



**pennsylvania**  
DEPARTMENT OF HEALTH

**2015**

# ASTHMA MORTALITY IN PENNSYLVANIA



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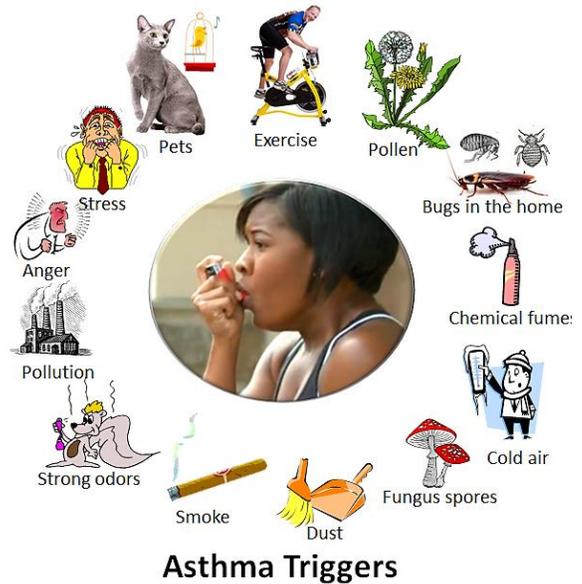
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## INTRODUCTION

Asthma, a chronic disease of the lungs characterized by wheezing, breathlessness, chest tightness, and coughing at night or early in the morning.<sup>3</sup> The cause(s) of asthma is not clear but several triggers have been associated with asthma. A combination of both genetic and environmental factors may predispose an individual to asthma.<sup>5</sup> Asthma triggers includes pollen, animal dander, mold, cockroaches, dust mites, tobacco smoke, physical activity, certain foods and medication. Asthma has no cure; however, its effective management has been shown to reduce the severity of symptoms.

Asthma affects all people of all ages. Worldwide, an estimated 334 million people have asthma.<sup>4</sup> In 2011 in the United States, 25.7 million persons have current asthma, of which 7.0 million were children and 18.7 million were adults. Among adults, an estimated 3.1 million people over sixty-five years of age are living with asthma. In children, more boys have asthma than girls. The reverse is true in adults. More adult females develop asthma compared to men.<sup>1</sup> The role of sex and hormones in the development of asthma is unclear.

Deaths due to asthma are a rare occurrence but do occur. An estimated 255,000 people worldwide die from asthma annually<sup>1</sup>. In the U.S, an estimated nine deaths occur daily.<sup>2</sup> This is of serious concern because asthma deaths are preventable through asthma education, proper management and control. Asthma will continue to be an important public health issue as the health department along with its partners work to reduce the burden of asthma and eliminate preventable deaths from asthma in the Commonwealth of Pennsylvania.



## METHODOLOGY

This section describes mortality data of Pennsylvania residents who died of asthma as noted on their death certificates from year 2003 to 2012. Deaths due to asthma as the underlying cause were classified using the ICD-10/ICD-9: J45-J46/493 code. Asthma deaths were combined in a three-year block and aggregated by age, gender, race/ethnicity to increase the reliability of the results.

Age-adjusted rates were calculated using the direct standardization method and presented per 100,000 population. 95% Confidence Intervals were calculated and displayed. Mortality rates for demographic units with a small number of events (less than 10) were not calculated and not displayed (ND) because these rates were statistically unreliable. The source of asthma mortality data is the Pennsylvania Department of Health, Bureau of Health Statistics and Research



## SUMMARY

The total number of deaths and age-adjusted mortality rates in Pennsylvania increased from 2010 to 2012. In 2010, there were 126 deaths due to asthma. In 2011, there were 129 deaths and in 2012 there were 145 deaths due to asthma.

In combined three year period from 2010-2012, there were 400 deaths due to asthma, a rate of 0.9 per 100,000 residents in Pennsylvania.

In 2010, of the 126 deaths due to asthma, 44 were males and 82 were females. In 2011, of the 129 deaths due to asthma, 46 were males while 83 were females. In 2012, of the 145 deaths due to asthma, 51 were males and 94 were females.

