



Asthma in Maryland 2007

Prepared by the State of Maryland
Department of Health and Mental Hygiene
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Maryland Asthma Control Program

MARYLAND ASTHMA SURVEILLANCE REPORT

2007

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HIGHLIGHTS

- ◆ Statewide, in 2006, approximately 566,000 (13.4%) Maryland adults and 180,000 (13.1%) children had a history of asthma. Of those, approximately 373,000 (8.9%) adults and 125,000 (9.1%) children currently had asthma.
- ◆ Among Medicaid enrollees, 9.0% currently have asthma. Children under the age of 14 (11.6%) have the highest asthma prevalence among Medicaid enrollees.
- ◆ In 2006, there were approximately 44,300 asthma-related emergency department visits (80.9 per 10,000 residents) and approximately 9,700 asthma hospitalizations (17.2 per 10,000 residents) in Maryland for asthma.
- ◆ From 2002-2006, there was an average of 81 deaths per year due to asthma.
- ◆ Many disparities exist in asthma morbidity and mortality. Persons at increased risk for asthma and its complications include the very young, the elderly, Blacks, low-income individuals, and individuals in certain jurisdictions, particularly Baltimore City.
- ◆ In 2006, charges for hospitalizations due to asthma totaled nearly \$57 million. Charges for emergency department visits due to asthma totaled an additional \$27 million.
- ◆ Compared to those without asthma, adults with asthma perceive their general health less favorably.





INTRODUCTION

Asthma is 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 (Bloom, et al., 2003). In 2006, approximately 9.9 million (13.5%) U.S. children under 18 years of age had been diagnosed with asthma at some point in their lifetime, and approximately 6.8 million (9.3%) children currently had asthma (Bloom, et al., 2007). An estimated 24.3 million (11%) U.S. adults have been diagnosed with asthma during their lifetime, and an estimated 16.1 million (7.3%) currently have asthma (Pleis, et al., 2007). In 2006, asthma was responsible for 443,600 hospitalizations nationwide (DeFrances, et al., 2008).

This is the sixth annual surveillance report of the Maryland Asthma Control Program (MACP). The MACP began in 2001, with funding by the Centers for Disease Control and Prevention (CDC) to develop a State Asthma Plan and an Asthma Surveillance Program. 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, targeted interventions, and coalition.

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 has been expanded to include more detailed information about asthma morbidity and mortality.

Data sources for this surveillance report include the CDC Behavioral Risk Factor Surveillance System (BRFSS), the Maryland Health Services Cost Review Commission (HSCRC)'s hospital discharge dataset, Maryland Medicaid encounter and claims data, and the Maryland Vital Statistics Administration dataset. For BRFSS data, asthma prevalence is identified by respondents to a telephone survey. 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 1999-2006 mortality data. Rates are based on 2006 population statistics from the Vital Statistics Administration. Where possible, rates have been age-adjusted to the 2000 U.S. standard population in order to reliably compare populations with different age distributions.





PREVALENCE

As in previous years, asthma prevalence in Maryland was measured using the Behavioral Risk Factor Surveillance System (BRFSS), a statewide ongoing telephone survey of adults coordinated by the CDC and conducted in all 50 states, the District of Columbia, and three territories. The survey is designed to monitor the prevalence of major behavioral risk factors associated with chronic disease, injuries, and preventable infectious disease among adults. Each year prior to 2005, approximately 4,400 Maryland residents were surveyed. In 2005 and 2006, approximately 8,800 Maryland residents were surveyed. Results were weighted in order to adjust for the selection probabilities and estimate 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. 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. However, 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?" The questions were modified in 2005. The 2005 and 2006 Maryland BRFSS questions posed to adults for assessing both pediatric lifetime prevalence and current prevalence of asthma have been "Has a doctor, nurse or other health professional EVER said that the child has asthma?" and [If Yes] "Does the child still have asthma?"

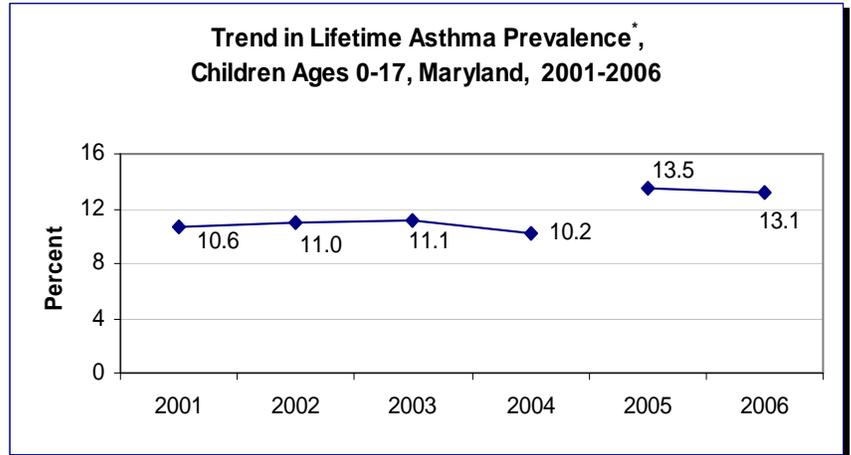


PREVALENCE - Continued

Prevalence of Asthma among Children Ages 0-17

Among Maryland children less than 18 years of age, lifetime asthma prevalence was highest in 2005 at 13.5%. In 2006, the lifetime asthma prevalence was an estimated 180,054 (13.1%).

Figure 1-1

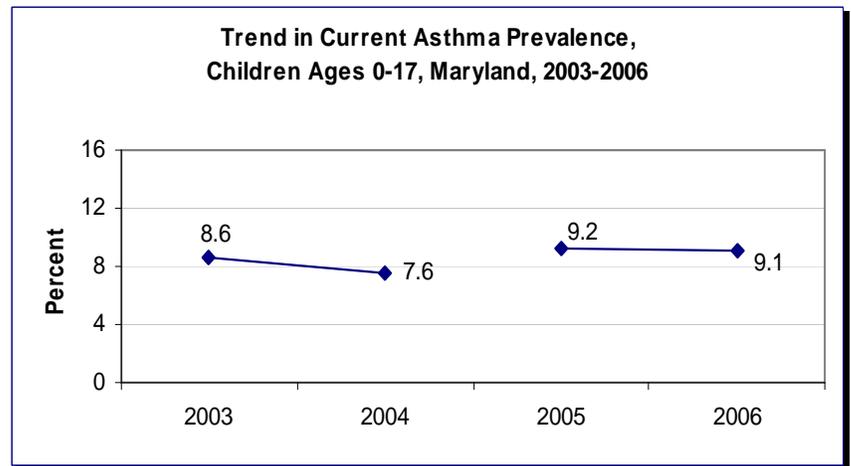


Source: Maryland, BRFSS

*Survey question changed in 2005. The lifetime prevalence between 2004 and 2005 are not comparable.

Among Maryland children less than 18 years of age, an estimated 124,502 (9.1%) children currently have asthma.

Figure 1-2



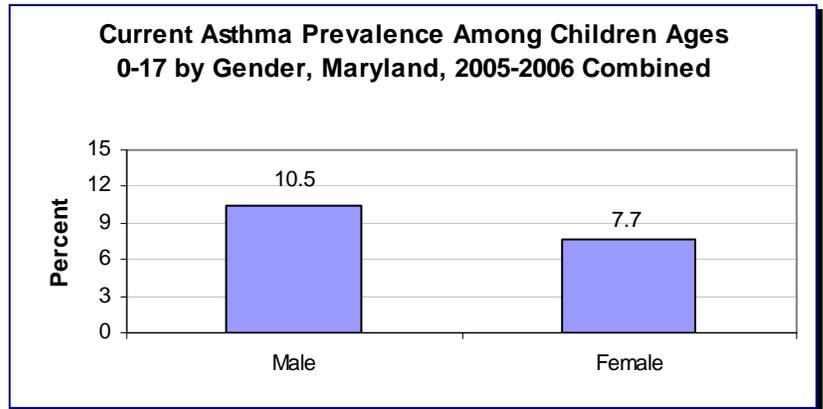
Source: Maryland BRFSS

*Survey question changed in 2005. The current prevalence between 2004 and 2005 are not comparable.

PREVALENCE - Continued

In 2005-2006, the current asthma prevalence was not significantly different between genders.

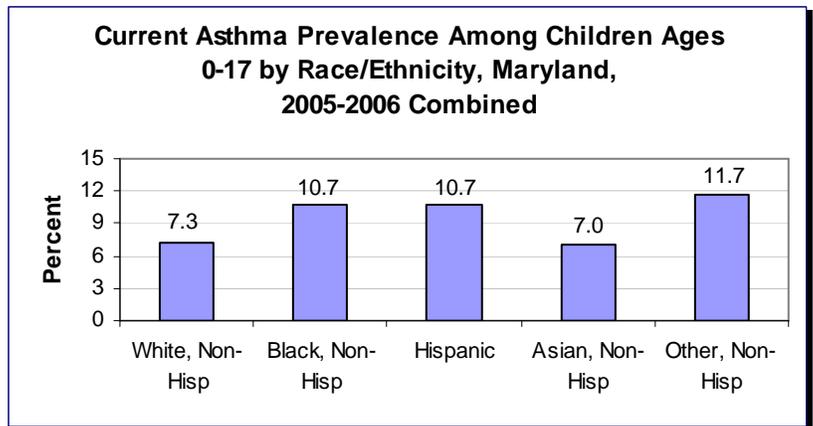
Figure 1-3



Source: Maryland BRFSS

The current asthma prevalence was comparable between race and ethnicity.

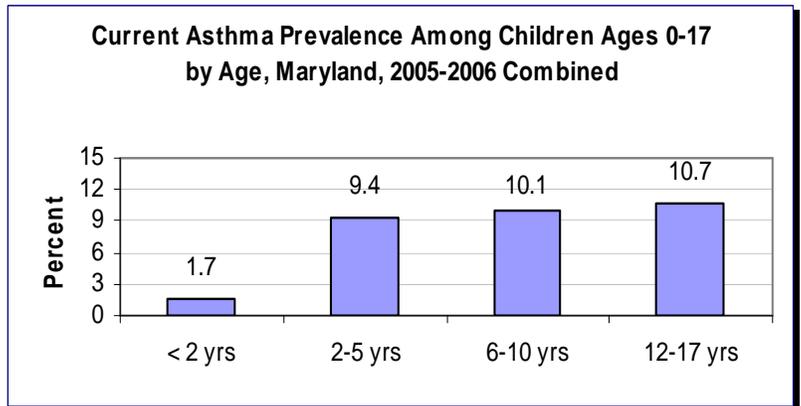
Figure 1-4



Source: Maryland BRFSS

Between 2005 and 2006, the prevalence of current asthma was lowest among children under the age of 2¹.

Figure 1-5



Source: Maryland BRFSS

¹ Asthma diagnosis is not often made for children under age three

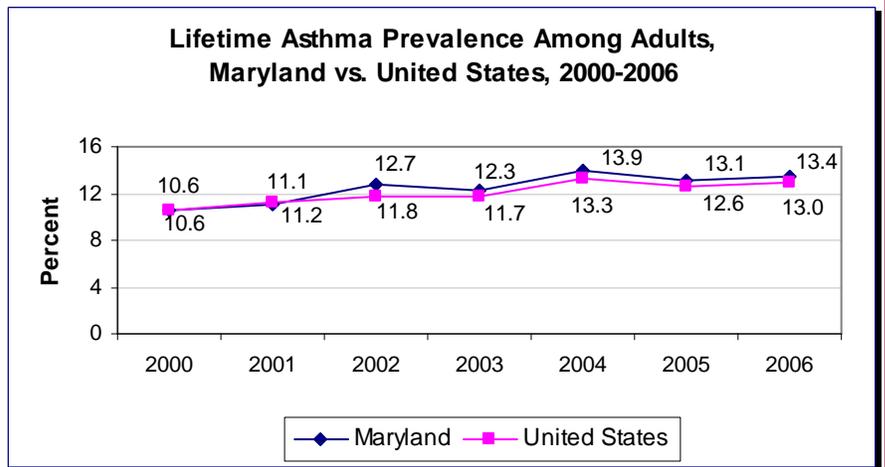
PREVALENCE - Continued

Prevalence of Asthma among Adult Ages 18+

Among Maryland adults, lifetime asthma prevalence increased approximately 27% from 2001 to 2006 with some fluctuations.

Lifetime asthma prevalence for Maryland adults was higher than the U.S. prevalence for every year since 2002.

Figure 1-6

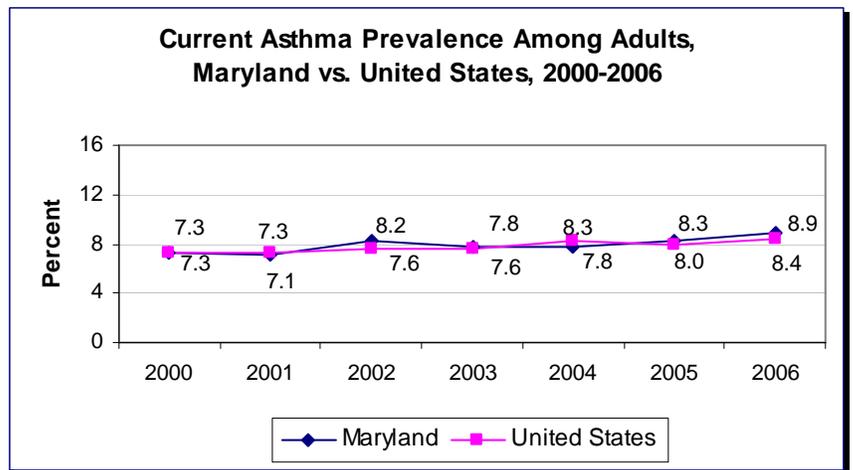


Source: BRFSS

Among Maryland adults, current asthma prevalence increased approximately 25% from 2001 to 2006. Current asthma prevalence was highest in 2006 at an estimated 372,862 (8.9%).

Current asthma prevalence for Maryland adults was higher than the U.S. prevalence for every year except 2001 and 2004.

Figure 1-7

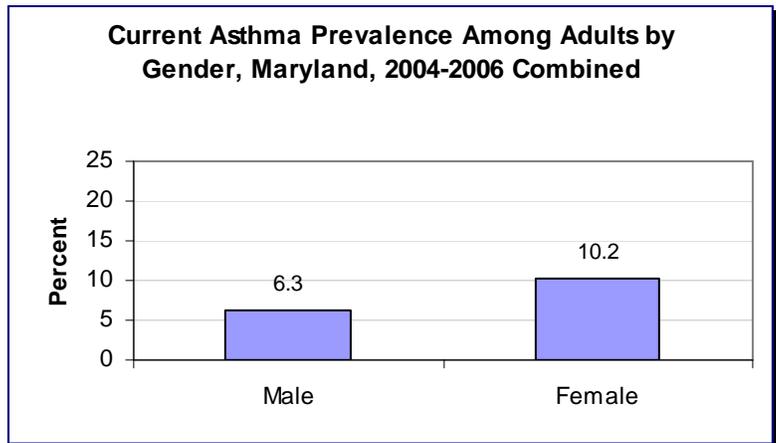


Source: BRFSS

PREVALENCE - Continued

Between 2004 and 2006, the current asthma prevalence among females (10.2%) was statistically significantly higher (62%) than the prevalence among males (6.3%).

