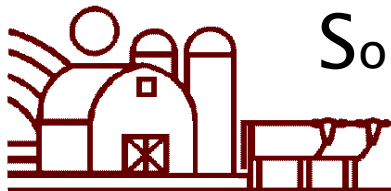


Emergency Department Use by Medically Indigent Rural Residents



South Carolina

Rural Health Research Center



UNIVERSITY OF
SOUTH CAROLINA

Arnold School of Public Health
Department of Health Administration
Columbia, SC 29208

Emergency Department Use by Medically Indigent Rural Residents

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Authors:

Kevin Bennett, MS
Janice C. Probst, PhD
Charity G. Moore, PhD
Judith A. Shinogle, PhD

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www.vgh.mb.ca/emergency.htm
www.hanoverhospital.on.ca/picture.html
www.rurdev.usda.gov/ok/utilities.htm

Executive Summary

Study Purpose

Because EDs are required to provide some treatment to all patients, uninsured persons cannot be denied care. The need to handle all patients is believed to put significant financial strain on hospitals, particularly those in rural areas. The study reported here examined ED use, combining national data and South Carolina state data to estimate:

- Uncompensated charges in rural ED's nationally
- The ameliorating effects of rural community health centers (FQCHC's) on ED use by rural residents

Key Findings

ED visits

- An estimated 211 million emergency department (ED) visits were made across the United States during 1999 – 2000, 37.4 visits per 100 persons per year. The visit rate for rural ED's was higher, at 42.2 visits per 100 persons. "Rural" was defined as non-metropolitan counties.
- African Americans had a much higher ED visit rate (62.2 per 100 persons) compared to whites. This difference was even more pronounced in the rural population (84.6 for rural African Americans, 40.9 for rural whites).

Self-pay visits

- Of persons visiting ED's, 17.8% lacked health insurance to help them meet the costs of service.
- Self-pay visits were more likely to involve African American patients (25.6%) than were insured visits (19.2%).
- Self-pay patients were admitted to the hospital as a result of their ED visit at about half the rate (6.9%) of patients covered by a third-party payer (14.0%).

Charges for ED visits

- In South Carolina, the median charge for an insured ED visit that did not result in hospital admission was \$297, with urban and rural ED's having similar charges (\$309 and \$274, respectively). The median charge for a self-pay patient who was admitted was \$6,407 state-wide. Charges were higher in urban hospitals (\$6,957) than in rural hospitals (\$5,225).
- Projecting to the nation, an estimated \$8.8 billion in charges were generated at rural hospitals caring for persons who did not have insurance in 1999 and 2000, including both ED visits and any resulting hospitalizations. If one assumes that institutions typically only receive half of charges, this would represent \$4.4 billion that rural hospitals did not receive across 1999 – 2000.

Reducing ED visits

- The presence of a federally-qualified community health center in a patient's county of residence significantly decreased the ED visit rate, from 37.4 visits per 100 persons per year to 31.0 visits per 100 persons.

Policy Implications

Two infrastructure programs appear particularly relevant for ameliorating the effects of uninsured patients on rural hospitals:

- Conversion of appropriate rural hospitals to Critical Access Hospitals, with increased reimbursement, offers one method for ensuring that rural hospitals remain viable in the face of continued high levels of uninsured patients in their ED's.
- Expanding community health centers into more rural counties. The research reported here supports the value of community health centers, with their expanded access for all populations, as a means of reducing ED use.

Future research

- Future research should determine the proportion of rural ED visits that are potentially avoidable, as an additional means of assessing the adequacy of provider supply and patient access to care in rural areas.
- Future research should track whether population-based ED visit rates decline in communities that acquire community health centers as a result of planned expansion.

Emergency Department Use by Medically Indigent Rural Residents

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Chapter One

Introduction

Previous Research On Emergency Department Use by Medically Indigent Rural Residents

Who Are the Medically Indigent?

Because health care costs can be substantial, persons who lack health insurance are nearly always “medically indigent,” that is, unable to pay for the costs of their care. The United States Census Bureau estimated 38.7 million Americans went without insurance for the *entire year* in 2000 (United States Census Bureau, Table A, 2001), and the Agency for Healthcare Research and Quality estimated that in 1999, 42.8 million were without insurance *for any period* during that year (Agency for Healthcare Research and Quality., 2001). Minority persons are more likely to be uninsured, the proportion of uninsured in rural areas is on the rise, and being employed does not guarantee having coverage:

- Lack of health insurance varies by race. For a three year average (1998-2000), about one in 10 white persons (10.1%) lacked health insurance. In comparison, one in every three Hispanics (32.8%), one in every four American Indian or Alaskan Native (26.8%), and nearly one in every five African Americans (19.5%) and Asian Americans (18.8%) were uninsured (United States Census Bureau, Table C, 2001).
- The proportion of persons without health insurance is lower in rural¹ areas compared to urban areas, but the proportion of uninsured residents in rural communities grew from 14.2% to 15.7% between 1991 and 1998. Growth was especially high in the rural non-elderly (16.5% to 18.2% of those below the age of 65), and adults between the ages of 25 and 54 years old (17.2% to 18.5%) (Pol, 2000).

¹ For purposes of this report, “rural” means outside a metropolitan area, and “urban” means metropolitan areas. See Appendix B.

- Nearly 20 million employed people are uninsured (14.7% of the working population), while lack of insurance is more common among those without a job (46.4% are uninsured) (United States Census Bureau, Table 2, 2002).

What is the effect of medically indigent persons on rural hospitals?

Lack of health insurance affects not only the individual, but also the institutions from which that person may need to seek care:

- In 1998, hospitals spent \$19 billion in uncompensated care (combination of charity care and bad debt), approximately 6% of total revenues (Hospitals, 2000).
- Since rural hospitals are predominately public (45.7%), church-run (6.6%), or not-for-profit (38.6%), they provide a significant amount of uncompensated care (Ricketts & Heaphy, 2000).
- Rural hospitals are also less able to absorb these costs, because they are more dependent upon the prospective payments from Medicare (9.6% of total revenues, compared to 7.1% for urban hospitals), and low reimbursements from Medicaid (Burt & McCraig, 2001).

Why are emergency departments important?

Many physician offices require proof of insurance or advance payment before allowing a prospective patient access to services. Emergency departments (ED's), however, are prohibited from limiting access based on ability to pay. The Emergency Medical Treatment and Active Labor Act (EMTALA), enacted in 1996, mandates that ED's must assess and stabilize all patients before discharge. Thus, in addition to treating emergency illness or injury or serving as an after-hours point of access, persons who do not have health insurance often use ED's as a primary source of care. Use of ED's by low income persons as a primary source of care is suggested by the following statistics:

- In 1994, over 29.2% all ED visits were for primary care, and 43% of all ED visits were made by the uninsured or by those insured by Medicaid (Forrest & Whelan, 2000).

- Over 28% of the poor, and 27.1% of the near poor, had at least one visit to an ED in 1998, compared to only 18% of the non-poor (Advantage Health America, 2001).
- More than 22% of those who live in rural areas used the ED at least once per year, compared to 20% of those in urban areas; rural residents showed a higher visit rate per person (44.2 per 100) compared to urban residents (35.5 per 100) (Advantage Health America, 2001).
- Minorities are more likely to have visited the ED: over 25% of African Americans and almost 29% of Native Americans make at least one visit to the ED per year compared to only 19.1% of Caucasian Americans (Advantage Health America, 2001).
- The percent of patients who paid for the visit out-of-pocket increased from 13.4% in 1992 to 16.1% in 1999 (Burt & McCraig, 2001).

What does a high proportion of self-pay patients in the ED mean for rural hospitals?

Self-pay frequently implies that little or no money will be received by the hospital. A study examining self-payment of ED bills when Medicaid payment was prospectively denied, that is, when the patient accepted responsibility for payment, found that only \$134 of \$46,246 was actually received (Beck and Paul, 1998). Patients visiting the ED may require hospital admission, leading to further financial burden on the hospital if the patient is uninsured. Hospitals suffer financially from uncompensated care (Weissman et al, 1999). This burden is leading hospitals, including rural hospitals, to close ED's (The State, 3/31/01). More ominously, hospitals may turn away patients in need of care (Taylor, 2000):

- From 1990 to 1998, the total number of rural ED's decreased by 11.3%, but the patient volume in the remaining ED's increased by 23.8%. Overall, ED visits have increased by 14% from 1992 to 1999 (Advantage Health America, 2001).
- The case-mix has changed significantly over the past decade, as well. Patients are older and more likely to be visiting for illness rather than injury:
 - In 1992, the average age of a patient visiting the ED was 33.0 years; in 1999 it was 35.7 years. The number of visits by those over 65 years also increased by

17% during this period. This change was most evident in African American seniors, whose visit rates increased by almost 60%, from 45.4 visits per 100 persons per year in 1992 to 72.2 visits per 100 in 1999 (Burt & McCraig, 2001).

- In 1992, the illness-related visit rate was 21.0 per 100; by 1999, that had increased to 24.0 visits per 100 (Burt & McCraig, 2001).

Questions to be answered

National statistics on the charges associated with ED visits are lacking, making estimation of the burden of uncompensated care experienced by rural hospitals difficult. The principal source of national information concerning ED visits, both at urban and rural hospitals, is the National Hospital Ambulatory Medical Care Survey – Emergency Departments (NHAMCS-ED). This survey collects demographic and medical information regarding ED visits across the country, but does not collect charge data. The study described in this report develops estimates of the charges associated with uncompensated care by using data from the state of South Carolina to develop national projections. The analysis has two overall goals:

- To develop national estimates of the impact of uncompensated charges in rural ED's
- To ascertain the ameliorating effects of rural community health centers (FQCHC's) on ED use by rural residents

Information in this report comes from two sources, the 1999-2000 NHAMCS-ED conducted by the National Center for Health Statistics, and ED utilization data maintained by the South Carolina Office of Research and Statistics for the same period. NHAMCS-ED provides a nationally representative sample of persons visiting emergency departments, their care, and their disposition (return home or hospital admission). However, NHAMCS-ED does not collect charge data. Because the South Carolina data set includes charge data, it was used to develop models, which are then used to estimate the national impact of uncompensated ED care, including ED visits that result in hospitalization.

Details concerning the data sources and the methods used for analysis are included in the Appendix. Findings and conclusions are presented as follows:

- Chapter Two presents the basic characteristics of ED visits for the United States and South Carolina.
- Chapter Three presents the basic characteristics of ED visits made by persons paying of pocket in both the United States and South Carolina.
- Chapter Four presents the national uncompensated care projections, based upon the South Carolina Data.
- Chapter Five presents the effects of FQCHCs on
- Chapter Six presents conclusions and policy implications.

Chapter Two

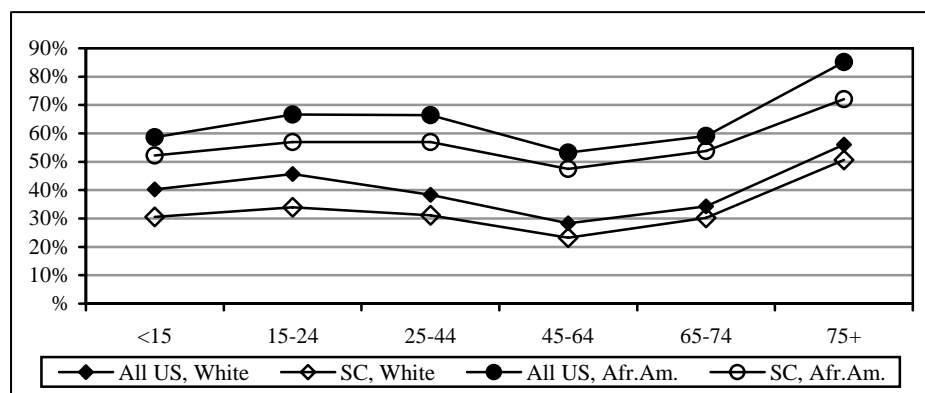
Characteristics of ED Visits: United States and South Carolina 1999-2000

To develop accurate national models for the financial impact of self-pay patients, we first have to understand who visits emergency departments (ED's), the characteristics of each visit, and the influence of patient and visit characteristics on charges for the visit. The section below describes ED patients. We begin by describing population-based visit rates, then provide information of patient characteristics, such as age and primary diagnosis, that will affect visit charges. Information was provided for the nation as a whole and for South Carolina.

