Asthma: Hospitalizations for Asthma

Type of EPHT Indicator	Health Outcome
Measures	1. Age-adjusted rate of hospitalization for asthma per 10,000 population 2. Crude rate of hospitalization for asthma per 10,000 population 3. Number of hospitalizations for asthma
Derivation of Measures	*Numerator*: Resident hospitalizations for asthma, ICD-9-CM: 493.XX by gender and total for state and by county *Denominator*: Midyear resident population, by gender, for state and by county *Adjustment*: Age-adjustment by the direct method to year 2000 US standard population
Unit	1. Age-adjusted rate per 10,000 population 2. Rate per 10,000 population 3. Number
Geographic Scope	Iowa
Geographic Scale	Residents of jurisdiction — State, County
Time Period	Hospital admissions between January 1 to December 31, inclusive, for each year, 2000—
Time Scale	Annually (as appropriate for the measure)
Rationale	In 2004, 20.5 million people in the U.S. reported having asthma. In 2003, there were over 574,000 hospitalizations for asthma. In 2002, there were over 4,200 deaths in which asthma was the underlying cause. Asthma is the leading chronic health condition among children. There are also large racial, income, and geographic disparities in poor asthma outcomes. Asthma causes lower quality of life, preventable undesirable health outcomes, and large direct and indirect economic costs. Environment Attributable Fractions of the 1988-1994 economic costs for asthma were 39.2% for children < 6 years and 44.4% for 6—16 year olds, costing more than $400 million for each age group. A number of epidemiologic studies have reported associations between air pollution exposures and asthma. The association between ambient air particulate matter (PM) concentrations and asthma, including increased hospital admissions, is well documented. Models demonstrate 5—20% increases in respiratory-related hospital admissions per 50μg/m^3 of PM_{10} and 5—15% per 25μg/m^3 of $PM_{2.5}$, with the largest effect on asthma admissions. In the Eastern United States, summer ozone pollution was associated with more than 50,000 hospital admissions per year for asthma and other respiratory emergencies. Large multi-city and individual city studies found a positive association between ozone and total respiratory hospital admissions, including asthma, especially during the warm season. Among US and Canadian studies, the ozone-associated increase in respiratory hospital admissions ranged from 2-30% per 20 ppb (24 hour), 30 ppb (8 hour) or 40 ppb (1 hour) increment of ozone in

	warm seasons. In 2000, the Institute of Medicine cited sufficient evidence to conclude that allergens produced by cats, cockroaches and house dust mites caused asthma exacerbations as did exposure to environmental tobacco smoke (ETS) in preschool aged children. A 2005 California Air Resources Board report noted that there is sufficient evidence to conclude that ETS causes asthma exacerbation in children and adults (CARB, 2005). That report also estimated 202,300 excess childhood asthma episodes occur each year in the U.S. as a result of exposure to ETS.
Use of the Measures	The development of a standardized analytic method for asthma hospital admissions among residents in each state will inform multiple users at the national, state, and local levels. These measures will allow the monitoring of trends over time, identify high risk groups, and inform prevention, evaluation and program planning efforts. These measures will address the following surveillance functions: • How many hospitalizations for asthma occur in every month? • Is there a seasonal or temporal trend of asthma hospitalizations? • What's the distribution of asthma hospitalizations by place of residence? • How do hospitalizations for asthma differ between geographic areas (e.g. zip code, county, state, or region)? • With further analysis … Are there disparities in asthma hospitalizations by factors such as age, race, ethnicity, gender, education, and/or income? • Which populations are in need of targeted interventions? • When asthma data are linked with environmental variables, do the linked measures identify environmental relationships warranting further investigation or environmental public health action?
Limitations of the Measures	• Hospitalization data, by definition, does not include asthma among individuals who do not receive medical care or who are not hospitalized, including those who die in emergency rooms, in nursing homes, or at home without being admitted to a hospital, and those treated in outpatient settings. • Differences in rates by time or area may reflect differences or changes in diagnostic techniques and criteria and in the coding of asthma. • Reporting rates at the state and/or county level will not show the true asthma burden at a more local level (i.e. neighborhood). • Differences in rates by area may be due to different socio-demographic characteristics and associated behaviors. • When comparing rates across geographic areas, a variety of non-environmental factors, such as access to medical care and diet, can impact the likelihood of persons being hospitalized for asthma. • Reporting rates at the state and/or county level will not be geographically resolved enough to be linked with many types of environmental data.

