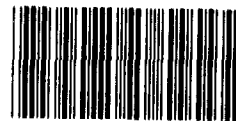


February 1991

RURAL HOSPITALS

Federal Efforts Should Target Areas Where Closures Would Threaten Access to Care



143344



United States
General Accounting Office
Washington, D.C. 20548

Human Resources Division

B-239983

February 15, 1991

Dear Congressional Requesters:

In response to your request, we investigated the causes and consequences of rural hospital closures. This report identifies the major factors associated with a higher risk of closure, assesses the impact of hospital closures on rural communities and health care costs, and reviews the role of Medicare's prospective payment system in closures. A recommendation to the Secretary of Health and Human Services and a matter for congressional consideration are included in the report.

We are forwarding copies of this report to the Secretary and other interested parties.

Please contact me on (202) 275-5451 if you or your staff have any questions concerning this report. Other major contributors are listed in appendix VIII.

A handwritten signature in cursive script, appearing to read 'Janet L. Shikles'.

for Janet L. Shikles
Director, Health Financing
and Policy Issues

Executive Summary

Purpose

Between 1980 and 1988, there were 200 rural hospital closures—about half of the total community hospital closures in the United States. Because of widespread congressional concern that rural hospital closures may jeopardize access to medical care, 33 Senators requested that GAO investigate why such hospitals are closing and what impact the closures have on rural communities. They also asked that GAO assess Medicare's role in closures and the impact of closures on Medicare costs. (See app. I for a list of the congressional requesters.)

This report identifies hospital and environmental characteristics associated with financial distress and a high risk of closure; assesses the impact of rural hospital closures on access to care, health care costs, and local economies; and reviews public policy initiatives that assist rural hospitals.

Background

Rural hospitals—those outside a metropolitan statistical area—are a key component of the U.S. health care system; they represent one-fourth of all acute care beds, and about half of all acute care hospitals. Rural hospitals differ greatly from urban hospitals. More rural than urban hospitals are small, are government-owned, are in areas with weak economies, and provide care for less complex medical conditions.

The health care environment faced by rural hospitals has changed dramatically in the last decade. The changes include the increasing sophistication and cost of technology used to deliver medical services, the shifting of services from inpatient to outpatient settings, and the establishment of Medicare's fixed-price prospective payment system for inpatient services. These and other changes have contributed to intense hospital competition for a declining number of people who need inpatient care, and created special problems for small or rural hospitals trying to compete in today's health care market.

GAO analyzed national data bases and conducted 11 case studies of rural hospital closures to investigate the causes and consequences of such closures. To review public policy initiatives that focus on rural hospitals, GAO interviewed federal and state officials and reviewed related documentation.

Results in Brief

No single factor causes rural hospitals to close. Rather, a number of interrelated factors affect risk—rural hospitals as a group are vulnerable because they more often have these characteristics. Both hospital

characteristics, such as small size and low occupancy rate, and environmental characteristics, such as a weak economy and competition from other hospitals, were associated with a higher risk of closure.

Most rural closures GAO studied did not significantly reduce access to inpatient care. However, in some areas, closures appeared to worsen access problems, especially for vulnerable populations, such as Medicaid recipients or the uninsured, and those needing emergency care.

Federal and state governments do not systematically identify hospitals at risk of closure and assess the potential impact of the closure on access. If they did, they could target available funding to communities that would be most negatively affected and thereby better assure communities' continued access to care.

Although a number of federal initiatives provide some financial relief for rural hospitals, across-the-board solutions may not adequately address the major problems facing individual hospitals. One effort, the Rural Health Care Transition Grant Program, has more potential to assist communities where access to care is threatened. However, it could achieve this potential more effectively with some policy changes. Currently, the program (1) is not targeted to reduce access problems, (2) does not attempt to assess whether the federal funding (together with other funding sources) is likely to make a significant difference in the hospital's viability, and (3) does not allow grants for alternative approaches to maintaining access to hospital care when a hospital is not viable.

Principal Findings

Certain Hospital and Environmental Characteristics Increase Closure Risk

A hospital's rural location did not raise its risk over and above that of a comparable urban hospital. Instead, a number of interrelated hospital and environmental factors were associated with higher risk. Among these factors were (1) small size and low occupancy; (2) for-profit ownership; (3) providing care for less complex medical conditions; (4) weak local economies; and (5) competition from other hospitals. Rural hospitals are vulnerable as a group because several of these factors are more prevalent among rural than urban hospitals. In GAO's case studies, physician recruitment/retention problems, failed management strategies,

and uncompensated care were other important factors that contributed to financial distress and closure.

Low Medicare payment was not a major factor increasing risk of closure for most rural or urban hospitals. Medicare, however, may have contributed disproportionately to the financial distress that preceded closure in the smallest rural hospitals. (See ch. 3.)

Most Closures Had Little Adverse Effect, but Some Raise Concern

Most rural hospital closures GAO studied did not significantly reduce access to inpatient care. In these areas, alternative hospitals were both available and used by many area residents.

However, problems in access to inpatient or emergency care appeared to worsen after closure in some areas. GAO's analysis indicates that problems in access to inpatient care may have been caused or exacerbated by closures in as many as a third of the rural areas with closures in 1986. Also, case studies in 11 rural communities with closures between 1983 and 1988 provided evidence that closures may sometimes worsen access problems, especially for vulnerable populations, such as Medicaid or uninsured residents, or those needing emergency care. In some of the communities in GAO's case studies where access problems appeared to worsen, actions were taken to address the problems. In others, however, plans are still under development several years after the closure.

Rural hospital closures GAO studied did not cause a major decline in the local economies, primarily because the hospitals were so small that they had not been major factors in those local economies. Some observers feared that closures would increase Medicare costs by causing patients to go to more expensive urban hospitals. However, Medicare inpatient expenditures per person did not grow any faster in counties with 1985 or 1986 closures than in counties with no closures. (See ch. 4.)

Federal Assistance Is Not Well Targeted; State Programs Vary

The Department of Health and Human Services (HHS) and many state governments could better identify and monitor areas where a hospital is at risk of closure and that closure would threaten access. Of several federal initiatives that assist rural hospitals, one, the Rural Health Care Transition Grant Program, has more potential to help maintain access in rural communities threatened with hospital closures that would substantially reduce access to care. However, it could better achieve this potential with some policy changes.

The program is not targeted at hospitals that are financially weak and provide essential services to their communities. Also, nearly 400 projects have been funded without first assessing whether the amount of funding, and the proposed project, is likely to make a significant difference in the hospital's financial viability, given its local environment and operating characteristics. Finally, grants are available only to a hospital to maintain its services, although alternative approaches might better maintain access to care when the hospital is not viable. (See ch. 5.)

Matter for Congressional Consideration

To assist rural communities in maintaining access to hospital care in an efficient and effective manner, the Congress should consider making any future transition grant funding for this purpose available according to certain principles. These principles would assure that the funding (1) targets at-risk, essential hospitals that appear to have a reasonable chance of survival, (2) is substantial enough to make a difference for that hospital, and (3) could help a community implement alternative approaches to maintaining access to care, when a hospital providing essential services is not a viable entity.

Recommendation

To identify areas threatened with loss of a hospital whose closure would substantially reduce access to care in time to avoid closure, GAO recommends that the Secretary of HHS direct the Office of Rural Health Policy to develop guidelines for states to identify and monitor rural areas in which (1) hospitals are at risk of closure and (2) vulnerable populations or the community as a whole would face substantial problems in obtaining essential inpatient or emergency care if the hospital closed.

Agency Comments

GAO obtained oral comments on a draft of this report from Health Care Financing Administration (HCFA) officials and officials from HHS's Office of Rural Health Policy. A summary of their comments and GAO's responses are included in chapter 6. Although HCFA officials disagreed with GAO's recommendation, they did not present evidence that caused GAO to alter its major findings or recommendation.

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Abbreviations

AHA	American Hospital Association
EMS	emergency medical services
EMT	emergency medical technician
GAO	General Accounting Office
HCFA	Health Care Financing Administration
HCIA	Health Care Investment Analysts, Inc.
HCRIS	Hospital Cost Report Information System
HHS	Department of Health and Human Services
MSA	metropolitan statistical area
ORHP	Office of Rural Health Policy
PPS	prospective payment system
RRC	Rural Referral Center
SCH	Sole Community Hospital

Introduction

Faced with a rapidly evolving and highly competitive health care environment, many rural hospitals have closed in recent years. Nearly three times as many rural hospitals closed between 1985 and 1988 as in the previous 4 years, and more are financially distressed¹ and at significant risk of closure. Some analysts argue that hospital closures have resulted in a more efficient and high-quality health care delivery system. There is concern, however, that improvements in efficiency are occurring at the expense of access to care. Rural hospital closures are of particular concern because the consequences—in terms of access to care and the economic impact on the community—are perceived to be greater for rural than urban communities.

To clarify the nature of the problems facing rural hospitals and rural communities, 33 Senators requested that we investigate why rural hospitals are closing, and what impact the closures have on rural communities. They also asked that we assess Medicare's role in closures and the impact of closures on Medicare costs. The congressional requesters are listed in appendix I.

Background

Rural hospitals—those outside a metropolitan statistical area—are a major component of the U.S. health care system.² Of the 5,746 community hospitals in the United States in 1987, about half were in rural areas. However, because they are on average smaller than urban hospitals, they represent only about one-fourth of all acute care beds in the United States. The percentage of hospital beds in rural areas closely approximates the distribution of the U.S. rural population: about a fourth of U.S. residents live in rural (nonmetropolitan) areas.

Many states rely on rural hospitals to provide residents' hospital care because they have either a large rural population or a large portion of their population in rural areas.³ Also, twenty-nine states have at least

¹About a third of rural hospitals experienced net financial losses, a sign of financial distress, during fiscal years 1985-87. See *Rural Hospitals: Federal Leadership and Targeted Programs Needed* (GAO/HRD-90-67), pp. 57-58. We issued this and a second report on rural hospitals, *Rural Hospitals: Factors That Affect Risk of Closure* (GAO/HRD-90-134), in June 1990. The first report focused on the federal, state, and hospital initiatives that help rural hospitals. The second presented the results of our quantitative analysis of the factors that affect risk of closure.

²This is the definition generally used by Medicare's prospective payment system. Conversely, urban hospitals and urban populations are those located in a metropolitan statistical area.

³As of 1987, 15 states had more than half of their population residing in rural areas, and six had rural populations of 2 to 3.2 million. (Source: U.S. Bureau of the Census, *Statistical Abstract of the United States: 1989*, 109th ed. Washington, D.C.: U.S. Government Printing Office, 1989.)

half of their hospitals located in rural areas.⁴ Thus, the survival of rural hospitals is a concern for many states.

Role and Characteristics of Rural Hospitals

Historically, the role and value of rural hospitals have extended beyond the delivery of acute care services. Rural hospitals have served as the umbrella network for access to primary care services, emergency care, and hospital inpatient services. In addition, they were often viewed as much a social as a health care institution because they provided social services and hosted community meetings and social gatherings. Even today, rural and urban hospitals differ in their range and scope of services. Hart and colleagues found that rural hospitals are more likely to provide long-term care and home health services than urban hospitals of similar size.⁵ Although they have fewer technological resources and provide care for less complex medical conditions than most urban hospitals, rural hospitals must compete for patients with the more technologically sophisticated urban hospitals.

Rural and urban hospitals also differ on several institutional characteristics (see table 1.1). Rural hospitals are smaller on average than urban hospitals, with about three-fourths having fewer than 100 beds. The smaller size of rural hospitals is assumed to place them at greater financial risk than urban hospitals. In addition, a larger percentage of rural hospitals are owned by a state, county, or local government entity (42 percent versus 14 percent). Public ownership has potential advantages and disadvantages. Publicly owned hospitals often receive support from state or local tax dollars; however, they also provide more care to those who are unable to pay than private nonprofit and for-profit hospitals.

⁴American Hospital Association, *Hospital Statistics*, 1988, table 6.

⁵L.G. Hart, R.A. Rosenblatt, and B.A. Amundson, "Is There a Role for the Rural Hospital?" Working Paper, Vol. 1, No. 1, WAMI Rural Health Research Center, University of Washington, 1989.

Table 1.1: Characteristics of Urban and Rural Hospitals (1987)

	Rural	Urban
Number of hospitals	2,642	3,104
Number of beds (percent): ^a		
6-49	39	7
50-99	34	16
100-199	21	27
200+	7	49
Ownership (percent): ^a		
Government (nonfederal)	42	14
Private, nonprofit	48	66
For-profit	10	20
Patient/payor mix (percent): ^b		
Medicare inpatient days	50	45
Medicaid inpatient days	8	7

^aAmerican Hospital Association annual survey data.

^bMedicare cost report data.

The Operating Environment of Rural Hospitals

To understand the difficulties facing rural hospitals, it is important to examine the context in which they operate. Rural areas generally have a larger percentage of elderly residents and are poorer than urban areas (see table 1.2). Also, rural areas have experienced less population growth than urban areas in the last decade.

Table 1.2: Comparison of Rural and Urban Populations

Characteristics	Rural	Urban
Percent of U.S. population (1988)	22	78
Persons per square mile (1980)	27	179
Percent age 65+ (1980)	13.8	10.3
Per capita income (1987)	\$11,863	\$13,917
Unemployment rate (1988)	6.4	5.3
Percent increase in population (1980-88, median)	1	8
Percent with family incomes below poverty (1987) ^a	16.9	12.5

^aSource: Office of Technology Assessment, *Health Care in Rural America*, September, 1990, p. 40. Source, except where noted: GAO analysis of Department of Health and Human Services' Area Resource File.

The health care environment has changed dramatically since many of the nation's rural hospitals were built. Federal funds through the Hill-

Burton Act facilitated the growth of hospitals in urban and rural communities.⁶ Since then, and especially in the 1980s, scientific and technological advances as well as changes in hospital reimbursement policies have greatly altered medical practice patterns. Many medical procedures that once required hospitalization are now performed in outpatient settings, thus reducing inpatient hospital use.

The most important change in the reimbursement of hospitals occurred in 1983, when the Congress created a prospective payment system (PPS) for hospital inpatient services provided to Medicare beneficiaries. The goal was to control costs by giving hospitals financial incentives to deliver services more efficiently and reduce unnecessary use of services. Under Medicare, PPS pays a hospital a predetermined amount, based on the 1981 national average cost of treatment for each patient with a similar problem or requiring a similar treatment procedure. These payments are adjusted for certain hospital characteristics and updated annually.⁷ Hospitals with costs below this amount make a profit from the system; those with costs above the amount lose. After implementation of PPS, patients, on average, were discharged from hospitals more quickly.

Employers and private insurers have also adopted a number of cost-containment strategies. The growth in health maintenance organizations, preferred provider organizations, and direct contracting between insurers and hospitals are all examples of efforts to reduce unnecessary hospitalizations and constrain the growth of hospital costs. These efforts also have reduced the volume of hospital inpatient services and contributed to intense hospital competition for a declining patient base.

Access Is Still a Concern

Despite major gains in access to care nationally, residents of rural areas continue to face greater barriers to care than urban residents. Rural residents report more chronic or serious illnesses, have higher injury-related mortality rates, and are more likely to be uninsured than urban residents (see table 1.3). Rural areas have fewer physicians per 1,000 population and have less well-developed emergency medical transportation systems. Also, rural residents must travel farther for care than urban residents. Distance affects accessibility as well as the costs to the

⁶Enacted in 1946 and officially entitled the Hospital Survey and Construction Act (P.L. 79-725), this act matched federal grant money with local funds to renovate, expand, or construct hospitals in order to equalize hospital facilities among the states, and between urban and rural areas within states.

⁷The predetermined amount is based on the average cost of treating that type of patient and adjusted for some sources of hospital cost variation, including local wages, teaching status, and urban or rural location.

individual. Since most persons are hospitalized near their homes,⁸ there is concern that rural hospital closures will jeopardize rural residents' ability to obtain timely and appropriate levels of care.

Table 1.3: Comparison of Health and Health Resources in Rural and Urban Areas

Indicator	Rural	Urban
Beds per 1,000 population (1988) ^a	4.0	3.4
Active nonfederal physicians per 10,000 population (1988) ^a	7.1	16.2
Percent medically underserved counties ^{a,b}	56.0	16.6
Estimated percent of population limited in activities due to chronic illness (1988) ^c	14.9	12.6
Mortality Rate (per 10,000 population, 1980): ^c		
Motor vehicle accidents	3.1	2.1
All other accidents	2.9	2.2

^aSource: GAO analysis of HHS Area Resource File.

^bA county was counted as medically underserved if it was wholly designated by HHS as a medically underserved area. This designation is based on an index derived from a weighted score of four indicators reflecting direct or proxy measures of the availability and need for health services.

^cSource: Office of Technology Assessment, *Health Care in Rural America*, September 1990, p. 44. Chronic illness data are adjusted to accommodate age differences. Mortality rates were adjusted to accommodate the different age, sex, and racial distributions of the urban and rural population.

Objectives, Scope, and Methodology

As requested, we investigated the causes of rural hospital closures and their consequences. To identify the factors that might contribute to a hospital's financial distress and ultimate closure, we compared the operating and environmental characteristics of open and closed hospitals during the period 1985-88.⁹ Also, we used a statistical technique, logistic regression, to assess the individual and combined influence of the multiple factors associated with a hospital's closure.¹⁰ Before any analysis, we validated a sample of hospital closures as described in appendix II.

⁸Christopher Hogan, "Patterns of Travel for Rural Individuals Hospitalized in New York State: Relationships Between Distance, Destination, and Casemix," *The Journal of Rural Health*, Vol. 4, No. 2, July 1986, p. 30.

⁹National data sources used in our analysis of the causes and consequences of closure included the American Hospital Association (AHA) closure files, AHA Annual Surveys, Medicare Hospital Cost Report Information System, Department of Health and Human Services (HHS) Area Resource File, and HHS Medicare Provider Analysis and Review (MEDPAR-2) file. In addition, we contracted with a private firm, Health Care Investment Analysts, Inc., to provide some additional analysis of Medicare cost reports. See app. II for further detail.