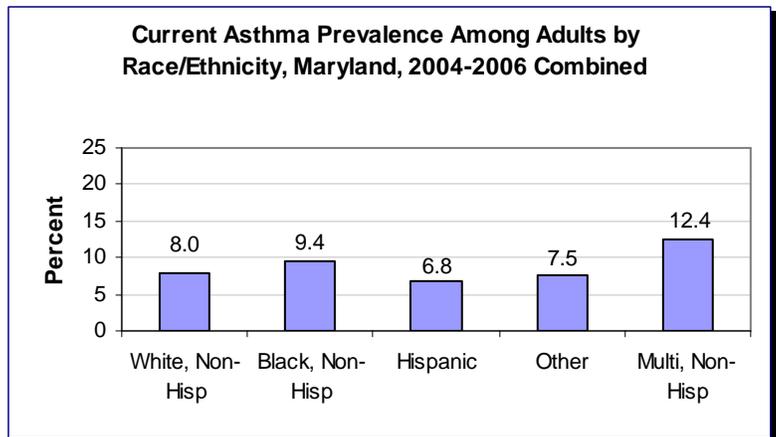
Figure 1-8



Source: Maryland BRFSS

Between 2004 and 2006, the current asthma prevalence was not significantly different between race and ethnicity.

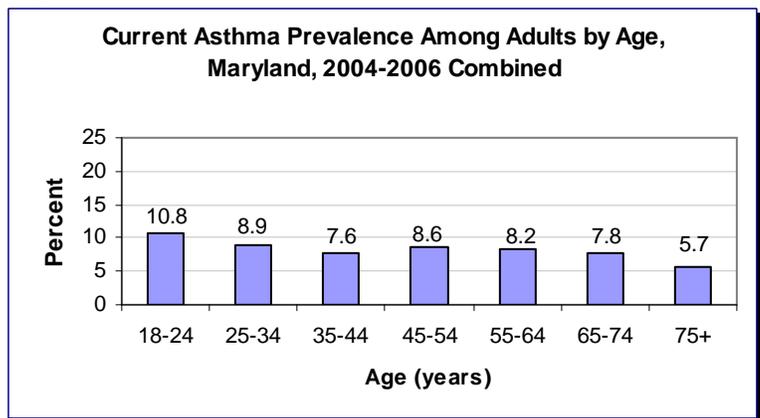
Figure 1-9



Source: Maryland BRFSS

Between 2004 and 2006, the current asthma prevalence was highest among adults aged 18-24 years and lowest among adults aged 65 years and older.

Figure 1-10

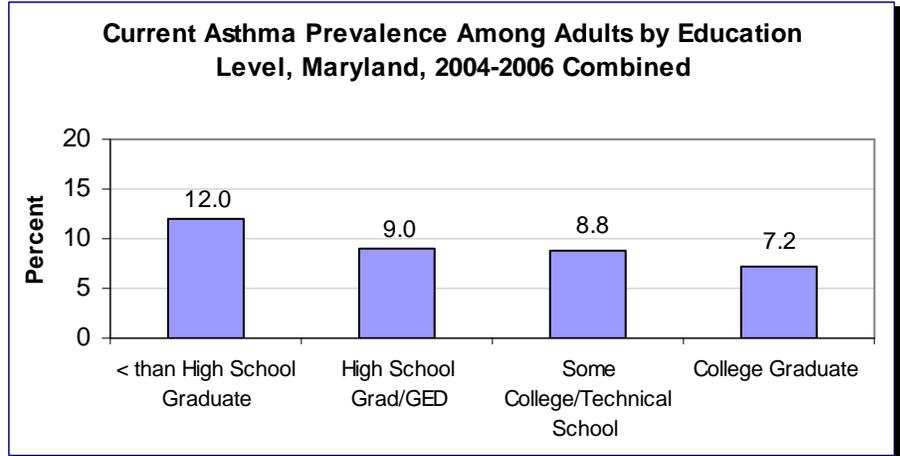


Source: Maryland BRFSS

PREVALENCE - Continued

Between 2004-2006, adults with a college education had significantly less prevalence of asthma than those with less education.

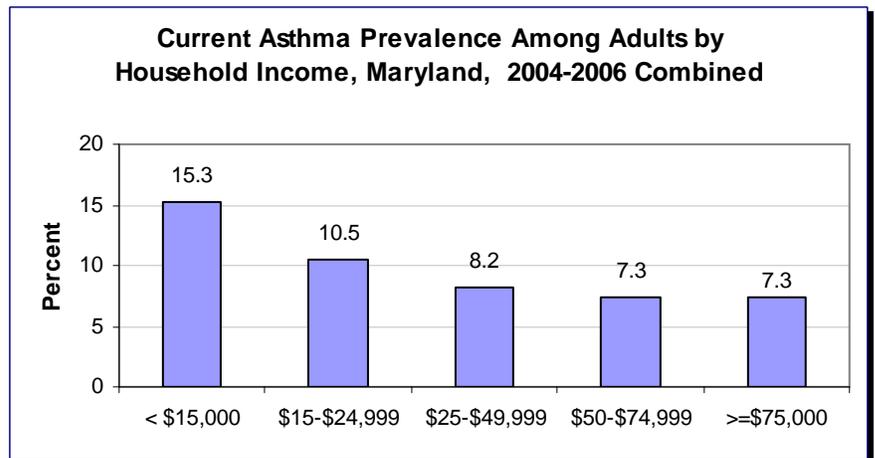
Figure 1-11



Source: Maryland BRFSS

Between 2004-2006, adults whose annual household income was less than \$15,000 had the highest current asthma prevalence at 15.3%, while adults whose annual household income was \$50,000 and greater had the lowest current asthma prevalence at 7.3%.

Figure 1-12

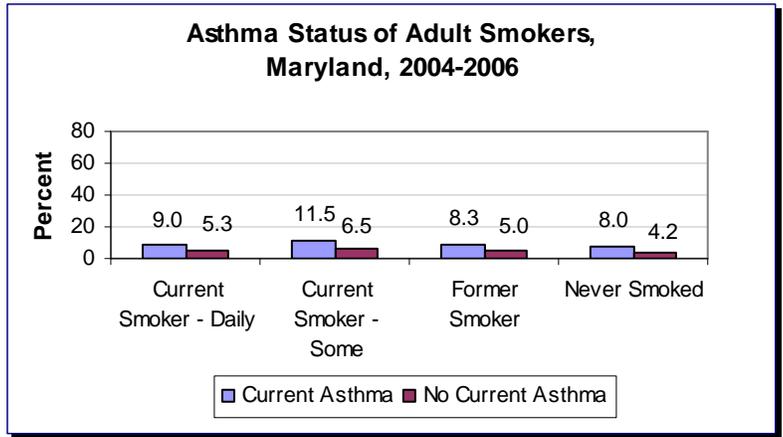


Source: Maryland BRFSS

RISK FACTORS AND PREVENTIVE BEHAVIORS

There are many conditions and risk factors that can affect adults with asthma, including tobacco smoke. The prevalence of current asthma is slightly higher among adults who currently smoke some (11.5%) than among those who are “never” (8.0%) smokers.

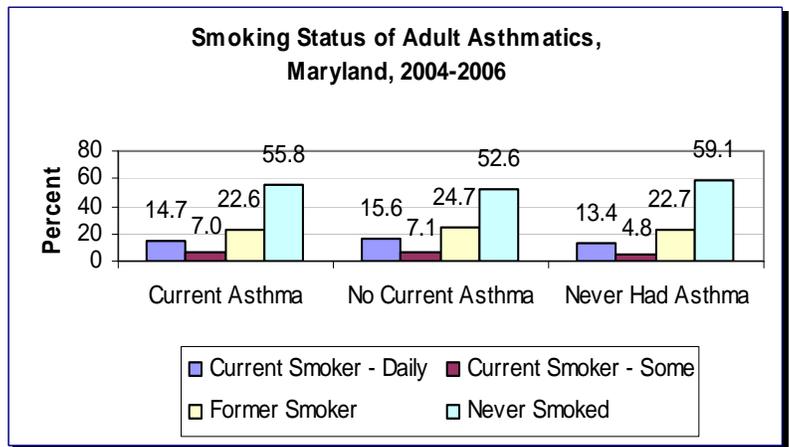
Figure 2-1



Source: Maryland BRFSS

Maryland adults who have asthma may be more likely to smoke than adults who have never had asthma. Because this data is cross-sectional, it is not possible to determine whether smoking caused or exacerbated asthma among Maryland adults. However, the high rates of smoking among Maryland asthmatics is concerning, and may be a target for further interventions.

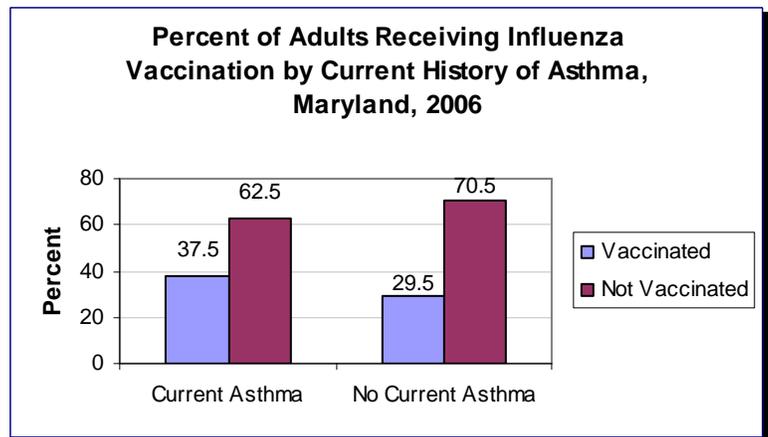
Figure 2-2



Source: Maryland BRFSS

Influenza is associated with substantial adverse effects especially among people with asthma. The CDC recommends persons with asthma to receive vaccination against influenza to reduce morbidity and mortality. In 2006, Maryland adults with current asthma were more likely than adults without current asthma to be vaccinated against influenza. Still, less than half of adults with asthma were vaccinated.

Figure 2-3

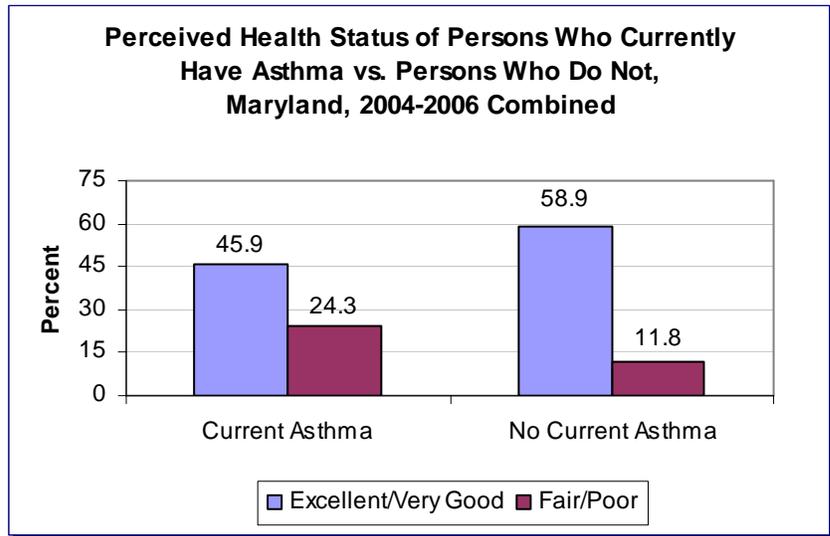


Source: Maryland BRFSS

PERCEIVED HEALTH STATUS OF MARYLAND ASTHMATICS

In general, Maryland adults with current asthma consider their health to be poorer than those without current asthma. From 2004 to 2006, adults with current asthma were statistically significantly less likely than adults without current asthma to report their general health status as excellent or good (45.9% vs. 58.9%). Likewise, adults with current asthma were statistically significantly more likely to report their general health status as fair or poor (24.3% vs. 11.8%).

Figure 3-1



Source: Maryland BRFSS



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 2006. The data are based upon the number of visits to the ED and not the number of unique individuals who visited the ED.

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 analysis methods.¹

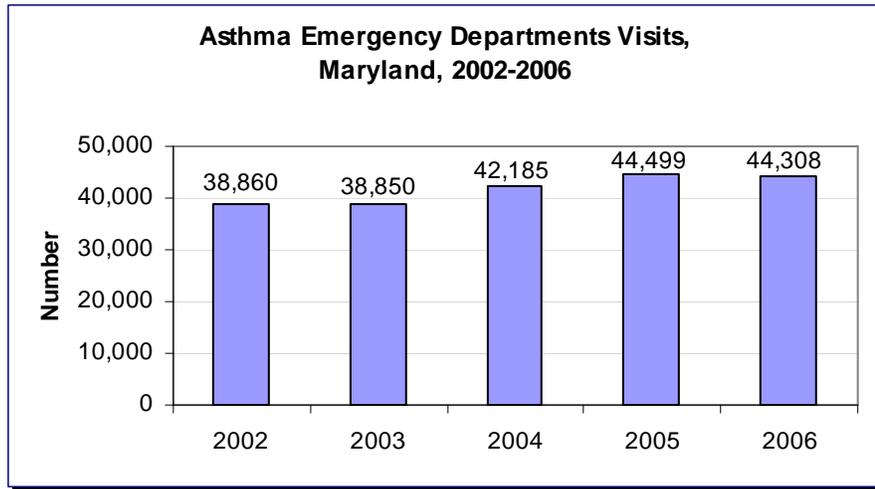


¹ Previous reports presented ED visits/year data determined by admission date and zip code-specific data. Currently, ED visits/year were determined by discharge date. Additionally, rather than creating zip code-specific county data, county-specific data, already provided by HSCRC, was used to abstract ambulatory discharge data. Focusing on the county-specific data is viewed to be more accurate since many of the zip codes belong to more than one county.

EMERGENCY DEPARTMENT VISITS - Continued

In 2006, there were 44,308 ED visits in Maryland with asthma as a principal diagnosis.

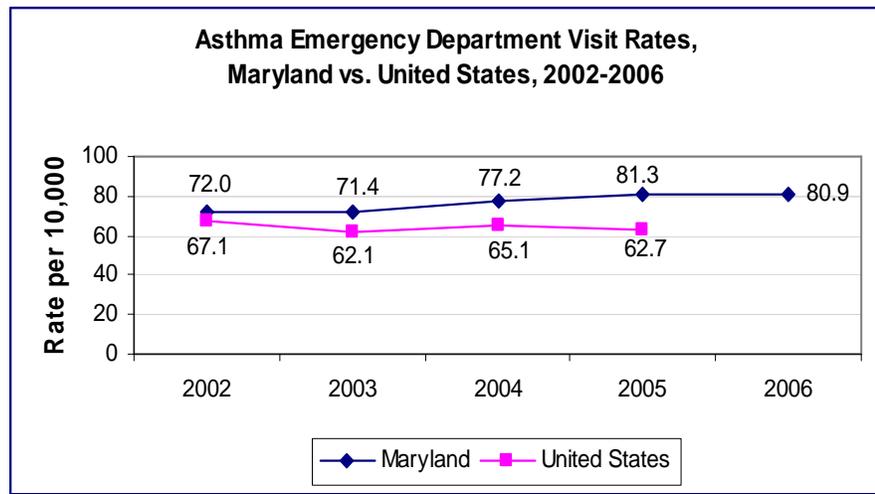
Figure 4-1



Source: HSCRC

The ED visit rate among Maryland residents with a principal diagnosis of asthma increased from 2002 to 2006. The overall rate of ED visits due to asthma was 80.9 per 10,000 population in 2006. Maryland asthma ED visit rates are higher than the 2005 national rate of 62.7 visits per 10,000 population.