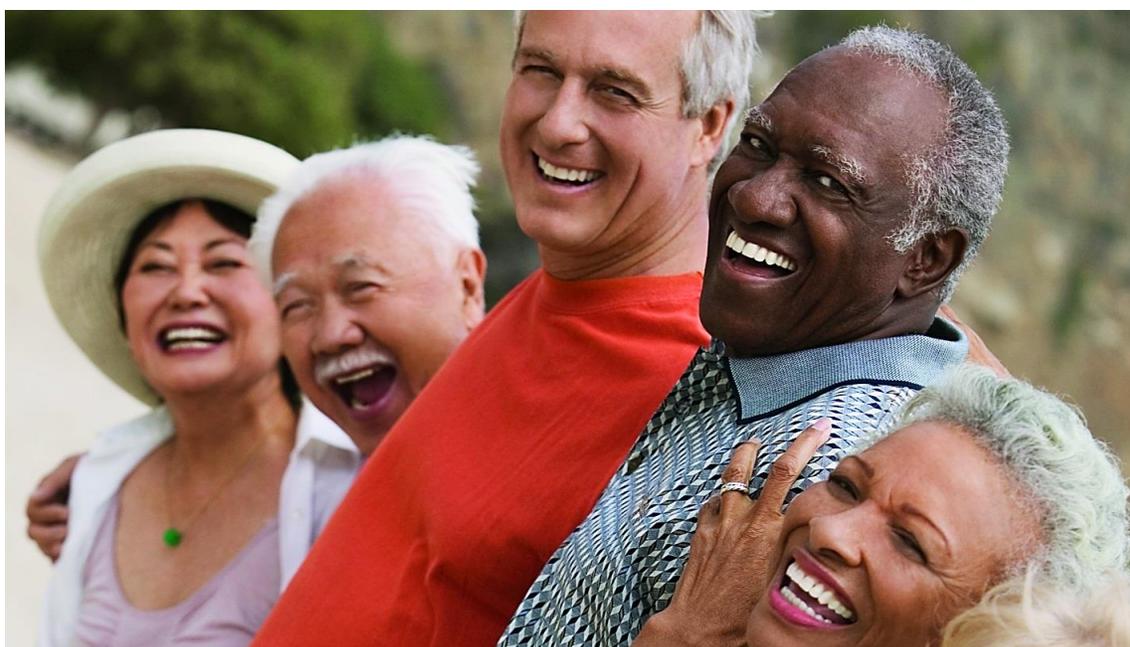
In combined three year period from 2010-2012, females had a higher proportion of deaths due to asthma compared to males (65% vs 35%). The age adjusted rates in females are higher than that of males but the difference is not statistically significant.

Blacks have consistently had higher death rates due to asthma than Whites. The rates in Blacks are approximately 3-4 times that of Whites during the three year period from 2010-2012.

In the U.S, asthma mortality rate presented in 2013 was 1.1 per 100,000. This is similar to the rates in Pennsylvania in combined in a three-year period from 2010-2012.

Asthma mortality rate increases with age, with persons age 85 and older having the highest mortality rate. However, advancing age and other co-morbidities such as Chronic Obstructive Pulmonary disease (COPD), diabetes might be responsible for the high death rates in this group.

Disparities in asthma death rates were observed with Blacks having higher death rates than Whites and females having higher death rates than males.



