



2015

Asthma Prevalence Report



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EXECUTIVE SUMMARY

Asthma is a chronic disease of the lungs that is characterized by wheezing, coughing at night or early in the morning, chest tightness, and breathlessness. It is an inflammatory disorder of the respiratory passages which results in a narrowing of the airways that carry oxygen to the lungs and is often reversible.¹⁰ The cause 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. Triggers of asthma include pollen, animal dander, mold, cockroaches, dust mites, tobacco smoke, industrial fumes, physical activity, certain foods and medication.¹⁷

Asthma affects all people of all ages. Worldwide, an estimated 334 million people have asthma.¹⁵ In the 2013 National Health Interview Survey (NHIS), an estimated 28.0 million adults and 9.3 million children in the U.S. were diagnosed with asthma in their lifetime. Also, an estimated 22.6 million people have current asthma, of which 6.1 million were children and 16.5 million were adults.⁷ Among adults, an estimated 2.7 million people over 65 years of age are living with asthma.⁷ Asthma is, and will continue to be, an important public health issue, considering its immense impact on health, quality of life and economic cost.

The Commonwealth of Pennsylvania had an estimated population of 12,781,296 in 2013. In 2013 in Pennsylvania, an estimated 1,428,654 adults were diagnosed with asthma at some point in their lifetime.⁴ That is, one out of every nine adults resident in Pennsylvania has been diagnosed with asthma in a lifetime. Also, an estimated 955,374 adults currently have asthma.⁴ This means one in 10 adults in the Commonwealth of Pennsylvania has asthma. This morbidity will have a great impact on the cost of care and management of the disease, considering the number of individuals with asthma.

The cost of asthma in terms of hospitalization cost, indirect cost associated with missed work and school days, physician, and medication costs is substantial. In Pennsylvania in 2013, the average charge for inpatient hospitalizations was \$26,952. The total charge for inpatient hospitalization (excluding professional fees/physician charges) due to asthma was almost half a billion U.S. dollars. In terms of missed work and school days, an estimated 23.6 percent of working adults missed some days of work due to asthma, and an estimated 28.0 percent of school age children missed some days of school due to asthma.² The cost of work absenteeism in 2010 was estimated at \$181,000,000.⁸ The entire health care cost of asthma and absenteeism was estimated to be approximately \$1.7 billion in 2010 for the Commonwealth of Pennsylvania.⁸ The projected cost of asthma in 2020 is estimated to be approximately \$2.6 billion.⁸ This will represent a more than 50 percent increase in cost of asthma from 2010 to 2020, excluding the cost of inflation. Asthma has no cure; however, its effective management through education and medical care has been shown to reduce the severity of symptoms and cost associated with asthma.

The burden of asthma is huge; however, there are large disparities by sex, race/ethnicity and age. Adult females, male children, blacks, multiracial respondents and Hispanics are disproportionately affected by asthma. In the period of this report (2011-2013), adult females in Pennsylvania had higher lifetime and current asthma prevalence rates compared to adult males.

EXECUTIVE SUMMARY (continued)

The three-year average lifetime asthma prevalence in adult females was 16.0 percent and 10.9 percent in adult males, while the three-year average current asthma prevalence in adult females was 12.3 percent and 6.6 percent in adult males. Boys in Pennsylvania also had a higher three-year lifetime asthma prevalence of 17.5 percent compared to 11.0 percent of girls. The current asthma prevalence rate among boys was 12.6 percent, while that of girls was 7.8 percent. Both lifetime and current asthma prevalence was highest among respondents who identified as multiracial compared to black non-Hispanics and among respondents who identified as multiracial compared to white non-Hispanics. Adult black non-Hispanics had a higher three-year average lifetime asthma prevalence compared to adult white non-Hispanics (18.3 versus 12.6 percent). Also, the current asthma prevalence was higher among adult black non-Hispanics compared to adult white non-Hispanics (13.0 versus 8.8 percent). Hispanics make up about 14.0 percent of those with current asthma from 2011 to 2013.

The Commonwealth of Pennsylvania is divided into six health districts, namely northwest, northcentral, northeast, southwest, southcentral and southeast. Children residing in the Northeast Health District in Pennsylvania had the highest three-year average current asthma prevalence of 11.3 percent. The largest counties in Pennsylvania are Philadelphia and Allegheny. Their three-year average current asthma prevalence rates were 19.0 and 12.7 percent, respectively. These rates were higher than the Pennsylvania average of 10.0 percent.

The Asthma Control Program of the Pennsylvania Department of Health and the Pennsylvania Asthma Partnership (PAP) are focusing their efforts towards improving the health status and quality of life for all Pennsylvania residents affected by asthma. Over the years, the number of asthma inpatient hospitalizations is on the decline; however, the number of individuals with asthma is on the increase. The increase in prevalence of asthma can be attributed to several factors, including adverse environmental conditions (such as industrial and exhaust fumes), hazardous home conditions (such as the presence of molds and rats), and genetic factors. The Asthma Control Program continues to intensify its outreach efforts in increasing awareness among people with asthma with the overall goal of reducing asthma prevalence in the Commonwealth of Pennsylvania. This is done at appropriate comprehension and literacy levels for the target audience through education programs such as the Community Asthma Prevention Program (CAPP), Integrated Pest Management (IPM), Asthma 101, and other outreach and educational programs. The overall goals of these educational programs are to increase asthma self-management strategies, increase preventive measures, reduce environmental triggers, and provide available resources among people with asthma, their families and stakeholders.

Data on hospitalizations, mortality, the number of school children with asthma, etc. have also been collected on a regular basis to monitor asthma in the Commonwealth of Pennsylvania. These data are described and discussed in other Pennsylvania Department of Health's asthma reports. These surveillance reports also help achieve one of the goals of the Asthma Control Program, which is to help identify disparate populations with the objective of reducing the asthma burden among these groups of Pennsylvanians.

INTRODUCTION: WHAT IS ASTHMA PREVALENCE?

Asthma prevalence is defined as the proportion of a population affected by asthma at a point in time. Prevalence helps answer the question "How many people actually have the disease at any point in time?" Prevalence also provides information on the magnitude of the stated disease burden in the population.

The two asthma prevalence measures in use by the Centers for Disease Control and Prevention (CDC) are the self-reported lifetime and current asthma.⁴ Lifetime asthma is defined as an affirmative response to the question, "Have you ever been told by a doctor (nurse or other health professional) that you have asthma?" Current asthma is defined as an affirmative response to the preceding question followed by an affirmative response to the subsequent question, "Do you still have asthma?"

Lifetime asthma prevalence is the proportion of the population that has had asthma at some point in their lifetime. Current asthma prevalence is the proportion of the population who currently has asthma and reported so in the last 12-month period. Lifetime asthma for children is defined in terms of the number of children that have ever been diagnosed with asthma. Childhood current asthma is defined as the number of children who still had asthma.

According to the 2013 National Health Interview Survey (NHIS), an estimated 28.0 million adults and 9.3 million children in the U.S. have been diagnosed with asthma in their lifetime.⁷ Also, an estimated 22.6 million people had current asthma, of which 6.1 million were children and 16.5 million were adults. Among adults, an estimated 2.7 million people over 65 years of age were living with asthma. By race,

14.4 million were white non-Hispanic, 3.7 million were black non-Hispanic and 1.4 million were other races. Hispanics also made up 3.2 million of people with current asthma, while non-Hispanics made up 19.4 million people with asthma.⁷



Disparity exists in asthma prevalence. The 2013 NHIS data shows that the prevalence of current asthma was higher in blacks (9.9 percent) compared to whites (7.4 percent) and higher in Hispanics of Puerto Rican descent (14.2 percent) compared to those of Mexican descent (4.7 percent).⁷ The Commonwealth of Pennsylvania had a higher current asthma prevalence (9.6 percent) compared to the entire the United States (9.0 percent) in 2013.⁴

METHODOLOGY

The Behavioral Risk Factor Surveillance System (BRFSS) is the world's largest telephone survey system that collects health-related data from U.S. residents about their health-related risk behaviors, chronic health conditions and use of preventive services.⁵

In 2011, BRFSS data collection changed from a land-line sample survey to both land-line and cell phone survey. The 2011 BRFSS data weighting methodology also changed as a result of the addition of cell phone-only respondents.

Hence, the 2011 BRFSS data will be considered a baseline year and will not be compared to previous years of data because of the changes in weighting methodology and the addition of the cell phone-only respondents.⁵

The Centers for Disease Control and Prevention (CDC) and U.S. states and territories, using random-digit-dialed telephone surveys collect information on health behaviors and conditions of non-institutionalized U.S. civilian adults age 18 and older.⁵

Pennsylvania BRFSS is a state-based system of health surveys, and one of the surveys, the Pa. Asthma Call-back Survey (ACS), is unique to Pa. BRFSS and asthma.

This report is based on data obtained from both the Behavioral Risk Factor Surveillance System (BRFSS) at the national level and Pennsylvania BRFSS. The Asthma Control Program (ACP) analyzes the data as part of its surveillance activities, using SAS 9.2 software and Microsoft Excel. Results from the data analysis are presented in tables and graphs. Demographic and sub-population analyses are done to identify disparities in asthma morbidity.

There are some limitations to the data. Since the information obtained from the respondents is self-reported, data obtained are subject to response/recall bias. The survey also excludes those without land-line and cell phones, as this information might result in under-coverage selection bias. Also, the number of respondents surveyed has been declining. This is of concern, as it might undermine the reliability of future



KEY FINDINGS: ASTHMA IN PENNSYLVANIA

The 2013 lifetime asthma prevalence in Pennsylvania was 14.2 percent.

The 2013 current asthma prevalence in Pennsylvania was 9.6 percent.

For the period 2011-2013, the average annual lifetime asthma prevalence in adults, age 18 and over, was 13.5 percent, while the average annual current asthma prevalence was 9.6 percent.

Adult females both in the U.S. and Pennsylvania had a higher lifetime and current asthma prevalence rate compared to adult males.

For the period 2011-2013, the three-year average lifetime asthma prevalence in adult females was 16.0 percent and 10.9 percent in adult males while the average annual current asthma prevalence in adult females was 12.3 percent and 6.6 percent in adult males.

For the period 2011-2013, the three-year average lifetime and current asthma prevalence in children ages 0-17 was 14.3 and 10.2 percent, respectively. The lifetime and current asthma prevalence was higher in boys compared to girls both in the U.S. and in Pennsylvania.

For the period 2011-2013, the three-year average lifetime asthma prevalence among boys in Pennsylvania was 17.5 percent; among girls, it was 11.0 percent.

For the period 2011-2013, the average annual current asthma prevalence among boys in Pennsylvania was 12.7 percent; among girls, it was 7.7 percent.

For the period 2011-2013, the three-year average annual lifetime and current asthma prevalence was higher in children ages 0-17 (14.3 and 10.2 percent, respectively) compared to adults,

age 18 and over (13.5 and 9.6 percent, respectively).

Both lifetime and current asthma prevalence was highest among respondents who identified as multiracial compared to black non-Hispanics and among respondents who identified as multiracial compared to white non-Hispanics.

For the period 2011-2013, the three-year average annual lifetime asthma prevalence was higher among adult black non-Hispanics compared to adult white non-Hispanics (18.3 versus 12.6 percent). Also, the current asthma prevalence was higher among adult black non-Hispanics compared to adult white non-Hispanics (13.0 versus 8.8 percent).

Black non-Hispanic children had the highest three-year average lifetime (23.7 percent) and current asthma prevalence (19.3 percent) compared to white non-Hispanic children, with three-year average lifetime prevalence of 11.2 percent and current prevalence of 7.6 percent.

Among adults, respondents in age group 18-24 had the highest adult lifetime and current prevalence rate from 2011 to 2013.

Children ages 0-4 had the lowest three-year average lifetime asthma prevalence of 6.9 percent. Children ages 10-14 had the highest three-year average lifetime asthma prevalence of 18.2 percent.

Children ages 0-4 had the lowest three-year average current asthma prevalence of 5.8 percent, while children ages 10-14 had the highest three-year average current asthma prevalence of 13.2 percent.

KEY FINDINGS: ASTHMA IN PENNSYLVANIA (continued)

Children ages 12-17 had a higher current asthma prevalence (11.7 percent) compared to children ages 0-11 (10.0 percent).

The three-year average lifetime prevalence was higher in high school non-graduates compared to college graduates (17.6 versus 11.9 percent). Likewise, high school non-graduates had a higher current asthma prevalence of 13.9 percent compared to 7.6 percent in college graduates.

For the period 2011- 2013, the lifetime asthma prevalence was highest among respondents with incomes less than \$15,000 and lowest among respondents with incomes between \$50,000 and \$74,999.

The three-year average lifetime asthma prevalence rate among respondents with incomes less than \$15,000 was 22.4 percent, while those with incomes between \$50,000 and \$74,999 was 10.4 percent.

For the period 2012-2013, the current asthma prevalence was highest among respondents with income less than \$15,000 and lowest among respondents with income greater than \$50,000.

The three-year average current asthma prevalence rate among respondents with incomes less than \$15,000 was 17.6 percent, while those with income greater than \$50,000 was 6.9 percent.

The three-year average lifetime and current asthma prevalence was highest among current adult smokers (17.3 and 13.0 percent, respectively) compared to former smokers (12.7 and 9.0 percent, respectively) and individuals that never smoked (12.7 and 8.3 percent, respectively).

Adults with health care coverage had a higher three-year average lifetime (14.0 percent) and current asthma prevalence (9.7 percent) compared to respondents without health care coverage (12.3 and 8.0 percent, respectively). The prevalence of lifetime asthma was higher in respondents diagnosed with diabetes than those without a diabetes diagnosis (17.7 versus 13.3 percent).

The prevalence of current asthma was higher in respondents diagnosed with diabetes than those without a diabetes diagnosis (13.7 versus 9.3 percent).

Overweight respondents (Body Mass Index [BMI] greater than 25, less than 30) had the lowest lifetime and current asthma prevalence compared to obese respondents (BMI greater than 30) and respondents that were neither obese nor overweight. Obese respondents had the highest three-year average lifetime asthma prevalence of 17.3 percent compared to 11.3 percent in overweight respondents.

Children residing in the Northeast Health District in Pennsylvania had the highest three-year average current asthma prevalence of 11.3 percent.

The three-year average current asthma prevalence in Philadelphia and Allegheny counties were 19.0 and 12.7 percent, respectively. These rates are higher than the Pennsylvania average of 10.0 percent.

**Three-year average prevalence rate refers to years 2011, 2012 and 2013.*

DEMOGRAPHICS OF THE COMMONWEALTH OF PENNSYLVANIA

The Commonwealth of Pennsylvania ranks sixth in terms of its population and is also the sixth-largest state economy in the United States of America. According to the U.S. census data, it had an estimated population of 12,787,209 in 2014.¹⁶ Pennsylvania is made up of 67 counties and 2,561 municipalities. It also has six community health districts, 10 local health departments and the state health department located in Harrisburg, Pa.¹¹ Pennsylvania has a large rural population in which 48 of its 67 counties are designated rural counties and the remaining 19 are designated urban counties.¹¹ Selected demographics for Pennsylvania are listed below in Table 1.



