

## STATISTICAL BRIEF #54

June 2008

# Hospital Stays Related to Asthma for Adults, 2005

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### Introduction

In 2005, an estimated 22.2 million Americans had a current diagnosis of asthma with approximately 12.2 million of these individuals suffering at least one asthma attack in the previous year.<sup>1</sup> Asthma, a chronic disease characterized by inflammation of the airways, restricts the passage of air into the lungs and leads to episodes of wheezing, coughing, chest tightness, and shortness of breath; severe asthma episodes can close off airways completely and may prevent vital organs from receiving oxygen.<sup>2</sup> With proper outpatient care, the disease is largely controllable and hospitalization is preventable. However, differences in the prevalence of asthma and disparities in outpatient treatment result in rates of hospitalizations for asthma which vary by age, gender, race, and educational background, among other factors.<sup>3</sup>

This Statistical Brief presents data from the Healthcare Cost and Utilization Project (HCUP) on asthma-related stays for adults at U.S. community hospitals in 2005. Variation in the characteristics of hospitalizations principally for asthma, stays with a secondary diagnosis of asthma, and those with no mention of asthma are examined. The differing rates of asthma-related hospitalization across region and income-level are also presented.

This brief is the first report in a two-part series on asthma-related hospitalizations. Because characteristics of hospital stays for asthma differ for adults and children, discussion of pediatric asthma-related stays will be presented in a separate brief (HCUP Statistical Brief #58, August 2008).

<sup>1</sup> Asthma Prevalence, Health Care Use and Mortality: United States, 2003–05. Lara Akinbami, M.D., Office of Analysis and Epidemiology, CDC.

<sup>2</sup> A.D.A.M. Medical Encyclopedia [Internet]. Atlanta (GA): A.D.A.M., Inc.; ©2005. Asthma; [updated 2006 Oct 30; cited 2008 Mar 12]; [about 4 p.].

<sup>3</sup> Diette GB, Krishnan JA, Dominici F, Hoponik E, Skinner EA, Steinwachs D, Wu AW. *Asthma in Older Patients: Factors Associated with Hospitalization*. Arch Intern Med. 2002; 162:1123–1132.

### Highlights

- In 2005, approximately 1.9 million adult hospital stays were related to asthma.
- While the number of adult hospital stays principally for asthma remained relatively stable between 1997 and 2005, the number of stays with secondary asthma more than doubled.
- Among adults living in poorer communities, the rate of hospital stays principally for asthma was 63.2 percent greater compared to those living in wealthier communities.
- Even though only 8.2 percent of the adult population was covered by Medicaid, it was the expected payer for more than 30 percent of adult hospitalizations principally for asthma.
- Nearly three-fourths of stays principally for asthma were admitted from the emergency department.
- Pneumonia was the most common reason for hospitalization among adult stays noting asthma as a secondary diagnosis; it accounted for 7.6 percent of these stays.
- Among adults, mood disorders were nearly twice as likely to be the principal reason for asthma-related hospital stays than for stays with no mention of asthma.
- Rates of adult asthma-related hospitalizations were lowest in the West.

## Findings

### *General findings*

In 2005, there were approximately 1.9 million asthma-related hospital stays among adults; asthma was listed as the principal reason for hospitalization (i.e., the principal diagnosis) for 15 percent of these stays and was listed as a secondary diagnosis for the remaining 85 percent (table 1). While the number of hospital stays principally for asthma remained relatively stable between 1997 and 2005, the number of hospital stays noting asthma as a secondary condition more than doubled over this time period (figure 1).

Table 1 demonstrates that resource use associated with stays principally for asthma differed from that of stays with a secondary diagnosis of asthma. For example, stays principally for asthma were, on average, almost one day shorter than those stays noting asthma as a secondary diagnosis (4.1 days versus 4.9 days). Adjusting for differences in lengths of stay, hospitalizations principally for asthma also cost about \$400 less per day than those stays with secondary asthma (\$1,400 per day compared to about \$1,800 per day). Although shorter and less costly, almost three out of four stays with a principal diagnosis of asthma were admitted from the emergency department compared to about half of stays with asthma as a secondary diagnosis. Resource use for stays with no mention of asthma was very comparable to stays for which asthma was listed as a secondary diagnosis.

