



HIDI HealthStats

Statistics and Analysis From the Hospital Industry Data Institute

JUNE 2015 ■ HOSPITAL UTILIZATION FOR PEDIATRIC ASTHMA IN MISSOURI

Efforts to Improve the Health of Missouri Children With Asthma

Missouri's Medicaid program, MO HealthNet, is in the process of implementing new tools to help low-income families identify and address asthma triggers in their homes. Thanks to an appropriation spearheaded by Rep. Sue Allen and signed by Gov. Nixon, Medicaid will begin paying asthma educators to work with families and perform environmental assessments of their homes. The services will be targeted to the pediatric population served by Medicaid who have high asthma-related usage of emergency departments, hospital admissions and medication refills. It is expected that 5,000 to 6,000 households will be served each year. The executive director of the St. Louis chapter of the Asthma and Allergy Foundation, Joy Krieger, said the effort would help Missouri save money.

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HOSPITAL INDUSTRY DATA INSTITUTE
The Data Company of the Missouri Hospital Association

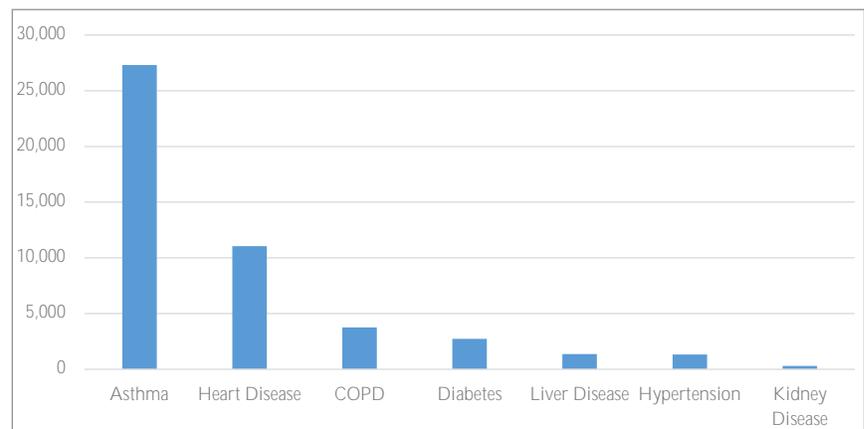
Background

With 6.8 million annual visits nationally, respiratory system disorders are second only to injury and poisoning as the primary cause of pediatric emergency department visits. Asthma is an ambulatory care treatable condition that accounts for more than 1 in 4 hospitalizations that originate in the ED for children under the age of 10.ⁱ The prevalence and costs associated with pediatric asthma in the U.S. are increasing. A recent study estimated that pediatric asthma ED visits cost Medicaid programs across the country more than \$272 million in 2010. The same study placed the Medicaid burden of pediatric asthma ED visits in Missouri at 15th highest in the nation, while the total number of children covered by Medicaid in Missouri was 18th highest.ⁱⁱ

Asthma is the most-commonly diagnosed chronic condition for pediatric patients in hospital settings in Missouri. Throughout fiscal year 2014, more than 304,000 Missouri children ages 0 to 17 were treated in a hospital, with more than 847,000 encounters.ⁱⁱⁱ More than 27,000 — 9 percent of these children — were diagnosed with asthma during the year (Figure 1).

Based on a systematic review of the evidence-based literature, the Community Guide to Preventive Services found that home-based educational and multi-component environmental interventions aimed at reducing pediatric asthma triggers yielded numerous improvements in health outcomes for children with the disease. The study found that the median number of annual asthma symptom days per child decreased by 21, and the median number of missed school days dropped by 12. In addition, the estimated cost-benefit of these interventions suggested a

Figure 1: Number of Unique Pediatric Patients Diagnosed in Missouri Hospitals During 2014



\$5.30 to \$14 return for every dollar invested.^{iv} Based on this evidence, state and national lawmakers are taking steps to reduce barriers to providing care for children with asthma in nontraditional settings. Following rulemaking from the Centers for Medicare & Medicaid Services, which in 2014 authorized reimbursement for home and community-based asthma intervention services for Medicaid and CHIP beneficiariesⁱⁱ, the Missouri General Assembly recently appropriated funds to address home-based triggers of asthma for low-income children in the state.