Philadelphia, Pennsylvania

Table 1. Selected Demographics of the State of Pennsylvania

Selected characteristics	Pennsylvania	U.S.A
Population, 2014 estimate	12,787,209	318,857,056
Population, 2013 estimate	12,781,296	316,497,531
Population, percent change - April 1, 2010 to July 1, 2013	0.6%	2.5%
People under 5 years, percent, 2013	5.6%	6.3%
People under 18 years, percent, 2013	21.3%	23.3%
People 65 years and over, percent, 2013	16.4%	14.1%
Female people, percent, 2013	51.1%	50.8%
Male people, percent, 2013	48.9%	49.2%
White alone, percent, 2013 (a)	83.2%	77.7%
Black or African American alone, percent, 2013 (a)	11.5%	13.2%
American Indian and Alaska Native alone, percent, 2013 (a)	0.3%	1.2%
Asian alone, percent, 2013 (a)	3.1%	5.3%
Native Hawaiian and Other Pacific Islander alone, percent, 2013 (a)	0.1%	0.2%
Two or More Races, percent, 2013	1.8%	2.4%
Hispanic or Latino, percent, 2013 (b)	6.3%	17.1%
White alone, not Hispanic or Latino, percent, 2013	78.4%	62.6%
Living in same house 1 year and over, percent, 2009-2013	88.0%	84.9%
Foreign born people, percent, 2009-2013	6.0%	12.9%
High school graduate or higher, percent of people age 25+, 2009-2013	88.7%	86.0%
Bachelor's degree or higher, percent of people age 25+, 2009-2013	27.5%	28.8%

Data Source: United States Census Bureau

DEMOGRAPHICS OF THE COMMONWEALTH OF PENNSYLVANIA (continued)

The five largest cities in Pennsylvania are: Philadelphia, Pittsburgh, Allentown, Erie and Reading. The population in Pennsylvania is becoming more diverse in terms of its age composition, race and ethnicity. Several factors are responsible for this diversity, including migration into and out of the state, improved health care quality with its resulting aging population and reduced birth rate.

In terms of its racial composition, white non-Hispanics make up 78.4 percent of the entire population, while the remaining 21.6 percent represents the minority population in 2013. It should be noted that Hispanics can belong to any race. In a three-year period, between 2010 and 2013, there was a decline in the white non-Hispanic population by approximately 1.0 percent, while the minority population grew by approximately 6.5 percent.

The rate of population decline among the white population was mainly in the age population under 18 years of age, which declined by 5.1 percent between 2011 and 2013. The resultant effect of this decline is the increasing diversity among Pennsylvanians under 18 years of age. Philadelphia County has 63.7 percent of the minority population in Pennsylvania. The minority population in all 67 counties grew since 2010.

There are several sub-divisions of the Hispanic population in Pennsylvania based on country of origin (Table 2). The Hispanic population accounted for approximately 52.3 percent of the minority population growth. This represents a 12.3 percent growth in the Hispanic population

between 2010 and 2013. The black population grew by 1.8 percent, and the Asian population grew by 10.8 percent between 2010 and 2013. Population of individuals who identify as two or more races grew by 10.7 percent.

Pennsylvania's population is also aging. Approximately 16.4 percent of the population is 65 years and older. This number is projected to increase to 19.0 percent in 2020 and 23.0 percent in 2030. The state of Pennsylvania has the fourth highest proportion of people ages 65 years and older in the United States of America.¹¹



Pittsburgh, Pennsylvania



Erie, Pennsylvania

**DEMOGRAPHICS OF THE
COMMONWEALTH OF PENNSYLVANIA
(continued)**

**Table 2: Hispanic or Latino Population
in the Commonwealth of Pennsylvania**

HISPANIC OR LATINO	Number	Percent
Total population	12,702,379	100.0
Hispanic or Latino (of any race)	719,660	5.7
Not Hispanic or Latino	11,982,719	94.3
HISPANIC OR LATINO BY TYPE		
Hispanic or Latino (of any race)	719,660	5.7
Mexican	129,568	1.0
Puerto Rican	366,082	2.9
Cuban	17,930	0.1
Dominican (Dominican Republic)	62,348	0.5

Data Source: United States Census Bureau

Median Household Income

According to the Census Bureau's 2013 American Community Survey (ACS), the Pennsylvania median and mean household income was estimated at \$52,548 and \$71,088, respectively. For full-time male workers, the median earning was \$50,223, while for full-time female workers, the median earning was \$38,537.¹⁶ At the county level, differences do exist in the median household incomes. The top 10 counties with highest median household income are:

County	Median Household Income in U.S.D
Chester County	86,050
Montgomery County	79,183
Bucks County	76,555
Delaware County	64,041
Cumberland County	60,826
Northampton County	60,097
Adams County	59,492
Pike County	59,340
York County	58,745
Butler County	58,230

The top 10 counties with the lowest median household income are:

County	Median Household Income in U.S.D
Potter County	41,547
Cameron County	41,410
Jefferson County	41,262
Northumberland County	41,208
Clearfield County	41,030
Sullivan County	40,964
Mifflin County	40,384
Fayette County	39,115
Philadelphia County	37,192
Forest County	36,556



DEMOGRAPHICS OF THE COMMONWEALTH OF PENNSYLVANIA (continued)

An estimated 9.2 percent of all families and 13.3 percent of the population in 2013 have incomes below the poverty level.

In terms of health insurance coverage, an estimated 90.2 percent of the Pennsylvania non-institutionalized population has health insurance coverage.¹⁶ Seventy-three percent of those with health insurance coverage are privately insured while 31.4 percent makes use of public coverage. An estimated 5.3 percent of the population under 18 years of age lack health insurance coverage compared to 13.7 percent of adults' ages 18 to 64.



Allentown, Pennsylvania



ASTHMA IN PENNSYLVANIA



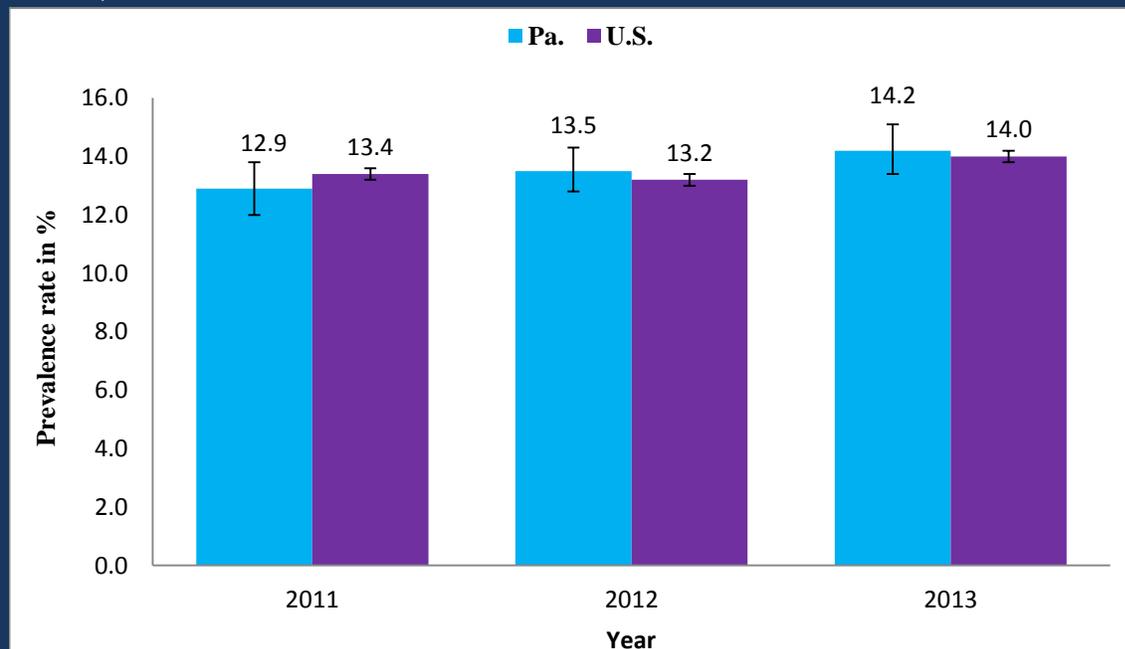
ASTHMA PREVALENCE IN ADULTS IN PENNSYLVANIA

Lifetime and Current Asthma Prevalence among Adults in Pennsylvania and the U.S., 2011-2013

Adult self-reported lifetime asthma prevalence rates are increasing both in the U.S. and in Pennsylvania. The lifetime prevalence rates in the Commonwealth of Pennsylvania are higher than the rates in the U.S. for years 2012 and 2013. The lifetime prevalence rate in Pennsylvania increased from 12.9 percent in 2011 to 14.2 percent in 2013. This represents a 10.1 percent increase in prevalence rate (Figure 1). For the period 2011-2013, the average annual lifetime asthma prevalence in Pennsylvania adults was 13.5 percent.

Based on the 2013 estimates, approximately 1,428,654 adults in Pennsylvania had lifetime asthma. This number is higher than the prevalence estimates for years 2012 and 2011, which were 1,353,459 and 1,275,179, respectively. Several factors have been attributed to this increase, including an increase in air pollution as a result of industrial expansion and widespread tobacco smoking. It is also probable that health care providers are making better diagnoses of asthma cases based on increased asthma awareness.

Figure 1: Adult Self-Reported Lifetime Asthma Prevalence Rate (Percent), Pa. vs U.S., BRFSS, 2011-2013



Data Source: The National Behavioral Risk Factor Surveillance System (BRFSS)
 Pennsylvania Behavioral Risk Factor Surveillance System (BRFSS)
 Vertical bars on the graph denote the 95% confidence interval.

Adult self-reported current asthma

prevalence is higher in Pennsylvania compared to the entire United States. The rates increased by 12.2 percent from 9.0 percent in 2011 to 10.1 percent in 2012. This was followed by a decrease in prevalence rate from 10.1 percent in 2012 to 9.6 percent in 2013 (Figure 2). For the period 2011-2013, the average current asthma prevalence in Pennsylvania was 9.6 percent. Based on 2013 estimates, approximately 955,374 adults in Pennsylvania had a current diagnosis of asthma. The current asthma prevalence rate estimates in 2012 and 2011 were 1,004,566 and 887,934, respectively. In the U.S., the current prevalence rate remained relatively the same from 2011 to 2013 at an average of 8.9 percent.

In the recently released Natural Resources Defense Council (NRDC) report, there is increasing ragweed pollen and ozone pollution in the U.S.. These are asthma triggers that have been associated with increasing threats to respiratory health. Of the top 35 cities profiled by NRDC, four are located in the state of Pennsylvania, namely Philadelphia, Allentown, Pittsburgh and Harrisburg. The presence of increased ragweed pollen and ozone might be contributing to the high prevalence of asthma in Pennsylvania. Approximately 66.9 percent of adults who self-reported lifetime asthma have current asthma in 2013.

Figure 2: Adult Self-Reported Current Asthma Prevalence Rate (Percent), Pa. vs U.S., BRFSS, 2011-2013



Data Source: The National Behavioral Risk Factor Surveillance System (BRFSS)
 Pennsylvania Behavioral Risk Factor Surveillance System (BRFSS)
 Vertical bars on the graph denote the 95% confidence interval.

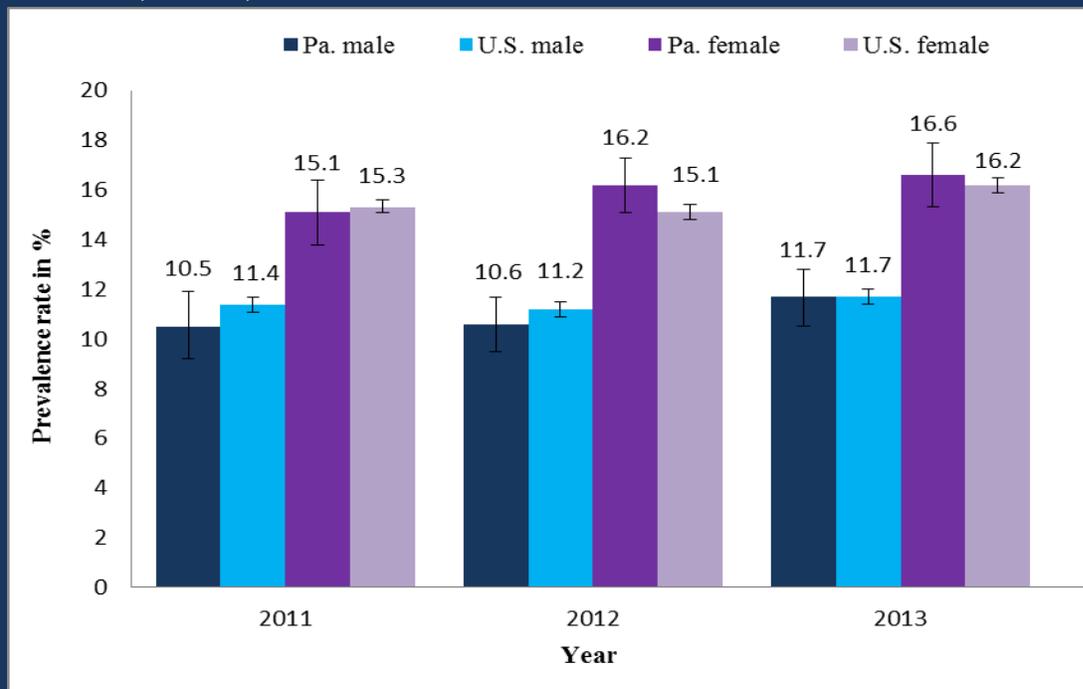
Lifetime and Current Asthma Prevalence among Adults by Sex in Pennsylvania and the U.S., 2011-2013

Lifetime asthma prevalence rates are generally on the rise both in males and females in the U.S. and Pennsylvania. However, adult females both in the U.S. and Pennsylvania have higher lifetime prevalence rates than adult males in the U.S. and Pennsylvania. In year 2011 (43.8 percent), 2012 (52.8 percent) and 2013 (41.8 percent), more females had lifetime asthma compared to males in Pennsylvania.

Lifetime asthma prevalence rates in males in Pennsylvania increased from 10.5 percent in 2011 to 11.7 percent in 2013. This represents an 11.4 percent increase in prevalence rate. In females in Pennsylvania, lifetime prevalence rates increased from 15.1 percent in 2011 to 16.6 percent in 2013 (Figure 3).

For the period 2011-2013 in Pennsylvania, the average lifetime asthma prevalence was 16.0 percent in adult females and 10.9 percent in adult males. Based on the 2013 estimates, approximately 562,920 adult males and 865,733 adult females in Pennsylvania had lifetime asthma.

Figure 3: Adult Self-Reported Lifetime Asthma Prevalence Rate (Percent) by Sex, Pa. vs U.S., BRFSS, 2011-2013



Data Source: The National Behavioral Risk Factor Surveillance System (BRFSS)
 Pennsylvania Behavioral Risk Factor Surveillance System (BRFSS)
 Vertical bars on the graph denote the 95% confidence interval.

Current asthma prevalence rates in adult females both in the U.S. and Pennsylvania are higher than males in the U.S. and Pennsylvania (Figure 4). Current prevalence rate in U.S. males remained relatively the same from 2011 to 2013. In 2012, the current prevalence rate in Pennsylvania females was highest compared to rates in 2011 and 2013. The 2013 current asthma prevalence in Pennsylvania females (12.6 percent) was twice the rate in males (6.3 percent) in 2013 (Figure 4). Based on the 2013 estimates, approximately 302,323 adult males and 653,051 adult females in Pennsylvania had current asthma.

For the period 2011-2013 in Pennsylvania, the average current asthma prevalence in adult females was 12.3 percent and 6.6 percent in adult males.

