The 2013 Pennsylvania

Asthma Disparities Report

Asthma Control Program

Pennsylvania Asthma Surveillance System

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Introduction

Asthma is a chronic respiratory disease that affects persons of all ages and is characterized by episodic and reversible attacks of wheezing, chest tightness, shortness of breath and coughing. Obstruction of the airways results from chronic inflammation associated with hyper-responsiveness to a variety of stimuli such as pollen, dust, mold, industrial chemicals, tobacco smoke, emotional stress, etc. Edema and excess mucus production of the airway membranes can also limit airflow. Although asthma cannot be cured and the exact cause of asthma is unknown, symptoms can be controlled and reversed with appropriate medical treatment, self-management education, and by avoiding exposure to environmental allergens and irritants that can trigger an attack. Although most people with asthma can be free of symptoms with appropriate management, poor asthma control continues to be associated with increased emergency department visits, hospitalizations and medical costs.

Asthma is a widespread and serious health threat. In the United States in 2010, more than 18 million adults (8.2 percent), and over seven million children (9.4 percent) reported that they have asthma. In Pennsylvania, approximately one million adults (9.9 percent) and approximately 279,000 children (9.8 percent) stated that they have asthma. For reasons that are not fully understood, that number has been rising steadily for the last 10 years. The number of people diagnosed with asthma in 2010 has increased over 50 percent compared to 2000.

Since 2006, when the first Pennsylvania Asthma Burden Report was published, the Asthma Control Program (ACP) has identified and described asthma disparities, and presented the burden of asthma in various reports.[1] This report is not a classic asthma burden report and does not include all of the statistical figures, tables and graphs. This additional information is available on www.PAasthma.org. The 2013 Asthma Disparities Report presents a few possible explanations, hypotheses and analysis in reference to risk factors and the burden of asthma disparities in Pennsylvania. Correlations, interpretations and associations were made when supportive data were available.

The main purpose of this report is to provide a broad picture of the health disparities and social determinants of health in reference to asthma. This report begins with an introduction and brief description of asthma, two success stories of what we have done that seems to work, socioeconomic and demographic profiles in Pennsylvania, including information on population characteristics such as sex, age groups, geographic location (city/town and county), education, poverty level, health insurance status and household income. The General Overview of Asthma Disparities and Risk Factors section describes risk factors and burden of asthma disparities on the national level. The Executive Summary identifies key findings in Pennsylvania that describe some surveillance data analysis, which includes prevalence, hospitalization and cost of asthma in different segments of the population disproportionately affected by asthma, and mortality. This summary also includes a brief description of each data source for asthma used in the analysis of the burden of asthma disparities.

This report can be useful for planning, education and evaluation of the issues that surround asthma. Knowing the gap in rates of asthma prevalence, hospitalization and mortality in different groups of population, as compared to the health status of the general population, will help epidemiologists, policy makers, advocates and different groups of residents develop strategies to decrease the asthma disparities and improve the quality of life for people with asthma in Pennsylvania. In general, Pennsylvania residents with asthma may find this report interesting and helpful in preventing asthma attacks and improving control of asthma.

Methodology

Data were analyzed using SAS 9.1.3, SUDAAN and Excel, with results presented in PowerPoint. Maps generated by Geographic Information System (GIS) tools are used for visual display of the data and for identification of areas with high burden. Confidence intervals were calculated using SUDAAN, a software package developed by the Research Triangle Institute. It properly estimates sample variances for complex sample designs. Both geographic (e.g., county, PADOH health district) and demographic (e.g., age group) subpopulation analyses were conducted to identify disparities. However, due to the small size of some groups, descriptive information was limited, and estimated prevalence and hospitalization rates of asthma for smaller geographical areas were not always available.

Success Stories

The Children's Hospital of Philadelphia

My CAPP Experience

Tonda, mother of Amon, shared her experience with the Community Asthma Prevention Program (CAPP). Amon suffers from severe asthma. At age14, he has participated in the CAPP program with the support of home visitor Carmen. Tonda recalled Amon's life before enrolling in the CAPP program as "a nightmare."

"They don't diagnose asthma at birth, but since then, Amon has been back and forth to the emergency room. He was sick constantly." Simply a change in weather seemed to trigger his asthma, and he epidemically missed school. As a single mother of three, there were days when Tonda was forced to keep her daughter home in order to take care of her younger brother Amon. It affected the entire family. "There were five or six awful episodes in the ER when I was told by doctors that I'd better start praying."

Tonda had a difficult time communicating with her son's doctors. "I took him to a few doctors who didn't seem to take his asthma so seriously or treated us poorly because of our health insurance. At times, I just felt like I wasn't getting enough information or the right information." At times, both Tonda and Amon were not sure if his asthma was flaring or if he was showing symptoms of something else, like allergies. "I felt like a lot was lost in translation and that I was responsible for fixing Amon's asthma. It seemed impossible." Not until they enrolled in CAPP did they understand how to offset his asthmatic symptoms. Carmen, the CAPP home visitor, taught Tonda and Amon basic preventive measures, such as logging each controller medication intake, which held Amon accountable when he often failed to take his medications. Tonda recounts, "It was like suddenly a light came on." She showed them the things that triggered his asthma and helped to get rid of possible triggers in her home. "We know, now, how to take precautions against asthma attacks when he goes out to exercise or do any physical activity. The services we've received from CAPP have been unlike anything else we've received before." Since taking part in the CAPP program, Tonda attests to understanding both the causes and effects of asthma. She currently has great communication with Amon's doctor. "His doctor was astonished that we pulled through Amon's last major episode without him. We have a new doctor and now that I'm informed about the ways to treat my son's asthma, my doctor tells us to continue what we're doing. Carmen has helped to break down those walls/communication barriers between us and our doctors. She's like an interpreter who knows how to speak to me so that I can understand what's going on. For years, the lack of asthma education kept my child from being healthy. It's incredibly important for those affected by asthma and their caretakers to understand what they can do to overcome it. The CAPP program has been more than helpful and has made my life and Amon's so much easier. I hope it can continue and expand."

Pittsburgh Allegheny General Hospital

Regaining Control

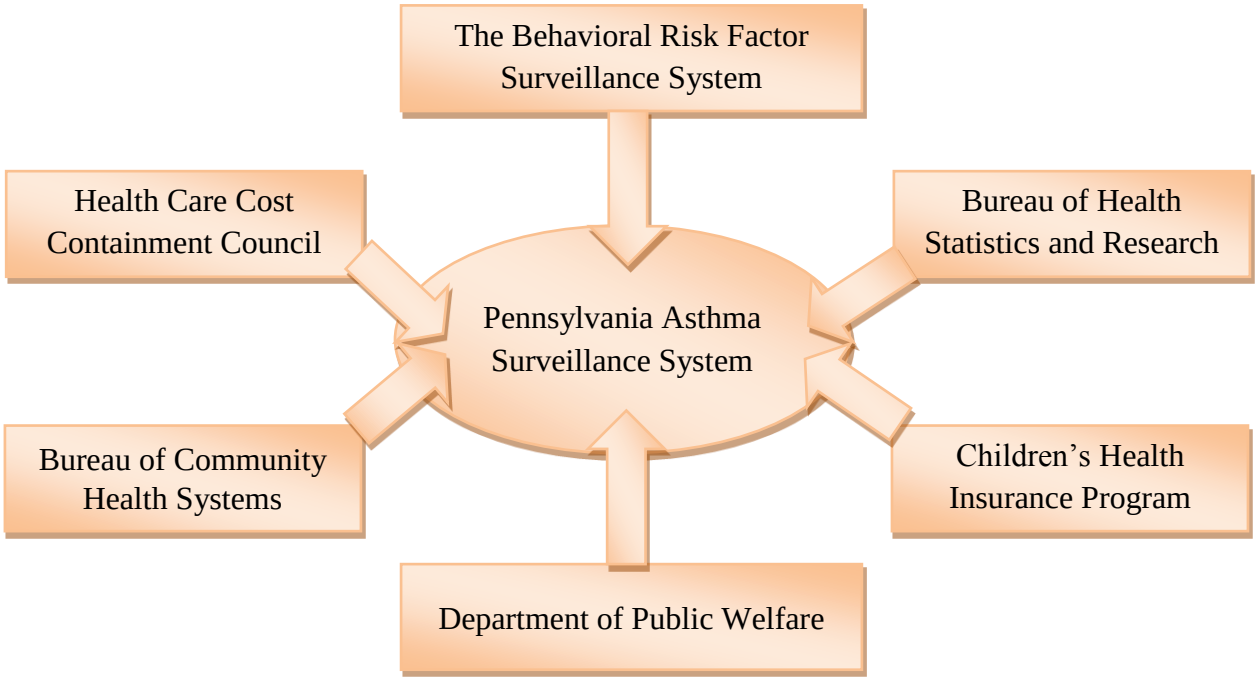
Derwin describes how gaining control of his asthma helped him to regain control of his life. An otherwise healthy 58-year-old man, he experienced episodes of "unstoppable" intermittent coughing for years. These episodes were severe enough to wake him in the middle of the night, causing him to grasp nearby furniture for support. At this point in his life, he did not have a primary care doctor. Once he became established with one, courses of steroids failed to provide long-term suppression of the cough. At an emergency department visit one night, the doctor's words, "I'm worried about you," led to Derwin's referral to Dr. Skoner and Dr. Gentile in the allergy, asthma and immunology division of Allegheny General Hospital in Pittsburgh.

Derwin recalls that, within minutes, the diagnosis pointed directly to asthma. "I didn't know that's what an asthma attack was like," he said. He believes that having no prior connections in the medical community kept him from obtaining care sooner. Thankfully, Derwin was prescribed a combination inhaled corticosteroid and long-acting beta agonist, one of the staple asthma controller medications, which provided a substantial amount of relief and control of his asthma. "To me, it was a miracle," he states. He realized that he would no longer have to wake his wife at night or worry about his now ten-year-old daughter. With an effective treatment plan in place, Derwin finally felt like he was regaining control and quality of his life. Without the guidance and knowledge of a healthcare team, Derwin realized that he suffered with uncontrolled asthma longer than necessary. He believes that awareness of the various presentations of asthma and knowing when to seek specialized care would have helped him through this journey.

In Derwin's case, he was not diagnosed as a child and was unaware that asthma could occur in adulthood. It is instances such as his that highlight the importance of education throughout all ages. He demonstrated such an improvement in his asthma symptoms and quality of life that he was invited to tell his inspirational story at the Nemacolin Asthma Conference at Nemacolin Woodlands Conference Center this fall. He appreciated this experience and had an encouraging message for the audience, explaining that healthcare providers are doing more than just writing prescriptions-- they help people to resume their lives.

Executive Summary

The Pennsylvania Asthma Surveillance System (PASS) is the main component of Pennsylvania's Asthma Control Program (ACP). Data from different sources have been utilized by PASS. They are:



The Behavioral Risk Factor Surveillance System (BRFSS) is designed to monitor the prevalence of the major behavioral risks among adults associated with morbidity and mortality. This includes asthma. Survey includes questions about adult and child asthma prevalence. Two asthma prevalence measures such as lifetime and current asthma are constructed. The Pennsylvania BRFSS is a state-based telephone survey of the Pennsylvania population, including people with asthma. It collects information regarding age, sex, race, ethnicity, income, etc.

The PA Health Care Cost Containment Council provides asthma discharge data, length of stay, hospital charges, payment source, admission type, patient home county code, sex, age, race, ethnicity, readmission data and work-related hospitalization data.

Bureau of Health Statistics and Research provides asthma mortality data. Data are available statewide by county, age group, race/ethnicity and sex.

Department of Public Welfare provides asthma prevalence data, asthma hospitalization data, office and ER visits by sex, age and county, cost of medical service, and medications.

Bureau of Community Health Systems provides ACP with the count of the total number of students with a medical diagnosis of asthma.

Children's Health Insurance Program provides asthma ER data visits and asthma hospitalization data by age, sex and county.

In general, during the 10-year period of 2001-2010, the annual prevalence estimates of lifetime asthma among adults in both Pennsylvania and the U.S have significantly increased. The prevalence of lifetime asthma among adults in Pennsylvania was lower than in the U.S until 2006, gradually increasing ever higher than U.S rates from 2007 to 2010. In 2010, the lifetime prevalence estimates for adults in Pennsylvania and in the U.S were 13.8 percent and 13.5, respectively. During the 10-year period of 2001-2010, the annual prevalence estimates of current asthma among adults in Pennsylvania were higher than in the U.S. The 2010 current prevalence estimates for adults in Pennsylvania and in the U.S were 9.9 percent and 8.6, respectively.[2]

Asthma Prevalence, Pennsylvania

In Pennsylvania, during the five-year period of 2006-2010, more boys had current and lifetime asthma than girls.[2] In 2010, current asthma prevalence among children was significantly higher for boys than girls (12 percent vs. 7 percent, respectively). There was a significant difference in the estimated child current asthma prevalence in the age group 5-9 compared to the 0-4 age group (12 percent vs. 5 percent). Between 2006-2010, black children were approximately twice as likely to have current asthma as white children (Table 3-1).[2]

In Pennsylvania, between 2006 and 2010, the prevalence among adult females was significantly and consistently higher compared to adult males. In 2010, current prevalence for females in Pennsylvania was significantly higher than males (12 percent vs. 8 percent, respectively). In the same year, current prevalence for adults was similar when compared to children (9.9 percent vs. 9.6 percent). [2] During 2008-2010, current asthma prevalence was higher in blacks compared to whites and among females compared to males, regardless of health coverage status. [2]

During 2005-2010, the estimated prevalence of current asthma among adults with a body mass index (BMI) greater than 30 was significantly higher compared to adults with a BMI less than 30. For the same period of time, the current asthma prevalence among adults who consider themselves current smokers was significantly higher than adults who were former smokers or never smoked. There were no significant discrepancies between adults who have health care coverage and those who have no health care coverage (Figure 3-2). Rates among blacks with health coverage were higher compared to those without health coverage (Table 3-2). The current asthma prevalence among adults was significantly higher among people with less than a high school education compared to those people who graduated from high school and compared to those with a college degree (approximately 50 percent and 25 percent, respectively) [Figure 3-3].

During 2005-2007 and 2008-2010, the current asthma prevalence among adults was significantly higher among people with an income level of less than $15,000 compared to an income level of $50,000 and higher (Figure 3-4). A strong correlation in prevalence of current asthma was observed among adults diagnosed with asthma and diabetes compared to those with asthma, but without diabetes (Table 3-4).

During 2009-2010, asthma prevalence was higher among those enrolled in Medicaid ages 5-14 compared to people ages 0-4. Males younger than 24 years of age had higher rates compared to

females of the same age. Females ages 25 and older had higher rates compared to males of the same age (Figure 3-5).

Asthma and Health Care Utilization

In 2010, females with current asthma were more likely to have had an asthma attack during the preceding 12 months than males (52 percent vs. 37 percent). Non-Hispanic whites with current asthma were more likely to have had an asthma attack during the preceding 12 months than non-Hispanic blacks (48 percent vs. 40 percent). More females were unable to work or perform activities due to asthma compared to males (23 percent vs. 15 percent). [2]

Use of Controller Medicines

Regular use of long-term control medications reduces the subsequent risk of needing emergency care. Conversely, the failure to routinely use long-term asthma control medications increases the emergency care use. Among adults with asthma, 38 percent of the females used long-term medications compared to 28 percent of the males; 23 percent of the females used inhalers five or more times in the past month, as did 15 percent of the males. Of these same adults, 37 percent of the non-Hispanic whites used long-term medications compared to 23 percent of the non-Hispanic blacks.[2]

Asthma Hospitalization, Pennsylvania

Asthma hospitalization rates in Pennsylvania reflect existing asthma disparities.
In 2010, inpatient rates were significantly higher for blacks than whites (52.1 and 10.5 per 10,000, respectively), Hispanics compared to non-Hispanics (27.7 and 16.0), and for females compared to males (19.9 and 12.8).[2] Asthma hospitalization rates continued to be significantly higher among black females than white females and black males compared to white males (Figure 3-6).

In 2006-2010, inpatient hospitalization rates among children with asthma as the primary discharge diagnosis were significantly higher compared to adults (approximately 20 percent to 50 percent). In 2010, the 0-4 age group had the highest rate of asthma with the primary diagnosis (44.8 per 10,000).[2] During 2006-2010, among children younger than age 14, male blacks had significantly higher rates of asthma (followed by black females) compared to white males and females. Among citizens older than age 15, black females had the highest hospitalization rates, followed by black males (Figure 3-7). Detailed analysis demonstrates that among all selected groups of Pennsylvania residents the highest asthma hospitalization rates were observed in age groups 0-4 and ages 75 and older. However, among blacks, age groups 0-4 and 45-54 had the highest rates (Table 3-5). This could be explained by the presence of secondary diagnosis, medical noncompliance, different types of insurances, age-related physiological and hormonal changes.

In general, the lowest hospitalization rates were observed in age groups 18-19 and 20-24. However, the percent of hospitalizations admitted through the ER (or the increased number of asthma attacks leading to hospitalizations) was the highest in those groups compared to other age groups (Table 3-6). Possible explanations include: lack of a primary care physician, changing insurances or lack of health coverage, exposure to different kinds of allergens, stress due to leaving home after school graduation, finding and starting new jobs, and entering and graduating

from college. Additional explanations include: changing climate zones, diets and noncompliance asthma medicine. The lowest percentage of hospital admissions through the ER was observed in age groups 5-9 and 10-14 (Table 3-6). This might be explained by compliance with drug therapy, increased self and parental education, and hormonal, physical and behavioral changes. It has been long accepted that many children with asthma outgrow the disease after the onset of puberty.[32]

During 2006-2010, the highest hospitalization asthma rates among children were in the Southeast Health District, and the highest asthma rates among adults were in the Southeast and Southwest Health Districts (Figure 3-8). Inpatient hospitalization rates for asthma as the primary discharge diagnosis among Pennsylvania residents were higher among females in all 67 counties (Figure 3-9). In all Pennsylvania counties and districts, the age-specific rates were higher among children than adults.[2] The differences could be explained by hormonal/gender/diet differences, etc. (Asthma Risk Factors, Section 2, pages 15-20). There is a correlation between the age of patients and the increased number of days spent in hospitals. Between years 2006 and 2010, adults stayed in hospitals longer than children, females stayed in hospitals longer than males, non-Hispanic whites stayed in hospitals longer than non-Hispanic blacks, and non-Hispanics stayed in hospitals longer than Hispanics.[2]

In urban areas, asthma hospitalization rates were observed to be disproportionally higher among people with asthma compared to people with asthma in rural counties (Figure 3-9).[2] Interestingly, patients in rural counties spent more time in hospitals compared to patients from urban counties until age 40; the reverse is true after age 40. This occurrence might be explained by differences in insurance coverage, severity of disease and type of work. This urban-rural gradient in asthma hospitalization and asthma attacks indicates that certain exposures in urban environments are different from exposures in those residing in rural areas. It is likely that some combination of exposures are associated with the physical, social and cultural environments in the inner city that contribute to the problem of asthma hospitalizations, along with asthma prevalence and mortality seen in poor urban communities.

