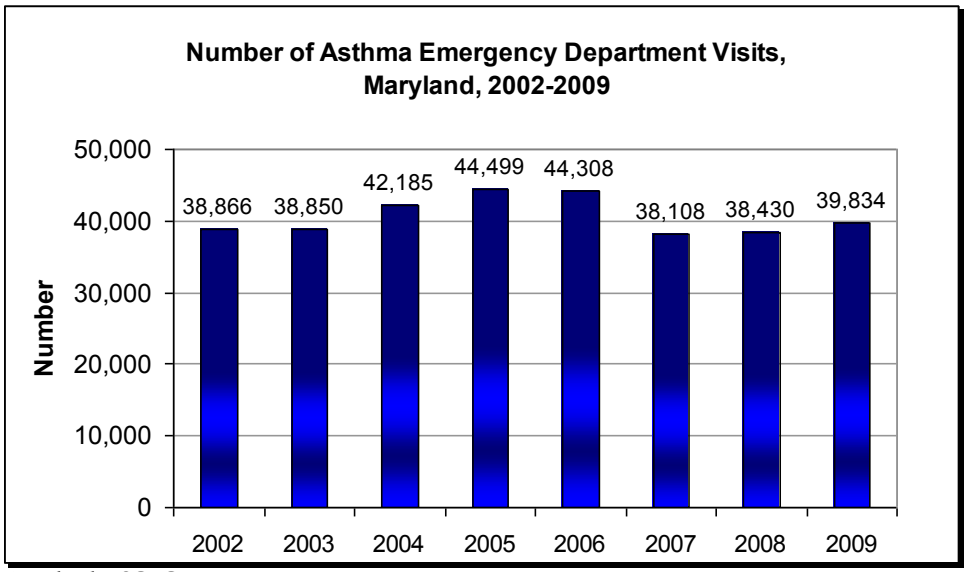
* In reports prior to 2002, ED visits were determined by admission date. Current reports determine ED visits by discharge date. Additionally, rather than creating zip code-specific county data, county-specific data provided by HSCRC was used in the analysis of ambulatory discharge data for reports created on or after 2006. County-specific data is more accurate since many of the zip codes belong to more than one county.

† Data collection methodology changed in July of 2007 - ED visits prior to 2007 are not comparable to 2007 and beyond. Reports prior to 2007 data presented ED visits determined by encounter type. Data after 2007 determines ED visits are determined by ED charges.

EMERGENCY DEPARTMENT VISITS - Continued

In 2009, there were approximately 39,834 ED visits in Maryland with asthma as a principal diagnosis.

Figure 10-1

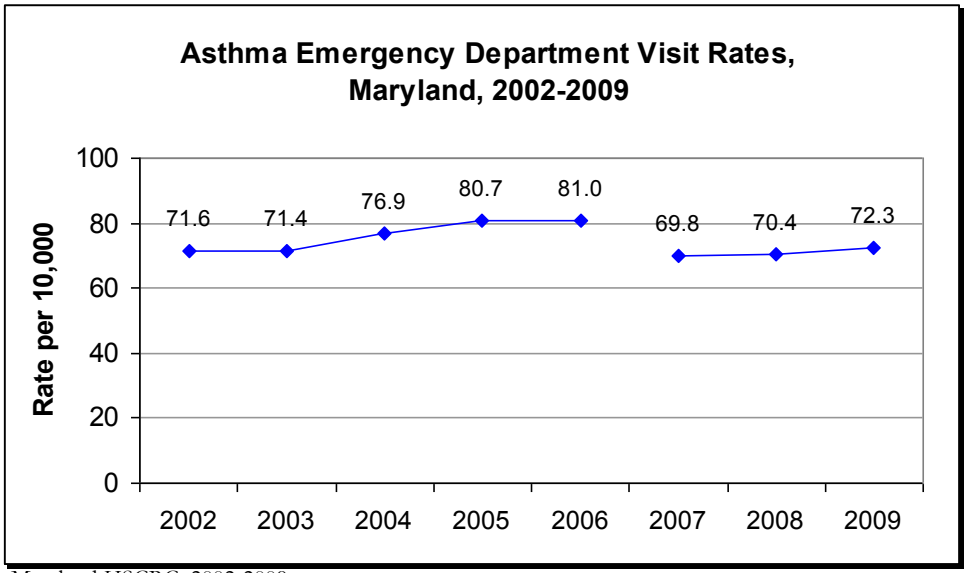


Maryland HSCRC, 2002-2009.

[a] ED data collection methodology changed in July 2007; therefore, data years 2006 and before are not comparable to 2007 and beyond.

The overall rate of ED visits due to asthma was 72.3 per 10,000 population in 2009.

Figure 10-2



Maryland HSCRC, 2002-2009.

[a] Rates are age-adjusted to the 2000 U.S. standard population.

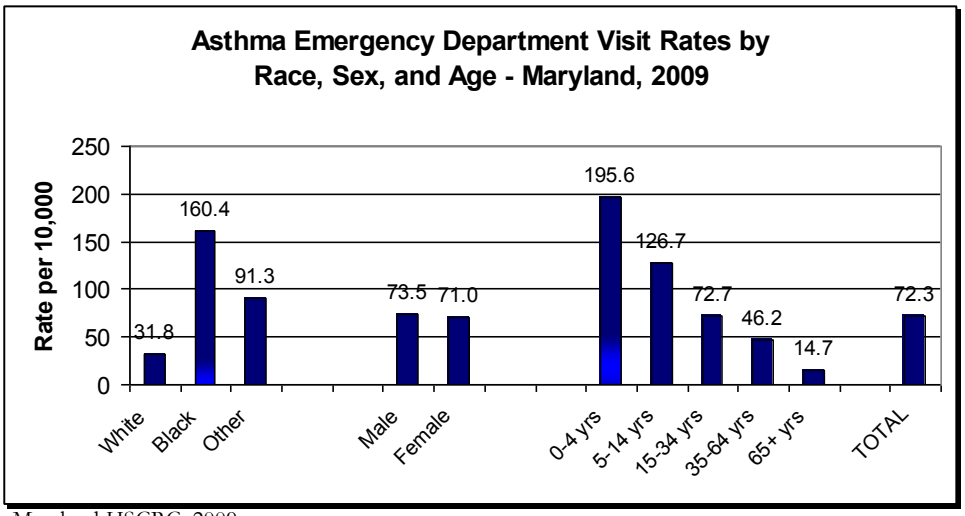
[b] ED data collection methodology changed in July 2007; therefore, data years 2006 and before are not comparable to 2007 and beyond.

EMERGENCY DEPARTMENT VISITS - Continued

Asthma ED visits for Blacks in Maryland were five times the rate of Whites (160.4 vs. 31.8 per 10,000).

Young children are brought to the ED for asthma more often than adults.

Figure 10-3



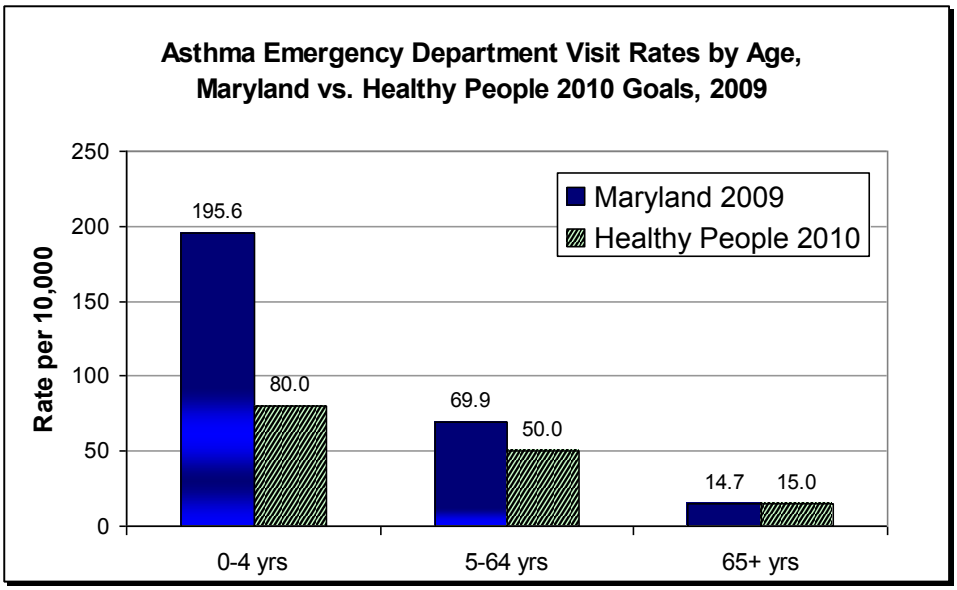
Maryland HSCRC, 2009.
[a] Rates are age-adjusted to the 2000 U.S. standard population.

In 2009, asthma ED visit rates exceed the Healthy People 2010 goals for the age groups of 0 to 4 year olds and 5 to 64 year olds.[19]

This difference remains most dramatic for children under 5 years of age. The Healthy People 2010 goal is 80 visits per 10,000 population, yet Maryland's youngest children (ages 0-4) had 196 visits per 10,000 population.

In the age group of older adults, 65 years of age and older, the Healthy People 2010 asthma ED visit goal was met in Maryland.

Figure 10-4



Maryland HSCRC, 2009; DATA2010 Healthy People 2010 Database, U.S. Department of Health and Human Services, 2010.
[a] Rates are age-adjusted to the 2000 U.S. standard population.

HOSPITALIZATIONS

Hospitalizations for asthma, like emergency department visits, are generally considered a failure of outpatient management. Maryland hospitalization data from 2001-2009 were obtained from the Maryland Health Services Cost Review Commission (HSCRC) hospital discharge files. HSCRC currently collects health record level detail on patient demographics, diagnoses, treatments, services, residence location, and charges for every hospital discharge in Maryland. Although the data does not represent all persons with asthma, they provide a picture of those people with the most severe or poorly controlled asthma, and those who may not have adequate access to preventive care.

Data are presented for all Maryland residents discharged from the hospital with a principal diagnosis of asthma from 2001 to 2009. The data, which lacks unique identifiers, is based upon the number of admissions to the hospital and not the number of individuals who were admitted to the hospital. The crude and age-adjusted rates for asthma ED visits can be found in Appendix C, Table C-2. Since some Maryland residents are hospitalized in neighboring states, data on hospitalization of Maryland residents from Delaware, Pennsylvania*, Washington D.C., and West Virginia are included when possible.

An asthma hospital discharge is defined as a hospitalization with principal diagnosis of asthma; an ICD-9 CM code of 493.0-493.9. Hospitalization numbers and rates presented in this report may differ from prior reports due to changes in analysis methods.†

* "The Pennsylvania Health Care Cost Containment Council (PHC4) is an independent state agency responsible for addressing the problem of escalating health costs, ensuring the quality of health care, and increasing access to healthcare for all citizens regardless of ability to pay. PHC4 has provided data to this entity in an effort to further PHC4's mission of educating the public and containing health care costs in Pennsylvania.

PHC4, its agents, and staff, have made no representation, guarantee, or warranty, expressed or implied, that the data -- financial, patient, payor, and physician specific information -- provided to this entity, are error-free, or that the use of the data will avoid differences of opinion or interpretation.

This analysis was not prepared by PHC4. This analysis was done by MACP. PHC4, its agents and staff, bear no responsibility or liability for the results of the analysis, which are solely the opinion of MACP."

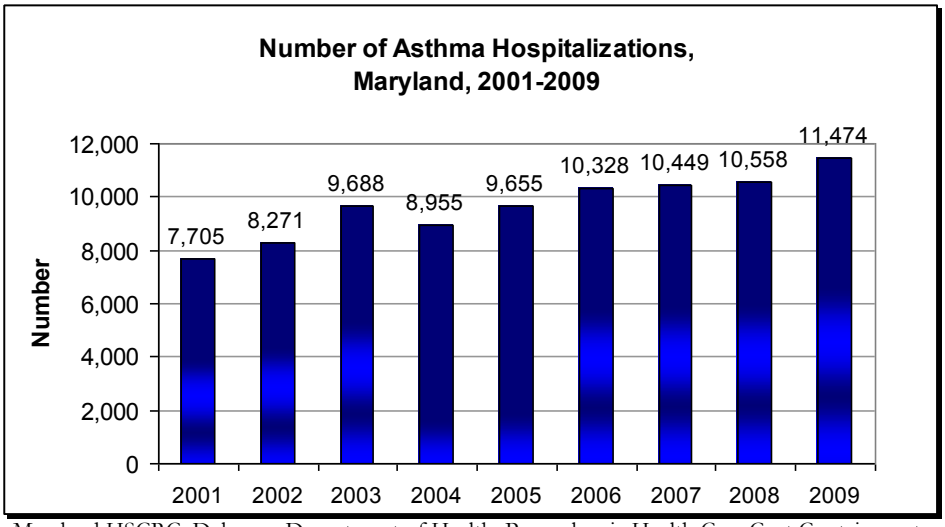
† Reports prior to 2002 presented hospitalization data determined by admission date. Since 2003, hospitalization data has been determined by discharge date. Additionally, instead of creating zip code-specific county data, county-specific data already provided by HSCRC has been used since 2006. Focusing on the county-specific data is viewed to be more accurate since many of the zip codes belong to more than one county.

HOSPITALIZATIONS - Continued

All data in this Hospitalizations Section includes Maryland residents hospitalized in DC, Delaware, Pennsylvania, and West Virginia. In Figure 11-1, the number of hospitalizations is displayed by year. The 2009 total number of hospitalizations in Maryland includes the 755 Maryland residents that were hospitalized for asthma in neighboring states. The majority of these Maryland residents were hospitalized in Washington D.C. (676), with 44 in Delaware, 27 in Pennsylvania, and 8 hospitalized in West Virginia.

There were approximately 11,474 hospitalizations of Maryland residents with a principal diagnosis of asthma in 2009.

Figure 11-1



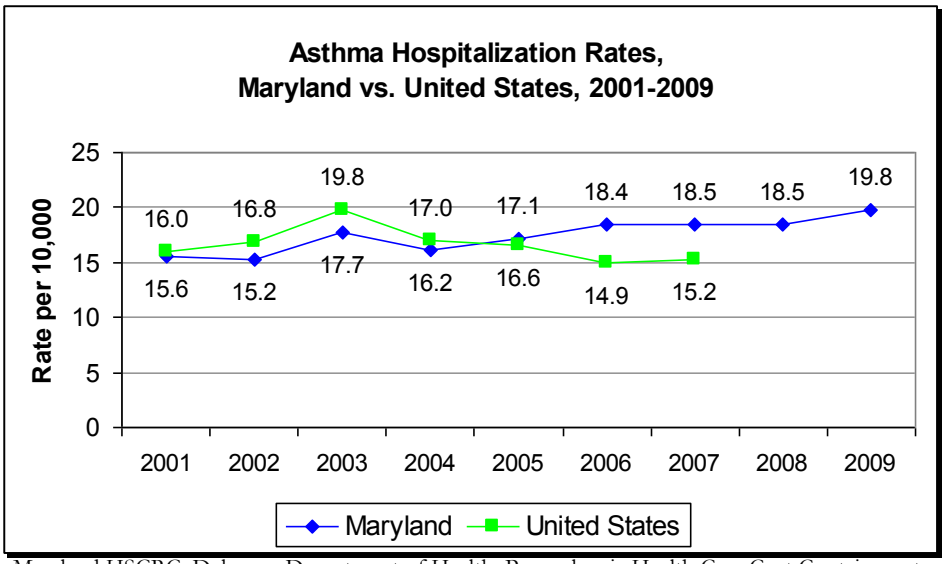
Maryland HSCRC, Delaware Department of Health, Pennsylvania Health Care Cost Containment Council, West Virginia Health Care Authority, 2001-2009.

In 2009, the hospitalization rate for Maryland residents was 19.8 (per 10,000 population).

Asthma hospitalizations in Maryland have increased almost 30% from 2001 to 2009.

Maryland asthma hospitalization rates were lower than the United States until 2005. Since then, Maryland's rates have continually remained higher than the nation.

Figure 11-2



Maryland HSCRC, Delaware Department of Health, Pennsylvania Health Care Cost Containment Council, West Virginia Health Care Authority, 2001-2009; CDC/National Center for Health Statistics, National Hospital Discharge Survey, 2001-2007.

