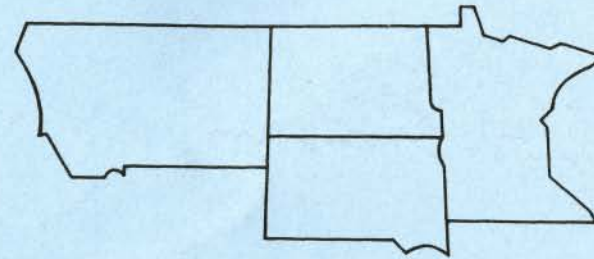

HEALTH MANPOWER FOR THE UPPER MIDWEST

A STUDY OF THE NEEDS FOR PHYSICIANS AND DENTISTS IN MINNESOTA, NORTH DAKOTA, SOUTH DAKOTA, AND MONTANA



By
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A STUDY SPONSORED BY THE LOUIS W. AND MAUD HILL FAMILY FOUNDATION, SAINT PAUL, MINNESOTA — JUNE, 1966

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GUIDE TO THE READER

The purpose of this report is to present clearly to a wide and varied audience the results of our investigations.

Many of the citizens of the Upper Midwest states, for whom this report was prepared, may not be familiar with some of the technical terms used. Persons with an interest in the study methods will find these outlined in Appendix A. Appendix B contains selected tabular data in some detail for the careful reader who wishes to determine how our data were derived.

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Dr. M. Sidney Hedeem of The Minnesota Osteopathic Association generously made available information on its membership. Dr. Marshal W. Mueller of the

Minnesota Dental Association and Mr. Duane Moen of the American Dental Association were most helpful in aiding us to gather the necessary data on dentists.

Creating a temporary organization willing to expend great effort posed a major problem. We were fortunate in obtaining the services of a hard working, conscientious, and able group of college students. The research staff included Adele Dingfelder, Mary Johnson, Dean Duenow, Ralph Olsen, Judy Klassy, Jean Anderson, Osler L. Peterson, Jr., Phyllis Larson, Thea Lesar, and Stephanie Culbertson. The long hours and the frequent weekends which these young research aides worked made possible the early completion of a very extensive study. Mrs. Barbara Uppgren, who assembled much published information, outlined and wrote the first draft of this report, and undertook many other duties, has earned a special word of thanks.

Special mention should be made of the great help furnished by the College of Saint Thomas in making its computer facilities available to us. Mr. James Lindsay, the able Director of the Computer Center, gave attention to our often urgent requests for data processing. From time to time consultants were employed and their specialized and helpful contributions are gratefully acknowledged. Among them are John

Borchert, PhD., Geographer, University of Minnesota; Charles Eugene Ramsey, PhD., Sociologist, University of Minnesota; Theodore Colton, ScD., Biostatistician, Harvard Medical School; Jacob Feldman, PhD., Medical Sociologist, Harvard School of Public Health; and Jerome Stromberg, PhD., Sociologist, Washington University. In addition, Miss Audrey Anderlie of the Commerce Department Library in Minneapolis and Mr. Lester Storey of the Vital Statistics Department of Minneapolis deserve our gratitude for their help in furnishing necessary data and statistics.

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Finally, the generous support of the Hill Family Foundation of Saint Paul which made this study possible must be acknowledged. The wise counsel and frequent help of Mr. A. A. Heckman and Dr. Donald A. Hughes of the Foundation deserve special mention. The task of assembling an organization staffed by temporary employees who were constantly subject to unusual demands and deadlines was immensely facilitated by the encouragement and helpfulness of these men.

Public education today is faced with the necessity of expanding its facilities at all levels to keep pace with the recent sharp rise in the number of young people in our population. The clamor for more teachers and more classrooms reflects an immediate need which must be met but which should not obscure the desirability of long-range planning. Planning for education in the health professions has to be carried out long in advance because the period of professional training is so long. In medicine this may extend to eight or ten years. Furthermore, the need for expanded educational facilities in this area is not conditioned entirely by the projected demand for admission but is determined to an important degree by the health requirements of the population.

It is timely and fitting therefore, that the Regents of the University of Minnesota should take this opportunity to appraise its resources in training for the health professions in long-range terms. In their request to the Hill Family Foundation for support for such a study, the Regents clearly indicate the acceptance of a responsibility which transcends state borders. The Health Manpower Study Commission has wisely interpreted this responsibility as including a special concern for the other three states in the Upper Midwest Region—North and South Dakota and Montana—none of which has a four-year medical school or a reasonable prospect of one in the foreseeable future and all of which have long-established economic and cultural ties with Minnesota.

Drs. Peterson and Fahs have compiled an impressive amount of relevant data which could well serve as a model for future regional health manpower surveys. Their figures indicate a probable falling off in the ratio of physicians to population in Minnesota by 1975. Furthermore, if present trends continue, the number

of physicians actually engaged in family practice will diminish to such a point as to present a special problem particularly in the rural areas.

The number of dentists in Minnesota has not quite kept up with the population growth over the last 35 years.

The Commission's recommendations that the University of Minnesota's Schools of Medicine, Dentistry and Dental Hygiene be expanded to meet projected state needs are well documented.

Once the decision to expand has been made the question will be . . . how much? The evidence indicates that for the Dental School a modest increase of six graduates per year would be sufficient to keep pace with the population growth in Minnesota. Expansion of Minnesota's School of Dental Hygiene and the development of similar schools in the Dakotas and Montana would offer a major supplementary contribution to the region's dental health and ease the burden on the practicing dentists.

The proposal for increasing the size of the classes in the Medical School from the present level of 150 to 200 appears appropriate. If this is more than enough to take care of Minnesota's immediate needs any surplus places could be easily filled with out-of-state students. In keeping with its regional responsibility Minnesota might well show preference to applicants from Montana which has no medical school. Minnesota would also do a service to the rest of the Upper Midwest Region by accepting a given number of students in transfer each year from the two-year schools of basic medical sciences in North and South Dakota. Students from the Dakota schools who earned their medical degrees at Minnesota would be much more likely to take their internships and residencies in the

area (and eventually to practice in the region) than if they were obliged to complete their medical education in more distant medical schools. Since the last two years of medical school are ordinarily devoted to clinical service in hospitals, this period does not require the expensive laboratory installations of the first two years and expansion is dependent on the availability of good clinical teaching facilities and in particular, good clinical teachers. There does not appear to be a dearth of either in the Minneapolis-St. Paul area.

The prime felt need in Minnesota and the rest of the Upper Midwest is for family practitioners. In the face of a rising public demand the number of medical graduates entering family practice is declining particularly in rural areas. But simply increasing the output of physicians will not meet this demand. The education of more auxiliary medical personnel should make family practice less burdensome and more attractive. The continuing growth of group practice even in small communities will also make for more efficient and more professionally satisfying medical care. The new Federally sponsored regional programs in heart disease, cancer and stroke may help to break down the isolation of the rural practitioner. Inevitably, these and other Federal health programs will involve the medical school to an increasing degree with questions of provision of and distribution of medical care. The University of Minnesota is in a strong position to take the leadership in shaping its programs in the health professions to meet the changing needs of the times.

James M. Faulkner, M.D.
President, National Fund
For Medical Education

INTRODUCTION

THE CHARGE FROM THE BOARD OF REGENTS OF THE UNIVERSITY OF MINNESOTA

In 1964 the Board of Regents of the University of Minnesota considered the growing need of Minnesota for health manpower required by the state's growing population and the manner in which this need would affect the role of the University in providing physicians, dentists, nurses, and other health care personnel. The following extract from the minutes of a meeting on September 16, 1964, embodies the substance of the Regents' request to the Hill Family Foundation.

In recognition of the apparent need of the State of Minnesota and of the nation for increasing numbers of physicians to meet the needs of a growing population, the College of Medical Sciences has recently advanced a proposal for a substantial increase in the size of the entering class in the Medical School from the present level of 150 students to 200 students. The tentatively outlined cost of the proposed program appears to be in line with costs of similar expansion proposals made by other medical schools, indeed lower than a good many. Nevertheless, its accomplishment would require substantial sums of public funds for both capital expenditures and on-going maintenance. Further, the proposal is a complex one, involving not only the Medical School, but the School of Dentistry, the School of Nursing, the School of Public Health, and perhaps even other units of the University as well.

The Regents feel that they neither can nor should respond to this proposal as though it were purely a University matter. The

public's stake in the supply of physicians and other health personnel is immediate and clearly evident. The Regents believe therefore, that they should consider the Medical School and related intra-University proposals only in light of a most careful state-wide study of needs for additional physicians, dentists, nurses and other health care personnel and of the potentials for training of such personnel. It is suggested, therefore, that a widely representative committee be formed under other than University auspices and that it be asked to study the needs both state and national to consider means of meeting such needs and to make appropriate recommendations. Such a committee should include representatives of at least the following: the public at large; the State Legislature; the University, including the Medical, Dental, and Nursing Schools, and the Mayo Foundation; the State Medical, Dental and Nursing Associations; the Minnesota Academy of General Practice; and the group that has been studying the possibility of establishing an independent medical school in St. Paul.

The Hill Family Foundation with its broad and long standing interests in education, public welfare, and medical care would appear to be ideally suited for the sponsorship of such a study.¹

The Hill Family Foundation accepted the responsibility for such an investigation and established the Health Manpower Study under the direction of Dr. Osler L. Peterson, Professor of Preventive Medicine at Harvard University.

¹(Board of Regents), University of Minnesota, Extract of Minutes, September 16, 1964.

THE SELECTION OF AN ADVISORY COMMISSION

It was realized that the advice of an interested group of citizens would be of great help in conducting the Study and in framing conclusions. An Advisory Committee was therefore selected from among leaders in the health professions, business, education, farming, and law. However, the members were invited to serve as individuals and not as representatives of particular institutions or points of view.

The following persons were asked to serve:

Edgar M. Carlson, Ph.D., Chairman
President, Gustavus Adolphus College
St. Peter, Minnesota

Robert M. Barr, M.D., Executive Officer
Minnesota State Department of Health
St. Paul, Minnesota

Mr. Robert D. Corette
Attorney at Law
Butte, Montana

H. E. Drill, M.D.
Past President,
American Academy of General Practice
Hopkins, Minnesota

Mr. H. H. Corey²
Chairman of the Board
Hormel Company
Austin, Minnesota

Mr. Richard A. Devereaux
Vice President
Northwestern Bell Telephone
Sioux Falls, South Dakota

Davitt Felder, M.D.
President,
Northern Association for Medical Education
St. Paul, Minnesota

Joseph Gibilisco, D.D.S.
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Past President, Minn. State Dental Society
St. Cloud, Minnesota

Mrs. Walter Walker
Minneapolis, Minnesota

Mr. Willis Wyard
Past President, First National Bank
Duluth, Minnesota

²Mr. Corey found it necessary to resign for reasons of ill health.

Ivan J. Fahs, Ph.D., Department of Sociology, Bethel College, St. Paul, was engaged as Director of Field Studies. A staff was selected by Drs. Peterson and Fahs, and the gathering of data began in June, 1965.

The members of this Advisory Commission held meetings over a seven-month period during which the information gathered by the staff was presented and discussed. These meetings were normally limited to Commission members, the single exception occurring when in July, 1965, Mr. Walter McNerney, President of the National Blue Cross Association, was invited to address the Commission on the changing role of voluntary health insurance companies.

Several of the issues discussed by Mr. McNerney would have been subjects for Commission study and possibly for recommendation had not the Federal government taken steps which made this unnecessary. The Federal program to combat heart disease, cancer, and stroke has made regional planning, which Mr. McNerney recommended, official policy, and action to implement this has already been taken in Minnesota.

In addition to gathering and analyzing a large amount of data which will be presented in this report, the members of the study staff consulted with officers of many voluntary and official health organizations. The purpose of these consultations was to determine what plans or programs among the agencies should be considered or might be affected by the Commission's deliberations.

Since it appeared impossible to study intensively all health manpower groups in the time available, the staff decided to gather data on physicians and dentists in this first phase. The federally supported regional planning organization, which was being formed in early 1966 for the first time, provided an appropriate body to take continuing responsibility for surveillance of health manpower. Certain recommendations relative to the other health professions will be found at the end of the section dealing with the Commission's recommendations.

In February, 1966, the gathering of data was completed, and the Commission met to draft its recommendations.

The Ninth Federal Reserve District includes Montana, North Dakota, South Dakota, Minnesota, 26 counties in the north and west of Wisconsin, and 15 counties of Michigan's Upper Peninsula. This area has also been referred to as the Upper Midwest.

THE STUDY AREA

Preliminary investigation soon made it evident that the University of Minnesota educates many physicians and dentists who practice in North and South Dakota. Later investigation revealed that Montana, too, has many educational and economic ties with Minnesota. In view of these facts, the staff, with the concurrence of the officers of Hill Family Foundation, decided to include all four states of the Upper Midwest trade area—Minnesota, North Dakota, South Dakota, and Montana—in the Study.

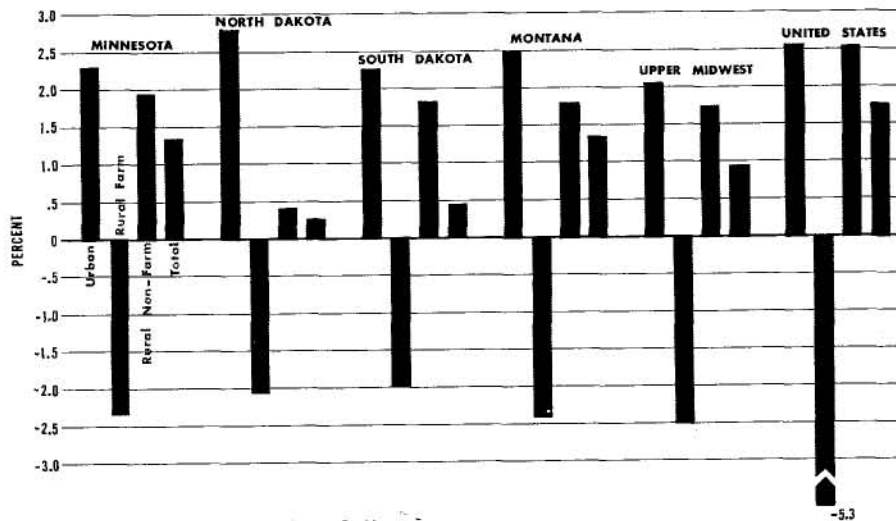
There are many reasons why the four states encompassed by this Study should be examined together. They have shown similar growth patterns in the past and are expected to have similar problems and prospects in the future. They have formed part of the same federal reserve district for the past 50 years,³ and constitute a definite trade area with economic inter-relationships which extend to medical care. All four states have economic ties that make any development in one state an influence upon developments in the other states. This economic and educational interdependence made advisable a study which would include all four states.

THE UPPER MIDWEST STATES

Historically, the Upper Midwest was developed around its agricultural, timber, and mineral resources. As the railroads followed the first settlers, marketing centers were established at regular intervals along the right-of-way until the states were well covered with small rural towns. These towns sometimes grew to include processing plants for raw materials, but they seldom lost their economic dependence on natural resources.

As the Upper Midwest Economic Study has pointed out, the natural resource sectors of the economy have been offering fewer

FIGURE 1: Population Growth Rates (Average Percentage Per Year) 1950-60.



Source: James M. Henderson, Anne O. Krueger, *National Growth and Economic Change in the Upper Midwest*, University of Minnesota Press, Minneapolis, Minnesota, 1965, p. 14.

and fewer employment opportunities.⁴ Though this decline has been nation-wide, the Upper Midwest's dependence on these natural resources means that its annual increases in employment have fallen well below those of the nation as a whole. The great challenge facing the Upper Midwest is to provide opportunities for employment to the manpower released from dependence on natural resources as well as to the manpower produced by an above-average birth rate.

