

THE BURDEN OF **ASTHMA**



IN OHIO 2012

ASTHMA

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INTRODUCTION

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What is Asthma?

Asthma is a chronic inflammatory disease of the airways. Because of inflammation the airways are unusually sensitive and react to stimulation from many kinds of irritants and allergens by constricting, producing mucus and swelling. When these reactions take place, an individual generally experiences reduced ability to breathe and may cough, wheeze and feel short of breath. This reaction may happen very quickly or over an extended period with minor or major impact on a person's ability to function. Depending on an individual's level of control, episodes may be very frequent or very infrequent. Control may vary depending on the time of year and other environmental conditions.

Since the mid-1990's, the means have been available to control asthma so that individuals with the disease can live normal lives. The National Asthma Education and Prevention Program (NAEPP) located at the National Institutes of Health (NIH) convened an expert panel to establish evidence based *Guidelines for Diagnosis and Management of Asthma* in 1991, 1997, 2002 and 2007. These guidelines have established the currently accepted diagnosis for asthma and indicate that for all people with persistent asthma an inhaled corticosteroid is the preferred method for controlling inflammation. Once inflammation is controlled many symptoms will be reduced. Although, many individuals require other medications to control asthma along with inhaled corticosteroids, control is the emphasis of medication therapy. Short acting bronchodilators are recommended as rescue medications only.

As with previous guidelines for asthma management, control of environmental allergens, irritants and sensitizers that trigger responses from inflamed airways continues to be an important part of a complete asthma control plan. Public health strategies must still incorporate both environmental and medical models to achieve a reduction in the burden of asthma.

Unfortunately for many people, asthma is a complex disease to diagnose, treat and manage. Appropriate treatment can reduce the risk of deaths, the need for emergency care, hospitalization and death from asthma. Prevention of these events not only reduces pain and suffering but the high cost of health care for patients with asthma, both of which are significant.

Disparities in Asthma

In Ohio, asthma is more common among children, adult women, low income residents, and residents of Appalachian counties. Ohio data show that the effect of asthma is disproportionately felt also among these groups. Asthma is also a disease that affects younger persons at a higher rate, especially younger children. In addition, people in their most productive years are feeling the effects of asthma on their physical and mental health. For all these reasons, the monitoring and control of asthma must be considered a priority for Ohio's health providers and public health professionals. Many of these disadvantaged and at-risk populations experience above average rates of emergency department visits, inpatient hospitalizations, and deaths. There are many reasons for these disparities, including, economic, social, and cultural factor as well as genetics. These groups may also face substandard housing and work conditions that place them at greater exposure to environmental conditions that worsen asthma.

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While the causes of asthma remain largely unidentified, the role of indoor air contaminants in exacerbation of asthma episodes is significant and it is suspected that some contaminants may have causal associations. Pollutants inside a building can be 2-5 times that of the levels found outside. Since most children spend a significant part of their day in a school building, the Indoor Environments Program at the Ohio Department of Health has identified indoor air quality as a priority issue.

The National Public Health Response to Asthma

Nationally, the response to this issue has taken place on several levels. The Department of Health and Human Services (DHHS) has included asthma in the Healthy People 2010 and 2020 goals. We will use Healthy People 2010 goals in this report as we are reporting on data prior to 2010. These Goals are:

- Reduce asthma deaths.
- Reduce hospitalizations for asthma.
- Reduce hospital emergency department visits for asthma.
- Reduce activity limitations among persons with asthma.
- Reduce the number of school or work days missed by persons with asthma due to asthma.
- Increase the proportion of persons with asthma who receive formal patient education, including information about community and self-help resources, as an essential part of the management of their condition.
- Increase the proportion of persons with asthma who receive appropriate asthma care according to the NAEPP Guidelines.
- Establish in at least 25 states a surveillance system for tracking asthma death, illness, disability, impact of occupational and environmental factors on asthma, access to medical care, and asthma management.

The Centers for Disease Control and Prevention (CDC) Asthma Control Program has funded state health departments to develop asthma programs including surveillance for asthma and state planning for implementation of interventions. The Ohio Department of Health (ODH) has been funded since it received a CDC Asthma grant in 2003. Additionally, CDC has developed resources for states such as evaluating asthma partnerships, effective interventions for asthma and coordination of surveillance efforts.

The United States Environmental Protection Agency (USEPA) has also developed a program for asthma with the development of tools for the public including pamphlets on asthma education topics and indoor air quality. Particular emphasis has been given to indoor air quality in schools. In partnership with the CDC's Asthma Control Program, the US EPA Asthma Program is producing webinars for professionals working with asthma and promoting collaboration of public and private partners to create innovative strategies to address asthma at the local and state levels.

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The Ohio Public Health Response to Asthma

The ODH has been a driving force along with many organizations within Ohio working toward control of asthma. As part of the CDC grant, ODH has focused on development of the Ohio Asthma Coalition (OAC) and the Ohio Surveillance System for Asthma (OSSA).

In June 2003, brought together through collaborative activities between the ODH Asthma Program and the American Lung Association of Ohio®, the OAC held its inaugural meeting. Since that time the coalition has completed the Ohio Statewide Asthma Plan and begun implementation activities. Additional funding for implementation will be sought as needs become apparent. The 2009 revision of the plan can be accessed at <http://www.ohioasthmacoalition.org/about/about.htm>. The coalition is in the process of reorganizing to produce three major initiatives in the next few years: Clinical, School and Home Visit interventions which are evidence based and will be effective in reducing the asthma burden from a comprehensive perspective. Additionally, the coalition holds a major statewide asthma conference for asthma professionals, biennially.

The other major effort of the Asthma Program is development of the Ohio Surveillance System for Asthma (OSSA). This system will supply the critical information necessary to provide measures of need for asthma interventions and evidence of the success or failure of those interventions. OSSA will:

- Provide high quality asthma morbidity, mortality, risk factor, disease management and access to medical care data, and their analyses.
- Monitor the occurrence of asthma in Ohio.
- Identify high risk populations of asthma in Ohio.
- Use these data in the design and evaluation of interventions for planning and implementing programs to control the burden of asthma in Ohio.
- Establish a repository of asthma data for other users.

The major data sets available to ODH that consistently provide data for these requirements are the Center for Disease Control and Prevention's (CDC) Behavioral Risk Factor Surveillance Systems (BRFSS), the Ohio Hospital Association's Discharge Data Set (OHA), Ohio Family Health Survey (OFHS), and the Ohio Department of Health's Center for Health and Vital Statistics' asthma death data.

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How Should OSSA Data Be Used?

The final link in the surveillance chain is to apply the data to prevention and control. The epidemiologic aspects of asthma such as distribution and time trends are crucial to the planning, implementation and evaluation of programs to control the burden of asthma in Ohio. Some of the many ways the data collected by OSSA can be used is to:

- **Target efforts to fight asthma.**
The OSSA has local profiles of the major cities and regional or county data available online. This data allows public health organizations to direct resources to high priority populations and identified geographical areas.
- **Demonstrate the need for funding.**
Agencies and individuals applying for grants or other forms of funding have specific and up-to-date information to demonstrate Ohio's or local areas' needs. Those applying for continuing funding may be able to demonstrate the effectiveness of their programs.
- **Evaluate the impact of advances in treatment.**
New asthma medications and treatments are being introduced at a brisk pace. Rather than relieve an asthma attack in progress, new medications taken on a long term basis, such as glucocorticoids, glucocorticoid-beta-adrenergic combinations and leukotriene receptor agonists can prevent asthma attacks. If a larger proportion of the population is properly treated, it is possible that Ohio could see a dramatic difference in emergency room rates and reported symptoms. Surveillance may be able to demonstrate success of these efforts and identify treatments that can make large differences in quality of life and reduction of health care costs.
- **Monitor the progress of efforts.**
In addition to the efforts of ODH, there are many other organizations, institutions, coalitions and individuals that are working to reduce the burden of asthma. They are implementing interventions in diverse areas such as clinical practice, environment, data/research, and education. Providing accurate, timely and specific data to these groups will enable them to see progress that they are making or alert them to improvements that need to be made.

Contents of this Report

This report presents data from multiple sources:

- Behavioral Risk Factor Surveillance System (BRFSS)
- Ohio Family Health Survey – Child asthma surveillance data
- Ohio Hospital Association – Hospitalization and emergency department usage data
- Ohio Center for Health and Vital Statistics – Mortality data

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Key Findings:

Estimated asthma prevalence for Ohio

| | |
|--------------------------------------|--------------|
| ■ Adult Current Asthma ¹ | 9.6 percent |
| ■ Adult Lifetime Asthma ¹ | 13.8 percent |
| ■ Child Lifetime Asthma ³ | 15.2 percent |

1,200,825 of Ohio adults have been told at some time in their life that they had asthma, of which 847,641 reported that they currently had asthma.

417,567 of children in Ohio have been told at some time in their life that they had asthma.³

- Adults 18 years of age and over who were employed missed 11.8 million work days due to asthma.²
- Children with asthma are more likely to have unmet health needs, have problems getting care, and are more likely to delay or avoid care. Their parents are nearly twice as likely to face major medical costs.³
- Over one in five Black children in Ohio have been diagnosed with asthma, a significantly higher rate than for white, and Hispanic or Asian/Pacific Islander children.³
- In Ohio, nearly one in 5 children living at or below the poverty line have asthma.³
- Children with reported asthma are significantly more likely to be in reported poor health, especially in Appalachia.³
- Women, Black residents and people who didn't graduate from high school are more likely to report having asthma.^{1,3}
- Adult women have significantly more hospital discharges for primary diagnosis of asthma than men.⁴
- In 2009, there were over 17,000 inpatient hospital visits, and over 70,000 emergency department visits for patients with a primary diagnosis of asthma.⁴
- People who earn less than \$15,000 per year are significantly more likely to have asthma than those who earn \$50,000 or more.¹
- Since 1990, an average of 160 Ohio citizens per year die from asthma.⁵ Adult women and black residents are significantly more likely to die of asthma.⁵ Most asthma deaths are preventable with guideline based asthma care.

Sources

1. Centers for Disease Control and Prevention. Behavior Risk Factor Surveillance System, Year 2010.
2. Centers for Disease Control and Prevention, National Center for Health Statistics (2006).
3. Ohio Family Health Survey, 2008.
4. Ohio Department of Health. Ohio Hospital Association Clinical Financial Data Base, 2004-2009.
5. Ohio Department of Health, Center for Health and Vital Statistics, 1990-2010.

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Prevalence and Incidence

Prevalence describes the proportion of people in the population who are found to have asthma at a point in time. Asthma prevalence is generally estimated from survey data. Prevalence data are an important part of understanding the burden of asthma in Ohio, since they tell how many people have asthma, which people are affected and which populations are most at risk.

Incident cases of asthma are defined as people diagnosed with asthma by a healthcare provider within 12 months prior to survey participation. Asthma prevalence — the proportion of people with asthma in a given time period — is related to both the number of new cases of asthma in a given time period as well as the duration of the disease in individuals over time: an increase in either of these factors increases asthma prevalence.

Prevalence statistics are largely derived from the Behavioral Risk Factor Surveillance System (BRFSS). It is one of the major sources of health data for all the United States, as well as the District of Columbia and three territories. The BRFSS is a state-based system of health surveys that generate information about health risk behaviors, clinical preventive practices, and health care access and utilization practices that are related to chronic diseases and injury. The purpose of BRFSS is to monitor the prevalence of the major behavioral risks that contribute to chronic diseases such as asthma, diabetes, obesity and heart disease among adults. These risk factors may be smoking, exercise, diet, health care and even issues related to control of the chronic disease.

In all states, including Ohio, the BRFSS is conducted annually. Beginning in 2002, the Ohio Department of Health included an asthma module with questions regarding the severity of the disease. In 2006, the asthma module was replaced with the Asthma Call-Back Survey. Currently, there are too few cases to report results from this survey with statistical confidence. It will be reported in subsequent years.

The Centers for Disease Control and Prevention develops standard core questionnaires for states so that data can be compared across states. The information gathered in the survey can be used to track when and where these diseases and risk factors are affecting US residents, so that resources can be directed toward treating or curing these problems, and the progress achieved can be monitored. BRFSS data can be used to identify emerging health problems, establish and track health objectives, and develop and evaluate public health policies and programs.

The BRFSS determines asthma's presence by asking two questions. "Have you ever been told by a doctor {nurse or other health professional} that you have asthma?" Answers to this question can tell us about the disease's prevalence in the US population. The next questions asked help us to determine incidence of asthma- "Do you still have asthma?" These responses are collected for each state, and divided by demographics such as sex, income, education, and race.

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FIGURE 1

Estimated Current Adult Asthma Prevalence, Ohio and US, 2000-2010

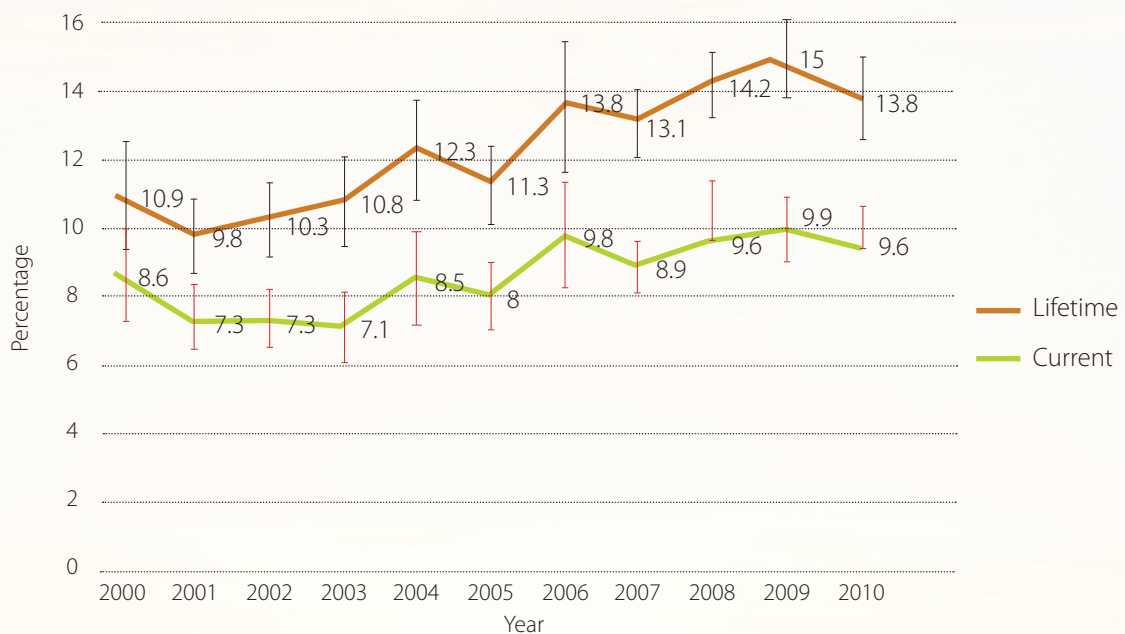


Source: Behavioral Risk Factor Surveillance System, Centers for Disease Control and Prevention, 2000-2010.

Ohio and the US have similar rates of asthma. A significant rising trend in asthma has occurred for both areas from 2000 through 2010.

FIGURE 2

Estimated Lifetime and Current Adult Asthma Prevalence, Ohio, 2000-2010

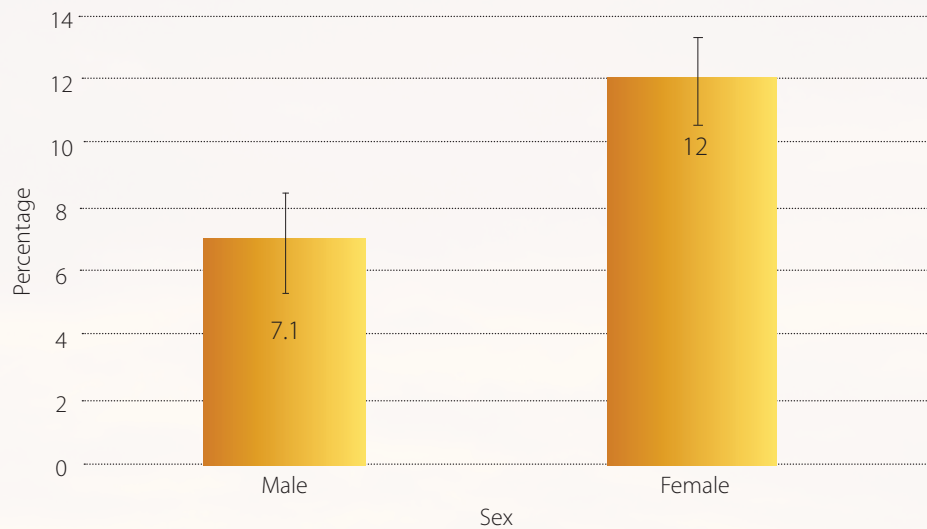


Source: Behavioral Risk Factor Surveillance System, Centers for Disease Control and Prevention, 2000-2010.

As of 2010, 9.6 percent of Ohio adults have current asthma and 13.8 percent have lifetime asthma. Both rates have increased significantly since 2000.

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FIGURE 3 Estimated Current Adult Asthma Prevalence, by Sex, Ohio 2010



Source: Behavioral Risk Factor Surveillance System, Centers for Disease Control and Prevention, 2000-2010.

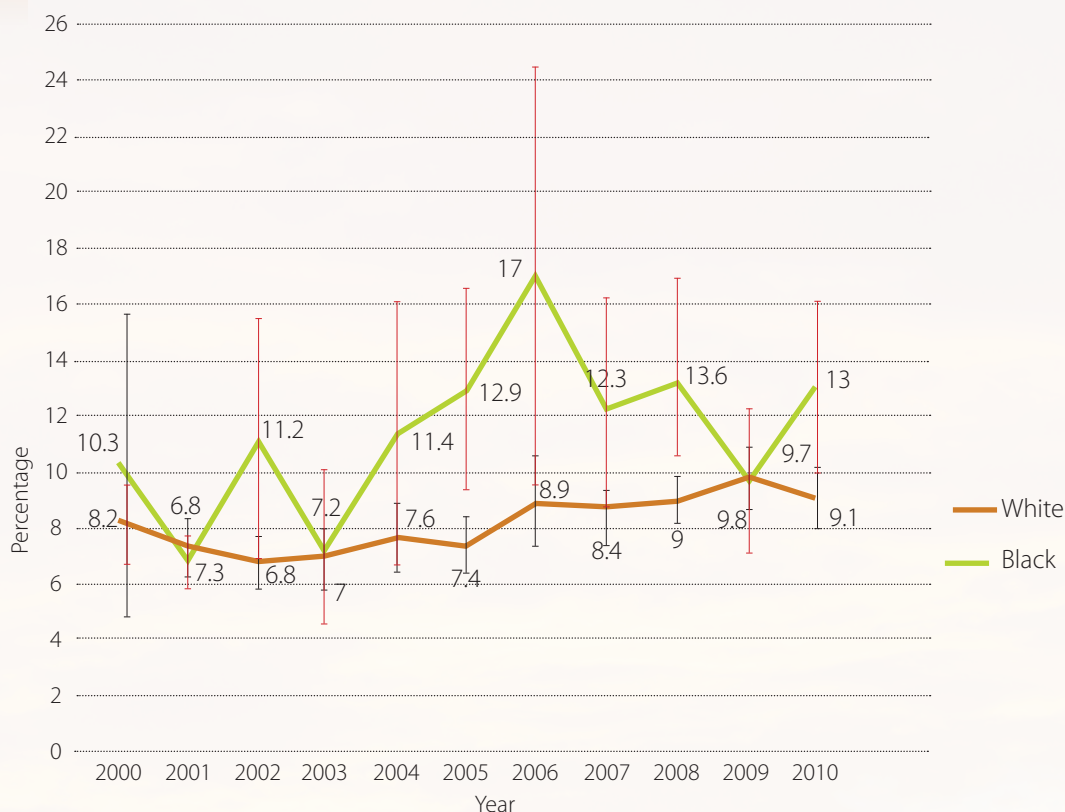
Adult females in Ohio have significantly higher current asthma prevalence than males. The current asthma prevalence rate was significantly higher for women (12.0 percent) than men (7.1 percent), consistent with the higher female asthma burden for lifetime prevalence, morbidity, mortality and health care utilization.



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FIGURE 4

Estimated Current Adult Asthma Prevalence, by Race, Ohio, 2000-2010



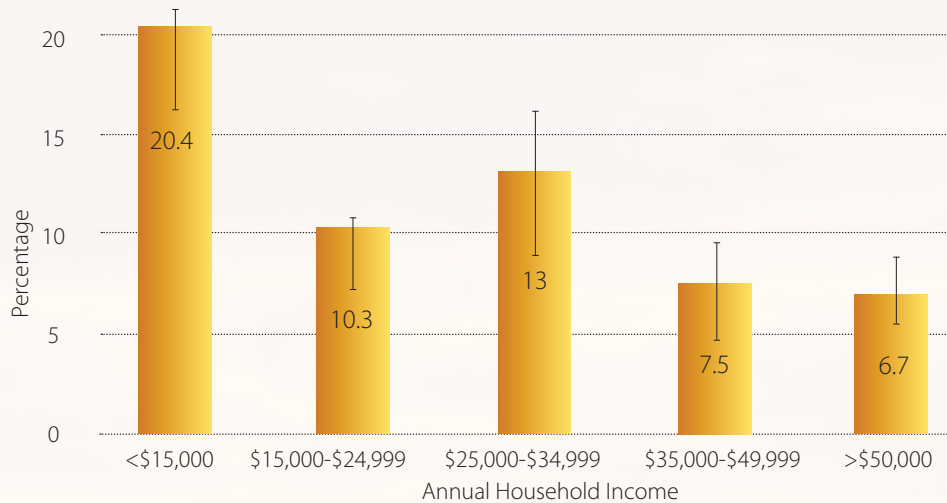
Source: Behavioral Risk Factor Surveillance System, Centers for Disease Control and Prevention, 2000-2010.

There is a wide variation in the black prevalence rates from year to year. In 2009 and 2010, there were no statistical differences between black and white residents of Ohio. This is contrary to national asthma prevalence rates, which are much higher for black citizens than white citizens.

It should be noted that the prevalence estimates for the minority groups in Ohio are far more variable than for the white population, probably due to their small numbers in the state, and therefore, lower chance in being included in a sample for a survey. Prevalence rates for residents with Hispanic, Asian or multicultural backgrounds are not shown for this reason.

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FIGURE 5 Estimated Current Adult Asthma Prevalence, by Income Level, Ohio, 2010



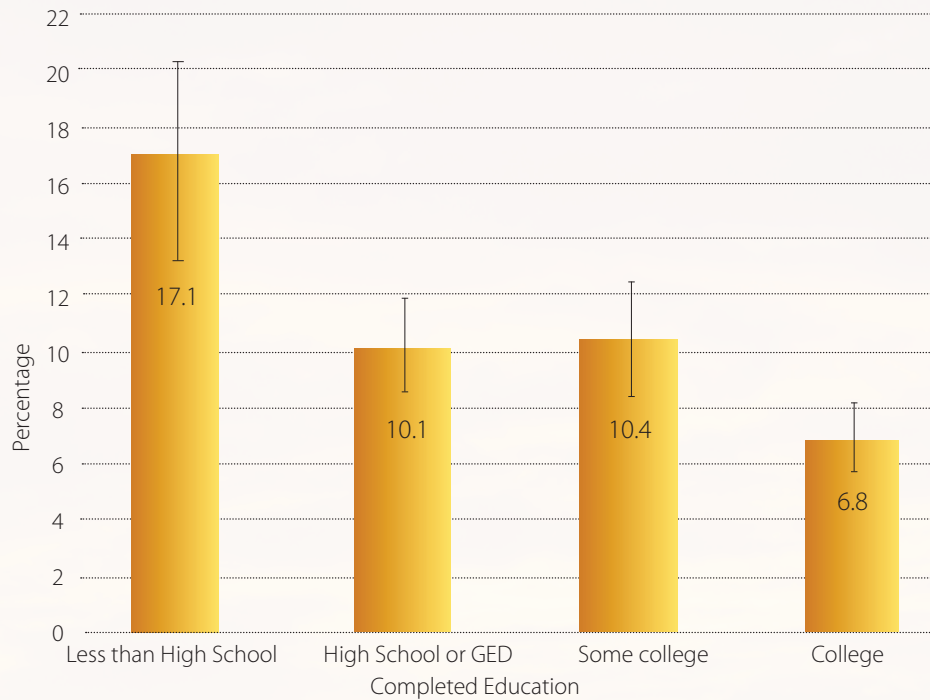
Source: Behavioral Risk Factor Surveillance System, Centers for Disease Control and Prevention, 2000-2010.

