

# **Childhood Asthma in Tennessee 1997-2007**

Tennessee Department of Health

Office of Policy Planning and Assessment  
Surveillance, Epidemiology and Evaluation

*Report prepared by:*

Audrey M Bauer, DVM, MPH  
Yinmei Li, MD, PhD

Surveillance, Epidemiology and Evaluation  
Office of Policy, Planning and Assessment  
Tennessee Department of Health

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## Key Findings

- Prevalence of current asthma among Tennessee children was 9.5% in 2007.
- Asthma prevalence was higher among boys than among girls, and higher among black non-Hispanics than among white non-Hispanics.
- Asthma prevalence increased with decreasing family income.
- Each year between 2002-2006, there were an average of approximately 2,300 inpatient hospitalizations and 14,100 emergency department (ED) visits for asthma among children in Tennessee.
- Inpatient hospitalizations for asthma decreased 31% between 1997 and 2006, while ED visits increased 25%.
- Between 2002 and 2006, the inpatient hospitalization rate in Tennessee was 168/100,000 children, and the ED visit rate was 1,048/100,000.
- Both inpatient hospitalization and ED visit rates were higher among boys than among girls, and higher among blacks than among whites.
- Among the state's 14 health department regions, the Shelby region had the highest inpatient hospitalization and emergency department visit rates.
- Among the state's 95 counties, Hardeman County had the highest inpatient hospitalization and emergency department visit rates, as well as the worst ranking for overall asthma burden in the state.
- In 2006, hospital charges for childhood asthma totaled \$29.1 million in Tennessee.
- Per visit charges for both inpatient and outpatient hospitalizations increased between 1997 and 2006 (64% and 113% increase, respectively).
- The prevalence of asthma among children enrolled in TennCare was 10.6% from 2004-2006.
- Between 2002 and 2006, 5.8% of asthmatic children enrolled in TennCare had to be hospitalized because of their asthma, and 21.5% had to be seen in the emergency room.
- Among the state's 14 health department regions, the Shelby region had the highest percentages of TennCare enrollees requiring hospitalization or emergency care for their asthma.
- The five counties with the lowest childhood asthma burden were Pickett, Moore, Stewart, Williamson and Sequatchie counties (ranked 1 to 5).
- The five counties with the greatest childhood asthma burden were Knox, Fentress, Lauderdale, Shelby and Hardeman counties (ranked 91 to 95).

# Introduction

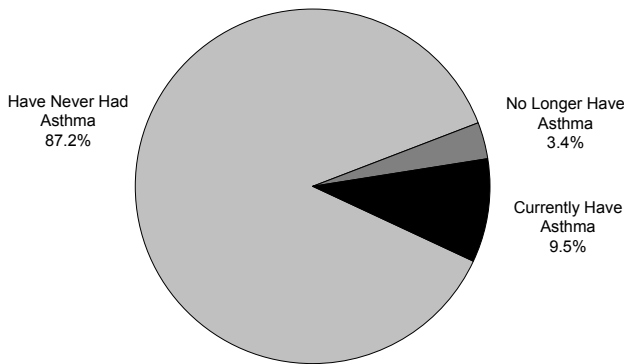
Asthma is the most common chronic illness of children in the United States. In 2006, over 6.8 million U.S. children under the age of 18 had asthma and 4.1 million had an asthma attack that year.<sup>1</sup> Although deaths due to asthma are rare among children, the disease is responsible for significant morbidity. For example, asthma is the third leading cause of hospitalizations among U.S. children under the age of 15, and is one of the leading causes of school absenteeism.<sup>1</sup> In 2003, asthma accounted for an estimated 12.8 million lost school days in U.S. children who had an asthma attack in the previous year.<sup>1</sup>

The Tennessee Department of Health's *The Burden of Asthma in Tennessee* was the first comprehensive report to describe the impact of this disease within the state. It examined prevalence, medical facility utilization, and mortality between 1995 and 2006, and provided information on asthma disparities among people with different demographic characteristics, including age. The report found that children bear an important part of the burden of this disease in the state. For example, children aged 1-17 years had higher rates of emergency department visits for asthma than adults, and inpatient hospitalization rates for asthma were highest among children aged 1-4 years.<sup>2</sup>

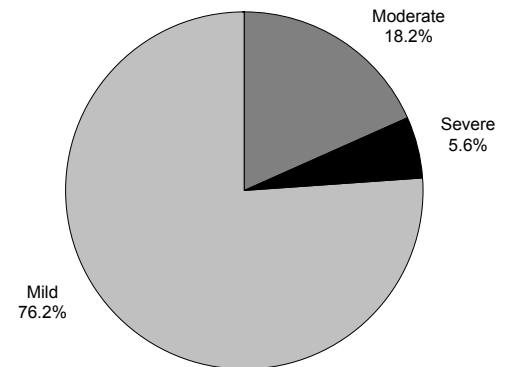
The purpose of this current document, which includes data for the years 1997-2007, is to supplement the childhood asthma information contained within the original burden report. It updates and expands data on childhood asthma prevalence; medical facility use and costs associated with childhood asthma; and asthma among children enrolled in TennCare. There is a special emphasis on childhood asthma data for individual Tennessee Health Department regions and counties. It is hoped that this document, together with the information contained within the original asthma burden report, will help inform and guide childhood asthma control efforts in the state.

# Asthma Prevalence

- In 2007, 9.5% of Tennessee children (0-17 years) *currently* had asthma, compared to 8.6% in 2003.\*
- In 2007, a total of 12.9% of children were reported to have *ever* had asthma.
- Among children with current asthma, the majority (76.2%) had mild asthma, while 5.6% were reported to have severe asthma.

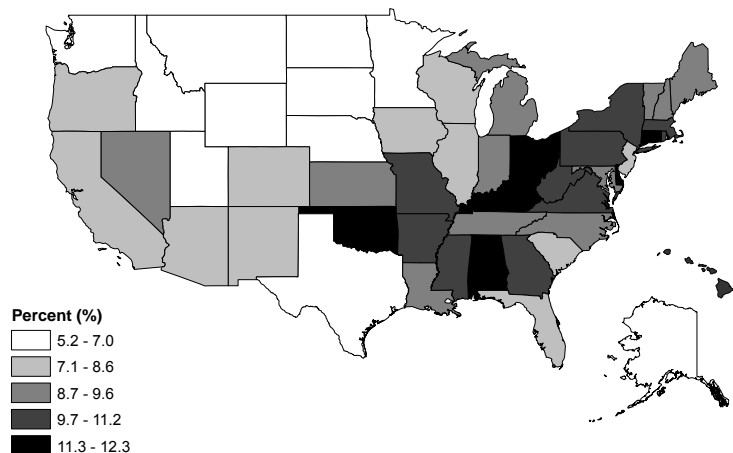


Childhood asthma prevalence, Tennessee, 2007 (NSCH)



Childhood asthma severity, Tennessee, 2007 (NSCH)

- In 2007, the prevalence of current asthma for the entire United States was 9.0%.
- Among individual states, current asthma prevalence ranged from 5.2% in South Dakota to 12.3% in Alabama and Ohio. Tennessee had the 20<sup>th</sup> highest prevalence rate (tied with Michigan) among the 50 states.

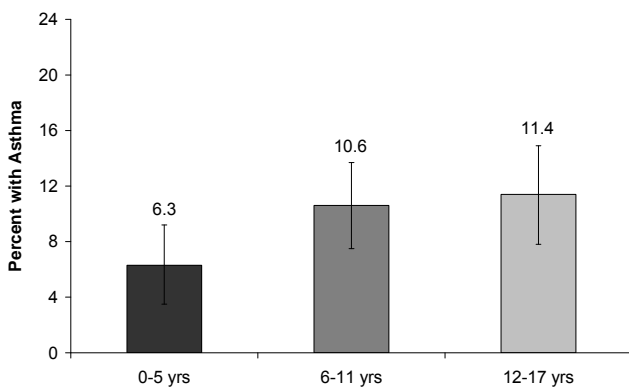


Current childhood asthma prevalence, United States, 2007 (NSCH)

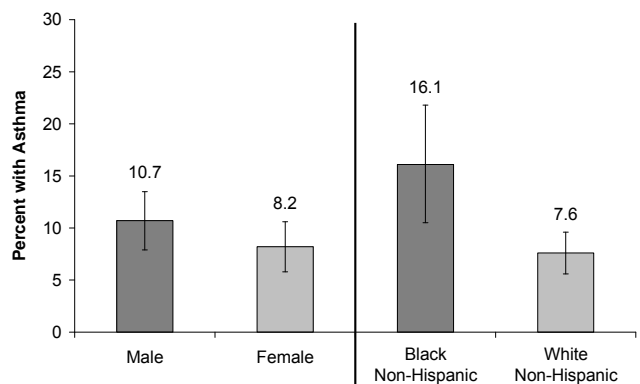
\* For definitions of current and lifetime asthma please see Technical Notes.

# Asthma Prevalence

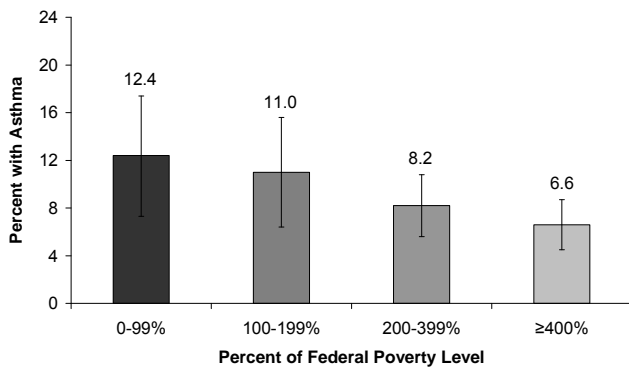
- In 2007, current asthma prevalence was 6.3% among 0-5 year olds, compared to approximately 11% among 6-11 and 12-17 year olds.
- Current asthma prevalence was 10.7% among boys, compared to 8.2% among girls.
- Among black non-Hispanics, current asthma prevalence was 16.1%, compared to 7.6% among white non-Hispanics.
- Current asthma prevalence increased with decreasing family income, from 6.6% among those from homes earning 400% or more of the federal poverty level to 12.4% among those from homes earning less than 100% of the poverty level.
- Among children with public insurance (e.g. TennCare), current asthma prevalence was 13.6%, compared to 7.0% among children with private insurance.
- Current asthma prevalence was 12.2% among children who were uninsured or had periods without insurance coverage, compared to 9.2% among children who were consistently insured.



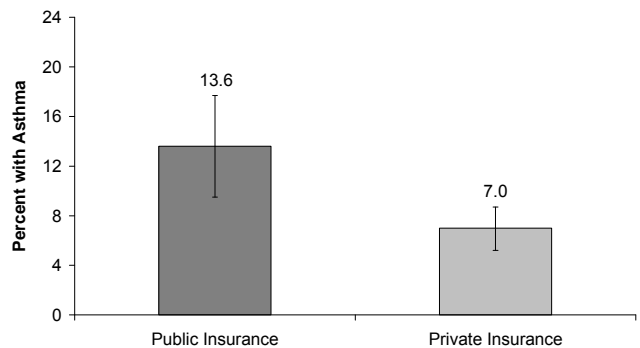
Current asthma prevalence by age, Tennessee, 2007 (NSCH)



Current asthma prevalence by gender or race, Tennessee, 2007 (NSCH)



Current asthma prevalence by household income, Tennessee, 2007 (NSCH)

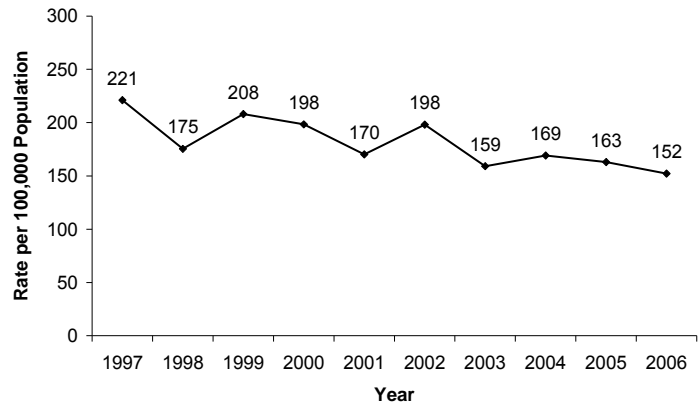


Current asthma prevalence by insurance type, Tennessee, 2007 (NSCH)

# Health Care Utilization and Cost

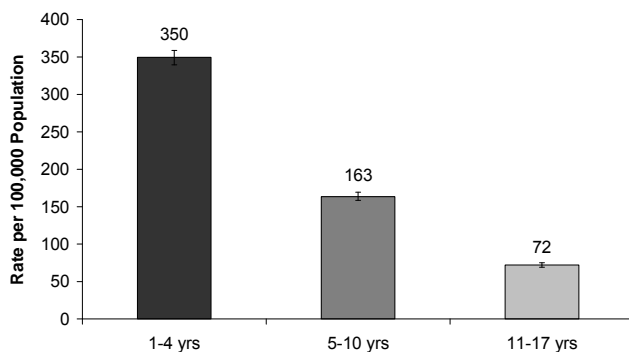
## Inpatient Hospitalizations for Asthma

- Each year from 2002-2006, there were an average of approximately 2,300 inpatient hospitalizations for a primary diagnosis of asthma among Tennessee children aged 1-17 years.
- During this same time period, the annual hospitalization rate for asthma averaged 168 hospitalizations per 100,000 children in the population.
- Between 1997 and 2006, the asthma hospitalization rate decreased by 31%, from 221/100,000 to 152/100,000.

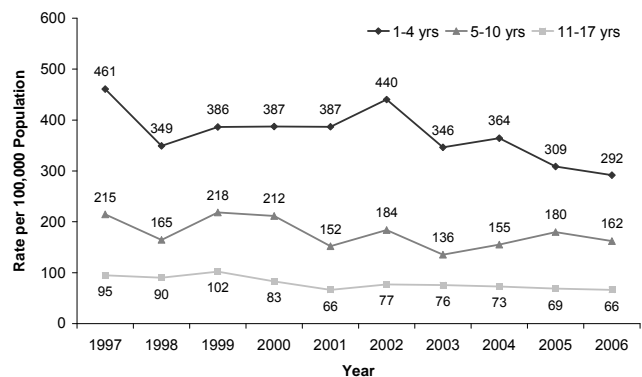


Inpatient hospitalization rate for primary asthma, 1-17 year olds, Tennessee, 1997-2006 (HDDS)

- Inpatient hospitalizations for asthma decreased with increasing age. The asthma hospitalization rate was highest among 1-4 year olds (350/100,000), compared to 163/100,000 among 5-10 year olds and 72/100,000 among 11-17 year olds.
- Between 1997 and 2006, the asthma hospitalization rate decreased 37% among 1-4 year olds and 31% among 11-17 year olds. There was not a statistically significant upward or downward trend in the asthma hospitalization rate among 5-10 year olds over this time period.



Inpatient hospitalization rate for primary asthma by age, Tennessee, 2002-2006 average (HDDS)

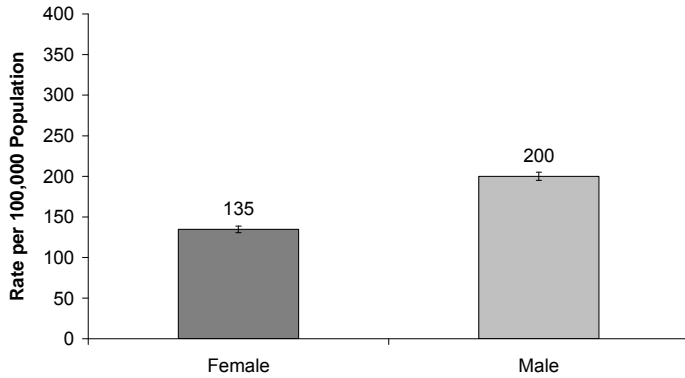


Inpatient hospitalization rate for primary asthma by age, Tennessee, 1997-2006 (HDDS)



# Health Care Utilization and Cost

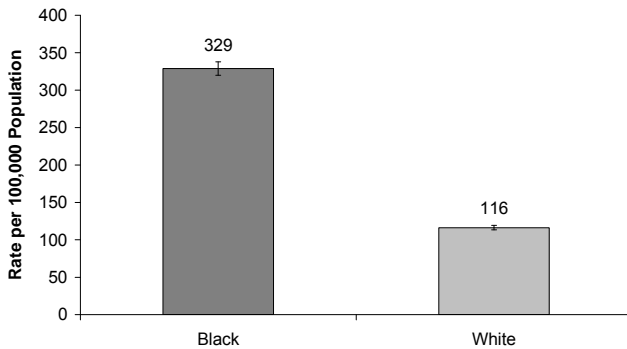
## Inpatient Hospitalizations for Asthma *cont.*



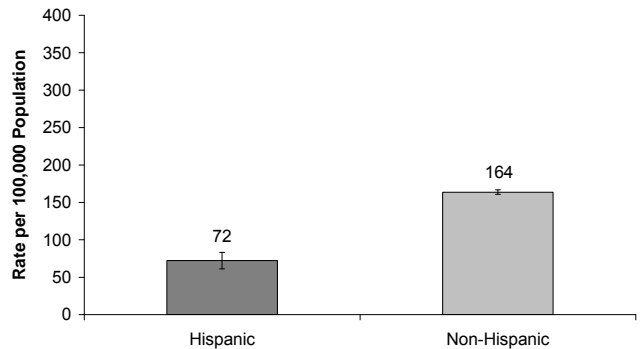
- The inpatient hospitalization rate for asthma was higher among boys than among girls (200/100,000 vs. 135/100,000).

