



Childhood Asthma in Tennessee 2003 - 2012

Division of Policy, Planning and Assessment
January 2015

TENNESSEE DEPARTMENT OF HEALTH ORGANIZATION

John J Dreyzehner, MD, MPH, FACOEM, Commissioner

Bruce Behringer, MPH, Deputy Commissioner for Continuous Improvement and Training

David Reagan, MD, PhD, Chief Medical Officer

Lori Ferranti, PhD, MBA, MSN, Assistant Commissioner, Division of Policy, Planning and Assessment

The mission of the Tennessee Department of Health is to protect, promote and improve the health and prosperity of people in Tennessee

Tennessee Department of Health
Division of Policy, Planning and Assessment

The authors would like to thank the Tennessee Bureau of TennCare for providing TennCare data.

Report prepared by:

Generosa Kakoti, PhD, MA and Hosneara Dewan, Ed.S, MSPS, MS, M.Ed

Suggested Citation:

Kakoti G. and Dewan H. (2015). Childhood Asthma in Tennessee, 2003-2012. Division of Policy, Planning & Assessment, Tennessee Department of Health, Nashville, Tennessee.



Department of Health. Authorization No. 343336, 01/15. Website only.

Table of Contents

Key Findings	1
Introduction	2
<i>Prevalence</i>	
Asthma Prevalence	6
Asthma and Smoking	9
<i>Health Care Utilization and Cost</i>	
Inpatient Hospitalizations for Asthma	11
Emergency Department Visits for Asthma	16
Hospital Charges for Asthma	20
<i>Asthma among TennCare Enrollees</i>	
Asthma Prevalence	24
Summary	27
Technical Notes	28
References	30
<i>Appendices</i>	
Appendix A – Regional and County Hospital Discharge Data	32
Appendix B – Regional and County Data: Charges, Race and Gender	37
Appendix C – Regional and County TennCare Data	42

Key Findings

Asthma Prevalence

- Prevalence of current asthma among Tennessee children was 11.5 percent in 2011.
- Lifetime asthma prevalence was higher among boys than among girls.
- Asthma prevalence was higher among black non-Hispanics than among white non-Hispanics.
- Asthma prevalence increased with age.
- In Tennessee the percent of children who lived in households where someone uses tobacco was 32.7 percent compared to 24.1 percent nationally.
- Among children with public insurance 47.3 percent were reported to live in households where someone smokes compared to 21.0 percent of those with private health insurance.
- The percentage of mothers who smoked during pregnancy in Tennessee in 2012 was 16.3 percent.

Health Care Utilization and Cost

- Annually from 2003 to 2012, there were approximately 1,900 inpatient hospitalizations and 14,530 emergency department visits for asthma among children in Tennessee.
- Between 2003 and 2012 inpatient hospitalizations for asthma decreased 27.7 percent while emergency department visits increased 12.5 percent.
- The annual inpatient hospitalization rate for primary asthma averaged 140 per 100,000 children between 2003 and 2012. The annual emergency department visit rate for asthma averaged 1,057 visits per 100,000 children.
- Boys had higher inpatient hospitalization and emergency department visit rates compared to girls.
- Black children had higher inpatient hospitalization and emergency department visit rates than white children.
- Shelby health region had the highest inpatient hospitalization rate and emergency department visit rate among Tennessee Health Department regions.[#]
- In 2012 total hospital charges for childhood asthma in Tennessee were \$53.7 million.
- Per visit charges for both inpatient and outpatient hospitalizations increased over 100 percent between 2003 and 2012.
- The per visit inpatient hospitalization charges averaged \$9,950 between 2003 and 2012 while the per visit outpatient hospitalization charges averaged \$1,427.

Asthma Among TennCare Enrollees

- The prevalence of asthma among children enrolled in TennCare was 13.7 percent between 2010 and 2012.
- Asthma prevalence was highest among children 1-4 years old.
- Among the 14 Tennessee Health Department regions, Hamilton region had the highest prevalence rate for asthma among TennCare children enrollees.[#]

[#]Fourteen regions designated by the Tennessee Department of Health include eight rural and six metropolitan regions. For a map of the regions, please visit: http://hit.state.tn.us/inmap/print_inmap.htm. See Appendix A for detailed Health Department region grouping.

Introduction

Asthma is a common chronic illness for children in the United States (US). In the last decade alone, the proportion of individuals with asthma in the US has grown by almost 15 percent. In 2012, 1 in 11 children had asthma, equaling 7 million children nationwide. In 2009 asthma was responsible for approximately 479,300 hospitalizations, 1.9 million emergency department visits and almost 9 million doctor visits. The average annual cost for care of a child with asthma was \$1,039. Asthma was also responsible for over 10 million missed days of school and 14 million missed days of work in 2008.¹

The Tennessee Department of Health's "*The Burden of Asthma in Tennessee*" was the initial report in Tennessee detailing the impact of asthma within the state by examining asthma prevalence, healthcare utilization, and mortality. It also provided information on health disparities in the asthma population.²

In 2012 the Tennessee Department of Health published "*The Burden of Asthma in Tennessee 2001-2010*" updating asthma data. Key findings from this report indicate that between the years 2001 and 2010 asthma inpatient hospitalizations for children decreased. Emergency department visits for children decreased with increasing age. In 2010 the prevalence of asthma among Tennessee children was 9.5 percent.³

This current document contains data for the years 2003 to 2012 and is a supplement to the childhood asthma information provided in the previous burden reports. It provides data on prevalence, healthcare use and costs related to childhood asthma, and asthma among TennCare enrollees aged 1 to 17 years. The information provided in this report and previous asthma burden reports may advise and assist childhood asthma management efforts in Tennessee.

Introduction

What is Asthma?

Asthma is a chronic disease of the lungs. Inflammation of the sensitive airways makes it harder to breathe. During an asthma episode, a trigger causes the airways of the lungs to narrow or become blocked. Air can't get into the lungs and breathing becomes very difficult. Attacks can be mild, moderate, or even life threatening.^{1, 4}

During an asthma attack a person with asthma may cough, wheeze, have trouble breathing, or feel chest pains. The individual may require emergency treatment in order to regain normalcy.⁴

In An Asthma Attack⁴:

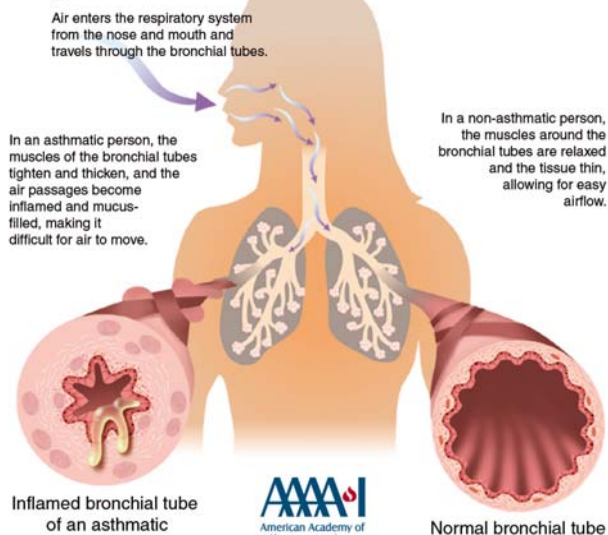
- The airway's lining swells and becomes further inflamed.
- Mucous clogs the airways.
- Muscles tighten around the airways.
- These changes narrow the airways until breathing becomes difficult and stressful.
- Breathing is like "trying to breathe through a straw stuffed with cotton."

Who is at Greatest Risk for Asthma?⁵

Children: Asthma is twice as common among children as adults.
Minorities: African Americans have the highest death rates of all groups.

Risk factors for developing childhood asthma include allergies, family history of allergies and/or asthma, frequent respiratory infections, low birth weight, second-hand smoke before and/or after birth, and growing up in a low income, urban environment.

Why asthma makes it hard to breathe



Revised 2010

Introduction

What Triggers an Asthma Attack?^{1,4}

Inflammatory factors, irritants, environment or other triggers like feelings of excitement, fear, anger and sadness can be to blame. Common asthma triggers include dust, tobacco smoke, air pollution outside, cockroaches and droppings, pet dander, mold, exercise, some foods, weather conditions and respiratory infections.

How is Asthma Treated and Controlled?⁶

There are several different kinds of medications that can be used to treat and control asthma. These medications are either for use every day to decrease the frequency of bad asthma attacks or as needed by an inhaler to provide “QUICK HELP” for those suffering the onset of an asthma attack. Parents of children with asthma are encouraged to work with their child’s physician or healthcare provider to create a plan that helps control asthma. A good plan will reduce the frequency of attacks, reduce wheezing and coughing, enable better sleep, reduce missed school days and reduce hospitalizations for asthma related attacks.

Asthma Attack Prevalence^{7,8,9}

In the U.S. asthma attacks are reported more frequently in children with asthma than in adults with asthma. Children aged 0 to 4 years and those aged 5 to 11 years are more likely to have asthma attacks than those aged 12 to 17 years.

In 2012, 55.2 percent of children under 18 years with current asthma in the U.S., reported an asthma attack over the past year. Children 0 to 4 years of age had a higher asthma attack prevalence rate of 60.8 percent when compared with children aged 5 to 14 years (56.3 percent).

Nationally the asthma attack prevalence rate for boys was 60.1 percent and 49.3 percent for girls in 2012. Boys aged 0 to 4 years had the highest prevalence rate of 65.2 percent.

Nationwide the white non-Hispanic asthma attack prevalence rate in children was similar to the black non-Hispanic rate at 58.3 percent and 56.1 percent respectively. The prevalence rate for Hispanic children was lower at 50.9 percent.

Introduction

Asthma in Schools^{1, 10}

The economic costs of childhood asthma include those related to school absences:

- Nearly one in two children miss at least one day of school each year because of their asthma.
- Nearly three in five people with asthma limit their usual activities because of their asthma.
- Parents' loss of productivity to care for asthma related absences for their children.

The implementation of school health programs that aim at improving the health of children with asthma may ultimately assist in reducing their school absences.

Asthma-friendly schools provide support and assistance to children with asthma and their families. This support may be in the form of education programs for students, families and school staff. It may include the provision of a safe and healthy school environment, school services that provide assistance with medication and the provision of appropriate physical education and activities for children with asthma.

The School Health Profiles (Profiles) is a system of surveys that assesses school health policies and practices nationwide. Asthma management activities are among the monitored health policies and activities surveyed.

Findings from Profiles for 2012 include:

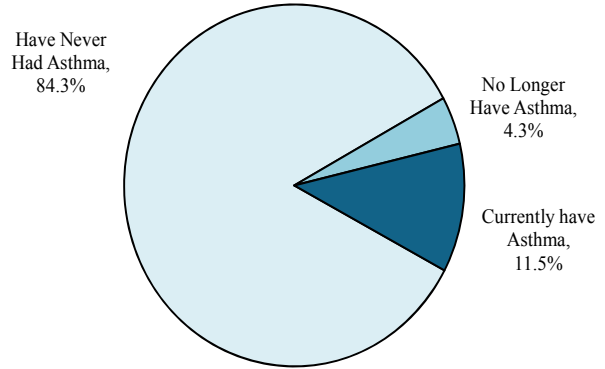
- 67.6 percent of Tennessee schools had an asthma action plan on file for all students with known asthma compared to the US median of 61.0 percent.
- 63.3 percent of Tennessee schools had a fully implemented policy permitting students to carry and self-administer asthma medications by communicating the policy to students, parents, and families, and by designating an individual responsible for implementing the policy compared to the national median of 53.5 percent.
- 48.9 percent of Tennessee schools identified students with poorly controlled asthma by keeping track of them in at least 3 different ways compared to the national median of 52.7 percent.
- 37.9 percent of Tennessee schools provided parents and families with health information to increase parent and family knowledge of asthma compared to the national median of 16.2 percent.

Prevalence

Asthma Prevalence

In 2011/2012 the percent of Tennessee children aged 0-17 years, who currently had asthma was 11.5 percent. This was a 21.0 percent increase from 9.5 percent in 2007.*

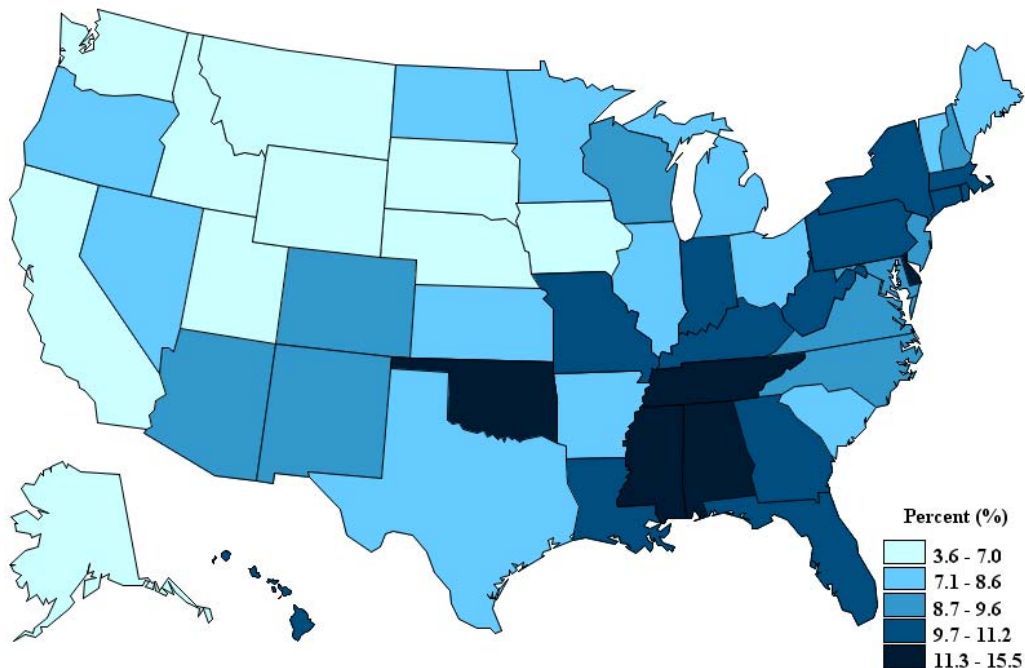
A total of 15.8 percent of Tennessee's children aged 0-17 years were reported to have ever had asthma in 2011/2012. The percent of children with current asthma who had mild asthma was 76.2, while 23.8 percent were reported to have moderate or severe asthma.



Childhood asthma prevalence in Tennessee (NSCH 2011/2012)

In 2011/2012, the current asthma prevalence rate in the nation was 8.8 percent, ranging from Alaska with the lowest rate at 3.6 percent to Delaware with the highest rate at 12.0 percent. Tennessee had the third highest current childhood asthma prevalence rate behind Delaware and Alabama.

The nationwide lifetime asthma prevalence rate was 14.5 percent, ranging from 8.4 percent in South Dakota to 19.7 percent in Delaware. Tennessee had the 15th highest lifetime childhood asthma prevalence rate among the 50 states.