Among Medicaid recipients, emergency and hospitalization rates were significantly higher among enrollees ages 0-4 compared to other age groups, among males ages 0-14 compared to females of the same age, and among females ages 15-64 compared to males of the same age (Figure 3-11 and Figure 3-12). During 2006-2010, the majority of Medicaid recipients were blacks and percentages varied by age groups (Table 3-8). In 2009-2010, emergency and hospitalization rates were significantly higher among children and adults in the Southeast Health District compared to other districts. It is also noted the largest discrepancies between children and adults were observed in the Southeast Health District (Figure 3-13 and Figure 3-14). In 2005-2010, ER visits and inpatient hospitalization rates for Children's Health Insurance Program enrolled children with asthma as the primary discharge diagnosis were highest among the age group 0-5, followed by age group 6-12. (Asthma Risk Factors, Section 2, pages 15-20). Some progress has been made to close these gaps, and there were significant reductions in asthma hospitalization rates among black and Hispanic populations in the last eight years. However, more work needs to be done. This includes: increasing the level of asthma education through presentations, seminars and publications; expanding the Community Asthma Prevention Program (CAPP); developing a similar program with other hospitals; and updating commonwealth asthma

prevention websites. The enhancement of our existing program and the implementation of new programs will be initiated based on future findings.

Hospital Cost

In 2006-2010, the average charges for inpatient hospitalization with asthma as the primary discharge diagnosis were higher among adults than children, among males compared to females, among non-Hispanic blacks compared to non-Hispanic whites, and among Hispanics compared to non-Hispanic groups.[2] In 2006-2010, the highest charges were among black females compared to white females and black males compared to white males (Figure 3-10). Similar trends in the average charges for inpatient hospitalization with asthma as the primary discharge diagnosis occurred among Medicaid recipients during 2009-2010. During 2009-2010, the average annual paid pharmacy claims amount among Medicaid recipients with asthma was highest in the age group 55-64. There are some differences in the average amount of annual paid pharmacy and medical service claims among Medicaid recipients with asthma (Figure 3-15 and Figure 3-16). In order to arrive at scientifically valid conclusions regarding these differences, ACP would need multiyear and supportive data sets.

Asthma Mortality, Pennsylvania

The age-adjusted asthma mortality rate with asthma as the underlying cause of death significantly decreased in 2010 compared to 2000 (0.9 vs. 1.4 deaths per 100,000 population).[2] There is the same trend in age-adjusted mortality rate in the segment all causes of death. The rate significantly decreased in 2010 compared to 2000 (758.8 vs. 886.6 deaths per 100,000 population).

During 2001-2009, the age-adjusted asthma mortality rates with asthma as the underlying cause of death among females were significantly higher than among males (Figure 3-20).
During 2001-2009, the age-adjusted asthma death rate was approximately three times higher among blacks than whites (Figure 3-21), significantly higher among black males (approximately three to four times) than white males, as well as among black females than white females (Figure 3-22). About 50 percent of the asthma deaths occurred in patients age 65 and older. About 30 percent of deaths occurred in people age 40 and younger and one-third of those were under age 20.[2] In 2008-2010, asthma mortality was not distributed homogeneously among all counties. Among Pennsylvania residents, the age-adjusted mortality rate was the highest in Philadelphia County (2.3 deaths per 100,000 population) (Figure 3-23). Death from asthma is considered to be preventable. The severity of asthma, presence of secondary diseases and weakness of immune system might represent an explanation for the demise of people with asthma as the underlying cause of death.

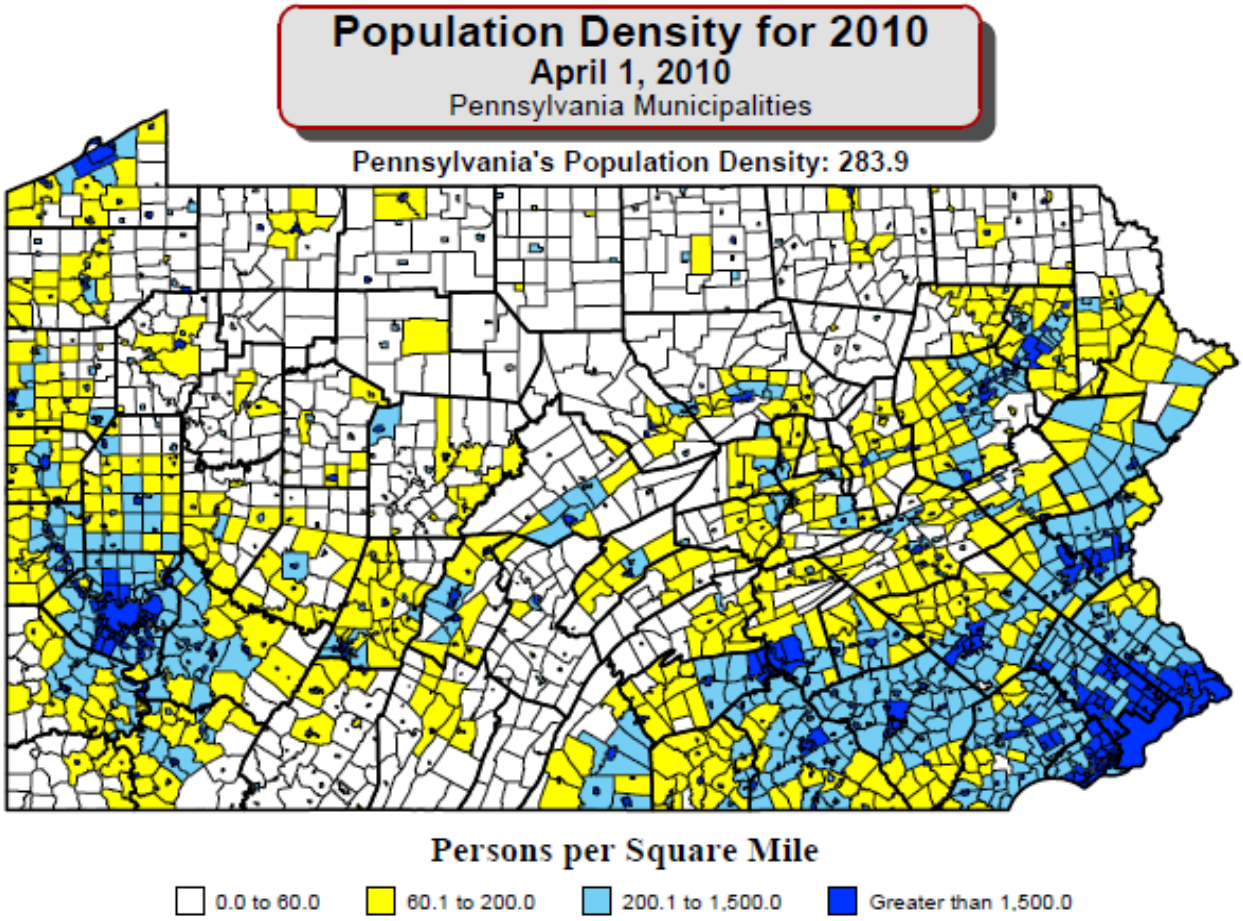
Use of Controller Medicines

Regular use of long-term control medications reduces the subsequent risk of needing emergency care. Conversely, the failure to routinely use long-term asthma control medications increases the emergency care use. Among adults with asthma, 38 percent of the females used long-term medications compared to 28 percent of the males; 23 percent of the females used inhalers five or more times in the past month, as did 15 percent of the males. Of these same adults, 37 percent of the non-Hispanic whites used long-term medications compared to 23 percent of the non-Hispanic blacks.[2]

Section 1: Socioeconomic and Demographic Profiles in Pennsylvania

The Commonwealth of Pennsylvania is the sixth-largest state economy in the nation, with an estimated population of 12,702,379 in 2010. Pennsylvania has one of the largest rural populations any state in the United States of America (U.S). There are 67 counties and 2,574 municipalities in Pennsylvania with various population densities (Figure 1-1).

Figure 1-1: Population Density, PA 2010



Data Source: U.S. Census Bureau, Pennsylvania State Data Center

About one in seven Pennsylvania residents live in Pittsburgh or Philadelphia. Pennsylvania has the third-largest number of colleges and universities in the U.S. Of Pennsylvanians ages 25 or older in 2010, 88.5 percent had a high-school diploma and 27.1 percent had a bachelor's degree or higher.

Pennsylvania's Population by Age Group

The population ages 65 and older increased 2.1 percent from 2000 to 2010, and the population under age 18 declined 4.5 percent during this same period. Nationally, Pennsylvania ranks fourth in the percentage of persons ages 65 and over. Forty-nine Pennsylvania counties had a higher percentage of elderly residents than the commonwealth overall. Median age rose from 38.0 years in 2000 to 40.1 years in 2010.

Pennsylvania's Population by Race and Ethnicity

Pennsylvania's racial and ethnic composition is growing more diverse. All of Pennsylvania's minority groups grew from 2000 to 2010. According to the 2010 Census, the U.S. was home to nearly 39 million black residents. Blacks accounted for 12.6 percent of the total U.S. population in 2010. In Pennsylvania, more than 1.3 million residents identified themselves as blacks in 2010, representing 10.8 percent of the commonwealth's total population.

Table 1-1: Demographic Profile by Age Group, Race and Ethnicity, PA 2010

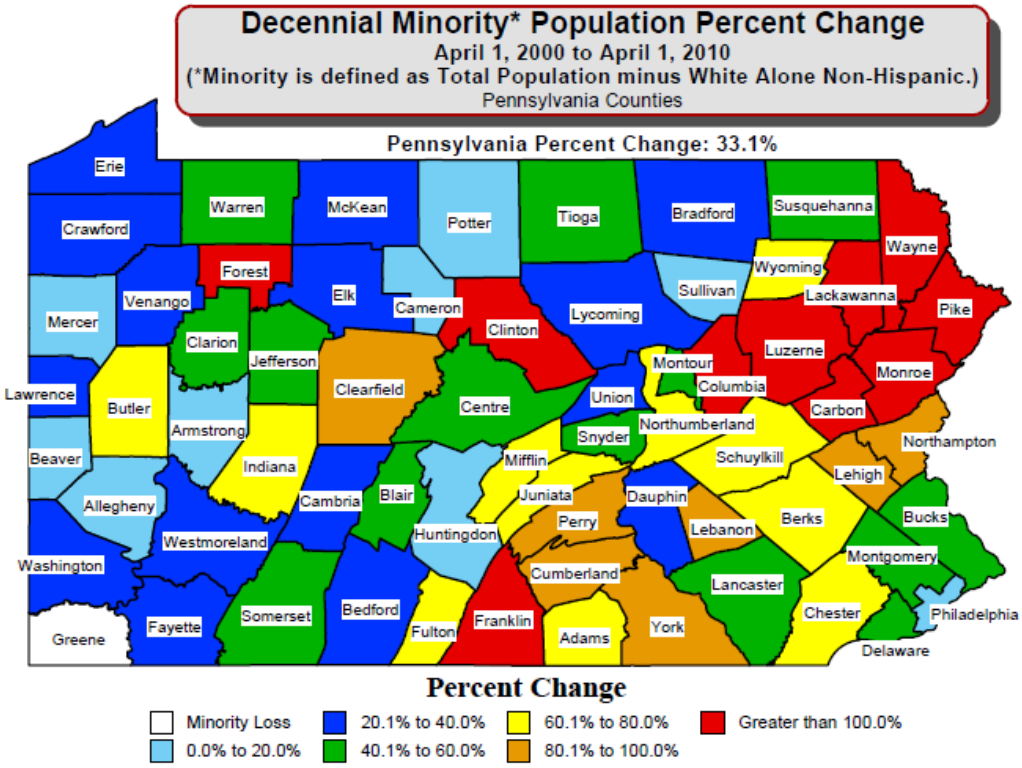
Age Group	White		Black		Other		Hispanic		Non-Hispanic	
	Number	%	Number	%	Number	%	Number	%	Number	%
00-04	528,320	5.1	102,818	7.5	98,400	10.7	79,857	11.1	649,681	5.4
05-09	564,259	5.4	100,647	7.3	88,729	9.7	71,977	10.0	681,658	5.7
10-14	603,991	5.8	106,592	7.7	80,568	8.8	67,253	9.3	723,898	6.0
15-17	395,486	3.8	74,834	5.4	47,511	5.2	41,152	5.7	476,679	4.0
18-19	295,333	2.8	55,200	4.0	36,702	4.0	30,097	4.2	357,138	3.0
20-24	673,160	6.5	116,381	8.4	84,605	9.2	66,910	9.3	807,236	6.7
25-29	608,350	5.8	93,668	6.8	79,509	8.7	61,140	8.5	720,387	6.0
30-34	568,180	5.5	87,879	6.4	73,533	8.0	57,306	8.0	672,286	5.6
35-39	609,265	5.9	86,731	6.3	68,291	7.4	51,545	7.2	712,742	5.9
40-44	699,045	6.7	92,676	6.7	59,661	6.5	47,341	6.6	804,041	6.7
45-54	1,652,520	15.9	191,543	13.9	96,341	10.5	73,813	10.3	1,866,591	15.6
55-64	1,426,059	13.7	136,357	9.9	59,928	6.5	41,091	5.7	1,581,253	13.2
65-74	877,661	8.4	72,879	5.3	28,998	3.2	19,035	2.6	960,503	8.0
75-84	618,975	5.9	42,897	3.1	12,221	1.3	8,610	1.2	665,483	5.6
85>	285,684	2.7	16,587	1.2	3,405	0.4	2,533	0.4	303,143	2.5

Data Source: U.S. Census Bureau, Pennsylvania State Data Center

The black population had significantly lower income and higher poverty levels in 2010 compared to the overall population. Black residents had a median family income of $37,693 in Pennsylvania, which is significantly lower than the median family income for the overall population of $61,890 ($65,328 for the white population). One-fourth (25.1 percent) of black families had an income below the poverty level in Pennsylvania in 2010.

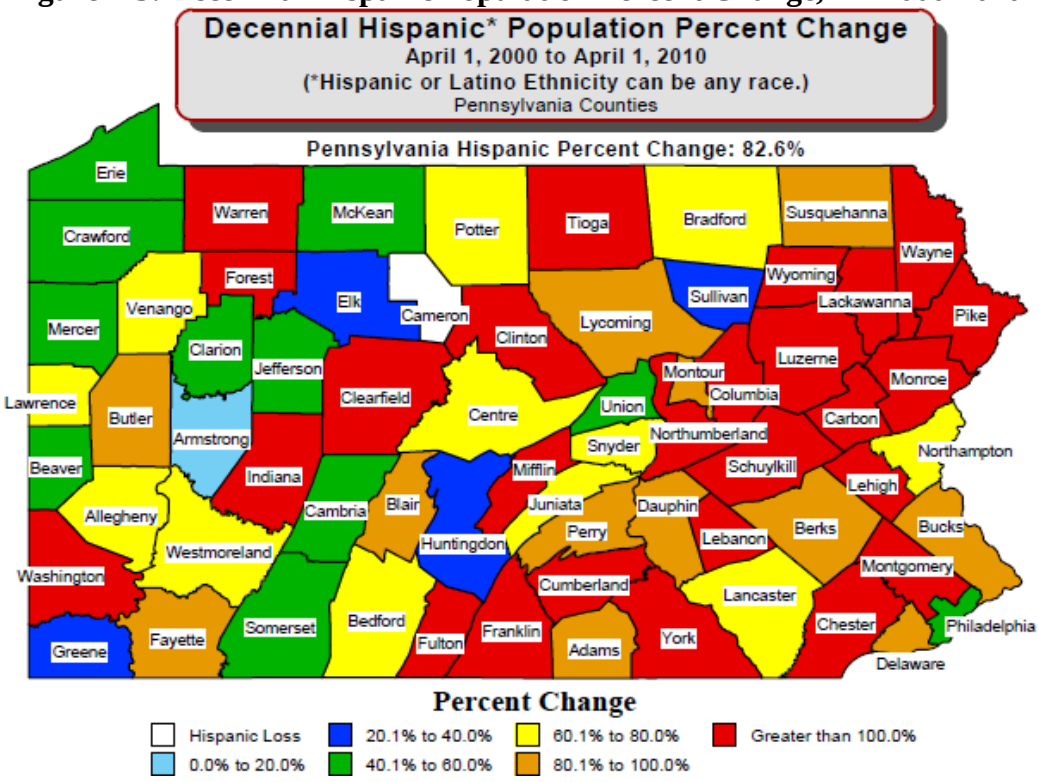
Among all people reporting Hispanic ethnicity in Pennsylvania, natives of Puerto Rico made up the largest of all Hispanic ethnic groups in Pennsylvania. In 2010, a total of 366,082 Puerto Ricans lived in Pennsylvania, representing just over half (50.9 percent) of all Hispanics. Philadelphia County has the greatest number of Puerto Ricans in Pennsylvania, with a total of 121,643 in 2010. Figures 1-2 and 1-3 represent the percent of minority and Hispanic population changes from 2000 to 2010 in Pennsylvania.