There is a strong inverse relationship between income and prevalence of asthma. In Ohio, adults with household incomes under \$15,000 are significantly more likely to report being told by a doctor that they have asthma, when compared to adults in households making over \$50,000. Many studies have associated poverty with a higher rate of asthma.

Low-income families, who are already burdened with greater rates of disease, limited access to health care and other health disparities are also the population who tend to have the worst built environmental conditions. The defective housing common to poor families is associated with higher exposures to asthma triggers such as mold, moisture, dust mites, and rodents, and mental health stressors such as violence and social isolation.

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FIGURE 6 Estimated Current Adult Asthma Prevalence, by Education Level, Ohio, 2010



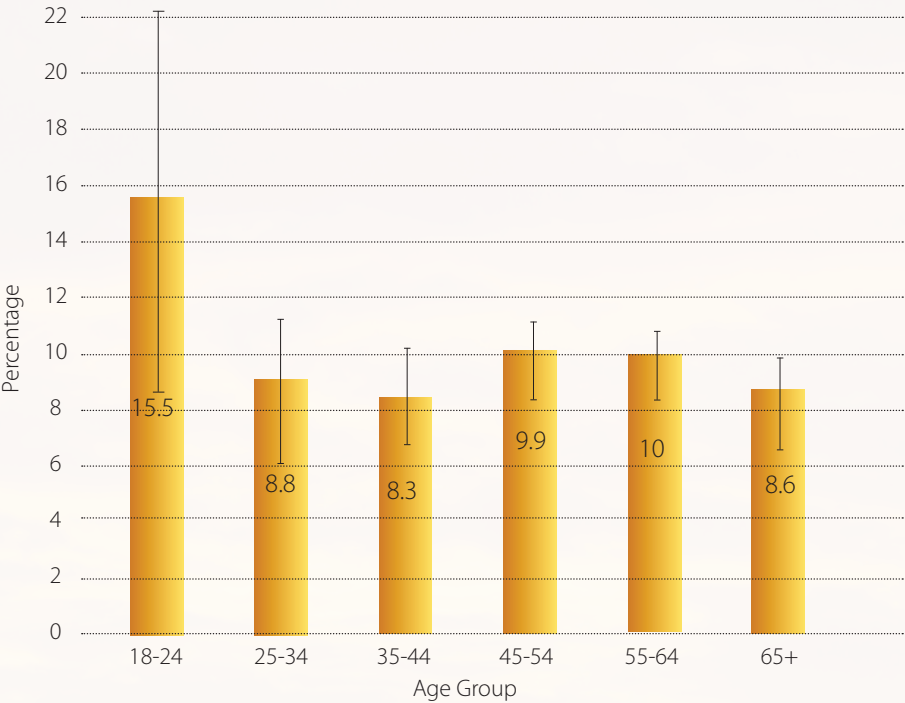
Source: Behavioral Risk Factor Surveillance System, Centers for Disease Control and Prevention, 2000-2010.



In Ohio, adults who dropped out of high school are significantly more likely to be diagnosed with asthma than those who have completed college.

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FIGURE 7 Estimated Current Adult Asthma Prevalence, by Age Group, Ohio, 2010



Source: Behavioral Risk Factor Surveillance System, Centers for Disease Control and Prevention, 2000-2010.

- Young adults aged 18-24 are significantly more likely to have asthma than any other adult age group. Their prevalence rate is similar to children 17 and younger, which is 15.2 percent.



Children with reported asthma face a host of challenges that other children do not.... special health care needs, need more medical care or educational services, or report binge in fair or poor mental health.

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Child Asthma in Ohio

In 2008, the Ohio Family Health Survey reported that 15.2 percent of Ohio children were diagnosed with asthma. Approximately 417,567 children have been told they have asthma in Ohio.

Children with reported asthma face a host of challenges that other children do not. Children with asthma are more likely to be in poor health and have unmet health needs. Children with asthma are also reported to be more likely to have special health care needs, need more medical care or educational services, or report binge in fair or poor mental health. Families who report having a child with asthma are more likely to report major medical bills and forgoing of medical care.

While school age children have fewer asthma inpatient hospitalizations than adults, they are significantly more likely to experience emergency department visits for asthma.

The most common symptoms include coughing, wheezing and difficulty breathing, which is caused by inflammation and tightness in the breathing tubes of the lungs. Asthma attacks and the symptoms of asthma can be prevented by avoiding triggers, using environmental controls and using preventative medications. Asthma is a controllable disease. Medications that are used to control asthma include bronchodilators and anti-inflammatories, including inhaled cortico steroids.

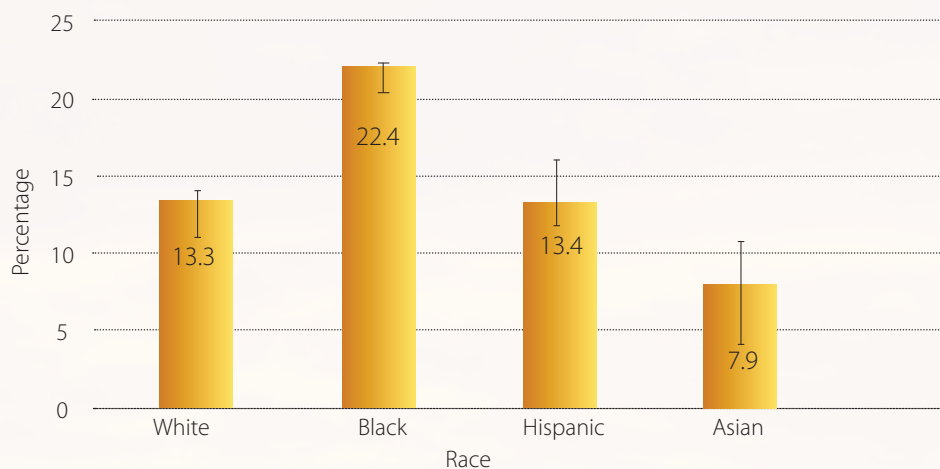
Asthma is more prevalent among some children than others. Male children are significantly more likely to be reported to have asthma (16.7 percent) than female children (11.8 percent). Groups with higher prevalence for children include low income, low education, African Americans and secondary school age children. Obese children are also more likely to be diagnosed with asthma than children who are normal weight or underweight (Ohio Family Health Survey, 2008).



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FIGURE 8

Estimated Child Asthma Prevalence, by Race, Ohio, 2008

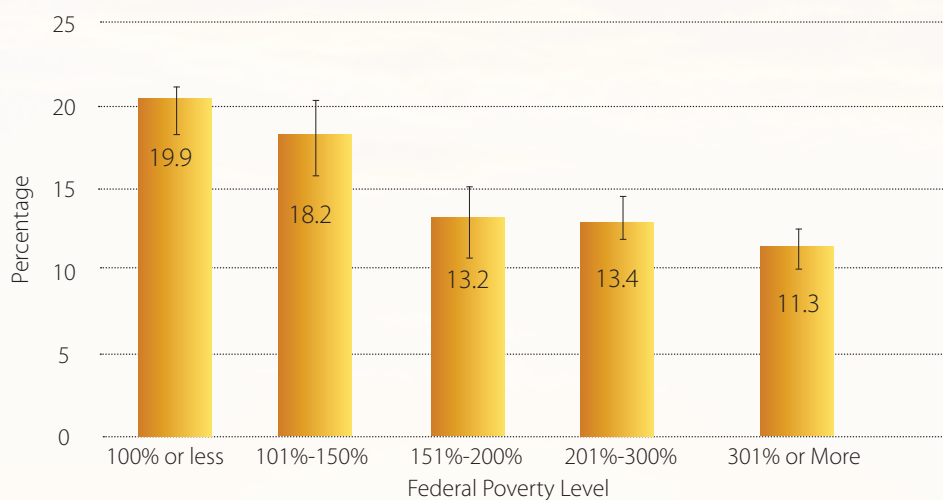


Source: Ohio Family Health Survey, 2008

More than one in five Black children in Ohio have reported asthma, at 22.4 percent. Black children in Ohio are significantly more likely to have asthma than whites, Hispanics or Asians.

FIGURE 9

Estimated Child Asthma Prevalence, by Federal Poverty Level, Ohio, 2008

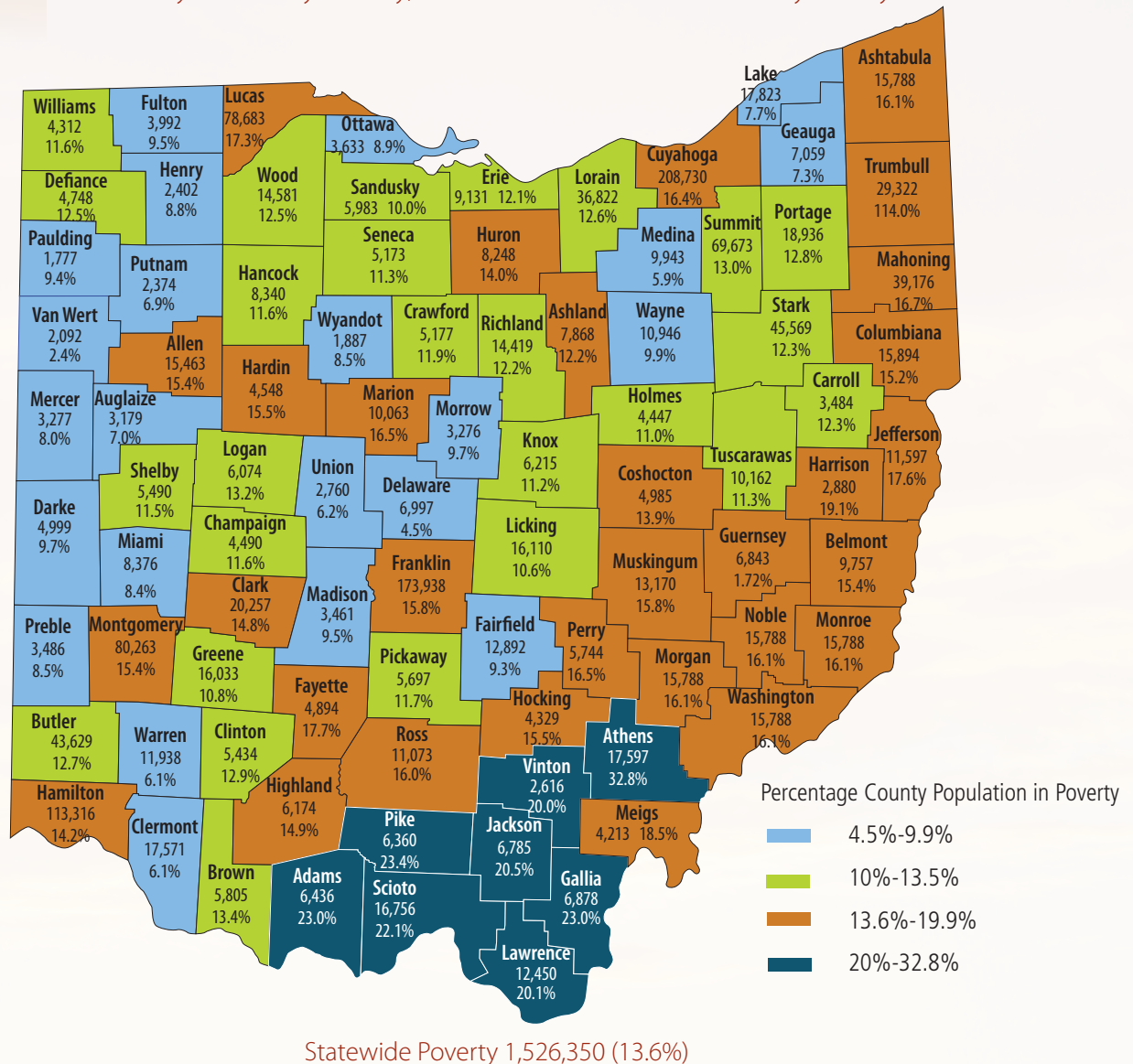


Source: Ohio Family Health Survey, 2008

In Ohio, nearly one in 5 children at or below the poverty line (for family of four, \$21,027) have asthma. Children in household that earn 301% of poverty level or more (for a family of four, \$63,081) are significantly less likely to have asthma.

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FIGURE 10 Poverty in Ohio by County, 2005-2009 American Community Survey



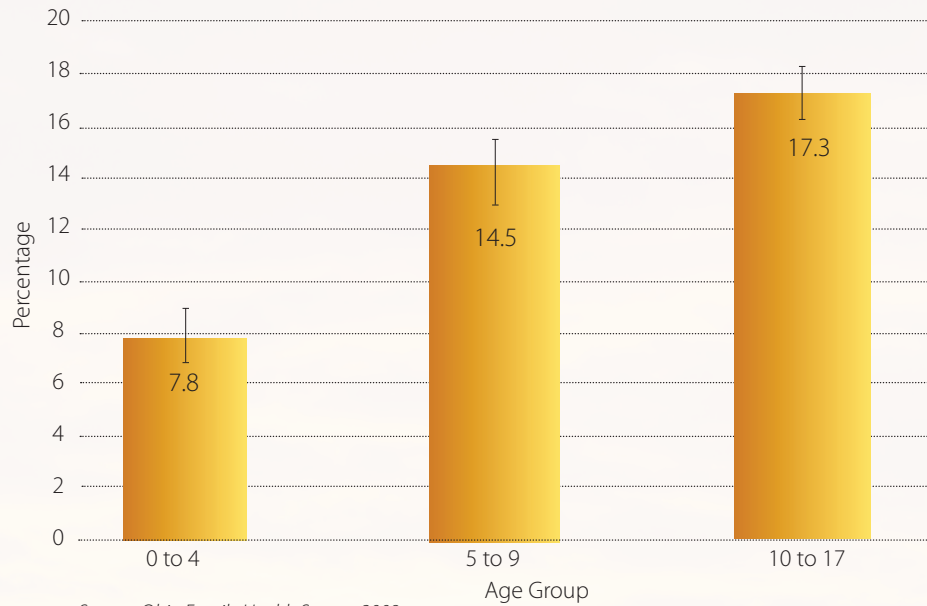
Source: 2005-2009 American Community Survey, U.S. Census Bureau. Prepared by: Ohio Department of Development Policy Research and Strategic Planning April 2011.

While the Appalachian region does not appear to have a significantly higher child asthma prevalence, poverty is most prevalent in Appalachian counties, along the Ohio River.

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FIGURE 11

Estimated Child Asthma Prevalence, by Age Group, Ohio, 2008



School age children are significantly more likely to have reported asthma than children under age 5.

It may be valuable to target the demographic groups with children at the highest risk: areas with low income, low education, and a high percentage of African Americans. Within these demographics, secondary school age children may deserve the first consideration.

Hospitalization Discharges

According to the National Asthma Education and Prevention Program, asthma is considered to be an ambulatory care-sensitive condition, because with regular, effective outpatient care, the vast majority of hospitalizations due to asthma are preventable (National Heart, Lung and Blood Institute, 2007).

The burden of asthma can be estimated through a number of asthma-related events. Inpatient hospital discharge rates and emergency visit rates are important proxies for burden. It is important to note that asthma hospital discharge rates measure a severe outcome of the disease and can be used to help identify persons with asthma that are at higher risk of morbidity and mortality due to poor asthma control.

Each visit to the hospital represents a treatment failure- an asthma case out of control. In Ohio during 2009, there were 17.0 hospital discharges for patients with a primary diagnosis of asthma per 10,000 residents. Close to 20,000 discharges occurred in Ohio in 2009.

Tracking rates of hospital discharge can aid in identifying groups or areas with inadequate access to basic medical care. Hospitalizations represent severe asthma events that might have been prevented with proper management. Asthma inpatient hospital discharge data also give us important information about the burden and cost of asthma in Ohio. With the Ohio Hospital Association Discharge Data Set, we can identify:

- numbers and rates of hospital discharges
- hospital discharge rates by age, sex or county
- annual trends for asthma hospital discharges
- average length of stay for asthma
- charges associated with asthma hospitalization

These pieces of information tell us how severe asthma is affecting a person and their community. Asthma affects people with human, social and financial costs. Asthma surveillance can help quantify these costs in order to provide information about where to target interventions and resources.

What Is Considered a Hospitalization for Asthma?

The Council of State and Territorial Epidemiologists (CSTE) and the Centers for Disease Control and Prevention developed a standardized case classification for asthma to identify probable and possible asthma cases in hospital discharge data.

Confirmed Case: There is no confirmed case classification for hospital discharge data.

Probable Case: Hospital records listing the ICD-9-CM Code 493.0–493.9X as the primary discharge diagnosis.

Possible Case: Hospital records listing the ICD-9-CM Code 493.0–493.9X as the secondary discharge diagnosis.

For further information on ICD-9 Codes, see Description of Data in Appendix 5. Unless otherwise specified, this report will use the probable case definition of asthma with hospital discharges that have a primary diagnosis of asthma.

What Are The Numbers and Rates for Asthma Inpatient Hospital Discharges in Ohio?

In 2009, there were 105,840 hospital discharges of Ohio residents with any mention of asthma in their diagnosis. Of these discharges, 19,578 had asthma listed as the primary diagnosis. Figure 1 shows the trend of these data from 2004-2009. As indicated in Figure 13, during 2009, for hospital discharges with asthma as the primary diagnosis, the rate was 17.0 per 10,000 residents.

For primary diagnosis of asthma inpatient hospital discharges, there was a 15.6 percent increase from 2004-2009 from 14.7 to 17.0 per 10,000 residents. Inpatient hospital discharges that had any mention of asthma increased 14.2 percent from 2004-2009, from 80.3 to 91.7 per 10,000 residents.



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FIGURE 12

Number of Inpatient Hospital Discharges for Patients with a Primary Diagnosis of Asthma, by Year, Ohio 2004-2009

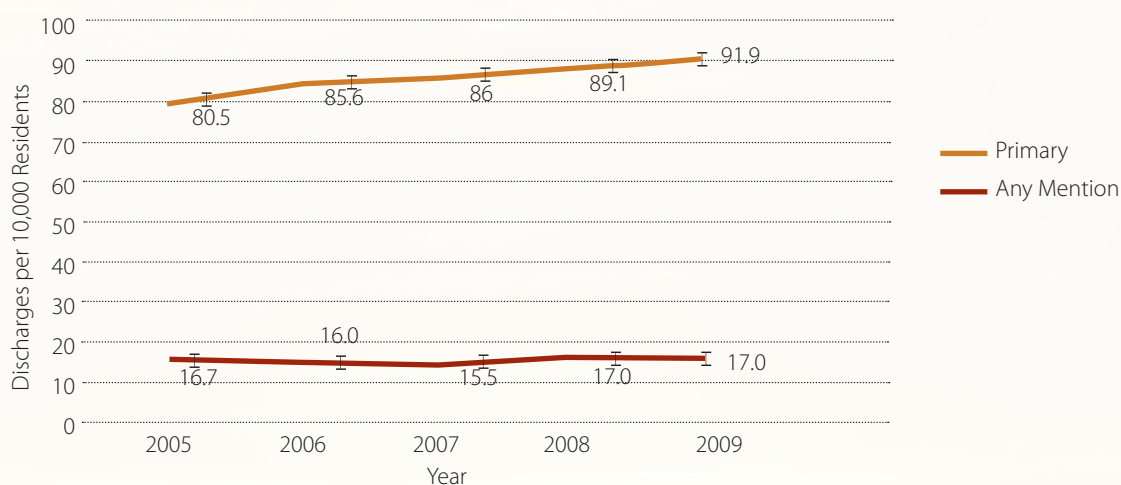


Source: Ohio Hospital Association Statewide Clinical-Financial Database, 2004-2009.

In 2009, there were 19,578 hospital discharges with a primary diagnosis of asthma, up 10.8 percent from 17,661 in 2004.

FIGURE 13

Inpatient Hospital Discharge Rates for Patients with a Primary Diagnosis of Asthma and for Patients with Any Mention of Asthma by Year, Ohio 2005-2009



Source: Ohio Hospital Association Statewide Clinical-Financial Database, 2004-2009.

There was a 14.1 percent increase in hospital discharge rates for patients with any mention of asthma diagnosis from 2005 through 2009, a statistically significant difference. There is no significant difference in hospital discharges for patients with a primary diagnosis of asthma from 2005-2009.

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How Does Ohio Compare with the Healthy People 2010 Goals?

Healthy People 2010 is a set of health objectives developed by an alliance of more than 350 national membership organizations and 250 state health, mental health, substance abuse and environmental agencies. Healthy People 2010 goals are used by states, communities, professional organizations and others to develop programs to improve health. There are two overarching goals in Healthy People 2010: increase quality and years of healthy life and eliminate health disparities.

Objective 24-2 in Healthy People 2010 is to reduce hospitalizations for asthma.

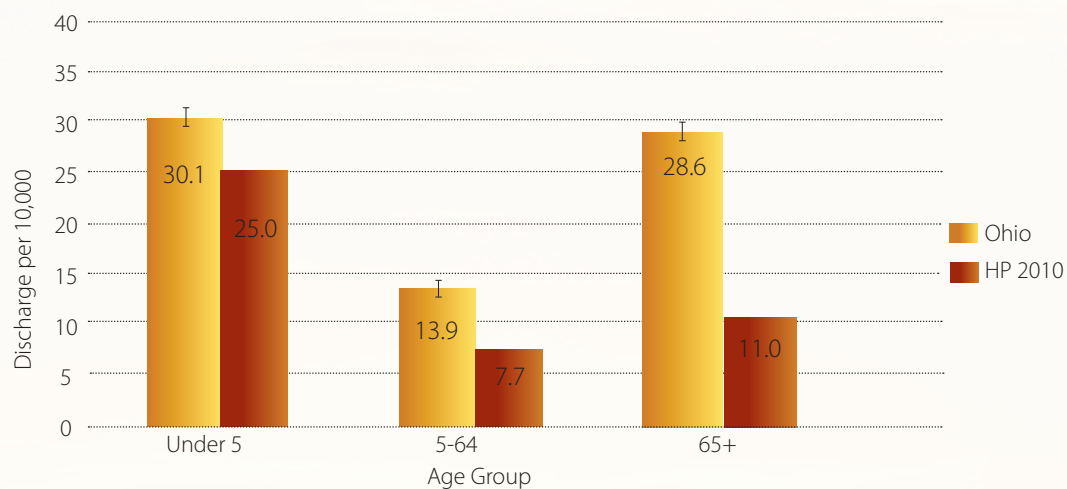
The Healthy People 2010 goals for asthma hospitalization are:

- 25/10,000 in children under age 5 years
- 7.7/10,000 in children and adults age 5 to 64 years
- 11/10,000 in adults aged 65 years and older

As shown in Figure 14, Ohio exceeded all three of these targets by at least 39.2 percent in 2009. For adults 65 and older, the target is exceeded by 150 percent. The inpatient hospital discharge rates for patients with a primary diagnosis of asthma are 34.8 per 10,000 residents for children under 5, 12.6 per 10,000 residents for adults and children aged 5 to 64; and 27.5 per 10,000 residents for adults 65 and older.

