

**2011**

**BURDEN OF ASTHMA IN INDIANA**



Indiana State  
Department of Health

# **BURDEN OF ASTHMA IN INDIANA**

## **INDIANA STATE DEPARTMENT OF HEALTH**

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The 2010 Indiana Asthma Burden Report provides information about the prevalence of asthma among adults and children, hospitalizations, emergency department visits, mortality and the economic cost associated with asthma. The report also describes risk and protective factors, and interventions implemented by the Indiana State Department of Health (ISDH). The data presented in this report helps identify populations and geographical areas where the burden of asthma is particularly high. This is critical information for effective planning and resource allocation to address asthma and asthma-related issues. The information given in the report is also useful for asthma education and for guidelines to implement interventions that reduce asthma in the state.

Asthma is a chronic disease that affects the airways and lungs. The inside walls of those airways are inflamed in people with asthma making them more sensitive and reactive to “triggers.” Common triggers for people with asthma are dust mites, cockroaches, animal dander, feathers, dust, food, mold, pollen, tobacco smoke, indoor and outdoor air pollutants, ozone, stress, respiratory infections, cold and exercise. People with asthma are not affected by every trigger and responses can vary. As the inflamed airways are narrowed, less air is allowed to pass through them. This leads to the common symptoms of asthma, including coughing, wheezing, shortness of breath, and chest tightness.

Asthma carries a significant public health burden in Indiana. Asthma affects people of all ages – children and adults – and the severity of the disease differs from one person to another. Specific methods of detection, intervention, and treatment exist that may reduce this burden and promote health.

## Facts About Asthma in Indiana

- Asthma is the third leading cause of hospitalization among children under the age of 17 years. In 2009, there were 9,081 hospitalizations with a principal diagnosis of asthma in Indiana, for an age-adjusted hospitalization rate of 13.94 per 10,000 Indiana residents.
- In 2009, an estimated 435,000 (9.1%) Indiana adults and 150,000 (9.9%) children reported currently having asthma. More than 13 percent of adults and nearly 15 percent of children reported having been diagnosed with asthma at some point during their lifetime.
- Nearly 24 percent of high school students reported having asthma at some time in their lives and 12.2% reported having current asthma in 2009.
- There were more than 31,000 emergency department visits related to asthma in 2009 – an increase of nearly 3,000 (9.8%) from 2008.
- More than 9,000 hospitalizations were recorded due to asthma in 2009 – an increase of 6.6% from 2008. In 2007, 68 Indiana resident deaths listed asthma as the underlying cause; 46 were women and 22 were men.
- In Indiana, the estimated economic cost attributed to asthma-related hospitalization was \$122 million in 2009. The estimated cost of asthma-related emergency department visits was \$46 million.



Although Healthy People 2020 goals and objectives have recently been published, the Indiana State Department of Health (ISDH) Asthma Program has been utilizing the national baseline data and targets from Healthy People 2010 to measure Indiana's improvement since 2006. Future burden reports will utilize Healthy People 2020 national targets, national baseline data, and state baseline data to develop Indiana specific goals.

Following are the Healthy People 2020 goals, along with Indiana's baseline information:

## ***Objective 1: Reduce deaths from asthma***

- RD-1.1 Children and adults under age 35 years

RD- 1.1 is for informational purpose only

Indiana baseline: 3.3\* asthma deaths per million children and adults under age 35 years occurred in 2007

- RD-1.2 Adults aged 35 to 64 years old

National Target: 6.0 deaths per million

Indiana Target: To Be Determined

Indiana baseline: 10.8\* asthma deaths per million adults aged 35 to 64 years occurred in 2007

- RD-1.3 Adults aged 65 years and older

National Target: 22.9 deaths per million.

Indiana Target: To Be Determined

Indiana baseline: 41.1\* asthma deaths per million adults aged 65 years and older occurred in 2007

## ***Objective 2: Reduce hospitalizations for asthma***

- RD-2.1 Children under age 5 years

National Target: 18.1 hospitalizations per 10,000

Indiana Target: To Be Determined

Indiana baseline: 27.8 hospitalizations for asthma per 10,000 children under age 5 years occurred in 2009.

- RD-2.2 Children and adults aged 5 to 64 years

National Target: 8.6 hospitalizations per 10,000

Indiana Target: To Be Determined

Indiana baseline: 11.1 hospitalizations for asthma per 10,000 children and adults aged 5 to 64 years occurred in 2009

- RD-2.3 Adults aged 65 years and older

National Target: 20.3 hospitalizations per 10,000

Indiana Target: To Be Determined

Indiana baseline: 23.09 hospitalizations for asthma per 10,000 adults aged 65 years and older occurred in 2009.

***Objective 3: Reduce emergency department visits for asthma***

- RD-3.1 Children under age 5 years

National Target: 95.5 emergency department visits per 10,000

Indiana Target: To Be Determined

Indiana baseline: 98.8 emergency department visits for 10,000 children under age 5 years occurred in 2009

- RD-3.2 Children and adults ages 5 to 64 years

National Target: 49.1 emergency department visits per 10,000

Indiana Target: To Be Determined

Indiana baseline: 51.2 emergency department visits for asthma per 10,000 children and adults aged 5 to 64 years occurred in 2009

- RD-3.3 Adults aged 65 years and older

National Target: 13.2 emergency department visits per 10,000

Indiana Target: To Be Determined

Indiana baseline: 14.04 emergency department visits for asthma per 10,000 adults aged 65 years and older occurred in 2009

***Objective 5: Reduce the proportion of persons with asthma who miss school or work days.***

- RD-5.1 Reduce the proportion of children aged 5 to 17 years with asthma who miss school days.

National Target: 48.7%

Indiana Target: To Be Determined

Indiana baseline: N/A

- RD-5.2 Reduce the proportion of adults aged 18 to 64 years with asthma who miss work days.

National Target: 26.8%.

Indiana Target: To Be Determined

Indiana baseline: N/A

***Objective 6: Increase the proportion of persons with current asthma who receive formal patient education.***

- RD – 6 Increase the proportion of persons with current asthma who receive formal patient education

National Target: 14.4%.

Indiana Target: To Be Determined

Indiana baseline: 4.5% in 2008

***Objective 7: Increase the proportion of persons with current asthma who receive appropriate asthma care according to National Asthma Education and Prevention Program (NAEPP) guidelines.***

- RD-7.1 Persons with current asthma who receive written asthma management plans from their health care provider.

National Target: 36.8%.

Indiana Target: To Be Determined

Indiana baseline: 28.8% in 2008

- RD-7.2 Persons with current asthma with prescribed inhalers who receive instruction on their use.

National Target: Not applicable

Indiana Target: To Be Determined

Indiana baseline: 96.4% in 2008

- RD-7.3 Persons with current asthma who receive education about appropriate response to an asthma episode, including recognizing early signs and symptoms or monitoring peak flow results.

National Target: 68.5%

Indiana Target: To Be Determined

Indiana baseline: 75.9% in 2008

- RD-7.4 Increase the proportion of persons with current asthma who do not use more than one canister of short-acting inhaled beta agonist per month.

National Target: 90.2%

Indiana Target: To Be Determined

Indiana baseline: Asthma Call Back survey question is not comparable with NHIS (National Health Interview Survey)

- RD-7.5 Persons with current asthma who have been advised by a health professional to change things in their home, school, and work environments to reduce exposure to irritants or allergens to which they are sensitive.

National Target: 54.5%

Indiana Target: To Be Determined

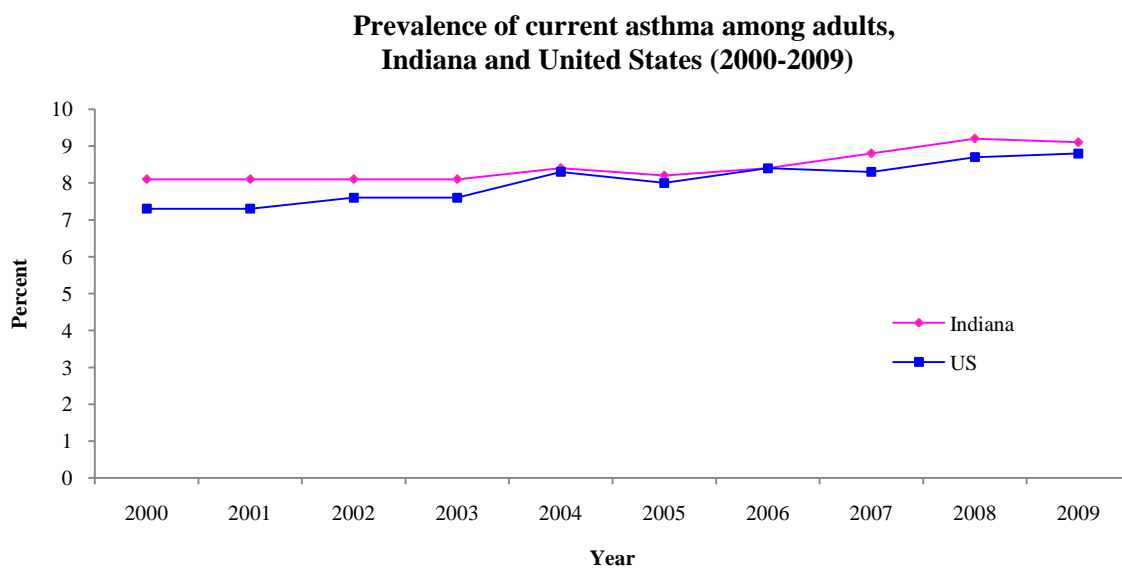
Indiana baseline: 38.3% in 2008

## Prevalence

The prevalence trends based on Behavior Risk Factor Surveillance System (BRFSS) estimates indicate that overall current and lifetime asthma in Indiana has increased significantly. Although year-to-year differences for current and lifetime asthma prevalence were not statistically significant, the overall increase from 2002 to 2009 was significant.