The absence of such an employment adjustment has made it necessary for some of the labor force to move to areas of greater opportunity. Minnesota, North Dakota, South Dakota, and Montana all exceeded the national out-migration rate in 1960, as their workers moved to other states for employment.⁵

At the same time, the four states have followed the national pattern of urbanization. The area's urban growth rates, as seen in Figure 1, are near the national rate; North Dakota, in particular, has experienced a strong urbanization. This movement of population into urban areas is expected to continue, and by 1975 it is estimated that 59.9% of the people in the Upper Midwest will reside in cities.⁶

In the Upper Midwest, the ratio of school age children to adults is higher than the national average, and since these states have below average per capita income, the ratio of the education costs to personal income is above the national average. Unless per capita income can be increased, this disparity between income and educational responsibilities will grow with the area's population. The projected enrollment increases pictured in Table 1 show a particularly high rate of increase for college enrollments. In the light of the need to build a skilled labor force to aid in the transition from an economy based on natural resources to a more diversified industrial economy, the Upper Midwest Economic Study has urged that attention be given to the development of technical junior colleges which will provide improved employment opportunities for the youth of the area.⁷

⁴James M. Henderson, Anne O. Krueger, *National Growth and Economic Change in the Upper Midwest*, University of Minnesota Press, Minneapolis, Minnesota, 1965, p. 3.

⁵*Ibid.* p. 14.

⁶*Ibid.* p. 25.

⁷*Ibid.* p. 69.

Thus, there are competing demands on the public purse; medical care and related programs must be considered within the context of the economic abilities of the four states.

MEASURING THE NEED

Measuring the need for doctors is a very complex process involving many questions, including the following:

Is the ratio of physicians and dentists to the population declining?

Is the distribution of physicians and dentists poor? Will it become worse, or will it improve?

How many people have ready access to a physician or dentist?

Are graduates of the University of Minnesota Medical School and School of Dentistry leaving the state or the area? If they are, why do they go, and what might bring them back? How many leave and where do they settle?

How many doctors from other areas migrate to the Upper Midwest? Is this in-migration declining? Could more doctors be attracted to the Upper Midwest?

If more doctors were graduated from the University of Minnesota Medical School, would they go to areas most in need of doctors? How many would stay in Minnesota? In the Upper Midwest?

In addition to asking these questions about physicians, dentists, and nurses, it is necessary to ask others. For instance, how will economic development and population change affect our health manpower?

The feeling that a physician is needed in a community must be weighed against the community's economic and social circumstances. Can a doctor make a living in the town? Even if the demand for a doctor's services is great enough to assure his livelihood, can a physician be induced to establish his practice in the community?

TABLE 1: School Enrollments, 1960 and Estimated Enrollments 1975, by State and Type of School for the Upper Midwest

STATE	NUMBER ENROLLED		AVERAGE ANNUAL PERCENTAGE INCREASE, 1960-1975
	1960	1975 EXPECTED	
	Kindergarten and Elementary		TOTAL
MINNESOTA	615,365	738,053	1.22
NORTH DAKOTA	115,522	114,270	-0.08
SOUTH DAKOTA	126,980	135,659	0.44
MONTANA	121,043	144,494	1.18
	High School		
MINNESOTA	208,074	341,663	3.31
NORTH DAKOTA	43,977	49,705	0.82
SOUTH DAKOTA	44,130	55,422	1.52
MONTANA	42,260	61,716	2.50
	College		
MINNESOTA	65,499	155,728	5.78
NORTH DAKOTA	12,656	22,043	3.70
SOUTH DAKOTA	12,783	24,310	4.28
MONTANA	11,618	25,700	5.29

Source: James M. Henderson, Anne O. Krueger, *National Growth and Economic Change in the Upper Midwest*, University of Minnesota Press, Minneapolis, Minnesota, 1965, p. 59.

GENERAL INFORMATION

HEALTH CARE IN THE UNITED STATES

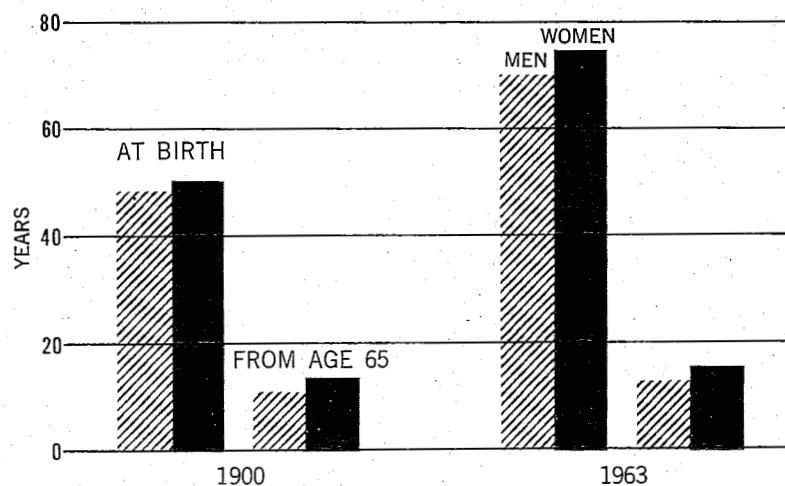
The American people can be justly proud of the advances that have been made in the general level of health during this century. Within the memory of many citizens, infectious diseases were the major cause of death: tuberculosis, pneumonia, and influenza were common killers. In the early part of our century, such diseases killed about 15% of all infants before they reached their first birthday. These infectious diseases, which accounted for 29.4% of all deaths in 1900 and killed mainly children and young adults, now account for only 1.1% of the deaths in the United States. Thus, infant deaths have been reduced manyfold, while heart diseases and cancer, both of which are associated with advancing age, have become the major causes of death.¹

Since 1900, life expectancy *at birth* has increased steadily from 46.3 to 67.6 years for males and from 48.3 to 74.4 years for females.² The greater increase for women can be attributed partly to the greatly increased safety of childbirth. However, as Figure 2 shows, there has been only a slight increase in the life expectancy after age 65; more people are living to the Biblical three score and ten years, not because there is a greater life expectancy after 65, but because the premature deaths which have been prevented were mainly in the very young.

¹The President's Commission on Heart Disease, Cancer and Stroke, *A National Program to Conquer Heart Disease, Cancer and Stroke*, Volume II, U.S. Government Printing Office, Washington, D.C. 1965, p. 15.

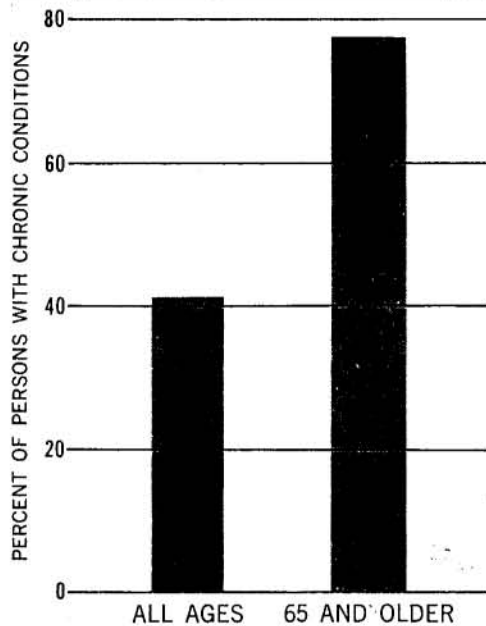
²U.S. Bureau of the Census, *Historical Statistics of the United States, Colonial Times to 1957*, U.S. Government Printing Office, Washington, D.C., 1960, pp. 24, 25.

FIGURE 2: Life Expectancy in the United States at Birth and at Age 65 (1900, 1963).



Source: U. S. Dept. of Health, Education and Welfare, *Health, Education and Welfare Trends*, (Washington, D. C. 1964), p. VII.

FIGURE 3: Prevalence of Chronic Disease at Age 65 and at all Ages.



Source: Charles S. Wilder and Eugenia Sullivan, "Chronic Conditions and Disability," *New Directions in Health, Education and Welfare*, (Washington, D. C., 1963), p. 15.

The life expectancy and health of our older citizens is a matter of vital importance, since the elderly make up an ever-increasing percentage of our population. Today, one out of eleven persons has passed his 65th birthday.³ Increasing age is inevitably accompanied by poorer health and greater need for medical care, as is demonstrated in Figure 3.

The recent passage of the Medicare legislation to provide pre-paid health insurance for persons in this age group had to be considered by the Commission. Arguments for the legislation were based upon the fact that the aged, who are mostly retired, have lower incomes and less health insurance than the younger and usually working population. The broad insurance provided by the Medicare program, it is assumed, will increase the demand for physicians, hospitals, and other facilities, though the extent of this increase can obviously not be specified as yet.

Most of the population under age 65 has access to medical care, the costs of which are being met to an increasing degree by health insurance. This insurance provides a means of anticipating medical bills and protecting oneself and one's family against the large and unforeseen expenses connected with major illness. Title 19 of the Medicare legislation has furthermore provided for the extension of medical care programs for the medically indigent below the age of 65. Thus the economic pressures that discouraged poorer families from seeking medical care are being removed through a combination of voluntary health insurance and government action. The increased demand for medical facilities which can be expected from the older part of our population will, therefore, be heightened even further by an increased demand for such facilities from our poorer families.

The Federal government subsidizes most of the basic medical and scientific research done in the United States and provides funds for the construction of hospitals, nursing homes, health research facilities and, in other ways, for the expansion of educational programs and services in the broad field of health. The education of students in the health fields has been secured by the

³U.S. Dept. of Health, Education and Welfare, *Health, Education and Welfare Trends*. U.S. Government Printing Office, Washington, D.C., 1964, p. vii.

availability of federal loans and scholarships, so that today economic barriers deter far fewer qualified men and women from studying medicine, dentistry, or related occupations. Overall about 20% of the total U.S. medical care expenditures of \$40 billion come from governments—national, state and local.

Recent legislation to provide centers for the treatment of heart disease, cancer, and stroke has evolved into a nation-wide plan for the regionalization of health care which will seek to make better and more efficient use of hospital specialists and family doctor services. A Commission has been appointed, and preliminary planning is underway in Minnesota to implement this legislation. North Dakota, South Dakota, and Montana are engaged in preliminary planning, too.

The health services industry is a major employer in the United States; it consumes 5.9% of the Gross National Product and employs 4 to 5% of the total labor force. Only agriculture and construction rank higher.⁴ Health workers, furthermore, include a highly skilled manpower group; about half possess college degrees or higher levels of training.

The American people have amply demonstrated in many ways their concern for the general health of the nation. As outstanding as these advances have been, however, one must not lose sight of the fact that certain problems in health care are yet to be met. The challenge now is successfully to implement the regionalization and Medicare legislation and to further improve the nation's health.

HOW GOOD IS OUR NATION'S HEALTH?

Death Rates:

Deaths are generally counted accurately; hence, death rates are a valuable measure of the success of a country's health services, particularly when one considers the age at which death occurs.

Although there are a few countries that have lower death rates than the United States, we are, compared to the rest of the world,

very healthy. However, when deaths from specific causes in the United States are compared with those in England and Wales, Holland, and Sweden—all wealthy, industrialized societies much like our own—it is apparent that there is some room for improvement in the United States rates. Sweden's and Holland's death rates are lower in most categories, and the rates for England and Wales, though not so low as those in the two former countries, are lower in most categories than those in the United States.⁵

However, when considering the relation between a country's death rate and its health services, we need to remember that some of the more frequent causes of death are not much affected by medical care. Among these are cirrhosis of the liver (Which is often a consequence of alcoholism) and motor vehicle accidents. In addition, variations in death rates are associated with education, income, and race. Since these are influences about which medicine can do little, improvement in the death rates will require social as well as medical action.

Infant Mortality

Infant mortality provides a sensitive measure of the effect of health care on society since the loss of young lives, though clearly associated with the education, income, and race of the parents, is also affected by prenatal, delivery, and postnatal care. While life expectancy at age 50 or 60 has changed little—everyone will die eventually, whatever we do—infant mortality and the many diseases of early life have been reduced to the point that life expectancy at birth has doubled in this century. Table 2 shows, however, that the United States even recently has higher infant mortality rates than Sweden or England and Wales, a surprising occurrence in the wealthiest country in the world. The Netherlands, Australia, New Zealand, Iceland, Norway, Denmark and Ireland also have lower infant mortality rates than the United States. Further reduction in United States rates is to be anticipated from a combined attack on medical and social problems.

⁴A National Program to Conquer Heart Disease, Cancer and Stroke, *op. cit.*, p. 267.

⁵United Nations data as cited by Alex M. Burgess, Jr., Theodore Colton, and Osler L. Peterson, "Categorical Programs for Heart Disease, Cancer and Stroke," *New England Journal of Medicine*, Vol. 273, Number 10, Sept. 2, 1965, p. 536.

TABLE 2: Infant Mortality Rate and Life Expectancy at Birth and at Age Fifty by Country

Country	Infant Mortality Rates*** (1963) %	Life Expectancy at Birth		Life Expectancy At Age of 50 Yr.	
		Males Yrs.	Females Yrs.	Males Yrs.	Females Yrs.
United States	25.2	66.8*	73.4	23.0*	27.8
England & Wales	20.9	68.0*	74.0	22.7*	27.5
Sweden	15.0	71.6**	75.4	24.8**	28.4

*1962
**1961
***Deaths per 1000 live births

Source: United Nations data as cited by Alex M. Burgess, Jr., Theodore Colton, and Osler L. Peterson, "Categorical Programs for Heart Disease, Cancer and Stroke," *New England Journal of Medicine*, Vol. 273, Number 10, Sept. 2, 1965, p. 536.

TABLE 3: Patients and Admission Rates in Mental Hospitals*

Period	Rate per 100,000 Civilian Population	
	Resident Patients	Admissions
1950	339.9	101.0
1952	345.7	105.9
1953	348.1	109.0
1954	346.9	107.5
1955	343.0	109.2
1956	332.1	111.8
1957	324.4	115.0
1958	316.6	121.8
1959	309.2	127.1
1960	301.6	132.2
1961	291.1	139.5
1962	280.6	146.9
1963	270.5	152.0
1964	259.2	160.0

*State and local government hospitals

Source: Adapted from U. S. Department of Health, Education and Welfare, *Health, Education and Welfare Indicators*, (Washington, D. C., 1965), p. S-7.

Mental Illness

One of the major health problems in the United States today is the presence of conditions which cause widespread disability and yet are not themselves significant causes of death. Mental illness is one striking example of such a problem, and the large number of United States citizens afflicted with mental illness and residing in mental hospitals presents a challenge to all who are concerned for the well-being of our population. Though improved treatment has meant a decline in the number of resident patients in public mental hospitals, the steady rise in the number of admissions shown on Table 3 is testimony to the importance of mental illness in our society.

Chronic Diseases and Disablement

Despite the astonishing increase in our knowledge about disease and its causes, little progress has been made in treating the chronic and disabling diseases which afflict one out of ten citizens and six percent of the active labor force.⁶ These diseases, some of which are listed in Figure 4, may cause much disability and many hours of lost work while yet resulting in relatively few deaths. Chronic illness, which is often responsible for the inability to work, increases with age, until at 65 and over, 78.7% of the population have one or more chronic conditions, and 15.5% suffer from chronic conditions which make it impossible for them to work.

Dental Health

The National Health Survey has made it clear that the nation's dental health is in great need of improvement. In the middle years of life, edentulousness is common, and the number of decayed, missing or filled teeth (D.m.f. ratio) when compared to healthy teeth is high. Both of these conditions can be prevented by better care in early life (Figure 5).