Demographic characteristics of patients hospitalized principally for asthma and individuals hospitalized with a secondary diagnosis of asthma were similar: hospitalization rates increased with age and were higher in females. Rates of asthma-related hospitalizations were more than 3 times greater in the 65+ age group compared to the 18–44 age group. Among women, the hospitalization rate for asthma-related stays was about 2.5 times greater than the rate for men. For hospital stays with no mention of asthma, hospitalization rates were even more strongly related to age, but less related to gender. In stays with no mention of asthma there were 4.2 times more stays among the elderly (65+ years) compared to younger adults (18–44 years) and the stays were 1.4 times more likely to be for females than males.

### *Asthma-related hospital stays, by median income*

In 2005, adult asthma hospitalization rates were higher in poor regions than in richer ones. The rate of stays principally for asthma was 63.2 percent higher among adults living in poorer communities (i.e., a ZIP Code with a median income of less than \$36,000) than it was among adults living in wealthier communities (i.e., a ZIP Code with a median income of \$36,000 or more) (figure 2). The difference in rates was still sizeable, but smaller, for stays with a secondary diagnosis of asthma: the hospitalization rate for individuals living in poorer communities was 31.7 percent higher than for those living in wealthier communities.

### *Asthma-related hospital stays, by payer*

Government payers, Medicare and Medicaid, were billed for about 60 percent of adult asthma-related stays which was comparable to the percentage of all hospital stays billed to public payers (figure 3). Relative to their shares of all hospital stays, Medicaid was billed for disproportionately more stays principally for asthma (30.2 percent of stays for asthma compared to 19.5 percent of all stays) while Medicare was billed with greater frequency when asthma was listed as a secondary diagnosis (47.4 percent of secondary cases of asthma compared to 37.2 percent of all stays). Similar to their share of all hospital stays, private insurers were billed for about a third of adult asthma-related stays. Uninsured stays accounted for 5 to 8 percent of asthma-related stays and about 5 percent of all hospitalizations.

### *Asthma-related hospital stays, by region*

The overall prevalence of asthma did not vary significantly by region with about 10–11 percent of the U.S. adult population self-reporting as having asthma at some point in their lives and 7–8 percent reporting as current asthmatics in each region.<sup>4</sup> After adjusting for regional population differences, rates of hospitalization principally for asthma were comparable in the Northeast, Midwest, and South at about 2

<sup>4</sup> Pleis JR, Lethbridge-Çejku M. Summary Health Statistics for U.S. Adults: National Health Interview Survey, 2005. National Center for Health Statistics. Vital and Health Stat. 10, (232). 2006.

stays per 1,000 population (figure 4). The rate in the West was lower at 1.4 stays per 1,000 population. Hospital stays with a secondary diagnosis of asthma showed a slightly different pattern. While hospitalization rates remained comparable in the Northeast and Midwest (10.2 and 9.1 stays per 1,000 population, respectively), the rates were lower in the South and the West (7.6 and 6.7 stays per 1,000 population, respectively).

#### *Most common principal diagnoses for hospital stays with asthma noted as a secondary condition*

Asthma is often a secondary reason for hospitalization rather than the principal reason. Among those stays with asthma noted as a secondary diagnosis, table 2 shows the five most common principal reasons why patients were hospitalized. Pneumonia was, by far, the most common principal reason for hospitalization in asthma-related stays being noted in 123,100, or 7.6 percent, of asthma-related stays. Pneumonia was more than twice as commonly noted as the principal reason for admission in asthma-related stays compared to stays with no mention of asthma.