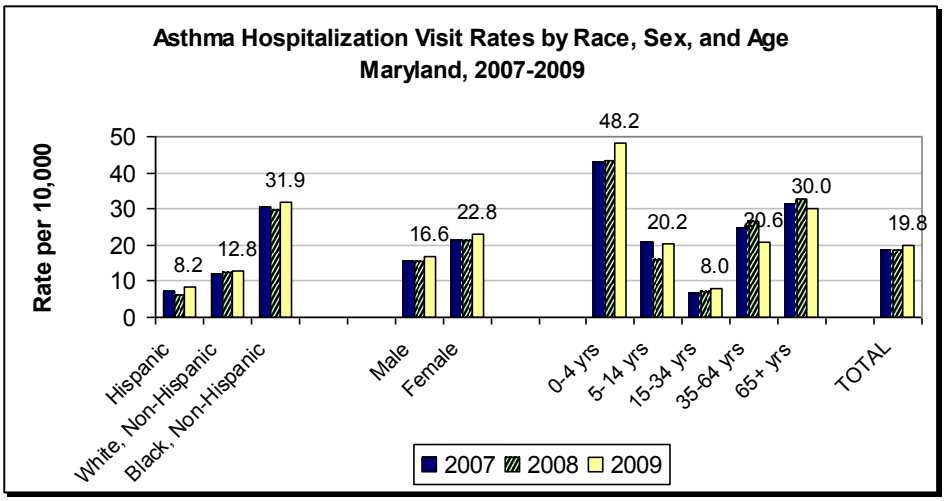
[a] Rates are age-adjusted to the 2000 U.S. standard population.

[b] Includes Maryland residents hospitalized in DE, PA, Washington D.C., and WV.

HOSPITALIZATIONS - Continued

In 2009, hospitalization rates for non-Hispanic Blacks were 2.5 times higher than Whites. Females continued to have higher hospitalization rates than males. Children under the age of 5 years of age continued to have the highest hospitalization rates when compared to other age groups (48.2 hospitalizations per 10,000 population).

Figure 11-3

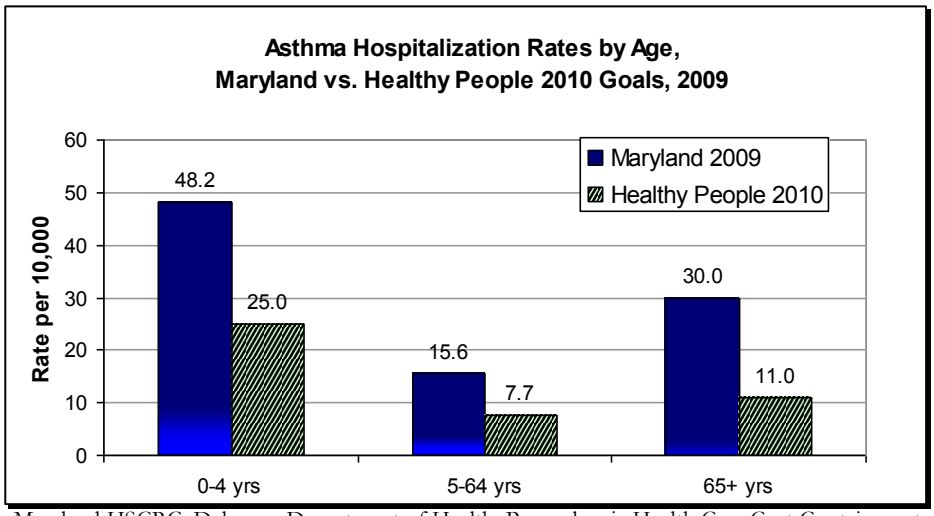


Maryland HSCRC, Delaware Department of Health; Pennsylvania Health Care Cost Containment Council, West Virginia Health Care Authority, 2007-2009.
[a] Rates are age-adjusted to the 2000 U.S. standard population.
[b] Includes Maryland residents hospitalized in DE, PA, Washington D.C., and WV.
[c] Out of state data for ethnicity only includes Pennsylvania.

Maryland residents hospitalized for asthma spent a total of 40,313 days in the hospital during 2009, with an average stay of 3.8 days. Females and Whites had a longer average hospital stay than their counterparts. The length of hospitalization stays increased with age. Children under 5 years old spent an average of 1.8 days in the hospital, while adults aged 65 years and older spent, on average, 5.3 days in the hospital for asthma (Maryland HSCRC, 2009; out of state hospitalizations not included).

Hospitalization rates for all age groups continued to exceed Healthy People 2010 goals.[19]

Figure 11-4



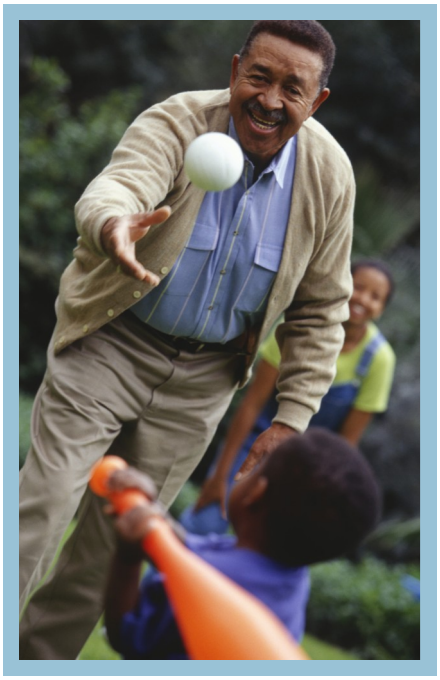
Maryland HSCRC, Delaware Department of Health; Pennsylvania Health Care Cost Containment Council, West Virginia Health Care Authority, 2009; DATA2010 Healthy People 2010 Database, U.S. Department of Health and Human Services, 2010.
[a] Rates are age-adjusted to the 2000 U.S. standard population.
[b] Includes Maryland residents hospitalized in DE, PA, Washington D.C., and WV.

DEATHS

Mortality from asthma is potentially preventable. Therefore, to some extent, trends in asthma mortality reflect the State's overall success in the management and control of asthma. The Maryland Asthma Control Program tracks asthma mortality with data from the Maryland Vital Statistics Administration (VSA). Until 1998, asthma deaths were defined as having a primary cause of death with ICD-9-CM codes of 493.0-493.9. Since 1999, asthma deaths were defined as having a primary or underlying cause of death with ICD-10 codes of J45 to J46.

Underlying cause refers to the first listed cause of death, that is, the disease or injury that initiated the chain of events leading directly to death. Contributing cause refers to all other listed causes of death, that is, significant conditions that may have contributed to the death. Unless otherwise stated, information reported here is for deaths among Maryland residents with asthma listed as the underlying cause of death. Some limited information is provided for those deaths with asthma listed as the contributing cause of death. These data included deaths of Maryland residents that occurred in Maryland.* Data from 1989-2009 also include out-of-state deaths of Maryland residents. Mortality rates have been age-adjusted to the 2000 U.S. standard population.

Five-year averages are calculated for mortality rates due to the small numbers of deaths each year. Additionally, mortality rates that contain low counts (deaths) in the numerator are not displayed to prevent any possibility of individual identification.



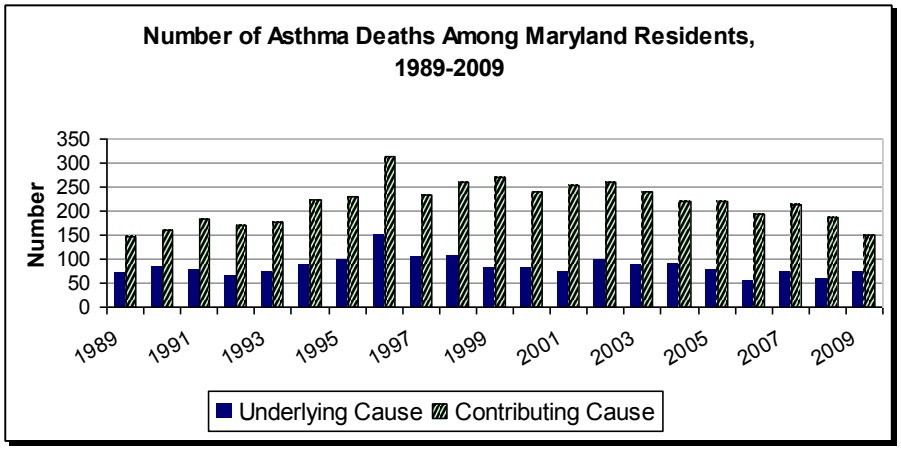
* The number of asthma deaths presented in this report may differ from prior reports due to revised datasets.

DEATHS - Continued

Figure and Table 12.1 display the number of asthma deaths among Maryland residents from 1989 to 2009.

In 2009, 72 Maryland residents died from asthma as the underlying cause of death. Asthma contributed to the death of an additional 149 Maryland residents.

Figure 12-1



Maryland VSA, 1989-2009.

Table 12-1: Asthma Deaths Among Maryland Residents, 1989-2009

Year	Number of Deaths, Asthma as Underlying Cause	Number of Deaths, Asthma as Underlying or Contributing Cause
1989	70	148
1990	82	160
1991	76	182
1992	65	171
1993	73	178
1994	88	223
1995	96	229
1996	150	315
1997	103	232
1998	107	260
1999	81	270
2000	81	240
2001	74	253
2002	96	261
2003	87	239
2004	91	221
2005	77	220
2006	55	193
2007	73	213
2008	56	188
2009	72	221

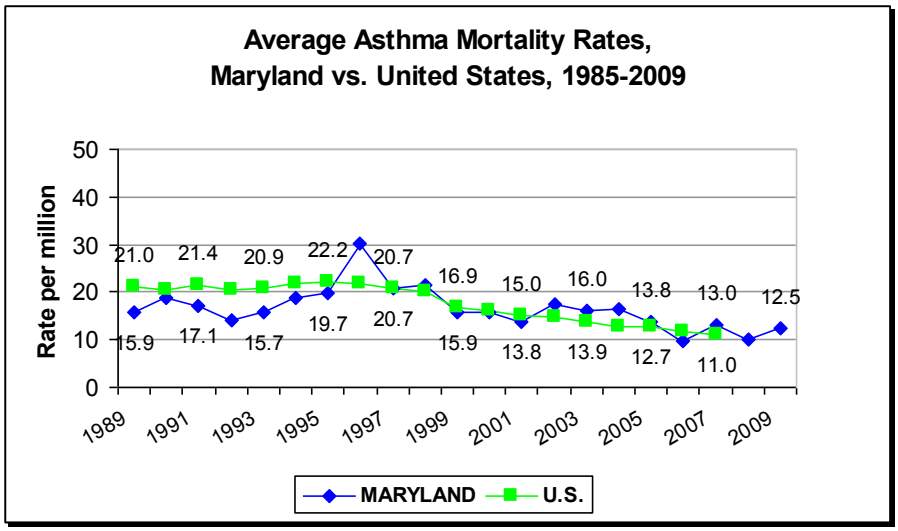
Maryland VSA, 1989-2009.

DEATHS - Continued

Mortality rates for Maryland have remained similar to national rates over time. Both Maryland and national mortality rates appear to be on a downward trend since 1996. Over the past five years, there has been no specific trend in deaths by month or season.

The age adjusted mortality rate in Maryland for 2009 was 12.5 deaths per million.

Figure 12-2

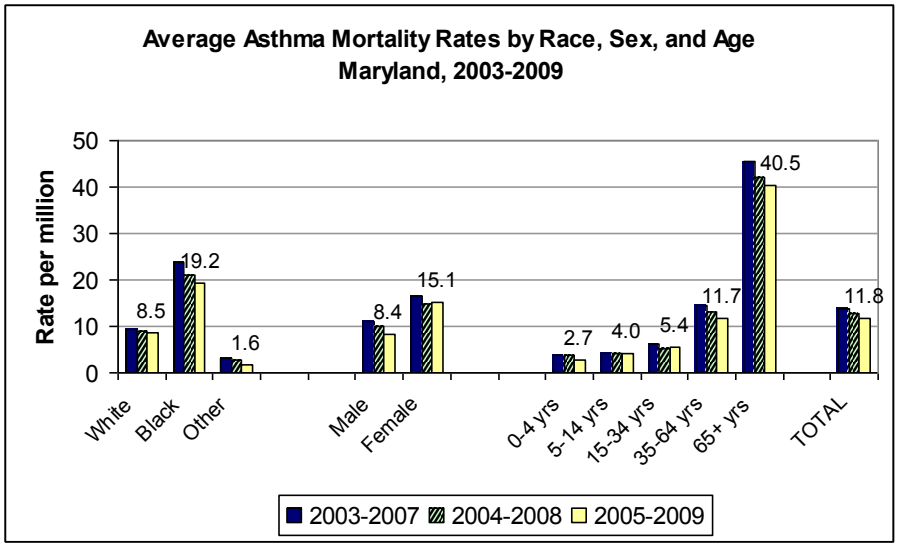


Maryland VSA, 1985-2009.
[a] Rates are age-adjusted to the 2000 U.S. standard population.

From 2005-2009, an average of 66.6 Maryland residents died each year from asthma as an underlying cause; a rate of 11.8 deaths per million.

Disparities in asthma mortality continue to exist - Blacks continue to die at a rate over twice as high than that of Whites (2005-2009 mortality rate of 19.2 vs. 8.5 per million). Women have a higher mortality rate than men (2005-2009 mortality rate of 15.1 vs. 8.4 per million). Asthma mortality rates are highest in the elderly and lowest in children under 5 years of age (2005-2009 mortality rate of 40.5 vs. 2.7 per million).

Figure 12-3

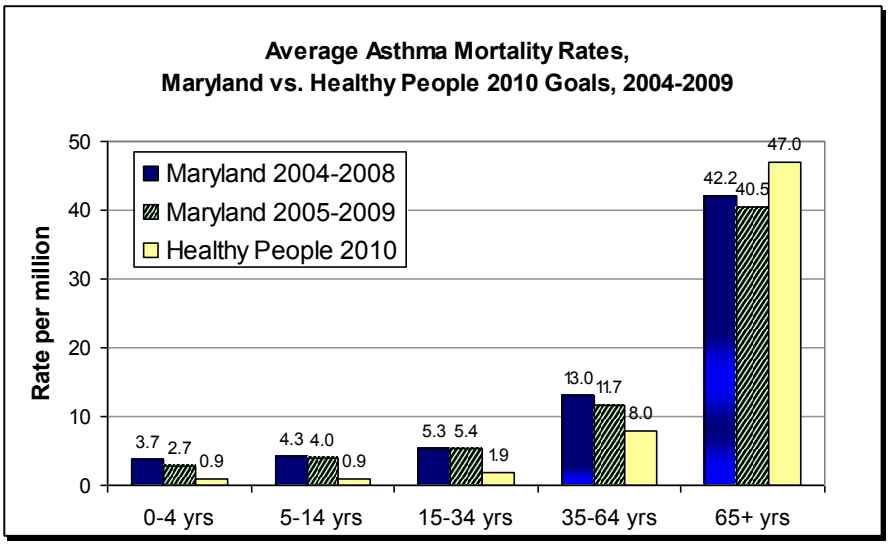


Maryland VSA, 1985-2009.
[a] Rates are age-adjusted to the 2000 U.S. standard population.

DEATHS - Continued

Maryland asthma mortality rates over the past 5 years have exceeded Healthy People 2010 goals for all age groups except for persons 65 years and older.[19]

Figure 12-4



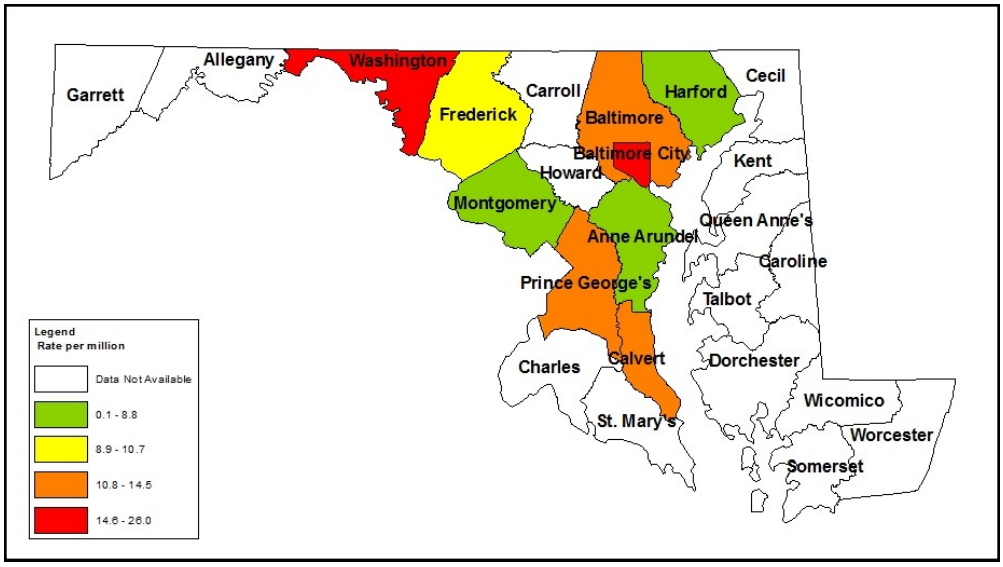
Maryland VSA, 2004-2009; DATA2010 Healthy People 2010 Database, U.S. Department of Health and Human Services, 2010.