During the 10-year period of 2000-2009, the annual prevalence estimate of current asthma among Indiana adults gradually increased, ranging from a low of 7.5% in 2001 and 2002 to a high of 9.2% in 2008 (Figure 1). This gradual increase was significant indicating that there was an overall, detectable upward increase in current asthma prevalence. According to 2009 data, the current asthma prevalence in Indiana (9.1%) is comparable to that of the United States (8.8%).

**Figure 1.**

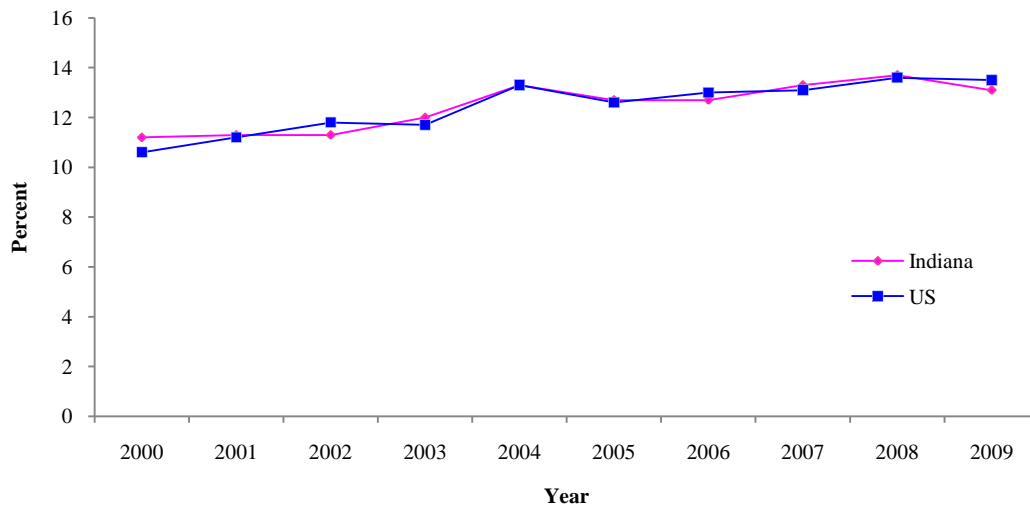


Data Source: Behavior Risk Factor Surveillance System, Indiana State Department of Health

The estimated prevalence of lifetime asthma among adults in Indiana was also comparable to that of the U.S. between 2000 and 2009 (Figure 2). The estimated lifetime asthma prevalence has been increasing for both Indiana and U.S. since 2000. The increase for Indiana – based on trend analysis – is significant. The lowest lifetime prevalence rate was recorded in 2000 (11.2%) whereas the highest was in 2009 (13.1%).

**Figure 2.**

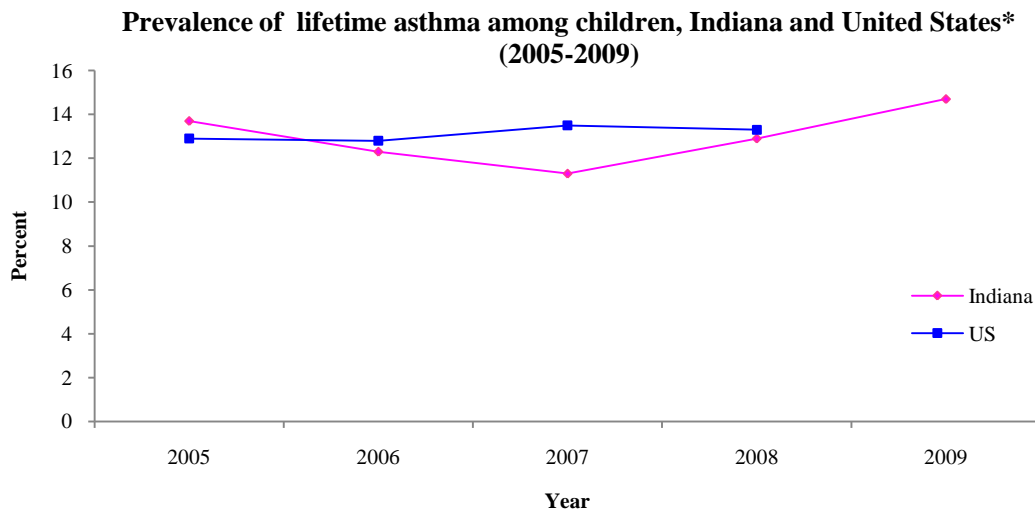
**Prevalence of lifetime asthma among adults,  
Indiana and United States (2000-2009)**



Data Source: Behavior Risk Factor Surveillance System, Indiana State Department of Health

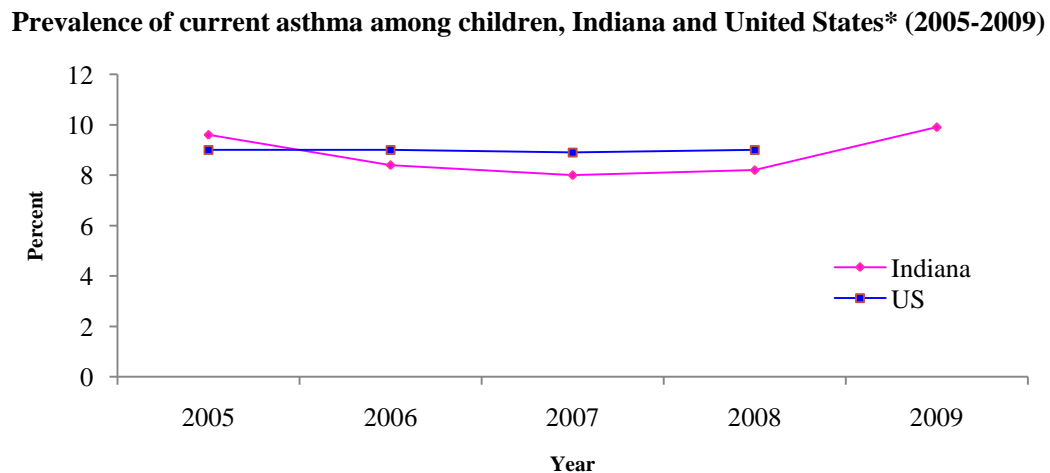
Figures 3 and 4 provide trend information associated with lifetime and current asthma prevalence among Indiana and U.S. children (17 years and younger). Since 2007, the lifetime and current asthma rates have increased significantly among Indiana children. Except for 2007, the lifetime prevalence rate of Indiana children was similar to those of U.S.

**Figure 3.**



Data Source: Behavior Risk Factor Surveillance System, Indiana State Department of Health  
\*U.S. data not available for 2009

**Figure 4.**



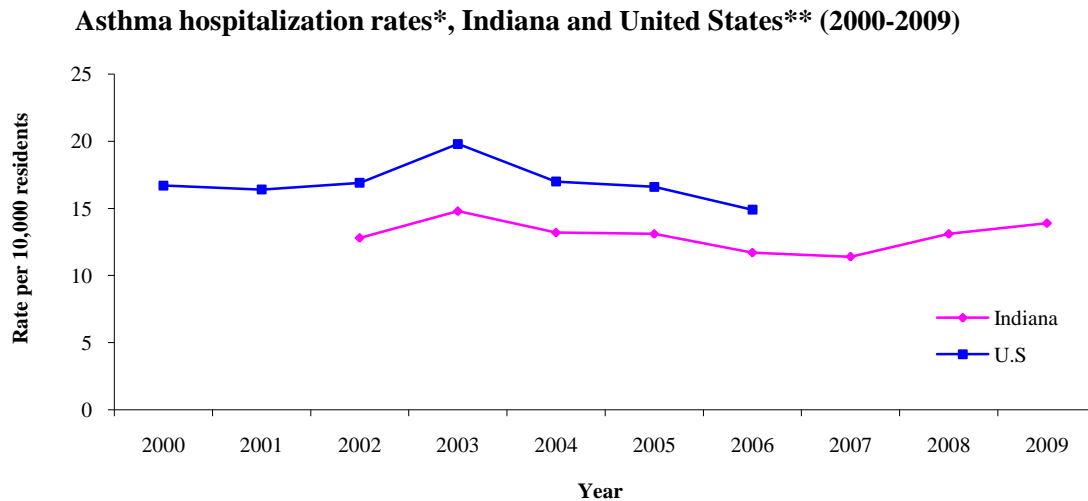
Data Source: Behavior Risk Factor Surveillance System, Indiana State Department of Health  
\*U.S. data not available for 2009

## Hospitalization

In 2009, there were more than 9,000 hospitalizations for asthma in Indiana, which was equal to an average of 25 hospital admissions every day.

Indiana's hospitalization rate is lower than the national rate. The age-adjusted hospitalization rate due to asthma increased from 12.8 in 2002 to 13.9 in 2009 (Figure 5). Although the age-adjusted rates in Indiana have been declining each year between 2003 and 2007, they have been increasing since 2007. The U.S. hospitalization rates have decreased since 2003.

