

Pediatric Asthma Hospitalizations With Direct Hospital Admission Compared to Admission Through an Emergency Department, Texas 2012

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Background

Asthma hospitalization indicates uncontrolled disease management and is more likely among young, black children in Texas. National studies report differences in patient and hospital characteristics and patient outcomes for children with direct hospital admission compared to admission through an emergency department (ED).

Data on Texas ED visits that do not result in a hospitalization are not collected and available state-wide. However, inpatient hospitalizations and ED visits resulting in a hospitalization are captured by the state-wide hospital inpatient files.

This analysis compares patient and hospital characteristics and patient outcomes among Texas pediatric asthma hospitalizations with direct hospital admission to those with admission through an ED.

Methods

Texas Hospital Inpatient Discharge Public Use Data File from the Texas Health Care Information Collection program at the Texas Department of State Health Services was used to identify hospitalizations for which asthma (ICD-9 code 493.xx) was the principal diagnosis among children age 1 to 17 during 2012.

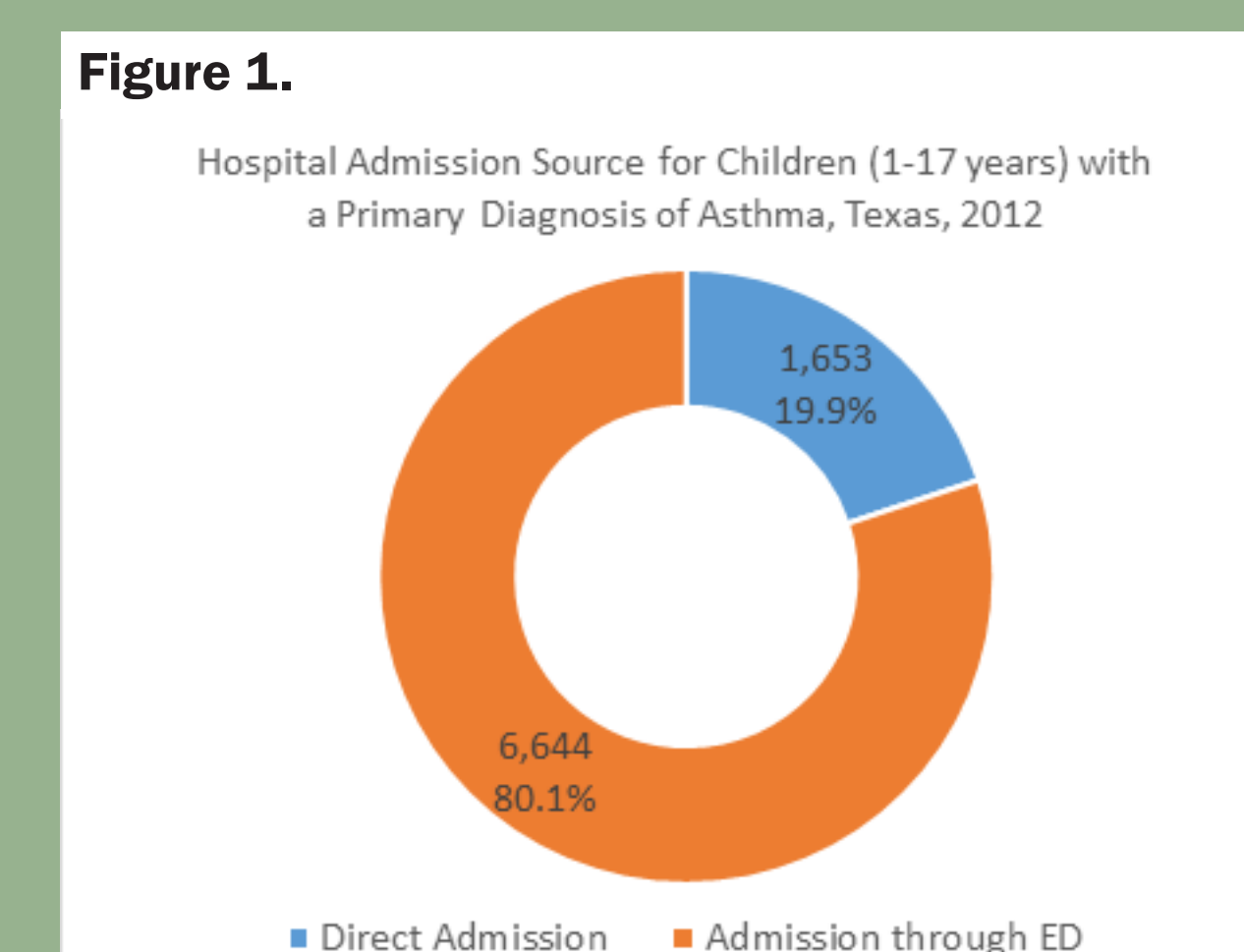
Patient records with complete data on sex, age, expected primary source of payment ("payer"), discharge quarter, and hospital name were included in analyses. Hospitalizations admitted through the ED were defined by records with revenue codes for emergency room (0450, 0451, 0452, 0456, or 0459); all other hospitalizations were considered direct hospital admissions. Additional patient characteristics included race/ethnicity (non-Hispanic white, non-Hispanic black, Hispanic, other), hospitalization during respiratory season (October through March), severity of illness (minor, moderate, severe, extreme) defined using All Patient Refined (APR) Diagnosis Related Group (DRG) from the 3M APR-DRG Grouper, and patient address by Texas Health Service Region. Patient outcomes were length of stay (days), high turnover stay (length of stay less than two nights), and total hospital charges (dollars).

