

Asthma

The word asthma comes from the Greek, *aazein*, which translates as “to breathe with open mouth or to pant”. It first appeared in Homer’s *Iliad* meaning short of breath, and probably was first used in a medical sense by Hippocrates. Today the emerging consensus is that asthma is unlikely to be a single disease entity, but rather a clinical manifestation of several distinct diseases and it has been proposed that the term asthma should be abolished altogether.¹²⁹

Asthma is a chronic lung condition. It is characterized by difficulty in breathing. People with asthma have extra sensitive or hyperresponsive airways that react by narrowing or obstructing when they become irritated. Narrowing or obstruction is caused by airway inflammation and broncho-constriction and results one or more of the following symptoms: wheezing, coughing, shortness of breath, and chest tightness. Two factors provoke asthma — triggers which result in broncho-constriction and inducers which result in inflammation of the airways. Common triggers of broncho-constriction include everyday stimuli such as cold air, dust, strong fumes, exercise, inhaled irritants, emotional upsets, and smoke. Second-hand smoke has been shown to aggravate asthma symptoms, especially in children.

In contrast to triggers, inducers cause both airway inflammation and airway hyper-responsiveness and hence are recognized as causes of asthma. Inducers result in symptoms which may last longer and which are delayed and less easily reversed than those caused by triggers. The most common inducers are allergens and respiratory viral infections.

According to the Centers for Disease Control and Prevention (CDC), asthma prevalence, morbidity and mortality increased among adults in the United States between 1980 and 1999. It is estimated that asthma results in the loss of 10-12 million work days and 13-15 million school days each year in the US.¹³⁰ In other industrialized countries (Canada, England, Australia, and New Zealand) asthma mortality rates have been decreasing.

National Prevalence

An estimated 7.7% of US population has asthma with rates decreasing with age. Among persons <18 y of age with boys are 1.7 times more likely than girls to be diagnosed with asthma.¹³¹ Non-Hispanic black children are more likely to have asthma and to have emergency department visits for asthma than non-Hispanic whites and Hispanics.¹³² And, children from poor families are more likely to be diagnosed with asthma than children from families that are not poor. This latter observation may be related to

¹²⁹ Anon. A plea to abandon asthma as a disease concept. *Lancet* 2006;368:705.

¹³⁰ Akinbauni L. Asthma prevalence, health care use and mortality, United States, 2003-05. *NCHS Health E-Stats*, Dec 2006. www.cdc.gov/nchs

¹³¹ Akinbami L. The state of childhood asthma, United States, 1980-2005. *Adv Data Vital Health Stat* 2006;381:1-28. www.cdc.gov/nchs

¹³² McDaniel M et al. Racial disparities in childhood asthma in the United States: evidence from the National Health Interview Survey, 1997 to 2003. *Pediatrics* 2005;117:e868-e877.

cockroach allergens in the home environment.¹³³ Children in fair or poor health are 5 times more likely to have asthma than children in excellent or very good health. Among high school students, 16.1% are current asthmatics.¹³⁴ There is an association between obesity and asthma, and this is stronger among women than men; this association holds for most racial and ethnic subgroups.¹³⁵

A child's birthweight and gestational age may influence their risk of developing asthma. Canadian researchers found that 10.4% of the pregnant women they studied were asthmatic. Among children born <37 weeks gestation or whose birthweight was <2,500 g, the prevalence of asthma was 6.3% and 4.9%, respectively (Reuters News 3/7/06). Low birthweight children are twice as likely as normal birthweight children to have an asthma diagnosis at 3 years of age.¹³⁶ Neighborhood housing characteristics were strong predictors of childhood asthma.

Missouri

The Missouri Department of Health and Senior Services' *Missouri Asthma Surveillance Report 2006* (www.dhss.mo.gov/asthma), estimated that 400,000 adults and 150,000 children in the state are currently living with asthma. Among adults, women have a higher rate of asthma (10.3%) than men (7.9%) with essentially no difference by race/ethnicity. And, prevalence declines with increasing age, increasing income, and increasing level of educational attainment. Of the estimated 400,000 adults with asthma an estimated 30,000 (7.5%) were told by their health care provider that their asthma was work related.

Among adults with asthma, 28.4% were current smokers (compared to 26% for persons without asthma) and regular exposure to second hand smoke was common.¹³⁷ The prevalence of exposure to second hand smoke varied between 19.9% and 36.4% depending on the setting: 22% in the home, 36% in a vehicle, and nearly 20% in the workplace. Those asthmatics with college or technical school education, and blacks were less likely to be current smokers, although among non-current smokers, blacks were more likely to be exposed to second hand smoke. Of the asthmatic current smokers who had visited a physician in the past 12 months, 30% were not advised to quit smoking.

When the Missouri data is broken down into regions, the Kansas City Metro Region (consisting of Cass, Clay, Clinton, Jackson, Lafayette, Platte and Ray counties) was estimated to have 83,000 adults and 25,000 children living with asthma. The asthma prevalences among adults and children were 9.8%, respectively, higher than the statewide estimates of 9.1% for adults and 8.0% for children. There were

¹³³ Gruchalla RS et al. Inner City Asthma Study: relationships among sensitivity, allergen exposure, and asthma morbidity. *J Allergy Clin Immunol* 2005;115:478-485.