Population based ED Visit Rates

Across the United States, patients visited ED's at the rate of 37.4 visits per 100 persons per year. While children and adults constitute most of the patients visiting ED's (see next section), visit rates per 100 persons were highest among the elderly, as shown in Figure 1 (also see Tables 1-A & 1-B). Nationally, persons between the ages of 45 and 64 had the lowest visit rate (29.2 visits per 100

persons per year) and those over the age of 75 the highest visit rate (56.9 visits per 100 persons). African



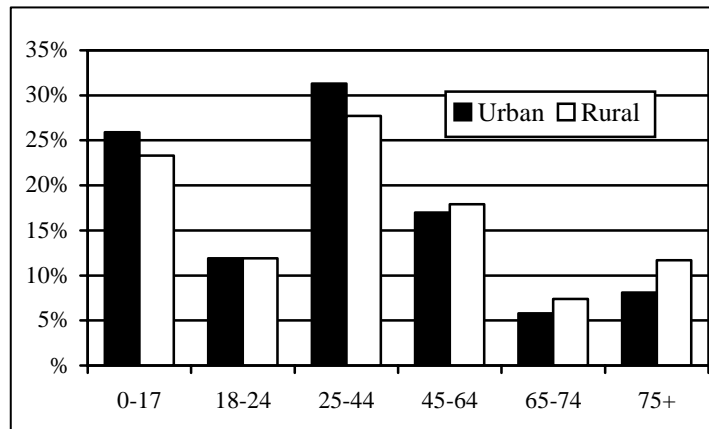
Americans had a higher overall visit rate (62.2) than whites (38.2). African Americans over the age of 75 had the highest visit rate of all groups, 85.1 visits per 100 people per year.

Population based ED visit rates in South Carolina, as shown in the preceding graph, mirrored national age and race trends, but visit rates per 100 persons per year were slightly lower for all age groups. Overall, South Carolina residents visited ED's at a rate of 37.5 visits per 100 persons per year in urban areas, and 37.2 visits per 100 persons in rural areas. For the whole United States, urban residents made 36.2 ED visits per 100 persons per year and rural residents, 42.2 visits. Nationally, rural African Americans showed ED visit rates twice that of rural White residents (84.6 visits per 100 person per year vs. 40.9 visits).

What was the patient population in Emergency Departments?

Patient age and gender

An estimated 211 million emergency department (ED) visits were made across the United States during 1999 – 2000. On a percentage basis, children and early working age adults (ages 25

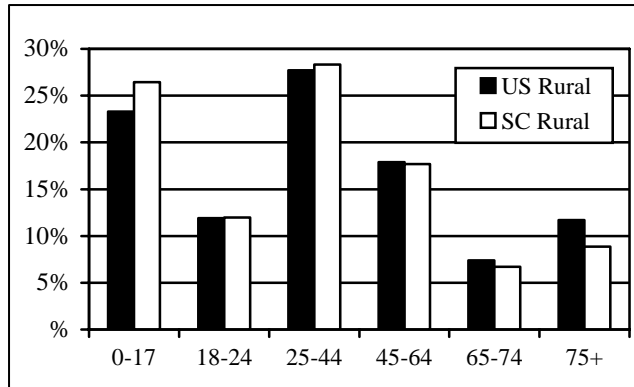


– 44) account for about half of all patients who visited ED's (Figure 2 and Table 2). Female patients accounted for just over one-half of all visits (53%), and white patients represented over three quarters of the total (77%).

Nationally, rural facilities accounted for 23.6% of all ED visits. ED's located in rural areas saw a slightly older distribution of patients than urban ED's, as shown in Figure 2. Rural visits were more likely to be a person older than 65 compared to visits to urban ED's (see Table 2).

The age distribution of patients visiting rural ED's in South Carolina is shown in Figure

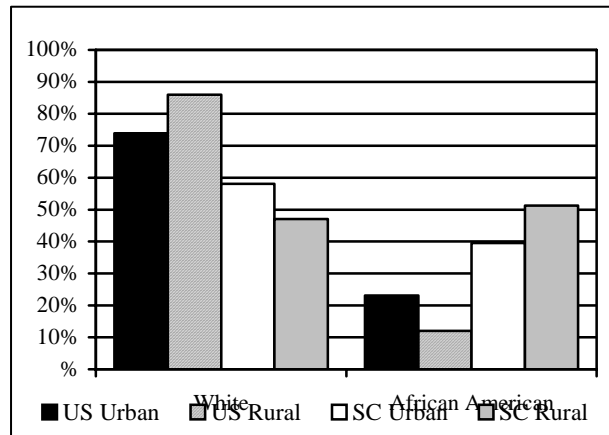
3. Rural ED's in South Carolina saw a slightly younger mix of patients than was the case for rural ED's nationally. For example, while patients age 65 or older accounted for 19.1% of visits nationally, they only represented 15.6% of patients visiting South Carolina ED's.



Patients by race

Nationally, about one in five ED visits (20.5%) was made by African American patients, with the proportion of African Americans being higher in urban ED's (23.1%) than in rural ED's (12.0%). South Carolina's racial makeup includes more African Americans, with less representation from other racial groups than the general United States population. In addition, South Carolina has a particularly high

concentration of rural African American visits when compared to the United States, which is visible in Figure 4. While across the United States the proportion of African American

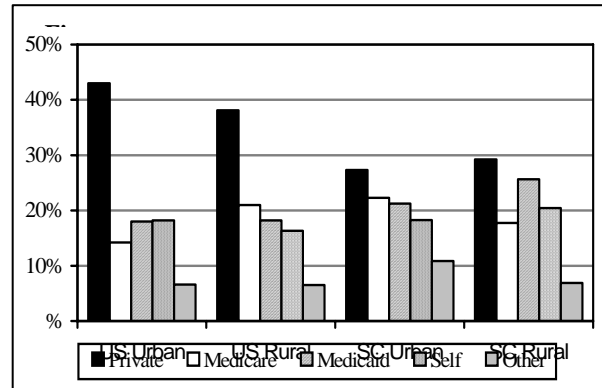


patient visits in rural ED's was lower in rural areas than in urban areas, in South Carolina, the situation was reversed. Over one-half of all rural ED visits in South Carolina were made by African Americans (51.2%) versus 39.5% at urban ED's.

Patients by payment source

Across the United States, private insurance was the most common method of payment, covering two out of every five ED visits (41.8%). Private insurance coverage was associated with a greater proportion of visits to urban ED's (43.0%) than rural ED's (38.1%). Medicare

was the second largest payer in rural areas nationally (21.0%), while it accounts for a smaller proportion of all visits in urban areas (14.2%) than either Medicaid (18.0%) or self-payment (18.2%). This reflects the older age of the rural population. In South Carolina, the



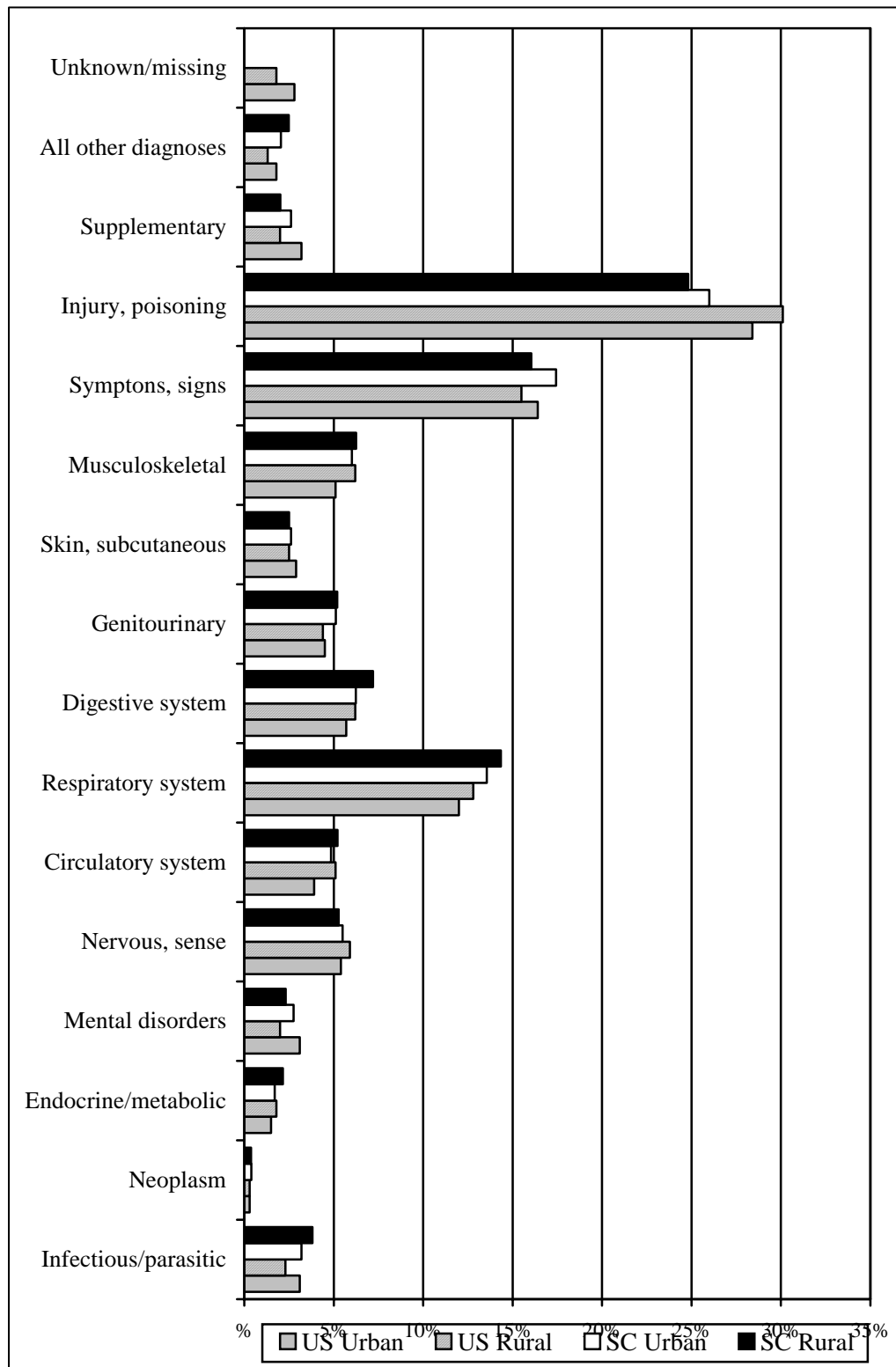
proportion of ED visits covered by private insurance was smaller than it was nationally, and the proportion was slightly higher in rural ED's.

The proportion of self-pay patients in ED's in South Carolina (18.9%) was slightly higher than that for the whole United States (17.8%). In addition, self-pay patients accounted for a higher proportion of all patients in South Carolina rural ED's than urban ED's, while nationally the reverse was true. (See Figure 5 and Table 2).

What causes an ED visit, and how often does it lead to hospitalization?

Diagnoses associated with ED visits

In both the nation as a whole and in South Carolina, injury was the leading primary diagnosis associated with an ED visit (see Figure 6, and Table 3), followed by the general category "signs and symptoms," which would include general complaints, such as pain. Rural



and urban patterns were slightly different. Nationally, rural ED's had a slightly higher proportion of visits attributable to injury than did urban ED's; in South Carolina this pattern was reversed.

Outcome of ED Visits

Nationally, about one in every eight persons who came to an ED (12.6%) was admitted to the hospital, with no difference between rural and urban areas. South Carolina's aggregate admission rate was similar (12.8% admission).