The next two most common principal diagnoses associated with asthma-related hospitalizations were conditions of the circulatory system—congestive heart failure and nonspecific chest pain—collectively being noted in 121,100, or 7.5 percent, of asthma-related hospital stays. The prevalence of these cardiac conditions was comparable in stays with no mention of asthma.

Osteoarthritis and mood disorders were each noted in more than 53,000, or 3.3 percent, of asthma-related stays. Osteoarthritis was slightly more common in stays with no mention of asthma compared to asthma-related stays; however, mood disorders were noted more commonly in stays with a secondary diagnosis of asthma. Compared to patients with no mention of asthma, patients with asthma were nearly twice as likely to have a mood disorders noted as the principal reason for hospitalization.

## Data Source

The estimates in this Statistical Brief are based upon data from the HCUP 2005 Nationwide Inpatient Sample (NIS). Historical data were drawn from the 1997, 1998, 1999, 2000, 2001, 2002, 2003, and 2004 NIS. Supplemental sources included:

- 1) Denominator data for the population rates presented in Table 1 were derived from 2005 Claritas Population Data.
- 2) Health insurance coverage estimates from the Current Population Survey (CPS) Table Creator in the 2005 data year ([http://www.census.gov/hhes/www/cpstc/cps\\_table\\_creator.html](http://www.census.gov/hhes/www/cpstc/cps_table_creator.html)).

## Definitions

### *Diagnoses, Procedures, ICD-9-CM, and Clinical Classifications Software (CCS)*

The principal diagnosis is that condition established after study to be chiefly responsible for the patient's admission to the hospital. All-listed procedures include all procedures performed during the hospital stay.

ICD-9-CM is the International Classification of Diseases, Ninth Revision, Clinical Modification, which assigns numeric codes to diagnoses. There are about 12,000 ICD-9-CM diagnosis codes.

CCS categorizes ICD-9-CM diagnoses and procedures into clinically meaningful categories.<sup>5</sup> This "clinical grouper" makes it easier to quickly understand patterns of diagnoses and procedures.

### *Case Definition*

The CCS diagnosis code used to identify asthma cases was "128."

<sup>5</sup> HCUP CCS. Healthcare Cost and Utilization Project (HCUP). August 2006. U.S. Agency for Healthcare Research and Quality, Rockville, MD.

### *Types of hospitals included in HCUP*

HCUP is based on data from community hospitals, defined as short-term, non-Federal, general and other hospitals, excluding hospital units of other institutions (e.g., prisons). HCUP data include OB-GYN, ENT, orthopedic, cancer, pediatric, public, and academic medical hospitals. They exclude long-term care, rehabilitation, psychiatric, and alcoholism and chemical dependency hospitals, but these types of discharges are included if they are from community hospitals.

### *Unit of analysis*

The unit of analysis is the hospital discharge (i.e., the hospital stay), not a person or patient. This means that a person who is admitted to the hospital multiple times in one year will be counted each time as a separate "discharge" from the hospital.

### *Costs and charges*

Total hospital charges were converted to costs using HCUP Cost-to-Charge Ratios based on hospital accounting reports from the Centers for Medicare and Medicaid Services (CMS).<sup>6</sup> Costs will tend to reflect the actual costs of production, while charges represent what the hospital billed for the case. For each hospital, a hospital-wide cost-to-charge ratio is used because detailed charges are not available across all HCUP States. Hospital charges reflect the amount the hospital charged for the entire hospital stay and does not include professional (physician) fees. For the purposes of this Statistical Brief, costs are reported to the nearest hundred.

### *Payer*

Payer is the expected primary payer for the hospital stay. To make coding uniform across all HCUP data sources, payer combines detailed categories into more general groups:

- Medicare includes fee-for-service and managed care Medicare patients.
- Medicaid includes fee-for-service and managed care Medicaid patients. Patients covered by the State Children's Health Insurance Program (SCHIP) may be included here. Because most state data do not identify SCHIP patients specifically, it is not possible to present this information separately.
- Private insurance includes Blue Cross, commercial carriers, and private HMOs and PPOs.
- Other includes Worker's Compensation, TRICARE/CHAMPUS, CHAMPVA, Title V, and other government programs.
- Uninsured includes an insurance status of "self-pay" and "no charge."