¹⁰Since publication of our prior report, we tried several alternate closure models in an attempt to clarify the role of the local economy and competition. In this report, we present the results of a model that is similar in most respects to our previous model, but which we believe provides additional insight into the economic and competitive factors affecting risk of closure.

The methodology for assessing Medicare's role in hospital closures is described in appendix II. Because PPS payment rules changed during our study period (for example, payment rates were increasingly based on national average costs, rather than hospitals' own costs), our assessment of Medicare's role in closures must not be assumed to reflect the pattern for more recent (since 1988) or future closures.

To assess the impact that hospital closures had on access, we evaluated, for 1986 rural closures, (1) Medicare beneficiaries' reliance on the hospital 2 years before closure, (2) the availability of physicians and hospital beds before and after closure, and (3) trends in Medicare beneficiaries' use of hospital services during 1984-87. National data sets were used in this analysis (see footnote 9). We used data on Medicare beneficiaries for this analysis because data on all residents were not available from a national data base. We do not know to what extent Medicare beneficiary patterns of use reflect those of the general population. In particular, since Medicare beneficiaries are an insured population, their patterns of use could differ substantially from patients without insurance.¹¹ Rural hospitals validated as closing in 1986 were included in this analysis (see app. II for validation methodology).

We also used national data sets to assess the impact of rural closures on health care and Medicare program costs by studying the proportion of Medicare beneficiaries that used more costly types of hospitals¹² before and after the closure. In addition, we reviewed published data on changes in Medicare expenditures in areas with closures and areas with no closures. To assess the economic impact of the closures, we studied trends in per capita income in the 12 rural counties with confirmed closures in 1984.

In addition to using national data sources, we conducted 11 case studies of selected hospitals that closed in Illinois, Mississippi, Montana, and Texas. The case studies provided an opportunity to examine in depth the chronology of events as well as some of the social dynamics and managerial decisions that result in hospital closures. In each state, case studies focused on at least two of the hospitals that closed between 1983 and 1988. Where possible, we used information from a previous GAO

¹¹Numerous studies show that uninsured persons use health services less frequently than those who are insured.

¹²Urban hospitals or Rural Referral Centers.

survey of rural hospital administrators,¹³ published studies, or other sources to indicate whether problems identified in the case study hospitals were experienced widely among rural hospitals.

Residents in each of the communities in our case studies had a long tradition of living near a community hospital—the hospitals had been in the communities from 25 to 112 years. Like most rural hospital closures, the hospitals in our case studies were small facilities, having between 8 and 50 beds. Two were owned by a for-profit corporate entity (see table 1.4). Our fieldwork was conducted primarily in the community in which the rural hospital closed.

Table 1.4: Characteristics of Hospitals in GAO Case Studies During Their Last Year of Operation

Location	Number of beds	Years in operation	Ownership	Date of closure
Illinois				
Beardstown	50	55	Public	12/86
Cairo	44	102	Public	12/86
Avon	20	52	Private nonprofit	9/87
Paxton	29	59	For-profit ^a	9/87
Mississippi				
Mound Bayou	34	41	Private nonprofit	7/83
Leland	20	28	Public	10/85
Montana				
Jordan	8	65	Public	5/86
St. Ignatius	18	112	Private nonprofit	2/88
Texas				
Gorman	39	66	Public	10/86
Wortham	32	25	For-profit	7/87
Yorktown	21	35	Private nonprofit	12/86

^aBefore being leased to a for-profit business in May 1985, Paxton was a public hospital.

In each case study community, we investigated the history of the hospital and reasons for closure through interviews with such persons as former hospital administrators, neighboring hospital administrators, former hospital board members, area physicians, and the town mayor. We also assessed the availability of other community health resources before and after closure. Finally, we studied the community itself. We examined its population and economic characteristics, studied patterns of hospital use, and obtained the views of selected officials on the impact of closure on the community.

¹³GAO/HRD-90-67.

A prior GAO report¹⁴ focused on the federal, state, and hospital efforts that assist rural hospitals. In this report, we updated information on the federal efforts by interviewing HHS officials, reviewing recent policy changes, and examining literature published since our previous review. To supplement information we previously reported on state assistance to rural hospitals, we interviewed by telephone state health officials in the 12 states with the most rural hospitals with net financial losses over a 3-year period.¹⁵ Our work was performed between March 1989 and July 1990 in accordance with generally accepted government auditing standards.

¹⁴GAO/HRD-90-67.

¹⁵Alabama, Arkansas, Georgia, Illinois, Kansas, Louisiana, Michigan, Minnesota, Mississippi, Oklahoma, Tennessee, and Texas.

Patterns and Trends in Hospital Closures

Between 1980 and 1988, 408 community hospitals closed in the United States. About half of these hospitals were in rural areas, and about a fifth of rural closures occurred in Texas. Since 1985, closures have become a more frequent occurrence for both urban and rural hospitals. However, a slightly larger percentage of rural than urban hospitals closed during the 1985-88 period.

Closure usually is not a surprising event; the warning signs of financial decline often are apparent years earlier. These signs include substantial and increasing financial losses, a high debt burden, a high cost per discharge, high staffing ratios, and shortages of cash and working capital. Hospitals that closed had much poorer financial status, demonstrated by these characteristics, than those of similar size that remained open, confirming the expected link between very poor financial condition and closure.

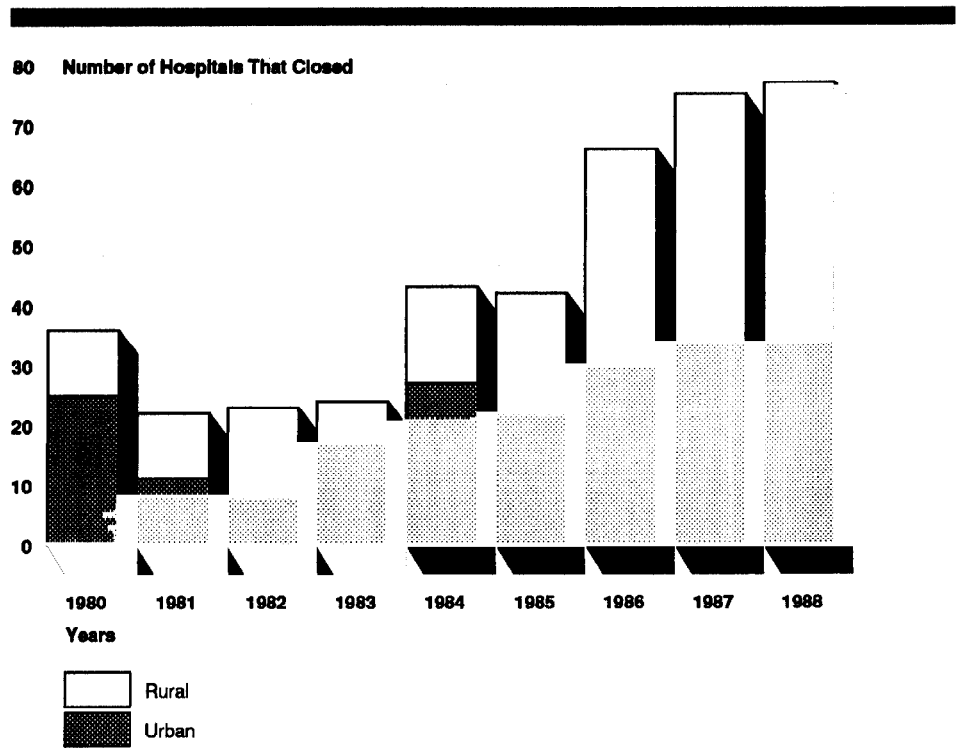
More Hospitals Closed During 1985-88 Than in Preceding 4 Years

The number of hospitals closing has increased annually since 1985 (see fig. 2.1). More than twice as many hospitals closed in the 4-year period after implementation of Medicare's PPS (1985-88) as in the preceding 4 years. And closure rates suggest that rural hospitals may be in greater jeopardy (see fig. 2.2).¹ During 1985-88, the closure rate for rural hospitals was 29 percent higher than that for urban hospitals (5.3 vs. 4.1 per 100).² Most closures occurred among small hospitals; eighty percent of all hospitals that closed between 1980 and 1988 had fewer than 100 beds. However, the average size of the rural hospitals that closed increased after 1986 (see fig. 2.3).

¹The closure rate is the proportion of hospitals open at the start of the period that close by the end of the period. The 4-year rate of community hospital closures is calculated as follows: (No. of community hospital closures in 1985-88/total no. of community hospitals in 1985) X 100.

²While hospitals closed in some areas, some new hospitals also opened—but largely in urban areas. According to the Center for Health Economics Research, a private consulting firm, 87 community hospitals opened in urban areas during 1980-86, compared with only 10 in rural areas.

Figure 2.1: Community Hospital Closures
 (1980-88)



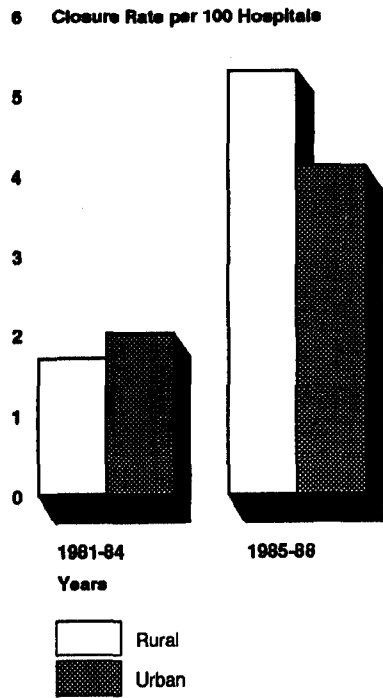
Total closures (1980-88)=408

Urban closures=208

Rural closures=200

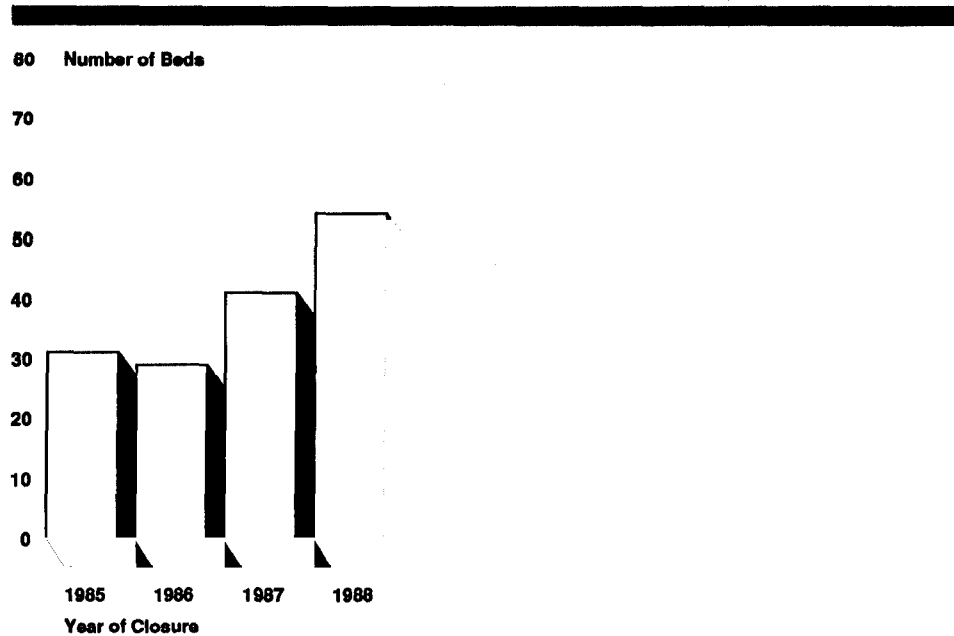
Note: Source for year of closure is the AHA closure file.

Figure 2.2: Four-Year Closure Rates



Note: Source for year of closure is the AHA closure file.

Figure 2.3: Median Size of Rural Closures Has Been Increasing



Note: Source for year of closure is the AHA closure file.

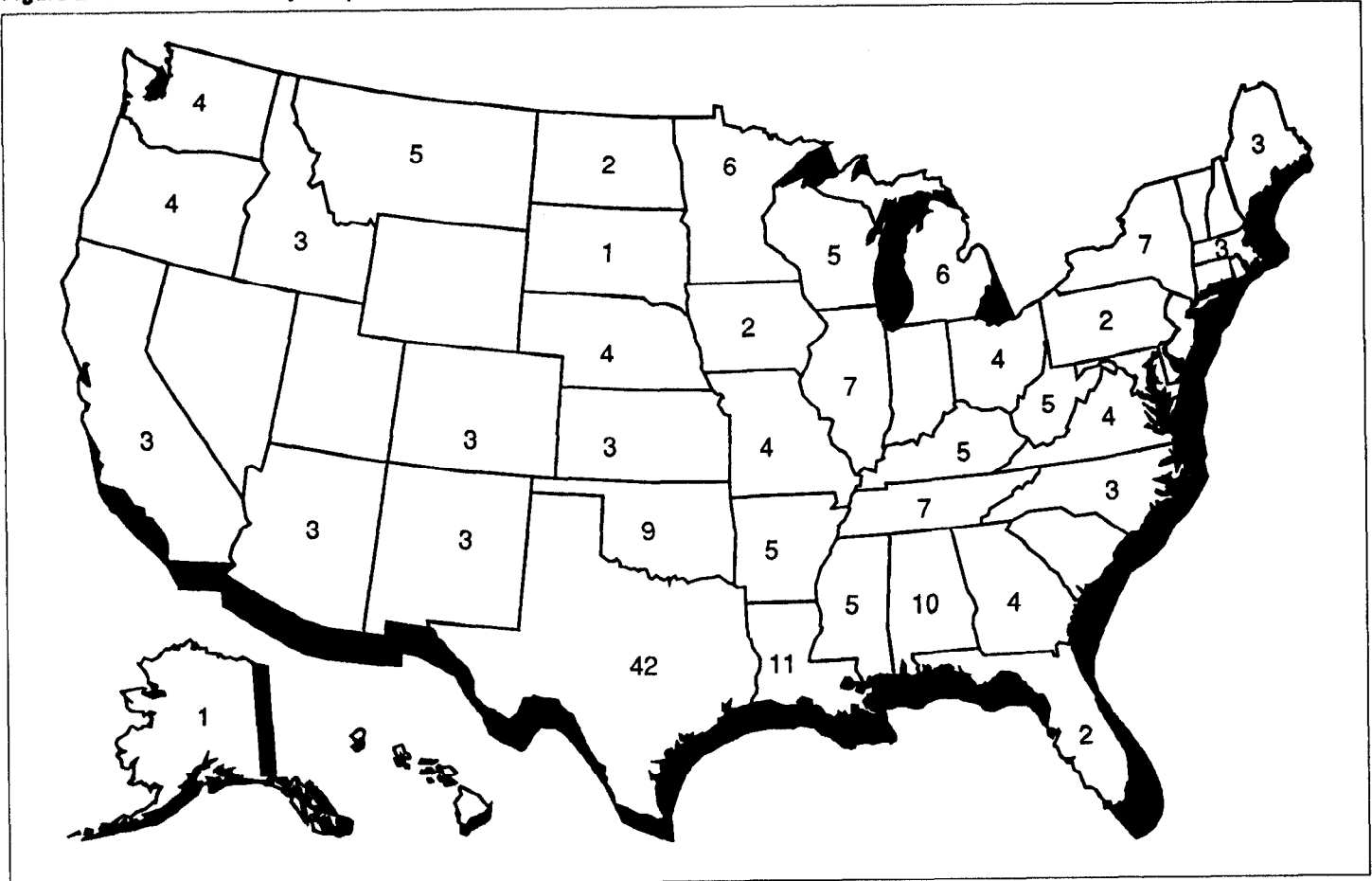
Disproportionate Share of Closures Occurred in Texas

About one-third (34 percent) of the rural closures during 1980-88 occurred in the west south central region³ of the United States, with the largest number occurring in Texas⁴ (see fig. 2.4). Although Texas has more rural hospitals than any other state, the number of Texas closures still exceeds what would be expected if Texas hospitals were represented in proportion to their number in the nation. Texas rural hospitals represented 8 percent of open rural hospitals in 1980, yet they accounted for 21 percent of rural closures during 1980-88.

³Arkansas, Louisiana, Oklahoma, and Texas.

⁴See appendix VI for a list of closures by state.

Figure 2.4: Rural Community Hospital Closures (1980-88)



Note: Source for year of closure is the AHA closure file.

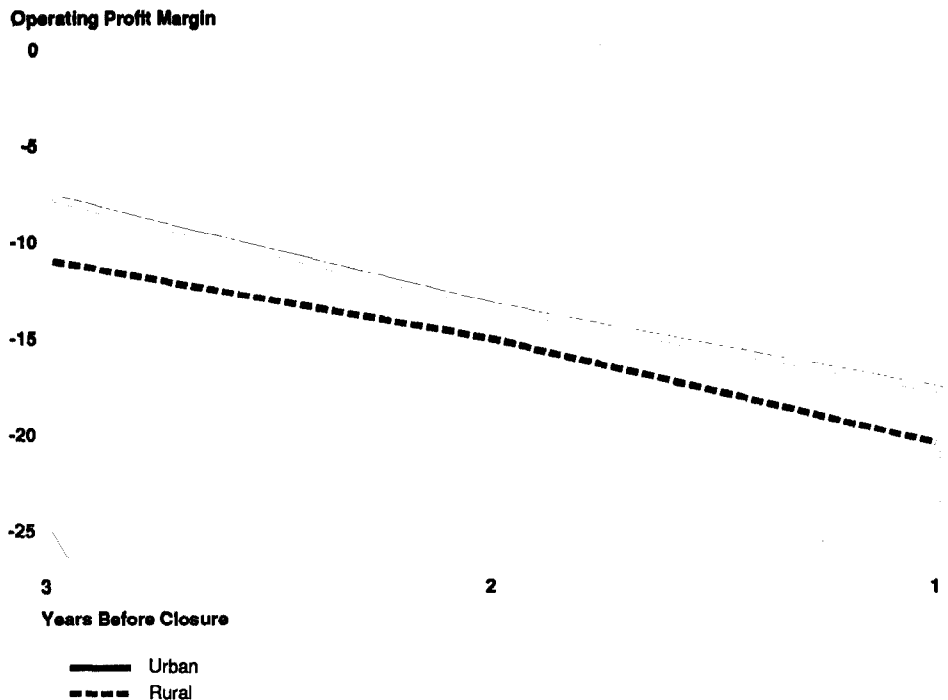
Urban closures occurred predominantly in the west south central (20 percent) and pacific⁵ regions (25 percent)—especially in Texas and California. Like rural closures in Texas, urban closures in these two regions were disproportionate. Since a disproportionate number of urban as well as rural closures occurred in Texas, operating and environmental characteristics common to both groups were investigated as factors contributing to the large number of closures.