Chapter Three

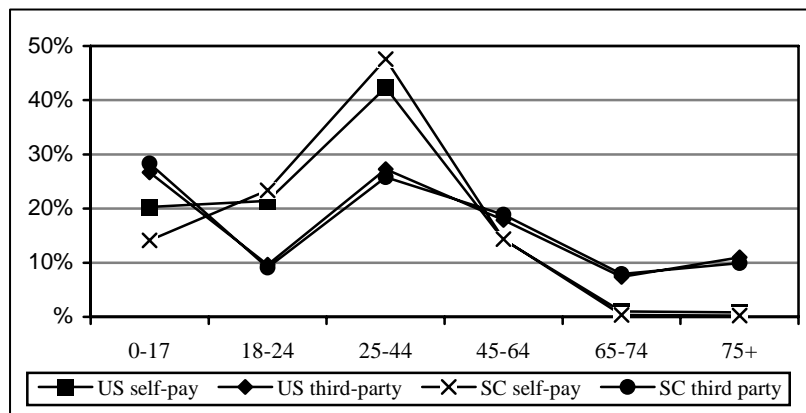
Characteristics of Self-Pay ED Visits: United States and South Carolina 1999-2000

Patient Characteristics

Age

The 25-44 age group has the highest concentration of self-pay patients, both nationally and in South Carolina, with the proportion being slightly higher in South Carolina ED's (See Tables 4-A and 4-B and Figure

7, below). In South Carolina, the proportion of visits by uninsured children was lower (14.1%) than was the case across the United States



(20.3%), possibly due to South Carolina's aggressive promotion of the SCHIP program during 1999 – 2000.

Race

Nationally, African Americans accounted for a higher proportion of self-pay visits (25.6%) than third-party payment visits (19.2%; Tables 4-A and 4-B). The same situation held true in South Carolina, although the proportion of visits made by African Americans was higher, reflecting South Carolina's demographics.

Diagnoses

Although self-pay patients are widely held to use ED's for primary care, and may in fact do so, the proportion of visits attributable to injury/poisoning was higher among the self-pay visits than among persons whose visits were covered by insurance, both nationally and in South Carolina. The higher proportion of injury visits among self-pay patients could be interpreted two ways: persons without insurance may be more likely to appear at an ED for an injury because they defer care unless the problem requires immediate attention, as would be the case for injury. Alternatively, self-pay patients may come to an ED with an injury because they perceive that they may be unable to receive care at other sites, while the ED was required to address the problem. Persons with insurance coverage, who have more options, may choose to have minor injuries treated by office-based practitioners. Figure 8 illustrates the distribution of primary diagnoses associated with rural ED visits in South Carolina and across the rural United States, sorted by whether the visit was financed by a third-party payer or by the patient (self-pay).

Visit outcome

Nationally, about one in every eight persons who comes to an ED (12.6%) was admitted to the hospital, with no difference between rural and urban areas. Self-pay visits are admitted at only about half the rate (6.9%) of visits covered by a third-party payer (14.0%) (Table 4-A). South Carolina's overall admission rate was similar to the national value (12.8% admission; Table 3, SC). In South Carolina, self-pay ED patients are admitted to the hospital as a result of their visit at one third the rate of other patients (4.3% versus 15.0%, Table 4-B). The same pattern was present in both rural and urban areas, although admission rates for both self-pay and insured patients are slightly higher in rural ED's.

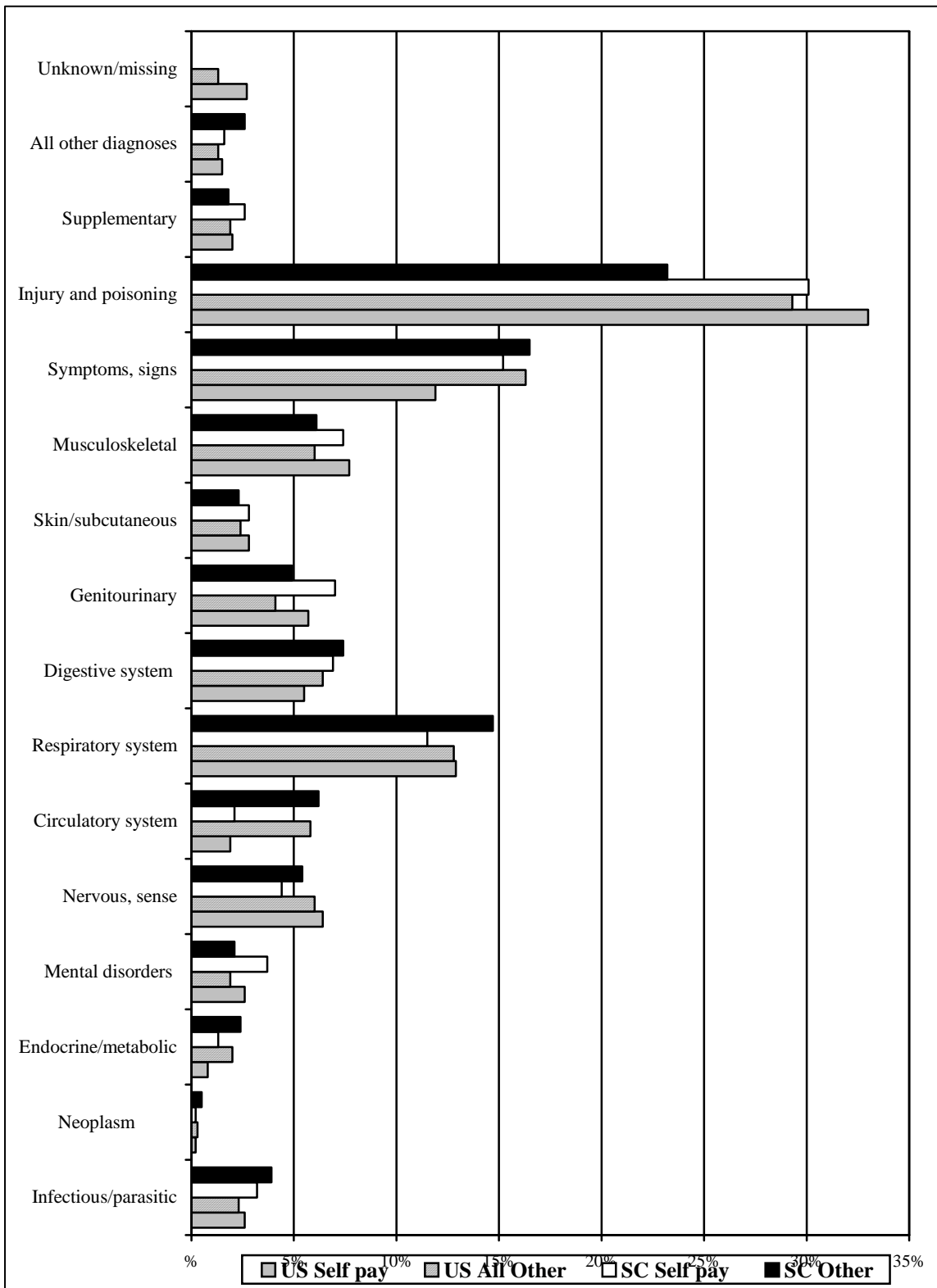


Table 5 shows the percentage of ED visits resulting in admission by payment status, for the United States and for South Carolina. In both rural and urban areas, self-pay patients were least likely to be admitted from an ED visit, while Medicare patients were most likely to be admitted. In South Carolina, more than 35.4% of all patients with Medicare as their primary method of payment were admitted to the hospital, a likely overlap with an age effect. About one in ten ED patients with private insurance (9.5%) and other payment types (10.3%) were admitted, while persons with Medicaid (7.0%) and self-pay patients (4.3%) were admitted less often. For rural residents, the admission percent admitted was slightly lower for Medicare patients (33.7%) and those with private insurance (9.1%). Medicaid patients (7.3%) and self-pay patients had higher rates of admission, while the percent admitted for those with other payment sources were similar.

Further analysis was conducted on the South Carolina data, looking at the admission by self-pay status and demographic characteristics of the patients (Table 6). As age increased, the percentage admitted increased, from 3.4% admitted in the 0-17 year old age group to nearly 44% in the 75+ year old age group. The proportion of self-pay visits resulting in admission were less than half as likely to be admitted across diagnoses when compared to those covered by health insurance. For example, 32.1% of self-pay visits with a circulatory system diagnosis were admitted compared to 65.0% of those that were not self-pay.

Chapter Four

Uncompensated Care Charges: South Carolina and Projections to the United States

Rationale

Developing predictive models

Developing estimates of the charges associated with self-pay patients might appear simple: determine charges associated with ED visits handled by third-party payers and use that information to estimate charges for self-pay patients. This approach was useful if all patients can be assumed to receive the same services while in the ED, as some studies suggest. Carr (2000) found no differences by payer for maternity services. Rhee and colleagues (1997) found no difference in treatment between insured and uninsured patients when looking at ED services for motor vehicle trauma. Rhee and co-authors, however, grouped self-pay and Medicaid patients into a single category. In addition, vehicular trauma was not affected by previous care received, and thus may not follow the same pattern as illness-related visits.

Other evidence regarding the level of service provided to self-pay patients was contradictory. Some research has found that self-pay patients receive more services when hospitalized or visiting an ED, presumably because they have deferred necessary care. For example, Udvarhelyi and colleagues (1992) found that self-pay patients with suspected acute myocardial infarction had lengths of stay 21% higher than insured persons. If this pattern were generally true, then the charges associated with an ED visit by an uninsured person would be higher than those for insured patients.

Most studies have found that self-pay patients receive fewer services and thus, when charge data are reported, incur fewer charges. Studies looking at ED care have found that self-pay patients are less likely to receive test services (Quintana, 1997: children with acute

gastroenteritis). Similarly, an analysis comparing uninsured and privately insured cancer patients found lower rates of utilization of services among the uninsured, resulting in substantially lower expenditures (Thorpe & Howard, 2003). Studies of the outcome of an ED visit (admission versus discharge) have found that uninsured persons are less likely to be admitted to a hospital (Svenson & Spurlock, 200: head injury; Sox et al, 1998: abdominal pain, chest pain, shortness of breath). Additional studies have found that self-pay persons receive fewer services when hospitalized (Braveman et al, 1991: sick newborns; Bradbury et al, 2001: all hospital admissions).

Reviewing previous research, we determined that a detailed modeling process would be necessary to determine which patient and insurance factors affect charges. An unadjusted projection from the insured to the uninsured population would not be adequate.

Charges versus costs

Charge data contain several weaknesses. First, charge data cannot be assumed to reflect income, as the provider rarely collects full charges. Negotiations with third parties typically establish actual reimbursement as a fixed percentage of charges. Second, charges and costs are not synonymous. Charges are the “bill” the institution presents to a payer, which may be less than or greater than the actual cost of providing the service. The exact relationship between costs and charges will vary from institution to institution, depending on negotiating skills and local markets, and from payer to payer across institutions. Some authors reduce charge data by a standard factor to estimate costs (see for example Shi et al, 1999 used 0.47, a cost/charge value derived from Medicare cost reports). This report does not do so at the individual patient level, although our final analysis presents some simple discounts to move from charges to costs. The report uses charge data from South Carolina to develop charge estimates for the total United

States. Developing a national projection from single-state data introduces a degree of inaccuracy into the resulting charge estimates. We have chosen not to increase the inaccuracy by applying any single factor to deflate charges during the analytic process.

Admitted patients

The South Carolina data analyzed in our report are based on the UB-92 (billing form) submitted for each episode of care. For ED visits resulting in the patient’s discharge back to the community, the ED charge was the full bill and was reported. For ED visits resulting in the patient’s admission to the hospital, the total charge including the hospitalization was reported. From a positive perspective, this enables the analysis to calculate the full charge of an uninsured ED visit: both the ED charge and the subsequent hospital charge.