Patients were excluded if transferred to the hospital (Ex: from another hospital, health care facility, or distinct unit within a hospital); admission source was court/law enforcement or an unknown source; or patient left the hospital against medical advice.

The 2012 Hospital Characteristics file from the Texas Health Care Information Collection program at the Texas Department of State Health Services, provided data on 576 hospitals in Texas. Characteristics included hospital ID, hospital name, address, county, number of beds, teaching hospital (yes/no). Rural/urban hospital location was determined by the county where the hospital was located. A children's hospital was defined as any hospital name including "children" or "children's". Data for an additional 25 hospitals were not included in the Hospital Characteristics file but was supplemented with information found on each hospital's website.

A Hospital ID was used to link the inpatient hospital file and the hospital characteristics file.

Number and percent of asthma hospitalizations were calculated by type of admission (direct or through an ED) and by patient and hospital characteristics; mean and median were calculated for length of stay (days) and total hospital charges (dollars). Using SAS 9.3, Chi-square and Wilcoxon rank sum tests were used to test for statistically significant differences between direct admissions and admissions through an ED.



Results

A total of 8,297 hospitalizations from 192 hospitals met eligibility criteria, including 1,653 (19.9%) admitted for asthma directly to a hospital and 6,644 (80.1%) admitted through an ED (Figure 1).

Patient and Hospital Characteristics

Most hospitalizations were among males (direct and ED admission, 63.0%) and children age 1 to 9 (direct admission, 78.4%; ED admission, 80.9%) (Figure 2).

Children with **direct hospital admission** were more likely than children with admission through an ED to:

- be white (32.0% vs. 24.7%) or Hispanic (49.1% vs. 38.0%) (Figure 2),
- have private insurance (49.1% vs. 34.7%) (Figure 3),
- have asthma alone (no other listed diagnoses) (20.6% vs. 16.9%) (Figure 3),
- be admitted during respiratory season (58.1% vs. 52.7%) (Figure 3),
- have a minor illness severity level (73.7% vs. 65.8%) (Figure 3),
- be a resident in Health Service Region 11 (21.6% vs. 7.6%) or Health Service Region 9 (10.3% vs. 3.3%) (Figure 4), and
- be admitted to a hospital located in a rural county (13.3% vs. 5.2%) (Figures 6a, 6b).

Children with **admission through an ED** were more likely than children with direct hospital admission to:

- be black (30.8% vs. 12.8%) (Figure 2),
- have public insurance (56.0% vs. 43.1%) or be uninsured (5.5% vs. 2.5%) (Figure 3),
- be a resident in Health Service Region 3 (27.3% vs. 13.5%) or Health Service Region 6 (16.8% vs. 6.0%) (Figure 4), and
- be admitted to a children's hospital (46.7% vs. 9.7%) (Figures 5a, 5b).

Patient Outcomes

Children with admission through an ED were more likely than children with direct hospital admission to:

- have a high turnover stay (32.9% vs. 25.4%) (Table 1),
- have a total hospital charge with a higher mean (\$20,074 vs. \$13,616) (Table 1), and
- have a total hospital charge with a higher median (\$13,762 vs. \$9,676) (Table 1).