Figure 1-2: Decennial Minority Population Percent Change, PA 2000-2010



Data Source: U.S. Census Bureau, Pennsylvania State Data Center

Figure 1-3: Decennial Hispanic Population Percent Change, PA 2000-2010

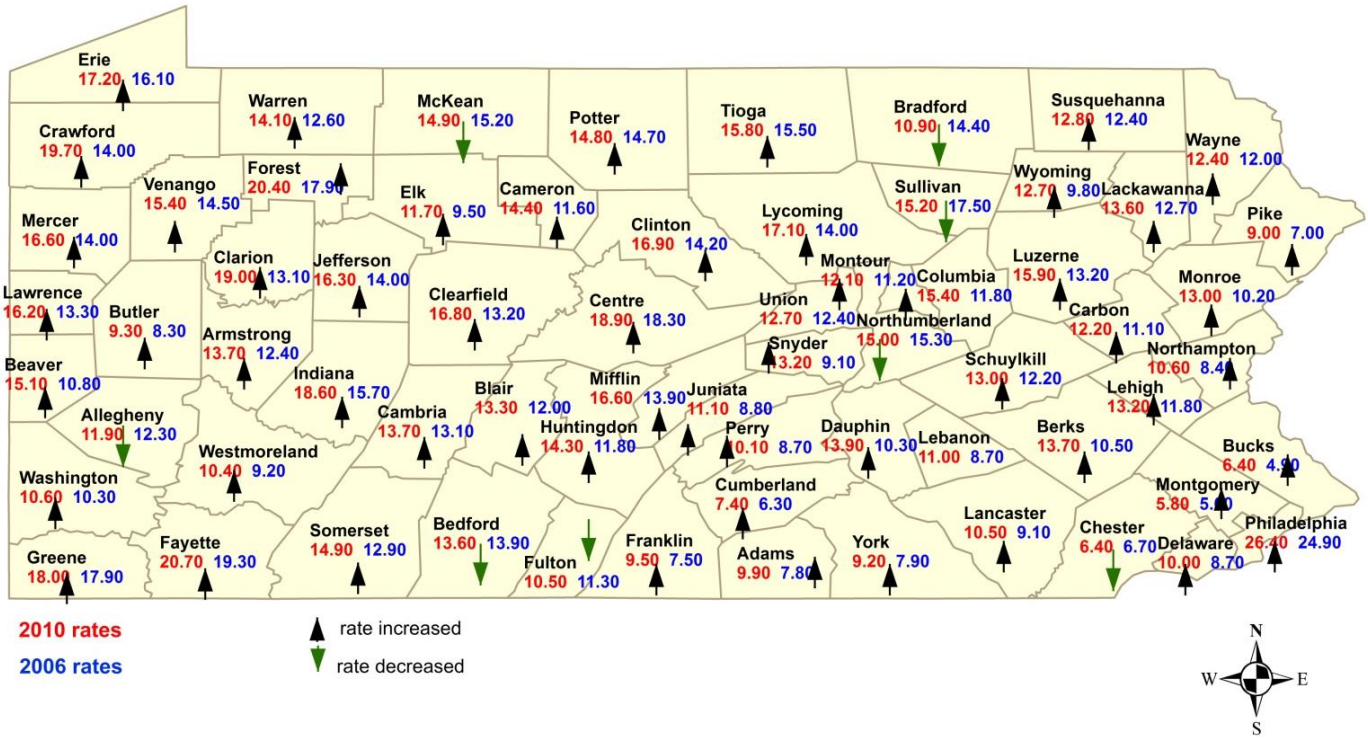


Data Source: U.S. Census Bureau, Pennsylvania State Data Center

Poverty Status of Families

The percentage of Pennsylvanians below the poverty level increased from 12.5 percent in 2009 to 13.4 percent in 2010. Despite the increase, the commonwealth's poverty rate ranks 31st among the states and the District of Columbia and is nearly two percentage points lower than that of the nation overall (15.3 percent). In 2006-2010, 12.4 percent of all ages in Pennsylvania lived in poverty (13.8 percent for U.S. population); 17.3 percent of Pennsylvanians under age 18 lived in poverty (19.2 percent for U.S.); and 8.6 percent of Pennsylvanians ages 65 and over lived in poverty (9.5 percent for U.S.).

Figure 1-4: Poverty Estimates (Percent) among Residents by County, PA 2006 vs. 2010



Data Source: U.S. Census Bureau, Pennsylvania State Data Center

Population in Rural and Urban Counties

According to the 2010 U.S. Census Bureau, nearly 80 percent of Pennsylvanians live in an urban area representing densely developed territory and encompassing residential, commercial and other nonresidential urban land uses that meet minimum population density requirements. The Census Bureau identifies two types of urban areas: "urbanized areas" of 50,000 or more people and "urban clusters" of at least 2,500 and less than 50,000 people. According to the data, Pennsylvania is becoming increasingly urbanized. The number of Pennsylvanians living in urban areas increased 5.6 percent between 2000 and 2010. The urban parts of the state were much more racially and ethnically diverse than rural Pennsylvania. In 2010, one in four Pennsylvanians residing in an urban area identified themselves as belonging to a minority group. In comparison, the minority population made up only 4 percent of the rural population. The white population was the largest racial group in both urban and rural areas (77.8 percent and 97.0 percent, respectively). Pennsylvania's urban areas also had a higher percentage of Hispanics than rural areas in 2010 (6.8 percent vs. 1.6 percent) [Table 2-2].

Table 1-2: Percent of Rural and Urban Population by Race and Ethnicity, PA 2010

Race/Ethnicity	Pennsylvania		Urban		Rural	
	Number	Percent	Number	Percent	Number	Percent
Total Population	12,702,379	100	9,991,287	100	2,711,092	100
White	10,406,288	81.9	7,776,390	77.8	2,629,898	97.0
Black	1,377,689	10.8	1,349,809	13.5	27,880	1.0
American Indian and Alaska Native	26,843	0.2	23,047	0.2	3,796	0.1
Asian	349,088	2.7	336,473	3.4	12,615	0.5
Some Other Races	300,983	2.4	288,428	2.9	12,555	0.5
Two or More Races	237,835	1.9	214,054	2.1	23,781	0.9
Hispanic	719,660	5.7	675,650	6.8	44,010	1.6

Data Source: U.S. Census Bureau, Pennsylvania State Data Center

Section 2: General Overview of Asthma Disparities and Risk Factors

Asthma is a common chronic airway disorder characterized by periods of reversible airflow obstruction known as asthma attacks. Airflow is obstructed by inflammation and airway hyperreactivity (contraction of the small muscles surrounding the airways) in reaction to certain exposures. The frequency and severity of symptoms vary greatly from patient to patient. Different designations of asthma include bronchial asthma, exercise-induced asthma, drug-induced asthma, occupational asthma and cardiac asthma.[3, 4]

There is strong evidence to suggest that genetic predisposition to asthma plays a very important role. It has been noted that asthma tends to run in families. People whose immediate blood relatives have asthma are more likely to develop the disease. Studies suggest genetics plays a significant role, with estimates of the inheritability of asthma as high as 70 percent.
Genes and environment play a role in the development of asthma. When asthma does not run in families, the cause is most likely due to environmental exposure to triggers of asthma. However, patient/parent education, environmental control, compliance with medical treatment and avoidance of identified triggers are all effective means of prevention.

Allergens are responsible for 50 percent of asthma cases in adults and 80 percent in children. The most likely allergens for people with allergic asthma appear to be those triggers that are inhaled. Common inhaled allergens include animal dander (skin, saliva), dust mites, cockroach particles, mold and pollen. The most common foods associated with allergic symptoms are cow's milk, eggs, almonds, peanuts, pecans, walnuts, wheat, soy, fish, shrimp and other shellfish. Food preservatives such as sodium and potassium sulfites, bisulfites and metabisulfites can also trigger asthma; they are commonly used in food processing or preparation and can be found in foods such as dried fruits or vegetables, processed potatoes, wine and beer, bottled lime or lemon juice, and pickled foods. People with asthma should avoid certain medications (such as beta-blocker drugs and aspirin) and avoid exposure to outdoor and indoor air pollutants, as well as infections such as flu, bronchitis, colds and respiratory syncytial virus. Conditions such as acid reflux and physical exertion; bad weather such as thunderstorms, high humidity and cold weather; and irritants such as cigarette smoke, perfumes, chemical cleaners, paints, adhesives, pesticides, cosmetics and air fresheners may make asthma worse.[5, 6] Chemical irritants are also present in schools and can be found in commonly used cleaning supplies and educational kits. Strong emotions can lead to hyperventilation, another trigger for an asthma attack. Exercise can trigger an early asthmatic response. Mechanisms underlying exercise-induced asthmatic response remain somewhat uncertain.

In the U.S. between 2008–2010, asthma prevalence was higher among non-Hispanic blacks and Hispanics in general, compared to their non-Hispanic white counterparts. In 2010, about 3,600,000 Hispanics reported that they currently have asthma. Hispanics are 30 percent more likely to visit the hospital for asthma compared to non-Hispanic whites. Hispanic children are 40 percent more likely to die from asthma compared to non-Hispanic whites.[6] Puerto Rican children are 2.4 times more likely to have asthma compared to non-Hispanic whites, and have 2.6 times the asthma rate compared to the overall Hispanic population.[7]

The reasons for differences in asthma and asthma morbidity among and within Hispanic subgroups are poorly understood, but are likely due to the interaction between yet-unidentified genetic variants and other factors, including tobacco smoke exposure, obesity, allergen exposure and availability of health care. There is a genetic predisposition. However, it does not mean that 100 percent of people with genetic predisposition toward asthma will develop asthma. Moreover, patient education and avoidance of triggers may eliminate or relieve asthma symptoms. The percentage of people with asthma taking daily medicine to control it is lower among Hispanics and blacks (23.2 percent and 25.1 percent, respectively) than among whites (35.1 percent).[8]

The incidence and prevalence of asthma is higher in boys than girls during childhood. Throughout puberty, children are more likely to grow out of it than adults, some studies say. In adolescence, the pattern changes and the onset of a wheeze is more prevalent in females than males. Asthma, after childhood, is more severe in females than in males and is under-diagnosed and undertreated in female adolescents. Possible explanations for this switch during puberty in the gender susceptibility to develop asthma include hormonal changes and gender-specific differences in environmental exposures such as diet, obesity, allergen exposure or cigarette smoking.[9,10] Better understanding sex-related differences, environmental exposures and providing patients with education geared toward health disparities are important strategies for establishing effective, individualized asthma management for all patients suffering from attacks.

Asthma in children is a leading cause of ER visits; in 2009, there were approximately 774,000 ER visits nationally due to asthma in patients less than 15.[11] Asthma is the third leading cause of hospitalization among children under the age of 15; it accounts for more hospitalizations in children than any other chronic illness. Approximately 29 percent of all 2009 asthma hospital discharges were in patients under 15, although only 21 percent of the U.S. population is less than 15 years old. Asthma is one of the leading causes of school absenteeism.[12] In 2008, asthma accounted for 10.5 million missed school days. Asthma also accounts for more school absences than any other chronic disease.

Children with more severe asthma and/or nighttime symptoms are more likely to suffer academically than those with milder symptoms.[13] In the U.S., there is higher prevalence of children with asthma than adults; black children are twice as likely to be hospitalized and visit the ER. They are four times more likely to die due to asthma than white children.[14] Minority children are less likely than white children to be prescribed or take recommended treatments to control their asthma and are less likely to attend outpatient appointments.

No one really knows the exact reasons why more and more children are developing asthma. Some experts suggest that children spend too much time indoors and are exposed to more and more dust, air pollution and secondhand smoke. Some suspect that children are not exposed to enough childhood illnesses to direct the attention of their immune system to bacteria and viruses. Factors such as genetic differences, socioeconomic status, health maintenance behaviors, air quality and obesity likely contribute in combination to the increase in the asthma burden.

One of the major triggers for asthma attacks is cigarette smoke. Cigarette, pipe or cigar smoke is especially harmful to people with asthma because it damages the cells in the lungs that create the protective coating lining the bronchial tubes. The tubes become more irritated and inflamed,

making an asthma attack more likely. Smoke is an avoidable asthma trigger. According to the American Lung Association, breathing secondhand smoke may cause asthma or an attack in those who already have asthma.

Reports have shown that nearly 75 percent of emergency room visits for asthma have been among obese individuals, and studies have shown that obesity pre-dates asthma. The risk for developing asthma increases with increasing obesity. Yet little is known about how obesity influences asthma. More research is needed to explain the relationship between asthma and obesity.

There is some evidence that asthma is associated with an increased risk of developing diabetes. Evidence from several studies indicates that obesity and diabetes are associated with an increased risk of asthma. However, poor diet and a sedentary lifestyle may increase a child's chances of developing the two diseases and asthma as a result. Obesity, diabetes and asthma may share some common etiology, such as a common genetic predisposition. Understanding the mechanistic basis for the relationship between obesity, diabetes, and asthma may lead to new therapeutic strategies for treatment of susceptible populations. Further work is needed to better understand these complex risk factors. To remedy disparities, we need to ensure that patients at higher risk are given proper care and the knowledge to control their asthma.[15] The reasons for these disparities are complex; they may be attributed to genetic differences or economic, social and cultural factors.

Housing

The places where people with asthma live are associated with factors that influence their well-being, such as environment, lifestyle, educational level, health status, etc. It seems that quality of housing may be associated with asthma hospitalizations and ER visits. America's low-income communities too often foster conditions that contribute to bad health. People spend most of their time indoors, particularly older people and children. If there are problems with the condition and environment of a house, then it should be no surprise that this affects health. Common problems that are directly linked with asthma include dampness, mold growth, poor ventilation, and cold and poorly heated accommodations. People living in damp and moldy dwellings have a greater prevalence of asthma compared to persons in dry houses. People with asthma are more than twice as likely to live in damp houses. Dampness leads to mold and fungi, which can trigger broncho-constriction and asthma. The most common cause of asthma attacks in children is the house dust mite. Polluted highways, idling diesel trucks and buses, inadequately constructed aging homes and schools, rodents, lead, and other toxins contribute to high rates of asthma in general, and poor health in low-income communities.[16] In fact, one in seven children in the nation suffers from asthma, and the rates are highest in areas where the median annual income is lowest. The type of housing is associated with childhood asthma, with the highest prevalence of asthma found in public housing. Residents of all types of private housing had lower odds of asthma than children living in public housing.

For example, the majority (68.7 percent) of public housing residents reported the presence of cockroaches, compared to 21 percent of residents of private houses. Reported cockroaches, rats and water leaks were also independently associated with asthma.

Environment

In a study conducted by the World Health Organization, it is estimated that 44 percent of the asthma burden worldwide is due to the environment.[17] In the U.S., an expert panel estimated that 30 percent of asthma exacerbations among children was related to the environment -- this was associated with an annual cost of $2 billion.[18]

There is evidence that environmental factors may cause asthma, exacerbate asthma symptoms, and trigger asthma attacks. Changing environmental exposures may not affect disease prevalence immediately. If exposures exert their effect in utero or early in life, changes in the prevalence of asthma may take more than a generation to become apparent.

Indoor air quality in the home involving dust mites, dander from animals, mold, chemicals, etc., and in the workplace (involving chemical dusts, vapors from plasticizers, polyurethane paints, insulation, foam products, platinum, chromium, nickel, latex products, cleaning/disinfection agents, etc.) are concerns for people with asthma.

Environmental factors, such as pollution, sulfur dioxide, nitrogen oxide, ozone, cold temperatures and high humidity, are all known to trigger asthma in susceptible individuals. Pollutants have been associated with an increased rate of ER visits, worse asthma symptoms and elevated exhaled nitric oxide levels.[19,20] Although poor outdoor air quality has not been clearly linked to a higher incidence of asthma, it has been associated with greater asthma morbidity. Poor air quality may affect individuals of all ages and races; however, pollutants such as particulate matter and diesel exhaust are worse in urban areas and contribute to the greater asthma morbidity observed in urban residents, specifically children, blacks and Hispanics. Epidemiologic research demonstrates that asthma morbidity and mortality are highest in inner cities, where environmental pollutants and airborne allergens are significant factors. Researchers found that chronic exposure to ozone in early childhood was associated with increased risk of hospital admission due to asthma.[21] The higher prevalence of asthma among low-income persons may be related to exposure to high traffic density, location of houses/apartments and exposure to sources of particulate air pollution.

In fact, asthma symptoms and hospital admissions have greatly increased during periods of heavy air pollution. Ozone is the major destructive ingredient in smog. It causes coughing, shortness of breath and even chest pain. Weather changes can also result in asthma attacks in some people. Increases in humidity may also cause breathing difficulty.

Urban versus Rural

Urban asthma is frequently described as one of America's fastest growing epidemics. The epidemic is particularly common among blacks and Hispanic children living in public housing. Urban areas typically have a high proportion of residents living at or below the poverty level, and minorities often constitute a substantial proportion of the population in these areas. Multiple stressors that can occur more often in low-income urban areas, such as air pollution and urban allergens, have also been linked to greater asthma morbidity.[22, 23]

To provide better care for residents of low-income urban areas, it is important to understand the factors that may be contributing to their higher morbidity and mortality rates.

Patients with asthma who lack sufficient financial support for treatment, who lack adequate psychological support and who have more major life stressors are at higher risk of asthma. Disruption and dysfunction of the family and lack of community support have been associated with greater asthma morbidity.[24]

Health Care

There is a consistent pattern of care among black and Hispanics suffering with asthma. This pattern is characterized by the use of emergency services rather than of routine care. This is the case with adults as well as with children. The crucial element appears to be the underuse of asthma maintenance medications, documented in numerous studies of minority children. This may explain the periodic attacks of asthma and the high frequencies of ER visits and hospitalizations.

Studies have found that almost all children visiting the emergency department of a large urban hospital did have a primary care provider, but black and Hispanic patients (as well as patients on Medicaid) were less likely to call their primary care provider before going to the emergency room. One study found that, although 73 percent of black children had health providers of asthma care, approximately 44 percent of them visited the emergency room for asthma care in the previous six months.[25] Medicaid enrolled black and Hispanic children visited the emergency room more often than white children, but had fewer specialist visits.