**Figure 5.**



Data Source: Indiana State Department of Health

\*Age-adjusted rate per 10,000 population

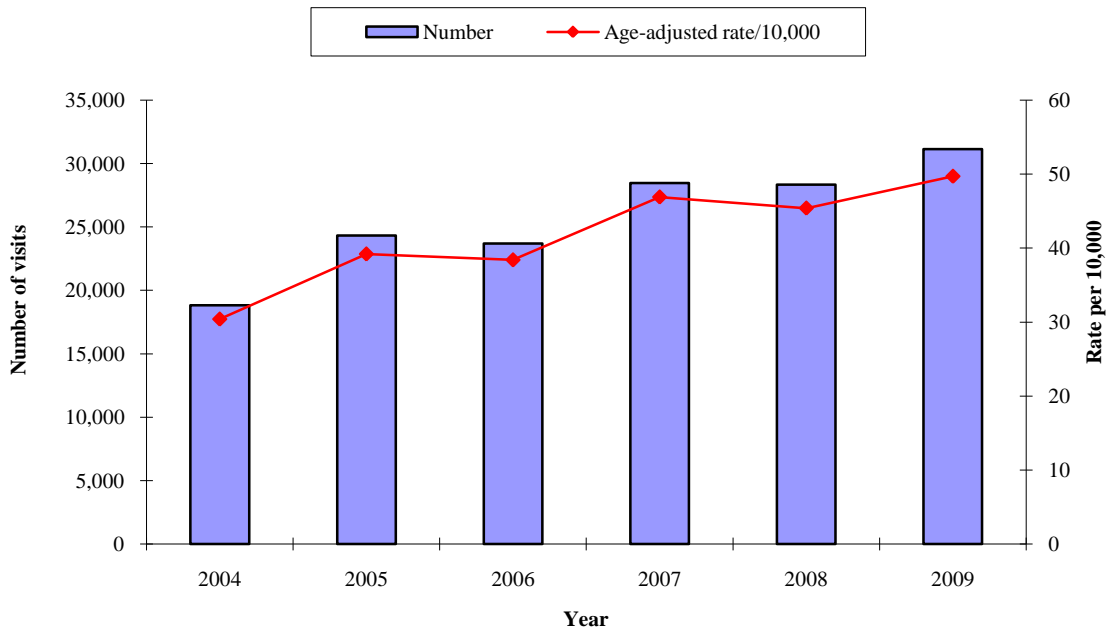
\*\*U.S. data not available after 2006

## Emergency Department (ED) Visits

Emergency Department visits among Indiana residents have also increased significantly since 2004 (Figure 6). From 2004 through 2009, there were 154,784 ED visits due to asthma among Indiana residents. An average of 25,797 ED visits for asthma occurred every year, which is equal to an average of 71 ED visits every day. The age-adjusted ED visit rate per 10,000 Indiana residents increased from 30.4 in 2004 to 49.7 in 2009.

**Figure 6.**

**Emergency Department (ED) visits for asthma by age-adjusted rate and number of visits, Indiana (2004-2009)**



Data Source: Indiana State Department of Health

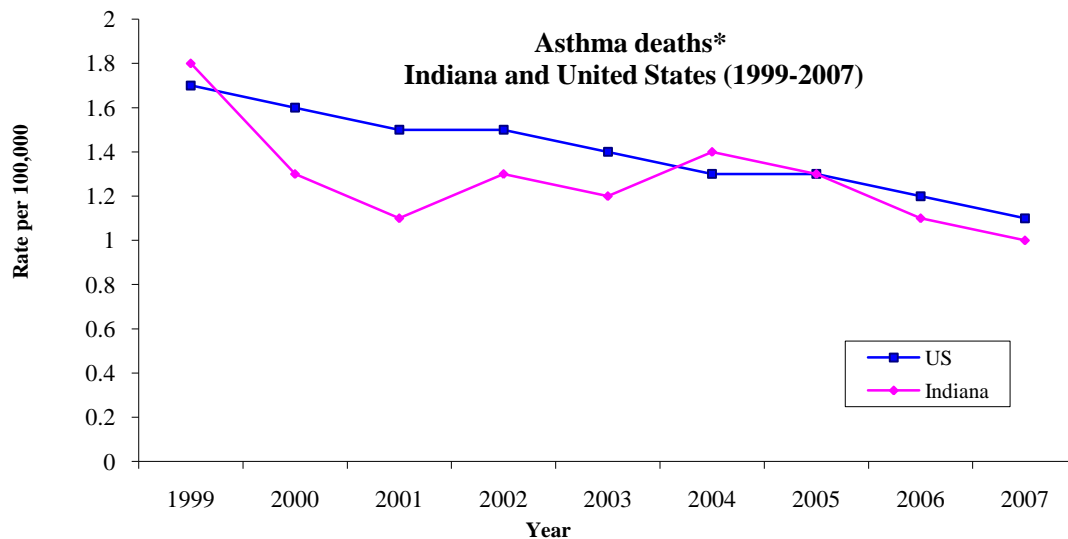


## Mortality

Asthma mortality is a rare event in Indiana and nationwide. Deaths due to asthma are mostly a result of lack of diagnoses, management, and/or treatment. There were 68 deaths in Indiana attributed to asthma in 2007 – the lowest number of asthma deaths in last nine years. The highest number of deaths due to asthma was 106 in 1999 (a decrease of about 38% between 1999 and 2007).

The age-adjusted asthma death rate trends are presented in Figure 7. For all years except 1999 and 2004, the Indiana asthma-related mortality rate was slightly below the nationwide rate.

**Figure 7.**



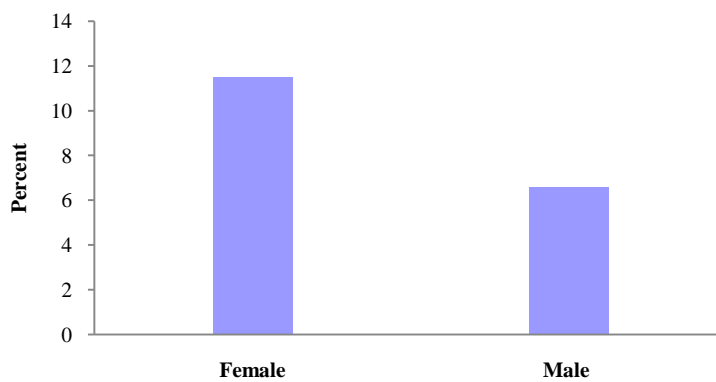
Data Source: Vital Statistics, Indiana State Department of Health  
\*Age-adjusted death rate per 100,000 population

## Age and Gender

In 2009, the current asthma prevalence was nearly two times higher among adult females (11.5%) than males (6.6%) in Indiana (Figure 8). Emergency department (ED) visit and hospitalization rates were also significantly higher among females than males (Figure 9).

**Figure 8.**

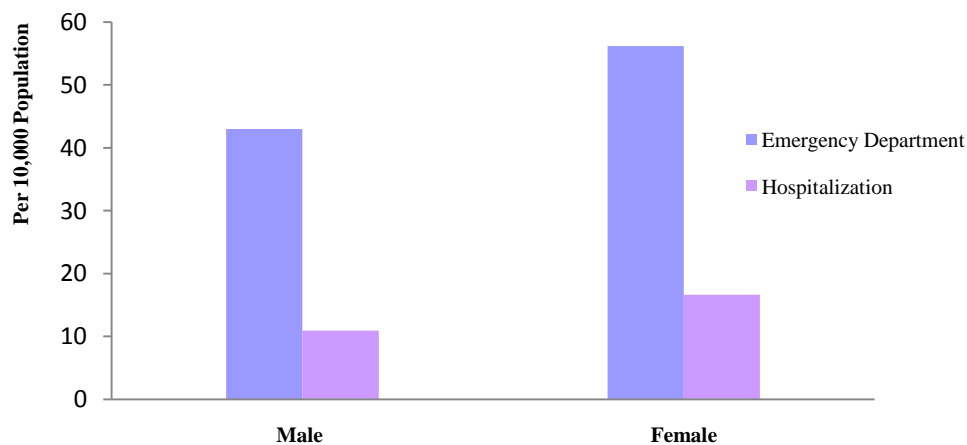
**Current asthma prevalence by gender, Indiana (2009)**



Data Source: Behavior Risk Factor Surveillance System. Indiana State Department of Health

**Figure 9.**

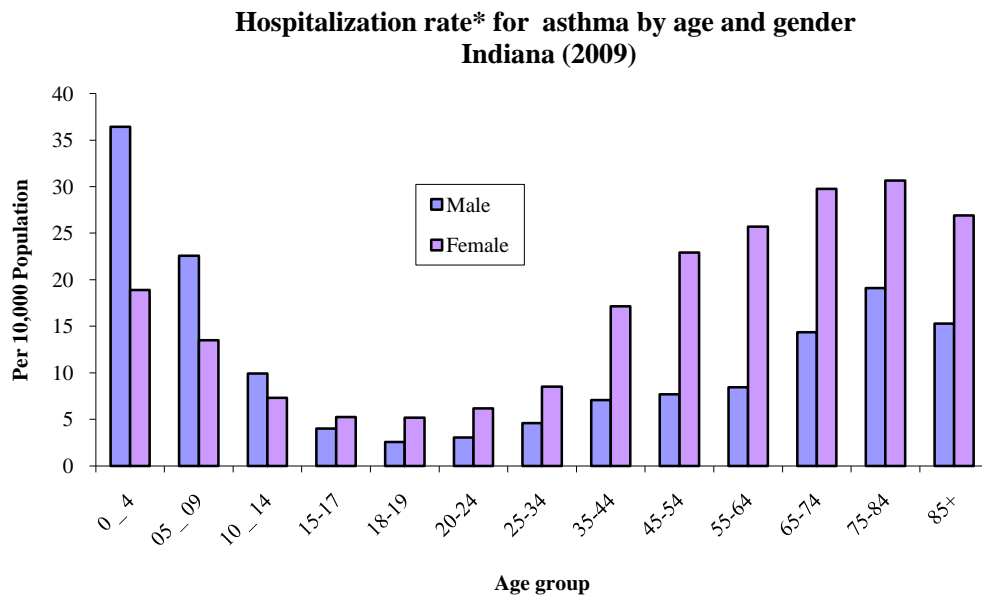
**Emergency Department visit\* and hospitalization\* for asthma by gender, Indiana (2009)**



Data Source: Indiana State Department of Health  
\*Age-adjusted rate per 10,000 population

There were more than 9,000 asthma-related hospitalizations in Indiana according to the 2009 data. Of those hospitalizations, 5,661 (62.3%) were attributed to females, whereas 3,420 (37.7%) were attributed to males. The highest rate of hospitalizations was found among male children ages 0-4 (36.5/10,000) followed by the women aged 65 and older. Interestingly, hospitalization rates for male children were higher than female until the age of 14, but from the age of 15, the rates reversed, i.e. females had significantly higher hospitalization rates than males from age 15 (Figure 10).