FIGURE 14

Inpatient Hospital Discharge Rates for Patients with a Primary Diagnosis of Asthma, Ohio 2009, Compared to Healthy People 2010



Source: Ohio Hospital Association Discharge Data Set, 2004-2009

Ohio hospital discharge rates for a primary diagnosis of asthma exceed the Healthy People 2010 targets for all age groups by large margins. For adults over age 65, the Healthy People 2010 benchmark is exceeded by 150 percent.

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What Are The Demographic Trends For Asthma Hospital Discharges?

Ohio Hospital Association Discharge Data are stratified by sex, age, and county. As seen in Figure 15, close to twice as many females than males were discharged from the hospital for a primary diagnosis of asthma in 2009 (6,908 males and 12,670 females). These figures are consistent with the difference in current adult asthma prevalence rates, where women (11.7 percent) have a significantly higher asthma prevalence than men (7.9 percent) (Behavioral Risk Factor Surveillance System, 2009).

Figure 16 shows that females also had nearly twice the rate of hospital discharge as males for a primary diagnosis of asthma in 2009 (females at 21.4, and males at 12.3 per 10,000 residents).

For possible cases of asthma, with any mention of asthma in the hospital discharge, rates increased for males and females at approximately the same rate, 14.4 percent and 14.2 percent, respectively. Similar to other statistics, Figure 17 shows that the inpatient hospital discharge rate for inpatient stays with any mention of asthma in the diagnosis is more than twice as high for females than for males in 2009 (126.5 per 10,000 residents for females and 55.7 per 10,000 residents for males).

The age group with the highest number of inpatient hospital discharges with a primary diagnosis of asthma was for residents aged 35–64 (8,533 discharges) in 2009, shown in Figure 18. In 2009, the fewest number of discharges with a primary diagnosis of asthma were for children aged 5 to 14, (2,053).

Of all discharges with a primary diagnosis of asthma in 2009, 21.8 percent were for children under the age of 14 and younger. About one-fourth (23.4 percent) of patients with primary diagnosis of asthma were 65 years old and over.

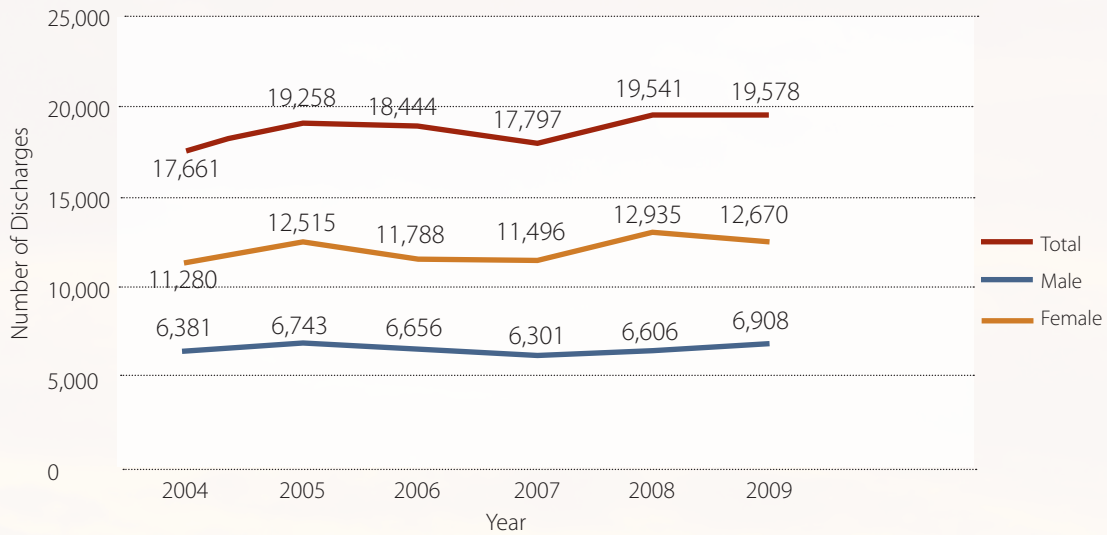
The highest hospital discharge rates for primary diagnosis of asthma are for children under age 5 (30.0 per 10,000 residents), slightly higher than the next nearest age group in 2009. However, Figure 19 shows in this age group there has been a significant decline from a high of 35.5 per 10,000 in 2006 to 2009. Rates of hospital discharges with a primary diagnosis of asthma are rising the fastest for adults aged 65 and older, from 26.0 per 10,000 residents in 2004 to 29.3 per 10,000 residents in 2009, a significant difference since 2006. Rates remain low for children and young adults aged 15–34 years compared with Healthy People 2010 targets.

Hospital discharge rates for primary diagnosis of asthma were calculated for all Ohio counties for the years 2007–2009. County rates significantly higher than the state average rate of 16.2 hospital discharges per 10,000 residents were concentrated in the urban areas (with the exception of Columbus), along Lake Erie and in Northeast Appalachian counties, shown in Figure 20. Cuyahoga is notably higher than other counties, at 28.7 hospital discharges per 10,000 residents. Monroe County is the lowest, at 3.9 discharges per 10,000 residents. Rates of hospital discharges for males were concentrated in Northeast Ohio. Females had higher rates of hospital discharge in Appalachian counties (Figure 20).

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FIGURE 15

Number of Inpatient Hospital Discharges for Patients with a Primary Diagnosis of Asthma by Sex and Year, Ohio, 2004-2009

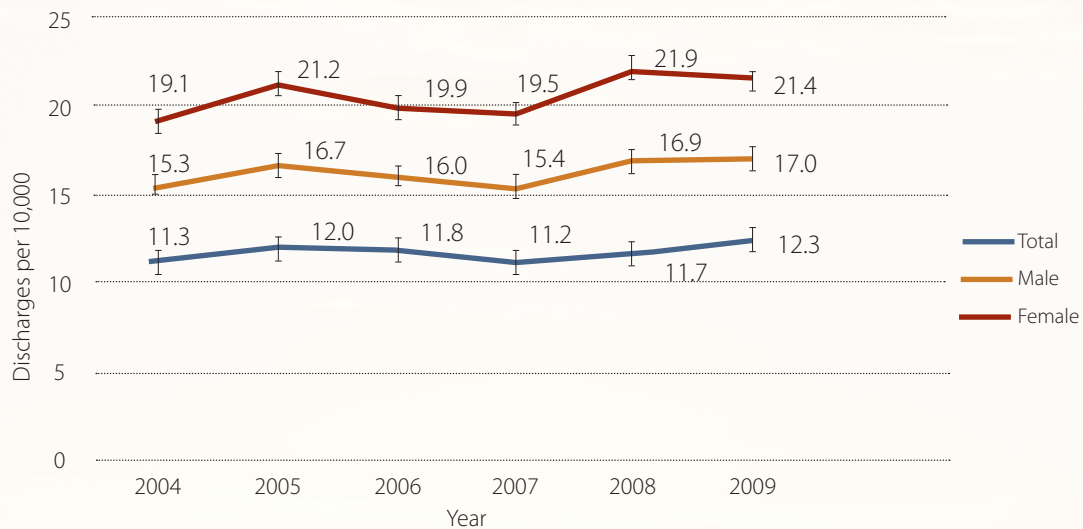


Source: Ohio Hospital Association Statewide Clinical-Financial Database, 2004-2009.

There were nearly twice as many inpatient hospital discharges for patients with a primary diagnosis of asthma for females than for males in 2009.

FIGURE 16

Inpatient Hospital Discharge Rates per 10,000 Residents for Patients with a Primary Diagnosis of Asthma, by Sex and Year, Ohio, 2004-2009



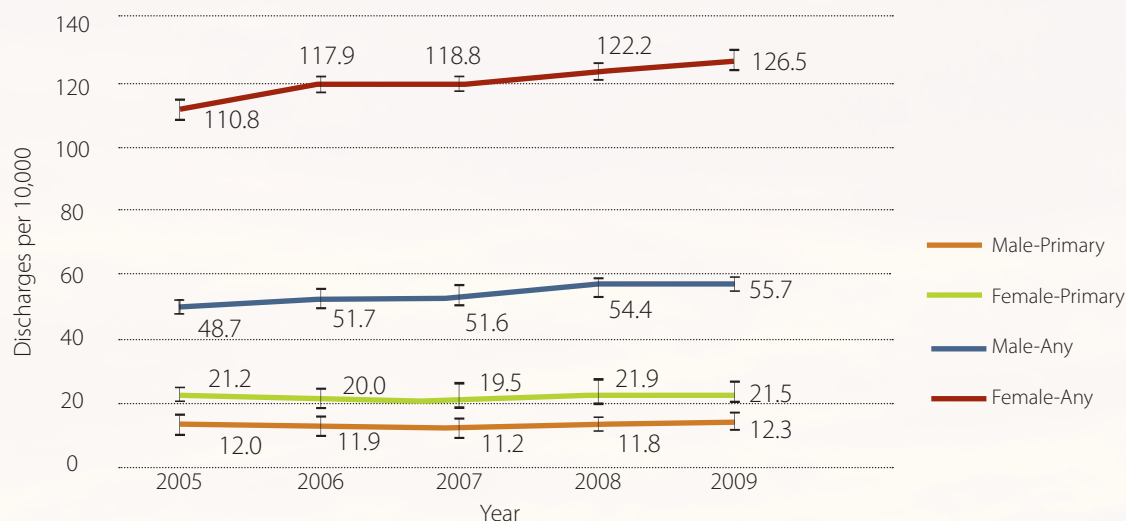
Source: Ohio Hospital Association Statewide Clinical-Financial Database, 2004-2009.

Hospital discharge rates for patients with a primary diagnosis of asthma remain almost twice as high for females than for males from 2004-2009, a statistically difference in all years.

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FIGURE 17

Inpatient Hospital Discharge Rates for Patients with a Primary Diagnosis of Asthma or Any Mention of Asthma, by Sex and Year, Ohio, 2005-2009



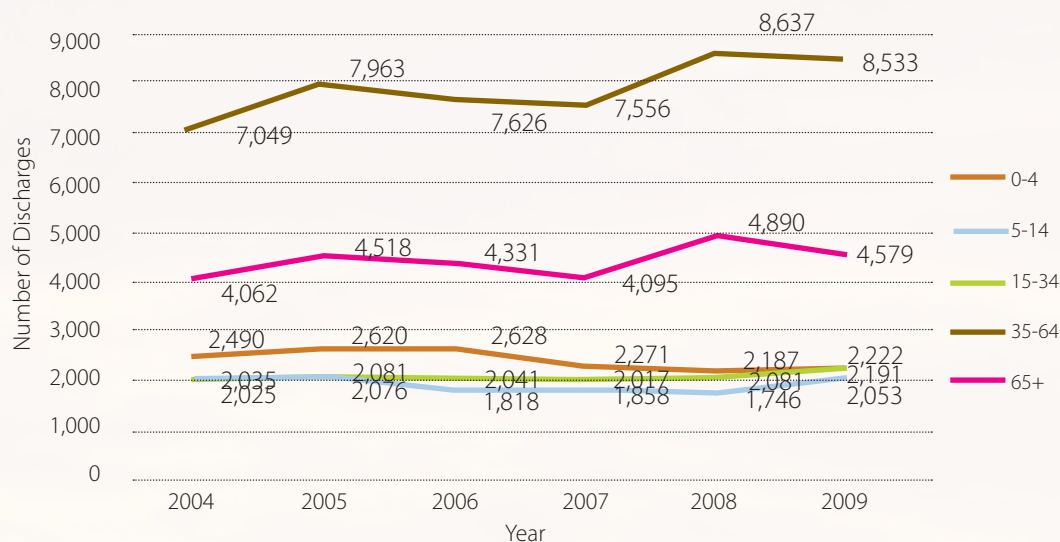
Source: Ohio Hospital Association Statewide Clinical-Financial Database, 2004-2009.

For possible cases of asthma, with any mention of asthma in the diagnosis at hospital discharge, the rate of discharges increased for males and females at approximately the same rate, 14.4 percent and 14.2 percent, respectively. Discharge rates for patients with a primary diagnosis of asthma remained fairly consistent for both sexes from 2005-2009. Discharge rates were significantly higher in all years for females who were discharged from an inpatient hospital visit with any mention of asthma.

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FIGURE 18

Inpatient of Hospital Discharges for Patients with a Primary Diagnosis of Asthma, by Age Group and Year, Ohio, 2005-2009



Source: Ohio Hospital Association Statewide Clinical-Financial Database, 2004-2009.

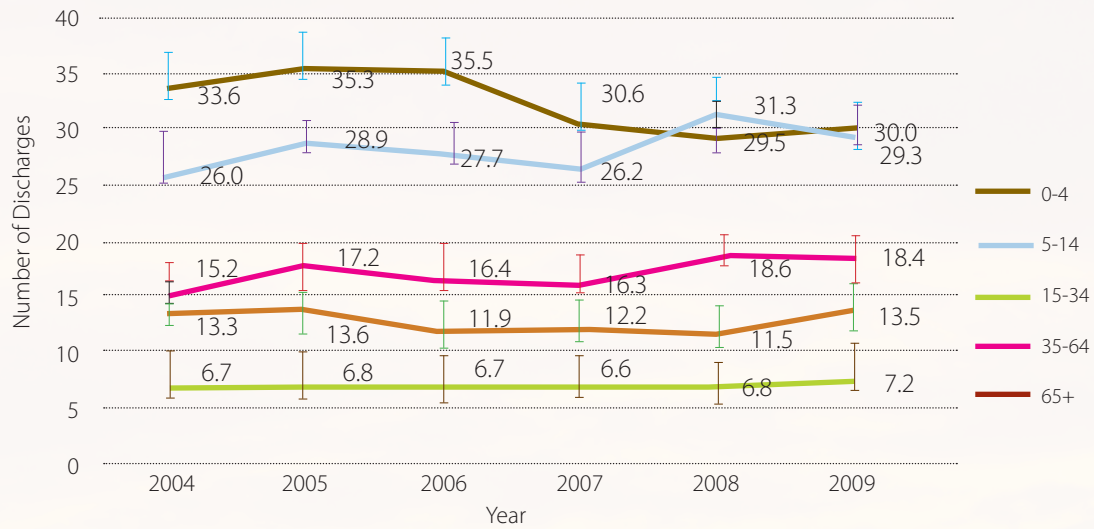
Of all discharges with a primary diagnosis of asthma in 2009, 21.8 percent were for children aged 14 years and younger. About one-fourth (23.4 percent) of patients with primary diagnosis of asthma were 35 through 64. People in age groups 0-4 years, 5-14 years and 15-34 years are significantly less likely to be hospitalized for asthma than people aged 35-64 years.



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FIGURE 19

Inpatient Hospital Discharge Rates for Patients with a Primary Diagnosis of Asthma, by Age Group and Year, Ohio, 2004-2009



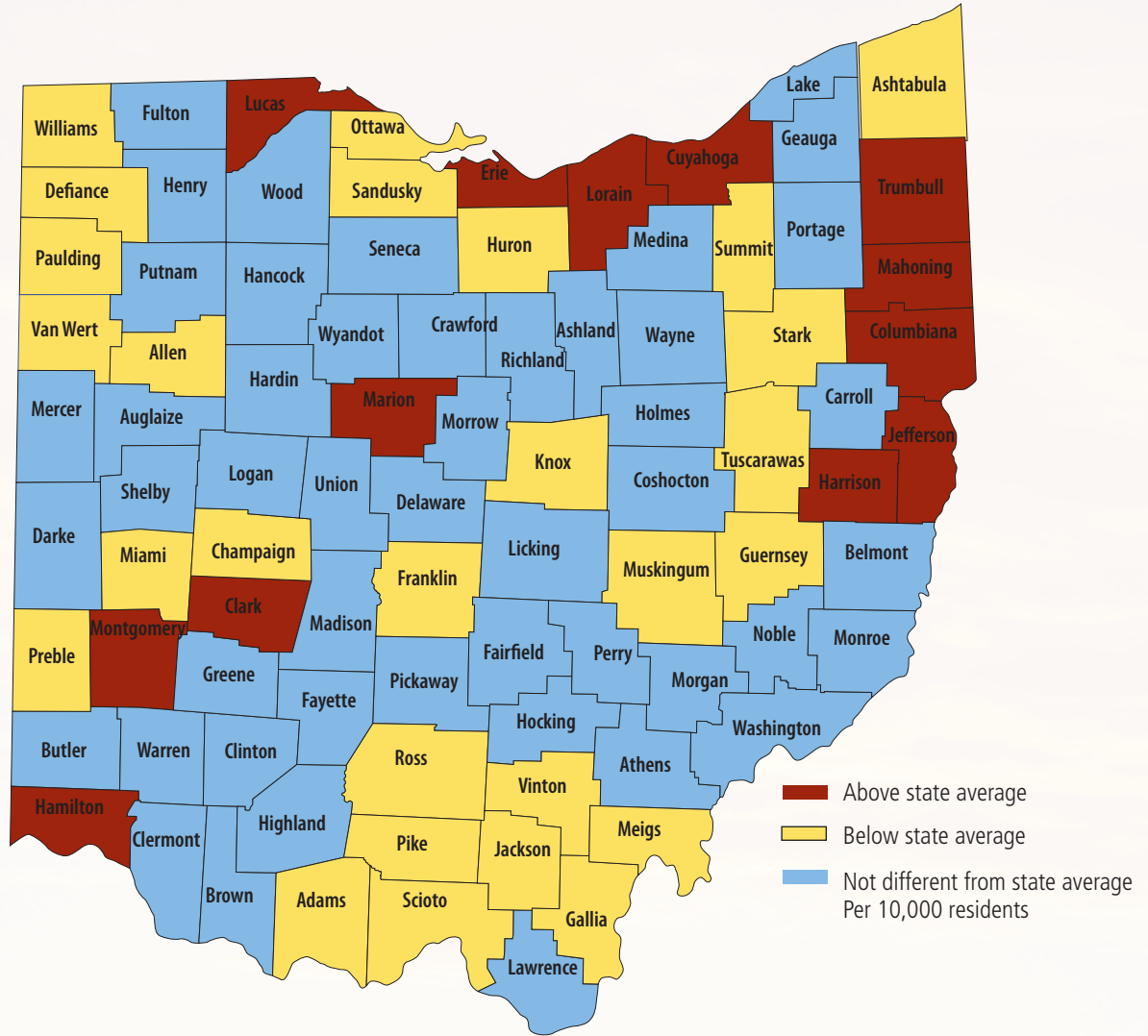
Source: Ohio Hospital Association Statewide Clinical-Financial Database, 2004-2009.

The highest rates for hospital discharges with a primary diagnosis of asthma are for children under 5 years of age (30.0 per 10,000 residents). Rates remain lower for children and youth aged 15-34 years than for the other age groups.

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FIGURE 20

Comparison of Hospital Discharge Rates per 10,000 Residents for Patients with a Primary Diagnosis of Asthma, by County, Ohio, 2005-2009



Source: Ohio Hospital Association Statewide Clinical-Financial Database, 2004-2009.

County rates significantly higher than the state average rate were concentrated in the urban areas, along Lake Erie and in Northeast Appalachian counties. Cuyahoga Community is notably higher than other counties; Monroe County is the lowest, at 3.9 discharges per 10,000 residents. Individual county rates can be found in Table 21.

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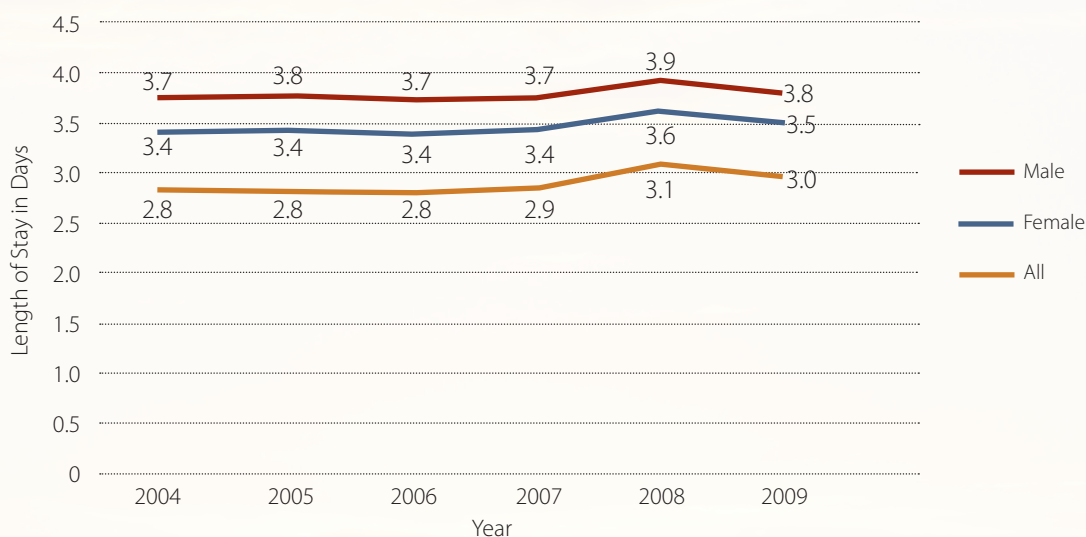
How Long Do People Stay In The Hospital For Asthma?

For every age group, females have a longer length of stay than males. The average length of stay in the hospital for patients with a primary diagnosis of asthma is fairly consistent, from 3.4 days in 2004 to 3.5 days in 2009, as shown in Figure 21. Females had an average length of stay of 3.8 days, and males had an average of 3.0 days in 2009, a statistically significant difference between sexes exists all years.

In 2009, 24.5 percent of patients with a primary diagnosis of asthma had stays that were less than two days. Figure 22 shows that the two youngest age groups (children under 5 and children aged 5 through 14) had the shortest average length of stay, at 2 and 2.2 days, respectively. The longest average stays were for adults age 65 and over. The length of stay for this age category dropped dramatically between 2007 and 2008, from 4.7 days to 3.8 days.

During 2007–2009, average length of stay for patients with a primary diagnosis of asthma varied widely by county. The highest average length of stay for patients with a primary diagnosis of asthma was experienced by residents of Monroe County (4.7 days), shown in Figure 23. The lowest average length of stay for patients with a primary diagnosis of asthma was experienced by residents of Fayette County (2.6 days) Counties with the highest average length of stay significantly above the state average were located in extreme Northeast Ohio and the middle of the Appalachian region. Most counties below the state average length of stay are in South Central Ohio.

FIGURE 21 Average Length of Stay for Patients in Days with a Primary Diagnosis of Asthma, by Sex and Year, Ohio, 2004-2009



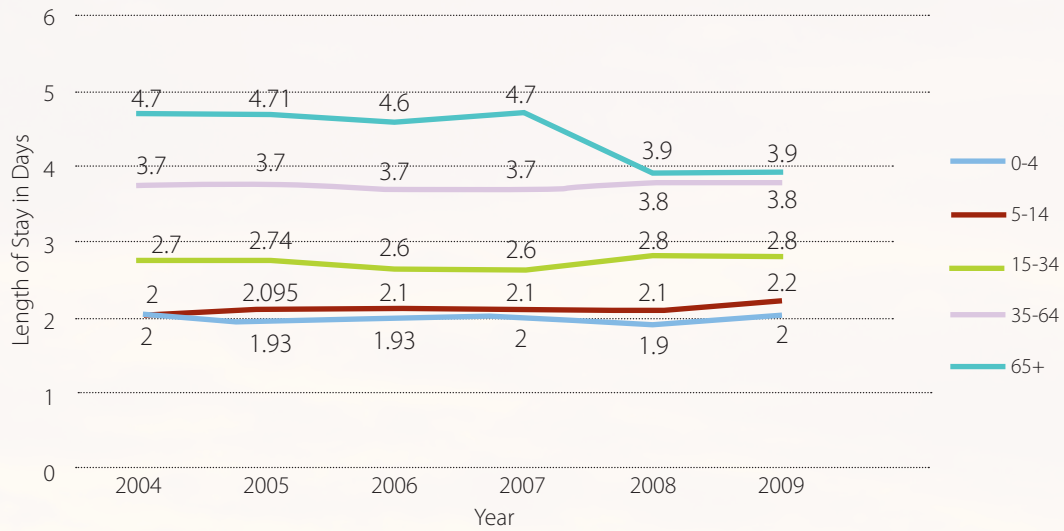
Source: Ohio Hospital Association Statewide Clinical-Financial Database, 2004-2009.