Inpatient hospitalization rate for primary asthma by gender, 1-17 year olds, Tennessee, 2002-2006 average (HDDS)

- The asthma hospitalization rate among black children was almost three times as high as the rate among white children (329/100,000 vs. 116/100,000).
- The asthma hospitalization rate among non-Hispanic children was over two times as high as the rate among Hispanic children (164/100,000 vs. 72/100,000).



Inpatient hospitalization rate for primary asthma by race, 1-17 year olds, Tennessee, 2002-2006 average (HDDS)

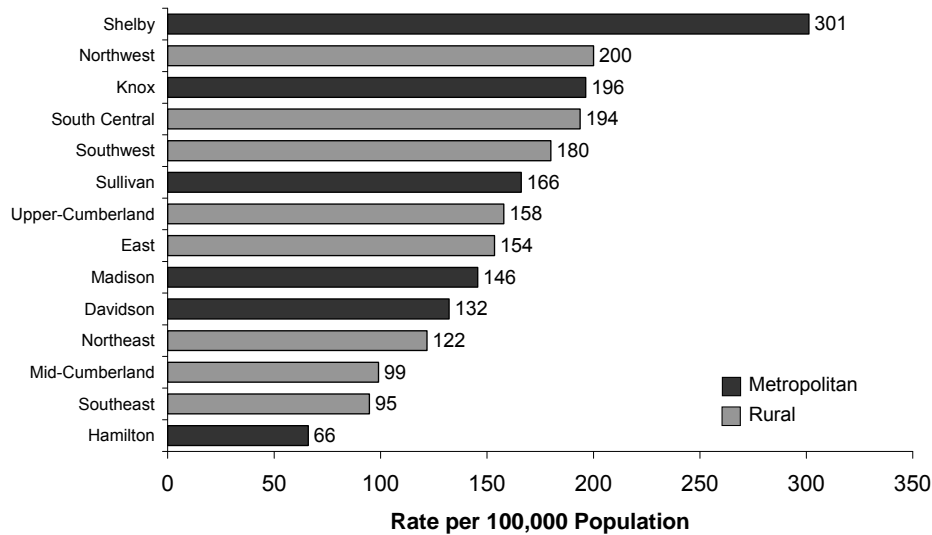


Inpatient hospitalization rate for primary asthma by ethnicity, 1-17 year olds, Tennessee, 2002-2006 average (HDDS)

# Health Care Utilization and Cost

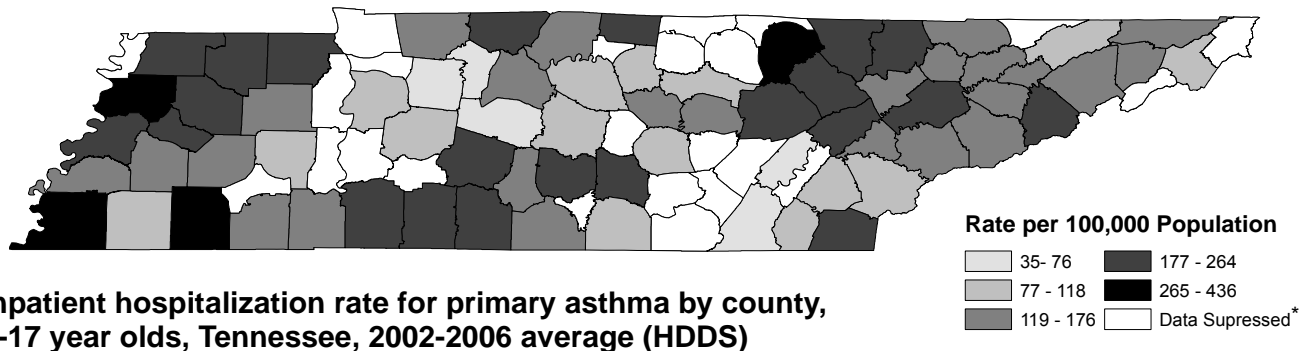
## Inpatient Hospitalizations for Asthma *cont.*

- Between 2002 and 2006, the average, annual asthma hospitalization rate in individual Tennessee Health Department regions ranged from 66/100,000 in Hamilton to 301/100,000 in Shelby.



**Inpatient hospitalization rate for primary asthma by region, 1-17 year olds, Tennessee, 2002-2006 average (HDDS)**

- The average, annual asthma hospitalization rate in individual Tennessee counties ranged from 35/100,000 in Williamson County to 436/100,000 in Hardeman County.\*
- The ten counties with the lowest hospitalization rates were: Williamson, Dickson, Hamilton, Rhea, Cheatham, Carter, Franklin, Rutherford, Monroe, and Warren.
- The ten counties with the highest hospitalization rates were: Giles, Cumberland, Wayne, Maury, Macon, Lauderdale, Dyer, Shelby, Fentress and Hardeman.



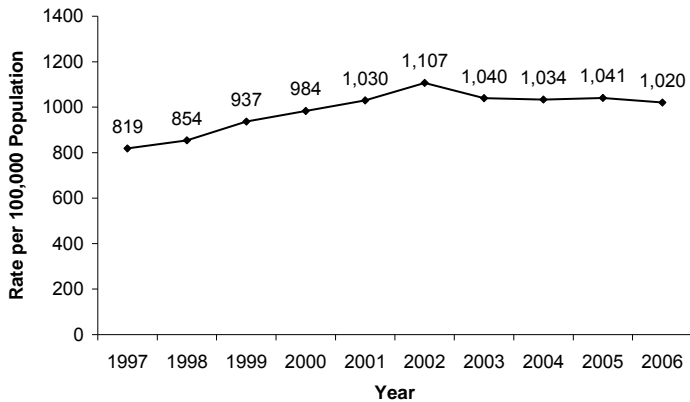
**Inpatient hospitalization rate for primary asthma by county, 1-17 year olds, Tennessee, 2002-2006 average (HDDS)**

\* Data are suppressed for counties with fewer than 20 inpatient hospitalization between 2002-2006. See Appendix A for detailed inpatient hospitalization rates for all counties.

# Health Care Utilization and Cost

## Emergency Department Visits for Asthma

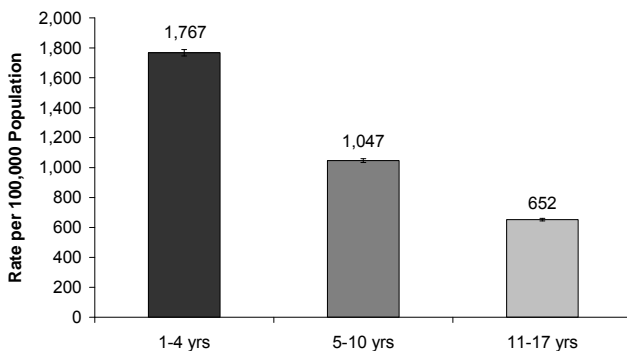
- Each year from 2002-2006, there were an average of approximately 14,100 emergency department (ED) visits for a primary diagnosis of asthma among Tennessee children aged 1-17 years.



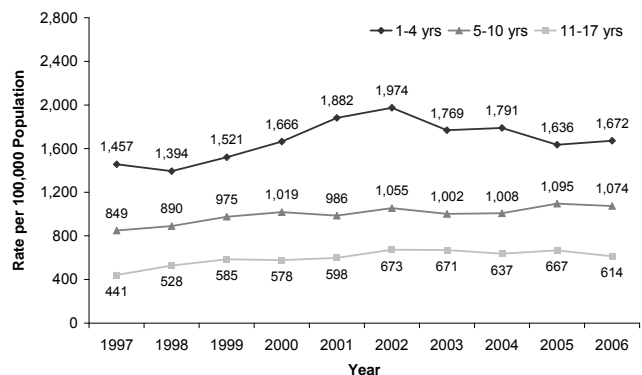
- During this same time period, the annual ED visit rate for asthma averaged 1,048 visits per 100,000 children in the population.
- Between 1997 and 2006, the asthma ED visit rate increased by 25%, from 819/100,000 to 1,020/100,000.

Emergency department visit rate for primary asthma, 1-17 year olds, Tennessee, 1997-2006 (HDDS)

- Emergency department visits for asthma decreased with increasing age. The asthma ED visit rate was highest among 1-4 year olds (1,767/100,000), compared to 1,047/100,000 among 5-10 year olds and 652/100,000 among 11-17 year olds.
- Between 1997 and 2006, the asthma ED visit rate increased among all three age groups: 15% increase among 1-4 year olds, 27% among 5-10 year olds and 39% among 11-17 year olds.



Emergency department visit rate for primary asthma by age, Tennessee, 2002-2006 average (HDDS)

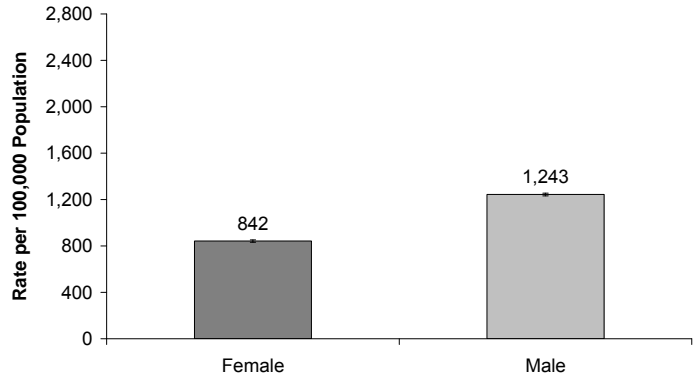


Emergency department visit rate for primary asthma by age, Tennessee, 1997-2006 (HDDS)

# Health Care Utilization and Cost

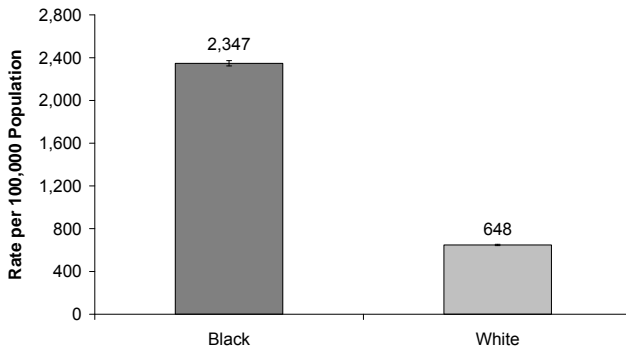
## Emergency Department Visits for Asthma *cont.*

- The emergency department visit rate for asthma was higher among boys than among girls (1,243/100,000 vs. 842/100,000).

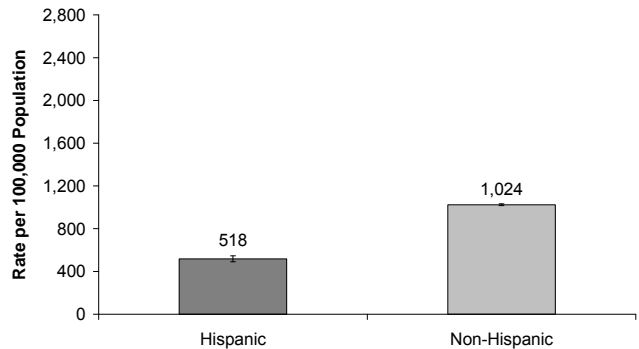


Emergency department visit rate for primary asthma by gender, 1-17 year olds, Tennessee, 2002-2006 average (HDDS)

- The ED visit rate among black children was over three-and-a-half times as high as the rate among white children (2,347/100,000 vs. 648/100,000).
- The ED visit rate among non-Hispanic children was almost two times as high as the rate among Hispanic children (1,024/100,000 vs. 518/100,000).



Emergency department visit rate for primary asthma by race, 1-17 year olds, Tennessee, 2002-2006 average (HDDS)

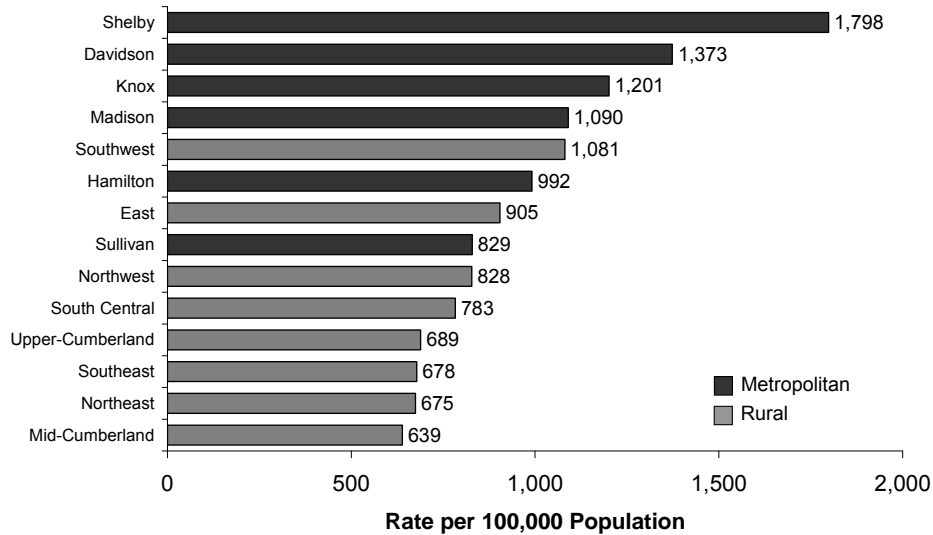


Emergency department visit rate for primary asthma by ethnicity, 1-17 year olds, Tennessee, 2002-2006 average (HDDS)

# Health Care Utilization and Cost

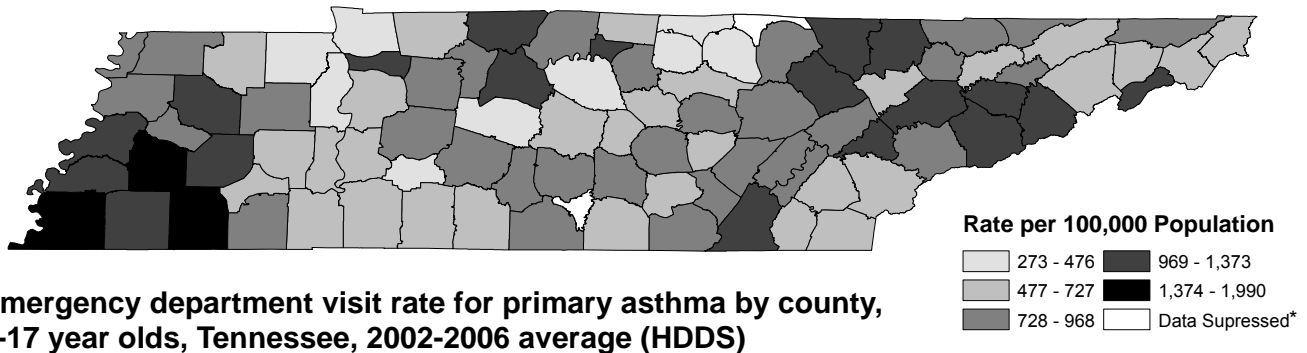
## Emergency Department Visits for Asthma *cont.*

- Between 2002 and 2006, the average, annual asthma ED visit rate in individual Tennessee Health Department regions ranged from 639/100,000 in Mid-Cumberland to 1,798/100,000 in Shelby.