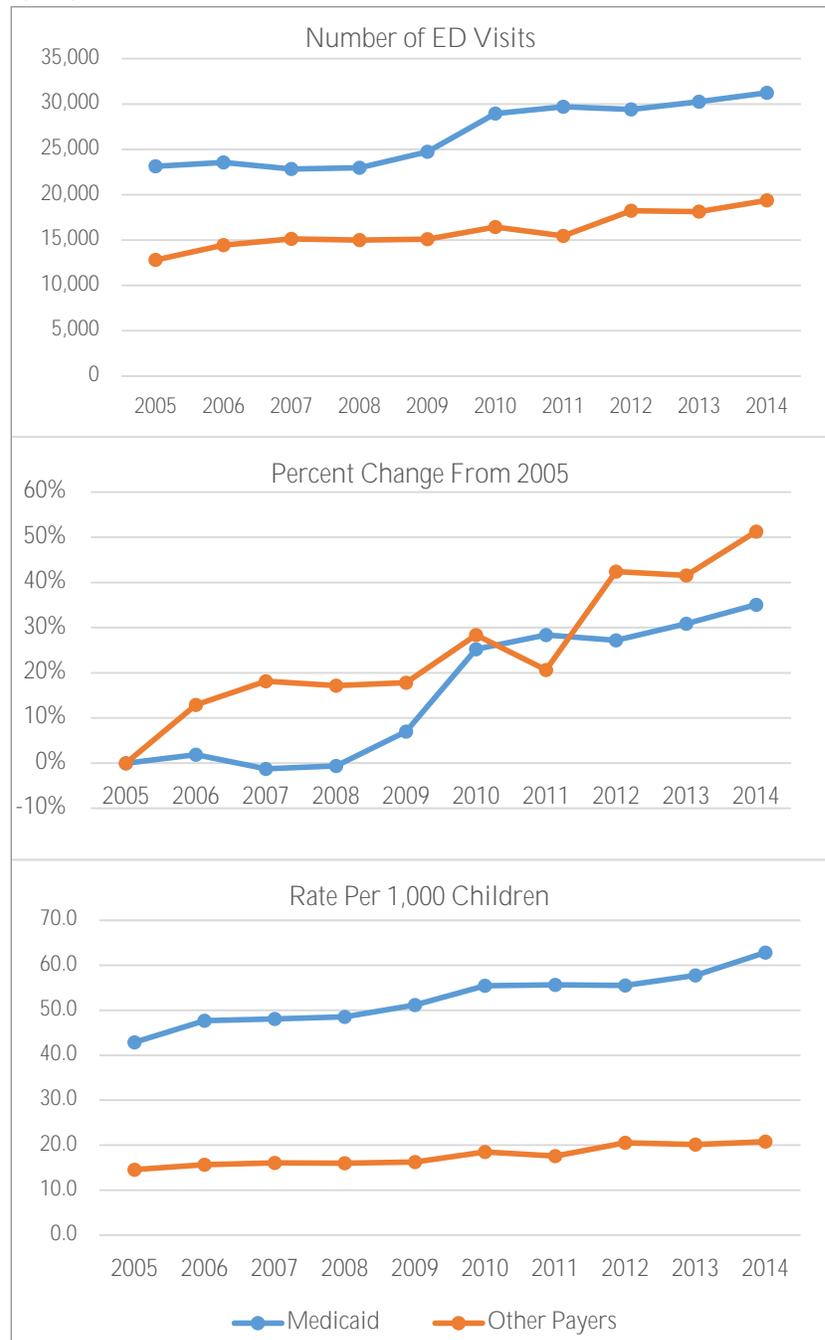
Data and Methods

An observational, retrospective cohort study of pediatric asthma hospital patients was conducted by the Hospital Industry Data Institute to evaluate trends in all hospital encounters in which children below the age of 18 were diagnosed with asthma as a primary or contributing factor for the visit (n = 426,826 visits between fiscal year 2005 and FY 2014). For FY 2014, the retrospective study cohort was limited to pediatric ED encounters only with asthma identified as the primary diagnosis using ICD-9 CM codes 493 - 493.92 (n = 11,259 visits for 8,823 unique children). This cohort was used to identify differences in ED utilization by the poverty rate of the child's ZIP code.^v The FY 2014 cohort also was used to evaluate the rate of 90-day revisits for asthma using hierarchical logistic regression methods.

Trends in Pediatric Asthma Hospital Utilization

Policies that enable the coordination of care for children with asthma are greatly needed in Missouri. Figure 2 shows that the state's number, rate and percent change for hospital visits for pediatric asthma have increased substantially during the most recent 10-year period. These trends are based on inpatient, outpatient and ED visits

Figure 2: 10-Year Trends in Pediatric Asthma Emergency Department Visits by Payer in Missouri



for children under age 18 where asthma was the primary or contributing reason for the visit. Medicaid is the dominant payer for pediatric asthma hospital visits in Missouri, resulting in the program serving as the primary payer for more than 31,000 (62 percent) asthma-related pediatric hospital visits. Comparatively, in 2014, all

other payers combined were listed as the primary on 19,369 (38 percent) of visits (Figure 2, top panel).

Since 2005, the 10-year percent change for Missouri Medicaid pediatric asthma hospital visits for other payers outstripped the percent change for children covered by Medicaid by

51 percent to 35 percent, respectively (Figure 2, middle panel). However, the rate of visits per 1,000 children eligible for Medicaid over the 10-year period significantly outgrew the rate for non-Medicaid children at 63 visits per thousand for Medicaid versus only 21 visits per thousand for all other payers combined in 2014 (Figure 2, bottom panel).^{vi} For Medicaid, this rate per thousand increased by 50 percent throughout the period, from 42.9 visits per thousand in 2005 to 62.8 in 2014.