[a] Rates are age-adjusted to the 2000 U.S. standard population.

Baltimore City (26.0), Washington (21.6), and Calvert (14.5) all had significantly higher asthma mortality rates compared to Maryland's state asthma mortality rate of 11.8 per million in 2009.

See Table 15.1 and 15.2 on page 62 and 63 for each specific jurisdiction's average annual mortality rates.

Figure 12-5: Maryland Average Annual Asthma Mortality Rates by Jurisdiction, 2005-2009



Maryland VSA, 2005-2009.

[a] Rates are age-adjusted to the 2000 U.S. standard population.

[b] Jurisdictions with low data counts are not available for display.

The Maryland Asthma Control Program will continue to follow mortality rates to determine whether current trends in asthma mortality persist. Specific circumstances surrounding asthma deaths will also be followed to better identify and address the risk factors that may lead to fatal asthma events.

DISPARITIES AND ASTHMA

Data from the previous sections demonstrate the existence of many disparities in asthma morbidity and mortality. Black children have a higher asthma prevalence than White children in Maryland. Adult women in Maryland are more likely to have asthma than men. Additionally, persons with low income and lower levels of education are disproportionately burdened by asthma (see Figures 1.7 and 1.8 on page 18). Disparities are also seen when examining rates of hospitalization and emergency department visits. When examining Maryland residents of all ages, Blacks have much higher hospitalization and emergency department visits than Whites. Young children (less than 5 years of age) have disproportionate numbers of hospitalizations and emergency department visits compared to older persons with asthma. Blacks have higher asthma mortality rates than Whites. Additionally, asthma disproportionately affects individuals living in certain jurisdictions (see next section, 'Maryland Jurisdictions and Asthma').

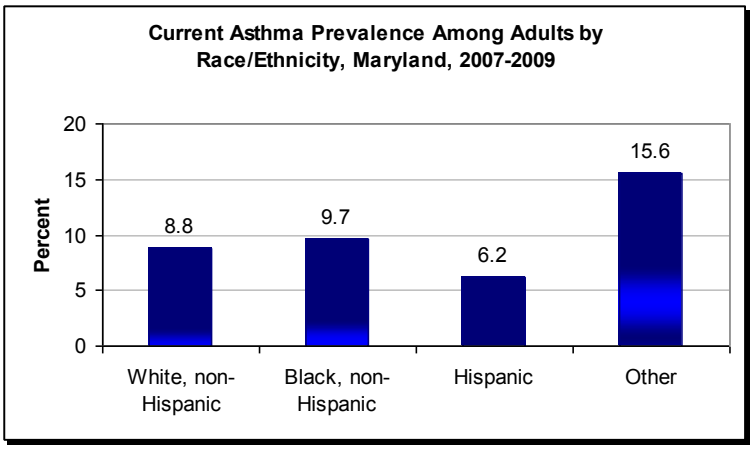
For some groups, increased rates of hospitalization, emergency department visit, and mortality may be a direct result of the increased prevalence of asthma in those groups. For example, if one group has twice the prevalence of asthma, that group might be expected to also have twice the rate of hospitalizations, emergency department visits, and deaths. In order to examine whether prevalence of asthma among Blacks could explain the higher morbidity and mortality, the "disparity ratio" was examined. The disparity ratio is defined as the ratio of Blacks to Whites. Figure 13-1 through 13-4 provide the rate of hospitalization, ED visits, and mortality for Blacks and Whites. The disparity ratios for these measurements are presented in Figure 13-5.

DISPARITIES AND ASTHMA - Continued

As shown in Figure 1-5 on page 17, the current asthma prevalence was comparable between Black, non-Hispanic adults (9.7%) and White non-Hispanic adults (8.8%).

However, the current asthma prevalence was significantly higher for adults who self -reported their race/ethnicity as 'Other' (15.6%) compared to all other categories of race/ethnicity.

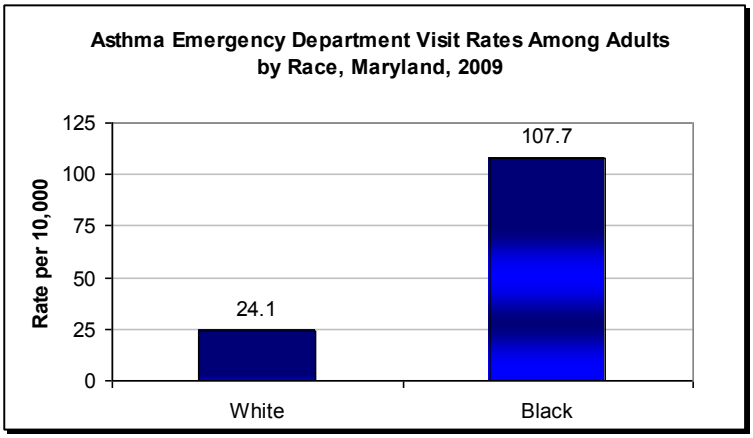
Figure 13-1



Maryland BRFSS, 2007-2009.

Figure 13-2

Black adults in Maryland had a higher rate of emergency department visits than White adults (107.7 vs. 24.1 per 10,000).

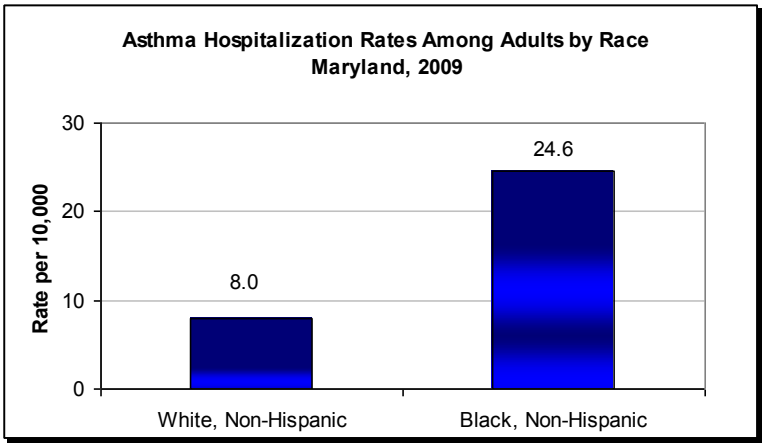


Maryland HSCRC, 2009.

[a] Rates are age-adjusted to the 2000 U.S. standard population.

Figure 13-3

Black, non-Hispanic adults in Maryland had a higher hospitalization rate than White, non-Hispanic adults (24.6 vs. 8.0 per 10,000).



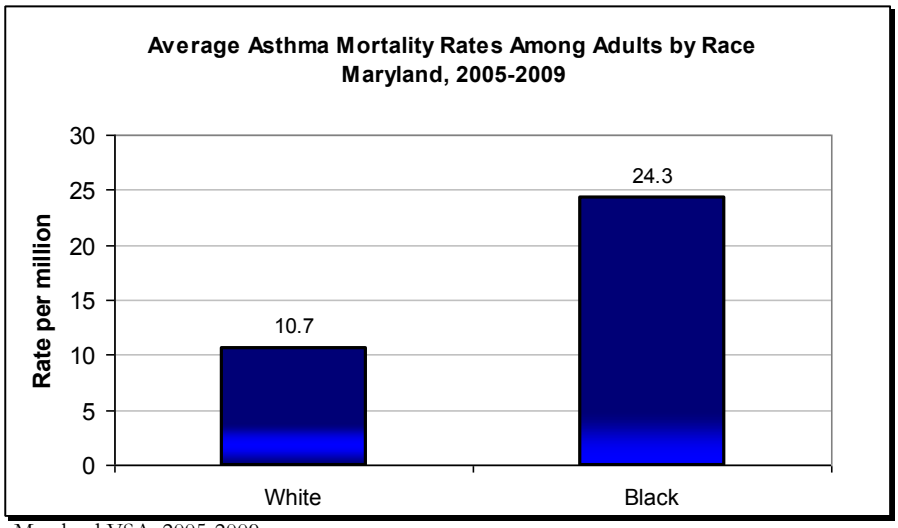
Maryland HSCRC, 2009.

[a] Rates are age-adjusted to the 2000 U.S. standard population.

DISPARITIES AND ASTHMA - Continued

From 2005-2009 (5-year average), Black adults in Maryland had a higher mortality rate than White adults (24.3 vs. 10.7 deaths per million).

Figure 13-4

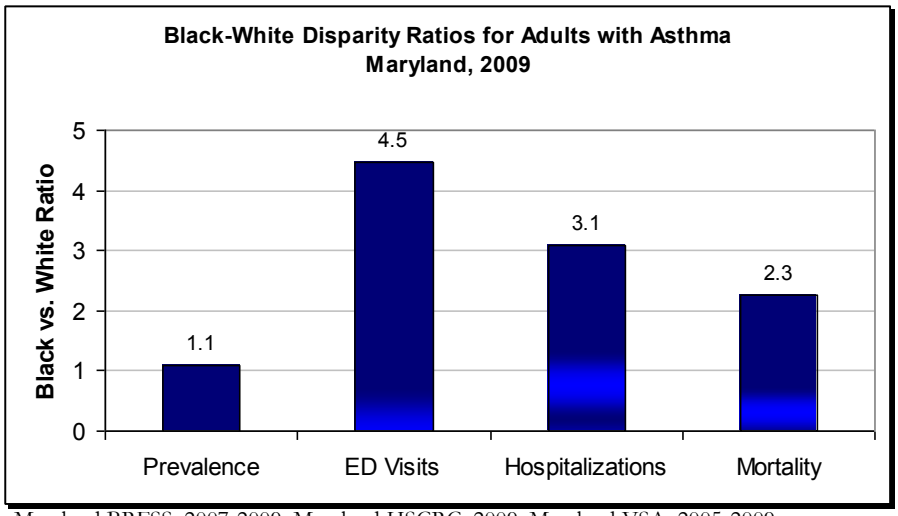


Maryland VSA, 2005-2009.
[a] Rates are age-adjusted to the 2000 U.S. standard population.

Although Black adults in Maryland had a 1 to 1 asthma prevalence ratio to White adults (9.7% vs. 8.8%), they had significantly higher ED, hospitalization, and mortality rates.

Black adults had a 4.5 times higher rate of ED visits (107.7 vs. 24.1 visits per 10,000), a 3.1 times higher hospitalization rate (24.6 vs. 8.0 hospitalizations per 10,000), and a 2.3 times higher mortality rate (24.3 vs. 10.7 deaths per million).

Figure 13-5



Maryland BRFSS, 2007-2009; Maryland HSCRC, 2009; Maryland VSA, 2005-2009.
[a] Rates are age-adjusted to the 2000 U.S. standard population.
[b] ED visits and hospitalizations are 2009 data, prevalence is aggregated 2007-2009 data, and mortality is aggregated 2005-2009 data.

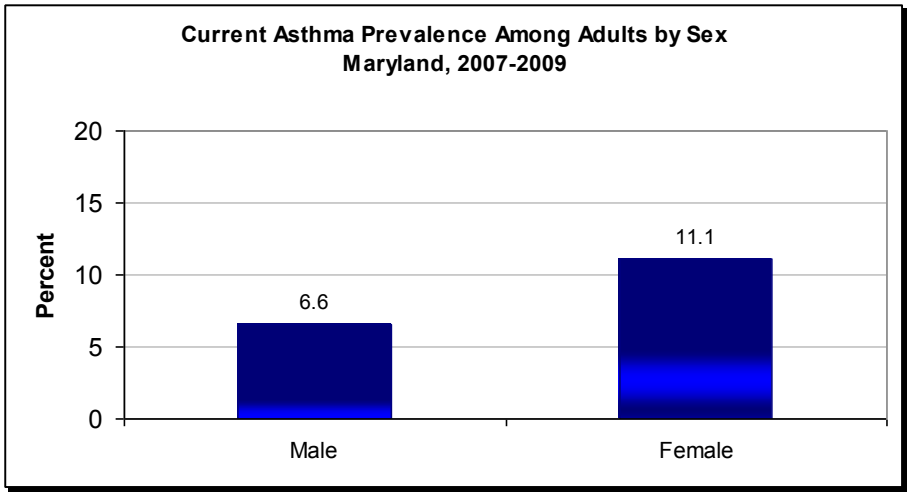
The increased asthma morbidity and mortality among Blacks cannot be explained by prevalence. Other factors, such as higher asthma severity, poorer asthma control, poorer indoor and/or outdoor environment, and/or more limited access to health care may explain these differences. It was not possible to conduct similar analyses for other minority groups due to the small sample sizes within those groups.

DISPARITIES AND ASTHMA - Continued

Adult women in Maryland consistently have higher prevalence, hospitalization rates, emergency department visit rates, and mortality rates when compared to men. The higher prevalence of asthma among women might be explained by physiological differences such as smaller airways, hormonal differences, or increased health care usage among women. Additionally, higher smoking rates among men may lead to more men being diagnosed with chronic obstructive pulmonary disease rather than asthma. Female-male disparity ratios for these measurements are presented in Figure 13-10.

As shown in Figure 1-4 on page 17, adult women in Maryland had a significantly higher asthma prevalence compared to adult men (11.1% vs. 6.6%).

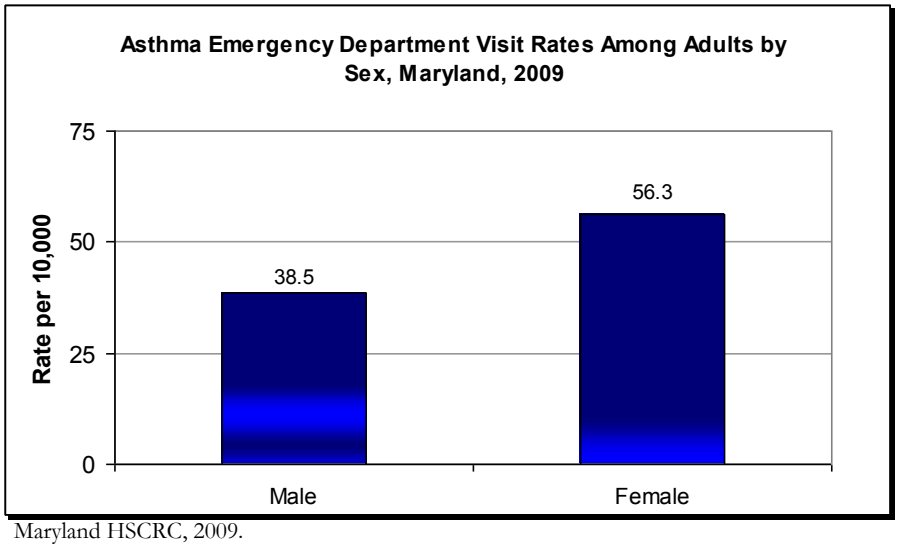
Figure 13-6



Maryland BRFSS, 2007-2009.
[a] Rates are age-adjusted to the 2000 U.S. standard population.

Adult women in Maryland had a higher rate of emergency department visit than adult men (56.3% vs. 38.5%).

