

Section II. Morbidity: Hospitalizations by Primary Diagnosis

Assessing levels of morbidity (illness at a point in time) in a population is very difficult. Part of the difficulty lies in the availability and accessibility of complete data. In general, poor health is transitory or mild and is treatable without a doctor's intervention. Health conditions and problems that require medical care are usually treated in the ambulatory setting, including physician offices, clinics, and health centers. Typically records of these types are not publicly available. Only data about hospitalizations and emergency room visits are easily obtained in most states. These hospital discharge data sets provide summary information about all hospital inpatient and emergency room visits in a state, including the patients' primary and secondary diagnoses, primary and secondary procedures, dates of service, insurance status, demographic information, and county of residence, which is useful but not complete. Some types of data, such as Medicaid and Medicare, are relatively complete for specific population subgroups. The problem with using hospitalization data is that it provides an indicator of morbidity only for afflictions that are serious enough to require hospitalization. Because most diseases that result in either a stay in a hospital or death (and therefore diagnosed) have a latent period of development, the *true* level of population morbidity can never be known.

Hospitalization data, however, provide the best available information on morbidity for most health conditions.

A majority of studies which have examined hospitalization rates have relied on administrative claims data from Medicaid and Medicare programs. Until fairly recently, these were the only sources of uniform hospitalization data available. However Medicaid and Medicare only maintain data for specific population subgroups, namely the poor and the elderly, and therefore provide an incomplete picture overall population health.

The Healthcare Cost and Utilization Project (HCUP) provides uniform and relatively complete inpatient hospitalization data for a number of states in the U.S. These data provide all inpatient hospitalizations from participating hospitals in the HCUP network, regardless of healthcare provider, and therefore provide more complete coverage of the overall population.

A. Hospitalizations in Appalachia

The purpose of this section is to summarize some characteristics of hospitalizations in the Appalachian region. A subset of the 406 constituent counties, defined by the Appalachian Regional Commission as of January 2002, has been utilized in this analysis due to data limitations.

Data and Methods

Hospitalization data

Inpatient hospitalizations were obtained from the Healthcare Cost and Utilization Project (HCUP) State Inpatient Databases (SIDs) database for the year 2000. HCUP is sponsored by the Agency for Healthcare Research and Quality (AHRQ) and consist of a series of hospital databases from organizations in participating states. The SIDs represent the universe of inpatient discharge abstracts in those states. There are currently twenty-nine U.S. states participating in HCUP. Of the thirteen states that have Appalachian counties, ten are participating in HCUP. Appalachian states that are not participating are Ohio, Mississippi, and Alabama. Appalachian states participating in the HCUP project are shown in Figure 1.

Data from the SIDs are generally uniform with some important exceptions. There is some variability in the level of hospital participation within each state (see Appendix B). Data for six states (NY, MD, WV, KY, NC, SC) were obtained from the HCUP central distributor and have a fairly consistent data format. Data from the remaining four states participating in HCUP (PA, VA, TN, GA) were obtained from an individual organization within each state. There is considerable variability in the geographic units used to report patient

residence. Some states have used county, some have used ZIP code areas, and some provide both. For this analysis, county of patient residence is used to generate hospitalization rates. For those data that report the patient residence as ZIP code area, these have been collapsed into their appropriate county. Data for the state of Maryland does not contain geographic identifiers for patient residence and therefore was excluded from this analysis.

Although the data represent the universe of inpatient hospitalizations within each state, many residents from participating states are hospitalized out of state. Therefore, the data are likely to be incomplete for each state. This is particularly true for states that share borders with states that are not participating in HCUP (OH, MS, AL) or those that were excluded from this analysis (MD). This introduces a potential bias in hospitalization rates examined in these analyses, particularly among counties along the borders for non-participating states. Appalachian counties for which hospitalization rates have been calculated are shown in Figure 2.