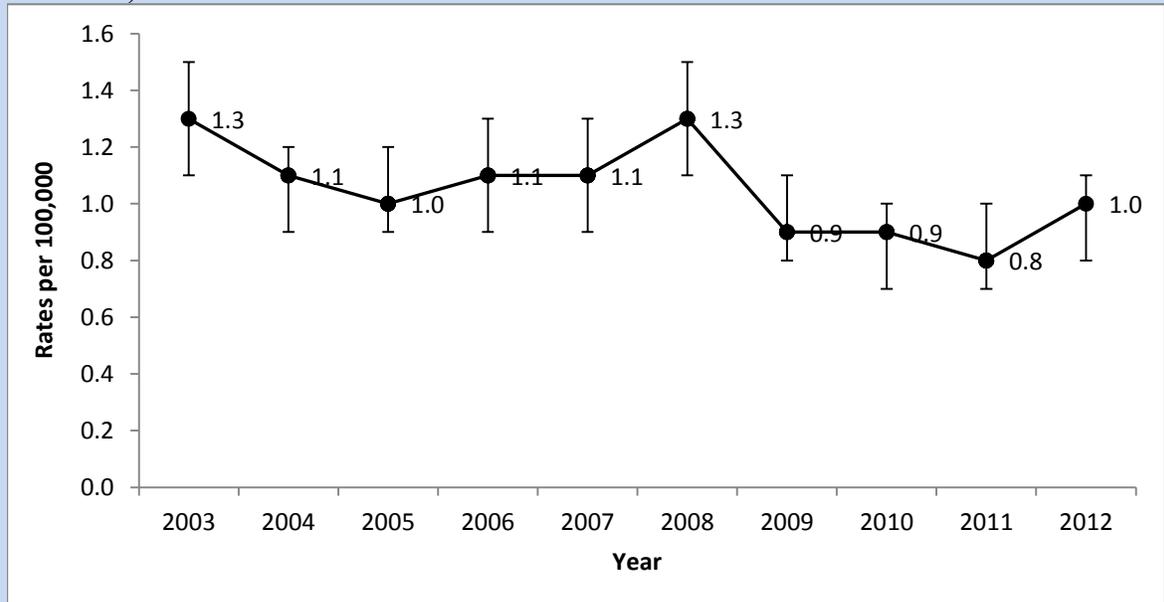
## MORTALITY TRENDS

### Age-Adjusted Mortality Rate from 2003-2012

The age-adjusted mortality rates for year 2004 - 2007 remained relatively the same at 1.1 deaths per 100,000. Two peak rates of 1.3 deaths per 100,000 residents were observed in 2003 and 2008. There is a subsequent decrease in mortality rate from 1.3 deaths per 100,000 in 2008 to 0.9 deaths per 100,000 in 2009. The death rates remained the same in 2009 and 2010, decreased slightly in 2011 and increased to 1.0 death per 100,000 in 2012. Overall, the death rates in Pennsylvania have remained relatively stable ranging from 0.8 to 1.3 deaths per 100,000 (figure 1).



**Figure 1: Trends in Age-adjusted Asthma Death Rates per 100,000 Pennsylvania Residents, PA 2003-2012.**



Data Source: Bureau of Health Statistics and Research, Pennsylvania Department of Health

\*Only includes death with asthma listed as the underlying cause

Vertical bars on the graph denote the 95% confidence interval.

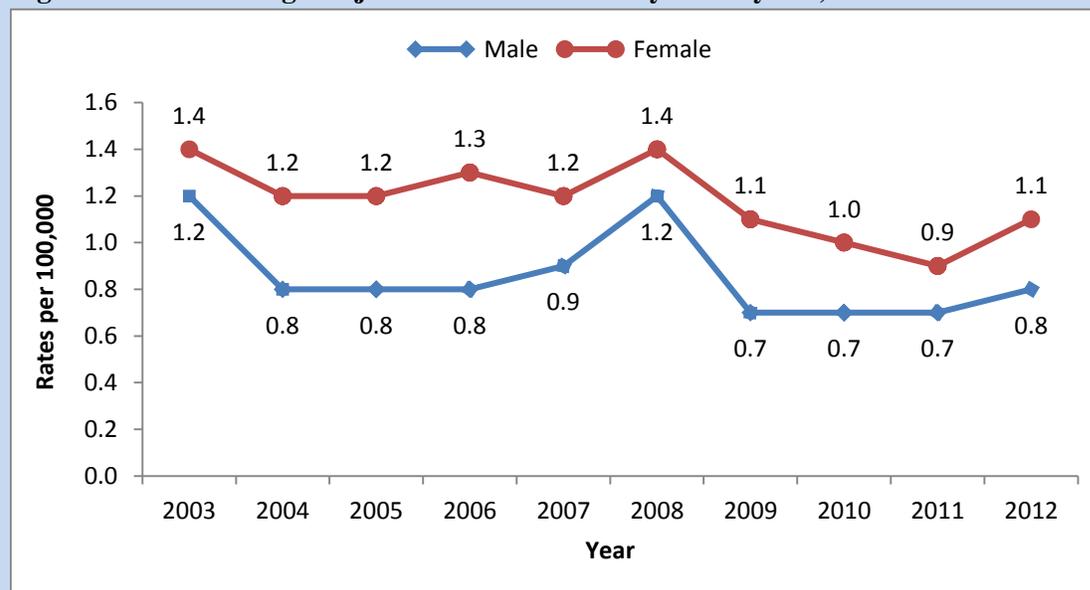
### Age-Adjusted Asthma Mortality Rate by Sex

The ten-year trend analysis of the mortality data in both females and males follow a similar pattern. However, disparity exists in asthma mortality between females and males. Age-adjusted death rates per 100,000 were higher in females compared to males. Death due to asthma occurred in more females than males in a ratio of approximately 1.5 to 1.