Current childhood asthma prevalence, United States (NSCH 2011/2012)

*For detailed descriptions of current and lifetime asthma please see Technical Notes.

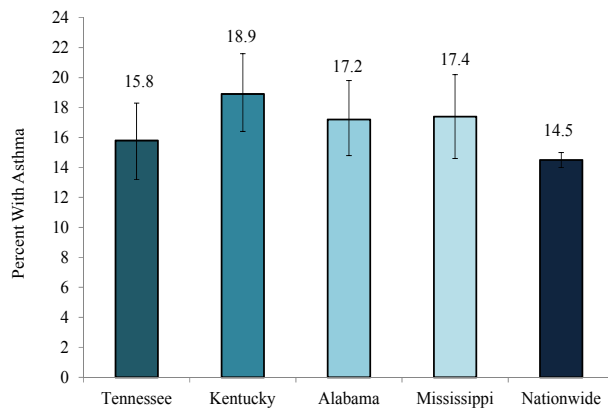
Prevalence

Asthma Prevalence

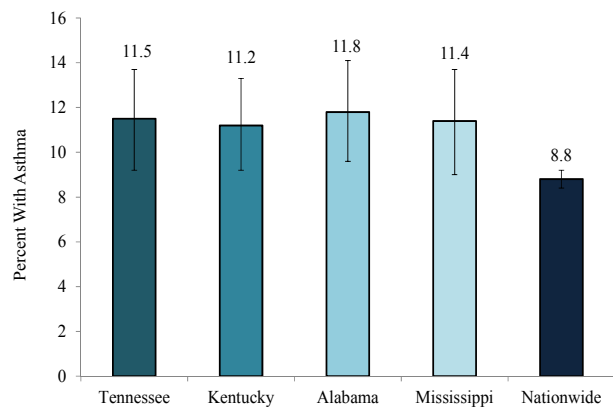
Among the four south-eastern central states, Kentucky had the highest lifetime asthma prevalence. Tennessee had the lowest prevalence of lifetime asthma when compared to the other states. However the difference between the states was not statistically significant.*

Tennessee had the second highest current childhood prevalence after Alabama, while Kentucky had the lowest prevalence.

All of the four south-eastern central states had higher lifetime asthma and current asthma prevalence rates than the national rate. There were no statistically significant differences in lifetime or current asthma prevalence in Tennessee compared to the nationwide prevalence.



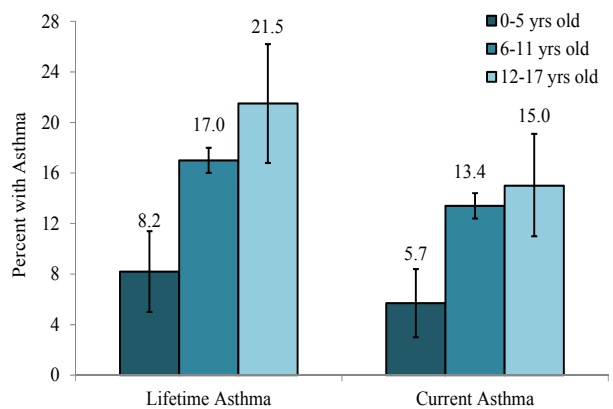
Lifetime asthma prevalence in children, south-eastern central states and the United States (NSCH 2011/2012)



Current asthma prevalence in children, south-eastern central states and the United States (NSCH 2011/2012)

In 2011/2012 childhood asthma prevalence in Tennessee was higher for ages 12 to 17 than for the other age groups. Lifetime asthma prevalence was lowest for the 0 to 5 years old group (8.2 percent), followed by the 6 to 11 years old (17.0 percent), with the 12 to 17 years old group having a prevalence rate of 21.5 percent. Current asthma prevalence was lowest among 0 to 5 year olds at 5.7 percent when compared to other age groups.

The 0 to 5 year olds current asthma prevalence rate in 2011/2012 was lower by 9.5 percent when compared to the rate in 2007 of 6.3 percent. The current prevalence rate rose for ages 6 to 11 years from 10.6 percent in 2007 to 13.4 percent in 2011/2012, and for ages 12 to 17 from 11.4 percent in 2007 to 15.0 percent in 2011/2012.



Lifetime and current asthma prevalence in children, in Tennessee (NSCH 2011/2012)

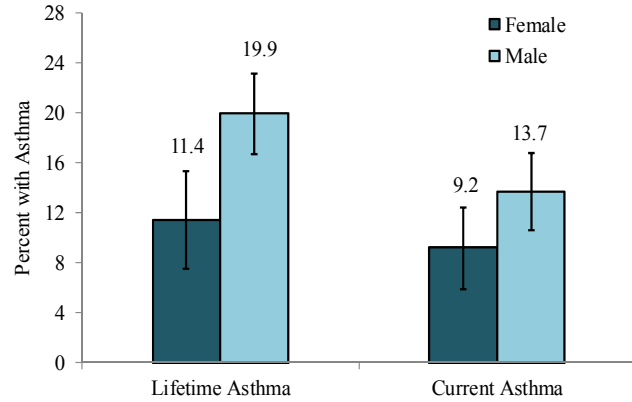
* The absence of any statement regarding the variance between rates or figures does not imply that the difference was tested and found not to be significant.

Prevalence

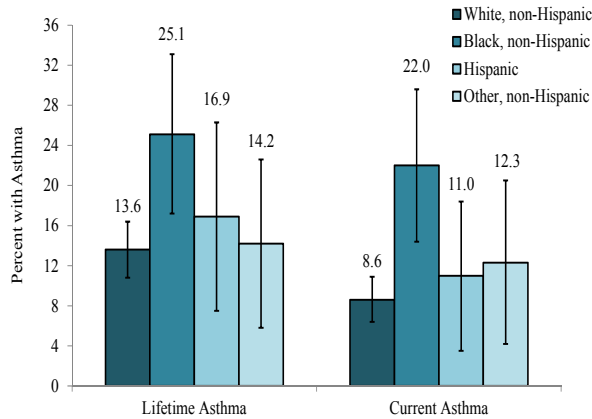
Asthma Prevalence

In 2011/2012 childhood asthma prevalence in Tennessee was higher among boys than among girls. Current asthma prevalence rates were higher in 2011/2012 than in 2007 for both boys and girls.

Current asthma prevalence was 13.7 percent among boys aged 0-17 years compared to 9.2 percent among girls. Lifetime prevalence was 19.9 percent for boys and 11.4 percent for girls. These differences were not statistically significant.



Lifetime and current asthma prevalence in children, by gender, Tennessee (NSCH 2011/2012)



Lifetime and current asthma prevalence in children, by race and Hispanic ethnicity, Tennessee (NSCH 2011/2012)

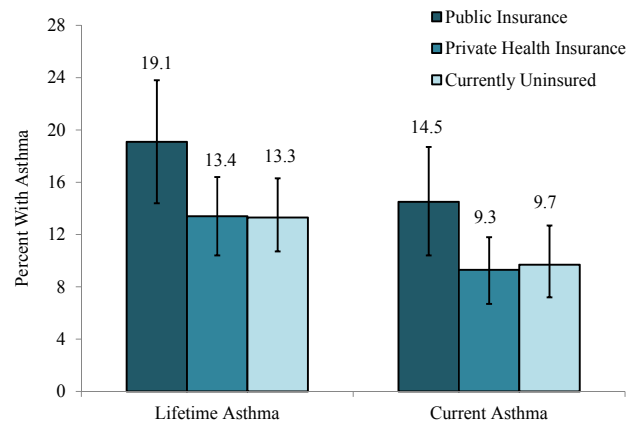
Childhood asthma prevalence was higher among black non-Hispanics than among white non-Hispanics in 2011/2012.

Current asthma prevalence was 22.0 percent for black non-Hispanics compared to 8.6 percent among white non-Hispanics.

Lifetime prevalence rate for black non-Hispanics increased by 55.9 percent, from 16.1 percent in 2007 to 25.1 percent in 2011/2012.

Lifetime childhood asthma prevalence was higher among children with public insurance, such as TennCare, 19.1 percent, compared to 13.4 percent among children with private insurance and 13.3 percent among currently uninsured children.

Current asthma prevalence was 14.5 percent for children with public insurance, 9.7 percent for currently uninsured children, and 9.3 percent for children with private health insurance.



Lifetime and current asthma prevalence in children, by insurance type, Tennessee (NSCH 2011/2012)

However, these differences by insurance type were not statistically significant.

Prevalence

Asthma and Smoking

Smoking in the Household

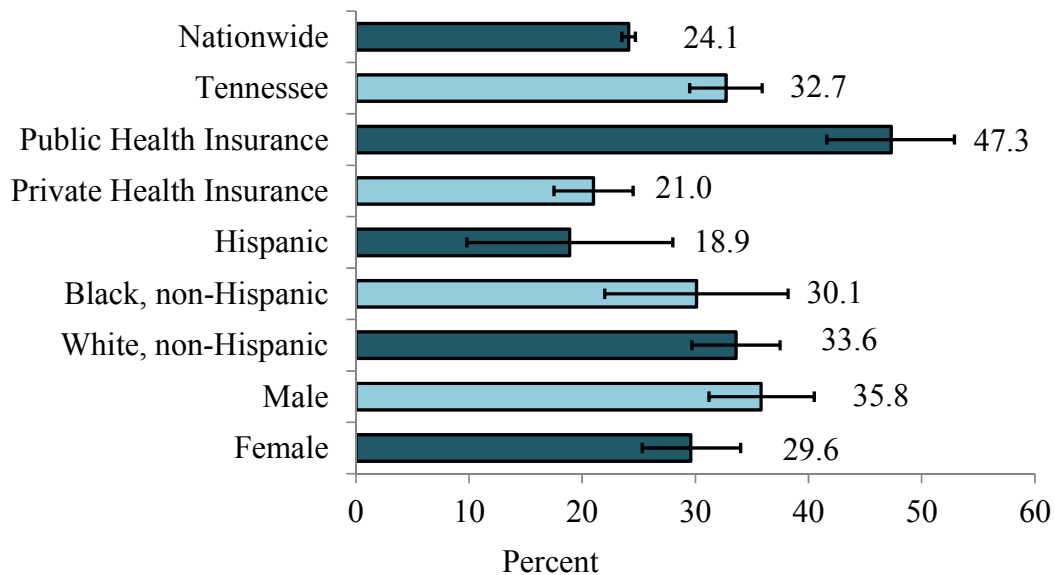
Exposure to secondhand smoke can trigger an asthma attack and worsen existing asthmatic conditions. Children in the household are more exposed to secondhand smoke than other family members.¹¹

A higher percentage of children with asthma in the United States (54.0 percent) were exposed to environmental tobacco smoke when compared to children without asthma (44.2 percent) between 2007 and 2010.¹²

In 2011/2012, the percent of children who lived in households where someone smoked ranged from Utah with the lowest at 12.4 percent to West Virginia with the highest at 41.0 percent. States having the highest “Smoking in the Household” rankings include West Virginia, Kentucky, Louisiana, Mississippi, Tennessee, Ohio, Missouri, Arkansas, Alabama and Indiana.

The percent of children who lived in households where someone used tobacco in Tennessee (32.7 percent) was higher than the nationwide percentage (24.1 percent). Across gender, racial and ethnic groups, there were no statistically significant differences in the percentage of children in Tennessee who had exposure to secondhand smoke inside their homes.

Among children in Tennessee with public insurance, 47.3 percent were reported to live in households where someone smoked, compared to 21.0 percent among children with private health insurance.



Percent of children who live in households where someone smokes, Tennessee (NSCH 2011/2012)

Prevalence

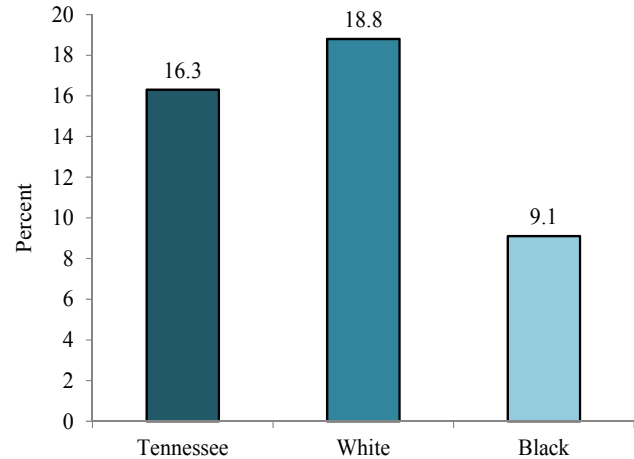
Asthma and Smoking

Smoking during Pregnancy

Smoking during pregnancy or exposure to secondhand smoke during pregnancy affects the lung development of babies. Secondhand smoke exposure also weakens the baby's lungs after birth. The development of asthma in Hispanic and black children is associated with tobacco exposure before birth.^{13, 14}

The percentage of mothers who smoked during pregnancy in Tennessee, in 2012, was 16.3 percent. This was 4.1 percent lower than in 2011 (17.0 percent).

A higher percentage of white mothers (18.8 percent) smoked during pregnancy than black mothers (9.1 percent).



Percent of mothers smoking during pregnancy, Tennessee, 2012 (BSS)

Counties with the highest percent of mothers who smoked during pregnancy included Meigs (41.1 percent), Johnson (38.9 percent), Benton (37.5 percent), Cocke (36.2 percent), Jackson (35.4 percent), Van Buren (35.2 percent), Clay (35.1 percent), Claiborne (34.2 percent), Fentress (33.0 percent) and Humphreys (32.4 percent).

Counties with the lowest percent of smokers during pregnancy included Williamson (4.2 percent), Shelby (7.2 percent), Davidson (8.8 percent), Rutherford (11.4 percent), Hamilton (12.3 percent), Fayette (12.5 percent), Madison (13.0 percent), Montgomery (13.5 percent), Hardeman (14.3 percent) and Moore (14.3 percent).

Asthma Capitals List¹⁵

The Asthma Capitals List compares and ranks the 100 largest U.S. cities on 12 different factors that affect asthma. These factors are grouped into prevalence factors, risk factors and medical factors. They include asthma death rates, air quality, laws, pollen counts, and medical utilization. This list addresses the quality of life and aim's to find the "most challenging places to live with asthma."

Three of Tennessee's cities made the top ten cities list on the Asthma Capitals List for 2013. Chattanooga and Memphis were second and third respectively. Knoxville was tenth on the list. Nashville ranked thirty-second.