The Impact of Children's Socioeconomic Status

The relationship between pediatric asthma and socioeconomic status, including the child's race and ethnicity, is widely researched.^{vii} Studies have pointed to the positive association between ED utilization for pediatric asthma and the poverty rate of the patients' ZIP code of residence. The empirical evidence suggests that the relationship becomes asymptotic — or is subject to the law of diminishing marginal returns — as the childhood poverty rate approaches 30 percent.^{viii}

Last year in Missouri, children from the highest poverty (fifth-quintile)

ZIP codes accounted for 43 percent of all pediatric asthma ED visits in the state (Figure 3). The average childhood poverty rate in these ZIP codes was 40.2 percent. Combined, children living in the fourth and fifth poverty quintile ZIP codes accounted for 61 percent of all pediatric asthma ED visits in the state. Conversely, children from the lowest quintile ZIP codes accounted for only 12 percent of all visits and lived in areas with an average 6.5 percent of children living in poverty.

Figure 4 displays the spatial relationship between pediatric asthma ED visits and childhood poverty in Missouri during fiscal year 2014.^{ix} The left panel shows the hot and cold spot clusters of ZIP codes for pediatric asthma ED visits measured as a rate per 1,000 total population, ages 0-17. The map on the right includes the hot and cold spots for the percent of families with children living below the poverty level by ZIP code.^x

The maps show a positive association between ZIP-code level clustering of high and low poverty and pediatric ED utilization for asthma.^{xi} The ED utilization hot spots may be

understated, particularly in border areas that are in close proximity to a hospital in another state. South central Ozark County is one example of a hot spot for childhood poverty, but a cold spot for pediatric asthma ED visits. This may be due in part to the accessibility of a hospital in the area in Mountain Home, Arkansas, for which hospital discharge data are unavailable to HIDI.