CURRENT ASTHMA, 2013

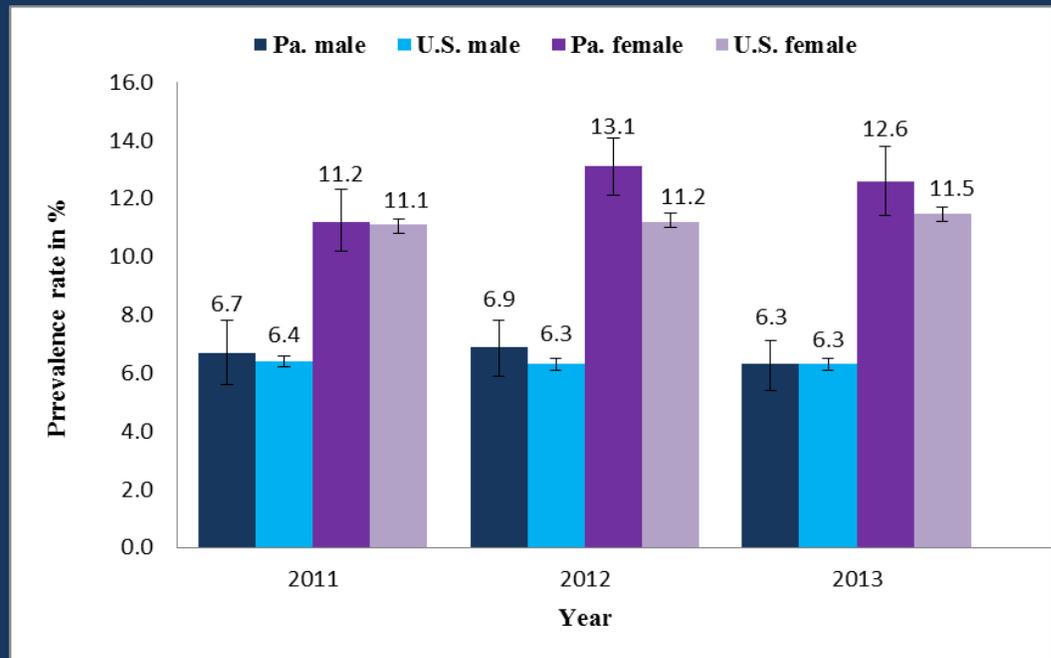


1 in 16 Adult Male



1 in 8 Adult Female

Figure 4: Adult Self-Reported Current Asthma Prevalence Rate (Percent) by Sex, Pa. vs U.S., BRFSS, 2011-2013



Data Source: The National Behavioral Risk Factor Surveillance System (BRFSS) Pennsylvania Behavioral Risk Factor Surveillance System (BRFSS)
Vertical bars on the graph denote the 95% confidence interval.

Lifetime and Current Asthma Prevalence among Adults by Race in Pennsylvania and the U.S., 2011-2013

Lifetime asthma prevalence and race:

Disparities in asthma prevalence exist among races and ethnicities. White non-Hispanics and other non-Hispanics typically had lower lifetime prevalence rates compared to black non-Hispanic, multiracial and Hispanic respondents both in Pennsylvania and U.S. In the U.S. in 2011, individuals who identified as multiracial had the highest lifetime prevalence rate compared to other races in the U.S. and Pa. population. In 2011, Hispanics and black non-Hispanics in Pennsylvania had the highest and similar lifetime prevalence rate of 18.9 and 18.7 percent, respectively (Table 4).

In 2012, however, individuals in Pennsylvania who identified as multiracial had the highest lifetime prevalence rate of 23.1 percent. This represents a 63.8 percent increase in lifetime prevalence rate in the multiracial group from 14.1 percent in 2011 to 23.1 percent in 2012. The prevalence rate also increased to 31.9 percent in the multiracial group in 2013 (Table 4). The reason for this high lifetime prevalence rate in the multiracial group is unknown. It is probable that more people are identifying as multiracial rather than belonging to a single race. Overall in the U.S., the prevalence rate among the multiracial group is similar from 2011 to 2013.

Table 4: Adult Self-Reported Lifetime Asthma Prevalence Rate (Percent) by Race/Ethnicity, Pa. vs U.S., BRFSS, 2011-2013

Year	Race/ Ethnicity	U.S.		Pa.	
		Prevalence (Percent)	95% C.I.(Percent)	Prevalence (Percent)	95% C.I (Percent)
2011	White NH	13.4	(13.2 - 13.6)	11.9	(10.9 - 12.9)
	Black NH	15.8	(15.0 - 16.5)	18.7	(14.9 - 22.5)
	Other NH	11.5	(10.6 - 12.4)	10.9	(4.6 - 17.2)
	Multirace NH	23.5	(21.5 - 25.6)	14.1	(7.0 - 21.2)
	Hispanic	11.6	(10.9 - 12.2)	18.9	(12.7 - 25.1)
2012	White NH	13.0	(12.8 - 13.2)	12.6	(11.8 - 13.4)
	Black NH	15.7	(15.0 - 16.4)	17.1	(14.4 - 19.9)
	Other NH	12.3	(11.2 - 13.4)	9.3	(5.3 - 13.4)
	Multirace NH	21.8	(19.9 - 23.8)	23.1	(12.8 - 33.4)
	Hispanic	11.8	(11.1 - 12.6)	20.6	(15.8 - 25.4)
2013	White NH	14.1	(13.9 - 14.3)	13.2	(12.3 - 14.2)
	Black NH	16.6	(15.9 - 17.3)	19.0	(15.5 - 22.5)
	Other NH	11.6	(10.6 - 12.5)	11.7	(6.2 - 17.2)
	Multirace NH	23.7	(21.5 - 25.9)	31.9	(20.4 - 43.4)
	Hispanic	12.0	(11.3 - 12.6)	18.0	(12.7 - 23.4)

*CI denotes confidence interval.

**U.S. Total includes 50 states plus the District of Columbia and excludes the three territories.
The National Behavioral Risk Factor Surveillance System (BRFSS)
Pennsylvania Behavioral Risk Factor Surveillance System (BRFSS)

Lifetime asthma prevalence and race

(continued): Between blacks and whites in Pennsylvania, differences exist in the lifetime prevalence rates from 2011 to 2013. Prevalence rates were higher among blacks compared to whites, and these differences were statistically significant. For the period 2011-2013, the average lifetime asthma prevalence was 18.3 percent among black non-Hispanics compared to 12.6 percent in white non-Hispanics in Pennsylvania (Table 4).

Current asthma prevalence and race: In 2011, current prevalence rate among adults was highest among black non-Hispanics and Hispanics in Pennsylvania. In 2011, the current prevalence rate among Hispanics in Pennsylvania is approximately twice the rate in

the U.S., and the difference is statistically significant (Table 5). In 2012, the difference in current prevalence rate between Hispanics in Pennsylvania and the U.S. is about 55.4 percent, with Hispanics in Pennsylvania having a higher rate than the U.S. Hispanic population. The current prevalence rate increased among non-Hispanic whites in Pennsylvania from 2011 to 2012 and decreased from 2012 to 2013, while it remained at almost the same rates in the U.S. (Table 5). Among black non-Hispanics, current prevalence rate decreased from 13.4 percent in 2011 to 12.7 percent in 2012. This is followed by an increase from 12.7 percent in 2012 to 13.0 in 2013. For the period 2011-2013, the average annual current asthma prevalence was 13.0 percent among black non-Hispanics compared to 8.8 percent among white non-Hispanics.

Table 5: Adult Self-Reported Current Asthma Prevalence Rate (Percent) by Race/Ethnicity, Pa. vs U.S., BRFSS, 2011-2013

Year	Race/ Ethnicity	U.S.		Pa.	
		Prevalence (Percent)	95% C.I (Percent)	Prevalence (Percent)	95% C.I (Percent)
2011	White NH	8.9	(8.7 - 9.1)	8.2	(7.4 - 9.0)
	Black NH	10.7	(10.1 - 11.3)	13.4	(10.1 - 16.7)
	Other NH	7.1	(6.4 - 7.8)	8.6	(2.9 - 14.2)
	Multirace NH	16.0	(14.3 - 17.8)	12.3	(5.6 - 19.1)
	Hispanic	6.8	(6.3 - 7.3)	13.2	(8.4 - 17.9)
2012	White NH	8.9	(8.7 - 9.1)	9.4	(8.7 - 10.1)
	Black NH	11.1	(10.5 - 11.7)	12.7	(10.3 - 15.1)
	Other NH	7.3	(6.5 - 8.1)	7.1	(3.4 - 10.7)
	Multirace NH	14.6	(12.9 - 16.2)	18.4	(8.4 - 28.3)
	Hispanic	7.0	(6.5 - 7.6)	15.7	(11.3 - 20.1)
2013	White NH	9.1	(8.9 - 9.3)	8.8	(8.0 - 9.5)
	Black NH	11.2	(10.7 - 11.8)	13.0	(10.1 - 15.9)
	Other NH	6.4	(5.7 - 7.0)	7.6	(2.8 - 12.5)
	Multirace NH	15.3	(13.5 - 17.0)	22.6	(12.1 - 33.1)
	Hispanic	7.0	(6.5 - 7.5)	12.9	(8.1 - 17.8)

*CI denotes confidence interval

**U.S. Total includes 50 states plus the District of Columbia and excludes the three territories.

The National Behavioral Risk Factor Surveillance System (BRFSS)

Pennsylvania Behavioral Risk Factor Surveillance System (BRFSS)

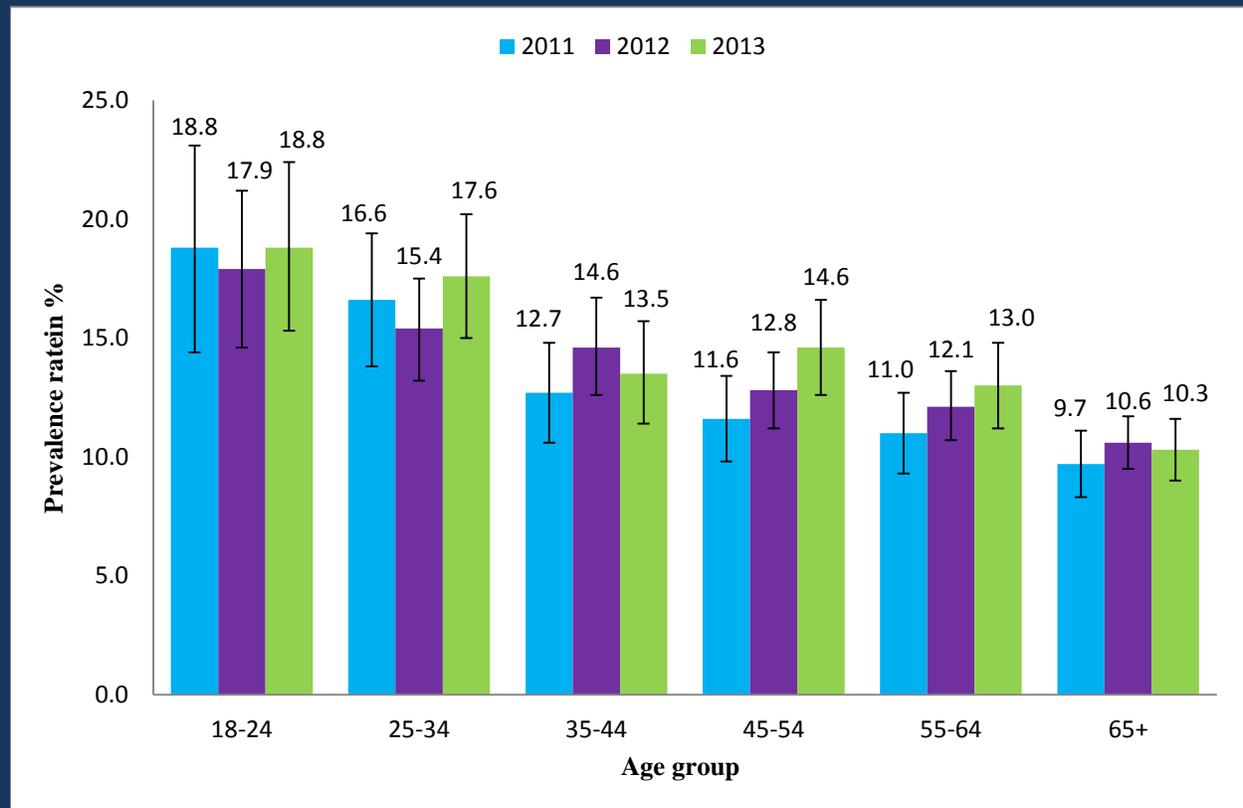
Lifetime and Current Asthma Prevalence among Adults by Age in Pennsylvania, 2011-2013

Lifetime asthma prevalence and age:

Individuals in age-group 18-24 had the highest adult lifetime prevalence rate from year 2011 to 2013 (Figure 5). Respondents in age-group 65 and above had the lowest adult lifetime prevalence rate from year 2011 to 2013. In 2012, there was a decrease in lifetime asthma prevalence in age-groups 18-24 and 25-34 compared to prevalence rate in 2011 and 2013. In age-groups 45-54 and 55-64, lifetime asthma prevalence increased from 2011 through 2013. In general, there is a gradual decrease in asthma prevalence with advancing age.



Figure 5: Adult Self-Reported Lifetime Asthma Prevalence Rate (Percent) by Age, Pa., BRFSS, 2011-2013

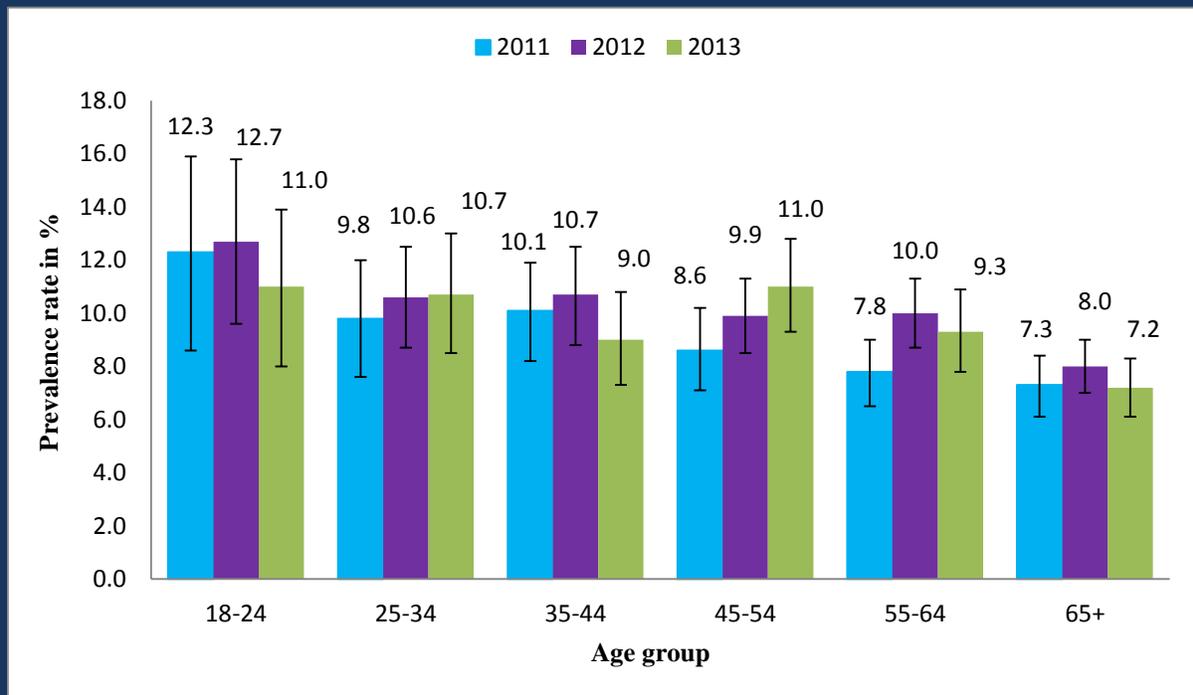


Data Source: The National Behavioral Risk Factor Surveillance System (BRFSS) Pennsylvania Behavioral Risk Factor Surveillance System (BRFSS)
 Vertical bars on the graph denote the 95% confidence interval

Current asthma prevalence and age: Overall, individuals in the age-group 18-24 had the highest current prevalence rate in year 2011 through to 2013 (Figure 6). In 2013, the prevalence rate observed in age group 45-54 was the same as that in age-group 18-24. In age group 45-54, the current prevalence rate increased annually from 2011 to 2013. In age group 35-44, the highest current prevalence rate was in year 2012. Individuals in age-group 65 and above had the lowest current prevalence rate of all age-groups from 2011 to 2013.