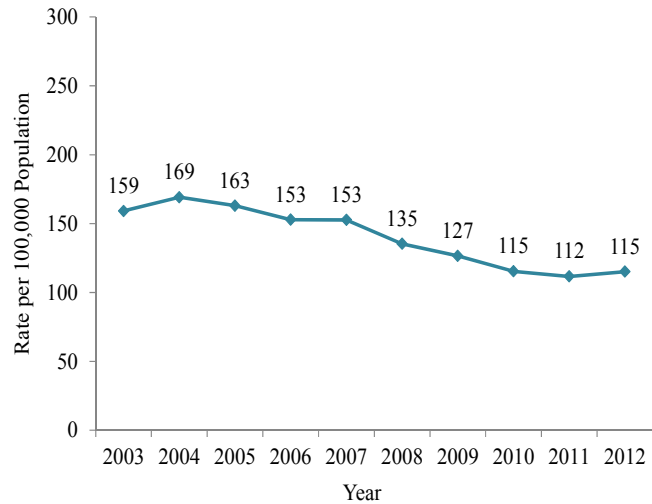
Health Care Utilization and Cost

Inpatient Hospitalizations for Asthma

In 2012 the number of inpatient hospitalizations among children in Tennessee aged 1-17 years for a primary diagnosis of asthma was 1,626. The rate of inpatient hospitalizations for primary asthma was 115 per 100,000 children.

Annually, from 2003 to 2012, there were approximately 1,900 inpatient hospitalizations for a primary diagnosis of asthma for children aged 1 to 17 years.

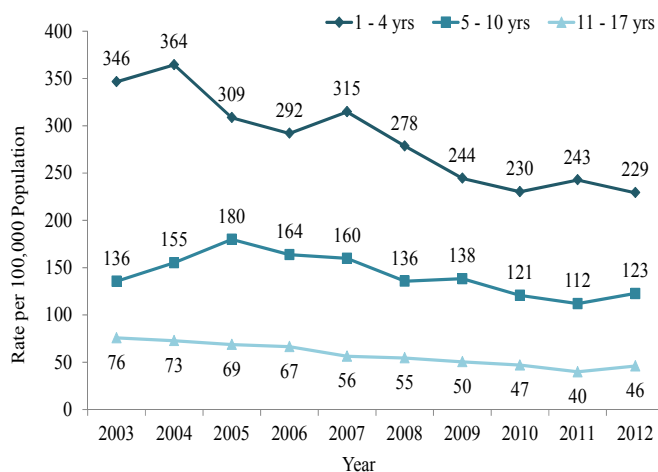
Between 2003 and 2012 the annual inpatient hospitalization rate for primary asthma for 1-17 year olds averaged 140 per 100,000 children. There was a 27.7 percent decrease in the asthma hospitalization rate from 159 per 100,000 children in 2003 to 115 per 100,000 children in 2012.



Inpatient hospitalization rate for primary asthma, 1-17 year olds, Tennessee, 2003-2012 (HDDS)

The inpatient hospitalization rate for primary asthma for children aged 1-4 years in Tennessee between 2003 and 2012 decreased by 33.8 percent, from 346 per 100,000 population to 229 per 100,000 population. The annual hospitalization rate averaged 285 per 100,000 children.

The inpatient hospitalization rate for children aged 5-10 years decreased by 9.6 percent, from 136 per 100,000 population in 2003 to 123 per 100,000 population in 2012. The annual hospitalization rate from 2003 to 2012 averaged 142 per 100,000 children.



Inpatient hospitalization rate for primary asthma by age, Tennessee, 2003-2012 (HDDS)

Between 2003 and 2012 the inpatient hospitalization rate for children aged 11-17 years decreased by 39.5 percent, from 76 per 100,000 population to 46 per 100,000 population. The annual hospitalization rate was on average 58 per 100,000 children.

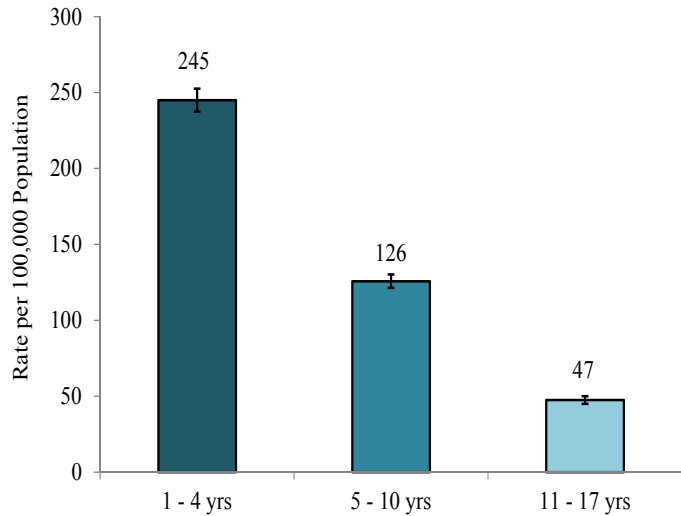
Health Care Utilization and Cost

Inpatient Hospitalizations for Asthma cont.

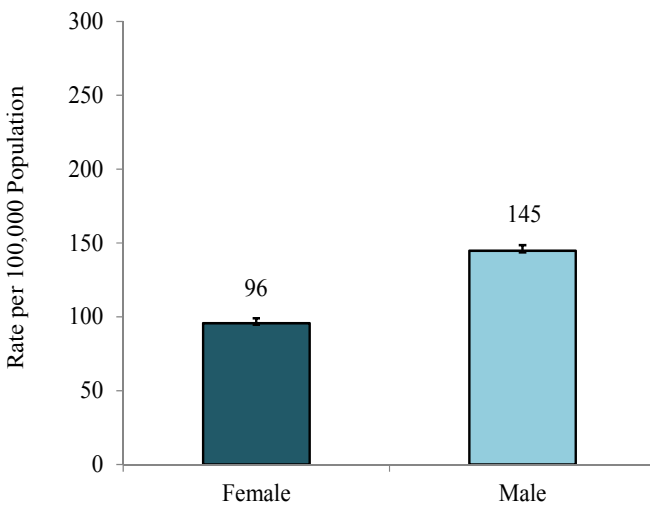
The average inpatient hospitalization rate for primary asthma for 1-17 year olds in Tennessee, between 2008 and 2012, decreased with increasing age.

Children aged 1-4 years had the highest inpatient hospitalization rate for primary asthma, 245 per 100,000 population, compared to 126 per 100,000 population for 5-10 year olds and 47 per 100,000 population for 11-17 year olds.

Forty-seven percent of the total hospital inpatient discharges for a primary diagnosis of asthma, between 2008 and 2012, were for children aged 1-4 years.



Inpatient hospitalization rate for primary asthma by age, 1-17 year olds, Tennessee, 2008-2012 average (HDDS)



Inpatient hospitalization rate for primary asthma by gender, 1-17 year olds, Tennessee, 2008-2012 average (HDDS)

Male children, aged 1 to 17 years, had a higher inpatient hospitalization rate when compared to female children.

The average inpatient hospitalization rate for primary asthma between 2008 and 2012 for boys was 145 per 100,000 population, and 96 per 100,000 population for girls.

Sixty-one percent of the total hospital discharges for a primary diagnosis of asthma, between 2008 and 2012, were for male children.

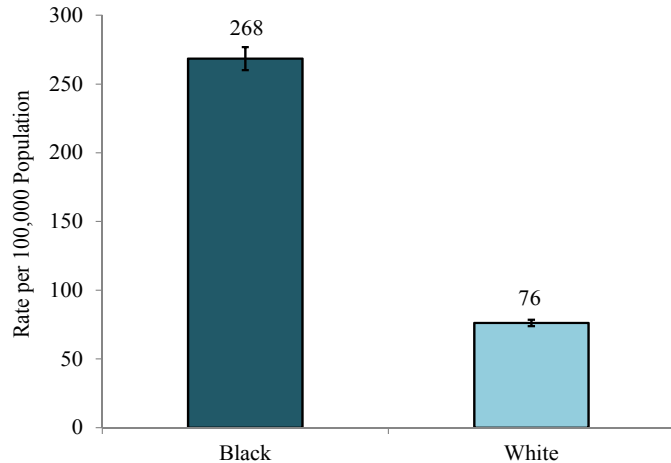
Health Care Utilization and Cost

Inpatient Hospitalizations for Asthma cont.

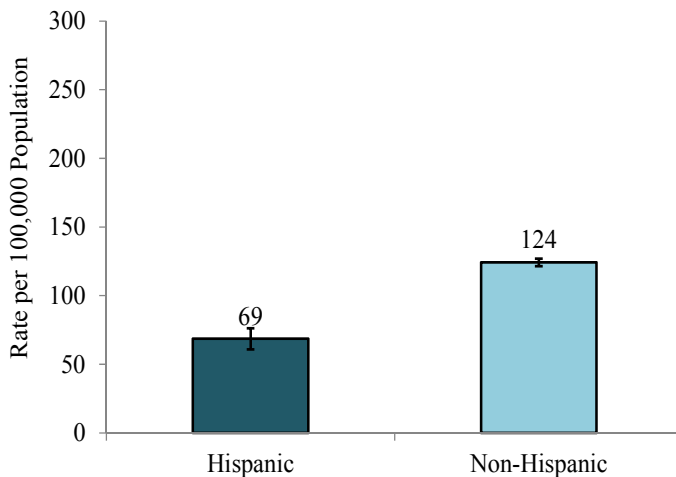
The number of inpatient hospitalizations for primary asthma, between 2008 and 2012, among white children was 3,957 and 3,910 among black children.

Black children had a higher inpatient hospitalization rate when compared to white children. The asthma hospitalization rate among black children was three times higher than the rate among white children.

The average, annual hospitalization rate was 268 per 100,000 among blacks and 76 per 100,000 among whites.



Inpatient hospitalization rate for primary asthma by race, 1-17 year olds, Tennessee, 2008-2012 average (HDDS)



Inpatient hospitalization rate for primary asthma by Hispanic ethnicity, 1-17 year olds, Tennessee, 2008-2012 average (HDDS)

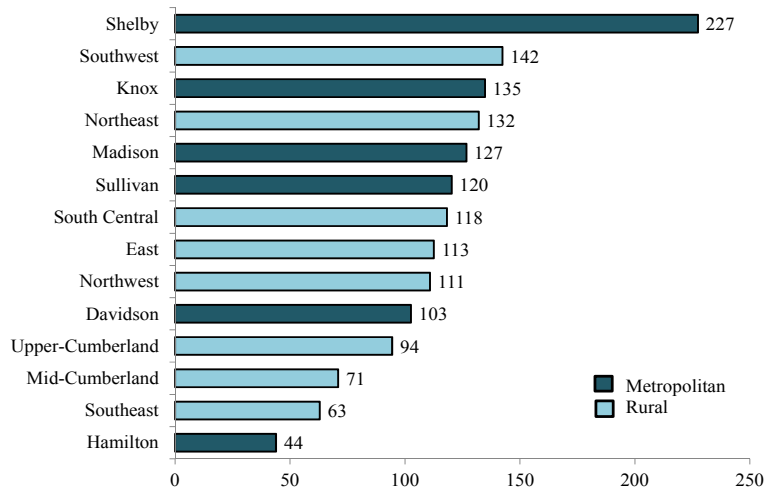
Hispanic children had 305 inpatient hospitalizations for primary asthma between 2008 and 2012.

The average, annual hospitalization rate was 69 per 100,000 among Hispanic children and 127 per 100,000 among non-Hispanics.

Health Care Utilization and Cost

Inpatient Hospitalizations for Asthma cont.

The average annual asthma hospitalization rate for children aged 1 to 17 years in Tennessee was 121 per 100,000 population between 2008 and 2012. The rate for individual Tennessee Health Department regions ranged from 44 per 100,000 in the Hamilton region to 227 per 100,000 in the Shelby region.[#]

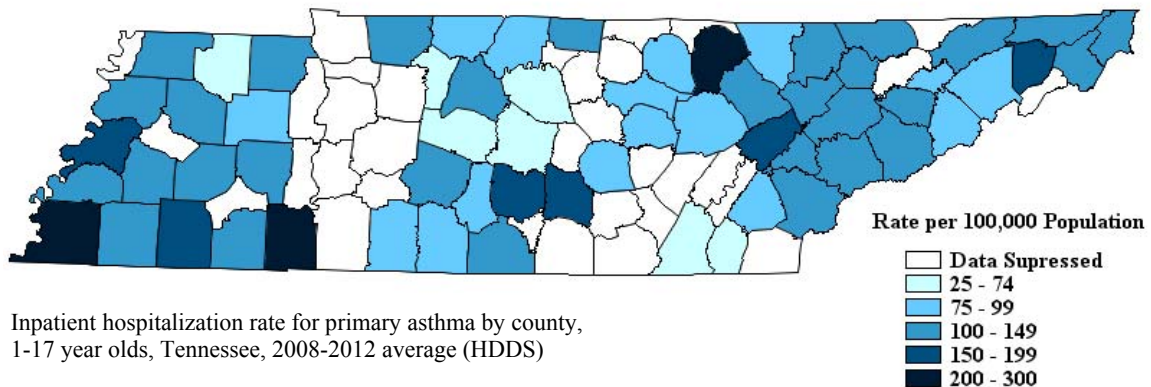


Inpatient hospitalization rate for primary asthma by region, 1-17 year olds, Tennessee, 2008-2012 average (HDDS)

Between 2008 and 2012 the average annual rate of inpatient hospitalizations was highest in Fentress county (297 per 100,000) and lowest in Williamson county (30 per 100,000) among all counties in Tennessee.*

The ten counties with the highest asthma hospitalization rates were: Fentress, Shelby, Hardin, Bedford, Lauderdale, Roane, Hardeman, Washington, Coffee and Obion.

The ten counties with the lowest inpatient hospitalization rates were: Williamson, Hamilton, Cheatham, Wilson, Rutherford, Bradley, Weakley, Marshall, Putnam and Hamblen.



Inpatient hospitalization rate for primary asthma by county, 1-17 year olds, Tennessee, 2008-2012 average (HDDS)

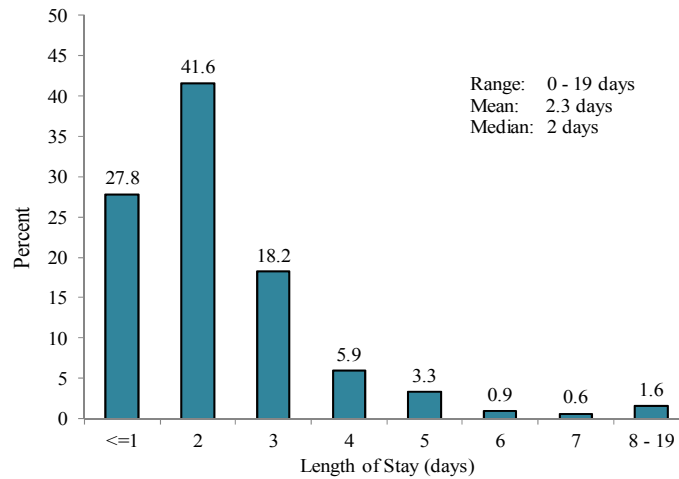
[#]Fourteen regions designated by the Tennessee Department of Health include eight rural and six metropolitan regions. For a map of the regions, please visit: http://hit.state.tn.us/inmap/print_inmap.htm.
^{*}Data are suppressed for counties with fewer than 20 inpatient hospitalizations.

