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Supply and Demand of Medical Services in Northwest South Dakota: An Economic Analysis

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Bulletin 568
March 1970

In Northwest South Dakota

Supply and Demand of Medical Services

An Economic Analysis

Economics Department
Agricultural Experiment Station
South Dakota State University, Brookings

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In Northwest South Dakota

An Economic Analysis

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PART I

A community which has its own hospital and doctor is benefited in many ways. First, people in the community are near medical care in times of emergency. Second, hospital patients from the community are near family and friends when receiving care. Third, a community may be benefited economically by the presence of a hospital facility because additional jobs are provided and people from the surrounding area are given increased incentive to come to the town in purchasing other goods. Also, adequate medical services are of importance in attracting new industry into a town.

The trend today, however, is away from the concept of the small hospital and one doctor for each town. The modern practice of medicine requires specialization of equipment and personnel to a degree not practical in many small town situations.

Because of rising costs, personnel shortages, and rapidly advancing medical technology, communities throughout the United States are having difficulty providing the types of medical services required today.

Rural areas are particularly hard hit by rising costs and medical personnel shortages because they have the additional problem of low population density. These communities often find that the population base of relatively large hospital service areas is not large enough to support a hospital of sufficient size to provide the types of facilities doctors need in treating patients. As a result, communities constructing small hospitals frequently have difficulty holding a physician for any length of time.

In summary, the situation is this: modern medicine, with its emphasis upon specialization of personnel

and equipment, is forcing many small towns to lose both doctor and hospital. In sparsely populated areas where the distance between major trade centers is considerable, this trend away from small town medical facilities often denies many people ready access to medical services. The problem, then, becomes one of providing easy access to medical services for people located in sparsely populated areas in South Dakota.

The purpose of this publication is to give a general description of the problems facing the Northwest South Dakota area in providing medical and health services and to analyze some of the factors affecting the future demand for such services and the supply of resources available for meeting that demand. With this information, policy makers and rural community leaders will have a better basis for making relevant decisions on the coordination of health services within their area to provide accessibility to health services at the least possible cost, consistent with desired quality standards.

The first part of this publication will discuss some geographic, demographic, and economic factors of the area and the effect they have on the demand for medical and health services. The second part will deal with the supply of medical and health resources available in the area.

Description of Area

The area designated as Northwest South Dakota is composed of 16 counties.¹ It is approximately 120 miles wide and 160 miles long.

Northwest South Dakota is an area of diverse characteristics. It includes an urban area as well, as sparsely populated areas; pockets of poverty and the largest gold mine in North America.

Most of the area is rural and suitable mainly for farming and ranching. Most industry is of the light manufacturing or fabricating nature, although two large employers in the area are the Homestake Mining Company and the Ellsworth Air Force Base, both near Rapid City. Recreation and tourism is a major industry in the area as the Black Hills, on the west, and the Missouri River to the east, are favorite vacation spots for South Dakotans and many other Americans.

About one-sixth of the land area is devoted to Indian Reservations. The Indian population is served by two Public Health Hospitals, neither open to the general public, hence not included in this study.

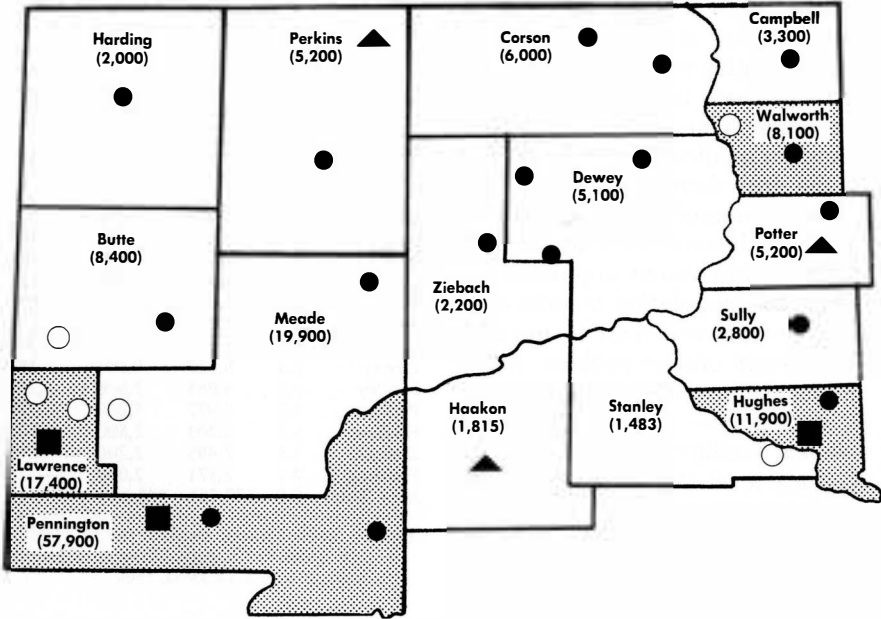
In general, Northwest South Dakota is characterized by a concentration of population at opposite ends of the area, near the Black Hills and near the Missouri River, with a vast space between devoted almost exclusively to farming and ranching and containing nearly half of the population. These characteristics present problems in providing easy access to medical and health care for all the people in the area.

Demographics of Study Area

In 1967 the average population

¹Northwest South Dakota is defined for purposes of this study as encompassing the following counties: Harding, Butte, Lawrence, Pennington, Perkins, Meade, Corson, Ziebach, Haakon, Dewey, Stanley, Campbell, Walworth, Potter, Sully, Hughes.

Figure 1. Population density of counties in northwest South Dakota, 1967.



KEY TO FIGURE

Population Size of Towns, 1960

- 400-999
- ▲ 1,000-2,499
- 2,500-4,999
- above 5,000

County Populations, 1967

- ▨ 11 or more people per square mile
- ▧ 6-10.9 people per square mile (no area represented)
- less than 6 people per square mile
- () Total population in county

density for Northwest South Dakota was approximately six people per square mile. Counties in the area ranged from an average of 21.8 people per square mile in Lawrence County to 0.7 people per square mile in Harding County (see figure 1 and table 1). The location of major towns greatly influenced population density figures.

Northwest South Dakota has been increasing in population at a

relatively slow rate (see table 1). Although total population in Northwest South Dakota has been increasing, the increases have occurred in very selective areas. Only 5 out of the 16 counties registered an increase in population between 1960 and 1967. The largest increase was in Meade County in the immediate area around Ellsworth Air Force Base. Population increases in the other four counties were small. Dis-

tribution of these population changes show a continuation of the trend toward a further decline in the population in the rural areas and some increase in the population of the cities. Thus, although the demand for medical care will continue in the area there will tend to be a greater demand and a greater increase in demand for it in the parts that are more heavily populated and where the population is increasing. This process will tend to intensify the already critical problem facing the rural areas: not enough resources and people to support quality medical facilities and personnel at the local level, thereby necessitating long distance travel by many area residents to obtain medical care.

The racial make-up of the area's population affects the demand for medical resources. The Indian population is not likely to utilize these facilities because they are eligible for medical services in two Public Health Service Hospitals in the study area. The white population is generally not eligible for medical services at these two hospitals. Thus, the greater the proportion of a local area's population that is Indian the lower the total demand for medical services provided by local non-Public Health Service facilities. Although the population of the areas was only about 6% Indian in 1960, a large proportion of these people lived on reservations which were located in the most sparsely populated portions of the study area. For example, Ziebach, Corson, and Dewey counties all had population densities of less than 2.5 people per square mile and populations over 30% Indian. Thus, because of the

Table 1. Population density for northwest South Dakota by county.