**Emergency department visit rate for primary asthma by region, 1-17 year olds, Tennessee, 2002-2006 average (HDDS)**

- The average, annual asthma ED visit rate in individual Tennessee counties ranged from 273/100,000 in Lewis County to 1,990/100,000 in Hardeman County.\*
- The ten counties with the lowest ED visit rates were: Lewis, Clay, Henry, Stewart, Wilson, Williamson, Jackson, Overton, Benton, and Humphreys.
- The ten counties with the highest ED visit rates were: Campbell, Cocke, Knox, Gibson, Scott, Lauderdale, Davidson, Haywood, Shelby and Hardeman.



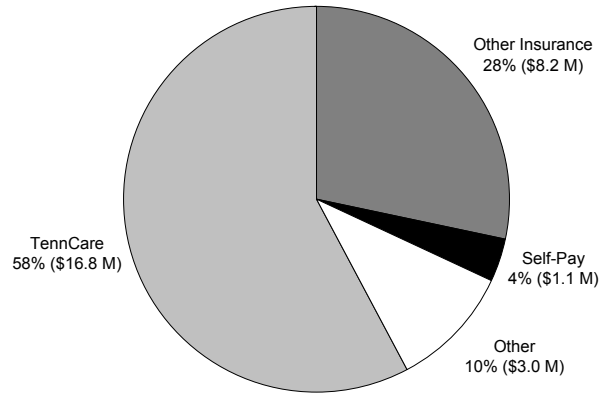
**Emergency department visit rate for primary asthma by county, 1-17 year olds, Tennessee, 2002-2006 average (HDDS)**

\* Data are suppressed for counties with fewer than 20 emergency department visits between 2002-2006. See Appendix A for detailed ED visit rates for all counties. Regional and county-level ED visit rates by gender and by race may be found in Appendices C and D, respectively.

# Health Care Utilization and Cost

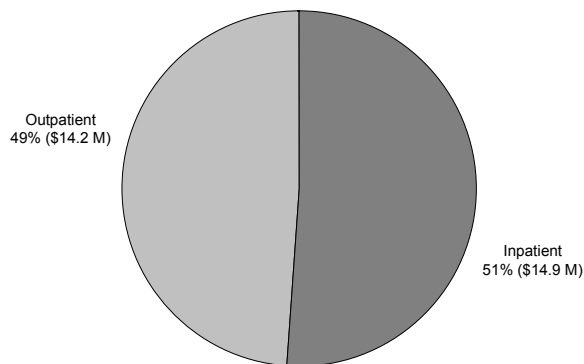
## Hospital Charges for Asthma\*

- In 2006, total hospital charges for a primary asthma diagnosis (i.e. combined inpatient and outpatient charges) among children totaled \$29.1 million in Tennessee.<sup>†</sup>
- TennCare was charged for the greatest percentage of asthma charges (58%), followed by other insurance (28%), other or unknown payer (10%) and self-pay (4%).

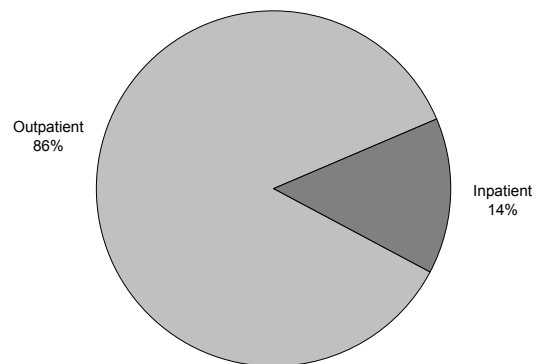


Total hospital charges for primary asthma by payer, 1-17 year olds, Tennessee, 2006 (HDDS)

- Although inpatient hospitalizations represented 14% of all asthma hospital visits among children, they accounted for 51% of hospital charges for asthma.
- Outpatient hospitalizations accounted for 86% of asthma hospital visits and 49% of asthma hospital charges among children.



Total hospital charges for primary asthma by admission status, 1-17 year olds, Tennessee, 2006 (HDDS)



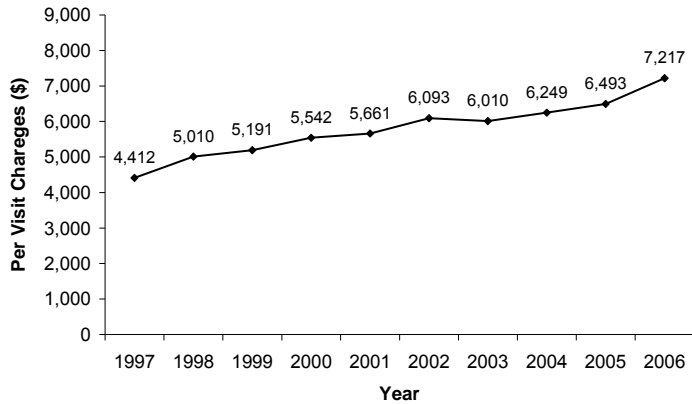
Total hospital visits for primary asthma by admission status, 1-17 year olds, Tennessee, 2006 (HDDS)

\* All charges for years prior to 2006 have been inflation adjusted to 2006 dollars.

<sup>†</sup> Inpatient hospitalizations represent patients who were admitted to the hospital for treatment. Outpatient hospitalizations represent patients who were treated in a hospital setting without being admitted.

# Health Care Utilization and Cost

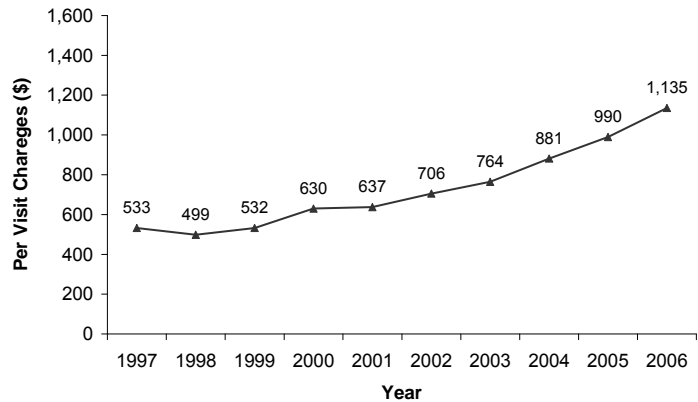
## Hospital Charges for Asthma *cont.*



Inflation-adjusted per visit charges for inpatient hospitalizations for primary asthma, 1-17 year olds, Tennessee, 1997-2006 (HDDS)

- Between 1997 and 2006, per visit inpatient hospitalization charges for primary asthma increased 64%, from approximately \$4,400 to \$7,200.
- Between 2002 and 2006, per visit inpatient hospitalization charges for primary asthma averaged \$6,392.

- Between 1997 and 2006, per visit outpatient hospitalization charges for primary asthma increased 113%, from approximately \$500 to \$1,000.
- Between 2002 and 2006, per visit outpatient hospitalization charges for primary asthma averaged \$894.

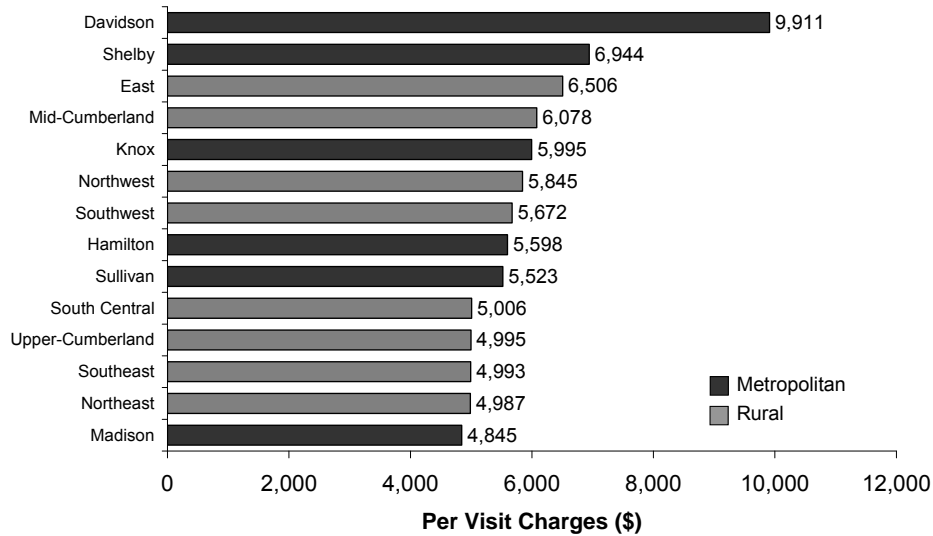


Inflation-adjusted per visit charges for outpatient hospitalizations for primary asthma, 1-17 year olds, Tennessee, 1997-2006 (HDDS)

# Health Care Utilization and Cost

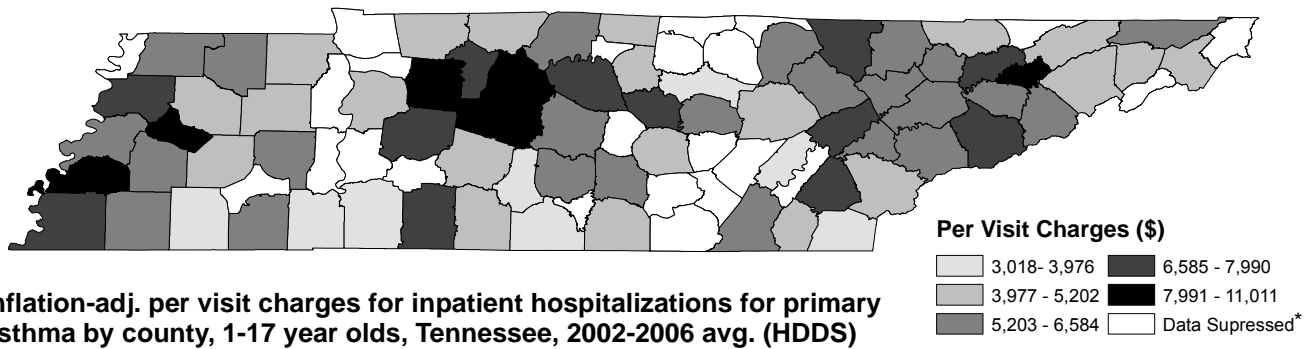
## Hospital Charges for Asthma *cont.*

- Between 2002-2006, average per visit charges for inpatient asthma hospitalizations in individual Tennessee Health Department regions ranged from \$4,845 in Madison to \$9,911 in Davidson.



**Inflation-adjusted per visit charges for inpatient hospitalizations for primary asthma by region, 1-17 year olds, Tennessee, 2002-2006 average (HDDS)**

- Average per visit charges for inpatient asthma hospitalizations in individual Tennessee counties ranged from \$3,018 in Wayne County to \$11,011 in Dickson County.\*
- The ten counties with the lowest per visit charges were: Wayne, Hardin, Hardeman, Polk, Putnam, Rhea, Lincoln, Marshall, Gibson and Giles.
- The ten counties with the highest per visit charges were: Sevier, Roane, Wilson, McMinn, Crockett, Tipton, Hamblen, Williamson, Davidson and Dickson.



**Inflation-adj. per visit charges for inpatient hospitalizations for primary asthma by county, 1-17 year olds, Tennessee, 2002-2006 avg. (HDDS)**

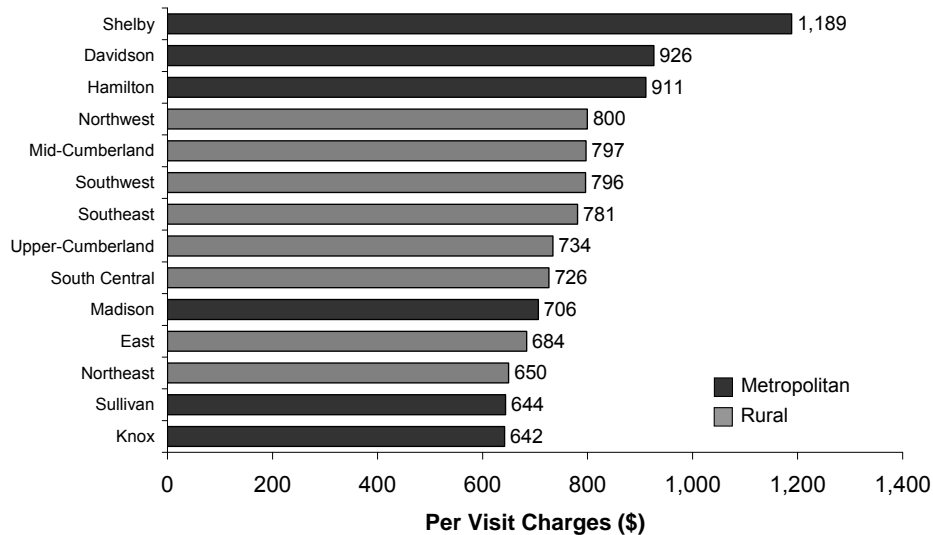
\* Data are suppressed for counties with fewer than 20 inpatient hospitalization between 2002-2006. See Appendix A for detailed inpatient charges for all counties.



# Health Care Utilization and Cost

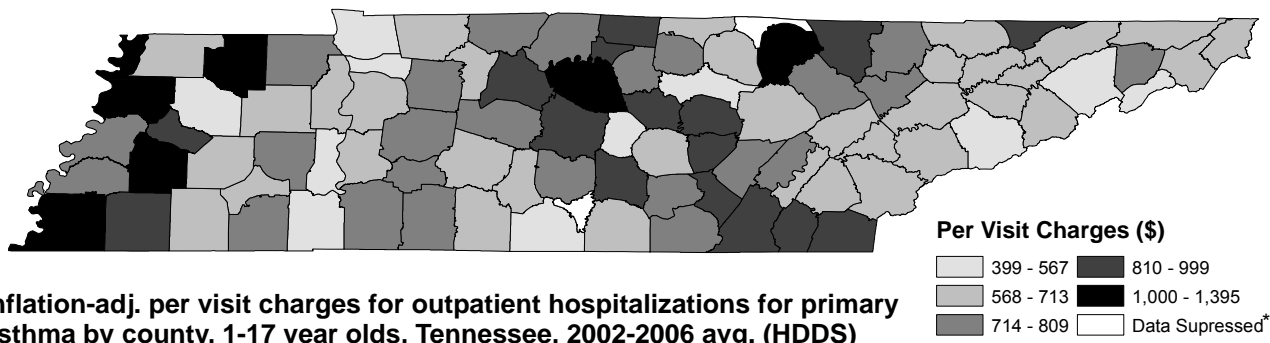
## Hospital Charges for Asthma *cont.*

- Between 2002-2006, average per visit charges for outpatient asthma hospitalizations in individual Tennessee Health Department regions ranged from \$642 in Knox to \$1,189 in Shelby.



**Inflation-adj. per visit charges for outpatient hospitalizations for primary asthma by region, 1-17 year olds, Tennessee, 2002-2006 average (HDDS)**

- Average per visit charges for outpatient asthma hospitalizations in individual Tennessee counties ranged from \$399 in Decatur County to \$1,395 in Lake County.\*
- The ten counties with the lowest per visit charges were: Decatur, Hardin, Unicoi, Greene, Lincoln, Putnam, Houston, Stewart, Sevier, and Gibson.
- The ten counties with the highest per visit charges were: Trousdale, Fayette, Coffee, Fentress, Weakley, Haywood, Dyer, Shelby, Wilson and Lake.



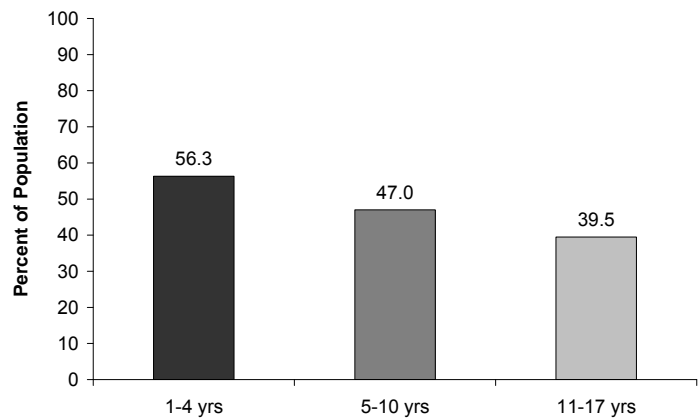
**Inflation-adj. per visit charges for outpatient hospitalizations for primary asthma by county, 1-17 year olds, Tennessee, 2002-2006 avg. (HDDS)**

\* Data are suppressed for counties with fewer than 20 outpatient hospitalizations between 2002-2006. See Appendix A for detailed outpatient charges for all counties.