¹³⁴ Merkle S et al. Self-reported asthma among high school students – United States, 2003. *MMWR* 2005;54:766-767.

¹³⁵ Kim S, Camargo CA. Sex-race differences in the relationship between obesity and asthma: The Behavioral Risk Factor Surveillance System, 2000. *Am J Epidemiol* 2003;13:666-673.

¹³⁶ Nepomnyaschy L, Reichman NE. Low birthweight and asthma among young urban children. *Am J Public Health* 2006;96:1604-1610.

¹³⁷ Yun S et al. 2006. Active and passive smoking among asthmatic Missourians: implications for health education. *Prev Med* 42:286-290.

6,925 asthma related visits to emergency departments (ED) in the region during 2003. The age-adjusted asthma ED visit rate also was higher in the region (6.3 per 1,000 persons vs 5.6 statewide). Children accounted for 42.7% of the asthma related ED visits compared to 45.0% statewide. Non-Hispanic blacks accounted for 15.6% of the region's population but 48.5% of the asthma related ED visits. And, ED visit rates were higher among females than males.

Similar to the ED visits, the region also had higher asthma related hospital admission rates than statewide, 15.0 per 10,000 vs 13.9 per 10,000 statewide. Women were more likely to be hospitalized than men.¹³⁸ Children in the region accounted for 33.3% of all asthma related hospital admissions (36.7% statewide). Non-Hispanic blacks accounted for 35.6% of all asthma hospital admissions. Asthma in the region accounted for 5,192 days of hospital care in 2003 at a cost of \$14.1 million in hospital charges.

Nationally, important differences exist in charges incurred by children with asthma based on patient and hospital characteristics.¹³⁹ Charges are lower for non-children's hospitals, higher for minority children, and higher for children on Medicaid. In Missouri, children on Medicaid have higher rates of ED use and costs than children covered by private insurance.¹⁴⁰

Between 2001 and 2005, 388 Missourians died from asthma (237 females, rate 1.4 per 100,000; 151 males, rate 1.1). Death rates increased with age from 0.3 for those <15 y of age to 4.4 for persons ≥65 y. Two hundred and seventy-seven deaths occurred among non-Hispanic whites (96 males; 181 females) and 105 among non-Hispanic blacks (50 males; 55 females).

Kansas City

A 2004 telephone survey commissioned by the Kansas City Health Department found a 12.5% prevalence rate for asthma among respondents.¹⁴¹ In 1996, the American Lung Association estimated an asthma prevalence of 5.8% for residents of Clay, Jackson and Platte counties and 5.5% for Kansas City proper.

About 60% of persons with asthma suffer from allergic asthma. For these individuals, Kansas City is not the not the worst environment, but it is far from the best. Rankings of metropolitan areas across the nation for 2007 by the Asthma and Allergy Foundation of America place Kansas City as the 70th leading "US Spring Allergy Capital" out of 100 communities with a rating of better than average (www.aafa.org) while St Louis City ranked 6th. When the communities were ranked for asthma, however, Kansas City was the 56th leading "US Asthma Capital" with a rating of average and St Louis City ranked 28th with a worst than average ranking.

Asthma was the 3rd leading cause of visits to Kansas City emergency departments in 2003, with

¹³⁸ Baibergenova A et al. Sex differences in hospital admissions from emergency departments in asthmatic adults: a population-based study. *Ann Allergy Asthma Immunol.* 2006;96:666-72.

¹³⁹ Gupta RS et al. Predictors of hospital charges for children admitted with asthma. *Ambulatory Pediatr* 2006;6:15-20.

¹⁴⁰ Missouri Department of Health and Senior Services. Asthma-related emergency room visits by children under age 18. *Focus*, May 2006. www.dhss.mo.gov

¹⁴¹ Kansas City Health Department. 2004 Health Assessment Survey. www.kcmo.org/health.



4,424 visits. Among blacks and Hispanics it was the 3rd leading cause, but it was only the 5th leading cause for whites. This racial and ethnic disparity was consistent with the national data. It was the 8th overall cause of hospitalization that year and was the 3rd leading cause for persons under 25 years of age. For blacks asthma was the 6th leading cause for hospitalization.

Asthma visits to emergency departments and hospitalizations peak in Kansas City during May and October each year. The specific causes for these peaks is not known, although Canadian researchers believe the Fall peak in their country is driven by kids, colds, and the return to school.¹⁴² Data reported by Children's Mercy Hospital at the 2006 annual meeting of the American College of Allergy, Asthma and Immunology, suggested that rising temperatures locally are causing earlier pollen seasons in Kansas City which, in turn, could affect asthmatic individuals who are sensitive to spring pollens.

For the period 2001-2005, 33 Kansas City residents died from asthma (14 non-Hispanic whites, 4 male and 10 female; 18 non-Hispanic blacks, 8 male, 10 female). The asthma death rate in Missouri from asthma was 1.3 per 100,000 population, while in Kansas City the rate was 1.5 compared to 3.1 in St Louis City.

¹⁴² Johnston NW et al. 2006. The September epidemic of asthma hospitalizations: school children as disease vectors. *J Allergy Clin Immunol* 117:557-562.