⁵Alaska, California, Hawaii, Oregon, and Washington.

Warning Signs of Financial Decline Precede Closure

The trends of closures are seen in a pattern of financial decline several years before closure, as hospitals have increasing difficulties paying their bills and maintaining or modernizing their facilities. Both rural and urban hospitals that closed had substantial and increasing financial losses on patient care during the 3 years before closure (see fig. 2.5). Hospitals that remained open also generally declined in profitability during fiscal years 1984-87. As would be expected, the closed hospitals' decline was much steeper, and they were less profitable throughout the period.

Figure 2.5: Financial Decline Precedes Closure



Other symptoms of financial problems leading to closure include a higher debt burden, a higher cost per discharge, higher staffing ratios, and shortages of cash and working capital, relative to open hospitals. For example, a comparison of median values for closed hospitals compared with open ones showed⁶

⁶Data are for the 2nd year before closure, unless otherwise noted.

- a debt burden⁷ that was roughly 3 times that of open hospitals of similar size, for rural closures with fewer than 50 beds;
- higher operating costs, indicated by operating costs per discharge that were 24 to 29 percent higher than those of open rural hospitals, in the year before closure;
- between 1 and 1.5 additional full-time equivalent staff per occupied bed than open hospitals of similar size, for rural closures with fewer than 50 beds; and
- 41 percent and 29 percent fewer days' cash on hand than open rural hospitals, for hospitals that closed in 1987 and 1988, respectively, in the year before closure.

In our case studies, we found that to help address their hospitals' financial problems, some hospitals were able to obtain loans when they were already experiencing financial problems. But, probably of necessity, the loans were used to correct certification standard violations, finance current operations, or make short-term debt payments rather than to make the kinds of changes that might attract additional patients and revenues, such as adding new services or improving technology. Several of the hospitals in our case studies defaulted on loans at about the time of closure. For these hospitals, the federal government incurred or expects to incur substantial losses.⁸

In our case studies, we found that difficulty meeting basic patient safety standards can be a result of financial problems and another sign that the hospital may soon be forced to close. Continuing financial losses together with an aging facility may have jeopardized patient safety in the last months or years of operation in two of our the hospitals in our case studies. For example, 6 months before the hospital in Cairo closed, Medicare surveyors found serious safety code violations, including no fire alarms and a sprinkler system not connected to water. State surveyors at the Mound Bayou hospital cited lack of smoke detectors and fire walls, a broken nurse-call system, and lack of an isolation ward a year before closure.

⁷Measured by the ratio of long-term debt to total assets.

⁸The Farmers Home Administration lost nearly \$600,000 on a 1981 loan to refinance the Cairo hospital's mortgage, and is expected to lose over \$1 million from losses on a loan to Paxton. Also, outstanding loans by HHS and the Department of Housing and Urban Development to Beardstown total about \$2.6 million.

Why Are Rural Hospitals Closing?

A number of interrelated factors affect hospitals' risk of closure. These include small size, low occupancy, and characteristics of the hospital's market, such as competition from other hospitals. In our case studies, we found that the factors, and the underlying problems that begin a hospital's financial decline, differ for individual hospitals and communities. Low Medicare payment, however, was not among the major factors contributing to the financial distress and ultimate closure of most urban or rural hospitals, although it may have contributed more to the smallest rural hospitals' problems than to those of larger hospitals. Rural hospitals are vulnerable as a group because several of the characteristics associated with a higher risk of closure are more prevalent among rural than urban hospitals.

Multiple Factors Contribute to Risk of Closure

There is no single cause of rural hospital closures. Rather, there are interrelated factors contributing to the risk of closure of both urban and rural hospitals. One factor—low occupancy—is associated with substantially higher risk. All else equal, hospitals with few patients have higher per patient costs. This can reduce their profitability. In turn, low profitability creates difficulties in maintaining and updating hospital services with the newer technologies. Consequently, these hospitals may find it difficult to convince physicians or patients that they can provide state-of-the-art medical care, and may find themselves unable to reverse the trend toward lower occupancy. Thus, financially distressed hospitals often are trapped in a cycle of problems that gradually erode their financial viability and ultimately result in closure.

We identified a number of hospital operating and environmental characteristics that were associated with a higher risk of closure. Factors we identified in this analysis are

- small size and low occupancy;
- for-profit ownership;
- providing care for less complex medical conditions;
- competitive markets; and
- weak economies.

In our case studies, problems in physician recruitment or retention, and patient preferences to obtain care elsewhere, were important factors underlying the hospitals' low patient volume before closure. Failed management strategies and uncompensated care were other important factors that contributed to financial distress and closure for some of the hospitals in our case studies.

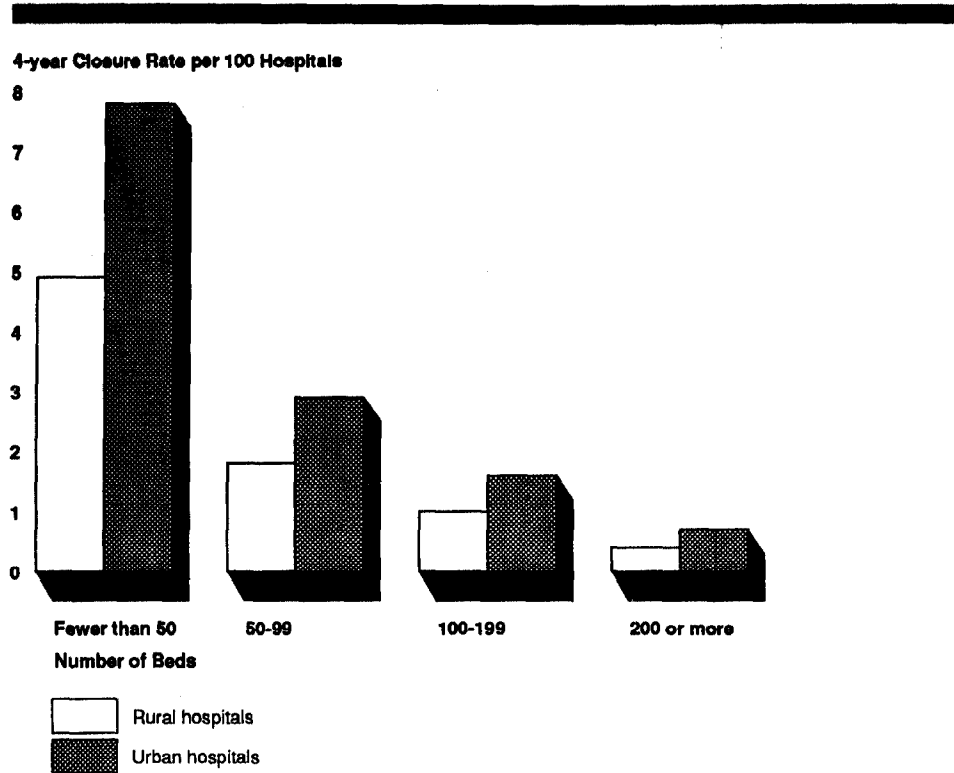
**Small Size and Low
Occupancy Increase Risk**

Small size and low occupancy¹ were factors associated with a hospital's greater risk of closure. Small hospitals, which had higher closure rates, also had lower occupancy rates. Holding occupancy² and other characteristics constant, we found that very small hospitals (fewer than 50 beds) were more than 10 times as likely to close as hospitals with 200 or more beds (see fig. 3.1). Similarly, when holding size and other characteristics constant, hospitals with very low occupancy rates (less than 20 percent) were more than 5 times as likely to close as hospitals with occupancy rates of 61 percent or more (see fig. 3.2).

¹A hospital's occupancy rate is the percentage of staffed beds in use on an average day.

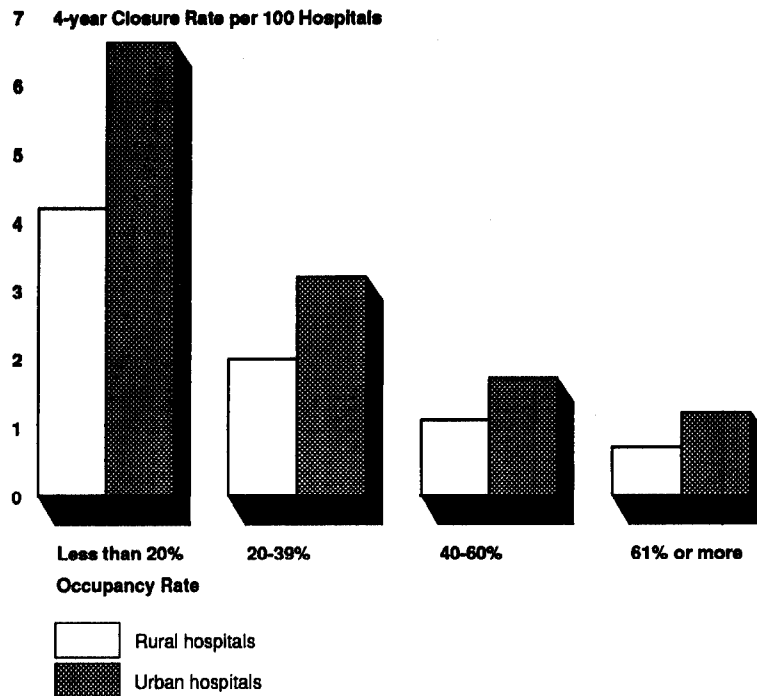
²Occupancy data for closures were for at least 1 year before closure. Data for 1986, 1987, and 1988 closures were from the 1985 AHA annual surveys. Data for the 1985 closures were from either the 1983 or the 1984 AHA annual survey.

Figure 3.1: Probability of Closure by Hospital Size: Adjusted Rates



Note: Because they adjust for other hospital characteristics, these rates give an estimate of risk of closure by hospital size, when other characteristics are equal, given average hospital characteristics (see app. II). They therefore differ from observed closure rates, but are better for comparing the relative risk for hospitals with fewer than 50 beds, for example, to the risk for larger hospitals.

Figure 3.2: Probability of Closure by
Occupancy Rate: Adjusted Rates



Note: See app. II for a discussion of adjusted rates.

While a hospital's size and occupancy rate are important, the number of patients treated is also important; this number depends on a hospital's occupancy rate and size taken together. Among hospitals with otherwise similar characteristics, those with fewer patients have higher costs per patient, because certain costs, such as those for capital investment, equipment maintenance, and wages of core employees, are fixed and therefore apportioned over a smaller base of patients. Thus, facilities with fewer patients, in general, have higher costs per patient and are disadvantaged, especially in the current cost-conscious environment.

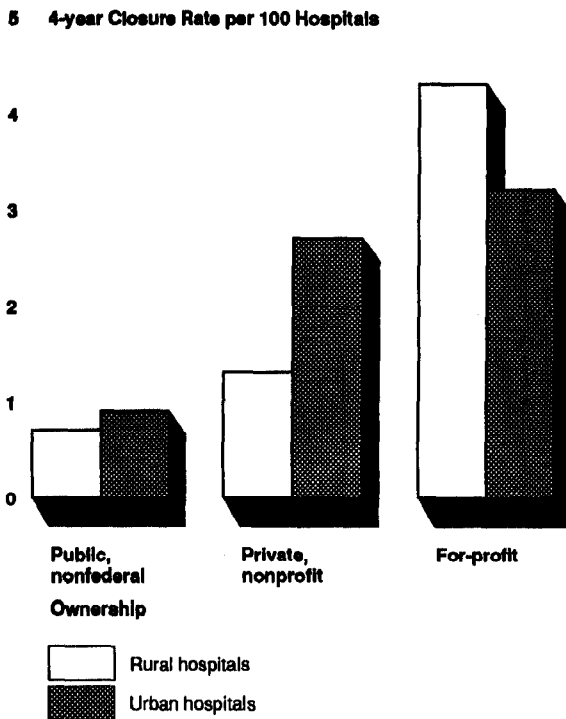
While low patient volume is directly associated with a higher risk of closure, it is usually the result of a combination of other factors. These include problems in physician recruitment and retention, and patients' preferences to go elsewhere. We did not test these interrelationships statistically, but found them in some of the hospitals in our case studies (see pp. 31-33).

Risk Differs by Type of Ownership for Rural and Urban Hospitals

Hospitals owned by a for-profit entity were more likely to close than publicly owned hospitals. This was not an unexpected finding. For-profit hospitals have the greatest incentive to leave an unprofitable market area since they must earn an adequate return on investment. Although public hospitals have a larger burden of uncompensated care, their public status gives them financial alternatives, such as seeking increased local government appropriations, that generally are not available to private nonprofit or for-profit hospitals.

We also found that rural for-profit hospitals were 3 times as likely to close as rural nonprofit hospitals (see fig. 3.3). In contrast, urban for-profit and nonprofit hospitals differed little in their risk of closure. This could reflect greater financial support of nonprofit hospitals in rural areas or greater financial risk to rural for-profit hospitals due to troubled rural economies.

Figure 3.3: Probability of Closure by Ownership: Adjusted Rates



Note: See app. II for a discussion of adjusted rates.

Hospitals Providing Care for Less Complex Medical Cases Are More Likely to Close

Hospitals that provided care for less complex medical conditions had a higher risk of closure. We used Medicare's case-mix index³ as a measure of the complexity of the cases treated at a hospital. Hospitals with an index that was 10 percent below the mean for all hospitals (1.13) had about 1.5 times the risk of closure. Studies show that rural hospitals provide a core of basic services to local rural communities. These services generally are for less complex medical conditions. In fiscal year 1985, the median Medicare case-mix index for urban hospitals was 1.14 compared to 1.06 for rural hospitals. The relatively lower index of the average rural hospital is, in part, related to the services and technological resources available there. Rural hospitals are on average smaller institutions and often lack the financial means or patient volume to support the more technology-intensive services.

Most of the hospitals in our case studies offered a limited range of services before closure. Among the types of care usually provided were simple diagnostic and therapeutic procedures dealing with fever, pneumonia, diabetes, bronchitis, and fractures. The limited nature of the hospitals' services also limited their markets, as people had to go elsewhere for services that these hospitals did not provide.⁴

Competitive Markets and Weak Economies Increase Risk

Competition generally was associated with a higher risk of closure. Hospitals were more likely to close, other things being equal, when there was at least one competing hospital in the county. Consistent with this finding, most of the hospitals in our 11 case studies were in competitive markets. Seven were within 50 miles of one or more Rural Referral Centers (RRCs),⁵ and all except one hospital were within 35 miles of at least two hospitals. In many of these areas, the neighboring hospitals appeared to be in stronger competitive positions in that they offered more services, employed more physicians, and had developed community support. This, together with their proximity, made it difficult for the hospitals in our case studies to recapture patients once they began receiving care at the neighboring hospitals.

³A measure of the costliness of Medicare inpatients at a hospital relative to the national average cost of treating all Medicare patients. Although based on a hospital's Medicare patients, the index is used to approximate the complexity of the hospital's entire patient mix.

⁴The principal exceptions to this were the Mound Bayou and Cairo hospitals, which drew patients from two or more surrounding counties, as well as their own town. Their wider market area can be explained by their function as the major providers of the communities' acute care to indigent residents.

⁵RRCs are larger rural hospitals that treat a complex mix of patient cases.

Weak or declining local economies also were associated with a higher risk of closure, other things being equal.⁶ Most hospitals, and particularly small ones, depend on nonpatient revenue (that is, public or private funds) to offset losses on patient care.⁷ Yet public or private funds may be more scarce in areas with weak or declining economies. Also, a weak economy may increase the uncompensated care burden on the hospital by reducing patients' ability to pay.⁸

However, these economic factors did not have a significant effect on hospitals' risk of closure in Texas, once we controlled for other characteristics. We investigated Texas closures because their large numbers since 1986 substantially influenced national trends in closures during our study period (see app. VI), and the large increase in closures in 1986 did not reflect a national pattern. Also, Texas hospitals experienced a higher risk of closure than other hospitals even when we controlled for their other characteristics. Although the large increase in Texas closures coincided with an economic downturn, our results do not show any relationship between the two events. Other possible reasons for increased risk in Texas include low Medicaid payments or more uncompensated care than elsewhere.

Physician Recruitment/ Retention Problems and Patient Perceptions Led to Low Patient Volume in Our Case Studies

Problems in physician recruitment, retention, or support were a factor in the low or declining occupancy rates and closure of most (7) of the hospitals in our case studies. A survey we conducted of administrators at open rural hospitals suggests that they are struggling with these same difficulties—about one-third reported spending at least 20 percent of their time on physician recruitment activities. GAO found that reasons for physician recruitment or retention problems include limited opportunities for family and professional spouses, minimal professional or community support, and limited economic opportunities.⁹

For example, in Jordan, Montana, one of our case-study areas, a 1985 study by the hospital's new administrators found the community's

⁶Population declines, increases in the unemployment rate, or low per capita income were used to indicate a weak or declining county economy.

⁷GAO/HRD-90-67.

⁸We could not test this theory with available data.

⁹The Office of Technology Assessment recently concluded that physician location decisions are more dependent on personal and professional than on financial factors. U.S. Congress, OTA, Health Care in Rural America, OTA-H-434 (Washington, DC: U.S. Government Printing Office, Sept. 1990).

patient base insufficient to financially support a physician's practice.¹⁰ Among open small rural hospitals, those with very low patient volumes were more likely to be in areas with lower population density, suggesting that other communities like Jordan may have an insufficient patient base to financially support the hospital or local physicians.

Another factor causing recruitment or retention problems for some of the hospitals in our case studies was minimal professional support, because few other physicians resided in the area. As a result, resident physicians were expected to work very long hours. Our case-study communities were not unique in this respect; rural physicians generally spend more hours per week in patient care activities than do urban physicians.¹¹ In several of our case studies, conflicts among physicians also caused retention problems. An established physician in one area discouraged newcomers from staying by assigning them to undesirable duties, scheduling them for emergency room coverage at odd hours, and refusing to refer patients to them.