No data elements in the SIDs data uniquely identify individual patients. Therefore the potential exists for multiple hospitalization records to occur for a single individual. Multiple hospitalizations for a single patient may result in overestimates of calculated hospitalization rates. Although the patient birth month and birth year are provided, these data elements are insufficient to identify individual patients. An analysis was performed to determine the number of hospitalizations that were unique for birth month and birth year, gender, primary diagnosis, and ZIP code area of residence. Approximately 60% of all records represent unique hospitalizations based on birth month and birth year, gender, primary diagnosis, and ZIP code area of residence. This does not

Figure 1. Appalachian States participating in HCUP

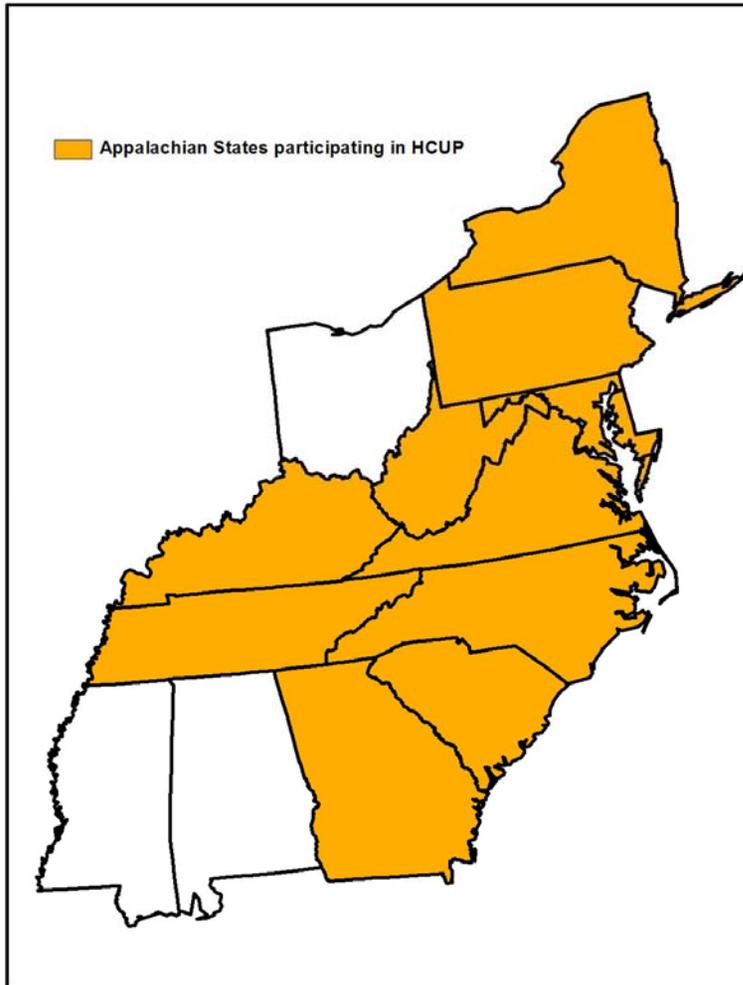
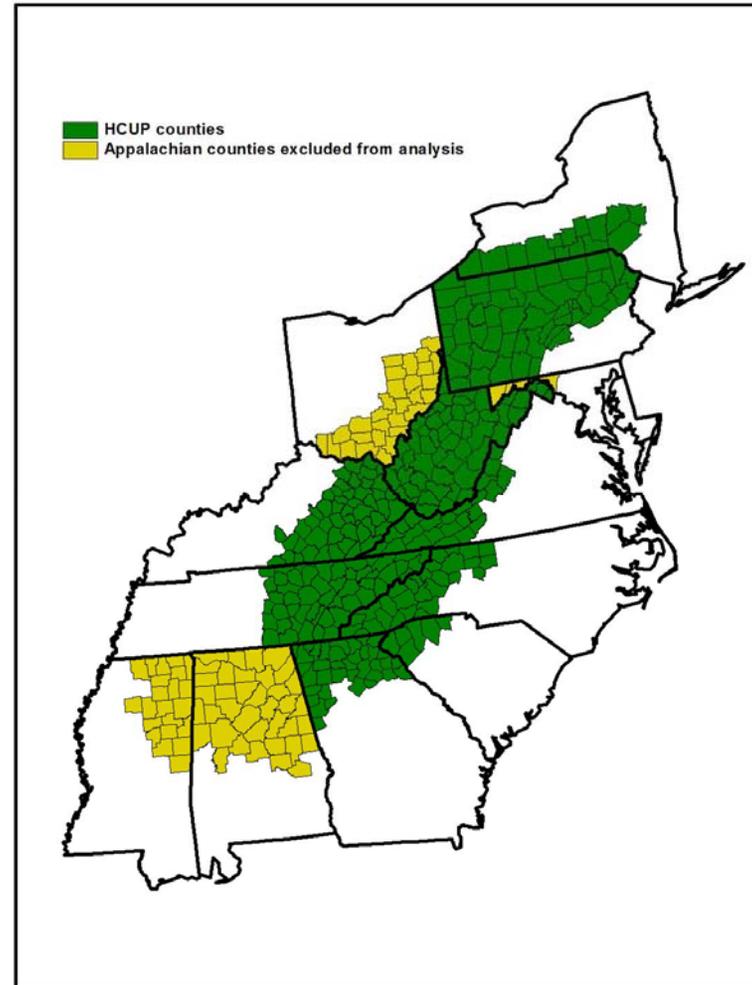