Overall, the asthma mortality rates in both male and female in 2012 were lower than the rates in 2003 (Figure 2). In a combined data analysis covering three groups of data for the period 2003 to 2012, the age-adjusted asthma mortality

rates with asthma as the underlying cause of death was higher among females compared to males. Deaths rates were also higher among females compared to rates in Pennsylvania. Death rates per 100,000 residents have decreased in both females and males since 2003 to 2011 and peaked in 2008 for both sexes. More recently, from 2011 to 2012, there has been a slight increase in death rates per 100,000 residents in both females and males (Figure 3).

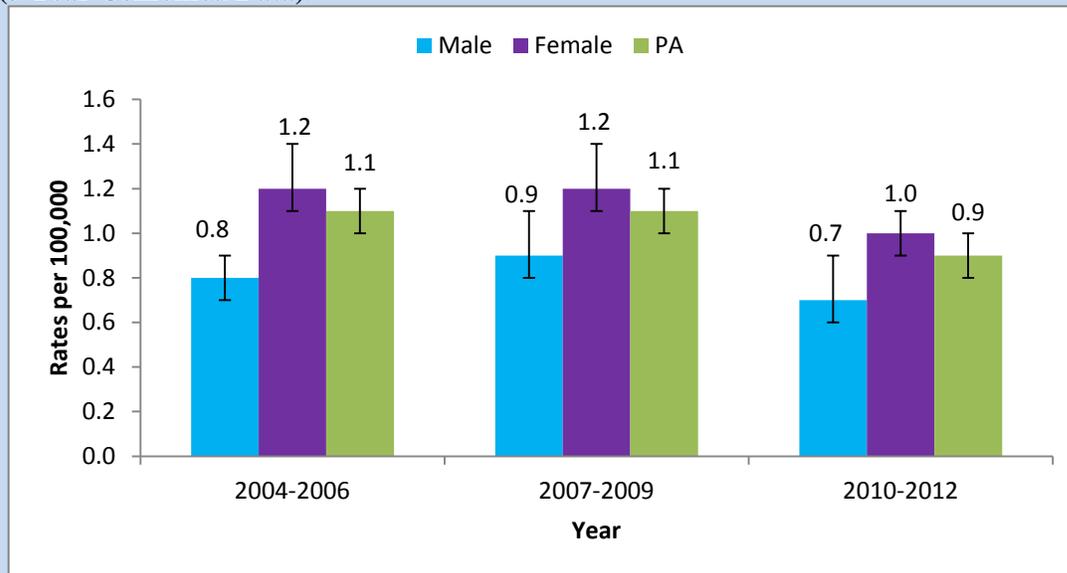
**Figure 2: Trends in Age-Adjusted Asthma Mortality Rate by Sex, PA 2003-2012.**



Data Source: Bureau of Health Statistics and Research, Pennsylvania Department of Health

\*Only includes death with asthma listed as the underlying cause

**Figure 3: Age-Adjusted Asthma Mortality Rate by Sex, PA 2004-2012 (3 Year Combined Data).**



Data Source: Bureau of Health Statistics and Research, Pennsylvania Department of Health  
 \*Only includes death with asthma listed as the underlying cause  
 Vertical bars on the graph denote the 95% confidence interval.