Problems that developed between physicians and the community also contributed to declines in physician referrals or physician retention problems for some of the hospitals in our case studies. According to one Paxton, Illinois, community physician, many recruits had been foreign medical graduates. It took time to overcome the cultural barriers, and many of the recruits gave up after a year, according to a local physician. Supportive professional and community environments have been cited by rural health experts as factors that can affect a community's ability to retain physicians, although their importance relative to other factors is unclear for rural hospitals nationwide.

Low patient volume also can be a result of patient preferences to go elsewhere for care.¹² At two of the hospitals in our case studies, officials we interviewed cited perceptions of poor quality care, relative to neighboring hospitals, as a factor underlying low patient volume and eventual hospital closure. In both the St. Ignatius and Leland communities, residents believed that bigger hospitals were better. In St. Ignatius, officials believed that talk about a malpractice suit involving an infant

¹⁰The study estimated that under optimistic assumptions, a primary care physician in Jordan would receive only two-thirds of the patient visits needed to support a practice.

¹¹OTA, September 1990, p. 317.

¹²Survey research that documents this point includes: Illinois Farm Bureau, *Health Care in Rural Illinois*, 1989, p. 45, and Community Health Services Development Project, unpublished data from 18 rural community surveys conducted between 1985 and 1990.

there, which resulted in a settlement, contributed to this perception. In Leland, officials believed the hospital's limited services played a role in patients' views.

Failed Management Strategies and Uncompensated Care Were Problems for Hospitals in Our Case Studies

In our case studies, failed management strategies and uncompensated care were other important factors contributing to financial distress and closure. Because data were not available to examine these factors adequately for all 1985-88 closures, we cannot determine whether our case studies illustrate broad problems facing rural hospitals or isolated situations.

Two hospitals, both managed by the same for-profit enterprise¹³ during the 2 to 3 years before closure, provide examples of management decisions that resulted in financial decline and eventual closure. According to community residents, management raised prices at both hospitals to levels far above customary charges. Patients objected to these prices, and many in the community chose to obtain their care elsewhere. Also, in one case the hospital stopped itemizing its bills. As a result, some insurance companies refused to pay.

Two of the hospitals in our case studies closed because of problems related to treating large proportions of patients with little ability to pay. Hospital officials told us that Mound Bayou's mission was to serve the surrounding communities' low-income residents. Low-income patients went out of their way to seek care at that hospital, in part because they felt uncomfortable going to other hospitals. According to former hospital employees, this discomfort was due to concerns about being turned away or treated differently. Nearly 42 percent of the residents in the hospital's service area had incomes below the poverty level,¹⁴ and paying patients gravitated toward other area hospitals. As a result, almost 90 percent of the patients seen by the hospital and associated health center were indigent. Historically, care for indigent patients at Mound Bayou was subsidized by the federal and state governments. From 1980 through 1982, grants under section 330 of the Public Health Service Act¹⁵ amounted to about \$1 million per year—over 60 percent of the hospital's income in the year before closure. HHS terminated funding

¹³Westworld Community Healthcare, Inc. When we selected these hospitals for study, we were unaware that they both had been managed by Westworld.

¹⁴U.S. Bureau of Economic Analysis and Mississippi Medicaid Commission data.

¹⁵Grants under section 330 (42 U.S.C. 254c) provide funding for community health centers and supplemental medical services, such as inpatient medical care.

for the hospital in fiscal year 1982, when funds for inpatient care under section 330 were reduced. This dramatically reduced revenue, leading to closure in July 1983.

While the Cairo hospital did not have an explicit charity mission, its Medicaid patient load and percentage of uncompensated care both were far higher than the norm.¹⁶ It was the community's perception that the hospital was for the indigent. This, combined with declining occupancy and overall poor financial condition, made it unlikely that the hospital could have been saved—a conclusion drawn by a specially convened governor's task force that sought alternatives to closure.

Low Medicare Payment Not a Major Factor in Closures

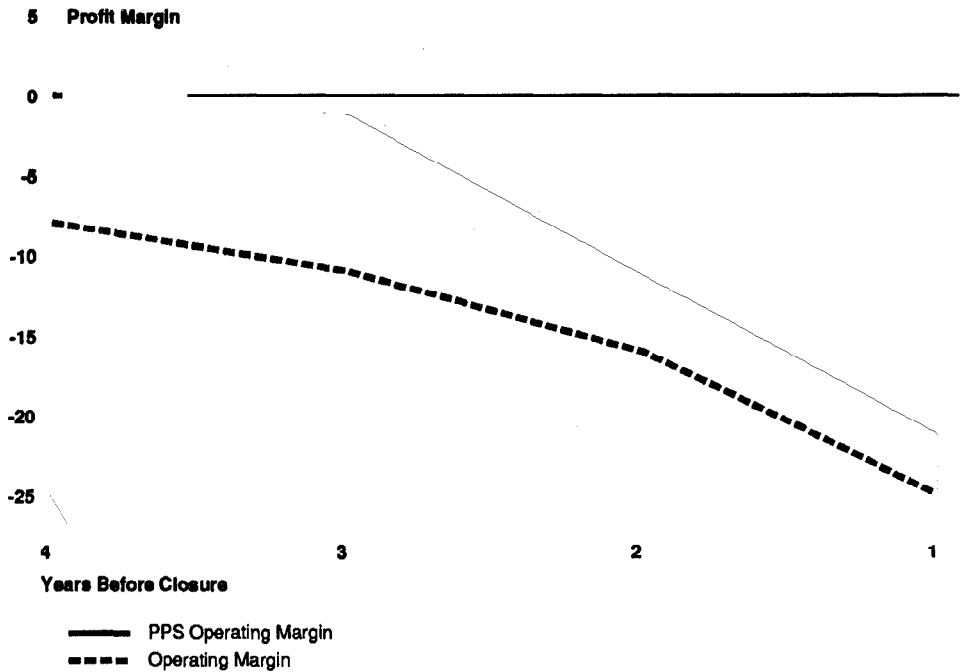
Although some critics contend that low Medicare payment to rural hospitals under PPS has been a major factor increasing rural closures, our analysis found otherwise for hospitals that closed during 1985-88. Information from two analyses supported this finding. Before closure, hospitals generally fared better from treating Medicare patients than other patients. Also, after holding other factors constant, Medicare-dependent rural hospitals¹⁷ were at no greater risk of closure than those that were less dependent on Medicare.

Rural hospitals generally profited, broke even, or experienced slight losses from treating Medicare patients in the 3rd and 4th years before closure, at the same time their low median overall profitability showed considerable losses from treating other patients (see fig. 3.4). As closure approached, hospitals generally lost from treating Medicare patients, but their losses were less on Medicare patients than on their business as a whole.

¹⁶Medicaid patient load is measured by Medicaid inpatient days, which ranged from 15 to 36 percent in the 2 years before closure. Bad debt and charity care ranged from 6.7 to 13.3 percent of hospital charges in the last 3 years of business.

¹⁷Those with 60 percent or more Medicare inpatient days.

Figure 3.4: Rural Hospitals' Medicare and Patient Profitability Before Closure



Notes: PPS operating margin = (PPS revenue-PPS costs)/PPS revenue. Operating margin = (net patient revenue-operating costs)/net patient revenue. Because for many hospitals, net patient revenue does not include all operating revenue, this measure understates operating profitability by an estimated 1-1/2 to 2 percent (Health Care Investment Analysts estimate, see p. 66). All usable data for closed hospitals were included. Because we combine data for hospitals that closed in different years, the number of observations varies due to data availability in the years before closure.

About three-quarters of the closed hospitals either profited from Medicare patients or fared better from treating Medicare patients than other patients in the 2nd year before closing. That is, their PPS operating margins (a measure of profitability on Medicare patients) either showed a profit or were higher than their total operating margins (a measure of overall profitability on patient care).

The smallest closed rural hospitals, however, lost significantly more on Medicare than other open or closed hospitals.¹⁸ Specifically, 35 percent of the rural hospitals that closed with fewer than 50 beds had PPS operating margins that were lower than their total operating margins. This compares with about 19 percent of larger rural and urban hospitals that closed.¹⁹ Small hospitals experienced steeper average annual declines in

¹⁸GAO/HRD-90-134.

¹⁹Analysis based on 2nd year before closing.

patient volume than larger hospitals after fiscal year 1984. Because hospitals' costs per case often rise when patient volume declines, these small hospitals as a group may have been more vulnerable under PPS and other systems that pay based on average costs of treatment.

Adjusting for other characteristics, Medicare-dependent hospitals (those with 60 percent or more Medicare inpatient days) were no more likely to close than those with fewer Medicare inpatient days. That is, although the 1985-88 closure rate was higher for Medicare-dependent rural hospitals than for other rural hospitals, our analysis suggests this is due to other characteristics, such as small size or low occupancy rates.

Risk Factors Differ in Individual Closures

Our statistical analysis found that a number of hospital and environmental characteristics generally affect hospitals' risk of closure. These factors include small size, low occupancy rate, low patient case complexity, for-profit ownership, weak local economies, and competition from neighboring hospitals (see pp. 25-31). Rural hospitals are vulnerable as a group because these high-risk characteristics are more prevalent among them, not because of their location in a rural area. For example, more rural than urban hospitals are small (fewer than 50 beds) and have low occupancy rates. While occupancy rates declined for all hospitals during the years after PPS was implemented, the decline was greater for rural than urban hospitals.²⁰ Once we controlled for their hospital and environmental characteristics,²¹ rural hospitals were at no greater risk of closure than comparable urban hospitals.²²

Although a number of factors were associated with a higher risk of closure, we found in our case studies that the factors, and the underlying problems that begin a hospital's financial decline, differ for individual

²⁰These greater declines in occupancy for rural hospitals are caused partly by changes in practice patterns that have reduced admissions. Declines in admissions have been greatest for conditions routinely admitted by rural hospitals (for example, simple pneumonia). Also, rural hospitals are usually in areas with low population density and are more likely to be in areas with a shortage of physicians—other factors that can affect occupancy.

²¹App. III, table III.3, presents all of the characteristics we controlled for in this analysis.

²²When holding operating and environmental characteristics constant, only for-profit rural hospitals had a slightly higher risk of closure than urban hospitals. Since for-profit rural hospitals represent a small share (10 percent) of all rural hospitals, the effect of this finding on the number of closures was small.

hospitals and communities.²⁹ For example, Wortham, Jordan, and Leland hospitals all experienced low or declining patient volume before closure, but the underlying reasons for it varied. The varying reasons for low occupancy at these hospitals were failed management strategies, difficulties retaining physicians who were acceptable to the community, and problems keeping physicians in the face of high malpractice costs and long hours, respectively. Given these individual variations, it appears that the most effective methods for preventing closure would be those that could be tailored to individual community circumstances.

²⁹In any statistical analysis that generalizes findings to a group of interest, certain members of that group will differ from the group as a whole. This section illustrates this point, and supplements, rather than contradicts, our statistical analysis.

Impact of Closures on Rural Communities

Most of the rural closures in 1986 did not cause significant barriers to care for rural area residents. In many areas residents were using alternate sources of care even before the closure, and our analysis of hospital use indicates that Medicare beneficiaries generally were able to obtain care before and after the closure.

In some areas, however, closures appeared to have an adverse effect on access to care for vulnerable populations. Our analysis indicates that as many as one-third of the rural areas with hospitals that closed in 1986 may have experienced some such problems. Two of these areas were included in our case studies. Our findings in both of these areas support the conclusion that access problems likely were caused or worsened by some of these closures. In some of our case studies, actions were taken to avoid potential access problems, but in others, plans were still under development several years after the closure. In the two communities we studied in-depth where access to inpatient care appeared to worsen after closure, reopening the closed hospitals was not a viable option.

The closed rural hospitals we studied had limited economic impact. They were not large employers, and their closure did not cause a major economic decline in their communities. Although more residents in closure areas obtained care at more costly hospitals after the closure, the growth in expenditures was about comparable to that occurring in areas with no closures.

Most Closures Had Little Adverse Effect, but Some Raise Concern

In most areas we studied, closures did not significantly reduce access to inpatient care. Residents residing in the service area of the closed hospitals had available alternate sources of inpatient care that were used by many area Medicare beneficiaries at least 2 years before the closures. Hospital use declined substantially among beneficiaries in closure areas; however, it generally declined to rates of use that were above or comparable to the U.S. average, indicating that Medicare beneficiaries generally were able to obtain hospital care after the closure.

However, we identified 9 of 26 areas with rural hospitals that closed in 1986 where barriers to care may have been created or exacerbated by the closures. Case studies in two of these areas provided evidence that problems worsened after the closures. Several communities also had concerns about maintaining access to timely emergency medical services after the closure. Despite the difficulties, reopening the case-study hospitals did not appear to be a viable option, and other plans were made in an attempt to resolve the problems.

Closures in Most Areas Had Little Effect on the Availability of Inpatient Medical Care

After closure, the areas we studied were left with a supply of hospital beds and physicians that was about comparable to that of other rural areas. The 200 rural hospitals that closed between 1980 and 1988 had represented a total of only about 4 percent of all rural community hospital beds in existence in 1980. For the counties with a closure in 1986, the average number of beds per 1,000 population declined considerably, but the decline resulted in an average bed supply that was only slightly less than that of other rural and urban counties (see table 4.1). Physician supply in the areas with closures also declined—a trend that warrants monitoring. Although the decline was small, it was counter to the national trend for urban and rural counties.

Table 4.1: Availability of Health Services in Areas With Closures

	Rural counties with a 1986 closure (N=26) ^a	All rural counties (N=2,343)	All urban counties (N=737)
Active nonfederal physicians per 10,000 persons (means)			
1985	6.3	7.0	15.9
1988	6.1	7.1	16.2
Percent change	-3.2	1.4	1.9
Community hospital beds per 1,000 persons (means)			
1985	6.3	4.3	3.7
1988	3.2	4.0	3.4
Percent change	-49.2	-7.0	-8.1

^aIncludes only counties with a confirmed 1986 closure where the hospital remained closed through 1988.

Source: GAO analysis of HHS Area Resource File.

Although physician supply was limited in rural areas with a 1986 closure, residents in most of these communities had alternate sources of inpatient care available. Of the 29 communities with a closure,¹ 21 had at least one remaining hospital within 25 road miles, and all but 2 had at least one alternative hospital within 35 miles (see p. 43).² Further, the beneficiaries who lived in the areas with a 1986 closure obtained care from an average of 11 other hospitals before the closure. Thus, these facilities were accessible to some area beneficiaries, although we do not know whether financial considerations or travel distance created a barrier for some residents.

¹A total of 29 rural hospitals were confirmed as 1986 closures. Three of the 29 reopened between 1986 and 1987. These were included in our analysis except where otherwise noted.

²Distance data are from a data file developed by a private consulting firm, Systemetrics/McGraw-Hill, Inc., under contract with the Prospective Payment Assessment Commission.

Also, in our case studies, most residents were within acceptable travel distance of another hospital with enough excess capacity to treat additional patients.³ All but two communities had at least one other hospital within 25 miles, and all but one were within 35 miles of an alternative hospital (see table 4.2).⁴ With one exception, the number of acute care beds lost ranged from about 3 to 22 percent of the total beds within 35 miles of the closed facility. Seven of the communities had an RRC, a larger hospital offering a broad range of services, within 50 miles.⁵

Table 4.2: Availability of Other Hospitals and Numbers of Beds

Location	Distance to nearest alternative hospital (road miles) ^a	Hospitals within 35 miles	
		Number	Beds
Illinois			
Avon	21	4	716
Beardstown	10	3	317
Cairo	31	4 ^b	1,167
Paxton	16	8	905
Mississippi			
Leland	8	5	719
Mound Bayou	6	4	464
Montana			
Jordan	67	0	0
St. Ignatius	14	2	64
Texas			
Gorman	11	7	350
Wortham	8	5	381
Yorktown	17	4	199

^aGAO estimate from state highway maps.

^bAll of the hospitals within 35 miles are in neighboring states.

Interviews in two case study communities suggested that the accepted travel time for nonemergency health care varies by geographic area. The variation appears to depend partly on the routine travel patterns of area residents or historical customs. For example, some Montana

³In health planning literature, 30-minute travel time has sometimes been considered a standard for reasonable access to nonemergency services. Present HHS regulations allow a hospital to qualify for special protections if Medicare beneficiaries must travel more than 45 minutes for care. We estimated the distance between hospitals rather than the travel time, but others have estimated that a 25-mile distance translates roughly to 30 or 35 minutes, and the average time to travel 35 miles is 45 minutes.

⁴Like HHS, we estimated distance in relation to the closed hospital. However, an individual's travel time will vary depending on his or her exact location in the community.

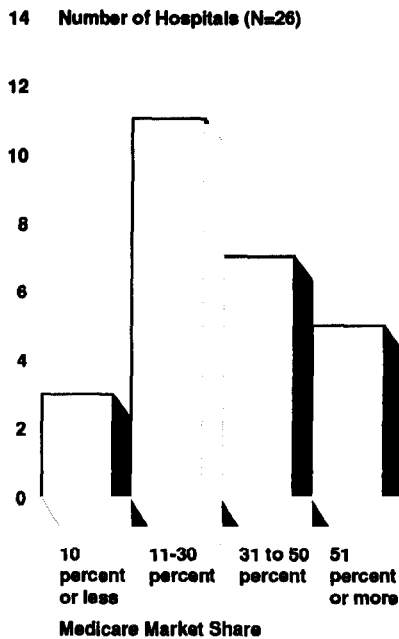
⁵This was unexpected, since as of 1989, only about 9 percent of rural hospitals (226) were RRCs.

residents traveled over 80 miles for work or entertainment and often sought health care in these same distant communities even before the local hospital closed. However, residents in a small town in Texas accustomed to local care were quite concerned about having to travel 17 miles after the closure.