The amount of dental care a family receives is strongly related to the family's income and the education of the head of the family (Figure 6). Thus, with increasing prosperity and higher educa-

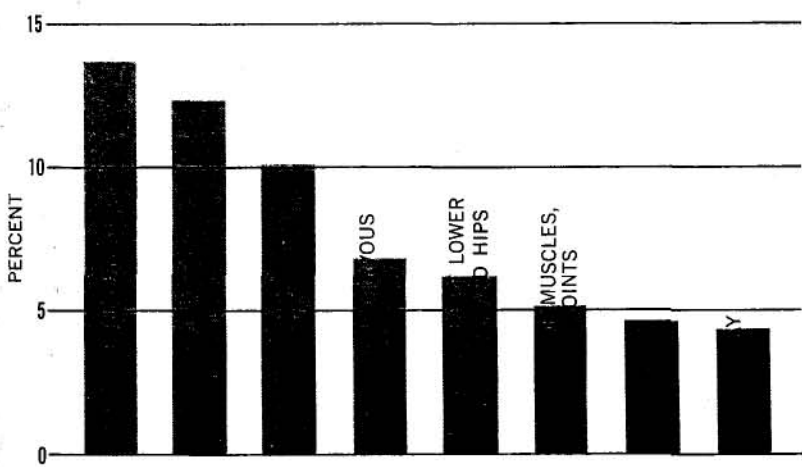
⁶Charles S. Wilder and Eugenia Sullivan, "Chronic Conditions and Disability," *New Directions in Health, Education and Welfare*, U.S. Government Printing Office, Washington, D.C., 1963, pp. 112-113.

TABLE 4: Prevalence of Chronic Disease and Inability to Work by Age—U. S., 1959-61

Category	Age Group					
	Average Number (in thousands) and Percent					
	All Ages	Under 17	17-44	45-64	65 and Over	
Total Population	176,302	61,911	63,068	35,989	15,334	
Persons with one or more chronic conditions	No.	73,849	11,116	28,596	22,068	12,070
	%	41.9	18.0	45.3	61.3	78.7
Persons unable to carry on major activity (unable to work, keep house, or go to school)	No.	3,974	133	422	1,045	2,374
	%	2.3	0.2	0.7	2.9	15.5

Source: Charles S. Wilder and Eugenia Sullivan, "Chronic Conditions and Disability," *New Directions in Health, Education and Welfare*, (Washington, D. C., 1963), p. 115.

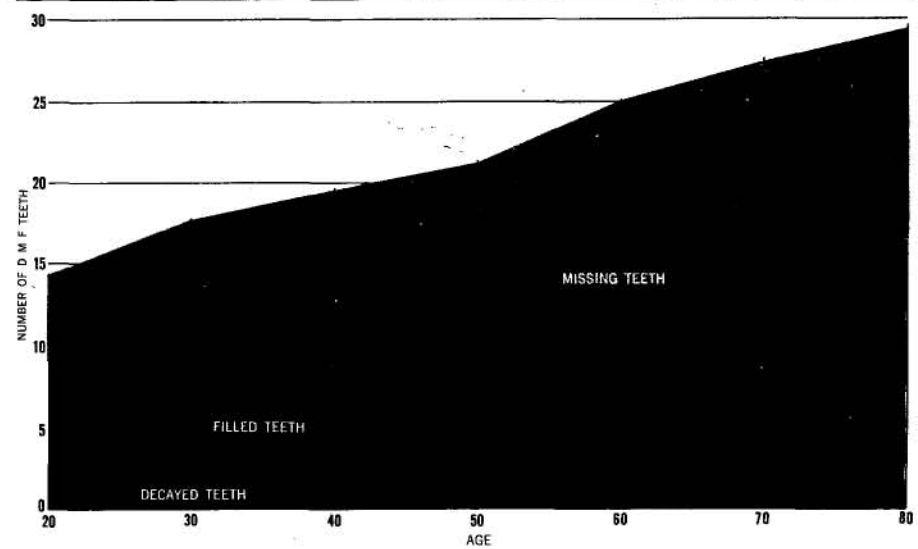
FIGURE 4: Selected Chronic Conditions Affecting Ability to Work.



$$\text{PERCENT} = \frac{\text{Specific chronic condition causing limitation}}{\text{Total number of limited persons usually working}}$$

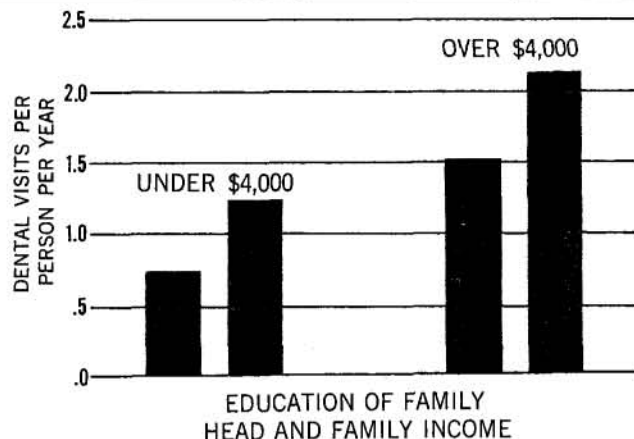
Source: Charles S. Wilder and Eugenia Sullivan, "Chronic Conditions and Disability," *New Directions in Health, Education and Welfare*, (Washington, D. C., June, 1965), p. 113.

FIGURE 5: Average Number Decayed, Missing, and Filled Teeth For Adults, by Age, U.S., 1960-62.



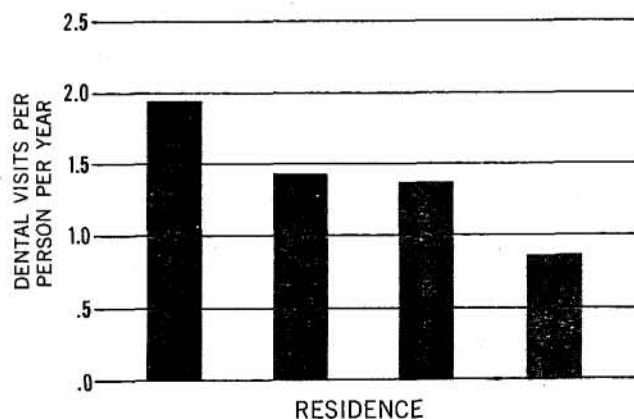
Source: U. S. Dept. of Health, Education and Welfare, *Selected, Dental Findings in Adults by Age, Race and Sex, United States 1960-62* (Washington, D. C., 1965), p. 8.

FIGURE 6: Number of Dental Visits Per Person Per Year by Education of Family Head and Family Income.



Source: National Center for Health Statistics, Series X, Number Y, *Dental Visits by Income, Education, and Residence, United States 1953-1955*, U. S. Dept. of H.E.W., (Washington, D. C., 1965), p. 8.

FIGURE 7: Number of Dental Visits Per Person Per Year, by Urban-Rural Residence.



Source: National Center for Health Statistics, Series X, Number Y, *Dental Visits by Income, Education, and Residence, United States 1953-1955*, U. S. Dept. of Health, Education and Welfare, (Washington, D. C., 1965) p. 8.

tional levels, the demand for dental care will increase. If this demand is met through the provision of more dentists, we may confidently look forward to greatly improved dental health.

As Figure 7 shows, the number of dental visits per person per year varies considerably by place of residence. Persons living in urban areas seek more dental care than those in rural areas. Thus the urbanization of our society will also increase the demand for dental care.

Fluoridation can be expected to reduce dental caries by nearly 60%. Hopefully, all communities will eventually adopt this and other programs of preventive dentistry.

DISTRIBUTION OF HEALTH MANPOWER

All the countries in the world, including the United States, are experiencing difficulties with the distribution of health manpower and resources. Table 5 makes it clear that the rural residents of the Upper Midwest, like the residents of the entire United States, have ready access to fewer local physicians, nurses, and dentists than do those living in cities—a point which is corroborated by the data gathered by the Health Manpower Study.

It is often convenient to think of the number of patients each physician or dentist may be called on to treat in terms of the population per physician ratio. Thus a doctor practicing alone in a county of 5,000 persons will probably carry a greater patient load than one of three doctors practicing in a county of 10,000 persons. This relationship between the available health manpower and the population is most conveniently expressed as the number of doctors per 100,000 persons.

Minnesota, with 145.3 physicians per 100,000 population (Or about 690 persons for every physician), is the only one of the states in the Upper Midwest that has more physicians than the national average of 142.9. It is also the only state of the four to contain a

major metropolitan area. (The U.S. Census Bureau defines a major metropolitan area as one which has a population of one million or more.) Table 5 reveals, however, that Ramsey and Hennepin counties (The metropolitan area of Minnesota) have fewer physicians than the national average for all major metropolitan areas.

Lesser metropolitan counties (defined as centers of population between 50,000 and 1,000,000) are found in all four states. Only North Dakota, with one county in this category, has a higher number of physicians than the United States average of 145.3 in this county group.

Counties in Minnesota, North Dakota and South Dakota that are adjacent to metropolitan areas have fewer physicians than the national average; South Dakota's rate for this type of county is particularly low.

Isolated semi-rural counties (which contain an incorporated place of 2,500 or more persons and are not contiguous to metropolitan counties) are better served by physicians in the Upper Midwest than are similar counties across the nation. In Minnesota, North Dakota and South Dakota the rate for the isolated semi-rural county is higher than the rate for the state as a whole; in Montana, the rate for the isolated semi-rural county is nearly the same as that of the entire state.⁷

Isolated rural counties in the Upper Midwest (which the Census Bureau defines as containing no incorporated place of 2,500 or more persons) have a serious shortage of doctors when compared to the rate for each state as a whole.

Although this study was concerned with doctors of medicine and not osteopaths, the staff believed that the medical picture was incomplete unless the latter were also tabulated. The work of an osteopath is becoming more and more similar to that of the M.D. Inspection of Table 5 calls attention to the fact that the U. S.

⁷The high rate for Minnesota's isolated semi-rural counties can be in part attributed to the presence of the Mayo Clinic in Olmsted County, a county of this category.

North Dakota and South Dakota each contain only one lesser metropolitan county, and these are located on a border, so that few counties are adjacent to metropolitan areas; thus most of their cities are located in counties of the isolated semi-rural category, hence have a high rate of health manpower coverage.

TABLE 5: Health Personnel Per Population for the U. S. and the Upper Midwest States by Urban-Rural Status of County, 1962

UNITED STATES	NUMBER OF HEALTH PERSONNEL PER 100,000 POPULATION					Total
	Dentists Total	Nurses Active	M.D.	Physicians D.O.		
Greater Metropolitan	71.0	492.7	327.5	195.4	9.9	205.3
Lesser Metropolitan	52.0	509.3	339.6	145.3	7.7	153.0
Adjacent to Metropolitan	38.7	388.3	254.2	85.6	5.9	91.5
Isolated Semi-Rural	40.6	350.6	242.8	94.2	6.2	100.4
Isolated Rural	27.4	195.7	125.9	53.0	6.1	59.1
United States	54.1	449.8	300.0	142.9	7.9	150.8
MINNESOTA	70.2	497.4	382.4	145.3	2.1	147.3
Great Metropolitan	83.0	592.8	455.2	167.9	1.4	169.3
Lesser Metropolitan	60.1	475.2	373.7	111.9	1.4	113.3
Adjacent to Metropolitan	57.0	362.9	277.6	70.4	2.2	72.6
Isolated Semi-Rural	64.4	460.4	354.5	167.1	3.8	170.9
Isolated Rural	45.9	279.3	207.5	55.7	—	55.7
NORTH DAKOTA	45.6	491.9	336.2	91.3	2.0	93.3
Lesser Metropolitan	58.5	685.7	498.5	156.4	5.8	162.2
Adjacent to Metropolitan	54.9	420.2	276.2	65.2	3.4	68.6
Isolated Semi-Rural	50.3	659.9	460.7	120.5	2.5	123.0
Isolated Rural	34.0	257.0	158.3	44.7	—	44.7
SOUTH DAKOTA	45.9	412.9	287.9	82.1	6.6	88.7
Lesser Metropolitan	59.4	622.6	471.4	126.5	5.6	132.1
Adjacent to Metropolitan	41.9	330.1	175.5	40.3	1.3	41.6
Isolated Semi-Rural	53.4	475.0	339.3	98.7	7.4	106.1
Isolated Rural	29.8	253.3	164.3	50.2	4.3	54.4
MONTANA	55.3	535.8	354.7	103.8	7.4	111.2
Lesser Metropolitan	55.6	611.5	419.7	133.0	8.1	141.1
Adjacent to Metropolitan	44.8	544.2	359.9	105.9	7.5	113.4
Isolated Semi-Rural	60.0	552.9	366.6	102.2	8.5	110.7
Isolated Rural	47.9	364.6	217.3	64.5	2.8	67.3

Greater Metropolitan: Counties that constitute Standard Metropolitan Statistical Areas with a population of 1,000,000 or more.

Lesser Metropolitan: Counties that constitute SMSA's with populations of 50,000 to 1,000,000.

Adjacent to Metropolitan: Counties contiguous to Greater or Lesser Metropolitan counties.

Isolated Semi-Rural: Counties which contain at least one incorporated place of 2,500 or more persons.

Isolated Rural: Counties containing no incorporated place of 2,500 or more.

Source: Maryland Y. Pennell and Kathryn I. Baker, "Table 4, Ratio of persons in health occupation and other data to population, by county group with State, 1962," *Health Manpower Source Book*, Sec. 19, No. 263, (Washington, D. C., 1962), pp. 32, 34, 36.

TABLE 6: Distribution of Physicians, Dentists, and Nurses Ranked by State, 1963

Rank	Physicians ^{1, 2}		Dentists ¹		Nurses ³	
	State	Rate	State	Rate	State	Rate
1.	N.Y.	207	N.Y.	79	N.H.	474
2.	Mass.	196	Oreg.	77	Conn.	433
3.	Conn.	180	Hawaii	70	Vt.	429
4.	Calif.	178	Mass.	69	Mass.	423
5.	Vt.	172	Conn.	68	R.I.	385
6.	Colo.	169	Va.	68	N.Y.	384
7.	Md.	158	MINN.	68	MINN.	381
8.	Pa.	153	Ill.	62	Del.	380
9.	R.I.	152	Wash.	62	Colo.	361
10.	Oreg.	150	N.J.	62	Pa.	356
11.	Mo.	149	Tex.	62	Maine	354
12.	MINN.	145	W. Va.	61	MONT.	346
13.	N.H.	143	Pa.	60	N.J.	344
14.	N.J.	143	Calif.	59	Oreg.	344
15.	Wash.	143	Colo.	58	N. DAK.	338
16.	Fla.	142	Iowa	57	Wash.	333
17.	Mich.	141	R.I.	56	Wisc.	330
U.S. 18.	Ill.	140	Mo.	54	Ariz.	329
19.	Ohio	136	MONT.	54	Wyo.	321
20.	Del.	135	Mich.	52	Nebr.	317
21.	Hawaii	132	Wyo.	51	Iowa	308
22.	Ariz.	131	Idaho	48	Calif.	306
23.	Utah	127	Ohio	48	Ohio	293
24.	Maine	125	Kans.	47	Ill.	286 U.S.
25.	Iowa	117	Nev.	47	Hawaii	285
26.	Wisc.	117	Vt.	47	Alaska	282
27.	Kans.	116	Ind.	46	Kans.	280
28.	Nebr.	115	Fla.	45	Idaho	273
29.	La.	114	Maine	45	S. DAK.	263
30.	Okla.	113	N. DAK.	45	Fla.	260
31.	Tenn.	113	Md.	42	Mich.	254
32.	Tex.	111	Tenn.	42	Nev.	254
33.	Va.	108	S. DAK.	41	W. Va.	246
34.	Nev.	107	Nev.	40	Ind.	241
35.	Ind.	106	W. Va.	40	Md.	241
36.	W. Va.	103	Okla.	39	Va.	233
37.	Ga.	102	Del.	38	Utah	232
38.	MONT.	102	Ariz.	37	N.C.	229
39.	N.C.	100	Ky.	37	Mo.	212
40.	Ky.	95	Va.	37	S.C.	212
41.	N. Mex.	94	La.	36	N. Mex.	209
42.	Wyo.	93	Tex.	35	La.	196
43.	Idaho	92	Ala.	31	Ga.	191
44.	Ark.	91	Ark.	31	Tenn.	173
45.	N. DAK.	90	N.C.	31	Ky.	172
46.	S.C.	80	Alaska	30	Tex.	170
47.	Ala.	79	Ga.	29	Okla.	161
48.	Miss.	76	N. Mex.	29	Ala.	152
49.	S. DAK.	73	Miss.	28	Miss.	139
50.	Alaska	69	S.C.	23	Ark.	119
	D.C.	357	D.C.	93	D.C.	507
	U.S. ⁴	140	U.S. ⁴	53	U.S. ⁴	286

Public Health Service includes osteopaths in the "total" physician per 100,000 ratio; the ratio in Table 5 is increased only slightly when the osteopaths are added.