# Asthma among TennCare Enrollees

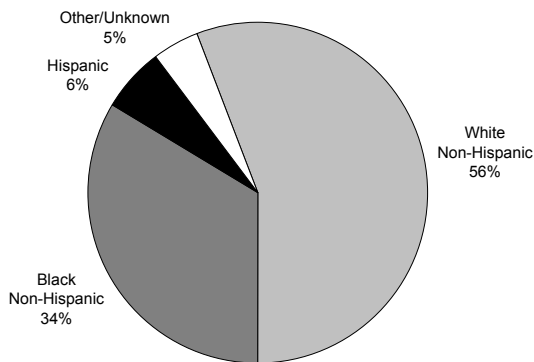
## TennCare Enrollment\*

- TennCare is Tennessee’s expanded Medicaid program which provides health coverage to vulnerable populations, such as low-income children, pregnant women and the disabled. Each year, approximately 50% of Tennessee children are enrolled in TennCare.
- In 2006, there were 624,090 children aged 1-17 years enrolled in TennCare, representing approximately 46% of children in the state.
- Approximately 56% of Tennessee children aged 1-4 years were enrolled in TennCare, compared to 47% among 5-10 year olds and 40% among 11-17 year olds.
- The same percentage of boys and girls were enrolled in TennCare (46% each).

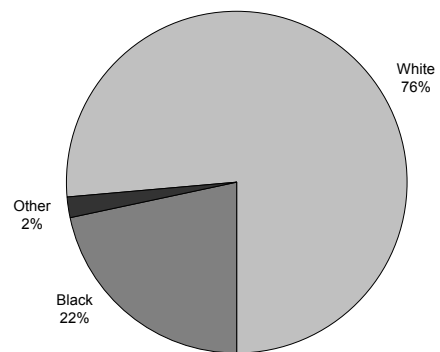


TennCare enrollment by age, Tennessee, 2006 (*TennCare*)

- In 2006, 56% of children enrolled in TennCare were white non-Hispanic, 34% were black non-Hispanic and 6% were Hispanic. This same year, approximately 76% of children in the state were white and 22% were black (regardless of ethnicity), while 4.1% were Hispanic (regardless of race).



Distribution of TennCare enrollees by race and ethnicity, 1-17 year olds, Tennessee, 2006 (*TennCare*)

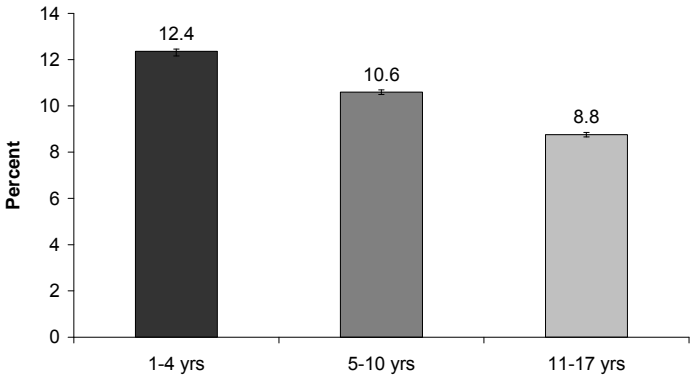


Population distribution by race, 1-17 year olds, Tennessee, 2006

\* For regional and county-level TennCare enrollment see Appendix B.

# Asthma among TennCare Enrollees

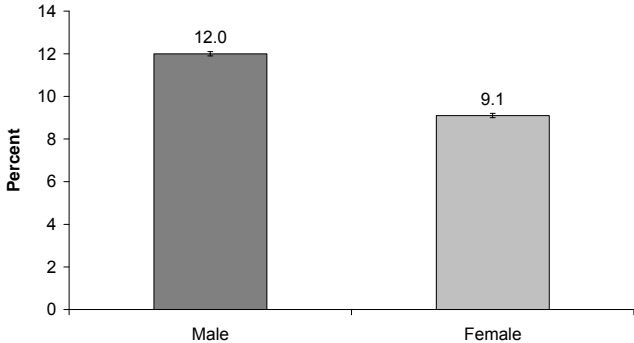
## Asthma Prevalence



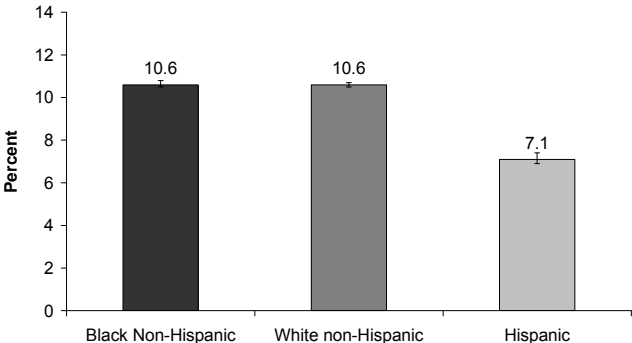
- Between 2004 and 2006, the 3-year prevalence of asthma among children enrolled in TennCare was 10.6%.
- Asthma prevalence was 12.4% among 1-4 years olds, 10.6% among 5-10 year olds, and 8.8% among 11-17 year olds.

Asthma prevalence by age, TennCare enrollees, 2004-2006 (TennCare)

- Asthma prevalence was higher among boys than among girls (12.0% vs. 9.1%, respectively).
- Asthma prevalence was similar among black and white non-Hispanic children (10.6% within each group). Asthma prevalence was 7.1% among Hispanic children.



Asthma prevalence by gender, TennCare enrollees, 2004-2006 (TennCare)

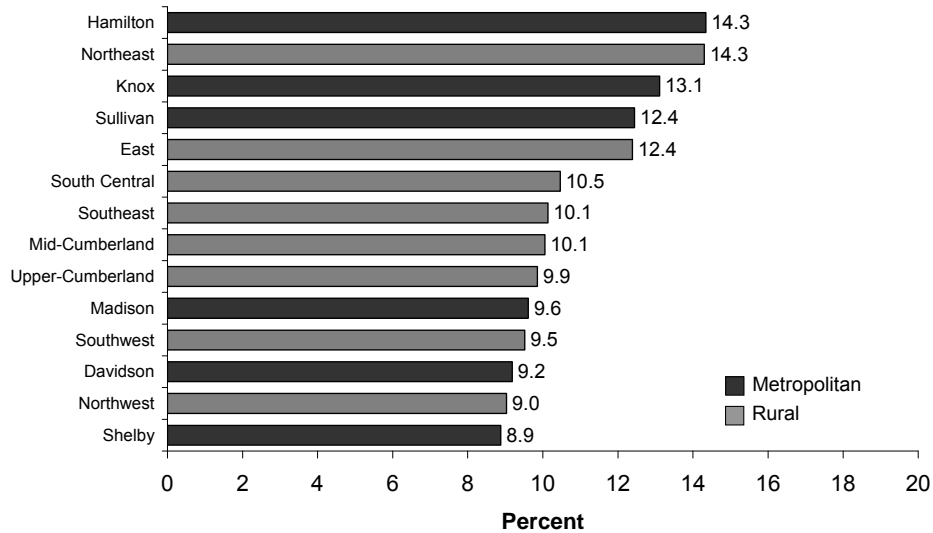


Asthma prevalence by race and ethnicity, TennCare enrollees, 2004-2006 (TennCare)

# Asthma among TennCare Enrollees

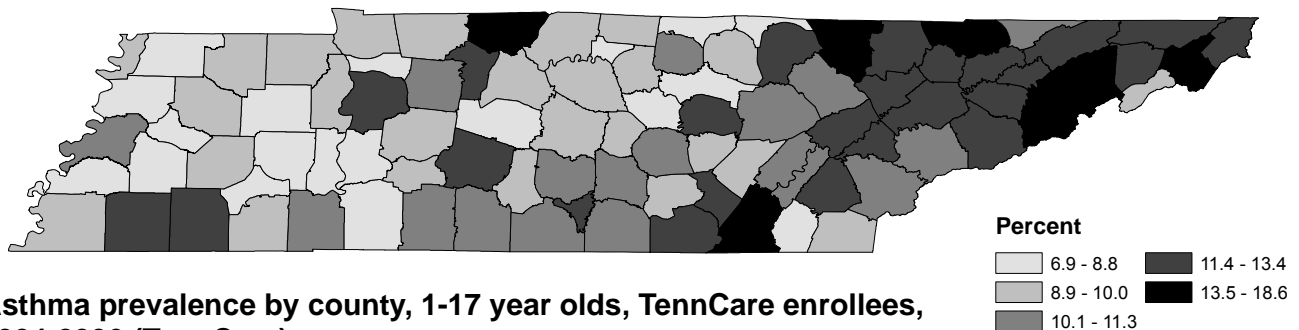
## Asthma Prevalence *cont.*

- The 2004-2006 3-year prevalence of asthma among children in individual Tennessee Health Department regions ranged from 8.9% in Shelby to 14.3% in Hamilton and Northeast.



**Asthma prevalence by region, 1-17 year olds, TennCare enrollees, 2004-2006 (TennCare)**

- Asthma prevalence in individual Tennessee counties ranged from 6.9% in Decatur County to 18.6% in Greene County.\*
- The ten counties with the lowest asthma prevalence were: Decatur, Perry, Clay, Henderson, Obion, Pickett, Williamson, Haywood, Chester, and Crockett.
- The ten counties with the highest asthma prevalence were: Roane, Moore, Washington, Cocke, Hamilton, Scott, Robertson, Carter, Claiborne and Greene.



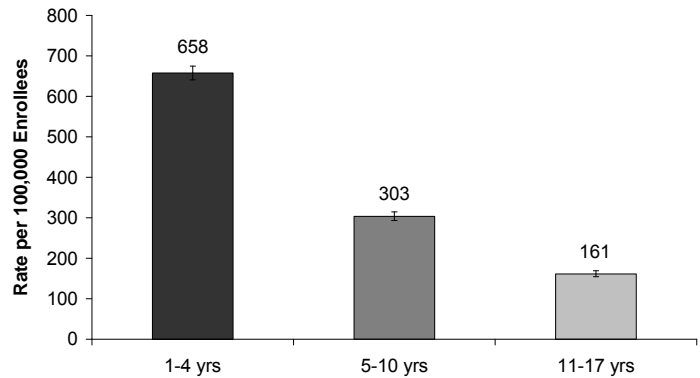
**Asthma prevalence by county, 1-17 year olds, TennCare enrollees, 2004-2006 (TennCare)**

\* For regional and county-level asthma prevalence among TennCare enrollees see Appendices B (overall), C (by gender) and D (by race).

# Asthma among TennCare Enrollees

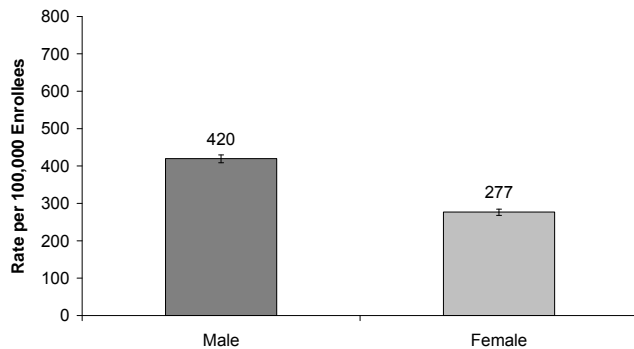
## Inpatient Hospitalizations for Asthma\*

- Between 2002 and 2006, the annual inpatient hospitalization rate for a primary diagnosis of asthma averaged 350 hospitalizations per 100,000 TennCare enrollees.
- Inpatient hospitalizations for asthma decreased with increasing age. The asthma hospitalization rate was highest among 1-4 year olds (658/100,000), compared to 303/100,000 among 5-10 year olds and 161/100,000 among 11-17 year olds.

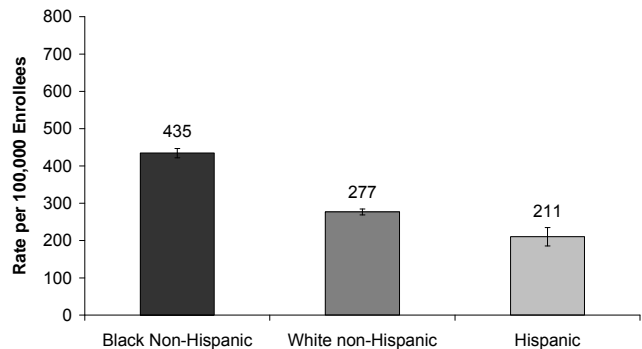


Inpatient hospitalization rate for primary asthma by age, TennCare enrollees, 2002-2006 average (*TennCare*)

- The asthma hospitalization rate was higher among boys than among girls (420/100,000 vs. 277/100,000).
- The asthma hospitalization rate was highest among black non-Hispanics (435/100,000), followed by white non-Hispanics (277/100,000) and Hispanics (211/100,000).



Inpatient hospitalization rate for primary asthma by gender, TennCare enrollees, 2002-2006 average (*TennCare*)



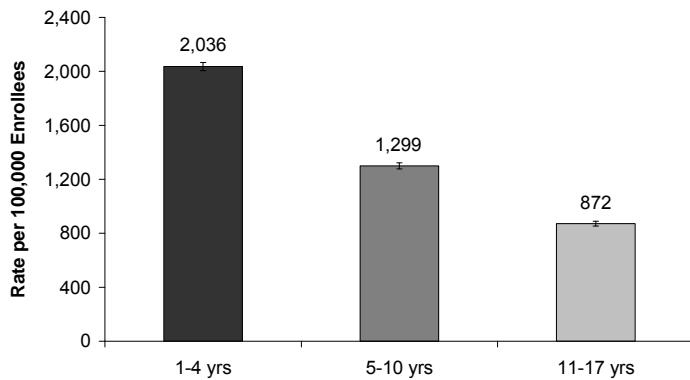
Inpatient hospitalization rate for primary asthma by race and ethnicity, TennCare enrollees, 2002-2006 average (*TennCare*)

\* For regional and county-level TennCare enrollee inpatient hospitalization rates see Appendix B.

# Asthma among TennCare Enrollees

## Emergency Department Visits for Asthma\*

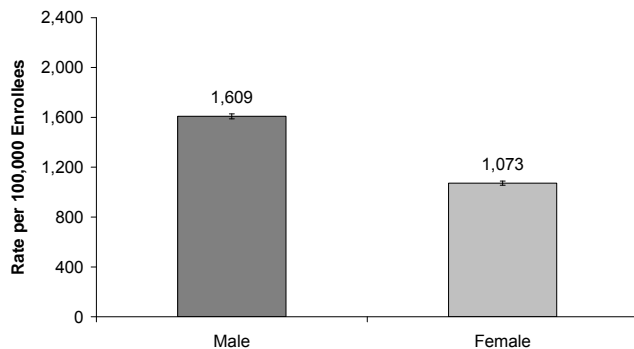
- Between 2002 and 2006, the annual emergency department visit rate for a primary diagnosis of asthma averaged 1,347 visits per 100,000 TennCare enrollees.



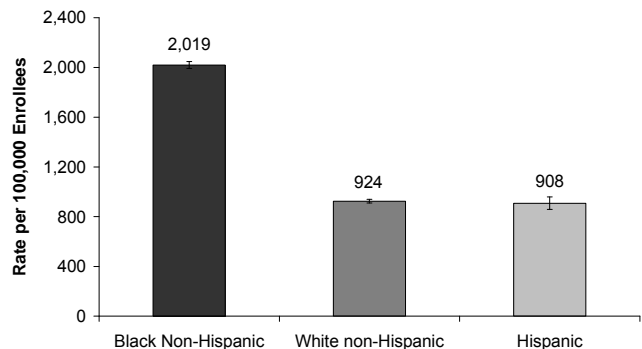
- Emergency department visits for asthma decreased with increasing age. The asthma ED visit rate was highest among 1-4 year olds (2,036/100,000), compared to 1,299/100,000 among 5-10 year olds and 872/100,000 among 11-17 year olds.

Emergency department visit rate for primary asthma by age, TennCare enrollees, 2002-2006 average (*TennCare*)

- The asthma ED visit rate was higher among boys than among girls (1,609/100,000 vs. 1,073/100,000).
- The asthma ED visit rate was higher among black non-Hispanics (2,019/100,000) than among white non-Hispanics (924/100,000) and Hispanics (908/100,000).



