Issue Brief

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Potentially Avoidable Hospitalization in Tennessee, 2008

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Introduction

Tennesseans spend more on hospital care than any other medical treatment, with hospital costs accounting for more than a third of all dollars spent on health care in 2008.[1] In many cases these costly hospitalizations could be avoided.

This Issue Brief begins with an overview of hospital services delivered in Tennessee in 2008, followed by a detailed look at potentially avoidable hospitalizations (PAHs). It then examines differences in PAHs by gender, age, race, and ends with a comparison of the four most populous counties in the state.

This report focuses on adult patients ages 18 and over who were discharged from short-term general and critical access hospitals in Tennessee in 2008. Of all non-maternal adult dischargesreported in Tennessee inpatient discharge records, about 11% were for out-of-state patients, mostly from Virginia, Mississippi, and Georgia. These non-Tennessee patients are excluded from this report.

Tennessee Hospitalizations

In 2008, Tennessee hospitals discharged about 583,000 adult patients, resulting in an estimated expenditure of $5,528 million. Total days of inpatient treatment were almost 3 million, and the average expenditure per day was $1,892. Table 1 shows the number of discharges in each major diagnostic category (MDC), total inpatient days, and estimated expenditures for each.[2] Expenditures are the total of the amounts paid by patients and third-party payers (e.g. insurance companies) for hospital care. They are estimated from the reported hospital charges. On average, expenditures were about 33% of total charges in 2008.[3]

Table 1: Tennessee Inpatient Discharges, Days, and Expenditures by MDC, 2008

Major Diagnostic Category (MDC)	Discharges	Days	Expenditures[a]
Diseases & Disorders of the Circulatory System	121,377	524,204	$1,388.6
Diseases & Disorders of the Respiratory System	88,266	483,240	$720.3
Diseases & Disorders of the Digestive System	63,422	320,999	$530.0
Diseases & Disorders of the Musculoskeletal System And Connective Tissue	60,172	249,862	$817.3
Diseases & Disorders of the Nervous System	44,521	234,095	$414.9
Diseases & Disorders of the Kidney And Urinary Tract	34,352	160,750	$239.9
Endocrine, Nutritional And Metabolic System	24,055	90,702	$136.3
Infectious and Parasitic Diseases & Disorderss	22,282	167,785	$284.3
Diseases & Disorders of the Hepatobiliary System And Pancreas	20,809	105,697	$191.6
Mental Diseases and Disorders	20,191	159,317	$103.3
Diseases & Disorders of the Skin, Subcutaneous Tissue And Breast	17,287	75,863	$100.2
Diseases & Disorders of the Female Reproductive System	12,790	37,100	$87.5
Injuries, Poison And Toxic Effect of Drugs	10,648	39,217	$79.5
Factors Influencing Health Status	9,881	97,639	$81.0
Diseases & Disorders of the Blood and Blood Forming Organs and Immunological Disorders	8,743	38,327	$60.4
Diseases & Disorders of the Ear, Nose, Mouth And Throat	5,537	20,245	$38.6
Myeloproliferative Diseases & Disorderss (Poorly Differentiated Neoplasms)	4,765	37,387	$76.3
Alcohol/Drug Use or Induced Mental Disorders	4,357	18,665	$17.6
Diseases & Disorders of the Male Reproductive System	4,192	11,190	$31.8
Multiple Significant Trauma	2,044	22,032	$76.7
Human Immunodeficiency Virus Infection	1,561	13,484	$19.9
Diseases & Disorders of the Eye	679	2,444	$4.4
Burns	612	4,763	$15.6
Pre-MDC	376	6,412	$11.9
	582,919	2,921,419	$5,528.0

[a] In millions; estimated from hospital-reported charges and revenue-to-charge ratios

What is a Potentially Avoidable Hospitalization?