Table 1. Unadjusted Outcomes Among Children (1 to 17 years) With a Principal Diagnosis of Asthma and Direct Hospital Admission or Admission Through an ED, Texas, 2012

Outcome	Direct Admission (n= 1,616)*	ED Admission (n= 6,599)*	P Value
Length of Stay (days)			
Mean (SD)	2.3 (1.3)	2.3 (1.3)	0.17 [†]
Median (IQR)	2(1,3)	2(1,3)	
High Turnover Hospitalization (<2 days)	410 (25.4)	2,169 (32.9)	<.0001 [‡]
Total Hospital Charge (\$)			
Mean (SD)	13,616 (14,440)	20,074 (48,639)	<.0001 [‡]
Median (IQR)	9,676 (6,114-15,664)	13,762 (9,704-21,444)	

ED, Emergency Department; SD, Standard Deviation; IQR, Interquartile Range.
*Determined by Wilcoxon rank sum tests for continuous variables.
†Determined by Pearson Chi Square test.
‡Total hospital charges among direct admissions, n=1,653; Total hospital charges among ED admissions, n = 6,644. Hospital charges were rounded to the nearest dollar.

Figure 2.

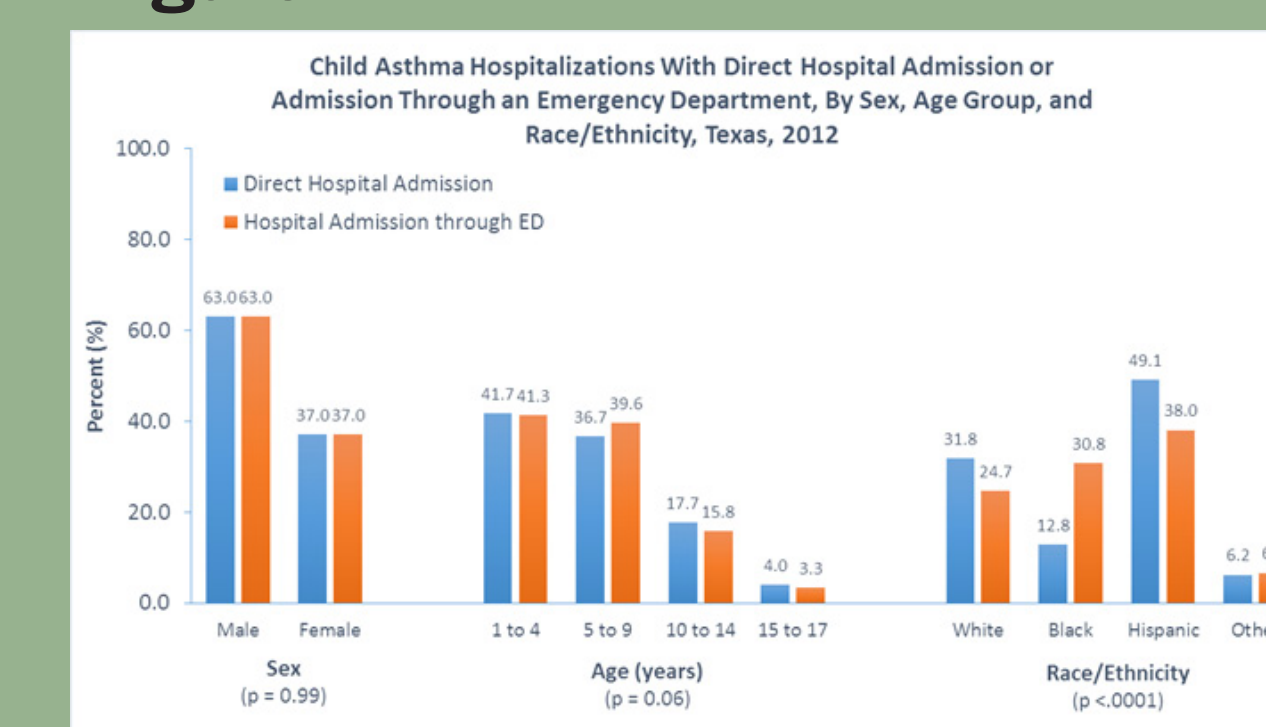


Figure 3.