Figure 13-7

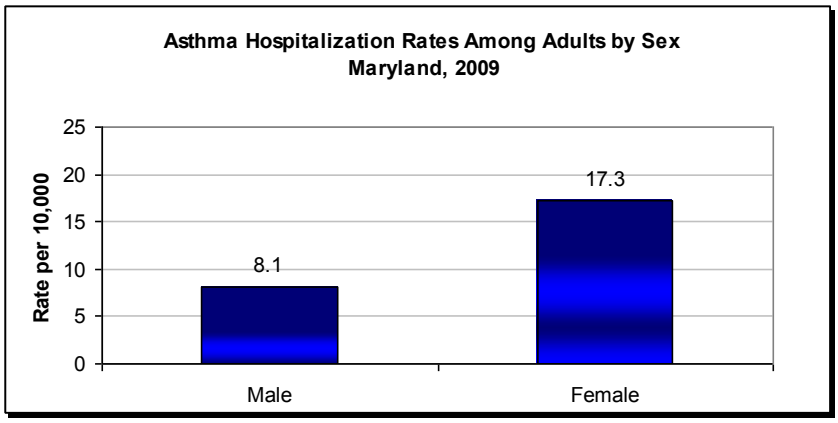


Maryland HSCRC, 2009.
[a] Rates are age-adjusted to the 2000 U.S. standard population.

DISPARITIES AND ASTHMA - Continued

Adult women in Maryland had a higher hospitalization rate than adult men (17.3 vs. 8.1 hospitalizations per 10,000).

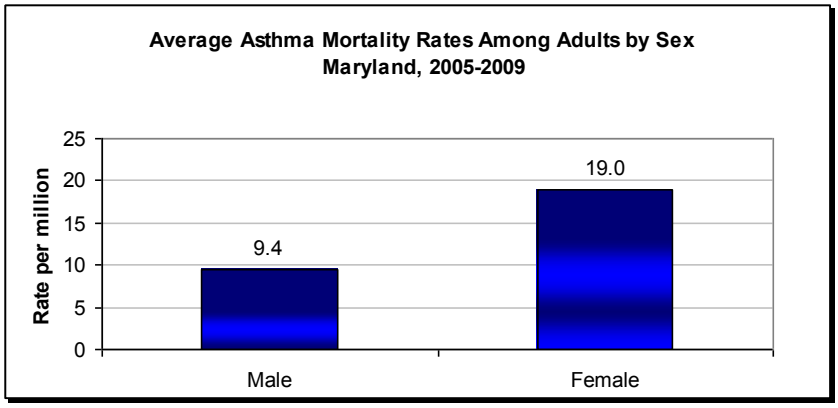
Figure 13-8



Maryland HSCRC, 2009.
[a]Rates are age-adjusted to the 2000 U.S. standard population.

Adult women in Maryland had a higher mortality rate than adult men (19.0 vs. 9.4 deaths per million).

Figure 13-9

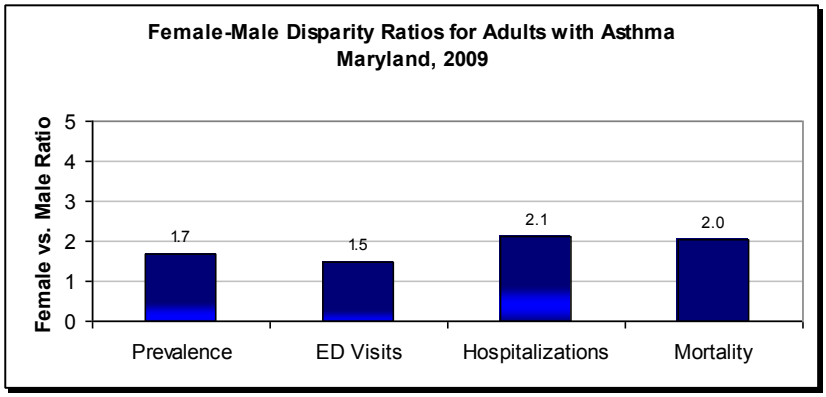


Maryland VSA, 2005-2009.
[a] Rates are age-adjusted to the 2000 U.S. standard population.

The prevalence of asthma among women in Maryland is 1.7 times higher than that among men (11.1% vs. 6.6%). Similarly, women have a 1.5 times higher ED visit rate (56.3 vs. 38.5 visits per 10,000). The difference in ED visits by sex may potentially be explained by the difference in prevalence.

However, women have a 2.1 times higher hospitalization rate (17.3 vs. 8.1 visits per 10,000) and a 2.0 times higher mortality rate (19.0 vs. 9.4 deaths per million). The difference in hospitalizations and mortality by sex cannot be fully explained by the prevalence.

Figure 13-10



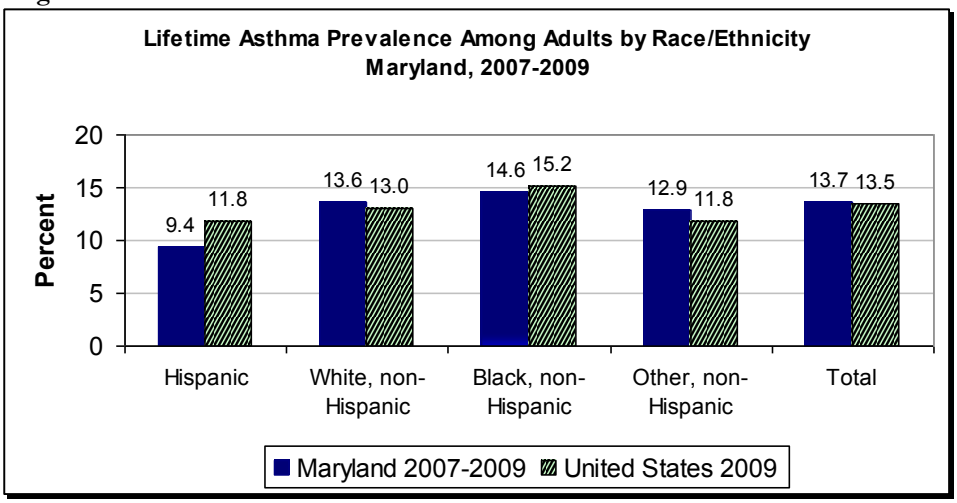
BRFSS, 2007-2009; HSCRC, 2009; VSA, 2005-2009; MD Health Care Commission, 2009; Pennsylvania Health Care Cost Containment Council, 2009; WV Health Care Authority, 2009.
[a] Rates are age-adjusted to the 2000 U.S. standard population.
[b] ED visits and hospitalizations are 2009, prevalence is 2007-2009, and mortality is 2005-2009.
[c] Hospitalization data includes MD residents hospitalized in PA, Washington D.C., and WV.

ASTHMA AMONG MARYLAND HISPANICS

Data regarding Maryland Hispanics with asthma is somewhat limited. Prevalence data is available from the BRFSS. The survey was only conducted in English until 2007, when the BRFSS began administering the survey in Spanish as well. Three-year averages are calculated since small sample sizes still persist each year. Hospitalization data is available from the HSCRC; however, HSCRC does not collect data on ethnicity for emergency department visits.

Between 2007 and 2009, the lifetime asthma prevalence was significantly lower for Hispanic adults in Maryland compared to White, non-Hispanics, Black, non-Hispanics, and total adult prevalence in Maryland.

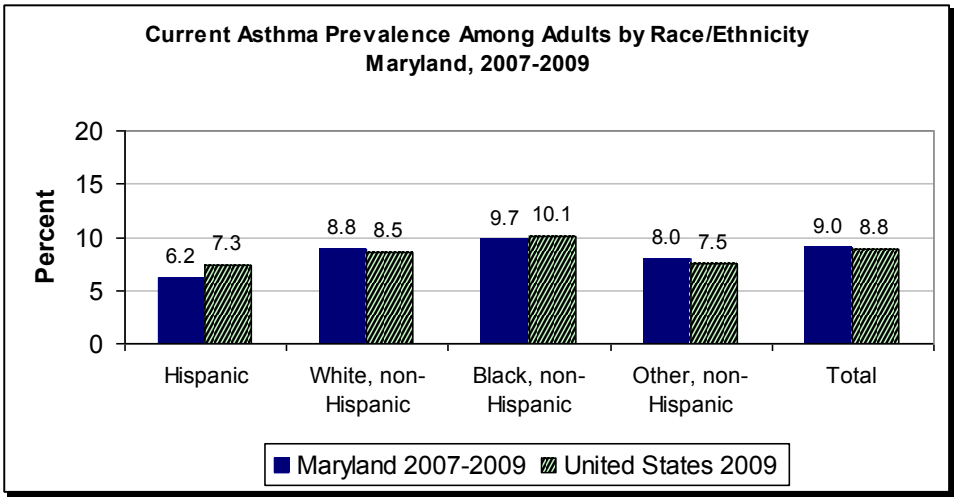
Figure 14-1



Maryland BRFSS, 2007-2009; CDC BRFSS, 2009.

The 2007-2009 current asthma prevalence among Maryland Hispanic adults was not significantly different to that of the Maryland adult population as a whole.

Figure 14-2



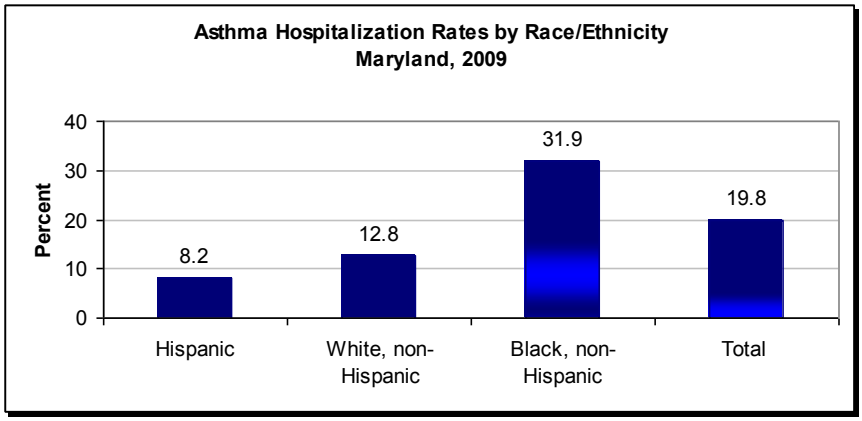
Maryland BRFSS, 2007-2009; CDC BRFSS, 2009.

ASTHMA AMONG MARYLAND HISPANICS — Continued

In 2009, Maryland Hispanics* had a lower hospitalization rate compared to other racial and ethnic groups.

During that same year, Hispanics had a lower hospitalization rate than the total hospitalization rate for Maryland.

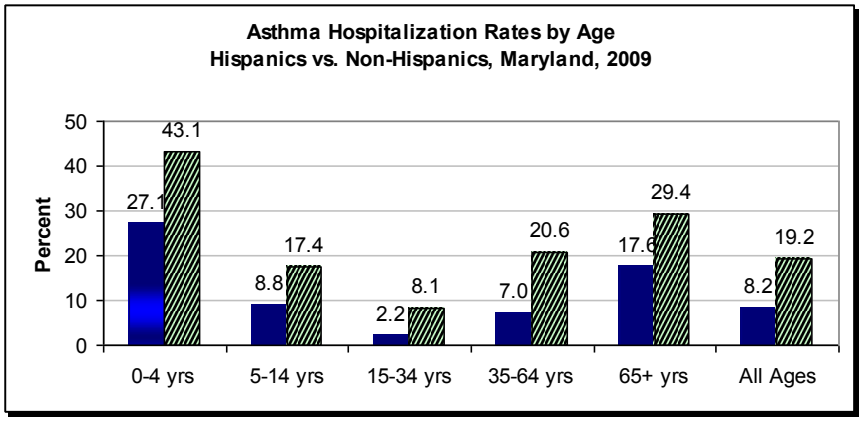
Figure 14-3



Maryland HSCRC, 2009.
[a] Rates are age-adjusted to the 2000 U.S. standard population.
[c] Out of state data for ethnicity only includes Pennsylvania.

In Maryland, the hospitalization rates by age group for Hispanics were lower than that of Non-Hispanics for 2009.

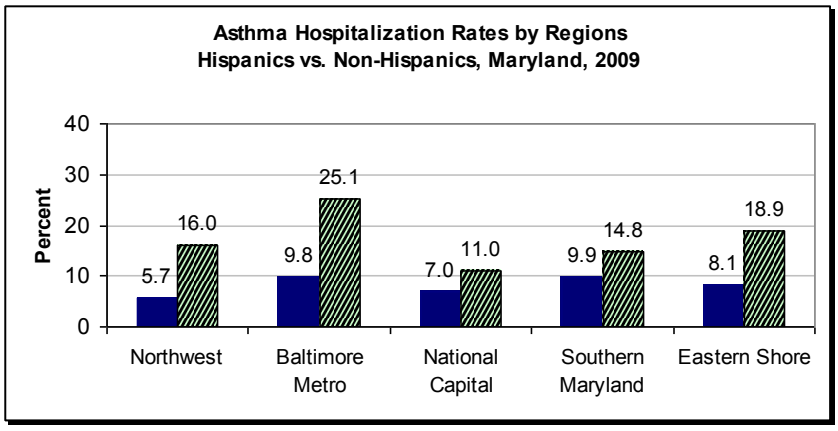
Figure 14-4



Maryland HSCRC, 2009.
[a] Rates are age-adjusted to the 2000 U.S. standard population.
[c] Out of state data for ethnicity only includes Pennsylvania.

Hospitalization rates for Hispanics in all Maryland regions are lower than the hospitalization rates for the non-Hispanic population in those areas (see Table 15-1 on page 55 for each region's jurisdiction classification).

Figure 14-5



Maryland HSCRC, 2009.
[a] Rates are age-adjusted to the 2000 U.S. standard population.
[c] Out of state data for ethnicity only includes Pennsylvania.

MARYLAND JURISDICTIONS AND ASTHMA

The burden of asthma prevalence, hospitalizations, emergency department visits, and deaths differs across the state. Baltimore City residents consistently have among the highest prevalence, rates of emergency department visit, hospitalization, and death. While all Baltimore City rates are above the state average, other counties have high rates in one category, but lower rates in others. This is because multiple factors such as differences in population risk, access to primary care, access to emergency care, and quality of care may affect emergency department visit, hospitalization, and death rates.

The BRFSS is used to generate jurisdiction-level prevalence estimates. Sample sizes for each jurisdiction are relatively small per year, but a greater stability of the estimates is obtained when years are combined. Based on the small sample sizes of asthma data for children by jurisdiction, the BRFSS data in this section is for adults only. As with previous Maryland asthma surveillance reports, three years of data (2007-2009) have been combined in order to provide better estimates of prevalence. Because BRFSS prevalence data are estimates based on a sampling of the population, 95% confidence intervals have been provided to account for possible sampling fluctuations.

For mortality rates, five years of jurisdiction-specific data have been combined, as the number of asthma deaths per year in each jurisdiction is small. The 2005-2009 mortality data is presented for all Maryland residents (adults and children) in Figure 12.5 on page 50. Mortality rates that contain five or less events (deaths) in the numerator are displayed as zero to prevent any possibility individual identification. Even when several years of data are combined, there may be large changes in rates from last year's report for some small counties. Data may still be somewhat unstable because of the small number of deaths and the low number of BRFSS respondents in these smaller counties.

The numbers of hospitalizations and emergency department visits are much larger than those for prevalence and mortality. Therefore, data are presented for 2009 only. Adults and children are included in the hospitalization and ED visit data. For this section on jurisdictions, asthma hospitalization data includes numbers of Maryland residents hospitalized in Washington D.C. and West Virginia. Data was not collected on emergency department visits of Maryland residents in neighboring states. Therefore, emergency department visit rates may be underestimated, particularly for those jurisdictions that border other states.

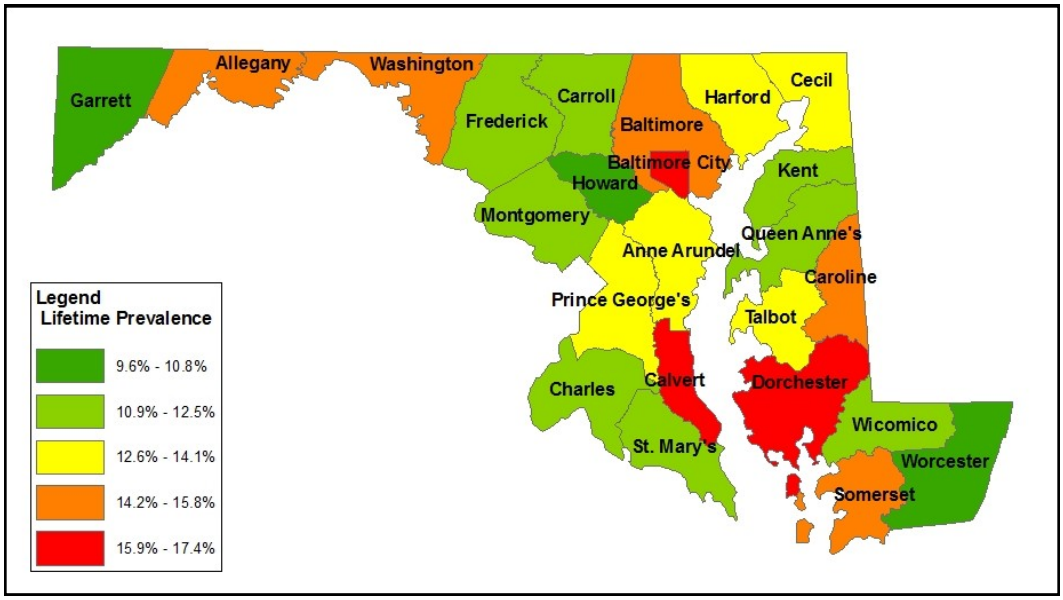
For all data in this section, percentages are weighted to the 2009 Maryland population and rates are age-adjusted to the 2000 standard U.S. population.