Dentists and nurses are distributed in a similar way throughout the Upper Midwest, though an evaluation of nursing personnel is complicated by the fact that the active nurse may only work part time. Thus the large number of nurses in the metropolitan and semi-rural areas is not a true measure of nursing power. In fact, many hospitals in the four states feel a real shortage of nursing help.

Table 6 ranks the states by number of physicians, dentists, and nurses. A comparison of the average of individual states with the national average reveals wide divergences, both between states and between geographic regions.

While Montana's physician-population ratio falls at the U.S. average, Minnesota is the only one of the states within the Upper Midwest that has a ratio of physicians above the national average. However, its high rank is affected in some measure by the presence of the Mayo Clinic. The nearly 325 physicians on the Clinic staff constitute approximately 10% of the active physicians in Minnesota. Since about 30% of the care given by the Mayo Clinic doctors is furnished to Minnesotans,⁸ only the equivalent of 98 physicians of this group can be counted as part of Minnesota's physician force. If the remaining physicians were subtracted from Minnesota's total, the state would drop from 12th to 18th in the

⁸The Accounting Department of the Mayo Clinic has computed the Clinic's service to Minnesotans on the basis of total bookings or dollar volume, as 32% of the total Clinic effort. A geographical analysis of patient origin supplied by the Clinic shows that 28.5% of the total new patients in 1963 were Minnesotans.

Rates computed on the basis of numbers of professional personnel supplied by the American Medical Association, the American Osteopathic Association, the American Dental Association and the American Hospital Association. ¹ Population estimates used in comparing rates of physicians and dentists are as of July 1, 1963 and are for the civilian population only. ² Includes Doctors of Medicine (M.D.) and Doctors of Osteopathy (D.O.), Non-Federal only. ³ Population estimates used in computing rates for nurses are as of July 1, 1962 and for the civilian and military population, excluding armed forces overseas. ⁴ United States totals include 50 States and the District of Columbia.

Source: Part 2 of 1964 Edition of *Health, Education, and Welfare Trends*, "State Data and State Rankings in Health, Education, and Welfare," Washington, D. C., p. s-10.

ranking by number of physicians. It would then have a physician-population ratio of 139, just below the average for the United States. Doctors of the Minneapolis-St. Paul area also provide care for populations beyond Minnesota's borders, particularly to parts of Wisconsin and Iowa and to three western states included in this study. It was not feasible for the staff to try to estimate the volume of this service, but it must be considered in making decisions about Minnesota's physician needs.

The four-state area appears adequately served by dentists in comparison with the United States as a whole. While this comparison is of some value as a measure of a state's reaction to a disease problem, it is clear from previous tables that the total supply of dentists is insufficient to cope with the nation's dental needs. Minnesota and Montana rank seventh and ninth, respectively, among the 50 states in the ratio of dentists to population, and well above the national average of 53 dentists per 100,000 population. North Dakota and South Dakota, which rank thirtieth and thirty-third, respectively, are by this measure disadvantaged with respect to the rest of the nation. (These states have also been strained to provide dental care for the dependents of military personnel stationed at bases within their borders, since only the military personnel themselves receive dental care at their base.)

The Upper Midwest is more fortunate in its supply of professional nurses, for we find Minnesota, Montana and North Dakota ranking seventh, twelfth and fifteenth among the states in the number of nurses per 100,000 population. Only South Dakota falls below the national average in ratio of nursing personnel.

The concern of the residents of the Upper Midwest for good medical care is further reflected in Table 7, which ranks the states

TABLE 7: Hospital Use and Civilian Inpatient Beds, by State, 1965

Rank	Patient days in general and special hospitals, 1962		Acceptable Civilian Inpatient Beds per 1,000 Population as of January 1, 1965 ¹					
	State	Annual rate per 1,000 population	General		Long-term care		Mental	
			State	Ratio	State	Ratio	State	Ratio
1.	Del.	1,789.8	N. DAK.	4.73	Wash.	4.48	R.I.	4.40
2.	N. DAK.	1,688.3	Mo.	4.75	R.I.	4.11	N.Y.	3.79
3.	R.I.	1,686.2	MINN.	4.43	MINN.	4.01	Conn.	3.35
4.	Mass.	1,672.3	Wis.	4.31	Okla.	3.91	Calif.	3.19
5.	N.Y.	1,645.1	W. Va.	4.20	Colo.	3.74	N.J.	3.16
6.	W. Va.	1,504.7	MONT.	4.17	Oreg.	2.82	Va.	3.14
7.	Mo.	1,499.4	Wyo.	4.17	Mo.	2.74	Wis.	3.09
8.	MINN.	1,484.3	Nebr.	4.07	S. DAK.	2.70	Nebr.	3.05
9.	Pa.	1,457.4	N.Y.	4.03	Nebr.	2.64	Okla.	3.05
10.	Ill.	1,441.7	S. DAK.	4.00	MONT.	2.51	Md.	3.03
11.	Colo.	1,440.1	Del.	3.98	N. DAK.	2.31	N. DAK.	2.92
12.	Hawaii	1,433.1	Kans.	3.94	Wis.	2.27	Mich.	2.86
13.	Mich.	1,413.8	Ill.	3.87	N.J.	2.19	Ga.	2.73
14.	Wis.	1,405.4	Pa.	3.80	Iowa	2.18	Fla.	2.67
15.	Nebr.	1,367.9	Vt.	3.77	Ark.	2.12	Pa.	2.65
16.	Vt.	1,361.9	La.	3.76	La.	2.11	Miss.	2.62
17.	S. DAK.	1,359.8	Okla.	3.75	Idaho	2.05	MINN.	2.59
18.	Alaska	1,358.9	Ark.	3.72	Tex.	1.99	Mo.	2.58
19.	Kans.	1,357.8	Mass.	3.71	Calif.	1.97	Oreg.	2.56
U.S. 20.	Tenn.	1,331.9	Colo.	3.68	Conn.	1.96	W. Va.	2.46
21.	Md.	1,293.8	Iowa	3.59	Fla.	1.95	N.H.	2.45
22.	Conn.	1,283.1	Tex.	3.47	Del.	1.89	Hawaii	2.41
23.	MONT.	1,273.0	Ala.	3.46	Alaska	1.83	N. C.	2.41
24.	Nev.	1,255.6	Ariz.	3.46	Nev.	1.83	Del.	2.37
25.	La.	1,254.3	Alaska	3.45	Hawaii	1.81	S. DAK.	2.37
26.	Wyo.	1,243.4	Nev.	3.44	Md.	1.80	Ill.	2.30
27.	Iowa	1,243.0	N. J.	3.43	N.Y.	1.79	MONT.	2.29
28.	N.H.	1,218.8	Tenn.	3.42	Ariz.	1.73	Wash.	2.23
29.	Calif.	1,204.5	Fla.	3.38	Ill.	1.70	Maine	2.20
30.	Ohio	1,201.1	Miss.	3.38	Tenn.	1.60	Ohio	2.19
31.	Va.	1,164.2	N.H.	3.38	Va.	1.57	Kans.	2.17
32.	N.J.	1,146.3	Ohio	3.37	W. Va.	1.55	Mass.	2.15
33.	Ariz.	1,140.4	Ga.	3.34	Mass.	1.41	Ark.	2.13
34.	N. Mex.	1,133.4	R.I.	3.32	Wyo.	1.36	Colo.	1.98
35.	N.C.	1,123.1	Maine	3.29	Mich.	1.18	Vt.	1.95
36.	Tex.	1,114.8	N. C.	3.23	Ind.	1.17	Nev.	1.94
37.	Oreg.	1,109.3	Va.	3.20	N. Mex.	1.16	Ind.	1.89
38.	Okla.	1,097.4	Oreg.	3.15	Pa.	1.13	La.	1.80
39.	Fla.	1,069.9	Hawaii	3.14	Ala.	1.01	Tenn.	1.70
40.	S.C.	1,064.1	Ky.	3.14	Ohio	.96	Ky.	1.64
41.	Ind.	1,055.8	S.C.	3.14	Ky.	.93	Wyo.	1.60
42.	Utah	1,055.0	Mich.	3.09	S.C.	.90	Ala.	1.55
43.	Maine	1,024.8	Ind.	2.95	Ga.	.89	Iowa	1.52
44.	Ky.	1,020.1	Conn.	2.93	N. H.	.88	Tex.	1.45
45.	Wash.	1,019.7	Md.	2.93	Utah	.86	Alaska	1.33
46.	Ark.	944.2	Wash.	2.75	Vt.	.79	Ariz.	1.08
47.	Ala.	938.6	Idaho	2.62	Kans.	.64	S.C.	1.03
48.	Ga.	919.1	Utah	2.49	Miss.	.63	N. Mex.	.49
49.	Miss.	886.4	N. Mex.	2.21	N.C.	.61	Idaho	.22
50.	Idaho	823.9	Calif.	1.95	Maine	.38	Utah	.17
	D.C.	3,198.0	D.C.	5.17	D.C.	2.28	D.C.	3.91
	U.S.	1,294.8	U.S.	3.44	U.S.	1.76	U.S.	2.55

Hospital use data on patient days are computed on the basis of data now appearing in Part II of the annual "Guide Issue" of the semi-monthly HOSPITALS, official journal of the American Hospital Association. The Division of Hospital and Medical Facilities derived State inventory summaries from State Plans for hospital and related facility construction. Hill-Burton State Plan Data (PHS Pub. No. 930-F-2, annual). ¹ Includes all types of hospitals other than mental and tuberculosis. Rates are computed on the basis of July 1 population estimates excluding armed forces overseas.

Source: Part 2 of 1964 Edition of Health, Education, and Welfare Trends, "State Data and State Rankings in Health, Education, and Welfare," Washington, D. C., p. s-21.

with respect to the number of acceptable hospital beds. All four states rank among the top ten in the number of hospital beds per 1,000 population, and North Dakota has more hospital beds per thousand population than any other state.

THE NATION'S PHYSICIANS

Doctors and Death Rates

It is interesting to note that the presence of a large number of doctors is not related to the health of an area as measured by death rates. Israel, which has the highest ratio of physicians to population, and the Soviet Union with the highest ratio of any major country—a rate well above that of the United States—both have death rates higher than those of the United States.⁹ Conversely, Sweden and England, with fewer physicians than the United States, enjoy excellent health and somewhat greater longevity.

Life expectancy is a way of expressing the force or power of mortality rates in a summary figure; when death rates are low at all ages, life will obviously, on the average, be longer. When one examines Table 8, which ranks the states in the United States in terms of average life expectancy at birth, one finds South Dakota at the top of the list, though it ranked 49th in number of physicians—a situation which has puzzled U.S. Public Health Service investigators for years. Minnesota and North Dakota, with longevity rankings of third and sixth, respectively, are also healthy states in which to live. Montana is the only one of the states in the Upper Midwest that ranks low in longevity; the populations of forty states have a longer average life expectancy.

No single explanation for the generally great longevity of the Upper Midwest has been found, though it has been the subject of much study.¹⁰

Doctors Do Save Lives

If death rates do not help us to determine how many physicians are needed, what standards should be employed?

Medical care can make the difference between life and death in conditions such as staphylococcal pneumonia, appendicitis, bleeding peptic ulcer and some cancers, as well as in serious accidents; these situations obviously make it most important that medical care is available even though they are, fortunately, not numerically important causes of deaths.

The physician is more likely to be called on to give comfort and relief from specific diseases such as respiratory infections, and to minimize the discomfort, disability and loss of work time from illnesses such as arthritis. He often helps the person with an emotional problem to cope with his difficulty and to continue as a productive member of society. He, furthermore, has a most important function in the prevention of disease through immunization and other measures such as prenatal care. The infant born to a woman who has had prenatal care is much more likely to survive than one whose mother had not received that attention.

While in the 1930's the average person saw the doctor only 2.5 times per year, today he visits the doctor 4.5 times per year,¹¹ or about 300 times in his lifetime. At all times he wants reassurance, comfort, and relief of symptoms, and this personal aspect of medical care must not be discounted as an important tool for effecting the well-being of the people. The assurance that an available doctor furnishes to the healthy is also not to be disregarded. As long as people feel a need for a doctor in their area, this must be accepted as a genuine measure of need, even though the sparse population, the economic level or lack of amenities make it unlikely that any physician can ever be induced to take up practice in the community.

In tabulating the number of physicians living within a given area, one must also bear in mind the fact that the licensed physi-

⁹Russia, which has 7% of the world's population, has 25% of the world's physicians.

¹⁰Average life expectancy at birth for states was available only for 1950; the Public Health Service informed us that ranked state data for 1960 would not be available until late 1966. Data (1959-1961) for geographic divisions were available, and this evidence continued the long-standing trend for people in the West North Central division (Minnesota, Iowa, Missouri, North Dakota, South Dakota, Nebraska, Kansas) to live longer than any other geographic division. (See *Life Tables For The Geographic Divisions of The United States: 1959-61*, Vol. 1, No. 3, Public Health Service, Washington, D. C., May 1965, p. 2.

¹¹U. S. Public Health Service, *Vital and Health Statistics*, Series 10, No. 18, "Volume of Physician Visits by place of Visit and Type of Service, United States, July 1963-June 1964," U. S. Dept. of Health, Education, and Welfare, Washington, D. C., 1965, p. 3.

cian may not actually be treating the sick; he may be teaching at a medical school, engaged in administration, doing research, or possibly retired. The teacher, the administrator and the research worker are necessary for the health of a community even though they may care for few or no patients.

In attempting to describe the force of physicians available to a given population, the number of physicians in active civilian practice is often a more useful figure than the total number of physicians residing in the area. In much of our discussion, attention will be directed toward this group of physicians in active civilian practice. From the evidence available to the commission, it appears that it is this group of personal physicians that Minnesota citizens obviously feel is in short supply.