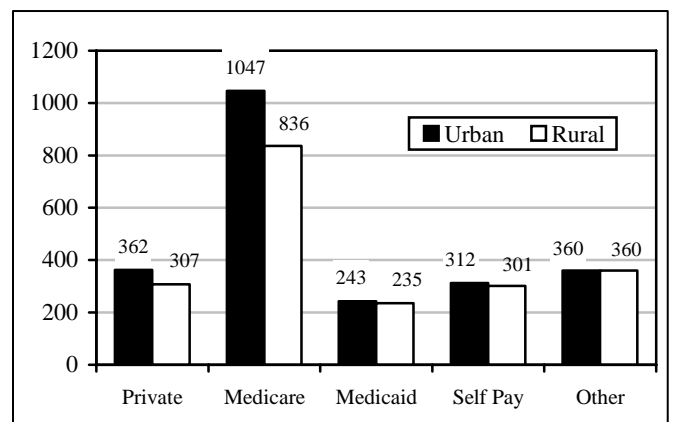
Discussing charges: use of median values

The presentation for South Carolina uses median charges, rather than means, to illustrate differences by category of payer. ED charges are not normally distributed. While most charges are relatively low (hundreds of dollars), there are small subgroups of charges that are so high (thousands of dollars) as to make the mean a poor measure of central tendency.

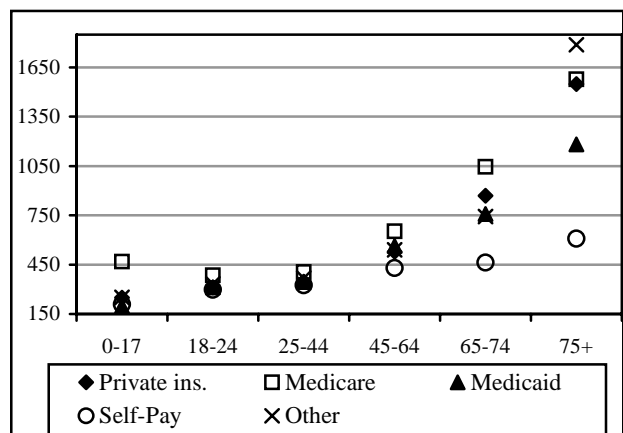
ED Charges in South Carolina

The median charge for an ED visit in South Carolina that resulted in discharge back to the community (regardless of hospitalization) was \$353 (See **Table 7**). Charges were similar at urban ED’s (\$357) and rural ED’s (\$329).

Charges for self-pay



patients were lower than for Medicare patients, patients with private insurance, and patients with other types of insurance, but higher than for Medicaid patients, as shown Figure 9. For all payment methods, charges

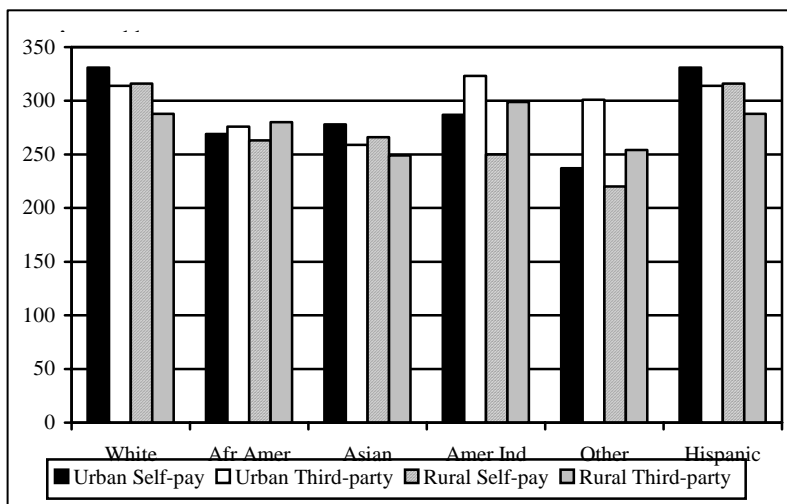


increased with age, with self-pay patients having the smallest increase. 7

Factors affecting ED Charges

For visits not resulting in hospitalization, charges increased with age, were typically higher for whites and Hispanics than African Americans, and varied according to the primary diagnosis (Table 8). As might be anticipated, ED visits for potentially serious diagnoses incurred higher median charges than those

for potentially less serious problems. For example, median charge for a visit due to respiratory system problems among insured visits was \$226, while the median charge for a visit related to disorders of the



circulatory system was \$840. For 9 of the 15 illness/injury categories, charges were higher for third-party and publicly financed visits than for self-pay visits (See Table 8).

Visits resulting in hospitalization accounted for about one in every eight persons who visit an ED (See previous chapter). For South Carolina ED visits that resulted in hospital

admission, we could not obtain ED charges separately, and thus present charges for the whole episode of care, from ED to discharge. While the fact that ED charges cannot be separated is a limitation, the whole episode of care represents the true burden of the uninsured admission for the institution.

Across South Carolina, the median charge for an insured ED visit that resulted in admission was \$7,926, with a median of \$8,481 in urban hospitals and \$6,775 in rural hospitals. Across the state, the median charge for a self-pay patient who was admitted was \$6,407, with \$6,957 in urban hospitals and \$5,225 in rural. For both self-pay and insured patients, charges increased with age, were higher in urban than in rural hospitals, and were higher for potentially serious diagnoses such as neoplasms (Table 9). Among insured patients, charges were highest for whites in urban hospitals and for Hispanics in rural institutions. In general, charges were lower for self-pay patients than for insured patients.

ED Visit Charges: Projection to the whole United States

Demographic Differences

South Carolina and the United States differ across several of the demographic variables that affect ED visit charges. South Carolina has a slightly lower percentage of its visit population over the age of 65 (14.2% vs. 15.2%). The age difference affects payment distribution. Although South Carolina has slightly more privately insured patients than was the case nationally, it has fewer Medicare patients. South Carolina has a higher percentage of minority visits (45.1% vs. 23.3%), a higher percentage of visits in rural areas (30.0% vs. 16.1%), and a lower percentage of male visits (44.6% vs. 47%) than the nation.

To account for differences between the two populations, modeling techniques were used in a sample of 300,000 visits to determine factors affecting charges. The result of this analysis,

performed on South Carolina data, is shown in Table 10. The single largest factor affecting charges was disposition, with admitted cases generating markedly higher charges, as would be anticipated. Patient factors affecting charges included age, sex, race, method of payment, and principal diagnosis. The hospital's location, urban versus rural, also significantly affected charges. Finally, because we used two years of data (1999 and 2000), we included a factor for year to control for the effects of inflation. Details of the method used to develop projections from South Carolina to the whole United States can be found in Appendix B.

National Charge Estimates

Because ED visit charges were generally lower for self-pay patients than for others, self-pay patients represented a smaller proportion of all charges at United States ED's (9.0% across 1999 and 2000) than of all patients (17.8%). Nonetheless, charges were substantial.

Table 4.1: Estimated Charges for ED Visits in 1999 and 2000, US, in millions

	1999		2000		Total (1999-2000)	
	Urban	Rural	Urban	Rural	Urban	Rural
Total Costs	160,398.3	48,081.9	172,424.1	59,976.1	332,822.4	108,057.9
ED Alone						
Self-pay	5,149.4	1,490.2	6,501.4	1,737.6	11,650.8	3,227.8
Other	26,658.3	8,655.4	30,292.6	9,719.1	56,950.8	18,374.6
Visit resulting in hospitalization						
Self-pay	10,424.0	2,049.1	9,654.8	3,598.6	20,078.8	5,647.7
Other	118,166.6	35,887.1	125,975.3	44,920.7	244,141.9	80,807.8

Across the United States, ED visits generated an estimated \$440.9 billion in charges across 1999 – 2000, including associated hospital admissions (See table 4.1). Self-pay patients were associated with \$19.1 billion in charges in 1999 and \$21.3 billion in 2000, including both ED visits alone and ED visits that resulted in hospitalization. In the rural United States, \$3.5

billion in charges were incurred in 1999 and \$5.3 billion in 2000. Assuming a 50% discount from charges to costs, the total burden for 1999 and 2000 would be \$19.9 billion for the whole United States and \$4.4 billion for hospitals in rural areas. Among insured patients, just over 80% of the charges associated with ED visits came from hospitalizations. Reflecting the lower admission rates among the self-pay population, two thirds of the total charges for self-pay patients were associated with hospitalizations resulting from ED visits.

Chapter Five

Effects of FQCHCs and RHCs on ED use in South Carolina Counties

Introduction

The presence of health services infrastructure may be assumed to influence the behavior of the community of persons who have access to it. We defined community at the county level for purposes of analyzing the effects of Federally Qualified Community Health Centers (FQHCs) on the ED visit rate for each of South Carolina's 46 counties.

Methods

Four county-level (n=46) multivariate models were performed to assess the impact of FQHC's and CHC's upon ED visit rates. Four visit rates were calculated for each county, and used as the dependent variables: visit rate for the entire county population, for children (less than 18 years old), working age adults (18-64 years old), and older adults (greater than 64 years old). It was not possible to calculate rates among only uninsured populations, because accurate data on the number of uninsured in the population was not available. The main variable of interest was presence of a FQHC/CHC, measured dichotomously (presence of a FQHC/CHC or not). Each model included five other variables potentially affecting ED use: the presence of an ED in the county, the percentage of the population below poverty, the percentage of ED visits made by self-payers, the percentage in the county with Medicaid, and rurality of the county (according to MSA status).

Results

Overall county-level visit rates

The ED visit rate for all residents in a county was significantly influenced by the presence of a FQHC/CHC ($p = 0.0143$), when controlling for the other factors listed above. On average, the presence of a FQHC/CHC decreased the visit rate by 6.4 per 100. The percentage of the population below the federal poverty line was also a significant contributor to the model ($p=0.0089$), which increased the visit rate by 1.02 (per 100) for each percentage point increase. The percentage of ED visits made by self-pay patients ($p=0.0018$) also contributed significantly, increasing the visit rate by 0.61 per percentage point increase in self-pay visits. The other variables were not significant. To determine if particular populations were contributing to differences in rates, we conducted the same analysis within three age groups: children, working age adults, and older persons.

County-level visit rates for ages 0 - 17

The pediatric ED visit rate per county was significantly influenced by the presence of a FQHC/CHC ($p = 0.05$). On average, the presence of a FQHC/CHC decreased the visit rate by 5.2 per 100. The percentage of ED visits made by self-payers was also a significant contributor to the model ($p=0.0037$), increasing the visit rate by 0.60 visits per 100 for each percentage increase in self-pay visits to the ED. The other model variables were not significant.

County-level visit rates for ages 18 - 64

The ED visit rate for residents in a county between the ages of 18 and 64 was significantly influenced by the presence of a FQHC/CHC ($p = 0.0486$), when controlling for the other county characteristics. On average, the presence of a FQHC/CHC decreased the visit rate by 5.60 per 100. The percentage of the population below the federal poverty line was also a

significant contributor to the model ($p=0.0257$), increasing the visit rate by 1.19 per 100 for each percentage point increase. The percentage of ED visits made by self-pay patients was also significant ($p=0.0197$), increasing the ED visit rate by 0.43 for each percentage point increase. The other variables were not significant.

County-level visit rates for ages 65 and older

The county-level ED visit rate for residents over the age of 64 was significantly influenced by the presence of a FQHC/CHC ($p = 0.0047$). On average, the presence of a FQHC/CHC decreased the visit rate by 8.68 per 100. The other variables were not significantly related to visit rates among older residents. This may stem from the fact that virtually all persons 65 and older have insurance through Medicare. In the younger age groups, the proportion of all ED visits from a county that were self-pay had a small but significant effect.

Chapter Six

Conclusions & Policy Implications

Conclusions

Emergency departments provide a significant amount of care. An estimated 211 million emergency department (ED) visits were made across the United States during 1999 – 2000, 37.4 visits per 100 persons per year. Just under a quarter of all visits (23.6%) were to rural ED's. In urban areas, 18.2% of visits involved persons without health insurance; in rural areas, 16.3% of patients lacked coverage.