From 2004 through 2009 average length of stay for hospital discharges for patients with a primary diagnosis of asthma stayed fairly consistent for both sexes. In 2009, the average length of stay was 3.5 days for patients with a primary diagnosis of asthma, and females tended to stay longer than males, 3.8 vs. 3.0 days, respectively.

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FIGURE 22

Average Length of Stay in Days for Patients with a Primary Diagnosis of Asthma by Age Group and Year, Ohio, 2004-2009



Source: Ohio Hospital Association Statewide Clinical-Financial Database, Years, 2004-2009.

The two youngest age groups had the shortest average length of stays. The longest average stays were for adults age 65 and over. The length of stay for this age category dropped dramatically between 2007 and 2008, from 4.7 days to 3.9 days. Children under age 15 have significantly shorter stays than adults over age 35.



Emergency Department Visits

Asthma emergency department (ED) visits are an important piece of data in determining the burden of asthma in Ohio. Each visit to the ED represents a potential treatment failure— an asthma case out of control. The Ohio Hospital Association (OHA) provides data to the Ohio Department of Health regarding:

- numbers of ED visits
- rates of ED visits
- ED visits by age or sex

What Is Considered An ED Visit For Asthma?

This data uses the Council of State and Territorial Epidemiologists (CSTE) Probable Case definition to determine which ED visits were for asthma. Hospital records listing the ICD-9-CM Code 493.0–493.9, the asthma codes, as the primary discharge diagnosis were considered to be an asthma ED visit.

Are The Asthma ED Visit Rates Higher Than Healthy People 2010 Objectives?

The Healthy People 2010 objective 24-3 focuses on a reduction of ED visits for asthma to:

- 80/10,000 in children under age 5 years
- 50/10,000 in children and adults age 5 to 64 years
- 15/10,000 in adults aged 65 years and older

Ohio has met the goal for residents 65 and over, and is very close to the goal for adults and children aged 5 to 64. However, Ohio's ED visit rate for children under 5 is much higher than the Healthy People 2010 goal, as seen in Figure 27.

What are the demographic trends for ED visits?

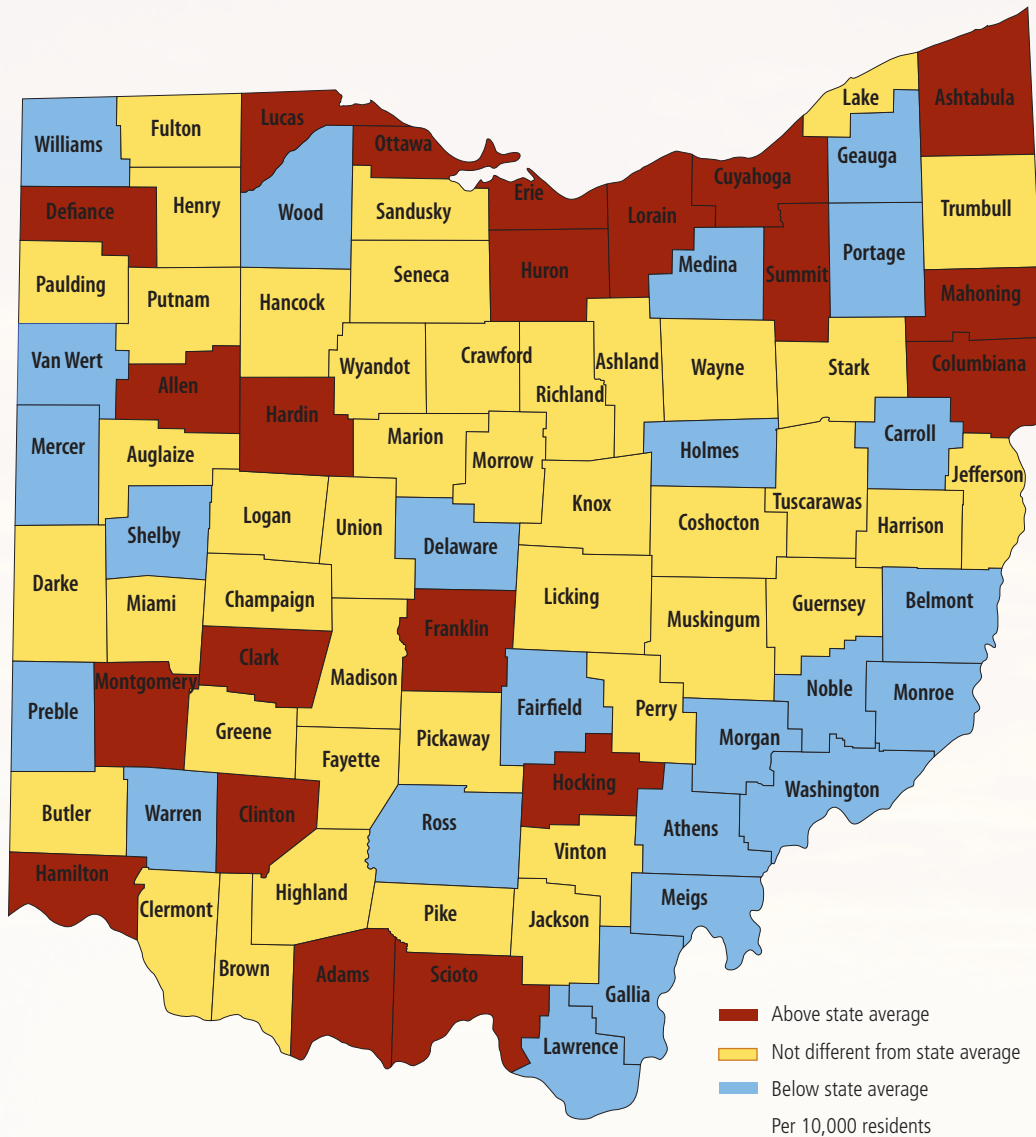
The highest rates of ED use are typically seen in urban areas, while Appalachian and rural counties without hospitals see the lowest use, as shown in Figure 23.

Children under 5 have higher rates of asthma ED visits than adults, similar to hospital discharge rates. While adults 65 and older had the second highest inpatient discharge rates, the fewest ED visits were experienced by adults 65 and older. Shown in Figure 25.

There were between 65,000 to 71,000 ED visits for primary asthma between 2005 and 2009. In all years, females had a significantly higher rate of asthma ED visits than males, as shown in Figure 26.

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FIGURE 23 Emergency Department Visit Rates per 10,000 Residents for Patients with a Primary Diagnosis of Asthma, by County, Ohio 2009



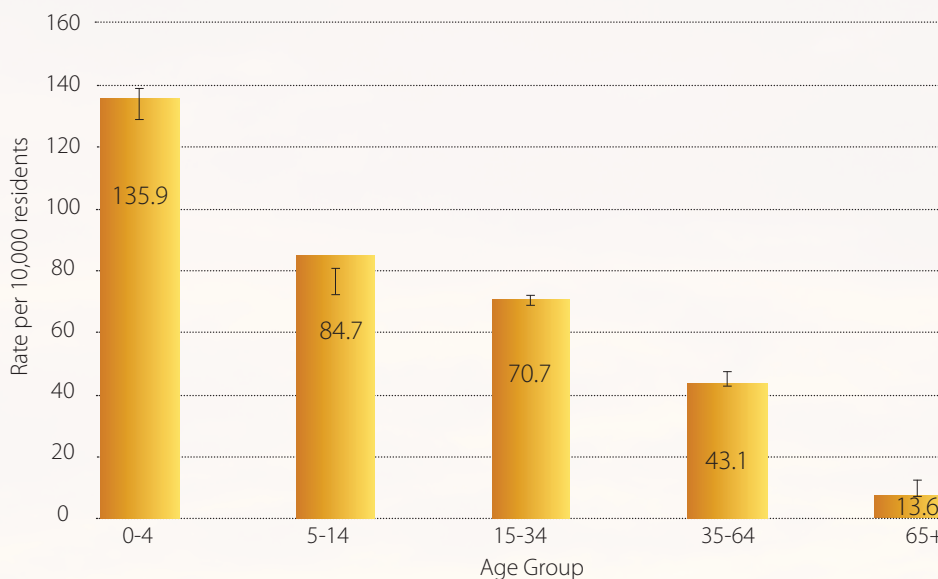
Source: Ohio Hospital Association Statewide Clinical Financial Database File 1 (SF1)

All of the major urban counties have emergency department visit rates significantly higher than the state average. With the exceptions of Medina, Wood and Geauga counties, the counties significantly below the state average are rural. Several of those counties do not have a hospital within their borders.

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FIGURE 24

Emergency Department Visit Rates per 10,000 Residents for Patients with a Primary Diagnosis of Asthma, by Age Group, Ohio 2009

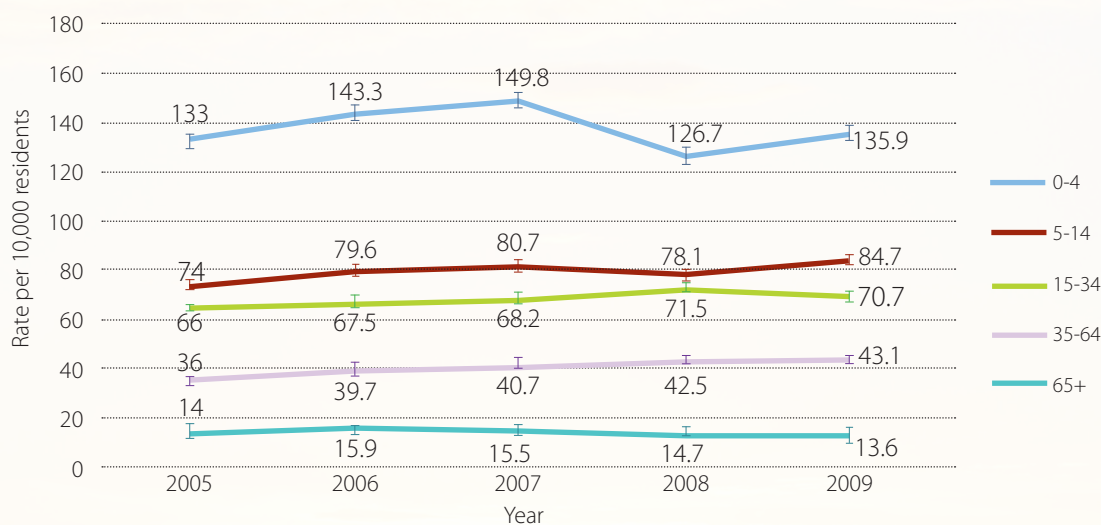


Source: Ohio Hospital Association Statewide Clinical Financial Database, Year, 2009

The emergency department visit rate for asthma is close to ten times higher for children under 5 years of age than adults over 65, a statistically significant difference.

FIGURE 25

Emergency Department Visit Rates per 10,000 Residents for Patients with a Primary Diagnosis of Asthma, by Age Group and Year, Ohio 2005-2009



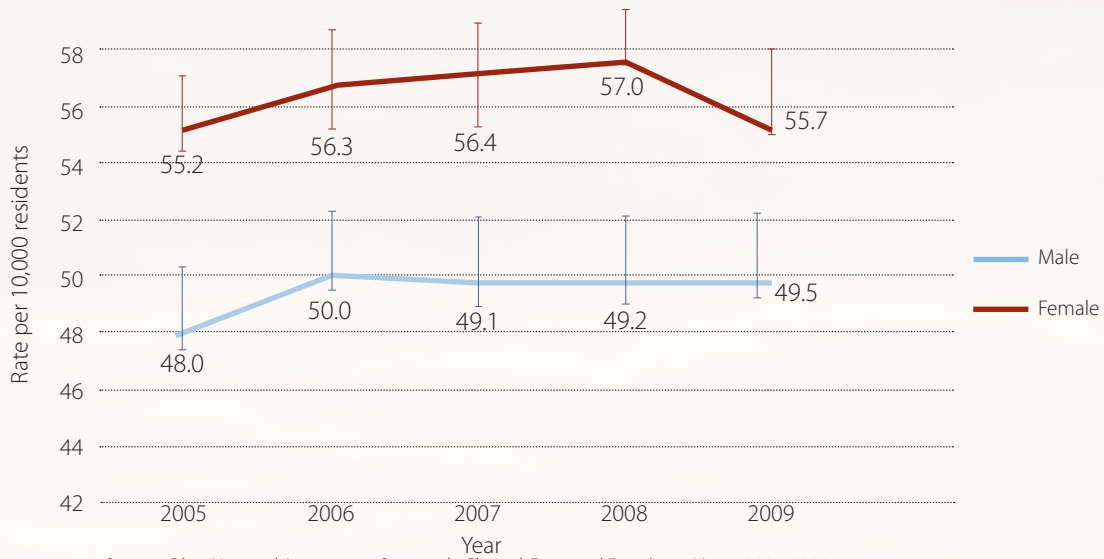
Source: Ohio Hospital Association Statewide Clinical-Financial Database, Years, 2004-2009

Rates for children under 5 dipped significantly in 2007. Children under 5 are admitted significantly more than any other age group in all years.

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FIGURE 26

Emergency Department Visit Rates per 10,000 Residents for Patients with a Primary Diagnosis of Asthma, by Sex and Year, 2005-2009

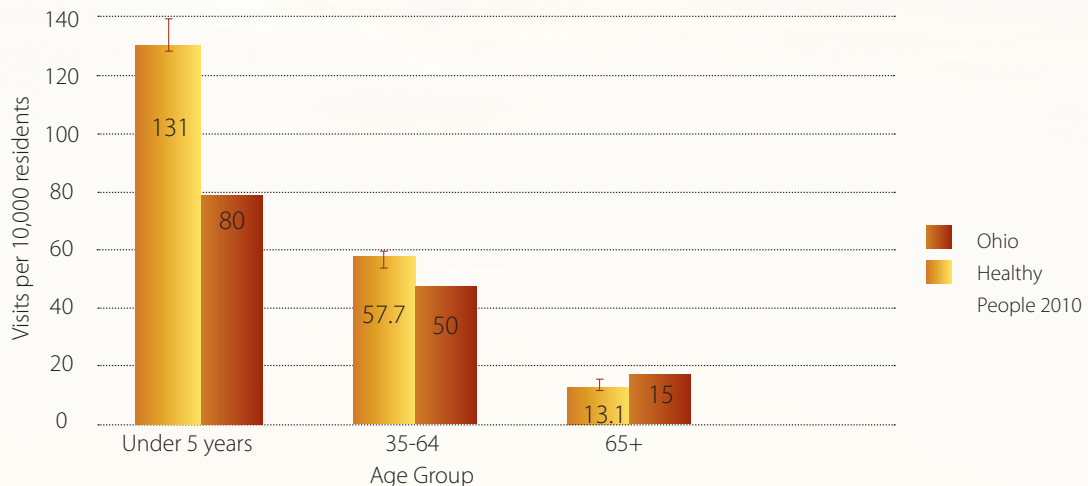


Source: Ohio Hospital Association Statewide Clinical-Financial Database, Years, 2004-2009.

Women have significantly higher admission rates to the emergency department than men for asthma during 2005-2009.

FIGURE 27

Emergency Department Visit Rates per 10,000 Residents for Patients with a Primary Diagnosis of Asthma, by Age Group, Ohio 2009 Compared to Healthy People 2010



Source: Ohio Hospital Association Statewide Clinical-Financial Database, 2010

Ohio has emergency department visit rates below the goal for residents 65 and over, and is close to the Healthy People 2010 goals for adults and children aged five to 64. However, Ohio's ED visit rate for children under five is significantly above the Healthy People 2010 goal of 80 per 10,000 residents.

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Mortality

Deaths due to asthma are fairly rare, but in almost every case, preventable. Nationally, there are close to 5,000 deaths per year from asthma. In Ohio, there has been an average of 157 asthma deaths per year since 1990. Successful asthma management reduces symptoms and improves quality of life. Failure to maintain good control of the disease results in a higher risk of mortality. Deaths can occur among individuals with mild intermittent asthma as well as those with severe persistent asthma.

Asthma is not a leading cause of death, and mortality rates have remained stable over the past 21 years. The Ohio asthma death rate was 1.1 deaths per 100,000 residents during 2010, comparable to the national rate of 1.3. With so few deaths per year occurring in Ohio, rates are highly variable and must be interpreted cautiously. Asthma deaths are rare events and small numbers can result in unstable and unreliable rates or estimates. In addition, causes of death listed, and coding of those causes may be inaccurate. For example, the asthma death rate for children five through fourteen years of age is 1.0 per million, on target for a Healthy People 2010 benchmark of 1 per million. However, this rate represents one child death in Ohio. One additional child death would “double” the mortality rate.

As recommended by Council of State and Territorial Epidemiologists, deaths where asthma is the primary cause are selected from these data. From 1990 to 1998, these are deaths with primary cause coded to ICD-9 (International Classification of Diseases, version 9) codes 493.XX. Deaths occurring from 1999 to 2010 are classified according to ICD-10. ICD-10 codes for asthma are J45 and J46. Mortality data from the Ohio Department of Health's Center for Health and Vital Statistics were used to calculate asthma mortality rates from 1990-2010.

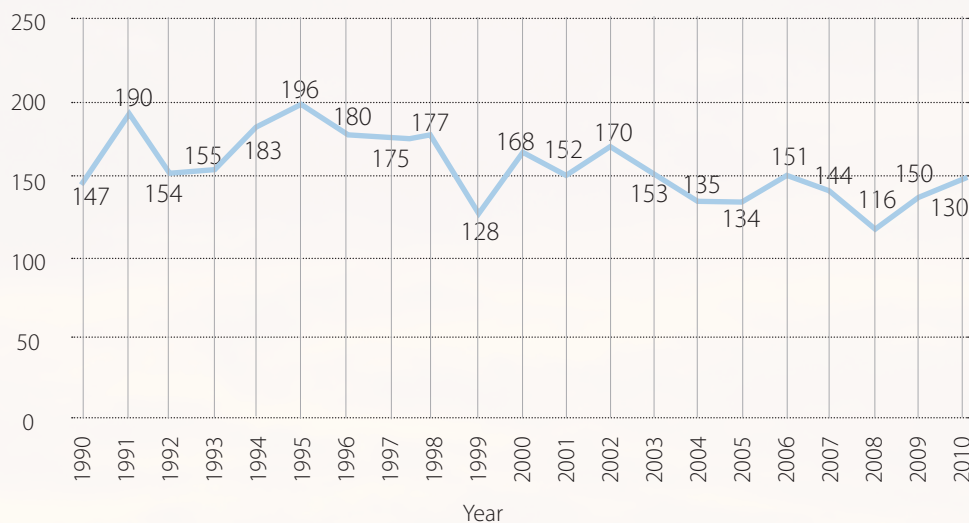
Because mortality due to a primary cause of asthma is a relatively rare event, confidence intervals are not calculated.



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FIGURE 28

Asthma Deaths, Ohio, 1990-2010

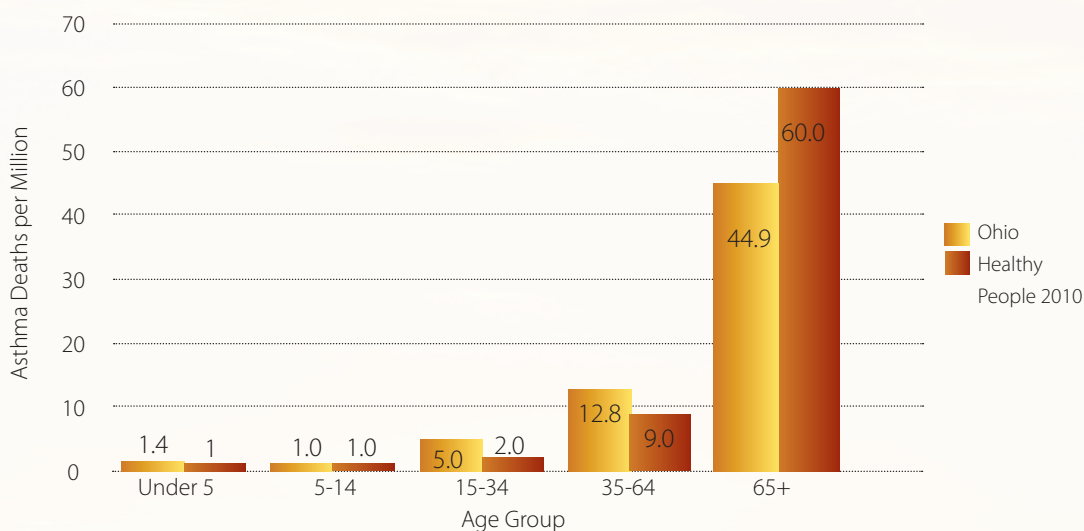


Source: Ohio Department of Health, Center for Health and Vital Statistics, 1990-2010.

An average of 157 deaths from asthma occurred in Ohio per year from 1990 through 2010.

FIGURE 29

Asthma Deaths in Ohio, per Million Residents, by Age Group, 2010, Compared to Healthy People 2010 Benchmark



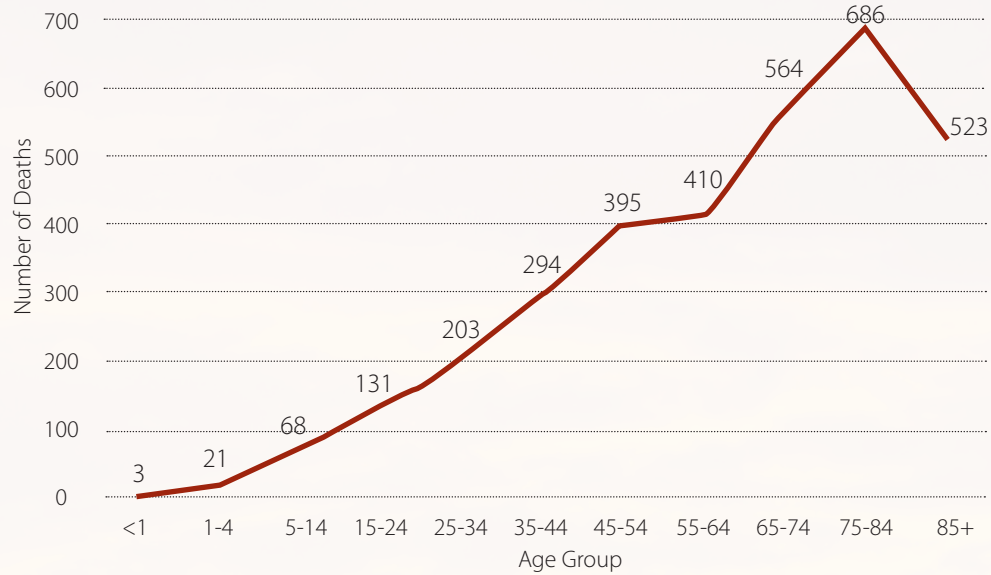
Source: Ohio Department of Health, Center for Health and Vital Statistics, 2010.

Healthy People 2010's first objective in the respiratory section is to reduce asthma deaths. Mortality for asthma in Ohio is above recommended Healthy People 2010 age group targets, except for five to fourteen and adults 65 and over.