ED Visits and 90-Day Revisits for Pediatric Asthma Patients

Nationally, ED revisit rates to emergency departments are higher among young patients with Medicaid coverage.^{xii} Recent data suggest this holds true for pediatric asthma ED visits in Missouri. ED visits and revisits for asthma are considered an avoidable portion of the estimated \$56 billion direct and indirect burden of asthma in the U.S. annually.ⁱⁱ Recent research has placed the 30-day ED revisit rate for adults in the U.S. between 3^{xiii} and 20 percent^{xiv}. In addition to being costly, revisits also contribute to ED over-crowding, particularly for ambulatory care sensitive conditions.^{xiii}

Figure 3: Percent and Cumulative Number of Pediatric Asthma ED Visits per Day by ZIP Code Poverty Quintile (Average Poverty Rate for Children in Parentheses)

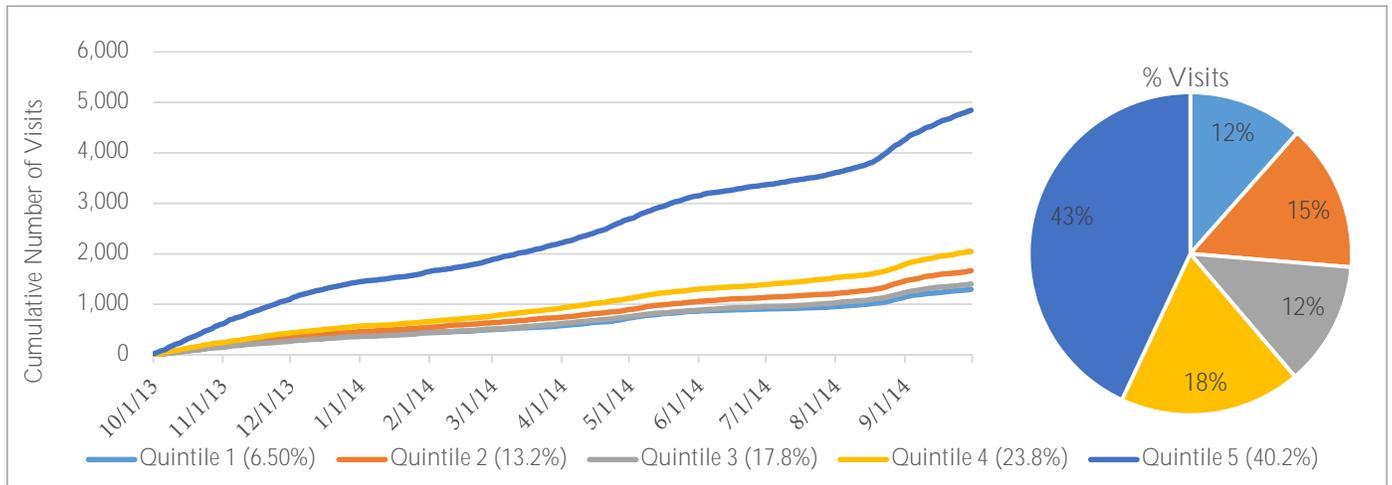
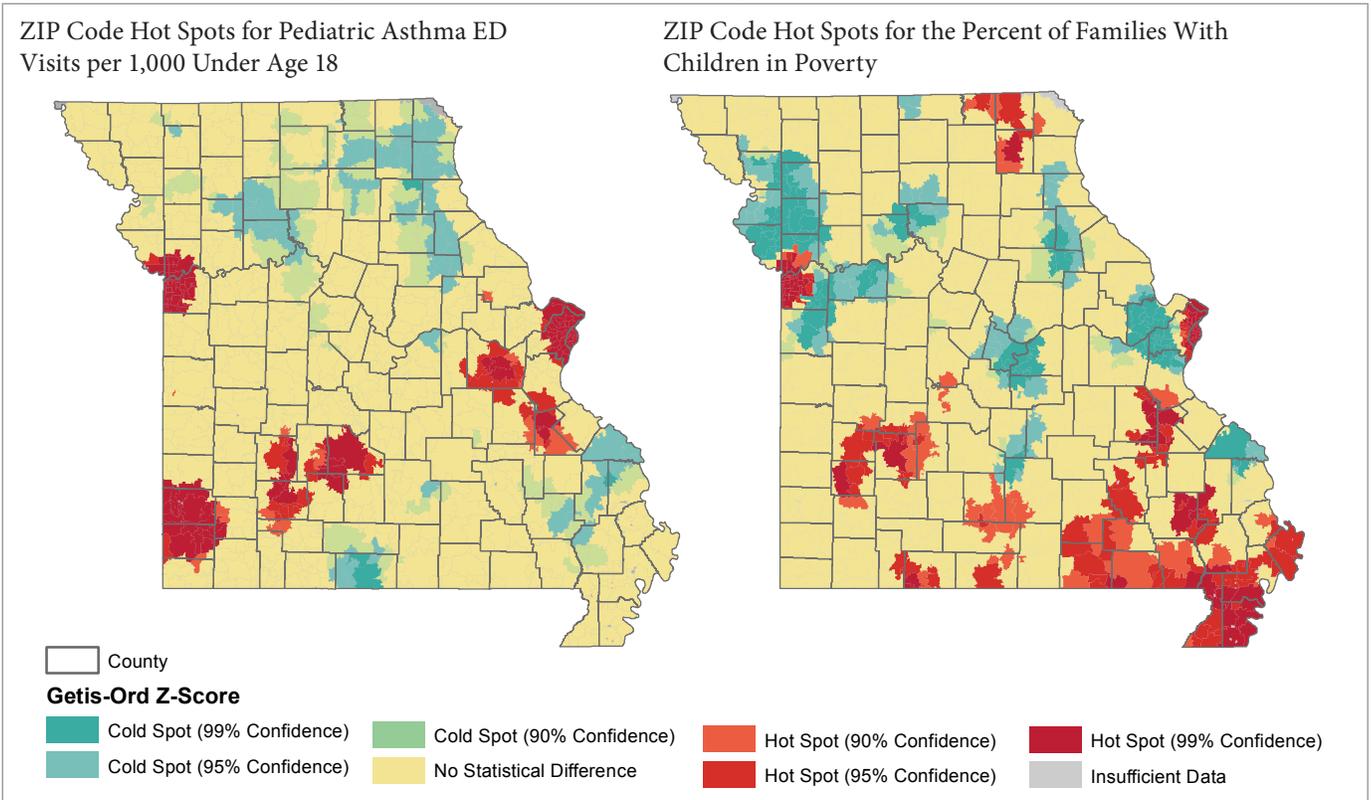