When more than one payer is listed for a hospital discharge, the first-listed payer is used.

### *Admission source*

Admission source indicates where the patient was located prior to admission to the hospital. Emergency admission indicates the patient was admitted to the hospital through the emergency department.

### *Median community-level income*

Median community-level income is the median household income of the patient's ZIP Code of residence. The income value is missing for homeless and foreign patients.

## **About HCUP**

HCUP is a family of powerful health care databases, software tools, and products for advancing research. Sponsored by the Agency for Healthcare Research and Quality (AHRQ), HCUP includes the largest all-payer encounter-level collection of longitudinal health care data (inpatient, ambulatory surgery, and emergency department) in the United States, beginning in 1988. HCUP is a Federal-State-Industry Partnership that brings together the data collection efforts of many organizations—such as State data organizations, hospital associations, private data organizations, and the Federal government—to create a national information resource.

<sup>6</sup>HCUP Cost-to-Charge Ratio Files (CCR). Healthcare Cost and Utilization Project (HCUP). 2001–2003. U.S. Agency for Healthcare Research and Quality, Rockville, MD. [www.hcup-us.ahrq.gov/db/state/costtocharge.jsp](http://www.hcup-us.ahrq.gov/db/state/costtocharge.jsp).

HCUP would not be possible without the contributions of the following data collection Partners from across the United States:

**Arizona** Department of Health Services  
**Arkansas** Department of Health & Human Services  
**California** Office of Statewide Health Planning & Development  
**Colorado** Hospital Association  
**Connecticut** Integrated Health Information (Chime, Inc.)  
**Florida** Agency for Health Care Administration  
**Georgia** Hospital Association  
**Hawaii** Health Information Corporation  
**Illinois** Health Care Cost Containment Council and Department of Public Health  
**Indiana** Hospital & Health Association  
**Iowa** Hospital Association  
**Kansas** Hospital Association  
**Kentucky** Cabinet for Health and Family Services  
**Maryland** Health Services Cost Review Commission  
**Massachusetts** Division of Health Care Finance and Policy  
**Michigan** Health & Hospital Association  
**Minnesota** Hospital Association  
**Missouri** Hospital Industry Data Institute  
**Nebraska** Hospital Association  
**Nevada** Division of Health Care Financing and Policy, Department of Health and Human Services  
**New Hampshire** Department of Health & Human Services  
**New Jersey** Department of Health & Senior Services  
**New York** State Department of Health  
**North Carolina** Department of Health and Human Services  
**Ohio** Hospital Association  
**Oklahoma** Health Care Information Center for Health Statistics  
**Oregon** Association of Hospitals and Health Systems  
**Rhode Island** Department of Health  
**South Carolina** State Budget & Control Board  
**South Dakota** Association of Healthcare Organizations  
**Tennessee** Hospital Association  
**Texas** Department of State Health Services  
**Utah** Department of Health  
**Vermont** Association of Hospitals and Health Systems  
**Virginia** Health Information  
**Washington** State Department of Health  
**West Virginia** Health Care Authority  
**Wisconsin** Department of Health & Family Services

## About the NIS

The HCUP Nationwide Inpatient Sample (NIS) is a nationwide database of hospital inpatient stays. The NIS is nationally representative of all community hospitals (i.e., short-term, non-Federal, non-rehabilitation hospitals). The NIS is a sample of hospitals and includes all patients from each hospital, regardless of payer. It is drawn from a sampling frame that contains hospitals comprising about 90 percent of all discharges in the United States. The vast size of the NIS allows the study of topics at both the national and regional levels for specific subgroups of patients. In addition, NIS data are standardized across years to facilitate ease of use.

