POPULATION SCIENCE

A comparison of hospital utilization in urban and rural areas of South Carolina

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ABSTRACT

Background: Previous studies have described health care utilization based on insurance status and ethnicity. Few investigations, however, have looked at rural populations in relation to distance in securing health care.

Methods: The 2008 to 2009 Healthcare Cost and Utilization Project (HCUP) State Inpatient Database (SID) for South Carolina was used to assess the relationship of living in rural versus urban communities and the demographic variables related to insurance coverage. By use of bivariate and multivariate analyses, patient socio-demographic characteristics were explored for working-aged groups in relation to their income and for payer status (Medicaid or uninsured) relative to those privately insured.

Results: Of hospitalizations, 68.89% were for those living in urban areas, 20.52% in large rural areas, 6.57% small rural areas, and 4.02% in isolated rural areas. Blacks lived predominantly in small rural (53.65%) and isolated rural communities (51.55%). As income decreased, the percentage of hospital admissions increased, from 5.83% for those earning $66,000 to 43.29% for those earning between $1 and $39,999.

Conclusions: Hospital admissions may not be entirely dependent on race, income or insurance, but could also be influenced by geographic access. Further, having private insurance, higher incomes, and living in urban areas are positive predictors for better health outcomes.

Keywords: health insurance; rurality; race; income

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INTRODUCTION

Frequently, researchers have used administrative data to measure various aspects of health care. This type of data indicates that insurance is a positive predictor for health care access (Probst et al., 2002). Another approach to assessing health care utilization is the observation of geographical use in under-served areas. For example, adults living in rural areas are more likely to lack health insurance, to have limited access to care, and to have lower socio-economic status (Wi et al., 2016). Moreover, many do not seek medical care because of the long distances to travel to receive care. Even those who have health insurance often experience inconsistent care because of travel distance and/or lack of transportation to hospitals and health care facilities (Liu et al., 2012).

Although previous studies have examined the patterns of care, few have addressed the need to determine ways to close the gap in health care access in rural communities. "Where a person lives matters," that is, where a person lives influences his or her ability to obtain health care (access) and the quality of health care he or she obtains (Radley and Schoen 2012).

Within rural communities, the quality of health is affected when access to routine and noncompulsory services are limited within rural communities (Lavelle et al., 2012). Further, being under-insured and uninsured are barriers to healthcare access but do not explain all modifiable barriers (MacDowell et al., 2010). Recent behavioral research has revealed deficiencies in Andersen's model, which uses the individual as the unit of analysis for healthcare access (Aday and Andersen, 1974). The more recent health care access barriers (HCAB) model, as part of its framework of structural barriers, uses a practical context for modifiable health care access and addresses barriers associated with health disparities that include transportation and distance traveled to receive care (Carrillo et al., 2011).

Accessibility to healthcare facilities can be measured by use of county-scale census data (Jin et al., 2015). Identification of inequities in healthcare services by region can lead to reduced hospital administration and to improved health quality. However, distances traveled do not entirely explain healthcare utilization for proximity versus utilization is not conclusive in the receipt of healthcare (Alford-Teaster et al., 2016). Use of available facilities for healthcare services may be influenced by non-geographic factors, such as weather, rather than transportation (Onitilo et al., 2014).

Administrative data are often used to analyze trends in healthcare utilization based on types of hospital admissions and diagnosis, length of stays, and cost-to-charge ratios (HCUP Databases, 2006-2009). A comparison of urban and rural hospital admissions may be relevant to public health but may not be influenced by delays in seeking medical attention and/or by a lack of confidence in local healthcare facilities.

The 2008-2009 Healthcare Cost and Utilization Project (HCUP) State Inpatient Database (SID) of South Carolina was used to explore the relationship of rural hospital admissions for working- aged adults 20 to 64 years old in relation to insurance, race, and income compared to those who lived in urban areas. The present study had two objectives: first, to describe the patterns of urban and rural hospitalizations; second, to quantify and assess the importance in identifying the inequalities in hospitalizations based on insurance, race, and income.

METHODS

Data Source

The SID for South Carolina 2008-2009 was obtained from the Healthcare Cost and Utilization Project (HCUP), a publicly available set of databases and software tools developed through a federal-state-industry partnership sponsored by the U.S. Agency for Healthcare Research and Quality (AHRQ). The SID for South Carolina 2008-2009 contains at least 90% of the discharge records for each payer population and has valid de-identified patient numbers.

The SID, previously used to assess disparities in health care, includes discharge information, including age, sex, race, payment type, diagnosis, length of stay, total charges, and living areas. In the present study, data from 2008-2009 were analyzed for working-aged adults 20-64 years old. The initial data set contained 560,234 samples; 298,730 were excluded because they were not in the age group of 20-64. One was excluded because of missing gender. The final sample size was 261,504.

Variables

Variables in the 2008-2009 SID were hospitalizations of working-aged adults 20-64 years old. Co-variables were insurance status, race, sex, and age. AHRQ's Rural-Urban Commuting Area codes were used to identify primary living areas of patients, with clusters for urban, large rural, small rural, and isolated rural. Race and ethnicity were recoded to reflect two categories, White and Black. Race was restricted to two categories because of the small sample sizes for Hispanic, Native Americans, and Asian and Pacific Islanders in the data set.