Figure 6: Adult Self-Reported Current Asthma Prevalence Rate (Percent) by Age, Pa., BRFSS, 2011-2013



Data Source: The National Behavioral Risk Factor Surveillance System (BRFSS)
 Pennsylvania Behavioral Risk Factor Surveillance System (BRFSS)
 Vertical bars on the graph denote the 95% confidence interval

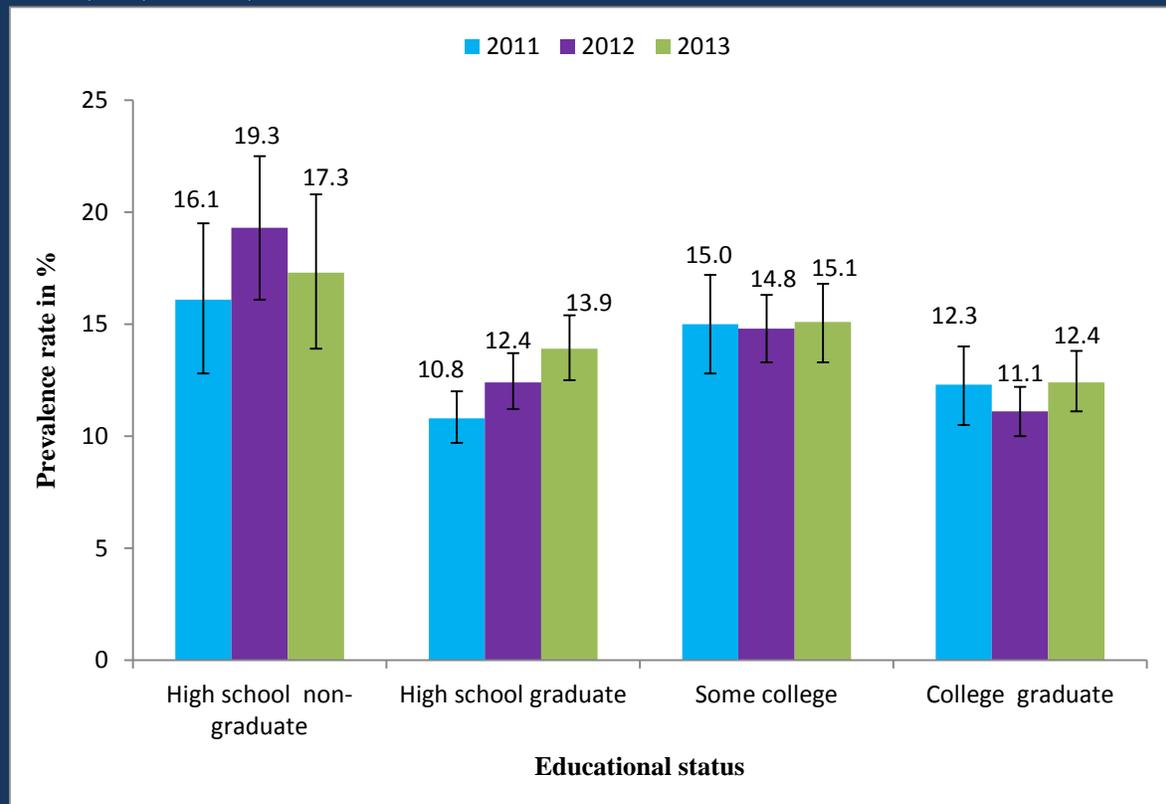
ASTHMA AND SOCIOECONOMIC CHARACTERISTICS

EDUCATIONAL STATUS

Lifetime asthma prevalence and educational attainment: An association between asthma and low educational achievement has not been established. There is no clear relationship between diagnosis of asthma and educational status. However, based on a three-year average, high school non-graduates had the highest adult lifetime asthma prevalence of 17.6 percent (Figure 7). This was followed by adults with some college education (15.0 percent). The lowest lifetime asthma prevalence was reported among college graduates (11.9 percent).

The three-year average prevalence rate among high school graduate was 12.4 percent. Prevalence rate increased from year to year among high school graduate respondents. It remained at a relatively constant rate among respondents with some college education.

Figure 7: Adult Self-Reported Lifetime Asthma Prevalence Rate (Percent) by Educational Status, Pa., BRFSS, 2011-2013

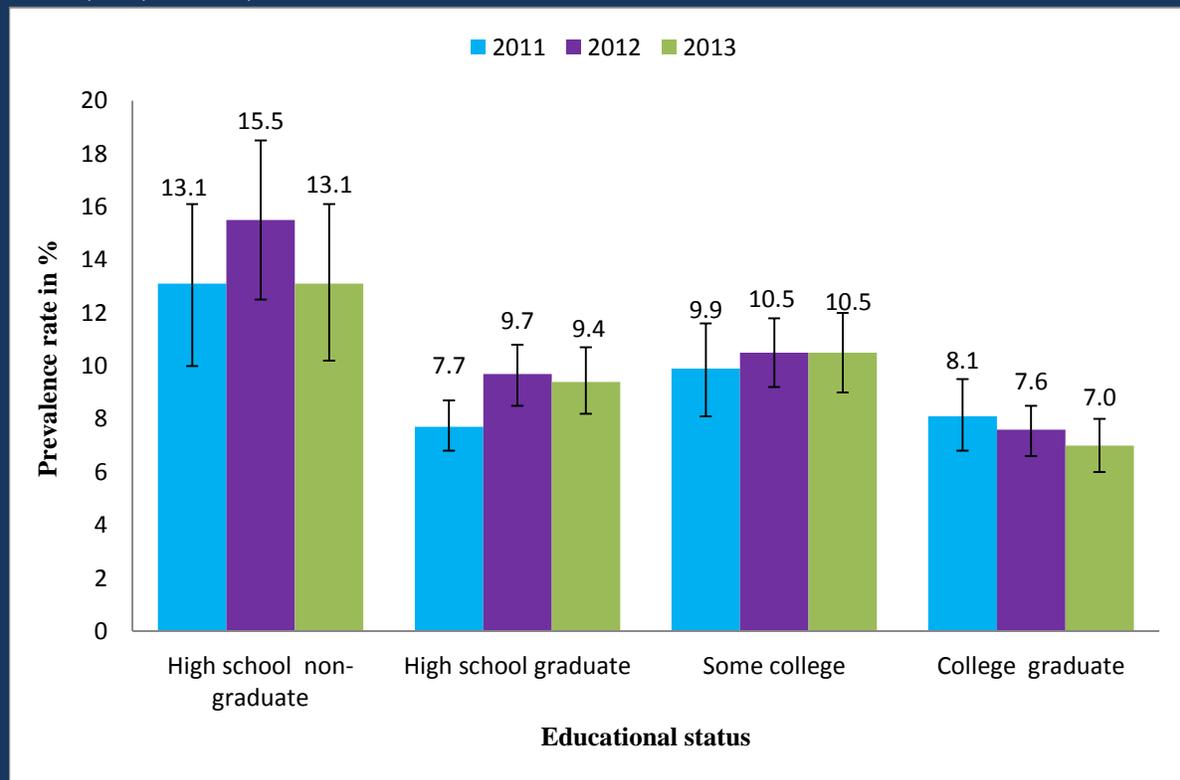


Data Source: The National Behavioral Risk Factor Surveillance System (BRFSS)
 Pennsylvania Behavioral Risk Factor Surveillance System (BRFSS)
 Vertical bars on the graph denote the 95% confidence interval

Current asthma prevalence and educational attainment: Based on a three-year average, high school non-graduates had the highest adult current asthma prevalence of 13.9 percent. This was followed by adults with some college education with a prevalence rate of 10.3 percent. The lowest current asthma prevalence of 7.6 percent was reported among college graduates (Figure 8). The pattern observed in respondents with current asthma was similar to those with lifetime asthma.



Figure 8: Adult Self-Reported Current Asthma Prevalence Rate (Percent) by Educational Status, Pa., BRFSS, 2011-2013



Data Source: The National Behavioral Risk Factor Surveillance System (BRFSS)
 Pennsylvania Behavioral Risk Factor Surveillance System (BRFSS)
 Vertical bars on the graph denote the 95% confidence interval

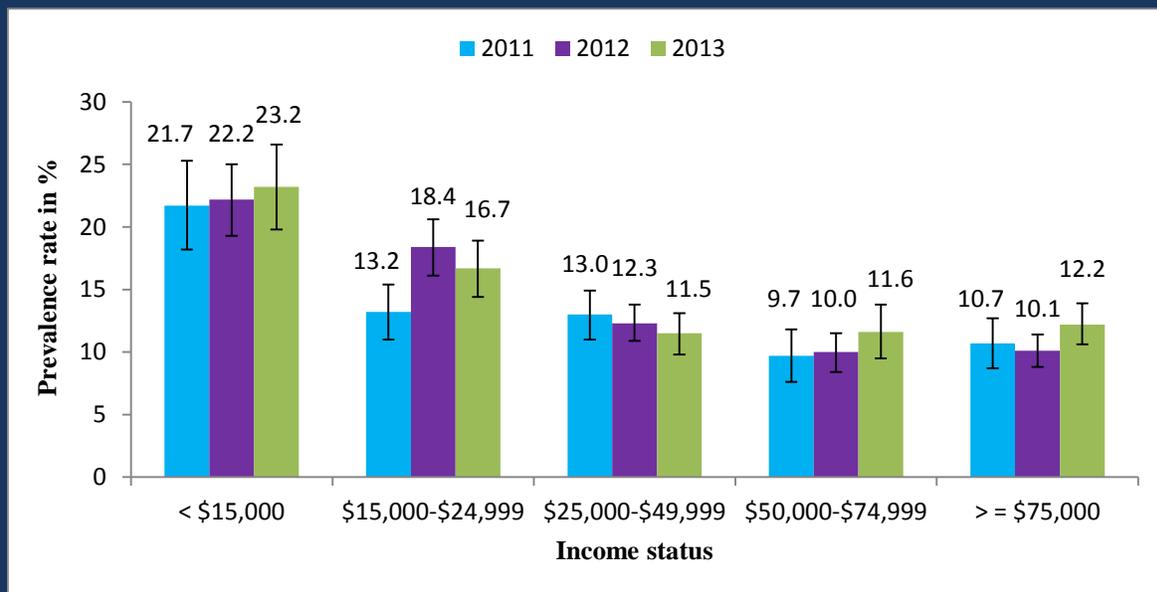
INCOME STATUS

Lifetime asthma prevalence and income levels:

Between year 2011 and 2013, the lifetime asthma prevalence was highest among respondents with income less than \$15,000 and lowest among respondents with income between \$50,000 and \$74,999. The three-year average lifetime asthma prevalence rate among respondents with income less than \$15,000 was 22.4 percent, while those with income between \$50,000 and \$74,999 had a rate of 10.4 percent. Lifetime asthma prevalence increased from year to year among respondents with income less than \$15,000 and those with income between \$50,000 and \$74,999 but decreased among respondents with income between \$25,000 and \$49,999 (Figure 9).



Figure 9: Adult Self-Reported Lifetime Asthma Prevalence Rate (Percent) by Income Status, Pa., BRFSS, 2011-2013

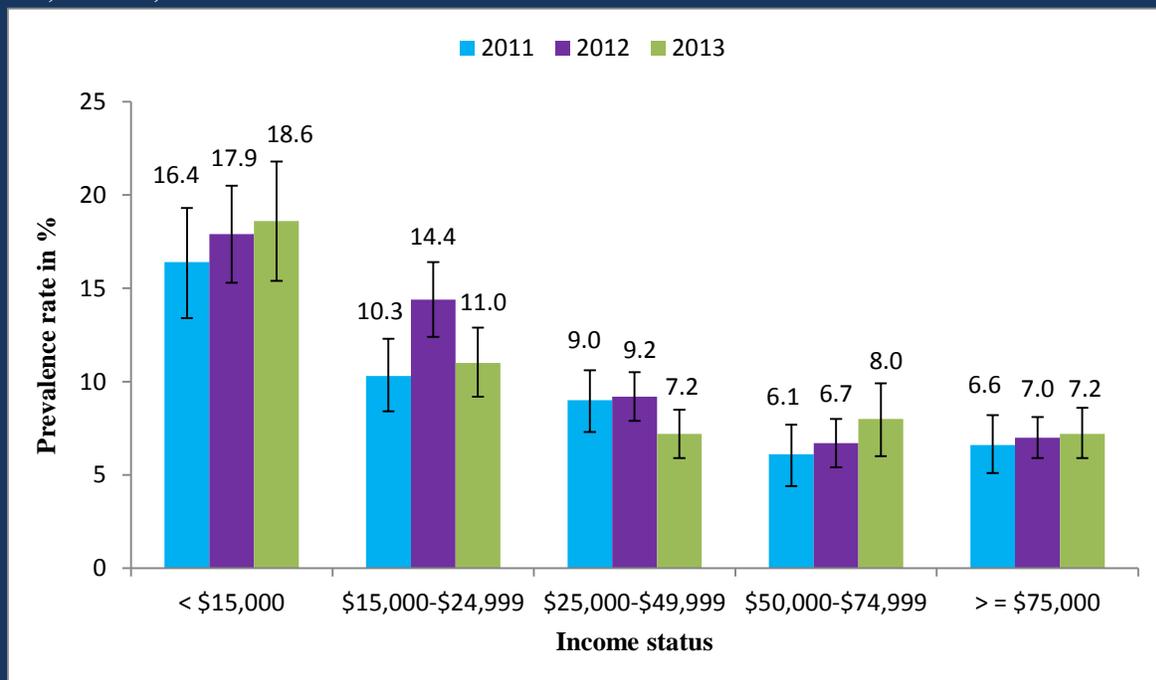


Data Source: The National Behavioral Risk Factor Surveillance System (BRFSS)
 Pennsylvania Behavioral Risk Factor Surveillance System (BRFSS)
 Vertical bars on the graph denote the 95% confidence interval

Current asthma prevalence and income levels: Between year 2011 and 2013, the current asthma prevalence was highest among respondents with income less than \$15,000 and lowest among respondents with income greater than \$50,000. The three-year average current asthma prevalence rate among respondents with income less than \$15,000 was 17.6 percent while those with income greater than \$50,000 had a rate of 6.9 percent. Current asthma prevalence increased from year to year among respondents with income less than \$15,000 and those with income between \$50,000 and \$74,999 but decreased among respondents with income between \$25,000 and \$49,999.

Generally, with low income, an individual is more likely to live in a poorer neighborhood with poor housing and more likely to be exposed to allergens that can trigger the occurrence or worsen the symptoms of asthma. There is a negative association between income and current asthma prevalence. The higher the income, the lower the current prevalence of asthma (Figure 10).