Hospitalizations for ambulatory care sensitive conditions (ACSCs) are called potentially avoidable hospitalizations (PAHs) because they can be prevented with high quality and timely preventive care delivered by primary care providers. The Agency for Healthcare Research and Quality (AHRQ) has established the specifications for determining which hospitalizations are potentially avoidablebased on the diagnostic codes and procedures performed in each discharge record. Collectively, the rates of PAHs are called Prevention Quality Indicators (PQIs). AHRQ recommends these quality indicators as a measure of quality of care in the ambulatory setting, meaning care provided in physicians' offices and urgent care clinics.[4]

It is important to note that a PAH is not an unnecessary hospitalization. In most cases the patients,once admitted, truly need the care. It should be noted, too, that while PAHs suggest a lack of access to effective primary care in the outpatient setting, many other factors can also contribute to the rate of PAHs in a community, including individuals' health status, when they seek treatment, and individuals' willingness to engage in health-promoting behaviors. Thirdly, the terms "ambulatory care sensitive condition," "potentially avoidable hospitalization," and "prevention quality indicator" should not be used interchangeably. ACSC refers specifically to the principal diagnosis while PAH, by contrast, refers to the hospitalization resulting from the ACSC. Finally, a PQI is the community-wide rate of PAHs, generally measured per 100,000 people.

PAHs can be classified as a chronic or acute condition. Chronic ACSCs require certain preventive health services and regular maintenance visits to a primary care physician. By contrast, acute ACSCs are those not requiring ongoing management but are still sensitive to primary care treatment. Chronic ACSCs are diabetes, hypertension, congestive heart failure (CHF), angina (if no cardiac procedure is performed), asthma, and chronic obstructive pulmonary disease (COPD).

Acute PQIs are measured using hospitalizations for the following ACSCs: dehydration, bacterial pneumonia, urinary tract infection, and perforated appendix. The perforated appendix PQI is measured differently from all of the others. It is calculated per appendicitis admission rather than at the population level. Because it has a different denominator, the perforated appendix PQI is treated separately and not included in summary rates for this Issue Brief.

State-Wide Rates of Potentially Avoidable Hospitalizations

Our application of the PQI software to the Tennessee inpatient discharge data for 2008 shows that of the582,919 of total discharges for all conditions in Tennessee, about 18% of themwere potentially avoidable, amounting to a total cost saving of about $491 million (10% of costs for all hospitalizations). The majority of PAHs are for chronic conditions (59%). Of the chronic conditions, most hospitalizations are for CHF followed by COPD.

Table 2 shows the number of PAHs and the rate per 100,000 adults in the general population for each of the different ACSCs. Also shown in Table 2 are the expected rates of PAH by type of ACSC. Expected rates represent what Tennessee rates would be if Tennessee had the same case mix (e.g., age, gender, and poverty status) as the rest of the nation. They are calculated using the AHRQ software that adjusts for age, gender, and poverty status.[5]

Table 2: Potentially Avoidable Hospitalizations by ACSC

	PAHs	Observed Rate[a]	Expected Rate[b]
Chronic ACSCs	**61,393**	**1,296.2**	**942.1**
Short-term Diabetes Complications (PQI 1)	3,415	72.1	54.3
Long-term Diabetes Complications (PQI 3)	6,344	133.9	116.6
Uncontrolled Diabetes (PQI 14)	1,247	26.3	20.6
Lower-Extremity Amputations Due To Diabetes (PQI 16)	2,020	42.6	33.1
Hypertension (PQI 7)	3,622	76.5	58.2
Congestive Heart Failure (PQI 8)	21,364	451.1	358.6
Angina Without Procedure (PQI 13)	998	21.1	26.5
Chronic Pulmonary Obstructive Disease (PQI 5)	17,161	362.3	184.0
Adult Asthma (PQI 15)	6,226	131.5	106.9
Acute ACSCs	**41,999**	**886.8**	**585.8**
Dehydration (PQI 10)	6,732	142.1	95.9
Bacterial Pneumonia (PQI 11)	23,043	486.5	325.2
Urinary Tract Infection (PQI 12)	12,224	258.1	163.1
Perforated Appendix (PQI 2)	1,216	36.8	31.4
Chronic and Acute ACSCs[c]	**103,389**	**2,182.9**	**1,534.2**
[a]Per 100,000 adults, except perforated appendix; perforated appendix shown per 100 appendicitis admissi			
[b]Expected rate given state sociodemographic characteristics			
[c]Excludes perforated appendix			

In 2008, Tennessee's observed rates were above the expected ratesfor almost all types of PAHs. The difference between observed and expected rates may be explained by lower quality primary care in Tennessee than in the rest of the nation, poorer average health, Tennesseans'tendency in delaying care seeking or seeking care from inappropriate places, or some combination of these factors.