Counties by pop- ulation density	Pop- ulation density	Population per county		Change in pop- ulation
		1960	1967	
Lawrence	21.8	17,075	17,400	+325
Pennington	20.9	58,195	57,900	-295
Hughes	15.9	12,725	11,900	-825
Walworth	11.0	8,600	8,100	-500
Potter	5.9	4,926	5,200	+274
Meade	5.7	12,044	19,900	+7,856
Campbell	4.3	3,531	3,300	-231
Butte	3.7	8,592	8,400	-192
Sully	2.7	2,607	2,800	+193
Corson	2.4	5,798	6,100	+302
Dewey	2.1	5,257	5,100	-157
Stanley	1.9	4,085	2,800	-1,285
Perkins	1.8	5,977	5,200	-777
Haakon	1.5	3,303	2,800	-503
Ziebach	1.1	2,495	2,200	-295
Harding	0.7	2,371	2,000	-371
Area Total	6.5	157,581	161,100	+3,519

Source: South Dakota Department of Health, *Annual Statistical Report*, Division of Health Statistics, Pierre, S. D. 1960, 1967.

lower total demand for services provided by local non-Public Health Service facilities one would expect these counties to have problems supporting local facilities.

The age make-up of the population affects both the total demand and the make-up of demand for hospital and other medical services. There is direct correlation between age and the demand for medical services. For example, it has been found that persons 65 years old or over stay in the hospital twice as long as those under 65 and have a bill 80% higher.²

In the area in 1960 there was a total of 30,491 people above 50 years of age—about 33% of the population

²Walter J. McNerney, et. al., *Hospital and Medical Economics*, Vol. I, (Chicago: Hospital Research and Educational Trust, 1962) 367.

(see table 2). In comparison, nationwide, an average of 23.3% of the population was above 50 years of age.³ The fact that a larger percentage of the population in Northwest South Dakota was above 50 years of age suggests a higher per capita level of medical service use might be expected.

The age make-up of the population also affects the area's ability to support hospitals. People in the below 14-year-old age group and above 65 age category are characterized by their economic dependence upon the remainder of society. The relationship of the number of people in these categories to the number in the remainder of the population can be shown by the dependency ratio. The dependency ratio for all coun-

ties in Northwest South Dakota was at least 16 points above the United States dependency ratio of 67 (see table 2). The most sparsely populated counties were the counties with the highest dependency ratios.

Another factor affecting the demand for health and medical care and related to the age and size of the population is the number of births in the area. Between 1957 and 1967 live births in the area declined by almost 36%. Most of this decline has occurred since 1963 (see table 3). Offsetting, to some degree, the decline in number of births has been a decrease in infant death rate. Thus, although birth rate has de-

³U. S. Bureau of the Census, *Statistical Abstract of the United States: 1967*, (Washington: U. S. Department of Commerce, 1967) 10.

Table 2. Age and racial make-up of the Northwest South Dakota population, 1960.

County	Population age* make-up, 1960		Dependency† ratio 1960	Racial make-up*	
	Number below 14	Number above 50		Number non-white	Percent non-white
	Pennington	21,014	8,832	84.2	2,590
Meade	3,787	2,973	91.5	257	2.1
Lawrence	5,808	4,031	92.7	124	0.7
Hughes	4,657	2,399	95.1	641	5.0
Walworth	2,796	1,900	94.7	199	2.5
Potter	1,725	1,116	97.6	50	1.6
Campbell	1,255	758	95.0	2	0.0
Butte	2,893	2,082	98.6	52	0.6
Sully	938	586	99.9	20	0.8
Corson	2,329	1,054	115.5	1,674	28.9
Dewey	2,063	1,014	108.4	2,005	38.1
Stanley	1,724	535	104.7	133	3.3
Haakon	1,204	774	108.4	41	1.2
Perkins	2,063	1,506	98.5	37	0.6
Ziebach	1,035	411	111.6	998	40.0
Harding	854	520	97.9	4	0.0
TOTAL	56,155	30,491			5.6

Sources:

*U. S. Bureau of the Census, *U. S. Census of Population: 1960*. General Social and Economic Characteristics, South Dakota. Final Report PC (1)-43C, U. S. Government Printing Office, Washington, D. C., 1961.

†Marvin P. Riley, *South Dakota Population and Farm Census Facts*, Circular Number 151, Rural Sociology Department, South Dakota State University, Brookings, South Dakota, 1962.

clined the number of babies surviving past one year of age has increased. Most of this decrease in death rate has been accounted for by the non-white population (see tables 4 and 5). If the number of births continues to decline in the area the demand for obstetrics medical services and facilities will also decline. In the longer run, of course, it would indicate that the demand for all

medical services would probably decline.

Economic Characteristics

The average family income in 1967 for the counties in Northwest South Dakota ranged from \$10,497 in Butte county to \$6,025 in Corson. In all of the counties average income was considerably above the levels of 1960. At the same time, however, there was slight change,

Table 3. Live births in Northwest South Dakota, by county of mother's residence, 1957-1967

County	Live Births Per County					Change	
	1957	1959	1961	1963	1965	1967	1957-1967
Pennington	2,069	2,285	2,130	2,358	1,593	1,329	— 740
Meade	264	282	283	355	250	225	— 39
Lawrence	434	451	467	472	357	300	— 134
Hughes	359	379	431	327	240	209	— 150
Walworth	206	224	221	166	179	117	— 89
Potter	164	169	159	133	107	103	— 61
Campbell	80	87	87	79	65	42	— 38
Butte	207	212	202	214	164	116	— 91
Sully	71	67	82	66	53	37	— 34
Corson	177	169	174	185	177	157	— 20
Dewey	179	218	187	160	153	121	— 57
Stanley	129	107	157	95	66	65	— 64
Haakon	103	92	80	78	53	54	— 49
Perkins	153	144	125	108	90	70	— 83
Ziebach	66	98	89	69	77	54	— 12
Harding	60	61	63	51	36	29	— 31
TOTAL	4,721	5,045	4,937	4,916	3,660	3,028	—1,693

Source: Division of Public Health Statistics, *Annual Statistical Report*, South Dakota Department of Health, Pierre, South Dakota, 1957, 1959, 1961, 1963, 1965, 1967.

Table 4. Infant death rate among white and non-white populations in Northwest South Dakota.

Year	Infant* death rate per 1,000 live births					
	Northwest† South Dakota		South Dakota†		United States‡	
	White	Non-white	White	Non-white	White	Non-white
1960	26.7	75.0	26.0	79.1	26.0	43.2
1962	20.4	71.9	25.3	52.7	25.3	40.7
1965	25.3	42.5	24.7	50.3	24.7	40.3
1967	20.0	28.3	22.1	34.9	22.1	—

*Includes deaths of all babies under one year of age.

Sources:

†Division of Public Health Statistics, South Dakota Public Health Statistics, *Annual Statistical Report*, South Dakota Department of Health, Pierre, South Dakota.

‡U. S. Bureau of the Census, *Statistical Abstract of the United States: 1967*, (88th edition.) Washington, D. C., 1967.

in a downward direction, in the percentage of families in the area that had cash incomes below \$3,000. For the area as a whole 28.8% of the families had cash incomes below \$3,000 in 1960. By 1967 this percent had declined by only 3.3% to 25.5%. In some counties—Butte, Hughes, Lawrence, and Stanley—the percent actually increased. This suggests that the rich have become richer and the poor have not gained much in the area (see table 6).

Welfare payments, federal, state and local, in the area increased by almost 70% between 1961 and 1967 (see table 7). Total welfare payments in fiscal 1961 were \$2,452,400. In fiscal 1967 they were approximately \$4,168,300. Most of this increase resulted from increases in Aid to Dependent Children and the inauguration of Medical Aid to

Aged. Old Age Assistance and Aid to the Blind did not contribute much to the increase in welfare payments. Most of the change in these latter two categories was accounted for by only a few counties. For example, 9 out of 16 counties decreased the payments for Old Age Assistance during the time period considered. In contrast, only one county decreased its Aid to Dependent Children and only five decreased Aid to the Disabled.

In 1962, the latest year for which data are available, local governments in Northwest South Dakota were spending an average of \$1.02 per capita for health and hospitals

Table 5. Infant deaths per 1,000 live births in Northwest South Dakota, by counties.