Figure 10: Adult Self-Reported Current Asthma Prevalence Rate (Percent) by Income Status, Pa., BRFSS, 2011-2013



Data Source: The National Behavioral Risk Factor Surveillance System (BRFSS)
 Pennsylvania Behavioral Risk Factor Surveillance System (BRFSS)
 Vertical bars on the graph denote the 95% confidence interval

SMOKING STATUS

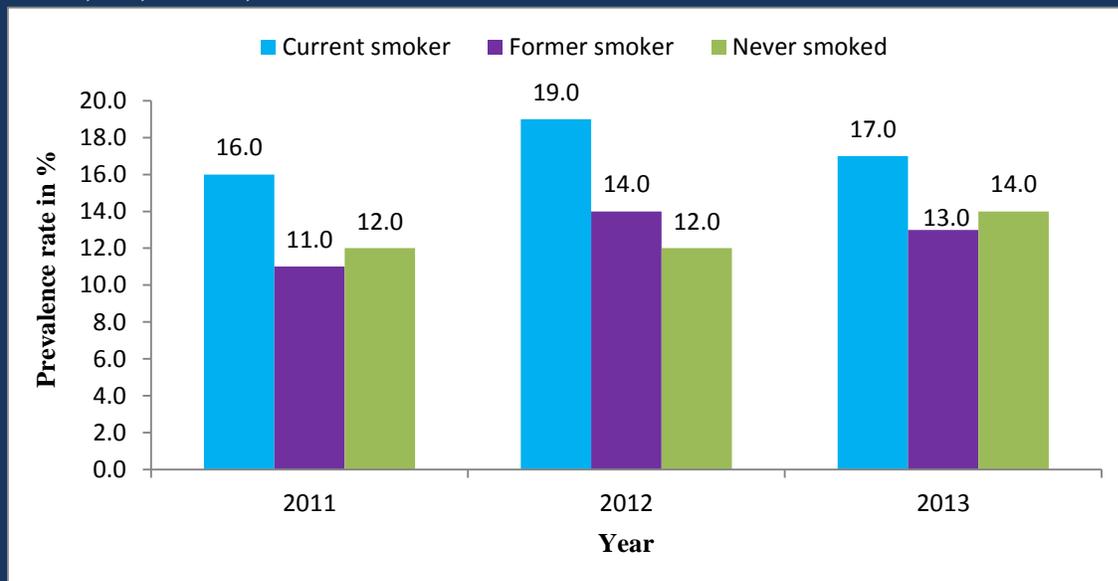
Lifetime and current asthma prevalence and smoking

The Behavioral Risk Factor Surveillance System survey questions regarding smoking were: “Have you smoked at least 100 cigarettes in your entire life?” and “Do you now smoke cigarettes every day, some days, or not at all?” Responses to these questions were categorized as: current smoker, former smoker, and never smoker. Individuals who reported smoking at least 100 cigarettes in their lifetime and who, at the time of survey, smoked either every day or some days were defined as current smoker. Individuals who reported smoking at least 100 cigarettes in their lifetime and who, at the time of the survey, did not smoke at all were defined as former smoker. Individuals who reported never having smoked 100 cigarettes were defined as never smoker.

Smoking has been associated with adverse outcomes in asthma and asthma management. Tobacco smoke and environmental tobacco smoke has been shown to trigger asthma attacks and worsen asthma symptoms.

Lifetime asthma prevalence: In 2013, among respondents reporting lifetime asthma prevalence, current adult smokers have the highest lifetime asthma prevalence (17.0 percent) compared to former smokers (13.0 percent) and individuals who never smoked (14.0 percent) [Figure 11].

Figure 11: Adult Self-Reported Lifetime Asthma Prevalence Rate (Percent) by Smoking Status, Pa., BRFSS, 2011-2013



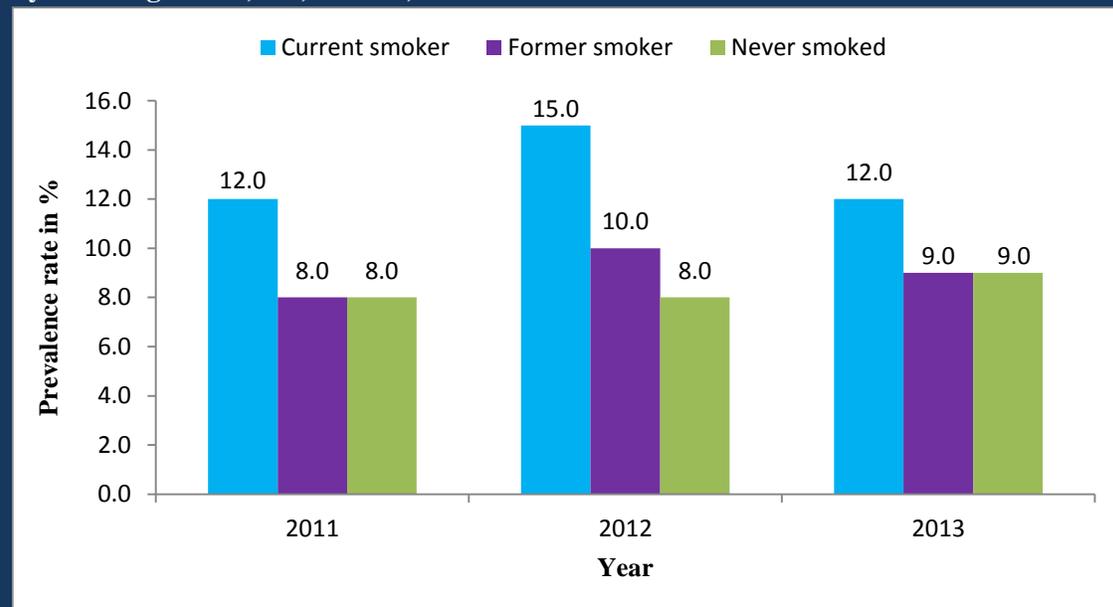
Data Source: The National Behavioral Risk Factor Surveillance System (BRFSS)
Pennsylvania Behavioral Risk Factor Surveillance System (BRFSS)

Current asthma prevalence and smoking status.:

In 2013, among individuals who self-reported current asthma prevalence, current smokers have the highest current asthma prevalence (12.0 percent) compared to former smoker (9.0 percent) and individuals who never smoked [9.0 percent] (Figure 12).



Figure 12: Adult Self-Reported Current Asthma Prevalence Rate (Percent) by Smoking Status, Pa., BRFSS, 2011-2013



Data Source: The National Behavioral Risk Factor Surveillance System (BRFSS)
 Pennsylvania Behavioral Risk Factor Surveillance System (BRFSS)
 Vertical bars on the graph denote the 95% confidence interval

INSURANCE STATUS

Asthma prevalence and insurance status:

Adults with health care coverage had a higher three-year average lifetime [14.0 percent](Table 6) and current asthma prevalence [9.7 percent](Table 7) compared to respondents without health care coverage (12.3 and 8.0 percent, respectively). Generally, individuals with asthma are more likely to have health insurance than those without asthma, based on national estimates obtained from the Centers for Disease Control and Prevention.⁶



Table 6: Adult Self-Reported Lifetime Asthma Prevalence Rate (Percent) by Insurance Status, Pa., BRFSS, 2011-2013

Year	Respondents Without Health Care Coverage		Respondents With Health Care Coverage	
	Prevalence (percent)	95% C.I (percent)	Prevalence (percent)	95% C.I (percent)
2011	12.0	(10.0-15.0)	13.0	(12.0-14.0)
2012	13.0	(11.0-16.0)	14.0	(13.0-14.0)
2013	12.0	(10.0-15.0)	15.0	(14.0-15.0)

*CI denotes confidence interval.

Data Source: Pennsylvania Behavioral Risk Factor Surveillance System (BRFSS)

Table 7: Adult Self-Reported Current Asthma Prevalence Rate (Percent) by Insurance Status, Pa., BRFSS, 2011-2013

Year	Respondents Without Health Care Coverage		Respondents With Health Care Coverage	
	Prevalence (percent)	95% C.I (percent)	Prevalence (percent)	95% C.I (percent)
2011	7.0	(5.0-9.0)	9.0	(9.0-10.0)
2012	10.0	(8.0-12.0)	10.0	(9.0-11.0)
2013	7.0	(5.0-9.0)	10.0	(9.0-11.0)

*CI denotes confidence interval.

Data Source: Pennsylvania Behavioral Risk Factor Surveillance System (BRFSS)

ASTHMA AND OTHER HEALTH RISK FACTORS

ASTHMA PREVALENCE AND DIABETES

Asthma has been associated with increased risk of developing diabetes. Some studies suggest that declining lung function is an associated pathophysiological change associated with diabetes.¹⁴

Lifetime asthma prevalence and diabetes: The three-year average prevalence of lifetime asthma is higher in respondents diagnosed with diabetes (17.7 percent) than those without a diabetes diagnosis (13.3 percent). Lifetime asthma prevalence increased from year to year in respondents with diabetes.

The lifetime prevalence in respondents not diagnosed with diabetes remained the same in 2011 and 2012 but increased by approximately 7.7 percent in 2013 (Table 8).

Current asthma prevalence and diabetes: The three-year average prevalence of current asthma is higher in respondents diagnosed with diabetes (13.7 percent) than those without a diabetes diagnosis (8.3 percent). Current asthma prevalence also increased from 12.0 percent in 2011 to 15.0 percent in 2012 in those respondents diagnosed with diabetes. In respondents without diabetes, the current asthma prevalence was between 9.0 and 10.0 percent (Table 9).

Table 8: Adult Self-Reported Lifetime Asthma Prevalence Rate (Percent) among Adults with and without Diabetes, Pa., BRFSS, 2011-2013

Year	Respondents Diagnosed With Diabetes		Respondents Not Diagnosed With Diabetes	
	Prevalence (percent)	95% C.I (percent)	Prevalence (percent)	95% C.I (percent)
2011	16.0	(13.0-18.0)	13.0	(12.0-14.0)
2012	18.0	(16.0-21.0)	13.0	(12.0-14.0)
2013	19.0	(16.0-22.0)	14.0	(13.0-15.0)

*CI denotes confidence interval.

Data Source: Pennsylvania Behavioral Risk Factor Surveillance System (BRFSS)

Table 9: Adult Self-Reported Current Asthma Prevalence Rate (Percent) among Adults with and without Diabetes, Pa., BRFSS, 2011-2013

Year	Respondents Diagnosed With Diabetes		Respondents Not Diagnosed With Diabetes	
	Prevalence (percent)	95% C.I (percent)	Prevalence (percent)	95% C.I (percent)
2011	12.0	(10.0-15.0)	9.0	(8.0-10.0)
2012	15.0	(12.0-17.0)	10.0	(9.0-10.0)
2013	14.0	(11.0-17.0)	9.0	(8.0-10.0)

*CI denotes confidence interval.

Data Source: Pennsylvania Behavioral Risk Factor Surveillance System (BRFSS)

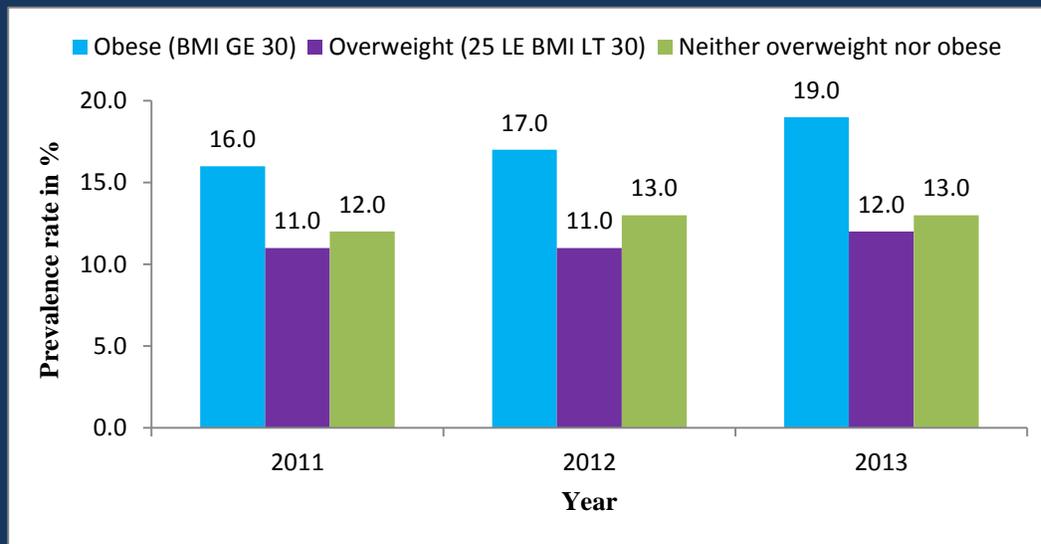
ASTHMA PREVALENCE AND OBESITY

Lifetime asthma prevalence and obesity

Overweight respondents had the lowest three-year average lifetime asthma prevalence of 11.3 percent compared to obese respondents (17.3 percent) and respondents who were neither obese nor overweight (12.7 percent). Obese respondents had the highest lifetime asthma prevalence. Lifetime asthma prevalence has been rising in obese respondents, with rates increasing from 16.0 percent in 2011 to 19.0 percent in 2013 (Figure 13).



Figure 13: Adult Self-Reported Lifetime Asthma Prevalence Rate (Percent) in Obese, Overweight and neither Obese nor Overweight Respondents, Pa., BRFSS, 2011-2013



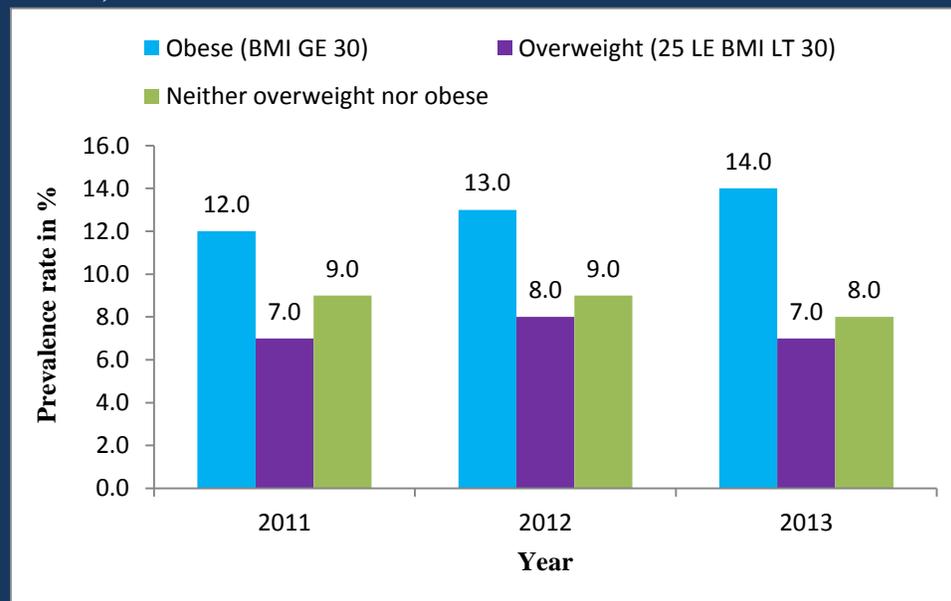
Data Source: The National Behavioral Risk Factor Surveillance System (BRFSS)
Pennsylvania Behavioral Risk Factor Surveillance System (BRFSS)

Current asthma prevalence and obesity

In adults with self-reported current asthma, overweight respondents had the lowest three-year average current asthma prevalence of 7.3 percent compared to obese respondents (13.0 percent) and respondents that were neither obese nor overweight (8.7 percent). Obese respondents had the highest current asthma prevalence. Current asthma prevalence has been rising in obese respondents, with rates increasing from 12.0 percent in 2011 to 14.0 percent in 2013 (Figure 14). The reason for the lower lifetime and current asthma prevalence in overweight respondents is unclear.