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FIGURE 30

Asthma Deaths, by Age Group, 1990-2010



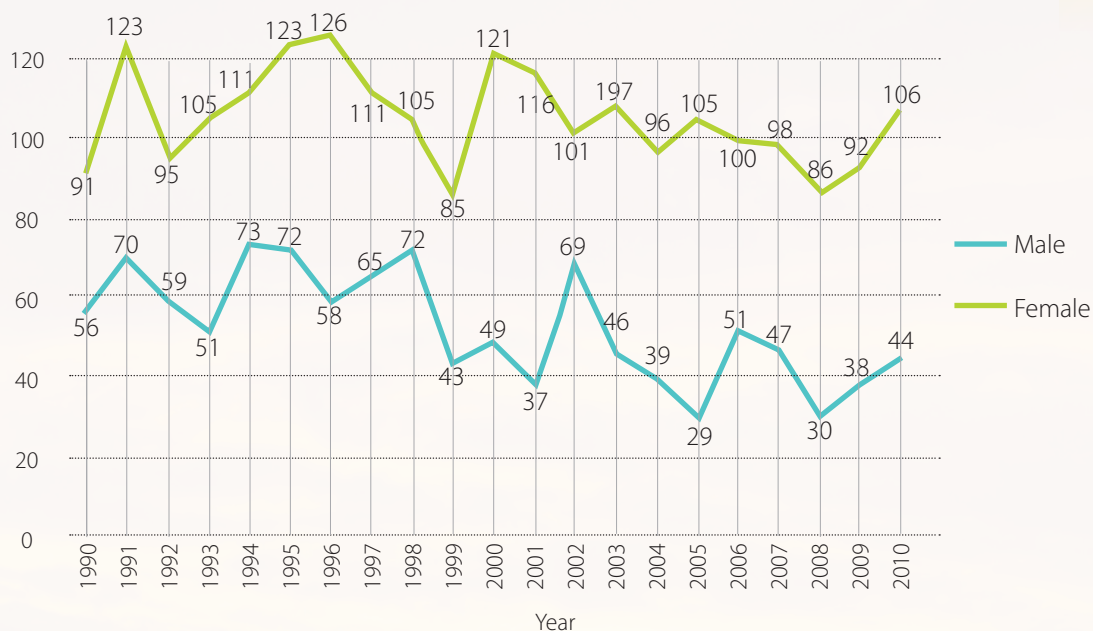
Source: Ohio Department of Health, Center for Health and Vital Statistics, 1990-2010.

Asthma deaths among children are rare, with fewer than 100 occurring among children under the age of 15 during the past 19 years. During 1990-2010, the vast majority of asthma deaths occurred in adults 55 years of age and older. Since 1990, the most common age group for asthma deaths in Ohio has been the 75-84 year range.

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FIGURE 31

Asthma Deaths, by Sex and Year, Ohio, 1990-2010

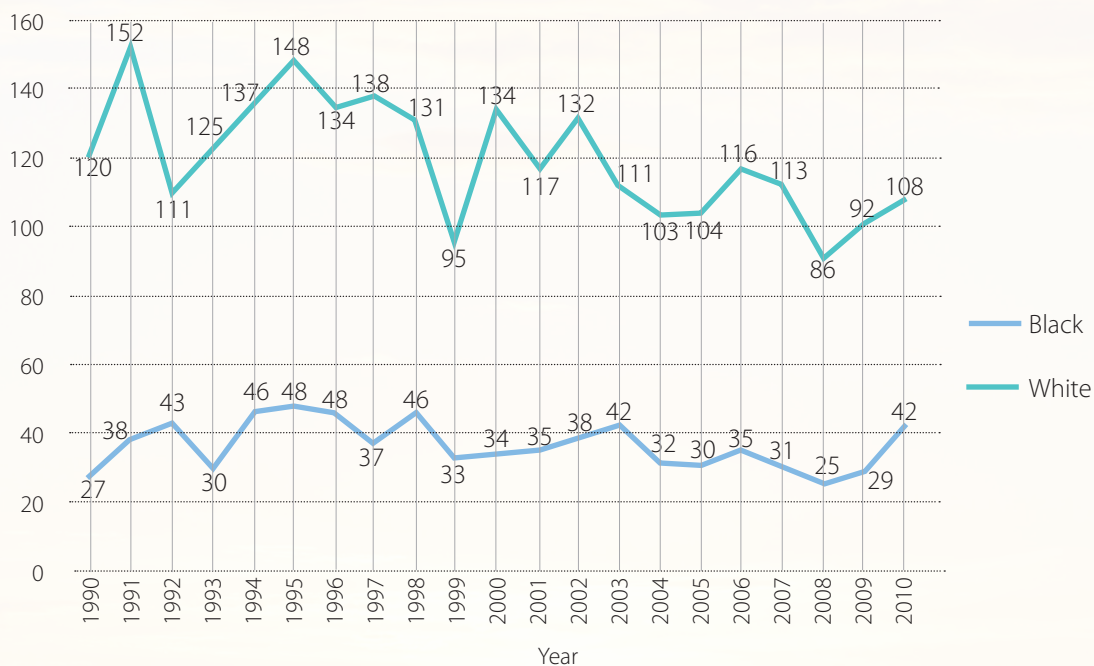


Source: Ohio Department of Health, Center for Health and Vital Statistics, 1990-2010.

Asthma deaths are higher in adult females than adult males, consistent with the sex differences seen in asthma prevalence, hospitalization and Medicaid utilization. In 2009, there were over twice as many females who died from asthma, compared to males in Ohio.

FIGURE 32

Asthma Deaths, by Race and Year, Ohio, 1990-2010



Source: Ohio Department of Health, Center for Health and Vital Statistics, 1990-2010.

Black residents of Ohio die more often from asthma than whites. While 12 percent of the Ohio population is black, in 2009 they represented 29 percent of asthma deaths.

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Steps to Move Forward

In 2002, the Ohio Department of Health Asthma Program (ODHAP) and the American Lung Association came together to develop the Ohio Asthma Coalition (OAC). ODHAP and OAC developed the first Ohio Statewide Asthma Plan in 2004. During the successive 5 year period, committees of the coalition worked to implement the plan with the full understanding that the coalition activities were a part of a larger whole of organizations in Ohio working to improve the burden of asthma.

In the fall of 2008, ODHAP and the steering committee of the coalition began the revision by engaging members in the process to guide activities from 2009 to 2014 through a survey of the membership which received almost 100 responses. ODHAP and OAC steering committee members worked diligently to incorporate the responses and lessons learned during the implementation of the first statewide plan and to produce a workable current statewide asthma plan that reflects what all partners believe to be the priority issues for those organizations and individuals working on asthma in Ohio. Priorities were identified through discussions of partners at coalition meetings.

In the current plan, goals are formulated to encompass a broad range of activities to be implemented throughout the state. Where possible, a statement about baseline data is also included.

The Ohio Statewide Asthma Plan (OSAP) (2009-2014) outlines a comprehensive approach to address asthma in Ohio through a broad range of population-based strategies (consistent with Healthy People 2010). Because asthma is controllable but not curable or preventable at this time, a coordinated effort is focused on secondary and tertiary prevention, such as controlling the disease to prevent asthma episodes that result in unplanned visits to health care providers, emergency departments, hospitals, or death. The major goals objectives and current activities of the OSAP are listed below. The OSAP developed through a combined effort of The Asthma Coalition and the Ohio Department of Health.

1. Assess the burden of asthma in Ohio.

1.1 Improve ability to track and report asthma deaths, hospitalizations, and disabilities through identification and linkage of existing data collection tools.

1.2 Increase access to Ohio asthma data through identification and implementation of new communication strategies.

This goal and its objectives are focused on assuring that we are able to define the face of asthma in Ohio. The OSHA must continue to ensure that appropriate data are collected, analyzed, and distributed so those working on asthma in Ohio can make appropriate decisions about where to expend resources and they will be able to assist judging them in the effectiveness of their efforts.

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Preliminary/Ongoing Activities: Identification of additional existing databases that may offer new information or perspectives on the impact of asthma in Ohio; Survey of data users to identify alternative ways to provide asthma data in ways they will find useful; Development and distribution of formal reports and more frequent updates about asthma trends identified by the OSSA.

2. Reduce asthma disparities among disproportionately affected population segments in Ohio.

2.1 Improve capacity to control asthma in communities affected by healthcare disparities through identification of culturally competent clinical and educational approaches for asthma care. OSSA data has identified that in Ohio, asthma affects populations disparately. We recognize the importance of working to reduce disparities by attacking controllable barriers to health equality.

Preliminary/Ongoing Activities: Regular OSSA reports that highlight population disparities; Assurance that interventions are targeted toward disparate populations and that interventions and tools or materials produced are culturally appropriate; Identification of agencies and organizations that work with disparate populations and the provision of materials and tools to raise awareness about asthma within these populations.

3. Decrease the number of asthma hospitalizations, emergency department and urgent care visits.

3.1 Increase the percentage of asthma patients who receive self-management education, including developing and using a customized self-management plan, recognizing early signs or symptoms of an asthma episode, understanding what to do during an asthma episode or attack, and adjusting medications according to the individualized Asthma Action Plan.

3.2 Improve systems and policies to support asthma management in work, schools, clinical, and home settings.

3.3 Identify and reduce exposure to outdoor asthma triggers.

This goal represents the heart of what the Ohio Statewide Asthma Plan is trying to accomplish. By improving self-management of asthma through identified and evidence-based guidelines, we are confident we will see a decrease in associated asthma morbidity. However, we realize that sustainable outcomes will not be achieved without systems and policy changes to support these changes.

Systems and policy changes must be multi-focused and must approach asthma not only in a clinical setting, but everywhere that people with asthma live, work, learn, and play.

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Preliminary/Ongoing Activities: ODH and the Ohio Asthma Coalition will focus on developing evidence-based initiatives appropriate for statewide implementation and will implement these multi-focal interventions in a limited way to assure effectiveness before beginning statewide implementation (clinical, school, and home in early phases); Facilitate a Statewide Asthma Health Plan Collaborative to assist in achieving this goal.

4. Develop, facilitate, and strengthen partnerships and collaborations to improve Ohio's ability to address the burden of asthma in Ohio.

4.1 Develop internal partnerships (within the Ohio Department of Health) to raise awareness of the burden of asthma in Ohio and to facilitate the inclusion of asthma in public health initiatives.

4.2 Develop partnerships with local individuals, agencies, or organizations to facilitate addressing the burden of asthma in Ohio.

4.3 Develop state-level partnerships to leverage accomplishment of the Ohio Statewide Asthma Plan and to facilitate the inclusion of asthma in public health initiatives

4.4 Participate in and strengthen partnership efforts on a federal or national level to promote reducing the burden of asthma in Ohio.

Progress toward goals and objectives of any plan or program will be enhanced through facilitation and use of partnerships. It is our belief that strong partnerships will prevent duplication of effort and will improve our ability to identify evidenced-based interventions. Leveraging of resources toward common goals will also increase the impact we can have on decreasing the burden of asthma in Ohio.

Preliminary/Ongoing Activities: Partnerships will be promoted and maintained through membership development in the Ohio Asthma Coalition; Technical assistance will be offered to new and existing local coalitions². Facilitate the conduct and impact of research in Ohio.

5.1 Increase research in Ohio on causes, triggers, and management of asthma.

5.2 Increase access to and utilization of Ohio research through identification of new communication and networking strategies.

Research is needed to expand our understanding of asthma and also to help us in more efficiently using what we know about asthma to control the burden of asthma. Some of us will do this by promoting and facilitating research, some of us will do this by conducting research, and some of us will do this by implementing interventions based on research findings. All Ohioans who have asthma or work on issues related to asthma can benefit from increased research on asthma and increased communication about asthma research results.

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Preliminary/Ongoing Activities: Develop registry of Ohio researchers; Evaluate research funding in Ohio compared with other states; Evaluate and develop networking opportunities for researchers conducting research in Ohio

6. Review and enhance the Ohio Department of Health Asthma Program, Ohio Surveillance System for Asthma (OSSA), and asthma partnerships including the Ohio Asthma Coalition (OAC) through comprehensive, ongoing evaluation.

6.1 Develop and maintain the Strategic Evaluation Plan

Effective, systematic program evaluation is necessary to maximize impact of resources. With limited funds available, it is only with ongoing evaluation that we can assure useful, feasible, ethical, and accurate actions toward change. Ongoing evaluation will also help us to demonstrate the value of our activities and will help us to identify what works to decrease the burden of asthma in Ohio.

Preliminary/Ongoing Activities: Complete development of Strategic Evaluation Plan (SEP); Regular meetings of evaluation team to implement SEP; Distribution of evaluation results

7. Advocate for people with asthma.

7.1 Increase advocacy for asthma-friendly laws and administrative rules.

7.2 Increase advocacy for community activities to reduce the burden of asthma.

7.3 Increase awareness of Ohio residents about asthma.

Advocacy plays an important role in reducing the burden of asthma in Ohio and occurs at many different levels. Some of us in Ohio focus on advocacy at the local or individual level helping to improve awareness about asthma and to create policies or system change at the individual or organizational level. Others of our partners focus on state or even federal campaigns or policy changes.

Preliminary/Ongoing Activities: Renew Asthma Legislative Caucus; Asthma awareness activities focused on disparate populations; Promotion of Tobacco Free Ohio; Work with Ohio Environmental Protection Agency to strengthen Ambient Air Quality Standards in Ohio.



Advocacy plays an important role in reducing the burden of asthma in Ohio and occurs at many different levels.

Future Activities to Reduce the Burden of Asthma

In Ohio, activities are taking place throughout primary and specialty care practices to address asthma. Ideally, these activities are based on recommendations developed by the Expert Panel 3 (EPR3) of the National Asthma Education and Prevention Program at the National Institute of Health. The 2007 EPR3 “Guidelines for the Diagnosis and Management of Asthma” presents the review of evidence leading to the recommendations and addresses actions by all health professionals by recommending a team oriented approach to asthma care. The focus of this care is to ensure patients learn to self-manage their asthma through an interactive relationship with the team of healthcare professionals. These guidelines are summarized in the following recommendations that are used simultaneously to form a cohesive program for each individual that increases asthma control and reduces the risk of asthma exacerbations and use of emergency and hospital care.

1. Individuals with frequent symptoms, severe asthma exacerbations or both should receive regular treatment with inhaled corticosteroids.
2. Education is an essential component of asthma therapy and should be offered to all patients. Educational interventions may be of particular benefit in patients with severe asthma, at the time of emergency department visits and admissions to hospitals, and also at follow-up visits.
3. Asthma education should aim primarily at changing patient behavior, rather than simply improving knowledge. Patients with asthma-related morbidity and frequent emergency department and hospital use should receive targeted asthma education. Structured education, with a written self-management plan, regular office visits and review of key concepts will likely reduce the number of inpatient hospital visits.
4. A systematic, individualized program to identify and eliminate an individual’s allergens and other triggers is needed for all patients with asthma. Examples of allergen reduction can include eliminating cats or dogs in the home, avoiding tobacco smoke, and ensuring a home free of dampness.

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APPENDICES

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All information displayed in figures in the preceding text can be found in the corresponding tables.

TABLE 1 Adults Who Have Been Told They Currently Have Asthma, Ohio, 2000-2010

| Ohio | | | |
|-------|-----|----------|------|
| Year: | % | CI* | n |
| 2000 | 8.6 | 7.2-10.0 | 284 |
| 2001 | 7.3 | 6.3-8.3 | 280 |
| 2002 | 7.3 | 6.4-8.2 | 312 |
| 2003 | 7.1 | 6.1-8.1 | 300 |
| 2004 | 8.5 | 7.2-9.8 | 776 |
| 2005 | 8 | 7.0-9.0 | 691 |
| 2006 | 9.8 | 8.2-11.4 | 587 |
| 2007 | 8.9 | 8.1-9.7 | 1004 |
| 2008 | 9.6 | 8.8-10.4 | 1216 |
| 2009 | 9.9 | 9.0-10.9 | 916 |
| 2010 | 9.6 | 8.7-10.6 | 959 |

Source: Behavioral Risk Factor Surveillance System, Centers for Disease Control and Prevention, Years 2000-2010.

* (Confidence Intervals)

TABLE 2 Adults Who Have Been Told They Currently Have Asthma, Ohio and US, 2010

| Year: | Nationwide (States and DC) | |
|-------|----------------------------|----------|
| | Median % | # States |
| 2000 | 7.3 | 51 |
| 2001 | 7.3 | 51 |
| 2002 | 7.6 | 51 |
| 2003 | 7.6 | 51 |
| 2004 | 8.4 | 50 |
| 2005 | 8.0 | 51 |
| 2006 | 8.5 | 51 |
| 2007 | 8.4 | 51 |
| 2008 | 8.8 | 51 |
| 2009 | 8.8 | 51 |
| 2010 | 9.1 | 51 |

Source: Behavioral Risk Factor Surveillance System, Centers for Disease Control and Prevention, Year 2010.

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TABLE 3

Adults Who Have Ever Been Told They Have Asthma, Ohio, 2000-2010

| | Ohio | | |
|-------|------|-----------|------|
| Year: | % | CI | n |
| 2000 | 10.9 | 9.4-12.4 | 361 |
| 2001 | 9.8 | 8.7-10.9 | 379 |
| 2002 | 10.3 | 9.2-11.4 | 441 |
| 2003 | 10.8 | 9.5-12.1 | 427 |
| 2004 | 12.3 | 10.8-13.8 | 1064 |
| 2005 | 11.3 | 10.1-12.5 | 948 |
| 2006 | 13.6 | 11.7-15.5 | 788 |
| 2007 | 13.1 | 12.1-14.1 | 1402 |
| 2008 | 14.2 | 13.2-15.2 | 1722 |
| 2009 | 15.0 | 13.8-16.1 | 1294 |
| 2010 | 13.8 | 12.7-15.0 | 1315 |

Source: Behavioral Risk Factor Surveillance System, Centers for Disease Control and Prevention, Years 2000-2010.

TABLE 4

Adults Who Have Been Told They Currently Have Asthma,
By Gender, Ohio, 2010

| Gender: | | Yes | No |
|---------|----|-----------|-----------|
| Male | % | 7.1 | 92.9 |
| | CI | 5.7-8.5 | 91.5-94.3 |
| | n | 236 | 3388 |
| Female | % | 12 | 88 |
| | CI | 10.6-13.3 | 86.7-89.4 |
| | n | 723 | 5434 |

Source: Behavioral Risk Factor Surveillance System, Centers for Disease Control and Prevention, Years 2000-2010.

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TABLE 5 Adults Who Have Been Told They Currently Have Asthma, By Race Ohio, 2000-2010

| Year | White | CI | Black | CI |
|------|-------|-----------|-------|------------|
| 2000 | 8.2 | 6.8-9.7 | 10.3 | 4.9-15.8 |
| 2001 | 7.3 | 6.2 - 8.3 | 6.8 | 5.9 - 7.8 |
| 2002 | 6.8 | 5.9 - 7.8 | 11.2 | 6.9 - 15.6 |
| 2003 | 7.0 | 5.9 - 8.0 | 7.2 | 4.3 - 10.1 |
| 2004 | 7.6 | 6.3-8.9 | 11.4 | 6.7-16.1 |
| 2005 | 7.4 | 6.4-8.4 | 12.9 | 9.4-16.4 |
| 2006 | 8.9 | 7.2-10.6 | 17 | 9.6-24.4 |
| 2007 | 8.4 | 7.4-9.4 | 12.3 | 8.4-16.2 |
| 2008 | 9.0 | 8.1-9.8 | 13.6 | 10.4-16.9 |
| 2009 | 9.8 | 8.7-10.9 | 9.7 | 7.1-12.3 |
| 2010 | 9.1 | 8.0-10.1 | 13 | 10.0-16.1 |

Source: Behavioral Risk Factor Surveillance System, Centers for Disease Control and Prevention, Years 2000- 2010.

TABLE 6 Adults Who Have Been Told They Currently Have Asthma, By Income, Ohio, 2010

| Income | | Yes | No |
|--------------------|----|-----------|-----------|
| Less than \$15,000 | % | 20.4 | 79.6 |
| | CI | 15.8-25.0 | 75.0-84.2 |
| | n | 175 | 794 |
| \$15,000-24,999 | % | 10.3 | 89.7 |
| | CI | 8.1-12.5 | 98.5-91.9 |
| | n | 168 | 1487 |
| \$25,000-34,999 | % | 13 | 87 |
| | CI | 9.1-16.8 | 83.2-90.9 |
| | n | 115 | 1012 |
| \$35,000-49,999 | % | 7.5 | 92.5 |
| | CI | 5.8-9.2 | 90.8-94.2 |
| | n | 116 | 1155 |
| \$50,000+ | % | 6.7 | 93.3 |
| | CI | 5.5-8.0 | 92.0-94.5 |
| | n | 233 | 3074 |

Source: Behavioral Risk Factor Surveillance System, Centers for Disease Control and Prevention, Year 2010.

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TABLE 7 Adults Who Have Been Told They Currently Have Asthma, By Education, Ohio, 2010

| Education: | | Yes | No |
|------------------|----|-----------|-------------|
| Less than H.S. | % | 17.1 | 82.9 |
| | CI | 13.1-21.2 | 78.8-86.9 |
| | n | 129 | 646 |
| H.S. or G.E.D. | % | 10.1 | 89.9 |
| | CI | 8.4-11.9 | 88.1-91.6 |
| | n | 311 | 3081 |
| Some post-H.S. | % | 10.4 | 89.6 |
| | CI | 8.4-12.5 | 87.5-91.6 |
| | n | 287 | 2223 |
| College graduate | % | 6.8 | 93.2 |
| | CI | (5.5-8.1) | (91.9-94.5) |
| | n | 225 | 2839 |

Source: Behavioral Risk Factor Surveillance System, Centers for Disease Control and Prevention, Years 2000- 2010.

TABLE 8 Adults Who Have Been Told They Currently Have Asthma, By Age Group, Ohio, 2010

| Age: | | Yes | No |
|-------|----|----------|-----------|
| 18-24 | % | 15.5 | 84.5 |
| | CI | 8.8-22.3 | 77.7-91.2 |
| | n | 33 | 160 |
| 25-34 | % | 8.8 | 91.2 |
| | CI | 6.1-11.5 | 88.5-93.9 |
| | n | 65 | 625 |
| 35-44 | % | 8.3 | 91.7 |
| | CI | 6.5-10.2 | 89.8-93.5 |
| | n | 116 | 1180 |
| 45-54 | % | 9.9 | 90.1 |
| | CI | 8.3-11.4 | 88.6-91.7 |
| | n | 216 | 1817 |
| 55-64 | % | 10 | 90 |
| | CI | 8.5-11.6 | 88.4-91.5 |
| | n | 272 | 2158 |
| 65+ | % | 8.6 | 91.4 |
| | CI | 7.4-9.8 | 90.2-92.6 |
| | n | 257 | 2882 |

Source: Behavioral Risk Factor Surveillance System, Centers for Disease Control and Prevention, Years 2000- 2010.