Figure 4: 2014 ZIP Code Hot Spots for Pediatric Asthma and Poverty in Missouri^{ix}



Last year in Missouri, the 30-day ED revisit rate for pediatric asthma was 6.8 percent, the 60-day rate was 9.9 percent and the 90-day rate was 12.3 percent (Figure 6). These rates (and subsequent analysis) only include visits and revisits where the primary diagnosis was for asthma. Revisit rates also increase with the poverty rate of the child’s home ZIP code — children living in the lowest poverty areas have a 9.6 percent, 90-day revisit rate while children in the highest poverty quintile areas face a 14.1 percent revisit rate (Figure 5).

To further examine the effect of socioeconomic status and other factors on the risk of 90-day pediatric asthma ED revisits, a hierarchical logistic regression model was fit using patient’s age, race, ethnicity, gender, insurance status and factors associated with the child’s home ZIP code. The data were nested by the treating hospital, so the model was designed to control for risk at both patient and provider levels.

Figure 5: 2014 Pediatric Asthma ED Visits and 90-Day Revisit Rates by Poverty Rate Quintiles for Families With Average Poverty Rate for Children in Parentheses

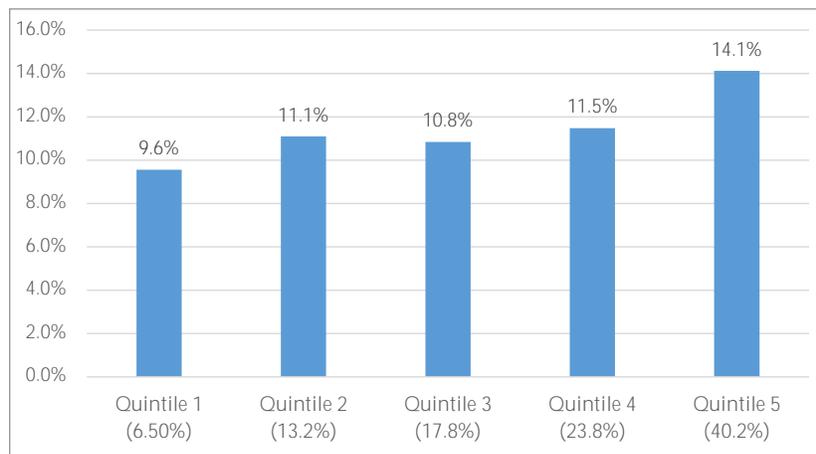


Table 1 includes the frequencies and model results for the patient-level controls (fixed effects) used in the 90-day pediatric asthma ED revisit model. The average age of pediatric ED patients in Missouri with a primary diagnosis of asthma was 7.6 years during fiscal year 2014. The majority of patients were male

(59.1 percent) and disproportionately African American (53.6 percent). An additional 3.5 percent of visits were by Hispanic children. At 70.1 and 24.2 percent respectively, children with Medicaid or who were uninsured also were over-represented in pediatric asthma ED visits compared to the total population. Children residing in

statistical pediatric asthma hot spots and heavily-populated ZIP codes also made up the majority of pediatric ED visits for asthma. The average ZIP code poverty rate for children was 26.6 percent for pediatric asthma ED patients, while the average rate for the state as a whole was 19.5 percent in 2014.

All else equal, African American children were 1.55 times more likely to experience a 90-day revisit for asthma exacerbation following an ED visit with the primary cause being asthma (OR = 1.548, P <0.0001). Hispanic children were 22 percent more likely to have a revisit within 90 days; however, the estimate was not found to be statistically significant. Compared to children with private insurance, patients with Medicaid were 38 percent more likely to have a 90-day revisit (OR = 1.376, P < 0.0001) and uninsured children were 20 percent more likely, holding other included factors constant (OR = 1.197, P = 0.08). Children from hot spot, low income and densely-populated ZIP codes also were marginally more likely to experience additional ED visits for asthma within 90 days of an initial pediatric asthma ED visit.