TABLE 8: Average Life Expectancy at Birth: States in Rank Order, 1950

Rank		White	
		Male	Female
1	SOUTH DAKOTA	68.4	73.6
2	Nebraska	68.2	74.0
3	MINNESOTA	68.2	73.4
4	Iowa	68.2	73.7
5	Kansas	68.0	73.7
6	NORTH DAKOTA	67.9	73.2
7	Arkansas	67.8	73.5
8	Connecticut	67.7	72.8
9	Wisconsin	67.6	72.5
10	Oklahoma	67.4	73.8
11	Utah	66.9	73.4
12	Missouri	66.8	72.5
13	Washington	66.7	72.9
14	Massachusetts	66.7	72.1
15	Oregon	66.7	73.4
16	Rhode Island	66.7	71.7
17	Ohio	66.6	72.1
18	New Jersey	66.6	71.5
19	Florida	66.6	73.7
20	New Hampshire	66.6	72.3
21	North Carolina	66.5	72.9
22	Idaho	66.5	73.1
23	Michigan	66.5	71.8
24	Maine	66.4	71.6
25	Indiana	66.4	71.9

SUMMARY

From this first examination, it appears that the Upper Midwest compares favorably with the rest of the nation in many respects. Its health, as measured by health expectancy, is unusually good. Compared with the rest of the nation, it is amply supplied with hospital beds and nurses. While Minnesota appears to have a good supply of physicians as compared with other states, these physicians provide services to an area much greater than Minnesota. North and South Dakota and Montana have fewer physicians. Although Minnesota and Montana appear to be well supplied with dentists, as judged by the whole United States, national statistics indicate that dental needs are being met only partially.

26	Mississippi	66.3	72.6
27	Vermont	66.3	72.1
28	Maryland	66.3	71.9
29	New York	66.3	71.3
30	UNITED STATES	66.3	72.0
31	Colorado	66.3	72.2
32	Tennessee	66.2	71.6
33	Illinois	66.0	71.6
34	Louisiana	66.0	72.8
35	Alabama	66.0	72.2
36	Delaware	66.0	71.3
37	Virginia	66.0	72.4
38	Pennsylvania	65.9	71.0
39	Georgia	65.9	72.8
40	California	65.8	72.7
41	MONTANA	65.7	72.4
42	Kentucky	65.7	71.3
43	Wyoming	65.5	72.1
44	Texas	65.4	72.1
45	West Virginia	65.3	71.1
46	District of Columbia	65.1	72.7
47	South Carolina	64.8	72.4
48	New Mexico	64.3	69.1
49	Arizona	63.3	71.4
50	Nevada	62.8	71.5

Source: *State Life Tables for 1949-51*, computed by the Statistical Bureau of the Metropolitan Life Insurance Company from mortality and population data supplied by the National Office of Vital Statistics and the U.S. Bureau of the Census.

TRENDS IN THE DISTRIBUTION OF HEALTH MANPOWER

PHYSICIANS

T9
T10
T11
T12
An understanding of the present supply of and future trends concerning the number of physicians requires some knowledge of the changes of the recent past. To illustrate the relevant trends, we have shown the changes in medical practice that have occurred between 1910 and 1965 in Tables 9, 10, 11 and 12. In 1910, 95% of all Minnesota doctors were in general practice, and the corresponding figure for the other three states of the Upper Midwest was about 99%. At that time Minnesota had 89 doctors who classified themselves as surgeons, 11 as medical specialists, and 4 as psychiatrists or neurologists. North Dakota, South Dakota and Montana had 4 to 5 doctors classified as surgeons. None of these states then had a psychiatrist or a neurologist, and only South Dakota had a physician who described himself as a medical specialist.

Between 1910 and 1920 there was a marked drop in the percentage of doctors in general practice and a marked increase in the number who classified themselves as surgeons. This increase in surgeons is probably accounted for in part by the founding of the American College of Surgeons in 1913. Many of the doctors who had previously classified themselves as general practitioners qualified for membership in this new society and were tabulated thereafter as surgeons. It is also likely that many doctors obtained surgical experience during World War I and subsequently chose to continue in this branch of practice.

Between 1930 and 1950 the proportion of doctors who described themselves as general practitioners remained quite stable although

there was some variation between the states in this regard. Between 1950 and 1960, particularly in Minnesota, there was a sharp decline in the percentage of doctors in general practice and an increase in the percentage of specialists. The percentage of doctors in psychiatry and neurology and in medical specialties increased rapidly in that decade. The rapid, recent growth of the heterogeneous specialists grouped under "other" is striking in Minnesota.

The increase in specialization shown in Tables 9-12 does not tell the full story. More and more doctors are taking long periods of hospital training before going into practice, and this group of trainees is not included in the tables. Many new specialties have also developed and have grown steadily. Among these are public health, occupational medicine, medical administration, pathology, radiology, and teaching and research. The increasing constriction of the group giving personal or family care has been accompanied by one other important change that has, no doubt, influenced thinking about the need for doctors. This is the increase in the demand for medical care that has accompanied rising incomes and the spread of prepaid health insurance. While there is little information on the frequency of doctor use before 1930, it is known that the average, annual per person doctor visits have about doubled between 1930 and the present time.

The effects of the changes in specialty practices are shown in another fashion in Tables 13, 14 and 15. In these tables we have shown the number of physicians per 100,000 population for each of the four states. The physicians have been broken down into three categories which will, it is hoped, clarify the significance of the changes. These statistics deal with the total number of physicians in each state, the number of physicians in active practice and, lastly, the doctors who are probably giving personal or family care. These numbers are shown as rates per 100,000 population to illustrate the changes in the size of the physician force.

T13
T14
T15

Certain difficulties related to the statistics should be mentioned. First, the large amount of work involved in obtaining these tabulations has limited us to a few recent years. Most of our statistics have been presented for census years—1940, 1950 or 1960—because these provide accurate information on population size.

TABLE 9: Percentage Distribution of Active Physicians in Minnesota by Type of Practice, 1910-65

Field of Practice	1910	1920	1930	1940	1950	1960	1965
General Practitioners	95.0	70.3	63.8	61.6	59.3	41.0	51.6
Medical Specialists	.5	3.8	8.0	7.9	10.7	18.3	13.7
Surgical Specialists	4.3	24.6	26.8	26.5	23.8	31.0	22.8
Psychiatrists and Neurologists	.2	1.3	1.4	1.1	2.2	3.6	3.5
Others*	—	—	—	2.9	4.0	6.1	8.4
Base for Calculation	100.0	100.0	100.0	100.0	100.0	100.0	100.0
	2084	2465	2791	2861	2936	3163	3787

* Others includes those in "Occupational Medicine," "Administrative Medicine," "Faculty and Research," and other types of practice which do not fit into the categories mentioned in the left-hand column. However, these physicians described themselves as "in regular practice" and hence are called "active." Data for 1910, 1920, 1930 not collected.

TABLE 10: Percentage Distribution of Active Physicians in North Dakota by Type of Practice, 1910-65

Field of Practice	1910	1920	1930	1940	1950	1960	1965
General Practitioners	99.1	70.4	65.9	61.7	56.2	45.7	47.8
Medical Specialists	0	3.6	4.7	6.1	9.6	17.2	18.3
Surgical Specialists	.9	25.4	28.6	31.4	32.8	35.6	30.5
Psychiatrists and Neurologists	0	.6	.8	.6	1.5	1.4	3.3
Others*	—	—	—	.2	.0	.1	.1
Base for Calculation	100.0	100.0	100.0	100.0	100.0	100.0	100.0
	532	528	490	458	406	435	518

* See Note Table 9.

TABLE 11: Percentage Distribution of Active Physicians in South Dakota by Type of Practice, 1910-65

Field of Practice	1910	1920	1930	1940	1950	1960	1965
General Practitioners	99.1	77.0	73.6	65.9	58.7	53.4	56.9
Medical Specialists	.2	2.2	2.4	3.6	4.6	11.4	14.2
Surgical Specialists	.7	20.3	22.9	29.2	34.7	33.6	25.8
Psychiatrists and Neurologists	0	.5	1.1	1.1	1.8	1.4	3.1
Others*	—	—	—	.2	.2	.2	.0
Base for Calculation	100.0	100.0	100.0	100.0	100.0	100.0	100.0
	590	632	550	438	434	419	515

* See Note Table 9

TABLE 12: Percentage Distribution of Active Physicians in Montana by Type of Practice, 1910-65

Field of Practice	1910	1920	1930	1940	1950	1960
General Practitioners	98.7	77.1	70.7	59.7	58.1	44.6
Medical Specialists	0	1.6	4.8	7.1	9.8	16.1
Surgical Specialists	1.3	20.1	23.8	32.4	31.2	37.1
Psychiatrists and Neurologists	0	1.2	.7	.6	.8	2.2
Others*	—	—	—	.2	.1	.0
Base for Calculation	100.0	100.0	100.0	100.0	100.0	100.0
	395	573	458	447	497	547

* See Note Table 9

TABLE 13: Total Physicians Per 100,000 Population in the Upper Midwest, 1940-65

	1940	1950	1960	1965
MINNESOTA	126	137	137	155
NORTH DAKOTA	80	77	79	98
SOUTH DAKOTA	78	75	71	87
MONTANA	96	94	96	102

TABLE 14: Active Physicians Per 100,000 Population in the Upper Midwest, 1940-65

	1940	1950	1960	1965
MINNESOTA	101 (89)	98 (94)	93 (84)	105 (86)*
NORTH DAKOTA	71	66	68	81
SOUTH DAKOTA	68	67	62	72
MONTANA	80	84	81	88

* The ratio in parenthesis is calculated with Oimsted County and the Mayo Clinic omitted.

TABLE 15: Personal or Family Physicians Per 100,000 Population in the Upper Midwest, 1940-65

	1940	1950	1960	1965
MINNESOTA	69	67	53	59
NORTH DAKOTA	44	42	43	52
SOUTH DAKOTA	47	41	39	50
MONTANA	48	56	48	55

Lack of census information of similar accuracy for 1965 makes statistics for that year less reliable. Physician statistics, furthermore, were collected in 1965 by somewhat different methods than those employed in preceding years by the American Medical Association. The problems related to these statistics are discussed more fully in the section dealing with Study Methods.

Table 13 shows that the *total* number of physicians per 100,000 population in Minnesota increased between 1940 and 1965. In South Dakota there may have been some decline in the ratio of total physicians to population, while in North Dakota and Montana the ratio of total physicians to population was stable.

Table 14 shows the active physicians per 100,000 population in each state. The number of *active* physicians has been arrived at by eliminating all doctors who describe themselves as retired, not in practice, or still in hospital training. The recent medical graduates who are in hospital training undoubtedly give much medical care within each state, but they are not available to the general population. Many of them, furthermore, will leave Minnesota, the only one of the three states with a large number of trainees, upon completion of their internship or residency. The large size of this group can be deduced from the difference between the ratio for total physicians and the ratio for active physicians for Minnesota in 1965. The example of the Mayo Clinic with about 700 Fellows (equal to about one in seven of all practicing doctors in Minnesota) gives one measure of the size of this group. In addition, the University of Minnesota has a large number of doctors in training, and there are others in the larger hospitals in Minneapolis, Saint Paul, and Duluth.

In the three western states, the ratio of active physicians to population has been stable on the whole. The rates for North and South Dakota are lower than those for Minnesota and Montana. If the 1965 rates are accurate, there has been a gain in the number of active physicians in all three western states since 1960.

In Minnesota the number of active physicians per 100,000 population declined steadily between 1940 and 1960 and then rose very rapidly in the next five-year period. However, the Minnesota ratio is strongly influenced by the presence of the Mayo Clinic. When

similar ratios are calculated for the state without Olmsted County—and its concentration of doctors at the Mayo Clinic—both the ratio and the trend over time are somewhat different. These ratios, which are shown in Table 14 in parenthesis, are definitely lower. Furthermore, the marked increase in active physicians between 1960 and 1965 is clearly due in large part to growth of the Mayo Clinic. Although the decline in the ratio of active physicians to population has been somewhat irregular, it has tended downward for a quarter century. The 1950 statistics were often out of line from those of other years, and this is probably related to the dislocations of the immediate postwar period.

In a later table (21) the actual gains and losses of physicians in the various hospital regions in Minnesota are shown for the years 1960-1965. This table will help to make clear how the ratio of the active physicians to the population has been distorted.

In Table 15 an attempt has been made to estimate the number of doctors per 100,000 population engaged in giving personal or family care. Included in this tabulation are the general practitioners, most of the internists, and the pediatricians. A small group of internists, including those who describe themselves as allergists, cardiologists, endocrinologists, gastroentologists, and specialists in pulmonary disease, have been excluded since men in these fields are more likely to be consultants than personal physicians. Other specialists, such as surgery, psychiatry and neurology, are also excluded even though it is recognized that a few surgeons also do some general practice. The group of doctors who are included in this table are those to whom men, women and children would probably turn for primary medical care. The ratio for Minnesota is clearly declining as was that for South Dakota until 1960. The ratios for Montana and North Dakota were stable over the period from 1940 to 1960, and were followed by an increase between 1960 and 1965. If there is a feeling that doctors are in short supply or that doctors have too little time for their patients, these statistics explain why this is so. If we look at the figure for Minnesota, we see that in 1940 over one-half of all physicians were engaged in practice which has here been classified as personal or family doctoring. By 1965 this proportion had dropped to almost one-third. Stated in another way, there were 69 doctors available in 1940 to

TABLE 16: Estimated Total Visits to Personal or Family Doctors Per Day, Minnesota, 1965

	Number	Patient Visits per Day	Estimated Total Visits per Day
General Practitioners	1475	30	44,250
Internists	501	21	10,521
Pediatricians	144	25	3,600
TOTALS	2120		58,371

Source: Mawardi, B. H., A Career Study of Physicians, *J. Med. Educ.* 40:658-666, (1965).

give the care which only 53 doctors were giving in 1960 or 59 were giving in 1965.

The Need for Personal or Family Physicians

There are thousands of human diseases sufficiently well known to have a name. A few score of these diseases are common, many are uncommon, and a great many are rare. The need for a large body of personal doctors (general practitioners, internists and pediatricians) is related to the frequency of common diseases. However, one must not confuse common diseases with mild or trivial diseases. A patient with pneumonia—a potentially serious disease—can probably be better treated by a family doctor, because of his extensive experience, than by many specialists for whom that is an uncommon condition.

Because common diseases are common, we need more personal physicians than any other type of doctor or specialist. For example, most people will require the attention of a surgeon during their lifetimes but, fortunately, few will require his care very often. Most people will never need a psychiatrist, and a very small percentage are ever likely to need a neurologist or a heart surgeon.

Personal physicians are better distributed in relation to the population than all other doctors. This is due to the fact that general practitioners, the most numerous of the group, are quite evenly distributed in relation to population. The other personal doctors, the internists and the pediatricians, are more like the other specialists in that they usually practice in larger towns and cities.

The diminution in the number of general practitioners from decade to decade will have far reaching effects. If the general practitioners disappear, which is quite possible unless something is done, there are many smaller towns which now have a physician that will have none in the future. In addition, the care of a physician will be more difficult to obtain because doctors will be even busier than they are now.

Table 16 shows the number of personal or family doctors in Minnesota. From a recent study, the average number of patients

visiting each type of personal physician is known. From this we have estimated the total daily patient visits to general practitioners, internists and pediatricians as well as the total for all personal doctors in Minnesota. The estimated number of visits is over 50 thousand for each working day.

If we make the assumption that the men who formerly entered general practice will all henceforth select internal medicine, we can then calculate how many doctors will be needed to provide the same volume of service at some future date when there are no general practitioners. If we assume, for the sake of ease, that the number of pediatricians remains the same while these changes in general practice and internal medicine are occurring, one can estimate that 2,752 internists and pediatricians, seeing patients at their present rates, would be required to give the same volume of care now given by Minnesota's 2,120 general practitioners, internists and pediatricians. *Over six hundred* more doctors will be needed to give the same number of services.

The three other states are actually gaining general practitioners in recent decades so this estimating process is not as relevant for them. However, if general practitioners disappear from the rest of the United States, North Dakota, South Dakota and Montana are unlikely to escape changes. The calculated numbers of additional personal physicians needed under the conditions cited above would be:

North Dakota 104
South Dakota 123
Montana 125

It is thus quite obvious that the decline in the proportion of general practitioners will be accompanied by a diminution in the amount of patient care. If the amount of care is to be sustained at present levels, a large increase in the number of practicing family doctors will be needed.