Self-pay patients were less likely to be admitted to the hospital as a result of an ED visit than were paying patients, and charges associated with their care were lower. While about one in every seven insured persons (14.0%) visiting an ED was admitted to the hospital, only one in every 14 uninsured patients was admitted (6.9%). Charges associated with ED visits by uninsured patients were lower than those for insured patients, both for ED only visits (median charge, respectively) and for ED visits resulting in hospitalization \$6,407 versus \$7,926; cost data for South Carolina). Projecting South Carolina data to ED patients nationally, an estimated \$8.8 billion in charges were generated i In rural hospitals in 1999 and 2000 caring for persons who did not have insurance, including both ED visits and resulting hospitalizations. Even assuming that institutions typically only receive half of charges, this would represent \$4.4 billion that rural hospitals did not receive across 1999 – 2000.

Both demographic and community factors affected the payment status of a visit. Demographically, African Americans and persons in the 25-44 age group were more likely to be self-pay than others. At the community level, the presence of a federally-qualified community

health center in a patient's county of residence significantly decreased the ED visit rate, from 37.4 visits per 100 persons per year to 31.0 visits per 100 persons.

Policy Implications

There are three directions that policy can take to reduce the burden posed by medically indigent persons on rural ED's, assuming that some form of care will continue to be provided:

- Divert appropriate patients to primary care providers, to transfer low-acuity visits to a less expensive setting.
- Ensure that more persons in the ED catchment area have insurance.
- Change the health services infrastructure in the community.

Numerous programs have attempted to divert medically indigent persons who have non-emergent conditions to a program of primary care. Such programs do succeed in reducing ED costs among the affected individuals (Davidson, Giancola, et al, 2003; Steiner, Price et al, 2002). Diversion programs can also generate cost savings for the ED (Davidson, Giancola et al 2003) or for the hospital as a whole (Nykamp & Ruggles, 2000). However, three core problems have affected diversion programs. First, indigent patients may or may not accept referral when it was offered. One ED-based referral program found that only 22% patients who reported that they had no primary care provider accepted referral to a local community health center. The referral acceptance rate was even lower, 19%, among patients who were self-pay (McCarthy et al, 2002). Nonetheless, overall savings may result from modest success rates. Second, most diversion programs require coordination across multiple institutions, as between the hospital and the CHC in the preceding example. Case studies have found, however, that modest success rates are not sufficient to ensure program continuation, given the complexities of merging the interests of multiple organizations (Steiner et al, 2002). Third, not all ED visits by self-pay patients are non-

emergent. A fully successful diversion program, for example, would still leave the sponsoring hospital at risk for the truly urgent care needed by medically indigent persons, including the costs of inpatient care delivered subsequent to a hospital visit.

A second alternative, reflected in activities such as the SCHIP program, was to reduce the number of persons who do not have health insurance. Nationally, access to insurance rose slightly between 1997 and 2001. In 2001, 84% of working families had access to health insurance, among whom 90% participated. Nonetheless, even after accounting for individually purchased and public health insurance, 11.6% remained uninsured (Strunk & Reschovsky, 2002). No clear consensus has arisen regarding how the remaining uninsured persons and families should be covered. While the SCHIP program, directed at individual consumers, has generally been regarded as successful in expanding coverage for children, there are no guarantees that the program will continue. Subsidy programs directed at employers have been projected to be ineffective (Reschovsky & Hadley 2001).

A third alternative was to focus efforts on modifying health services infrastructure in at-risk communities. Two infrastructure programs appear particularly relevant for ameliorating the effects of uninsured patients on rural hospitals:

- Conversion of appropriate rural hospitals to Critical Access Hospitals, with increased reimbursement, offers one method for ensuring that rural hospitals remain viable in the face of continued high levels of uninsured patients in their ED's.
- Expanding community health centers into more rural counties. The research reported here supports the value of community health centers, with their expanded access for all populations, as a means of reducing ED use. In South Carolina, the presence of a CHC in a county was associated with an overall decrease in ED visit rates of 18% (6.4/34.7

visits per 100 persons per year). This finding should provide further impetus for the President's plan to expand CHC's nationwide.

Future research

Future research needs to continue a focus on ED visit populations and the effects of interventions:

- **Studying ED visits:** An important question regarding ED visits, in all populations, was the extent to which they are "necessary." Necessity can be measured in two dimensions: the severity of the symptoms in question and the degree to which those symptoms could have been averted with appropriate primary care. Researchers have begun to explore the degree to which ED use, as well as hospital use, may be avoidable with appropriate primary care (Weinich, Billings and Thorpe, 2003). Future research should determine the proportion of ED visits in rural areas which are potentially avoidable, as an additional means of assessing the adequacy of provider supply and patient access to care in rural areas.
- **Determining the effects of interventions:** As the CHC program expands, the evidence presented here suggests that population-based ED visit rates will decline. We recommend that ED visit rates be evaluated further, in different states across the country, as a possible indicator of CHC program effectiveness.

Appendix A

Literature Review

Uninsured in Rural America

The United States Census Bureau estimated 38.7 million Americans went without insurance for the entire year 2000 (United States Census Bureau, Table A, 2001). This represented 14% of the United States population with a financial barrier to access to the health care system. These statistics only account for those that are without insurance for the entire year. The Agency for Healthcare Research and Quality estimated that in 1999, 42.8 million were without insurance for any period during that year (AHRQ, 2001). This places four million more individuals with out access to the health care system for a significant period.

A number of factors are associated with being uninsured; among these are employment, race/ethnicity, age, education, and income. Of the 117 million full time employees in the United States, 15.4% were uninsured, and 20.7% of the part time employees were uninsured. Overall, over 22 million people with some form of employment were uninsured (16.2% of the working population) compared to 23.6% of those people who did not work in 2000 (United States Census Bureau, Table A, 2001). The uninsurance rate was higher for minorities compared to their white non-Hispanic counterparts; 19.5% of African Americans, 32.8% of Hispanics, 18.8% of Asian Americans, and 26.8% of American Indian or Pacific Islanders were uninsured compared to 10.1% of white non-Hispanic people (Health insurance Coverage 2000, Table C, 2001). Among children (18 years or younger), 8.5 million (11.6%) were uninsured in 2000, a decrease from 12.6% in 1999. These numbers have decreased in recent years due to efforts to enroll children in public insurance plans, but the levels are still high. The percent of uninsured individuals

increased to over 23% among those ages 18 to 34 years but then incrementally decreased to 0.7% among individuals 65 years and older (due to Medicare coverage). The percent uninsured decreased with increasing education: 26.6% of those without a high school diploma were uninsured compared to 7.1% of individuals with a bachelor's degree or higher. Lower income was also associated with uninsurance: 22.7% of those with an income less than \$25,000 per year were uninsured, and 17.0% with incomes between \$25,000 and \$50,000 were uninsured as well. Of those whose income was higher than \$75,000, only 6.9% were uninsured (United States Census Bureau, Table A, 2001).

Another factor associated with being uninsured was living in a rural location. The number of uninsured (as a percentage) has grown in rural communities from 14.2% to 15.7% between 1991 and 1998. This growth was especially high in the rural non-elderly (16.5% to 18.2%), and rural working age adults between 25 and 54 years old (17.2% to 18.5%). While the percent of rural African Americans without insurance has remained steady (25.8% to 26.1%), it was higher than the percentage for the urban African Americans (21.4% and 23.6%) (Pol, Figure 1, 2000). Rural residents were more likely to have individual coverage, or coverage through a small employer (Coburn, Kilbreth, Long, & Marquis, 1998). Compared to their urban counterparts, the working uninsured were more likely to work for a business with fewer than 10 employees (40.0% vs. 30.9%), to be self-employed (15.7% vs. 9.5%), work in agriculture (7.6% vs. 4.0%), or work in mining, fishing, or forestry (1.2% vs. 0.2%).

These statistics indicate a significant problem in gaining access to health care across different but not mutually exclusive populations in the United States —minorities, working adults, children, individuals with lower income, and persons with less education. They also

demonstrate the disparity between rural and urban communities, and the need to recognize these differences when shaping health policy.

Health Care System Response: Government Provided Insurance

Public, government funded insurance has attempted to make up the insurance coverage shortfall in several ways. Medicare began in 1965 as a way to provide quality coverage to citizens over the age of 65. In 1965, an estimated 56% of those over the age of 65 did not have hospital coverage; in 2000 only 0.7% of those over age 65 were uninsured (Gornick, 1985; Health Insurance Coverage 2000, Table A, 2001). Medicaid was also enacted in 1965 in an attempt to provide coverage to poor citizens who previously could not afford insurance. Medicaid was run by the states, using federal and state funds, with eligibility and program details set by each state. Medicaid covers citizens with incomes at or near the federally designated poverty line. In 2000, over 37 million were insured via Medicare, and 28.6 million were insured via Medicaid. These two groups cover 23.8%, (13.4% via Medicare and 10.4% via Medicaid) of the United States population (United States Census Bureau, Table A-1, 2001).

The State Children's Health Insurance Program was designed to provide access to children not previously covered by Medicaid by expanding eligibility guidelines. In 2000, the parents of the children eligible for coverage could earn incomes ranging from 133% to 350% of the federal poverty level. In 1999, over 1.9 million children were enrolled through this program; in 2000, the number enrolled increased to over 3.3 million (Children's Health Insurance Program, 2000). Current efforts to increase the number included in this program include tax credits to pay for the premiums and insuring the uninsured parents of the eligible children (Expanding access through public coverage, 2001).

The Safety Net Physicians

Physicians form another significant, if informal, part of the health care safety net by providing their services for free. A 1998 telephone survey among 12,000 physicians from 60 randomly chosen communities indicated that 72% of the physicians provided charity care to patients in the community. On average, those physicians provided over 11 hours per month to these patients. The number of physicians increased 4.6% from 1996-1999 (347,000 to 363,000), but the number providing charity care decreased by 1.5% (265,000 to 261,000) (Reed, Cunningham, & Stoddard, 2001).

Hospitals

Hospitals are also a significant source of charity care for the uninsured population. In 1998, hospitals spent \$19 billion in uncompensated care (combination of charity care and bad debt). While increasing \$500 million between 1997 and 1998, the level of uncompensated care as a percent of total expenses has remained at 6% (Hospitals spend 19 billion on uncompensated care in 1998, 2000). In year-adjusted dollars, the total amount spent remained steady from 1993-1995 (17.6 billion, 17.7 billion, and 17.5 billion, respectively). During the same period, the level of uncompensated care per uninsured person decreased over time, from \$457 per person in 1991 to \$431 in 1995. Not-for-profit hospitals provided 10.5 times the amount of uncompensated care as for-profit hospitals (55.8% vs. 5.3%). (Mann, Melnick, Bamezai, & Zwanziger, 1997).

Rural hospitals are more vulnerable to the burden of uncompensated care than urban hospitals. Over 45% of all hospitals in the United States are in rural areas. Of those, 72% have fewer than 100 beds, and 42% have fewer than 50 beds (and consequently smaller revenue bases to cover uncompensated care costs). Rural hospitals also rely more upon Medicare and Medicaid

for their revenues than urban hospitals; almost half of all rural hospital discharges are paid by Medicare reimbursements (compared to 37% for urban hospitals) (Facts about..., 2002). Since rural hospitals are predominately public (45.7%), church-run (6.6%), or not-for-profit (38.6%), they provide a significant amount of uncompensated care, relative to their population. They are less able to absorb these costs, as they are more dependent upon the prospective payments from Medicare (9.6% of total revenues, compared to 7.1% for urban hospitals), and low reimbursements from Medicaid (Ricketts & Heaphy, 2000, Mueller & McBride, 1999).

Emergency Departments

The emergency department (ED) is a very important part of the safety net for the uninsured. In 1986, Congress passed the Emergency Medical Treatment and Active Labor Act (EMTALA), requiring access to emergency services for all individuals. This law requires ED's to triage patients, determine if an emergent situation exists, then stabilize the patient before discharge, regardless of their ability to pay. ED's also provide access to other services, such as diagnostic tools, procedures, specialists, and pharmaceuticals that would otherwise not be available to the medically indigent. For these reasons, the ED is an important source of health care for the uninsured and underinsured in America. However, this law did not provide any additional funding to ED's to help subsidize this mandated treatment burden.