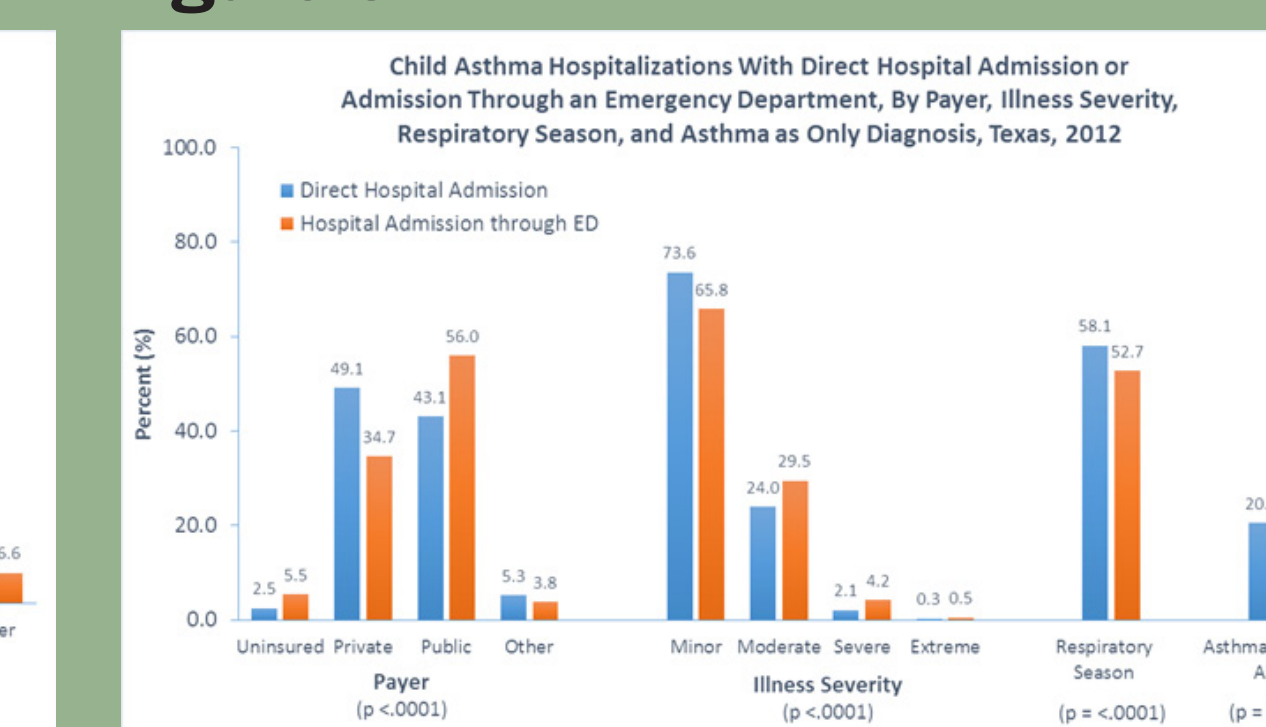


Figure 4.

Percent of Child Asthma Hospitalizations by Health Service Region (HSR) of Residence Among Those With Direct Hospital Admission or Admission Through an Emergency Department (ED), Texas, 2012