Emergency department visit rate for primary asthma by gender, TennCare enrollees, 2002-2006 average (*TennCare*)



Emergency department visit rate for primary asthma by race and ethnicity, TennCare enrollees, 2002-2006 average (*TennCare*)

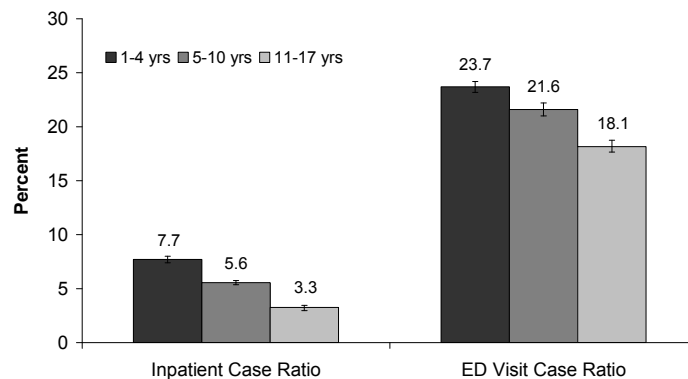
\* For regional and county-level TennCare enrollee emergency department visit rates see Appendix B.

# Asthma among TennCare Enrollees

## Inpatient and Emergency Department Visit Case Ratios for Asthma

Inpatient case ratios were calculated as the number of unique asthma patients with at least one inpatient hospitalization for a primary diagnosis of asthma divided by the total number of unique asthma patients. An asthma patient was defined as a child with any diagnosis of asthma (i.e. a primary and/or secondary diagnosis) in any TennCare claim file. Emergency department visit case ratios are similar to those for inpatient hospitalizations, except the numerator is the number of unique asthma patients with at least one ED visit for a primary diagnosis of asthma. Case ratios are a reflection of asthma severity and/or level of asthma control – a higher case ratio indicates more severe and/or more poorly controlled disease. High emergency department case ratios may also reflect the use of emergency rooms in place of primary care providers.

- The inpatient case ratio among children enrolled in TennCare was 5.8% between 2004 and 2006, while the emergency department case ratio was 21.5%. In other words, 5.8% of asthmatic children were hospitalized and 21.5% had to go to an emergency room for their asthma during this time period.



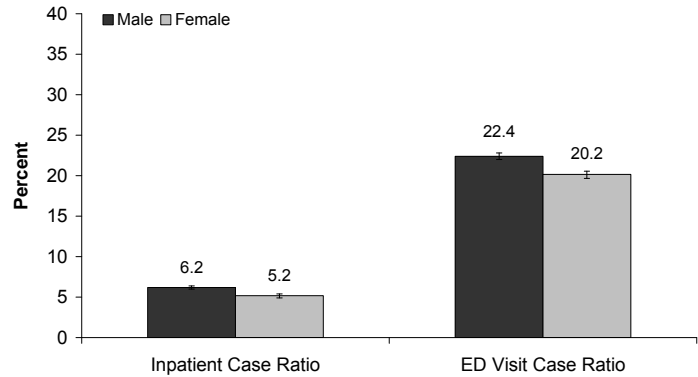
Case ratios for primary asthma by age, TennCare enrollees, 2004-2006 (TennCare)

- Both inpatient and ED visit case ratios decreased with increasing age, with the highest ratios among 1-4 year olds and the lowest among 11-17 year olds.
  - The inpatient case ratio was 7.7% among 1-4 year olds, compared to 5.6% among 5-10 year olds and 3.3% among 11-17 year olds.
  - The ED visit case ratio was 23.7% among 1-4 year olds, compared to 21.6% among 5-10 year olds and 18.1% among 11-17 year olds.

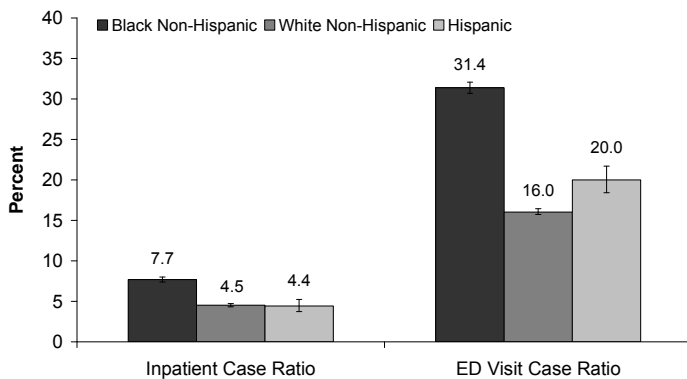
# Asthma among TennCare Enrollees

## Inpatient and Emergency Department Visit Case Ratios for Asthma *cont.*

- The inpatient case ratio was 6.2% among boys compared to 5.2% among girls.
- The ED visit case ratio was 22.4% among boys compared to 20.2% among girls.



Case ratios for primary asthma by gender, TennCare enrollees, 2004-2006 (*TennCare*)



Case ratios for primary asthma by race and ethnicity, TennCare enrollees, 2004-2006 (*TennCare*)

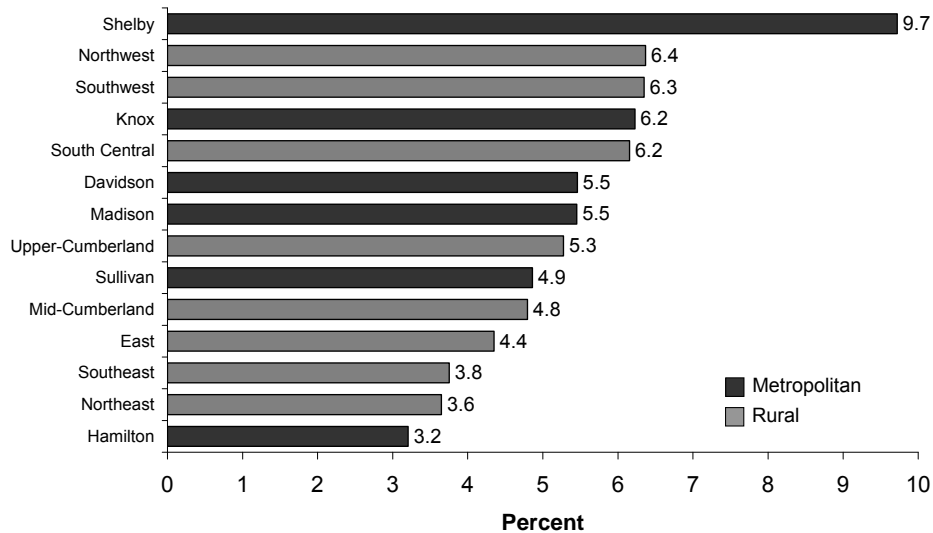
- The inpatient case ratio was highest among black non-Hispanics (7.7%), compared to 4.5% among white non-Hispanics and 4.4% among Hispanics.
- The ED visit case ratio was also highest among black non-Hispanics (31.4%), followed by Hispanics (20.0%) and white non-Hispanics (16.0%).



# Asthma among TennCare Enrollees

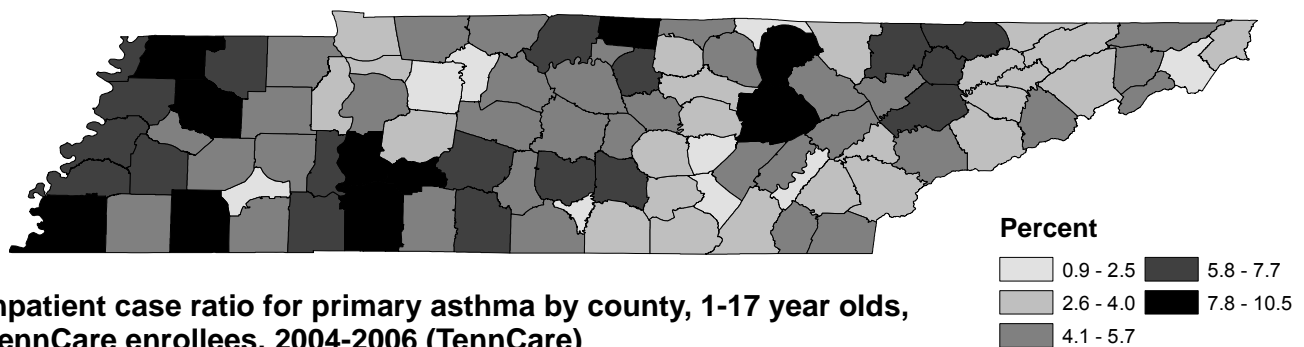
## Inpatient and Emergency Department Visit Case Ratios for Asthma *cont.*

- Between 2004 and 2006, the inpatient case ratio for asthma in individual Tennessee Health Department regions ranged from 3.2% in Hamilton to 9.7% in Shelby.\*



## Inpatient case ratio for primary asthma by region, 1-17 year olds, TennCare enrollees, 2004-2006 (*TennCare*)

- The inpatient case ratio in individual Tennessee counties ranged from 0.9% in Meigs County to 10.5% in Hardeman County.†
- The ten counties with the lowest inpatient case ratios were: Meigs, Sequatchie, Carter, Moore, Pickett, Dickson, Van Buren, Cheatham, Chester, and Stewart.
- The ten counties with the highest inpatient case ratios were: Lewis, Gibson, Cumberland, Fentress, Macon, Wayne, Obion, Perry, Shelby, and Hardeman.



## Inpatient case ratio for primary asthma by county, 1-17 year olds, TennCare enrollees, 2004-2006 (*TennCare*)

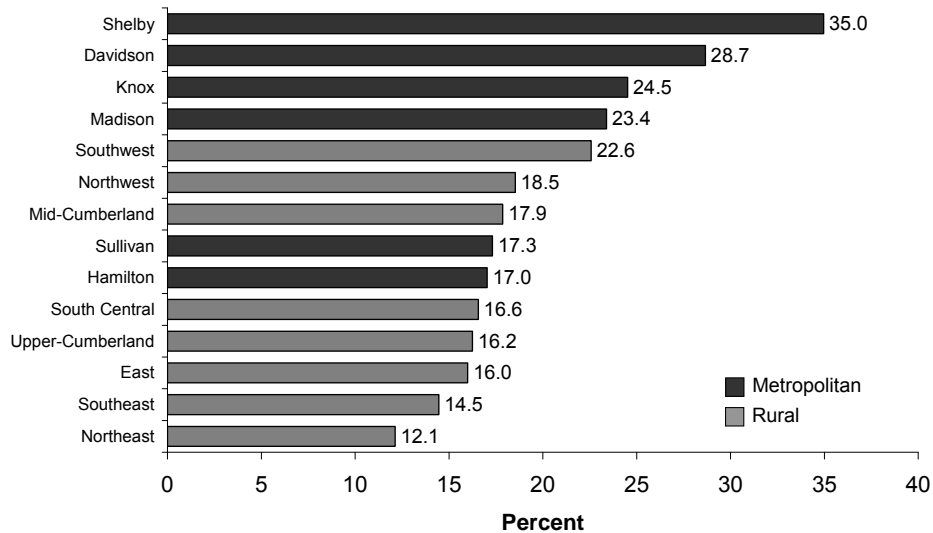
\* Note that the two regions with the highest inpatient case ratios (Shelby and Northwest) had the lowest asthma prevalence (see pg 17), while those with the lowest inpatient case ratios (Northeast and Hamilton) had the highest prevalence.

† For regional and county-level inpatient case ratios see Appendix B.

# Asthma among TennCare Enrollees

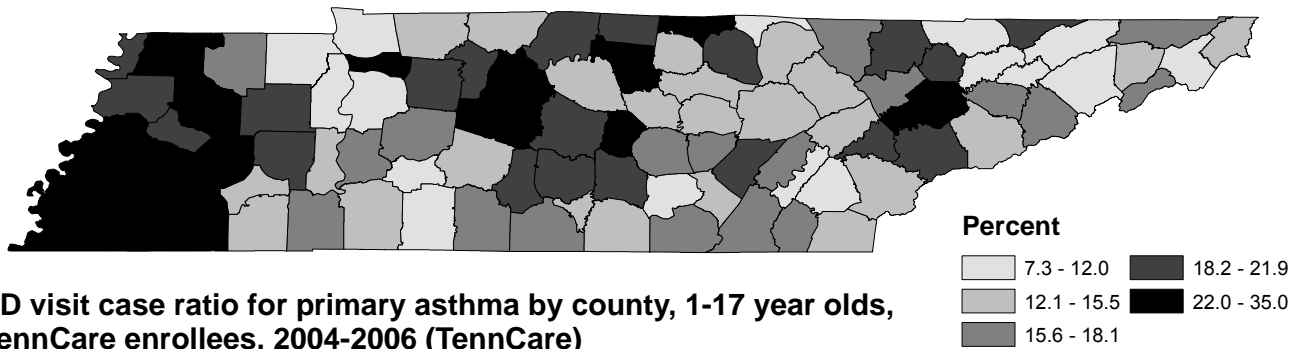
## Inpatient and Emergency Department Visit Case Ratios for Asthma *cont.*

- Between 2004 and 2006, the ED visit case ratio for asthma in individual Tennessee Health Department regions ranged from 12.1% in Northeast to 35.0% in Shelby.\*



**ED visit case ratio for primary asthma by region, 1-17 year olds, TennCare enrollees, 2004-2006 (*TennCare*)**

- The ED visit case ratio in individual Tennessee counties ranged from 7.3% in Lewis County to 35.0% in Shelby County.†
- The ten counties with the lowest ED visit case ratios were: Lewis, Grundy, Humphreys, Pickett, Henry, Meigs, Stewart, Greene, Benton, and Carter.
- The ten counties with the highest ED visit case ratios were: Tipton, Williamson, Houston, Obion, Fayette, Clay, Lauderdale, Davidson, Haywood and Shelby.



**ED visit case ratio for primary asthma by county, 1-17 year olds, TennCare enrollees, 2004-2006 (*TennCare*)**

\* Note that the four regions with the highest ED case ratios were all metropolitan regions.

† For regional and county-level ED visit case ratios see Appendix B.

# County Childhood Asthma Burden Rankings

Thus far, childhood asthma has been described in terms of its prevalence, inpatient hospitalization and emergency department visit rates, and inpatient and ED visit case ratios, with each of these five measurements describing one aspect of the childhood asthma burden. Prevalence measures how common asthma is in the population regardless of disease severity; inpatient hospitalization and ED visit rates capture more severe asthma cases in the population; and case ratios measure the relative severity of asthma among cases without consideration of how prevalent the disease is in the population. A composite indicator derived from these five measurements using a scoring method was used to rank the asthma burden among Tennessee’s 95 counties.\* A score for each individual measurement was first calculated for each county as follows:  $SCORE = ((COUNTY \div STATE) - 1) \times 100$ . Each score gauges the extent to which a given measurement for a county is higher or lower than that for the state. The final weighted score for each county was then calculated by adding the scores for each of the five measurements multiplied by its weight. To prevent an extreme value for a specific measurement from excessively influencing a county’s final score, the maximum any county could receive for a single measurement was limited to the state average plus or minus two standard deviations for that measurement.

Measurement	Weight (i.e. percent of total score)
Inpatient Visit Rate	30%
ED Visit Rate	30%
Prevalence	20%
Inpatient Case Ratio	10%
ED Visit Case Ratio	10%
<i>Total</i>	<i>100%</i>

The ranking is the ordering of each county according to its final score. A score of zero means that a county’s childhood asthma burden is similar to that of the state. A negative score indicates that a county is doing better than the state average, while a positive score indicates that a county is doing worse. Counties were ranked from 1 to 95, with 1 being the county with the lowest childhood asthma burden and 95 being the county with the greatest burden. Ties in score were assigned equal rankings.

- The five counties with the lowest asthma burden score were: Pickett, Moore, Stewart, Williamson and Sequatchie.
- The five counties with the highest asthma burden score were: Knox, Fentress, Lauderdale, Shelby and Hardeman. Three of these five counties were in southwestern Tennessee.