Medicare Beneficiaries in Most Closure Areas Continued to Obtain Hospital Care

Analysis of Medicare beneficiaries' hospital use before and after closure provides further evidence that most closures did not impair beneficiaries' access to inpatient care, although we identified some areas where problems may have occurred (see pp. 43-44). About half (14) of 26 rural hospitals that closed in 1986⁶ provided care to a minority (i.e. less than a third) of the Medicare patients hospitalized in their area before closure. Thus, of area beneficiaries potentially affected by these closures, most already were obtaining care at other hospitals (see fig. 4.1).

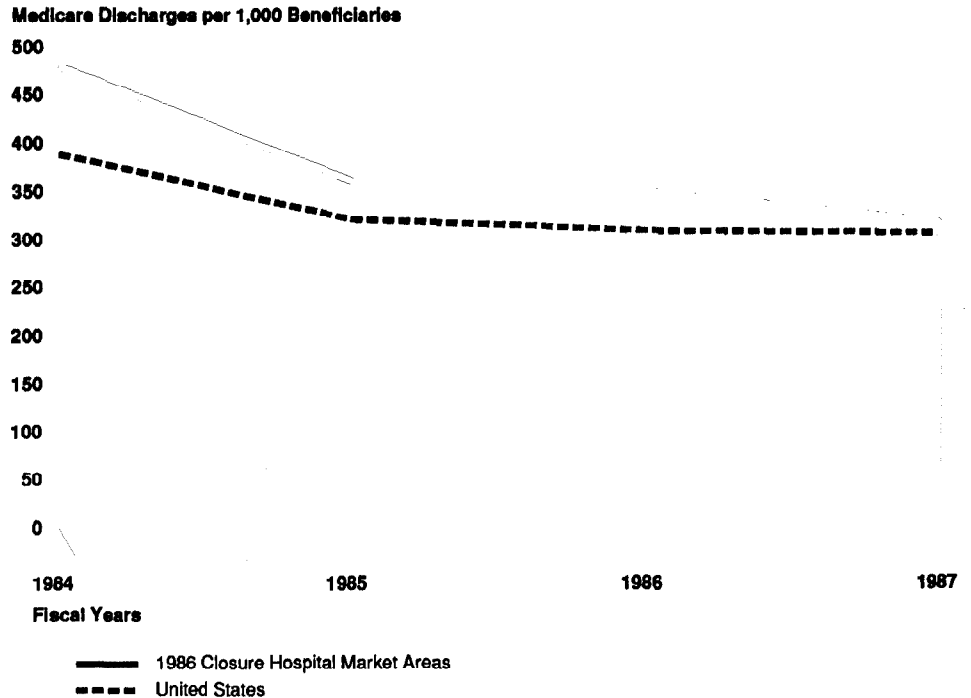
Figure 4.1: 1984 Medicare Market Share of the 1986 Rural Hospital Closures



⁶Three rural hospitals that remained closed were excluded from this analysis and our analysis of rates of hospital use, because the methodology used in determining a hospital's market area did not adequately define the area for two of the closures, and data were believed inaccurate for one area.

Even in areas where a closed hospital had been used by a large number or percentage of beneficiaries, beneficiaries generally obtained hospital care after the closure at rates at or above the national average rate. Since lower-than-expected rates of hospital use following closure can mean that needed care was not obtained, we compared rates of beneficiaries' hospital use in the rural areas with a 1986 closure to national rates of hospital use during 1984-87. The average utilization rate for the closure hospital market areas was higher than the U.S. average both before and after the closure (see fig. 4.2). For these areas, the average rate of hospital use was much higher than the national average in 1984, then declined by a third between 1984 and 1987. Although the decline in the average utilization rate for the closure areas was steeper than for the nation as a whole, the continued higher rates of hospital use suggest that most beneficiaries in most areas obtained needed hospital care after closure.

Figure 4.2: Medicare Discharges Per 1,000 Beneficiaries



Source: U.S. rates were reported by ProPAC (1985-87) and HCFA (1984) based on data from the Medicare Provider and Analysis Review (MedPAR) file. 1986 closure hospital market area rates are GAO analysis of MedPAR data for 23 permanent closures (see app. II).

Some Closures Raise Concern About Access for Vulnerable Populations

Although the rural closures we studied as a group did not appear to significantly reduce access, our analysis indicated that about a third of the rural closures in 1986 may have created or worsened access problems for the most vulnerable populations in those communities.⁷

Two closures were of particular concern because residents in these communities had to travel 35 or more miles to the nearest hospital after closure. These two hospitals also treated relatively high proportions of the beneficiaries in their market area⁸ (50 percent or more). Hospital use rates did not drop below the national average in either of these two areas after the closures, indicating that Medicare beneficiaries as a group continued to obtain hospital care. However, given the relatively long travel time to the next nearest hospital, we believe that patients needing emergency care or those without transportation likely were adversely affected by the closure. One of these hospitals was one of our case-study hospitals. Our findings in that area supports this view (see p. 45). Although access may have been reduced for some, the number of beneficiaries treated before closure was very small.⁹ This, and very low population density in these areas,¹⁰ suggests there may not be enough potential patients in these areas to support a full-service hospital.

Four other rural 1986 closures were in less remote areas, but our data suggested that they, too, may have resulted in access problems for vulnerable populations.¹¹ The communities where these hospitals closed had greater-than-average declines in hospital use rates between 1984 and 1987,¹² and were 25 or more miles from the nearest hospital after closure. Further, these closures were in partly or wholly designated medically underserved areas, and in 1984 they treated a much higher-than-

⁷We performed case studies in two of the communities identified with potential access problems. We found that problems in these areas appeared to worsen after closure (see pp. 44-45) for Medicaid recipients, the uninsured, and those needing emergency care. A similar, local-level investigation of residents' access would be needed to confirm that problems resulted in the other communities.

⁸Data were for the second year before closure (1984).

⁹Only 36 and 48 beneficiaries from these hospitals' market areas were treated on an inpatient basis by the two hospitals during 1984.

¹⁰Each area had 1 person or less per square mile.

¹¹Hospitals in two of these communities remained closed through 1988, while hospitals in the other two areas closed, then later reopened.

¹²We studied the decline in utilization rates during 1984-87 because our case studies showed hospitals sometimes reduce services in the years before closure. In such cases, the impact of the hospital's decline, as well as closure, can reduce access to care. Reduced access, then, would be reflected in a steep decline over the period, rather than a sharp decline just after the closure.

average number and proportion of the Medicare patients in their areas.¹³ Also, they were in counties with an average of 28 percent of the population below the poverty rate, compared to an average of 17 percent for all rural areas.

Thus, although the rate of hospital use by Medicare beneficiaries in these areas did not decline below the national average after closure, we believe that the closures may have had an adverse impact on access for the most vulnerable populations in these communities. One of these four hospitals, located in Cairo, Illinois, was also one of our case-study hospitals. Our work there showed that access problems for low-income individuals that existed before closure appeared to worsen after closure (see pp. 44-45).

Finally, closures in three other communities raised concern because during 1984-87, beneficiaries experienced (1) a greater-than-average decline in their rate of hospital use and (2) a decline that resulted in a rate of use lower than the U.S. average. Each of these communities was within 25 miles of at least one alternative hospital, and the number and proportion of beneficiaries treated 2 years before closure was small. However, the lower-than-expected hospital use rates in these areas could indicate beneficiaries had difficulty obtaining care. This possibility would need to be confirmed or ruled out through investigation in the community itself.

Closures Appeared to Worsen Access Problems in Two Case-Study Communities

Concerns about diminished access were significant in 2 of the 11 communities we studied in depth—Cairo, Illinois, and Jordan, Montana. In these communities, we found socioeconomic and geographic barriers to care. The hospital in Cairo provided a large volume of care to low-income residents. In Jordan, the concerns were a consequence of the town's remoteness. For these areas, it is difficult to distinguish between the effects of the closure and long-standing access problems; however, the closures appeared to exacerbate existing access problems.

The Cairo hospital was in a medically underserved area with a very high rate of poverty, and it served a large proportion of patients with little ability to pay. For Cairo residents with Medicare or with private

¹³The number of Medicare patients from their market areas treated by these hospitals in 1984 was 76 percent higher than the average for 1986 rural closures (383 Medicare beneficiaries, compared with an average of 218). The four hospitals of concern treated an average of over half (55 percent) the beneficiaries in their market areas, compared to an average of 32 percent for all 1986 rural closures.

insurance, care was available from several Missouri and Kentucky hospitals 31 to 35 miles away. Such access, however, was not assured for low-income residents because of a reluctance of the out-of-state hospitals to treat Illinois Medicaid patients, except in an emergency, according to several Cairo health officials.¹⁴ In Cairo, plans for expansion of the local clinic (supported in part by local government funding) and negotiations with the out-of-state hospitals to accept nonemergency Medicaid cases should resolve these concerns when fully implemented.¹⁵ However, 4 years after the closure, the expansion is just getting underway.

The Jordan hospital was extremely isolated; the next nearest hospital was 67 miles away and that, too, was small. The closest hospital with more services was 84 miles away. Because only limited inpatient and emergency services were available and the Jordan community sometimes had no physician, Jordan residents often traveled 84 to 175 miles to obtain their care even before the hospital closed. The persons most adversely affected by the closure were uninsured, working, low-income residents, we were told. To improve the community's access to care after the Jordan closure, the town is participating in a demonstration project designed to address the acute care needs of frontier counties. Under this project, Jordan plans to open a Medical Assistance Facility. In part through the use of mid-level practitioners,¹⁶ the facility will provide inpatient care to ill or injured patients before their transfer to a hospital or provide inpatient care to persons needing care for no longer than 96 hours.¹⁷ The facility was not operational as of December 1990.

Closures in medically underserved areas were of particular concern because residents in these areas could face barriers to care due to a lack

¹⁴Consequently, since 1985, when the Cairo hospital's obstetrics unit closed, most physicians in Cairo refer Medicaid obstetric patients to a hospital in Carbondale, 60 miles away. The hospital is an RRC with a neonatal intensive care unit.

¹⁵Once the building is constructed, several new services will be available locally, including a pre- and postnatal program with care provided by an obstetric nurse practitioner, ambulatory surgery, and urgent care. According to the mayor, the community is working with the center to expand services since officials realize that reopening a hospital in Cairo is not feasible.

¹⁶These are nonphysicians (for example, nurse practitioners and physician assistants) trained to provide a limited range of medical services under the supervision of a physician.

¹⁷A Medical Assistance Facility must be located in Montana and in a frontier county, meaning it has fewer than 6 residents per square mile or is located more than 35 miles from the nearest hospital. The demonstration program is funded in part by the Health Care Financing Administration, which will study its implementation and outcome. The Montana Hospital Research and Education Foundation is directing the program.

of adequate health resources.¹⁸ However, the closure of a hospital often appeared not to worsen existing access problems in such areas, our case studies showed; of the 9 closures in medically underserved areas we studied, only 1 appeared to worsen access problems (Cairo). In 4 of the 9 underserved areas (Beardstown, Avon, Wortham, and St. Ignatius), officials we spoke with indicated the closure had created more of an inconvenience than a threat to residents' access to care. Many residents were traveling to neighboring hospitals before the closure, and alternative sources of care were perceived to be accessible for most residents.

In three other communities in medically underserved areas (Mound Bayou, Leland, and Gorman), action was taken to avert potential barriers to inpatient and outpatient care by area health providers, civic leaders, and state and federal governments. For example, in Mound Bayou, the principal concern centered on the availability of obstetric care because the hospital had provided a large portion of such care for the predominantly black and low-income residents in its four-county area. Although the Mound Bayou hospital was located near other hospitals, those facilities did not want to assume the large burden of uncompensated care borne by Mound Bayou. Also, according to former hospital employees, low-income residents of the area felt uncomfortable going to other hospitals because they were concerned about being turned away or treated differently.

The state was concerned that Mound Bayou's closure could result in a shortage of maternity and pediatric services for the area's largely medically indigent population and developed a program to fund the care of low-income obstetric and infant patients in the hospital's service area.¹⁹ Although the 4-year federally funded project ended in June 1986, the state established similar initiatives to continue providing maternal and infant health care to low-income families within the state.²⁰

¹⁸Over half (114) of the rural and 3 percent (6) of the urban closures between 1980 and 1988 occurred in counties designated by HHS as medically underserved.

¹⁹Funding for this program was provided by HHS through grants from its National Office of Maternal and Child Health and regional primary care office.

²⁰The following actions were taken in the other two communities. In Leland, the hospital facility was converted to an outpatient clinic operated by three physicians. In Gorman, a medical clinic was established shortly before the hospital closed. The Gorman clinic is owned by a multi-specialty group practice affiliated with a hospital about 30 miles away.

Access to Emergency Medical Services Is a Problem for Some Areas

In 6 of our 11 case study communities (Cairo, Beardstown, Gorman, Avon, Paxton, and Jordan), concerns about emergency medical services (EMS) appeared to heighten after the closures. The many problems faced by rural EMS providers are described in a recent report by the Office of Technology Assessment.²¹ Although we did not evaluate the adequacy of our case-study areas' EMS before the closures, these areas' hospitals had an emergency room that provided some level of care. In each of these areas, community residents or officials expressed concern about access to EMS after the closure.

Actions taken or plans made by civic leaders and health officials were designed to resolve most of the concerns. For example, after the closure in Beardstown, officials agreed that a city emergency room was not feasible in the absence of a hospital and that the city should upgrade its EMS. The city ambulance service, staffed by five emergency medical technicians (EMTs) and two paramedics, made plans to upgrade the training of all staff from EMT to paramedic status.²²

Emergency services in Jordan were somewhat unreliable even when the hospital was open, because at times there was no doctor on call at the hospital or no doctor in the community. Due to the hospital's limited services, most emergency cases had to be transferred to hospitals at least 84 miles away. Air transportation is available from a facility 175 miles away, but is not used routinely for emergencies, in part because of a generally long response time, we were told. When operational, the previously noted Medical Assistance Facility demonstration project will provide emergency services and should reduce some of the residents' concerns.

In Avon, the ambulance service changed from an all-volunteer staff to a staff of 2 paid and 18 volunteer EMTs. The paid staff are former employees of the closed hospital. Community and health officials voice confidence in the emergency services available in the community. However, after the closure, the ambulance service doubled its charges.

²¹U.S. Congress, Office of Technology Assessment, Rural Emergency Medical Services—Special Report, OTA-H-445 (Washington, DC: U.S. Government Printing Office, Nov. 1989).

²²EMTs are trained in basic life support, and paramedics are trained in advanced life support. The basic life support training includes noninvasive treatment methods, such as administering cardiopulmonary resuscitation, dressing wounds, and administering oxygen. Generally, paramedics deliver advanced life support under medical direction, through radio contact with a physician and by following written medical protocols. Advanced life support training includes use of specialized equipment and medications.

Rise in Medicare Expenditures Was No Greater in Areas With Closures Than in Other Areas

Concerns have been raised that rural closures have resulted in the use of more costly hospitals and, thus, contributed to a rise in Medicare expenditures. Based on our findings, these concerns are not warranted. Patterns of hospital use and expenditures did not differ dramatically between areas with closures and those without closures. The proportion of rural residents who obtained care at more costly hospitals (urban hospitals and RRCs) increased in areas with closures, but this trend is also occurring in other rural areas. Thus, neither the outmigration of rural patients nor the increase in cost can be attributed to the rural closures. For whatever reasons, patterns of use in the areas we studied shifted toward larger rural and urban hospitals. Rural hospitals, however, remained an important source of care for rural Medicare beneficiaries.

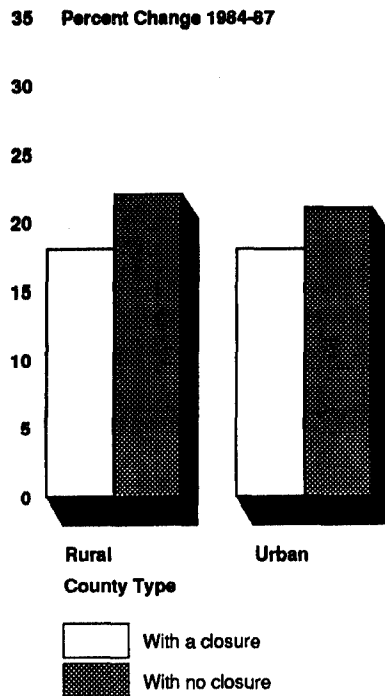
1985-86 Closures Did Not Substantially Increase Medicare Expenditures

Medicare expenditures in areas with rural closures have not grown any faster than spending in other areas. During 1984-87, Medicare expenditures per beneficiary for inpatient care grew 18 percent in rural counties with closures in 1985 and 1986, compared to 22 percent in counties with no closures (see fig. 4.3).²³ It is possible that the growth in Medicare expenditures in counties with closures would have been less had patients not sought care at more costly hospitals.²⁴ However, since the past closures affected relatively few beneficiaries, it seems unlikely that so few patients would have a major effect on expenditures.

²³Prospective Payment Assessment Commission, June 1990 Report to the Congress.

²⁴It is also possible that data on all counties with no closures are not sufficiently disaggregated to capture the effects of closures on medical expenditures. Of the 2,374 rural counties, 56 had a closure in 1985 or 1986 (year of closure reported by AHA).

Figure 4.3: Percent Change in Medicare Inpatient Expenditures Per Beneficiary for Counties With and Without Hospital Closures in 1985 and 1986



Note: In rural counties with a closure, Medicare expenditures per beneficiary for hospital inpatient services were \$1,301 in 1987 compared with \$1,352 for rural counties with no closures.

Source: Prospective Payment Assessment Commission, Report to the Congress, June 1990, Table 3-11.

Shifting Patterns of Use Could Result in Higher Medicare Expenditures

The impact of closures on health care costs, and Medicare expenditures, depends on many factors, including the number of residents affected and where they obtain care after the closure. If the closure results in shifts to a similarly paid rural hospital,²⁵ there would be little change in expenditures. If the closure results in residents not obtaining care, there could be short-term savings but higher long-term costs because of a need for more intensive care at a later stage of an illness. Finally, if the closure results in a shift to an urban hospital or RRC, higher expenditures

²⁵Except for RRCs, Sole Community Hospitals, and small, Medicare-dependent hospitals, Medicare pays rural hospitals based on the same standardized amount with certain adjustments (for example, for variations in wage costs and teaching responsibilities).

could result since such facilities receive higher Medicare payments per case.²⁶

In our rural closure hospital market areas, patterns of hospital use were shifting to more costly hospitals. The percentage of rural residents obtaining care at an urban hospital increased from 30 percent in 1984 to 40 percent in 1987 (see table 4.3). Similarly, rural residents increased their use of RRCs during this period. Analysis undertaken by the Codman Research Group, Inc.,²⁷ indicates that these trends are not unique to areas with closures. Thus, factors other than closures (perhaps physician preferences and patients seeking more technologically sophisticated care) are likely influencing the shifts.