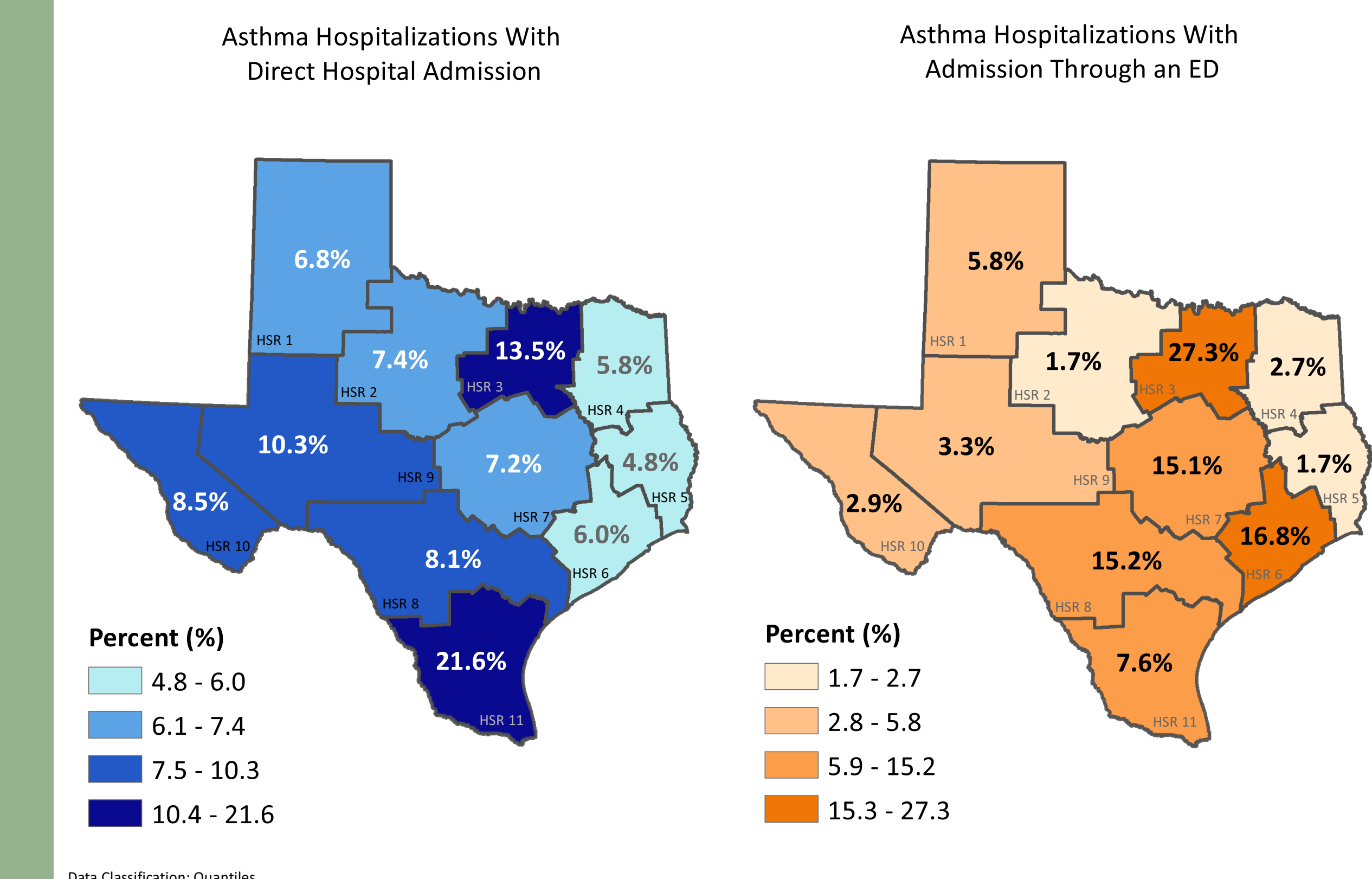


Figure 5a.