## About HCUPnet

HCUPnet is an online query system that offers instant access to the largest set of all-payer health care databases that are publicly available. HCUPnet has an easy step-by-step query system, allowing for tables and graphs to be generated on national and regional statistics, as well as trends for community

hospitals in the U.S. HCUPnet generates statistics using data from HCUP's Nationwide Inpatient Sample (NIS), the Kids' Inpatient Database (KID), the State Inpatient Databases (SID) and the State Emergency Department Databases (SEDD).

### For More Information

For more information about HCUP, visit [www.hcup-us.ahrq.gov](http://www.hcup-us.ahrq.gov).

For additional HCUP statistics, visit HCUPnet, our interactive query system, at [www.hcup.ahrq.gov](http://www.hcup.ahrq.gov).

For information on other hospitalizations in the U.S., download *HCUP Facts and Figures: Statistics on Hospital-based Care in the United States in 2005*, located at <http://www.hcup-us.ahrq.gov/reports.jsp>.

For a detailed description of HCUP, more information on the design of the NIS, and methods to calculate estimates, please refer to the following publications:

Steiner, C., Elixhauser, A., Schnaier, J. The Healthcare Cost and Utilization Project: An Overview. *Effective Clinical Practice* 5(3):143–51, 2002.

*Design of the HCUP Nationwide Inpatient Sample, 2005*. Online. June 13, 2007. U.S. Agency for Healthcare Research and Quality.  
[http://www.hcup-us.ahrq.gov/db/nation/nis/reports/NIS\\_2005\\_Design\\_Report.pdf](http://www.hcup-us.ahrq.gov/db/nation/nis/reports/NIS_2005_Design_Report.pdf)

Houchens, R., Elixhauser, A. *Final Report on Calculating Nationwide Inpatient Sample (NIS) Variances, 2001*. HCUP Methods Series Report #2003-2. Online. June 2005 (revised June 6, 2005). U.S. Agency for Healthcare Research and Quality.  
<http://www.hcup-us.ahrq.gov/reports/CalculatingNISVariances200106092005.pdf>

Houchens RL, Elixhauser A. *Using the HCUP Nationwide Inpatient Sample to Estimate Trends. (Updated for 1988–2004)*. HCUP Methods Series Report #2006-05 Online. August 18, 2006. U.S. Agency for Healthcare Research and Quality.  
[http://www.hcup-us.ahrq.gov/reports/2006\\_05\\_NISTrendsReport\\_1988-2004.pdf](http://www.hcup-us.ahrq.gov/reports/2006_05_NISTrendsReport_1988-2004.pdf)

### Suggested Citation

Merrill, C.T. (Thomson Reuters), Stranges, E. (Thomson Reuters), and Steiner, C. (AHRQ). *Hospital Stays for Asthma Among Adults, 2005*. HCUP Statistical Brief #54. June 2008. Agency for Healthcare Research and Quality, Rockville, MD. <http://www.hcup-us.ahrq.gov/reports/statbriefs/sb54.pdf>

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AHRQ welcomes questions and comments from readers of this publication who are interested in obtaining more information about access, cost, use, financing, and quality of health care in the United States. We also invite you to tell us how you are using this Statistical Brief and other HCUP data and tools, and to share suggestions on how HCUP products might be enhanced to further meet your needs. Please e-mail us at [hcup@ahrq.gov](mailto:hcup@ahrq.gov) or send a letter to the address below:

Irene Fraser, Ph.D., Director  
Center for Delivery, Organization, and Markets  
Agency for Healthcare Research and Quality  
540 Gaither Road  
Rockville, MD 20850

**Table 1. Characteristics of hospital stays related to asthma compared to stays with no mention of asthma, among adults, 2005\***