**Figure 10.**

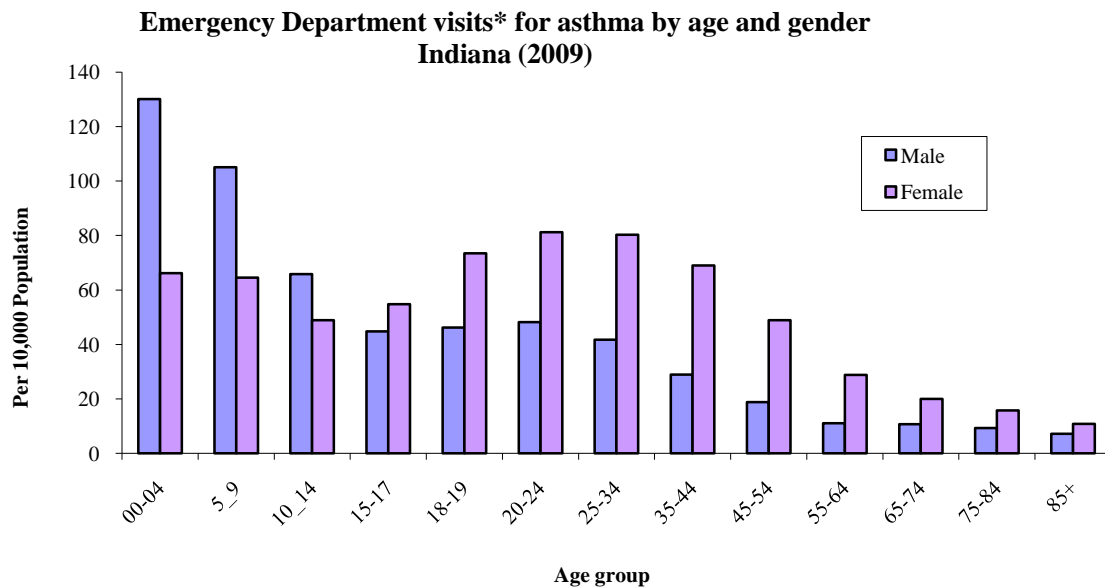


Data Source: Indiana State Department of Health  
\*Age-specific rate per 10,000 population

In 2009, there were 31,136 ED visits for asthma, 17,529 (56.3%) were for females and 13,606 (43.7%) for males. The younger age groups visited ED more than those in older age groups (Figure 11). For those younger than 15 years, the rates of ED visits were higher for males than females. For those ages 15 and older, females had higher ED visit rates than males (Figure 11). An analysis of age-specific rates reveals that the proportion of younger children (0-9 years) visiting ED due to asthma was the highest of all age groups. The ED visit rates decline in 10-17 age group; it increases again with the ages of 18-19 and continues to increase until age 34, after which it starts to decline. The lowest ED visit rate was seen among the people aged 85 and older (9.8/10,000).

Indiana mortality rates for asthma were significantly higher for females than for males in 2007 (Figure 15).

**Figure 11.**

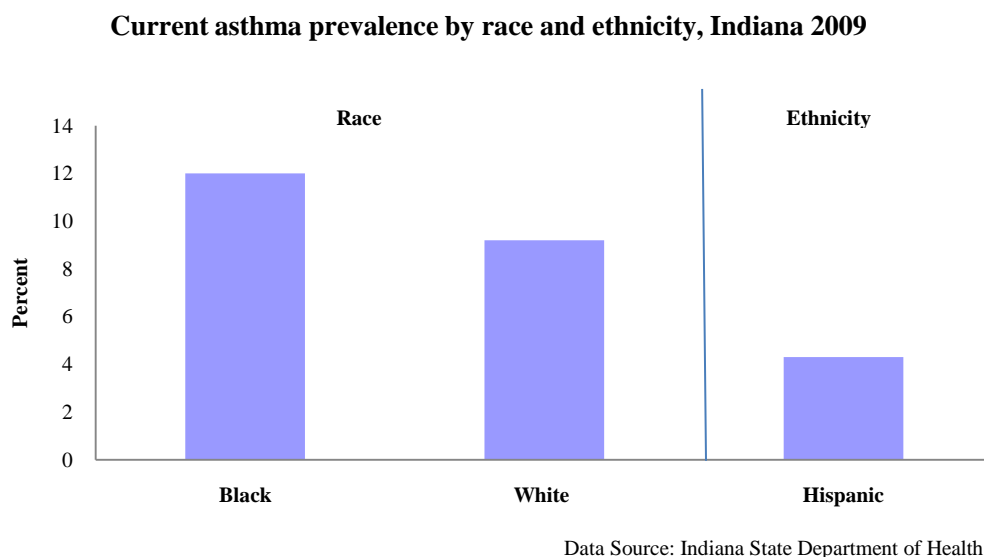


Data Source: Indiana State Department of Health  
\*Age-specific rate per 10,000 population

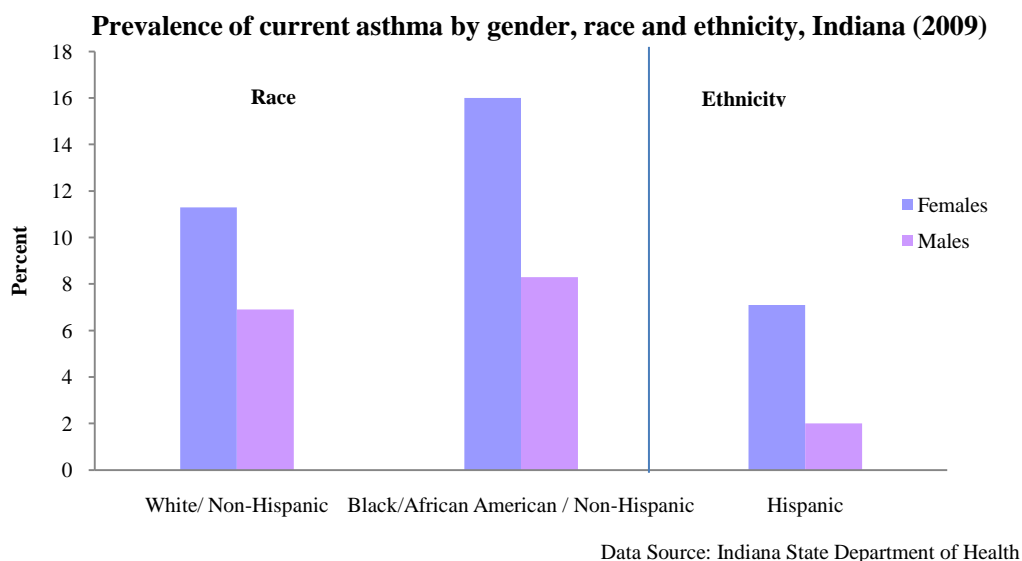
## Race and Ethnicity

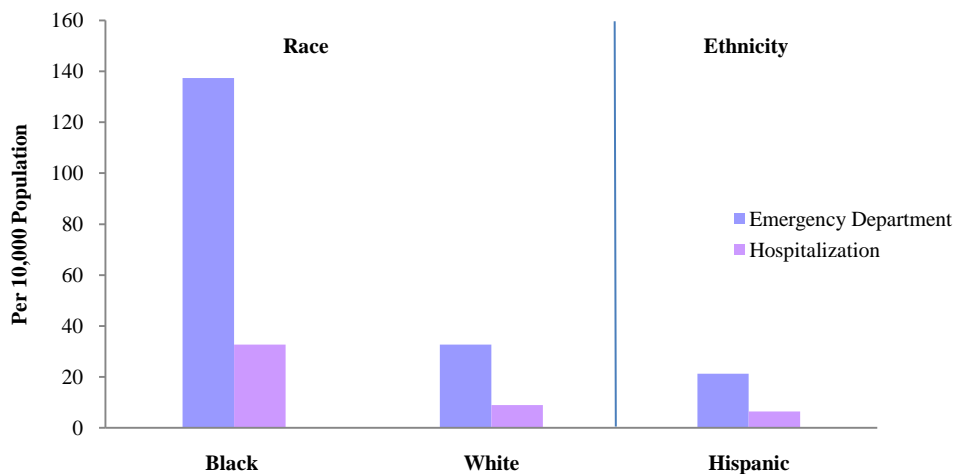
Asthma occurs in all races and ethnicities. Hispanic adults reported the lowest rate of current asthma prevalence (4.3%) of all racial and ethnic groups in Indiana in 2009 (Figure 12). Hispanics also had the lowest rates of hospitalization and ED visits (Figure 14). Whites reported a prevalence rate of 9.2% whereas blacks reported 12%. Interestingly, this difference was not statistically significant. However, blacks were hospitalized three times more often than whites; blacks were also more than four times as likely to visit ED for asthma as whites (Figure 14). Of all racial and ethnic groups, the prevalence rate among black females was the highest (Figure 13). Mortality rates were significantly higher among blacks than whites; the female black rate was the highest (Figure 15).