Blacks and Hispanics had a higher likelihood of hospital readmission than whites. It seems that poor healthcare communication, lack of cultural competency and differences in insurance coverage contribute to asthma health disparities for minorities with asthma. Changes in the healthcare system, such as enhanced access to a healthcare provider who will provide a point of reference in the healthcare system, the presence of professional translators, and the improvement of patient education about asthma self-management would offer hope of better asthma care and the reduction of asthma care disparities.

Compliance with Asthma Medications

Taking the time to ensure that patients truly understand all aspects of their disease and to establish a healthcare environment that is culturally appropriate may have a significant impact in patients with asthma. A poor provider-patient relationship has been cited as a barrier to adherence.[26] Differences in medication beliefs and the ability to obtain medications may explain the reported disparity in controller medication use.[27] Research has shown that there is a problem of under-prescription of medication by physicians, as well as underuse of the medication by children, once it has been prescribed. The average use of inhaled anti-inflammatory medications among children was 44 percent. Cultural barriers to appropriate medication use, as well as a low level of income, poor insurance status and reliance on ER care, are important factors in retarding compliance with prescribed asthma treatments.

Healthy People 2020 and Pennsylvania's Plan to Eliminate Health Disparities

Twice in the past two decades, the federal Department of Health and Human Services (DHHS), through the Centers for Disease Control and Prevention (CDC), has provided science-based, 10-year national objectives for improving the health of Americans. One of the goals of Healthy People has been to address health disparities: in Healthy People 2000, it was to reduce health

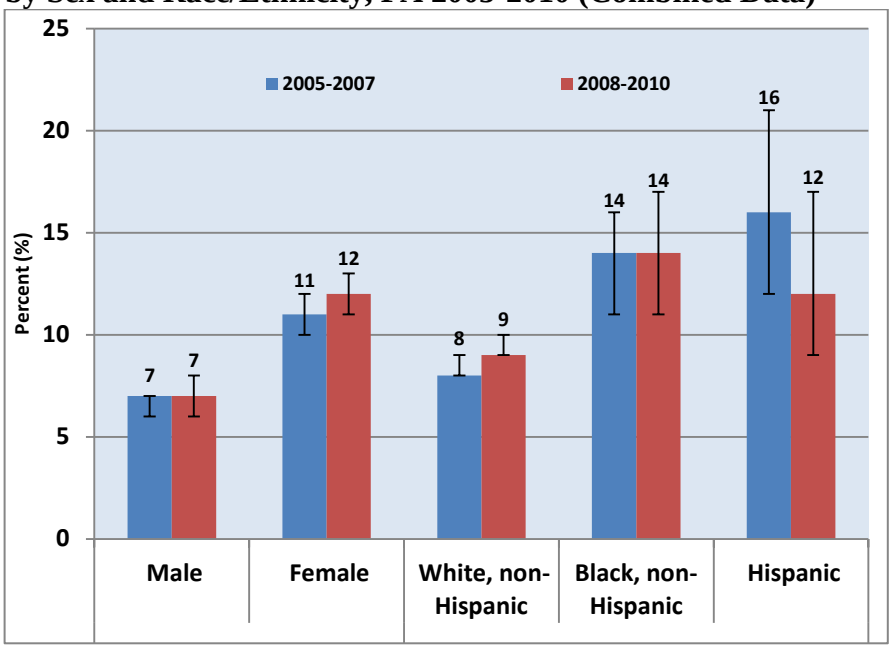
disparities; in Healthy People 2010, it was to eliminate, not just reduce, health disparities. In Healthy People 2020, the goal was expanded further: to achieve health equity, eliminate disparities and improve the health of all Americans. Healthy People 2020 defines a health disparity as "a particular type of health difference that is closely linked with social, economic, and/or environmental disadvantage. Health disparities adversely affect groups of people who have systematically experienced greater obstacles to health based on their racial or ethnic group; religion; socioeconomic status; gender; age; mental health; cognitive, sensory, or physical disability; sexual orientation or gender identity; geographic location; or other characteristics historically linked to discrimination or exclusion."[28] Throughout the next decade, Healthy People 2020 will assess health disparities in the U.S. population by tracking rates of illness, death, chronic conditions, behaviors and other types of outcomes in relation to demographic factors. Further, DHHS unveiled two new strategic plans at its National Partnership for Action (NPA) meeting in April 2011: the National Stakeholder Strategy for Achieving Health Equity [29]and the HHS Action Plan for Reducing Health Disparities.[30] The former provides a common set of goals and strategies for initiatives and partnerships to help racial and ethnic minority populations and other underserved groups reach their health potential through: awareness and leadership; health system and life experience; cultural and linguistic competency; and evaluation and research.

The latter builds on provisions of the Affordable Care Act to address the needs of racial and ethnic minority populations by: bringing down healthcare costs; investing in prevention and wellness; supporting improvements in primary care; and creating linkages between the traditional realms of health and social services.

Section 3: Asthma Disparities in Pennsylvania

Asthma Prevalence

Figure 3-1: Self-reported Current Asthma Prevalence among Adults by Sex and Race/Ethnicity, PA 2005-2010 (Combined Data)



During 2005-2010, the current asthma prevalence among females was significantly higher than males. For the same period of time, asthma prevalence among non-Hispanic blacks was significantly higher compared to non-Hispanic whites. Among the Hispanic population, the current asthma prevalence decreased 25 percent during 2008-2010 compared to 2005-2007. However, the confidence intervals (CI) overlap, indicating that there may be no difference between these estimates.

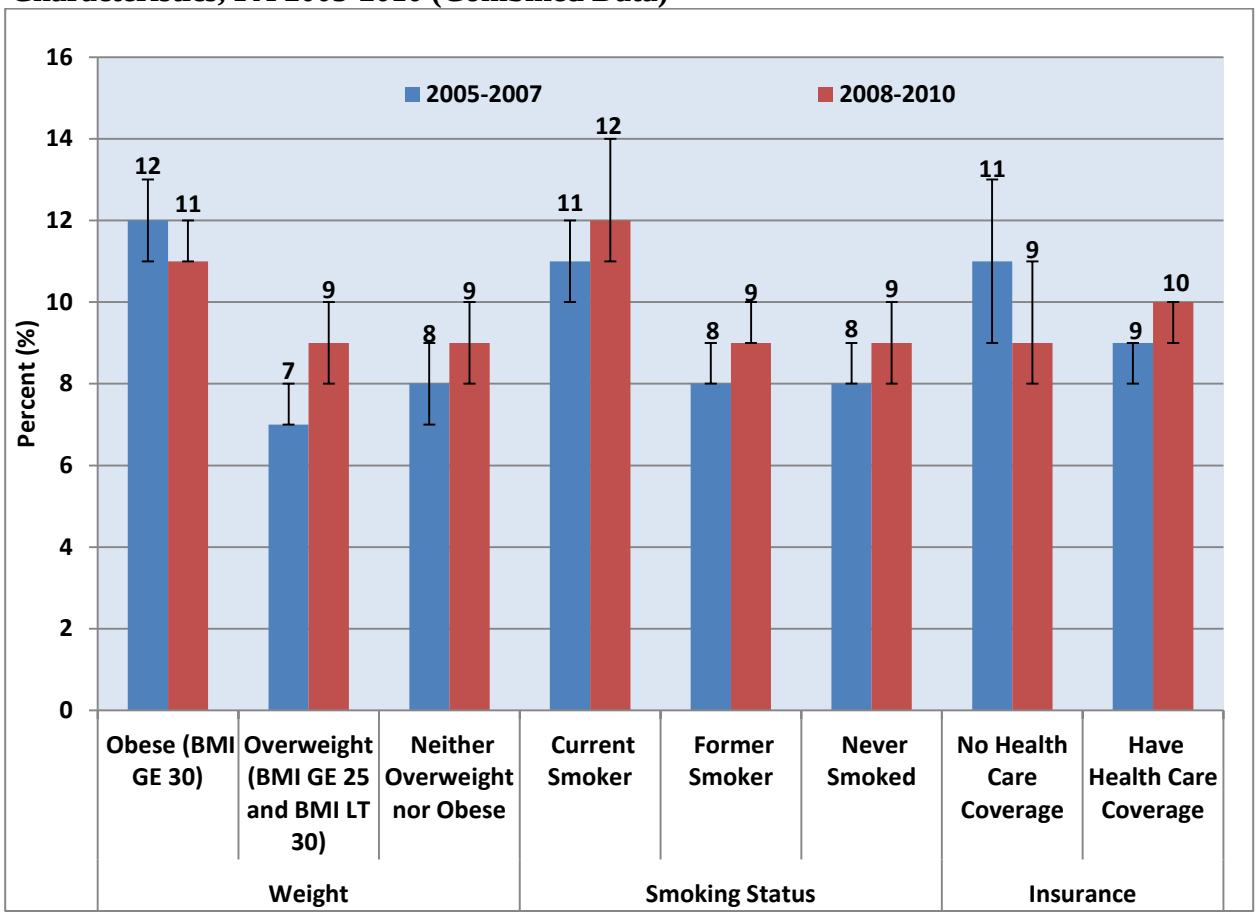
Data Source: Pennsylvania Behavioral Risk Factor Surveillance System (BRFSS)
Vertical bars on the graph denote the 95% confidence interval.

Table 3-1: Self-reported Current Asthma Prevalence among Children by Selected Characteristics, PA 2006-2010

Selected Characteristics	2006		2007		2008		2009		2010	
	Percent	95% CI	Percent	95% CI	Percent	95% CI	Percent	95% CI	Percent	95% CI
Male	9	7-12	11	9-14	12	9-15	12	10-16	12	10-15
Female	7	5-10	10	8-13	8	6-10	8	6-11	7	5-9
White	8	6-9	9	8-11	8	7-10	9	7-11	8	7-10
Black	14	8-23	19	13-27	17	12-25	18	10-29	17	12-24
Age: 0-4	8	5-13	8	5-12	8	5-12	8	4-14	5	5-10
Age: 5-9	8	5-11	11	8-15	10	7-14	11	8-16	12	9-16
Age: 10-14	11	8-15	12	9-15	10	7-13	12	8-18	11	8-14
Age: 15-17	7	5-11	12	9-17	14	10-19	12	8-16	10	7-14

Data Sources: National Behavioral Risk Factor Surveillance System (BRFSS)
Pennsylvania Behavioral Risk Factor Surveillance System (PA BRFSS)
"95% CI" denotes ninety-five percent confidence interval.

Figure 3-2: Self-reported Current Asthma Prevalence among Adults by Selected Characteristics, PA 2005-2010 (Combined Data)



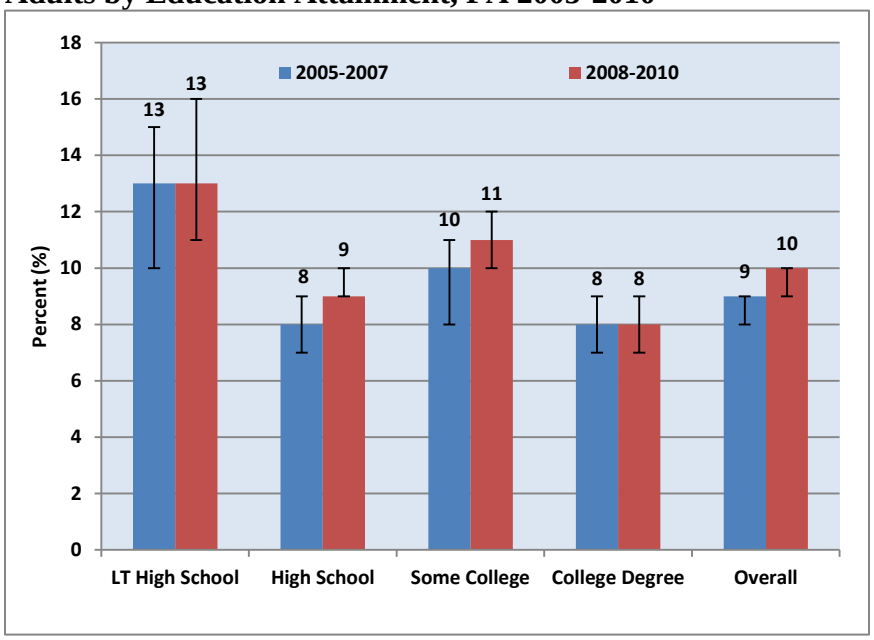
Data Source: Pennsylvania Behavioral Risk Factor Surveillance System (BRFSS)
Vertical bars on the graph denote the 95% confidence interval.

During 2005-2010, the current asthma prevalence among obese adults, defined as body mass index (BMI) greater than or equal to 30 (BMI GE 30), was significantly higher than overweight adults, defined as BMI 25-29 (BMI GE 25 and BMI LT 30) and adults that were neither overweight nor obese. However, while prevalence among obese adults declined slightly from 2005-2007 to 2008-2010, estimated percentages increased significantly in overweight and not significantly in neither overweight nor obese groups of the population.

In 2005-2007 and 2008-2010, the current asthma prevalence among adults who were current smokers was significantly higher than adults who were former smokers and those who never smoked.

During 2005-2007 and 2008-2010, there were no significant differences in current asthma prevalence between the two categories: adults with no health care coverage and those who have health care coverage.

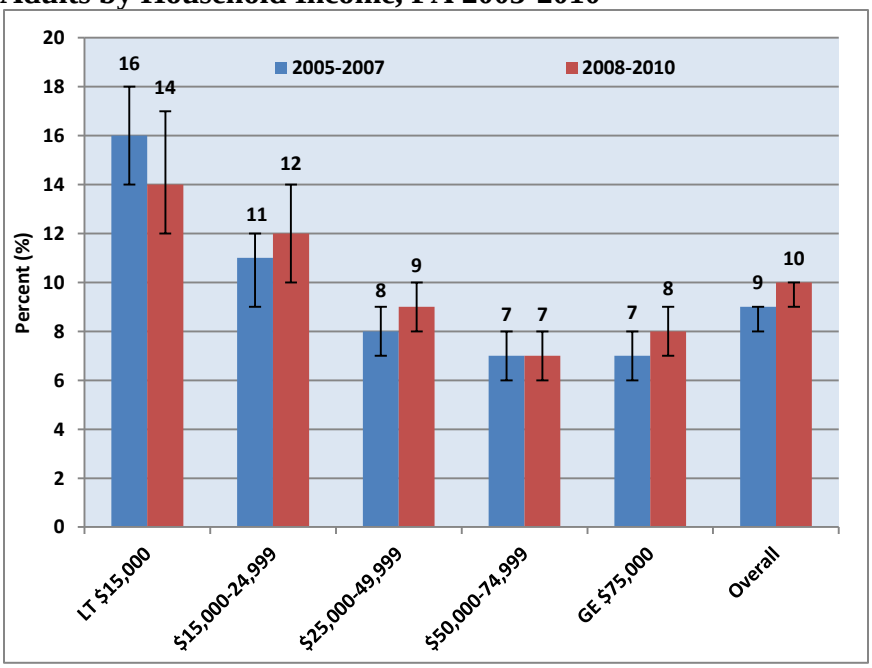
Figure 3-3: Self-reported Current Asthma Prevalence among Adults by Education Attainment, PA 2005-2010



During 2005-2007 and 2008-2010, the current asthma prevalence among adults was significantly higher among people with less than a high school education, compared to people that graduated from high school and to those with a college degree. However, prevalence estimates remained about the same among those in each education category when comparing 2005-2007 estimates to 2008-2010.

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

Figure 3-4: Self-reported Current Asthma Prevalence among Adults by Household Income, PA 2005-2010



During 2005-2010, the current asthma prevalence among adults was significantly higher among people with annual household incomes of less than $15,000 compared to citizens with household incomes of $25,000 and higher. There were no significant differences in prevalence among people with household incomes of $50,000 or more.

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

Table 3-2: Self-reported Current Asthma Prevalence among Adults by Education Attainment, Household Income, Health Coverage, Race and Sex, PA 2008-2010

	Black		White		Male		Female	
	Percent	95% CI	Percent	95% CI	Percent	95% CI	Percent	95% CI
Household Income								
LT $15,000	14	9-20	14	12-16	11	8-15	18	16-20
$15,000-24,999	16	12-22	10	9-12	9	7-11	14	13-16
$25,000-49,999	10	7-14	9	8-10	7	6-9	10	9-11
$50,000-74,999	8	5-13	7	6-8	5	3-6	10	9-12
GE $75,000	8	4-15	8	7-9	6	5-8	9	8-11
Education								
LT High School	19	12-28	12	10-15	11	8-15	17	15-21
High School	12	9-16	9	8-10	7	6-8	11	10-13
Some College	13	9-19	10	9-11	6	5-8	13	12-25
College Degree	8	5-13	8	7-9	7	6-8	9	8-10
Health Coverage								
Yes	13	11-16	9	8-10	7	6-8	11	11-12
No	11	7-17	9	7-11	7	5-9	13	11-16

Data Sources: Pennsylvania Behavioral Risk Factor Surveillance System (PA BRFSS)
"95% CI" denotes ninety-five percent confidence interval.

During 2008-2010, the current asthma prevalence among adults was significantly higher among blacks and whites with household annual incomes up to $25,000 compared to the same categories of people with higher household incomes. There were significant differences between males and females with household incomes up to $24,999 and for the $50,000-$74,999 category. Strong associations were observed in current asthma prevalence between blacks and whites, race and level of education, with the exception of adults with a college degree. Females had higher prevalence of asthma at all levels of education compared to males. Generally, there is correlation between level of education and gender. Current asthma prevalence was higher in blacks compared to whites and among females compared to males, regardless of health coverage status. Rates among blacks with health coverage were higher compared to those without. There were no differences in prevalence of asthma among whites and males with or without health coverage. However, rates were lower among females with health coverage compared to females without health coverage.

Table 3-3: Self-reported Current Asthma Prevalence among Adults by Education Attainment and Household Income, PA 2008-2010

Income Level	LT High School		High School		Some College		College Degree	
	Percent	95% CI	Percent	95% CI	Percent	95% CI	Percent	95% CI
LT $15,000	22	17-29	13	11-16	15	11-19	8	5-13
$15,000-24,999	13	10-17	11	9-13	17	13-20	9	5-14
$25,000-49,999	16	11-23	8	7-10	9	7-11	7	6-9
$50,000-74,999	7	3-17	7	6-9	7	5-9	8	6-10
GE $75,000	NSR	NSR	7	5-9	9	7-12	8	7-9

Data Sources: Pennsylvania Behavioral Risk Factor Surveillance System (PA BRFSS)
"95% CI" denotes ninety-five percent confidence interval.