Figure 6: 2014 Missouri Pediatric Asthma ED Revisit Rate by Day

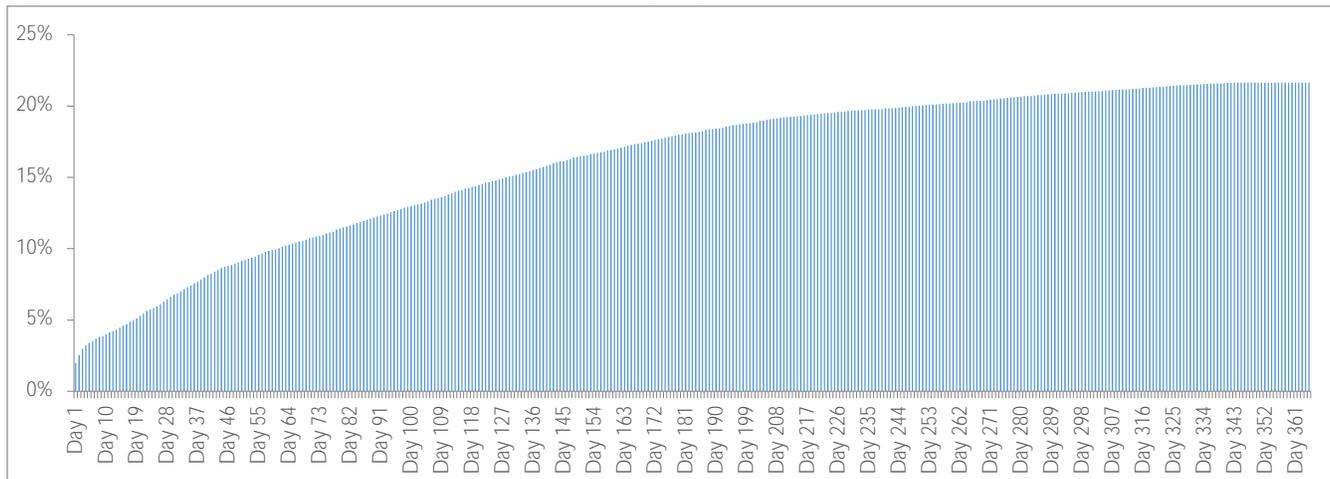


Table 1: Pediatric Asthma 90-Day ED Revisit Model Results

Effect	Frequency	Odds Ratio	95% CI		P Value
Intercept	-	0.072	0.056	0.093	<.0001
Age	7.63 (mean)	0.989	0.976	1.002	0.097
Male	59.1%	0.923	0.823	1.035	0.170
Black	53.6%	1.548	1.318	1.817	<.0001
Hispanic	3.5%	1.220	0.882	1.686	0.229
Medicaid Status	70.1%	1.376	1.185	1.597	<.0001
Uninsured Status	24.2%	1.197	0.979	1.465	0.080
Patient's ZIP Code is a Hot Spot (Getis-Ord z > 1.96)	70.0%	1.038	0.838	1.287	0.731
Patient's ZIP Code Childhood Poverty Rate	26.6% (mean)	1.005	1.000	1.009	0.061
Patient's ZIP Code is Top Quintile Population Density	79.5%	1.096	0.873	1.376	0.430

n = 11,259 *C* = 0.60

Suggested Citation

Reidhead, M. (2015, June). Hospital utilization for pediatric asthma in Missouri. *HIDI HealthStats*. Missouri Hospital Association. Hospital Industry Data Institute. Available at <http://web.mhanet.com/hidi>