**Figure 12.**

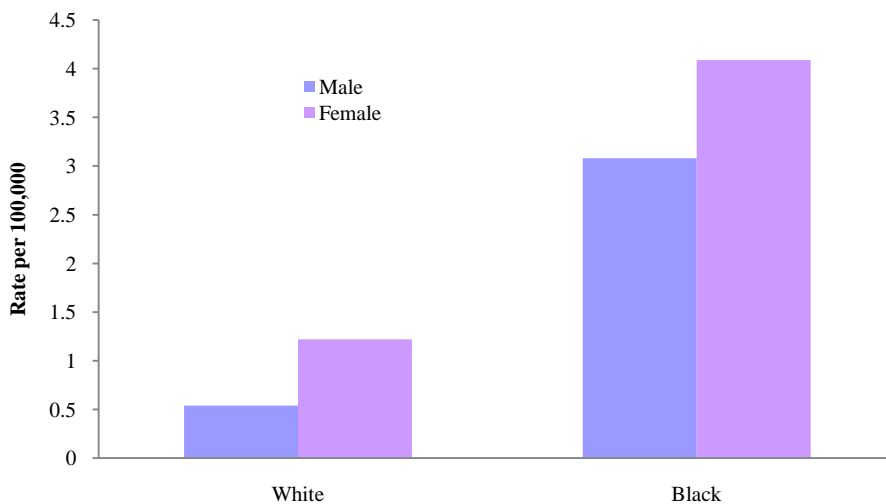


**Figure 13.**



**Figure 14.****Hospitalization and emergency department visits for asthma by race and ethnicity\*, Indiana (2009)**

\* Age-adjusted rate per 10,000 Indiana population  
Data source: Indiana State Department of Health

**Figure 15.****Mortality rate\* by gender, Indiana (2005-2007)**

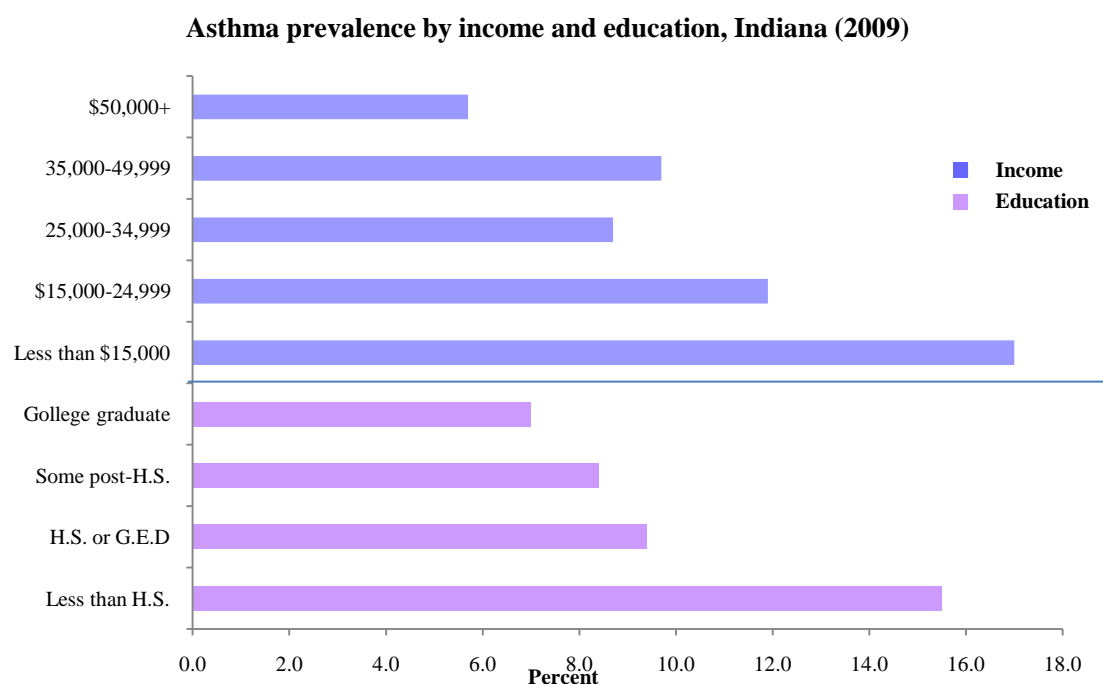
\* Age-adjusted rate per 10,000 Indiana population  
Data source: Indiana State Department of Health

## Income and Education

There appears to be an association between income level and asthma prevalence. Of all income categories, adults with an annual household income of \$50,000 or more reported the lowest current asthma prevalence (5.7%) (Figure 16). The highest prevalence of asthma was reported by the adults with an annual household income of \$15,000 or less (17%).

Asthma prevalence also varies with the level of education completed. Prevalence of current asthma was higher among adults with less than a high school education (15.5%) than those who have completed high school (9.4%), some post-high school education (8.4%), or college graduates (7.0%). The difference of asthma prevalence between adults with less than a high school education and post-high school education was statistically significant (Figure 16).

**Figure 16.**



Data Source: Indiana State Department of Health

## Geographic Variation

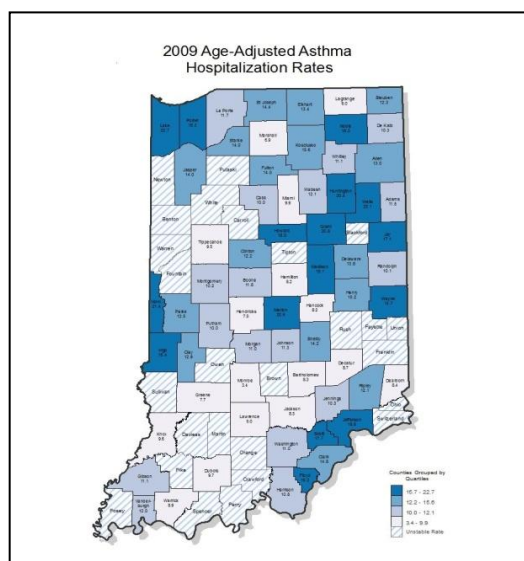
Table 1 lists the top 10 Indiana counties for hospitalization (age-adjusted rate) due to asthma in 2009. Except in those counties that had unstable rates, Lake County had the highest hospitalization rate for asthma (22.6 per 10,000) and Monroe County had the lowest (3.4 per 10,000) in 2009 (Appendix D).

Map 1 shows the county-specific rates of hospitalization in Indiana. (A larger version of this map is shown as Appendix A). Marion County had the highest number of hospitalizations (1,905 discharges) for asthma in 2009, which is consistent with its largest population. The asthma hospitalization rate for Marion County, however, was the fourth highest (21/10,000) in the state. Twenty-six counties had fewer than 20 hospitalizations (Appendix D).

**Table 1. Hospitalization rate for asthma by selected counties, Indiana, (2009)**

Rank	County	Age-Adjusted Rate/10,000
1	LAKE	22.7
2	WELLS	22.2
3	VERMILLION	21.4
4	MARION	21.0
5	GRANT	20.8
6	HUNTINGTON	20.4
7	MADISON	19.1
8	JEFFERSON	18.6
9	PORTER	18.3
10	NOBLE	18.3

**Map 1.**



There is variability of asthma related prevalence, hospitalization and ED visits among Indiana counties. Possible reasons for this variability include demographic, socioeconomic (e.g., income and education levels), and environmental factors (e.g., outdoor air pollution and climate), or physician diagnostic methods.



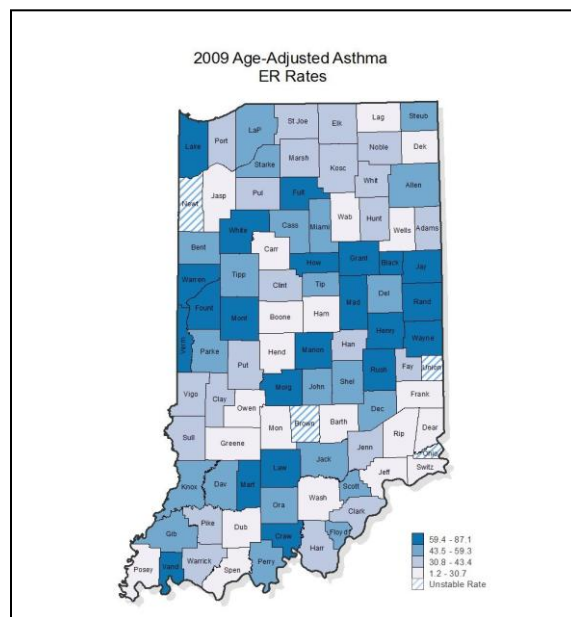
Except those counties with unstable rates, Grant County had the highest ED visit rate for asthma (87.1 per 10,000) and Union County had the lowest (7.2 per 10,000) in 2009 (Appendix C). Table 2 includes the top 10 Indiana counties by age-adjusted ED rate due to asthma in 2009. Map 2 shows the geographical disparities for asthma-related ED visits in Indiana. (A larger version of this map is shown as Appendix B).

**Table 2. ED visits for asthma by selected counties, Indiana (2009)**

Rank	County	Age-adjusted rate/10,000
1	GRANT	87.13
2	FOUNTAIN	85.83
3	MARION	83.60
4	WHITE	75.18
5	VERMILLION	75.05
6	MARTIN	74.83
7	RUSH	71.54
8	MONTGOMERY	70.02
9	WARREN	68.90
10	RANDOLPH	67.78

Data Source: Indiana State Department of Health

**Map 2.**



## Risk factors

Risk factors for asthma are not completely known. A combination of genetic and environmental factors mediated by immune system alterations is suspected. A family history of asthma makes three to six times more likely of developing asthma.

Although the cause of asthma is unknown, many “triggering” factors have been identified. A variety of environmental factors can trigger an asthma episode – including viral infections, allergens (like pollen, mold and dust mites), irritants (like second hand smoke, cleaning products, and air pollution) and other factors like pets, cockroaches, stress, and exercise.

Since 2006, Indiana has collected information regarding asthma management through the Asthma Call-back Survey (ACBS), a follow-up survey to the BRFSS for respondents who report that they or their children have asthma. The following information is taken from the 2007 adult ACBS in Indiana and reflects responses from adults with current asthma.

- Nearly 40 percent were advised by a doctor or health professional about changing the environment in their home, school, or work to improve their asthma.
- About 10 percent reported they had seen mold, smelled mold, or detected a musty odor in their home within the 30 days prior to responding to the survey.
- Four percent had seen cockroaches inside their home, within the last 30 days.
- Five percent had seen mice/rats inside their home, within the last 30 days.
- Only 20 percent used a mattress or pillow cover made especially to control dust mites.
- Almost 80 percent had carpeting or rugs in their bedroom.
- About 70 percent used an exhaust fan in the bathroom that vented directly to the outside.
- Nearly two-thirds (65 percent) had a fan in the kitchen.
- Less than one third (26.6%) used a dehumidifier regularly to reduce moisture.
- Thirty-four percent used an air cleaner or purifier regularly inside their home.
- More than half (56.9%) had pets such as dogs, cats, hamsters, birds, or other feathered/furry animals that lived indoors. Of those, 70 percent allowed pets in their bedroom.
- Twenty-eight percent reported that someone had smoked inside their home in the past week.
- Nearly 70 percent used hot/warm water to wash sheets and pillowcases, while 22 percent used cold water.
- Twenty-nine percent were current smokers.