### Age-adjusted Asthma Mortality Rate by Race/Ethnicity

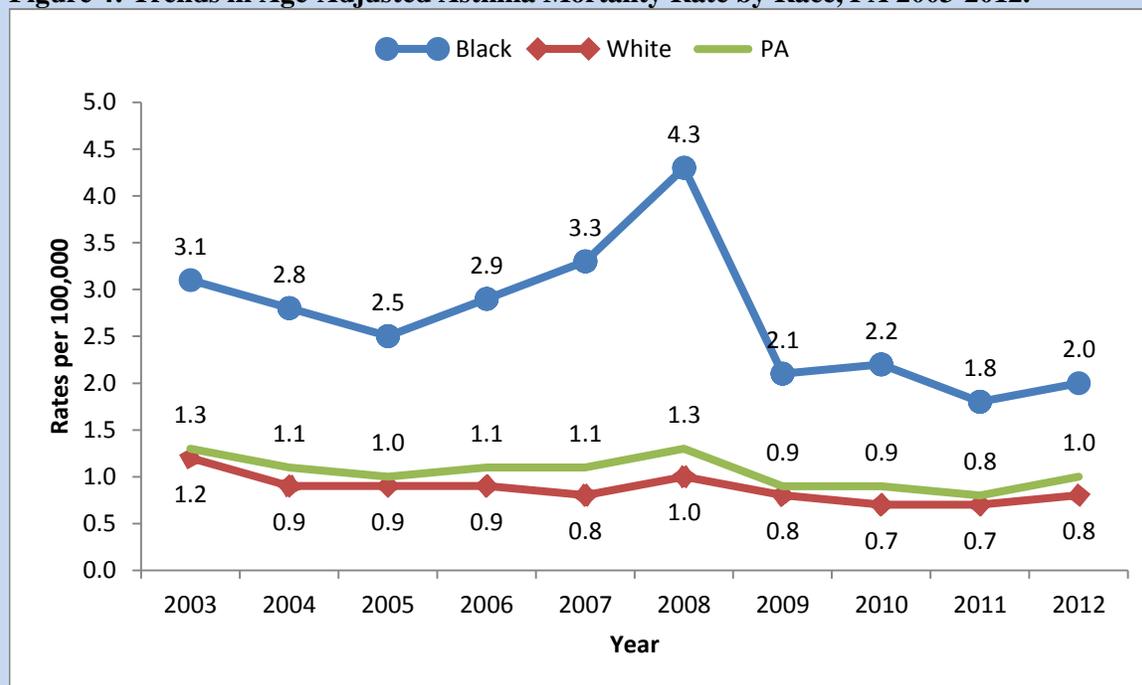
The ten-year asthma mortality trend in Whites in Pennsylvania follows a similar pattern to the overall rate pattern in Pennsylvania. Rates in Whites are lower than the overall state rates. Asthma mortality rates in Whites have been relatively constant all through 2003 to 2012 with rates ranging from 1.2 death rates per 100,000 in 2003 to 0.8 death rates per 100,000 in 2012.

However among Blacks, death rates per 100,000 were higher than rates in Whites and the overall state rates (Figure 4). Rates among Blacks decreased from 3.1 per 100,000 in 2003 to 2.5 per 100,000 in 2005.

This was followed by an increase and peak rate of 4.3 per 100,000 in 2008. From 2009, rates have gradually decreased among blacks from 2.1 per 100,000 to 2.0 per 100,000 in 2012 (Figure 4). Blacks have consistently had higher death rates due to asthma than Whites.

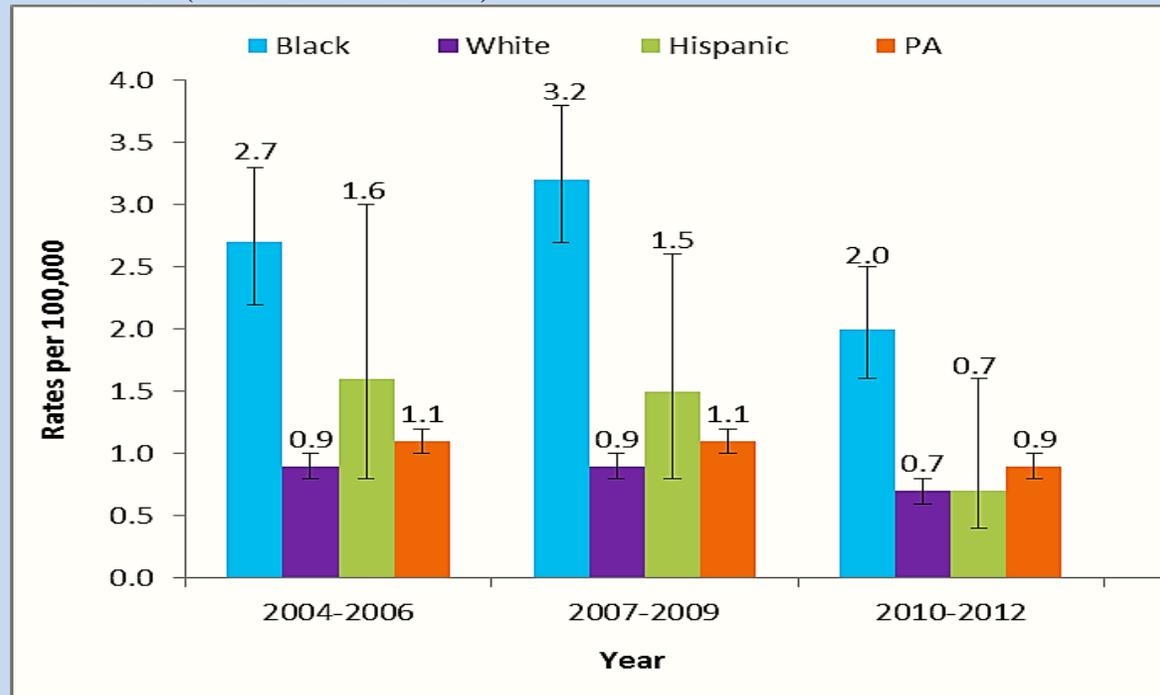
Data on trends in death rates due to asthma among Hispanics and Asian/Pacific islander are not shown because counts were less than ten and unreliable results will be produced.