	Adult hospital stays with:		
	Asthma as a principal diagnosis	Asthma as a secondary diagnosis	No mention of asthma
Number of hospital stays (percent of all stays)	290,600 (0.9%)	1,610,900 (5.0%)	30,175,400 (94.1%)
Percentage of asthma stays	15.3%	84.7%	
Mean length of stay, days	4.1	4.9	4.9
Mean cost per stay, dollars	\$5,600	\$8,900	\$8,800
Mean cost per day, dollars	\$1,400	\$1,800	\$1,800
Aggregate costs, dollars	\$1.6 billion	\$14.4 billion	\$266.0 billion
Percent admitted from the emergency department	73.6%	51.3%	47.6%
<i>Hospitalization Rate per 1,000 Population</i>			
All Adults	1.3	7.2	135.3
<i>Age</i>			
18–44 years	0.7	4.6	83.2
45–64 years	1.6	7.5	109.8
65+ years	2.5	14.6	346.4
<i>Gender</i>			
Female	1.8	10.0	158.8
Male	0.7	4.2	110.5
*Adults were defined as patients 18 years of age and older.			
Source: AHRQ, Center for Delivery, Organization, and Markets, Healthcare Cost and Utilization Project, Nationwide Inpatient Sample (NIS), 2005.			

**Table 2. Five most common principal diagnoses for hospital stays with asthma noted as a secondary condition, among adults, 2005\***

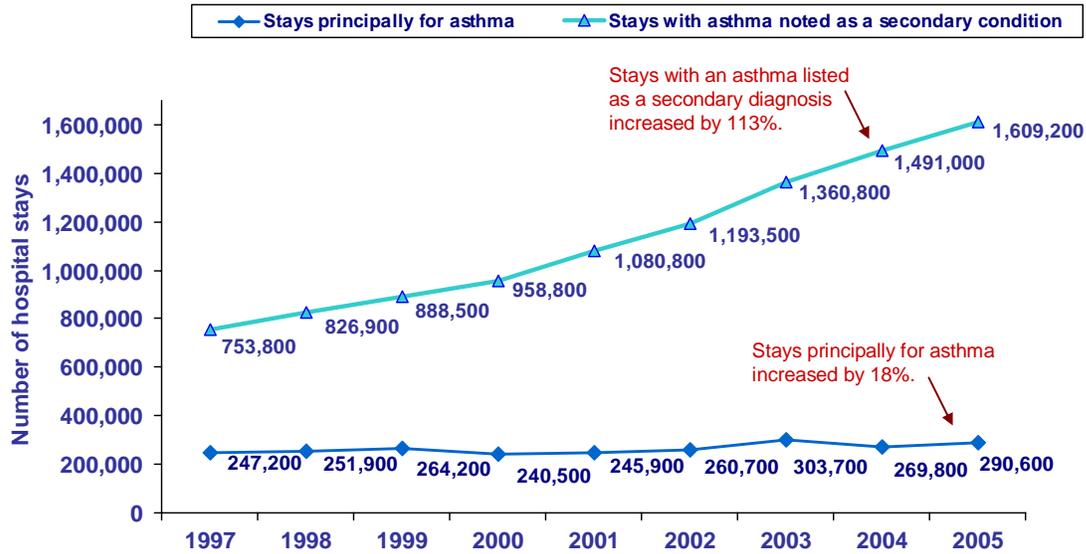
Rank	Principal Diagnosis	Number of stays with asthma as a secondary diagnosis	Percentage of stays with this principal diagnosis among:	
			Stays with asthma as a secondary diagnosis	Stays with no mention of asthma
1	Pneumonia	123,100	7.6%	3.5%
2	Congestive heart failure	62,300	3.9%	3.4%
3	Nonspecific chest pain	58,800	3.7%	2.5%
4	Osteoarthritis (degenerative joint disease)	53,700	3.3%	2.3%
5	Mood disorders (depression and bipolar disorder)	53,500	3.3%	1.7%

\*Adults were defined as patients 18 years of age and older.

Source: AHRQ, Center for Delivery, Organization, and Markets, Healthcare Cost and Utilization Project, Nationwide Inpatient Sample (NIS), 2005.