Gender and Age Differences

Considerable variations in PAHs exist among Tennesseans of different gender, age, and race groups. Table 3 shows the rates per 100,000 adults for men and women and the difference between the two groups. Overall, women have 2,482 PAHs per 100,000 adults, 622 more PAHs than men, or 1.3 times as many. For chronic conditions, the rates are closer—women have 1.2 times as many PAHs as men. Most

of the difference, however, comes from acute conditions—women have 400 more acute PAHs per 100,000 than men, or 1.6 times as many.

PAHs become more common as individuals grow older. This is in part due to greater disease burden and likelihood of any admission as people get older. However, disparity amongst age groups may also be an indication that older Tennesseans are not getting the high-quality preventive care they need.

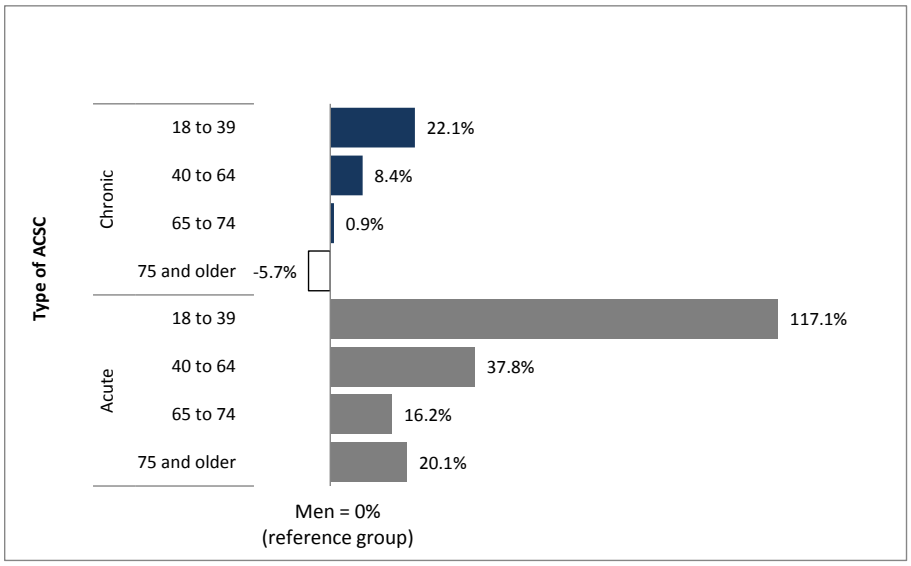
As shown in Table 3, men 75 years and older in Tennessee have 9,658 PAHs per 100,000 while young men ages 18 to 39 years old have 389 PAHs per 100,000. The oldest men experience nearly 25 PAHs for every one PAH experienced by young men. For women, the age difference, though smaller, is still substantial—17 PAHs for the oldest women for every one PAH for young women.

Table 3: Rates of PAHS per 100,000 Adults by Gender and Age

	Men	Women	Women-Men
Chronic ACSCs	**1,180.8**	**1,402.8**	**222.0**
18 to 39	244.2	298.2	54.0
40 to 64	1,087.4	1,178.9	91.5
65 to 74	3,040.9	3,069.7	28.8
75 and older	5,323.5	5,019.7	-303.8
Acute ACSCs*	**678.6**	**1,079.0**	**400.4**
18 to 39	144.7	314.1	169.4
40 to 64	468.5	645.7	177.2
65 to 74	1,643.5	1,909.6	266.1
75 and older	4,335.0	5,204.7	869.7
Chronic and Acute ACSCs[a]	**1,859.4**	**2,481.8**	**622.4**
18 to 39	388.9	612.3	223.4
40 to 64	1,555.9	1,824.6	268.7
65 to 74	4,684.4	4,979.3	294.9
75 and older	9,657.7	10,223.6	565.9
[a]Excludes perforated appendix			