Counties by infant death rate	Infant death rate per 1,000 live births, 1960-1966 average		
	All Races	White	Non-white
Corson	37.8	21.4	57.3
Sully	37.5	37.5	—
Hughes	32.1	27.9	71.1
Meade	29.5	28.2	66.7
Pennington	28.1	26.6	54.5
Lawrence	27.3	26.9	54.1
Campbell	25.9	25.9	—
Ziebach	26.6	2.6	44.4
Haakon	22.8	22.8	—
Butte	22.7	21.0	33.3
Stanley	21.9	22.1	21.3
Walworth	18.8	14.9	64.5
Dewey	17.1	14.6	18.7
Potter	16.9	16.9	—
Perkins	15.1	15.1	—
Harding	14.8	14.8	—
AREA	26.8	24.9	44.9

Source: Division of Public Health Statistics, *Annual Statistical Report*, South Dakota Department of Health, Pierre, S. D., 1960-1966.

Table 6. Economic characteristics of the Northwest South Dakota population.

County	Average family incomes*		Percent of families below \$3,000 cash income†	
	1960	1967	1960	1967
Pennington	5,501	9,359	17.1%	15.9%
Meade	4,490	8,795	27.8	21.9
Lawrence	5,226	8,202	18.3	18.9
Hughes	6,360	10,223	13.3	16.7
Walworth	4,771	8,086	27.4	24.6
Potter	4,289	7,117	33.9	27.9
Campbell	3,691	6,355	36.8	32.4
Butte	5,062	10,947	21.1	21.4
Sully	4,109	8,106	35.0	26.7
Corson	2,914	6,025	51.3	42.0
Dewey	3,364	6,081	44.2	38.1
Stanley	5,758	9,064	9.7	15.0
Haakon	4,660	8,589	29.3	24.7
Perkins	4,471	7,741	30.1	27.5
Ziebach	3,988	7,899	35.6	28.2
Harding	4,710	9,316	31.0	26.1
AREA	—	—	28.8	25.5

*Effective Buying Income as reported in "Survey of Buying Power," *Sales Management, The Marketing Magazine*, June 10, 1967, Effective Buying Income is equivalent to disposable personal income.

†As reported in "Survey of Buying Power," *Sales Management, The Marketing Magazine*, June 10, 1967.

(see table 8). This figure, although low compared to the \$12.15 spent nationally by similar levels of governments, still overestimates what most counties actually spent on health and hospitals. Sully County had a very high per capita expenditure, thus bringing up the area average. The high average value for Sully County has probably been reduced since 1962, because the hospital located in that county closed in December 1967.⁴

By 1967 one of the most common areas of local government involvement in health service was provision of ambulance services. Many funeral homes, previously providing these services, discontinued them because of minimum wage legislation and quality control measures. Six volunteer ambulance services in the area were being maintained by county and city governments in 1967, and several local governments were considering financial subsidy of ambulance services.⁵

Table 8. Local government expenditures for health and hospitals*

County	Total 1962	Per capita 1962
Pennington	\$ 77,000	\$1.33
Meade	7,000	0.59
Lawrence		
Hughes	1,000	0.05
Walworth		
Potter		
Campbell	1,000	0.26
Butte		
Sully	66,000	25.50
Corson		
Dewey		
Stanley	7,000	0.39
Haakon		
Perkins	1,000	0.09
Ziebach		
Harding		
Area	160,000	1.02

*U. S. Bureau of the Census, *Census of Governments: 1962*, Vol. IV, No. 4, Compendium of Government Finances, U. S. Government Printing Office, Washington, D. C., 1964.

⁴Division of Comprehensive Health Planning, Hospital License Information, Public Health Service, Pierre, S. D.

⁵Information was obtained from questionnaire sent to county and city governments in the study area.

Table 7. Welfare payments in thousands of dollars by counties in Northwest South Dakota, 1961 and 1967

	Old age assistance		Medical aid to the aged 1967	Aid to the blind		Aid to dependent children		Aid to the disabled		Totals	
	1961	1967		1961	1967	1961	1967	1961	1967	1961	1967
Pennington	283.1	393.7	76.3	2.4	4.7	333.4	1,078.1	43.8	142.6	662.7	1,695.4
Meade	84.6	127.8	29.9	.9	3.8	38.5	97.9	5.3	16.9	129.3	276.3
Lawrence	180.8	140.3	45.6	1.6	1.8	46.9	81.9	10.7	20.6	240.0	290.2
Hughes	80.3	96.3	21.0	.3	.4	75.8	159.4	9.6	27.6	166.0	304.7
Walworth	73.2	109.8	19.4	.8		87.7	129.8	22.8	38.6	184.5	297.6
Potter	44.1	66.7	15.8			20.2	25.8	7.7	9.7	72.0	118.0
Campbell	31.3	32.9	6.0	.8		18.1	18.3	6.0	10.2	56.2	67.4
Butte	142.9	135.6	27.3			81.4	107.2	26.7	28.6	251.0	298.7
Sully	11.6	7.4				12.5	13.8	2.3	1.1	26.4	22.3
Corson	44.6	36.9	.3	2.3	1.6	135.5	226.4	7.4	15.4	189.8	280.6
Dewey	51.3	41.6		1.7	1.9	87.7	137.2	6.9	5.2	147.6	185.9
Stanley	28.1	12.3	3.0	.8		14.7	21.1	2.6	6.6	46.2	43.0
Haakon	23.9	10.4	.9			5.5	5.7	.7	3.6	30.1	20.6
Perkins	92.3	76.9	13.4	1.2	2.2	28.9	37.4	16.1	23.5	138.5	153.4
Ziebach	21.7	21.7		.7	.6	47.0	77.1	3.7	2.7	73.1	102.1
Harding	25.1	7.3	.3			12.6	3.3	1.3	1.2	39.0	12.1
AREA	1,218.9	1,317.6	259.2	13.5	17.0	1,046.4	2,220.4	173.6	354.1	2,452.4	4,168.3

In general these data suggest that the economy of Northwest South Dakota is characterized by two groups of people, those who have had substantial increases in income in recent years and another group whose incomes have been near the poverty level and have had to rely on welfare assistance. The first group can afford to seek and pay for medical care and health services; the latter group cannot. Further, because of age and inability to travel

long distances members of the latter group probably need health care and access to the services more than members of the former group. Contributions made by the county government to support medical and health facilities have been rather small. This is undoubtedly due to the fact of a small tax base and inability to raise tax revenues needed to support local facilities at adequate levels.

Growth in Demand for Medical Care

Growth of Outpatient Facilities

Hospitals serve the health needs of communities through both the services to patients admitted into the hospital and those treated only in the outpatient department of the hospital.

The number of patients treated as outpatients in Northwest South Dakota hospitals increased by 13,000 from the 1957 level of 23,453 to 36,582 by 1967.⁶ This represented a 55% increase.

The number of patients treated in outpatient departments at Northwest South Dakota hospitals increased faster than did the number of inpatients treated at those same

hospitals. Data in table 9 indicate that the ratio of outpatients to inpatients increased from 1.01 in 1957 to 1.46 in 1967. All this increase was accounted for by the very small hospitals and the very large hospitals.

Nation-wide the ratio of outpatients to inpatients was 3.1 in 1957 and 3.9 in 1967. This higher national ratio indicates that the amount of use made of out-patient departments relative to inpatient departments was less for Northwest South Dakota than for the remainder of

⁶Data for both 1957 and 1967 were available for only 13 Northwest South Dakota hospitals, thus only data from these hospitals were used in making comparison between increases in outpatients and inpatients treated.

Table 9. Utilization of outpatient facilities at 13 hospitals in Northwest South Dakota, 1957, 1967.

Hospital size	Number of hospitals*		Average number of outpatients treated per hospital		Percent change	Ratio of outpatients to inpatients treated	
	1957	1967	1957	1967		1957	1967
0-24 Beds	6	4	440	798	+81.0%	.80	1.93
25-99 Beds	4	6	1,696	1,276	-24.8	1.20	.93
100-200 Beds	3	3	4,676	8,579	+83.4	.98	1.69
TOTAL	13	13	23,453	36,582	+56.0	1.01	1.46

*Two of the thirteen hospitals increased in size between 1957 and 1967.