During 2008-2010, there was strong association in current asthma prevalence among people with less than a high school education and people with annual incomes of less than $15,000, compared to other categories. Generally, people with less than a high school education, people who graduated from high school, and those who had some college education and earned up to $25,000 had higher asthma rates, compared to people in the same categories who earned more. Current asthma prevalence among adults with a college degree was significantly lower (regardless of income) compared to others. These differences could be explained by location of residenceof people with asthma, house conditions, diet, etc. (Asthma Risk Factors, Section 2, Risk Factors, pages 15-20).

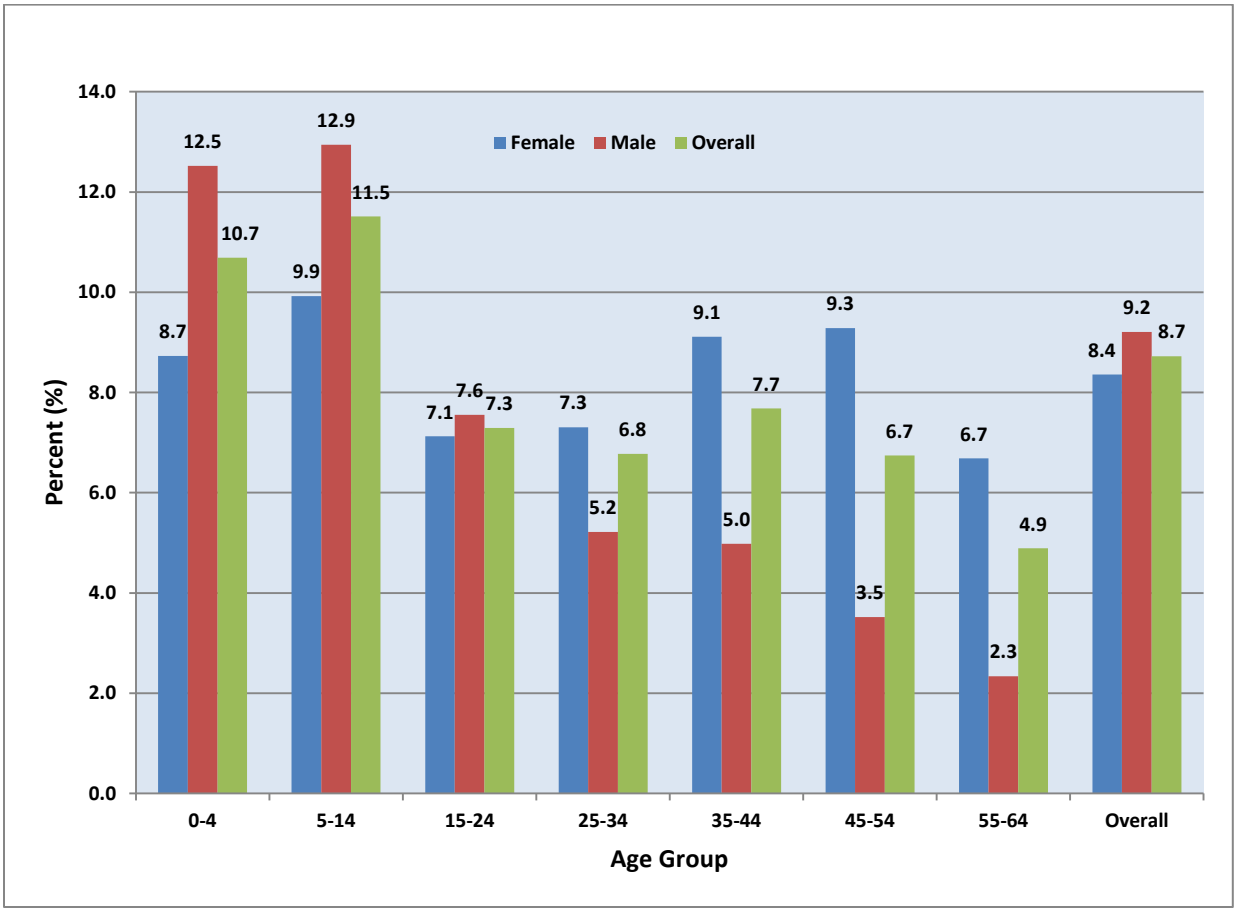
Table 3-4: Self-reported Current Asthma Prevalence among Adults with Diabetes and Without Diabetes, PA 2007-2010

	2007		2008		2009		2010	
	Percent	95% CI	Percent	95% CI	Percent	95% CI	Percent	95% CI
Diagnosed Diabetes	12	8-17	14	11-17	11	9-14	14	12-17
Not Diagnosed Diabetes	9	8-10	9	8-10	9	8-10	9	9-10

Data Sources: Pennsylvania Behavioral Risk Factor Surveillance System (PA BRFSS)
"95% CI" denotes ninety-five percent confidence interval.

During 2007-2010, the annual prevalence estimate of current asthma among adults with diabetes was higher in 2007 and 2009 and significantly higher in 2008 and 2010 compared to those without diabetes. Data revealed that asthma was associated with an increased risk of developing diabetes.

Figure 3-5: Prevalence of Asthma among Medicaid Recipients by Age Group and Sex, PA 2009-2010

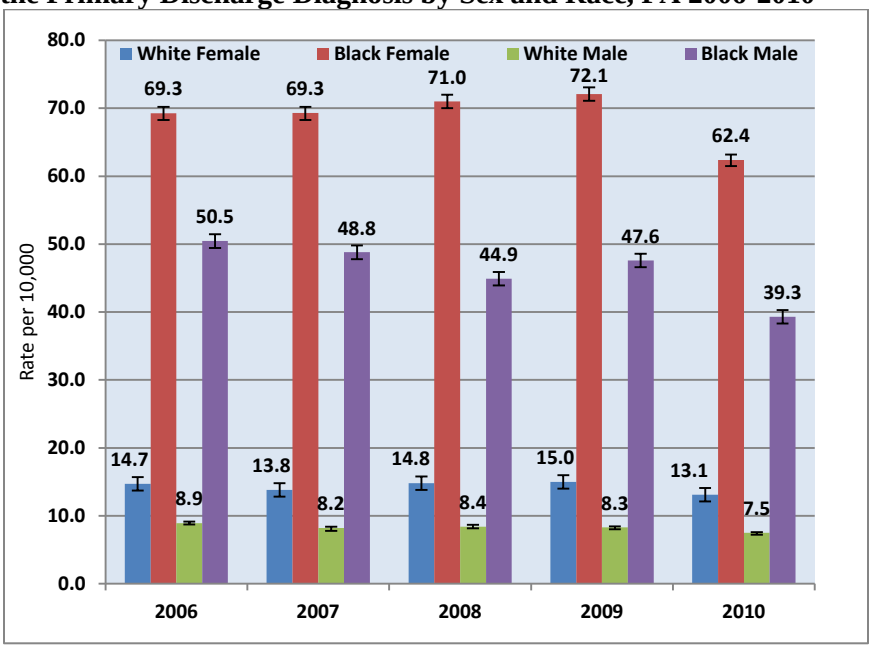


Data Source: Department of Public Welfare, Commonwealth of Pennsylvania

During 2009-2010, asthma prevalence was significantly higher among enrollees ages 0-14 compared to recipients ages 15 and older. Males younger than 24 years of age had higher rates compared to females of the same age. Of recipients ages 25 and older, females had higher rates compared to males. Generally, the prevalence of asthma among males was higher than females (9.2 percent vs. 8.4 percent).

Asthma Hospitalization

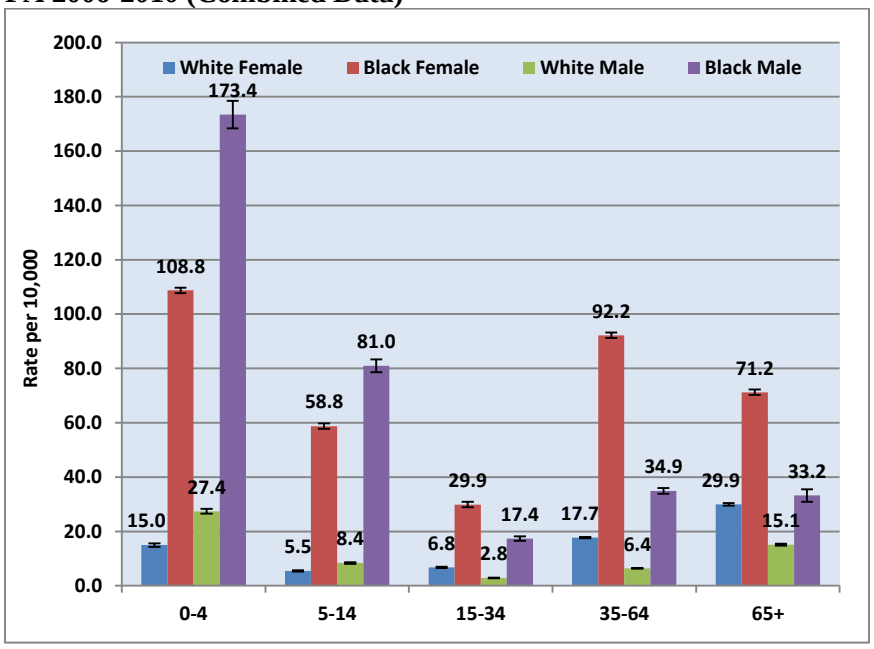
Figure 3-6: Rates of Inpatient Hospitalization with Asthma as the Primary Discharge Diagnosis by Sex and Race, PA 2006-2010



Data Source: Pennsylvania Health Care Cost Containment Council (PHC4)
Vertical bars on the graph denote the 95% confidence interval.

From 2006 to 2010, there were significant reductions in asthma hospitalization rates among selected groups. Among blacks, the rate of asthma hospitalizations for females decreased 9.2 percent (from 69.3 per 10,000 in 2006 to 62.4 per 10,000 in 2010) and for males 22 percent from 50.5 per 10,000 in 2006 to 39.3 per 10,000 in 2010. However, asthma hospitalization rates continued to be significantly higher among black females than white females, as well as among black males compared to white males (Asthma Risk Factors, Section 2, pages 15-20).

Figure 3-7: Rates of Inpatient Hospitalization with Asthma as the Primary Discharge Diagnosis by Sex, Race and Age Group, PA 2006-2010 (Combined Data)



Data Source: Pennsylvania Health Care Cost Containment Council (PHC4)
Vertical bars on the graph denote the 95% confidence interval.

In 2006-2010, age-specific inpatient hospitalization rates for asthma as the primary discharge diagnosis were significantly higher in children ages 0-4. Among children younger than age 14, black males had significantly higher rates, followed by black females, compared to white males and females. Among people older than 15 years of age, black females had the highest hospitalization rates, followed by black males.

Table 3-5: Asthma Age-Specific Rates for Inpatient Hospitalizations with Asthma as the Primary Discharge Diagnosis by Age Group, Race and Ethnicity, PA 2010

Age Group	White		Black		Other		Hispanic		Non-Hispanic	
	Number	Rate	Number	Rate	Number	Rate	Number	Rate	Number	Rate
00-04	1,116	21.1	1,393	135.5	759	77.1	531	66.5	2,737	42.1
05-09	486	8.6	796	79.1	363	40.9	259	36.0	1,386	20.3
10-14	280	4.6	511	47.9	181	22.5	124	18.4	848	11.7
15-17	102	2.6	202	27.0	61	12.8	42	10.2	323	6.8
18-19	80	2.7	101	18.3	27	7.4	23	7.6	185	5.2
20-24	254	3.8	159	13.7	41	4.8	36	5.4	418	5.2
25-29	279	4.6	196	20.9	64	8.0	40	6.5	499	6.9
30-34	339	6.0	224	25.5	57	7.8	45	7.9	575	8.6
35-39	483	7.9	303	34.9	67	9.8	75	14.6	778	10.9
40-44	698	10.0	498	53.7	99	16.6	98	20.7	1,197	14.9
45-54	1,852	11.2	1,277	66.7	261	27.1	229	31.0	3,161	16.9
55-64	1,877	13.2	800	58.7	190	31.7	154	37.5	2,713	17.2
65-74	1,465	16.7	388	53.2	129	44.5	101	53.1	1,881	19.6
75-84	1,419	22.9	176	41.0	74	60.6	55	63.9	1,614	24.3
85+	820	28.7	72	43.4	21	61.7	N/D	N/D	900	29.7

Table 3-6: Number and Percentage of Inpatient Hospitalizations with Asthma as the Primary Discharge Diagnosis Entering the Hospital through the Emergency Room (ER) by Age Group, Race and Ethnicity, PA 2010

Age Group	White		Black		Other		Hispanic		Non-Hispanic	
	Number	%	Number	%	Number	%	Number	%	Number	%
00-04	707	63.4%	918	65.9%	265	10.6%	84	15.8%	1,806	66.0%
05-09	301	61.9%	500	62.8%	107	8.3%	45	17.4%	863	62.3%
10-14	157	56.1%	328	64.2%	54	6.8%	19	15.3%	520	61.3%
15-17	65	63.7%	143	70.8%	19	6.3%	N/D*	N/D*	221	68.4%
18-19	63	78.8%	79	78.2%	19	10.5%	16	69.6%	145	78.4%
20-24	203	79.9%	151	95.0%	35	8.5%	28	77.8%	361	86.4%
25-29	208	74.6%	173	88.3%	58	12.2%	32	80.0%	407	81.6%
30-34	262	77.3%	208	92.9%	46	8.2%	30	66.7%	486	84.5%
35-39	337	69.8%	268	88.4%	58	7.4%	58	77.3%	605	77.8%
40-44	510	73.1%	447	89.8%	92	7.7%	81	82.7%	968	80.9%
45-54	1,370	74.0%	1,132	88.6%	232	7.4%	166	72.5%	2,568	81.2%
55-64	1,361	72.5%	717	89.6%	166	6.2%	109	70.8%	2,135	78.7%
65-74	1,046	71.4%	340	87.6%	113	6.1%	78	77.2%	1,421	75.5%
75-84	1,065	75.1%	154	87.5%	60	3.8%	35	63.6%	1,244	77.1%
85+	628	76.6%	63	87.5%	21	2.4%	N/D*	N/D*	704	78.2%

Data Sources of Table 3-5 and Table 3-6: Pennsylvania Health Care Cost Containment Council (PHC4)
ND = Not displayed if count <10 admissions.*
Asthma age-specific rates are calculated per 10,000 population.

Table 3-7: Number and Percentage of Inpatient Hospitalizations with Asthma as the Primary Discharge Diagnosis by Age Group and Primary Payers, PA 2006-2010

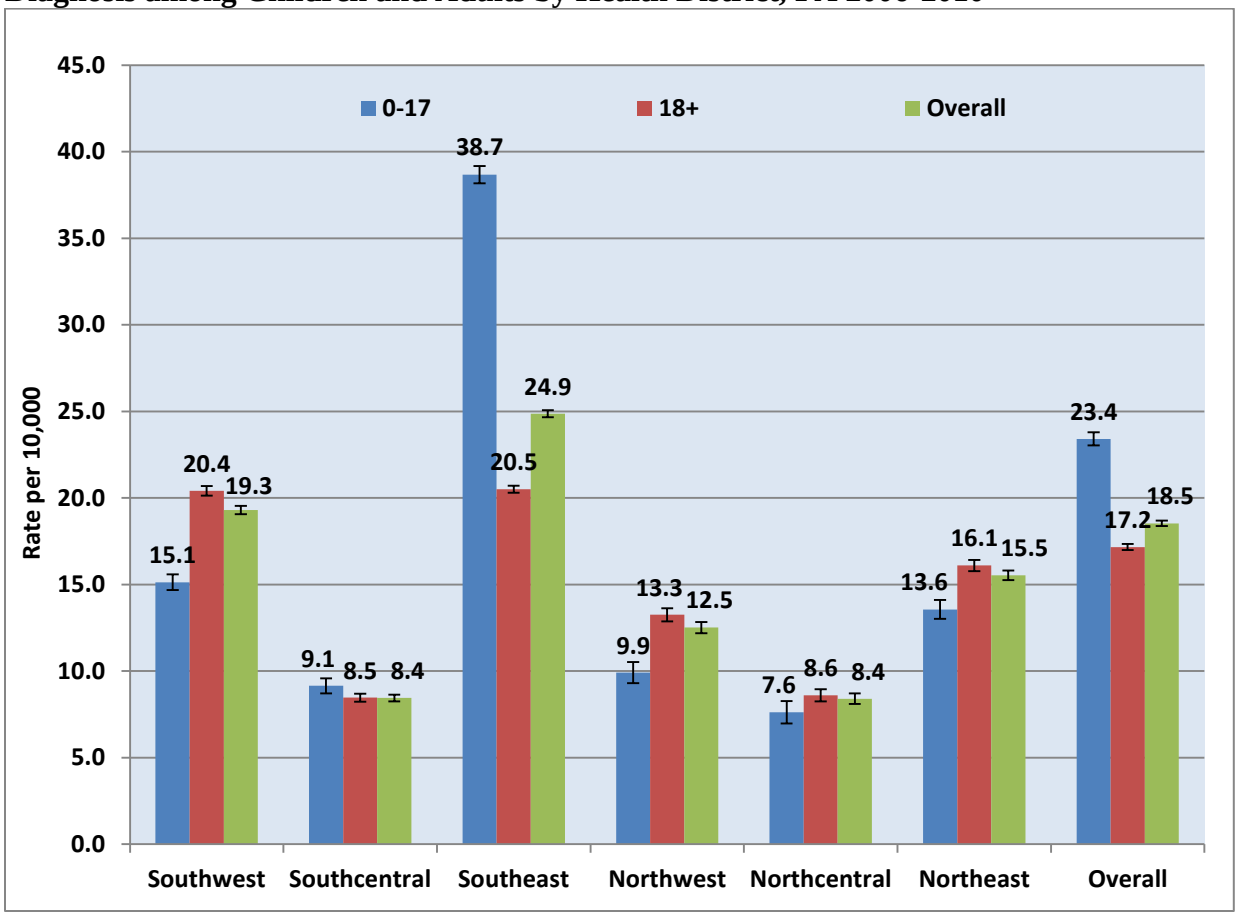
Age Group	Medicaid		Private Insurance		Medicare		Self-pay		Government	
	Number	%	Number	%	Number	%	Number	%	Number	%
00-04	11,038	65.9%	5,186	31.0%	44	0.3%	313	1.9%	105	0.6%
05-09	5,174	60.4%	3,066	35.8%	21	0.2%	216	2.5%	57	0.7%
10-14	3,358	59.7%	2,034	36.1%	N/D*	N/D*	146	2.6%	60	1.1%
15-17	1,208	56.3%	835	38.9%	N/D*	N/D*	63	2.9%	21	1.0%
18-19	662	57.2%	408	35.3%	13	1.1%	63	5.4%	N/D*	N/D*
20-24	1,517	52.4%	851	29.4%	135	4.7%	356	12.3%	24	0.8%
25-29	1,533	48.4%	997	31.5%	244	7.7%	372	11.7%	17	0.5%
30-34	1,647	44.9%	1,317	35.9%	399	10.9%	279	7.6%	16	0.4%
35-39	2,197	43.7%	1,871	37.2%	611	12.2%	316	6.3%	26	0.5%
40-44	3,013	40.4%	2,733	36.7%	1,241	16.7%	405	5.4%	42	0.6%
45-54	7,056	37.7%	7,234	38.6%	3,529	18.9%	726	3.9%	122	0.7%
55-64	3,958	26.9%	6,267	42.6%	4,041	27.4%	296	2.0%	123	0.8%
65-74	292	2.6%	1,050	9.5%	9,650	87.0%	25	0.2%	18	0.2%
75-84	74	0.7%	398	4.0%	9,512	94.5%	26	0.3%	21	0.2%
85+	22	0.4%	123	2.5%	4,775	96.4%	N/D*	N/D*	14	0.3%