Age group was categorized by two subsets (20-44 and 45-64 years) to reflect differences in hospitalizations based on age. Female was used as an indicator of sex. The HCUP's ZIPINC code was used to classify median income by quartiles of 1($1-39,999), 2($40,000-48,999), 3($49,000-63,999) to 4($66, 000+).

Statistical Analysis

To determine how rural and urban communities differ in hospitalizations for individuals, descriptive statistics were used for socioeconomic and demographic characteristics, including race, sex, age, and income. Insurance type was compared by use of bivariate analysis. Analyses were conducted with the use of SAS statistical software Version 9.2 (SAS Institute, Cary, NC).

RESULTS

The final patient sample was 261,504. Descriptive statistics included insurance type, age group, sex, race, residential living area and income based on quartiles (Table 1). Hospital admissions, compared by race, showed that Whites had a higher percentage of admissions (64.28%) than Blacks (35.72%). Females had a higher percentage of admissions (62.37%) than males (38%).

Table 1. Descriptive statistics by rural/urban hospitalizations

	Demographic data	Actual sample	%
		261,504	100
Race			
	White	168,050	64.27
	Black	93,407	35.73
Insurance type			
	Private	120,005	45.89
	Medicaid (dual covered)	76,961	29.43
	Medicare	43,367	16.58
	Uninsured/Self pay	21,171	8.1
Age group			
	20-44	121,779	46.58
	45-64	139,677	53.42
Sex			
	Male	98,381	37.63
	Female	163,054	62.37

	Demographic data	Actual sample	%
Residence			
	Urban	176,006	68.88
	Large rural	52,436	20.52
	Small rural	16,813	6.58
	Isolated rural	10,268	4.02
Income and quartile			
1st	1-39,999	110,892	43.29
2nd	39,000-48,999	94,194	36.77
3rd	49,000-63,999	36,164	14.12
4th	66,000+	14,930	5.83

Hospitalizations for those living in urban areas were higher (68.88%) than those living in large rural (20.52%), small rural (6.58%) or isolated rural areas (4.02%). As income decreased, the percentage of hospital admissions increased (5.83%) for those earning $66,000 to 43.29% for those earning between $1 and $39,999). Blacks lived in small rural (53.65%) and isolated rural communities (51.55%) more than Whites (46.35 % and 48.45% respectively) (Table 2).

Table 2. Rural-urban commuting areas by race

Patient Residence	Total	%	White	%	Black	%	p-value
Urban	175,983	68.9	119,111	67.68†	56,872	32.3	<0.0001
Large rural	52,432	20.5	32,377	61.75†	20,055	38.3	<0.0001
Small rural	16,779	6.57	7,777	46.35	9,002	53.7	<0.0001
Isolated rural	10,263	4.02	4,972	48.45	5,291	51.6	<0.0001

The percentage of Medicaid admissions for large rural (31.07%), small rural (34.14%) and isolated rural (34.18%) areas were higher than for urban areas (28.25%) (Table 3). The percentages of patients living in large, small and isolated rural areas were higher for those covered by Medicare and Medicaid. This may be indicative of chronic-illness related to being covered by Medicaid under the age of 65.

Table 3. Rural-urban commuting areas by insurance type

Patient Residence	Total	Private	%	Medicaid	%	Medicare	%	Uninsured	%	p-value
Urban	176,003	84,222	47.9	49,722	28.3	26,364	15	15,695	9	<0.0001
Large rural	52,424	22,545	43.0	16,286	31.1	10,194	19	3,399	7	<0.0001
Small rural	16,811	6,606	39.3	5,740	34.1	3,419	20	1,046	6	<0.0001
Isolated rural	10,266	4,129	40.2	3,509	34.2	2,121	21	507	5	<0.0001

DISCUSSION

This evaluation of administrative data provided an opportunity to examine trends in hospitalizations focused on rural versus urban patients in comparison to income, race, and insurance status. The findings suggest that rurality may not be a predominant factor accounting for lack of access to health care. The numbers of patients admitted to hospitals were higher among those living in urban areas. However, those living in rural areas had higher percentages on Medicaid or Medicare. Further, Blacks had more admissions; for females, this may be due in part to maternal care. The percentage of patients hospitalized was related to income. Thus, the analysis suggests that distinctions between rural and urban inequalities relates to race, gender, and income.

There were methodological limitations for this study. First, the dataset was not representative of the entire population of South Carolina since it included only hospitalizations. Second, the data did not provide information on hospital type or locations within the state. Third, such data cannot account for psychosocial or behavioral attitudes in seeking care or attitudes or beliefs of patients and providers in seeking and providing care.

CONCLUSIONS

The identification need of public health trends and evaluation of effectiveness can shed light on patterns that affect the health of communities and facilitate positive health outcomes. These data allowed assessment of the trends of hospitalizations in South Carolina. In summary, after controlling for possible confounders, it was found that race, gender, income, and insurance had the highest

associations with hospitalizations. Hospital admissions were also influenced by geographic access. Further research is needed to evaluate types of health care facilities located in various areas and the patterns of medical care-seeking behaviors of those living in rural communities.

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