**Figure 1. Number of hospital stays for adults with a secondary diagnosis of asthma increased at a much faster pace than stays principally for asthma, 1997–2005\***

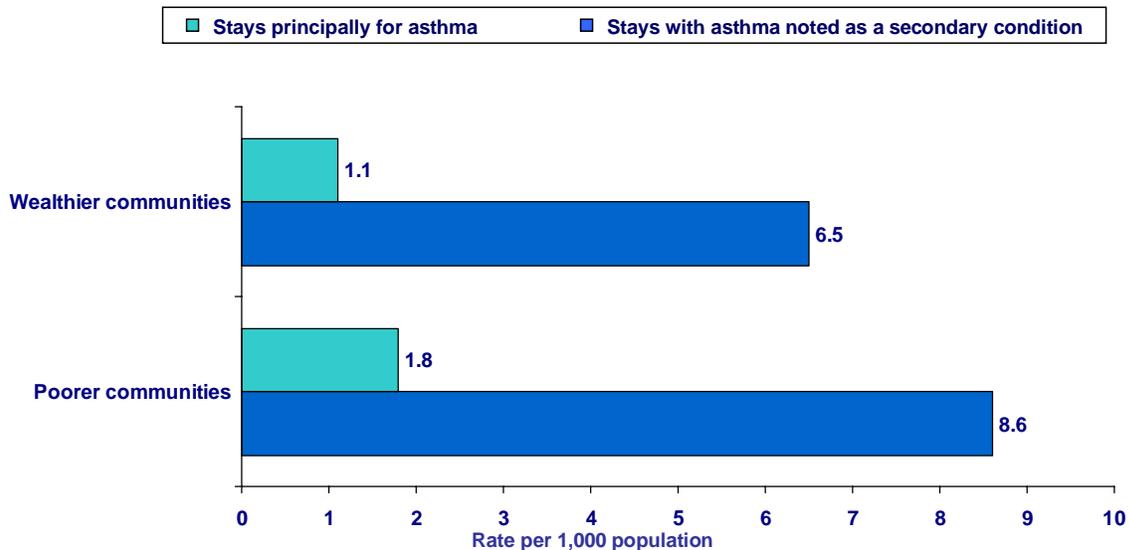


\* Adults were defined as patients 18 years of age and older.

Source: AHRQ, Center for Delivery, Organization, and Markets, Healthcare Cost and Utilization Project, Nationwide Inpatient Sample, 1997–2005



**Figure 2. Rate of stays principally for asthma, among adults, was 63 percent greater in poorer communities compared to wealthier communities, 2005 \***



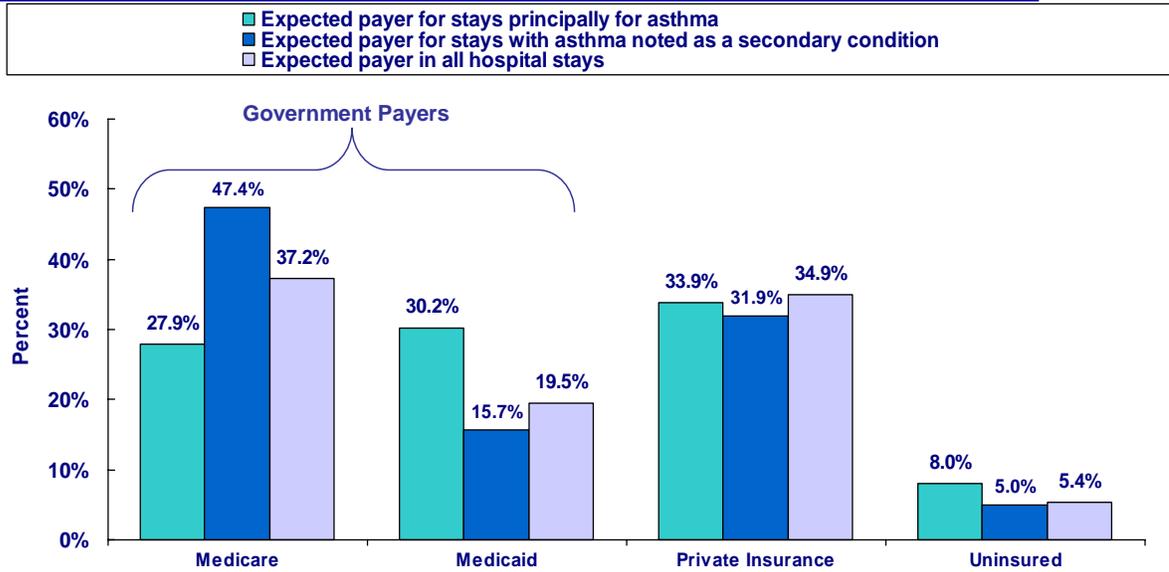
\* Adults were defined as patients 18 years of age and older.