Health Care Utilization and Cost

Inpatient Hospitalizations for Asthma cont.

In 2012 the length of stay for inpatient hospitalizations for children aged 1 to 17 years ranged from 0 to 19 days.

The average length of stay was 2.3 days and the median length of stay was 2 days.

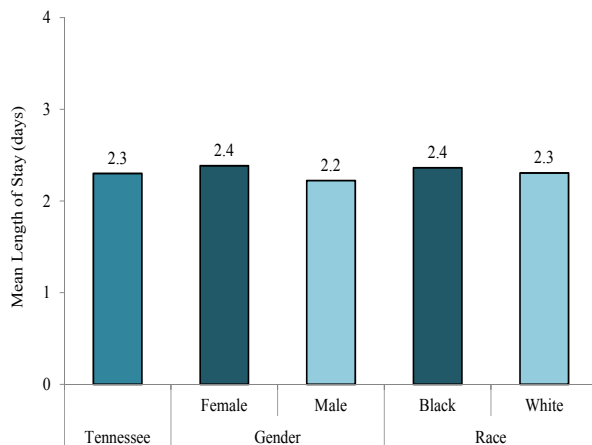


Distribution of length of stay among inpatient hospitalizations for primary asthma, 1-17 year olds, Tennessee, 2012 (HDDS)

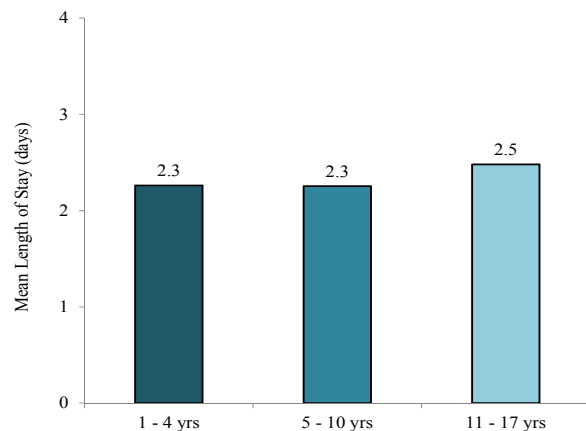
The mean length of stay was 2.4 days for female children and 2.2 days for male children.

Black and white children had comparable mean length of stay for inpatient hospitalizations.

The average length of stay for inpatient hospitalizations for primary asthma diagnosis increased with the 11-17 years age group.



Mean of length of stay among inpatient hospitalizations for primary asthma by gender and race, 1-17 year olds, Tennessee, 2012 (HDDS)



Mean of length of stay among inpatient hospitalizations for primary asthma by age, 1-17 year olds, Tennessee, 2012 (HDDS)

Health Care Utilization and Cost

Emergency Department Visits for Asthma

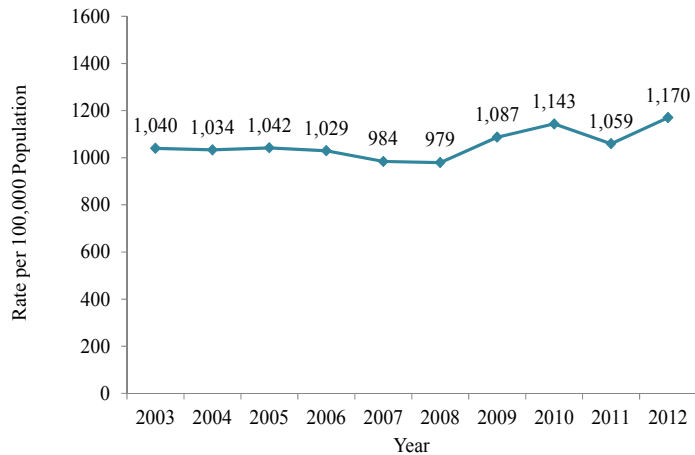
In 2012 there were 16,525 emergency department (ED) visits for a primary diagnosis of asthma among Tennessee children aged 1-17 years. The emergency department visit rate for primary asthma was 1,170 per 100,000 children.

Annually, from 2003 to 2012, there were approximately 14,530 emergency department visits for a primary diagnosis of asthma for children aged 1 to 17 years.

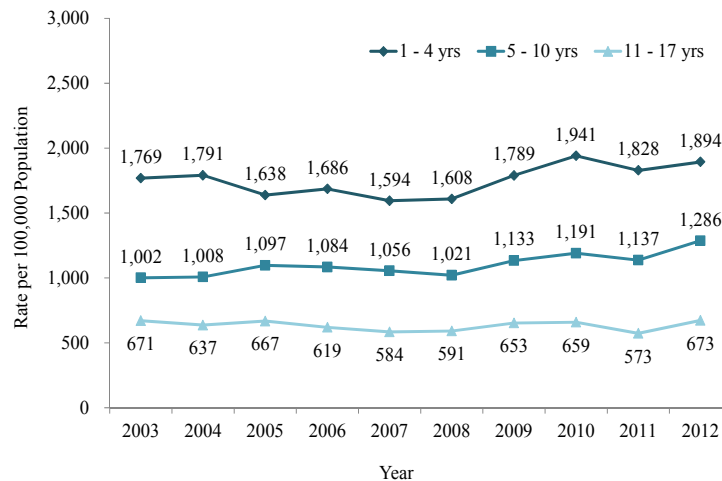
Between 2003 and 2012 the annual emergency department visit rate for asthma averaged 1,057 visits per 100,000 children in the population.

There was a 12.5 percent increase in the emergency department visit rate for asthma from 1,040 per 100,000 children in 2003 to 1,170 per 100,000 children in 2012.

Between 2003 to 2012 the asthma emergency department visit rate increased by 7.1 percent for the 1-4 year old age group and by 28.3 percent for the 5-10 year old age group. There were no statistically significant increases in the emergency department visit rate for the 11-17 year old age group.



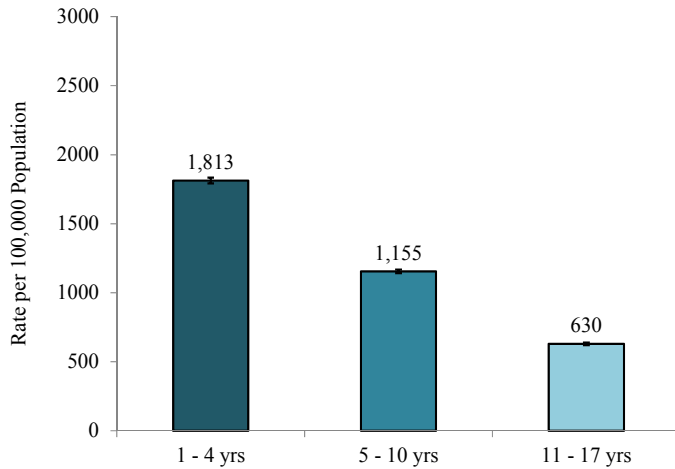
Emergency Department visit rate for primary asthma, 1-17 year olds, Tennessee, 2003-2012 average (HDDS)



Emergency Department visit rate for primary asthma by age, 1-17 year olds, Tennessee, 2003-2012 average (HDDS)

Health Care Utilization and Cost

Emergency Department Visits for Asthma cont.



Emergency Department visit rate for primary asthma by age, 1-17 year olds, Tennessee, 2008-2012 average (HDDS)

The average emergency department visit rate for a primary diagnosis of asthma, between 2008 and 2012, differed by age group.

The emergency department visit rate for patients aged 1-4 years with a primary diagnosis of asthma was the highest among all age groups at 1,813 per 100,000 children.

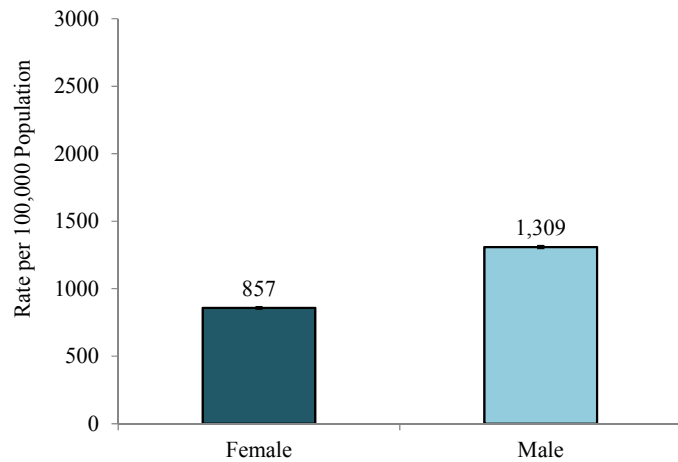
This was followed by the emergency department visit rate for children aged 5-10 years at 1,155 per 100,000 children. The 11-17 years age group had the lowest emergency department visit rate at 630 per 100,000 children.

Thirty-nine percent of the total emergency department visits for a primary diagnosis of asthma, between 2008 and 2012, were for children aged 1-4 years.

Male children, aged 1 to 17 years, had a higher emergency department visit rate when compared to female children.

The average emergency department visit rate for primary asthma between 2008 and 2012 for boys was 1,309 per 100,00 population, and 857 per 100,000 population for girls.

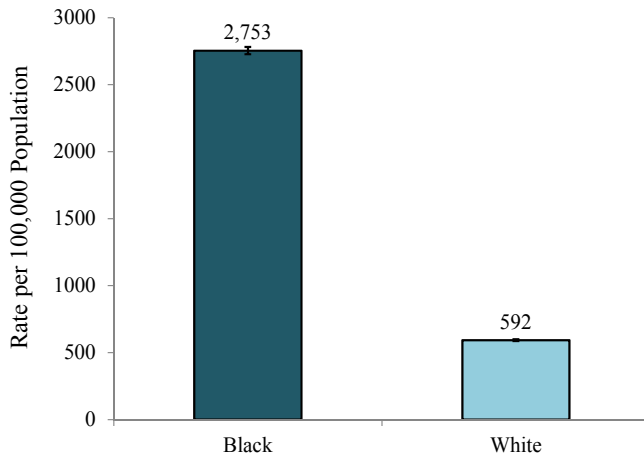
Sixty-two percent of the total visits for primary diagnosis of asthma were male children.



Emergency Department visit rate for primary asthma by gender, 1-17 year olds, Tennessee, 2008-2012 average (HDDS)

Health Care Utilization and Cost

Emergency Department Visits for Asthma cont.



Emergency Department visit rate for primary asthma by race, 1-17 year olds, Tennessee, 2008-2012 average (HDDS)

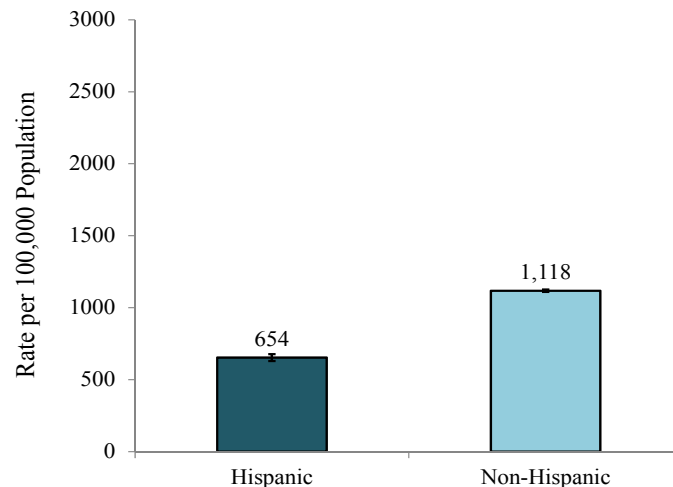
Between 2008 and 2012 there were 30,730 emergency department visits for primary asthma among white children and 40,105 among black children.

Black children had a higher emergency department visit rate when compared to white children. The average emergency department visit rate among black children was more than four times higher than the rate among white children.

The average emergency department visit rate for primary asthma was 2,753 per 100,000 among black children and 592 per 100,000 among white children.

Between 2008 and 2012 there were 2,908 emergency department visits for primary asthma among Hispanic children.

The average emergency department visit rate was 654 per 100,000 among Hispanics and 1,118 per 100,000 among non-Hispanics.

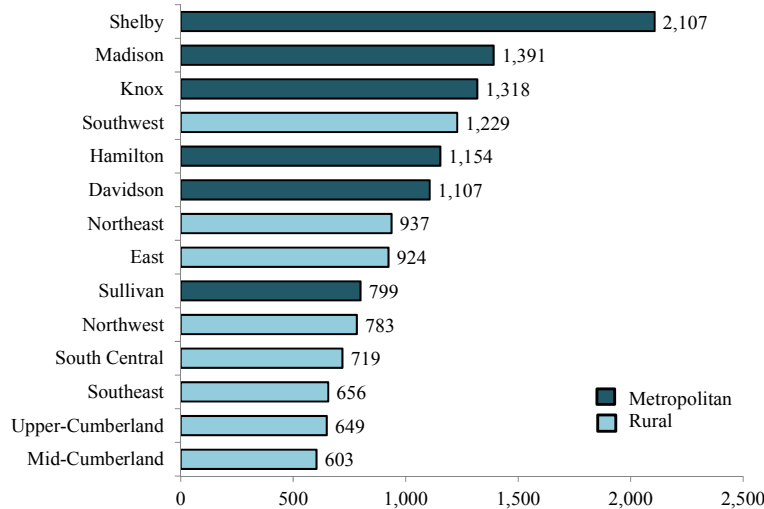


Emergency Department visit rate for primary asthma by Hispanic ethnicity, 1-17 year olds, Tennessee, 2008-2012 average (HDDS)

Health Care Utilization and Cost

Emergency Department Visits for Asthma cont.

The average annual asthma hospitalization rate for children aged 1 to 17 years in Tennessee was 1,087 per 100,000 population between 2008 and 2012. The rate for individual Tennessee Health Department regions ranged from 603 per 100,000 in the Mid-Cumberland region to 2,107 per 100,000 in the Shelby region.[#]

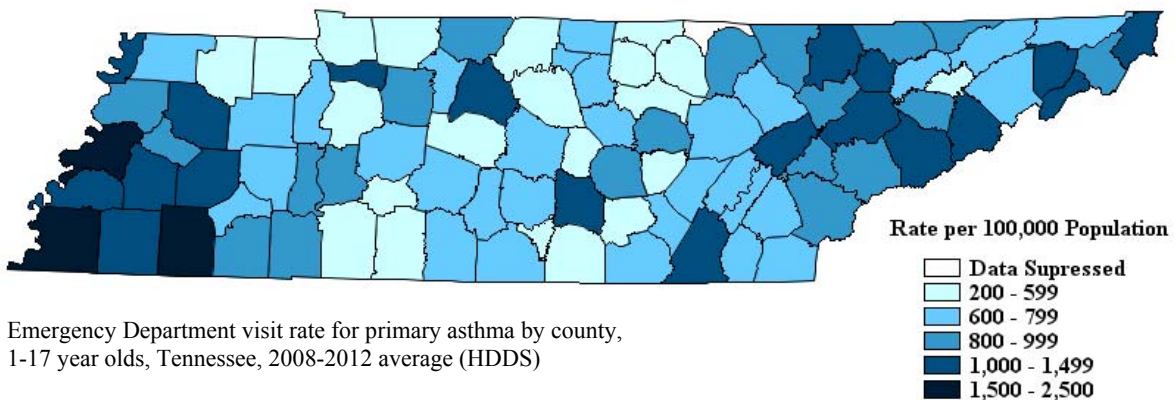


Emergency Department visit rate for primary asthma by region, 1-17 year olds, Tennessee, 2008-2012 average (HDDS)

Between 2008 and 2012 the average annual emergency department rate was highest in Hardeman county (2,446 per 100,000) and lowest in Lewis county (214 per 100,000) among all counties in Tennessee.*

The ten counties with the highest emergency department rates were: Hardeman, Shelby, Lauderdale, Cocke, Madison, Houston, Haywood, Knox, Sevier, and Washington.