Table 3-8: Number and Percentage of Inpatient Hospitalizations with Asthma as the Primary Discharge Diagnosis among Medicaid Recipients by Age Group, Race and Ethnicity, PA 2006-2010

Age Group	White		Black		Other		Hispanic		Non-Hispanic	
	Number	%	Number	%	Number	%	Number	%	Number	%
00-04	2,660	24.1%	5,884	53.3%	2493	22.6%	2,013	18.2%	9,021	81.7%
05-09	1,018	19.7%	3,107	60.1%	1049	20.3%	864	16.7%	4,309	83.3%
10-14	569	16.9%	2,116	63.0%	673	20.0%	542	16.1%	2,814	83.8%
15-17	250	20.7%	727	60.2%	231	19.1%	195	16.1%	1,013	83.9%
18-19	170	25.7%	390	58.9%	102	15.4%	92	13.9%	570	86.1%
20-24	613	40.4%	713	47.0%	191	12.6%	167	11.0%	1,348	88.9%
25-29	643	41.9%	667	43.5%	223	14.5%	163	10.6%	1,368	89.2%
30-34	672	40.8%	766	46.5%	209	12.7%	182	11.1%	1,461	88.7%
35-39	927	42.2%	1,042	47.4%	228	10.4%	210	9.6%	1,986	90.4%
40-44	1,025	34.0%	1,602	53.2%	386	12.8%	328	10.9%	2,684	89.1%
45-54	2,472	35.0%	3,649	51.7%	935	13.3%	819	11.6%	6,232	88.3%
55-64	1,689	42.7%	1,660	41.9%	609	15.4%	511	12.9%	3,446	87.1%
65-74	99	33.9%	115	39.4%	78	26.7%	35	12.0%	257	88.0%
75-84	25	33.8%	18	24.3%	31	41.9%	N/D*	N/D*	65	87.8%
85+	N/D*	N/D*	N/D*	N/D*	13	59.1%	N/D*	N/D*	16	72.7%

Data Sources of Table 3-7 and Table 3-8: Pennsylvania Health Care Cost Containment Council (PHC4)
ND = Not displayed if count <10 admissions.*

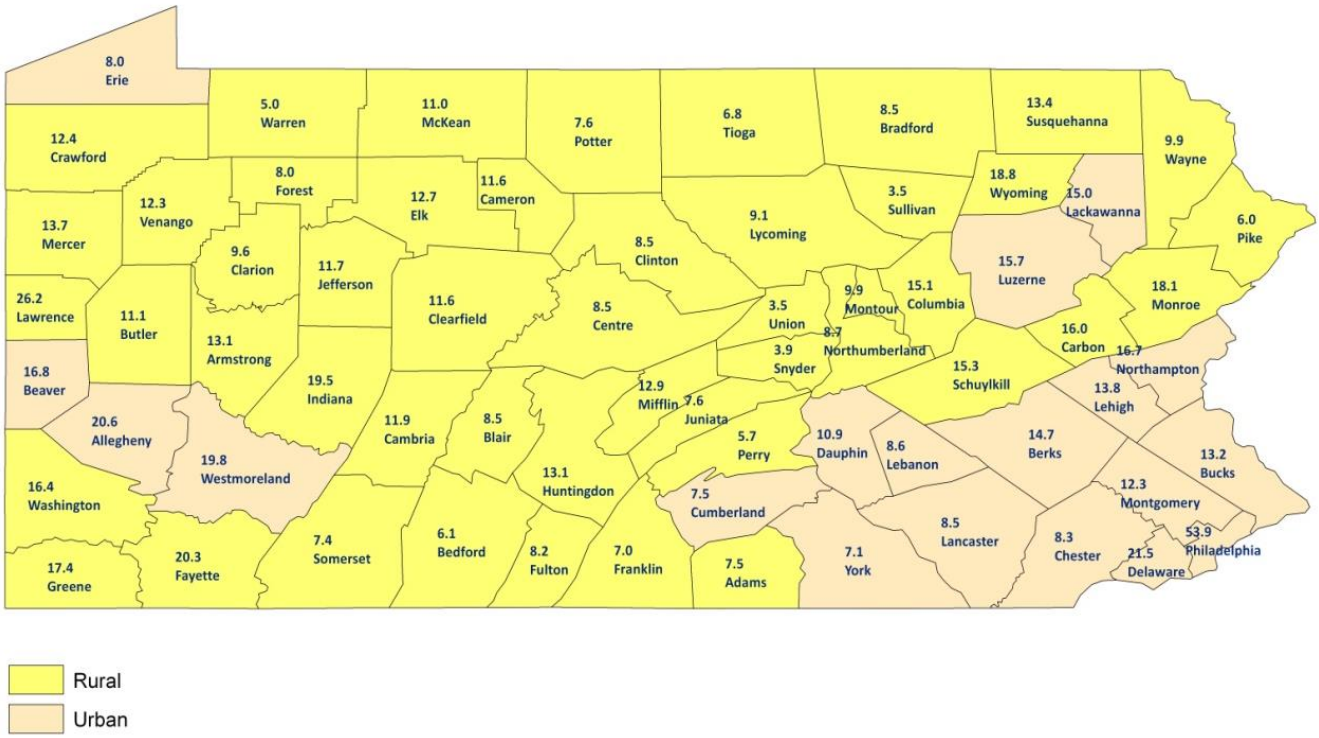
Figure 3-8: Rates of Inpatient Hospitalization with Asthma as the Primary Discharge Diagnosis among Children and Adults by Health District, PA 2006-2010



Data Source: Pennsylvania Health Care Cost Containment Council (PHC4)
Vertical bars on the graph denote the 95% confidence interval.

In all health districts, the age-specific rates were higher among children than adults. The highest asthma rates among children were in the Southeast Health District (which includes Philadelphia). The highest asthma rates among adults were in the Southeast and Southwest Health Districts (which includes Pittsburgh).

Figure 3-9: Age-Adjusted Rates for Inpatient Hospitalization with Asthma as the Primary Discharge Diagnosis by Urban vs. Rural County, PA 2006-2010



Data Source: Pennsylvania Health Care Cost Containment Council (PHC4)
Note: according to Center for Rural Pennsylvania Definition there are 19 urban and 48 rural counties. The Center considers a county to be rural when its population density or the number of people per square land mile is below the statewide average of 284. County is urban when its population density is at or above the statewide density.

In 2006-2010, inpatient hospitalization rates for asthma as the primary discharge diagnosis among residents of rural counties were the highest in Lawrence, Fayette, Indiana, Wyoming and Monroe counties. Among residents of urban counties, rates were the highest in Philadelphia, Delaware, Allegheny, Beaver and Northampton counties (Asthma Risk Factors, Section 2, pages 15-20).

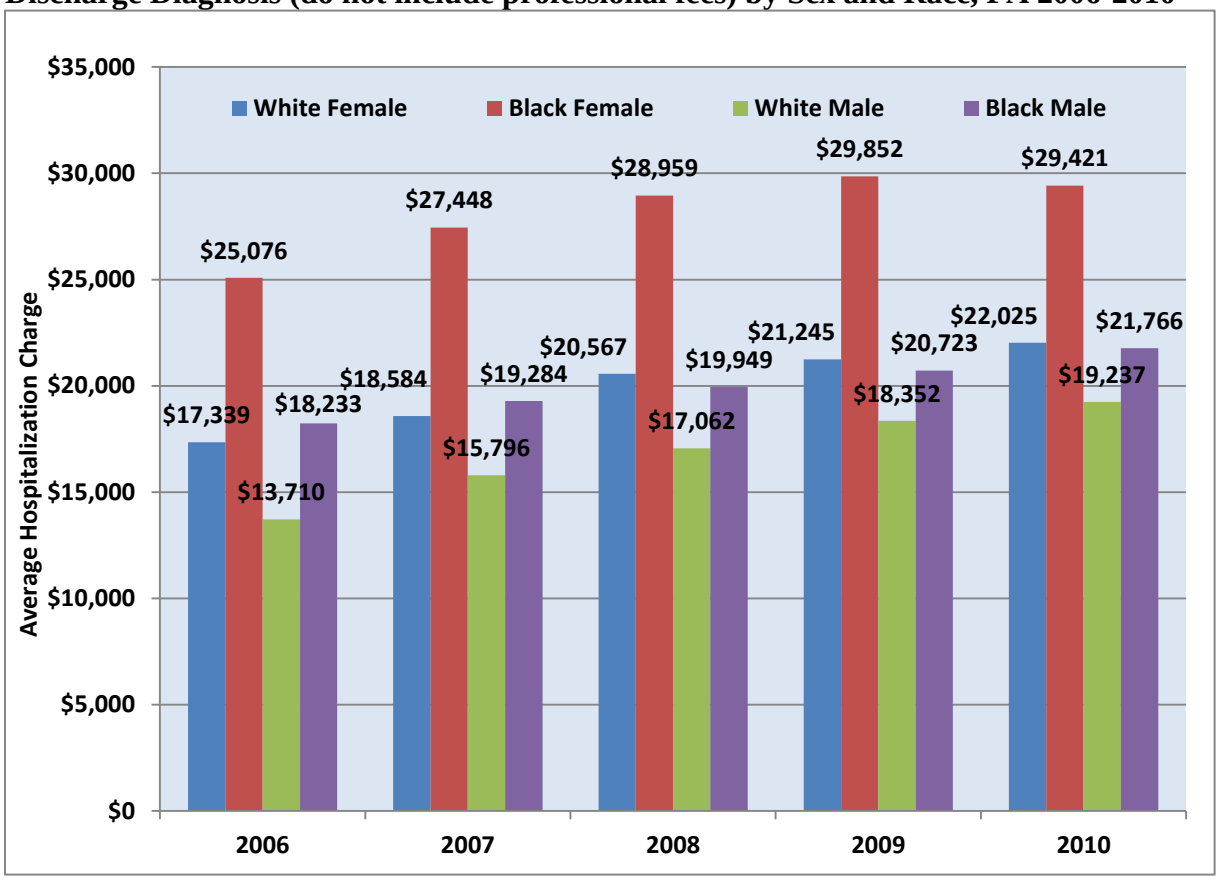
Table 3-9: Average Length of Stay (LOS) and Average Charges per Day in the Hospital due to Asthma by Selected Characteristics, PA 2006-2010

Selected Characteristics	2006		2007		2008		2009		2010	
	LOS	Charges per Day	LOS	Charges per Day	LOS	Charges per Day	LOS	Charges per Day	LOS	Charges per Day
Children	2.0	$6,084	2.0	$6,576	2.0	$6,957	2.0	$7,836	2.0	$8,421
Adults	4.0	$5,371	4.1	$5,812	4.1	$6,027	4.0	$6,403	3.9	$6,680
Female	3.8	$5,377	3.8	$5,832	3.9	$6,078	3.8	$6,455	3.7	$6,803
Male	2.7	$5,784	2.8	$6,211	2.9	$6,355	2.8	$7,133	2.8	$7,435
NH white	4.0	$4,049	3.9	$4,504	4.0	$4,846	3.9	$5,223	3.8	$5,559
NH black	2.8	$7,920	2.9	$8,442	3.0	$8,607	2.9	$9,096	2.9	$9,180
Hispanic	2.7	$8,366	2.9	$8,000	2.9	$8,464	2.8	$8,703	2.6	10,251
Non-Hispanic	3.5	$5,337	3.5	$5,794	3.6	$5,996	3.5	$6,487	3.4	$6,759
Total	3.4	$5,487	3.4	$5,954	3.6	$6,154	3.4	$6,643	3.4	$6,980

Data Source: Pennsylvania Health Care Cost Containment Council (PHC4)

Between 2006-2010, the average LOS for inpatient hospitalization with asthma as the primary discharge diagnosis for all selected characteristics has not changed significantly from year to year. Children stayed in hospitals half the time that adults did. Males, non-Hispanic blacks and Hispanics spend much less time in hospitals compared to females, non-Hispanic whites and non-Hispanics. Average charges per day were higher among children compared to adults, among males compared to females, among non-Hispanic blacks compared to non-Hispanic whites, and among Hispanics compared to non-Hispanic groups.

Figure 3-10: Average Charge per Inpatient Hospitalization with Asthma as the Primary Discharge Diagnosis (do not include professional fees) by Sex and Race, PA 2006-2010



Data Source: Pennsylvania Health Care Cost Containment Council (PHC4)

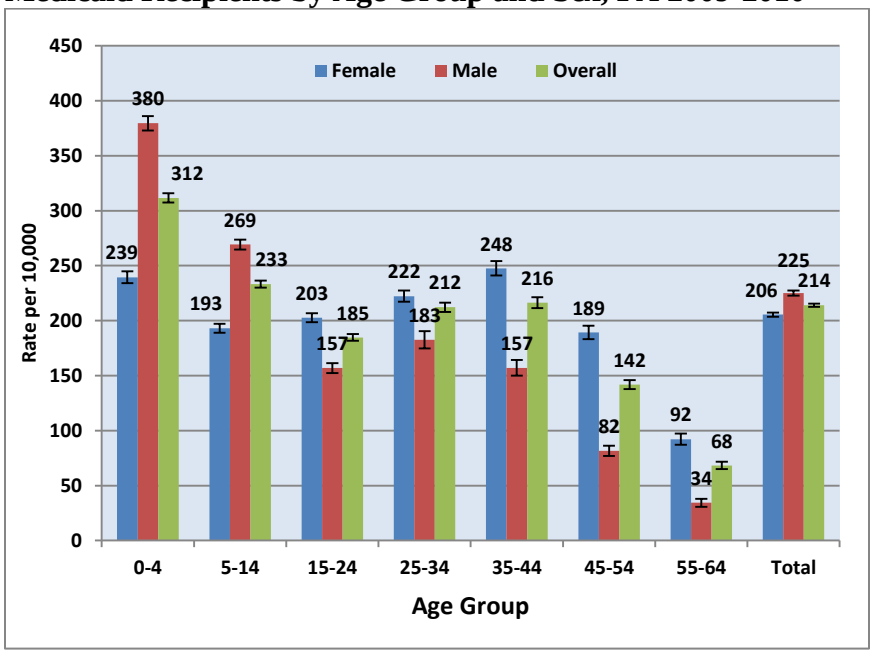
From 2006-2010, the average charge for inpatient hospitalizations with asthma as the primary discharge diagnosis among white and black females, and males increased every year. However, in 2010, the average charge for black females decreased. The highest charges were among black females compared to other groups. These discrepancies could be explained by severity of asthma, type of insurance, etc. (Asthma Risk Factors, Section 2, pages 15-20). There are associations between patient's conditions, LOS and hospital charges. Table 3-10 below shows differences in hospital charges per day and LOS in hospitals.

Table 3-10: Average Length of Stay (LOS) and Average Charge per Day in the Hospital due to Asthma by Race and Gender, PA 2006-2010

Selected Characteristics	2006		2007		2008		2009		2010	
	LOS	Charges per Day	LOS	Charges per Day	LOS	Charges per Day	LOS	Charges per Day	LOS	Charges per Day
White female	4.3	4,079	4.2	4,386	4.3	4,751	4.2	5,075	4.1	5,390
Black female	3.2	7,951	3.2	8,518	3.3	8,679	3.3	9,125	3.2	9,186
White male	3.2	4,345	3.3	4,803	3.4	5,061	3.3	5,626	3.2	6,007
Black male	2.3	7,803	2.3	8,222	2.4	8,368	2.3	8,980	2.4	9,069

Data Source: Pennsylvania Health Care Cost Containment Council (PHC4)

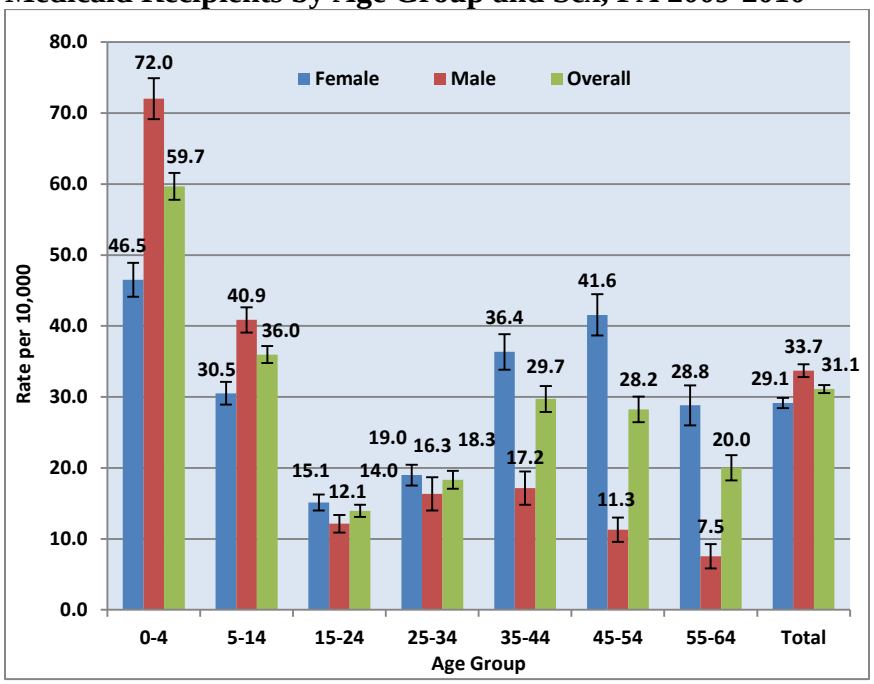
Figure 3-11: Rates of Asthma Emergency Room Visits among Medicaid Recipients by Age Group and Sex, PA 2009-2010



Data Source: Department of Public Welfare, Commonwealth of Pennsylvania
Vertical bars on the graph denote the 95% confidence interval.