Source: Division of Comprehensive Health Planning, Hospital License Information, Public Health Service, Pierre, S. D.

the United States in 1967. This lower rate of outpatient facility utilization may also be a factor contributing to the somewhat higher per capita inpatient admittance rate for Northwest South Dakota.

Part of the explanation for the growth of outpatients may lie in the fact that many people located in rural areas that lack a doctor probably travel directly to a hospital to obtain services they would normally receive from a local doctor. Also recent advances in medical knowledge have resulted in the treatment of certain diseases on an outpatient basis that previously required hospitalization.

Growth of In-Patient Care

Data were not available on the type of hospital services given the outpatients treated in Northwest South Dakota, but information was available on the category of care provided the inpatients served. The departmental breakdown used in this study was medical, surgery, obstetrics, psychiatry, orthopedics, pediatrics, and geriatrics.

Data in table 10 show that the inpatient days of care provided in Northwest South Dakota hospitals increased between 1957 and 1967 for each of the categories of care provided except obstetrics and pediatrics. The most used department was the medical department where the most common type of treatment includes rest, control of diet, medication, and atmospheric control. The increase in the days of care provided in this department resulted entirely from an increase in the number of patients treated.

The increase in patient days of surgical care provided was accounted for by a 1.3-day increase in the average length of stay and a 2,776 increase in number of patients. The decrease in patient days of obstetric care was accounted for by both a decrease in the average length of stay and by a decrease in the number of patients. The decline in the number of obstetric patients was probably caused in part by the migration of many of the younger women from the area before they reach the child-bearing age. The number

Table 10. Change in days of care given in each of seven hospital departments, 1967.

Type of care	In-patient days provided		Average length of stay		Number of in-patients treated		Change in in-patient days of care because of change in	
	Number in 1957	Change 1957-1967	1957	Change 1957-1967	1957	Change 1957-1967	Length of Stay	Number Admitted
Medicine	72,622	+11,168	7.3	0	9,925	+1,548	0	+11,300
Surgery	29,525	+27,378	6.3	+1.3	4,701	+2,776	+6,111	+21,098
Obstetrics	22,614	-12,041	5.8	-2.1	3,897	-1,037	-8,184	-3,837
Pediatrics	23,914	-3,026	4.3	-1.1	5,546	840	-6,101	+2,688
Geriatrics		+20,165		29.8		+676		
Extended Care	35,379		15.7		2,250			
Orthopedic		+6,049		8.7		+698		
Psychiatric		+729		5.4		+136		

Source: Division of Comprehensive Health Planning, Hospital License Information, 1967, Public Health Service, Pierre, S. D.

of days of pediatrics care decreased by 3,000 patient days between 1957 and 1967. All of this decrease was caused by a decrease in the average length of stay. Data on geriatrics,

extended care, orthopedic, and psychiatric care were not available for both 1957 and 1967 thus comparisons between the two years could not be made.

Implications for the Future Demand

The geographic characteristics of the area affect the future demand for medical and health care in a number of ways. Tourism in Northwest South Dakota is likely to increase resulting in more travel across the sparsely populated parts. Medical facilities and personnel will be needed to handle the increased number of accidents and emergency cases that go with increased traffic flows and human congestion. The rural population will probably continue to decline as the number of farms and ranches continues to decline but it will eventually stabilize. There is some evidence this may already be happening in parts of the area. The light manufacturing activity located at both ends of the area is likely to increase and, as it does so the population will probably increase, thereby creating more demand for medical care. The end result, however, is likely to be similar to the present pattern of concentration of population at both ends of the area with a large low-population density area in the middle.

If the present trend toward an increasing average age of the population continues, the demand for medical services will be affected in a couple of ways. First, in the short run, the demand for particular types of services will change. There will likely be less demand for obstetrics services and more for heart and ger-

iatric services. Second, in the long run as the average age of the population increases there will likely be a decrease in the total population, which will result in a decrease in the total demand for medical services.

A further problem that arises from the aging and declining population is that it becomes increasingly difficult to provide easy access to medical services. Many older people are unable or unwilling to travel great distances to obtain the care they need. At the same time their local areas do not have the ability to support medical facilities needed to supply the care people should have.

Economic characteristics of the area suggest that average incomes are increasing. As this happens one ordinarily expects the demand for medical care and services to also increase. There is, however, a sizable group of people in the area that has not participated in the rising income trend. The demand for medical services by this latter group is, to some extent, dependent on the level of their income. If incomes are very low, people often seek medical services whether they can pay for them or not. Further, when incomes are low, often the diet and living conditions are of such poor quality that these people are more susceptible to disease and health problems.

As incomes rise above some minimum level people will often seek medical care and services, except in emergencies, in relation to their ability to pay for it.

Welfare payments have an effect on the demand for medical and health services because they increase the ability of the recipient to improve the diet and the living conditions, thus reducing susceptibility to sickness. Depending on the level of pre-welfare payment income,

welfare payments may also encourage the recipient to seek medical care that he would not otherwise have sought. Which of these two factors has the greatest impact on demands depends to a great extent on the makeup of the population. For Northwest South Dakota it is probable that the level and type of welfare payments would encourage greater demand for medical and health services, particularly among the aged.

PART II

Supply of Medical and Health Resources in Northwest South Dakota

Part I of this publication suggests that the demand in Northwest South Dakota for medical and health services will grow in the near future. It is important therefore that rural community leaders become aware

of the medical and health resources and facilities currently available in the area. This part deals with the supply, location and utilization of medical and health resources in the area.

Medical Manpower Available

Doctors

In 1967 there was a total of 130 doctors, including 11 doctors of osteopathy, in Northwest South Dakota. These 130 doctors, not all of whom were active, were located in 18 towns, all but two of which contained a hospital. Half (65) of these 130 doctors practiced in Rapid City in 15 different medical specialty fields (see table 11).

Only nine of the Rapid City physicians were engaged in full-time general practice and only four were engaged in part-time general prac-

tice. The remaining 52 practiced in various other specialties, the most common being surgery and internal medicine (see table 12).

Of the 13 physicians located in Pierre only five had a specialty other than general practice listed. Two of these five had general practice listed along with some other specialty.

A total of 41 medical doctors were in the remaining Northwest South Dakota towns. Of these, 41 (63%) were engaged in general practice and 13 (37%) were engaged in gen-

Table 11. Location of physicians in Northwest South Dakota, 1967*

Towns	Total number Doctors	Number doctors of medicine	Number doctors of osteopathy	Number doctors with specialties†
Rapid City ..	67	65	2	56
Pierre	14	13	1	5
Mobridge	7	7	—	2
Lead	6	6	—	2
Belle Fourche	5	5	—	3
Deadwood	5	5	—	1
Spearfish	6	5	1	1
Sturgis	6	3	3	2
Lemmon	2	2	0	0
Faith	2	0	2	0
Newell	1	1	—	0
Gettysburg ..	2	2	—	0
Hoven	1	1	—	0
McLaughlin ..	1	1	—	0
Wall	1	1	—	0
Philip	1	1	—	0
Bison‡	1	0	1	0
Buffalo‡	1	0	1	0
Total	130	119	11	75

*Not all of these doctors are engaged in full-time practice.

†Doctors with a specialty other than general practice.

‡Non-hospital towns.

Source: South Dakota State Board of Medical and Osteopathic Examiners, 1967.

eral practice in addition to some other specialty. Consequently, more than 90% of the physicians located in towns other than Rapid City or Pierre were in some way involved in a general practice.

Although medical doctors were most numerous in nearly all size classes of towns, they were most commonly found in the larger centers. The doctor of osteopathy tended to be in the small town not served by a medical doctor. Eight of the 11 doctors of osteopathy were in towns of less than 5,000 people, while only 35 of 130 medical doctors were so located.

When towns with hospitals were grouped on the basis of number of doctors located in them, those towns with the fewer number of doctors had the highest number of hospital beds, hospital personnel, and hospital patients per doctor. Data in table 13 show that the towns with only one or two doctors had on the average 18.6 hospital beds per doctor,

Table 12. Location of medical doctors in Northwest South Dakota, by specialty, 1967.