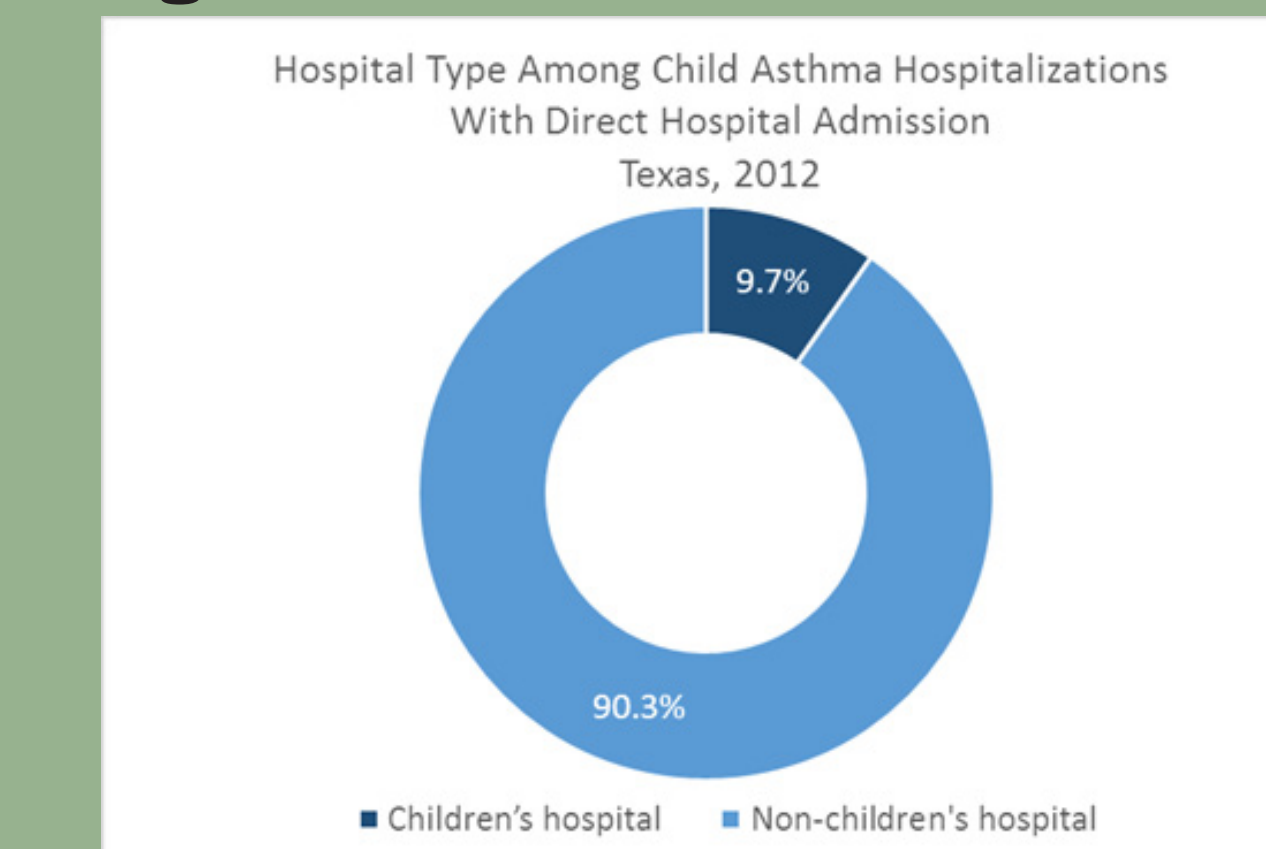


Figure 5b.

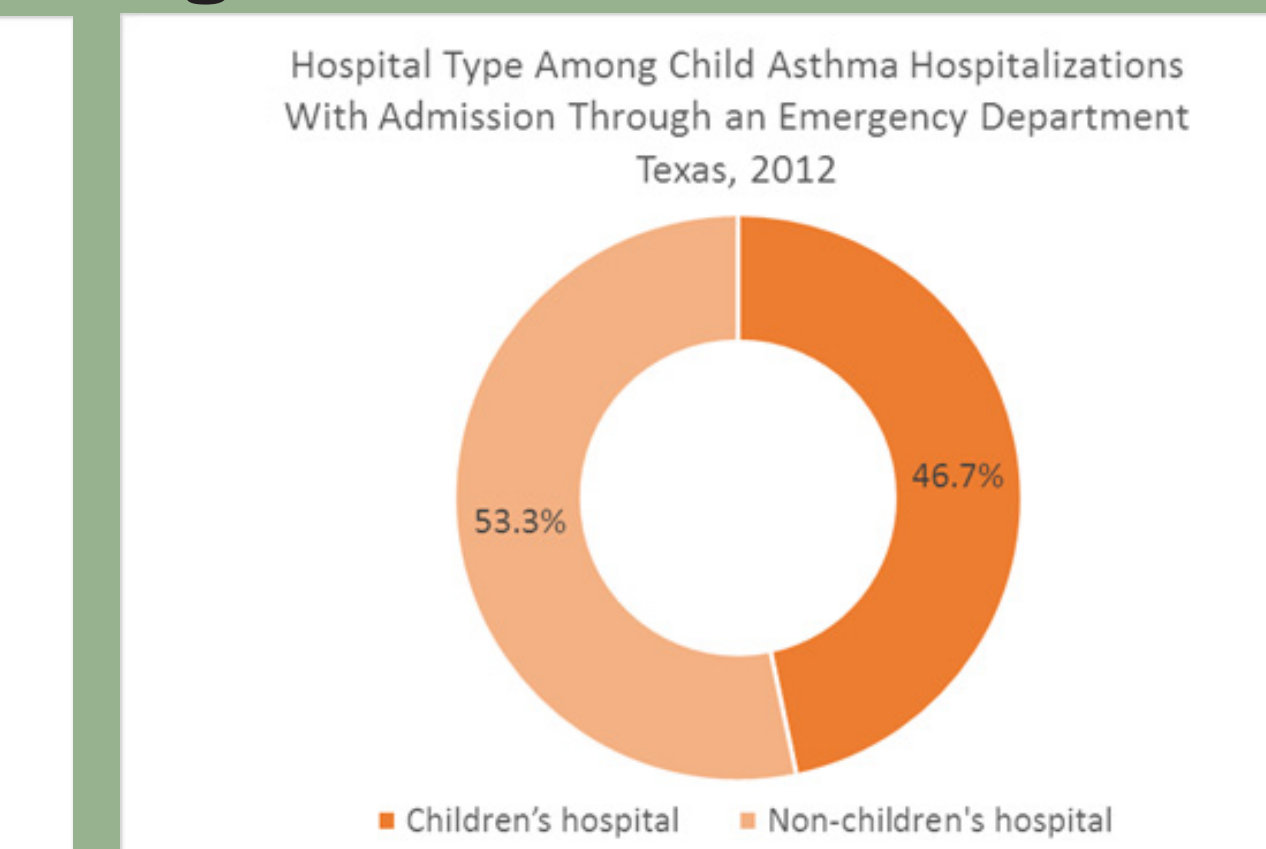


Figure 6a.