MARYLAND JURISDICTIONS AND ASTHMA - Continued

The red and orange jurisdictions were all significantly higher than Maryland's state asthma lifetime prevalence of 13.7%.

From 2007-2009, adults in Dorchester (17.4%), Calvert (17.1%), and Baltimore City (16.6%) had the highest asthma lifetime prevalence in Maryland.

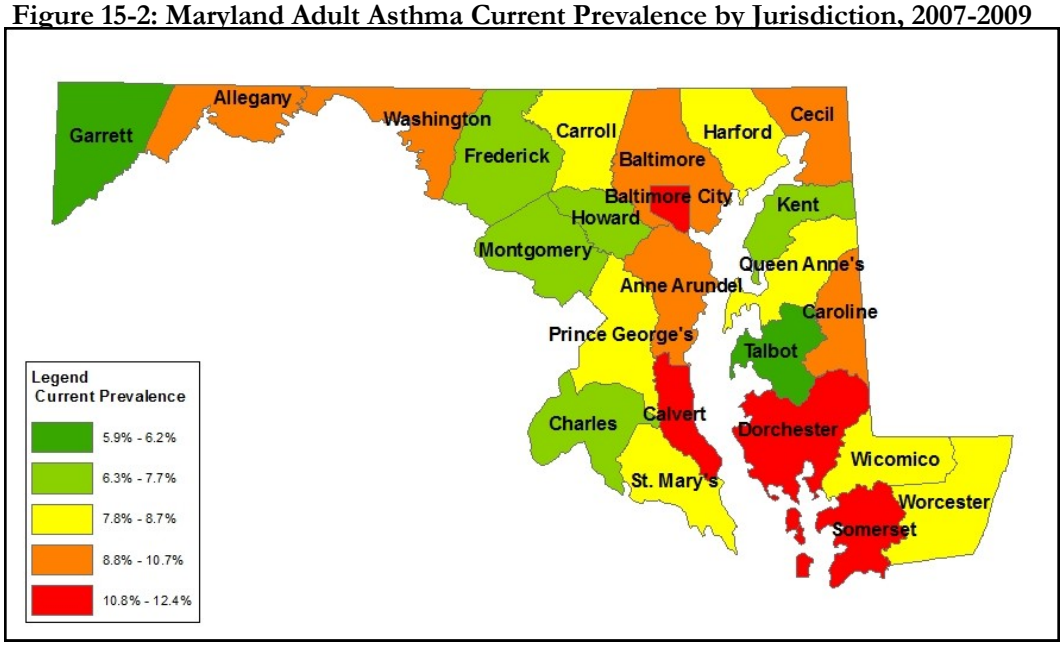
Figure 15-1: Maryland Adult Asthma Lifetime Prevalence by Jurisdiction, 2007-2009



Maryland BRFSS, 2007-2009.

Figure 15-2: Maryland Adult Asthma Current Prevalence by Jurisdiction, 2007-2009

From 2007-2009, adults in Baltimore City (12.4%), Dorchester (12.1%), Somerset (12.1%), and Calvert (11.6%) had the highest prevalence of current asthma in Maryland.

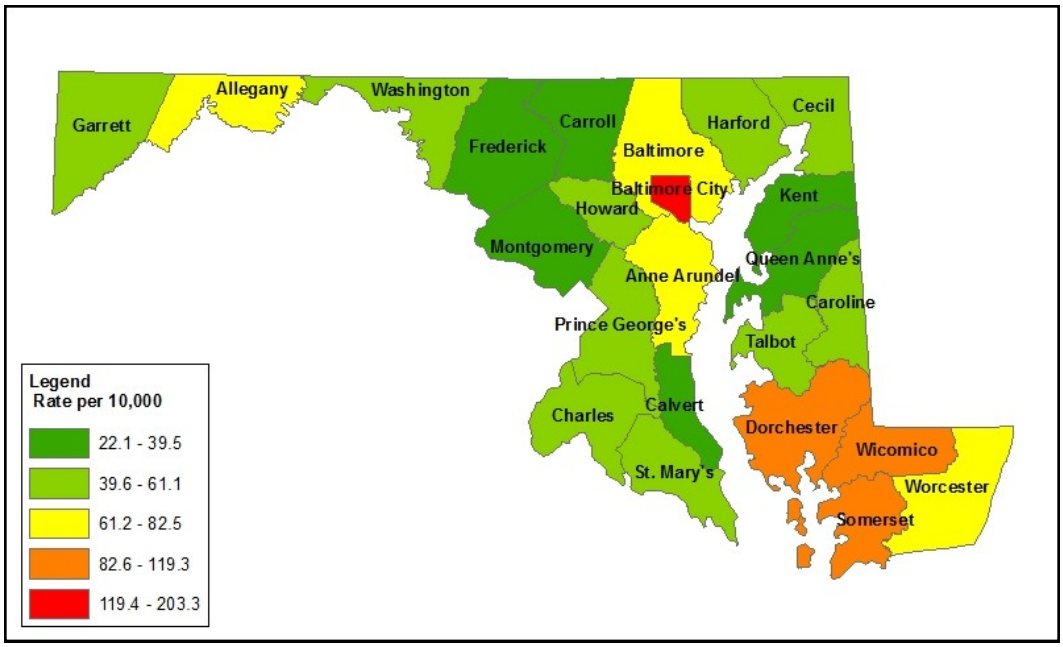


Maryland BRFSS, 2007-2009.

MARYLAND JURISDICTIONS AND ASTHMA - Continued

Figure 15-3: Maryland Asthma ED Visit Rates by Jurisdiction, 2009

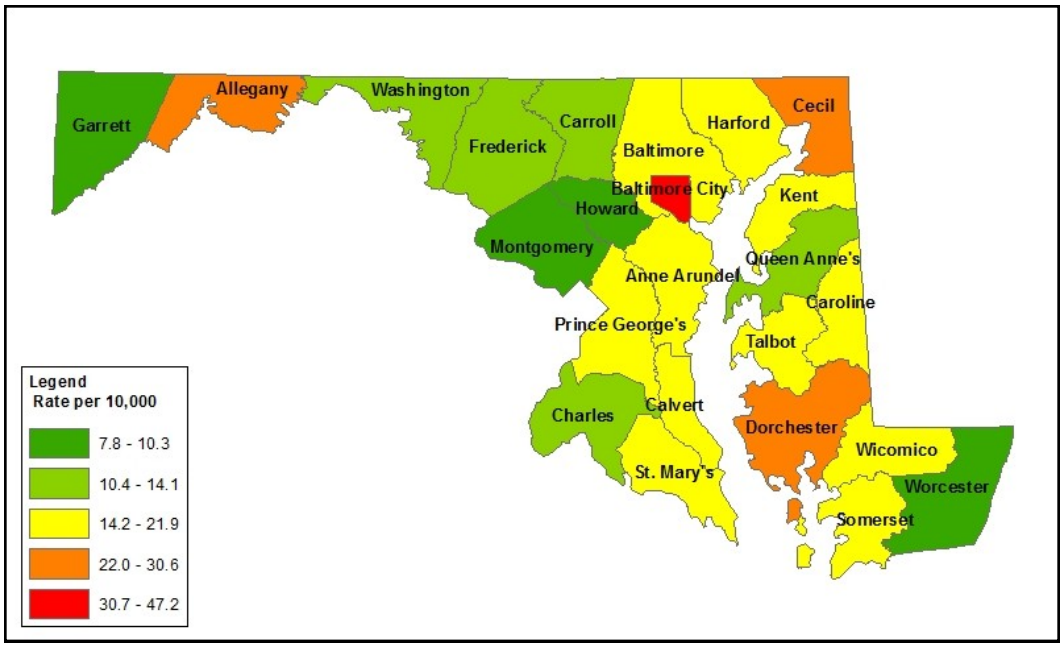
Baltimore City, Wicomico, Dorchester, and Somerset all had significantly higher rates of asthma ED visits compared to Maryland's state asthma ED visit rate in 2009 (203.3, 119.3, 101.0, and 93.2 per 10,000 vs. 72.3 per 10,000).



Maryland HSCRC, 2009.
[a] Rates are age-adjusted to the 2000 U.S. standard population.

Figure 15-4: Maryland Asthma Hospitalization Rates by Jurisdiction, 2009

Baltimore City, Allegany, Cecil, and Dorchester all had significantly higher asthma hospitalization rates compared to Maryland's state asthma hospitalization rate in 2009 (47.2, 30.6, 26.5, and 24.4 per 10,000 vs. 19.8 per 10,000).



Maryland HSCRC, 2009; Pennsylvania Health Care Cost Containment Council, 2009; West Virginia Health Care Authority, 2009.
[a] Rates are age-adjusted to the 2000 U.S. standard population.
[b] Includes Maryland residents hospitalized in Pennsylvania, Washington D.C., and West Virginia.

MARYLAND JURISDICTIONS AND ASTHMA - Continued

Table 15-1: Average Lifetime and Current Asthma Prevalence in Adults, 2007-2009; Emergency Department Visit and Hospitalization Rates, 2009; Average Mortality Rates, 2005-2009; Data by Region and Jurisdiction. **Rate significantly different from state of Maryland rate ($p < 0.05$).

Jurisdiction	Average Lifetime Prevalence in Adults 2007-2009 Weighted Percent (95% CI)	Average Current Prevalence in Adults 2007-2009 Weighted Percent (95% CI)	ED Visit Rates (per 10,000) 2009	Hospitalization Rates (per 10,000) 2009	Average Mortality Rates (per 1 million) 2005-2009
NORTHWEST			43.8 **	16.1 **	12.6
Garrett	9.6 (6.9-12.3)	5.9 (3.7-8.1)	46.3 **	8.0 **	--
Allegany	15.4 (12.4-18.4)	10.7 (8.1-13.3)	74.1	30.6 **	--
Washington	15.6 (13.1-18.1)	10.3 (8.2-12.4)	52.3 **	13.0 **	21.6 **
Frederick	12.1 (10.2-14.0)	7.1 (5.6-8.6)	29.4 **	13.9 **	10.7
BALTIMORE METRO			98.6 **	24.7 **	13.2
Baltimore City	16.6 (14.4-18.8)	12.4 (10.4-14.4)	203.3 **	47.2 **	26.0 **
Baltimore County	15.3 (13.7-16.9)	10.2 (8.9-11.5)	82.5	21.9	12.4
Anne Arundel	14.1 (12.1-16.1)	9.5 (7.8-11.2)	66.6	19.5	8.8 **
Carroll	12.5 (9.3-15.7)	8.7 (6.0-11.5)	32.2 **	13.5 **	--
Howard	10.8 (8.5-13.1)	6.9 (5.0-8.8)	47.5 **	7.8 **	--
Harford	13.0 (10.2-15.8)	8.7 (6.4-11.0)	56.0 **	17.5	7.3 **
NATIONAL CAPITOL			46.2 **	14.0 **	10.6
Montgomery	12.4 (11.0-13.8)	7.6 (6.5-8.7)	33.0 **	10.3 **	8.2 **
Prince George's	13.6 (11.8-15.4)	8.0 (6.6-9.5)	61.1	18.6	13.2
SOUTHERN MD			52.4 **	17.1	10.6
Calvert	17.1 (13.7-20.5)	11.6 (8.7-14.5)	39.5 **	17.5	14.5 **
Charles	12.3 (9.7-14.9)	7.7 (5.6-9.8)	55.8 **	14.1 **	--
Saint Mary's	12.2 (9.5-14.9)	8.0 (5.8-10.3)	58.9	21.0	--
EASTERN SHORE			71.2	19.2	4.2 **
Cecil	13.7 (10.7-16.7)	9.8 (7.2-12.4)	52.3 **	26.9 **	--
Kent	11.5 (7.2-13.8)	7.2 (4.4-10.0)	22.6 **	19.3	--
Queen Anne's	12.4 (9.7-15.2)	8.2 (5.9-10.5)	22.1 **	11.5 **	--
Caroline	15.8 (12.0-19.6)	10.6 (7.4-13.8)	52.5 **	21.9	--
Talbot	13.1 (10.2-16.0)	6.2 (4.1-8.3)	60.9	21.9	--
Dorchester	17.4 (13.7-21.1)	12.1 (8.9-15.3)	101.0 **	24.4 **	--
Wicomico	11.4 (8.7-14.1)	7.9 (5.6-10.2)	119.3 **	17.2	--
Somerset	15.6 (11.0-20.3)	12.1 (7.9-16.3)	93.2 **	21.0	--
Worcester	10.8 (7.6-14.0)	8.1 (5.3-11.0)	79.5	9.2 **	--
TOTAL	13.7 (13.2-14.2)	9.0 (8.5-9.4)	72.3	19.8	11.8

Maryland BRFSS, 2007-2009; Maryland HSCRC, 2009; Maryland VSA, 2005-2009; Pennsylvania Health Care Cost Containment Council, 2009; West Virginia Health Care Authority, 2009.

[a] Hospitalization and ED visit rates are age-adjusted to the 2000 U.S. standard population.

[b] Hospitalization data includes Maryland residents hospitalized in Pennsylvania, Washington D.C., and West Virginia.

MARYLAND JURISDICTIONS AND ASTHMA - Continued

Table 15-2: Total Number of Adults with Lifetime and Current Asthma Prevalence, 2007-2009; Total Number of Emergency Department Visits and Hospitalizations, 2009; Total Number of Deaths per Year, 2005-2009; Data by Region and Jurisdiction.

Jurisdiction	Total Number of Adults with Lifetime Asthma 2007-2009	Total Number of Adults with Current Asthma 2007-2009	Total Number of ED Visits 2009	Total Number of Hospitalizations 2009	Total Number of Deaths per Year 2005-2009
NORTHWEST			2,980	788	6.2
Garrett	2,923	1,793	119	25	--
Allegany	10,119	6,937	477	259	--
Washington	17,662	11,587	725	190	3.4
Frederick	19,849	11,479	659	314	2.0
BALTIMORE METRO			24,953	6,610	35.0
Baltimore City	64,002	47,530	12,485	2,946	16.4
Baltimore County	101,646	67,414	5,988	1,743	10.6
Anne Arundel	53,611	36,197	3,376	1,038	4.6
Carroll	15,915	10,951	513	219	--
Howard	26,829	17,134	1,304	219	--
Harford	24,669	16,449	1,287	429	1.8
NATIONAL CAPITOL			8,233	2,578	18.0
Montgomery	92,578	56,023	3,142	1,031	7.6
Prince George's	79,347	46,442	5,091	1,547	10.4
SOUTHERN MD			1,733	560	3.2
Calvert	11,847	7,956	336	151	1.2
Charles	12,574	7,871	782	194	--
Saint Mary's	10,174	6,577	615	215	--
EASTERN SHORE			2,867	886	4.2
Cecil	9,585	6,813	502	278	--
Kent	2,106	1,431	38	43	--
Queen Anne's	4,266	2,796	94	58	--
Caroline	4,192	2,823	171	77	--
Talbot	3,508	1,658	173	86	--
Dorchester	3,897	2,689	269	84	--
Wicomico	8,371	5,793	1,073	160	--
Somerset	2,333	1,805	217	51	--
Worcester	4,460	3,339	330	49	--
TOTAL	586,466	381,489	39,834	11,474	66.6

Maryland BRFSS, 2007-2009; Maryland HSCRC, 2009; Maryland VSA, 2005-2009; Pennsylvania Health Care Cost Containment Council, 2009; West Virginia Health Care Authority, 2009.
[a] Hospitalization data includes Maryland residents hospitalized in Pennsylvania, Washington D.C., and West Virginia.

