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 general consensus is that asthma is unlikely to be a single disease entity, but rather a clinical manifestation of several distinct diseases. Therefore, it has been proposed that the term asthma should be abolished altogether.[277]

Asthma is a chronic lung condition characterized by difficulty in breathing. People with asthma have extra sensitive or hyper-responsive 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, are delayed and less easily reversible than those caused by triggers. The most common inducers are allergens and respiratory viral infections.

Asthma statistics distinguish between persons who had ever been diagnosed with asthma and persons who currently have asthma. Therefore, the reader needs to distinguish between these two types of statistics.

National prevalence

According to the Centers for Disease Control and Prevention (CDC), current asthma prevalence in the US is 8.5% among children and 6.7% among adults.[278] Overall and among adults asthma is more prevalent among females (8.1% overall, 8.4% in adults) than males (6.2% overall, 4.9% in adults). Boys have higher rates (9.6%) than girls (7.4%). It also more prevalent among blacks (9.2%) than whites (6.9%) and among Hispanics is more prevalent among those of Puerto Rican descent (14.5%) than Mexican descent (3.9%). The difference in prevalence between blacks and whites is greater for children (12.5% vs 7.7%) than for adults (7.6% vs 6.7%). Black race is associated with worse asthma outcomes, including a greater risk of emergency department visits and hospitalizations, even in health care settings that provide uniform access to care.[279]

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Asthma is more prevalent among persons living below the federal poverty level (10.3%) than those at or above the federal poverty level (6.4% to 7.9%). Asthma prevalence is higher in the Midwest than the South or West, but lower than that in the Northeast. 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.[280] 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.[281]

Approximately 11 million persons annually experience an asthma attack resulting in 12.3 million physician visits, 1.3 hospital outpatient visits, 1.8 million emergency department visits, and 504,000 hospitalizations each year. On average, 4,310 deaths occur annually from asthma.

A child's birthweight and gestational age may influence their risk of developing asthma, with increasing risk as birthweight or gestational age declines.[282] [283] Neighborhood characteristics are strong predictors of childhood asthma; this may be related to cockroach allergens in the home environment.[284] [285]

Missouri

According to the Missouri 2007 Behavioral Risk Factor Surveillance System data, 8.5% of adults (7.0% of males; 10.0% of females) currently had asthma.[286] 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 had a higher rate of asthma (10.3%) than men (7.9%) with essentially no difference by race/ethnicity. And, prevalence declined with increasing age, increasing income, and increasing level of educational attainment. Of the estimated 400,000 adults with asthma, 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

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[286] Missouri Department of Health and Senior Services. *2007 Behavioral Risk Factor Surveillance System.* www.dhss.mo.gov/BRFSS

asthma) and regular exposure to second-hand smoke was common.[287] 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) is 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 6,925 asthma related visits to emergency departments in the region during 2003. The age-adjusted asthma emergency department 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 emergency department 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 emergency department visits. And, emergency department visit rates were higher among females than males.

Similar to the emergency department 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 are more likely to hospitalized than men.[288] 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.[289] 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 emergency department use and costs than children covered by private insurance.[290]

Between 2002 and 2006, 371 Missourians died from asthma (231 females, rate 1.3 per 100,000; 136 males, rate 1.0). Death rates increased with age from 0.2 for those <15 years of age to 4.1 for persons ≥65 years. Two hundred and seventy-one deaths occurred among non-Hispanic whites (89 males; 182 females) and 94 among non-Hispanic blacks (46 males; 48 females).

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Kansas City

A 2004 telephone survey commissioned by the Kansas City Health Department found a 12.5% prevalence rate for asthma among respondents.[291] BRFSS data for 2006 found that 7.7% of adults in the bi-state metropolitan area had asthma.[292]

About 60% of persons with asthma suffer from allergic asthma. Fall allergy rankings of metropolitan areas across the nation for 2007 by the Asthma and Allergy Foundation of America place Kansas City as the 64th with a rating of average (www.aafa.org) while St Louis City ranked 6th, or below average. When the Asthma and Allergy Foundation of America ranked communities in 2008 for asthma, both the Kansas City metropolitan and the St Louis City metropolitan area received ratings of worst than average, ranking in at 11th and 9th, respectively.

Asthma was the 6th leading cause of visits to Kansas City emergency departments in 2006, with 3,412 visits. Among non-Hispanic blacks it was the 3rd leading reason for emergency department visits and the 6th leading cause for hospitalization; for non-Hispanic whites it was the 9th leading reason for emergency department visits. Figure 90 displays the estimated number of emergency department visits for asthma for 2007-2009 plus the 95% confidence intervals for those projections.

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.[293] 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 2002-2006, 38 Kansas City residents died from asthma (15 non-Hispanic whites, 4 male and 11 female; 22 non-Hispanic blacks, 11 male, 11 female; 1 non-Hispanic Asian male). All but 2 of the deaths occurred among persons ≥25 years of age. The annualized asthma death rate in Missouri was 1.2 per 100,000 population, while in Kansas City the rate was 1.8 compared to 2.8 in St Louis City.

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Figure 90 Quarterly projection of asthma emergency department visits and 95% confidence intervals for 2007-2009, Kansas City, Mo