Specialty	Rapid City (Pop. 49,000)		Pierre (Pop. 11,200)		Other hospital towns		Total for all towns in area	
	Full-time	Part-time*	Full-time	Part-time*	Full-time	Part-time*	Full-time	Part-time*
General Practice†	9	4	8	2	26	13	45	2
Internal Medicine	8	0	0	0	1	2	9	3
Obstetrics and Gynecology	3	3	0	1	0	1	3	5
Roentgenology and Radiology	4	0	1	0	0	2	5	2
Surgery	9	1	1	1	1	7	11	9
Other Specialty	28	0	1	0	0	1	25	3
Total	61	8	11	4	28	26	98	42

*Part-Time means that the specialty to the left was listed in addition to some other specialty.

†For purpose of this study, general practice was considered a type of specialty.

Source: South Dakota State Board of Medical and Osteopathic Examiners, 1967.

while those towns with three to nine doctors had 7.3 general hospital beds per doctor. The two towns with over 10 doctors had on the average 5 hospital beds per doctor.

The statistics also show that the number of hospital personnel per doctor in towns with only one or two doctors was much greater than for towns with over three doctors. There was an average of 9.9 hospital personnel per doctor in the one- and two-doctor towns, while only an average of 4.4 hospital personnel per doctor in towns with over 10 doctors.

The average daily census of hospital patients per doctor was also higher in towns with fewer doctors. The number of hospital patients per doctor averaged 7.9 in the one- and two-doctor towns, while the number of patients per doctor averaged 4.3 in the three- to nine-doctor towns and 2.9 in the hospital towns with over 10 doctors.

In spite of the larger number of hospital patients per doctor, the one- and two-doctor towns still were found to have an average of 10.7 empty hospital beds per doctor. This large number of empty beds indicates that hospital facilities would have been available for the patients of from one to two additional doctors. The results of this analysis sug-

gest that rural doctors have a higher work load which may make it difficult for rural communities to keep the number of medical doctors which they need.

The trend for Northwest South Dakota, as well as the United States, has been away from the one doctor per town and the small hospital concept. The extent to which doctors have left Northwest South Dakota towns with only one or two doctors is indicated in table 14. The number of one- and two-doctor towns decreased from 14 to 8. The table also shows that 9 of the 14 doctors located in these towns in 1957 were no longer there by 1967. Six of these nine medical doctors which left were not replaced by medical doctors, although one doctor was replaced by two osteopathic physicians. The high turnover for rural doctors may discourage the use of small-town medical facilities be-

Table 13. The relationship between doctor and hospital facility availability, 1967.

Number doctors in town	Hospital personnel per doctor	Hospital beds per doctor	Hospital patients per doctor
1-2 Doctors	9.9	18.6	7.9
3-9 Doctors	5.5	7.3	4.3
10 Doctors or more	4.4	5.0	3.5

Table 14. Medical doctor location changes in Northwest South Dakota, 1957-1967.

Number doctors in towns*	No. of towns		Doctors leaving towns	Doctors locating in towns	Number doctors in towns	
	1957	1967	1957-1967	1957-1967	1957	1967
1-2	14	8	9	3	16	10
3-10	6	6	22	21	32	31
10 or more	2	2	24	37	65	78

*Osteopathic physicians were not included in this table.

Source: South Dakota State Board of Medical and Osteopathic Examiners, 1957, 1967.

cause patients may not like to establish medical records with a doctor who is not likely to remain in the area.

The centers with over three doctors in them were not experiencing this same loss of physicians. From 1957 to 1967 the number of towns with 3 to 10 doctors and 10 or more doctors remained constant. The total number of towns with 3 to 10 doctors located in them declined by one. In the case of towns with over 10 doctors, the number of available doctors increased by 13 from 1957 to 1967.

The number of years since a doctor was licensed was used to give some indication of the relative age of physicians in different locations. Physicians were grouped into four categories on the basis of the length of time since they were issued a license.

Data in table 15 indicate that of the 10 medical doctors located in towns served by only one physician, only one (or 10%) had received his license in the 10 years previous to 1967. Over 35% of the doctors located in towns with over 10 doctors had been licensed during this same 10-year period. Thirty percent of the

doctors in towns served by only one or two physicians were found to have been licensed before 1937 or 31 years ago, while only 9% of the doctors in towns with over 10 doctors located in them were licensed previous to 1937. This information seems to indicate reluctance on the part of younger physicians to locate in the smaller towns in Northwest South Dakota where there was only one other doctor at all.

Dentists and Optometrists

In 1969 there was a total of 69 dentists in Northwest South Dakota. These 69 dentists were located in 10 different towns in only 10 out of the 16 counties in the area.

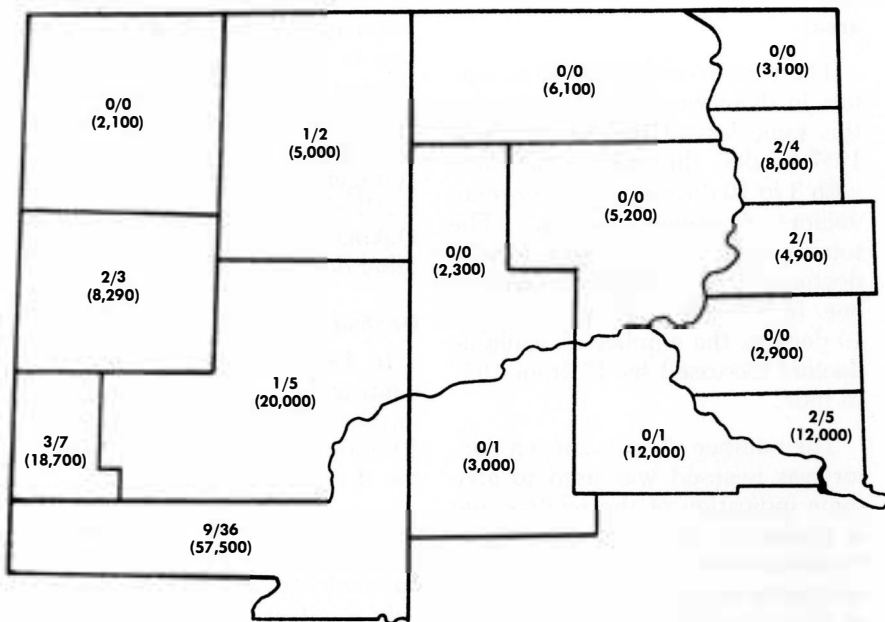
Similarly, in 1969 there were only 22 optometrists in the area. These optometrists were in 11 towns in only 8 out of the 16 counties. The most striking fact about their distribution is that all of them are located in the counties along the edge of the area. The counties located near the center of the area had no optometrists and very few dentists. The ratio of dentists to population and optometrists to population was 1:2478 and 1:7773, respectively, for the area as a whole. For some parts of the area, however, these ratios were as

Table 15. Time since license was issued to Northwest South Dakota medical doctors

Number doctors in town	Number doctors in towns 1967	Doctors licensed during 10 years previous to 1967	Doctors licensed during 1937-1956	Doctors licensed previous to 1937	Date license issued unknown
1 or 2	10	1	6	3	0
3 or 10	31	12	10	7	2
10 or more	78	28	36	7	7

Source: South Dakota State Board of Medical and Osteopathic Examiners, 1957, 1967.

Figure 2. Location of dentists and optometrists in Northwest South Dakota, by county, 1969*



*The number at the left of the "/" in each county represents the number of dentists and the number to the right of the "/" represents the number of optometrists in the county. County population estimates in 1969 appear in parenthesis.

Dentist/population ratio=1:2478

Optometrist/population ratio=1:7773

Source: South Dakota Department of Health, Comprehensive Health Planning Division, Pierre, S. D.

much as three times higher (see figure 2).

Hospital Personnel

Hospital personnel were grouped into four classes on the basis of level and type of service performed. The classifications were: (1) registered nurses, (2) licensed practical nurses, (3) hospital aides, and (4) specialized personnel. Included in the specialized personnel group were medical records personnel, dietitians, physical therapists, x-ray technicians, pharmacists, radiologists, and pathologists.