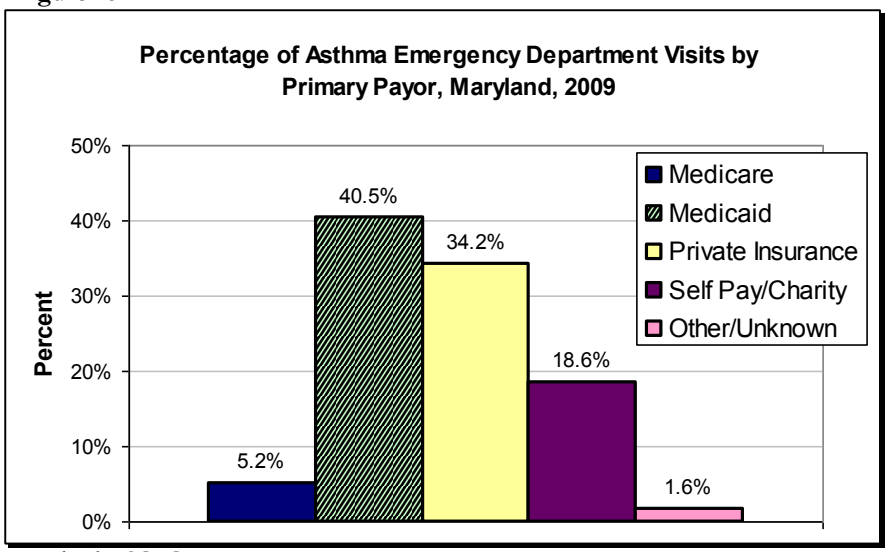
COSTS OF ASTHMA

The financial burden of asthma in Maryland is substantial. While data is not available for all costs related to asthma care, the HSCRC does provide information about charges for asthma hospitalization and emergency department visits. The data below use charges as an estimate of the actual costs of asthma hospitalizations and emergency department visits. Total charges for asthma hospitalizations in 2009 were approximately $73,353,805. Emergency department visits accounted for an additional $25,984,114. The average charge for an inpatient stay for asthma in 2009 was $6,843. The average charge for an emergency department visit for asthma was $652.

In 2009, Medicaid covered the largest percentage of ED visits.

Combining together Medicare and Medicaid, public insurance accounted for 45.7% of asthma ED visits.

Figure 16-1

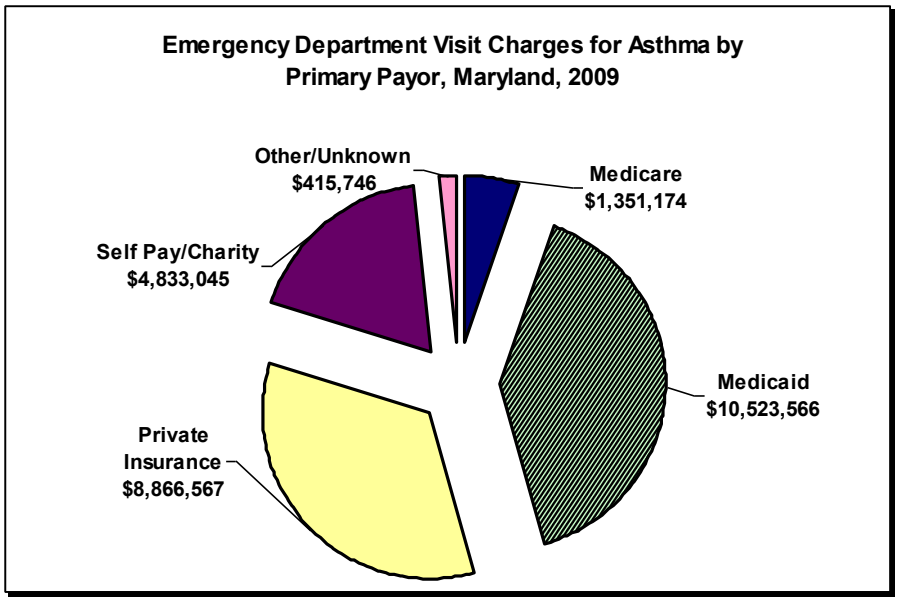


Maryland HSCRC, 2009.

In 2009, Medicaid totaled over $10m for asthma ED visit costs.

Private insurance totaled almost $9m for asthma ED visit costs.

Figure 16-2



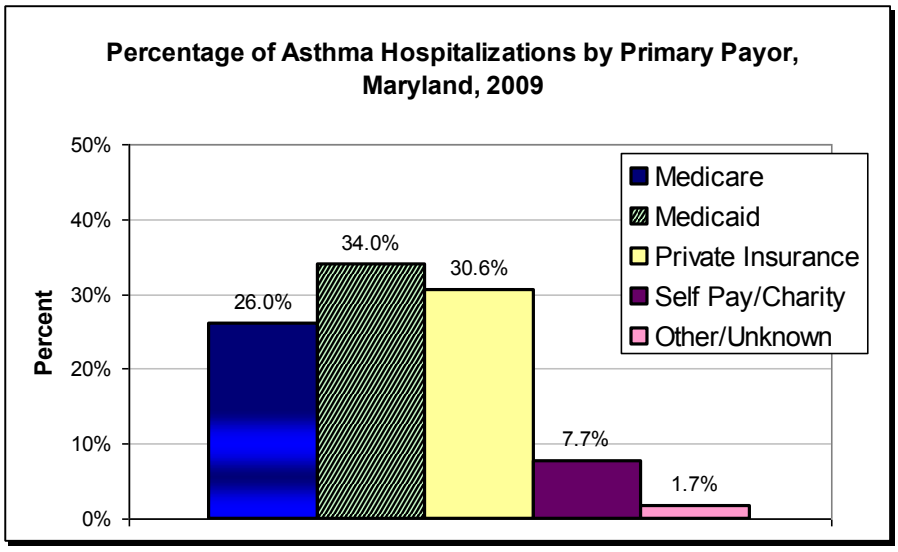
Maryland HSCRC, 2009.

COSTS OF ASTHMA - Continued

In 2009, Medicaid was largest source of payment for 34% of the asthma hospitalizations.

Public insurance (Medicaid and Medicare) was the payment source for 60% of asthma hospitalizations in 2009.

Figure 16-3

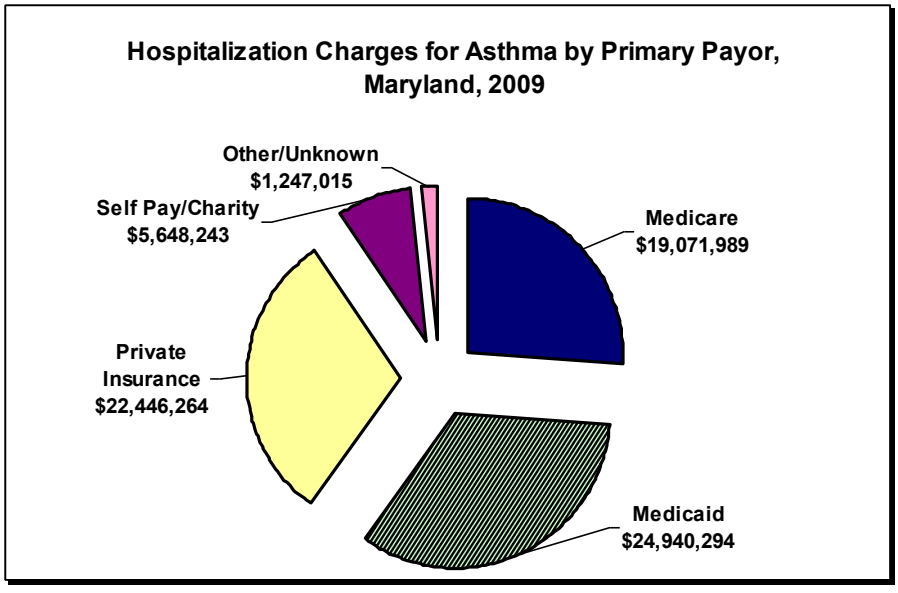


Maryland HSCRC, 2009.
[a] Out of state hospitalizations of Maryland residents are not included.

In 2009, Medicaid totaled almost $25m for hospitalizations due to asthma.

Private insurance totaled over $22m for asthma hospitalizations in 2009.

Figure 16-4



Maryland HSCRC, 2009.
[a] Out of state hospitalizations of Maryland residents are not included.

CONCLUSIONS

This report confirms that asthma continues to be a major public health problem in Maryland. An estimated 13.9% of Maryland adults and 17.1% of Maryland children have been diagnosed with asthma. An estimated 9.1% of adults and 11.9% of children in Maryland currently have asthma. Over the past decade, these prevalence rates have been steadily increasing.

The 2007-2009 Maryland Asthma Call-back Survey assessed asthma control and management, asthma self-management education, and environmental triggers in the homes of children and adults with asthma. These data indicate that there is room to improve asthma control among Marylanders with asthma, as exemplified by the 18.5% of adults and 34.4% of children missing up to one week of work/school annually due to their asthma. In addition, the 2007-2009 Maryland Asthma Call-back Survey also provides a first look at the prevalence of work-related asthma and comorbid chronic conditions among Maryland adults who have asthma. More than one-third of all adults with asthma report that their asthma was caused or made worse by a current job. Approximately one-third of adults with asthma report a diagnosis of depression. Over one-third of adults with asthma reported a diagnosis of some form of COPD (chronic bronchitis, COPD, and/or emphysema).

Over the past decade, hospitalization rates for asthma have steadily increased in Maryland. Mortality rates for asthma have slowly declined over the past two decades. Asthma prevalence, hospitalization rates, emergency department visit rates, and mortality rates still remain well above the Healthy People 2010 goals (with the exception Maryland adults ages 65 years and older who met the Healthy People 2010 goal for emergency department visit rates).

As indicated in the section on disparities, asthma and its complications continue to disproportionately affect very young children, older adults, Blacks, adult women, low-income individuals, individuals with lower levels of education, and individuals in certain jurisdictions, particularly Baltimore City. The monetary cost of asthma hospitalizations and emergency department visits is substantial and is largely borne by public insurers, Medicare and Medicaid. Additional tracking of asthma prevalence, morbidity, and mortality is vital to improve understanding of individual and environmental contributing factors. Information gained from analyzing the epidemiology of asthma is critical to planning, implementing, and evaluating activities aimed at reducing the personal and public health burden of asthma for Maryland residents. Since interventions to reduce the burden of asthma take time to have an effect on data indicators, the effectiveness of asthma control programs and reductions in the burden of asthma will continue to be tracked by ongoing surveillance activities.

FUTURE DIRECTIONS

The Maryland Asthma Control Program (MACP) will continue to produce ongoing asthma surveillance reports and data briefs. Findings from new datasets and/or enhanced statistical analysis will be included in future reports. Data is collected annually to assess the burden of asthma among the privately insured population as well as Marylanders in school, child care, and workplace settings. MACP will continue its ongoing evaluation of the surveillance system to ensure its effectiveness.

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GLOSSARY OF TERMS

Age-adjustment – A statistical process applied to rates of death, hospitalizations, disease, or other health outcomes which allows populations with different age distributions to be compared (see Appendix B).

Asthma – A controllable chronic lung disease characterized by inflammation of the airways that leads to reversible airway constriction and excess mucus secretion. This narrowing of the airway results in reduced airflow that may cause symptoms of wheezing, coughing, tightness of the chest, and difficulty breathing. Asthma affects both adults and children and is the most common chronic disease of childhood.[1]

Average Mortality Rate –

$$\frac{\text{The average number of people dying from a disease within a specified time period}}{\text{The total number of people in the population during that time period}}$$

Confidence Interval (95%) – The range in which the true magnitude of effect (e.g., prevalence) lies with a 95% degree of assurance.

When two groups have 95% confidence intervals that overlap, indicating that the "true" value could potentially be the same in both groups, the groups are conservatively assumed to have statistically similar rates. If the confidence intervals do not overlap, we assume that the groups being compared are significantly different from one another. A narrow confidence interval implies high precision; while a wide interval implies poor precision. Determination of statistical significance for data in this report is based on non-overlapping 95% confidence intervals. Although this is not strictly speaking a statistical test, it is a commonly accepted way to compare estimates.

Disparity Ratio – A measure comparing a specific group to another specific group which highlights the differences (e.g., comparing Blacks to Whites or females to males).

Contributing Cause – The term used to describe all other listed causes of death, that is, significant conditions that may have contributed to the death.

Encounter – A visit between a patient and a health care provider.

Healthy People 2010 – A statement of national health objectives designed to identify the most significant preventable threats to health and establishes national goals to reduce these threats. The main goals are to increase quality and years of healthy life and to eliminate health disparities. http://www.healthypeople.gov

ICD-9 – International Classification of Diseases, 9th revision; a numbered system of classifying diseases and health conditions that is published by the World Health Organization (WHO) and used as an international standard for epidemiological and health management purposes.

ICD-10 – International Classification of Diseases, 10th revision; published in 1990 as an updated version of ICD-9 (See also "ICD-9"). This term is used to classify the causes of death due to diseases or health conditions.

GLOSSARY OF TERMS - Continued

Morbidity – General term used to refer to the range of negative outcomes due to the presence and/or severity of a disease or health in question.

Mortality – General term used to refer to death due to the disease or condition.

Prevalence – The proportion of people in a population that have a disease or condition at a given point in time.

Current Prevalence – The proportion of people in a population that currently has a disease or condition at a given point of time.

Lifetime Prevalence - The proportion of people in a population who have ever had the disease or condition at a given point of time.

Principal Diagnosis – The primarily disease or condition for which the patient is admitted for care.

Rate – A measure of some event, disease, or condition in relation to a unit of population, within some specified period of time.

$$\frac{\text{Number of events in a given time period}}{\text{Number of people at risk of experiencing the event in that same time period}}$$

Rates are typically presented and interpreted per unit of population (i.e., 10,000, 100,000, or 1,000,000 population). For example, a rate of 20 per 10,000 means that for every 10,000 people in the population, 20 experienced the event. Percentages are rates presented per 100 population.

Risk Factor – A personal habit or characteristic, clinical condition, or environmental exposure that is associated with an increased probability and/or severity of disease.

Statistical Significance – The term used to describe rates that have been tested and found to be statistically different (i.e., not occurring through chance alone).

Surveillance – The ongoing systematic collection, analysis, and interpretation of health-related data essential to the planning, implementation, and evaluation of public health practice, closely integrated with the timely dissemination of these data to those responsible for prevention and control (Centers for Disease Control and Prevention).

Underlying Cause – The term used to describe the first listed cause of death, that is, the disease or injury that initiated the chain of events leading directly to death.

Weighted Percent – The percentage that has been adjusted to account for the survey design, respondents' probability of selection, demographic differences, and survey non-response when compared to the general population. The weighted percent allows results from a sample to be generalized to the larger population it was drawn from.

Appendix A: 95% Confidence Intervals for BRFSS Data

The information in each title refers to the corresponding figure in the text.