Figure 14: Adult Self-Reported Current Asthma Prevalence Rate (Percent) in Obese, Overweight and neither Obese nor Overweight Respondents, Pa., BRFSS, 2011-2013



Data Source: The National Behavioral Risk Factor Surveillance System (BRFSS)
Pennsylvania Behavioral Risk Factor Surveillance System (BRFSS)

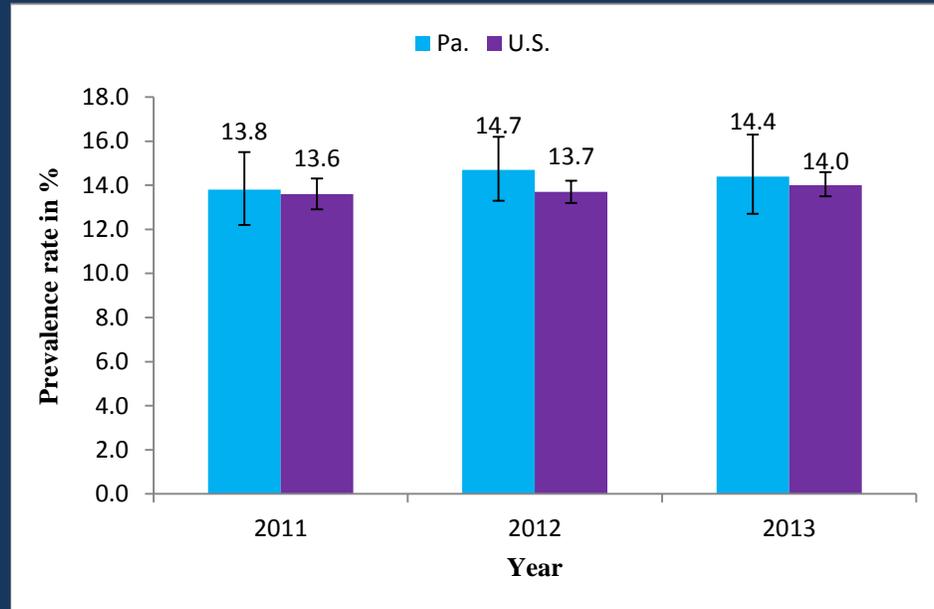
ASTHMA PREVALENCE IN CHILDREN IN PENNSYLVANIA

Child self-reported lifetime asthma prevalence, 2011 through 2013

The three-year average lifetime asthma prevalence was 14.3 percent among children in Pennsylvania compared to 13.7 percent among children in the U.S.. In Pennsylvania, the lifetime asthma prevalence among children increased from 13.8 percent in 2011 to 14.7 percent in 2012 and then decreased to 14.4 percent in 2013. These differences from year to year are not statistically significant. The lifetime asthma prevalence in the U.S. during this time, 2011 to 2013, increased from 13.6 percent in 2011 to 14.0 in 2013 (Figure 16). Based on the 2013 estimates, approximately 382,146 children had lifetime asthma.



Figure 16: Child Self-Reported Lifetime Asthma Prevalence Rate (Percent), Pa. vs U.S., BRFSS, 2011-2013



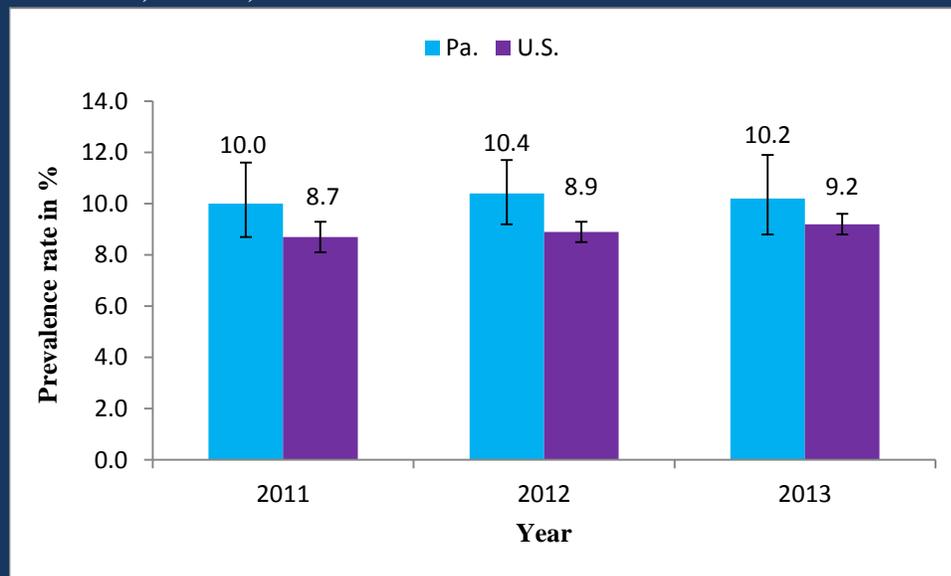
Data Source: The National Behavioral Risk Factor Surveillance System (BRFSS) Pennsylvania Behavioral Risk Factor Surveillance System (BRFSS)
Vertical bars on the graph denote the 95% confidence interval.

Child self-reported current asthma prevalence, 2011 through 2013

The three-year average current asthma prevalence among children in Pennsylvania was 10.2 percent compared to 8.9 percent among children in the U.S.. The current asthma prevalence in Pennsylvania increased from 10.0 percent in 2011 to 10.4 percent in 2012, decreasing to 10.2 percent in 2013. This increase is not statistically significant. However, the current asthma prevalence in the U.S. increased from 8.7 percent in 2011 to 9.2 percent in 2013 (Figure 17). Based on the 2013 estimates, approximately 269,423 children had current asthma.



Figure 17: Child Self-Reported Current Asthma Prevalence Rate (Percent), Pa. vs U.S., BRFSS, 2011-2013



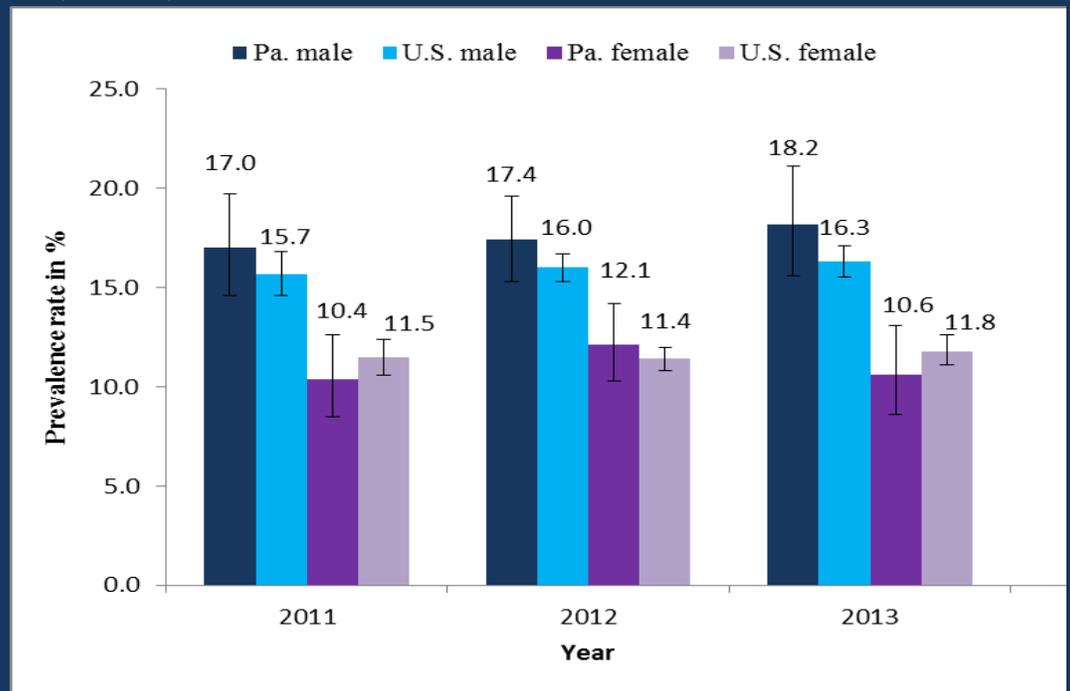
Data Source: The National Behavioral Risk Factor Surveillance System (BRFSS)
 Pennsylvania Behavioral Risk Factor Surveillance System (BRFSS)
 Vertical bars on the graph denote the 95% confidence interval.

Lifetime and Current Asthma Prevalence among Children by Sex, Pennsylvania and the U.S., 2011-2013

The lifetime asthma prevalence was higher in male children compared to female children both in the U.S. and Pennsylvania. From 2011 through 2013, the three-year average lifetime asthma prevalence among Pennsylvania male children was 17.5 percent and 16.0 percent in U.S. male children. During this same time, females in Pennsylvania had a lifetime asthma prevalence of 11.0 percent compared to U.S. females of 11.6 percent.

The lifetime asthma prevalence rate among males both in Pennsylvania and the U.S. and females in the U.S. increased from 2011 to 2013. The trend among female children in Pennsylvania is different from the trend in males and U.S. females. Lifetime asthma prevalence among Pa. females increased from 10.4 percent in 2011 to 12.1 percent in 2012, then decreased to 10.6 percent in 2013 (Figure 18).

Figure 18: Child Self-Reported Lifetime Asthma Prevalence Rate (Percent), Pa. vs U.S., BRFSS, 2011-2013

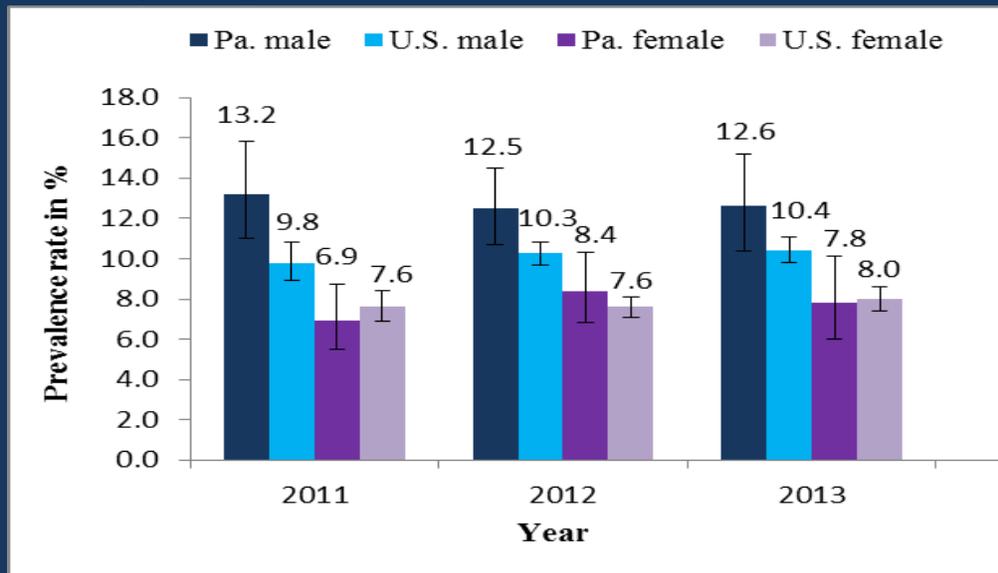


Data Source: The National Behavioral Risk Factor Surveillance System (BRFSS)
 Pennsylvania Behavioral Risk Factor Surveillance System (BRFSS)
 Vertical bars on the graph denote the 95% confidence interval.

The current asthma prevalence was higher in males compared to females both in the U.S. and in Pennsylvania (Figure 19). From 2011 through 2013, the three-year average current asthma prevalence among Pennsylvania males was 12.7 percent and 10.1 percent in U.S. males. During this same time period, females in Pennsylvania and the U.S. had approximately the same current asthma prevalence of 7.7 percent (Figure 19). The current asthma prevalence rate among male children in Pennsylvania decreased from 13.2 percent in 2011 to 12.6 percent in 2013. Among male and female children in the U.S., the prevalence increased from rates in 2011 to rates in 2013.



Figure 19: Child Self-Reported Current Asthma Prevalence Rate (Percent), Pa. vs U.S., BRFSS, 2011-2013



Data Source: The National Behavioral Risk Factor Surveillance System (BRFSS)
 Pennsylvania Behavioral Risk Factor Surveillance System (BRFSS)
 Vertical bars on the graph denote the 95% confidence interval.

Lifetime and Current Asthma Prevalence among Children by Age, Pennsylvania and the U.S., 2011-2013

Lifetime asthma prevalence and age

In Pennsylvania, lifetime asthma prevalence among children varied by age group and from year to year. Children ages 0-4 had the lowest three-year average lifetime asthma prevalence (6.9 percent), while children ages 10-14 had the highest three-year average lifetime prevalence [18.2 percent] (Table 10). The prevalence among children ages 5-9 (15.5 percent) was more than twice the prevalence among children ages 0-4. The three-year average lifetime asthma prevalence among children ages 15-17 was 17.8 percent (Table 10).



Table 10: Child Self-Reported Lifetime Asthma Prevalence Rate (Percent) by Age, Pa. vs U.S., BRFSS, 2011-2013

Year	Age group	U.S.		PA	
		Prevalence (percent)	95% CI *	Prevalence (percent)	95% CI *
2011	0-4	7.3	(6.0 - 8.9)	6.8	(4.8 - 9.6)
	5-9	14.2	(12.9 - 15.7)	13.7	(10.4 - 17.9)
	10-14	17.8	(16.4 - 19.4)	18.3	(15.0 - 22.1)
	15-17	17.4	(15.8 - 19.1)	16.6	(13.0 - 20.9)
2012	0-4	7.3	(6.6 - 8.1)	7.0	(5.2 - 9.4)
	5-9	14.6	(13.6 - 15.6)	16.0	(13.1 - 19.5)
	10-14	17.5	(16.5 - 18.6)	17.4	(14.6 - 20.6)
	15-17	17.4	(16.3 - 18.6)	18.7	(15.5 - 22.5)
2013	0-4	7.3	(6.6 - 8.2)	6.8	(4.8 - 9.5)
	5-9	14.5	(13.4 - 15.7)	16.7	(13.0 - 21.2)
	10-14	17.9	(16.8 - 19.0)	18.8	(15.1 - 23.1)
	15-17	17.9	(16.5 - 19.4)	18.1	(14.0 - 23.2)

*CI denotes confidence interval

**U.S. Total includes 50 states plus the District of Columbia and excludes the three territories.

The National Behavioral Risk Factor Surveillance System (BRFSS)

Pennsylvania Behavioral Risk Factor Surveillance System (BRFSS)

Current asthma prevalence and age

In Pennsylvania, current asthma prevalence among children varied by age group and from year to year. Children ages 0-4 had the lowest three-year average current asthma prevalence (5.8 percent), while children ages 10-14 had the highest three-year average current asthma prevalence of 13.2 percent. The three-year average current asthma prevalence among children ages 15-17 was 11.0 percent (Table 11).



Table 10: Child Self-Reported Current Asthma Prevalence Rate (Percent) by Age, Pa. vs U.S., BRFSS, 2011-2013

Year	Age group	U.S.		PA	
		Prevalence (percent)	95%CI* (percent)	Prevalence (percent)	95% CI * (percent)
2011	0-4	5.3	(4.1 - 6.9)	6.1	(4.2 - 8.8)
	5-9	9.7	(8.6 - 10.9)	10.1	(7.3 - 13.9)
	10-14	11.4	(10.2 - 12.7)	14.1	(11.2 - 17.6)
	15-17	9.6	(8.5 - 10.9)	10.4	(7.6 - 14.1)
2012	0-4	5.2	(4.6 - 5.9)	5.6	(4.0 - 7.9)
	5-9	9.8	(9.0 - 10.7)	11.7	(9.1 - 14.9)
	10-14	11.5	(10.7 - 12.4)	12.4	(10.0 - 15.2)
	15-17	10.3	(9.4 - 11.2)	11.6	(9.0 - 14.8)
2013	0-4	5.3	(4.7 - 6.0)	5.6	(3.8 - 8.1)
	5-9	10.4	(9.5 - 11.5)	13.0	(9.7 - 17.3)
	10-14	11.4	(10.5 - 12.4)	13.2	(10.0 - 17.1)
	15-17	10.2	(9.1 - 11.3)	11.0	(7.8 - 15.3)

*CI denotes confidence interval

**U.S. Total includes 50 states plus the District of Columbia and excludes the three territories.
The National Behavioral Risk Factor Surveillance System (BRFSS)
Pennsylvania Behavioral Risk Factor Surveillance System (BRFSS)

Lifetime and Current Asthma Prevalence among Children by Race, Pennsylvania and the U.S., 2011-2013

Lifetime asthma prevalence and race

Disparities exist among races and ethnicities. White non-Hispanic children typically had lower lifetime prevalence rates compared to black non-Hispanics. Black non-Hispanic children in Pennsylvania had the highest three-year average lifetime asthma prevalence (23.7 percent) compared to other races and ethnicities both in the U.S. and Pennsylvania. White non-Hispanic children had a three-year average prevalence rate of 11.2 percent. The difference in the lifetime asthma prevalence rate between white non-Hispanic and black non-Hispanic children is statistically significant.