Note: The denominator for the rates was derived from 2005 Clarita's Population Data. "Poorer communities" included ZIP Codes with median income level less than \$36,000; "wealthier communities" included ZIP Codes with median income level greater than or equal to \$36,000.

Source: AHRQ, Center for Delivery, Organization, and Markets, Healthcare Cost and Utilization Project, Nationwide Inpatient Sample, 2005.



**Figure 3. Government payers were billed for about 60 percent of asthma-related stays, 2005\***

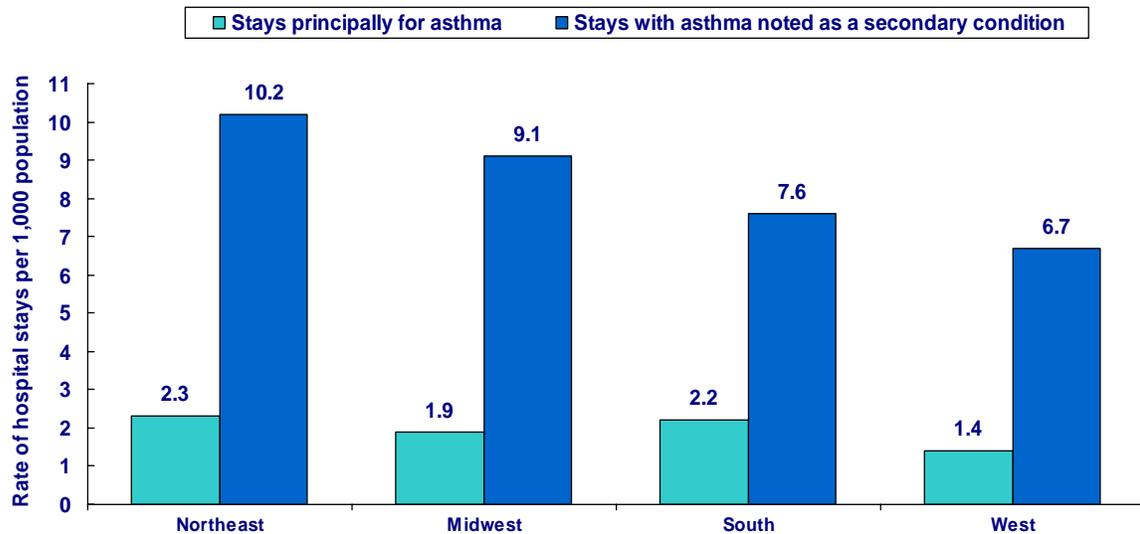


\*Adults were defined as patients 18 years of age and older. A small portion of stays covered by other insurance programs (such as TRICARE/CHAMPUS and Title V) were not included in this figure.

Source: AHRQ, Center for Delivery, Organization, and Markets, Healthcare Cost and Utilization Project, Nationwide Inpatient Sample, 2005.



**Figure 4. Rate of adult asthma-related hospital stays was lowest in the West, 2005 \***



\*Adults were defined as patients 18 years of age and older.

Note: The denominator for the rates was derived from 2005 Clarita's Population Data.

Source: AHRQ, Center for Delivery, Organization, and Markets, Healthcare Cost and Utilization Project, Nationwide Inpatient Sample, 2005.