Figure 1-1: Trend in Lifetime Asthma Prevalence Among Adults, Maryland vs. United States, 2000-2009

Year	Maryland Prevalence (95% CI)	United States Prevalence (95% CI)
2000	10.6% (9.5% -11.7%)	10.4% (10.2% - 10.7%)
2001	11.1% (10.0% - 12.2%)	11.0% (10.8% - 11.2%)
2002	12.7% (11.5% - 13.9%)	11.8% (11.6% - 12.0%)
2003	12.3% (11.1% - 13.5%)	11.9% (11.6% - 12.1%)
2004	13.9% (12.7% - 15.2%)	13.3% (13.1% - 13.6%)
2005	13.1% (12.2% - 14.0%)	12.5% (12.2% - 12.7%)
2006	13.4% (12.5% - 14.3%)	12.8% (12.5% - 13.0%)
2007	12.9% (12.0% - 13.8%)	12.9% (12.7% - 13.2%)
2008	14.3% (13.4% - 15.2%)	13.3% (13.1% - 13.5%)
2009	13.9% (13.0% - 14.8%)	13.4% (13.1% - 13.6%)

Figure 1-2: Trend in Current Asthma Prevalence Among Adults, Maryland vs. United States, 2000-2009

Year	Maryland Prevalence (95% CI)	United States Prevalence (95% CI)
2000	7.3% (6.4% - 8.2%)	7.2% (7.0% - 7.4%)
2001	7.1% (6.2% - 8.0%)	7.2% (7.0% - 7.4%)
2002	8.2% (7.2% - 9.2%)	7.5% (7.3% - 7.7%)
2003	7.8% (6.8% - 8.8%)	7.7% (7.5% - 7.9%)
2004	7.8% (6.8% - 8.8%)	8.1% (7.9% - 8.3%)
2005	8.3% (7.6% - 9.0%)	7.9% (7.7% - 8.0%)
2006	8.9% (8.2% - 9.6%)	8.2% (8.0% - 8.4%)
2007	8.3% (7.6% - 9.0%)	8.2% (8.1% - 8.4%)
2008	9.4% (8.7% - 10.1%)	8.5% (8.3% - 8.7%)
2009	9.1% (8.4% - 9.9%)	8.4% (8.3% - 8.6%)

Appendix A: 95% Confidence Intervals for BRFSS Data - Continued

Figure 1-3: Age at Initial Asthma Diagnosis for Adults, Maryland, 2007-2009 (Raw sample size = 1,275)

Age	Prevalence (95% CI)
1-10 years	34.9% (28.9% - 37.7%)
11-17 years	16.7% (12.2% - 19.6%)
18-34 years	22.2% (17.9% - 24.3%)
35-44 years	10.6% (8.1% - 12.1%)
45-54 years	8.1% (6.1% - 9.3%)
55-64 years	4.6% (3.3% - 5.5%)
65+ years	3.0% (2.0% - 3.6%)

Figure 1-4: Current Asthma Prevalence Among Adults by Sex, Maryland, 2007-2009 (Raw sample size = 2,403)

Sex	Prevalence (95% CI)
Male	6.6% (6.0% - 7.2%)
Female	11.1% (10.5% - 11.7%)

Figure 1-5: Current Asthma Prevalence Among Adults by Race/Ethnicity, Maryland, 2007-2009 (Raw sample size = 2,326)

Race/Ethnicity	Prevalence (95% CI)
White, Non-Hispanic	8.8% (8.3% - 9.3%)
Black, Non-Hispanic	9.7% (8.6% - 10.8%)
Hispanic	6.2% (4.1% - 8.3%)
Other, Non-Hispanic	15.6% (12.1 - 19.2%)

Appendix A: 95% Confidence Intervals for BRFSS Data - Continued

Figure 1-6: Current Asthma Prevalence Among Adults by Age, Maryland, 2007-2009 (Raw sample size = 2,377)

Age	Prevalence (95% CI)
18-24 years	12.1% (9.4% - 14.8%)
25-34 years	9.1% (7.7% - 10.5%)
35-44 years	8.6% (7.6% - 9.6%)
45-54 years	8.7% (7.8% - 9.6%)
55-64 years	8.5% (7.6% - 9.4%)
65-74 years	9.2% (8.1% - 10.3%)
75+ years	6.8% (5.8% - 7.8%)

Figure 1-7: Current Asthma Prevalence Among Adults by Education, Maryland, 2007-2009 (Raw sample size = 2,397)

Education Level	Prevalence (95% CI)
Less than High School	11.5% (9.7% - 13.3%)
High School Grad/GED	8.8% (8.0% - 9.6%)
Some College/Tech School	11.0% (10.1% - 12.0%)
College Graduate	7.5% (6.9% - 8.1%)

Figure 1-8: Current Asthma Prevalence Among Adults by Household Income, Maryland, 2007-2009 (Raw sample size = 2,086)

Income	Prevalence (95% CI)
<$15,000	13.9% (11.8% - 16.0%)
$15,000-$24,999	13.4% (11.8% - 15.0%)
$25,000-$49,999	9.4% (8.4% - 10.4%)
$50,000-$74,999	7.6% (6.6% - 8.6%)
>=$75,000	7.8% (7.2% - 8.5%)

Appendix A: 95% Confidence Intervals for BRFSS Data - Continued

Figure 1-9: Trend in Lifetime Asthma Prevalence Among Children Ages 0-17, Maryland, 2001-2009

Year	Maryland Prevalence (95% CI)	United States Prevalence (95% CI)
2001	10.6% (NA)	--
2002	11.0% (NA)	11.6% (11.1% - 12.1%)
2003	11.1% (NA)	11.6% (11.2% - 12.0%)
2004	10.2% (NA)	11.8% (11.4% - 12.2%)
2005	13.5% (11.3% - 15.7%)	12.9% (12.4% - 13.4%)
2006	13.1% (11.5% - 14.7%)	12.8% (12.3% - 13.4%)
2007	13.6% (11.9% - 15.3%)	15.5% (13.0% - 14.1%)
2008	14.3% (12.7% - 15.9%)	13.3% (12.8% - 13.7%)
2009	17.1% (15.3% - 18.9%)	--

Figure 1-10: Trend in Current Asthma Prevalence Among Children Ages 0-17, Maryland, 2003-2009

Year	Maryland Prevalence (95% CI)	United States Prevalence (95% CI)
2003	8.5% (NA)	8.1% (7.8% - 8.4%)
2004	7.6% (NA)	8.3% (7.9% - 8.6%)
2005	9.2% (7.3% - 11.1%)	9.0% (8.6% - 9.4%)
2006	9.1% (7.8% - 10.4%)	9.1% (8.5% - 9.5%)
2007	8.9% (7.5% - 10.3%)	8.9% (8.5% - 9.4%)
2008	9.5% (8.2% - 10.8%)	9.0% (8.6% - 9.4%)
2009	11.9% (10.4% - 13.5%)	--

Figure 1-11: Current Asthma Prevalence Among Children Ages 0-17 by Sex, Maryland, 2007-2009 (Raw sample size = 764)

Sex	Prevalence (95% CI)
Male	11.7% (10.5% - 12.9%)
Female	8.6% (7.5% - 9.7%)

Appendix A: 95% Confidence Intervals for BRFSS Data - Continued

Figure 1-12: Current Asthma Prevalence Among Children Ages 0-17 by Race/Ethnicity, Maryland, 2007-2009 (Raw sample size = 659)

Race/Ethnicity	Prevalence (95% CI)
White, Non-Hispanic	7.5% (6.6% - 8.4%)
Black, Non-Hispanic	14.9% (12.7% - 17.2%)

Figure 1-13: Current Asthma Prevalence Among Children Ages 0-17 by Age, Maryland, 2007-2009 (Raw sample size = 703)

Age	Maryland Prevalence (95% CI)
2-5 years	10.4% (8.5% - 12.4%)
6-11 years	11.5% (9.9% - 13.1%)
12-17 years	11.1% (9.7% - 12.5%)

Figure 1-14: Asthma Lifetime Prevalence for Middle School Students by Grade, Maryland, 2010 (Raw sample size = 29,199)

Grade	Male (95% CI)	Female (95% CI)	Total (95% CI)
6th	21.0% (19.5% - 22.5%)	17.5% (16.2% - 19.0%)	19.2% (18.2% - 20.3%)
7th	21.2% (19.7% - 22.9%)	17.7% (16.2% - 19.4%)	19.4% (18.4% - 20.6%)
8th	23.1% (21.5% - 24.7%)	18.7% (17.3% - 20.2%)	20.8% (19.9% - 21.8%)
Total	21.9% (20.9% - 22.9%)	18.0% (17.2% - 18.8%)	19.9% (19.3% - 20.5%)

Figure 1-15: Asthma Lifetime Prevalence for High School Students by Grade, Maryland, 2010 (Raw sample size = 56,899)

Grade	Male (95% CI)	Female (95% CI)	Total (95% CI)
9th	24.2% (22.7% - 25.8%)	20.1% (18.8% - 21.5%)	22.1% (21.1% - 23.1%)
10th	22.0% (20.8% - 23.2%)	20.5% (19.4% - 21.7%)	21.2% (20.4% - 22.1%)
11th	22.5% (21.4% - 23.7%)	21.7% (20.6% - 22.9%)	22.1% (21.3% - 22.9%)
12th	20.9% (19.5% - 22.4%)	20.4% (19.2% - 21.7%)	20.7% (19.7% - 21.6%)
Total	22.4% (21.7% - 23.1%)	20.7% (20.2% - 21.3%)	21.5% (21.1% - 22.0%)

Appendix A: 95% Confidence Intervals for BRFSS Data - Continued

Figure 2-1: Asthma Status of Adult Smokers, Maryland, 2007-2009 (Raw sample size = 26,593)

Smoking Category	% With Current Asthma	% No Current Asthma	% Never Had Asthma
Current Smoker-Daily	13.7%	14.3%	10.8%
Current Smoker-Some	5.3%	4.7%	4.9%
Former Smoker	25.2%	20.9%	24.2%
Never Smoked	55.8%	60.1%	60.1%

Figure 2-2: Smoking Status of Adults with Asthma, Maryland, 2007-2009 (Raw sample size = 26,593)

Asthma Status	% Current Smoker - Daily	% Current Smoker - Some	% Former Smoker	% Never Smoked
Current Asthma	11.4% (10.0% - 12.8%)	10.9% (8.6% - 13.2%)	9.2% (8.4% - 10.0%)	8.3% (7.8% - 8.9%)
No Current Asthma	5.2% (4.2% - 6.2%)	4.7% (3.2% - 6.2%)	4.1% (3.6% - 4.6%)	4.2% (3.8% - 4.6%)
Never Had Asthma	83.4% (81.7% - 85.1%)	84.4% (81.8% - 87.0%)	86.8% (85.9% - 87.7%)	87.5% (86.8% - 88.2%)

Figure 2-3: Percent of Adults Receiving Influenza Vaccination by Current History of Asthma, Maryland, 2009 (Raw sample size = 8,360)

	Flu Shot in the Past Year	
	% YES (95% CI)	% NO (95% CI)
Current Asthma	53.4% (49.0% - 57.8%)	46.6% (42.2% - 51.0%)
No Current Asthma	42.4% (35.6% - 49.2%)	57.6% (50.8% - 64.4%)
Never Had Asthma	41.0% (39.6% - 42.4%)	59.0% (57.6% - 60.4%)

Appendix A: 95% Confidence Intervals for BRFSS Data - Continued

Figure 2-4: Percent of Children Ages 0-17 with Asthma Who Received Influenza Vaccination, Maryland, 2007-2009 Combined (Raw sample size = 377)

	Flu Shot in the Past Year	
	% YES (95% CI)	% NO (95% CI)
Current Asthma	50.7% (41.% - 57.3%)	49.3% (42.7% - 55.9%)

Figure 2-5: Leisure Time Physical Activity in Past 30 Days for Adults by Asthma Status, Maryland, 2007-2009 (Raw sample size = 26,672)

	Physical Activity in Past 30 Days	
	% YES (95% CI)	% NO (95% CI)
Current Asthma	70.1% (67.9% - 72.3%)	29.9% (27.7% - 32.1%)
No Current Asthma	77.7% (74.6% - 80.8%)	22.3% (19.2% - 25.4%)
Never Had Asthma	77.0% (76.3% - 77.7%)	23.0% (22.3% - 23.7%)

Figure 2-6: Adult Obesity by Asthma Status, Maryland, 2007-2009 (Raw sample size = 8,118)

	% Obese (BMI ≥ 30) (95% CI)	% Overweight (BMI 25.0 - 29.9) (95% CI)	Not Overweight/Obese (BMI ≤ 24.9) (95% CI)
Current Asthma	39.9% (35.5% - 44.3%)	28.6% (24.5% - 32.7%)	31.5% (27.3% - 35.7%)
No Current Asthma	33.8% (27.2% - 40.4%)	31.9% (25.4% - 38.4%)	34.3% (27.7% - 40.9%)
Never Had Asthma	25.0% (23.8% - 26.2%)	36.2% (34.9% - 37.5%)	37.8% (36.4% - 39.2%)

Appendix A: 95% Confidence Intervals for BRFSS Data - Continued

Figure 3-1: Most Recent Asthma Symptoms Among Adults and Children in the Past Year, Maryland, 2007-2009
(Raw sample size: Adults = 1,301; Children = 378)

	Most Recent Asthma Symptoms in the Past Year	
	Adults (95% CI)	**Children (95% CI)**
<1 Week	27.5% (23.9% - 31.2%)	16.9% (11.7% - 22.1%)
1 Week to <3 Months	20.3% (16.9% - 23.7%)	29.1% (23.1% - 35.1%)
3 Months to <1 Year	15.4% (11.9% - 18.9%)	18.3% (13.3% - 23.3%)
≥1 Year	35.9% (31.7% - 40.2%)	34.1% (27.8% - 40.3%)
Never	0.9% (0.00% - 1.8%)	1.6% (0.3% - 2.9%)

Figure 3-2: Frequency of Asthma Symptoms Among Adults and Children in the Past Month, Maryland, 2007-2009
(Raw sample size: Adults = 710; Children = 167)

	Most Recent Asthma Symptoms in the Past Month	
	Adults (95% CI)	**Children (95% CI)**
Every day	17.0% (13.8% - 20.3%)	5.3% (1.7% - 8.9%)
11-29 days	24.7% (18.8% - 30.5%)	12.9% (6.0% - 19.7%)
6-10 days	9.3% (6.3% - 12.3%)	17.0% (8.9% - 25.1%)
3-5 days	24.3% (19.5% - 29.2%)	21.5% (13.3% - 29.7%)
1-2 days	13.8% (10.2% - 17.5%)	22.1% (14.3% - 30.0%)
None	10.9% (7.9% - 13.8%)	21.2% (13.1% - 29.2%)

Figure 3-3: Most Recent Asthma Medication Among Adults and Children, Maryland, 2007-2009 (Raw sample size: Adults = 1,311; Children = 383)

	Most Recent Asthma Medication	
	Adults (95% CI)	**Children (95% CI)**
<1 Week	35.2% (31.3% - 39.1%)	33.6% (27.4% - 39.7%)
1 Week to <3 Months	11.0% (8.3% - 13.8%)	18.4% (13.1% - 23.6%)
3 Months to <1 Year	8.4% (6.1% - 10.7%)	11.5% (7.4% - 15.5%)
≥1 Year	42.7% (38.3% - 47.2%)	36.5% (30.2% - 42.9%)
Never	2.6% (1.2% - 3.9%)	0.1% (0.0% - 0.3%)

Appendix A: 95% Confidence Intervals for BRFSS Data - Continued

Figure 3-4: Percentage Who Experienced an Asthma Attack in the Past Year, Maryland 2007-2009 (Raw sample size: Adults = 1306; Children = 383)

	Percentage Who Experienced an Asthma Attack in the Past Year
	Prevalence (95% CI)
< 10 years	24.4% (18.4% - 30.5%)
10-17 years	18.8% (14.1% - 23.6%)
18-34 years	10.7% (7.1% - 14.3%)
35-44 years	8.5% (6.5% - 10.6%)
45-54 years	8.1% (6.3% - 9.8%)
55-64 years	4.2% (3.1% - 5.2%)
65+ years	4.0% (3.0% - 5.0%)

Figure 3-5: Number of Nights with Asthma-related Sleeping Difficulty in the Past Month, Maryland, 2007-2009 (Raw sample size: Adults = 703; Children = 164)

	Number of Nights with Asthma-related Sleep Difficulty in the Past Month	
	Adults (95% CI)	**Children (95% CI)**
Every night	3.6% (2.2% - 5.0%)	0.6% (0.0% - 1.9%)
8-29 nights	11.7% (8.1% - 15.3%)	6.2% (1.4% - 10.9%)
3-7 nights	9.9% (6.7% - 13.1%)	17.2% (8.2% - 26.3%)
1-2 nights	10.2% (7.1% - 13.3%)	14.8% (8.1% - 21.5%)
None	64.7% (59.3% - 70.0%)	61.1% (51.0% - 71.3%)

Figure 3-6: Number of Days Asthma Interfered with Work or Usual Activities Among Adults in the Past Year, Maryland, 2007-2009 (Raw sample size = 1,015)

	Number of Days Asthma Interfered with Work or Usual Activities in Past Year
	Prevalence (95% CI)
≥ 30 days	4.2% (2.4% - 5.9%)
8-29 days	5.0% (3.2% - 6.9%)
3-7 days	10.3% (7.6% - 12.9%)
1-2 days	8.5% (4.8% - 12.2%)
None	72.0% (67.4% - 76.6%)

Appendix A: 95% Confidence Intervals for BRFSS Data - Continued

Figure 3-7: Perceived Health Status of Adults with Currently Asthma vs. Adults with No Current Asthma, Maryland, 2007-2009 (Raw sample size = 26,325)