\* Scoring and ranking methodology was based on that used for the United Health Foundation’s America’s Health Rankings.<sup>3</sup>

## County Childhood Asthma Burden Rankings *cont.* \*

Rank	County	Score
1	Pickett	-59.7
2	Moore	-49.7
3	Stewart	-42.1
4	Williamson	-38.5
5	Sequatchie	-35.1
6	Benton	-32.7
7	Grundy	-32.3
8	Chester	-30.4
9	Jackson	-29.9
10	Clay	-29.3
11	Wilson	-28.1
12	Overton	-27.9
13	Lewis	-26.1
14	Franklin	-24.9
15	Carter	-24.0
16	Van Buren	-23.4
17	Marion	-22.5
18	Johnson	-21.9
18	Humphreys	-21.9
20	Bradley	-21.6
21	Monroe	-21.4
22	Putnam	-20.9
23	Hawkins	-20.5
24	Henderson	-18.9
25	Montgomery	-18.4
26	Cheatham	-17.2
27	McMinn	-16.6
28	Rutherford	-16.5
29	Dickson	-16.1
29	Warren	-15.9
31	Rhea	-14.5
32	Meigs	-14.2
33	Hickman	-10.5
34	Dekalb	-9.7
35	Decatur	-8.9
36	Anderson	-8.7
37	Bledsoe	-8.4
38	Henry	-7.5
39	Houston	-6.3
39	Hamilton	-6.3
41	Cannon	-6.2
42	McNairy	-5.1
42	Polk	-5.1
44	Washington	-4.5
45	Grainger	-4.4
46	Smith	-3.0
47	Hamblen	-2.5
48	Hardin	-2.3

Rank	County	Score
49	Lincoln	-1.6
49	Sumner	-1.4
51	Hancock	-0.8
52	Unicoi	-0.3
53	Marshall	-0.2
53	Blount	0.4
55	White	0.7
56	Lawrence	0.9
56	Perry	1.2
58	Weakley	2.2
59	Greene	2.3
60	Sevier	3.3
61	Carroll	4.1
62	Fayette	5.6
63	Crockett	6.2
64	Loudon	6.6
65	Claiborne	7.9
66	Sullivan	8.0
67	Giles	10.8
68	Jefferson	11.8
69	Obion	12.3
69	Trousdale	12.3
71	Lake	12.4
72	Madison	12.9
73	Bedford	14.5
73	Union	14.5
73	Wayne	14.5
76	Roane	16.0
77	Tipton	18.0
78	Macon	20.4
79	Morgan	20.7
80	Davidson	22.9
81	Cumberland	23.8
82	Robertson	25.4
83	Coffee	26.3
84	Haywood	27.8
85	Mauzy	28.2
86	Scott	28.5
87	Campbell	30.7
88	Gibson	32.9
89	Cocke	33.1
90	Dyer	34.9
91	Knox	36.2
92	Fentress	40.1
93	Lauderdale	52.1
94	Shelby	62.6
95	Hardeman	68.2

\* Appendix E contains an alphabetical listing of counties w/ their individual measurement scores, total score and ranking.

## Summary

Approximately 10% of children in Tennessee suffered from asthma in 2007. Although inpatient hospitalizations for this disease have decreased since 1997, emergency department (ED) visits and charges for both inpatient and outpatient hospitalizations have increased. In addition, there are significant gender, racial, socioeconomic and geographic disparities in childhood asthma. Asthma prevalence was higher among boys than girls, and higher among blacks than whites. Male children and black children were also more likely to be hospitalized or to visit the emergency room for asthma. Socioeconomic disparities are illustrated by the fact that asthma prevalence increases with decreasing family income. In addition, inpatient hospitalization and ED visit rates were higher among TennCare enrollees than among the population as a whole. There were also wide geographic variations in the childhood asthma burden across the state. For example, county-level inpatient hospitalization rates ranged from 35 to 436/100,000, and ED visit rates ranged from 273 to 1,990/100,000. Knox, Fentress, Lauderdale, Shelby and Hardeman counties were identified as having the greatest childhood asthma burden, while Pickett, Moore, Stewart, Williamson and Sequatchie counties were identified as having the lowest burden.

Hospitalizations and emergency department visits due to asthma are indicative of severe and/or poorly controlled disease and are costly both monetarily and in terms of personal suffering. However, such severe consequences are largely preventable with appropriate treatment and disease management. The trends and differences noted in this report therefore indicate a need for additional childhood asthma prevention and control efforts in the state. The information contained in this report is important for health professionals, policy makers, and other individuals and organizations interested in asthma and in the health of children in Tennessee. It is hoped it will be used to guide planning efforts, to target interventions and to serve as a baseline to track childhood asthma trends and evaluate efforts to decrease the burden of this disease.

## Appendix A

# Regional and County Hospital Discharge Data

The following table presents detailed regional and county-level hospital discharge data for childhood asthma (ages 1-17). Inpatient and ED visit rates are 2002-2006 annual averages. Emergency department trend refers to the overall trend in annual ED visit rates from 1997 to 2006. Only statistically significant trends are noted in the table – regions and counties without a statistically significant upward or downward trend over this time period have been left blank. Numbers in parentheses indicate the percent change in the ED visit rate between 1997 and 2006. Inpatient and outpatient charges are 2002-2006 average charges per visit. Inpatient charges have been rounded to the nearest \$100, and outpatient charges have been rounded to the nearest \$10. Counties with fewer than 20 inpatient hospitalizations and/or ED visits have been included in the table. However, these counties have been marked with an asterisk and confidence intervals have been added to their inpatient hospitalization and ED visit rates. Because these rates and related hospital charges are based on small numbers of cases they should be interpreted with caution.

**Select asthma burden measures among children aged 1-17 years by region and county, Tennessee, 2002-2006 (Hospital Discharge Data System)**

Region/County	Inpatient Hospitalizations (visits per 100,000)	ED Visits (visits per 100,000)	ED Visit Trend (1997-2006)	Inpatient Charges (\$ per visit)	Outpatient Charges (\$ per visit)
<b>Metropolitan Regions/Counties</b>					
Davidson	132	1,373	Increase (72%)	9,900	930
Hamilton	66	992		5,600	910
Knox	196	1,201	Increase (51%)	6,000	640
Madison	146	1,090		4,800	710
Shelby	301	1,798		6,900	1,200
Sullivan	166	829	Increase (214%)	5,500	640
<b>East Region</b>					
Anderson	135	627	Increase (139%)	6,100	720
Blount	140	810		6,300	690
Campbell	210	1,128	Increase (487%)	6,000	750
Claiborne	143	820		4,900	710
Cocke	213	1,164	Increase (91%)	5,400	680
Grainger	165	727		7,300	630
Hamblen	151	833		9,000	680
Jefferson	167	1,024	Increase (50%)	5,700	670
Loudon	140	1,006		6,600	640
Monroe	91	683		5,200	640
Morgan	206	1,104		5,300	780
Roane	184	952	Increase (67%)	7,500	700
Scott	180	1,265	Increase (159%)	6,900	960
Sevier	131	1,019		7,400	550
Union	160	917		5,900	620
<b>Region Total</b>	<b>154</b>	<b>905</b>	<b>Increase (42%)</b>	<b>6,500</b>	<b>680</b>

Select asthma burden measures among children aged 1-17 years by region and county, Tennessee, 2002-2006 (Hospital Discharge Data System) *cont.*

Region/County	Inpatient Hospitalizations (visits per 100,000)	ED Visits (visits per 100,000)	ED Visit Trend (1997-2006)	Inpatient Charges (\$ per visit)	Outpatient Charges (\$ per visit)
<b>Mid-Cumberland Region</b>					
Cheatham	74	783		7,300	700
Dickson	61	946	Increase (378%)	11,000	750
Houston*	87 [38-172]	1,025	Increase (170%)	2,800	530
Humphreys	100	520		4,400	680
Montgomery	125	525	Increase (116%)	4,700	640
Robertson	199	1,035	Increase (60%)	4,800	770
Rutherford	89	684	Increase (174%)	6,200	850
Stewart*	71 [34-130]	416		4,400	540
Sumner	137	756	Increase (105%)	5,900	790
Trousdale*	155 [83-265]	1,097	Increase (65%)	4,900	970
Williamson	35	437		9,500	770
Wilson	95	425		7,800	1,200
<b>Region Total</b>	<b>99</b>	<b>639</b>	<b>Increase (87%)</b>	<b>6,100</b>	<b>800</b>
<b>Northeast Region</b>					
Carter	79	597		4,700	690
Greene	176	703		4,400	440
Hancock*	158 [79-283]	762	Increase (435%)	5,400	930
Hawkins	102	591	Increase (101%)	4,800	660
Johnson*	76 [39-132]	674	Increase (115%)	4,100	650
Unicoi*	113 [68-176]	1,075	Decrease (58%)	10,000	430
Washington	127	676		5,000	790
<b>Region Total</b>	<b>122</b>	<b>675</b>		<b>5,000</b>	<b>650</b>
<b>Northwest Region</b>					
Benton*	96 [55-157]	476	Decrease (81%)	4,800	620
Carroll	157	938		5,200	620
Crockett	188	818	Increase (165%)	8,900	940
Dyer	298	895	Increase (74%)	7,200	1,200
Gibson	188	1,244	Increase (18%)	4,100	560
Henry	216	397		5,000	770
Lake*	189 [98-330]	834		6,200	1,400
Obion	180	769		6,000	710
Weakley	194	631		5,700	1,100
<b>Region Total</b>	<b>200</b>	<b>828</b>	<b>Increase (19%)</b>	<b>5,800</b>	<b>800</b>
<b>South Central Region</b>					
Bedford	186	793		5,700	760
Coffee	218	968	Increase (27%)	5,700	1,000
Giles	219	629		4,200	610
Hickman	109	883	Increase (322%)	7,000	770
Lawrence	212	591		6,600	720
Lewis*	125 [73-200]	273		4,000	740
Lincoln	130	853		3,900	480
Marshall	128	929		3,900	610
Maury	254	868	Increase (53%)	4,500	690
Moore*	16 [0-88]	268 [156-430]		3,700	650
Perry*	165 [90-277]	683		4,000	650
Wayne	246	583		3,000	780
<b>Region Total</b>	<b>194</b>	<b>783</b>	<b>Increase (36%)</b>	<b>5,000</b>	<b>730</b>

Select asthma burden measures among children aged 1-17 years by region and county, Tennessee, 2002-2006 (Hospital Discharge Data System) *cont.*

Region/County	Inpatient Hospitalizations (visits per 100,000)	ED Visits (visits per 100,000)	ED Visit Trend (1997-2006)	Inpatient Charges (\$ per visit)	Outpatient Charges (\$ per visit)
<b>Southeast Region</b>					
Bledsoe*	112 [63-185]	786		3,700	770
Bradley	103	588		4,400	900
Franklin	88	601		4,500	700
Grundy*	84 [46-140]	561		4,400	730
Marion*	50 [28-82]	818		5,500	810
McMinn	108	647		8,000	620
Meigs*	129 [75-206]	863		4,700	690
Polk	187	566		3,500	860
Rhea	68	936		3,800	790
Sequatchie*	14 [2-51]	783	Increase (602%)	2,900	870
<b>Region Total</b>	<b>95</b>	<b>678</b>		<b>5,000</b>	<b>780</b>
<b>Southwest Region</b>					
Chester*	104 [62-165]	544		4,000	650
Decatur*	137 [78-223]	703		2,900	400
Fayette	113	995		6,100	1,000
Hardeman	436	1,990	Increase (43%)	3,400	680
Hardin	145	709	Increase (491%)	3,300	400
Haywood	151	1,490	Decrease (32%)	6,200	1,100
Henderson	101	660		6,400	770
Lauderdale	264	1,355		6,000	770
McNairy	149	779	Increase (115%)	5,800	800
Tipton	164	1,109	Increase (18%)	8,900	800
<b>Region Total</b>	<b>180</b>	<b>1,081</b>		<b>5,700</b>	<b>800</b>
<b>Upper-Cumberland Region</b>					
Cannon*	125 [75-196]	719		4,700	570
Clay*	76 [28-165]	378		3,100	680
Cumberland	244	767		4,500	700
Dekalb	148	698		7,000	860
Fentress	418	932	Increase (142%)	6,300	1,100
Jackson*	89 [43-163]	462	Decrease (42%)	6,300	790
Macon	261	549		4,600	930
Overton*	84 [50-133]	475		3,900	610
Pickett*	42 [5-152]	105 [34-245]		1,700	540
Putnam	118	649		3,800	490
Smith	112	753	Increase (63%)	5,100	790
Van Buren*	106 [39-231]	601		7,900	940
Warren	94	767		4,800	680
White	134	890		6,200	930
<b>Region Total</b>	<b>158</b>	<b>689</b>		<b>5,000</b>	<b>730</b>

\* Fewer than 20 inpatient hospitalizations and/or ED visits – results should be interpreted with caution.



## Appendix B

### Regional and County TennCare Data

The following table presents detailed regional and county-level TennCare data for childhood asthma (ages 1-17). TennCare enrollment data are for 2006. Prevalence and case ratios are for the period 2004-2006. Inpatient and emergency department visit rates are 2002-2006 annual averages. Counties with fewer than 20 inpatient hospitalizations and/or ED visits have been included in the table. However, these counties have been marked with an asterisk and confidence intervals have been added to their inpatient hospitalization and ED visit rates. Because these rates are based on small numbers of cases they should be interpreted with caution.

**Select asthma burden measures among children aged 1-17 years by region and county, Tennessee, 2002-2006 (TennCare)**

Region/County	Enrollment (% of children)	Prevalence (%)	Inpatient Hospitalizations (visits per 100,000)	ED Visits (visits per 100,000)	Inpatient Case Ratio	ED Visit Case Ratio
<b>Metropolitan Regions/Counties</b>						
Davidson	50.0	9.2	275	1,620	5.5	28.7
Hamilton	45.0	14.3	261	1,300	3.2	17.0
Knox	38.2	13.1	518	1,900	6.2	24.5
Madison	50.1	9.6	293	1,370	5.5	23.4
Shelby	56.2	8.9	460	2,020	9.7	35.0
Sullivan	45.2	12.4	317	1,020	4.9	17.3
<b>East Region</b>						
Anderson	44.4	11.4	355	990	4.8	16.2
Blount	34.1	10.3	315	1,284	5.0	21.0
Campbell	67.5	11.9	360	1,056	6.1	19.2
Claiborne	64.4	16.8	791	935	6.7	11.5
Cocke	66.2	14.2	476	1,288	4.6	17.8
Grainger	57.0	11.9	293	744	2.9	11.5
Hamblen	50.3	12.4	265	737	2.8	11.5
Jefferson	53.5	12.7	364	1,139	3.2	15.9
Loudon	45.0	11.4	333	1,252	3.7	20.0
Monroe	41.4	10.9	185	712	2.9	14.1
Morgan	44.2	11.3	251	785	4.3	13.6
Roane	50.9	13.3	398	1,234	4.6	15.1
Scott	67.3	15.3	251	1,210	3.2	17.4
Sevier	44.7	11.8	269	1,159	3.8	15.3
Union	40.6	12.5	507	1,454	6.6	18.5
<b>Region Total</b>	<b>48.5</b>	<b>12.4</b>	<b>356</b>	<b>1,080</b>	<b>4.4</b>	<b>16.0</b>

Select asthma burden measures among children aged 1-17 years by region and county, Tennessee, 2002-2006 (TennCare) *cont.*

Region/County	Enrollment (% of children)	Prevalence (%)	Inpatient Hospitalizations (visits per 100,000)	ED Visits (visits per 100,000)	Inpatient Case Ratio	ED Visit Case Ratio
<b>Mid-Cumberland Region</b>						
Cheatham	33.7	11.6	191	1,323	2.3	20.8
Dickson	43.8	11.1	138	1,312	2.3	18.6
Houston*	44.8	8.8	149 [55-324]	1,116	3.3	25.3
Humphreys	39.4	11.8	279	597	5.6	8.4
Montgomery	35.1	9.9	311	881	4.7	14.4
Robertson	33.6	15.4	534	1,426	4.6	15.2
Rutherford	29.4	9.4	255	1,257	5.0	21.2
Stewart*	45.5	8.8	126 [55-249]	616	2.8	9.8
Sumner	33.2	9.4	330	1,122	6.6	19.9
Trousdale*	46.6	8.6	332 [177-567]	1,429	4.8	24.1
Williamson	11.3	7.8	223	1,080	4.4	25.2
Wilson	25.5	9.3	265	689	5.6	13.7
<b>Region Total</b>	<b>29.2</b>	<b>10.1</b>	<b>284</b>	<b>1,090</b>	<b>4.8</b>	<b>17.9</b>
<b>Northeast Region</b>						
Carter	48.2	16.6	176	675	1.7	10.5
Greene	46.4	18.6	335	1,000	3.2	9.9
Hancock*	55.9	10.7	284 [130-539]	944	3.0	21.2
Hawkins	51.7	12.2	182	719	3.5	11.6
Johnson*	65.6	11.9	181 [109-382]	704	3.5	13.9
Unicoi*	57.3	9.6	174 [100-283]	958	4.4	16.7
Washington	40.8	13.4	382	830	5.5	14.0
<b>Region Total</b>	<b>47.4</b>	<b>14.3</b>	<b>270</b>	<b>820</b>	<b>3.6</b>	<b>12.1</b>
<b>Northwest Region</b>						
Benton	72.5	9.1	173	562	3.5	10.0
Carroll	63.5	8.7	219	965	4.7	19.6
Crockett	63.4	8.4	295	931	4.7	20.8
Dyer	60.5	8.7	414	982	7.3	19.4
Gibson	54.3	9.9	402	1,377	7.9	23.6
Henry	50.4	9.7	350	461	5.0	9.3
Lake*	63.3	9.8	334 [178-571]	1,027	6.2	20.6
Obion	40.2	7.6	414	945	9.4	25.3
Weakley	48.6	9.4	315	769	6.1	15.8
<b>Region Total</b>	<b>55.2</b>	<b>9.0</b>	<b>338</b>	<b>940</b>	<b>6.4</b>	<b>18.5</b>
<b>South Central Region</b>						
Bedford	43.6	11.0	471	1,099	7.7	18.6
Coffee	46.0	10.3	350	1,165	6.7	21.9
Giles	40.4	10.2	413	1,031	6.8	16.8
Hickman	54.7	9.7	171	1,013	3.3	16.6
Lawrence	48.9	10.4	336	663	4.5	12.0
Lewis	51.3	9.6	313	372	7.9	7.3
Lincoln	46.9	10.3	341	1,121	5.0	18.1
Marshall	41.3	9.0	279	1,046	5.6	18.8
Maury	46.8	11.9	560	1,190	6.4	15.3
Moore*	24.6	13.3	238 [29-859]	936 [498-1,600]	2.2	13.0
Perry*	44.3	7.4	408 [228-673]	788	9.5	17.6
Wayne	45.7	8.4	458	822	9.3	14.9
<b>Region Total</b>	<b>45.9</b>	<b>10.5</b>	<b>394</b>	<b>1,010</b>	<b>6.2</b>	<b>16.6</b>