Figure 4-2

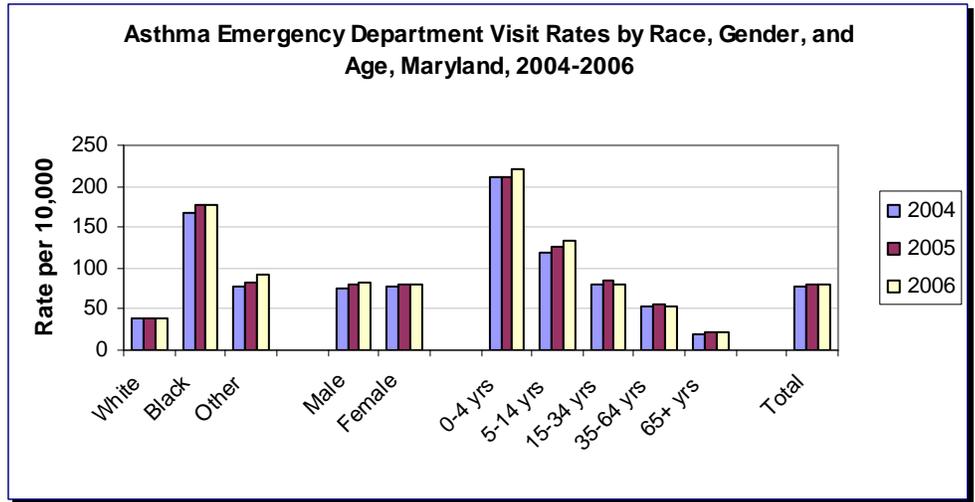


Source: HSCRC, United States data from National Center for Health Statistics (NCHS). Rates are age adjusted to the 2000 U.S. standard population.

EMERGENCY DEPARTMENT VISITS - Continued

Maryland ED visit rates showed an upward trend from 2004 to 2006. Between 2004 and 2006, ED visit rates increased for both genders, all age groups, Blacks and other minorities. Blacks in Maryland visit the ED for asthma at four times the rate of Whites. Young children are brought to the ED for asthma more often than adults.

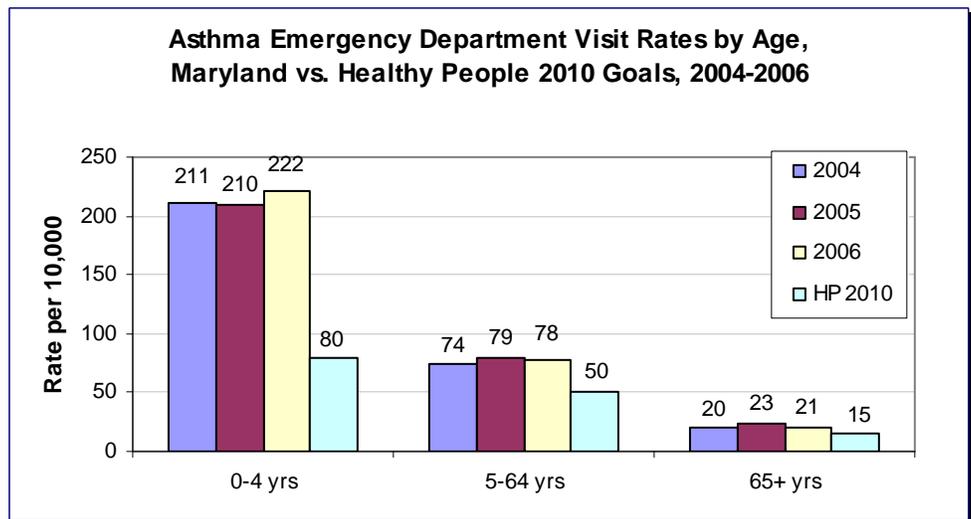
Figure 4-3



Source: HSCRC. Total ED visit rates, and rates by race and gender are age adjusted to the 2000 U.S. standard population.

Rates continue to exceed the Healthy People 2010 goals for all age groups. This difference remains most dramatic for children under 5 years of age. While the Healthy People 2010 goal is 80 visits per 10,000 population, Maryland's youngest children (age 0-4) had 222 visits per 10,000 Population in 2006.

Figure 4-4



Source: HSCRC, Healthy People 2010 Midcourse Review, U.S. Department of Health and Human Services, 2006. Rates are age adjusted to the 2000 U.S. standard population.

Many ED visits are avoidable with appropriate preventive and therapeutic care. Guidelines on asthma management are available from the National Heart, Lung, and Blood Institute of the National Institutes of Health (<http://www.nih.gov/guidelines/asthma/asthgdln.htm>). These guidelines can assist patients and providers in working together to establish an optimal asthma control regimen and to assure adherence to this regimen.

HOSPITALIZATIONS

Hospitalization for asthma, like ED visits, is generally considered a failure of outpatient management. Maryland hospitalization data from 2001-2006 were obtained from the Maryland Health Services Cost Review Commission (HSCRC). HSCRC currently collects health record level detail on patient demographics, diagnoses, treatments, services, residence location, and charges for every hospital discharge in Maryland. Although these data do 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 admitted to the hospital with a principal diagnosis of asthma from 2001 to 2006. The data, which lack unique identifiers, are based upon the number of admissions to the hospital and not the number of individuals who were admitted to the hospital. Since some Maryland residents are hospitalized in neighboring states, data on hospitalization of Maryland residents from the District of Columbia, West Virginia, Pennsylvania¹, and Delaware, are included when possible.

An asthma hospital discharge is defined as a hospitalization with principal diagnosis of asthma with 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.²



¹ “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 health care 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.

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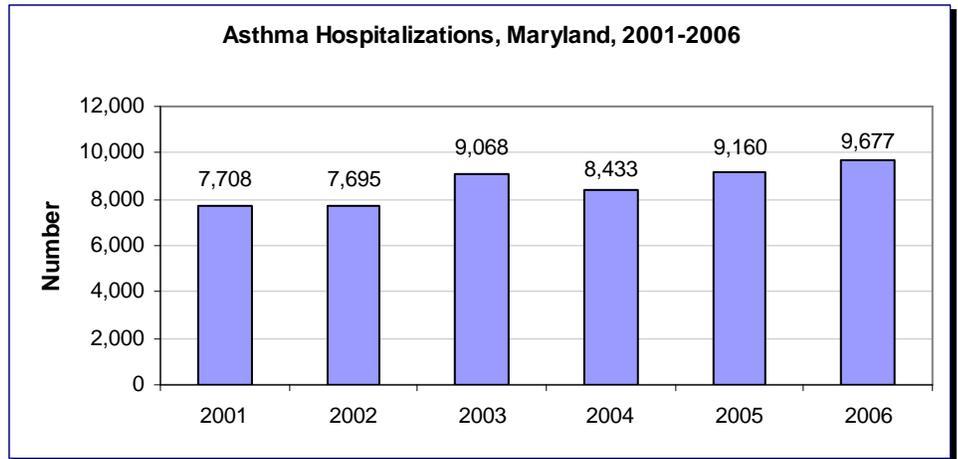
This analysis was not prepared by PHC4. This analysis was done by [Entity Name]. PHC4, its agents and staff, bear no responsibility or liability for the results of the analysis, which are solely the opinion of MACP.”

² Previous reports presented hospitalizations/year data determined by admission date and zip code-specific data. Currently, hospitalizations/year were determined by discharge date. Additionally, instead of creating zip code-specific county data, county-specific data, already provided by HSCRC, was used to abstract hospital discharge data. 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

In Maryland hospitals, there were 9,677 hospitalizations of Maryland residents with a principal diagnosis of asthma in 2006, a 5.6% increase from the previous year. An additional 373 Maryland residents were hospitalized for asthma in neighboring states jurisdictions. The majority of these Maryland residents were hospitalized in the District of Columbia (275), with 7 hospitalized in West Virginia, 32 in Pennsylvania, and 59 in Delaware.

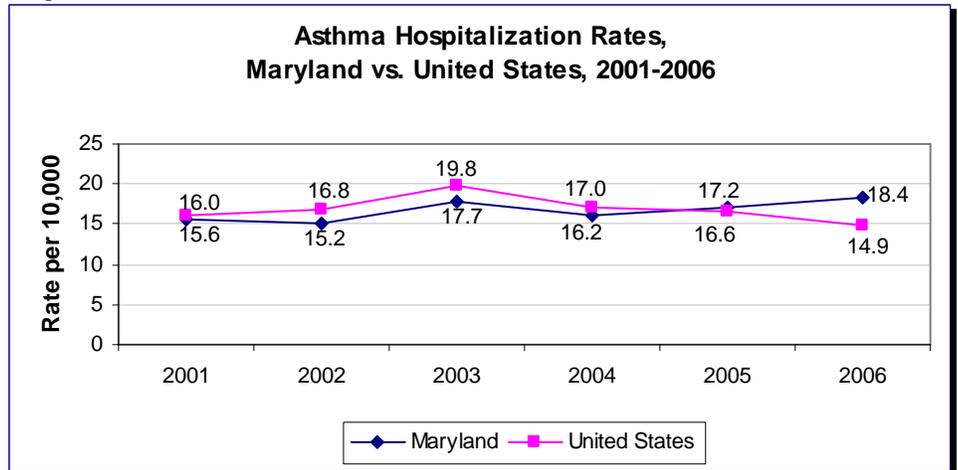
Figure 5-1



Source: HSCRC, Maryland Health Care Commission, West Virginia Health Care Authority, Pennsylvania Health Care Cost Containment Council, and Delaware Department of Health.

The hospitalization rate for Maryland residents was 17.2 per 10,000 population excluding those hospitalizations outside of Maryland, and increased to 18.4 per 10,000 population when hospitalizations outside of Maryland are included. These rates are lower than that for the United States as a whole, which averaged 17.0 hospitalizations per 10,000 between 2002 and 2006.

Figure 5-2

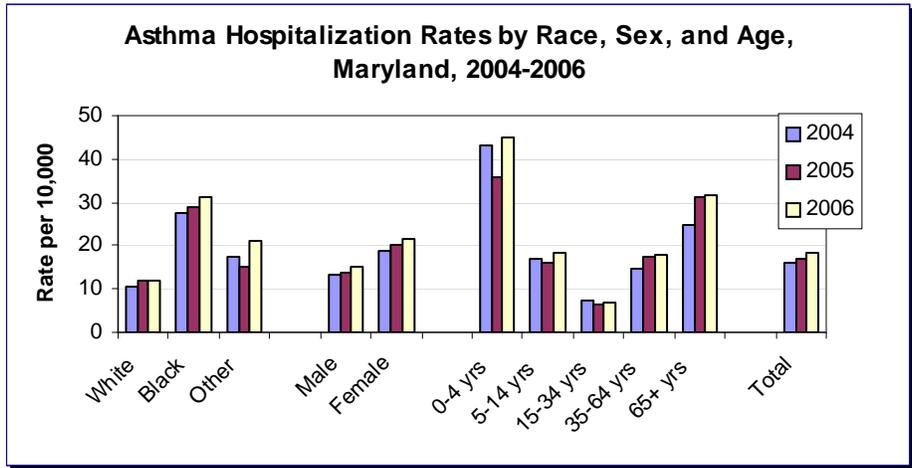


Source: HSCRC, Maryland Health Care Commission, West Virginia Health Care Authority, Pennsylvania Health Care Cost Containment Council, and Delaware Department of Health. Hospitalizations of Maryland residents in D.C., West Virginia, Pennsylvania, and Delaware are included in all data. Rates are age adjusted to the 2000 U.S. standard population.

HOSPITALIZATIONS - Continued

Hospitalization rates for Blacks in 2006 continued to be nearly three times that of 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; a rate of 45.5 hospitalizations per 10,000 population.

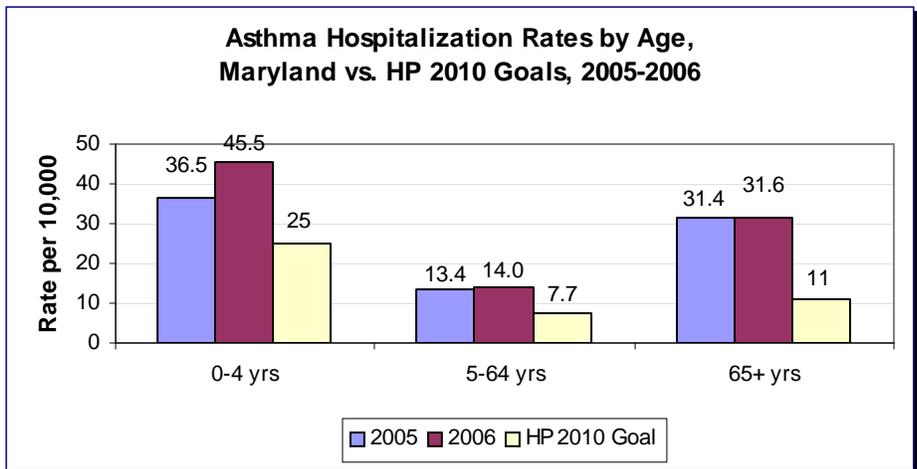
Figure 5-3



Source: HSCRC, Maryland Health Care Commission, West Virginia Health Care Authority, Pennsylvania Health Care Cost Containment Council, and Delaware Department of Health. Hospitalizations of Maryland residents in West Virginia are included in all data except rates by race, because West Virginia does not collect data on race. Hospitalizations of Maryland residents in the District of Columbia, Pennsylvania, and Delaware are included in all data. Total hospitalization rate, and rates by race and gender are age adjusted to the 2000 U.S. standard population.

Maryland residents hospitalized for asthma spent an average of 3.0 days in the hospital. The length of hospitalization increases with age. While children under the age of 5 years spent an average of 1.8 days in the hospital, adults age 65 and older spent, on average, 4.5 days in the hospital for asthma.

Figure 5-4



Source: HSCRC, Maryland Health Care Commission, West Virginia Health Care Authority, Pennsylvania Health Care Cost Containment Council, and Delaware Department of Health, Healthy People 2010 Midcourse Review, U.S. Department of Health and Human Services, 2006. Hospitalizations of Maryland residents in D.C., West Virginia, Pennsylvania, and Delaware are included in 2005 & 2006 data. Rates are age adjusted to the 2000 U.S. standard population.

MEDICAID ENROLLEES AND ASTHMA

Medicaid is a joint federal/state funded program that provides health care coverage to low income children and adults. Maryland residents enrolled in Medicaid are served by Medicaid’s managed care and fee-for-service (FFS) programs. The majority of Medicaid enrollees are enrolled in HealthChoice, Maryland Medicaid’s managed care program, while the FFS population is largely composed of institutionalized individuals and those eligible for Medicare. Both HealthChoice and Medicaid FFS programs provide preventive and primary care, inpatient care, benefits, as well as a variety of specialty health services.