The assumption used above is not altogether realistic. The men who in earlier years became general practitioners are now distributing themselves in many specialties in addition to internal medicine and pediatrics. The shift away from general practice has not been matched by an equal shift into other types of personal prac-

tice. Psychiatrists, whose numbers are increasing rapidly, see an average of seven patients each day, or less than a quarter of the number of those seen by a general practitioner. Obstetricians average 16 patients, general surgeons, 20, while the more highly specialized surgeons probably see only a fraction of these numbers daily. Medical administrators, a growing professional group, seldom treat patients. Thus the diminution of general practitioners is going to have profound effects on access to doctors and on the time which doctors can give to their patients.

The four states included in our studies are not the only ones that have felt a need for doctors. Several have established programs whose purpose was to attract practitioners—usually general practitioners—to areas of shortages. Preceptorships in family practice for medical students, elaborate educational services for the doctors in rural areas, and student loans which are forgiven after a certain number of years devoted to rural practice are among the programs tried. There is no evidence that any of these programs to recruit physicians for rural areas have been successful.

Questionnaires sent out to doctors who had settled in Minnesota showed that the most frequent reason for selecting a certain community was the practice opportunity it provided. *About a third* of the doctors were attracted by an opening in a group or a partnership. About 36% indicated that available hospital facilities influenced their selection.

Although doctors are forsaking solo rural practice, the number of doctors in rural group practice is increasing sharply. It seems probable that attempts to promote the formation of group practices in underdoctored areas holds more promise than other less direct attempts to recruit doctors.

Businessmen members of the Advisory Commission were deeply interested in the idea of using economic inducements to improve physician distribution. Low interest or interest-free loans to set up group practices were suggested as one mechanism. The payment of higher fees to doctors in areas needing physicians was a second suggested mechanism. Unfortunately, the persons who live in areas with the fewest doctors are also the least likely to have service insurance such as the Blue Shield, but it is probably the

only carrier that might consider using its resources to promote a better physician distribution.

If certain areas cannot attract physicians, alternative arrangements should be planned. In some instances good transportation may make the lack of a local doctor relatively unimportant. In addition, organized nursing services can provide some of the services now given by doctors. An experienced nurse, for example, can make better decisions about the patient's need for a home call or urgent care than can the patient himself. In areas without doctors, the community provision for the occasional emergency should be well established so that the patient can be rapidly transported to whatever facility is needed.

The rising demand for medical care and the changes in medical science have already made doctors acutely aware of pending problems. More extensive use of nurses to save doctor time is one suggested adaptation. Some European countries attach public health or visiting nurses to family doctors to make time-consuming house calls for doctors. Several medical centers in the United States have reinstated training of nurse-midwives. There is no doubt that under proper supervision the care given by the nurse-midwife is as safe as that of the doctor. At the Duke Medical School physician assistants are being trained to do histories, physical examinations, and many other routine clinical tasks under a physician's direction. Undoubtedly, in addition to providing more physicians, it will be necessary to make them more efficient. One way to do this is to give them more trained professional assistants—nurses, technicians and, perhaps, assistant physicians.

The problems of doctor distribution are complicated and are resistant to easy solutions. As mentioned elsewhere, the Advisory Commission would have proposed a regional body to provide a continuing surveillance of manpower problems and would have proposed that such a body also give attention to the distribution of physicians, dentists, and other medical personnel had it not been for the regional planning program created by federal legislation in 1965. While the Commission did not feel that it should recommend specific action to improve physician distribution, it felt strongly that attention must be given to this problem.

Public Law 89-239, better known as the Cancer, Heart Disease and Stroke program, stated as one of its purposes, ". . . to improve generally the health manpower and facilities available to the nation." It seems quite clear that federal funds can be used to support experiments whose aim is to achieve better distribution of physicians and of medical care.

Osteopaths

The practice of osteopathy has become more and more difficult to distinguish from the practice of medicine in recent years. It is therefore logical to see what contribution this group of doctors makes to patient care.

The total number of active osteopaths in the Upper Midwest is only 146. The rate per 100,000 population is only 1.7 in Minnesota and North Dakota, but in South Dakota and Montana it is 5.5 and 4.5, respectively. Although the osteopaths' contribution to patient care in South Dakota and Montana is much higher than in the other states, it can nowhere be described as substantial.

Physicians' Median Age

The age distribution of physicians is an important statistic since it provides a basis for estimating future physician needs. To illustrate this point, we might consider two extreme examples. If we found that one county had ten physicians, all of whom were over 60 years of age, it could be predicted that the county's needs for physicians would be great in the near future, since these doctors would either retire or die in a relatively short period of time. Another county, whose physicians were all under age 45, would face a very different kind of problem in considering its future needs, since it is unlikely that many of these doctors would die in the next 10 to 20 years and few will normally retire before age 65.

Where doctors are irregularly distributed in different age groups, the average age of a group of physicians may give an inaccurate picture, so we have used the *median age* instead. The median age is the age at which the number of younger doctors is

equal to the number of older doctors. In Table 18 we have shown the median age of the physicians in the Upper Midwest.

It will be noted that the median age of all active physicians in Minnesota has increased from 1940 to 1965. The median age for all physicians in North Dakota, South Dakota and Montana has been dropping, which means that the medical profession is, on the whole, becoming younger. The median age in the three western states may be shifting to lower ages because older doctors are retiring more rapidly or because greater numbers of young men are taking up practice. Since the median age of Minnesota doctors has been increasing for the last 25 years, it seems very likely that the number of young doctors entering practice has been fewer than the number of older doctors who have died or retired.

When the median age of the general practitioners is studied, it will be seen that Minnesota's general practitioners have been getting steadily older between 1940 and 1965. During the same period the median age of all specialists has been quite stable. The rather steady rise in the median age of general practitioners in Minnesota is related to the fact that fewer and fewer doctors are choosing this field of practice. The fact that the median age of specialists is stable probably indicates that the gains and losses from these fields are roughly in balance.

In South Dakota the median age of the general practitioners increased slightly between 1950 and 1965. However, this increase is much less than the increase in Minnesota. The median ages of general practitioners in North Dakota and Montana do not seem to show any definite trend. Specialists in all three of the western states seem to be becoming younger as shown by a declining median age.

The next table, Table 19, shows the percentage of doctors who are 45 years or younger and those who are 55 or older and their field of practice in the four states in 1965. Forty-nine percent of all Minnesota physicians are 45 years or younger. Only 46% of general practitioners are in this youngest age group in contrast with the specialist groups, all of whom have a higher percentage of young doctors. At the other end of the age span, 30% of all Minnesota doctors are 56 or older, but 35% of the general practitioners are in

TABLE 17: Number of Total and Active Osteopaths and Ratio Per 100,000 Population in the Upper Midwest, 1964

	TOTAL		ACTIVE	
	No.	Ratio	No.	Ratio
MINNESOTA	73	2	63	1.7
NORTH DAKOTA	11	1.7	11	1.7
SOUTH DAKOTA	42	5.9	39	5.5
MONTANA	44	6.0	33	4.5
WHOLE AREA	170	3.0	146	2.6

TABLE 18: Median Age of Active Physicians in the Upper Midwest by Type of Practice, 1940-65

	GPs	Specialists	All
MINNESOTA			
1965	47.1	45.2	46.5
1960	46.7	45.3	46.2
1950	42.4	45.3	42.9
1940	41.5	42.2	41.6
NORTH DAKOTA			
1965	44.4	44.0	44.1
1960	44.1	46.5	45.5
1950	46.0	50.2	48.7
1940	53.6	50.9	53.0
SOUTH DAKOTA			
1965	45.9	46.4	45.9
1960	44.6	46.8	45.2
1950	44.4	50.2	47.5
1940	57.4	51.6	55.2
MONTANA			
1965	45.3	44.8	44.8
1960	46.0	46.9	46.2
1950	44.5	47.1	45.9
1940	54.9	47.9	51.3

TABLE 19: Percentage of Active Minnesota Physicians Age 45 or Younger and Age 56 and Older by Type of Practice, 1965

Age Group	GPs	Med. Spec.	SS	P & N	Others	All Physicians
25-45	46%	51%	84%	52%	66%	49%
56+	35%	33%	4%	27%	14%	30%

this age group. The "other" specialists are a very young age group as can be seen by the fact that two-thirds of them are age 45 or less and only 14% are over 55. All the other specialists tend to have the smaller percentage of the doctors in the highest age group and the highest percentage in the youngest age group.

It is unnecessary to calculate a similar table for Montana or the Dakotas. Since the median ages of the doctors in the different fields of practice are almost the same, we can be confident that percents in the different age groups will not be greatly different.

We have pointed out above that the decline in general practitioners has not been matched by entry into other fields that we have associated with personal care. In 1965 there were 520 medical specialists including pediatricians in contrast with 1,373 general practitioners. The fact that the general practitioners are the largest single group of doctors giving personal or family care makes their increasing and high median age a particularly important finding.

Physicians Distribution Within Hospital Planning Regions

There are 261 counties in the four states encompassed by the Health Manpower Study. Since census data is reported on a county basis, a great deal of statistical information is available for these smaller population groupings.

Analyzing medical care by county unit, however, presents serious problems. A county that appears to have a shortage of physicians may actually be adjacent to another with a large city and many physicians. Sometimes cities occupy parts of several counties, and patients often cross county lines to get medical care. In the years since counties were established, there have been, furthermore, great shifts in population and changes in the flow of trade and transportation. Although the counties still have important administrative functions, they often have little relationship to present economic or medical care activities.

In attempting to minimize the difficulties associated with county statistics, the Health Manpower Study staff has chosen to

utilize the larger hospital regions originally defined as part of the planning for the Hill-Burton hospital construction program which began in 1946. Each region is composed of the several counties that constitute a medical trade area; such regional information eliminates the problem of county analysis and gives a better indication of the availability of medical care to persons residing in each region.

Geographers at the University of Minnesota state that the hospital planning regions within each state correspond closely to the "circulation systems" or marketing regions developed by the Upper Midwest Economic Study. These hospital planning regions honor county and state lines and have not been changed since their inception.

The distribution of medical care will almost certainly be organized regionally in the future, as a result of the availability of funds for regional planning and development under the so-called Cancer, Heart Disease, and Stroke Program. An examination of the population and physician-population ratios in the Hill-Burton Regions over the study years shows how the population has grown or declined and how the physician distribution has changed within the four states.

The eleven planning regions in Minnesota have populations of very dissimilar size. As Table 20 shows, 51% of the state's population lives in Region VIII which includes the Twin Cities; the next largest is Region V centering on Duluth, which contains 9.57% of the population. The smallest region is III (Koochiching County) which contains only .53% of the state's population.

The metropolitan area (Region VIII with St. Paul and Minneapolis) has always had a large percentage of the physicians practicing in the state, and in each of the years shown it has increased its proportion of the total physician force. While this region is undoubtedly the "best served" with respect to physicians, its ratio of physicians per 100,000 population has dropped through the years. Thus, the need for physicians, while more acute in the rural areas, is likely to be felt in metropolitan areas too.

During the tabular years, Region XI, which contains the Mayo Clinic, has more physicians in relation to its population than any

FIGURE 8: Boundaries of Hospital Planning Regions.

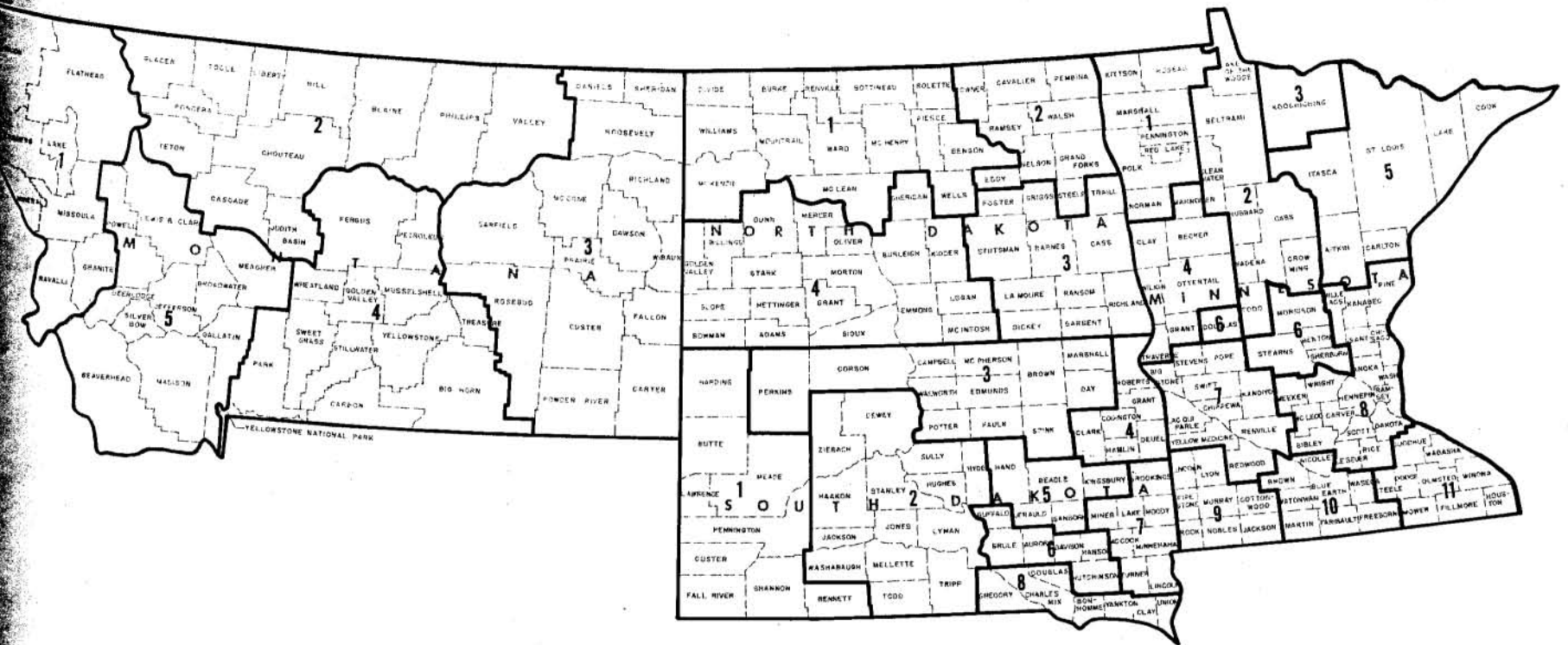


TABLE 20: Percentage Distribution of Population, of Active Physicians, and Active Physicians Per 100,000 Population by Hospital Planning Region, Minnesota, 1940-65.