Figure 2. Appalachian Counties for which hospitalization rates have been calculated.



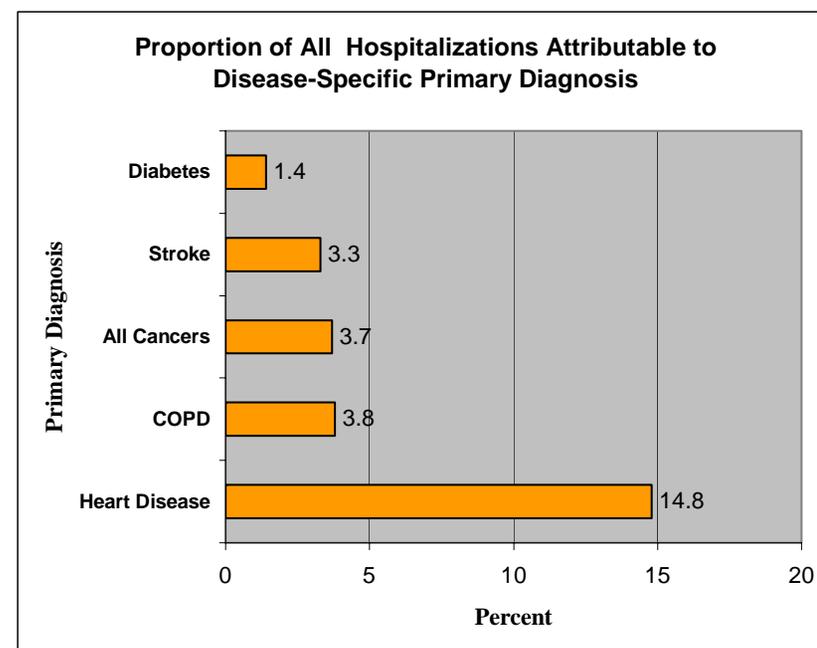
mean the remaining 40% represent duplicate hospitalizations; however, there is a greater likelihood that duplicates occur within 40% of the data.