Health Status	Percent With Asthma (95% CI)	Percent Without Asthma (95% CI)
Excellent	13.2% (11.5% - 14.9%)	19.7% (16.7% - 22.7%)
Very Good	31.0% (28.7% - 33.3%)	36.9% (33.3% - 40.5%)
Good	31.6% (29.3% - 33.9%)	28.6% (25.2% - 32.0%)
Fair	16.7% (14.9% - 18.5%)	11.4% (9.0% - 13.8%)
Poor	7.5% (6.2% - 8.8%)	3.4% (2.0% - 4.8%)

Figure 3-8: Number of Routine Asthma Check-ups Among Adults and Children in the Past Year, Maryland, 2007-2009 (Raw sample size: Adults = 1119; Children = 97)

	Number of Routine Asthma Check-ups in Past Year	
	Adults (95% CI)	**Children (95% CI)**
≥ 6 times	3.5% (2.4% - 4.6%)	4.3% (0.0% - 9.2%)
3-5 times	10.2% (8.0% - 12.4%)	20.5% (8.6% - 32.3%)
1-2 times	34.5% (30.0% - 38.9%)	42.6% (29.1% - 56.1%)
None	51.9% (47.2% - 56.5%)	32.6% (19.8% - 45.4%)

Figure 3-9: Number of Emergency Room Visits Among Adults and Children in the Past Year, Maryland, 2007-2009 (Raw sample size: Adults = 1121; Children = 326)

	Number of Emergency Room Visits in Past Year	
	Adults (95% CI)	**Children (95% CI)**
≥ 6 times	0.8% (0.0% - 1.7%)	0.9% (0.0% - 2.3%)
3-5 times	1.7% (0.9% - 2.5%)	2.8% (0.5% - 5.2%)
1-2 times	8.5% (5.8% - 11.1%)	18.4% (12.6% - 24.2%)
None	89.0% (86.2% - 91.9%)	77.8% (71.7% - 84.0%)

Figure 3-10: Number of Doctor Visits Among Adults and Children in the Past Year for Urgent or Worsening Asthma Symptoms, Maryland, 2007-2009 (Raw sample size: Adults = 1114; Children = 323)

	Number of Doctor Visits in Past Year	
	Adults (95% CI)	**Children (95% CI)**
≥ 6 times	1.4% (0.6% - 2.1%)	1.8% (0.3% - 3.4%)
3-5 times	2.0% (1.2% - 2.9%)	7.6% (3.8% - 11.3%)
1-2 times	14.5% (11.6% - 17.4%)	21.6% (15.4% - 27.8%)
None	82.1% (79.0% - 85.2%)	69.0% (62.3% - 75.8%)

Appendix A: 95% Confidence Intervals for BRFSS Data - Continued

Figure 6-1: Environmental Triggers in the Home of Adults and Children with Asthma, Maryland, 2007-2009 (Raw sample size: Adult = ~1318; Children = ~384)

	Environmental Triggers in the Home	
	Adults (95% CI)	Children (95% CI)
Carpeting or rugs in bedroom	72.6% (68.8% - 76.4%)	**71.5% (65.7% - 77.4%)**
Indoor pets	56.3% (52.0% - 60.6%)	**56.6% (50.0% - 63.1%)**
Gas used for cooking	46.3% (41.9% - 50.7%)	**49.4% (42.9% - 55.9%)**
Pets allowed in bedroom	43.5% (39.2% - 47.8%)	**33.3% (27.4% - 39.2%)**
Wood-burning fireplace or stove used in home	23.1% (19.3% - 27.0%)	**22.6% (17.3% - 27.9%)**
Smoking inside home (past week)	13.9% (11.0% - 16.8%)	**9.0% (5.3% - 12.7%)**
Mold seen/smelled in home (past month)	11.4% (8.8% - 13.9%)	**6.7% (3.7% - 9.8%)**
Mice or rats seen in home (past month)	8.4% (6.0% - 10.8%)	**6.3% (3.4% - 9.1%)**
Cockroach seen in home (past month)	6.1% (3.7% - 8.4%)	**3.9% (0.6% - 7.3%)**
Unvented gas logs, gas fireplace, or gas stove used in home	5.0% (3.4% - 6.6%)	4.5% (1.5% - 7.4%)

Figure 6-2: Environmental Modifications in the Home of Adults and Children with Asthma, Maryland, 2007-2009 (Raw sample size: Adults = ~1301; Children = ~381)

	Environmental Modifications in the Home	
	Adults (95% CI)	Children (95% CI)
Exhaust fan regularly used when cooking	**65.2% (61.1% - 69.2%)**	**69.5% (63.6% - 75.4%)**
Exhaust fan regularly used in bathroom	**62.8% (58.7% - 66.9%)**	**59.6% (53.2% - 66.0%)**
Sheets and pillow cases washed in hot	39.0% (34.7% - 43.2%)	**41.5% (35.1% - 47.9%)**
Air cleaner or purifier regularly used	34.4% (30.2% - 38.6%)	**36.2% (29.8% - 42.5%)**
Dehumidifier regularly used	33.8% (29.6% - 38.1%)	**40.3% (33.8% - 46.7%)**
Mattress cover used for controlling dust mites	32.0% (27.8% - 36.2%)	**36.5% (30.1% - 42.9%)**
Pillow cover used for controlling dust mites	28.2% (24.2% - 32.2%)	**30.3% (24.5% - 36.2%)**

Appendix A: 95% Confidence Intervals for BRFSS Data - Continued

Figure 7-1: Number of Missed School Days Due to Asthma Among Children in Past Year, Maryland, 2007-2009 (Raw sample size = 223)

	Number of Missed School Days
	Prevalence (95% CI)
1-2 days	20.1% (12.8% - 27.3%)
3-7 days	14.3% (8.1% - 20.4%)
8-29 days	10.9% (4.9% - 16.9%)
≥30 days	2.9% (0.3% - 5.5%)
None	51.9% (43.3% - 60.5%)

Figure 7-2: Asthma Action Plan and Medication at School, School-aged Children, Maryland, 2007-2009 (Raw sample size = ~201)

	Prevalence (95% CI)
Child has Asthma Action Plan	43.6% (34.8% - 52.4%)
Child Allowed to Cary Asthma Medication	37.8% (28.9% - 46.7%)

Figure 8-1: Prevalence of Work Related Asthma among Adults with Asthma, Maryland, 2007-2009 (Raw sample size = ~915)

	Prevalence of Work Related Asthma (95% CI)		
	Total	Male	Female
Ever told by health professional that asthma was work-related	8.2 % (6.1% - 10.2%)	2.6% (1.4% - 3.9%)	5.5% (3.9% - 7.1%)
Every told health professional that asthma was work-related	10.5% (7.7% - 13.2%)	4.5% (2.1% - 6.9%)	6.0% (4.5% - 7.5%)
Asthma caused by chemicals, smoke, fumes, or dust in current job	7.9% (5.2% - 10.7%)	2.6% (0.6% - 4.5%)	5.4% (3.4% - 7.4%)
Asthma caused by chemicals, smoke, fumes, or dust in any previous job	15.4% (12.3% - 18.6%)	7.2% (4.5% - 10.1%)	8.2% (6.4% - 10.1%)
Asthma made worse by chemicals, smoke, fumes, or dust in any current job	27.3% (21.2% - 33.3%)	9.6% (4.9% - 14.3%)	17.6% (12.9% - 22.3%)
Asthma made worse by chemicals, smoke, fumes, or dust in any previous job	29.7% (25.4% - 34.0%)	11.6% (8.5% - 14.7%)	18.1% (14.4% - 21.8%)
Ever changed or quit a job because chemicals, smoke, fumes, or dust caused or made asthma worse	27.1% (19.0% - 35.3%)	13.7% (6.3% - 21.0%)	13.4% (8.2% - 18.7%)

Appendix A: 95% Confidence Intervals for BRFSS Data - Continued

Figure 9-1: Number of Co-morbid Conditions Among Adults with Asthma, Maryland, 2007-2009 (Raw sample size = ~1302)

	Number of Co-morbid Conditions
	Prevalence (95% CI)
Depression	33.4% (29.1% - 37.7%)
Chronic Bronchitis	23.7% (20.1% - 27.3%)
COPD	8.6% (7.0% - 10.3%)
Emphysema	5.0% (3.8% - 6.2%)

Figure 13-1: Current Asthma Prevalence Among Adults by Race, Maryland, 2009 (Raw sample size = 758)

Race/Ethnicity	Prevalence (95% CI)
White, Non-Hispanic	8.6% (7.8% - 9.4%)
Black, Non-Hispanic	8.6% (6.7% - 10.5%)

Figure 13-6: Current Asthma Prevalence Among Adults by Sex, Maryland, 2009 (Raw sample size = 770)

Race/Ethnicity	Prevalence (95% CI)
Male	5.9% (4.9% - 6.9%)
Female	10.4% (9.4% - 11.4%)

Figure 14-1: Lifetime Asthma Prevalence Among Adult by Race/Ethnicity, Maryland vs. United States, 2007-2009

Race/Ethnicity	Maryland Prevalence (95% CI)	U.S. Prevalence (95% CI)
Hispanic	9.4% (6.9% - 11.9%)	11.8% (NA)
White, Non-Hispanic	13.6% (13.0% - 14.2%)	13.0% (NA)
Black, Non-Hispanic	14.6% (13.3% - 15.9%)	15.2% (NA)
Other, Non-Hispanic	12.9% (10.1% - 15.7%)	11.8% (NA)
Total	13.7% (13.2% - 14.2%)	13.5% (NA)

Figure 14-2: Current Asthma Prevalence Among Adult by Race/Ethnicity, Maryland vs. United States, 2007-2009

Race/Ethnicity	Maryland Prevalence (95% CI)	U.S. Prevalence (95% CI)
Hispanic	6.2% (4.1% - 8.3%)	7.3% (NA)
White, Non-Hispanic	8.8% (8.3% - 9.3%)	8.5% (NA)
Black, Non-Hispanic	9.7% (8.6% - 10.8%)	10.1% (NA)
Other, Non-Hispanic	8.0% (5.7% - 10.3%)	7.5% (NA)
Total	9.0% (8.5% - 9.4%)	8.8% (NA)

Appendix A: 95% Confidence Intervals for BRFSS Data - Continued

Figure 15-1: Raw Sample Sizes for Asthma Lifetime and Current Prevalence by Jurisdiction, BRFSS 2007-2009

Jurisdiction	Sample Size	Lifetime Prevalence 2007-2009 Weighted Percent (95% CI)	Current Prevalence 2007-2009 Weighted Percent (95% CI)
NORTHWEST	520	12.0 (10.8-13.2)	
Garrett	58	8.3 (5.5-11.1)	6.2 (3.8-8.6)
Allegany	89	11.6 (8.8-14.4)	8.2 (5.8-10.6)
Washington	170	13.5 (11.2-15.8)	8.5 (6.6-10.4)
Frederick	203	11.9 (10.0-13.8)	7.7 (6.2-9.2)
BALTIMORE METRO	894	12.9 (12.0-13.8)	
Baltimore City	263	16.1 (14.0-18.3)	11.1 (9.3-12.9)
Baltimore County	353	12.9 (11.4-14.4)	8.3 (7.1-9.5)
Anne Arundel	218	12.3 (10.4-14.2)	7.8 (6.3-9.3)
Carroll	101	15.0 (11.7-18.3)	10.3 (7.5-13.1)
Howard	98	9.9 (7.7-12.2)	6.1 (4.3-7.9)
Harford	124	15.7 (12.8-18.6)	10.5 (8.1-13.0)
NATIONAL CAPITOL			
Montgomery	422	12.4 (11.1-13.7)	7.7 (6.6-8.8)
Prince George's	295	13.6 (11.8-15.4)	8.7 (7.2-10.2)
SOUTHERN MD	281	12.3 (10.7-13.9)	
Calvert	74	10.7 (7.8-13.6)	7.3 (4.8-9.8)
Charles	115	14.8 (12.0-17.6)	8.1 (5.9-10.3)
Saint Mary's	92	10.1 (7.5-12.7)	7.1 (4.9-9.3)
EASTERN SHORE	649	13.5 (12.4-14.7)	
Cecil	117	14.3 (11.4-17.2)	8.8 (6.5-11.2)
Kent	38	11.0 (7.1-14.9)	7.6 (4.3-10.9)
Queen Anne's	80	12.7 (9.6-15.8)	8.4 (5.8-11.0)
Caroline	58	12.3 (8.6-16.0)	8.1 (5.0-11.2)
Talbot	78	10.8 (7.9-13.7)	6.5 (4.2-8.8)
Dorchester	70	21.1 (16.6-25.6)	12.0 (8.4-15.6)
Wicomico	107	13.0 (10.2-15.8)	9.8 (7.3-12.3)
Somerset	47	16.1 (10.7-21.5)	13.8 (8.7-18.9)
Worcester	54	11.8 (8.4-15.2)	7.8 (5.0-10.6)
TOTAL	3,324	13.1 (12.6-13.6)	8.5 (8.1-8.9)

Appendix B: Technical Notes

In this report, unless otherwise stated, the rates calculated are known as "crude" rates because they have not been adjusted in any way. More specifically, it is a measure of overall frequency which has not been adjusted for significant factors which might have influenced the rate (e.g., age, sex, race, or ethnicity). It is the number of cause-specific events (e.g., deaths, disease cases, individuals at risk) over a specified period of time (e.g., a year) divided by the total population.

However, a crude rate can be misleading if an individual wants to compare a population that differs in age because the crude rate for most cause-specific events will be higher in population with a larger proportion of a specific type of individuals (e.g., African Americans, Hispanic/Latino, or the elderly). In such cases where an individual would like to compare populations with different age distributions, an age-adjusted rate should be used.

Age-adjustment is a statistical process applied to rates of death, hospitalizations, disease, or other health outcomes which allows populations with different age distributions to be compared. It is the weighed average of the age-specific (crude) rates, where the weights are the proportions of persons in the corresponding age groups of a standard population. The potential confounding effect of age is reduced when comparing age-adjusted rates computed using the same standard population.

Age confounding occurs when the two populations being compared have different age distributions and the risk of the outcome varies across age groups. The process of age adjustment (direct method) used in this report changes the amount that each age group contributes to the average rate in each area, so that the overall rates are based on the same age structure. Rates based on the same age distribution can be compared to each other without the presence of confounding by age.

The crude and age-adjusted rates for asthma morbidity can be found in **Appendix C**.

Appendix C: Data Tables

Table C-1: Crude and Age-Adjusted Emergency Department Visit Rate per 10,000 Residents by Sex, Race, and County, Maryland, 2009

	Crude Rate	Age-Adjusted Rate
Total	69.9	72.3
Gender		
Male	70.5	73.5
Female	69.3	71.0
Race		
White	30.3	31.8
Black	149.3	160.4
Other	88.9	91.3

Maryland HSCRC, 2009. Rates are age-adjusted to the 2000 U.S. standard population.

Table C-2: Crude and Age-Adjusted Hospitalization Rate per 10,000 Residents by Sex, Race, Ethnicity, and County, Maryland, 2007-2009

	2007		2008		2009	
	Crude Rate	Age-Adjusted Rate	Crude Rate	Age-Adjusted Rate	Crude Rate	Age-Adjusted Rate
Total	18.5	18.4	18.7	18.5	20.1	19.8
Gender						
Male	15.4	15.5	15.3	15.3	16.5	16.6
Female	21.6	21.3	22.0	21.4	23.5	22.8
Ethnicity						
Hispanic	7.6	7.2	6.9	6.4	8.8	8.2
White, Non-Hispanic	12.1	12.0	12.8	12.5	13.0	12.8
Black, Non-Hispanic	31.0	30.5	30.5	29.5	33.1	31.9

Maryland HSCRC, 2007-2009; Maryland Health Care Commission, 2001-2009; Delaware Department of Health 2001-2009; Pennsylvania Health Care Cost Containment Council, 2001-2009; and the West Virginia Health Care Authority, 2007-2009. Rates are age-adjusted to the 2000 U.S. standard population.

[a] Delaware, Washington D.C., and West Virginia do not stratify by ethnicity in their out of state hospitalization data for Maryland residents; there were no Pennsylvania hospitalizations of Hispanic Maryland residents in 2009.

Martin O'Malley, Governor
Anthony G. Brown, Lieutenant Governor
Joshua M. Sharfstein, Secretary, DHMH

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