In 2011 and 2013, the lifetime asthma prevalence rate among black non-Hispanic children is more than twice the prevalence among white non-Hispanic children. In Pennsylvania, white non-Hispanic children had lower lifetime asthma prevalence compared to children of other races/ethnicity in the U.S. Lifetime asthma prevalence among black non-Hispanic, other non-Hispanic, multirace non-Hispanic and Hispanics in Pennsylvania are higher than those of the U.S. (Table 12).

Table 12: Child Self-Reported Lifetime Asthma Prevalence Rate (Percent) by Race, Pa. vs U.S., BRFSS, 2011-2013

Year	Race/Ethnicity	U.S.		PA	
		Prevalence (percent)	95% CI * (percent)	Prevalence (percent)	95% CI* (percent)
2011	White NH	12.3	(11.5 - 13.2)	10.9	(9.4 - 12.7)
	Black NH	18.3	(15.7 - 21.2)	24.7	(18.9 - 31.6)
	Other NH	14.0	(10.9 - 17.8)	17.6	(8.4 - 33.3)
	Multirace NH	16.4	(13.8 - 19.3)	21.1	(12.8 - 32.6)
	Hispanic	13.5	(12.1 - 15.2)	17.4	(11.4 - 25.6)
2012	White NH	12.2	(11.7 - 12.6)	11.4	(10.2 - 12.8)
	Black NH	19.9	(18.3 - 21.7)	17.2	(13.2 - 22.2)
	Other NH	11.4	(9.6 - 13.5)	16.5	(8.0 - 31.0)
	Multirace NH	20.3	(17.7 - 23.1)	23.4	(16.1 - 32.6)
	Hispanic	13.5	(12.5 - 14.7)	28.1	(21.5 - 35.8)
2013	White NH	11.9	(11.3 - 12.5)	11.2	(9.6 - 13.0)
	Black NH	21.3	(19.4 - 23.2)	29.2	(23.1 - 36.0)
	Other NH	12.4	(10.6 - 14.3)	11.6	(6.5 - 19.9)
	Hispanic	14.5	(13.3 - 15.8)	19.5	(12.8 - 28.5)

*CI denotes confidence interval

**U.S. Total includes 50 states plus the District of Columbia and excludes the three territories. The National Behavioral Risk Factor Surveillance System (BRFSS) Pennsylvania Behavioral Risk Factor Surveillance System (BRFSS)

Current asthma prevalence and race

White non-Hispanic and other non-Hispanic children typically had lower current prevalence rates compared to black non-Hispanics. Black non-Hispanic children had the highest three-year average current asthma prevalence (19.3 percent) compared to other races and ethnicities both in the U.S. and Pennsylvania. White non-Hispanic children had a three-year average prevalence rate of 7.6 percent. The difference in the current asthma prevalence rate between white non-Hispanic and black non-Hispanic children is statistically significant.

From 2011 to 2013, the current asthma prevalence rate among black non-Hispanic children was more than twice the prevalence among white non-Hispanic children. In Pennsylvania, white non-Hispanic children had current asthma prevalence rates similar to children in the U.S. Current asthma prevalence rates among black non-Hispanic, other non-Hispanic, multirace non-Hispanic and Hispanics in Pennsylvania are higher than those of the U.S. (Table 13).

Table 13: Child Self-Reported Current Asthma Prevalence Rate (Percent) by Race, Pa. vs U.S., BRFSS, 2011-2013

Year	Race/Ethnicity	U.S.		PA	
		Prevalence (percent)	95% CI* (percent)	Prevalence (percent)	95% CI * (Percent)
2011	White NH	7.9	(7.1 - 8.6)	7.9	(6.6 - 9.4)
	Black NH	13.8	(11.7 - 16.2)	20.8	(15.3 - 27.5)
	Other NH	9.1	(6.3 - 13.0)	9.3	(3.5 - 22.4)
	Multirace NH	11.5	(9.4 - 14.0)	15.8	(8.7 - 27.1)
	Hispanic	7.8	(6.7 - 9.1)	9.9	(5.5 - 17.3)
2012	White NH	7.9	(7.5 - 8.3)	7.9	(6.9 - 9.1)
	Black NH	14.5	(13.1 - 16.1)	12.9	(9.4 - 17.5)
	Other NH	7.2	(5.7 - 9.1)	12.2	(4.8 - 27.5)
	Multirace NH	13.1	(11.0 - 15.5)	18.0	(11.6 - 26.8)
	Hispanic	8.3	(7.5 - 9.2)	20.2	(14.5 - 27.3)
2013	White NH	7.8	(7.3 - 8.3)	7.1	(5.8 - 8.6)
	Black NH	15.8	(14.2 - 17.6)	24.1	(18.5 - 30.9)
	Other NH	7.5	(6.2 - 9.0)	8.4	(4.3 - 15.7)
	Hispanic	8.7	(7.8 - 9.8)	14.9	(9.1 - 23.4)

*CI denotes confidence interval

**U.S. Total includes 50 states plus the District of Columbia and excludes the three territories.

The National Behavioral Risk Factor Surveillance System (BRFSS)

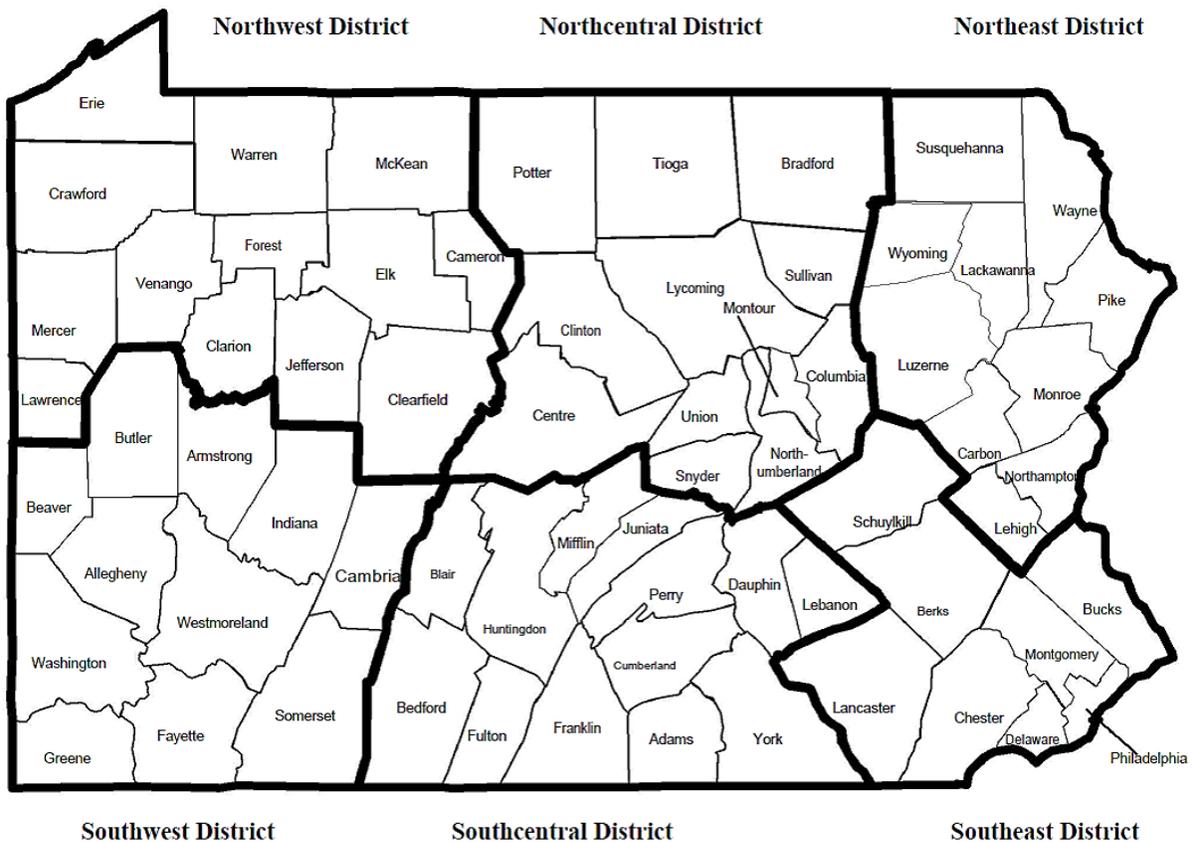
Pennsylvania Behavioral Risk Factor Surveillance System (BRFSS)

Child Self-Reported Current Asthma Prevalence by Health Districts and Counties in Pennsylvania, 2011-2013

The Commonwealth of Pennsylvania is divided into six health districts (Map 1). Implementation of the Department of Health’s public health programs is carried out by the Bureau of Community Health Systems, through the six community health districts. The current asthma prevalence rate in children ages 0 to 17 is presented in this report at the health district level and in two counties: Philadelphia and Allegheny. Overall in Pennsylvania, boys had a higher three-year average current asthma prevalence (12.7 percent) compared to girls (7.7 percent). Likewise, children ages 12 -17 had a

higher three-year average current asthma prevalence of 11.7 percent compared to children ages 0-11 (10.0 percent). The Northeast Health District had the highest three-year average current asthma prevalence of 11.3 percent. This is followed by the Southcentral Health District with a prevalence of 9.3 percent. The Northcentral and Southeast Health Districts had prevalence of 8.3 percent each respectively. The lowest prevalence rate was in the Northwest and Southwest Health Districts at 7.3 percent and 7.7 percent, respectively.

Map 1: Commonwealth of Pennsylvania Health Districts and Counties



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

Child Self-Reported Current Asthma Prevalence by Health Districts and Counties in Pennsylvania, 2011-2013 (continued)

Philadelphia and Allegheny counties are the first and second most populous counties in the Commonwealth of Pennsylvania. Exposure to dangerous levels of ozone and particulate matter has been shown to increase the severity of asthma symptoms or trigger an asthma attack. In a report released by the American Lung Association: State of the Air, 2015, Allegheny and Philadelphia counties were shown to have high ozone days, greater or equal to 3.3.¹ The particulate pollution was equally high in Allegheny County.

Children resident in Philadelphia County had very high current asthma prevalence from 2011

through to 2013 at 18.0, 17.0 and 22.0 percent respectively. These prevalence rates reported in Philadelphia County are higher than 10.0 percent reported annually from year 2011 to 2013 in Pennsylvania among children. The three-year average current asthma prevalence in children resident in Allegheny County (12.7 percent) was also higher than that of the Commonwealth of Pennsylvania (Table 14).

With high levels of ozone, long ozone days and high particulate matter, approximately 24,074 pediatric and 95,161 adult asthma patients are at risk in Allegheny County. In Philadelphia County, these numbers are 35,168 and 117,491, respectively.

Table 14: Child Self-Reported Current Asthma prevalence Rate (Percent) by Sex, Health Districts and Counties, PA, BRFSS, 2011-2013

2011																		
	Pennsylvania		Northwest		Southwest		Northcentral		Southcentral		Northeast		Southeast		Allegheny		Philadelphia	
	Percent	CI	Percent	CI	Percent	CI	Percent	CI	Percent	CI	Percent	CI	Percent	CI	Percent	CI	Percent	CI
All children	10	9-12	8	5-13	6	4-10	8	4-18	12	9-16	12	8-18	6	4-9	15	11-21	18	13-24
Sex: boy	13	11-16	11	6-20	6	3-11	11	3-31	16	11-23	15	9-25	8	5-13	21	14-30	22	15-31
Sex: girl	7	5-9	5	2-10	6	3-12	6	3-11	7	4-13	9	5-16	4	2-8	9	5-15	14	9-22
Age: 0-11	10	8-12	5	2-12	7	4-13	9	3-25	13	9-20	11	6-20	4	2-8	14	9-22	23	16-31
Age: 12-17	11	8-13	10	4-20	5	2-10	7	3-15	10	6-16	13	7-22	10	6-17	18	11-29	14	8-24
2012																		
	Pennsylvania		Northwest		Southwest		Northcentral		Southcentral		Northeast		Southeast		Allegheny		Philadelphia	
	Percent	CI	Percent	CI	Percent	CI	Percent	CI	Percent	CI	Percent	CI	Percent	CI	Percent	CI	Percent	CI
All children	10	9-12	7	5-10	9	6-13	6	5-8	10	7-14	13	10-17	10	7-14	9	6-13	17	13-22
Sex: boy	12	11-14	9	5-13	11	7-18	6	5-9	12	8-18	17	12-23	11	7-16	13	8-20	19	14-26
Sex: girl	8	7-10	6	3-10	7	4-12	6	4-10	8	5-14	9	5-14	10	6-15	7	4-12	13	8-21
Age: 0-11	10	8-11	5	3-9	7	4-11	4	3-6	10	6-15	12	8-18	11	7-16	11	7-18	13	9-19
Age: 12-17	12	10-14	10	6-17	12	6-23	9	6-13	13	8-20	13	9-18	9	5-16	7	3-14	19	13-28
2013																		
	Pennsylvania		Northwest		Southwest		Northcentral		Southcentral		Northeast		Southeast		Allegheny		Philadelphia	
	Percent	CI	Percent	CI	Percent	CI	Percent	CI	Percent	CI	Percent	CI	Percent	CI	Percent	CI	Percent	CI
All children	10	9-12	7	4-12	8	5-12	11	7-17	6	4-9	9	6-14	9	6-13	14	9-21	22	17-29
Sex: boy	13	10-15	8	4-15	11	7-19	11	6-21	7	4-12	7	4-14	12	7-18	21	13-33	27	19-37
Sex: girl	8	6-10	6	3-14	4	2-9	11	5-21	5	3-10	11	5-20	6	3-12	7	3-16	17	11-27
Age: 0-11	10	8-12	7	3-15	6	3-12	10	5-18	6	3-11	7	4-14	10	6-15	15	9-24	24	17-34
Age: 12-17	12	9-15	8	4-16	12	7-21	17	8-32	9	4-16	13	6-24	9	4-19	11	5-22	23	14-35

Source: Pennsylvania Behavioral Risk Factor Surveillance System (BRFSS)

*CI denotes Confidence Interval

ASTHMA MANAGEMENT IN PENNSYLVANIA



ASTHMA MANAGEMENT IN PENNSYLVANIA

The National Asthma Education and Prevention Program (NAEPP) Expert Panel Report 3 (EPR-3) provides guidelines for the diagnosis and management of asthma with the overall goal of ensuring that asthma is well controlled in people with asthma.⁹ The EPR-3 focuses on four major components of care. These are:

Asthma assessment and monitoring

Asthma education

Control of environmental factors and comorbid conditions

Medications/pharmacotherapy

Data for this report on asthma management was obtained from the 2013 Pennsylvania Behavioral Risk Factor Surveillance system and the Asthma Call Back Survey. Answers to the survey questions provided information on how well asthma is controlled and managed among respondents. One limitation of the Asthma Call Back Survey is that it does not provide information on the duration or frequency of use of both long-acting and short-acting corticosteroid use among respondents. Questions on the use of non-traditional, complementary or alternate therapies were asked in the survey. See technical notes for more information on the survey questions.