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TABLE 9

Estimated Child Asthma Prevalence by Sex, Race,
Federal Poverty Level (FPL) and Age, Ohio, 2008

| Demographic | Percentage | Lower CI | Upper CI |
|------------------|------------|----------|----------|
| Male | 16.7 | 15.8 | 17.6 |
| Female | 11.8 | 11.0 | 12.6 |
| White | 13.3 | 12.6 | 14.0 |
| Black | 22.4 | 20.2 | 24.5 |
| Hispanic | 13.4 | 11.1 | 15.8 |
| Asian or Pacific | 7.9 | 4.5 | 11.2 |
| 100% OR Less FPL | 19.9 | 18.2 | 21.5 |
| 101%-150% | 18.2 | 16.1 | 20.2 |
| 151%-200% | 13.2 | 11.3 | 15.1 |
| 201%-300% | 13.4 | 12 | 14.8 |
| 301% or more FPL | 11.3 | 10.4 | 12.1 |
| 0 to 4 years | 7.8 | 6.8 | 8.7 |
| 5 to 9 years | 14.5 | 13.2 | 15.7 |
| 10 to 17 years | 17.3 | 16.4 | 18.3 |

Source: Ohio Family Health Survey, 2008

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TABLE 10

Children Ever Diagnosed with Asthma, By County, Ohio, 2008

| County | % | Standard Error | Lower Confidence Interval | Upper Confidence Interval |
|------------|-------|----------------|---------------------------|---------------------------|
| Adams | 11.3% | 3.7% | 4.1% | 18.6% |
| Allen | 7.5% | 3.6% | 0.5% | 14.5% |
| Ashland | 9.6% | 3.8% | 2.1% | 17.1% |
| Ashtabula | 9.8% | 3.7% | 2.6% | 17.0% |
| Athens | 11.3% | 3.8% | 3.9% | 18.7% |
| Auglaize | 10.6% | 4.6% | 1.5% | 19.6% |
| Belmont | 15.0% | 4.9% | 5.3% | 24.7% |
| Brown | 9.6% | 2.3% | 5.1% | 14.1% |
| Butler | 14.7% | 2.3% | 10.1% | 19.2% |
| Carroll | 3.5% | 2.5% | -1.5% | 8.4% |
| Champaign | 20.8% | 7.7% | 5.6% | 35.9% |
| Clark | 27.3% | 5.9% | 15.6% | 38.9% |
| Clermont | 14.0% | 2.5% | 9.1% | 19.0% |
| Clinton | 8.0% | 3.1% | 1.9% | 14.0% |
| Columbiana | 19.9% | 4.7% | 10.6% | 29.2% |
| Coshocton | 22.3% | 5.8% | 10.9% | 33.8% |
| Crawford | 20.1% | 5.7% | 9.0% | 31.2% |
| Cuyahoga | 15.1% | 1.4% | 12.3% | 17.9% |
| Darke | 10.0% | 2.9% | 4.3% | 15.8% |
| Defiance | 20.5% | 6.8% | 7.2% | 33.8% |
| Delaware | 4.1% | 2.1% | 0.0% | 8.2% |
| Erie | 8.3% | 3.1% | 2.2% | 14.4% |
| Fairfield | 1.8% | 1.2% | -0.5% | 4.2% |
| Fayette | 20.9% | 9.3% | 2.7% | 39.0% |
| Franklin | 16.5% | 1.6% | 13.4% | 19.6% |
| Fulton | 9.9% | 3.7% | 2.7% | 17.1% |
| Gallia | 19.1% | 5.2% | 8.9% | 29.4% |
| Geauga | 7.5% | 3.4% | 0.8% | 14.2% |
| Greene | 14.5% | 3.8% | 7.1% | 22.0% |
| Guernsey | 9.8% | 4.1% | 1.7% | 17.9% |
| Hamilton | 16.2% | 1.9% | 12.4% | 19.9% |
| Hancock | 14.5% | 4.8% | 5.2% | 23.8% |
| Hardin | 11.6% | 5.0% | 1.8% | 21.5% |
| Harrison | 30.5% | 11.2% | 8.4% | 52.5% |
| Henry | 20.5% | 8.3% | 4.3% | 36.7% |
| Highland | 11.7% | 3.2% | 5.3% | 18.0% |

Table 10 continued on page 55

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Table 10 continued from page 54

| | | | | |
|------------|-------|------|-------|-------|
| Hocking | 14.5% | 6.3% | 2.1% | 26.9% |
| Holmes | 12.2% | 4.9% | 2.5% | 21.9% |
| Huron | 10.0% | 3.6% | 2.9% | 17.0% |
| Jackson | 13.0% | 4.9% | 3.4% | 22.7% |
| Jefferson | 8.5% | 3.4% | 1.8% | 15.2% |
| Knox | 22.3% | 7.7% | 7.3% | 37.4% |
| Lake | 23.5% | 4.7% | 14.3% | 32.8% |
| Lawrence | 33.7% | 6.8% | 20.5% | 47.0% |
| Licking | 11.8% | 3.6% | 4.7% | 18.9% |
| Logan | 20.4% | 7.4% | 5.9% | 34.9% |
| Lorain | 17.9% | 2.5% | 12.9% | 22.9% |
| Lucas | 15.2% | 2.2% | 10.9% | 19.6% |
| Madison | 24.4% | 8.6% | 7.6% | 41.3% |
| Mahoning | 17.3% | 3.0% | 11.4% | 23.2% |
| Marion | 8.7% | 4.1% | 0.7% | 16.8% |
| Medina | 12.7% | 3.9% | 5.0% | 20.4% |
| Meigs | 16.7% | 4.9% | 7.1% | 26.3% |
| Mercer | 7.7% | 3.3% | 1.3% | 14.1% |
| Miami | 16.7% | 5.1% | 6.6% | 26.7% |
| Monroe | 11.0% | 4.8% | 1.5% | 20.5% |
| Montgomery | 17.8% | 2.3% | 13.2% | 22.4% |
| Morgan | 13.1% | 4.8% | 3.7% | 22.5% |
| Morrow | 11.0% | 4.2% | 2.8% | 19.2% |
| Muskingum | 18.5% | 5.2% | 8.3% | 28.7% |
| Noble | 14.4% | 5.2% | 4.2% | 24.7% |
| Ottawa | 12.0% | 4.7% | 2.8% | 21.1% |
| Paulding | 12.0% | 4.0% | 4.0% | 19.9% |
| Perry | 24.4% | 6.9% | 11.0% | 37.9% |
| Pickaway | 21.9% | 5.8% | 10.5% | 33.2% |
| Pike | 19.4% | 4.4% | 10.8% | 28.1% |
| Portage | 9.3% | 3.0% | 3.4% | 15.2% |
| Preble | 17.3% | 7.5% | 2.5% | 32.0% |
| Putnam | 18.0% | 7.5% | 3.2% | 32.8% |
| Richland | 15.3% | 4.4% | 6.6% | 24.0% |
| Ross | 14.8% | 4.7% | 5.6% | 24.0% |
| Sandusky | 18.8% | 4.7% | 9.7% | 27.9% |

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Table 10 continued from page 55

| | | | | |
|------------|-------|------|-------|-------|
| Scioto | 22.9% | 5.5% | 12.2% | 33.6% |
| Seneca | 21.7% | 6.0% | 10.0% | 33.4% |
| Shelby | 4.3% | 1.9% | 0.6% | 7.9% |
| Stark | 17.5% | 2.6% | 12.4% | 22.5% |
| Summit | 16.7% | 1.8% | 13.1% | 20.2% |
| Trumbull | 18.5% | 4.1% | 10.5% | 26.6% |
| Tuscarawas | 8.4% | 3.2% | 2.1% | 14.6% |
| Union | 13.1% | 4.7% | 3.8% | 22.4% |
| Van Wert | 8.8% | 3.6% | 1.8% | 15.8% |
| Vinton | 20.6% | 8.1% | 4.7% | 36.4% |
| Warren | 16.3% | 3.3% | 9.8% | 22.8% |
| Washington | 15.1% | 5.9% | 3.5% | 26.8% |
| Wayne | 12.6% | 3.9% | 5.0% | 20.2% |
| Williams | 18.0% | 5.3% | 7.6% | 28.4% |
| Wood | 17.1% | 3.6% | 10.0% | 24.1% |
| Wyandot | 19.6% | 5.7% | 8.4% | 30.8% |
| Ohio | 15.4% | 0.4% | 14.5% | 16.3% |

Source: Ohio Family Health Survey, 2008

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TABLE 11

Number and Rate of Hospital Discharges for Patients with a Primary Diagnosis of Asthma, by Age Group, Ohio, 2009

| Ohio | 2009 Hospital Discharge Data | | | |
|-------------------|------------------------------|------------|------------|------------|
| | | 2009 | | |
| | SM weight | N of Hosp. | 2009 pop. | Crude Rate |
| Total | 1.000000 | 19,578 | 11,542,645 | 169.6 |
| Age Groups | | | | |
| Under 5 years | 0.069135 | 2222 | 739,526 | 300.5 |
| 5 to 9 years | 0.072532 | 1279 | 741,201 | 172.6 |
| 10 to 14 years | 0.073032 | 774 | 753,156 | 102.8 |
| 15 to 17 years | 0.043035 | 335 | 480,458 | 69.7 |
| 18 to 19 years | 0.029133 | 155 | 329,733 | 47.0 |
| 20 to 24 years | 0.066478 | 446 | 754,760 | 59.1 |
| 25 to 29 years | 0.06453 | 575 | 763,995 | 75.3 |
| 30 to 34 years | 0.071044 | 680 | 714,238 | 95.2 |
| 35 to 39 years | 0.080762 | 958 | 740,615 | 129.4 |
| 40 to 44 years | 0.081851 | 1275 | 779,303 | 163.6 |
| 45 to 49 years | 0.072118 | 1596 | 875,953 | 182.2 |
| 50 to 54 years | 0.062716 | 1892 | 878,313 | 215.4 |
| 55 to 59 years | 0.048454 | 1512 | 762,510 | 198.3 |
| 60 to 64 years | 0.038793 | 1300 | 623,568 | 208.5 |
| 65 to 69 years | 0.034264 | 1154 | 467,090 | 247.1 |
| 70 to 74 years | 0.031773 | 1037 | 368,691 | 281.3 |
| 75 to 79 years | 0.027 | 850 | 299,075 | 284.2 |
| 80 to 84 years | 0.017842 | 751 | 243,040 | 309.0 |
| 85 years or more | 0.015508 | 787 | 227,420 | 346.1 |

Source: Ohio Hospital Association Clinical Financial Database, 2009

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TABLE 12

Number of Hospital Discharges for Patients in Ohio with a Primary Diagnosis of Asthma by Sex and Year, 2004-2009

| Year | Total | Male Primary | Female Primary |
|------|--------|--------------|----------------|
| 2004 | 17,661 | 6,381 | 11,280 |
| 2005 | 19,258 | 6,743 | 12,515 |
| 2006 | 18,444 | 6,656 | 11,788 |
| 2007 | 17,797 | 6,301 | 11,496 |
| 2008 | 19,541 | 6,606 | 12,935 |
| 2009 | 19,578 | 6,908 | 12,670 |

Source: Ohio Hospital Association Clinical Financial Data Base, Years 2004-2009

TABLE 13

Numbers of Ohio Hospital Discharges for Patients with a Primary Diagnosis of Asthma and for Patients with Any Mention of Asthma by Sex and Year, 2005-2009

| Year | Male-Primary | Female- Primary | Male-Any | Female-Any |
|------|--------------|-----------------|----------|------------|
| 2005 | 6,743 | 12,515 | 27,315 | 65,392 |
| 2006 | 6,656 | 11,788 | 29,008 | 69,554 |
| 2007 | 6,301 | 11,496 | 28,964 | 70,088 |
| 2008 | 6,606 | 12,935 | 30,505 | 72,107 |
| 2009 | 6,908 | 12,670 | 31,237 | 74,602 |

Source: Source: Ohio Hospital Association Clinical Financial Database, Years 2005-2009

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TABLE 14

Ohio Hospital Discharge Rates per 10,000 Residents for Patients with a Primary Diagnosis of Asthma or Any Mention of Asthma, by Sex and Year, 2005-2009

| Year | Total | Lower CI | Upper CI | Male-Primary | Lower CI | Upper CI | Female-Primary | Lower CI | Upper CI | Male-Any | Lower CI | Upper CI | Female-Any | Lower CI | Upper CI |
|------|-------|----------|----------|--------------|----------|----------|----------------|----------|----------|----------|----------|----------|------------|----------|----------|
| 2005 | 16.7 | 16.4 | 18.8 | 12 | 11.7 | 14.1 | 21.2 | 20.8 | 23.3 | 48.7 | 48.1 | 49.2 | 110.8 | 110.0 | 111.7 |
| 2006 | 16 | 15.7 | 18.1 | 11.8 | 11.5 | 13.9 | 19.9 | 19.6 | 22.1 | 51.7 | 51.1 | 52.3 | 117.9 | 117.0 | 118.8 |
| 2007 | 15.4 | 15.2 | 17.5 | 11.2 | 10.9 | 13.3 | 19.5 | 19.1 | 21.6 | 51.6 | 51.0 | 52.2 | 118.8 | 117.9 | 119.7 |
| 2008 | 16.9 | 16.7 | 19 | 11.7 | 11.4 | 13.8 | 21.9 | 21.5 | 24 | 54.4 | 53.7 | 55.0 | 122.2 | 121.3 | 123.1 |
| 2009 | 17 | 16.7 | 19 | 12.3 | 12 | 14.4 | 21.4 | 21.1 | 23.6 | 55.7 | 55.0 | 56.3 | 126.5 | 125.6 | 127.4 |

Source: Ohio Hospital Association Clinical Financial Database, Years 2005-2009

TABLE 15

Ohio Hospital Discharges for Patients with a Primary Diagnosis of Asthma by Age Group and Year, 2004-2009

| Age Group | Year | | | | | |
|-----------|-------|-------|-------|-------|-------|-------|
| | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 |
| 0-4 | 2,490 | 2,620 | 2,628 | 2,271 | 2,187 | 2,222 |
| 5-14 | 2,035 | 2,081 | 1,818 | 1,858 | 1,746 | 2,053 |
| 15-34 | 2,025 | 2,076 | 2,041 | 2,017 | 2,081 | 2,191 |
| 35-64 | 7,049 | 7,963 | 7,626 | 7,556 | 8,637 | 8,533 |
| 65+ | 4,062 | 4,518 | 4,331 | 4,095 | 4,890 | 4,579 |

Source: Ohio Hospital Association Clinical Financial Database, Years 2004-2009

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TABLE 16 Ohio Hospital Discharge Rates per 10,000 Residents for Patients with a Primary Diagnosis of Asthma by Age Group and Year, 2004-2009

| Age Group | Year | | | | | | | | |
|-----------|------|----------|----------|------|----------|----------|------|----------|----------|
| | 2004 | Lower CI | Upper CI | 2005 | Lower CI | Upper CI | 2006 | Lower CI | Upper CI |
| 0-4 | 33.6 | 32.3 | 36.2 | 35.3 | 34.0 | 38.0 | 35.5 | 34.1 | 38.1 |
| 5-14 | 13.3 | 12.8 | 15.6 | 13.6 | 13.1 | 15.9 | 11.9 | 11.4 | 14.2 |
| 15-34 | 6.7 | 6.4 | 8.8 | 6.8 | 6.5 | 8.9 | 6.7 | 6.4 | 8.8 |
| 35-64 | 15.2 | 14.8 | 17.3 | 17.2 | 16.8 | 19.3 | 16.4 | 16.1 | 18.6 |
| 65+ | 26.0 | 25.2 | 28.4 | 28.9 | 28.1 | 31.3 | 27.7 | 26.9 | 30.1 |

| Age Group | | | | | | | | | |
|-----------|------|----------|----------|------|----------|----------|------|----------|----------|
| | 2007 | Lower CI | Upper CI | 2008 | Lower CI | Upper CI | 2009 | Lower CI | Upper CI |
| 0-4 | 30.6 | 29.4 | 33.2 | 29.5 | 28.3 | 32.1 | 30.0 | 28.7 | 32.6 |
| 5-14 | 12.2 | 11.6 | 14.4 | 11.5 | 10.9 | 13.7 | 13.5 | 12.9 | 15.7 |
| 15-34 | 6.6 | 6.3 | 8.7 | 6.8 | 6.5 | 8.9 | 7.2 | 6.9 | 9.3 |
| 35-64 | 16.3 | 15.9 | 18.4 | 18.6 | 18.2 | 20.8 | 18.4 | 18.0 | 20.5 |
| 65+ | 26.2 | 25.4 | 28.6 | 31.3 | 30.4 | 33.7 | 29.3 | 28.4 | 31.7 |

Source: Ohio Hospital Association Clinical Financial Data Base, Years 2004-2009

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TABLE 17

Number of Inpatient Hospital Discharges in Ohio for Patients with a Primary Diagnosis of Asthma by Age Group and Year, 2004-2009

| Age Group | Year | | | | | | | | |
|-----------|------|----------|----------|------|----------|----------|------|----------|----------|
| | 2004 | Lower CI | Upper CI | 2005 | Lower CI | Upper CI | 2006 | Lower CI | Upper CI |
| 0-4 | 33.6 | 32.3 | 36.2 | 35.3 | 34 | 38 | 35.5 | 34.1 | 38.1 |
| 14-May | 13.3 | 12.8 | 15.6 | 13.6 | 13.1 | 15.9 | 11.9 | 11.4 | 14.2 |
| 15-34 | 6.7 | 6.4 | 8.8 | 6.8 | 6.5 | 8.9 | 6.7 | 6.4 | 8.8 |
| 35-64 | 15.2 | 14.8 | 17.3 | 17.2 | 16.8 | 19.3 | 16.4 | 16.1 | 18.6 |
| 65+ | 26 | 25.2 | 28.4 | 28.9 | 28.1 | 31.3 | 27.7 | 26.9 | 30.1 |

Source: Ohio Hospital Association Clinical Financial Data Base, Years 2004-2009



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TABLE 18 Number of Ohio Inpatient Hospital Discharges and Hospital Discharge Rates per 10,000 Residents for Patients with a Primary Diagnosis of Asthma, by County and Sex, 2007-2009

| County | Male Number | Female Number | Total Number | Male | Lower Confidence Level | Upper Confidence Level | Female | Lower Confidence Level | Upper Confidence Level | Total | Lower Confidence Level | Upper Confidence Level | Significantly Different From State Average |
|------------|-------------|---------------|--------------|------|------------------------|------------------------|--------|------------------------|------------------------|-------|------------------------|------------------------|--|
| Adams | 38 | 99 | 137 | 9.1 | 6.2 | 12.0 | 23.2 | 18.6 | 27.8 | 16.2 | 13.5 | 18.9 | No |
| Allen | 200 | 269 | 469 | 12.8 | 11.0 | 14.6 | 16.9 | 14.9 | 19.0 | 14.9 | 13.5 | 16.2 | No |
| Ashland | 47 | 81 | 128 | 5.8 | 4.2 | 7.5 | 9.7 | 7.6 | 11.9 | 7.8 | 6.5 | 9.2 | Lower |
| Ashtabula | 158 | 371 | 529 | 10.6 | 8.9 | 12.2 | 24.0 | 21.5 | 26.4 | 17.4 | 15.9 | 18.9 | No |
| Athens | 26 | 42 | 68 | 2.8 | 1.7 | 3.9 | 4.3 | 3.0 | 5.7 | 3.6 | 2.7 | 4.4 | Lower |
| Auglaize | 53 | 86 | 139 | 7.7 | 5.6 | 9.8 | 12.1 | 9.5 | 14.6 | 9.9 | 8.3 | 11.6 | Lower |
| Belmont | 44 | 131 | 175 | 4.3 | 3.0 | 5.6 | 12.8 | 10.6 | 14.9 | 8.5 | 7.3 | 9.8 | Lower |
| Brown | 38 | 113 | 151 | 5.8 | 4.0 | 7.7 | 17.0 | 13.9 | 20.2 | 11.5 | 9.7 | 13.3 | Lower |
| Butler | 450 | 824 | 1,274 | 8.6 | 7.8 | 9.4 | 15.1 | 14.1 | 16.1 | 11.9 | 11.2 | 12.6 | Lower |
| Carroll | 13 | 46 | 59 | 3.0 | 1.4 | 4.7 | 10.6 | 7.5 | 13.6 | 6.8 | 5.1 | 8.6 | Lower |
| Champaign | 46 | 93 | 139 | 7.9 | 5.6 | 10.1 | 15.5 | 12.3 | 18.6 | 11.7 | 9.8 | 13.7 | Lower |
| Clark | 309 | 534 | 843 | 15.2 | 13.5 | 16.9 | 24.5 | 22.4 | 26.6 | 20.0 | 18.7 | 21.4 | Higher |
| Clermont | 198 | 426 | 624 | 6.9 | 6.0 | 7.9 | 14.5 | 13.1 | 15.9 | 10.8 | 9.9 | 11.6 | Lower |
| Clinton | 45 | 98 | 143 | 7.2 | 5.1 | 9.3 | 14.9 | 11.9 | 17.8 | 11.1 | 9.3 | 13.0 | Lower |
| Columbiana | 254 | 434 | 688 | 15.6 | 13.7 | 17.5 | 26.6 | 24.1 | 29.1 | 21.1 | 20.1 | 22.1 | High |
| Coshocton | 30 | 69 | 99 | 5.6 | 3.6 | 7.7 | 12.4 | 9.5 | 15.4 | 9.1 | 7.3 | 10.9 | Lower |
| Crawford | 22 | 44 | 66 | 3.4 | 2.0 | 4.9 | 6.4 | 4.5 | 8.3 | 5.0 | 3.8 | 6.2 | Lower |
| Cuyahoga | 3,823 | 7,324 | 11,148 | 20.8 | 20.1 | 21.4 | 35.8 | 34.9 | 36.6 | 28.7 | 28.1 | 29.2 | Higher |
| Darke | 33 | 89 | 122 | 4.3 | 2.8 | 5.8 | 11.2 | 8.9 | 13.5 | 7.8 | 6.4 | 9.2 | Lower |
| Defiance | 54 | 89 | 143 | 9.5 | 6.9 | 12.0 | 15.2 | 12.0 | 18.4 | 12.4 | 10.3 | 14.4 | No |
| Delaware | 102 | 173 | 275 | 4.3 | 3.4 | 5.1 | 7.2 | 6.1 | 8.3 | 5.7 | 5.1 | 6.4 | Lower |
| Erie | 168 | 296 | 464 | 14.8 | 12.5 | 17.0 | 25.0 | 22.1 | 27.8 | 20.0 | 18.2 | 21.8 | Higher |
| Fairfield | 89 | 173 | 262 | 4.2 | 3.4 | 5.1 | 8.2 | 6.9 | 9.4 | 6.2 | 5.4 | 7.0 | Lower |
| Fayette | 16 | 53 | 69 | 3.9 | 2.0 | 5.7 | 12.3 | 9.0 | 15.6 | 8.2 | 6.2 | 10.1 | Lower |
| Franklin | 1,952 | 2,961 | 4,913 | 11.9 | 11.3 | 12.4 | 17.2 | 16.5 | 17.8 | 14.6 | 14.2 | 15.0 | No |
| Fulton | 45 | 82 | 127 | 7.2 | 5.1 | 9.3 | 12.7 | 9.9 | 15.4 | 10.0 | 8.2 | 11.7 | Lower |
| Gallia | 63 | 136 | 199 | 13.9 | 10.5 | 17.3 | 28.8 | 24.0 | 33.7 | 21.5 | 18.5 | 24.5 | No |
| Geauga | 81 | 226 | 307 | 5.5 | 4.3 | 6.8 | 15.2 | 13.2 | 17.2 | 10.4 | 9.3 | 11.6 | Lower |
| Greene | 159 | 240 | 399 | 6.9 | 5.8 | 7.9 | 9.8 | 8.6 | 11.1 | 8.4 | 7.6 | 9.2 | No |
| Guernsey | 46 | 93 | 139 | 7.8 | 5.6 | 10.1 | 15.0 | 11.9 | 18.0 | 11.5 | 9.6 | 13.4 | Lower |
| Hamilton | 1,599 | 2,911 | 4,510 | 13.1 | 12.4 | 13.7 | 21.8 | 21.1 | 22.6 | 17.6 | 17.1 | 18.2 | Higher |
| Hancock | 38 | 91 | 129 | 3.5 | 2.4 | 4.6 | 8.0 | 6.3 | 9.6 | 5.8 | 4.8 | 6.8 | Lower |
| Hardin | 26 | 58 | 84 | 5.6 | 3.4 | 7.7 | 11.9 | 8.9 | 15.0 | 8.8 | 6.9 | 10.7 | Lower |
| Harrison | 45 | 74 | 119 | 19.9 | 14.1 | 25.7 | 31.3 | 24.1 | 38.4 | 25.7 | 21.1 | 30.3 | Higher |
| Henry | 31 | 48 | 79 | 7.2 | 4.7 | 9.8 | 10.9 | 7.8 | 14.0 | 9.1 | 7.1 | 11.1 | Lower |
| Highland | 43 | 89 | 132 | 6.9 | 4.8 | 8.9 | 13.8 | 10.9 | 16.7 | 10.4 | 8.6 | 12.2 | Lower |
| Hocking | 24 | 47 | 71 | 5.6 | 3.4 | 7.8 | 10.7 | 7.7 | 13.8 | 8.2 | 6.3 | 10.1 | Lower |
| Holmes | 19 | 55 | 74 | 3.1 | 1.7 | 4.4 | 8.8 | 6.5 | 11.2 | 6.0 | 4.6 | 7.3 | Lower |
| Huron | 123 | 196 | 319 | 13.9 | 11.4 | 16.4 | 21.4 | 18.4 | 24.4 | 17.7 | 15.8 | 19.7 | Higher |