- ⁱ Wier, L. (Truven Health Analytics), Hao, Y. (RAND), Owens, P. (AHRQ), & Washington, R. (AHRQ). (2013, June). *Overview of children in the emergency department, 2010*. HCUP statistical brief #157. Rockville, MD: Agency for Healthcare Research and Quality. Retrieved from <http://www.hcup-us.ahrq.gov/reports/statbriefs/sb157.pdf>
- ⁱⁱ Pearson, W., Goates, S., Harrykissoon, S., & Miller, S. (2014, June 26) *State-based Medicaid costs for pediatric asthma emergency department visits*. *Prev Chronic Dis* 2014, 11:140139. doi: <http://dx.doi.org/10.5888/pcd11.140139>.
- ⁱⁱⁱ Includes inpatient, outpatient and emergency department visits for patient records with a valid Social Security Number. Fiscal year 2014 covers discharges occurring between Oct. 1, 2013 and Sept. 30, 2014. The sources of all hospital discharge data used in this analysis are the FY 2014 Hospital Industry Data Institute Inpatient and Outpatient Databases. All chronic disease classifications are based on the AHRQ Clinical Classification Software categories identified by the Missouri Department of Health & Senior Services. Retrieved from <http://health.mo.gov/data/mica/ChronicDiseaseMICAs/>
- ^{iv} Guide to Community Preventive Services. (2008, June). *Asthma control: home-based multi-trigger, multicomponent interventions*. Retrieved from <http://www.thecommunityguide.org/asthma/multicomponent.html>
- ^v Poverty rate data were obtained using the 2014 Nielsen-Claritas PopFacts Premier Database and merged with patients' ZIP code of residence listed on the discharge record.
- ^{vi} The number of pediatric asthma ED visits with Medicaid listed as the primary payer was standardized each year with the number of children ages 0-17 eligible for Medicaid in January of the respective year using data from the Missouri Department of Health & Senior Services Medicaid Eligibility MICA (http://health.mo.gov/data/mica/mica/micaid_new.php). The number of ED visits for other payers was standardized by using the difference between the number of Medicaid eligible children and the total population in Missouri under age 18 using intercensal estimates from the U.S. Census Bureau (<http://www.census.gov/popest/>).
- ^{vii} Forno, E., & Celedón, J. (2009). Asthma and ethnic minorities: Socioeconomic status and beyond. *Current Opinion in Allergy and Clinical Immunology*, 9(2), 154–160. Retrieved from <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3920741/>
- ^{viii} Babin, S., Burkom, H., Holtry, R., Taberner, N., Stokes, L., Davies-Cole, J., ... Lee, D. (2007). Pediatric patient asthma-related emergency department visits and admissions in Washington, D.C., from 2001–2004, and associations with air quality, socio-economic status and age group. *Environmental Health*, 6(9), doi:10.1186/1476-069X-6-9. Retrieved from <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1845147/>
- ^{ix} Pediatric asthma visits were identified using HIDI FY 2014 Outpatient/Emergency Department Databases for patients under age 18 with asthma listed as the primary diagnosis on the discharge record. Population-based rates were derived using 2014 Nielsen-Claritas data for the population under age 18. Poverty data also were drawn from the Nielsen-Claritas 2014 PopFacts Premier Database. Statistical significance was calculated with ArcMap 10.2 using the Getis-Ord method.
- ^x Clustering was identified using Getis-Ord z-scores which are designed to detect hot spots through the autocorrelated spatial association of common attributes in neighboring geographic areas. For more information see: Ord, J., & Getis, A. (1995, October). Local spatial autocorrelation statistics: Distributional issues and an application. *Geographical Analysis*, 27(4). Retrieved from http://www.researchgate.net/profile/Keith_Ord/publication/229529958_Local_Spatial_Autocorrelation_Statistics_Distributional_Issues_and_an_Application/links/5433f9c70cf294006f733591.pdf
- ^{xi} Comparing the Getis-Ord z-scores for both maps revealed a Pearson's coefficient of correlation of 0.46 and univariate regression returned a slope coefficient of 0.27 with $R^2 = 0.21$.
- ^{xii} Steiner, C. (AHRQ), Barrett, M. (M.L. Barrett, Inc.), & Hunter, K. (Thomson Reuters). (2010, May). *Hospital readmissions and multiple emergency department visits, in selected states, 2006–2007*. HCUP Statistical Brief #90. Rockville, MD: Agency for Healthcare Research and Quality. Retrieved from <http://www.hcup-us.ahrq.gov/reports/statbriefs/sb90.pdf>
- ^{xiii} Hao, S., Jin, B., Shin, A., Zhao, Y., Zhu, C., et al. (2014) Risk prediction of emergency department revisit 30 days post discharge: A prospective study. *PLoS ONE* 9(11): e112944. doi:10.1371/journal.pone.0112944. Retrieved from <http://www.plosone.org/article/doi/10.1371/journal.pone.0112944&representation=PDF>
- ^{xiv} Duseja, R., Bardach, N., Lin, G., Yazdany, J., Dean, M., Clay, T., et al. (2015). Revisit Rates and Associated Costs After an Emergency Department Encounter: A Multistate Analysis. *Ann Intern Med*, 162(11), 750–756. doi:10.7326/M14-1616. Retrieved from <http://annals.org/article.aspx?articleid=2299853>



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