The ten counties with the lowest emergency department rates were: Lewis, Stewart, Williamson, Moore, Clay, Lawrence, Van Buren, Jackson, Weakley, and Henry.



Emergency Department visit rate for primary asthma by county, 1-17 year olds, Tennessee, 2008-2012 average (HDDS)

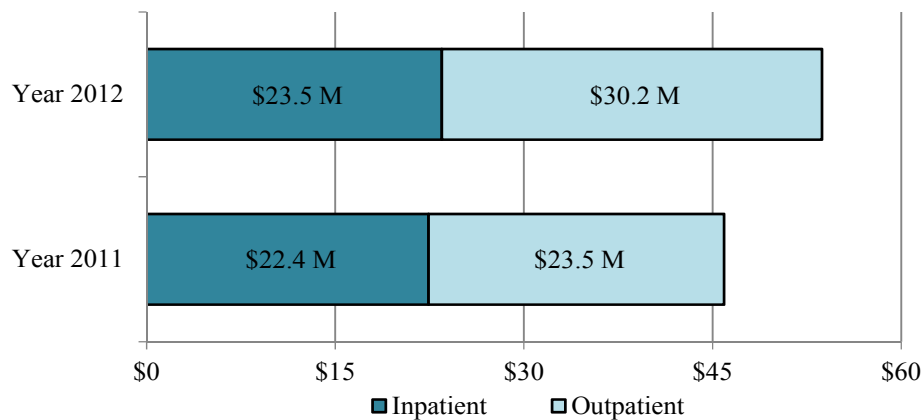
[#]Fourteen regions designated by the Tennessee Department of Health include eight rural and six metropolitan regions. For a map of the regions, please visit: http://hit.state.tn.us/tmap/print_tmap.htm.
^{*}Data are suppressed for counties with fewer than 20 emergency department visits.

Health Care Utilization and Cost

Hospital Charges for Asthma*

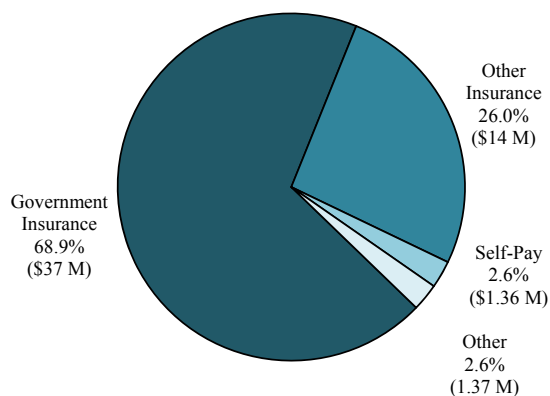
In 2012 the total hospital charges for a primary asthma diagnosis among children aged 1 to 17 years in Tennessee were \$53.7 million. This included charges for both inpatient and outpatient visits.**

Approximately 43.7 percent of the asthma charges (\$23.5 million) were for inpatient hospitalizations and 56.3 percent (\$30.2 million) were for outpatient hospitalizations. Although inpatient hospitalizations represented 9.5 percent of all asthma hospital visits among children, they accounted for 43.7 percent of total hospital charges for asthma.

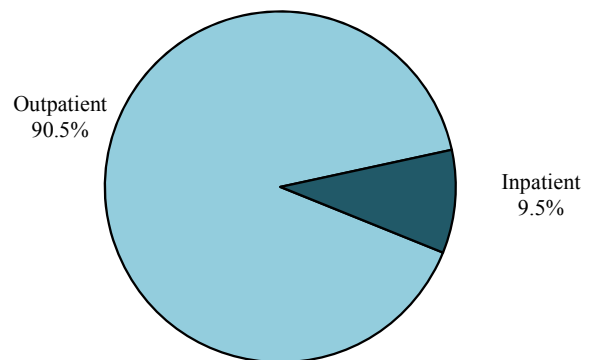


Total hospital charges for primary asthma by admission status, 1-17 year olds, Tennessee, 2011 and 2012 (HDDS)

Children with government insurance made up 68.9 percent of the asthma charges, totaling \$37 million. Children with other insurance had 26.0 percent (\$14 million), followed by other or unknown payer with 2.6 percent (\$1.37 million) and self-pay with 2.6 percent (\$1.36 million).



Total hospital charges for primary asthma by payer, 1-17 year olds, Tennessee, 2012 (HDDS)



Total hospital visits for primary asthma by admission status, 1-17 year olds, Tennessee, 2012 (HDDS)

* Charges prior to 2012 have been adjusted to 2012 dollars.

** Inpatient hospitalizations refer to patients who were admitted to the hospital for treatment. Outpatient hospitalizations refer to patients who were treated in a hospital without subsequent admission.

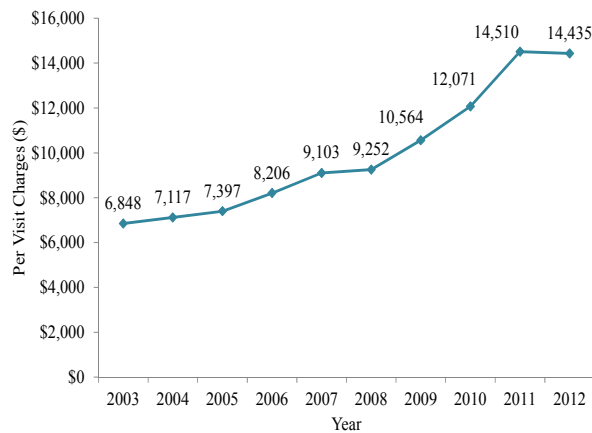
Health Care Utilization and Cost

Hospital Charges for Asthma cont.

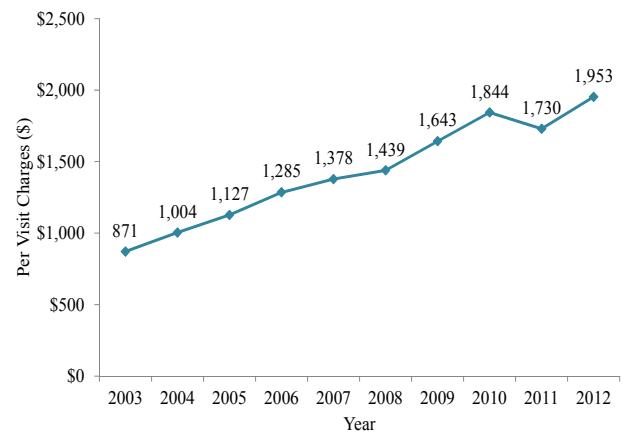
In 2012 the average per visit charges for inpatient hospitalization for a primary asthma diagnosis was \$14,435. The average per visit charge for outpatient hospitalization was \$1,953.

Annual per visit inpatient hospitalization charges for primary asthma in 2012 increased 110.8 percent from \$6,848 in 2003. The per visit inpatient hospitalization charges averaged \$9,950 between 2003 and 2012.

The average per visit charges for outpatient hospitalizations for a primary asthma diagnosis increased 124.2 percent from \$871 in 2003. The per visit outpatient hospitalization charges averaged \$1,427 between 2003 and 2012.

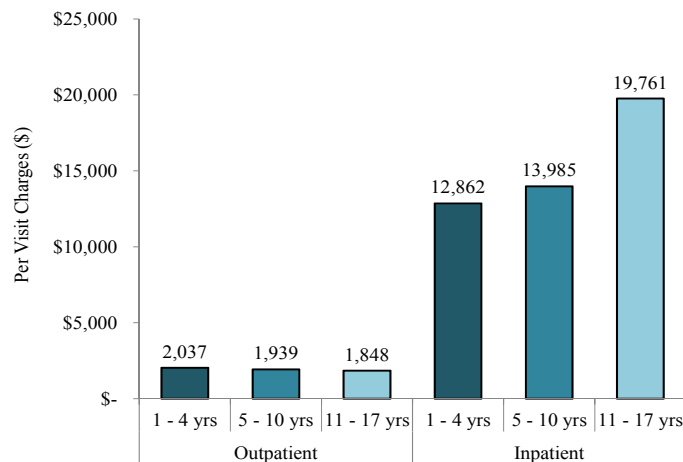


Inflation-adjusted per visit charges for inpatient hospitalizations for primary asthma, 1-17 year olds, Tennessee, 2003-2012 (HDDS)



Inflation-adjusted per visit charges for outpatient hospitalizations for primary asthma, 1-17 year olds, Tennessee, 2003-2012 (HDDS)

In 2012 asthma patients aged 11 to 17 had lower per visit outpatient hospitalization charges than other age groups but higher per visit inpatient hospitalization charges.

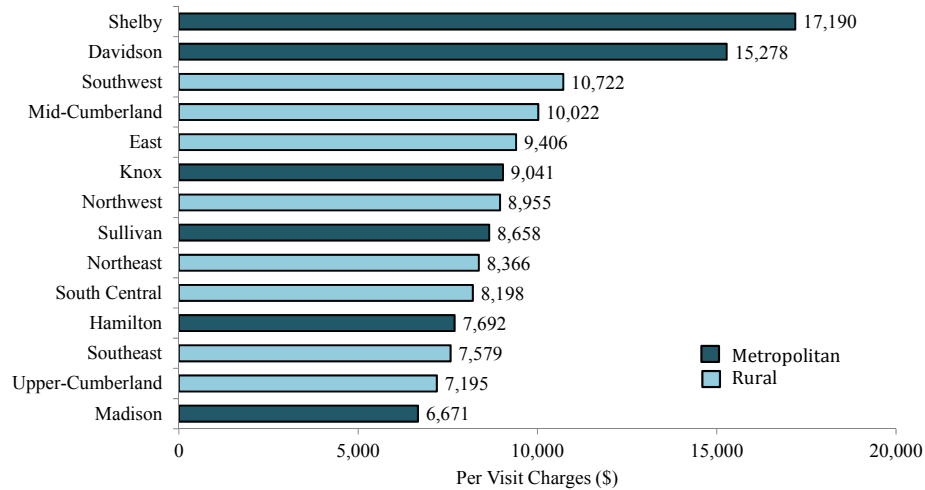


Per visit charges for inpatient and outpatient hospitalizations for primary asthma, by age, Tennessee, 2012 (HDDS)

Health Care Utilization and Cost

Hospital Charges for Asthma cont.

The average per visit charges for inpatient hospitalizations for children aged 1 to 17 years in Tennessee was \$12,052 between 2008 and 2012. The average per visit charges for individual Tennessee Health Department regions ranged from \$6,671 in the Madison region to \$17,190 in the Shelby region.[#]

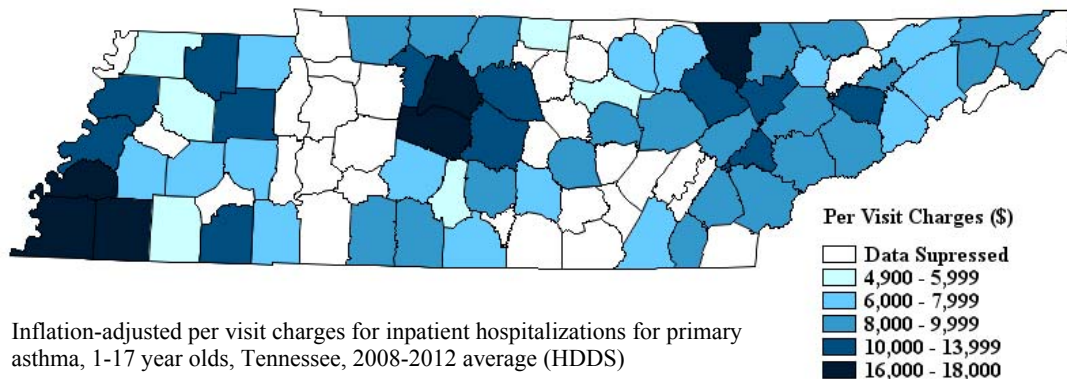


Inflation-adjusted per visit charges for inpatient hospitalizations for primary asthma by region, 1-17 year olds, Tennessee, 2008-2012 (HDDS)

Between 2008 and 2012 the average per visit charges for inpatient hospitalizations for primary asthma was highest in Shelby county (\$17,190) and lowest in Putnam county (\$4,947) among all counties in Tennessee.*

The ten counties with the highest per visit charges were: Shelby, Davidson, Tipton, Fayette, Williamson, Scott, Dyer, Lauderdale, Wilson and Morgan.

The ten counties with the lowest per visit charges were: Putnam, Gibson, Macon, Marshall, Hardeman, Obion, Hardin, Madison, Overton and Henderson.



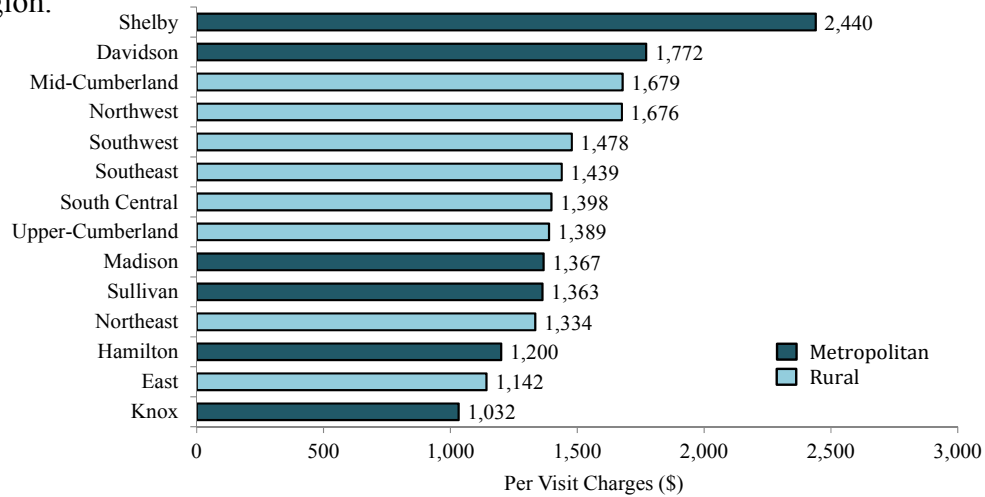
Inflation-adjusted per visit charges for inpatient hospitalizations for primary asthma, 1-17 year olds, Tennessee, 2008-2012 average (HDDS)

[#]Fourteen regions designated by the Tennessee Department of Health include eight rural and six metropolitan regions. For a map of the regions, please visit: http://hit.state.tn.us/tmmap/print_tmmap.htm.
^{*}Data are suppressed for counties with fewer than 20 emergency department visits.