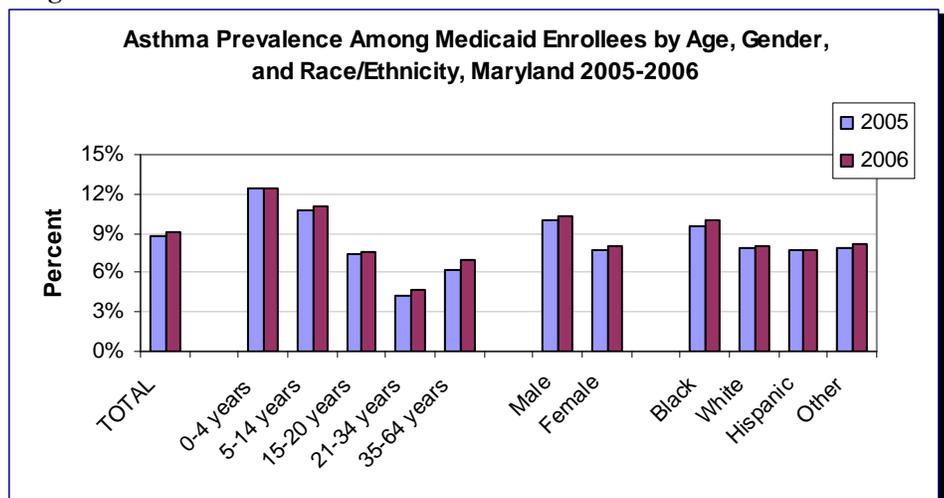
Maryland Medicaid collects claims and encounter data for a variety of purposes including program administration and evaluation, and managed care organization rate-setting. In this report, paid fee-for-service claims and HealthChoice encounters were obtained from Maryland Medicaid administrative data for the 2005 and 2006 calendar years. Asthma prevalence, utilization of outpatient care, ED visits, and hospitalizations were analyzed by patient demographics for persons age 0-64 years with asthma. Asthma rates were generated based on principal diagnosis with an ICD-9-CM code of 493.0-493.9 for outpatient, and ED visits, and hospitalizations. These data are not representative of the general population, when analyzed, they serve as a proxy for asthma morbidity among the lowest income Maryland residents.

Asthma Prevalence

Asthma prevalence was defined as the percent of Medicaid enrollees having **at least one encounter with a diagnosis of asthma during the calendar year**. Visits can be linked to specific enrollees, so the number of outpatient visits, emergency department visits, and hospitalizations per person can be determined. This is in contrast to hospitalization and emergency department visit data from the Health Services Cost Review Commission (HSCRC), in which visits cannot be matched to individuals. HSCRC data show the number of emergency department visits or hospitalizations, not the percent of individuals with emergency department visits or hospitalizations. This is because HSCRC data are not unduplicated; one individual with two visits would be counted twice.

In 2006, 71,236 Maryland Medicaid enrollees had a diagnosis of asthma. Asthma prevalence for all Medicaid enrollees in 2006 was 9.0%, up from 8.7% in 2005. The comparison of 2005 to 2006 shows increases for persons ages 5-64 years. Asthma prevalence was higher for Blacks than for Whites, and higher for males than females. Asthma prevalence is highest among the youngest children ages 0-4 years, decreases in older children and young adults, and then rises again in older adults.

Figure 6-1

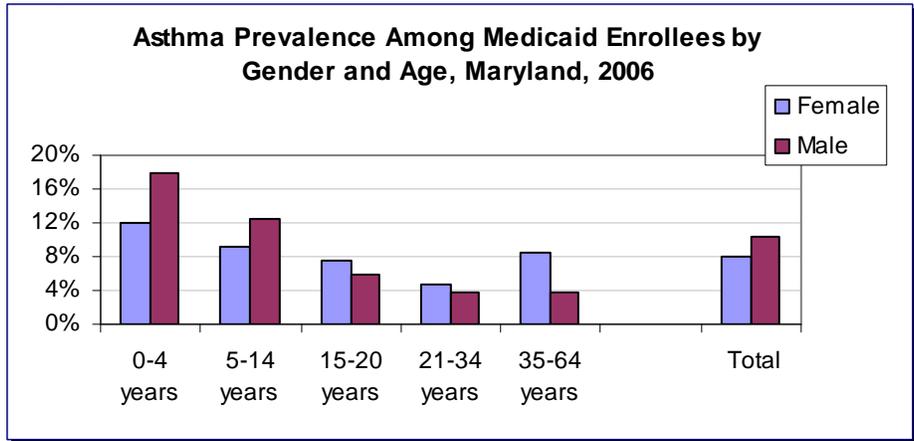


Source: Maryland Medicaid

MEDICAID ENROLLEES AND ASTHMA - Continued

Comparison by age and gender show higher prevalence among male children ages 0-14 years. From age 15 through age 64, females have a higher prevalence of asthma than males.

Figure 6-2



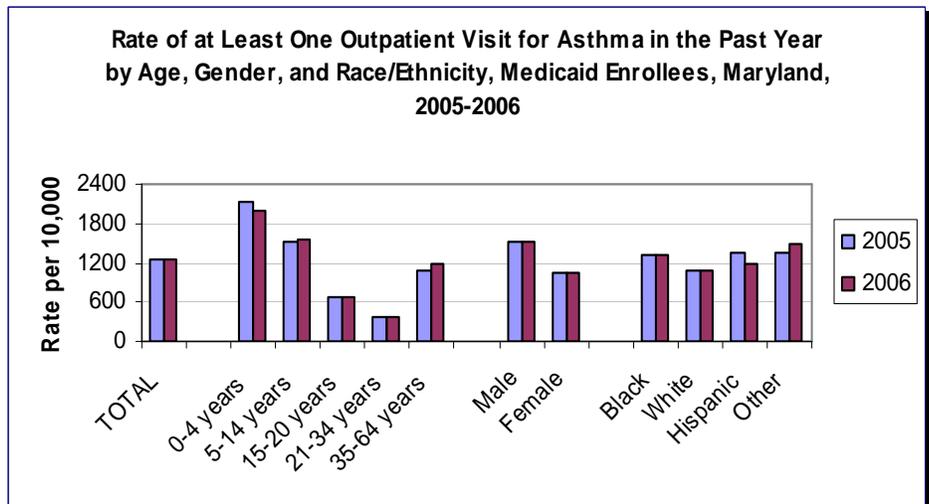
Source: Maryland Medicaid

Outpatient Visits

About half of Maryland Medicaid enrollees with asthma had an outpatient visit that included a diagnosis of asthma during the year.

Young children were more likely to have at least one outpatient visits, with 1,722 per 10,000. Children in this age group had an average of one outpatient asthma visit per child per year. Rates were higher for males than females.

Figure 6-3



Source: Maryland Medicaid

Interpretation of this data is challenging for several different reasons. For instance, it is likely that Medicaid enrollees with outpatient visits may have had a higher severity of disease than those who had no outpatient visits. In addition, individuals may have had additional outpatient visits which did not include a diagnosis of asthma; these visits are not counted here. For example, asthma may be addressed during a well-child visit, but not coded as such. Lastly, the level of asthma acuity was not determined.

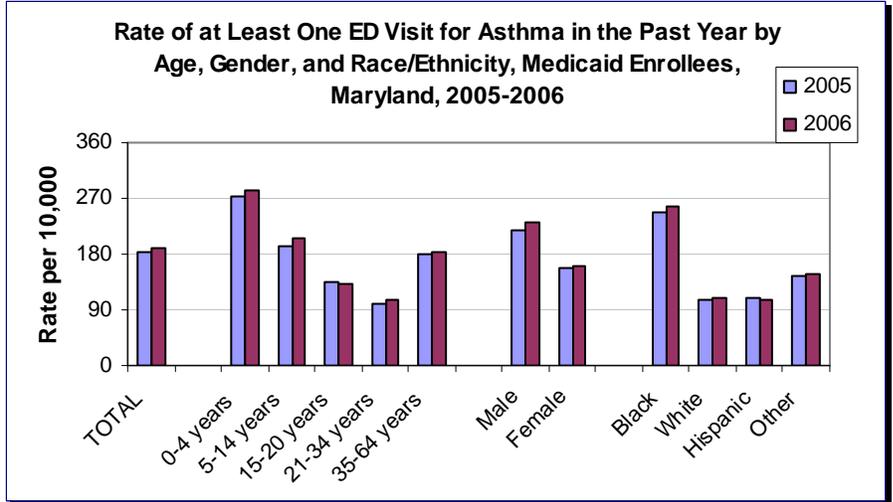
MEDICAID ENROLLEES AND ASTHMA - Continued

Emergency Department Use

In 2006, approximately 190 per 10,000 Medicaid enrollees had emergency department visits with a principal diagnosis of asthma. This rate is more than twice that for the Maryland population as a whole (80.9 emergency department visits per 10,000).

Emergency department visits with a principal diagnosis of asthma were highest for Medicaid enrollees 0-4 years of age with a rate of 281 enrollees per 10,000. Rates were nearly 2.5 times higher for Blacks than for Whites or Hispanics.

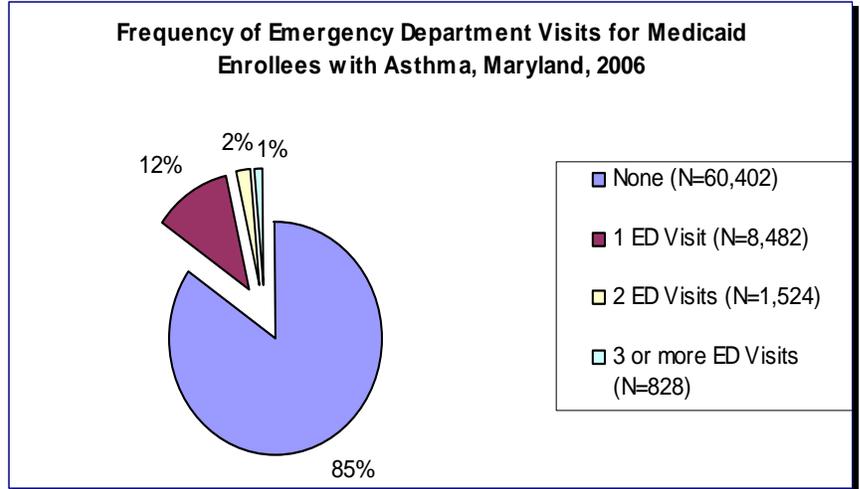
Figure 6-4



Source: Maryland Medicaid

Most Medicaid enrollees with a principal diagnosis of asthma required no emergency department visits in 2006 (60,402 or 84.8%). Twelve percent had one emergency department visit, and 2.1% had two or more visits in 2006.

Figure 6-5



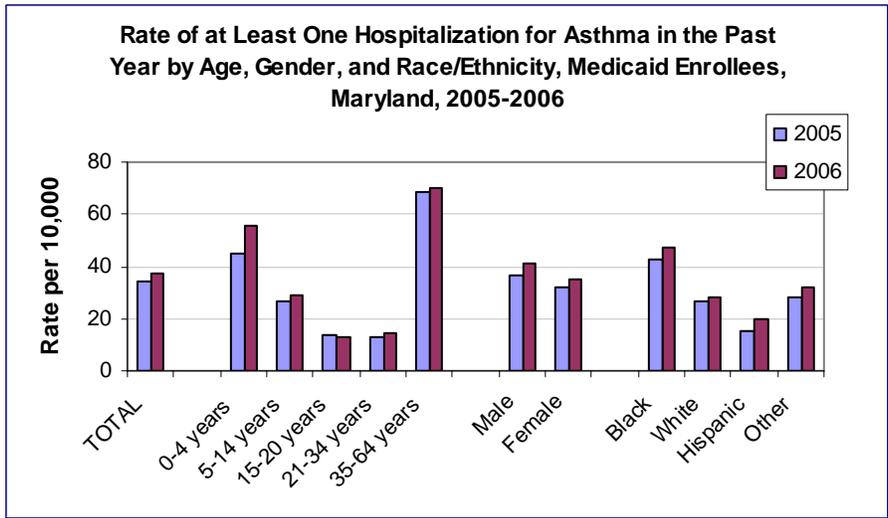
Source: Maryland Medicaid

MEDICAID ENROLLEES AND ASTHMA - Continued

Hospitalizations

The rate of hospitalization for asthma was 37.6 per 10,000 Medicaid Enrollees in 2006. Hospitalizations among children were highest for enrollees 0-4 years of age (55.7 hospitalizations per 10,000 enrollees). Among adults, hospitalization rates were highest for those age 35-64 years (69.8 hospitalizations per 10,000 enrollees). Rates were higher for Blacks than any other racial or ethnic group.

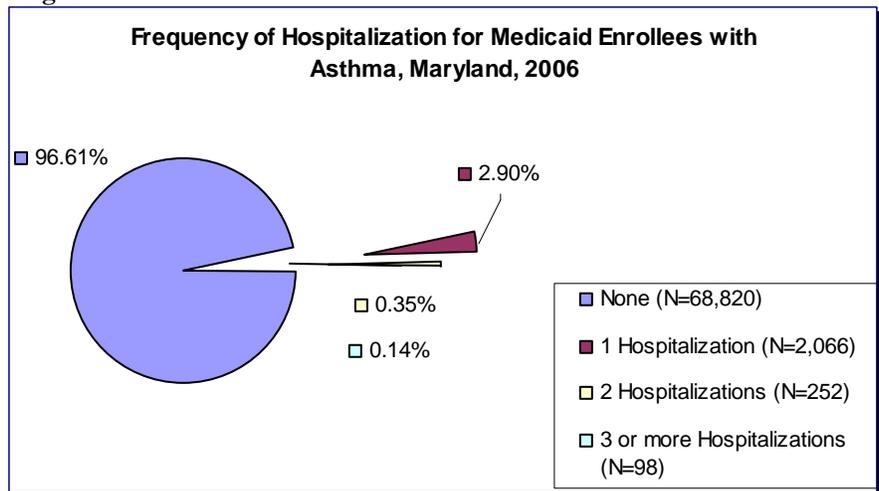
Figure 6-6



Source: Maryland Medicaid

The overwhelming majority of Medicaid enrollees with asthma had no hospitalization for asthma in 2006. Only 3.4% were hospitalized one or more times.

Figure 6-7



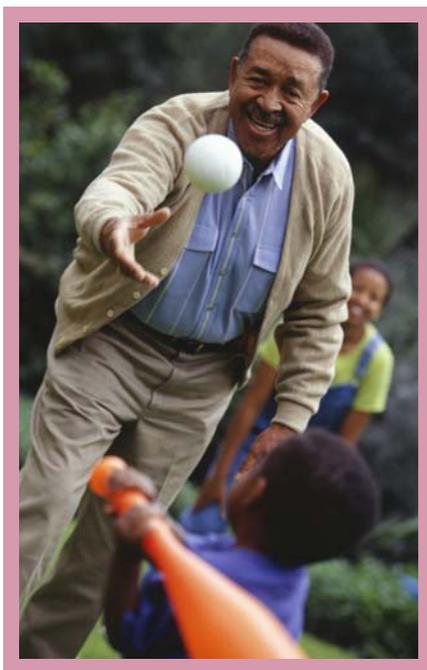
Source: Maryland Medicaid

DEATHS

Mortality from asthma is potentially preventable. Therefore, to some extent, trends in asthma mortality reflects 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. Until 1998, asthma deaths were defined as having a primary cause of death with an ICD-9-CM code of 493.0-493.9. Since 1999, asthma deaths were defined as having a primary cause of death with ICD-10 of J45 to J46. These data included deaths of Maryland residents that occurred in Maryland. Data from 1989-2006 also include out-of-state deaths of Maryland residents. Mortality rates have been age-adjusted to the 2000 U.S. standard population.

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. "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.

In 2006, 55 Maryland residents died from asthma as the underlying cause of death. Asthma contributed to the death of an additional 138 Maryland residents (Table 7-1). Because of the small numbers of deaths each year, five-year averages are calculated.