## Protective Factors

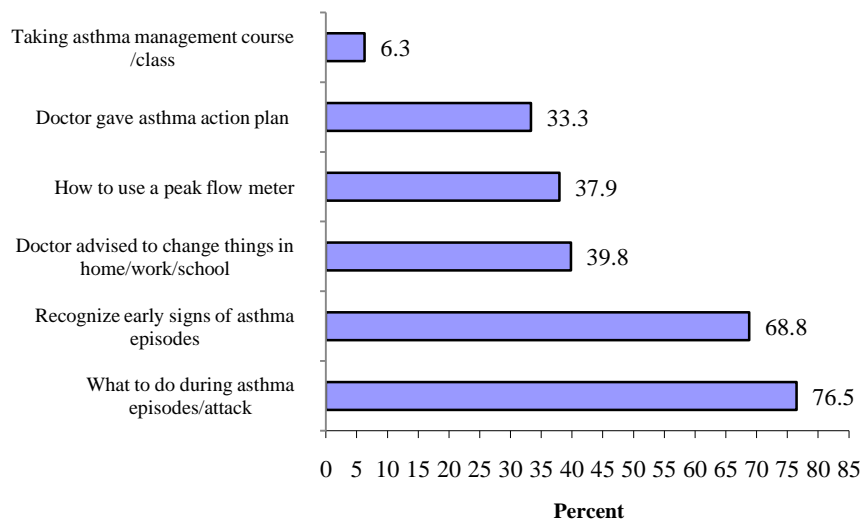
Medical management and control of environmental factors are the most important protective factors in reducing asthma attacks and symptoms, visits to the emergency department, hospitalizations, and deaths from asthma.

Among adults with current asthma in Indiana in 2007:

- About 69 percent reported that a doctor or other health care professional taught them how to recognize early signs of an asthma episode/attack.
- More than two-thirds (76.5%) had been taught what to do during an asthma episode/attack.
- Only 33 percent received an asthma action plan by a doctor or other health professional, and about 6.3% had taken a course or class on how to manage their asthma.
- Less than 38 percent of adults with current asthma reported that they were taught how to use a peak flow meter to adjust their daily medication.

**Figure 17.**

### **Prevalence of asthma education taught by doctor or health professional Indiana (2007)**



Data Source: Indiana State Department of Health

### Medical Management for Adults with Current Asthma

- More than one-fourth (27.7%) reported ever using an over-the-counter medication for their asthma and less than 3 percent have never taken any type of asthma medication.
- More than 93 percent have used a prescription inhaler (2.6% have never used asthma medication)
- Of those who used a prescription inhaler, a very high percentage (97 percent) were shown by a doctor or other health care professional how to use their inhaler. About 85 percent were watched using their inhaler by a doctor or other health care professional.
- Of those who used asthma medication, 96.1% used an inhaler, 30.4% used a pill, and 2.2% used syrup in the last three months.
- Only 22.1% used a nebulizer device for their asthma medication. (Respondents could report more than one type of asthma medication form.)
- 20% reported cost as a barrier for buying medication and 13 percent reported cost as a reason for not seeing their primary care doctor in the last 12 months. More than 6 percent reported they could not visit a specialist for their asthma because of the cost.

Influenza causes substantial illness in adults and children with asthma, often requiring emergency department visits or hospitalization. Influenza vaccination prevents influenza or reduces its complications. In 2009, 45 percent of adults with current asthma in Indiana reported receiving influenza vaccine in the past 12 months.

Forming meaningful partnerships with the state stakeholders has been one of the top priorities of the Indiana State Department of Health (ISDH) Asthma Program. The partnerships formed by the Asthma Program have made the development of a comprehensive asthma surveillance system that collects, analyzes, and interprets asthma data possible. The surveillance system includes seven primary sources of data. These sources of data provide information on specific measures, including adult and child asthma prevalence, asthma deaths, asthma hospitalizations (inpatient and outpatient), asthma management, and quality of life.

## Education

The Indiana State Asthma Program partners with the Family and Social Services Administration (FSSA) to address asthma in children who spend time with registered childcare providers. Education is offered to caregivers by providing in-person, on-site training and resource materials. The ultimate goal is to increase childcare workers' knowledge of asthma, provide asthma resources, reduce environmental triggers, increase utilization of asthma action plans, and provide guidance on appropriate asthma policies within childcare settings.

The ISDH Asthma Program and Indiana Joint Asthma Coalition (InJAC) provide an on-line training program called “*Winning with Asthma – Coaches Clipboard*,” as well. The program provides general information on asthma with a focus on exercise-induced asthma. Specific instruction is given on the difference between long-term controller and quick-relief medications. Techniques, such as exercise pre-treatment, are taught to promote asthma control. The training program also emphasizes the importance of an asthma action plan. Upon completion of the program, participants receive a clipboard (with instructions on what to do during an asthma attack), resource booklet notating training information, asthma first aid card, outdoor air quality brochure, and personalized certificate of completion.

Through InJAC, the Indiana University School of Medicine hosts an online training for health professionals. This training is geared toward improving knowledge and use of current guidelines for the diagnosis and management of asthma. The intervention targets health care providers such as physicians, nurses, and respiratory therapists and is available at the InJAC website - [www.InJAC.org](http://www.InJAC.org).

## Indoor Air Quality

The Asthma Program has initiated a project for schools in Indiana called “**Fly a Flag for Clean Air**”. This intervention educates students about the impact of air quality on students with asthma. Schools are required to become a tobacco-free campus and have asthma action plans on file for all students with a diagnosis of asthma. Schools are given information on how to implement the Environmental Protection Agency’s “*Tools for Schools*” program – which includes information on school indoor air quality improvement through reductions in chemical storage and usage, integrated pest management and environmentally green cleaning products. Students are taught about asthma triggers including car and school bus idling. Schools are required to stop all vehicular idling on campus to improve overall air quality on school grounds.

The ISDH has partnered with hospitals, local health departments and other groups in Indiana to implement home visiting programs to address home indoor air quality and environmental tobacco smoke. This program includes certified asthma educators and other health professionals who visit the homes of asthmatic children. The educators show family members how to mitigate the asthma triggers that are found throughout the home. Asthma education materials are sent to patients when permitted. Spacers and mattress and pillow encasements are provided as needed.

## Coalitions

The ISDH Asthma Program and InJAC continually seek to build and maintain local and regional asthma coalitions around the state. These coalitions are the main point of contact for Indiana residents with asthma in their area. Coalition members assist area residents and local organizations with educational materials and resources, such as home visitors and speakers.

# What Is the ISDH doing to Prevent & Control Asthma in Indiana?

There is no way to prevent asthma, but many ways in which it can be controlled. ISDH Asthma Program staff works closely with InJAC to disseminate information on best practices to health care providers, school nurses, and families of those with asthma.

**What is already in place?** There are clinical diagnosis and treatment guidelines available through the National Asthma Education Prevention Program (NAEPP), but there are varied levels of application of guidelines among health care providers. For example, the BRFSS data suggests that not all individuals with asthma have asthma action plans. Through education efforts addressing the needs of individuals with asthma and their health care providers, the ISDH Asthma Program and InJAC are collaborating to improve optimal management for individuals with asthma.

**Policy:** The ISDH Asthma Program reviews current evidence-based or promising practices in asthma-related public and organizational policy. The Asthma Program provides technical assistance and education to InJAC, schools, hospitals and communities on policies that have been linked to improved asthma control. Examples of these policies include minimizing vehicle idling on school property, ensuring tobacco-free work and school environments, ensuring children have the right to carry prescribed life-saving asthma treatment in school settings and ensuring that school children with asthma have an asthma action plan registered with their school-based health care provider.

**Systems Change:** The ISDH Asthma Program also works with health systems to implement innovative initiatives that would optimize asthma control, minimize treatment costs related to asthma, and ensure adequate provision of continuity of care for individuals with asthma. Such health initiatives may include targeting efforts to assist patients who utilize the emergency department for care of their asthma. These efforts include follow-up and ongoing patient education, ensuring utilization of primary care outpatient services for asthma control, and environmental home assessments to minimize asthma triggers.

**Environmental Change:** The ISDH Asthma Program supports initiatives in schools, workplaces, and other settings to address environmental triggers of asthma. For instance, through the “Fly a Flag for Clean Air” initiative, schools around the state are provided with teaching tools and technical assistance to help minimize asthma environmental triggers and reducing the number of missed days of school related to asthma. Participating schools monitor the daily air quality for their area, inform the students and faculty of the air quality index, and learn how to modify daily outside activities (when necessary). Schools and work places are encouraged to implement Integrated Pest Management to reduce exposure to chemicals that can trigger an asthma attack. When children miss school because of asthma, usually an adult family member misses a day of work, thus impacting families, employers, and communities economically.

This report clearly demonstrates that asthma affects individuals and families throughout Indiana. The prevalence of asthma in Indiana has increased significantly since 2000. The estimated number of people with current asthma was 585,000 including 150,000 children in 2009. This report also reveals that many Indiana residents suffer from asthma that results in emergency department visits and hospitalizations. The rate of asthma hospitalizations in Indiana has increased dramatically; between 2000 and 2009, the rate of asthma hospitalizations increased 30 percent (from 13.0 per 10,000 to 16.9 per 10,000). These hospitalizations cost Hoosiers millions of dollars each year.