Health Care Utilization and Cost

Hospital Charges for Asthma cont.

The average per visit charges for outpatient hospitalizations for children aged 1 to 17 years in Tennessee was \$12,052 between 2008 and 2012. The average, per visit charges for individual Tennessee Health Department regions ranged from \$1,032 in the Knox region to \$2,440 in the Shelby region.[#]

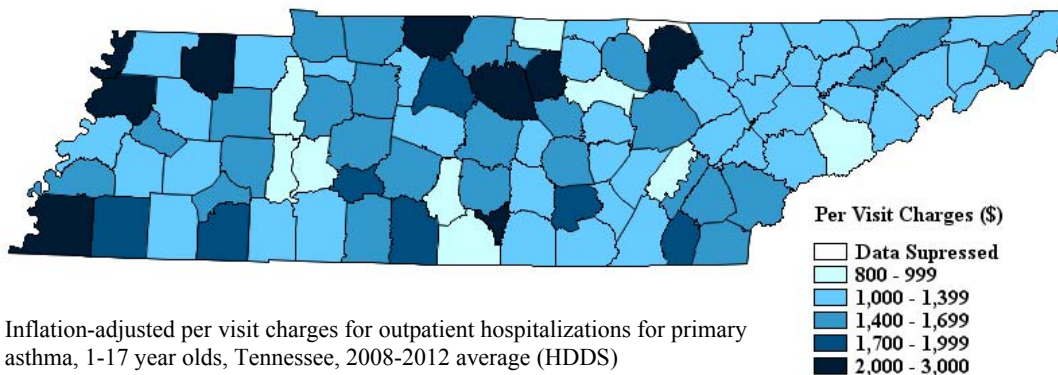


Inflation-adjusted per visit charges for outpatient hospitalizations for primary asthma by region, 1-17 year olds, Tennessee, 2008-2012 (HDDS)

Between 2008 and 2012 the average per visit charges for outpatient hospitalizations for primary asthma was highest in Dyer county (\$2,803) and lowest in Rhea county (\$4,807) among all counties in Tennessee.*

The ten counties with the highest per visit charges were: Dyer, Weakley, Lake, Shelby, Wilson, Moore, Smith, Fentress, Robertson and McNairy.

The ten counties with the lowest per visit charges were: Rhea, Benton, Putnam, Perry, Marshall, Macon, Decatur, Sevier, Lincoln and Roane.



Inflation-adjusted per visit charges for outpatient hospitalizations for primary asthma, 1-17 year olds, Tennessee, 2008-2012 average (HDDS)

[#]Fourteen regions designated by the Tennessee Department of Health include eight rural and six metropolitan regions. For a map of the regions, please visit: http://hit.state.tn.us/tmap/print_tmap.htm.
^{*}Data are suppressed for counties with fewer than 20 emergency department visits.

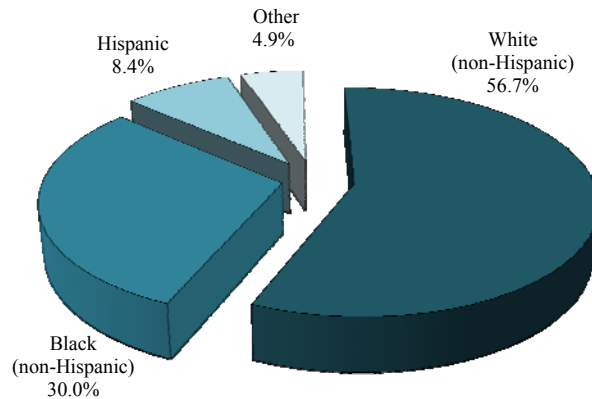
Asthma Among TennCare Enrollees

Asthma Prevalence

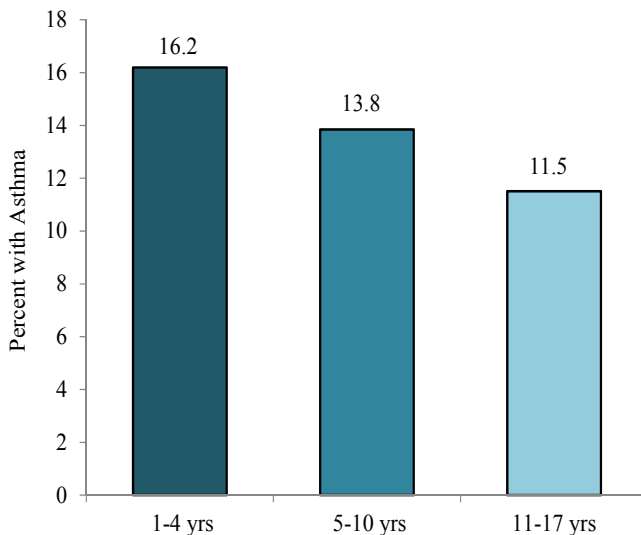
TennCare is Tennessee’s expanded Medicaid program which provides health coverage to vulnerable populations, such as low-income children, pregnant women and the disabled. In 2012, there were 674,190 children aged 0-17 years enrolled in TennCare, representing approximately 45.0 percent of children in the state.

Between 2010-2012 the race and ethnic distribution of children enrolled in TennCare was 56.7 percent white non-Hispanic, 30.0 percent black non-Hispanic, 8.4 percent Hispanic and 4.9 percent were other race and ethnicity.

The 3-year prevalence of asthma among children enrolled in TennCare was 13.7 percent between 2010 and 2012.



Distribution of TennCare enrollees by race and ethnicity, 1-17 year olds, 2010-2012 (TennCare)



Asthma prevalence by age, 1-17 year olds, TennCare enrollees, 2010-2012 (TennCare)

Asthma prevalence was 16.2 percent among 1-4 year olds, 13.8 percent among 5-10 year olds, and 11.5 percent among 11-17 year olds enrolled in TennCare.

In 2004-2006 asthma prevalence was 12.4 percent among 1-4 years olds. Asthma prevalence increased by 30.6 percent in 2010-2012.

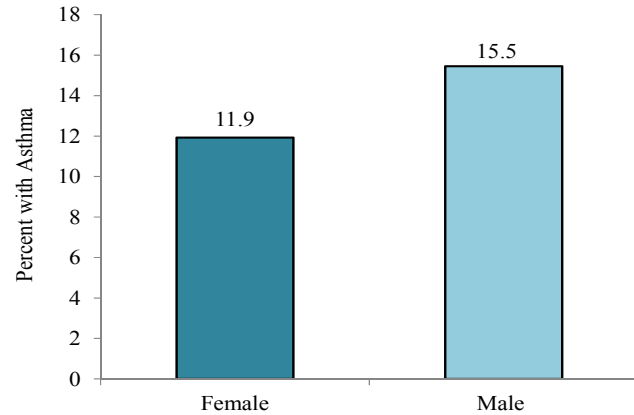
In 2010-2012 asthma prevalence increased by 30 percent among 5-10 year olds and 30.7 percent among 11-17 year olds compared to 2004-2006.

Asthma Among TennCare Enrollees

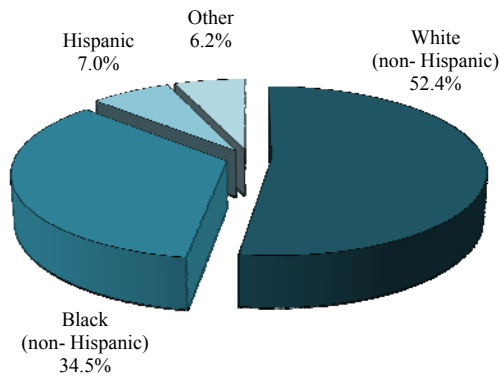
Asthma Prevalence

Between 2010 and 2012 asthma prevalence was higher among boys than among girls (15.5 percent vs. 11.9 percent, respectively).

In 2004-2006 asthma prevalence was 12.0 percent among boys and 9.1 percent among girls. In 2010-2012 asthma prevalence had increased by 29.0 percent among boys and 31.0 percent among girls.



Asthma prevalence by gender, 1-17 year olds, TennCare enrollees, 2010-2012 (TennCare)



Distribution of TennCare enrollees with asthma by race and ethnicity, 1-17 year olds, 2010-2012 (TennCare)

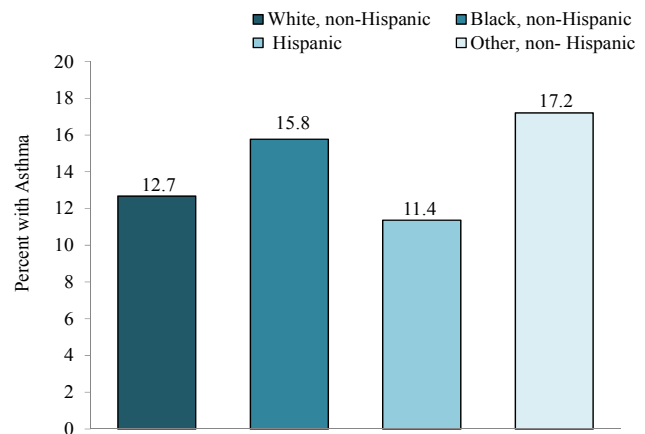
The racial distribution of TennCare children enrollees with an asthma diagnosis, in 2010-2012, was 52.4 percent white non-Hispanic, 34.5 percent black non-Hispanic, 7.0 percent Hispanic and 6.2 percent other.

Asthma prevalence was higher among black non-Hispanic (15.8 percent) than among white non-Hispanic children (12.7 percent).

Among Hispanic children enrolled in TennCare asthma prevalence was 11.4 percent.

In 2004-2006 asthma prevalence was similar among black and white non-Hispanic children (10.6 percent) and 7.1 percent among Hispanic children.

Asthma prevalence increased for white non-Hispanic children by 20.0 percent, for black non-Hispanic by 49.0 percent and decreased for Hispanic children by 39.0 percent between 2010-2012 compared to 2004-2006.

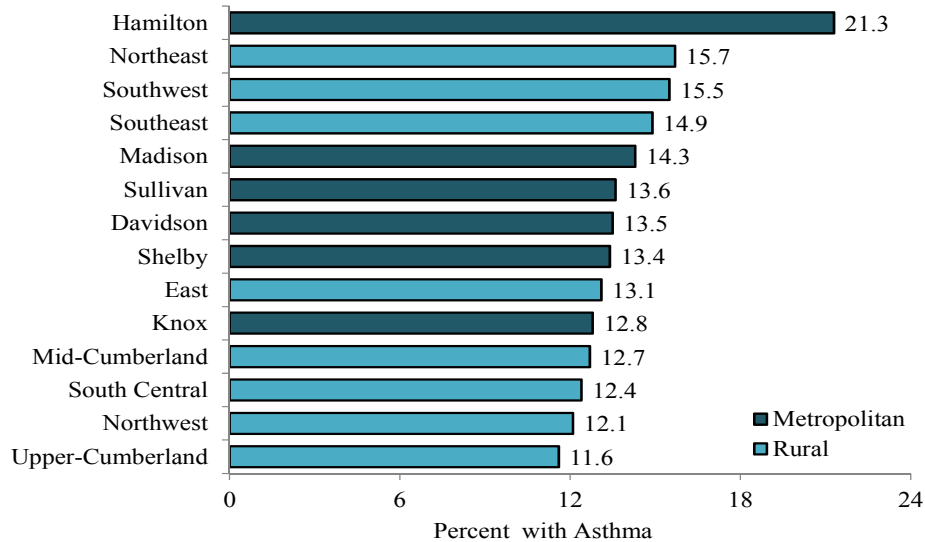


Asthma prevalence by race and ethnicity, 1-17 year olds, TennCare enrollees, 2010-2012 (TennCare)

Asthma Among TennCare Enrollees

Asthma Prevalence

In 2010-2012 the 3-year prevalence of asthma among children enrolled in TennCare was 13.7 percent. The prevalence rate for individual Tennessee Health Department regions ranged from 11.6 percent in the Upper-Cumberland region to 21.3 percent in the Hamilton region.[#]

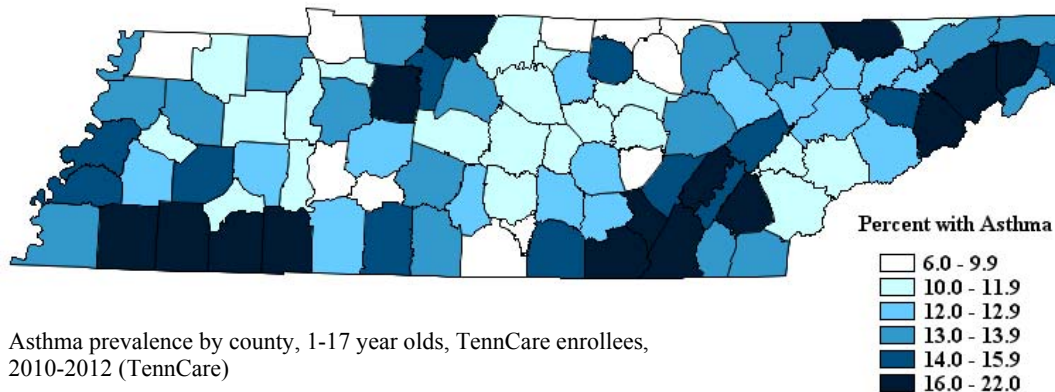


Asthma prevalence by region, 1-17 year olds, TennCare enrollees, 2010-2012 (TennCare)

Asthma prevalence among TennCare children enrollees in individual Tennessee counties ranged from 7.7 percent in Van Buren county to 21.7 percent in Hardeman county.

The ten counties with the highest asthma prevalence were: Hardeman, Hamilton, Robertson, Claiborne, Hardin, Cocke, Marion, Washington, Greene and Sequatchie.

The ten counties with the lowest asthma prevalence were: Van Buren, Clay, Pickett, Stewart, Moore, Macon, Obion, Lincoln, Overton and Lewis.



Asthma prevalence by county, 1-17 year olds, TennCare enrollees, 2010-2012 (TennCare)

[#]Fourteen regions designated by the Tennessee Department of Health include eight rural and six metropolitan regions. For a map of the regions, please visit: http://hit.state.tn.us/tmap/print_tmap.htm.