Does the gender difference in the rate of PAH change as men and women grow older? We address this gender-difference question in Figure 1 where women's rates of PAH are expressed as percent of those of men for different age groups. As can be clearly seen in Figure 1, the gender difference is particularly pronounced for the 18-39 age range and this is especially true for acute conditions where the rate of PAHs for younger women is about 117% higher than that of young men. However, the gender difference declines as age rises for both chronic and acute conditions.

Figure 1: Gender Differences in PAH Rates



Race, Gender and Age Differences

As seen in the previous section, men generally have lower rates of PAHs than women. This section expands the sub-group analysis to differences among whites, African-Americans, and Hispanics. Table 4 shows the observed and expected PAH rates by race or ethnicity. Data for adult population and the observed cases of PAHs for the different ethnic/racial sub-groups are also shown for reference.

Table 4: Observed and Expected PAH Rates by Race or Ethnicity

Type	Adult Population	PAHs[a]	Observed Rate[b]	Expected Rate[c]
Chronic ACSCs				
White/Caucasian	3,761,940.0	34,982.0	929.9	994.3
Black/Af. Amer.	725,784.0	10,997.0	1,515.2	774.9
Hispanic	139,126.0	1,538.0	1,105.5	508.7
Acute ACSCs				
White/Caucasian	3,761,940.0	26,186.0	696.1	622.4
Black/Af. Amer.	725,784.0	4,201.0	578.8	464.2
Hispanic	139,126.0	1,425.0	1,024.3	298.9
Chronic and Acute ACSCs				
White/Caucasian	3,761,940.0	61,165.0	1,625.9	1,616.6
Black/Af. Amer.	725,784.0	15,198.0	2,094.0	1,239.1
Hispanic	139,126.0	2,963.0	2,129.7	835.2
*Excluding perforated appendix				
**Per 100,000 adults				
***Expected rate given age, gender, and socioeconomic composition				

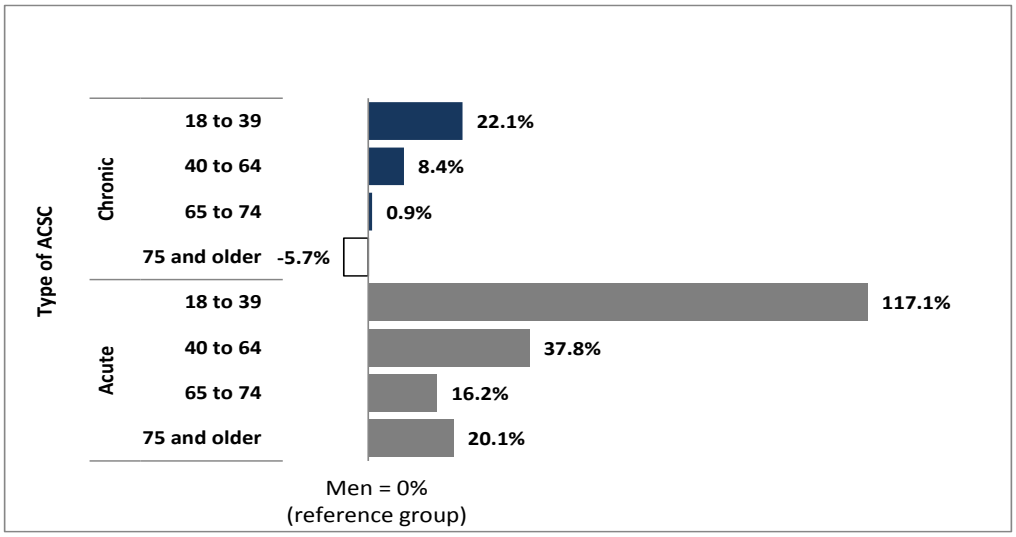
The rate of PAHs for African-Americans is about 29% higher than their white counterparts: 2,094 compared to 1,626of observed cases of PAHs per 100,000 adults. This is due largely to PAHs for chronic conditions, where the rate is nearly 63% higher for African-Americans than for whites. The racial difference in the rate of PAHs for acute conditions is, in contrast, lower in the African-American population than in the white population by a substantial 17.0%.