During 2009-2010, rates for emergency room (ER) visits were significantly higher among enrollees ages 0-4 compared to other age groups. The lowest rates were among the 55-64 age group. Males ages 0-14 had significantly higher rates than females. Females ages 15-64 had significantly higher rates than males of the same age (Asthma Risk Factors, Section 2, pages 15-20).

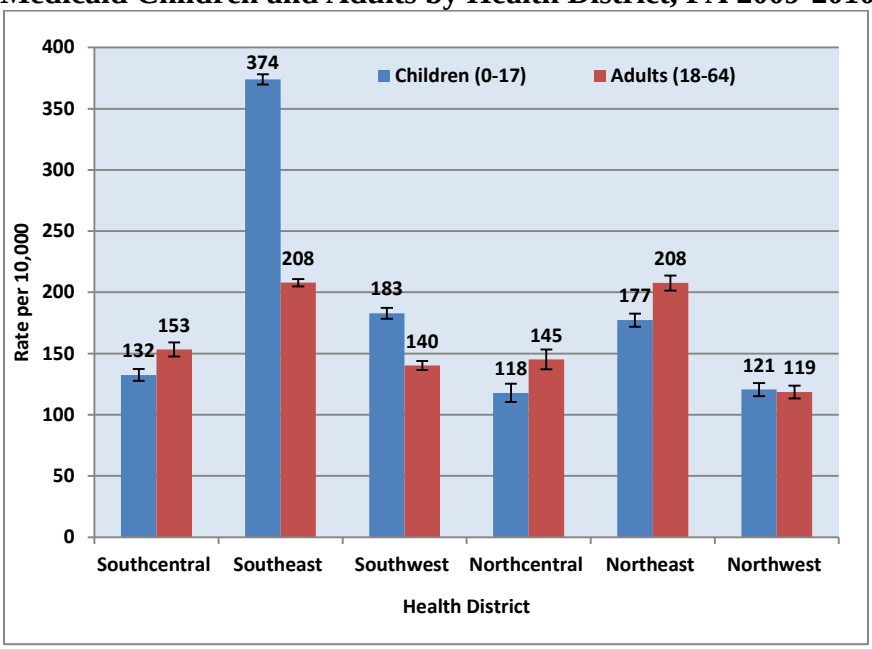
Figure 3-12: Rates of Inpatient Hospitalizations with Asthma among Medicaid Recipients by Age Group and Sex, PA 2009-2010



Data Source: Department of Public Welfare, Commonwealth of Pennsylvania
Vertical bars on the graph denote the 95% confidence interval.

During 2009-2010, hospitalization rates were significantly higher among those enrolled ages 0-4 compared to other age groups; among males ages 0-14 compared to females of the same age; and among females ages 15-64 compared to males of the same age.

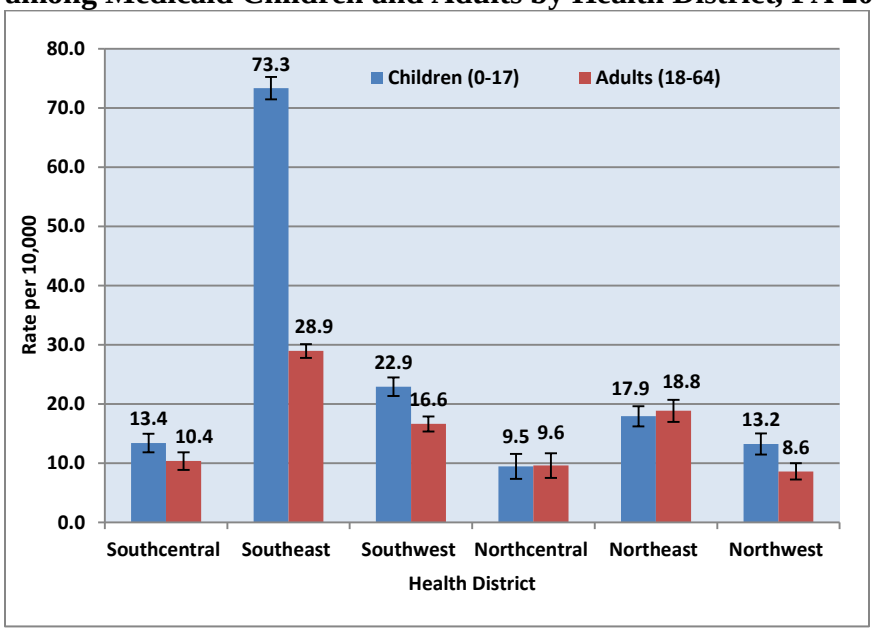
Figure 3-13: Rates of Asthma Emergency Room Visits among Medicaid Children and Adults by Health District, PA 2009-2010



During 2009-2010, rates for ER visits were significantly higher among children and adults in the Southeast Health District compared to other districts. The largest discrepancies between children and adults were observed in the Southeast Health District.

Data Source: Department of Public Welfare, Commonwealth of Pennsylvania
Vertical bars on the graph denote the 95% confidence interval.

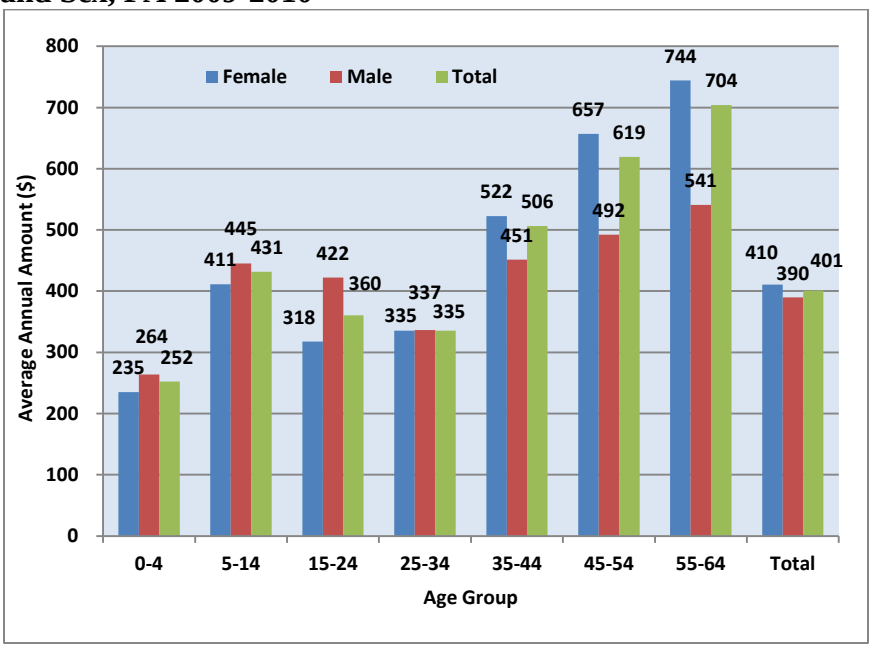
Figure 3-14: Rates for Inpatient Hospitalizations with Asthma among Medicaid Children and Adults by Health District, PA 2009-2010



In 2009-2010, hospitalization rates were significantly higher among children and adults in the Southeast Health District compared to other districts. The biggest discrepancies between children and adults were observed in the Southeast Health District.

Data Source: Department of Public Welfare, Commonwealth of Pennsylvania
Vertical bars on the graph denote the 95% confidence interval.

Figure 3-15: Average Annual Amount Paid by Pharmacy per Person with Asthma among Medicaid Recipients by Age Group and Sex, PA 2009-2010



During 2009-2010, the average annual pharmacy-paid claims amount among Medicaid recipients with asthma was highest in age group 55-64 and the lowest in age group 0-4. Up to age 34, the pharmacy-paid claims amount was higher among males than females. During ages 35-64 the pharmacy paid claims amount was higher among females than males. Overall, the average annual pharmacy-paid claims amount among Medicaid recipients with asthma was approximately 4.9 percent higher among females than males.

Data Source: Department of Public Welfare, Commonwealth of Pennsylvania

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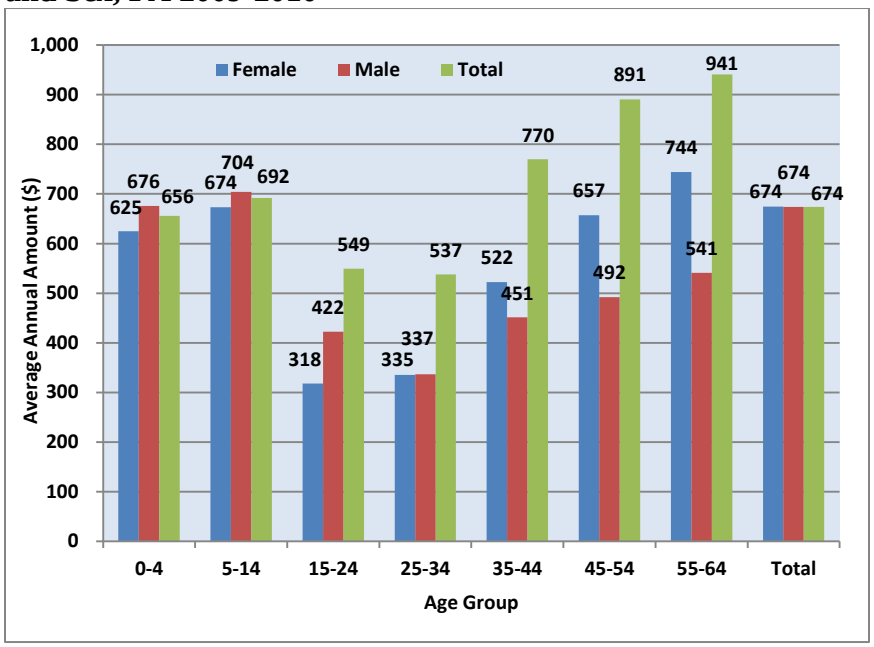
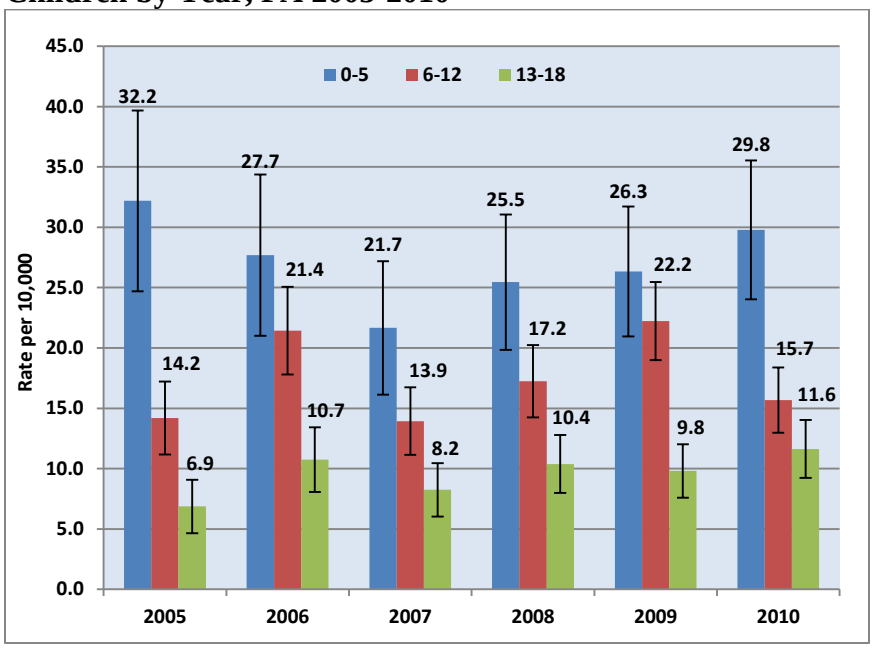
Figure 3-16: Average Annual Amount Paid by Medical Service per Person with Asthma among Medicaid Recipients by Age Group and Sex, PA 2009-2010



During 2009-2010, the average annual medical service-paid claims amount among Medicaid recipients with asthma was highest in age group 55-64 and the lowest in age group 25-34.
Overall, there were no significant differences in the average annual medical service-paid claims amount among Medicaid recipients with asthma among females and males.

Data Source: Department of Public Welfare, Commonwealth of Pennsylvania

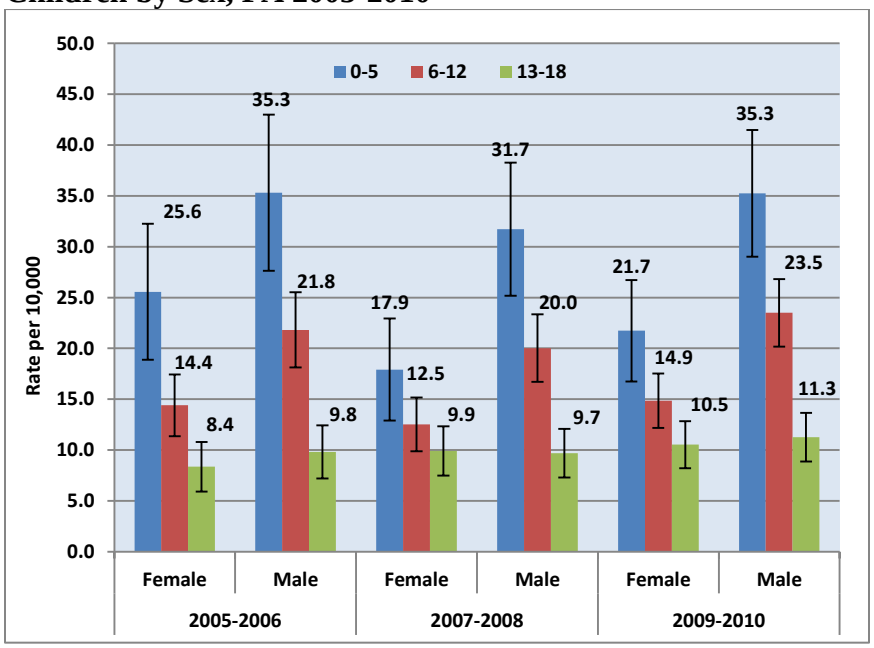
Figure 3-17: Rates with Asthma as Primary Discharge Diagnosis among Children's Health Insurance Program (CHIP)-enrolled Children by Year, PA 2005-2010



Data Source: Children's Health Insurance Program (CHIP)
Vertical bars on the graph denote the 95% confidence interval.

In 2005-2010, inpatient hospitalization rates for CHIP-enrolled children with asthma as the primary discharge diagnosis were highest among age group 0-5, followed by age group 6-12. Generally, the hospitalization rates for 0-5 age group have decreased 7.5 percent (from 32.2 per 10,000 in 2005 to 29.8 in 2010). However, the rates in age group 6-12 have increased approximately 10.6 percent (from 14.2 per 10,000 in 2005 to 15.7 in 2010) and have increased 68.1 percent (from 6.9 per 10,000 in 2005 to 11.6 in 2010) in age group 13-18.