**Figure 4: Trends in Age-Adjusted Asthma Mortality Rate by Race, PA 2003-2012.**



Data Source: Bureau of Health Statistics and Research, Pennsylvania Department of Health  
\*Only includes death with asthma listed as the underlying cause

**Figure 5: Age –Adjusted Asthma Mortality Rate by Race and Ethnicity, PA 2004-2012(3 Year Combined Data).**



Data Source: Bureau of Health Statistics and Research, Pennsylvania Department of Health  
 \*Only includes death with asthma listed as the underlying cause  
 Vertical bars on the graph denote the 95% confidence interval.

In a three-year combined data analysis from 2003 to 2012, the age-adjusted asthma mortality rate in Blacks with asthma as the underlying cause of death was approximately three to four times higher than rates in Whites. This difference is statistically significant. The asthma death rates per 100,000 among Whites were lower than the overall asthma death rates in Pennsylvania in the three-year block periods.

Death rates per 100,000 residents were higher among Hispanics compared to the overall asthma death rate in Pennsylvania. During the three-year block period, asthma death rates decreased among Whites and Hispanics. In Blacks, the death rate increased during 2007 - 2009.

#### KEY NOTES

Blacks are more likely to die from asthma as the underlying cause of death compared to Whites.

Death rates among Whites decreased from 1.2 /100,000 to 0.8/100,000 from 2003 to 2012.

The cause of disparities in mortality rates between Blacks and Whites, Blacks and Hispanics are unknown but can be attributed to complex factors such as genetics, environmental factors and socio-economic factors.

## Age-Adjusted Asthma Mortality Rate by Age-Group

Death rates per 100,000 residents from 2003 – 2012 increased with age with the highest number of deaths occurring in persons 85 years and older. Mortality rates per 100,000 in persons ages 85 and older were approximately two times the rate observed in individuals in age group 80-84. Other factors including advancing age, occurrence of co-morbidities such as Chronic Obstructive Pulmonary disease (COPD), diabetes and cardiovascular diseases might be contributing to this high rate observed among age group 85+ (Table 1).



**Table 1: Age-Specific Asthma Mortality Rates by Age, PA 2004-2012**

| AGE GROUP | YEAR 2004-2006 |      |      |      | YEAR 2007-2009 |      |     |      | YEAR 2010-2012 |      |     |      |
|-----------|----------------|------|------|------|----------------|------|-----|------|----------------|------|-----|------|
|           | FREQUENCY      | RATE | L    | U    | FREQUENCY      | RATE | L   | U    | FREQUENCY      | RATE | L   | U    |
| 00-04     | 3              | ND   | ND   | ND   | 3              | ND   | ND  | ND   | 1              | ND   | ND  | ND   |
| 05-09     | 10             | 0.4  | 0.2  | 0.8  | 8              | ND   | ND  | ND   | 2              | ND   | ND  | ND   |
| 10-14     | 5              | ND   | ND   | ND   | 12             | 0.5  | 0.3 | 0.9  | 1              | ND   | ND  | ND   |
| 15-19     | 1              | ND   | ND   | ND   | 11             | 0.4  | 0.2 | 0.7  | 6              | ND   | ND  | ND   |
| 20-24     | 9              | ND   | ND   | ND   | 6              | ND   | ND  | ND   | 14             | 0.5  | 0.3 | 0.9  |
| 25-29     | 7              | ND   | ND   | ND   | 20             | 0.9  | 0.5 | 1.4  | 17             | 0.7  | 0.4 | 1.1  |
| 30-34     | 10             | 0.4  | 0.2  | 0.8  | 15             | 0.7  | 0.4 | 1.1  | 14             | 0.6  | 0.3 | 1    |
| 35-39     | 13             | 0.5  | 0.3  | 0.9  | 22             | 0.9  | 0.6 | 1.4  | 12             | 0.5  | 0.3 | 0.9  |
| 40-44     | 28             | 1    | 0.7  | 1.5  | 19             | 0.7  | 0.4 | 1.1  | 23             | 0.9  | 0.6 | 1.4  |
| 45-49     | 43             | 1.5  | 1.1  | 2.1  | 44             | 1.6  | 1.2 | 2.1  | 21             | 0.8  | 0.5 | 1.2  |
| 50-54     | 36             | 1.4  | 1    | 1.9  | 38             | 1.4  | 1   | 2    | 34             | 1.2  | 0.8 | 1.6  |
| 55-59     | 29             | 1.3  | 0.9  | 1.8  | 29             | 1.2  | 0.8 | 1.7  | 38             | 1.4  | 1   | 1.9  |
| 60-64     | 34             | 1.8  | 1.3  | 2.6  | 38             | 1.9  | 1.3 | 2.6  | 32             | 1.4  | 0.9 | 1.9  |
| 65-69     | 24             | 1.6  | 1    | 2.3  | 28             | 1.8  | 1.2 | 2.5  | 20             | 1.2  | 0.7 | 1.8  |
| 70-74     | 22             | 1.6  | 1    | 2.5  | 24             | 1.8  | 1.2 | 2.7  | 14             | 1.1  | 0.6 | 1.8  |
| 75-79     | 33             | 2.8  | 1.9  | 3.9  | 28             | 2.5  | 1.7 | 3.6  | 33             | 3.1  | 2.1 | 4.3  |
| 80-84     | 42             | 4.8  | 3.5  | 6.5  | 40             | 4.7  | 3.4 | 6.4  | 37             | 4    | 2.8 | 5.5  |
| 85+       | 94             | 12.5 | 10.1 | 15.3 | 80             | 9.4  | 7.4 | 11.6 | 81             | 8.6  | 6.8 | 10.7 |
| TOTAL     | 443            | 1.1  | 1    | 1.2  | 466            | 1.1  | 1   | 1.2  | 400            | 0.9  | 0.8 | 1.0  |