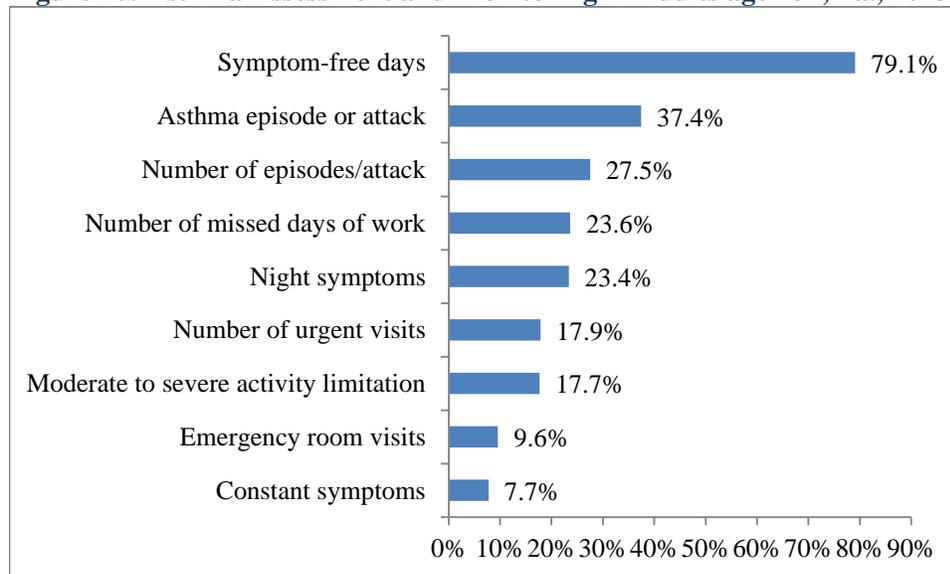


Asthma Control in Adults

In 2013, an estimated 23.6 percent of adults in Pennsylvania with asthma were unable to work or carry out usual activities because of asthma (Figure 20). The asthma RD-5.2 Healthy People (HP 2020) objective target is to reduce the proportion of adults age 18-64 with asthma who miss work to 26.7 percent. Pennsylvania has already achieved this objective. Asthma is also associated with some activity limitation. An estimated 17.7 percent of adults with asthma in Pennsylvania in 2013 experienced moderate to severe activity limitation due to asthma, while 21.2 percent of adults experienced little activity limitation (Figure 20). The RD-4 HP2020

objective is to reduce proportion of people reporting activity limitation to 10.3 percent by 2020. Pennsylvania is on track to achieving this goal by 2020. Nighttime/nocturnal asthma refers to asthma symptoms that occur or worsen at night, therefore making sleep impossible or difficult. Of the 23.5 percent of adults who reported having nighttime symptoms, 4.7 percent had symptoms less or equal to two days, signifying intermittent asthma, and 4.0 percent reported having symptoms 30 days out of 30 days, signifying severe persistent asthma (Figure 20).

Figure 20: Asthma Assessment and Monitoring in Adults age 18+, Pa., 2013.



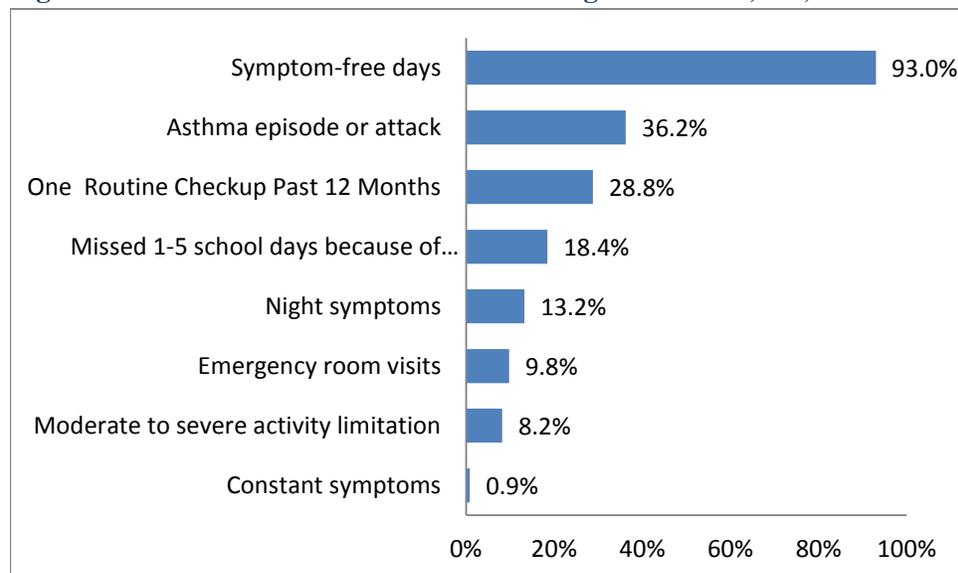
Data Source: Asthma Call Back Survey (ACS), 2013

Asthma Control in Children

In Pennsylvania an estimated 13.2 percent of children reports having night time symptoms (Figure 21). Overall, 28.0 percent of children missed some days in the school year, while 18.4 percent missed one to five days of school because of asthma (Figure 21). The RD-5.1 HP2020 objective is to reduce the proportion of children aged 5 to 17 years with asthma who

miss school to 48.8 percent. In Pennsylvania, this objective has been achieved. Ninety-three percent of children had more symptom-free days compared to adults at 79.1 percent. Also, less than 1.0 percent of the children reported having constant symptoms compared to adults at 7.7 percent (Figure 21).

Figure 21: Asthma Assessment and Monitoring in Children, Pa., 2013.



Data Source: Asthma Call Back Survey (ACS), 2013

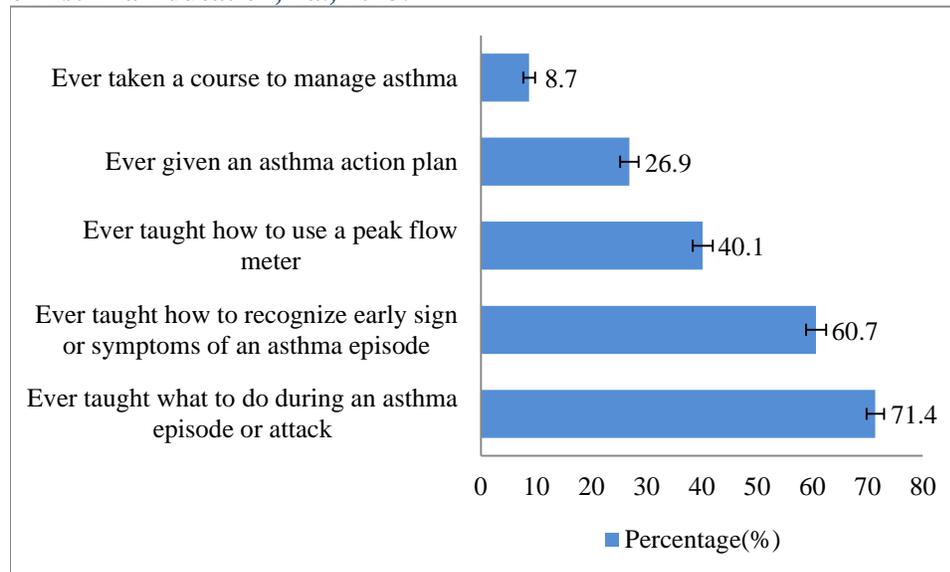


Asthma Education in Adults and Children

In 2013 in Pennsylvania, 26.9 percent of adults and 43.5 percent of children with asthma were given an asthma action plan. The asthma RD-7.1 Healthy People (HP 2020) objective target is to have 36.8 percent of people with current asthma receive written asthma management plans. Pennsylvania is on track to achieving this

objective in 2020 in adults (Figure 22). In 2013 in Pennsylvania, 71.4 percent of adults and 82.8 percent of children with asthma were taught what to do during an asthma episode or attack. An estimated 60.7 percent of adults and 79.8 percent of children were taught how to recognize early signs or symptoms of an asthma episode.

Figure 22: Percentage of Adults (18+) with Asthma Who Has Received Any Form of Asthma Education, Pa., 2013.



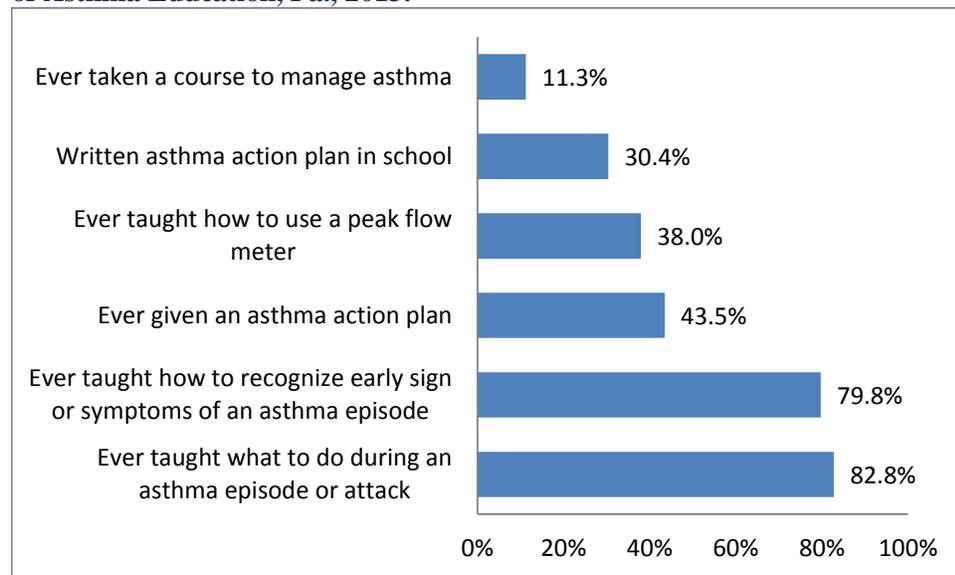
Data Source: Asthma Call Back Survey (ACS), 2013
Vertical bars on the graph denote the 95% confidence interval.

Asthma Education in Adults and Children (continued)

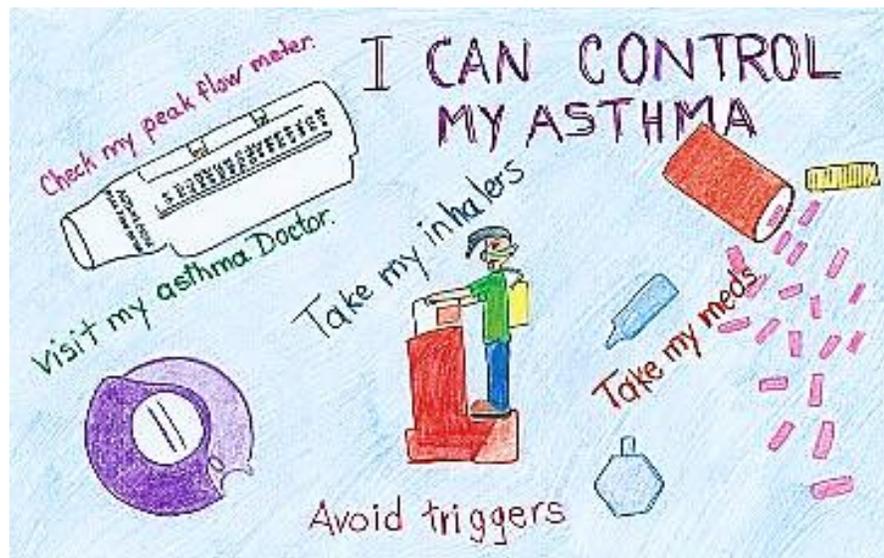
The asthma RD-7.3 Healthy People (HP) 2020 objective target is to have 68.5 percent of people receive education about appropriate response to an asthma episode. Pennsylvania is on track to achieving this objective in the adult population. The RD-6 objective of the HP2020 is to increase the proportion of people with current asthma

who receive formal patient education to 14.5 percent. Approximately 8.7 percent of adults and 11.3 percent of children in Pennsylvania in 2013 had taken a course to manage asthma. Also, 30.4 percent of children also reported having a written asthma action plan in school (Figure 23).

Figure 23: Percentage of Children with Asthma Who Has Received Any Form of Asthma Education, Pa., 2013.



Data Source: Asthma Call Back Survey (ACS), 2013



Environmental Factors and Comorbid Conditions

Environmental factors: In Pennsylvania, an estimated 34.5 percent of adults and 34.9 percent of children have been ever advised by a health professional to change things in their home to improve their asthma. The RD-7.5 goal is to increase the proportion of people with current asthma who has been advised to change things in their home to 54.6 percent. Pennsylvania is on track to achieving this goal.

Depression/ Co-morbid conditions: Several studies have shown that depression occurs at a higher rate in people with asthma than in general population.^{13, 18} It has been suggested that alterations in the stress axis, immune and

autonomic nervous systems may be responsible for this association.¹³ In the BFRSS survey, an estimated 34.9 percent of adults stated that they have been told by a doctor or other health professional that they were depressed. This is a serious comorbidity that should be addressed to reduce both the mortality and morbidity associated with asthma. The survey question regarding depression was not asked of children.



Medications/pharmacotherapy

In Pennsylvania, an estimated 48.9 percent of adults and 38.0 percent of children had taken prescription inhalers in the last three months. Less than 10.0 percent of respondents used each of the non-traditional, complementary or alternate therapies described in the survey. An estimated 24.0 percent of the respondents used breathing to control asthma; however, there is insufficient evidence to suggest that breathing alone can help control asthma.

Fifty-one percent of the children received flu shots, 12.9 percent received flu vaccine spray and 36.2 percent were allowed to carry their asthma medication with them in school.

With the implementation of the Affordable Care Act, an estimated 94.3 percent of children have some form of health insurance coverage. Specifically, 59.5 percent of these children received insurance coverage from parents' employers, 19.6 percent received Medicaid/Medicare, while 5.3 percent had coverage through the Pennsylvania Children's Health Insurance Program (CHIP). An estimated 4.7 percent had an insurance /coverage gap. In the future, it is likely this number will have reduced significantly and more people with asthma will have access to the needed medication and care.



TECHNICAL NOTES

The National Asthma Education and Prevention Program Expert Panel Report 3 provides guidelines for the diagnosis and management of asthma with the overall goal of ensuring that asthma is well controlled in people with asthma.⁴ The EPR-3 focuses on four major components of care. These are:

Asthma assessment and monitoring

Asthma education

Control of environmental factors and comorbid conditions

Medications/pharmacotherapy

In this report, the 2013 Asthma Call Back Survey responses were analyzed.

The extent of asthma control is based on responses to survey questions related to asthma assessment and monitoring. These questions are:

- Do you have symptoms all the time? “All the time” means symptoms that continue throughout the day.
- During the past 30 days, how many days did symptoms of asthma make it difficult for you to stay asleep?
- During the past two weeks, how many days were you completely symptom free, that is, no coughing, wheezing or other symptoms of asthma?
- During the past three months, how many asthma episodes or attacks have you had?
- During the past 12 months, have you had an emergency room or urgent care visit?
- During the past 12 months, how many times did you visit an emergency room or urgent care center because of your asthma?
- During the past 12 months, how many times did you see a doctor or health professional for urgent treatment of worsening asthma symptoms or for an asthma attack episode?
- During the past 12 months, how many days were you unable to work or carry out usual activities because of asthma?
- During the past 30 days, would you say you limited your usual activities due to asthma?
- During the past 12 months, how many days of school did a child miss because of asthma?
- During the past 12 months, how many times did a child see a doctor or other health professional for a routine checkup for asthma?

The extent in which people with asthma were given asthma education for effective asthma management will be based on responses to the following survey questions:

- Has your doctor or other health professionals ever taught you how to recognize early signs or symptoms of an asthma episode?
- Has your doctor or other health professionals ever taught you what to do during an asthma episode or attack?

TECHNICAL NOTES (continued)

- Has your doctor or other health professionals ever taught you how to use a peak flow meter to adjust daily medications?
- Has your doctor or other health professionals ever given you an asthma action plan?
- Have you ever taken a course or class on how to manage your asthma?
- Does your child have a written asthma action plan or asthma management plan on file at school?

Control of environmental factors and comorbid conditions will be based on responses to the following survey questions:

- Has a health professional ever advised you to change things in your home, school or work to improve your asthma?
- Have you ever been told by a doctor or other health professional that you were depressed?

Medications/pharmacotherapy

- Does your child's/children's school allow children with asthma to carry their medication with them while at school?
- In the past three months have you taken prescription asthma medicine using an inhaler?
- In the past three months, have you taken any prescription medicine in pill form for asthma?

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