DEATHS - Continued

Table 7-1 Asthma Deaths Among Maryland Residents, 1989-2006

Year	Number of Deaths, Asthma as Underlying Cause	Number of Deaths, Asthma as Underlying or Contributing Cause¹
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

Source: Maryland Vital Statistics Administration

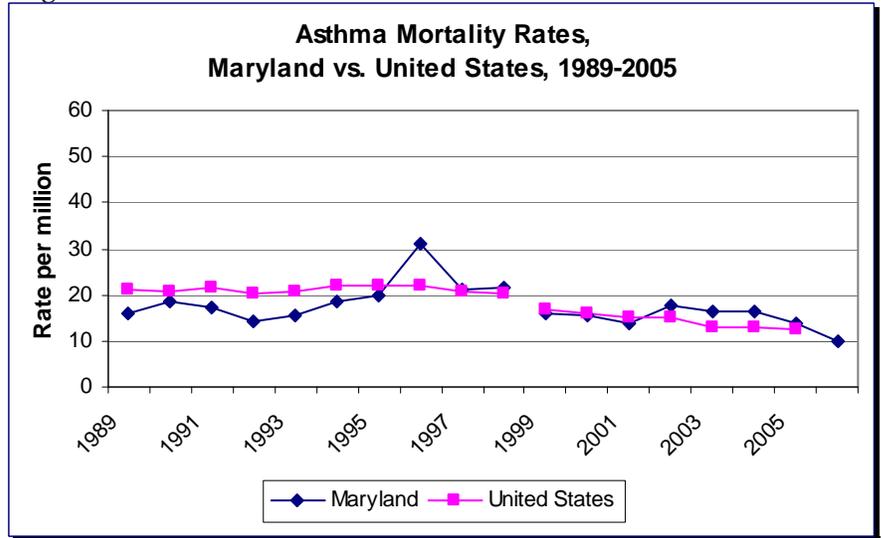
¹ Number of asthma deaths, as underlying or contributing causes, presented in this report may differ from prior reports due to revised datasets.

DEATHS - Continued

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

The age adjusted mortality rate in 2006 was 9.8 deaths per 1,000,000 population.

Figure 7-1

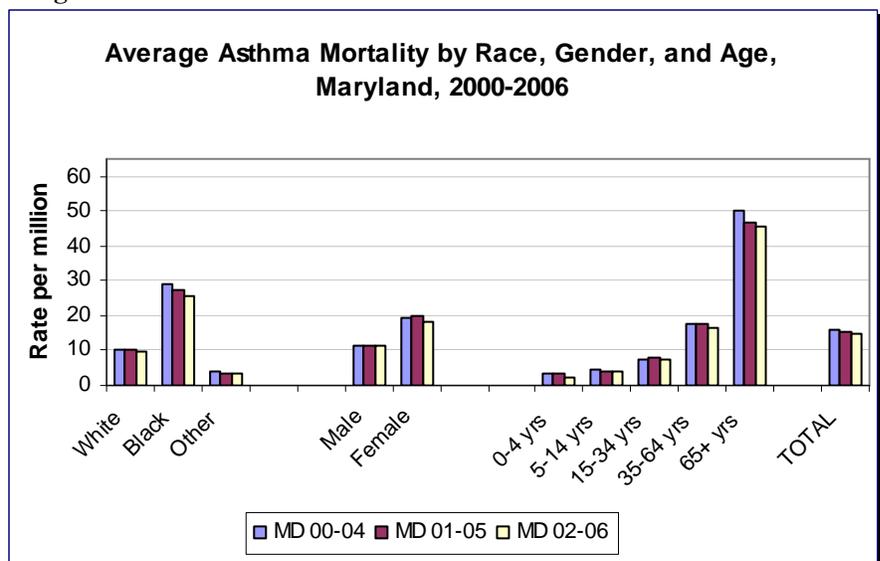


Source: Maryland Vital Statistics Administration, NCHS CDC WONDER
Rates are age adjusted to the 2000 U.S. standard population

From 2002-2006, an average of 81 Maryland residents died each year from asthma as an underlying cause; a rate of 14.7 deaths per 1,000,000 population. The 5-year average mortality rate is highest for Blacks, females, and older adults age 65 years and above.

Disparities in asthma mortality continue to exist, both in Maryland and nationally. Blacks continue to die at a rate nearly three times higher than that for Whites (2002-2006 mortality rate of 25.7 vs. 9.8 per 1,000,000, respectively). Women have nearly twice the mortality rate of men (2002-2006 mortality rate of 18.1 vs. 11.2 per 1,000,000, respectively). Asthma mortality rates are highest in the elderly and lowest in children under 15 years of age (2002-2006 mortality rate of 45.5 vs. 3.3 per 1,000,000, respectively).

Figure 7-2

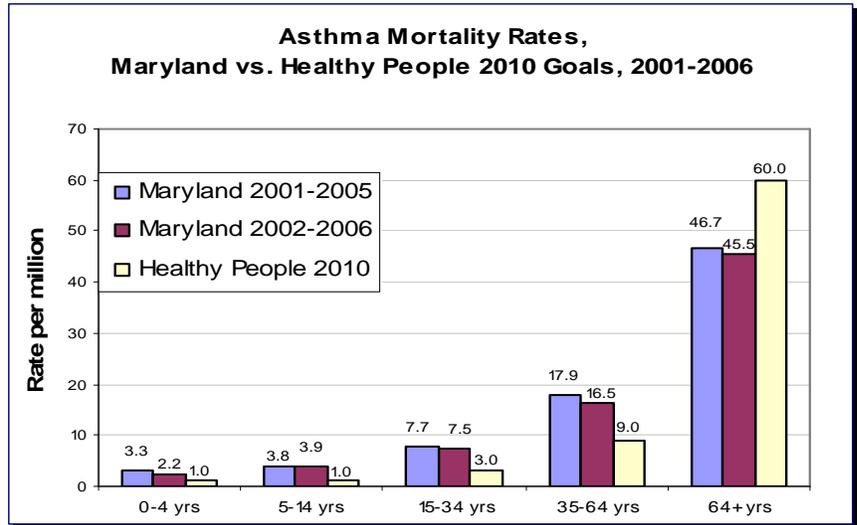


Source: Maryland Vital Statistics Administration.
Total mortality rate, and rates by race and gender are age adjusted to the 2000 U.S. standard population

DEATHS - Continued

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.

Figure 7-3



Source: Maryland Vital Statistics Administration, Healthy People 2010 Midcourse Review, U.S. Department of Health and Human Services, 2006. Rates are age adjusted to the 2000 standard population

While recent decreases in asthma mortality are encouraging, 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 many disparities in asthma morbidity and mortality. For example, among Maryland adults, Blacks have a higher asthma prevalence than Whites, and adult women are more likely to have asthma than men. In addition, persons with low income and low educational level are disproportionately burdened by asthma. 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 as compared to older asthmatics. Blacks have higher asthma mortality rates than Whites.

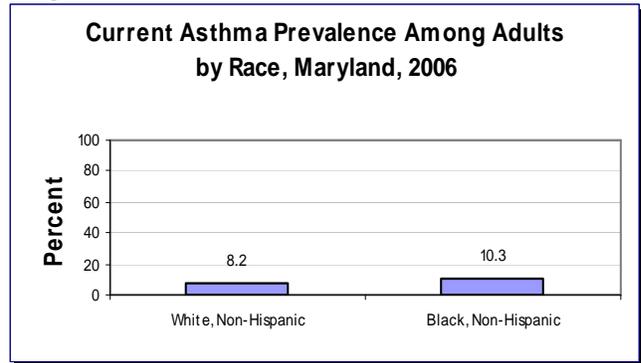
For some groups, increased rates of hospitalization, emergency department visit, and mortality may be a direct result of the increased prevalence of asthma in those groups. For example, if one group had twice the prevalence of asthma, that group might be expected to also have twice the rate of hospitalizations, emergency department visits, and deaths. In order to examine whether increased 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 8-1 through 8-4 provide the rate of hospitalization, ED visits, and mortality for Blacks and Whites. The disparity ratio for these measures are presented in Figure 8-5.



DISPARITIES AND ASTHMA - Continued

The current asthma prevalence was higher among Black, non-Hispanic adults (10.3%) than White non-Hispanic adults (8.2%). However, there were no statistical significant difference in current asthma prevalence among adults by race/ethnicity.

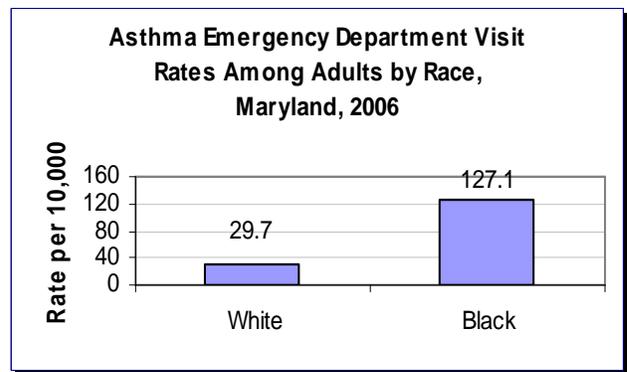
Figure 8-1



Source: Maryland BRFSS.

Black adults in Maryland had a higher rate of emergency department visits than White adults (127.1 vs. 29.7 per 10,000).

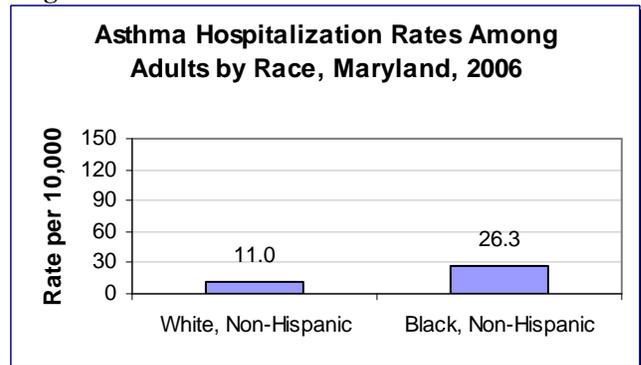
Figure 8-2



Source: HSCRC
 HSCRC does not collect data on ethnicity
 Rates are age adjusted to 2000 U.S. standard population

Black non-Hispanic adults in Maryland had a higher hospitalization rate than White adults (26.3 vs. 11.0 hospitalizations per 10,000).

Figure 8-3

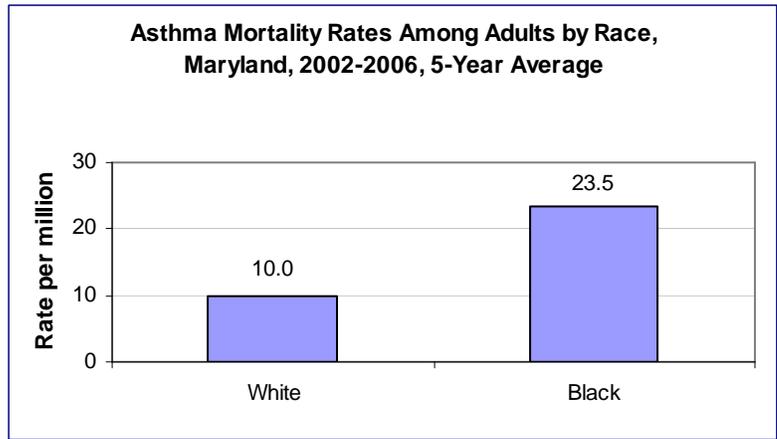


Source: HSCRC
 Rates are age adjusted to 2000 U.S. standard population

DISPARITIES AND ASTHMA - Continued

Black adults in Maryland had a higher mortality rate than White adults (23.5 vs. 10.0 deaths per million).

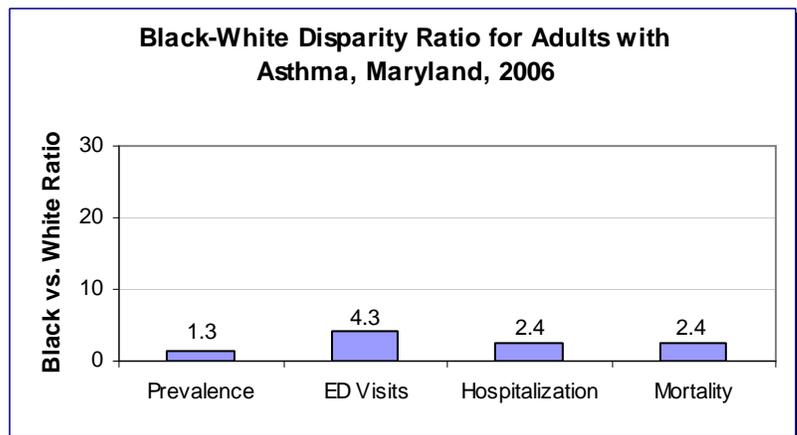
Figure 8-4



Source: Maryland Vital Statistics Administration
Rates are age adjusted to 2000 U.S. standard population

Black adults in Maryland had a 1.3 times higher asthma prevalence than White adults (10.3% vs. 8.2%). However, they had a 4.3 times significantly higher rate of emergency department visits (127.1 vs. 29.7 visits per 10,000), a 2.4 times significantly higher hospitalization rate (26.3 vs. 11 hospitalizations per 10,000), and a 2.4 times significantly higher mortality rate (23.5 vs. 10.0 deaths per million).

Figure 8-5



Source: MARYLAND BRFSS, HSCRC, Vital Statistics Administration
Rates are age adjusted to 2000 U.S. standard population

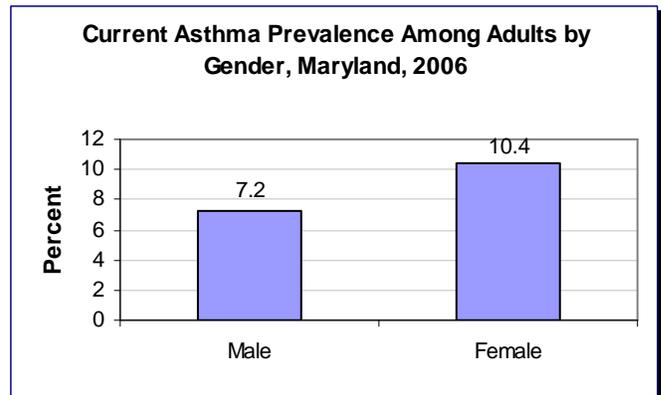
The increased asthma morbidity and mortality among Blacks cannot be fully explained by higher prevalence. Other factors, such as higher asthma severity, poorer asthma control, and/or more limited access to health care may further explain these differences. Because of small sample sizes, it was not possible to conduct similar analyses for other minority groups.

DISPARITIES AND ASTHMA - Continued

Adult women 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, or hormones, or increased health care seeking 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 ratio are shown here.

Adult women in Maryland had a higher asthma prevalence than adult men (10.4% vs. 7.2%).

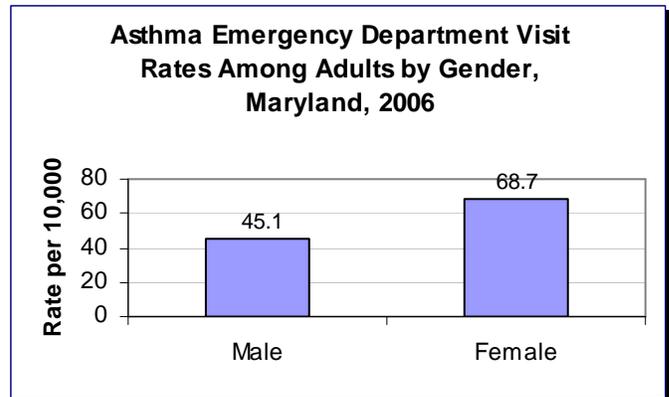
Figure 8-6



Source: Maryland BRFSS

Adult women in Maryland had a higher rate of emergency department visit than adult men (68.7% vs. 45.1%).