Data Source: Bureau of Health Statistics and Research, Pennsylvania Department of Health

\*Only includes death with asthma listed as the underlying cause

ND =not displayed if count <10

L=the lower 95% confidence limit for the rate or percent that appears in the corresponding row

U=the upper 95% confidence limit for the rate or percent that appears in the corresponding row

\*\*Age-Adjusted rates are standardized to “2000 U.S. Standard Million Population.”

## COUNTY LEVEL MORTALITY RATE DUE TO ASTHMA 2004-2012

The total deaths due to asthma as the underlying cause from 2004 to 2012 were 1,309. The crude rate during this period was 1.2 deaths per 100,000 residents. A total of 35 out of 67 counties had combined total deaths of less than 10. Hence, county data level will not be presented in any form. Mifflin County had the highest crude death rate of 2.6 per 100,000, followed by Lackawanna County at 2.0 per 100,000. Philadelphia County had a death rate of 1.9 per 100,000. Lancaster, Cumberland and Chester Counties had the lowest crude death rates of 0.6; 0.5 and 0.5 per 100,000 respectively (Table 2).



**ASTHMA DEATH IS  
PREVENTABLE!**

**Table 2: Age-Adjusted Asthma Mortality Rates by County, PA 2004-2012**

| County       | Rates per 100,000 |
|--------------|-------------------|
| Mifflin      | 2.6               |
| Lackawanna   | 2.0               |
| Beaver       | 2.0               |
| Philadelphia | 1.9               |
| Monroe       | 1.7               |
| Adams        | 1.7               |
| Fayette      | 1.6               |
| Blair        | 1.6               |
| Mercer       | 1.5               |
| Luzerne      | 1.5               |
| Crawford     | 1.4               |
| Lawrence     | 1.3               |
| Allegheny    | 1.3               |
| Schuylkill   | 1.3               |
| Lycoming     | 1.2               |
| Dauphin      | 1.2               |
| Pennsylvania | 1.2               |
| Berks        | 1.2               |
| Lebanon      | 1.1               |
| Franklin     | 1.1               |
| Northampton  | 1.1               |
| Delaware     | 1.0               |
| Bucks        | 1.0               |
| Montgomery   | 0.9               |
| Westmoreland | 0.9               |
| Butler       | 0.9               |
| York         | 0.9               |
| Lehigh       | 0.9               |
| Washington   | 0.9               |
| Erie         | 0.8               |
| Lancaster    | 0.6               |
| Cumberland   | 0.5               |
| Chester      | 0.5               |

Data Source: Bureau of Health Statistics and Research, Pennsylvania Department of Health

\*Only includes death with asthma listed as the underlying cause.

\*Counties with count <10 are not included in the table.