The overall rate of PAHs in the Hispanic population is about 31.0% higher than in white population. For chronic ACSCs, the rate of PAHs for Hispanics was about 19% higher than that for whites. The difference was much higher for acute conditions—47.1% higher in the Hispanic population when compared to whites.

The comparison of observed rates, though useful, is distorted inherently by differences in gender, age, and poverty rates that vary dramatically among different racial and ethnic groups. It is therefore important to compare observed rates to expected rates, which are adjusted for age, gender, and socioeconomic status to filter out the between-group variations in PAH due to the inherent differences in these specific demographic and socioeconomic characteristics.

The expected rates of PAHs shown in the last column of Table 4 reveal a different pattern of racial and ethnic disparities than that of the observed rates. We present this comparison in Figure 2 by calculating the "excess" PAHsfor the different racial and ethnic groups. Excess PAHs are defined asratios, shown in percentages, of observed rates to expected rates. For both chronic and acute ACSCs, the difference between the observed and expected rates is smallest for white Tennesseans. White Tennesseans' PAH rate was actually 6.5% lower than expected for chronic conditions. For both African-Americans and Hispanics, however, the expected rates exceed the observed rates by substantially larger margins for both chronic and acute ACSCs.

Figure 2: Excess PAHs by Race or Ethnicity



It is plausible that the high excess rates of chronic PAHs experienced by African-Americans are the consequence of the higher prevalence of chronic diseases in this population. However, the higher rates may also indicate challenges facing African-Americans in managing their chronic diseases not experienced by whites. For Hispanics, the observed rate of PAHs for chronic ACSCs is more than 117.3% higher than the expected rate while their observed rate of PAHs for acute conditions is a whopping 243% higher than their expected rates. These glaring disparities in the rates of PAHs clearly suggest severe deficiency in ambulatory carein the Hispanic population.

County Differences

Tennessee has 95 counties, but many of them are so small and sparsely populated that their PAH rates cannot be reliably calculated. We therefore examine the four most populous counties in Tennessee: Davidson, Hamilton, Knox, and Shelby. These four counties account for more than a third of Tennessee's population.

Table 5: PAHs of Four Major Counties

	Adult Population	PAHs[a]	Observed Rate[b]	Relative to State[c]
Davidson	476,912	7,845	1,645.0	-24.6%
Hamilton	258,721	4,148	1,603.3	-26.6%
Knox	334,493	4,441	1,327.7	-39.2%
Shelby	661,115	12,291	1,859.1	-14.8%

[a]Chronic and acute ACSCs, excluding perforated appendix
[b]Per 100,000 adults
[c]Percent higher (+) or lower (-) than the state-wide observed PAH rate

Table 5 provides a summary of the differences between each county and the state in the overall rate of PAHs. Rates of PAHs are highest in Shelby County and lowest in Knox County. In addition, the PAH rate was lower in all four urban counties than in the state as a whole. Because PAH rates reflect, in part, access to care, it is logical to infer that the lower PAH rates in urban areas are the result of their having more adequate supply of primary care. More detailed comparisons of observed and expected rates for the four individual counties are presented in Tables 6 – 8.