Primary diagnoses, coded from ICD9-CM, were utilized in this analysis to calculate hospitalization rates. Hospital diagnoses were analyzed to conform to the conventions used, where possible, in the Mortality Section of this study (Section I, Table 1.). Where the primary diagnosis for hospitalization was identified, the data include diagnoses for heart disease, cancer(s), cerebrovascular disease (stroke), and chronic obstructive pulmonary disease and allied conditions (COPD), and diabetes. In the year 2000, the SIDs data provided 2,289,547 hospitalizations that indicated a patient residence in one of the Appalachian counties shown in Figure 2. The total number of hospitalizations in the region that had primary diagnoses related to heart disease, COPD, cancers, stroke, diabetes, and other are shown in Table 1. The proportions of all hospitalizations by primary diagnoses are shown in Figure 3.

Table 1. Number of hospitalizations by diagnosis

Diagnosis	Number of Hospitalizations
Heart Disease	338,012
COPD	87,458
All Cancers	85,083
Stroke	75,835
Diabetes	31,368
Other	1,671,791
Total	2,289,547

Figure 3.



Hospitalizations from heart disease related illnesses outnumber the other disease specific hospitalizations used in this analysis combined and represent 14.8 percent of all hospitalizations in the region.

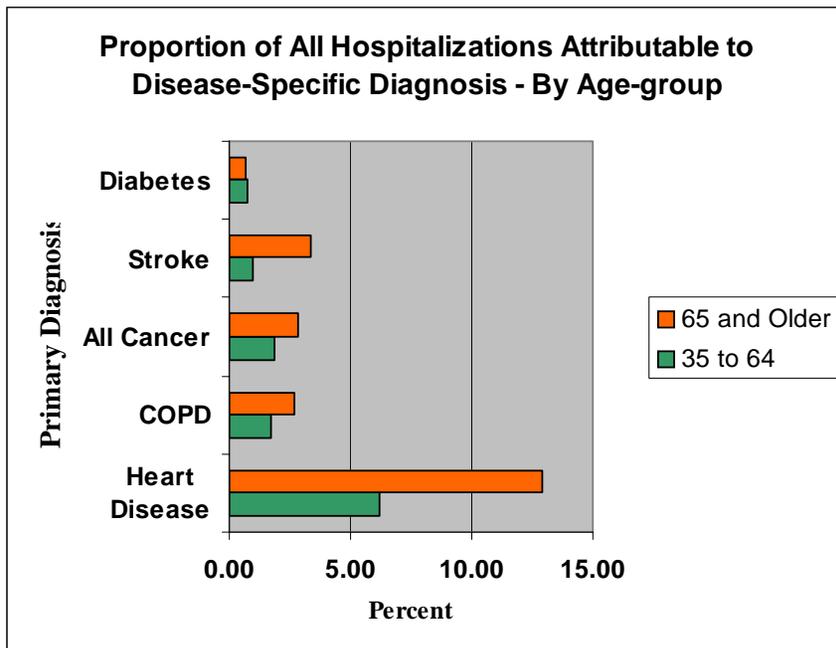
Disease-specific hospitalizations were identified for two age groups consistent with the age groups used in Section I: 35 to 64 and 65 and older. The numbers of hospitalizations for each age group are shown in Table 2. Hospitalizations related to heart disease for the elderly (65 and older) outnumber those for ages 35 to 64 by over 2 to 1. There are 1.6 times more COPD related hospitalizations, 1.5 times more cancer related hospitalizations, and 3.5 times more stroke

related hospitalizations among the elderly than among ages 35 to 64. Hospitalizations for diabetes are more prevalent among age 35 to 64; however, hospitalizations are very likely to grossly underrepresent the actual burden of diabetes morbidity because diabetes does not typically require hospitalization.

Table 2. Number of hospitalizations by diagnosis and age-group.

Diagnosis	Age Group	
	35 to 64	65 and Older
Heart Disease	105,523	221,528
COPD	28,972	45,696
All Cancer	31,693	48,338
Stroke	16,516	57,180
Diabetes	13,304	11,645

Figure 4.