The most numerous type of personnel found in Northwest South Dakota hospitals was the hospital aide. Table 16 shows that hospital aides made up nearly 50% of the total personnel employed for patient care by Northwest South Dakota hospitals. The least commonly employed personnel were licensed practical nurses.

Relationship of Personnel Availability to Hospital Size

Data in table 17 indicate that although small hospitals may have

just as many specialized personnel per patient as a larger facility, fewer types of specialized personnel were available per hospital. In the six hospitals of less than 25 beds in size, there was an average of only 1.8 different types of specialized full-time personnel available per hospital and 0.2 available on a part-time basis. The predominant type of personnel was medical records personnel. For hospitals of 25 to 49 beds in size there was an average of 2.6 different types of specialized personnel available full-time per hospital and 1.1 available part-time. The most common types of personnel in this case were x-ray technicians, lab technicians, and medical records personnel. There was an average of three different types of

specialized personnel available full-time in 50- to 99-bed hospitals and 0.5 available on a part-time basis. For the three hospitals 100 to 199 beds in size there was an average of 5.6 different types of specialized personnel employed full-time per hospital and 0.3 employed part-time.

Area's Dependence Upon Part-Time Personnel

Data in table 18 indicate that 45% of the personnel employed in hospitals of less than 25 beds in size were part-time, while only 24.9% of the personnel in 100-199 bed hospitals were employed on a part-time basis. A similar relationship existed for each specific type of personnel such as registered nurses. It appears that this high ratio of part-time to full-time personnel in small hospit-

Table 16. Number of personnel employed in Northwest South Dakota hospitals.

Size classes of hospitals	Registered nurses		Licensed practical nurses		Hospital aides		Specialized personnel		Total personnel	
	Full-time	Part-time	Full-time	Part-time	Full-time	Part-time	Full-time	Part-time	Full-time	Part-time
100 beds & above ..	99	46	24	12	147	37	37	7	307	102
50-99 beds	16	5	3	2	48	18	8	19	75	44
25-49 beds	35	29	7	6	55	26	21	20	118	81
25 beds & below	14	11	4	3	18	19	9	5	45	38
TOTAL	164	91	38	23	268	100	75	51	545	265

Source: Division of Comprehensive Health Planning, Hospital License Information, Public Health Service, Pierre, S. D.

Table 17. Percent of personnel employed part-time in four size classes of hospitals.

Size classes of hospitals	Percent of the following personnel employed part-time					
	Registered nurses	Licensed practical nurses	Hospital aides	Specialized personnel	Total personnel	
0-24 beds	44.0	42.9	51.4	35.7	45.8	
25-49 beds	45.3	46.2	32.1	48.8	40.7	
50-99 beds	23.8	40.0	27.3	70.4	37.0	
100-199 beds	31.7	33.3	20.1	15.9	24.9	

Source: Division of Comprehensive Health Planning, Hospital License Information, Public Health Service, Pierre, S. D.

als was not caused by the substitution of part-time personnel for full-time personnel, but rather, it was caused by the employment of more personnel per 100 patients in small hospitals.

Data in table 19 show that small hospitals employed nearly three times as many part-time personnel per 100 patients as did large hospitals, yet these small hospitals employed about the same number of

full-time personnel per patient. The employment of extra personnel per patient in small hospitals may be necessary to provide 24-hour availability of personnel and may also be caused by a lack of labor saving equipment. The lack of a complete complement of specialized personnel, plus reliance upon part-time personnel, might greatly hinder the provision of high quality care in small hospitals.

Table 18. The availability of specialized personnel in four size classes of hospitals.

Specialty of personnel	Number of hospitals in each size class with the specialized services listed							
	Hospitals with less than 25 beds		Hospitals with 25-49 beds		Hospitals with 50-99 beds		Hospitals with 100-199 beds	
	Full-time	Part-time	Full-time	Part-time	Full-time	Part-time	Full-time	Part-time
Medical records	5	0	5	1	1	0	3	0
Dietitian	0	1	2	0	0	0	3	0
Physical therapy	0	0	0	0	0	0	0	1
X-ray technician	2	0	6	0	2	0	3	0
Laboratory technician	2	0	5	0	2	0	2	0
Pharmacists	0	0	0	2	1	0	3	0
Radiologist	0	1	0	3	0	1	2	0
Pathologist	0	0	0	2	0	0	1	0
Number of hospitals	5		7		2		3	
Number of specialized services per hospital	1.8	0.2	2.6	1.1	3.0	0.5	5.7	0.3

Source: Division of Comprehensive Health Planning, Hospital License Information, Public Health Service, Pierre, S. D.

Table 19. Number of hospital personnel employed per 100 patients in four size classes of hospitals.

Size classes of hospitals	Number of the following personnel employed full-time and part-time per 100 patients									
	Registered nurses		Licensed practical nurses		Hospital aides		Specialized personnel		Total personnel	
	Full-time	Part-time	Full-time	Part-time	Full-time	Part-time	Full-time	Part-time	Full-time	Part-time
100 beds and larger	34.5	16.0	8.4	4.2	51.3	12.9	12.9	2.4	107.1	35.6
50-99 beds	23.6	7.4	4.4	2.9	70.8	26.6	11.7	28.0	110.5	64.9
25-49 beds	27.6	22.9	5.5	4.7	43.4	20.5	16.6	15.8	93.5	63.9
24 beds and below	39.1	30.7	11.2	8.4	50.3	53.1	25.1	14.0	125.7	106.2
Area Average	31.7	17.6	7.4	4.5	51.8	19.3	14.5	9.9	105.4	51.2

Source: Division of Comprehensive Planning, Hospital License Information, Public Health Service, Pierre, S. D.

Amount of Care Provided by Northwest South Dakota Hospitals

Admissions into hospitals in Northwest South Dakota increased in both total and per capita terms from 1957 to 1967. The total number of inpatients treated increased by 9% from 26,669 in 1957 to 29,065 in 1967 and the number of admissions per 100 people increased from 169.2 to 171.5 during this same period (see table 20). The per capita utilization was higher in South Dakota than for the United States as a whole and was probably caused in part by the larger proportion of the Northwest South Dakota's population in the higher age groups. In relative terms, however, admission per 100 people increased by 16.6% nationwide and only 1.4% in Northwest South Dakota.

There was a 30,000-day increase in patient days of care provided between 1957 and 1967. About half of this increase resulted from patients staying in the hospital 0.6 days longer per admission in 1967 than in 1957, and the rest was the result of the increase in the number of patients treated.

The increase in amount of care

given was not evenly distributed among Northwest South Dakota hospitals. Data in table 21 show that from 1957 to 1967, 11 of the area's hospitals experienced increases in number of patient days of care given ranging from 11,000 to 78 patient days while six hospitals provided fewer patient days of care in 1967 than in 1957.

Use Rate of Available Hospitals

Although total and per capita utilization of Northwest South Dakota hospitals was higher in 1967 than 1957, the proportion of available hospital beds which were occupied was below the United States average and the United States Public Health Department goal in both years. Statistics in table 22 show that on the average only 59 out of every 100 hospital beds available were utilized in 1957 and only 61 out of every 100 in 1967. In both 1957 and 1967 the hospitals in all size classes but one had from 4.5 to 12.5 more unoccupied beds per 100 available beds than was true for hospitals of similar size in the remainder of the United States. The level of utilization was even farther below the 80% utilization figure set as

Table 20. Selected data for United States and Northwest South Dakota hospitals, 1967.

	Northwest*		Percent change	United States†		Percent change
	1957	1967		1957	1967	
Total admission	26,669.0	29,065.0	+9.0%			+28.1%
Admissions/1,000 population	169.2	171.5	+1.4	117.1	136.5	+16.6
Total patient days	162,796.0	194,525.0	+19.5			+34.2
Patient days/1,000 population	1,033.1	1,147.6	+11.1	891.0	1,088.0	+22.1
Average length of stay	6.1	6.7	+9.8	7.6	7.9	+3.9
Percent of available beds occupied	59.0	60.8		73.7	76.5	

Sources:

*Division of Comprehensive Health Planning, Hospital License Information, 1967, Public Health Service, Pierre, S. D.