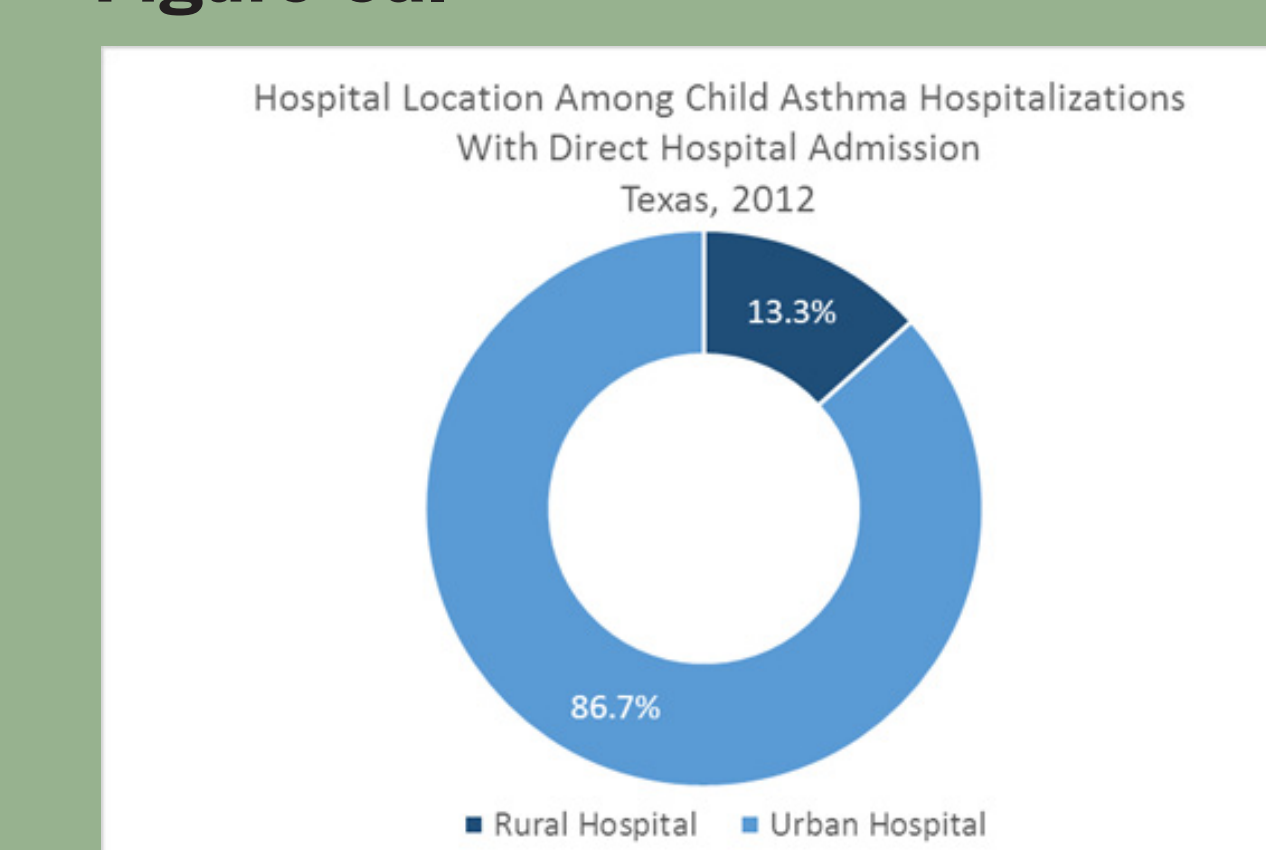
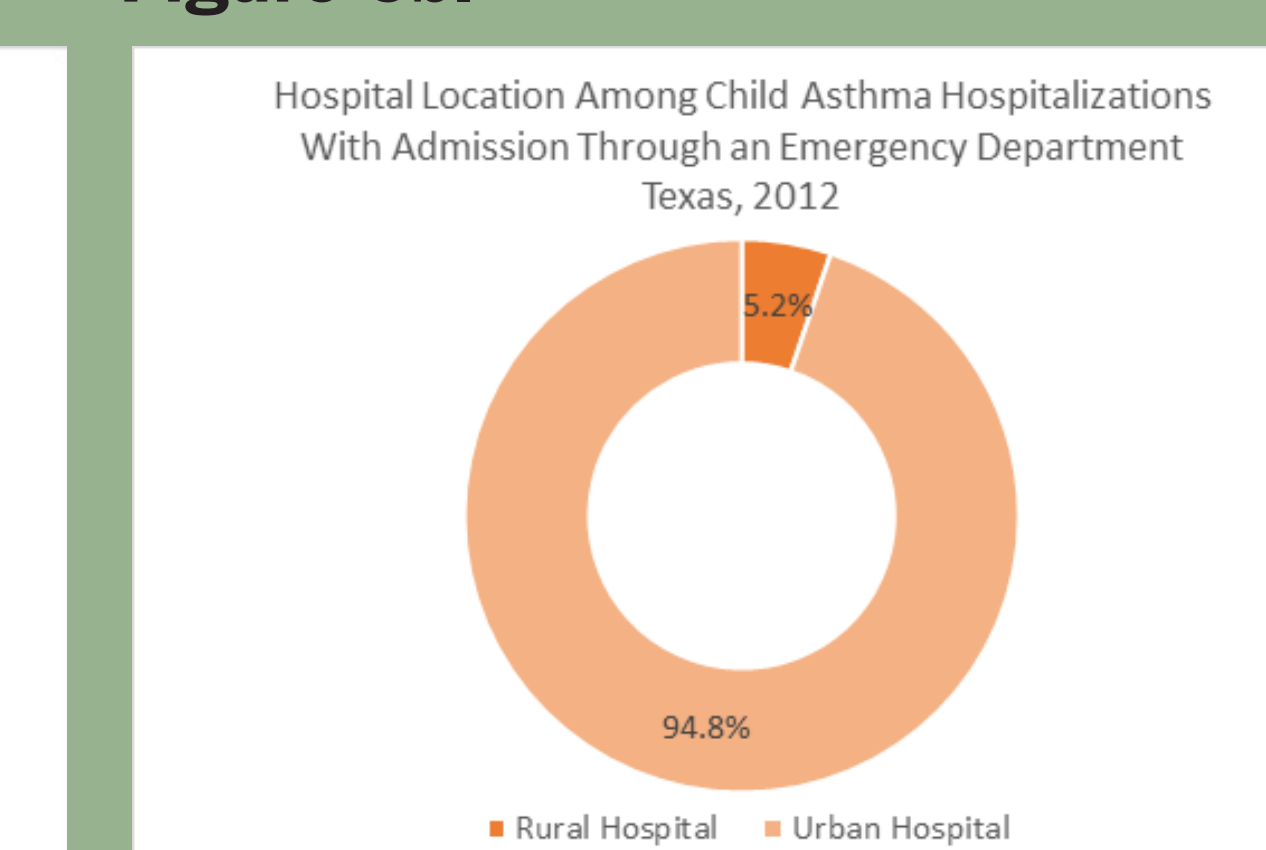