Summary

Overall asthma prevalence in children in Tennessee has increased to 11.5 percent in 2011/2012. Age, gender and racial disparities in asthma prevalence, inpatient hospitalizations and emergency department visits continue to persist. Older children have higher childhood asthma prevalence in Tennessee than the other age groups. Boys had higher inpatient hospitalization and emergency department visit rates compared to girls. Black children had higher inpatient hospitalization and emergency department visit rates than white children. Inpatient hospitalizations for asthma have decreased while emergency department visits have increased. Hospital charges for asthma have increased over 100 percent. Asthma prevalence among TennCare enrollees was higher among the 1-4 years old compared to the other age groups.

Asthma hospitalizations and emergency department visits may indicate a severe and/or poorly controlled disease. These costly outcomes may be avoided and/or mitigated with suitable treatment and disease management. This report documents the trends and disparities indicative of a need for continued childhood asthma prevention and controls in Tennessee. The information contained in this report is important for the diverse groups of persons concerned with childhood asthma in Tennessee. It is hoped that this report will be used for planning purposes, to target interventions, assist in tracking childhood asthma trends and evaluation of efforts to decrease the burden of childhood asthma in Tennessee.

Technical Notes

Data Sources

National Survey of Children’s Health (NSCH):

The NSCH is a constituent of the State and Local Area Integrated Telephone Survey, conducted by the National Center for Health Statistics. NSCH surveys the health condition, both physical and emotional, of children under age 18. The telephone statistical survey is conducted using a random digit dialing method for drawing a sample of households with children aged 0 to 17. Random-digit dialing gives accessibility to listed as well as unlisted telephones. One child is randomly selected from each household to be the subject of the survey. The interview questions are asked to the adult in the household who knows the most about the child’s health and health care. The two questions used by NSCH to determine the asthma prevalence are “Has a doctor or health professional ever told you that [child’s name] has asthma?” and “Does [child’s name] currently have asthma?” Positive responses to the first question determined lifetime asthma, while positive responses to both questions determined current asthma.

To determine the prevalence of smoking in the household, NSCH used the question “Does anyone in the household use cigarettes, cigars, or pipe tobacco?” A positive response determined that the child’s household included someone who smoked tobacco.

NSCH data were derived from the NSCH website: National Survey of Children's Health. NSCH 2011/2012. Data query from the Child and Adolescent Health Measurement Initiative, Data Resource Center for Child and Adolescent Health website. Retrieved 11/22/2013 from www.childhealthdata.org.

Hospital Discharge Data System (HDDS):

The Tennessee Hospital Discharge Data System (HDDS) was established for the purpose of having a state-based collection and summarization system of hospital claims data. Charges for similar types of services can be analyzed and compared to create a more price competitive environment in the medical market place. By Tennessee law, all hospitals licensed by the Tennessee Department of Health (TDH) are required to report patient-level discharge information to the Department. Federal facilities (i.e. VA hospitals, etc.) or facilities licensed by the Tennessee Department of Mental Health and Developmental Disabilities are not included. The first listed ICD-9-CM code beginning with 493 was used to identify asthma diagnoses. Data used were limited to the records of Tennessee residents. The terms “white” and “black” refer to persons of any ethnicity and the terms “Hispanic” and “non-Hispanic” refer to ethnicity regardless of race for HDDS. The analysis was limited to children 1 to 17 years of age because diagnosis of asthma is sometimes difficult among infants aged less than one year.

Birth Statistical System (BSS):

The data for the calculation of percent of mothers smoking during pregnancy was obtained from the Birth Statistical System, Tennessee Department of Health, Division of Policy, Planning and Assessment. Data were broken down by county and race of the mothers. Percent was not calculated when the number of births was less than ten. Total number of mothers smoking during pregnancy may include events with race other than white or black or race not stated.

Technical Notes

Data Sources

Bureau of TennCare (TennCare):

Both enrollment and claims data are included in TennCare data. The number of TennCare enrollees aged 1-17 years from January 1, 2010 to December 31, 2012 was used as the denominator for the calculation of rates. The numbers of unique recipients who were enrolled in TennCare at any time during the specified time period were determined as the number of enrollees. The enrollee's age was calculated as of December 31, 2010. An asthma patient aged 1-17 years was defined as a child with any diagnosis of asthma in any TennCare medical claim file. Asthma diagnosis was identified using all ICD-9-CM codes in the medical claim file beginning with 493. All children, white non-Hispanic, black non-Hispanic, Hispanic, other, or missing information were included in the data. The terms "white" and "black" refer to persons of non-Hispanic origin and the term "Hispanic" refers to ethnicity regardless of race. Data were broken down by county, race, gender and age group for enrollees and enrollees with asthma. No statistical tests were performed on TennCare data.

References

1. Centers for Disease Control and Prevention. *Asthma's Impact on the Nation (2012)*. Chamblee, GA: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Asthma Control Program.
2. Office of Policy, Planning and Assessment (2008). *The Burden of Asthma in Tennessee*. Tennessee Department of Health, Nashville, TN. Available at: <http://health.state.tn.us>.
3. Office of Policy, Planning and Assessment (2012). *The Burden of Asthma in Tennessee 2001-2010*. Tennessee Department of Health, Nashville, TN. Available at: <http://health.state.tn.us>.
4. Centers for Disease Control and Prevention. *Breathing Easier*. Chamblee, GA: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Asthma Control Program.
5. American Academy of Allergy, Asthma & Immunology. <http://www.aaaai.org/conditions-and-treatments/library.aspx>. Accessed 03/13/2014.
6. Centers for Disease Control and Prevention. *Asthma Fast Facts for Kids*. Chamblee, GA: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Asthma Control Program.
7. Centers for Disease Control and Prevention. Asthma Attacks Among Persons with Current Asthma -- United States, 2001–2010. *MMWR* 2013; 62(Suppl 3):93-98.
8. Centers for Disease Control and Prevention. *Asthma Facts—CDC's National Asthma Control Program Grantees*. Atlanta, GA: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, 2013.
9. Centers for Disease Control and Prevention. <http://www.cdc.gov/asthma/nhis/2012/data.htm>. Atlanta, GA: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Health Statistics. Accessed 03/13/2014.
10. Demissie Z, Brener ND, McManus T, Shanklin SL, Hawkins J, Kann L. School Health Profiles 2012: Characteristics of Health Programs Among Secondary Schools. Atlanta: Centers for Disease Control and Prevention; 2013. <http://www.cdc.gov/healthyyouth/asthma/strategies.htm>. Accessed 06/06/2014.
11. Centers for Disease Control and Prevention. Vital Signs: Nonsmokers' Exposure to Secondhand Smoke --- United States, 1999--2008. *MMWR* 2010; 59:1141-1146.
12. Quinto KB, Kit BK, Lukacs SL, Akinbami LJ. Environmental tobacco smoke exposure in children aged 3–19 years with and without asthma in the United States, 1999–2010. NCHS data brief, no 126. Hyattsville, MD: National Center for Health Statistics. 2013.

References

13. U.S. Department of Health and Human Services. The Health Consequences of Involuntary Exposure to Tobacco Smoke: A Report of the Surgeon General. Secondhand Smoke What It Means to You. U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, Coordinating Center for Health Promotion, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health, 2006.
14. Akuete K, Oh SS, Thyne S, Rodriguez-Santana JR, Chapela R, Meade K, et al. Ethnic variability in persistent asthma after in utero tobacco exposure. *Pediatrics*. 2011; 128:e623–e630.
15. Asthma and Allergy Foundation of America. *The U.S. Asthma Capitals*. <http://www.asthmacapitals.com/>. Accessed 03/13/2014.

Appendix A

Regional and County Hospital Discharge Data

The following tables present detailed data for asthma discharges for Tennessee counties and individual health department regions.[#]

Data presented are 2008 to 2012 annual averages for inpatient hospitalizations and emergency department visits with primary asthma diagnosis from the hospital discharge data system (HDDS). The rates calculated are per 100,000 population.

Metropolitan Regions

County	Inpatient Hospitalizations		Emergency Department Visits	
	Number	Rate	Number	Rate
Davidson	663	103	7,150	1,107
Hamilton	149	44	3,913	1,154
Knox	598	135	5,848	1,318
Madison	143	127	1,570	1,391
Shelby	2,647	227	24,517	2,107
Sullivan	182	120	1,209	799

East Region

County	Inpatient Hospitalizations		Emergency Department Visits	
	Number	Rate	Number	Rate
Anderson	89	116	629	819
Blount	140	111	1,061	838
Campbell	47	112	429	1,027
Claiborne	33	103	259	810
Cocke	34	94	514	1,421
Grainger*	19	80	166	701
Hamblen	59	85	402	582
Jefferson	66	123	477	889
Loudon	47	102	414	902
Monroe	51	104	398	813
Morgan*	27	128	167	792
Roane	96	180	586	1,102
Scott	23	87	232	881
Sevier	102	112	1,129	1,244
Union	31	142	229	1,049
East Region	864	113	7,092	924

[#]Fourteen regions designated by the Tennessee Department of Health include eight rural and six metropolitan regions. For a map of the regions, please visit: http://hit.state.tn.us/tmmap/print_tmmap.htm.

*Fewer than 20 Inpatient Hospitalizations and/or Emergency Department visits, results should be interpreted with caution.

Appendix A

Mid-Cumberland Region

County	Inpatient Hospitalizations		Emergency Department Visits	
	Number	Rate	Number	Rate
Cheatham	29	62	342	733
Dickson*	18	31	476	824
Houston*	6	64	128	1,370
Humphreys*	11	55	104	518
Montgomery	216	100	1,264	585
Robertson	74	94	780	989
Rutherford	220	71	2,304	742
Stewart*	5	35	34	239
Sumner	186	99	1,076	574
Trousdale*	13	148	63	716
Williamson	72	30	752	314
Wilson	87	66	642	486
Mid-Cumberland Region	937	71	7,965	603

Northeast Region

County	Inpatient Hospitalizations		Emergency Department Visits	
	Number	Rate	Number	Rate
Carter	81	148	481	877
Greene	68	99	449	655
Hancock*	4	58	68	990
Hawkins	77	129	393	657
Johnson*	19	121	166	1,056
Unicoi*	19	111	188	1,098
Washington	181	155	1,441	1,231
Northeast Region	449	132	3,186	937

*Fewer than 20 Inpatient Hospitalizations and/or Emergency Department visits, results should be interpreted with caution.

Appendix A

Northwest Region

County	Inpatient Hospitalizations		Emergency Department Visits	
	Number	Rate	Number	Rate
Benton*	10	63	107	679
Carroll	27	90	190	632
Crockett*	14	83	139	822
Dyer	63	141	430	964
Gibson	63	111	654	1,156
Henry	33	101	148	451
Lake*	14	229	67	1,095
Obion	52	150	237	682
Weakley	25	74	153	451
Northwest Region	301	111	2,125	783

South Central Region

County	Inpatient Hospitalizations		Emergency Department Visits	
	Number	Rate	Number	Rate
Bedford	109	193	374	663
Coffee	91	152	619	1,033
Giles	30	98	229	746
Hickman*	14	54	198	757
Lawrence	43	88	203	413
Lewis*	6	44	29	214
Lincoln	41	113	289	797
Marshall	27	78	268	772
Maury	124	134	711	771
Moore*	4	62	22	341
Perry*	4	48	70	845
Wayne*	15	96	75	481
South Central Region	508	118	3,087	719

*Fewer than 20 Inpatient Hospitalizations and/or Emergency Department visits, results should be interpreted with caution.

Appendix A

Southeast Region

County	Inpatient Hospitalizations		Emergency Department Visits	
	Number	Rate	Number	Rate
Bledsoe*	8	61	90	686
Bradley	78	73	678	637
Franklin*	17	40	250	585
Grundy*	9	58	85	545
Marion*	3	10	211	728
McMinn	56	99	348	615
Meigs*	11	87	97	771
Polk*	16	92	118	680
Rhea*	13	38	271	788
Sequatchie*	5	33	102	665
Southeast Region	216	63	2,250	656

Southwest Region

County	Inpatient Hospitalizations		Emergency Department Visits	
	Number	Rate	Number	Rate
Chester*	14	75	113	606
Decatur*	10	86	104	894
Fayette	55	134	467	1,134
Hardeman	46	164	686	2,446
Hardin	57	214	224	839
Haywood	28	122	311	1,358
Henderson	32	103	246	793
Lauderdale	57	183	599	1,918
McNairy	40	139	233	811
Tipton	111	146	901	1,187
Southwest Region	450	142	3,884	1,229

*Fewer than 20 Inpatient Hospitalizations and/or Emergency Department visits, results should be interpreted with caution.

Appendix A

Upper-Cumberland Region

County	Inpatient Hospitalizations		Emergency Department Visits	
	Number	Rate	Number	Rate
Cannon*	3	21	69	473
Clay*	5	65	32	413
Cumberland	45	90	310	617
DeKalb*	14	69	150	745
Fentress	57	297	178	927
Jackson*	9	83	48	440
Macon	31	119	157	603
Overton	23	99	110	472
Pickett*	2	43	8	172
Putnam	58	79	418	567
Smith*	16	73	148	680
Van Buren*	2	36	24	436
Warren	41	90	401	879
White	25	92	223	822
Upper-Cumberland Region	331	94	2,276	649

*Fewer than 20 Inpatient Hospitalizations and/or Emergency Department visits, results should be interpreted with caution.

Appendix B

Regional and County Data: Charges, Race and Gender

The following tables present detailed data for inpatient and outpatient charges and emergency department visit rates by race and gender for Tennessee counties and individual health department regions. #

Data presented are 2008 to 2012 annual averages for discharges with primary asthma diagnosis.

Metropolitan Regions

County	Inpatient Charges (\$ per visit)	Outpatient Charges (\$ per visit)	ED Visits (per 100,000)			
			Female	Male	Black	White
Davidson	15,278	1,772	826	1,375	2,029	399
Hamilton	7,692	1,200	912	1,384	2,730	545
Knox	9,041	1,032	1,047	1,575	4,531	830
Madison	6,671	1,367	1,027	1,737	2,691	382
Shelby	17,190	2,440	1,646	2,552	3,175	498
Sullivan	8,658	1,363	706	888	958	388

East Region

County	Inpatient Charges (\$ per visit)	Outpatient Charges (\$ per visit)	ED Visits (per 100,000)			
			Female	Male	Black	White
Anderson	10,159	1,036	573	1,054	2,293	735
Blount	9,440	1,052	634	1,036	3,348	713
Campbell*	8,511	1,100	852	1,198	5,328	885
Claiborne*	8,897	1,149	519	1,100	1,027	810
Cocke	7,445	1,371	1,266	1,573	3,324	1,334
Grainger*	9,199	1,300	564	824	5,263	593
Hamblen	8,409	1,466	524	637	1,881	447
Jefferson	11,041	1,193	750	1,019	1,586	709
Loudon	10,681	1,078	717	1,077	4,609	781
Monroe	9,414	1,402	688	929	2,970	748
Morgan*	11,442	1,258	741	840	1,802	788
Roane	8,648	1,013	977	1,215	4,623	1,013
Scott*	14,066	1,283	635	1,117	6,827	879
Sevier	8,512	993	964	1,503	3,228	1,168
Union*	7,806	1,078	808	1,274	10,448	971
East Region	9,406	1,142	739	1,098	2,915	829

Fourteen regions designated by the Tennessee Department of Health include eight rural and six metropolitan regions. For a map of the regions, please visit: http://hit.state.tn.us/tmmap/print_tmmap.htm.