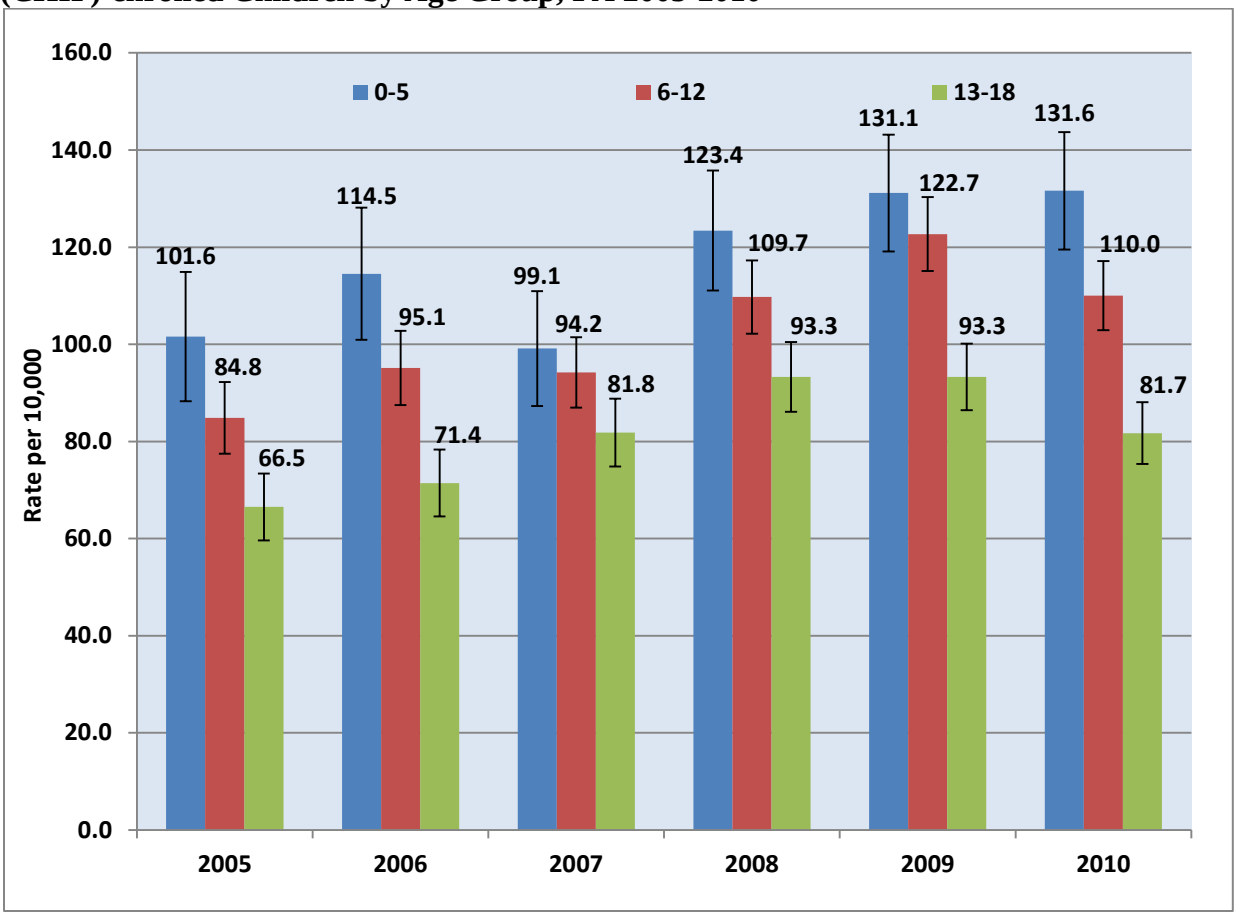
Figure 3-18: Rates with Asthma as Primary Discharge Diagnosis among Children's Health Insurance Program (CHIP)-enrolled Children by Sex, PA 2005-2010



Data Source: Children's Health Insurance Program (CHIP)
Vertical bars on the graph denote the 95% confidence interval.

In 2005-2010, males age 0-5 and 6-12 had higher asthma hospitalization rates than females. In 2005-2006 and 2009-2010, males age 13-18 had higher rates of asthma hospitalization compared to females. However, during 2007-2008, the rates for age group 13-18 were almost equal.

Figure 3-19: Emergency Room Visit Rates among Children's Health Insurance Program (CHIP)-enrolled Children by Age Group, PA 2005-2010

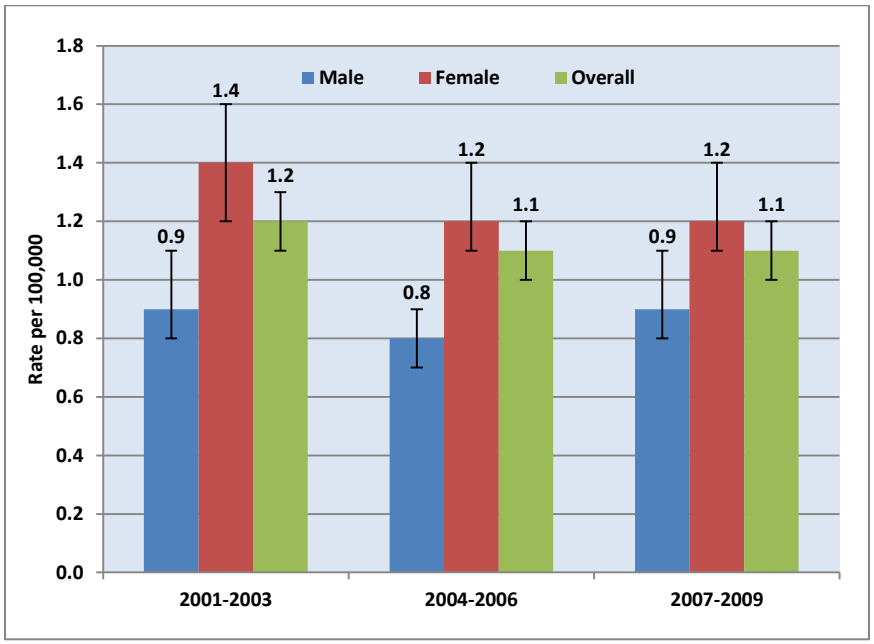


Data Source: Children's Health Insurance Program (CHIP)
Vertical bars on the graph denote the 95% confidence interval.

From 2005 through 2010, the rate of asthma ER visits per 10,000 CHIP recipients increased among children. In age group 0-5, the rates have increased since 2005 (101.6 per 10,000) to 2010 (131.6) or approximately 29.5 percent. In age group 6-12, the rates have increased since 2005 (84.8 per 10,000) to 2010 (110.0) or approximately 29.7 percent. In age group 13-18, the rate has increased since 2005 (66.5 per 10,000) to 2010 (81.7) or approximately 22.9 percent. During 2005-2010, the highest rates were observed in age group 0-5, and the lowest were observed in the 13-18 age group.

Asthma Mortality

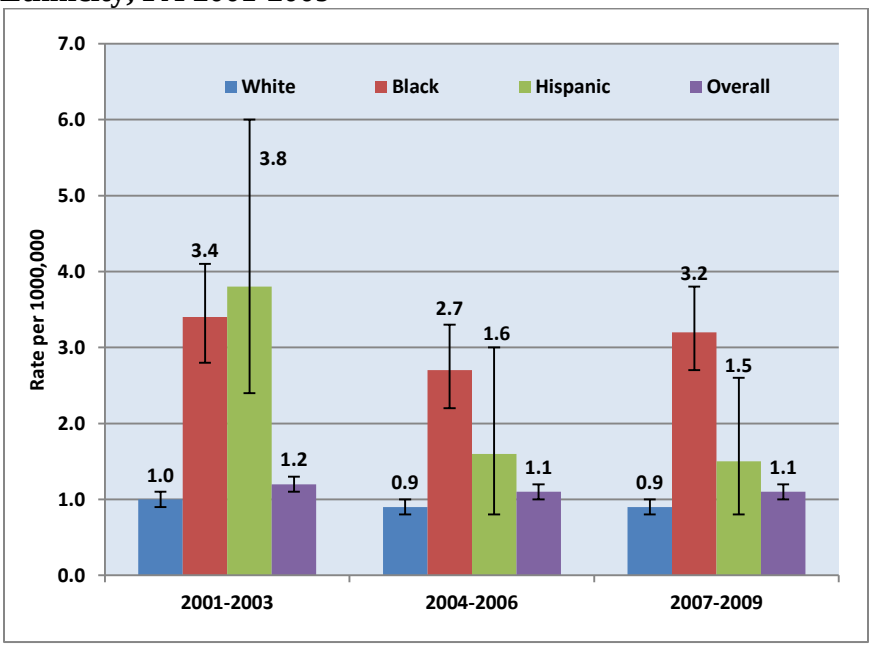
Figure 3-20: **Age-Adjusted Asthma Death* Rates by Sex, PA 2001-2009**



During 2001-2009, the age-adjusted asthma death rates with asthma as the underlying cause of death among females were significantly higher than among males.
Overall, asthma death rates decreased approximately 8.3 percent from 1.2 per 100,000 in the 2001-2003 three-year summary period to 1.1 per 100,000 in the 2007-2009 three-year summary period.

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.

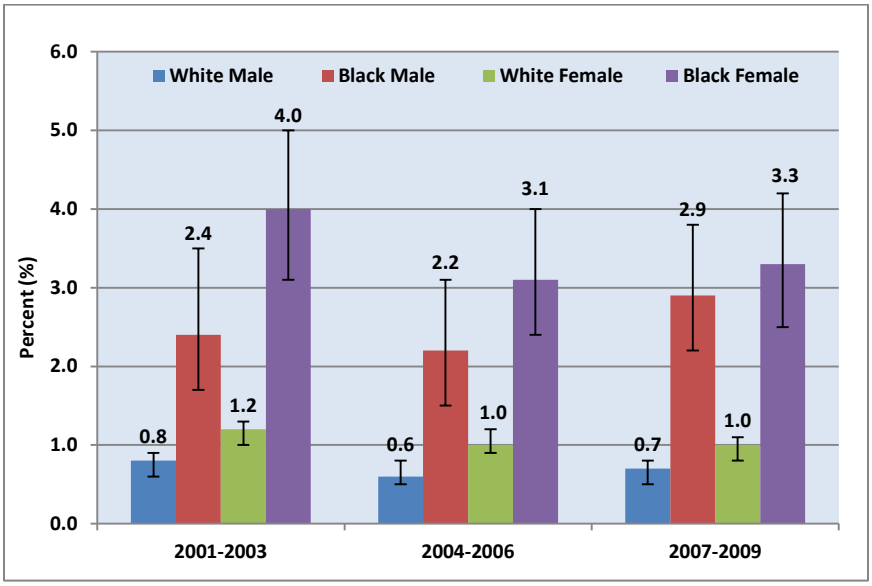
Figure 3-21: Age-Adjusted Asthma Death* Rates by Race and Ethnicity, PA 2001-2009



During 2001-2009, the age-adjusted asthma death rates with asthma as the underlying cause of death were significantly higher among blacks (approximately three to three and a half times) when compared to whites. Death rates decreased by more than 50 percent among Hispanics from 2001-2003 compared to 2007-2009.

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.

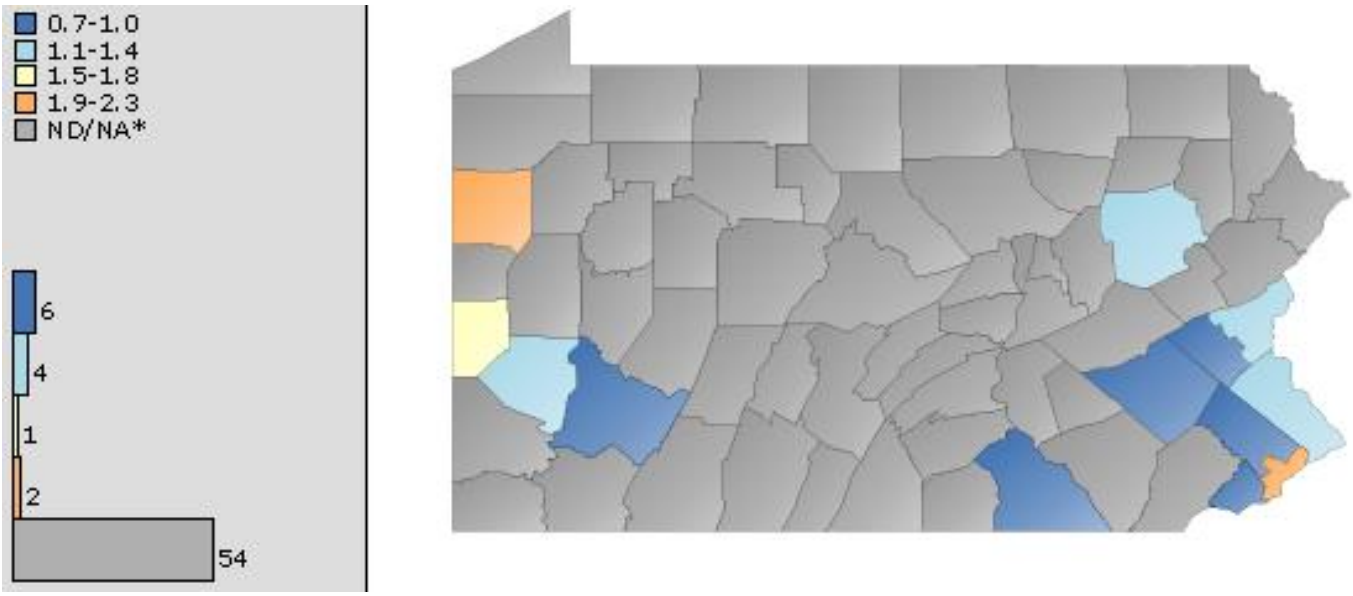
Figure 3-22: Age-Adjusted Asthma Death* Rates by Sex and Race, PA 2001-2009



During 2001-2009, the age-adjusted asthma death rates with asthma as the underlying cause of death were significantly higher among black males (approximately three to four times) than white males. In the same period of time, the age-adjusted asthma death rates among black females were significantly higher approximately three to three and a half times) than white females.

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.

Figure 3-23: Age-Adjusted Asthma Death* Rates by County, PA 2008-2010



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 (age-adjusted/specific rates and SMRs) or <3 (all other rates)*
NA = Data not available to calculate statistic*
Direct method per 100,000 US 2000 std million population used for an age-adjusted rates

During 2008-2010, among residents of Pennsylvania**,** the age-adjusted death rate was the highest in Philadelphia (2.3 deaths per 100,000 population), Mercer (2.2), Beaver (1.6) and Northampton (1.4) counties.

Conclusion/Recommendations

The causes of asthma disparities are complex. Therefore, the design of prevention strategies must be multi-faceted. Asthma disparities occur when individual, environmental, health system and provider factors interact and impact each other. These interactions may vary according to the person's particular needs at any given time. In a large proportion of patients, asthma occurs in the first years of life. Asthma may also occur during puberty and adulthood. Many cases of asthma during adulthood represent the reappearance of symptoms in persons who were transiently free of issues during adolescence and young adulthood. Asthma prevalence and hospitalization rates are correlated with low median family income, the percentage of minorities in the population and the percentage of children under age 18. The lack of access to preventive health care, poor housing conditions, indoor and outdoor exposures to allergens, and genetic susceptibility may contribute to a high incidence of asthma in some neighborhoods.

Population-based projections indicate minority populations in the U.S. will continue to increase over the next several decades. Also, increasing economic pressure may limit publicly available resources, initiating further restrictions on healthcare coverage and heightening the risk that existing disparities in asthma will not remain static but increase.

Asthma affects people of all ages, races and genders; however, certain population subgroups are disproportionately affected. Based on asthma prevalence, hospitalization, ER visits, and mortality data, the following population subgroups have been identified as priority for asthma intervention:

- Children;
- Boys (among children);
- Females (among adults);
- Elderly;
- Non-Hispanic blacks;
- Hispanics;
- Residents of low socioeconomic status; and
- Residents of urban areas.

There are limited valid recommendations to prevent asthma, reduce its severity and increase the quality of life in patients suffering from this illness. The following represent select justifiable recommendations to address asthma issues:

- Compliance with asthma medicine;
- Avoidance of passive and active exposure to allergens;
- Maintaining a healthy life style (diet, exercise, etc.,);
- Self-management;
- Clean air;
- Quality and/or advanced education;
- Nutritious food;
- Safe housing;
- Culturally competent and culturally sensitive healthcare providers; and
- Health insurance.

To reduce asthma disparities within the commonwealth, the Pennsylvania Asthma Control Program and Pennsylvania Asthma Partnership need to create public health education designed to increase patient knowledge. Implementing and enforcing environmental standards and regulations, monitoring pollution levels and human exposures, and considering the risks of pollution in decision making can all improve health, the quality of the environment and, consequently, people with asthma, especially among vulnerable groups of population. Housing free of hazards, such as secondhand smoke, pests, carbon monoxide, allergens, lead and toxic chemicals, helps prevent disease and other health problems.

Pennsylvania is working with the Children's Hospital of Philadelphia (CHOP) to conduct the Community Asthma Prevention Program (CAPP). The CAPP is an in-home program developed to help families of asthmatic children ages 2-16 to help reduce the environmental triggers within their home. An assessment of the home environment is conducted and families are referred to asthma classes, where they receive free remediation items, such as mattress and pillow covers, to reduce exposure to allergens within the home.

To conduct further analysis of existing risk factors, the Asthma Surveillance System needs to analyze the annual Asthma Call-back Survey. Statistical validity can be accomplished by using a larger population. Larger population sizes will permit the identification of asthma disparities by county and district.

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Glossary of Terms

Admission Types:
Emergency: The patient requires immediate medical intervention as a result of a severe, life threatening asthma attack

Urgent: The patient requires immediate attention for the care and treatment of an asthma attack

Elective: The patient's condition permits adequate time to schedule the availability of suitable accommodation

Age-adjusted rate: A rate calculated in a manner that allows areas with different age structures to be compared. Rates are standardized to a control population of "2000 U.S. Standard Million Population"

Asthma health disparities: Differences in the incidence, prevalence, mortality, and burden of diseases and other adverse health conditions that exist among specific population groups in the United States

Asthma pharmacy paid amount: Medications (paid) directly related to asthma

Average charges: The average sum of the hospital charges (excluding professional fees) for each hospitalization

Average length of stay (LOS): The average number of days per hospitalization that patient stayed in the facility

Body mass index (BMI): A mathematical method to determine obesity by dividing a person's metric weight by the square of the person's metric height

Confidence interval (CI): A way to measure sampling error and to define the range of values where percentages are estimated by multiple samples of the same population

Current asthma prevalence: The proportion of the population that has the disease currently

Hospital readmission rate: Represents the rate at which patients return to the hospital within 12 months of discharge following an inpatient stay due to asthma

Inpatient hospitalization rate: Inpatient hospitalizations with asthma as the primary discharge diagnosis reflecting the number of admissions (not the number of patients) per 10,000 residents

Lifetime asthma prevalence: The proportion of the population that has had the disease at any point in their life

Medical service paid amount: All services paid for by a specific consumer with asthma

Outpatient visit rate: Reflects the number of visits (not the number of patients) per 10,000 residents

Prevalence and prevalence rate: Prevalence is the total number of cases of a disease (both new and chronic) in a population at a given point or period in time. As an instance, the prevalence of diabetes in a population is considerably greater than the newly diagnosed (or incidence) cases seen in that population. Prevalence rate is the total number of prevalence over the total specified population in a given time period

Primary payer: The main source from which hospitals expect to receive payment for hospitalization charges

Statistical significance: The difference between two rates is considered statistically significant if the difference would have occurred by chance less than five times out of 100. If a difference is statistically significant, it is not likely due to random chance

Surveillance: The ongoing systematic collection, analysis and interpretation of health-related data essential to the planning, implementation and evaluation of public health practice

Total charges: The sum of the hospital charges (excluding professional fees) for an entire year

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