Table 4.3: Medicare Beneficiaries Residing in a Hospital Market Area With a Rural Closure in 1986: Percent Discharged From Urban and Rural Hospitals

	Year of discharge ^a				Percent change, 1984-85	Percent change, 1985-86	Percent change, 1986-87
	1984	1985	1986	1987			
All discharges in closure market areas ^b	100.0	100.0	100.1 ^c	100.1 ^c	•	•	•
Urban hospitals	29.9	31.0	33.9	39.7	3.7	9.4	17.1
Rural hospitals:							
RRCs	6.1	6.0	7.0	8.9	-1.6	16.7	27.1
All other rural hospitals	64.0	63.0	59.2	51.5	-1.6	-6.0	-13.0

Note: 26 hospital market areas were included in this analysis.

^aData are for fiscal years.

^bA total of 76,459 discharges were reported in the 4 years.

^cTotal does not add to 100.0 due to rounding.

Another factor that affects a closure's impact on costs for area residents' inpatient care is whether residents are seeking care for a service that was not available at the hospital before its closure. If the service was unavailable, costs might have risen even if the hospital had remained open. Some data suggest that the largest changes are occurring for services often not provided by small hospitals. Codman found that

²⁶RRCs and urban hospitals currently are paid based on higher PFS standardized amounts than rural hospitals other than RRCs. The higher amounts are based on the historically higher costs of treatment at urban hospitals. However, the difference between the standardized amounts used to pay urban and rural hospitals has decreased and will be phased out by 1995.

²⁷Codman performed this analysis under a contract with the Prospective Payment Assessment Commission. The firm has considerable experience in analyzing data on Medicare utilization patterns. It also obtains its data from the Medicare Provider Analysis and Review (MEDPAR-2) files, but computes sex- and age-adjusted utilization rates.

the volume of Medicare admissions for technology-intensive diagnostic categories increased in urban hospitals by 10 to 25 percent between 1984-86; yet only one of the five states in its study had a comparable increase among its rural hospitals. For these services the cost to the Medicare program may rise, but the increase is not a result of the closure.²⁸

Closures Did Not Cause a Major Economic Decline in Their Communities

Rural hospital closings did not cause a major economic decline in the counties with 1984 rural hospital closures, or in the 11 areas we studied in depth.²⁹ Although some unemployment and loss of community revenue often resulted in our case studies, the adverse effects appeared small, at least relative to the community's other economic problems. Although some community leaders believed the hospital closure would reduce the community's growth potential (that is, it would be more difficult to attract businesses), literature on business relocation suggests other factors may dominate location decisions.

Closures Had Limited Economic Impact

Economic effects from closure have not been severe for the counties where rural hospitals closed in 1984.³⁰ To assess such effects, we studied trends in per capita income in these counties compared to per capita income in other rural areas of that state.³¹ Compared with other rural areas in their states, the 12 counties with confirmed 1984 rural closures showed a stable trend in per capita income between 1981 and 1987 (see table 4.4).³² This was true even in counties with small populations (under 10,000).

²⁸Despite the increasing use of urban hospitals, rural hospitals provided a major source of inpatient care for rural Medicare beneficiaries during 1984-87. While rural hospitals provide care to a small share (about a fourth) of all Medicare beneficiaries nationally, over two thirds (70 percent) of the beneficiaries in our rural hospital market areas were discharged from a rural hospital in 1984. By 1987, the percentage had declined, but still reflected 60 percent of the beneficiaries in our hospital market areas. Codman found similar results in its study of inpatient hospital use among rural Medicare beneficiaries in five states.

²⁹This is not surprising, since the hospitals in our case studies were not large employers. Seven of them had fewer than 50 employees, and all had fewer than 100.

³⁰This is as expected given the small size of most rural hospital closures.

³¹We used 1984 rural closures for this analysis because enough data were available to establish the trend 3 years before closure and then compare this with the year of closure and 3 years after closure.

³²To analyze trends in per capita income, we used the ratio of income in the county with a closure to that of other rural counties in the state. If the closure had a dramatic impact on the local economy, we would have found declining ratios after closure, since they are sensitive to local economic conditions. Given the small size of most rural hospital closures, a stable trend is not surprising.

Table 4.4: Income Level in Counties With Rural Closures in 1984 Compared With All Rural Areas in the State

Counties with rural closure in 1984	Per capita income ratio ^a		
	Before closure, 1981-83	Year of closure, 1984	After closure, 1985-87
Population <10,000			
Park, Colorado	.98	.99	.99
Fulton, Kentucky	1.19	1.26	1.27
Population 10,000 to 19,999			
Marion, Texas	.78	.79	.82
Callahan, Texas	1.04	.96	.93
Waushara, Wisconsin	.95	.95	.99
Population 20,000 to 29,999			
St. James, Louisiana	1.20	1.20	1.19
Todd, Minnesota	.77	.78	.77
Population 30,000+			
Newaygo, Michigan	.94	.94	.93
Hale, Texas	.97	1.00	.95
Cherokee, Texas	1.00	.99	.99
Norton-Wise, Virginia	1.06	1.00	.94
Nevada, California	1.00	1.05	1.08

^aRatio of per capita personal income in the county to that of all rural counties in the state.

In 2 of our 11 case studies, local officials believed the economic impact of closure was minimal. The Jordan hospital continued to operate its nursing home, providing continued employment for all eight hospital employees after closure. Similarly, officials of Leland, Mississippi, agreed that the hospital closure had little adverse impact on the economy.

In the other nine case studies, officials either reported some adverse effect on the economy or were uncertain about whether and how much of an adverse effect occurred. Five communities reported loss of business to the local pharmacy. Effects on the pharmacies ranged from minor (a 5-percent drop in business) to major (closure of one of two local pharmacies). Some community officials also reported that other local merchants lost business or that there was a considerable loss in community revenue. We did not quantify these observations, but believe they are due to both direct and indirect economic effects related to the hospital's closing.

Unless there is another hospital in the same town that absorbs all of the closed hospital's business (not so in our case studies), there is a direct effect in that some money that was spent in town before the closure is

spent elsewhere afterward. This loss includes any hospital employees' wages that were spent in town before the closure but are spent elsewhere or not spent after closure, and any local sales to the hospital or to support the hospital's activities (for example, restaurant business that serves people visiting sick relatives).

In addition, there are indirect economic effects from closure. Communities lose more revenue than just the sum of the money that leaves the community, because money is spent, then respent. For example, a hospital employee may spend her or his wages paying rent to a local landlord, who spends money in the local shops, whose owners invest the money in a local business, and so on. The importance of these indirect effects is difficult to measure, in part because workers who lose their jobs after closure often find other sources of income.

Considering both types of losses, the Illinois Hospital Association estimated the lost community revenue from our Beardstown case study closure at between \$844,800 and \$1.6 million for the year after closure. These figures represent about 1 to 2 percent of Beardstown's total personal income and about one-half to 1 percent of Cass County's total personal income. The hospital in Beardstown employed 79 people—the third highest of our case study hospitals—so the economic effect appears likely to be smaller for many other communities.

The impact on the Beardstown economy likely eased after the first year following closure; the facility was purchased and a new facility for the mentally handicapped opened there. Community health service expansions lessened the economic impact on other communities as well. For example, an outpatient facility opened in the former W.S. Witte hospital (Leland, Mississippi) after closure. And in Avon, Illinois, the community's ambulance service expanded, hiring two of the former hospital employees after the hospital closed. However, not all communities reported expanding other health services after the hospital closed, and not all former hospital employees found jobs in the same community.

Some officials were also concerned that the hospital's closure would make it more difficult for the community to attract new businesses. Although the presence of a hospital may be one of many factors influencing business location, current business and economic research provides little support for the fear that rural hospital closures, by themselves, will stunt the future growth of the communities we studied. The research indicates that the quality of life in a community often

plays a role in business location decisions.³³ The availability of health care services may play a role in quality-of-life assessments, but so do other factors, such as the quality of schools. Further, many other factors also determine business location decisions.³⁴ Availability and price of labor, favorable attitudes of local leaders, proximity to major transportation routes, and location near a university are some factors that have been cited as important.

Where Major Economic Problems Existed, They Predated Closure

Many of our case study communities had major economic problems before the hospital closure that dwarfed the economic loss resulting from the closure. For example, Avon, Illinois, had suffered after the coal mining industry left the area. Then, in 1983, a nearby branch plant closed, causing 2,200 to 2,500 people to lose their jobs. Likewise, an official in St. Ignatius, Montana, explained that the community had been in economic decline before the hospital closure primarily because a highway had been expanded. Consequently, traffic no longer passed through the center of town. In Cairo, Illinois, the local newspaper described the hospital's closure as only the latest blow to a community with major economic problems, including a 25-percent unemployment rate.

Of the rural counties with hospitals that closed in 1984, two had very low per capita incomes after closure, but this was not caused by the closure. Per capita incomes in Todd County, Minnesota, and Marion County, Texas, were 18 to 23 percent lower than the rural averages in those states both before and after the hospitals there closed (see table 4.4, p. 52).

³³See, for example, Troy A. Festervand, James R. Lumpkin, and Dennis S. Tosh, "Quality of Life' in the Industrial Site Location Decision," *The Journal of Real Estate Development*, Vol. 4, No. 1, Summer 1988.

³⁴See, for example, Stephen M. Smith, "Diversifying Smalltown Economies With Nonmanufacturing Industries," *Rural Development Perspectives*, October 1985. Also, Merrill L. Johnson, "Industrial Transition and the Location of High-Technology Branch Plants in the Nonmetropolitan Southeast," *Economic Geography*, Vol. 65, No. 1, January 1989, or G. Michael Epping, "Tradition in Transition: The Emergence of New Categories in Plant Location," *Arkansas Business and Economic Review*, Vol. 19, No. 3, 1986.

Federal Efforts Could Be Better Targeted

Only some rural hospitals are at high risk of closure, and only some closures would reduce access to care. But federal initiatives that assist rural hospitals are not well targeted. Federal and state governments do not systematically identify all areas where access would likely be a problem in the event of a closure. Identifying and monitoring such areas would allow dollars spent for rural hospitals to be targeted at those communities facing the greatest threats to access to inpatient or emergency care. Further, one federal program (the Rural Health Care Transition Grant Program) has the potential to help maintain access to hospital services, but it could achieve this potential better with some policy changes.

Federal and State Governments Could Better Identify and Monitor Areas Where a Closure Would Threaten Access

HHS and many state governments could better identify and monitor areas where a hospital closure would threaten access to essential services. Such identification and monitoring is a necessary first step to effective spending of limited federal dollars for rural hospitals.

The number of rural hospitals that are financially distressed and provide essential services appears small, although their precise number and location cannot be determined without reviewing local circumstances. Geographically isolated hospitals represent a small proportion of all rural hospitals, and only a fraction of these are in financial trouble. About 5 percent of rural hospitals are both relatively isolated and could be financially troubled.¹ However, our analysis of access problems shows that factors other than isolation, such as the number, proportion, and vulnerability of patients treated by the hospital, and whether adequate emergency services are available, can affect the potential impact of a hospital's closure (see pp. 43-47).

The Sole Community Hospital (SCH) provision is the only nationwide federal effort targeted at hospitals providing essential services to their community. SCHs receive favorable Medicare payment, but this benefit is not enough to protect many small SCHs from financial distress.² Also, the criteria used to identify SCHs do not identify all hospitals whose closure would threaten access to care. The criteria are based on distance and other factors related to the accessibility of alternative hospitals or the community's dependence on the hospitals. However, the criteria do not

¹These hospitals either had been Sole Community Hospitals at some time or appeared eligible, and experienced net financial losses over the 3-year period fiscal years 1985-87. While these hospitals are few in number, they appear widely scattered across states. See GAO/HRD-90-67, p. 57.

²GAO/HRD-90-67, pp. 21-24.

consider whether vulnerable populations within the community would be adversely affected by closure, or whether the hospital is providing certain services that are essential, even if other hospitals are accessible for some services. Several hospitals whose closure appeared to threaten access to inpatient or emergency care for some residents in our case studies would not have been identified through SCH criteria (for example, the Mound Bayou hospital, p. 46).

Many states have supplemented federal efforts with their own initiatives to assist rural hospitals. State strategies vary greatly in the type and level of effort, but interviews with health officials in 12 states indicated most make no special effort to identify or monitor financially weak rural hospitals that were providing essential services.³ Minnesota is an exception. State health staff recently developed criteria to identify financially distressed hospitals. Such hospitals that could show they met federal criteria for SCH status were eligible for direct subsidies.⁴

Federal Assistance Is Not Well Targeted

A number of federal initiatives, some recently established or expanded, address problems facing rural hospitals either directly or indirectly (see app. VII). Several of these efforts provide some financial relief to certain subgroups of rural hospitals; however, they are not well-targeted mechanisms for maintaining access to hospital care.⁵ Our case studies and data analysis suggest that providing financial assistance to broadly defined groups of rural hospitals is neither an effective nor an efficient method for preserving such access. For example, many Medicare-dependent rural hospitals with fewer than 100 beds now receive increased Medicare payments.⁶ Many of these hospitals may not be essential to beneficiary access to care or may not need financial assistance. Our work showed no evidence that Medicare-dependent hospitals were at higher risk of closure during 1985-88, once we controlled for

³These states were selected for further review because they had the most rural hospitals with net losses during fiscal years 1985-87—a sign of financial distress.

⁴Hospitals also had to have 20 or fewer beds, a criterion that only reduced the number of eligible hospitals by one.

⁵Some of the federal efforts, however, may have been enacted primarily for other purposes, such as encouraging better use of excess hospital beds or correcting actual or perceived inequities created by PPS.

⁶They receive the higher of (1) the PPS payment for rural hospitals, (2) payment based on their 1982 costs, updated, or (3) payment based on their 1987 costs, updated.

their other characteristics (see p. 36).⁷ Finally, we previously reported that for some hospitals in very poor financial condition, paying their full Medicare costs would not solve their financial problems. Consequently, this special payment provision is not an efficient or effective method for preserving access.⁸

One effort, the Rural Health Care Transition Grant Program, has more potential than the others to assist communities in addressing their specific access problems. The Transition Grant Program is specifically designed to help hospitals change their type and mix of services.⁹ Other efforts, such as provisions for increased Medicare payment for patient treatment, may help some with day-to-day costs while major problems remain unaddressed.

However, the Transition Grant Program could achieve its potential more effectively with some policy changes. HCFA has so far awarded nearly 400 grants, each for up to \$50,000 per year for up to 3 years, without considering the applicant hospital's financial need, its viability, or whether it provides essential services. Consequently, hospitals that could fund their projects internally compete equally with financially weak hospitals providing essential services. Although HCFA was not required to target the grant funding, it also was not prohibited from doing so.

Second, the program is limited by allowing only hospitals to be eligible for grants. While a change would require legislative action, our work suggests that there are areas where continued provision of essential hospital services may be threatened, but the hospital is not a viable entity (see p. 43). Federal support to help maintain residents' access to essential inpatient or emergency health care in such areas might best be

⁷The Prospective Payment Assessment Commission reported similar findings in a study of hospital performance. Medicare-Dependent Hospitals Under PPS, Prospective Payment Assessment Commission, Technical Report, I-90-01.

⁸However, if the provision was enacted to address the potential disadvantages of small hospitals under a system based on average costs, further study would be needed to assess its effectiveness. This was beyond the scope of our review.

⁹Although the word "transition" is in the program's title, grants under the program were not to be strictly used for hospitals to change to another type of facility (for example, a nursing home or clinic). Very few such proposals have been received from hospitals. The types of projects most frequently funded have been for outpatient service development, staff development, and beneficiary services.

accomplished by supporting projects proposed by state or local governments. Such projects could include improving transportation systems or training emergency personnel.

Finally, no assessment is made (or required) during the awards process about whether the grant, together with other proposed funding, would be sufficient to make a difference for that hospital. Our case studies suggest that just before closure, only a major investment could have made a difference for some of the hospitals. The grant awards are usually of the maximum amount, indicating that the amount requested and provided may be based on the amount available, rather than the amount needed to make a significant difference. Making an assessment about whether the total funding (including federal and other funding sources) is likely sufficient to make a difference in the hospital's status could help protect the government from providing too little help too late to avoid closure.

Conclusions, Recommendation, and Matter for Congressional Consideration

Conclusions

Congressional concern that many rural hospitals are at risk of closure appears warranted. Although rural hospitals were at no greater risk of closure than comparable urban hospitals, most rural and urban hospitals are not comparable. Rural hospitals are on average smaller, have lower occupancy rates, and provide care for less severely ill patients than do urban hospitals. Rural hospitals' vulnerability is due to these differences rather than their geographic location or low Medicare payment. Since their high-risk characteristics result from many different factors (including physician shortages, a lack of state-of-the-art technology, or a failure to meet community needs), efforts to assist rural hospitals providing essential services must address the underlying problems they face.

It is difficult to justify a major federal financial role in assisting rural hospitals except in cases where a closure would create or worsen access problems. Closures we studied had little adverse effect on rural residents' access to care, on average. However, in about a third of the areas with 1986 rural closures, the closure may have created or worsened access problems for vulnerable populations, such as Medicaid recipients or the uninsured, and those needing emergency care. In 2 of the 26 areas with rural closures in 1986, the concerns about access were due to the isolation of the closed hospital. In four less remote communities, which were 25 to 35 miles from an alternative hospital, the access concerns were due to above-average declines in Medicare beneficiaries' hospital use combined with other factors that suggested vulnerable populations may have experienced reduced access after the closure. Case studies in one of the two remote areas and one of the four less remote areas supported these concerns. Finally, lower-than-expected rates of hospital use by Medicare beneficiaries in three communities that were within 25 miles of an alternative hospital indicate possible problems in obtaining care. Given the many hospitals at high risk of closure, identifying those whose closure would create or worsen access problems is a first step to spending limited federal dollars for rural hospitals effectively. Federal and state officials must work together in this effort.