†American Hospital Association, *Guide Issue, J.A.H.A.*, August, 1968.

a national goal by the United States Public Health Service and the 90% level thought reasonable by some experts in the field.⁷

Information on level of peak occupancy was available for only

Northwest South Dakota hospitals. The average peak occupancy was above 80% for all size classes of hos-

⁷Herman Somers and Anne Somers, *Medicare and the Hospitals*, (Washington: The Brookings Institution, 1967), 58.

Table 21. Change in patient days of care given in Northwest South Dakota hospitals, 1957-1967.

Hospitals	Patient days of care given		Change 1957-1967	Change in patient days caused by:	
	1957	1967		Change in length of stay	Change in admissions
Rapid City (St. John's)*	28,754	39,898	+11,144	+4,020	+7,124
Sturgis	7,364	12,732	+5,368	+3,352	+2,016
Pierre	28,104	33,403	+5,299	+8,819	-3,520
Rapid City (Bennett)*	26,560	31,413	+4,853	+2,210	+2,643
Spearfish	612	3,817	+3,205	+124	+3,081
Gettysburg	6,214	9,273	+3,059	-662	+3,721
Mobridge†	8,581	10,079	+1,398	-639	+2,037
Onida	1,184	2,309	+1,125	+2,664	-1,539
Philip	3,224	3,899	+675	+1,177	-502
Belle Fourche	8,070	8,250	+180	+1,454	-1,274
Lemmon	3,744	3,822	+78	+2,025	-1,947
Lead	6,106	5,766	-340	-59	-281
Faith	3,753	3,029	-724	+1,117	-1,841
McLaughlin	4,964	3,676	-1,288	-604	-684
Hoven	4,334	2,771	-1,563	-918	-645
Deadwood	21,128	14,694	-6,434	-1,987	-4,447

*Both Bennett and St. John's Hospitals were in Rapid City.

†This represents total for two hospitals in Mobridge in 1957.

Source: Division of Comprehensive Planning, Hospital License Information, 1967, Public Health Service, Pierre, S. D.

Table 22. Occupancy rate of Northwest South Dakota and United States hospitals by size classes, 1967.

Hospital size	Average occupancy*				Peak occupancy	
	Northwest South Dakota†		United States		Northwest South Dakota†	
	1957	1967	1957	1967	1957	1967
0-24 beds	48.1%	46.5%	53.7%	55.2%	85.0%	90.9%
25-49 beds	48.0	51.5	58.5	63.1	92.4	82.5
50-99 beds	78.2	56.5	66.0	69.0	98.7	95.8
100-199 beds	65.7	70.3	73.8	74.5	87.4	91.9
200-299 beds	0.0	0.0	77.0	79.8	—	—
300-499 beds	0.0	0.0	80.3	80.8	—	—
500 beds and over	0.0	0.0	79.8	81.7	—	—
Total	59.0	60.8	73.7	76.5	—	—

*American Hospital Association, *Guide Issue*, J.A.H.A., August, 1968.

†Division of Comprehensive Planning, Hospital License Information, Public Health Service, Pierre, S. D.

pitals in both 1957 and 1967. There were four hospitals which had peak occupancy above 100% in 1957 and three in 1967.

Differences in Type of Care Given by Four Size Classes of Hospitals

Data in table 23 show that 55% of the total patient days of care given by Northwest South Dakota hospitals was in the three largest hospitals in the area. These hospitals did not provide 55% of all types of care, however. It is shown in table 23 that only 46% of the medical days, and 27% of the geriatric days were provided by these hospitals, while over 70% of the total patient days of care in the surgery, orthopedic and psychiatric departments were provided by these same three hospitals.

Hard surfaced all-weather roads and modern automobiles have made it possible for people living in rural communities to travel long distances for the type of medical care desired.

Table 23. Proportion of total days of care given by each of four size classes of hospitals, 1967.

Type of care	Proportion of care given by hospitals in each size class			
	Under 25 Beds	25-49 Beds	50-99 Beds	100-199 Beds
Medicine ..	15.0%	25.8%	13.2%	46.0%
Geriatrics ..	12.5	34.4	26.1	27.0
Pediatrics:				
Medical ..	13.5	30.0	9.9	46.6
Surgical ..	1.4	14.8	7.8	75.9
Surgery	4.8	14.7	6.7	73.9
Orthopedic ..	1.1	17.8		81.1
Psychiatric ..	0.0	0.0	0.0	100.0
Obstetrics:				
Delivered ..	7.6	21.9	14.3	56.3
Not Delivered ..	1.2	41.6	14.3	42.7
Total Care ..	10.0	23.0	11.9	55.1

Source: Division of Comprehensive Health Planning, Hospital License Information, Public Health Service, Pierre, S. D.

In this situation if a particular type or quality of care is not available in a community's hospital, the likely result will be the utilization of a more distant hospital.

For example, when Northwest South Dakota was divided into hospital service areas and data gathered on the extent to which patients went to the hospital in their service area it was found that the proportion of people leaving their service area to obtain medical care in another area varied from 2% of all people seeking hospital care in the Rapid City service area to 80.4% in the Faith service area.⁸

The people found least likely to leave their service area to obtain hospital care from other Northwest South Dakota hospitals were those located in the Pierre and Rapid City hospital service area. This is to be expected since the three largest hospitals in the study area were located in these service areas. When people from these areas did utilize a hospital outside their area, it was usually a nearby facility.

Data in table 24 indicate that those patients not utilizing the nearest hospitals tended to travel to a hospital larger in size. Of the 4,546 patients not utilizing the closest hospital, only 644 went to a smaller hospital, while 3,902 went to a larger hospital. Furthermore, nearly one-half of the patients who did not utilize the nearest hospital were admitted into the Pierre and Rapid City hospitals, the largest hospitals in Northwest South Dakota.

⁸These data do not take account of patients who sought aid at a hospital in their area but were referred and admitted to another hospital which could provide the care needed.

It was also found that for nearly every area the proportion of patients seeking care outside their service area was higher among patients from non-hospital towns than was true for the patients from the area's hospital town. Area-wide, all but 13.3% of the patients from hospital towns were admitted into the hospital in their area, while 46.4% of the patients from non-hospital towns were not admitted into their area's hospital. The difference in utilization may in part be explained by the fact that the distance to a hospital outside the service area would nearly always be less for a non-hospital town resident than a resident from a hospital town. A second explanation may be that once on the road en route to a hospital, the added distance for care from a hospital outside the area would not seem important. A third factor may be that

people from a hospital town feel an obligation to patronize their town's hospital, also, they may have greater confidence in a local facility staffed by people they know personally.

Distance Traveled for Out-of-Town Care

Because of the location of hospitals and the sparse population in much of Northwest South Dakota, many people traveled considerable distances from their hometown (town of address) to obtain hospital care. For purposes of this study, distance traveled was measured from the patient's town of address to the hospital utilized. Distances traveled by patients who used hospitals in the same town as their post office address were assumed to be zero. Data in table 25 indicate that patients leaving their home town for care traveled 325,560 miles or an average of 56 miles per patient.

Table 24. The extent of which closest hospital was used by residents of 15 hospital service areas.

Hospital* service area	Total admissions into a hospital by area residents	Proportion leaving service area	Number to smaller hospital	Number to larger hospital	Number to Rapid City hospitals	Number to Pierre hospital
Rapid City	7,359	2.0%	137	9	—	9
Pierre	2,721	3.0	16	65	65	—
Deadwood-Lead	1,992	21.0	189	229	227	2
Mobridge	1,587	13.3	156	40	25	15
Belle Fourche	1,351	28.6	83	303	274	2
Sturgis	1,130	54.9	45	661	358	3
Gettysburg	573	14.9	5	163	4	131
Lemmon	648	17.3	6	106	82	1
McLaughlin	573	29.1	3	164	2	0
Faith	958	80.4	4	766	159	118
Philip	902	43.3	—	391	306	80
Spearfish	806	44.9	—	362	181	1
Onida	794	80.3	—	643	18	472
Herreid†	N.A.	—	—	—	—	—
Hoven	N.A.	—	—	—	—	—
TOTAL	21,394	21.2	644	3,092	1,701	834

*Service areas are arranged by size of hospital located in them.