In 1994, over 29.2% all ED visits were for primary care, and 43% of all ED visits were made by the uninsured or by those insured by Medicaid (Primary-care safety net delivery sites in the United States, 2000). In 1998 persons covered by Medicaid under the age of 65 were more likely to use the ED than those that were not insured or were covered by private insurance, (36.9%, 20%, and 16.9%, respectively, used the ED at least once). Emergency department utilization statistics show that the poor and near poor are more likely to use the ED than those in

higher income brackets. Over 28% of the poor, and 27.1% of the near poor, had at least one visit to an ED in 1998, compared to only 18% of the non-poor. Also, over 22% of those that live in rural areas use the ED at least once per year, compared to 20% of those in urban areas resulting in a higher visit rate per person for rural residents (44.2 per 100) compared to urban residents (35.5 per 100). Minorities are more likely to use the ED: over 25% of African Americans and almost 29% of Native Americans make at least one visit to the ED per year compared to 19.1% of Caucasian Americans. (Emergency Departments, 2001). The percent of patients who paid for the visit out-of-pocket increased from 13.4% in 1992 to 16.1% in 1999 (Burt & McCraig, 2001).

These trends have placed many ED's, especially in rural areas, at risk for financial under-performance and closure. From 1990 to 1998, the overall number of rural ED's decreased by 11.3%, but the patient volume increased by 23.8% (Emergency Departments, 2001). Overall, ED visits have increased by 14% from 1992 to 1999. The case-mix has changed significantly as well. In 1992, the average patient age per visit was 33.0 years; in 1999 that had increased to 35.7 years. The number of visits by those over 65 years also increased by 17% during this same period. This change was most evident in African American seniors, whose visit rates increased by almost 60%, from 45.4 visits per 100 in 1992 to 72.2 visits per 100 in 1999. African Americans aged 45-64 also had a higher visit rate (55.6 per 100) than their white counterparts (27.9 per 100). These changing demographics are further reflected in the change in illness-related visits. In 1992, the illness-related visit rate was 21.0 per 100; by 1999, that had increased to 24.0 visits per 100. This increase coincided with a decrease in injury-related visits. This changing case-mix has the potential to result in higher expenditure for the ED's, as sicker, older patients (who typically require a higher intensity of services) make more visits (Burt & McCraig, 2001).

The proportion of hospital uncompensated care costs associated with the ED is not currently known. Some small studies have shown that ED's form a significant portion of this care. In 1999, 285 of California's 355 ED's lost money, for a total of \$317 million lost in ED operations (Emergency Departments, 2001). Since over one-third (36.6%) of a hospital's admissions are through the ED, and up to 20% of ED visits are associated with self-pay patients (i.e. the uninsured), the burden for hospitals could be significant. With insurance, or a regular source of care, the potential for preventing many of these stays (and realizing the cost savings) is significant, especially given that the average hospital stay is approximately \$11,000 per inpatient visit (Elixhauser, Yu, Steiner, & Bierman, 2000).

Hospitals have long sought to reduce uncompensated care costs by offering other means of care to the uninsured. Hospitals have begun to establish community health centers to provide the necessary primary care to the uninsured and indigent populations in their community. The main driving force behind this trend is urban hospitals that provide a disproportionate share of uncompensated care for their community. Rural hospitals have followed suit, but more out of a bandwagon response to trends in hospital administration than a response to environmental pressures (Krein, 1999).

From 1980 to 1998, the number of rural hospitals decreased by 11.8% due to mergers, closings, or conversions. For many rural hospitals to survive, they have had to restructure or convert to a new classification of hospital. Classifications such as Medical Assistance Facility, Rural Primary Care Hospital, and Critical Access Hospital have allowed flexibility in financing, reimbursement, and operations that have enabled many rural hospitals to survive and continue to provide needed care to the community (Ricketts & Heaphy, 2000).

Rural hospitals have also learned to operate more efficiently, as indicated by having the lowest cost per discharge of all hospitals. This low expense rate is due, in part, to rural hospitals hiring more non-physician providers, such as physician assistants, nurse practitioners, and nurse midwives, than urban hospitals. They also tend to have a shorter average length of stay than urban hospitals (Gautam, Campbell, & Barrington, 1997). These cost-containment efforts have also enabled rural hospitals to continue providing health care.

Nykamp and Ruggles (2000) conducted a trial that provided free medical care and prescription drugs to the medically indigent that use the ED. They found that inpatient admissions dropped 39.5%, and outpatient visits dropped 64.4%, saving the hospital \$378,183 over the six month trial period. The cost of the provided prescription drugs amounted to \$27,588; the cost of the free medical care was \$459,962. Despite the small sample size (36 participants), the authors determined the program was successful, due to the liberating of financial and physical resources from the ED. Unfortunately, this program appears to be difficult to administer in many situations. The problems that occur by offering free care are many; who receives this free care, who provides it, what are the limits, and will the funding last indefinitely? Also, this program strives to create a new system of providing health care, rather than finding a new way to utilize existing methods (e.g. Medicaid, FQCHC, RHC's, etc.).

More research needs to be done to determine the burden of uncompensated care upon the health care system. Specifically, the share of this burden placed upon emergency departments should be determined. An analysis of programs designed to strengthen the safety net would also be vital to the understanding of the issues involved. There is also a lack of quality information pertaining to the problems facing rural communities. Specific data collection analysis regarding these communities that include data on the uninsured, underinsured, outcomes, differences

between minorities, and the impact of interventions need to be collected. This data investigation would then aid in the development of policy and programs that would help these communities in relevant and meaningful ways.

The purpose of this project is to estimate the uncompensated care costs associated with rural emergency departments in the state of South Carolina. From these estimates, national estimates can then be calculated based on demographic data. Also, the affects of federally qualified health centers and rural health clinics on emergency department utilization and uncompensated care provision will also be examined. The intent is to measure the effectiveness of these programs to reduce the burden to rural ED's to provide uncompensated care that may jeopardize their operational stability.

Appendix B

Methods and Data Sources

South Carolina ED data

The observations in this project were all ED visits made in 1999 and 2000 in South Carolina. Information on ED visits was drawn from the Office of Research and Statistics (ORS) within the South Carolina Budget and Control Board. The ORS functions as a data warehouse for all South Carolina health and social services information. South Carolina is one of only two states with mandatory reporting of all ED visits, making population-based estimates possible.

United States ED data

The National Hospital Ambulatory Medical Care Survey (NHAMCS) was created to learn more about ambulatory care rendered in hospital emergency and outpatient departments in the United States. The NHAMCS is conducted by the Ambulatory Care Statistics Branch of the National Center for Health Statistics, Centers for Disease Control and Prevention. The NHAMCS provides data from samples of patient records selected from the emergency departments (ED's) and outpatient departments (OPDs) of a national sample of hospitals. In 1999, there were 21,103 Patient Record forms provided by ED's and in 2000 there were 25,622 provided by ED's.

The 1999-2000 NHAMCS included a national probability sample of visits to the emergency and outpatient departments of noninstitutional general and short-stay hospitals, excluding Federal, military, and Veterans Administration hospitals, in the 50 states and the District of Columbia. The NHAMCS used a four-state probability design with samples of

primary sampling units (PSUs), hospitals within PSUs, clinics within hospitals, and patient visits within clinics.

All analyses of the NHAMCS-ED data were performed using Software for the Statistical Analysis of Correlated Data version 8.0.0 (SUDAAN, Research Triangle Institute). Observation weights were applied to each observation to allow generalization to emergency department visits in the United States and design variables supplied by NHAMCS were used in the statistical procedures to properly account for the sampling design.

In total, 46,725 ED visits were used in the combined years of 1999 and 2000, of which 7513 visits, involved visits to rural hospitals.

Advantages of South Carolina data

The South Carolina data set obtained from the ORS is similar in many respects to the NHAMC-ED data set. The South Carolina data does not include, however, patient and provider perception of the urgency of the visits, the characteristics of the hospital, pharmaceuticals used during the visits, or mode of arrival for the visits. The South Carolina data set does include a significant variable the NHAMC-ED data does not: charge data for the ED visit. The South Carolina data also includes the patient zip code, which enabled analysis regarding geographic specificity of both facility and patient, to study the effects of the total health services available in a community on ED use by medically indigent persons. This also allowed the determination of the influence of a patient's proximity to an FQHC on ED use.

Data Analysis Approach

Descriptive analysis of ED Use in South Carolina

Total ED visits: Total ED visits were summarized by the characteristics of the patient. We summarized the total number of visits and charges for all visits, and then by those classified

as medically indigent (self-pay). Characteristics analyzed included age, gender, residence (urban or rural), physician supply, race, payment method, diagnosis categories, and subsequent hospitalization.

ED visits by medically indigent persons: For all visits classified as medically indigent, we described the demographic and illness characteristics (age, sex, race, principal diagnosis) of the population and compared this to other payment methods. We then explored the outcome of the ED visit, i.e., discharge status (home versus admit), procedures performed, and charges accrued (total, median). Contributing factors such as race and residence were controlled.

Additional Analysis: the day of the week on which the visit occurred was analyzed to determine if visit patterns differed according to provider and clinic availability. The availability of FQCHC's, Rural Health Centers, and Community Health Centers were also analyzed to determine their impact upon ED visits rates across counties.

Cost estimates: The impact of the medically indigent visits upon the ED were based upon charges. Charge data only approximated costs, as charges are based on anticipated collection rates and internal accounting procedures, but it does proceed from readily available data. Charges were aggregated for the whole state and analyzed in different ways: by population characteristics (age, gender, race, etc.) and by visit characteristics such as diagnosis and disposition.

Projection of Cost of Uncompensated Care to the United States

Analytic Approach

To account for the fact that multiple factors pertaining to the patient, his or her illness, and the location of the ED affect charges for an ED visit, we modeled the effect of age, race, sex, residence, payer status, disease and disposition on a 10% sample of charges (n=300,000) in the

South Carolina data set. Linear regression was used on the natural logarithm of charges [$\ln(\text{charges})$] due to the skewness of the original distribution of charges. Each visit in the national data set was then assigned a predicted $\ln(\text{charge})$ based on the model from South Carolina data. We found estimated charges for each observation by incorporating Duan's (JASA 1983) "smearing estimate" to account for bias that usually arises in the retransformation. This involves taking the inverse log transformation of the predicted value and then multiplying this value by the mean of the exponentiated residuals (Pasta and Cisternas, 2003). Once each visit in NHAMCS-ED was assigned a predicted charge, the values were summed across factors of interest and percentages were calculated by taking the amount charged to self-pay patients over the total predicted charges (**See Table 4.1**).

Determination of the ameliorating effects of federally supported health clinics

Multiple regression analysis was utilized to determine the factors that influence ED visit rates. This analysis was performed on the county level, resulting in 46 observations per variable. Three outcome variables were calculated: ED visit rate for children, working age adults, and senior adults. These outcome variables were modeled with the county's percentage in poverty, percentage African American, per-capita physician ratio, the presence/absence of a CHC, and the presence/absence of an ED.

Limitations

The relative homogeneity of South Carolina population, in which white and African American populations outnumber Hispanic or other racial / ethnic minorities, may also present a problem when making national projections. However, all racial groups are present in South Carolina and representation of other ethnicities is similarly low in NHAMCS-ED. Ethnicity

information was missing in almost 20% of the NHAMCS-ED data set therefore we did not make projections from South Carolina data for visits by Hispanic persons.