Figure 8-7



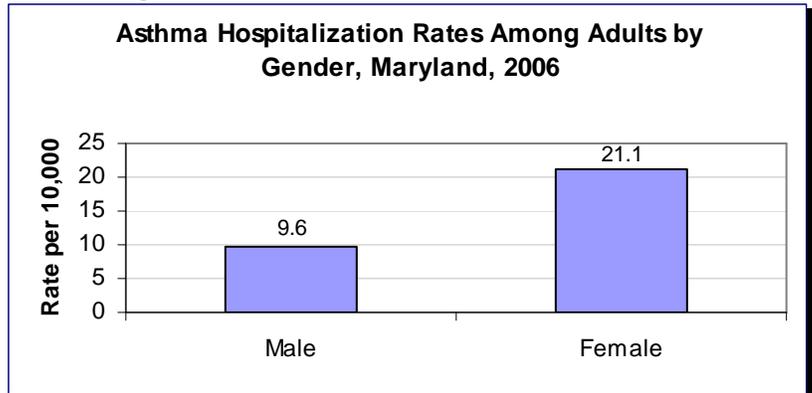
Source: HSCRC

Rates has been 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 (21.1 vs. 9.6 hospitalizations per 10,000).

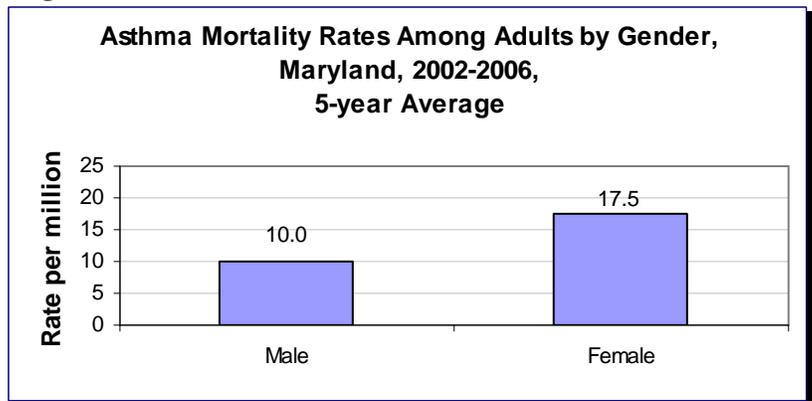
Figure 8-8



Source: HSCRC
Rate has been age adjusted to the 2000 U.S. standard population

Adult women in Maryland had a higher mortality rate than adult men (17.5 vs. 10.0 deaths per million).

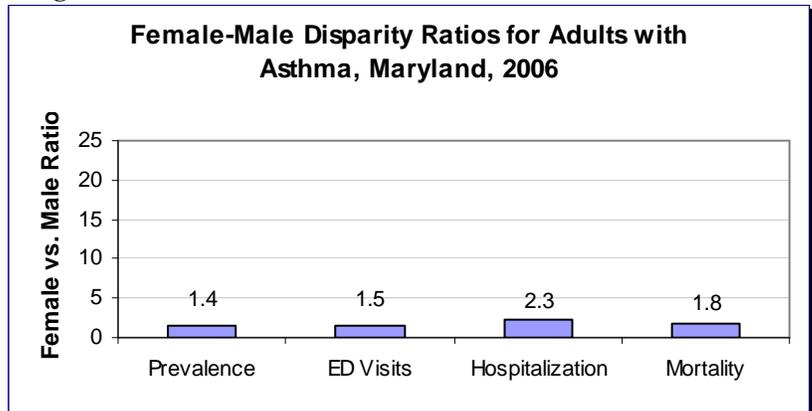
Figure 8-9



Source: Maryland Vital Statistics Administration
Rates are Age adjusted to 2000 U.S. standard population

The prevalence of asthma among Maryland women is 1.4 times higher than that among men (10.4% vs. 7.2%). Similarly, women have a 1.5 times higher emergency department visit rate (68.7 vs. 45.1 visits per 10,000) and a 1.8 times higher mortality rate (17.5 vs. 10 deaths per million). Therefore, much of the difference in emergency department visit and mortality rates by gender can be explained by the difference in prevalence. In contrast, women have a 2.3 times higher hospitalization rate (21.1 vs. 9.6 hospitalizations per 10,000), which cannot be explained solely by the increased prevalence of asthma among women.

Figure 8-10



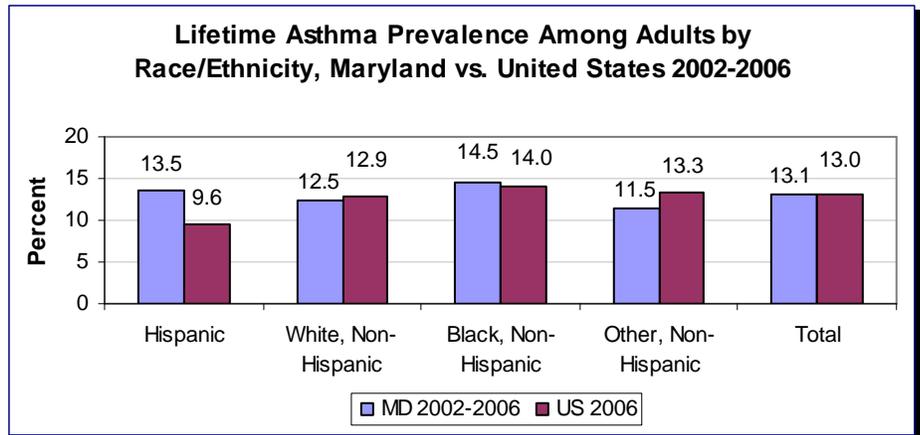
Source: MARYLAND BRFS, HSCRC, Vital Statistics Administration
Rates are age adjusted to 2000 U.S. standard population

ASTHMA AMONG MARYLAND HISPANICS

Data regarding Maryland Hispanics with asthma is somewhat limited. Prevalence data is available from the Behavioral Risk Factor Surveillance System (BRFSS), however, in Maryland the survey is only conducted in English. Beginning with 2007 data, the Maryland BRFSS will be administering the survey in Spanish. Because of the small sample size each year, five-year averages are calculated. Hospitalization data is available from the Health Services Cost Review Commission (HSCRC). The HSCRC does not collect data on ethnicity for emergency department visits.

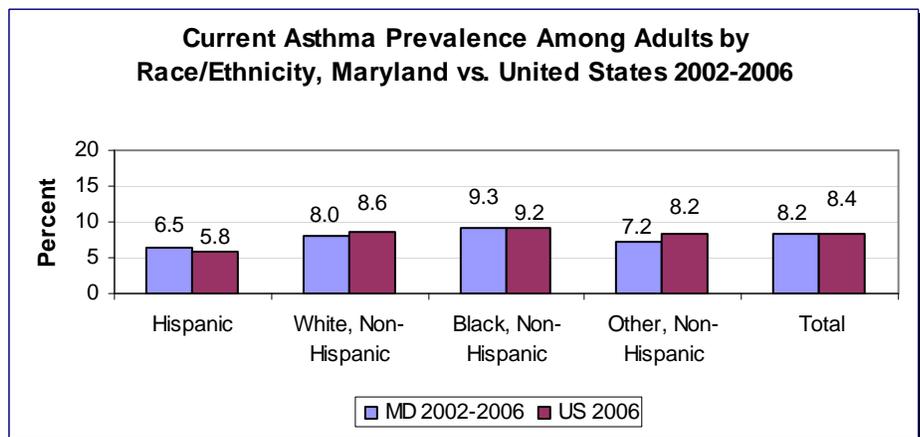
Between 2002 and 2006, the lifetime asthma prevalence was comparable between Maryland Hispanics adults and Maryland population as a whole.

Figure 9-1



Source: Maryland BRFSS

Figure 9-2



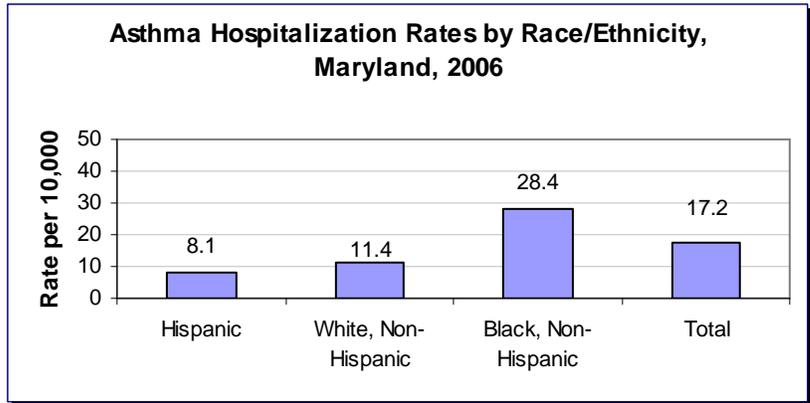
Source: Maryland BRFSS

The average current asthma prevalence among Maryland Hispanic adults was not significantly different to that of the Maryland population as a whole in 2002-2006.

ASTHMA AMONG MARYLAND HISPANICS — Continued

Hospitalization rates for Maryland Hispanics are lower than rates for other racial and ethnic groups.

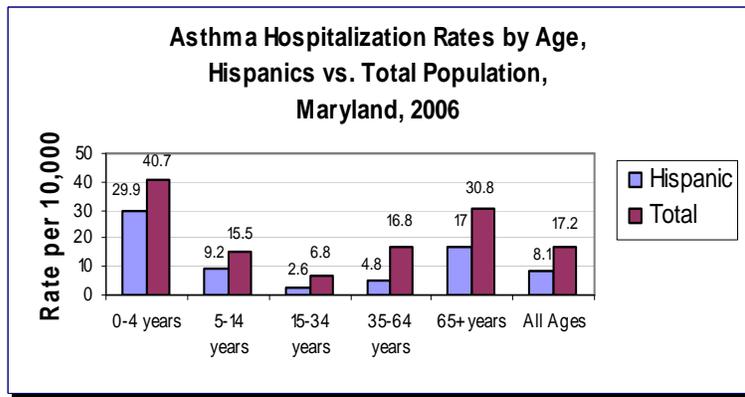
Figure 9-3



Source: HSCRC
 Rates by race/ethnicity are age adjusted to the 2000 U.S. standard population.
 Hospitalization data does not include Maryland asthmatics hospitalized out of state.

Differences in hospitalization rates between Hispanic and other racial and ethnic groups are larger for adults than children.

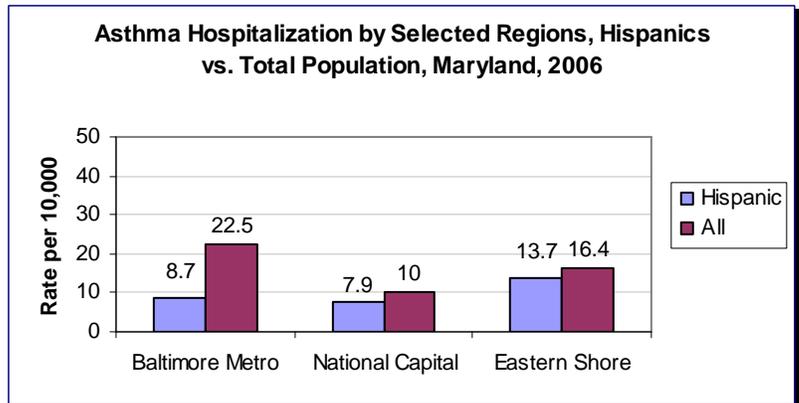
Figure 9-4



Source: HSCRC
 Hospitalization data does not include Maryland asthmatics hospitalized out of state.

Hospitalization rates for Hispanics in the Baltimore Metropolitan Area, the National Capital, and Eastern Shore area are lower than the hospitalization rates for the population as a whole in those areas.

Figure 9-5



Source: HSCRC
 Hospitalization data does not include Maryland asthmatics hospitalized out of state.

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 jurisdictional prevalence estimates. Sample sizes for each jurisdiction are relatively small per year, but greater stability of the estimates is obtained when years are combined. As with previous Maryland asthma surveillance reports, three years of data, 2004-2006, 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. Mortality data are presented for 2002-2006. Even when several years of data are combined, there may still 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 2006 only. Hospitalization data includes numbers of Maryland residents hospitalized in neighboring states (Delaware, Pennsylvania, and West Virginia) and the District of Columbia. Data were 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 the following two tables (10-1 and 10-2):

Lifetime and Current Prevalence from BRFSS. Percentages are weighted to the 2006 Maryland population.

Emergency Department and Hospitalization data from HSCRC

Mortality data from Maryland Vital Statistics Administration Five year average provided because of small numbers of deaths per year

All rates are age adjusted to the 2000 U.S. standard population

*Total ED visits includes 11 persons with county of residence unknown

*Total Hospitalizations includes Maryland residents hospitalized in Delaware.

Hospitalization data by county includes Maryland residents hospitalized in D.C., West Virginia, and Pennsylvania. Delaware data not included because Delaware does not collect data on Maryland county of residence.

**Rate significantly different from the State of Maryland rate ($p < 0.05$)

-- Rates with less than 5 events were not displayed

MARYLAND JURISDICTIONS AND ASTHMA - Continued

**Table 10-1: Lifetime and Current Asthma Prevalence, 2004-2006, Three-year average.
Emergency Department Visit and Hospitalization Rates, 2006.
Average Mortality Rate 2002-2006. Data by Region and Jurisdiction**

Jurisdiction	Lifetime Prevalence 2004-2006 Weighted Percent (95% CI)	Current Prevalence 2004-2006 Weighted Percent (95% CI)	ED Visits 2006 (Rate per 10,000)	Hospitalizations 2006 (Rate per 10,000)	Average Mortality 2002-2006 (Rate per 1,000,000)
NORTHWEST	12.8 (11.4-14.2)		52.9 **	16.7	15.2
Garrett	9.0 (5.6-12.4)	6.9 (3.8-10.0)	48.9 **	13.9	--
Allegany	12.4 (9.1-15.7)	8.0 (5.3-10.7)	94.0	34.8 **	--
Washington	12.9 (10.4-15.4)	9.0 (6.9-11.1)	64.3 **	10.8 **	22.7
Frederick	13.5 (11.4-15.6)	8.7 (7.0-10.5)	34.1 **	14.7	14.1
BALTIMORE METRO	13.3 (12.3-14.3)		109.1 **	22.7 **	17.2
Baltimore City	15.2 (13.0-17.5)	10.3 (8.4-12.2)	229.6 **	43.7 **	37.6 **
Baltimore County	14.0 (12.3-15.7)	9.6 (8.2-11.0)	89.4	20.3	14.5
Anne Arundel	12.6 (10.6-14.6)	7.6 (6.0-9.2)	61.6 **	13.7 **	9.0
Carroll	14.7 (11.3-18.2)	9.7 (6.8-12.6)	37.1 **	17.3	11.5
Howard	10.4 (7.9-12.9)	5.0 (3.2-6.8)	66.4 **	7.8 **	7.3
Harford	14.7 (11.6-17.8)	9.2 (6.7-11.7)	57.0 **	17.5	--
NATIONAL CAPITOL			56.9 **	12.9 **	12.1
Montgomery	12.0 (10.6-13.4)	7.3 (6.2-8.4)	44.3 **	9.7 **	9.7
Prince George's	15.4 (13.4-17.4)	8.3 (6.8-9.8)	70.8 **	16.8	31.4
SOUTHERN MD	11.6 (9.9-13.3)		50.8 **	16.8	15.4
Calvert	10.1 (7.0-13.2)	7.4 (4.7-10.1)	45.4 **	18.4	14.6
Charles	13.7 (10.8-16.7)	7.9 (5.6-10.2)	54.8 **	12.3 **	14.5
Saint Mary's	10.0 (7.2-12.8)	6.7 (4.3-9.1)	49.8 **	21.2	17.4
EASTERN SHORE	13.4 (12.1-14.7)		64.9 **	16.5	9.2
Cecil	14.7 (11.6-17.8)	7.5 (5.2-9.8)	45.5 **	23.5 **	15.8
Kent	13.4 (8.2-18.7)	10.0 (5.4-14.6)	70.1	19.4	--
Queen Anne's	10.7 (7.3-14.1)	5.9 (3.3-8.5)	40.3 **	9.5 **	--
Caroline	16.1 (11.2-21.0)	8.9 (5.1-12.7)	48.4 **	21.5	--
Talbot	11.3 (7.7-14.9)	6.6 (3.8-9.4)	62.4 **	14.7	--
Dorchester	17.3 (12.4-22.2)	9.2 (5.4-13.0)	121.6 **	24.1	--
Wicomico	14.2 (11.0-17.5)	10.2 (7.4-13.0)	85.8	15.1	--
Somerset	16.5 (9.9-23.1)	14.9 (8.6-21.2)	74.5	13.9	--
Worcester	8.2 (5.1-11.3)	5.2 (2.7-7.7)	61.7 **	8.9 **	--
TOTAL	13.4 (12.9- 14.0)	8.3 (7.9-8.8)	80.4	18.4	14.7

MARYLAND JURISDICTIONS AND ASTHMA - Continued

Table 10-2: Number of Residents with Lifetime and Current History of Asthma 2004-2006, Three-year Average. Total Number of Emergency Department Visits and Hospitalizations, 2006. Average Number of Deaths, 2002-2006. Data by Region and Jurisdiction.