## CONCLUSION

Asthma mortality is low in comparison to the burden of the disease and asthma death is preventable. Disparity in asthma mortality exists. Adults, females, Blacks and persons 85 years and older are more likely to die from asthma compared to children, male, White (and other ethnicity) and individuals less than 85 years old. The Asthma Control Program will continue to drive its intervention activities using surveillance data in ensuring that patients who are at high risk of asthma-related deaths have access to resources that will provide early treatment information and asthma management resources. Measures are also been put in place in conjunction with the Pennsylvania Asthma partnership (PAP) in ensuring that persons with asthma have a thorough understanding of asthma self-management. The Asthma Control Program will continue to work with her partners in ensuring that doctors, nurses, patients, care givers and family members are better educated and are aware of the factors that exacerbate an asthma attack, adopt better asthma management practice, have increased access to quality care and overall ensure that asthma mortality in the state of Pennsylvania is eliminated or remains low.



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## APPENDIX

**Table 1: Number of Deaths Due to Asthma and Age-Adjusted Rates by gender, PA 2003-2012.**

| Year | MALE      |      |     |     | FEMALE    |      |     |     |
|------|-----------|------|-----|-----|-----------|------|-----|-----|
|      | Frequency | Rate | L   | U   | Frequency | Rate | L   | U   |
| 2003 | 71        | 1.2  | 0.9 | 1.5 | 111       | 1.4  | 1.2 | 1.7 |
| 2004 | 50        | 0.8  | 0.6 | 1.1 | 98        | 1.2  | 1   | 1.5 |
| 2005 | 46        | 0.8  | 0.6 | 1.0 | 102       | 1.2  | 1   | 1.5 |
| 2006 | 47        | 0.8  | 0.6 | 1.1 | 100       | 1.3  | 1.1 | 1.6 |
| 2007 | 52        | 0.9  | 0.6 | 1.1 | 95        | 1.2  | 1   | 1.5 |
| 2008 | 73        | 1.2  | 0.9 | 1.5 | 111       | 1.4  | 1.1 | 1.7 |
| 2009 | 47        | 0.7  | 0.5 | 1.0 | 88        | 1.1  | 0.8 | 1.3 |
| 2010 | 44        | 0.7  | 0.5 | 1.0 | 82        | 1    | 0.7 | 1.2 |
| 2011 | 46        | 0.7  | 0.5 | 1.0 | 83        | 0.9  | 0.7 | 1.2 |
| 2012 | 51        | 0.8  | 0.6 | 1.0 | 94        | 1.1  | 0.9 | 1.3 |

Data Source: Bureau of Health Statistics and Research, Pennsylvania Department of Health

\*Only includes death with asthma listed as the underlying cause

L=the lower 95% confidence limit for the rate or percent that appears in the corresponding row

U=the upper 95% confidence limit for the rate or percent that appears in the corresponding row

\*\*Age-Adjusted rates are standardized to "2000 U.S. Standard Million Population."

**Table 2: Number of Deaths Due to Asthma and Age-Adjusted Rates, PA 2003-2012.**

| Year | Count | Population | Rate | L   | U   |
|------|-------|------------|------|-----|-----|
| 2003 | 182   | 12,365,455 | 1.3  | 1.1 | 1.5 |
| 2004 | 148   | 12,406,292 | 1.1  | 0.9 | 1.2 |
| 2005 | 148   | 12,429,616 | 1.0  | 0.9 | 1.2 |
| 2006 | 147   | 12,440,621 | 1.1  | 0.9 | 1.3 |
| 2007 | 147   | 12,432,792 | 1.1  | 0.9 | 1.3 |
| 2008 | 184   | 12,448,279 | 1.3  | 1.1 | 1.5 |
| 2009 | 135   | 12,604,767 | 0.9  | 0.8 | 1.1 |
| 2010 | 126   | 12,702,379 | 0.9  | 0.7 | 1.0 |
| 2011 | 129   | 12,742,886 | 0.8  | 0.7 | 1.0 |
| 2012 | 145   | 12,763,536 | 1.0  | 0.8 | 1.1 |

Data Source: Bureau of Health Statistics and Research, Pennsylvania Department of Health

\*Only includes death with asthma listed as the underlying cause

L=the lower 95% confidence limit for the rate or percent that appears in the corresponding row

U=the upper 95% confidence limit for the rate or percent that appears in the corresponding row

\*\*Age-Adjusted rates are standardized to "2000 U.S. Standard Million Population."

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