* Fewer than 20 Emergency Department visits, results should be interpreted with caution.

Appendix B

Mid-Cumberland Region

County	Inpatient Charges (\$ per visit)	Outpatient Charges (\$ per visit)	ED Visits (per 100,000)			
			Female	Male	Black	White
Cheatham*	10,665	1,364	602	855	1,926	679
Dickson	12,625	1,587	645	989	2,267	718
Houston*	9,036	1,165	1,437	1,307	2,703	1,315
Humphreys*	9,045	1,563	483	550	2,020	433
Montgomery	8,301	1,565	447	718	1,193	367
Robertson	8,293	2,111	814	1,157	4,116	605
Rutherford	10,987	1,599	576	900	2,242	426
Stewart*	13,067	1,467	160	313		253
Sumner	8,663	1,658	423	717	2,176	410
Trousdale*	6,790	1,607	380	1,024	1,538	634
Williamson	14,525	1,394	213	410	1,230	243
Wilson	12,255	2,392	385	583	1,556	395
Mid-Cumberland Region	10,022	1,679	465	734	1,815	419

Northeast Region

County	Inpatient Charges (\$ per visit)	Outpatient Charges (\$ per visit)	ED Visits (per 100,000)			
			Female	Male	Black	White
Carter*	8,498	1,482	647	1,098	2,162	817
Greene	6,936	1,020	571	733	1,263	608
Hancock	9,418	1,067	779	1,189		399
Hawkins*	7,545	1,587	541	771	703	334
Johnson	7,897	1,184	698	1,379		926
Unicoi	7,041	1,089	776	1,397		1,002
Washington	9,357	1,376	939	1,510	3,213	1,076
Northeast Region	8,366	1,334	725	1,139	2,422	779

*Fewer than 20 Emergency Department visits, results should be interpreted with caution.

Appendix B

Northwest Region

County	Inpatient Charges (\$ per visit)	Outpatient Charges (\$ per visit)	ED Visits (per 100,000)			
			Female	Male	Black	White
Benton	6,562	893	645	711	4,490	567
Carroll	10,583	1,667	524	738	1,688	482
Crockett	12,729	1,502	600	1,046	2,159	539
Dyer	12,930	2,803	787	1,137	2,636	555
Gibson	5,177	1,121	862	1,444	2,753	698
Henry	7,280	1,242	322	571	1,379	345
Lake*	13,609	2,450	588	1,502	2,057	765
Obion	5,986	1,343	538	825	2,162	452
Weakley	11,326	2,477	411	489	1,425	360
Northwest Region	8,955	1,676	615	945	2,312	511

South Central Region

County	Inpatient Charges (\$ per visit)	Outpatient Charges (\$ per visit)	ED Visits (per 100,000)			
			Female	Male	Black	White
Bedford	8,586	1,538	505	815	1,285	535
Coffee	7,727	1,308	881	1,177	2,476	953
Giles	9,025	1,755	815	681	1,496	644
Hickman*	29,852	1,698	582	914	1,818	716
Lawrence*	8,238	1,657	331	491	631	407
Lewis*	3,405	1,756	78	335	322	217
Lincoln	7,506	998	556	1,025	1,660	727
Marshall	5,542	968	667	875	2,333	651
Maury	7,096	1,473	582	948	2,062	542
Moore*	12,074	2,288	247	437	1,481	323
Perry	5,754	958	786	898		867
Wayne*	3,569	1,364	366	584	422	492
South Central Region	8,198	1,398	582	848	1,823	617

*Fewer than 20 Emergency Department visits, results should be interpreted with caution.

Appendix B

Southeast Region

County	Inpatient Charges (\$ per visit)	Outpatient Charges (\$ per visit)	ED Visits (per 100,000)			
			Female	Male	Black	White
Bledsoe	5,336	1,382	520	832		701
Bradley	8,443	1,842	500	764	1,214	557
Franklin	7,217	1,199	465	703	973	558
Grundy	5,454	1,729	402	677		554
Marion*	6,514	1,297	615	832	1,139	695
McMinn	8,009	1,406	482	740	1,028	520
Meigs*	6,933	1,544	698	841	521	775
Polk	4,981	1,579	574	782		691
Rhea*	7,133	807	723	850	1,996	732
Sequatchie	9,448	1,123	673	656		616
Southeast Region	7,579	1,439	540	765	1,109	605

Southwest Region

County	Inpatient Charges (\$ per visit)	Outpatient Charges (\$ per visit)	ED Visits (per 100,000)			
			Female	Male	Black	White
Chester	7,599	1,560	520	686	2,161	398
Decatur*	6,901	980	585	1,185	853	797
Fayette	14,831	1,919	826	1,415	2,162	617
Hardeman	5,737	1,214	2,311	2,583	3,955	1,001
Hardin	6,438	1,243	701	970	1,825	790
Haywood	7,475	1,224	1,175	1,534	2,092	333
Henderson	6,929	1,512	700	883	2,201	592
Lauderdale	12,506	1,360	1,448	2,355	3,280	1,035
McNairy	10,109	1,967	760	860	2,168	687
Tipton	14,907	1,631	928	1,434	3,034	725
Southwest Region	10,722	1,478	1,017	1,431	2,818	705

*Fewer than 20 Emergency Department visits, results should be interpreted with caution.

Appendix B

Upper-Cumberland Region

County	Inpatient Charges (\$ per visit)	Outpatient Charges (\$ per visit)	ED Visits (per 100,000)			
			Female	Male	Black	White
Cannon	14,675	1,236	464	481		483
Clay*	6,310	1,053	202	635		430
Cumberland*	8,089	1,457	488	741	305	613
DeKalb*	5,445	1,562	733	755	2,750	690
Fentress	7,961	2,193	623	1,203		870
Jackson*	5,719	1,201	285	586	3,448	432
Macon	5,504	971	421	781		566
Overton*	6,690	1,484	433	508	3,472	453
Pickett*	2,881	1,432	182	162		130
Putnam	4,947	955	484	645	1,838	553
Smith*	8,488	2,198	577	774	1,661	630
Van Buren*	3,904	1,273	501	378		426
Warren	9,317	1,480	678	1,068	1,415	742
White*	8,711	1,065	738	902	2,269	787
Upper-Cumberland Region	7,195	1,389	532	760	1,597	611

*Fewer than 20 Emergency Department visits, results should be interpreted with caution.

Appendix C

Regional and County TennCare Data

The following table presents detailed regional and county level TennCare data for childhood asthma (children aged 1 to 17 years).[#]

TennCare prevalence data are for 2010 to 2012.

Metropolitan Regions

County	Prevalence (%)	Prevalence by Gender (%)		Prevalence by Race (%)	
	Enrollees	Female	Male	Black	White
Davidson	13.5	11.6	15.3	15.2	11.2
Hamilton	21.3	19.0	23.6	26.4	18.7
Knox	12.8	11.2	14.3	16.4	11.7
Madison	14.3	11.9	16.7	15.8	11.0
Shelby	13.4	11.4	15.5	14.0	10.0
Sullivan	13.6	12.3	14.9	18.1	13.2

East Region

County	Prevalence (%)	Prevalence by Gender (%)		Prevalence by Race (%)	
	Enrollees	Female	Male	Black	White
Anderson	12.6	10.6	14.6	14.6	12.3
Blount	11.1	9.9	12.3	16.9	10.4
Campbell	13.5	11.7	15.2	19.0	13.0
Claiborne	17.5	16.2	18.9	15.8	17.3
Cocke	17.4	16.1	18.6	24.2	17.1
Grainger	12.5	11.3	13.6	17.6	12.4
Hamblen	12.4	10.7	14.1	18.0	12.2
Jefferson	14.1	12.8	15.4	16.6	13.6
Loudon	11.1	9.9	12.4	17.3	11.3
Monroe	11.9	10.0	13.6	12.7	11.8
Morgan	12.7	12.2	13.2	20.0	12.5
Roane	15.5	13.9	16.9	18.3	14.9
Scott	13.9	12.2	15.5	16.7	13.3
Sevier	12.0	11.2	12.8	12.2	11.9
Union	12.9	12.2	13.5	18.8	12.7
East Region	13.1	11.7	14.5	16.6	12.9

[#]Fourteen regions designated by the Tennessee Department of Health include eight rural and six metropolitan regions. For a map of the regions, please visit: http://hit.state.tn.us/tmap/print_tmap.htm.

Appendix C

Mid-Cumberland Region

County	Prevalence (%)	Prevalence by Gender (%)		Prevalence by Race (%)	
	Enrollees	Female	Male	Black	White
Cheatham	14.4	13.4	15.4	17.8	14.6
Dickson	16.1	14.2	17.7	24.5	15.1
Houston	10.6	9.4	11.6	20.0	9.1
Humphreys	13.3	12.1	14.5	14.8	12.4
Montgomery	13.2	11.4	15.0	15.7	11.5
Robertson	20.1	18.0	22.1	24.2	15.0
Rutherford	11.2	9.6	12.8	15.3	10.1
Stewart	8.4	7.7	9.1	10.4	8.0
Sumner	11.2	9.2	13.1	15.1	10.4
Trousdale	10.0	8.0	12.0	11.2	9.6
Williamson	10.8	9.5	12.0	17.0	9.5
Wilson	11.5	10.4	12.5	16.3	11.0
Mid-Cumberland Region	12.7	11.0	14.3	16.2	11.4

Northeast Region

County	Prevalence (%)	Prevalence by Gender (%)		Prevalence by Race (%)	
	Enrollees	Female	Male	Black	White
Carter	16.0	14.3	17.6	19.1	15.7
Greene	17.2	15.5	19.0	18.5	17.0
Hancock	10.5	9.6	11.3		10.1
Hawkins	13.6	11.6	15.4	21.2	13.2
Johnson	13.4	13.2	13.6	10.0	13.1
Unicoi	13.7	12.6	14.8	9.1	14.6
Washington	17.3	15.4	19.2	20.2	16.7
Northeast Region	15.7	14.1	17.4	19.8	15.3

Appendix C

Northwest Region

County	Prevalence (%)	Prevalence by Gender (%)		Prevalence by Race (%)	
	Enrollees	Female	Male	Black	White
Benton	10.4	9.5	11.3	28.6	9.6
Carroll	11.3	9.0	13.5	15.6	10.4
Crockett	11.3	10.0	12.5	16.0	10.5
Dyer	13.0	11.4	14.7	15.4	11.3
Gibson	13.3	11.2	15.3	18.0	10.5
Henry	13.3	11.6	14.9	17.9	12.5
Lake	13.2	10.4	15.5	15.2	11.5
Obion	9.4	8.6	10.2	15.8	7.9
Weakley	11.9	10.4	13.4	20.0	10.5
Northwest Region	12.1	10.4	13.7	16.9	10.5

South Central Region

County	Prevalence (%)	Prevalence by Gender (%)		Prevalence by Race (%)	
	Enrollees	Female	Male	Black	White
Bedford	11.8	10.0	13.6	16.8	11.2
Coffee	12.2	10.6	13.8	16.3	12.0
Giles	13.1	12.0	14.2	15.5	12.6
Hickman	12.7	11.4	13.9	22.7	12.2
Lawrence	14.8	11.7	17.6	17.8	14.5
Lewis	9.9	8.6	11.2	22.7	9.6
Lincoln	9.6	7.6	11.4	13.0	8.8
Marshall	12.1	10.5	13.7	18.0	11.4
Mauzy	13.6	12.1	15.1	18.5	11.6
Moore	8.8	10.0	7.8	18.2	8.8
Perry	9.9	8.2	11.7	4.9	9.5
Wayne	12.7	11.8	13.6	3.8	12.7
South Central Region	12.4	10.7	14.0	17.1	11.7

Appendix C

Southeast Region

County	Prevalence (%)	Prevalence by Gender (%)		Prevalence by Race (%)	
	Enrollees	Female	Male	Black	White
Bledsoe	14.8	12.1	17.2	25.7	14.9
Bradley	13.2	11.8	14.5	15.3	13.4
Franklin	14.3	13.4	15.3	16.2	14.3
Grundy	12.9	11.8	13.9	100.0	12.7
Marion	17.4	13.9	20.8	23.9	17.0
McMinn	16.4	13.8	19.0	17.6	16.3
Meigs	14.8	11.5	18.0	15.0	14.8
Polk	13.5	12.3	14.6	14.3	13.5
Rhea	16.3	15.0	17.5	22.4	16.4
Sequatchie	16.9	15.8	17.9		16.6
Southeast Region	14.9	13.1	16.6	17.5	14.9

Southwest Region

County	Prevalence (%)	Prevalence by Gender (%)		Prevalence by Race (%)	
	Enrollees	Female	Male	Black	White
Chester	11.7	10.4	13.0	15.8	10.8
Decatur	11.5	9.7	13.1	8.9	11.9
Fayette	16.9	14.5	19.1	18.2	14.7
Hardeman	21.7	20.4	22.9	26.3	14.7
Hardin	17.5	16.0	18.8	18.6	17.0
Haywood	13.0	10.7	15.1	13.7	11.2
Henderson	12.6	10.6	14.6	16.8	11.7
Lauderdale	14.5	12.4	16.7	15.8	12.9
McNairy	16.6	14.1	19.0	18.1	15.8
Tipton	15.4	13.4	17.2	16.6	14.4
Southwest Region	15.5	13.6	17.4	17.8	14.0

Appendix C

Upper-Cumberland Region

County	Prevalence (%)	Prevalence by Gender (%)		Prevalence by Race (%)	
	Enrollees	Female	Male	Black	White
Cannon	11.9	10.3	13.3	5.3	11.4
Clay	7.8	5.6	10.1	11.8	7.6
Cumberland	13.4	10.5	16.1	10.3	13.3
DeKalb	11.5	9.4	13.4	9.8	11.4
Fentress	13.0	11.3	14.7	10.0	13.1
Jackson	14.2	12.6	15.7	50.0	13.7
Macon	9.4	7.0	11.7	8.3	9.4
Overton	9.6	7.6	11.5	13.6	9.5
Pickett	8.3	6.0	10.3	23.1	7.6
Putnam	11.8	10.4	13.2	18.0	11.8
Smith	12.1	10.7	13.4	19.8	11.5
Van Buren	7.7	5.1	10.1		7.5
Warren	12.7	12.2	13.2	17.9	12.4
White	10.1	7.8	12.4	12.0	9.5
Upper-Cumberland Region	11.6	9.8	13.4	16.0	11.4