	1940			1950			1960			1965	
	% of State Pop.	% of MD's	MD/100,000	% of State Pop.	% of MD's	MD/100,000	% of State Pop.	% of MD's	MD/100,000	% of State Pop.	% of MD's
Region I	4.19	2.4	60	3.65	1.9	51	2.94	1.7	55		1.4
Region II	5.21	3.0	60	4.69	3.1	64	3.83	2.6	64		2.2
Region III	0.61	0.4	65	0.57	0.3	53	0.53	0.3	50		0.3
Region IV	5.08	3.2	65	4.75	2.8	59	4.26	2.7	59		2.3
Region V	10.46	9.1	89	9.69	9.3	94	9.57	9.4	90		7.7
Region VI	5.07	3.2	64	4.84	3.1	63	4.26	2.8	55		3.2
Region VII	6.21	4.1	68	5.76	4.5	77	4.90	3.8	71		2.9
Region VIII	43.32	45.8	108	46.71	55.5	117	51.00	54.2	98		51.4
Region IX	4.52	3.6	81	4.26	3.1	71	3.74	2.4	60		2.0
Region X	6.79	6.4	97	6.64	5.6	83	6.28	5.5	82		4.5
Region XI	8.56	18.6	223	8.45	10.5	123	8.31	14.5	162		19.3
TOTAL	100.00	100.00	101	100.00	100.00	98	100.00	100.00	93		105
Base For Calculation	2,792,300	2,868		2,982,483	2,936		3,413,864	3,163		3,611,868	3,787

* No data available

TABLE 21: Number of Active Physicians by Region, and Gains or Losses, 1960-65

Region	Number of Active Physicians		
	1960	1965	1960-1965 Changes
1	55	53	-2
2	83	82	-1
3	9	11	+2
4	86	86	
5	294	292	-2
6	87	131	+44
7	119	108	-11
8	1713	1946	+233
9	77	74	-3
10	176	173	-3
11	150*	150	-9
	(305)	(681)	+376
TOTALS	3163	3787	

* Region XI with Olmsted County omitted

TABLE 22: Percentage Distribution of Population, of Active Physicians, and Active Physician Per 100,000 Population by Hospital Planning Region, North Dakota, 1940-60

	1940			1950			1960		
	% of State Pop.	% of MD's	MD/100,000	% of State Pop.	% of MD's	MD/100,000	% of State Pop.	% of MD's	MD/100,000
Region I	27.49	24.47	65	27.36	25.24	62	27.80	23.26	61
Region II	20.06	21.06	77	19.93	18.75	63	19.83	21.09	77
Region III	27.63	32.55	86	28.57	35.10	83	28.52	33.26	85
Region IV	24.82	21.91	65	24.14	20.91	58	23.85	22.39	68
TOTALS	100.00	100.00	73	100.00	100.00	67	100.00	100.00	73

other region. It is extremely difficult to estimate a realistic rate for Region XI because of the Mayo Clinic's very wide area of service. About one-third of the care at the Mayo Clinic is given to Minnesota residents. If a third of the Mayo Clinic staff is counted as part of Region XI's physician force, the figure given in Table 20 for 1960 is reduced from 162 physicians per 100,000 to about 80 physicians per 100,000.

Between 1960 and 1965 there were several shifts in the distribution of active physicians between regions. Most of the regions had a smaller percent of total active physicians in 1965 than in 1960, and a few had the same percent in both years. Region VI, which is centered on St. Cloud, gained 44 physicians and increased its share of the state's physicians from 2.8 to 3.2%. This is a marked change since the area had been losing ground in previous years both as measured by its percentage of all Minnesota physicians and by its physician-population ratio. Region VIII, centered on the Twin Cities, gained 233 physicians between 1960 and 1965, but its proportion of the total fell from 54 to 51% in the five-year period. All of the other regions except Region XI contained a lower percentage of the state's active physicians in 1965 than in 1960. Region XI's percentage of Minnesota active physicians increased from 14.5% to 19.3%. During this five-year period Minnesota gained somewhat over 600 physicians and a large part of this was due to Region XI. All of this gain in Region XI occurred in Olmsted County and was undoubtedly related to growth of the Mayo Clinic staff. If we exclude Olmsted County from Region XI, the picture is very different. The physician-population ratio for this truncated region becomes 70 per 100,000 population in 1940, 65 in 1950 and 56 in 1960. We cannot calculate the 1965 doctor-population ratio since there is no available estimate of the population for each region for this year. The number of doctors practicing in the region exclusive of Olmsted County was essentially the same in 1965 as in 1960, and there probably was very little change in the ratio.

To make the changes clear, the actual number of doctors practicing in each region is shown in Table 21 for 1960 and 1965 together with the losses or gains. Again it will be seen that for most regions there was little change. Region VI (St. Cloud) and

Region VIII (The Twin Cities) both gained a substantial number of doctors. The figures for Region XI, 159 and 150, are for the area outside of Olmsted County whereas the figures in parentheses are for Olmsted County. It is apparent that most of Minnesota's gain in physicians between 1960 and 1965 was related to this one county.

While most of the changes in the number of doctors in the various regions are not striking, these changes have to be set against a population growth of almost 200,000 during the same period.

In each of the years shown, all the Minnesota hospital planning regions except Regions VIII and XI contain a smaller proportion of the state's physicians than of the state's population. Other tabulations show that in Minnesota, as in the country at large, specialists are concentrated in large cities while only the general practitioners are distributed in rough proportion to the population. A general practitioner is probably rather fully occupied in giving care to 2,000 people, while specialists usually can serve much larger populations. It is often estimated that a population of a million persons is required to keep one neurosurgeon fully occupied. The impressive concentration of doctors in Region VIII as compared with other areas does not represent a serious imbalance. As everyone knows, the Twin Cities is a medical center for a wide area.

North Dakota is divided into four hospital planning regions of roughly similar population (Table 22). The physician force in North Dakota is rather evenly distributed within these four regions. Although the differences are not great, Region III has consistently had a higher proportion of physicians than of population, while Region I and IV have had fewer. T22

Table 23 reveals that South Dakota's hospital planning regions are more varied with respect both to physicians and to population. The range in the physician-population ratio is greatest in this state. Region II with 46 physicians per 100,000 population or well over 2,000 persons per physician has the smallest available supply. Regions I, VI and VII have consistently had a larger proportion of the state's physicians than of the state's population. T23
T24

TABLE 23: Percentage Distribution of Population, of Active Physicians, and Active Physician Per 100,000 Population by Hospital Planning Region, South Dakota, 1940-60

	% of 1940 State Pop.	% of MD's	MD/ 100,000	% of 1950 State Pop.	% of MD's	MD/ 100,000	% of 1960 State Pop.	% of MD's	MD/ 100,000
Region I	13.82	16.11	81	14.96	15.06	69	18.06	20.09	73
Region II	8.98	6.26	49	8.20	5.39	45	8.62	6.03	46
Region III	18.08	17.00	65	17.37	15.96	63	15.81	15.62	65
Region IV	10.64	10.29	67	10.30	10.56	70	9.34	7.81	55
Region V	7.49	6.26	58	7.32	6.97	65	6.80	6.47	63
Region VI	7.28	8.28	79	6.98	7.86	77	6.61	7.14	71
Region VII	21.63	24.16	78	22.94	27.19	81	24.16	27.46	75
Region VIII	12.07	11.63	67	11.92	11.01	63	10.59	9.38	58
TOTALS	100.00	100.00	70	100.00	100.00	68	100.00	100.00	66

TABLE 24: Percentage Distribution of Population, of Active Physicians, and Active Physician Per 100,000 Population by Hospital Planning Region, Montana, 1940-60

	% of 1940 State Pop.	% of MD's	MD/ 100,000	% of 1950 State Pop.	% of MD's	MD/ 100,000	% of 1960 State Pop.	% of MD's	MD/ 100,000
Region I	17.90	18.26	86	19.36	21.19	96	19.05	17.83	82
Region II	23.34	22.08	80	23.01	21.39	82	25.30	22.41	77
Region III	14.13	13.16	78	13.16	10.21	68	12.22	12.73	91
Region IV	19.97	19.53	82	20.87	19.46	82	21.44	23.26	95
Region V	24.66	26.96	92	23.59	26.78	100	21.97	23.77	95
TOTALS	100.00	100.00	84	100.00	100.00	88	100.00	100.00	87

TABLE 25: Active Physicians Per 100,000 Population By Degree of Urbanization of County, Minnesota, 1940-60

Percent Urban Population	1940		1950		1960	
	Number of Counties	MD/ 100,000	Number of Counties	MD/ 100,000	Number of Counties	MD/ 100,000
0-9	32	64	27	56	24	53
10-19	11	65	7	68	6	49
20-29	16	63	15	71	13	68
30-39	12	67	17	75	20	58
40-49	5	115	8	161	8	62
50-59	7	86	6	73	4	90
60-69	1	90	4	138	8	134
70-79	1	97	1	104	1	101
80-89	0	0	0	0	1	16
90-100	2	124	2	117	2	138
TOTALS	87	101	87	98	87	93

The Urban-Rural Distribution of Physicians

Physicians show an increasing tendency to choose practice locations in cities (Table 25). Our population has been shifting from farms and rural areas to urban centers for many years, and physicians have followed this trend or may even have been shifting more rapidly than the population as a whole. The reasons for this are, no doubt, many and complex. The increasing frequency of specialization plays some part, since specialization is often dependent upon technical facilities that are found only in urban hospitals. The larger populations served by many specialists also make an urban location necessary.

Table 25 shows the changes that have taken place between 1940 and 1960. In addition to changes in the ratios of doctors to population, the numbers of counties in each urbanization class have changed. The most rural counties—those with less than 10% of their population living in areas defined as urban—numbered 32 in 1940, dropped to 27 in 1950, and to 24 in 1960.

The appendix table shows the type of doctors—general practitioners, medical and surgical specialists, etc.—practicing in the different types of counties. The number of doctors serving the most rural counties is dropping. The counties with less than 20% of their population in urban places have lost doctors since 1940. All counties with less than 50% of their population living in urban places lost doctors between 1950 and 1960.

In each year shown, the highest physician:population ratio is found in the Minneapolis-Saint Paul metropolitan area, except for Olmsted County, which includes Rochester and the Mayo Clinic.

The rural counties tend to have low physician-population ratios; most of the physicians practicing there are general practitioners. As the counties become more urbanized, the number of specialists rises, until in Hennepin and Ramsey counties 71% of the physicians are specialists. While there is no question that specialists need hospitals and other facilities and the larger population bases that only urban areas can provide, the declining number of doctors in the rural areas is cause for some concern.

The tables for the other three states demonstrate much the same trend. The number of the most rural counties (with less

TABLE 26: Active Physicians Per 100,000 Population by Degree of Urbanization of County, North Dakota, 1940-60

Percent Urban Population	1940		1950		1960	
	Number of Counties	MD/100,000	Number of Counties	MD/100,000	Number of Counties	MD/100,000
0-9	41	47	40	38	39	39
10-19	2	70	0	0	0	0
20-29	0	0	2	64	1	53
30-39	6	83	2	58	2	76
40-49	0	0	5	81	3	58
50-59	2	117	0	0	3	60
60-69	2	143	3	110	2	96
70-79	0	0	1	160	2	118
80-89	0	0	0	0	1	168
90-100	0	0	0	0	0	0
TOTALS	53	71	53	66	53	68

TABLE 27: Active Physicians Per 100,000 Population by Degree of Urbanization of County, South Dakota, 1940-60

Percent Urban Population	1940		1950		1960	
	Number of Counties	MD/100,000	Number of Counties	MD/100,000	Number of Counties	MD/100,000
0-9	51	54	45	42	44	41
10-19	2	34	2	40	0	0
20-29	1	66	3	69	3	43
30-39	3	67	2	29	2	32
40-49	3	77	8	71	5	58
50-59	4	96	0	0	4	76
60-69	4	110	3	98	3	112
70-79	1	95	5	109	6	68
80-89	0	0	0	0	0	0
90-100	0	0	0	0	0	0
TOTALS	69	68	68	67	67	62

TABLE 28: Active Physicians Per 100,000 Population by Degree of Urbanization of County, Montana, 1940-60

Percent Urban Population	1940		1950		1960	
	Number of Counties	MD/100,000	Number of Counties	MD/100,000	Number of Counties	MD/100,000
0-9	36	61	34	56	32	51
10-19	0	0	0	0	0	0
20-29	4	63	3	64	2	35
30-39	1	89	3	60	5	76
40-49	6	96	4	80	1	57
50-59	3	72	4	91	7	70
60-69	4	100	5	116	4	119
70-79	2	105	4	112	3	113
80-89	1	95	0	0	2	116
90-100	0	0	0	0	0	0
TOTALS	57	80	57	84	56	81

than 10% of the population living in urban areas) is declining in all three states, and the number of counties with a large proportion of their population in urban areas is increasing. In general, the ratio of doctors to population is declining in the most rural counties and is increasing in those that are most urban.

The Migration of Physicians

729 The Health Manpower Study staff sought to determine the extent to which the medical schools of the rest of the nation (or the world) contributed doctors to the Upper Midwest and the number of graduates of the three medical schools within the Upper Midwest that are lost to other areas. Table 29 shows the numbers of doctors in these two categories.

In 1910, the first year for which statistics are presented, the North and South Dakota medical schools had not been formed and the Minnesota school was only 20 years old. In that year, there were 140 Minnesota-educated physicians practicing outside of the Upper Midwest, and 1260 physicians educated in other parts of the United States were practicing in Minnesota. With the passage of time, the Minnesota-educated physicians increased many fold. Between 1910 and 1965, the physicians educated elsewhere in the United States and practicing in Minnesota increased from 1260 to 1865 or by 48%. Minnesota's population increased 74% during this same period, so Minnesota's ability to attract doctors has not kept pace with its population growth. It will be noted that in 1965 the number of Minnesota's graduates practicing outside the Upper Midwest and Minnesota's imported physicians were almost equal.

While the University of Minnesota has supplied an increasing proportion of all of Minnesota's doctors, its contribution to general practice has been more striking. The proportion of the state's general practitioners who are Minnesota graduates has risen steadily from about 25% in 1910 to 65% in 1960, and even slightly higher in 1965. This shift is probably due to two changes. The first is the rapid decline of general practice and the second is the low mobility of general practitioners. The latter are much more likely to practice in the area where they obtained their medical education than are specialists.

North and South Dakota exhibit trends that are much alike. As the size of their medical school alumni group has grown, the number practicing in other parts of the United States has increased. In 1965 South Dakota had obtained about the same number of physicians from out-of-area schools as it had exported to these same areas. Montana, which has no medical school, cannot be analyzed in terms of in-and-out migration, as the state has to import all her physicians.

North Dakota has lost in this exchange with other regions of the United States as is evident from the 1950, 1960 and 1965 statistics. There are substantially more North Dakota physicians practicing outside of the area than it recruited from outside.

There is no way of identifying the native Minnesota-born physician who obtained his medical education outside of the state. A native of Minnesota who obtains his medical education in Chicago or Philadelphia and returns to practice in Minnesota appears as an import in Table 29. In recent years about 20% of Minnesotans obtained their medical education out of state. Very probably, quite a few of these doctors returned to Minnesota to practice.

730 Table 29 makes it clear that Minnesota will have to depend increasingly upon its own resources in supplying its physicians. In Table 30, which shows the percentage of practicing physicians in the Upper Midwest who are Minnesota-educated, this is seen more plainly. In 1910 Minnesota had educated only 40% of its own physicians, and this percent has increased quite regularly to 53% in 1965. The substantial contribution made by the University of Minnesota Medical School to the physician manpower of the other three states is also evident. It has educated more doctors for North Dakota than for any other state, but this number has been declining since 1950.

The physicians who came to Minnesota to practice graduated from many medical schools, but the greater number came from the North Central states, especially Illinois with its many medical schools. New York and Pennsylvania also educated substantial numbers of Minnesota practitioners. The recruitment of physicians for North Dakota, South Dakota, and Montana was also largely from this same group of states.

The In-Migrating Physician. Since so many of the physicians who practice in the Upper Midwest were educated elsewhere, it seemed sensible to ask some of them why they had made this selection. A random 10% sample of the physicians who were educated in other areas and who were in practice in the Upper Midwest in 1965 was drawn. Questionnaires were sent to these 347 physicians, and of these 87% responded.

Most of the physicians practicing in Minnesota who were educated elsewhere are in group or clinic practice; 74% were specialists. The decision to practice in Minnesota, these doctors stated, was based on the high standard of medical care and the availability of adequate hospital facilities, hospital appointments, openings for the physician's speciality, post graduate training opportunities, and the opportunity to join an established group. Cultural and social advantages and educational opportunities for the children were also important factors in the decision to practice in Minnesota. The area's need for a doctor, climate, internship and residency opportunities, family factors, teaching, research and medical school appointments were not frequent influences on these doctors.