	• When looking at small geographic levels (e.g. ZIP code), users must take into consideration appropriate cell suppression rules imposed by the data providers or individual state programs. • Although duplicate records and transfers from one hospital to another are excluded, the measures are based upon events, not individuals, because no unique identifier is ever available. When multiple admissions are not identified, the true prevalence will be overestimated. • Even at the county level it can be expected that the measures generated will often be based upon numbers too small to report or present without violating state and federal privacy guidelines and regulations. Careful adherence to cell suppression rules in cross tabulations is necessary and methods to increase cell sizes by combining data across time (e.g., months, years) and geographic areas may be appropriate.
Data Sources	*Numerator*: State inpatient hospitalization data (using admission date) *Denominator*: US Census Bureau population data
Limitations of Data Sources	<u>State hospital discharge data:</u> • Using a measure of all asthma hospitalizations will include some transfers between hospitals for the same individual for the same asthma event. Variations in the percentage of transfers or readmissions for the same asthma event may vary by geographic area and impact rates. • Without reciprocal reporting agreements with abutting states, statewide measures and measures for geographic areas (e.g., counties) bordering other states may be underestimated because of health care utilization patterns. • Each state must individually obtain permission to access and, in some states, provide payment to obtain the data. • Veterans Affairs, Indian Health Services and institutionalized (prison) populations are excluded. • Practice patterns and payment mechanisms may affect diagnostic coding and decisions by health care providers to hospitalize patients. • Street address is currently not available in many states. • Sometimes mailing address is listed as the residence address of the patient. • Patients may be exposed to environmental triggers in multiple locations, but hospital discharge geographic information is limited to residence. • Since the data captures hospital discharges (rather than admissions), patients admitted toward the end of the year and discharged the following year will be omitted from the current year dataset. • Data will need to be de-duplicated (i.e. remove duplicate records for the same event). • There is usually a two year lag period before data are available from the data owner. <u>Census data:</u> • Only available every 10 years, thus postcensal estimates are needed when calculating rates for years following the census

	year. • Postcensal estimates at the ZIP code level are not available from the Census Bureau. These need to be extrapolated or purchased from a vendor.
Related Indicators	• Asthma prevalence among adults • Asthma prevalence among children • Emergency department visits due to asthma
References	1. Centers for Disease Control and Prevention. Behavioral Risk Factor Surveillance System (BRFSS) Prevalence Data. 1999–2010 November 16, 2011 [cited 2012 July 2]; Available from: http://www.cdc.gov/asthma/brfss/default.htm#00. 2. Mannino, D.M., et al., Surveillance for asthma—United States, 1960–1995. MMWR CDC Surveill Summ, 1998. 47(SS-1): p. 1–28. 3. Mannino, D.M., et al., Surveillance for asthma—United States, 1980–1999. MMWR Surveill Summ, 2002. 51(1): p. 1–13. 4. Britton, J. and S. Lewis, Epidemiology of Childhood Asthma, in Asthma: Epidemiology, Anti-Inflammatory Therapy and Future Trends, M. Giembycz and B. O'Connor, Editors. 2000, Birkhäuser Basel: Switzerland. p. 25–56. 5. Gold, D.R. and R. Wright, Population disparities in asthma. Annu Rev Public Health, 2005. 26: p. 89–113. 6. Lanphear, B.P., et al., Residential exposures associated with asthma in US children. Pediatrics, 2001. 107(3): p. 505–11. 7. Lanphear, B.P., et al., Contribution of residential exposures to asthma in us children and adolescents. Pediatrics, 2001. 107(6): p. E98. 8. Redd, S.C., Asthma in the United States: burden and current theories. Environ Health Perspect, 2002. 110 Suppl 4: p. 557–60. 9. Arif, A.A., J.E. Rohrer, and G.L. Delclos, A population-based study of asthma, quality of life, and occupation among elderly Hispanic and non-Hispanic whites: a cross-sectional investigation. BMC Public Health, 2005. 5: p. 97. 10. Jorres, R.M.H., Atmospheric pollutants, in Asthma: Basic Mechanisms and Clinical Management, P. Barnes, I. Rodger, and N. Thomson, Editors. 1998, Academic Press: London. p. 589–596. 11. Trasande, L. and G.D. Thurston, The role of air pollution in asthma and other pediatric morbidities. J Allergy Clin Immunol, 2005. 115(4): p. 689–99. 12. Jaffe, D.H., M.E. Singer, and A.A. Rimm, Air pollution and emergency department visits for asthma among Ohio Medicaid recipients, 1991–1996. Environ Res, 2003. 91(1): p. 21–8. 13. U.S. Environmental Protection Agency, Air Quality Criteria for Particulate Matter (Final Report, Oct 2004), 2004, U.S. Environmental Protection Agency. EPA 600/P-99/002aF-bF: Washington, DC. 14. Institute of Medicine, Committee on the Assessment of Asthma and Indoor Air. Division of Health Promotion. Disease Prevention. Clearing the Air: Asthma and Indoor Air Exposures 2000, Washington, DC: The National Academies Press.