Since the warning signs of financial distress generally appear several years before closure, there is time to identify those hospitals providing essential services that begin to decline and provide them the type and amount of support needed to address the root causes of their problems. This will require monitoring hospitals providing essential services.

Once potential problem areas are identified, better targeting of federal assistance to at-risk communities would best assure that those areas most needing assistance receive it. Although the Rural Health Care Transition Grant Program has the potential to help such communities, it could better achieve this potential with some policy changes. First, in making awards under that program, HHS should consider applicant hospitals' financial need and whether they provide essential services. While such targeting is not now required, it also is not prohibited.

Second, the effectiveness of the transition grants could be better assured if HHS were to consider an applicant hospital's potential to be viable, and determine that the total amount of proposed funding for the project is likely sufficient to implement the project and make a significant difference for the hospital. Policymakers and others should be cautious about providing financial assistance to hospitals that do not appear financially viable. Where financial problems have persisted for years, facility conditions or patient care quality may have deteriorated to a point where only major investments could significantly improve the hospital's chances for survival. Making some assessment of applicant hospitals' viability and the sufficiency of the proposed funding would better protect the federal government from providing too little assistance too late in the hospital's decline.

Finally, the grants are currently limited, by law, to hospitals. In some rural areas, especially sparsely populated ones, protecting timely access to appropriate sources of inpatient or emergency care may best be achieved by supporting an area's system of transportation and emergency medical services rather than maintaining a full-service acute care facility in an area without sufficient population to support it. These are difficult choices, but they are choices that communities must make, and the federal government could better support.

Recommendation to the Secretary of HHS

To identify areas threatened with loss of access to essential hospital services, when hospital closure might still be avoided, the Secretary should direct the Office of Rural Health Policy to provide guidelines for states to identify and monitor rural areas in which hospitals are at risk of closure and vulnerable populations, such as low-income residents, or the community as a whole would face substantial problems in obtaining essential inpatient or emergency care if the hospital closed.

Matter for Congressional Consideration

To assist rural communities in maintaining access to essential hospital services in an effective and efficient manner, the Congress should consider making any future transition grant funding for this purpose available according to the following two principles.

1. Before providing financial assistance to a hospital, a determination should be made that:

- the hospital is providing inpatient or emergency services essential for the community as a whole or for vulnerable populations;
- the continued provision of essential services is threatened by the hospital's financial problems; and
- the total amount of funding, including proposed federal and other funding sources, would be sufficient to give the hospital a reasonable chance for survival.

2. Where continued provision of essential services is threatened, but the hospital is not a viable entity, funding should be available to state or local governments to support other initiatives to strengthen access to inpatient or emergency health care (for example, by improving transportation systems or training emergency personnel).

HHS Officials' Comments and Our Evaluation

We met separately with HCFA officials and officials from the Office of Rural Health Policy (ORHP) to discuss a draft of our report. These officials presented a range of positions and concerns, but did not present evidence that caused us to substantially alter our findings and recommendation.

HCFA Officials' Comments

HCFA officials disagreed with our draft recommendation because they believed it would not be feasible to identify and target assistance to hospitals that are financially weak and provide essential services. Also, they believed our position indicated they should financially support hospitals that are poorly managed. Finally, HCFA officials questioned why we had focused on improving the Rural Health Care Transition Grant Program rather than any of the other programs that assist rural hospitals.

HCFA officials believed it is not feasible to identify hospitals that are financially weak because of the difficulty in defining criteria to identify

such hospitals. We believe that while any definition of financial weakness may be imperfect and incomplete in some way, adopting an objective measure of financial status is important. Without such a measure, there is little assurance that limited federal funds are spent effectively in areas with financial need. Also, available staff can more thoroughly review the potential for access problems once the number of areas of concern has been narrowed to those with financially weak hospitals.

HCFA officials also believed we were suggesting that they financially support hospitals that are poorly managed, since they believed hospitals that are financially weak may be poorly managed. That is not our position. Support for poorly managed hospitals should be avoided. However, we believe it cannot be assumed that most hospitals that are financially weak are poorly managed. While some may be (see p. 31), our analysis found that factors beyond the control of hospital management, such as local economic conditions, played a role in closures (see pp. 30-31). Finally, our recommendation suggests that financial assistance be given after a determination is made that with some assistance, the hospital has a reasonable chance for survival. Since no such determination could reasonably be made for a hospital where mismanagement was readily apparent, we have not altered our recommendation.

Finally, HCFA officials questioned why we focused on the Transition Grant program, rather than any other program that assists rural hospitals. We focused on that program because it was the only grant program available to support access to hospital care in rural areas nationwide, and we believe it has more potential than the other programs and provisions we reviewed to assist communities and hospitals where closure would create or worsen problems in access to inpatient or emergency care. A grant program supports thought-out projects designed to address identified problems. Most other efforts provide for increased Medicare payment for patient treatment. This may help some with day-to-day costs while major problems remain unaddressed (see p. 57).

ORHP Officials' Comments

ORHP officials agreed with our recommendation that they issue guidelines to assist states in identifying areas where closures would threaten access, as long as additional resources were provided to fund the additional responsibility. Also, these officials indicated that they support evaluation of the Transition Grant awards, in order to identify ways to improve the criteria in light of experience with the program thus far. They would support changes to the criteria that would make the program more effective in meeting rural communities' needs.

Also, ORHP officials expressed concern about our finding that Medicare was not a major factor in rural hospital closures. They believed there are interrelationships between Medicare policy and other payers' policies, and between the implementation of PPS and low occupancy rates, that adversely affected the profitability of rural hospitals.

Our analysis shows that PPS payments did not contribute disproportionately to the financial stress of most hospitals that ultimately closed. Since the implementation of PPS the hospital industry, both urban and rural sectors, has undergone dramatic change. This change has resulted in a substantial shift in service from inpatient hospital treatment to treatment in other settings, as well as the adoption of cost-containment measures by other payers. These broad changes have exerted financial stress on all hospitals, not just rural hospitals.

Finally, ORHP officials told us they believed the Essential Access Community Hospital program (see p. 82) had the potential to assist rural communities in maintaining access to care, and asked whether we supported its expansion in light of our findings. We believe alternative types of limited-service hospitals, such as the Primary Care Hospitals created under this program, appear promising because not every rural community has the population base or need for a traditional full-service hospital (see p. 43). However, we cannot recommend expansion of the program at this time because (1) other types of alternatives to full-service acute care hospitals have been proposed and are being tested and (2) the quality-of-care implications and financial viability of these facilities are not yet clear.

Congressional Requesters

U.S. Senators

Paul Simon
James R. Sasser
Kent Conrad
J. James Exon
John D. Rockefeller IV
Carl M. Levin
Richard Shelby
Tom Daschle
Lloyd Bentsen
Strom Thurmond
Bob Graham
Harry Reid
Larry Pressler
John C. Danforth
Steve Symms
Ernest F. Hollings
Thad Cochran
Terry Sanford
Albert Gore, Jr.
Quentin N. Burdick
Donald W. Riegle, Jr.
Christopher S. Bond
Mitch McConnell
Barbara Mikulski
Howard M. Metzenbaum
Robert W. Kasten, Jr.
John Breaux
Charles E. Grassley
John Heinz
Sam Nunn
J. Bennett Johnston
Tom Harkin
Max Baucus

Methodology

This appendix provides more details about the quantitative analyses used in this report and describes the closure validation that preceded our analysis. Except for our validation of closures, described below, we did not independently verify data from the national data sets we used.

Closure Validation

To explore and improve our data quality, we validated a sample of urban and rural community hospital closures listed in the AHA closure file (1980-87). We used the AHA definition of a community hospital as a nonfederal, short-term, general and other specialty hospital whose facilities are available to the public. A closure was defined as the discontinuance of the provision of inpatient acute care medical services for any period during 1980-88. Any hospital that closed and reopened during the study period was classified as a temporary closure but not excluded. Hospitals that did not meet our criteria for closure were excluded from our analysis.

To obtain a national sample for validation, one state was randomly selected from each of the nine census regions, and all reported closures in that state were validated. Also, we validated all 1980-87 closures in our case study states (Illinois, Mississippi, Texas, and Montana). Finally, hospitals listed as questionable 1988 closures in a 1989 publication also were validated.¹

The resulting closure file was used to generate lists of 1986 and 1984 rural closures. To study patterns of hospital use and trends in economic indicators, respectively, for these smaller subsets of closures, we validated the closure and year of closure for every 1986 and 1984 rural closure in our file. Only closures confirmed as 1986 or 1984 closures, respectively, by either a state licensure official, a state hospital association official, or a local health official were included in the analysis. We included or excluded temporary closures from our analysis on a case-by-case basis; where we report results for these groups, temporary closures were included unless otherwise noted. We included areas with temporary closures as areas of concern where the data suggested that access problems may have occurred, because even a temporary closure could have a significant impact on access under some circumstances. Further, some hospitals close, then reopen, then close again, providing an unreliable source of care for area residents.

¹"AHA Closure List Questioned," *Modern Healthcare*, Mar. 3, 1989, p. 6, and "AHA's '86,'87 Closure Data Questioned," *Modern Healthcare*, Mar. 17, 1989, p. 6.

Factors Associated With Risk of Closure

To identify hospital and environmental factors that might contribute to a hospital's financial distress and ultimate closure, we reviewed related literature and spoke with experts in the field. We then constructed indicators of these measures from several data sources, listed in table II.1.

Table II.1: Data Sources

Data	Data source
Hospital closures	AHA closure files, 1980-88
Hospital operating characteristics	AHA Annual Surveys, 1980-87 Medicare Hospital Cost Report Information System (HCRIS) PPS1-PPS4 ^a
Hospital financial characteristics	HCRIS PPS1-PPS4 Health Care Investment Analysts, Inc., analysis of Medicare cost reports ^b
Environmental characteristics	HHS Area Resource File, 1988, 1990

^aReporting periods for fiscal years 1984-87.

^bGAO contracted with a private firm, Health Care Investment Analysts, Inc. (HCIA), to provide some analysis of financial and other characteristics associated with closure. HCIA also obtains its data from the Medicare cost reports. However, it obtains the original cost report source documents and has access to financial information not included in the HCRIS data set. For measures that could be constructed using both the GAO and HCIA data sets, we found that the estimates resulted in similar patterns and trends.

Using these data, we first compared the financial, operating, and environmental characteristics of closed and open hospitals. To identify the financial characteristics associated with closure, we analyzed data on two commonly used measures of hospitals' profitability (total operating margin² and total margin³) in the 4 years before closure. In this analysis, we compared the financial characteristics of open and closed hospitals, stratified by size and urban/rural location. Using bivariate techniques, we compared open and closed hospitals' median profit margins, costs, revenues, and certain financial ratios. We also calculated rates of closure for hospitals, given certain levels of profitability.

Additional analyses were undertaken to assess Medicare's contribution to the overall profits and losses of rural and urban hospitals. We compared PPS costs and revenues of closed and open hospitals stratified by

²Used to measure profitability on all patient care operations and calculated as follows: (net patient revenue—operating expenses)/net patient revenue. Because for many hospitals, net patient revenue does not include all operating revenue, this measure understates operating profitability by an estimated 1-1/2 to 2 percent.

³Measures overall profitability and is: (total revenue—expenses)/total revenue.

size and urban/rural location. Also, we compared hospitals' PPS margins⁴ with their total operating margins. For hospitals that experienced PPS losses, we compared their PPS and operating margins to determine whether their losses on Medicare patients were more severe than on other patients.

We also computed closure rates for urban and rural hospitals by factors we suspected influenced the risk of closure.⁵ Finally, we used a statistical technique, logistic regression, to assess the individual and combined influence of the multiple factors associated with closure. This technique also permitted us to assess the effect of a hospital's location in an urban or rural area, while holding constant other factors that could influence closure. Our discussion of the major factors affecting risk of closure (see ch. 3) is based on these statistical analyses together with our understanding of rural hospitals' problems derived from our literature review, consultation with experts, and our case study analyses.

Description of the Closure Regression Models

In this report, as well as our June report,⁶ we used logistic regression analysis to quantify the impact of hospital operating and environmental characteristics on the risk of closure for all community hospitals in the nation.⁷ To estimate the statistical relationship between the likelihood of closure and our selected characteristics for each group of hospitals studied, we obtained maximum likelihood estimates from a logistic function.⁸ We observed the status of 5,320 community hospitals between 1985 and 1988. The dependent variable is the closure status of the hospital during 1985-88. The variable equals 1 if the hospital closed between 1985 and 1988; otherwise it equals 0.

⁴Used to measure profitability on Medicare patients and calculated as follows: (PPS operating revenue - PPS operating costs)/PPS operating revenue. Our PPS margin does not include a hospital's capital costs or capital cost reimbursement.

⁵GAO/HRD-90-134, p. 22.

⁶GAO/HRD-90-134.

⁷Based on the 5,320 community hospitals with data.

⁸A nonlinear estimation technique that is appropriate when the dependent variable is dichotomous. Here the technique is used because only two conditions are considered for each institution—either it remained open during the entire period or it closed. The estimates were performed with the author-supported SAS logistic procedure. For a detailed description of the logit model, see Jan Kmenta's *Elements of Econometrics*, 2nd ed. (New York: MacMillan Publishing Co., 1986), or Robert S. Pindyck and Daniel L. Rubinfeld, *Econometric Models and Economic Forecasts*, 2nd ed. (New York: McGraw-Hill Book Co., 1981).

Since publication of our prior report, we tried several alternate closure models in an attempt to clarify the role of the local economy and competition. In this report, we present the results of a model that is similar in most respects to our previous model, but which we believe provides additional insight into the economic and competitive factors affecting risk of closure.

Also since our prior report, we have investigated factors that may have contributed to the disproportionate number of Texas closures (see p. 21). To assess whether factors affecting risk of closure in Texas differ from those of the rest of the nation, we analyzed data separately on Texas and non-Texas hospitals. The Texas and non-Texas regressions included 450 and 4,870 hospitals, respectively. During this period, 260 hospitals closed, 59 in Texas.

Factors Included in the Closure Model

The independent variables included in our model are characteristics of the hospital and its market environment. For each hospital, expected financial performance depends on projected revenues and costs. We recognize that in some cases, the variables are indicators of more than one operating characteristic affecting costs and revenues. For example, the number of beds in a hospital is an indicator of its capacity, capital costs, and mix of services.

For variables obtained from the AHA Annual Survey, we used 1985 values of the variables to estimate the relationship between closure and the observed hospital or market characteristics.⁹ For those obtained from the Medicare cost reports, we used data from hospital cost reporting periods beginning during fiscal year 1985. The variables included in the final regression model are listed and described in appendix III.

Statistical Techniques Used in the Regression Analysis

When two variables have a joint effect over and above the effects of each factor separately, it is considered "interaction."¹⁰ To statistically test whether the effect of a hospital's location in a rural or urban area was consistent across the levels of the other variables in the model,

⁹Values for 1985 were not available for all the variables used in estimating the model. When 1985 values were missing for the individual characteristics of hospitals, we used the closest reported value from 1986 or 1987 to maximize the number of usable observations. If no reported value was available in any of those years and 1984 data were reported, we used that information.

¹⁰For further detail, see David G. Kleinbaum and Lawrence L. Kupper, Applied Regression Analysis and Other Multivariable Methods (Boston: Duxbury Press, 1978), pp. 333, 176, and 180.

interaction terms for urban/rural location and each variable identified in appendix III were jointly tested. Also, we used interaction terms in variations on our national model to test whether the effects of economic factors were similar for Texas and non-Texas hospitals. Specifically, we tested the joint significance of interaction terms between Texas/non-Texas location and the economic variables.¹¹

We used the logistic function to compute adjusted closure rates for subgroups of hospitals (tables III.1 and III.2). Adjusted rates were calculated by multiplying the coefficients (see table III.3) of the logistic regression equation by either the characteristic mean or proportion, and then performing the logistic transformation. The adjusted rates give an estimate of the probability of closure when hospital characteristics are comparable.¹²

Quality and Limitations of the Data and Measures

The data used in this analysis were the best available sources of information. Of the 260 closures, only 6 were deleted from the national regression model because data were not available on some of the variables included in the model.

PPS payment rules changed during our study period (for example, payment rates were based increasingly on national average costs, rather than hospitals' own costs). Therefore, while our methodology allows us to assess whether PPS payment was a major factor influencing the closure of hospitals between 1985 and 1988, these results must not be assumed to reflect the pattern for more recent or future closures.

Two limitations of the measures used in this analysis also deserve mention. Since we have not studied possible variations in hospital accounting practices, the operating and total margin data should be interpreted as general indicators, rather than as precise measurements, of the profitability of the hospital groups presented. Further, county-level data are imperfect measures of a hospital's market as they are derived for a county, a geographic area defined for political purposes. In some cases, a county may represent a reasonable approximation of a

¹¹Economic variables used were number of hospitals in the county, change in population, population over age 65, median education level, change in the county unemployment rate (1985-86), and per capita income.

¹²For further detail, see Kleinbaum and Kupper, pp. 218-220.

hospital's market area; in other cases, it may not. Neither of these limitations was considered to have jeopardized the study's potential to identify hospitals' major risk factors for closure.

Impact of Closures on Rural Communities

To assess the impact of hospital closures on access to care, we evaluated (1) the community's reliance on the hospital when it was open, (2) changes in the availability of physicians and hospital beds, and (3) trends in Medicare beneficiaries' use of health services. This analysis focused on the 1986 rural closures because data were available that permitted us to examine hospital use at least 2 years before and 1 year after closure and, thus, assess the hospital's use before the final stages of its financial decline. A comparison of hospitals that closed in 1986 compared with all closures during 1980-88 showed that their characteristics did not differ dramatically (see table II.2).