Davidson County

Davidson County is in the northern part of Middle Tennessee and contains the state capital, Nashville. The county is second in the state for population and thirty-seventh for land area. Overall, access to healthcare is high in Davidson County. It ranks third in the state for access to physicians and fourth in the state for access to hospitals. It has one of the lowest all-cause mortality rates in the state8.[6]

Population

The residents of Davidson County are slightly younger than the state as a whole. The median age is 36.5 years compared to 37.5 years statewide. Women outnumber men in Davidson County, making up about 51% of the population, which is comparable to the state. The county is more racially diverse than the state. About 39% of the population is Hispanic or a non-white race; 7% of the population is Hispanic. This compares to 22% and 3%, respectively, for the state. Davidson County is relatively affluent with

median household income about $46,800 compared to $43,700 for the state. However, the individual poverty rate is the same for Davidson County and the state9.[7]

PAHs

Table 6 shows the number of PAHs, observed rate, and expected rates of chronic and acute PAHs for Davidson County. As with the state, David County's observed rates exceeded expected rates given the population of Davidson County.

Table 6: PAH Rates for Davidson County

	PAHs	Observed Rate[a]	Expected Rate[b]
Chronic ACSCs	4,947	1,037.3	878.5
Acute ACSCs	2,898	607.7	544.8
Chronic and Acute ACSCs[c]	7,845	1,645.0	1,424.6

[a]Per 100,000 adults

[b]Expected rate given age, gender, and socioeconomic composition

[c]Excluding perforated appendix

Hamilton County

Hamilton County is in the southeast corner of Tennessee and contains Chattanooga. The county is fourth in the state for population and twenty-seventh for land area. Overall, access to healthcare is high in Hamilton County. It ranks seventh in the state for access to physicians and fifth in the state for access to community hospitals. The all-cause mortality rate in Hamilton County is slightly higher than the state average (10.3 compared to 9.5 deaths per 1,000 residents).[8]

Population

The residents of Hamilton County are slightly older on average than the state as a whole. The median age is 39.5 years compared to 37.5 years statewide. Women outnumber men in Hamilton County, making up about 52% of the population, comparable to the state. The county is also racially similar to the state. About 26% of the population is Hispanic or non-white; 3% of the population is Hispanic. This compares to 22% and 3%, respectively, for the state. Hamilton County is relatively affluent with median household income about $46,500 compared to $43,700 for the state. The individual poverty rate is slightly lower in Hamilton County compared to the state (13.5% and 15.7% respectively).[8]

PAHs

Table 7 shows the number of PAHs, the observed rates, and expected rates of both chronic and acute PAHs for Hamilton County. Unlike the state, observed rates are relatively close to the expected rates, with acute rates slightly below expected and chronic rates slightly above expected.

Table 7: PAH Rates for Hamilton County

	PAHs	Observed Rate[a]	Expected Rate[b]
Chronic ACSCs	2,676	1,034.3	1,029.6
Acute ACSCs	1,472	569.0	653.2
Chronic and Acute ACSCs[c]	4,148	1,603.3	1,695.8

[a]Per 100,000 adults

[b]Expected rate given age, gender, and socioeconomic composition

[c]Excluding perforated appendix

Knox County

Knox County is located in East Tennessee and is home to the state's largest university, The University of Tennessee. Knox County is third in the state for population and thirty-sixth for land area. Overall, access to healthcare is high in Knox County. It ranks sixth in the state for access to physicians and seventh in the state for access to community hospitals. The all-cause mortality rate in Knox County is equivalent to the state average11.[9]

Population

The residents of Knox County have the same median age as the state. As in the rest of the state, women slightly outnumber men in Knox County, making up about 51.5% of the population. The county is much less racially diverse than the state. About 14% of the population is Hispanic or non-white; 3% of the population is Hispanic. This compares to 28% and 3%, respectively, for the state. Knox County is relatively affluent with median household income about $46,700 compared to $43,700 for the state. Additionally, the individual poverty rate is lower the state's rate (13.1% compared to 15%).[9]

PAHs

Table 8 shows the number of PAHs, observed rates, and expected rates of the different types of PAHs for Knox County. Observed rates are close to the expected rates of PAHs in Knox County. This is in contrast to the state where the observed rates exceed expected rates by large amounts.