Select asthma burden measures among children aged 1-17 years by region and county, Tennessee, 2002-2006 (TennCare) *cont.*

Region/County	Enrollment (% of children)	Prevalence (%)	Inpatient Hospitalizations (visits per 100,000)	ED Visits (visits per 100,000)	Inpatient Case Ratio	ED Visit Case Ratio
<b>Southeast Region</b>						
Bledsoe*	39.7	9.8	301 [168-496]	762	4.7	20.2
Bradley	45.2	8.5	256	812	4.5	17.8
Franklin	40.6	10.3	227	784	3.6	13.9
Grundy*	68.7	9.8	167 [100-261]	492	3.4	7.8
Marion	47.9	11.4	178	768	3.1	15.7
McMinn	49.5	11.8	238	763	4.0	11.8
Meigs*	57.7	10.6	191 [99-333]	653	0.9	9.7
Polk	54.8	9.5	198	637	4.9	13.8
Rhea	62.1	10.2	196	858	4.1	16.1
Sequatchie*	53.1	11.4	126 [57-238]	920	1.5	14.6
<b>Region Total</b>	<b>49.5</b>	<b>10.1</b>	<b>217</b>	<b>760</b>	<b>3.8</b>	<b>14.5</b>
<b>Southwest Region</b>						
Chester*	48.5	8.1	190 [106-313]	581	2.5	13.3
Decatur*	55.3	6.9	244 [137-403]	570	7.5	15.1
Fayette	27.8	11.6	220	1,652	4.1	26.5
Hardeman	58.7	12.9	759	2,251	10.5	24.4
Hardin	51.3	10.6	302	829	6.1	16.4
Haywood	62.5	8.0	242	1,559	6.7	29.6
Henderson	43.6	7.5	195	730	4.6	21.7
Lauderdale	55.7	10.0	355	1,637	6.5	27.2
McNairy	68.7	9.1	232	818	4.8	15.2
Tipton	47.6	8.7	320	1,383	6.2	24.9
<b>Region Total</b>	<b>50.2</b>	<b>9.5</b>	<b>329</b>	<b>1310</b>	<b>6.3</b>	<b>22.6</b>
<b>Upper-Cumberland Region</b>						
Cannon*	36.4	9.2	258 [141-433]	941	5.4	23.1
Clay*	48.4	7.4	232 [106-440]	670	5.7	27.1
Cumberland	50.4	10.9	521	859	8.1	14.9
Dekalb	48.7	8.5	235	853	4.8	14.5
Fentress	70.8	11.5	583	757	8.5	12.6
Jackson*	44.2	10.5	240 [120-430]	655	3.1	15.0
Macon	38.4	9.5	612	907	9.1	18.6
Overton*	41.0	9.7	184 [105-298]	700	4.1	18.6
Pickett*	51.9	7.6	120 [25-351]	347 [140-715]	2.2	8.9
Putnam	62.2	8.6	180	714	2.9	15.4
Smith	45.4	9.4	310	1,047	7.3	23.6
Van Buren*	29.5	10.0	195 [24-703]	881 [455-1,539]	2.3	15.9
Warren	54.1	10.3	205	986	3.8	15.9
White	45.1	12.6	221	894	3.8	15.5
<b>Region Total</b>	<b>51.0</b>	<b>9.9</b>	<b>306</b>	<b>820</b>	<b>5.3</b>	<b>16.2</b>

\* Fewer than 20 inpatient hospitalizations and/or ED visits – results should be interpreted with caution.

## Appendix C

### Regional and County Data by Gender

The following table presents detailed regional and county-level data for childhood asthma (ages 1-17) by gender. It includes 2002-2006 emergency department visit rates from the hospital discharge data system and 2004-2006 TennCare prevalence rates. Counties with fewer than 20 ED visits and/or 20 TennCare asthma cases among girls or boys have been included in the table. However, these counties have been marked with an asterisk and confidence intervals have been added to their ED visit and/or prevalence rates. Because these rates are based on small numbers of cases they should be interpreted with caution.

**Select asthma burden measures among children aged 1-17 years by region/county and gender, Tennessee, 2002-2006**

Region/County	ED Visits (visits per 100,000) (HDDS)		Prevalence (%) (TennCare)	
	Female	Male	Female	Male
<b>Metropolitan Regions/Counties</b>				
Davidson	1,096	1,635	8.0	10.3
Hamilton	764	1,209	12.4	16.2
Knox	977	1,411	11.6	14.6
Madison	874	1,290	8.3	10.9
Shelby	1,370	2,208	7.3	10.4
Sullivan	765	890	10.6	14.2
<b>East Region</b>				
Anderson	504	745	10.4	12.3
Blount	607	1,006	8.9	11.7
Campbell	880	1,377	10.9	13.0
Claiborne	795	846	15.4	18.1
Cocke	1,059	1,267	12.9	15.5
Grainger	480	955	9.9	13.8
Hamblen	778	882	11.1	13.6
Jefferson	989	1,055	10.6	14.7
Loudon	828	1,173	9.8	13.0
Monroe	641	722	9.1	12.6
Morgan	991	1,212	10.0	12.5
Roane	910	991	11.7	14.8
Scott	1,015	1,500	13.4	17.2
Sevier	890	1,137	9.9	13.6
Union	879	954	11.2	13.7
<b>Region Total</b>	<b>780</b>	<b>1,022</b>	<b>10.9</b>	<b>13.8</b>

Select asthma burden measures among children aged 1-17 years by region/county and gender, Tennessee, 2002-2006 *cont.*

Region/County	ED Visits (visits per 100,000) (HDDS)		Prevalence (%) (TennCare)	
	Female	Male	Female	Male
<b>Mid-Cumberland Region</b>				
Cheatham	525	1,017	10.2	12.9
Dickson	739	1,140	9.4	12.7
Houston	1,015	1,034	6.3	11.2
Humphreys	440	593	10.7	12.8
Montgomery	421	621	8.2	11.4
Robertson	944	1,122	13.5	17.2
Rutherford	546	815	7.9	10.7
Stewart*	277 [167-432]	547	7.7	9.9
Sumner	617	885	7.9	10.9
Trousdale	955	1,225	7.1	10.1
Williamson	339	531	6.3	9.4
Wilson	304	541	7.9	10.6
<b>Region Total</b>	<b>512</b>	<b>759</b>	<b>8.5</b>	<b>11.5</b>
<b>Northeast Region</b>				
Carter	602	592	14.9	18.2
Greene	634	766	16.4	20.6
Hancock	594	935	10.6	10.8
Hawkins	435	744	11.3	13.0
Johnson	576	758	10.3	13.5
Unicoi	947	1,192	7.5	11.6
Washington	517	824	11.1	15.5
<b>Region Total</b>	<b>565</b>	<b>777</b>	<b>12.5</b>	<b>16.0</b>
<b>Northwest Region</b>				
Benton	418	533	8.0	10.1
Carroll	731	1,147	7.0	10.3
Crockett	514	1,114	7.7	9.1
Dyer	643	1,146	6.9	10.4
Gibson	1,009	1,473	8.6	11.1
Henry	293	495	8.1	11.3
Lake*	599 [355-947]	1,044	7.6	11.8
Obion	550	978	5.9	9.1
Weakley	548	708	8.5	10.4
<b>Region Total</b>	<b>638</b>	<b>1,011</b>	<b>7.6</b>	<b>10.4</b>
<b>South Central Region</b>				
Bedford	638	945	9.3	12.7
Coffee	897	1,037	9.4	11.2
Giles	511	739	8.9	11.4
Hickman	676	1,063	8.6	10.7
Lawrence	521	656	8.6	12.0
Lewis*	125 [54-247]	404	7.5	11.6
Lincoln	654	1,043	9.1	11.4
Marshall	852	1,005	8.0	10.1
Maury	649	1,072	10.0	13.7
Moore*	220 [88-453]	318 [152-585]	10.8 [6.4-17.0]	15.7
Perry*	415 [242-666]	932	6.8	7.9
Wayne	537	626	7.8	9.1
<b>Region Total</b>	<b>643</b>	<b>915</b>	<b>9.0</b>	<b>11.8</b>

Select asthma burden measures among children aged 1-17 years by region/county and gender, Tennessee, 2002-2006 *cont.*

Region/County	ED Visits (visits per 100,000) (HDDS)		Prevalence (%) (TennCare)	
	Female	Male	Female	Male
<b>Southeast Region</b>				
Bledsoe	627	917	7.8	11.6
Bradley	458	707	7.6	9.4
Franklin	528	672	9.4	11.2
Grundy	535	585	8.4	11.2
Marion	727	901	10.1	12.7
McMinn	566	723	9.7	13.8
Meigs	695	1,019	9.3	11.8
Polk	429	698	9.0	10.0
Rhea	840	1,030	8.5	11.9
Sequatchie	674	887	10.2	12.5
<b>Region Total</b>	<b>574</b>	<b>776</b>	<b>8.8</b>	<b>11.4</b>
<b>Southwest Region</b>				
Chester	390	682	6.9	9.4
Decatur	474	921	6.0	7.8
Fayette	938	1,041	10.8	12.4
Hardeman	1,934	2,044	12.1	13.8
Hardin	591	813	9.5	11.6
Haywood	1,129	1,840	6.1	9.8
Henderson	565	753	6.3	8.7
Lauderdale	1,283	1,423	8.9	11.2
McNairy	629	927	7.4	10.8
Tipton	898	1,308	7.7	9.7
<b>Region Total</b>	<b>936</b>	<b>1,217</b>	<b>8.3</b>	<b>10.7</b>
<b>Upper-Cumberland Region</b>				
Cannon	557	872	8.0	10.3
Clay*	340 [186-570]	420 [240-681]	6.2	8.8
Cumberland	577	950	8.9	12.7
Dekalb	598	791	7.2	9.8
Fentress	549	1,288	9.3	13.5
Jackson	426	495	10.4	10.6
Macon	425	669	8.1	10.7
Overton	392	555	8.5	10.8
Pickett*	44 [1-247]	160 [44-409]	4.7 [2.4-8.1]	9.9
Putnam	551	742	7.8	9.4
Smith	529	952	7.7	11.1
Van Buren*	503 [268-860]	684	7.2 [4.1-11.7]	12.8
Warren	684	847	8.4	12.2
White	887	892	10.8	14.2
<b>Region Total</b>	<b>563</b>	<b>808</b>	<b>8.4</b>	<b>11.3</b>

\* Fewer than 20 ED visits and/or TennCare asthma cases among boys and/ or girls – results should be interpreted with caution.

## Appendix D

### Regional and County Data by Race

The following table presents detailed regional and county-level data for childhood asthma (ages 1-17) by race. It includes 2002-2006 emergency department visit rates from the Hospital Discharge Data System and 2004-2006 TennCare prevalence rates. Counties with fewer than 20 ED visits and/or 20 TennCare asthma cases among black or white children have been included in the table. However, these counties have been marked with an asterisk and confidence intervals have been added to their ED visit and/or prevalence rates. Because these rates are based on small numbers of cases they should be interpreted with caution. TennCare prevalence data for black children are not presented for those counties with no black children enrolled in TennCare from 2004-2006 (indicated by "--"). For hospital discharge data, the terms "black" and "white" refer to children of any ethnicity. For TennCare data, these terms refer to non-Hispanics only.

**Select asthma burden measures among children aged 1-17 years by region/county and race, Tennessee, 2002-2006**

Region/County	ED Visits (visits per 100,000) (HDDS)		Prevalence (%) (TennCare)	
	Black	White	Black non-Hispanic	White non-Hispanic
<b>Metropolitan Regions/Counties</b>				
Davidson	2,372	665	10.6	8.2
Hamilton	2,052	583	16.4	12.9
Knox	3,631	857	14.9	12.5
Madison	1,718	633	10.4	8.2
Shelby	2,609	508	9.1	7.7
Sullivan	2,070	768	15.4	12.1
<b>East Region</b>				
Anderson	1,471	555	11.6	11.0
Blount	2,561	745	14.2	9.8
Campbell*	1,613 [439-4,130]	1,109	6.1 [1.3-17.9]	11.7
Claiborne*	1,007 [208-2,942]	431	22.2 [11.5-38.8]	16.3
Cocke	2,089	1,115	19.6	14.0
Grainger*	6,849 [2,224-15,984]	688	26.7 [7.3-68.3]	11.6
Hamblen	2,052	763	17.7	12.2
Jefferson	1,643	1,008	14.4	12.4
Loudon*	1,990 [1,137-3,232]	992	13.3 [7.6-21.7]	11.6
Monroe	2,022	650	14.5	10.5
Morgan*	8,989 [3,881-17,711]	1,032	20.0 [2.4-72.2]	11.1
Roane	3,568	857	17.7	12.9
Scott*	1,515 [38-8,442]	1,261	0 [0-100.0]	15.1
Sevier*	3,936	995	13.1 [7.5-21.3]	11.6
Union*	0 [0-11,178]	866	25.0 [0.6-100.0]	12.1
<b>Region Total</b>	<b>2,233</b>	<b>844</b>	<b>14.9</b>	<b>12.1</b>

Select asthma burden measures among children aged 1-17 years by region/county and race, Tennessee, 2002-2006 *cont.*