Appendix C

Unweighted Observations, NHAMCS 1999-2000

	Total	MSA	Non MSA
Total	46,725	39,212	7,513
Age			
0-17	11,336	9,560	1,776
18-24	5,505	4,633	872
25-44	14,628	12,574	2,054
45-64	8,280	6,935	1,345
65-74	2,900	2,337	563
75+	4,076	3,173	903
Gender			
Male	22,199	18,651	3,548
Female	24,526	20,561	3,965
Race			
White	34,710	28,149	6,561
Afr. Amer.	10,336	9,517	819
Asian	1,341	1,291	50
Am. Indian	309	230	79
Other	29	25	4
Expected Source of Payment			
Private	18,032	15,169	2,863
Medicare	6,721	5,237	1,484
Medicaid	1,303	6,854	1,303
Uninsured	7,768	6,674	1,094
Other	3,091	2,586	505
Missing	2,956	2,692	264

Appendix D Detailed Tables

Table 1-A. ED visit rates, All US, 1999-2000

	Number of visits in thousands for 1999-2000	Distribution, %	US Population 2000	Number of visits per 100 persons per year
All Visits	210,781		281,421,906	37.4
Age				
<15	45,272	21.5	60,253,375	37.6
15-24	33,200	15.8	39,183,891	42.4
25-44	64,193	30.5	85,040,251	37.7
45-64	36,225	17.2	61,952,636	29.2
65-74	12,997	6.2	18,390,986	35.3
75+	18,894	9	16,600,767	56.9
Sex and Age				
Female	111,348		143,368,343	38.8
<15	20,308	18.2	29,399,168	34.5
15-24	18,453	16.6	19,105,073	48.3
25-44	34,161	30.7	42,471,924	40.2
45-64	19,250	17.3	31,810,050	30.3
65-74	7,239	6.5	10,087,712	35.9
75+	11,938	10.7	10,494,416	56.9
Male	99,433		138,053,563	36.0
<15	24,965	25.1	30,854,207	40.5
15-24	14,747	14.8	20,078,818	36.7
25-44	30,032	30.2	42,568,327	35.3
45-64	16,974	17.1	30,142,586	28.2
65-74	5,759	5.8	8,303,274	34.7
75+	6,957	7	6,106,351	57.0
Race and Age				
White	161,727		211,460,626	38.2
<15	33,155	20.5	41,127,412	40.3
15-24	24,885	15.4	27,232,039	45.7
25-44	48,088	29.7	62,618,047	38.4
45-64	28,358	17.5	50,077,590	28.3
65-74	10,757	6.7	15,688,418	34.3
75+	16,485	10.2	14,717,120	56.0
African American	43,136		34,658,190	62.2
<15	10,695	24.8	9,131,828	58.6
15-24	7,412	17.2	5,558,305	66.7
25-44	14,195	32.9	10,694,349	66.4
45-64	6,869	15.9	6,450,758	53.2
65-74	1,908	4.4	1,613,172	59.1
75+	2,058	4.8	1,209,778	85.1
Metropolitan Status				
MSA	160,876	76.3	222,360,539	36.2
Non-MSA	49,906	23.7	59,061,367	42.2
Metropolitan Status & Race				
White				
MSA	118,830	73.4	158,987,785	37.4
Non-MSA	42,898	26.5	52,505,555	40.9
African American				
MSA	37,136	86.0	31,130,475	59.6
Non-MSA	5,999	13.9	3,543,682	84.6

Table 1B. ED Visit Rates, South Carolina, 1999-2000.

	Number of visits (1999-2000)	Distribution, %	Population, 2000	Number of visits per 100 persons per year
All Visits	3,002,895	100	4,012,012	37.4
Age				
<15	645,394	21.5	840,401	38.4
15-24	478,494	15.9	577,091	41.5
25-44	911,333	30.4	1,185,955	38.4
45-64	539,373	18.0	923,232	29.2
65-74	190,145	6.3	270,048	35.2
75+	238,156	7.9	215,285	55.3
Sex and Age				
Female	1,662,527		2,063,083	40.3
<15	297,807	26.5	410,516	36.3
15-24	287,593	16.1	283,065	50.8
25-44	517,079	25.9	601,252	43.0
45-64	295,182	15.5	479,651	30.8
65-74	107,731	6.2	149,235	36.1
75+	157,135	9.5	139,364	56.4
Male	1,340,328		1,948,929	34.4
<15	347,577	27.8	429,885	40.4
15-24	190,896	14.8	294,026	32.5
25-44	394,247	25.3	584,703	33.7
45-64	244,186	19.6	443,581	27.5
65-74	82,410	6.2	120,813	34.1
75+	81,012	6	75,921	53.4
Race and Age				
White	1,647,576			30.6
<15	305,293	18.5	498,295	30.6
15-24	239,762	14.6	352,635	34.0
25-44	495,356	30.1	796,140	31.1
45-64	311,794	18.9	672,099	23.2
65-74	126,468	7.7	209,567	30.2
75+	168,903	10.3	166,824	50.6
African American	1,287,829			0.0
<15	319,663	24.8	306,345	52.2
15-24	224,764	17.5	197,055	57.0
25-44	394,292	30.6	345,939	57.0
45-64	220,108	17.1	231,907	47.5
65-74	61,708	4.8	57,302	53.8
75+	67,294	5.2	46,668	72.1
Metropolitan Status				
MSA	2,139,811	71.3	2,850,767	37.5
Non-MSA	863,084	28.7	1,161,245	37.2
Metropolitan Status & Race				
White				
MSA	1,241,811	75.2	2,070,323	30.0
Non-MSA	405,765	24.8	625,237	32.4
African American				
MSA	845,657	65.7	742,458	56.9
Non-MSA	442,172	34.3	442,758	49.9

Table 2. Patient characteristics, US and South Carolina, 1999 and 2000.

	Total		Urban		Rural	
	United States	South Carolina	United States	South Carolina	United States	South Carolina
Total Visits	210,781,446	3,000,895	160,875,931	2,101,153	49,905,515	901,742
Age						
0-17	25.3	25.4	25.9	24.9	23.3	26.5
18-24	11.9	12.1	11.9	12.2	11.9	12.0
25-44	30.5	30.4	31.3	31.2	27.7	28.3
45-64	17.2	18.0	17.0	18.1	17.9	17.7
65-74	6.2	6.3	5.8	6.2	7.4	6.7
75+	9.0	7.9	8.1	7.5	11.7	8.9
Gender						
Male	47.2	44.6	47.3	44.9	46.7	44.1
Female	52.8	55.4	52.7	55.2	53.3	55.9
Race						
White	76.7	54.9	73.9	58.0	86.0	47.0
Afr. Amer.	20.5	42.9	23.1	39.5	12.0	51.2
Asian	2.0	0.2	2.5	0.2	0.5	0.1
Am. Indian	0.7	0.9	0.5	1.1	1.4	0.5
Other	0.1	1.1	0.1	1.1	0.1	1.2
Expected form of payment †						
Private	41.8	27.9	43.0	27.3	38.1	29.3
Medicare	15.8	21.0	14.2	22.3	21.0	17.8
Medicaid	18.0	22.5	18.0	21.3	18.2	25.7
Uninsured	17.8	18.9	18.2	18.3	16.3	20.5
Other‡	6.6	9.7	6.6	10.9	6.5	6.9

*Urban and Rural are defined according to the NAMCS definition of Metropolitan / Non-Metropolitan.

† Workman's comp, no charge and other (national), Workman's comp, unknown, HMO, Charity, and other (South Carolina).

‡ 2956 Missing or unknown (national), 29,418 unknown form of payment (South Carolina).

Table 3. US and SC visits in thousands and visit Characteristics, 1999-2000.

	Total US	Total SC	US Urban	SC Urban	US rural	SC Rural
Total Visits	210,781	3,002	160,876	2,101	49,906	901
Hospital Characteristics	%	%	%	%	%	%
Voluntary	73.2	-	76.2	-	63.5	-
Government	17.9	-	15.4	-	26.2	-
Proprietary	8.9	-	8.4	-	10.3	-
Primary Diagnosis						
Infectious/parasitic diseases	2.9	3.4	3.1	3.2	2.3	3.8
Neoplasm	0.3	0.4	0.3	0.4	0.3	0.4
Endocrine/metabolic	1.6	1.8	1.5	1.7	1.8	2.2
Mental disorders	2.8	2.6	3.1	2.8	2.0	2.3
Nervous system & sense organs	5.5	5.4	5.4	5.5	5.9	5.3
Circulatory system	4.2	5.0	3.9	4.9	5.1	5.2
Respiratory system	12.2	13.8	12.0	13.6	12.8	14.4
Digestive system	5.8	6.5	5.7	6.2	6.2	7.2
Genitourinary system	4.4	5.1	4.5	5.1	4.4	5.2
Skin/subcutaneous system	2.8	2.6	2.9	2.6	2.5	2.5
Musculoskeletal & connective	5.4	6.1	5.1	6.0	6.2	6.3
Symptoms, sign, ill-defined iill.	16.2	17.0	16.4	17.4	15.5	16.0
Injury and poisoning	28.8	25.7	28.4	26.0	30.1	24.8
Supplementary classification	2.9	2.4	3.2	2.6	2.0	2.0
All other diagnoses	1.7	2.2	1.8	2.1	1.3	2.5
Unknown/missing	2.5	0.0	2.8	0.0	1.8	0.0
Disposition						
Admitted to Hospital	12.6	12.8	12.6	12.7	12.6	13.0
ED only	87.4	87.3	87.4	87.3	87.4	87.0

*438 missing

Table 4-A. ED by patient characteristics, all US, self-pay versus other payment sources.

	US Total		US MSA		US Non-MSA	
	Self-Pay	Other	Self-Pay	Other	Self-Pay	Other
Age						
0-17	20.3	26.7	20.3	27.6	20.2	24.2
18-24	21.4	9.6	21.3	9.6	21.6	9.8
25-44	42.3	27.3	42.1	28.4	43.2	24.3
45-64	14.2	17.9	14.4	17.5	13.4	18.9
65-74	1.0	7.4	1.0	7.0	0.9	8.8
75+	0.8	11.0	0.8	10.0	0.8	14.1
Gender						
Male	50.8	46.2	51.4	46.2	48.7	46.2
Female	49.2	53.8	48.6	53.8	51.3	53.8
Race						
White	71.8	78.0	69.3	75.1	80.1	87.0
African American	25.6	19.2	28.1	21.8	16.5	11.2
Asian	1.7	2.0	2.0	2.5	0.6	0.5
American Indian	0.9	0.7	0.5	0.5	2.2	1.3
Multiple race reported	0.1	0.1	0.1	0.1	0.0	0.1
Primary Diagnosis						
Infectious/parasitic diseases	3.3	2.8	3.5	3.0	2.6	2.3
Neoplasm	0.2	0.3	0.1	0.3	0.2	0.3
Endocrine/metabolic disorder	1.0	1.7	1.1	1.6	0.8	2.0
Mental disorders	3.9	2.5	4.2	2.7	2.6	1.9
Nervous system & sense organs	5.4	5.7	5.2	5.6	6.4	6.0
Circulatory system	2.0	4.7	2.0	4.4	1.9	5.8
Respiratory system	11.9	12.4	11.7	12.2	12.9	12.8
Digestive system	5.9	5.9	6.0	5.7	5.5	6.4
Genitourinary system	5.6	4.3	5.6	4.3	5.7	4.1
Skin/subcutaneous system	3.1	2.7	3.1	2.8	2.8	2.4
Musculoskeletal & connective tissue	5.9	5.4	5.4	5.2	7.7	6.0
Symptoms, sign, ill-defined illness	14.0	16.8	14.6	16.9	11.9	16.3
Injury and poisoning	29.6	28.6	28.7	28.4	33.0	29.3
Supplementary classification	3.5	2.7	4.0	3.0	2.0	1.9
All other diagnoses	1.7	1.7	1.8	1.8	1.5	1.3
Unknown/missing	3.1	1.9	3.2	2.1	2.7	1.3
Disposition						
Admitted to Hospital	6.9	14.0	6.9	14.0	6.7	14.0

Values in italics are based on fewer than 30 observations and are considered unreliable.

Table 4-B. ED visits by patient characteristics, South Carolina, self-pay versus other payment sources.