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Table 18 continued from page 62

| | | | | | | | | | | | | | |
|------------|-------|-------|-------|------|------|------|------|------|------|------|------|------|--------|
| Jackson | 38 | 91 | 129 | 7.9 | 5.4 | 10.4 | 17.5 | 13.9 | 21.1 | 12.9 | 10.7 | 15.1 | Lower |
| Jefferson | 157 | 338 | 495 | 15.9 | 13.4 | 18.4 | 31.4 | 28.0 | 34.7 | 24.0 | 21.9 | 26.1 | Higher |
| Knox | 65 | 155 | 220 | 7.5 | 5.7 | 9.4 | 17.2 | 14.5 | 19.9 | 12.5 | 10.8 | 14.1 | Lower |
| Lake | 281 | 571 | 852 | 8.2 | 7.2 | 9.1 | 15.9 | 14.6 | 17.2 | 12.1 | 11.3 | 12.9 | Lower |
| Lawrence | 74 | 146 | 220 | 8.2 | 6.3 | 10.1 | 14.9 | 12.5 | 17.3 | 11.7 | 10.2 | 13.2 | Lower |
| Licking | 127 | 280 | 407 | 5.5 | 4.6 | 6.5 | 11.7 | 10.3 | 13.0 | 8.7 | 7.8 | 9.5 | Lower |
| Logan | 38 | 78 | 116 | 5.6 | 3.8 | 7.3 | 11.0 | 8.5 | 13.4 | 8.3 | 6.8 | 9.8 | Lower |
| Lorain | 625 | 1,174 | 1,799 | 14.0 | 12.9 | 15.1 | 25.5 | 24.0 | 26.9 | 19.8 | 18.9 | 20.7 | Higher |
| Lucas | 1,053 | 1,621 | 2,674 | 15.6 | 14.7 | 16.6 | 22.5 | 21.4 | 23.6 | 19.2 | 18.4 | 19.9 | Higher |
| Madison | 41 | 90 | 131 | 6.0 | 4.2 | 7.8 | 15.9 | 12.7 | 19.2 | 10.5 | 8.7 | 12.3 | Lower |
| Mahoning | 501 | 849 | 1,351 | 14.4 | 13.2 | 15.7 | 22.6 | 21.0 | 24.1 | 18.7 | 17.7 | 19.7 | Higher |
| Marion | 155 | 304 | 459 | 15.0 | 12.6 | 17.3 | 32.6 | 28.9 | 36.3 | 23.3 | 21.2 | 25.5 | Higher |
| Medina | 144 | 265 | 409 | 5.7 | 4.8 | 6.6 | 10.3 | 9.1 | 11.5 | 8.0 | 7.2 | 8.8 | Lower |
| Meigs | 39 | 39 | 78 | 11.6 | 8.0 | 15.3 | 11.1 | 7.6 | 14.6 | 11.4 | 8.8 | 13.9 | Lower |
| Mercer | 16 | 35 | 51 | 2.6 | 1.3 | 3.9 | 5.7 | 3.8 | 7.6 | 4.2 | 3.0 | 5.3 | Lower |
| Miami | 149 | 281 | 430 | 10.0 | 8.4 | 11.6 | 18.3 | 16.1 | 20.4 | 14.2 | 12.9 | 15.5 | No |
| Monroe | 2 | 15 | 17 | 0.9 | -0.4 | 2.2 | 7.0 | 3.4 | 10.5 | 4.0 | 2.1 | 5.9 | Lower |
| Montgomery | 1,152 | 1,868 | 3,020 | 14.9 | 14.0 | 15.7 | 22.3 | 21.3 | 23.3 | 18.7 | 18.0 | 19.4 | Higher |
| Morgan | 16 | 25 | 41 | 7.4 | 3.8 | 11.1 | 11.4 | 6.9 | 15.8 | 9.4 | 6.5 | 12.3 | No |
| Morrow | 24 | 43 | 67 | 4.6 | 2.8 | 6.5 | 8.3 | 5.9 | 10.8 | 6.5 | 4.9 | 8.0 | Lower |
| Muskingum | 113 | 267 | 380 | 9.2 | 7.5 | 10.9 | 20.1 | 17.7 | 22.5 | 14.9 | 13.4 | 16.4 | Lower |
| Noble | 14 | 22 | 36 | 5.6 | 2.7 | 8.5 | 12.4 | 7.2 | 17.6 | 8.4 | 5.7 | 11.2 | Lower |
| Ottawa | 57 | 134 | 191 | 9.4 | 6.9 | 11.8 | 21.4 | 17.8 | 25.1 | 15.5 | 13.3 | 17.7 | No |
| Paulding | 28 | 30 | 58 | 9.8 | 6.2 | 13.4 | 10.4 | 6.7 | 14.1 | 10.1 | 7.5 | 12.7 | No |
| Perry | 37 | 63 | 100 | 7.1 | 4.8 | 9.3 | 11.9 | 9.0 | 14.9 | 9.5 | 7.6 | 11.4 | Lower |
| Pickaway | 65 | 83 | 148 | 7.5 | 5.7 | 9.3 | 11.1 | 8.7 | 13.5 | 9.2 | 7.7 | 10.6 | Lower |
| Pike | 27 | 79 | 106 | 6.5 | 4.1 | 9.0 | 18.7 | 14.6 | 22.9 | 12.7 | 10.3 | 15.1 | Lower |
| Portage | 188 | 333 | 521 | 8.2 | 7.1 | 9.4 | 13.9 | 12.4 | 15.4 | 11.1 | 10.2 | 12.1 | Lower |
| Preble | 55 | 93 | 148 | 8.8 | 6.5 | 11.2 | 14.8 | 11.8 | 17.8 | 11.8 | 9.9 | 13.7 | No |
| Putnam | 30 | 44 | 74 | 5.8 | 3.7 | 7.9 | 8.5 | 6.0 | 11.0 | 7.1 | 5.5 | 8.8 | Lower |
| Richland | 119 | 262 | 381 | 6.2 | 5.1 | 7.3 | 14.1 | 12.4 | 15.8 | 10.1 | 9.1 | 11.1 | Lower |
| Ross | 123 | 214 | 337 | 10.3 | 8.5 | 12.1 | 19.9 | 17.3 | 22.6 | 14.9 | 13.3 | 16.4 | No |
| Sandusky | 103 | 144 | 247 | 11.5 | 9.3 | 13.7 | 15.6 | 13.1 | 18.2 | 13.6 | 11.9 | 15.3 | No |
| Scioto | 108 | 189 | 297 | 9.7 | 7.8 | 11.5 | 16.1 | 13.8 | 18.4 | 13.0 | 11.5 | 14.4 | No |
| Seneca | 54 | 113 | 167 | 6.4 | 4.7 | 8.1 | 13.1 | 10.7 | 15.6 | 9.8 | 8.3 | 11.3 | Lower |
| Shelby | 37 | 55 | 92 | 5.0 | 3.4 | 6.7 | 7.6 | 5.6 | 9.5 | 6.3 | 5.0 | 7.6 | Lower |
| Stark | 531 | 1,133 | 1,664 | 9.7 | 8.8 | 10.5 | 19.2 | 18.1 | 20.3 | 14.6 | 13.9 | 15.3 | Lower |
| Summit | 855 | 1,561 | 2,416 | 10.8 | 10.1 | 11.6 | 18.5 | 17.6 | 19.4 | 14.8 | 14.2 | 15.4 | No |
| Trumbull | 389 | 853 | 1,242 | 12.5 | 11.3 | 13.8 | 25.9 | 24.2 | 27.6 | 19.4 | 18.3 | 20.5 | No |
| Tuscarawas | 154 | 236 | 390 | 11.5 | 9.7 | 13.3 | 16.9 | 14.7 | 19.0 | 14.2 | 12.8 | 15.7 | No |
| Union | 29 | 78 | 107 | 4.3 | 2.7 | 5.8 | 10.5 | 8.2 | 12.9 | 7.5 | 6.1 | 8.9 | Lower |

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Table 18 continued from page 63

| | | | | | | | | | | | | | |
|--------------------|---------------|---------------|---------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-----------|
| Van Wert | 14 | 32 | 46 | 3.3 | 1.6 | 5.1 | 7.2 | 4.7 | 9.7 | 5.3 | 3.8 | 6.9 | Lower |
| Vinton | 11 | 36 | 47 | 5.6 | 2.3 | 8.9 | 17.9 | 12.1 | 23.8 | 11.8 | 8.4 | 15.2 | Lower |
| Warren | 145 | 350 | 495 | 4.7 | 3.9 | 5.5 | 11.7 | 10.4 | 12.9 | 8.1 | 7.4 | 8.8 | Lower |
| Washington | 69 | 129 | 198 | 7.7 | 5.9 | 9.5 | 13.7 | 11.3 | 16.0 | 10.7 | 9.2 | 12.2 | Lower |
| Wayne | 99 | 274 | 373 | 5.8 | 4.7 | 7.0 | 15.9 | 14.0 | 17.8 | 10.9 | 9.8 | 12.0 | No |
| Williams | 55 | 96 | 151 | 9.6 | 7.1 | 12.2 | 16.7 | 13.4 | 20.1 | 13.2 | 11.1 | 15.3 | No |
| Wood | 126 | 199 | 325 | 6.9 | 5.7 | 8.2 | 10.3 | 8.9 | 11.7 | 8.7 | 7.7 | 9.6 | Lower |
| Wyandot | 10 | 26 | 36 | 3.0 | 1.2 | 4.9 | 7.5 | 4.6 | 10.4 | 5.3 | 3.6 | 7.1 | Lower |
| Total State | 18,892 | 34,660 | 53,554 | 11.8 | 11.6 | 12.0 | 20.3 | 20.1 | 20.5 | 16.2 | 16.0 | 16.3 | No |

Source: Ohio Hospital Association Clinical Financial Database, Years 2007-2009

TABLE 19 Average Length of Stay In Days for Inpatient Hospital Stays for Patients in Ohio with a Primary Diagnosis of Asthma by Sex and Year, 2004-2009

| Year | Male | Female | All |
|------|------|--------|-----|
| 2004 | 2.8 | 3.7 | 3.4 |
| 2005 | 2.8 | 3.8 | 3.4 |
| 2006 | 2.8 | 3.7 | 3.4 |
| 2007 | 2.9 | 3.7 | 3.4 |
| 2008 | 3.1 | 3.9 | 3.6 |
| 2009 | 3.0 | 3.8 | 3.5 |

Source: Ohio Hospital Association Clinical Financial Data Base, Years 2004-2009

TABLE 20 Average Length of Stay In Days for Inpatient Hospital Stays for Patients in Ohio with a Primary Diagnosis of Asthma, by Age Group and Year, 2004-2009

| Age | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 |
|-------|------|------|------|------|------|------|
| 0-4 | 2.0 | 1.9 | 1.9 | 2.0 | 1.9 | 2.0 |
| 5-14 | 2.0 | 2.1 | 2.1 | 2.1 | 2.1 | 2.2 |
| 15-34 | 2.7 | 2.7 | 2.6 | 2.6 | 2.8 | 2.8 |
| 35-64 | 3.7 | 3.7 | 3.7 | 3.7 | 3.8 | 3.8 |
| 65+ | 4.8 | 4.7 | 4.6 | 4.7 | 3.9 | 3.9 |

Source: Ohio Hospital Association Clinical Financial Database, Years 2004-2009

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TABLE 21 Number and Rate of Emergency Department Visits for Patients with a Primary Diagnosis of Asthma, by Age Group, Ohio, 2009

| Ohio | | | |
|-------------------|----------------|-----------|-------------|
| | 2009 | | |
| | N of ED Visits | 2009 Pop. | Crude Rate |
| Total | 117,853 | | 56.8 |
| Age Groups | | | |
| Under 5 years | 9691 | 739,526 | 131.0 |
| 5 to 9 years | 7219 | 741,201 | 97.4 |
| 10 to 14 years | 5428 | 753,156 | 72.0 |
| 15 to 17 years | 2975 | 480,458 | 61.9 |
| 18 to 19 years | 2604 | 329,733 | 78.9 |
| 20 to 24 years | 6102 | 754,760 | 80.8 |
| 25 to 29 years | 5260 | 763,995 | 68.8 |
| 30 to 34 years | 4633 | 714,238 | 64.8 |
| 35 to 39 years | 4510 | 740,615 | 60.9 |
| 40 to 44 years | 4256 | 779,303 | 54.6 |
| 45 to 49 years | 3891 | 875,953 | 44.4 |
| 50 to 54 years | 3060 | 878,313 | 34.8 |
| 55 to 59 years | 1881 | 762,510 | 24.6 |
| 60 to 64 years | 1214 | 623,568 | 19.4 |
| 65 to 69 years | 769 | 467,090 | 16.4 |
| 70 to 74 years | 531 | 368,691 | 14.4 |
| 75 to 79 years | 340 | 299,075 | 11.3 |
| 80 to 84 years | 252 | 243,040 | 10.3 |
| 85 years or more | 204 | 227,420 | 8.9 |
| | 2096 | 1,605,316 | 13.0 |

Source: Ohio Hospital Association Clinical Financial Database, Year, 2009

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TABLE 22 Emergency Department Visit Rates per 10,000 Residents for Patients with a Primary Diagnosis of Asthma, by Sex and Year, Ohio, 2005-2009

SEX

| Year | Male | Lower CI | Upper CI | Female | Lower CI | Upper CI | Total | Lower CI | Upper CI |
|------|------|----------|----------|--------|----------|----------|-------|----------|----------|
| 2005 | 48 | 47.4 | 50.2 | 55.2 | 54.6 | 57.5 | 51.7 | 51.3 | 53.9 |
| 2006 | 50 | 49.4 | 52.3 | 56.3 | 55.7 | 58.6 | 53.2 | 52.8 | 55.4 |
| 2007 | 49.1 | 48.5 | 51.3 | 56.4 | 55.8 | 58.7 | 52.8 | 52.4 | 55 |
| 2008 | 49.2 | 48.6 | 51.4 | 57 | 56.4 | 59.2 | 53.2 | 52.8 | 55.4 |
| 2009 | 49.5 | 48.9 | 51.8 | 55.7 | 55.1 | 58 | 52.7 | 52.3 | 54.9 |

Source: Ohio Hospital Association Clinical Financial Database, Years, 2005- 2009

TABLE 23 Emergency Department Visits for Patients with a Primary Diagnosis of Asthma, by Age Group and Year, Ohio, 2005-2009

AGE GROUP

| Year | 0-4 | 5-14 | 15-34 | 35-64 | 65+ | Total |
|------|--------|--------|--------|--------|-------|--------|
| 2005 | 10,622 | 12,131 | 20,525 | 18,440 | 2,481 | 64,199 |
| 2006 | 11,106 | 12,303 | 20,763 | 18,899 | 2,427 | 65,498 |
| 2007 | 9,393 | 11,905 | 21,746 | 19,704 | 2,302 | 65,050 |
| 2008 | 10,066 | 11,867 | 21,111 | 20,129 | 2,361 | 65,534 |
| 2009 | 11,077 | 12,731 | 22,747 | 21,743 | 2,539 | 70,837 |

Source: Ohio Hospital Association Clinical Financial Database, Years, 2005-2009

TABLE 24 Emergency Department Visit Rates per 10,000 Residents for Patients with a Primary Diagnosis of Asthma, by Age Group and Year, Ohio, 2005-2009

| Age | 2005 | Upper CI | Lower CI | 2006 | Upper CI | Lower CI | 2007 | Upper CI | Lower CI | 2008 | Upper CI | Lower CI | 2009 | Upper CI | Lower CI |
|-------|------|----------|----------|-------|----------|----------|-------|----------|----------|-------|----------|----------|-------|----------|----------|
| 0-4 | 33.6 | 32.3 | 36.2 | 143.3 | 140.6 | 146.6 | 149.8 | 147.0 | 153.2 | 126.7 | 124.2 | 130.0 | 135.9 | 133.1 | 139.1 |
| 5-14 | 13.3 | 12.8 | 15.6 | 79.6 | 78.2 | 82.3 | 80.7 | 79.3 | 83.4 | 78.1 | 76.7 | 80.8 | 84.7 | 76.4 | 80.5 |
| 15-34 | 6.7 | 6.4 | 8.8 | 67.5 | 66.5 | 69.9 | 68.2 | 67.3 | 70.7 | 71.5 | 70.5 | 73.9 | 70.7 | 68.4 | 71.8 |
| 35-64 | 15.2 | 14.8 | 17.3 | 39.7 | 39.2 | 42.0 | 40.7 | 40.1 | 43.0 | 42.5 | 41.9 | 44.7 | 43.1 | 42.8 | 45.6 |
| 65+ | 26.0 | 25.2 | 28.4 | 15.9 | 15.2 | 18.2 | 15.5 | 14.9 | 17.8 | 14.7 | 14.1 | 17.0 | 13.6 | 14.5 | 17.4 |

Source: Ohio Hospital Association Clinical Financial Database, Years, 2005-2009

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TABLE 25

Number of Emergency Department Visits for Patients with
a Primary Diagnosis of Asthma, by County and Year, Ohio, 2005-2009

| County | 2005 | 2006 | 2007 | 2008 | 2009 |
|------------|-------|--------|-------|--------|-------|
| Adams | 208 | 183 | 157 | 142 | 164 |
| Allen | 740 | 777 | 764 | 841 | 829 |
| Ashland | 233 | 207 | 234 | 293 | 282 |
| Ashtabula | 641 | 637 | 606 | 715 | 581 |
| Athens | 250 | 192 | 161 | 173 | 130 |
| Auglaize | 275 | 204 | 185 | 171 | 169 |
| Belmont | 170 | 164 | 177 | 190 | 173 |
| Brown | 183 | 151 | 142 | 201 | 126 |
| Butler | 1,671 | 1,757 | 1,637 | 1,936 | 1,937 |
| Carroll | 76 | 68 | 58 | 64 | 53 |
| Champaign | 106 | 139 | 198 | 259 | 304 |
| Clark | 529 | 606 | 881 | 914 | 1,169 |
| Clermont | 923 | 846 | 834 | 880 | 782 |
| Clinton | 209 | 228 | 252 | 260 | 327 |
| Columbiana | 592 | 614 | 590 | 726 | 663 |
| Coshocton | 130 | 123 | 135 | 156 | 147 |
| Crawford | 259 | 212 | 205 | 247 | 200 |
| Cuyahoga | 4,451 | 10,094 | 9,456 | 10,042 | 8,409 |
| Darke | 165 | 168 | 218 | 217 | 245 |
| Defiance | 194 | 248 | 222 | 275 | 227 |
| Delaware | 587 | 567 | 452 | 421 | 412 |
| Erie | 853 | 810 | 841 | 735 | 693 |
| Fairfield | 534 | 377 | 389 | 435 | 427 |
| Fayette | 162 | 153 | 108 | 134 | 134 |
| Franklin | 7,645 | 8,115 | 6,083 | 6,794 | 6,029 |
| Fulton | 192 | 191 | 154 | 193 | 181 |
| Gallia | 93 | 66 | 63 | 63 | 75 |
| Geauga | 129 | 173 | 157 | 174 | 147 |
| Greene | 623 | 653 | 607 | 686 | 646 |
| Guernsey | 170 | 188 | 174 | 148 | 39 |
| Hamilton | 6,048 | 5,925 | 5,865 | 6,875 | 5,806 |
| Hancock | 312 | 250 | 259 | 329 | 266 |
| Hardin | 250 | 223 | 190 | 156 | 149 |
| Harrison | 84 | 79 | 81 | 99 | 62 |
| Henry | 158 | 160 | 151 | 177 | 127 |

Table 25 continued to page 68

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Table 25 continued from page 67

| | | | | | |
|------------|-------|-------|-------|-------|-------|
| Highland | 228 | 226 | 234 | 213 | 254 |
| Hocking | 204 | 228 | 196 | 238 | 175 |
| Holmes | 102 | 109 | 136 | 123 | 104 |
| Huron | 401 | 373 | 356 | 338 | 316 |
| Jackson | 141 | 105 | 99 | 132 | 123 |
| Jefferson | 371 | 303 | 216 | 285 | 293 |
| Knox | 258 | 242 | 236 | 267 | 292 |
| Lake | 1,033 | 1,110 | 1,091 | 1,093 | 1,001 |
| Lawrence | 188 | 114 | 124 | 112 | 115 |
| Licking | 612 | 499 | 506 | 625 | 558 |
| Logan | 209 | 183 | 190 | 229 | 169 |
| Lorain | 1,757 | 1,934 | 1,885 | 2,119 | 1,848 |
| Lucas | 3,818 | 4,017 | 3,639 | 3,741 | 3,249 |
| Madison | 211 | 183 | 173 | 166 | 198 |
| Mahoning | 1,509 | 1,517 | 1,478 | 1,763 | 1,664 |
| Marion | 233 | 412 | 404 | 370 | 374 |
| Medina | 532 | 588 | 498 | 608 | 586 |
| Meigs | 32 | 19 | 25 | 18 | 23 |
| Mercer | 107 | 95 | 103 | 83 | 88 |
| Miami | 530 | 455 | 466 | 455 | 445 |
| Monroe | 29 | 22 | 19 | 19 | 14 |
| Montgomery | 3,728 | 3,518 | 3,107 | 3,457 | 3,456 |
| Morgan | 31 | 34 | 47 | 44 | 19 |
| Morrow | 143 | 145 | 136 | 92 | 111 |
| Muskingum | 362 | 428 | 361 | 539 | 386 |
| Noble | 27 | 28 | 29 | 27 | 13 |
| Ottawa | 258 | 273 | 246 | 212 | 222 |
| Paulding | 99 | 98 | 83 | 109 | 69 |
| Perry | 85 | 132 | 115 | 149 | 124 |
| Pickaway | 300 | 266 | 289 | 296 | 271 |
| Pike | 153 | 153 | 135 | 142 | 116 |
| Portage | 483 | 611 | 519 | 490 | 520 |
| Preble | 131 | 127 | 96 | 84 | 89 |
| Putnam | 119 | 130 | 105 | 145 | 122 |
| Richland | 587 | 516 | 561 | 533 | 537 |
| Ross | 259 | 228 | 212 | 263 | 248 |
| Sandusky | 207 | 232 | 222 | 211 | 178 |
| Scioto | 613 | 492 | 483 | 519 | 478 |
| Seneca | 285 | 276 | 299 | 344 | 284 |

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Table 25 continued from page 68

| | | | | | |
|------------|-------|-------|-------|-------|-------|
| Shelby | 184 | 183 | 160 | 161 | 104 |
| Stark | 2,180 | 2,074 | 2,063 | 2,176 | 1,924 |
| Summit | 3,678 | 3,848 | 3,625 | 3,821 | 4,184 |
| Trumbull | 1,032 | 1,053 | 925 | 1,081 | 993 |
| Tuscarawas | 430 | 366 | 357 | 368 | 396 |
| Union | 173 | 135 | 156 | 178 | 168 |
| Van Wert | 100 | 90 | 100 | 87 | 71 |
| Vinton | 63 | 34 | 51 | 61 | 50 |
| Warren | 404 | 358 | 334 | 434 | 629 |
| Washington | 153 | 203 | 235 | 184 | 50 |
| Wayne | 491 | 473 | 462 | 561 | 464 |
| Williams | 24 | 101 | 227 | 167 | 132 |
| Wood | 441 | 383 | 415 | 384 | 347 |
| Wyandot | 100 | 105 | 88 | 92 | 82 |