†Data were not available for this hospital.

Source: Division of Comprehensive Planning, Hospital License Information, 1967, Public Health Service, Pierre, S. D.

Table 25. Distance traveled for hospital care in Northwest South Dakota, 1967.

Hospital* service area	Number of admis- sions into a hospital	Percent of those admitted who left their town for care	Miles traveled by those seeking out-of-town care	
			Total distance (miles)	Average distance (miles)
Faith	958	90%†	77,748	90.2
Onida	794	85	21,867	32.4
Philip	902	63	34,503	61.2
Sturgis	1,573	55	20,181	23.2
Mobridge	1,585	52	32,586	39.6
McLaughlin	573	50	10,218	35.9
Spearfish	806	46	11,271	30.2
Lemmon	648	46	22,575	76.3
Belle Fourche	1,351	44	29,051	49.0
Gettysburg	1,130	28	13,714	43.5
Deadwood-Lead	1,990	27	17,931	33.8
Rapid City	7,350	10	19,022	26.5
Pierre	2,711	7	14,931	83.4
Herreid†	N.A.	—	—	—
Hoven†	N.A.	—	—	—
TOTAL	22,394	25.4	325,562	56.0

*Service areas are arranged by size of hospital located in them.

†Data were not available for this hospital.

‡90% of people entering a hospital.

Source: Division of Comprehensive Planning, Hospital License Information, 1967, Department of Health, Pierre, S. D.

Table 26. Proportion of patients coming various road distances for hospital care, 1967.

Location of hospital	Number of out-of- town patients	Percent of out-of-town patients who came from within the following road distances				
		0-25 miles	0-49 miles	0-75 miles	0-99 miles	100 miles and over
Rapid City (Bennett)*	1,588	14%	45%	53%	67%	33%
Rapid City (St. John's)*	1,788	30	53	70	79	21
Spearfish	179	55	61	76	83	17
Pierre	2,056	33	63	88	94	6
Mobridge	1,239	27	76	92	96	4
Gettysburg	680	33	78	87	97	3
Belle Fourche	731	31	79	89	96	4
Sturgis	469	45	70	82	85	15
Lemmon	173	44	85	95	97	3
McLaughlin	376	31	93	96	98	2
Faith	107	37	81	86	98	2
Philip	191	17	91	96	97	3
Onida	48	54	100	—	—	—
Deadwood	938	88	93	95	96	4
Lead	178	100	—	—	—	—
Hoven†	N.A.	—	—	—	—	—
Herreid†	N.A.	—	—	—	—	—

*Rapid City was served by both Bennett and St. John's hospitals.

†Data were not available for this hospital.

Source: Division of Comprehensive Planning, Hospital License Information, 1967, Department of Health, Pierre, S. D.

It should be pointed out that both the average distance, and proportion of patients involved in computing the average distance, differed between areas. For example, 90% of the people from the Faith Hospital service area left their towns for hospital care and traveled an average of 91 miles from their town of address for the care they received. The remaining 10% were assumed to travel zero distance because their home address was Faith and they were admitted into the Faith hospital. In the case of Gettysburg, however, 28% of the service area residents traveled an average of 44 miles, while the remaining 72% were Gettysburg residents admitted into their hometown hospital and assumed to travel zero distance.

Geographic Location from Which Each Hospital Drew Patients

All of the hospitals in Northwest South Dakota drew patients from an area considerably larger than their service areas. Data in table 26 indicate that in the case of nine of the study area's hospitals, 75% of the out-of-town patients who were admitted were from within 50 miles of the hospital. In all but four cases, 90% of the out-of-town patients came from within 100 road miles of the hospital. The proportion of out-of-town patients from over 100 miles who utilized these hospitals varied from 33.1% for Bennett Hospital in Rapid City to 15% for the Sturgis Hospital.

CONCLUSIONS AND IMPLICATIONS

In summary, the supply and organization of medical resources in Northwest South Dakota seems hardly adequate to meet today's needs and, unless changes are made, most certainly inadequate to meet the future needs of the area.

The small towns in the area are having the greatest difficulty maintaining medical facilities and keeping personnel. From 1957 to 1967 the number of hospitals serving the area declined from 20 to 14. Those which closed tended to be less than 25 beds in size in towns of less than 1,000 people. A higher proportion of doctors left towns with only one or two doctors than was true for towns with three or more doctors. Two-thirds of the doctors who left these towns were not replaced by

another doctor. Most of the newly licensed doctors were in the area's larger centers. Doctors affiliated with a hospital in the small towns had much heavier patient loads than did their counterparts at the larger hospitals in larger towns in the area.

The small hospitals in the area employed more personnel per patient than the larger hospitals did, but nearly all of the additional employees were part-time personnel. Small hospitals also lacked many of the specialized personnel, such as x-ray and lab technicians. The smaller hospitals were not equipped to offer a very wide spectrum of medical services. A larger portion of the total patient days of service provided at the small hospitals was provided in the medical departments.

The analysis suggested that the problem of many small hospitals in sparsely populated areas has not been a lack of people seeking hospital care in their service area, but rather the problem seems to have been that so many people have left their service area for hospital care in another area. The result has been a low utilization rate of many hospitals located in sparsely populated areas. For example, if all patients who left the Faith Hospital service area for care in 1967 had instead utilized their local hospital then, assuming these patients stayed an average of 6.7 days per patient, people from the Faith area would have utilized a 30-bed hospital at an average of 75% of capacity. In 1967 the 20-bed Faith Hospital was used an average of less than 50% of capacity.

The exact reason for this lack of small hospital utilization was not found in this study, but the study did point out that when the nearest hospital was by-passed, a larger hospital was usually used. Possible reasons for use of hospitals in larger towns might be the greater variety of physicians available and better equipped hospitals with more specialized personnel than in small hos-

pitals. The analysis also showed that people from a hospital town were less likely to by-pass their hospital and go to another hospital than were people from other towns in the service area of that same hospital. This suggests a loyalty influence.

The data indicated that a major source of patients for hospitals of all sizes are people from the town in which the hospital is located. The distance traveled by out-of-town patients was not in general related to hospital size. The average distance traveled by out-of-town patients admitted into the Rapid City hospitals, which were among the largest hospitals in the study area, was far greater than was true for any other hospitals in the area. However, the average distance traveled by out-of-town patients admitted into the Pierre Hospital, the largest hospital in the study area, was among the shortest for any hospital in the area. One major reason for this difference may be the fact that Pierre had far fewer physicians, particularly physicians with specialties, than did Rapid City. Consequently, doctors in the study area would be more likely to refer patients to Rapid City doctors.

SUMMARY

In summary, there is little likelihood that the total demand for medical care and services in Northwest South Dakota will decline in the years immediately ahead. There will, however, probably be some shifts (increases for some services, decreases for others) in the demand for particular medical services. These shifts will not be uniform in

all parts of the area. The sparsely populated areas will likely remain sparsely populated but the demand for medical services in those areas will probably not decline. The major problem in the area will be supplying medical services for the people that need them and do not have ready access to them.

The situation with respect to the

supply of medical and health resources in Northwest South Dakota is unlikely to improve in the near future. Small towns are likely to continue to have problems in providing medical facilities and in attracting qualified medical personnel and doctors. People living in or traveling through much of the area will be denied ready access to medical services and facilities unless measures are taken to reverse these trends and improve the medical and health care system in the area.

These problems can be corrected only through concerted action and

planning by all of the communities in the area. Planning is essential for developing comprehensive personal health services for an area. It also aids in preventing the fragmentation of services, the needless duplication of services and the inefficient utilization of manpower and facilities. No single community can do the job alone. It needs to be an area-wide effort. By combining the resources and efforts of a number of communities a population base large enough to support a full range of efficient and high-quality health services and facilities can be obtained.

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