Figure 6b.



Limitations

This analysis does not include hospitalizations where asthma was a secondary diagnosis.

Using the hospital inpatient data, it is not possible to determine if a child was hospitalized more than once for asthma during 2012. Hospitalizations represent events rather than individual people.

Race and ethnicity data are generally not collected by hospitals and may be subjectively captured.

Expected primary source of payment ("payer") may depend on a hospital's collection and billing cycles which can affect the accuracy of payer data, especially self-pay and charity that may later qualify for Medicaid or other payment sources.

Comparability of length of stay across hospitals is affected by factors such as casemix and severity complexity, payer-mix, market areas and hospital ownership, affiliation, or teaching status.

Analysis includes four patients admitted through an ED who died in the hospital. The lengths of stay for each hospitalization were 20, 22, 29, and 54 days. The total charges for the four hospitalizations were \$178,621, \$2,058,850, \$386,566, and \$3,000,720 and include the top three highest charges in the final dataset. However, removing these four hospitalizations from the dataset had no or very little impact on the patient outcome data.

Conclusions

Patient and hospital characteristics varied by whether children with asthma were admitted directly to a hospital or admitted through an ED:

- Compared to patients with direct hospital admission, patients admitted through an ED were more likely to be black, have public insurance, reside in Health Service Region 3 or 6, and be admitted to a children's hospital.
- High turnover stays and hospital charges were higher among children admitted through an ED than among those with a direct hospital admission.

Further analysis using mixed modeling is needed to determine how hospital characteristics such as rural or urban county location and children's or non-children's hospital admission are related to patient characteristics and patient outcomes.