Given the prevalence and severity of asthma, it is important to include asthma interventions as a public health priority. One of the main goals of this report is to identify those populations in Indiana which are disproportionately affected by asthma. Based on the data described in this report, four priority populations have been identified for intervention:

1. Children
2. Elderly adults (65 and older)
3. Adult women in general, black adult women in particular
4. Those in the lower socioeconomic status

This information is used by the Indiana Joint Asthma Coalition and the Indiana State Department of Health to guide the planning and implementation of activities and interventions to reduce asthma in the state.

Indiana has already developed a State Asthma Action Plan, which provides the action steps to reduce the burden of asthma in the state. Asthma prevention may be enhanced by engaging non-traditional public health partners.

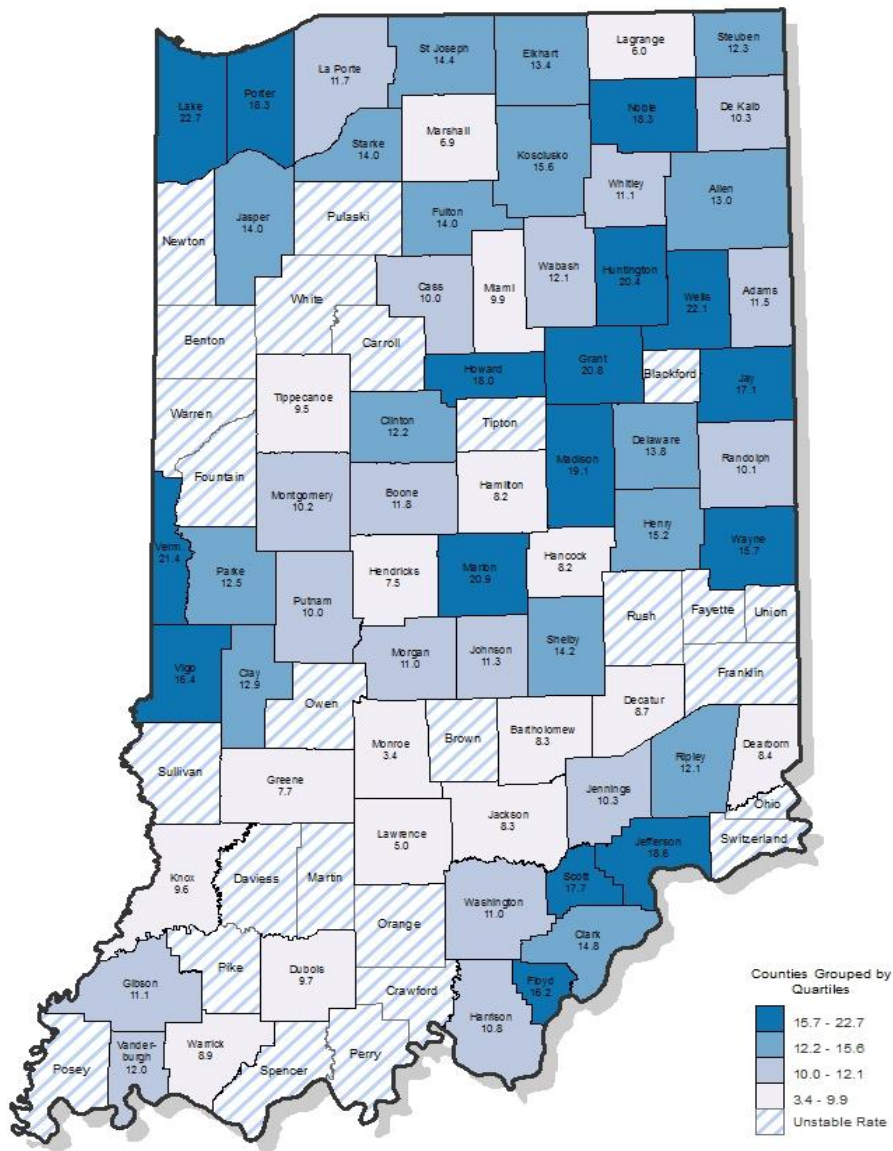


Organization	Website
Indiana Joint Asthma Coalition	<a href="http://www.injac.org">www.injac.org</a>
Indiana State Department of Health - Asthma Chronic Disease Control – Asthma	<a href="http://www.asthma.in.gov">www.asthma.in.gov</a> <a href="http://www.cdc.gov/asthma">www.cdc.gov/asthma</a>
ASK – About Special Kids	<a href="http://www.aboutspecialkids.org">www.aboutspecialkids.org</a>
Air Quality Index	<a href="http://www.airnow.gov">www.airnow.gov</a>
Asthma Alliance of Indianapolis	<a href="http://www.asthmaindy.org">www.asthmaindy.org</a>
American Lung Association	<a href="http://www.lungusa.org">www.lungusa.org</a>
Asthma & Allergy Foundation of America	<a href="http://www.aafa.org">www.aafa.org</a>
Asthma Community Network	<a href="http://www.asthmacommunitynetwork.org">www.asthmacommunitynetwork.org</a>
Asthma Control Test	<a href="http://www.asthmacontrol.com">www.asthmacontrol.com</a>
Central Indiana Clean Air Partnership	<a href="http://www.indycicap.org">www.indycicap.org</a>
Environmental Protection Agency (orders)	<a href="http://www.epa.gov/nscep">www.epa.gov/nscep</a>
IKE – Improving Kids Environment	<a href="http://www.ikecoalition.org">www.ikecoalition.org</a>
Indiana Dept. of Environmental Mgt.	<a href="http://www.in.gov/idem">www.in.gov/idem</a>
Know Zone	<a href="http://www.knozone.com">www.knozone.com</a>
National Heart, Lung, & Blood Institute	<a href="http://www.nhlbi.nih.gov/guidelines/asthma">www.nhlbi.nih.gov/guidelines/asthma</a>
Partnership for a Healthier Johnson Co. – Asthma Coalition	<a href="http://www.healthierjc.org">www.healthierjc.org</a>
Pennsylvania Pediatric Asthma Toolkit	<a href="http://www.PAasthma.org">www.PAasthma.org</a> Email ID: <a href="mailto:info@PAasthma.org">info@PAasthma.org</a> Password: Asthma
Starlight Foundation	<a href="http://www.starlight.org">www.starlight.org</a>
Winning with Asthma – “Coach’s Clipboard” Training	<a href="http://www.winningwithasthma.org">www.winningwithasthma.org</a>
Zap Asthma Simulation	<a href="http://www.peachtreelearning.com">www.peachtreelearning.com</a>

- 1- Center for Disease Control and Prevention's (CDC) National Center for Health Statistics  
[http://www.cdc.gov/nchs/data/series/sr\\_10/sr10\\_249.pdf](http://www.cdc.gov/nchs/data/series/sr_10/sr10_249.pdf)
- 2 - Center for Disease Control and Prevention's (CDC) National center for Health Statistics  
[http://www.cdc.gov/nchs/data/series/sr\\_10/sr10\\_247.pdf](http://www.cdc.gov/nchs/data/series/sr_10/sr10_247.pdf)
- 3- Center for Disease Control and Prevention's (CDC) National Center for Health Statistics  
<http://www.cdc.gov/nchs/data/nhsr/nhsr008.pdf>
- 4- Center for Disease Control and Prevention's (CDC) National Center for Health Statistics  
<http://www.cdc.gov/nchs/data/nhsr/nhsr005.pdf>
- 5- Center for Disease Control and Prevention's (CDC) National Center for Health Statistics  
[http://www.cdc.gov/nchs/data/nvsr/nvsr58/nvsr58\\_19.pdf](http://www.cdc.gov/nchs/data/nvsr/nvsr58/nvsr58_19.pdf)
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- 15- Litonjua AA, Carey VJ, Burge HA, Weiss DT, Gold DR, Parental history and the risk for childhood asthma. Does mother confer more risk than father? Am J Respir Crit Care Med 1998 Jul;158(1):176-81

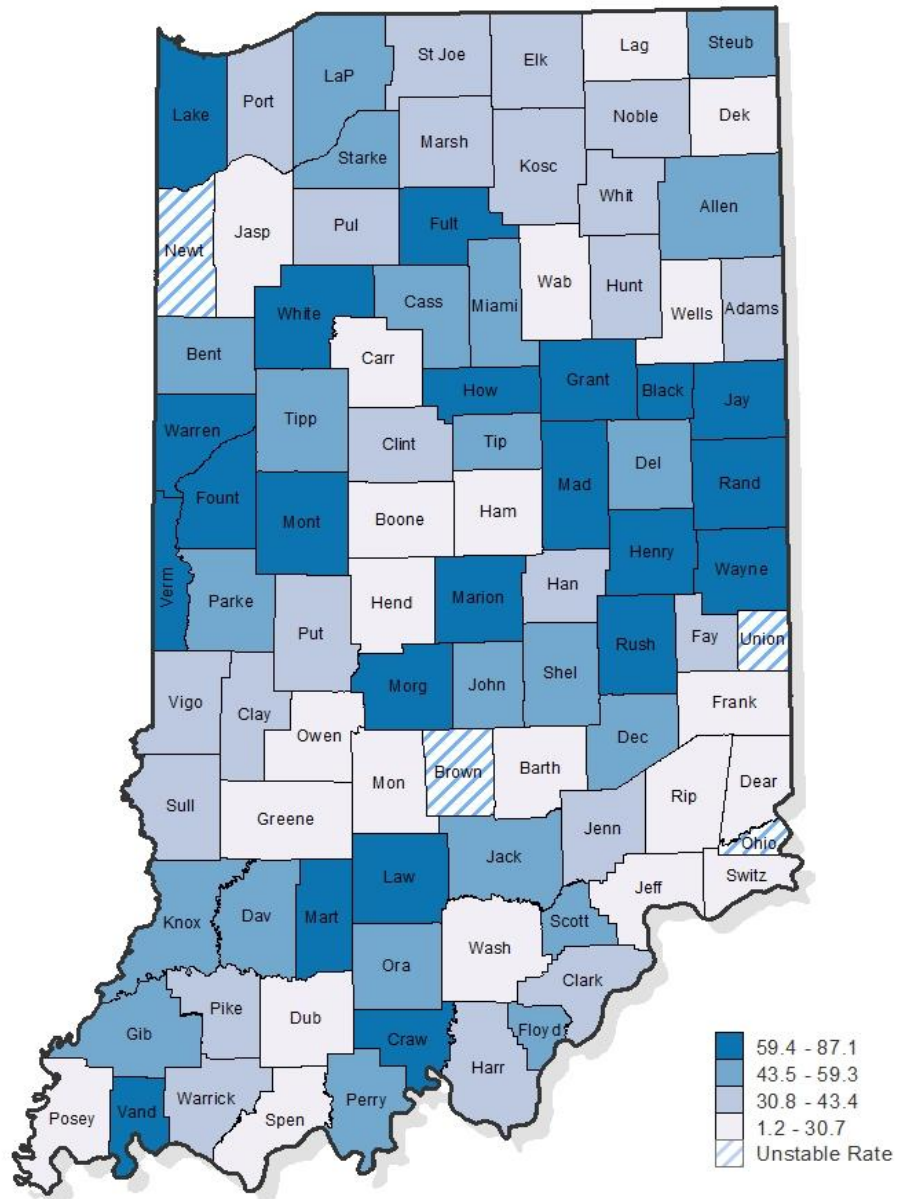
Appendix A.