Table 8: PAH Rates for Knox County

	PAHs	Observed Rate[a]	Expected Rate[b]
Chronic ACSCs	2,627	785.4	894.9
Acute ACSCs	1,814	542.3	565.9
Chronic and Acute ACSCs[c]	4,441	1,327.7	1,466.5

[a]Per 100,000 adults

[b]Expected rate given age, gender, and socioeconomic composition

[c]Excluding perforated appendix

Shelby County

Shelby County is located in the southwest corner of Tennessee along the Mississippi River and is home to the state's largest city, Memphis. Shelby County is the largest and most populous county in Tennessee. Access to healthcare is high in Shelby County, though it is lower than those in the other 3 major counties in the state. Shelby County ranks eighth in the state for access to physicians and twelfth in the state for access to hospitals. The all-cause mortality rate in Shelby County is lower than the state average—8.1 compared to 9.5 deaths per 1,000.[10]

Population

The residents of Shelby County are younger on average than other Tennesseans. The median age in Shelby County is 35.4 years, compared to 37.5 years statewide. Women outnumber men in Shelby County, making up 52.3% of the population, a higher proportion than observed in the rest of state. Shelby County is the most racially diverse county in Tennessee and is the state's only majority minority county. Approximately 52% of residents are Hispanic or non-white and 4.3% are Hispanic. This compares to 22% and 3%, respectively, for the state.

PAHs

Table 9 shows the number of PAHs, observed rates and expected rates of the different types of PAHs for Shelby County. As with the state, observed rates exceeded expected rates, a difference most pronounced for PAHs resulting from chronic ACSCs where the rate is about 22% higher than expected.

Table 9: PAH Rates for Shelby County

	PAHs	Observed Rate[a]	Expected Rate[b]
Chronic ACSCs	8,143	1,231.7	964.9
Acute ACSCs	4,148	627.4	563.1
Chronic and Acute ACSCs[c]	12,291	1,859.1	1,527.9

[a]Per 100,000 adults

[b]Expected rate given age, gender, and socioeconomic composition

[c]Excluding perforated appendix

Note:

[1]Kaiser Family Foundation's State Health Facts project.http://http://www.statehealthfacts.kff.org/profileind.jsp?ind=593&cat=5&rgn=44 [Accessed 3/19/2011]

[2] Expenditures were calculated based on each hospital's revenue to charge ratio using data from the Tennessee Joint Annual Report of Hospitals, a statewide database maintained by the Health Statistics Division of the Tennessee Department of Health. A description of the report can be found at: http://health.state.tn.us/statistics/jar.htm.

[3]Estimation of expenditures was done using each hospital's reported revenue and charges from Tennessee Joint Annual Report of Hospitals. We calculated a revenue-to-charge ratio and multiplied that number by charges for each discharge for a given hospital.

[4] For information about the development of the PQIs, the technical specifications, and other types of AHRQ quality indicators, visit the AHRQ Website, http://www.qualityindicators.ahrq.gov.

[5] We used Version 4.1 of the AHRQ PQI software to calculate age, gender and poverty status adjusted PHA rates in this report. It can be accessed from http://www.qualityindicators.ahrq.gov/software.htm.

[6] Tennessee Advisory Commission on Intergovernmental Relations, Davidson County, Tennessee County Profile. Online available at: http://www.tn.gov/tacir/county_profiles.html. [Access 4/17/2011]

[7] U.S. Census Bureau, 2006-2008 American Community Survey. Online available at: http://www.factfinder.census.gov/. [Accessed 4/17/2011]

[8] Tennessee Advisory Commission on Intergovernmental Relations, Hamilton County, Tennessee County Profile. http://www.tn.gov/tacir/county_profiles.html. [Access 4/17/2011]

[9] Tennessee Advisory Commission on Intergovernmental Relations, Knox County, Tennessee County Profile. http://www.tn.gov/tacir/county_profiles.html. [Access 4/17/2011]

[10]Tennessee Advisory Commission on Intergovernmental Relations, Shelby County, Tennessee County Profile. http://www.tn.gov/tacir/county_profiles.html. [Access 4/17/2011]

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