Source: Ohio Hospital Association Clinical Financial Database, Years, 2005-2009



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TABLE 26

Number of Emergency Room Visit Rates for Patients with
a Primary Diagnosis of Asthma per 10,000 Residents by County and Sex, Ohio, 2009

| County | Male | Lower Confidence Level | Upper Confidence Level | Female | Lower Confidence Level | Upper Confidence Level | Total | Lower Confidence Level | Upper Confidence Level | Different from State Average |
|------------|------|------------------------------|------------------------------|--------|------------------------------|------------------------------|-------|------------------------------|------------------------------|------------------------------------|
| Adams | 51.3 | 46.0 | 54.0 | 65.3 | 59.3 | 71.2 | 58.3 | 56.3 | 60.4 | Higher |
| Allen | 65.7 | 62.6 | 67.3 | 81.5 | 78.0 | 84.9 | 73.7 | 72.5 | 74.8 | Higher |
| Ashland | 37.0 | 33.8 | 38.7 | 50.9 | 47.1 | 54.6 | 44.0 | 42.8 | 45.3 | No |
| Ashtabula | 54.4 | 51.5 | 55.9 | 67.1 | 64.0 | 70.3 | 60.9 | 59.8 | 62.0 | Higher |
| Athens | 24.7 | 22.2 | 25.9 | 31.4 | 28.6 | 34.1 | 28.1 | 27.2 | 29.0 | Lower |
| Auglaize | 38.3 | 34.7 | 40.2 | 45.5 | 41.6 | 49.3 | 42.0 | 40.6 | 43.3 | No |
| Belmont | 20.6 | 18.5 | 21.7 | 29.6 | 27.0 | 32.2 | 25.1 | 24.3 | 26.0 | Lower |
| Brown | 29.1 | 25.9 | 30.8 | 41.8 | 38.0 | 45.6 | 35.6 | 34.3 | 36.8 | No |
| Butler | 44.4 | 43.0 | 45.1 | 52.2 | 50.7 | 53.6 | 48.4 | 47.8 | 48.9 | No |
| Carroll | 15.0 | 12.2 | 16.5 | 28.5 | 24.6 | 32.4 | 21.8 | 20.6 | 23.1 | Lower |
| Champaign | 42.8 | 38.7 | 44.9 | 54.7 | 50.2 | 59.3 | 48.9 | 47.3 | 50.4 | No |
| Clark | 51.4 | 49.0 | 52.6 | 61.8 | 59.3 | 64.4 | 56.8 | 55.9 | 57.7 | Higher |
| Clermont | 35.8 | 34.1 | 36.7 | 49.6 | 47.6 | 51.5 | 42.8 | 42.1 | 43.5 | No |
| Clinton | 51.3 | 47.0 | 53.5 | 65.1 | 60.3 | 69.8 | 58.4 | 56.7 | 60.0 | Higher |
| Columbiana | 46.5 | 43.9 | 47.8 | 67.4 | 64.3 | 70.5 | 57.0 | 55.9 | 58.0 | Higher |
| Coshocton | 28.3 | 24.8 | 30.1 | 45.7 | 41.3 | 50.0 | 37.2 | 35.7 | 38.6 | No |
| Crawford | 47.7 | 43.6 | 49.9 | 51.3 | 47.1 | 55.4 | 49.6 | 48.1 | 51.1 | No |
| Cuyahoga | 62.3 | 61.5 | 62.8 | 64.4 | 63.5 | 65.2 | 63.4 | 63.1 | 63.7 | Higher |
| Darke | 32.5 | 29.4 | 34.1 | 43.3 | 39.8 | 46.8 | 38.0 | 36.8 | 39.2 | No |
| Defiance | 58.4 | 53.6 | 60.9 | 59.4 | 54.6 | 64.3 | 58.9 | 57.2 | 60.7 | Higher |
| Delaware | 27.7 | 26.1 | 28.5 | 31.2 | 29.4 | 32.9 | 29.4 | 28.8 | 30.0 | Lower |
| Erie | 91.8 | 87.5 | 94.0 | 105.7 | 101.2 | 110.3 | 98.9 | 97.3 | 100.5 | Higher |
| Fairfield | 27.2 | 25.5 | 28.1 | 33.0 | 31.1 | 34.9 | 30.1 | 29.4 | 30.7 | Lower |
| Fayette | 38.9 | 34.2 | 41.2 | 56.0 | 50.5 | 61.4 | 47.6 | 45.7 | 49.4 | No |
| Franklin | 58.9 | 58.0 | 59.4 | 60.7 | 59.8 | 61.6 | 59.8 | 59.5 | 60.2 | Higher |
| Fulton | 34.1 | 30.6 | 36.0 | 48.9 | 44.7 | 53.0 | 41.6 | 40.2 | 43.0 | No |
| Gallia | 16.0 | 13.2 | 17.5 | 29.4 | 25.6 | 33.1 | 22.8 | 21.6 | 24.0 | Lower |
| Geauga | 14.0 | 12.5 | 14.7 | 16.9 | 15.3 | 18.6 | 15.5 | 14.9 | 16.0 | Lower |
| Greene | 35.0 | 33.1 | 35.9 | 43.5 | 41.5 | 45.6 | 39.4 | 38.7 | 40.1 | No |
| Guernsey | 27.9 | 24.6 | 29.5 | 39.9 | 36.1 | 43.8 | 34.1 | 32.8 | 35.4 | No |
| Hamilton | 69.3 | 68.1 | 69.8 | 70.1 | 69.0 | 71.2 | 69.7 | 69.3 | 70.1 | Higher |
| Hancock | 33.2 | 30.5 | 34.5 | 40.7 | 37.9 | 43.6 | 37.1 | 36.1 | 38.1 | No |
| Hardin | 53.3 | 48.1 | 55.9 | 65.6 | 60.0 | 71.1 | 59.5 | 57.6 | 61.5 | Higher |
| Harrison | 41.4 | 34.9 | 44.7 | 58.6 | 51.0 | 66.1 | 50.2 | 47.6 | 52.7 | No |

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Table 26 continued from page 70

| | | | | | | | | | | |
|------------|------|------|------|------|------|------|------|------|------|--------|
| Henry | 42.4 | 37.6 | 44.8 | 60.9 | 55.3 | 66.6 | 51.8 | 49.9 | 53.7 | No |
| Highland | 45.9 | 41.8 | 48.0 | 60.2 | 55.5 | 64.8 | 53.1 | 51.5 | 54.7 | No |
| Hocking | 55.4 | 49.9 | 58.1 | 83.5 | 76.9 | 90.1 | 69.6 | 67.4 | 71.8 | Higher |
| Holmes | 22.3 | 19.4 | 23.8 | 31.5 | 28.0 | 34.9 | 26.9 | 25.7 | 28.0 | Lower |
| Huron | 50.7 | 47.1 | 52.6 | 65.0 | 61.0 | 69.1 | 58.0 | 56.6 | 59.4 | Higher |
| Jackson | 28.4 | 24.8 | 30.3 | 40.1 | 35.9 | 44.3 | 34.5 | 33.1 | 35.9 | No |
| Jefferson | 36.9 | 34.0 | 38.4 | 46.2 | 43.0 | 49.3 | 41.7 | 40.6 | 42.8 | No |
| Knox | 36.6 | 33.5 | 38.2 | 49.9 | 46.3 | 53.4 | 43.4 | 42.2 | 44.6 | No |
| Lake | 41.1 | 39.4 | 41.9 | 47.1 | 45.4 | 48.9 | 44.2 | 43.6 | 44.8 | No |
| Lawrence | 15.6 | 13.6 | 16.6 | 24.8 | 22.4 | 27.2 | 21.3 | 20.5 | 22.2 | Lower |
| Licking | 29.6 | 27.9 | 30.5 | 39.3 | 37.4 | 41.3 | 34.6 | 33.9 | 35.3 | No |
| Logan | 37.3 | 33.8 | 39.1 | 44.1 | 40.3 | 47.9 | 40.8 | 39.5 | 42.1 | No |
| Lorain | 55.5 | 53.8 | 56.4 | 66.5 | 64.7 | 68.3 | 61.1 | 60.5 | 61.7 | Higher |
| Lucas | 74.5 | 72.9 | 75.3 | 79.8 | 78.2 | 81.4 | 77.2 | 76.7 | 77.8 | Higher |
| Madison | 31.4 | 28.1 | 33.0 | 58.3 | 53.4 | 63.1 | 43.5 | 42.1 | 45.0 | No |
| Mahoning | 62.7 | 60.6 | 63.7 | 65.1 | 63.1 | 67.1 | 64.0 | 63.2 | 64.7 | Higher |
| Marion | 47.3 | 44.1 | 49.0 | 59.8 | 56.0 | 63.7 | 53.2 | 52.0 | 54.5 | No |
| Medina | 29.3 | 27.7 | 30.2 | 34.5 | 32.8 | 36.3 | 32.0 | 31.3 | 32.6 | Lower |
| Meigs | 7.3 | 5.1 | 8.5 | 12.5 | 9.6 | 15.3 | 10.0 | 9.0 | 10.9 | Lower |
| Mercer | 21.4 | 18.5 | 22.8 | 24.7 | 21.6 | 27.7 | 23.0 | 21.9 | 24.1 | Lower |
| Miami | 38.1 | 35.7 | 39.3 | 52.3 | 49.5 | 55.1 | 45.3 | 44.4 | 46.3 | No |
| Monroe | 9.3 | 6.1 | 10.9 | 19.5 | 14.9 | 24.1 | 14.4 | 13.0 | 15.9 | Lower |
| Montgomery | 60.3 | 59.0 | 61.0 | 64.1 | 62.7 | 65.4 | 62.3 | 61.8 | 62.8 | Higher |
| Morgan | 21.8 | 16.9 | 24.2 | 25.9 | 20.7 | 31.1 | 23.9 | 22.1 | 25.7 | Lower |
| Morrow | 30.9 | 27.2 | 32.8 | 40.1 | 35.8 | 44.3 | 35.5 | 34.1 | 36.9 | No |
| Muskingum | 40.1 | 37.4 | 41.5 | 54.0 | 50.9 | 57.0 | 47.3 | 46.3 | 48.4 | No |
| Noble | 13.7 | 10.1 | 15.5 | 20.6 | 15.4 | 25.8 | 16.6 | 15.0 | 18.1 | Lower |
| Ottawa | 46.5 | 42.3 | 48.7 | 67.6 | 62.6 | 72.6 | 57.2 | 55.6 | 58.9 | Higher |
| Paulding | 43.9 | 37.9 | 46.9 | 49.7 | 43.4 | 56.0 | 46.8 | 44.6 | 49.0 | No |
| Perry | 31.6 | 27.9 | 33.5 | 34.6 | 30.7 | 38.5 | 33.1 | 31.8 | 34.5 | No |
| Pickaway | 41.0 | 37.7 | 42.7 | 64.3 | 59.8 | 68.7 | 51.8 | 50.4 | 53.2 | No |
| Pike | 38.3 | 33.6 | 40.6 | 58.3 | 52.7 | 64.0 | 48.4 | 46.5 | 50.3 | No |
| Portage | 32.0 | 30.2 | 32.9 | 33.3 | 31.5 | 35.1 | 32.7 | 32.0 | 33.3 | Lower |
| Preble | 19.3 | 16.6 | 20.6 | 30.2 | 26.9 | 33.5 | 24.8 | 23.7 | 25.8 | Lower |
| Putnam | 33.1 | 29.3 | 35.1 | 36.9 | 32.8 | 40.9 | 35.0 | 33.6 | 36.4 | No |
| Richland | 38.9 | 36.8 | 40.0 | 46.0 | 43.7 | 48.4 | 42.4 | 41.6 | 43.3 | No |

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Table 26 continued from page 71

| | | | | | | | | | | |
|------------|------|------|------|------|------|------|------|------|------|--------|
| Ross | 25.7 | 23.5 | 26.8 | 37.2 | 34.3 | 40.0 | 31.2 | 30.2 | 32.1 | Lower |
| Sandusky | 30.8 | 28.0 | 32.2 | 36.4 | 33.4 | 39.4 | 33.6 | 32.6 | 34.7 | No |
| Scioto | 56.2 | 52.8 | 57.9 | 75.6 | 71.7 | 79.4 | 66.1 | 64.8 | 67.4 | Higher |
| Seneca | 44.5 | 41.0 | 46.3 | 56.7 | 52.8 | 60.6 | 50.7 | 49.4 | 52.1 | No |
| Shelby | 28.9 | 25.9 | 30.4 | 34.2 | 30.9 | 37.5 | 31.5 | 30.4 | 32.7 | Lower |
| Stark | 46.1 | 44.8 | 46.9 | 59.9 | 58.3 | 61.4 | 53.2 | 52.7 | 53.8 | No |
| Summit | 69.2 | 67.8 | 69.9 | 67.5 | 66.1 | 68.9 | 68.3 | 67.8 | 68.8 | Higher |
| Trumbull | 38.4 | 36.7 | 39.2 | 54.2 | 52.2 | 56.1 | 46.5 | 45.9 | 47.2 | No |
| Tuscarawas | 34.7 | 32.3 | 36.0 | 46.4 | 43.7 | 49.2 | 40.7 | 39.8 | 41.6 | No |
| Union | 30.4 | 27.2 | 32.1 | 35.9 | 32.6 | 39.2 | 33.3 | 32.1 | 34.5 | No |
| Van Wert | 29.3 | 25.3 | 31.4 | 32.0 | 28.0 | 36.1 | 30.7 | 29.3 | 32.2 | Lower |
| Vinton | 30.4 | 24.4 | 33.4 | 42.5 | 35.5 | 49.4 | 36.5 | 34.1 | 38.8 | No |
| Warren | 19.5 | 18.3 | 20.1 | 21.8 | 20.5 | 23.1 | 20.6 | 20.1 | 21.0 | Lower |
| Washington | 20.0 | 17.7 | 21.1 | 32.5 | 29.7 | 35.3 | 26.4 | 25.5 | 27.3 | Lower |
| Wayne | 37.5 | 35.3 | 38.7 | 46.2 | 43.7 | 48.7 | 41.9 | 41.0 | 42.7 | No |
| Williams | 27.3 | 24.0 | 29.0 | 38.3 | 34.4 | 42.3 | 32.8 | 31.5 | 34.1 | No |
| Wood | 27.2 | 25.3 | 28.1 | 33.6 | 31.6 | 35.6 | 30.5 | 29.8 | 31.2 | Lower |
| Wyandot | 36.2 | 31.2 | 38.8 | 44.7 | 39.2 | 50.2 | 40.5 | 38.6 | 42.4 | No |
| STATE | 49.3 | 49.1 | 49.5 | 56.2 | 56.0 | 56.5 | 52.9 | 52.8 | 53.0 | |

Source: Ohio Hospital Association Clinical Financial Database, Years, 2005-2009.

TABLE 27 Deaths from the Primary Cause of Asthma, by Age Group and Year, Ohio, 2010

| Age Group | Ohio Population 2010 | Deaths from Asthma, 2010 | Ohio Death Rate per 1,000,000 Residents |
|-----------|----------------------|--------------------------|---|
| 0-4 | 719,136 | 1 | 1.4 |
| 5-14 | 1,520,054 | 1 | 1.0 |
| 15-34 | 2,998,766 | 15 | 5.0 |
| 35-64 | 4,672,025 | 60 | 12.8 |
| 65+ | 1,626,201 | 73 | 44.9 |
| Total | 11,536,182 | 150 | 13.0 |

Source: Ohio Department of Health, Center for Health and Vital Statistics, 2010

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TABLE 28

Deaths from the Primary Cause of Asthma,
by Sex and Year, Ohio, 1990-2010



| Year | Total | Male | Female |
|------|-------|------|--------|
| 1990 | 147 | 56 | 91 |
| 1991 | 191 | 70 | 123 |
| 1992 | 154 | 59 | 95 |
| 1993 | 156 | 51 | 105 |
| 1994 | 183 | 73 | 111 |
| 1995 | 196 | 72 | 123 |
| 1996 | 184 | 58 | 126 |
| 1997 | 176 | 65 | 111 |
| 1998 | 177 | 72 | 105 |
| 1999 | 128 | 43 | 85 |
| 2000 | 170 | 49 | 121 |
| 2001 | 153 | 37 | 116 |
| 2002 | 170 | 69 | 101 |
| 2003 | 153 | 46 | 107 |
| 2004 | 135 | 39 | 96 |
| 2005 | 134 | 29 | 105 |
| 2006 | 151 | 51 | 100 |
| 2007 | 145 | 47 | 98 |
| 2008 | 116 | 30 | 86 |
| 2009 | 130 | 38 | 92 |
| 2010 | 150 | 44 | 106 |

Source: Ohio Department of Health, Center for
Health and Vital Statistics, 1990-2010

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TABLE 29

Deaths from the Primary Cause of Asthma,
by Race and Year, Ohio, 1990-2010

| Year | Total | Black | White |
|------|-------|-------|-------|
| 1990 | 147 | 27 | 120 |
| 1991 | 191 | 38 | 152 |
| 1992 | 154 | 43 | 111 |
| 1993 | 156 | 30 | 125 |
| 1994 | 183 | 46 | 137 |
| 1995 | 196 | 48 | 148 |
| 1996 | 184 | 46 | 134 |
| 1997 | 176 | 37 | 138 |
| 1998 | 177 | 46 | 131 |
| 1999 | 128 | 33 | 95 |
| 2000 | 170 | 34 | 134 |
| 2001 | 153 | 35 | 117 |
| 2002 | 170 | 38 | 132 |
| 2003 | 153 | 42 | 111 |
| 2004 | 135 | 32 | 103 |
| 2005 | 134 | 30 | 104 |
| 2006 | 151 | 35 | 116 |
| 2007 | 145 | 31 | 113 |
| 2008 | 116 | 25 | 91 |
| 2009 | 130 | 29 | 101 |
| 2010 | 150 | 42 | 108 |

Source: Ohio Department of Health, Center for
Health and Vital Statistics, 1990-2010

Appendix 2

Technical Notes: Statistical Significance

The standard used in this document to assess the significance of a statistical test is $p\text{-value} = 0.05$. A p value less than or equal to 0.05 indicates that there is at most a 5 percent chance of observing a difference, given that, in reality, rates are similar. In this case, the result is considered statistically significant. If the p value is greater than 0.05, chance cannot be excluded as a likely explanation for the observed difference, so the result is not considered statistically significant.

The purpose of a confidence interval (CI) is to estimate the statistical uncertainty around a particular measure. Confidence intervals can also be used to determine if the difference between two percentages or rates are statistically significantly different. If the confidence intervals do not overlap, the groups are likely to be significantly different from each other. In this report, 95% confidence intervals are provided for rates.



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Appendix 3

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Appendix 4

Limitations

Behavioral Risk Factor Surveillance System (BRFSS)

Limitations to the BRFSS include that it relies on information reported directly by the respondent. As such, this self-reported data may be subject to errors. The manner in which questions are worded and the ability of individuals to recall details may result in inaccuracies. Additionally, the BRFSS can only be conducted in households with telephones, and cannot be conducted on cell phones. Sample size can be too small to draw any valuable conclusions.

Death Data, Ohio Department of Health, Center for Health and Vital Statistics

Limitations to this data set include potential misclassification on the death certificates, especially among older adults and people without a history of asthma. In their later stages, chronic obstructive bronchitis and asthmatic bronchitis may become indistinguishable.

Knowledge of the decedent's smoking history could influence the designation of COPD as the primary cause of death. The proxy respondents may not have known about a decedent's history of asthma or other severe respiratory problems at a young age. Also, inconsistency may occur with coding.

Ohio Family Health Survey

The Ohio Family Health Survey reported results without any external validation. Therefore, information on insurance status may not accurately reflect the true population values.

The interviewer often collected the insurance coverage data from a proxy respondent. The accuracy of these proxy respondents, from whom data was gathered about individuals who, for health, age, or other reasons, could not answer the questions themselves, may also be questionable.

Although several subpopulations were oversampled, the sample sizes for Asian or Pacific Islanders, Hispanics, or "Others" were relatively small compared to Whites and Blacks. Therefore, the standard errors of estimates tended to be larger, resulting in wider confidence intervals for estimated odds ratios.

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Ohio Hospital Association Clinical Financial Database

Asthma hospital discharge data are collected by the Ohio Hospital Association (OHA), a private organization that has agreed to share the data with the Ohio Department of Health. The data are given by the hospitals to OHA on a voluntary basis.

Currently, all hospitals in Ohio contribute data to OHA. It should be noted that these data are collected for billing and other administrative purposes, rather than surveillance purposes. As a result, some of the variables that would be of interest for surveillance, such as race, education level or income, are not collected.

There are some limitations to the OHA Association Clinical Financial Database. Unique identifiers are not assigned, so there is no way of identifying multiple hospital discharges for individuals. However, the count and rate of total hospital discharges is a good representation of the asthma burden experienced by a community.

Even with all hospitals reporting, the OHA Association Clinical Financial Database may not be a complete census of hospital discharges for Ohio residents. While efforts are employed to capture visits for asthma in other states, Ohio residents visiting other states are not reported in the data set.

For statistical stability, some counties with only a few cases, are calculated for multiple years.

It is also important to note that charges are not necessarily reflective of reimbursement received by any given hospital.

Appendix 5

Description of Ohio Hospital Association Clinical Financial Data Base

The hospital discharge data was collected by the Ohio Hospital Association and provided to the Ohio Department of Health for analysis. The data are given by the hospitals to OHA on a voluntary basis. Data collected between 2004-2009 were analyzed for this report.

Asthma was defined by the following range of ICD-9-CM Codes:

493 Asthma

493.0 Extrinsic asthma

- Allergic with stated cause
- Atopic
- Childhood
- Hay
- Platinum
- Hay fever with asthma

493.1 Intrinsic asthma

- 493.2 Chronic obstructive asthma
- Asthma with chronic obstructive pulmonary disease (COPD)

493.9 Asthma, unspecified

Asthma (bronchial) (allergic NOS)

Bronchitis:

- Allergic
- Asthmatic

When the hundredth decimal is used it indicates:

0 without mention of status asthmaticus

1 with status asthmaticus

Abstracted from International Classification of Diseases, 9th revision, Clinical Modification, issued by the US Department of Health and Human Services. Available in electronic versions from <http://www.cdc.gov/nchs/about/otheract/icd9/abticd9.htm>. Annual updates and revisions are available at <http://www.cms.hhs.gov/medlearn/icd9code.asp>. Published copies of ICD-9-CM are available from a variety of sources and should be found in any medical library.

The variables analyzed included the number of asthma-related discharges; average length of stay in the hospital in days, hospital discharge rates per 10,000 of the resident population; and crude hospital discharge rates per 10,000 of the estimated population with asthma by age, sex, primary payer, and county of residence. "Any mention of asthma" referred to a diagnosis of asthma being present in one of the 15 available diagnosis fields in the hospital record.

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The variables analyzed included the number of asthma-related discharges, average length of stay in the hospital in days, rates per 10,000 of the resident population, and crude and age-adjusted rates per 10,000 of the estimated population with asthma and by age, sex, primary payer, and county of residence. "Any mention of asthma" refers to a diagnosis of asthma being present in one of the 15 available diagnosis fields in the hospital record.

Hospital discharges with invalid dates of birth, age, unknown sex, and lengths of stay greater than 365 days were excluded from the analysis. All analyses were performed using SAS version 9.1 (SAS Institute, Cary, NC).

Crude rates were calculated by using the estimate for Ohio's resident population as the denominator. Age-adjusted rates were not calculated using the direct method to the U.S. 2000 standard population since the population ages are very similar. Rates were calculated as the number of hospital discharges per 10,000 persons. The Ohio resident population was obtained from the U.S. Census Bureau using the censal 2000 population estimates and the 2004-2009 intercensal population estimates.

Rates were calculated by using the estimate for Ohio's resident population as the denominator. Rates with the Ohio population as the denominator are useful to describe hospital discharges for asthma in the entire Ohio population.



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