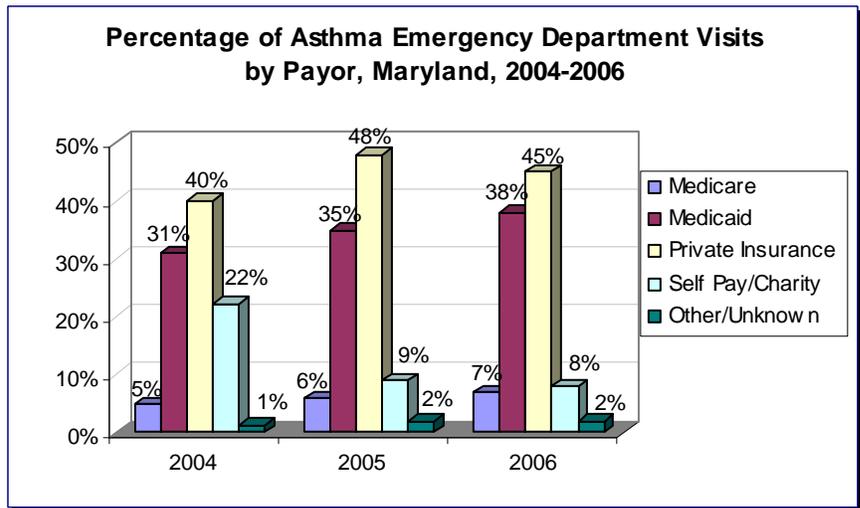
Jurisdiction	Number of Residents Who Ever Had Asthma Ave. 2004-06	Number of Residents Who Currently Have Asthma Ave. 2004-06	Number of Emergency Department Visits 2006	Number of Hospitalizations 2006	Average Number of Deaths per Year 2002-2006
NORTHWEST			2,404	787	7.2
Garrett	2,510	1,897	136	47	<1
Allegany	6,947	4,442	628	277	<1
Washington	13,823	9,569	883	152	3.4
Frederick	22,346	14,287	757	311	2.6
BALTIMORE METRO			27,507	5,956	44.4
Baltimore City	70,031	46,914	14,289	2,767	24.0
Baltimore County	83,538	56,800	6,458	1,590	12.2
Anne Arundel	47,384	28,659	3,052	697	3.8
Carroll	19,931	13,050	611	288	1.8
Howard	22,117	10,521	1,762	201	1.8
Harford	27,127	18,865	1,335	413	<1
NATIONAL CAPITOL			10,062	2,281	20.4
Montgomery	87,161	52,734	4,015	904	8.8
Prince George's	89,072	48,094	6,047	1,377	11.6
SOUTHERN MD			1,666	520	4
Calvert	5,727	4,215	398	153	1.2
Charles	13,612	7,850	772	170	1.4
Saint Mary's	7,391	4,914	496	197	1.4
EASTERN SHORE			2,658	729	4.4
Cecil	12,008	6,120	447	230	1.4
Kent	2,190	1,646	130	41	<1
Queen Anne's	3,551	1,941	180	44	<1
Caroline	4,173	2,263	155	70	<1
Talbot	3,340	1,936	190	54	<1
Dorchester	4,387	2,334	338	81	<1
Wicomico	9,614	6,809	767	139	<1
Somerset	2,279	2,053	172	29	<1
Worcester	3,359	2,120	279	41	<1
TOTAL	563,617	348,112,	44,308*	10,332*	81.2

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 Health Services Cost Review Commission (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 2006 were \$57,052,803. Emergency department visits accounted for an additional \$27,220,264. The average charge for an inpatient stay for asthma in 2006 was \$5,898. The average charge for an emergency department visit for asthma was \$614.

Between 2004 and 2006, there was an increase in the percentage of asthma ED visits for patients with private insurance. A larger percentage of ED visits were covered by public insurance, including Medicare and Medicaid.

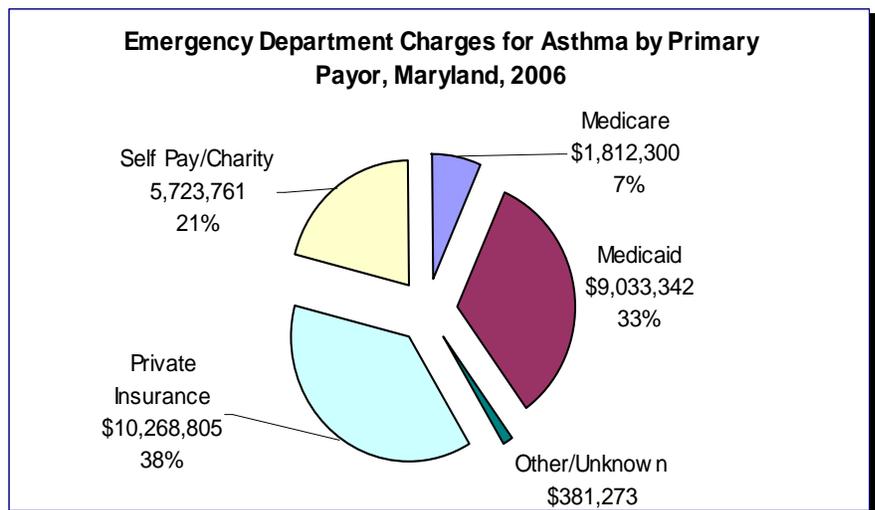
Figure 11-1



Source: HSCRC

Figure 11-2

In 2006, private insurance incurred 38% of the total asthma ED visit costs. Public insurance, on the other hand, incurred approximately 40% of the total ED visits. Of the total public insurance cost, Medicaid acquired 83% of the costs.

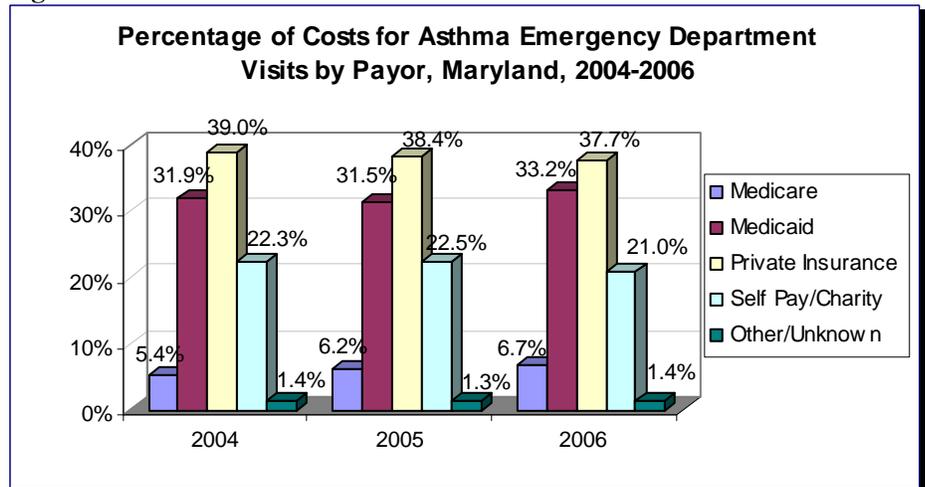


Source: HSCRC

COSTS OF ASTHMA - Continued

Between 2004 and 2006, the percentage of asthma ED costs paid for by private insurance decreased, while the percentage covered by public insurance increased.

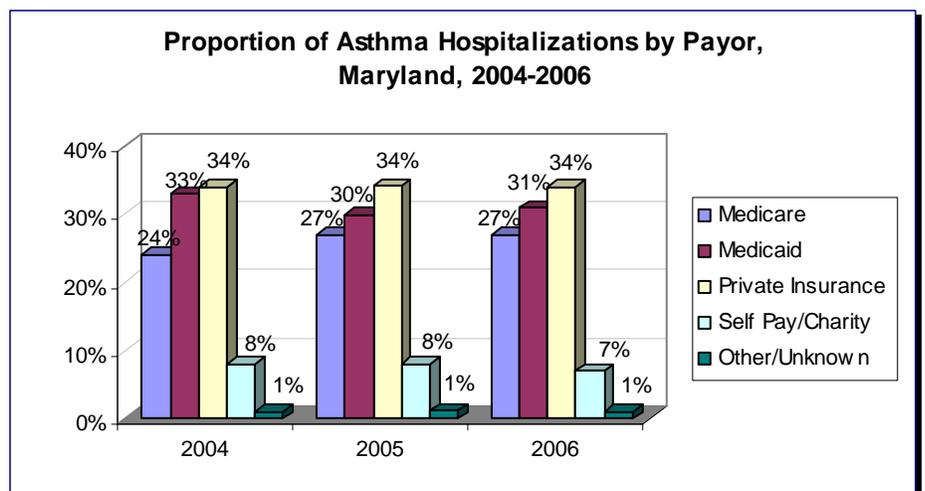
Figure 11-3



Source: HSCRC

Between 2004 and 2006, private insurance was the source of payment for 34% of asthma hospital discharges in Maryland. Public insurance, including Medicaid and Medicare, were the payment source of approximately 58% of asthma hospital discharges in 2006.

Figure 11-4

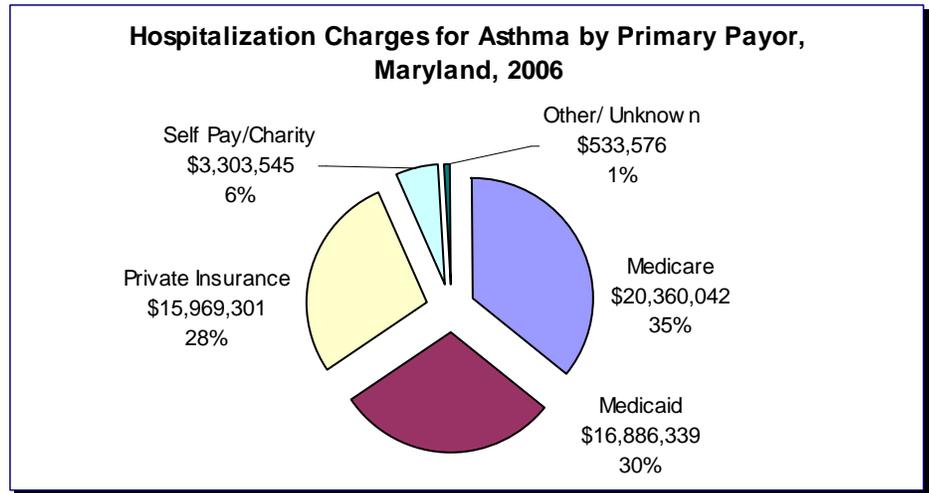


Source: HSCRC

COSTS OF ASTHMA - Continued

In 2006, private insurance incurred 28% of the total asthma hospitalization costs. Public insurance, on the other hand, incurred approximately 65% of the total hospitalizations. Of the total public insurance cost, Medicaid acquired 45% of the costs.

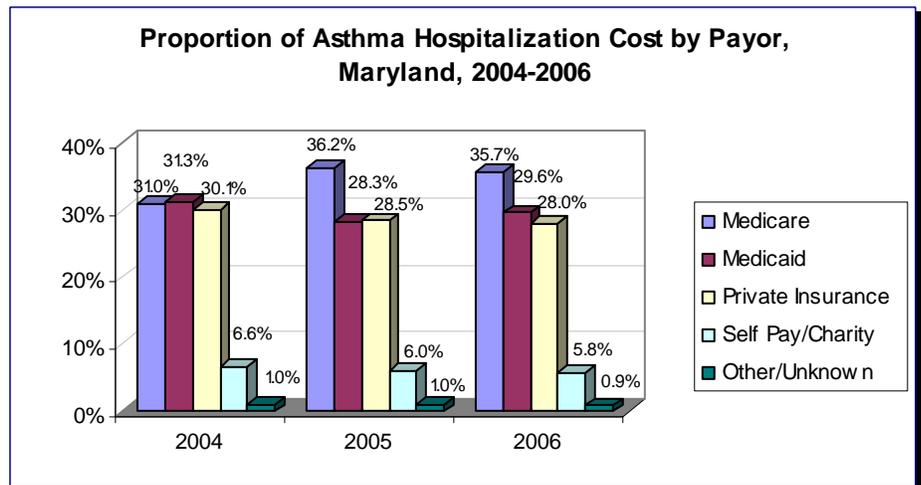
Figure 11-5



Source: HSCRC

Between 2004 and 2006, the percentage of asthma hospitalization costs paid for by private insurance decreased, while the percentage covered by public insurance increased.

Figure 11-6



Source: HSCRC

CONCLUSIONS

This report confirms that asthma continues to be a major public health problem in Maryland. An estimated 13.4% of Maryland adults and 13.1% of Maryland children have been diagnosed with asthma. An estimated 8.9% of adults and 9.1% of children in Maryland currently have asthma. These prevalence rates continue to increase over the past several years. Emergency department visit rates decreased for most groups, though they did increase slightly for males and persons under the age of 15 years. Similarly, hospitalization rates decreased for Whites and persons 35 years and older, but also increased slightly for all other groups. Asthma prevalence, hospitalization rates, emergency department visit rates, and mortality rates still remain well above the Healthy People 2010 goals.

As indicated in the chapters on disparities and on Medicaid enrollees, asthma and its complications continue to disproportionately affect the very young, the elderly, Blacks, low-income individuals, and individuals in certain jurisdictions, particularly Baltimore City. The monetary cost of asthma hospitalizations and emergency department visits is substantial, and are increasingly borne by Medicare and Medicaid. Additional tracking of asthma prevalence, morbidity and mortality is vital to improve understanding of individual and environmental contributing factors. Information gleaned 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. Because 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 through ongoing surveillance activities.