The proportion of patients who died while being hospitalized for a specific disease is shown in Table 3. A higher percentage of cancer related hospitalizations resulted in death while in the hospital than the other disease used in this analysis.

Table 3. Proportion patients who died in the hospital by primary diagnosis.

	Percent
Heart Disease	3.79
COPD	1.72
All Cancer	8.31
Stroke	6.42
Diabetes	1.41

B. County-level hospitalizations

Introduction

The purpose of this section is to examine the geographic dimension of county-level rates of hospitalization. Identifying counties that contribute to disparities in morbidity (high and low rate counties) will aid in targeting interventions aimed at reducing these disparities.

This section presents a series of maps depicting county-level rates of hospitalizations for specific diagnoses outlined in Section A. In addition, separate analyses were performed for breast cancer, colorectal cancer, and lung cancer. The mapped data aid in identifying regions and specific areas within Appalachian that have high rates of illness related to specific diseases. Because the use of hospitalization data reflects only diseases and conditions that are severe enough to require hospitalization, these analyses portray only a portion of the burden of morbidity in the Appalachian region.

Data and Methods

Calculation of Hospitalization Rates

Inpatient hospitalization data were obtained from the Healthcare Cost and Utilization Project (HCUP) (see Section II A). Patients were categorized by age, gender, and primary diagnoses. Race/ethnicity was not uniformly reported among participating states and therefore was not utilized in this analysis. Each patient's county of residence was obtained either directly from the hospital record or was derived from the patient's ZIP code area (see Appendix B for details). County-level analyses were conducted separately for the total population, men, and women, who were hospitalized during the calendar year 2000. Each of these subgroups was divided into two age categories; 35 to 64 and 65 and older. These age categories are consistent with those used in Section I.

Population count data for all counties in the region (see Figure 2) used as denominators in hospitalization rate calculations, were obtained from the Bureau of the Census for the year 2000.

Age-adjusted rates of hospitalization were calculated based on the combined hospitalization and populations counts for six population subgroups who were hospitalized in the year 2000: all persons aged 35 to 64, all persons aged 65 and older, all men aged 35 to 64, all men aged 65 and older, all women aged 35 to 64, and all women aged 65 and older. Hospitalization rates for each category were age standardized using the direct method of adjustment, with the 2000 U.S. population as the standard. County-level hospitalization rates have been mapped to enable easy identification of high and low rate counties in the region. Both high and low outliers in the distribution of hospitalization rates have been identified where

present. Outliers are counties that had statistically unusually low or high rates relative to the majority of counties. The method of determining outlier is outlined in Section I B. The identification of outliers allows a quick visual assessment of the counties in Appalachia most likely to represent clusters of high and low rate areas. On each of the maps, the darker shades represent higher rates of hospitalization.

Summary

There is considerable variability in rates of hospitalization across the Appalachian region. However there appears to be less geographic clustering for most primary diagnoses than indicated by mortality analyses. In general, the geographic distribution of hospitalization rates appears similar to rates of mortality for coincident diseases, however fewer differences occur between population subgroups than with rates of mortality. The central region of Appalachian, consisting of counties in Eastern Kentucky, Southern West Virginia, and Western Virginia, is most frequently represented by high rates of hospitalization for most primary diagnoses including, all cause, heart disease, lung cancer, COPD, and diabetes. Rates of stroke hospitalization appear to be more evenly distributed throughout the region in contrast to stroke death rates, which cluster primarily in the southern portion of the region.

DISCLAIMER

A number of independent state agencies have provided data for use in this study including the Pennsylvania Healthcare Cost Containment Council (PHC4), the Tennessee Hospital Association (THA), The Georgia Hospital Association (GHA), and Virginia

health Information (VHI). Agents and staff of these agencies have made no representation, guarantee, or warranty, expressed or implied, that the data – financial, patient, payer, and physician specific information – provided to this project, are error-free, or that the use of the data will avoid differences of opinion or interpretation.

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