Age-Adjusted Asthma Hospitalization Rate, Indiana, 2009



Appendix B.

Age-Adjusted Asthma Emergency Department Visits, Indiana, 2009



### Appendix C. Emergency Department Visits<sup>§</sup> by County, Indiana (2009)

County	Frequency	Age-adjusted Rate**	Stability of Rate***
1 ADAMS	136	40.22	
2 ALLEN	1697	48.19	
3 BARTHOLOMEW	213	29.31	
4 BENTON	38	48.23	
5 BLACKFORD	80	66.91	
6 BOONE	135	24.63	
7 BROWN	17	14.14	Unstable
8 CARROLL	53	28.77	
9 CASS	169	45.70	
10 CLARK	400	39.18	
11 CLAY	99	39.62	
12 CLINTON	128	37.32	
13 CRAWFORD	59	60.16	
14 DAVIESS	134	45.19	
15 DEARBORN	114	23.86	
16 DECATUR	117	48.87	
17 DEKALB	113	27.64	
18 DELAWARE	545	51.41	
19 DUBOIS	85	21.63	
20 ELKHART	836	40.87	
21 FAYETTE	75	34.00	
22 FLOYD	319	45.22	
23 FOUNTAIN	132	85.83	
24 FRANKLIN	21	10.23	
25 FULTON	113	61.66	
26 GIBSON	144	46.92	
27 GRANT	539	87.13	
28 GREENE	73	23.59	
29 HAMILTON	782	27.68	
30 HANCOCK	289	43.50	
31 HARRISON	120	33.59	
32 HENDRICKS	339	24.63	
33 HENRY	278	64.32	
34 HOWARD	503	65.79	
35 HUNTINGTON	137	38.47	
36 JACKSON	179	44.51	
37 JASPER	52	16.41	
38 JAY	131	64.54	
39 JEFFERSON	69	22.72	
40 JENNINGS	106	38.45	
41 JOHNSON	661	47.78	
42 KNOX	208	59.38	
43 KOSCIUSKO	247	33.42	
44 LAGRANGE	112	30.76	
45 LAKE	2961	61.66	
46 LAPORTE	545	52.50	
47 LAWRENCE	275	64.40	
48 MADISON	808	66.69	
49 MARION	7567	83.60	
50 MARSHALL	147	33.08	
51 MARTIN	68	74.83	
52 MIAMI	194	57.10	
53 MONROE	231	18.95	
54 MONTGOMERY	241	70.02	

### Appendix C. (cont.) Emergency Department Visits<sup>§</sup> by County, Indiana (2009)

	County	Frequency	Age-adjusted Rate**	Stability of Rate***
55	MORGAN	449	67.70	
56	NEWTON	16	14.14	Unstable
57	NOBLE	187	39.91	
58	OHIO	15	28.39	Unstable
59	ORANGE	88	47.90	
60	OWEN	50	23.15	
61	PARKE	67	43.98	
62	PERRY	96	55.87	
63	PIKE	42	36.31	
64	PORTER	580	37.26	
65	POSEY	52	22.51	
66	PULASKI	49	38.81	
67	PUTNAM	141	39.67	
68	RANDOLPH	155	67.78	
69	RIPLEY	63	25.01	
70	RUSH	113	71.54	
71	ST. JOSEPH	885	33.93	
72	SCOTT	132	58.97	
73	SHELBY	216	51.83	
74	SPENCER	51	26.94	
75	STARKE	98	46.04	
76	STEUBEN	140	43.55	
77	SULLIVAN	66	31.94	
78	SWITZERLAND	15	17.06	
79	TIPPECANOE	730	46.76	
80	TIPTON	79	55.80	
81	UNION*			
82	VANDERBURGH	1018	60.54	
83	VERMILLION	106	75.05	
84	VIGO	414	41.37	
85	WABASH	42	14.40	
86	WARREN	53	68.90	
87	WARRICK	221	42.11	
88	WASHINGTON	30	11.25	
89	WAYNE	369	61.43	
90	WELLS	71	26.66	
91	WHITE	160	75.18	
92	WHITLEY	132	42.42	

Source: Indiana State Department of Health

§ May include duplicate individuals

\*Numbers were suppressed when =<5 events

\*\*Age-adjusted rates are per 10,000 population

\*\*\*Rates are not considered stable if the frequency is less than 20

### Appendix D. Hospital Discharges<sup>s</sup> for Asthma by County (2009)

	County	Frequency	Age-Adjusted Rate**	Stability of Rate***
1	ADAMS	40	11.54	
2	ALLEN	464	12.97	
3	BARTHOLOMEW	65	8.31	
4	BENTON	11	11.85	Unstable
5	BLACKFORD	18	12.67	Unstable
6	BOONE	65	11.83	
7	BROWN*			
8	CARROLL	13	5.44	Unstable
9	CASS	42	10.04	
10	CLARK	164	14.76	
11	CLAY	34	12.86	
12	CLINTON	44	12.24	
13	CRAWFORD	10	8.10	Unstable
14	DAVISS	16	4.99	Unstable
15	DEARBORN	43	8.41	
16	DECATUR	23	8.70	
17	DEKALB	44	10.27	
18	DELAWARE	148	13.77	
19	DUBOIS	41	9.71	
20	ELKHART	274	13.37	
21	FAYETTE	16	6.38	Unstable
22	FLOYD	121	16.18	
23	FOUNTAIN	11	5.72	Unstable
24	FRANKLIN	8	3.42	Unstable
25	FULTON	28	14.01	
26	GIBSON	35	11.09	
27	GRANT	155	20.84	
28	GREENE	26	7.74	
29	HAMILTON	161	8.19	
30	HANCOCK	56	8.19	
31	HARRISON	41	10.84	
32	HENDRICKS	100	7.52	
33	HENRY	74	15.22	
34	HOWARD	165	18.00	
35	HUNTINGTON	79	20.43	
36	JACKSON	35	8.26	
37	JASPER	48	14.04	
38	JAY	38	17.08	
39	JEFFERSON	63	18.59	
40	JENNINGS	29	10.25	
41	JOHNSON	155	11.26	
42	KNOX	39	9.64	
43	KOSCIUSKO	128	15.64	
44	LAGRANGE	21	5.96	
45	LAKE	1156	22.66	
46	LAPORTE	125	11.67	
47	LAWRENCE	25	5.04	
48	MADISON	258	19.12	
49	MARION	1905	20.95	
50	MARSHALL	34	6.92	
51	MARTIN	17	16.73	Not stable rate
52	MIAMI	38	9.94	
53	MONROE	36	3.39	
54	MONTGOMERY	41	10.22	

### Appendix D. (cont.) Hospital Discharges<sup>§</sup> for Asthma by County (2009)

	County	Frequency	Age-Adjusted Rate**	Stability of Rate***
55	MORGAN	79	11.00	
56	NEWTON	18	11.83	Unstable
57	NOBLE	88	18.27	
58	OHIO*			
59	ORANGE	15	6.72	Unstable
60	OWEN	18	7.53	Unstable
61	PARKE	22	12.49	
62	PERRY	16	7.96	Unstable
63	PIKE	11	7.98	Unstable
64	PORTER	299	18.30	
65	POSEY	19	6.56	Unstable
66	PULASKI	12	8.35	Unstable
67	PUTNAM	35	10.02	
68	RANDOLPH	28	10.09	
69	RIPLEY	34	12.14	
70	RUSH	18	9.75	Unstable
71	ST. JOSEPH	384	14.38	
72	SCOTT	43	17.67	
73	SHELBY	62	14.23	
74	SPENCER	10	4.81	Unstable
75	STARKE	36	14.01	
76	STEUBEN	42	12.25	
77	SULLIVAN	19	8.59	Unstable
78	SWITZERLAND	14	13.88	Unstable
79	TIPPECANOE	130	9.50	
80	TIPTON	15	8.86	Unstable
81	UNION*			
82	VANDERBURGH	214	11.99	
83	VERMILLION	34	21.36	
84	VIGO	168	16.40	
85	WABASH	38	12.06	
86	WARREN*			
87	WARRICK	51	8.86	
88	WASHINGTON	32	11.00	
89	WAYNE	102	15.69	
90	WELLS	68	22.15	
91	WHITE	16	6.85	Unstable
92	WHITLEY	39	11.09	

Source: Indiana State Department of Health

§ May include duplicate individuals

\*Numbers were suppressed for  $\leq 5$  events

\*\*Age-adjusted rates are per 10,000 population

\*\*\*Rates are not considered stable if the frequency is less than 20





# Indiana State Department of Health

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Prevention & Control  
Asthma Program  
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