FUTURE DIRECTIONS

The Maryland Asthma Control Program (MACP) expects to continue to produce ongoing asthma surveillance reports and data briefs. Findings from new datasets will be included in future reports. Next year's report will for the first time include an analysis of data from the CDC Asthma Call-Back Survey on such issues as medication usage, and use of an asthma action plan and other self-management practices of persons with asthma. Efforts are also underway to assess the burden of asthma among the privately insured population as well as Marylanders in school, child care and workplace settings. MACP is spearheading a Surveillance Workgroup that will identify additional data sources and recommend ways to ensure consistency and clarity of data presentation. Finally, MACP will continue its ongoing evaluation of the surveillance system to ensure its effectiveness.



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Appendix – 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, Children Ages 0-17, Maryland, 2001-2006

Year	Maryland Prevalence (95% Confidence Interval)
2001	10.6% (NA)
2002	11.0% (NA)
2003	11.1% (NA)
2004	10.2% (NA)
2005	13.5% (11.3%-15.7%)
2006	13.1% (11.5%-14.7%)

Figure 1-2: Trend in Current Asthma Prevalence, Children Ages 0-17, Maryland, 2003-2006

Year	Maryland Prevalence (95% CI)
2003	8.6% (NA)
2004	7.6% (NA)
2005	9.2% (7.3%-11.1%)
2006	9.1% (7.8%-10.4%)

Figure 1-3: Current Asthma Prevalence Among Children Ages 0-17 by Gender, Maryland, 2005-2006 Combined (Raw sample size = 373)

Gender	Prevalence (95% CI)
Male	10.5% (8.9-12.1%)
Female	7.7% (6.2%-9.2%)

Appendix – 95% Confidence Intervals for BRFSS Data - Continued

Figure 1-4: Current Asthma Prevalence Among Children Ages 0-17 by Race/Ethnicity, Maryland, 2005-2006 Combined (Raw sample size =358)

Race/Ethnicity	Prevalence (95% CI)
White, Non-Hispanic	7.3% (6.1%-8.5%)
Black, Non-Hispanic	10.7% (8.0%-13.4%)
Hispanic	10.7% (5.1%-16.3%)
Asian, Non-Hispanic	7.0% (1.4%-12.6%)
Other, Non-Hispanic	11.7% (1.7%-21.7%)

Figure 1-5: Current Asthma Prevalence Among Children Ages 0-17 by Age, Maryland, 2005-2006 Combined (Raw sample = 350)

Age	Maryland Prevalence (95% CI)
< 2 years	1.7% (0.2%-3.2%)
2-5 years	9.4% (6.8%-12.0%)
6-11 years	10.1% (7.9%-12.3%)
12-17 years	10.7% (8.8%-12.6%)

Figure 1-6: Lifetime Asthma Prevalence Among Adult, Maryland vs. United States, 2000-2006

Year	Maryland Prevalence (95% CI)	U.S. Prevalence (95% CI)
2000	10.6% (9.5%-11.7%)	10.6% (NA)
2001	11.1% (10.0%-12.2%)	11.2% (NA)
2002	12.7% (11.5%-13.9%)	11.8% (NA)
2003	12.3% (11.1%-13.5%)	11.7% (11.5%-11.9%)
2004	13.9% (12.7%-15.2%)	13.3% (13.1%-13.6%)
2005	13.1% (12.2%-14.0%)	12.6% (12.4%-12.9%)
2006	13.4% (12.5%-14.3%)	13.0% (12.8%-13.3%)

Appendix – 95% Confidence Intervals for BRFSS Data

Figure 1-7: Current Asthma Prevalence Among Adult, Maryland vs. United States, 2000-2006

Year	Maryland Prevalence (95% CI)	U.S. Prevalence (95% CI)
2000	7.3% (6.4%-8.2%)	7.3% (NA)
2001	7.1% (6.2%-8.0%)	7.3% (NA)
2002	8.2% (7.2%-9.2%)	7.6% (NA)
2003	7.8% (6.8%-8.8%)	7.6% (7.5%-7.7%)
2004	7.8% (6.8%-8.8%)	8.3% (8.1%-8.5%)
2005	8.3% (7.6%-9.0%)	8.0% (7.8%-8.2%)
2006	8.9% (8.2%-9.6%)	8.4% (8.1%-8.7%)

Figure 1-8: Current Asthma Prevalence Among Adult by Gender, Maryland, 2004-2006 Combined (Raw sample size = 1,849)

Gender	Prevalence (95% CI)
Male	6.3% (5.7% – 6.9%)
Female	10.2% (9.6% – 10.8%)

Figure 1-9: Current Asthma Prevalence Among Adult by Race/Ethnicity, Maryland, 2004-2006 Combined (Raw sample size = 1,821)

Race/Ethnicity	Prevalence (95% CI)
White, Non-Hispanic	8.0% (7.5% - 8.5%)
Black, Non-Hispanic	9.4% (8.2% - 10.5%)
Hispanic	6.8% (4.1% - 9.5%)
Other, Non-Hispanic	7.5% (5.2% - 9.8%)
Multi-race, Non-Hispanic	12.4% (6.6% - 18.2%)

Appendix – 95% Confidence Intervals for BRFSS Data - Continued

Figure 1-10: Current Asthma Prevalence Among Adult by Age, Maryland, 2004-2006 Combined (Raw sample size = 1,823)

Age	Prevalence (95% CI)
18-24 years	10.8% (8.4% - 13.2%)
25-34 years	8.9% (7.6% - 10.2%)
35-44 years	7.6% (6.6% - 8.6%)
45-54 years	8.6% (7.6% - 9.6%)
55-64 years	8.2% (7.2% - 9.2%)
65-74 years	7.8% (6.6% - 9.1%)
75+ years	5.7% (4.5% - 6.9%)

Figure 1-11: Current Asthma Prevalence Among Adult by Education Level, Maryland, 2004-2006 Combined (Raw sample size = 1,846)

Education Level	Prevalence (95% CI)
Less than High School Graduate	12.0% (9.9% - 14.1%)
High School Graduate/GED	9.0% (8.1% - 9.9%)
Some College/Technical School	8.8% (7.9% - 9.7%)
College Graduate	7.2% (6.6% - 7.8%)

Figure 1-12: Current Asthma Prevalence Among Adult by Household Income, Maryland, 2004-2006 Combined (Raw sample size = 1,596)

Income	Prevalence (95% CI)
<\$15,000	15.3% (12.9% - 17.7%)
\$15,000-\$24,999	10.5% (8.9% - 12.1%)
\$25,000-\$49,999	8.2% (7.2% - 9.2%)
\$50,000-\$74,999	7.3% (6.3% - 8.4%)
>=\$75,000	7.3% (6.6% - 8.0%)

Appendix – 95% Confidence Intervals for BRFSS Data - Continued

Figure 2-1: Asthma Status of Adult Smokers, Maryland, 2004-2006
(Raw sample size = 21,746)

Smoking Category	% With Current Asthma (95% CI)	% With Past Asthma (95% CI)	% Never Had Asthma (95% CI)
Current Smoker-Daily	9.0% (7.7%-10.3%)	5.3% (4.3%-6.3%)	85.7% (84.1%-87.3%)
Current Smoker-Some	11.5% (9.0%-14.0%)	6.5% (4.6%-8.4%)	82.0% (79.0%-85.0%)
Former Smoker	8.3% (7.4%-9.2%)	5.0% (4.3%-5.7%)	86.7% (85.6%-87.8%)
Never Smoked	8.0% (7.4%-8.6%)	4.2% (3.8%-4.6%)	87.9% (87.2%-88.6%)

Figure 2-2: Smoking Status of Adult Asthmatics, Maryland, 2004-2006
(Raw sample size = 21,746)

Asthma Status	% Current Daily Smokers	% Current Smokers- Some Days	% Former Smokers	% Never Smoked
Current Asthma	14.7% (12.7%-16.7%)	7.0% (5.6%-8.4%)	22.6% (20.3%-24.9%)	55.8% (53.0%-58.6%)
Past Asthma	15.6% (12.6%-18.6%)	7.1% (5.0%-9.3%)	24.7% (21.1%-28.3%)	52.6% (48.4%-56.8%)
Never Had Asthma	13.4% (12.8%-14.0%)	4.8% (4.4%-5.2%)	22.7% (22.0%-23.4%)	59.1% (58.3%-60.0%)

Figure 2-3: Percent of Adults Receiving Influenza Vaccination by Current History of Asthma, Maryland, 2006

	Flu Shot in the Past Year	
	% YES (95% CI)	% NO (95% CI)
Current Asthma	37.5% (33.2%-41.8%)	62.5% (58.2%-66.8%)
No Current Asthma	29.5% (23.0%-36.0%)	70.5% (64.0%-77.0%)

Appendix – 95% Confidence Intervals for BRFSS Data - Continued

Figure 2-4: Perceived Health Status of Persons who Currently Have Asthma vs. Persons Who Do Not, Maryland, 2004-2006 Combined (Raw sample size = 21,744)

Health Status	Percent With Asthma (95% CI)	Percent Without Asthma (95% CI)
Excellent/Very Good	45.9% (42.6%-49.3%)	58.9% (53.9%-64.0%)
Fair/Poor	24.3% (21.6%-26.9%)	11.8% (8.4%-15.3%)

Note: BRFSS includes five categories, Excellent, Very Good, Good, Fair, and Poor. For this comparison, we did not show the “Good” group, and we combined Excellent with Very Good, and Fair with Poor.

Figure 8-1: Current Asthma Prevalence Among Adults by Race, Maryland, 2006 (Raw sample size = 744)

Race/Ethnicity	Prevalence (95% CI)
White, Non-Hispanic	8.2% (7.4% - 9.0%)
Black, Non-Hispanic	10.3% (8.3% - 12.3%)

Figure 8-6: Current Asthma Prevalence Among Adults by Gender, Maryland, 2006 (Raw sample size = 757)

Race/Ethnicity	Prevalence (95% CI)
Male	7.2% (6.1% - 8.3%)
Female	10.4% (9.4% - 11.4%)

Appendix – 95% Confidence Intervals for BRFSS Data - Continued

Figure 9-1: Lifetime Asthma Prevalence Among Adult by Race/Ethnicity, Maryland vs. United States, 2002-2006

Race/Ethnicity	Maryland Prevalence (95% CI)	U.S. Prevalence (95% CI)
Hispanic	13.5% (10.5% - 16.5%)	9.6% (NA)
White, Non-Hispanic	12.5% (12.0% - 13.0%)	12.9% (NA)
Black, Non-Hispanic	14.5% (13.3% - 15.7%)	14.0% (NA)
Other, Non-Hispanic	11.5% (9.2% - 13.8%)	13.3% (NA)
Total	13.1% (12.6% - 13.5%)	13.0% (NA)

Figure 9-2: Current Asthma Prevalence Among Adult by Race/Ethnicity, Maryland vs. United States, 2002-2006

Race/Ethnicity	Maryland Prevalence (95% CI)	U.S. Prevalence (95% CI)
Hispanic	6.5% (4.3% - 8.7%)	5.8% (NA)
White, Non-Hispanic	8.0% (7.6% - 8.4%)	8.6% (NA)
Black, Non-Hispanic	9.3% (8.3% - 10.3%)	9.2% (NA)
Other, Non-Hispanic	7.2% (5.3% - 9.1%)	8.2% (NA)
Total	8.2% (7.9% - 8.6%)	8.4% (NA)

Appendix – 95% Confidence Intervals for BRFSS Data - Continued

Figure 10-1: Raw Sample Sizes for Asthma Lifetime and Current Prevalence by County, BRFSS 2004-2006

Jurisdiction	Sample Size	Lifetime Prevalence 2004-2006 Weighted Percent (95% CI)	Current Prevalence 2004-2006 Weighted Percent (95% CI)
NORTHWEST	429	12.8 (11.4-14.2)	
Garrett	40	9.0 (5.6-12.4)	6.9 (3.8-10.0)
Allegany	73	12.4 (9.1-15.7)	8.0 (5.3-10.7)
Washington	136	12.9 (10.4-15.4)	9.0 (6.9-11.1)
Frederick	180	13.5 (11.4-15.6)	8.7 (7.0-10.5)
BALTIMORE METRO	776	13.3 (12.3-14.3)	
Baltimore City	220	15.2 (13.0-17.5)	10.3 (8.4-12.2)
Baltimore County	309	14.0 (12.3-15.7)	9.6 (8.2-11.0)
Anne Arundel	194	12.6 (10.6-14.6)	7.6 (6.0-9.2)
Carroll	90	14.7 (11.3-18.2)	9.7 (6.8-12.6)
Howard	85	10.4 (7.9-12.9)	5.0 (3.2-6.8)
Harford	98	14.7 (11.6-17.8)	9.2 (6.7-11.7)
NATIONAL CAPITOL	628		
Montgomery	361	12.0 (10.6-13.4)	7.3 (6.2-8.4)
Prince George's	267	15.4 (13.4-17.4)	8.3 (6.8-9.8)
SOUTHERN MD	227	11.6 (9.9-13.3)	
Calvert	54	10.1 (7.0-13.2)	7.4 (4.7-10.1)
Charles	98	13.7 (10.8-16.7)	7.9 (5.6-10.2)
Saint Mary's	75	10.0 (7.2-12.8)	6.7 (4.3-9.1)
EASTERN SHORE	483	13.4 (12.1-14.7)	
Cecil	105	14.7 (11.6-17.8)	7.5 (5.2-9.8)
Kent	25	13.4 (8.2-18.7)	10.0 (5.4-14.6)
Queen Anne's	47	10.7 (7.3-14.1)	5.9 (3.3-8.5)
Caroline	49	16.1 (11.2-21.0)	8.9 (5.1-12.7)
Talbot	52	11.3 (7.7-14.9)	6.6 (3.8-9.4)
Dorchester	44	17.3 (12.4-22.2)	9.2 (5.4-13.0)
Wicomico	95	14.2 (11.0-17.5)	10.2 (7.4-13.0)
Somerset	30	16.5 (9.9-23.1)	14.9 (8.6-21.2)
Worcester	36	8.2 (5.1-11.3)	5.2 (2.7-7.7)
TOTAL	2,763	13.4 (12.9-14.0)	8.3 (7.9-8.8)

Appendix – 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.

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.

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.

Average Mortality Rate –

The average number of people dying from a disease within a specified time period

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.

Disparity Ratio – A measure comparing a specific group to another specific group which highlights the differences. For example, comparing Blacks to Whites, or Females to Males.

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. www.healthypeople.gov.

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

ICD-10 – International Classification of Disease, 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.

Level of Acuity – An assessment of the urgency of the visit. For example, from the Medicaid outpatient claims data, a person is unable to determine whether the outpatient visit was for a routine asthma check, an urgent care visit for asthma exacerbation, or a follow-up visit after an asthma exacerbation.

Appendix – 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 has 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.

Rate =

Number of events in a given time period

Number of people at risk of experiencing the event in that same time period

Rates are typically presented and interpreted per unit of population (e.g., 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).

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 the results to be generalized to the larger population that the sample was drawn from.

Appendix – Glossary of Terms - Continued**Acronyms**

BRFSS	Behavioral Risk Factor Surveillance System
CDC	United States Centers for Disease Control and Prevention
CI	Confidence Interval
ED	Emergency Department
HSCRC	Health Services Cost Review Commission
ICD	International Classification of Disease
NCHS	National Center for Health Statistics
WONDER	Wide-ranging Online Data for Epidemiologic Research



Martin O'Malley, Governor
Anthony G. Brown, Lieutenant Governor
John M. Colmers, Secretary, DHMH

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