Region/County	ED Visits (visits per 100,000) (HDDS)		Prevalence (%) (TennCare)	
	Black	White	Black non-Hispanic	White non-Hispanic
<b>Mid-Cumberland Region</b>				
Cheatham*	2,419 [1,354-3,990]	743	13.4 [7.1-22.9]	11.5
Dickson	2,876	805	15.9	10.5
Houston*	771 [159-2,254]	860	12.0 [4.4-26.1]	8.4
Humphreys*	1,394 [720-2,435]	473	11.5 [5.3-21.9]	11.3
Montgomery	929	223	10.9	9.0
Robertson	2,793	830	20.3	10.8
Rutherford	1,800	523	10.5	9.1
Stewart*	5,000 [2,858-8,120]	272	12.6 [6.5-22.1]	8.7
Sumner	2,516	595	12.2	8.9
Trousdale*	1,847 [1,034-3,047]	1,019	12.2 [6.3-21.4]	8.3
Williamson	1,553	356	11.5	7.5
Wilson	1,477	327	11.7	9.1
<b>Region Total</b>	<b>1,586</b>	<b>489</b>	<b>11.8</b>	<b>9.4</b>
<b>Northeast Region</b>				
Carter*	383 [79-1,118]	545	15.3 [9.2-23.9]	16.4
Greene	1,299	679	19.9	18.3
Hancock	0 [0-5,950]	699	0 [0-100.0]	10.7
Hawkins*	1,242 [661-2,123]	571	10.1 [5.2-17.6]	12.1
Johnson*	0 [3,581]	452	8.3 [0.2-46.4]	11.7
Unicoi*	0 [0-5,950]	798	11.1 [0.3-61.9]	9.8
Washington	1,690	571	16.6	13.1
<b>Region Total</b>	<b>1,414</b>	<b>597</b>	<b>16.4</b>	<b>14.1</b>
<b>Northwest Region</b>				
Benton*	2,906 [1,693-4,653]	385	5.8 [2.3-12.0]	9.3
Carroll	1,647	753	12.3	7.9
Crockett	1,633	677	8.4	9.1
Dyer	1,576	738	10.0	7.6
Gibson	2,546	801	11.6	8.6
Henry	752	327	11.5	9.1
Lake*	988 [576-1,582]	761	10.0	9.3
Obion	1,829	465	11.2	6.4
Weakley	1,267	562	14.7	8.5
<b>Region Total</b>	<b>1,821</b>	<b>611</b>	<b>11.1</b>	<b>8.3</b>
<b>South Central Region</b>				
Bedford	1,646	661	14.3	11.1
Coffee	2,314	757	11.1	10.3
Giles	1,096	538	13.0	9.4
Hickman*	542 [112-1,585]	879	9.0 [3.6-18.5]	9.4
Lawrence*	1,102 [569-1,925]	572	13.3	10.1
Lewis*	313 [8-1,741]	273	13.5 [4.4-31.5]	9.4
Lincoln	1,776	762	13.3	9.9
Marshall	1,577	844	11.1	8.7
Maury	2,005	614	14.9	10.8
Moore*	2,400 [495-7,014]	226 [124-380]	22.2 [2.7-80.3]	12.6
Perry*	549 [14-3,061]	691	18.6 [8.0-36.7]	6.6
Wayne*	1,569 [427-4,016]	565	6.8 [1.4-19.9]	8.2
<b>Region Total</b>	<b>1,738</b>	<b>659</b>	<b>13.7</b>	<b>10.0</b>



Select asthma burden measures among children aged 1-17 years by region/county and race, Tennessee, 2002-2006 *cont.*

Region/County	ED Visits (visits per 100,000) (HDDS)		Prevalence (%) (TennCare)	
	Black	White	Black non-Hispanic	White non-Hispanic
<b>Southeast Region</b>				
Bledsoe*	1,010 [328-2,357]	759	24.0 [8.8-52.2]	9.6
Bradley	962	515	9.2	8.5
Franklin	1,305	533	12.7	10.1
Grundy*	0 [0-16,039]	559	33.3 [4.0-120.4]	9.7
Marion	1,494	779	13.9	11.2
McMinn	1,372	600	12.4	11.5
Meigs*	680 [17-3,790]	837	6.7 [0.2-37.1]	10.5
Polk	0 [0-6,960]	566	0 [0-46.1]	9.2
Rhea*	1,145 [592-2,000]	933	15.1 [9.1-23.5]	10.3
Sequatchie	0 [0-12,296]	788	--	11.3
<b>Region Total</b>	<b>1,176</b>	<b>636</b>	<b>11.5</b>	<b>10.0</b>
<b>Southwest Region</b>				
Chester*	748 [435-1,197]	510	7.1	8.2
Decatur*	2,337 [1,278-3,921]	618	7.2 [2.4-16.9]	6.9
Fayette	1,642	569	12.2	10.6
Hardeman	2,962	962	15.0	9.1
Hardin	1,885	606	12.0	10.4
Haywood	1,327	1,710	8.0	6.3
Henderson	1,059	612	8.4	7.0
Lauderdale	1,741	1,019	10.2	9.3
McNairy	1,535	704	9.6	8.9
Tipton	2,465	685	8.8	8.2
<b>Region Total</b>	<b>1,967</b>	<b>733</b>	<b>10.4</b>	<b>8.6</b>
<b>Upper-Cumberland Region</b>				
Cannon*	459 [12-2,556]	700	14.3 [2.9-41.7]	8.8
Clay*	532 [13-2,964]	377	4.5 [0.1-25.3]	7.5
Cumberland*	1,408 [171-5,088]	761	17.2 [5.6-40.2]	10.7
Dekalb*	277 [7-1,543]	688	14.0 [5.1-30.4]	8.3
Fentress*	0 [0-14,188]	904	50.0 [6.1-100.0]	11.5
Jackson	0 [0-12,720]	465	0 [0-100.0]	10.3
Macon*	0 [0-5,123]	547	7.1 [0.2-39.8]	9.4
Overton*	1,111 [28-6,191]	470	0 [0-52.7]	9.5
Pickett*	0 [0-20,494]	106 [34-247]	--	7.3
Putnam	1,674	596	9.8	8.9
Smith*	3,004	642	19.0 [10.9-30.9]	9.0
Van Buren	0 [0-100,000]	585	0 [0-100.0]	9.5
Warren*	999 [592-1,580]	728	16.7	10.3
White*	998 [366-2,173]	873	19.8 [11.3-32.1]	12.5
<b>Region Total</b>	<b>1,324</b>	<b>660</b>	<b>14.3</b>	<b>9.9</b>

\* Fewer than 20 ED visits and/or TennCare asthma cases among black and/or white children – results should be interpreted with caution.

# Appendix E

## County Childhood Asthma Burden Scores

Childhood asthma burden scores and rankings for 95 Tennessee counties, 2002-2006

County	Individual Measurement Scores					Total Score	Rank
	Prevalence	Inpatient Hospitalizations	ED Visits	Inpatient Case Ratio	ED Visit Case Ratio		
Anderson	7.6	-8.2	-22.3	-4.1	-6.5	-8.7	36
Bedford	4.2	26.8	-1.7	54.1	6.9	14.5	73
Benton	-14.3	-34.3	-41.0	-30.0	-42.2	-32.7	6
Bledsoe	-7.5	-23.6	-2.6	-6.3	16.1	-8.4	37
Blount	-2.4	-4.9	0.4	1.0	20.9	0.4	54
Bradley	-19.3	-29.8	-27.1	-9.2	2.6	-21.6	20
Campbell	12.7	43.0	39.9	22.3	10.4	30.7	87
Cannon	-13.5	-14.7	-10.9	8.4	32.9	-6.2	41
Carroll	-18.1	7.2	16.3	-6.2	12.9	4.1	61
Carter	41.0	-46.3	-26.1	-65.5	-39.3	-24.0	15
Cheatham	9.6	-49.6	-3.0	-53.9	19.9	-17.2	26
Chester	-23.1	-29.1	-32.6	-49.0	-23.4	-30.4	8
Claiborne	41.0	-2.8	1.7	34.1	-34.0	7.9	65
Clay	-29.7	-48.5	-53.1	15.1	56.3	-29.3	10
Cocke	34.3	45.1	44.2	-7.6	2.3	33.1	89
Coffee	-2.6	48.7	20.0	35.6	26.2	26.3	83
Crockett	-20.8	28.3	1.4	-5.0	19.5	6.2	63
Cumberland	2.5	66.2	-4.9	63.3	-14.2	23.8	81
Davidson	-13.3	-10.0	70.2	9.9	65.0	22.9	80
Decatur	-34.5	-6.6	-12.9	52.0	-13.1	-8.9	35
Dekalb	-19.5	0.5	-13.5	-2.7	-16.5	-9.7	34
Dickson	4.7	-58.4	17.3	-54.3	7.2	-16.1	29
Dyer	-18.2	97.9	10.9	47.9	11.5	34.9	90
Fayette	9.6	-23.0	23.3	-16.8	52.9	5.6	62
Fentress	8.6	97.9	15.5	71.0	-27.4	40.1	92
Franklin	-2.3	-40.2	-25.6	-26.6	-20.0	-24.9	14
Gibson	-6.8	28.2	54.1	59.5	36.0	32.9	88
Giles	-3.6	49.0	-22.1	37.7	-3.2	10.8	67
Grainger	12.8	12.0	-9.8	-42.0	-33.7	-4.4	45
Greene	41.0	19.6	-12.9	-36.1	-43.2	2.3	59
Grundy	-7.6	-43.1	-30.5	-32.4	-54.9	-32.3	7
Hamblen	16.7	2.8	3.2	-42.8	-34.0	-2.5	47
Hamilton	35.4	-55.1	23.0	-35.5	-1.9	-6.3	39
Hancock	1.2	7.7	-5.6	-39.0	22.2	-0.8	51
Hardeman	22.1	97.9	74.1	81.2	40.7	68.2	95
Hardin	-0.2	-1.0	-12.1	22.5	-5.5	-2.3	48
Hawkins	14.9	-30.5	-26.8	-30.2	-33.2	-20.5	23
Haywood	-24.5	2.8	74.1	34.7	61.5	27.8	84
Henderson	-29.0	-31.2	-18.2	-7.7	24.8	-18.9	24
Henry	-8.5	46.8	-50.7	0.4	-46.6	-7.5	38
Hickman	-8.5	-25.8	9.4	-34.5	-4.6	-10.5	33
Houston	-17.1	-40.6	27.0	-33.6	45.6	-6.3	39
Humphreys	11.5	-31.9	-35.5	12.3	-51.8	-21.9	18
Jackson	-1.0	-39.6	-42.8	-36.6	-13.8	-29.9	9
Jefferson	19.9	13.9	26.9	-35.5	-8.4	11.8	68
Johnson	12.7	-48.5	-16.4	-29.9	-19.8	-21.9	18
Knox	23.8	33.7	48.9	25.4	41.2	36.2	91

**Childhood asthma burden scores and rankings for 95 Tennessee counties, 2002-2006 cont.**

County	Individual Measurement Scores					Total Score	Rank
	Prevalence	Inpatient Hospitalizations	ED Visits	Inpatient Case Ratio	ED Visit Case Ratio		
Lake	-7.6	28.5	3.3	24.5	18.8	12.4	71
Lauderdale	-5.2	79.7	68.0	31.1	56.7	52.1	93
Lawrence	-2.0	44.6	-26.8	-9.9	-31.0	0.9	56
Lewis	-9.3	-14.7	-66.2	58.6	-58.1	-26.1	13
Lincoln	-2.3	-11.5	5.8	1.4	4.1	-1.6	49
Loudon	7.9	-4.4	24.7	-25.5	15.2	6.6	64
Macon	-10.3	77.4	-32.0	81.2	7.2	20.4	78
Madison	-9.2	-0.9	35.2	9.7	34.7	12.9	72
Marion	7.7	-66.0	1.4	-36.9	-9.8	-22.5	17
Marshall	-14.6	-12.9	15.2	12.6	8.0	-0.2	53
Maury	12.2	72.8	7.6	28.4	-12.1	28.2	85
McMinn	11.9	-26.4	-19.8	-19.0	-31.9	-16.6	27
McNairy	-14.3	1.3	-3.4	-3.9	-12.3	-5.1	42
Meigs	-0.2	-12.4	7.0	-81.4	-44.0	-14.2	32
Monroe	2.8	-38.0	-15.3	-41.0	-18.6	-21.4	21
Montgomery	-6.9	-14.8	-35.0	-4.4	-17.0	-18.4	25
Moore	25.9	-89.2	-66.7	-56.2	-24.9	-49.7	2
Morgan	6.4	40.0	36.9	-14.2	-21.9	20.7	79
Obion	-28.6	22.2	-4.7	81.2	46.0	12.3	69
Overton	-8.6	-42.9	-41.1	-17.6	7.3	-27.9	12
Perry	-30.3	12.2	-15.4	81.2	1.2	1.2	57
Pickett	-28.1	-71.4	-74.1	-55.3	-48.8	-59.7	1
Polk	-10.4	27.2	-29.8	-1.6	-20.6	-5.1	42
Putnam	-18.8	-19.8	-19.6	-41.6	-11.3	-20.9	22
Rhea	-3.6	-53.7	16.1	-17.1	-7.4	-14.5	31
Roane	25.3	25.6	18.0	-8.0	-12.9	16.0	76
Robertson	41.0	35.8	28.4	-8.1	-12.4	25.4	82
Rutherford	-11.6	-39.3	-15.2	0.2	21.9	-16.5	28
Scott	41.0	22.7	56.9	-35.6	-0.1	28.5	86
Sequatchie	7.9	-90.3	-2.9	-70.7	-16.1	-35.1	5
Sevier	11.4	-11.1	26.3	-23.6	-11.6	3.3	60
Shelby	-16.2	97.9	74.1	81.2	61.5	62.6	94
Smith	-10.8	-23.5	-6.6	46.4	36.1	-3.0	46
Stewart	-16.5	-51.9	-48.4	-43.7	-43.6	-42.1	3
Sullivan	17.5	13.1	2.8	-2.1	-0.3	8.0	66
Sumner	-11.0	-6.9	-6.3	33.7	14.4	-1.4	50
Tipton	-17.7	11.8	37.5	24.6	43.4	18.0	77
Trousdale	-18.6	5.5	36.0	-3.0	38.8	12.3	69
Unicoi	-9.1	-23.2	33.3	-11.3	-3.6	-0.3	52
Union	18.5	8.8	13.7	33.8	6.7	14.5	73
Van Buren	-6.0	-27.8	-25.5	-54.2	-8.4	-23.4	16
Warren	-2.8	-35.9	-4.9	-23.1	-8.2	-15.9	30
Washington	26.2	-13.3	-16.2	11.0	-19.3	-4.5	44
Wayne	-20.3	67.2	-27.7	81.2	-14.1	14.5	73
Weakley	-10.9	31.9	-21.8	22.2	-8.8	2.2	58
White	18.6	-9.0	10.3	-23.1	-10.6	0.7	55
Williamson	-26.0	-76.3	-45.8	-11.7	45.3	-38.5	4
Wilson	-12.3	-35.6	-47.3	13.4	-20.9	-28.1	11

# Technical Notes

## DATA SOURCES

**National Survey of Children's Health (NSCH):** The NSCH is a module of the State and Local Area Integrated Telephone Survey, conducted by the National Center for Health Statistics. The survey is administered to a random-digit-dialed sample of households with children less than 18 years of age – one child is randomly selected from all children in each identified household to be the subject of the survey. The respondent is the parent or guardian who knows the most about the child's health and health care. The questions used by NSCH to determine asthma prevalence are as follow: "Has a doctor or health professional ever told you that [child's name] has asthma?" and "Does [child's name] currently have asthma?" Lifetime asthma is defined as a positive response to the first question, while current asthma is defined as a positive response to both questions. NSCH data were obtained from the NSCH website (<http://www.nschdata.org>).

**Hospital Discharge Data System (HDDS):** The HDDS is an annual state-based compilation of data on patients discharged from all acute care hospitals licensed by the Tennessee Department of Health. The HDDS does not include federal facilities (i.e., VA hospitals, etc.) or facilities licensed by the Tennessee Department of Mental Health and Developmental Disabilities. The analyses were limited to the records of Tennessee residents. Asthma diagnoses were identified using all ICD9-CM codes beginning with 493. For HDDS data, the terms "white" and "black" refer to persons of any ethnicity and the terms "Hispanic" and "non-Hispanic" refer to ethnicity regardless of race. Hospital charges were adjusted to 2006 dollars to account for inflation. Diagnosis of asthma is often difficult in children less than 5 years of age, especially among infants less than 1 year. For this reason analyses were limited to children 1-17 years of age.

**TennCare Billing Data (TennCare):** TennCare data include both enrollment and claims data. Enrollment data contain information such as coverage period and demographic characteristics of all beneficiaries. Claims data contain claims for services provided by professionals (physician services, ambulance services, and durable medical equipment) and institutions (inpatient and outpatient hospital services). The number of enrollees, which was used as the denominator for rate calculations, was determined as the number of unique recipients who were enrolled in TennCare at any time during specific data year(s). The age of each enrollee was calculated as of December 31<sup>st</sup> of that data year, or the earliest data year when multiple years are involved. Asthma diagnoses were identified using all ICD9-CM codes beginning with 493. For TennCare data, the terms "white" and "black" refer to persons of non-Hispanic origin and the term "Hispanic" refers to ethnicity regardless of race. As with HDDS data, analyses were limited to children 1-17 years of age.

## STATISTICAL INFERENCE

For HDDS and TennCare data, trends were analyzed using linear regression and were statistically significant ( $p$ -value < 0.05) unless otherwise indicated in the text. Comparisons between groups (e.g. male vs. female) were considered significant if confidence intervals did not overlap. Confidence intervals for state-level data are based on the normal approximation, while those for regional and county-level data are exact Poisson. Exact Poisson confidence intervals were calculated using the Excel VBA functions developed by John C. Pezzullo PhD (Georgetown University), and freely available from the StatPages.org web site.<sup>4</sup>

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