	SC Total		SC MSA		SC Non-MSA	
	Self-Pay	Other	Self-Pay	Other	Self-Pay	Other
Age						
0-17	14.1	28.4	14.0	28.4	14.4	28.2
18-24	23.4	9.1	23.0	9.1	24.7	9.2
25-44	47.6	25.8	48.1	26.2	46.1	24.9
45-64	14.4	18.9	14.4	18.8	14.2	19.1
65-74	0.4	7.9	0.4	7.8	0.4	8.2
75+	0.2	9.9	0.2	9.7	0.2	10.5
Gender						
Male	51.4	56.4	51.4	56.3	51.6	56.7
Female	48.6	43.6	48.7	43.7	48.4	43.3
Race						
White	50.73	56.0	53.0	59.7	43.9	47.8
African American	45.4	42.2	42.9	38.2	53.3	51.0
Hispanic	1.3	0.8	1.5	1.1	0.5	0.4
Other	2.6	1.0	2.6	1.1	2.3	0.8
Primary Diagnosis						
Infectious/Parasitic diseases	3.0	3.5	3.0	3.3	3.2	3.9
Neoplasm	0.1	0.5	0.1	0.4	0.2	0.5
Endocrine/metabolic disorder	1.1	2.0	1.1	1.9	1.3	2.4
Mental disorders	4.2	2.2	4.3	2.3	3.7	2.1
Nervous system and sense organs	4.7	5.6	4.8	5.7	4.4	5.4
Circulatory system	1.8	5.8	1.7	5.6	2.1	6.1
Respiratory system	11.9	14.3	12.0	14.1	11.5	14.7
Digestive system	6.3	6.6	6.1	6.2	6.9	7.4
Genitourinary system	6.7	4.7	6.6	4.7	7.0	4.9
Skin/subcutaneous system	3.0	2.5	3.1	2.5	2.8	2.4
Musculoskeletal and connective tissue	7.2	5.8	7.1	5.7	7.4	6.1
Symptoms, sign, ill-defined illness	15.4	17.5	15.5	17.9	15.3	16.5
Injury and poisoning	30.0	24.5	29.9	25.1	30.1	23.2
Supplementary classification	3.0	2.3	3.1	2.5	2.6	1.8
All other diagnoses	1.6	2.3	1.6	2.2	1.6	2.6
Disposition						
Admitted to Hospital	4.3	15.0	4.1	14.6	5.0	15.9

Table 5. Percent admitted, by payment status and rurality, United States and South Carolina.

	Private Insurance	Self-pay patients	Medicaid	Medicare	Other insurance
All					
US % Admitted	10.0	6.9	8.3	34.2	5.6
SC % Admitted	9.5	4.3	7.0	35.4	10.3
MSA					
US % Admitted	10.5	6.6	8.5	35.1	6.1
SC % Admitted	9.7	4.1	6.8	36.2	10.3
Non MSA					
US % Admitted	8.8	6.7	7.6	32.1	3.8
SC % Admitted	9.1	5.0	7.3	33.7	10.5

Table 6. Percent of all ED visits resulting in admission, South Carolina only, by patient characteristics and diagnosis, residence, and payment method

	Total		MSA		Non-MSA	
	Self-Pay	Other	Self-Pay	Other	Self-Pay	Other
Age						
0-17	1.4	3.7	1.3	3.7	1.6	3.7
18-24	2.1	5.4	2.0	5.1	2.6	6.0
25-44	4.2	8.7	3.9	8.7	5.2	8.7
45-64	11.0	21.6	10.5	22.1	12.5	20.5
65-74	6.4	35.5	6.8	36.7	5.1	32.8
75+	8.5	44.1	7.2	44.7	10.6	42.6
Gender						
Male	3.5	14.8	3.2	14.8	4.3	14.9
Female	5.2	15.4	5.0	15.8	5.8	14.7
Race						
White	4.6	17.8	4.3	68.5	5.5	18.4
African American	4.0	11.7	3.7	11.7	4.5	11.5
Asian	4.3	11.0	4.2	11.1	4.7	8.9
Hispanic	5.6	18.1	5.5	19.3	5.8	11.3
Other	4.9	7.3	4.3	7.4	6.5	7.2
Primary Diagnosis*						
Infectious/parasitic diseases	4.4	15.9	4.2	16.7	4.8	14.4
Neoplasm	38.6	70.8	38.8	74.4	37.9	61.7
Endocrine/metabolic disorders	21.5	40.2	20.1	40.7	25.1	39.1
Mental disorders	6.1	18.8	5.3	20.2	8.9	15.2
Nervous system and sense organs	0.8	3.7	0.8	3.8	1.0	3.2
Circ. system	32.1	65.0	32.9	67.9	29.9	58.5
Resp. system	3.8	15.8	3.5	15.4	4.8	16.7
Digestive system	11.6	30.1	11.1	31.6	13.0	27.2
Genitourinary system	3.6	14.8	3.2	14.2	4.8	16.2
Skin/subcutaneous system	3.0	7.3	2.8	7.1	3.5	7.8
Musculoskeletal and connective tissue	0.8	4.0	0.8	4.0	1.0	3.9
Symptoms, sign, ill defined illness	3.2	9.0	3.0	8.9	3.9	9.5
Injury and poisoning	2.7	6.4	2.7	6.8	2.5	5.4
Supplementary classification	0.4	0.9	0.4	0.9	0.3	0.8
All other diagnoses	7.9	21.5	6.9	21.1	11.0	22.1

Table 7: South Carolina Visit Charges, by location of ED and payment source

All Visits	Total		MSA		Non-MSA	
25th Percentile	\$176		\$176		\$170	
50th Percentile	\$353		\$357		\$329	
75th Percentile	\$839		\$831		\$799	
Visits by Insurance Status						
	Insurance	Self-Pay	Insurance	Self-Pay	Insurance	Self-Pay
All ED Visits						
25th Percentile	\$179	\$167	\$179	\$165	\$178	\$169
50th percentile	\$368	\$309	\$374	\$312	\$337	\$299
75th Percentile	\$955	\$591	\$952	\$593	\$875	\$582
Visits discharged						
25th Percentile	\$158	\$161	\$161	\$160	\$152	\$163
50th percentile	\$297	\$292	\$309	\$295	\$274	\$284
75th Percentile	\$567	\$535	\$586	\$541	\$522	\$515
Visits resulting in admission						
25th Percentile	\$4633	\$3803	\$4955	\$4146	\$4005	\$3199
50th percentile	\$7926	\$6407	\$8481	\$6957	\$6775	\$5225
75 th percentile	\$14261	\$11240	\$15460	\$12220	\$11777	\$8986

Table 8. South Carolina charge data, ED visits not resulting in hospitalization, by patient characteristics (median)

	Total		MSA		Non-MSA	
	Self-Pay	Other	Self-Pay	Other	Self-Pay	Other
Age						
0-17	207	207	207	211	206	195
18-24	291	297	295	310	279	272
25-44	308	319	312	331	298	289
45-64	370	392	370	409	369	356
65-74	429	486	423	514	439	433
75+	552	566	550	604	559	501
Gender						
Male	290	287	296	318	284	277
Female	293	304	293	296	285	269
Race						
White	308	327	312	334	293	304
African American	276	266	276	276	278	252
Asian	259	278	258	283	262	237
Hispanic	308	327	315	286	358	264
Other	321	283	306	243	251	205
Primary Diagnosis*						
Infectious/parasitic diseases	209	187	213	193	199	181
Neoplasm	335	491	339	543	321	399
Endocrine/metabolic disorders	484	512	482	529	487	487
Mental disorders	313	484	312	311	324	275
Nervous system and sense organs	175	169	175	169	175	169
Circ. system	428	840	413	856	481	812
Resp. system	222	226	221	227	226	222
Digestive system	232	289	232	306	229	264
Genitourinary system	419	440	427	464	395	390
Skin/subcutaneous system	190	179	192	183	183	172
Musculoskeletal and connective tissue	238	271	241	279	229	250
Symptoms, sign, ill defined illness	423	468	442	506	365	383
Injury and poisoning	338	332	332	323	320	288
Supplementary classification	121	114	112	105	142	139
All other diagnoses	501	447	500	472	502	393

Table 9. South Carolina charge data, ED plus inpatient charges, by demographic characteristics (median)

	Total		MSA		Non-MSA	
	Self-Pay	Other	Self-Pay	Other	Self-Pay	Other
Age						
0-17	3,444	3,797	3,786	4,080	2,926	3,268
18-24	5,627	5,957	6,246	6,555	4,583	4,880
25-44	6,210	6,527	6,666	7,379	5,200	5,879
45-64	7,498	7,868	8,105	8,844	6,013	6,962
65-74	9,327	9,831	9,540	9,779	8,078	7,748
75+	7,728	7,728	8,157	9,724	5,905	7,955
Gender						
Male	6,584	8,046	6,712	8,423	5,173	6,819
Female	6,193	7,895	7,170	8,652	5,267	6,763
Race						
White	6,455	8,131	6,976	8,635	5,129	6,907
African American	6,345	7,648	6,923	8,312	5,364	6,657
Asian	7,602	7,532	7,845	7,702	3,704	5,126
Hispanic	6,947	7,796	7,093	7,821	6,880	7,609
Other	6,685	7,260	7,660	6,503	4,210	4,765
Primary Diagnosis*						
Infectious/parasitic diseases	6,540	8,673	6,754	8,950	6,154	8,065
Neoplasm	12,370	13,948	13,400	15,410	8,025	10,496
Endocrine/metabolic disorders	5,114	6,117	5,513	6,530	4,441	5,407
Mental disorders	4,365	6,018	4,598	6,349	3,906	4,887
Nervous system and sense organs	6,097	7,108	7,495	7,752	4,127	5,609
Circ. system	9,355	9,574	10,449	10,448	6,606	7,672
Resp. system	5,963	8,243	6,408	8,644	5,234	7,523
Digestive system	7,815	8,513	8,261	8,827	6,786	7,792
Genitourinary system	5,635	7,024	5,981	7,410	5,096	6,280
Skin/subcutaneous system	5,439	6,651	5,699	7,073	4,877	5,991
Musculoskeletal and connective tissue	6,408	7,205	6,836	7,758	4,529	5,930
Symptoms, sign, ill defined illness	4,838	5,495	5,295	5,787	3,971	4,792
Injury and poisoning	7,227	10,074	8,023	10,915	5,285	7,674
Supplementary classification	3,416	4,850	3,551	5,327	2,868	3,718
All other diagnoses	5,156	5,567	5,661	5,981	4,223	4,720

Table 10. Model coefficients: factors affecting ED charges in South Carolina

Variable	Estimate	Error
Intercept	6.2713	0.0184
Age Groups		
0-15	-0.6553	0.0090
15-24	-0.4099	0.0090
45-64	-0.3030	0.0082
65-74	-0.1160	0.0077
>75	0.0000	-----
Race		
White	0.1026	0.0154
African American	0.0085	0.0154
Asian	-0.0261	0.0406
Hispanic	0.1523	0.0228
Other Race	0.0000	-----
Gender		
Male	-0.0359	0.0033
Female	0.0000	-----
Rurality		
Rural	-0.0224	0.0035
Urban	0.0000	-----
Payment Method		
Private	-0.0290	
Self-Pay	-0.0604	
Medicaid	-0.1047	
Medicare	0.0106	
Other	0.0000	-----
Admission Status		
Inpatient	2.9643	0.0056
Disease Categories		
Infectious/parasitic diseases	-0.4403	0.0097
Neoplasms	0.1930	0.0256
Endocrine/metabolic disorders	-0.1230	0.0126
Mental disorders	-0.3092	0.0107
Nervous system and sense organs	-0.6634	0.0080
Circulatory System	0.0926	0.0088
Respiratory system	-0.3768	0.0059
Digestive system	-0.2445	0.0074
Genitourinary system	0.0462	0.0082
Skin/subcutaneous system	-0.7138	0.0107
Musculoskeletal & connective tissue	-0.5032	0.0076
Symptoms, sign, ill-define illness	0.0000	-----
Injury and poisoning	-0.2155	0.0051
Supplementary diagnoses	-1.1758	0.0110
All other diagnoses	0.0828	0.0118
Year		
2000	0.0858	0.0032

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