Table II.2: Comparison of the Characteristics of Rural Closures in 1986, 1985-88, 1980-88

	1986	1985-88	1980-88
Number of hospital closures	26	140	200
Number of beds (percent):			
6-49	73	73	73
50-99	23	20	20
100+	4	7	7
Ownership (percent):			
Public, nonfederal	54	29	27
Private, nonprofit	31	36	39
For-profit	15	34	35
Census region (percent):			
Northeast	0	6	8
North Central	23	22	22
South	54	56	56
West	23	16	15

The following indicators were used to evaluate access to care in communities with 1986 closures:

- the hospital's Medicare market share¹³ (that is, the proportion of the area's patients hospitalized at the hospital before its closure);
- the number of hospitals, hospital beds, and physicians in the area before and after a closure; and

¹³See app. V for market share methodology.

- inpatient hospital use rates for Medicare beneficiaries residing in the service area of the closed hospital.

We used this analysis of 1986 closures to provide a broad perspective on the impact of closures on access to care. However, we also reported access problems identified through our 11 case studies.

To assess whether rural hospital closures result in the use of more costly hospitals, we determined where Medicare beneficiaries obtained care before and after the closure. We traced the proportion using both urban hospitals and Rural Referral Centers since both types of facilities on average have higher costs and receive higher payments. We also reviewed published data on changes in Medicare expenditures in areas with closures and areas with no closures, to assess whether shifts in patterns of utilization increased per capita Medicare expenditures after closure.

To assess the economic impact of closures, we studied trends in per capita income in the 12 rural counties with confirmed 1984 closures. This analysis used 1984 closures because data were available 3 years before and 3 years after closure. We averaged per capita income over each 3-year period to provide a more stable measure than any single year of data would provide. Then, we used the ratio of per capita income in the county with a closure to the per capita income of all rural areas in that state. This method controlled for events that affected many rural areas in the state, thus providing a measure sensitive to local economic events. We reviewed each of the 12 areas individually and grouped by population size (see p. 52). In addition, we reported economic effects cited by officials we interviewed in the case-study communities.

Quality and Limitations of the Data and Measures

We used data on Medicare beneficiaries to calculate utilization rates in our hospital market areas and to determine hospital market shares before closure because data on all area residents were not available from a national data base. Therefore, we do not know to what extent Medicare beneficiary patterns of use reflect those of the general population. In particular, since Medicare beneficiaries are an insured population, their patterns of use could differ substantially from patients without insurance.¹⁴

¹⁴Numerous studies show that uninsured persons use health services less frequently than those who are insured.

Supporting Tables

Table III.1: Likelihood of Closure by Selected Hospital Characteristics Affecting Risk: Adjusted Rates^a

	Four-year closure rate per 100 hospitals	
	Rural	Urban
Number of beds		
Fewer than 50	4.92	7.78
50-99	1.82	2.92
100-199	.99	1.60
200 or more	.39	.64
Ownership		
Public, nonfederal	.66	.92
Private, nonprofit	1.26	2.67
Private, for-profit	4.28	3.17
Occupancy (percent)		
Less than 20	4.15	6.59
20-39	2.01	3.24
40-60	1.07	1.74
61 or more	0.71	1.15
Case mix index (value)^b		
1.03	1.84	2.96
1.20	.99	1.60

^aSee app. II for a discussion of adjusted rates.

^bCase mix indexes were not categorized in our regression model. Rates are presented for two values of the index to provide the reader with an example of how risk varies with case mix. Twenty-five percent of hospitals have case mix indexes below 1.03, and 25 percent have indexes above 1.20.

Table III.2: Likelihood of Closure by Selected Environmental Characteristics Affecting Risk: Adjusted Rates^a

	Four-year closure rate per 100 hospitals	
	Rural	Urban
Number of hospitals in the county		
One	.80	1.29
Two	1.35	2.18
Three or more	1.55	2.50
Percent change in population^b		
-0.2	1.42	2.30
8.4	1.15	1.87
Change in unemployment rate (1985-86)^b		
-0.9	1.16	1.87
0.5	1.32	2.13
Per capita income (1985)^b		
11,170	1.53	2.47
15,252	1.07	1.74

^aSee app. II for a discussion of adjusted rates.

^bThese variables were not categorized in our regression model. Rates are presented for two values of each variable to provide the reader with an example of how risk varies by each variable. Twenty-five percent of hospitals were in counties with values at or below the first value, and 25 percent were in counties with values at or above the second value.

**Appendix III
Supporting Tables**

Table III.3: Logit Estimates of Hospital Closure

Variable	Coefficient	Standard error
Rural	.312	.348
Occupancy (less than 20%)	1.798 ^b	.333
Occupancy (20-39%)	1.052 ^b	.304
Occupancy (40-60%)	.413	.302
Number of beds (1-49)	2.579 ^b	.388
Number of beds (50-99)	1.549 ^b	.369
Number of beds (100-199)	.935 ^b	.361
Public	-1.266 ^b	.418
Nonprofit	-.177	.258
Rural and public	-.638	.490
Rural and nonprofit	-1.082 ^b	.354
Medicare case mix index	-3.688 ^b	.793
Area wage index	2.157 ^a	1.013
High Medicare inpatient days (60% or more)	.073	.206
Few Medicare inpatient days (35% or fewer)	1.207 ^b	.169
High Medicaid inpatient days (11% or more)	.090	.171
Long-term care unit present	-.068	.178
South	1.254 ^b	.322
North Central	.719 ^a	.282
Northeast	1.067 ^b	.383
Population over age 65 ^c	.042	.032
Population density ^c	.179	.199
Percent change in population	-.025 ^a	.011
Change in unemployment rate (1985-86)	.095 ^a	.038
Per capita income (1986) ^c	-.875 ^a	.375
Median education level (1986)	.024	.131
Population ^c	-.002	.003
Two hospitals in the county	.532 ^b	.215
Three or more hospitals in the county	.674 ^b	.227
Constant	-3.816	2.144

^aStatistically significant at the 95-percent confidence level.

^bStatistically significant at the 99-percent confidence level.

^cWe multiplied these coefficients and standard errors by 10,000 for presentational convenience.

**Appendix III
Supporting Tables**

Table III.4: Logit Estimates of Hospital Closure for Texas and Non-Texas Hospitals

	Non-Texas		Texas	
	Coefficient	Standard error	Coefficient	Standard error
Rural	.277	.401	.636	1.033
Occupancy (less than 20%)	1.460 ^a	.252	.561	.649
Occupancy (20-39%)	.643 ^a	.204	.223	.522
Number of beds (6-49)	2.092 ^a	.416	5.896 ^a	1.411
Number of beds (50-99)	1.425 ^a	.392	3.300 ^a	1.256
Number of beds (100-199)	.957 ^b	.376	1.756	1.252
Public	-1.176 ^b	.480	.230	.979
Private nonprofit	-.120	.408	-.377	.698
Rural and public	-.645	.294	-3.220 ^a	1.233
Rural and private nonprofit	-1.164 ^b	.565	-1.514	.997
Medicare case mix index	-4.764 ^a	.908	-2.014	2.050
Area wage index	1.331	.992	1.431	4.745
High Medicare inpatient days (60% or more)	.133	.188	.262	.544
Few Medicare inpatient days (35% or fewer)	1.239 ^a	.187	.455	.450
High Medicaid inpatient days (11% or more)	.061	.388	.975 ^c	.504
Two hospitals in the county	.510 ^b	.243	.285	.532
Three or more hospitals in the county	.702 ^a	.257	.187	.655
Long-term care unit present	-.254	.195	2.062 ^a	.642
Population over age 65 ^d	.106 ^b	.043	.008	.756
Population density ^d	.133	.211	5.326	25.502
Population ^d	-.008 ^b	.004	.002	.029
Percent change in population	-.042 ^a	.014	-.026	.022
Change in unemployment rate (1985-86)	.113 ^b	.047	-.092	.105
Per capita income ^d	-1.123 ^a	.410	-.901	1.173
Median education level	-.031	.143	-.007	.312
Constant	.434	1.804	-8.875	5.972

^aStatistically significant at the 99-percent confidence level.

^bStatistically significant at the 95-percent confidence level.

^cStatistically significant at the 90-percent confidence level.

^dWe multiplied these coefficients and standard errors by 10,000 for presentational convenience.

Variables Used in Regression Model

Hospital Characteristics

Location	This variable classified a hospital as urban or rural. An urban hospital was one located within a metropolitan statistical area (MSA). A rural hospital was one outside an MSA. ¹
Number of Beds	Hospitals were grouped in one of four categories: fewer than 50 beds, 50-99 beds, 100-199 beds, and 200 beds or more. This factor measures a hospital's size and is an indicator of its capacity, capital costs, and mix of services.
Ownership	Hospitals were classified as either for-profit, private nonprofit, or public nonfederal. This variable measures differences in risk due to the incentives and constraints facing these institutions. Also, it is an indicator of the potential availability of nonpatient sources of revenue from either community fund-raising efforts or government subsidies.
Occupancy Rate	A hospital's occupancy rate was defined as the ratio of a hospital's average daily census ² to the average number of staffed beds maintained during the reporting period. Hospitals were categorized into one of four occupancy groups: less than 20 percent, 20-39 percent, 40-60 percent, and greater than 60 percent. Occupancy rate is an indicator of a hospital's patient volume, a determinant of revenues and per patient costs. ³
Percent Medicare Inpatient Days	Hospitals were classified into three groups: low Medicare population (less than or equal to 35 percent Medicare inpatient days), average-size Medicare population (36-59 percent Medicare inpatient days), and Medicare-dependent (60 percent Medicare inpatient days or more). This

¹This is the definition of rural generally used by Medicare's PPS.

²Average number of inpatients, excluding newborns, receiving care each day during the reporting period.

³For our statistical approach to yield meaningful results, a hospital's occupancy rate should be predetermined (observed) at least 1 year before closure. Occupancy data for all closures were for prior years. Data for the 1985 closures were from the 1983 and 1984 AHA annual surveys.

factor is an indicator of a hospital's patient and payer mix and, more specifically, its reliance on a federal government payer source.

Percent Medicaid Inpatient Days

Hospitals were classified into two groups: low/modest Medicaid population (less than 11 percent Medicaid inpatient days) and high Medicaid population (greater than or equal to 11 percent Medicaid inpatient days). This factor is also an indicator of a hospital's patient and payer mix and, more specifically, its reliance on a state government payer source.

Medicare Wage Index

The wage index was entered into the model as a continuous variable. It is a relative measure of labor costs for each MSA and for rural areas of each state. The index has unique values for each MSA in the United States. This number is assigned to each urban hospital located in that MSA. For rural hospitals, however, the measure is considerably less precise. The wage index contains one value for non-MSA areas in each state. Consequently, rural hospitals within each state are assigned the same index value.

Medicare Case-Mix Index

The case-mix index was entered into the model as a continuous variable. It is a measure of the costliness of Medicare inpatients at a hospital relative to the national average cost of treating all Medicare patients. The case-mix index is also considered a measure of the complexity of the medical cases treated at a hospital. It therefore affects hospital revenues as well as costs.

Long-Term Care Unit

Hospitals were classified as either having a long-term care unit or not. A long-term care unit was considered present where the number of total "facility beds" exceeded the number of "hospital beds" according to their Medicare cost report. When necessary information was missing from the cost report, AHA annual survey data were used where available.

Environmental Characteristics

Population Density	This factor measures the population density of the county in which the hospital is located and is an indicator of the potential demand for services. The data are for 1980 population per square mile.
Per Capita Income	Data were on the 1986 per capita income of county residents. This factor is an indicator of consumer purchasing power in the area, the extent of health insurance coverage, and the economic health of the area.
Median Education	Data were for the 1980 median level of education of county residents. This factor is an indicator of counties' relative levels of need for and use of services.
Change in Population	This factor measured the percentage change in the hospital county's population from 1980 to 1985. It is a measure of the area's growth, which affects the demand for health services.
Population	This factor measures the 1985 population of the county in which the hospital is located and thus indicates the potential demand for hospital services.
Population Over 65 Years Old	Data were for the number of county residents over 65 years of age in 1980. The measure is included to capture the effects of the population's age composition on the demand for hospital services.
Change in Unemployment Rate	This factor measures the change in the county unemployment rate between 1985 and 1986. It is an indicator of changes in the economic status of the hospital's environment.

Hospitals in the County

Hospitals' counties were classified into three groups: those with one hospital, those with two, and those with three or more. This factor is an indicator of the competitiveness of the hospital's market environment.

Region

The nine U.S. Census regions were collapsed into four summary categories: (1) North Central (East North Central and West North Central regions); (2) Northeast (New England and Middle Atlantic regions); (3) South (South Atlantic, East South Central, and West South Central regions); and (4) West (Mountain and Pacific) regions. This variable is an indicator of differences in costs and revenues not accounted for by other variables in the model. For example, it is intended to capture the effect of regional differences in practice patterns and resource costs.

Determining a Hospital's Market Area and Market Share

To determine the market area and market share of each hospital that closed in 1986, we used as our framework HCFA regulations for hospitals applying for Sole Community Hospital status.¹ These regulations provide essentially that the hospital would determine its service area based on where it draws at least 75 percent of its admissions. We used Medicare beneficiary discharge data from the Medicare Provider Analysis and Review (MEDPAR-2) file to determine a hospital's Medicare market area and share, since data on all patient admissions or discharges were unavailable from a national data set. For each rural hospital that closed in 1986, we determined its market area using the following procedures.

1. We identified the zip code of residence of all patients discharged from the hospital in 1984, 1985, and 1986.²
2. We totaled the Medicare discharges for each zip code and rank-ordered the totals.
3. We defined the hospital's market area as those zip codes from which at least 75 percent of the hospital's patients came.

Determining each hospital's market share before closure required several more steps. First, we identified all other hospitals used by Medicare beneficiaries residing in the hospital's market area. Second, we determined which hospitals were competitors of the hospital that closed and excluded discharges from noncompeting hospitals from further analysis. Hospitals were considered competitors if they discharged at least 10 Medicare beneficiaries residing in the hospital's market area.³ Third, we totaled the discharges from the hospital and its competitors. Finally, we determined what percentage of the total had been discharged from the hospital that later closed. This percentage was the hospital's market share.⁴

¹42 C.F.R. 412.92(a).

²We believed using 3 years of discharge data would provide a better indication of the hospital's true market area than would a single year.

³This approach was used to approximate HCFA regulations, which allow a hospital to exclude from its market share calculation patients who received care at hospitals not within a 50-mile radius.

⁴Market shares were calculated for 2 years before closure.

Rural and Urban Community Hospital Closures by State (1980-88)

State	Rural	Urban	Total
Texas	42	34	76
California	3	41	44
New York	7	22	29
Illinois	7	13	20
Michigan	6	12	18
Louisiana	11	5	16
Tennessee	7	6	13
Alabama	10	3	13
Missouri	4	8	12
Washington	4	7	11
Florida	2	9	11
Pennsylvania	2	8	10
Minnesota	6	4	10
Oklahoma	9	1	10
Ohio	4	4	8
West Virginia	5	3	8
Wisconsin	5	2	7
Arkansas	5	2	7
Oregon	4	3	7
Arizona	3	3	6
Kentucky	5	1	6
Massachusetts	3	3	6
Virginia	4	1	5
North Carolina	3	2	5
Georgia	4	1	5
Mississippi	5	0	5
Kansas	3	2	5
Montana	5	0	5
New Mexico	3	1	4
Colorado	3	1	4
Nebraska	4	0	4
New Jersey	0	4	4
Maine	3	0	3
Idaho	3	0	3
North Dakota	2	0	2
Iowa	2	0	2
South Carolina	0	1	1
South Dakota	1	0	1
Alaska	1	0	1
Hawaii	0	1	1

Overview of Federal Rural Hospital Efforts

Table VII.1: Federal Initiatives That May Help Specific Groups of Rural Hospitals

Rural hospital characteristics	Initiative	Some potential effects
Under 100 beds	Swing-Bed Program (42 U.S.C. 1395tt)	Use excess hospital beds to better meet community needs.
Under 100 beds and nonprofit	Rural Health Care Transition Grant Program (42 U.S.C. 1395ww note)	Assist in planning and implementing projects to modify type and extent of services.
Under 100 beds and Medicare-dependent	Small, Medicare-dependent Hospitals Provision (42 U.S.C. 1395ww(d)(5)(G))	Favorable Medicare payment. Volume adjustment payment (under certain circumstances) if patient discharges decline more than 5 percent in a year.
In a medically underserved area	Rural Health Clinic Provision (P.L. 95-210) (42 U.S.C. 1395x(aa))	Help with shortages of physicians since mid-level practitioners are used in clinic. Increase patient volume through referrals. Help cover hospitals' fixed costs, since clinic Medicare payment is cost-based.
Adjacent to an urban area	Lugar provision (42 U.S.C. 1395ww(d)(8)) Geographical Classification Review Board (42 U.S.C. 1395ww(d)(10))	Medicare payment at urban rate.
Large, with complex patient mix	Rural Referral Center Provision (42 U.S.C. 1395ww(d)(5)(C))	Medicare payment at rate for smaller urban areas.
Provides sole source of care reasonably available to area Medicare beneficiaries	Sole Community Hospital Provision (42 U.S.C. 1395ww(d)(5)(D))	Favorable Medicare payment. Volume adjustment payment (under certain circumstances) if patient discharges decline more than 5 percent in a year.
In a health manpower shortage area	National Health Service Corps (P.L. 101-597)	Increase patient volume through Corps physician referrals.

Table VII.2: Federal Initiatives That May Help Any Type of Rural Hospital

Initiative	Some potential effects
Medical Assistance Facility Demonstration (Montana)	Could show benefits of and problems with a new type of facility that could become a future alternative to a full-service hospital.
Essential Access Community Hospital Program ^a (42 U.S.C. 1395i-4)	Could show benefits of and problems with: <ul style="list-style-type: none"> —rural primary care hospitals (another alternative to a full-service hospital), —rural health networks, —getting states more involved in rural health planning, and —a different way of designating "essential access" hospitals.
Office of Rural Health Policy (42 U.S.C. 912)	Provide grants to involved states and hospitals.
Grants to States for Offices of Rural Health (P.L. 101-597, sec. 302)	Clearinghouse, and office staff, coordinate policy and provide information on rural health topics.
	Clearinghouses, and office staff in participating states, will coordinate rural health activities, collect and disseminate information on rural health topics, and provide technical assistance regarding federal and state programs.

^aUp to seven states will participate in fiscal year 1991.

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