When asked about their major source of income, 73% indicated that it was from private practice. Surprisingly, 64% reported that they received some portion of their income from salary. Seventy-three percent indicated that they originally had considered practicing in an area other than Minnesota, and 53% said they had considered leaving.

Physicians educated out of the four-state area and now in North Dakota were frequently practicing in groups; 57% are specialists. Ninety-two percent of the respondents derived their major income from private practice, but 38% had some salaried income.

Their move to North Dakota was prompted by availability of adequate hospital facilities, standard of medical care, the area's need for a doctor, and the educational advantages available to the children. Sixty-five percent of these physicians had considered locating in another state. North Dakota was chosen mainly because of the area's need for a doctor, and most of these physicians have not seriously considered leaving the area.

TABLE 29: Number of Physicians Educated at Minnesota, North Dakota, and South Dakota Practicing Outside the Upper Midwest States Compared with Physicians Educated Elsewhere Practicing in the Upper Midwest States

	Physicians Educated in the Four State Area Practicing Out of the Area, by School			Physicians Educated Out of the Four State Area By State of Practice		
	Minn.	N.D.	S.D.	Minn.	N.D.	S.D.
1965	1815	633	510	1865	485	499
1960	1960	520	499	1485	409	418
1950	1239	425	369	1721	328	416
1940	936	264	273	1556	370	443
1930	572	86	101	1564	370	509
1920	243	11	18	1557	420	602
1910	140	0	0	1260	422	551

TABLE 30: Percent of All Physicians Educated in Minnesota and Ratio of Minnesota-Educated Physicians Per 100,000 Population for Upper Midwest and by State, by Year

YEAR	UPPER MIDWEST		MINNESOTA		NORTH DAKOTA		SOUTH DAKOTA		MONTANA	
	Per Cent	Ratio	Per Cent	Ratio	Per Cent	Ratio	Per Cent	Ratio	Per Cent	Ratio
1965	40	39	53	56	12	10	9	7	11	10
1960	42	39	56	56	14	11	9	6	12	11
1950	42	44	52	64	24	17	10	7	15	13
1940	41	41	52	60	25	19	9	7	13	12
1930	36	36	47	54	26	19	9	7	9	7
1920	27	27	39	41	20	16	6	6	6	6
1910	28	28	40	40	21	19	7	7	7	8

Source: AMA Directories.

Responses by South Dakota physicians revealed that 57% practiced alone and that one-third were specialists. Group practice does not appear to be as significant in South Dakota as it is elsewhere in the Upper Midwest.

Their present location in South Dakota, however, was strongly influenced by economic promise, availability of hospital facilities, or hospital appointments. Two-thirds of the respondents had lived in South Dakota before they were married. Nearly half were in private practice, though eight respondents were employed by private companies, and half the respondents had some income from salary.

Seventy percent had originally considered another practice location. Like North Dakota, South Dakota's need for physicians proved to be the factor that influenced these physicians. The opportunity to be near relatives was a second important reason given by these physicians. Fifty-seven percent have considered leaving the area.

In Montana, the respondents were nearly equally divided between group practice and solo practice and slightly more than half are specialists. Nearly all the Montana respondents were in private practice, though one-third derived some income from salary. Only one-third had given any consideration to leaving the area.

Montana attracts physicians primarily because of its hospital facilities and its recreational opportunities. The standard of medical care also proved an attraction.

The physicians selected to receive this questionnaire were encouraged to complete open-ended questions concerning their reasons for their choice of practice location. Data of this kind is difficult to handle statistically because of the many and diverse opinions given. However, we feel that the opinions added by the doctors were important and valuable.

The study staff tabulated the write-in responses under the following headings:

Climate

Family factors, including nearness of relatives, preferences of wife, educational opportunities for the children, retirement.

Other social and cultural factors, such as recreational resources, political and ethnic considerations, housing and cultural benefits.

Economic factors, including opportunity to join an established practice, and possible tax advantages.

Professional factors, such as availability of hospital appointments and facilities, post graduate instruction and teaching opportunities, the area's need for a physician.

Other factors, generally inclusive statements such as "I like it here."

Of the physicians practicing in Minnesota who were trained in other states, the largest number indicated that they came to the state for professional reasons. For example, one physician said he came to Minnesota because of the "opportunity to practice my specialty and subspecialty in a superb medical environment with colleagues of ability . . . excellent facilities for practice, teaching and research."

Another large block of responses referred to professional opportunities available at the Mayo Clinic and the respondent's desire to be associated with this institution. A smaller group of respondents came to Minnesota to become associated with the medical school or hospital at the University of Minnesota. A few physicians mentioned the medical needs of their practice area as the main reason for their choice.

The second most important group of factors was economic, though the responses in this category comprise less than half the number of those who were influenced by professional reasons. These categories are difficult to classify, since an opportunity to join a group clinic usually carries with it an adequate income.

Of all the factors climate seems to have attracted the fewest physicians to Minnesota. Social and cultural reasons, including recreation, friends, and the "fine people of this area," did attract physicians. Some noted the "absence of racial and social strife" and the "availability of social, cultural and recreational activities within easy and pleasant driving distance." Family factors were also mentioned as influencing their choice. Many of these concerned the fine "educational opportunities for children" and the "excellent schools."

When enumerating factors which might attract them elsewhere, the physicians covered by the sample were nearly equally divided between climate, economics, and professional reasons. This inter-relationship is typified by one respondent who stated he might move if presented with an "equal opportunity plus less severe winters."

A large number of the responses under the economics category dealt with what many physicians consider to be punitive taxation in Minnesota. One physician stated:

"For the past several years I have interviewed physicians seeking employment at this clinic with fair success. During the past year three physicians, after careful study of our group, chose not to come when they learned of our income and property taxes. I rather admired their intelligence, but had no way of selling them after this discovery."

As a group, many physicians in this sample appeared to be generally satisfied with practice in Minnesota, since 26 stated that nothing would make them leave the state, and 21 more did not answer the question.

Of the physicians sampled in North Dakota, 16 had received the first two years of their medical education at the University of North Dakota, so that their locating in the state to practice was a return home.

In response to the question about their reasons for choosing North Dakota as a practice location, the responders were equally divided between professional factors and cultural and social factors; economic reasons were a close third.

Most physicians gave more than one reason for settling in the area: There was frequent mention of the high quality of medical care, the need for doctors in the area, the presence of good group practices, and broad expressions of satisfaction with the state, such as the following:

". . . North Dakota is a good wholesome and healthful and stimulating area in which to bring up a young family, not plagued with overcrowding, race problems, etc. Public education . . . is equal to other areas."

The most common single reason, however, for locating in the state was the desire for small town or a more rural type of life. One physician stated, "I hate to live in cities . . . delight in rural life," and another ". . . became tired of living in large metropolitan areas."

When asked what could conceivably attract them to another area, thirteen physicians in the North Dakota sample answered, "Nothing" or left the question blank. Of the remaining two-thirds who would consider leaving, climate was mentioned nearly as often as professional opportunities. Those physicians who might leave for professional reasons were looking for possible post-graduate training, reduced work load, or greater medical challenge. Only four physicians said that they might leave for economic reasons.

The responses of the South Dakota doctors were quite similar to those of North Dakota. Of the South Dakota physicians sampled, fifteen had taken their first two years of medical school at the State University of South Dakota. Their reasons for selecting South Dakota as a practice location were remarkably diverse, and a sizeable number of responses fell in each category.

The largest number of physicians responded to professional opportunities when they located in South Dakota. The most important single reason given by half of this group was the shortage of physicians in South Dakota. As one doctor said: "I feel the need—darn it!" Two physicians mentioned the high quality of medical care, and two admitted they were in South Dakota because of military assignment. Physicians drawn to South Dakota by economic factors usually mentioned the opportunity to join an established partnership or group.

Among the social and cultural factors which drew doctors, the attraction of small town living was mentioned, as well as the absence of severe racial tension in South Dakota. Some physicians indicated they liked the climate and geography of the state, and also found it "a good place to raise my family."

When asked what could conceivably draw them away from South Dakota, six physicians responded "nothing" or left the question blank. Those physicians who might be tempted to leave listed professional reasons as the most important factor. Within

this category, three thought they would eventually like a lighter work load; others mentioned the need of another area, the desire for specialization, or government orders as possible inducements to leave. Climate was the second most frequently cited reason and was closely followed by family factors—usually retirement or ill health—and economic factors.

Physicians in the Montana sample indicated that social and cultural factors were the most important influences on their choice of practice location. Among the responses included in this category were the desire for small town living, the "fine quality of people," "freedom from crowds," "the wonderful hunting and fishing." Economic factors proved to be second in importance and were followed by family considerations. One physician said:

"My family and I are happy in both the practice of medicine and our living conditions here in almost every way."

Of the twelve physicians who gave professional factors as a reason for settling in Montana, five mentioned the medical need of the area. One physician wrote:

"(It's) like riding a tiger. Once on, one can't get off. I can't bring myself to think of the problems the community would have with no doctor. People have been awfully good to me here."

As for reasons which might conceivably attract these physicians to another state, professional reasons were named more than any other, though 16 physicians indicated that nothing would make them move. Among the professional reasons given, teaching or research opportunities were mentioned often, as was the desirability of being near a medical school. The medical need of an area was also mentioned as an inducement to move away from Montana.

Medical Alumni of Minnesota, North Dakota, and South Dakota. In order to understand the factors that influence the practice location of graduates of the medical schools in the Upper Midwest, a number of these graduates were sent a questionnaire similar to the one described in the previous section. The 1949 and 1959

classes of the University of Minnesota medical school were sent the questionnaire. Since the classes at North and South Dakota are small, it was decided to include four classes, and, for comparability, to choose classes whose members would enter practice at about the same time as the 1949 and 1959 Minnesota classes. A total of 412 questionnaires were sent to alumni of the three schools, and 380 or 94% of these were completed and returned.

Most of the physicians educated at the University of Minnesota are practicing in partnership or groups; 22% are hospital based. Nearly 75% are specialists, though 93% took rotating hospital internships chosen primarily because of the quality of training available. Though most physicians in the sample had lived in Minnesota for a number of years, 60% had been at their present location five years or less. Fifty-eight percent of the total Minnesota-educated physicians were in private practice, yet 51% received some income from salary.

These physicians selected their present location primarily for the standard of medical care and the availability of adequate hospital facilities. Openings for a physician's particular specialty and the availability of hospital appointments also had some influence.

Physicians who had moved outside of Minnesota to practice were asked to compare their present location with Minnesota in respect to factors such as climate, internship and residency opportunities, family doctors, economic promise, and need for a doctor. In most cases, the two locations were rated much the same; however, Minnesota was rated highly advantageous for its internship and residency opportunities, but less favorably with respect to climate. Minnesota's post-graduate training opportunities and standard of medical care were also considered advantageous.

The physicians in the sample who were practicing in Minnesota were asked to compare Minnesota with other states to which they had considered moving. Minnesota was rated better with respect to nearness of relatives (understandably, since most of these physicians had lived in the state many years), somewhat better for educational opportunities for the children and internship and residency opportunities, and worse with respect to climate.

The North Dakota graduates of the four classes chosen for analysis also tend to practice in partnerships or groups (45%). Two-thirds of the North Dakota alumni were in private practice, though 54% had some income from salary. Seventy percent are specialists. The quality of training was the primary factor in the choice of a hospital for internship.

When choosing their present location, these physicians gave greatest consideration to the availability of adequate hospital facilities and the standard of medical care. When the physicians located outside of North Dakota compared their present practice location with North Dakota, it appeared that North Dakota was considered more advantageous only if a medical school appointment were available.

The North Dakota medical alumni who were practicing in North Dakota had given a good deal of consideration to locating in other areas. North Dakota was more attractive to them because of nearness to relatives, need for a doctor, and the preferences of their wives.

Only 45% of the South Dakota alumni practice with a partner or a group; 66% are specialists. Seventy-two percent were in private practice, though 48% had some income from salary. These physicians choose their present location primarily because of the standard of medical care and the availability of adequate hospital facilities. Possible hospital appointments and openings for a physician's specialty had some influence, as did educational and recreational advantages.

The South Dakota alumni who were practicing out of the state found their present location more advantageous in every category except nearness to family and need for physicians. Those alumni who were practicing in the state listed need for a physician and nearness to relatives, as well as preference of wife and educational opportunities for their children, as advantages in a South Dakota location.

The questionnaires also included a general question that invited the physicians to add their opinions about choosing a practice location. Since all the physicians included in the sample had been educated at the University of Minnesota or at the basic medical

science schools in North and South Dakota, this write-in-information helped determine what factors caused these physicians to remain in the state of their medical school, what could attract them to another state, and also, for the physicians who located out of state, the reasons for this location as well as factors that might have kept them in the home state or could conceivably bring them back.

The physicians educated at the University of Minnesota who remained in Minnesota to practice said that strong family ties were a reason for remaining in the state. More physicians listed family factors than any others, and there were also a high number of responses related to other social and cultural factors. Sometimes the family orientation took the form of an opportunity to join an established practice of a relative, but often it was tied to cultural and social reasons, as exemplified by the reply of one physician from the class of 1949:

"Nearness to both . . . families, close enough to the Twin Cities yet still . . . small town living, . . . adequate hospital facilities, aging population of town doctors at that time, nearness to hunting and fishing."

Professional factors were second in importance to the family. Often a respondent indicated his sensitivity to the need for physicians in an area. For instance:

"Immediate opportunity in a familiar area in definite need of a physician, and an immediate opportunity for full participation in a nice group practice, with high quality care being practiced and excellent hospital . . . privileges."

The high standard of medical care in Minnesota was mentioned by several physicians.

In answer to the question about what would make these physicians leave Minnesota, professional opportunities ranked first with climate close behind. Though one physician stated that he was . . . "too busy to think about leaving," others expressed concern about the socialization of medicine:

"If I leave it will be . . . demanded by the socialization which will make General Practitioners first aid men. In order to get

satisfaction (in practice) you will have to specialize, and then be forced into larger communities."

The Minnesota-educated physicians who left Minnesota to practice elsewhere have a strong professional orientation, since there were more than twice as many responses in this category as in any other. The reasons for leaving the state often involved particular fields of medicine. One psychiatrist said he left for "... an opportunity to train in psychoanalysis, which is practically absent in Minnesota," while another mentioned, "the absence of a psychoanalytically oriented psychiatric residency program." Two anesthesiologists shared an experience described by one:

"... At the completion of my residency I planned on returning to practice in the Minneapolis, St. Paul area. I talked to (a) senior anesthesiologist in Minneapolis... Interpretation (of his remarks): 'You had better not come... I don't think you could make a go of it.' At that time there wasn't one board certified anesthesiologist for each hospital in the area! However, the shortage of anesthesiologists was acute across the country, and... I decided to go to a place where I was welcome rather than attempt to fight my way on to a hospital staff."

A radiologist described his selection of a practice location as follows:

"... I had the choice of a Minnesota V.A. residency or an equal Michigan residency at twice the salary... Last year I was listed through the American College of Radiology Placement Bureau... I assumed that most... positions were filled in the Minnesota region by word of mouth."

The problem of low salaried internships and residencies in the state was mentioned often, as was the apparently slow pace of processing applications for these positions. The radiologist above probably would never have left if his inquiry into a residency at the Veterans Hospital in Minneapolis had been answered promptly!

In answer to questions about what might have kept these physicians in Minnesota or what might bring them back, professional opportunities again appeared as the most important factor. Most of the physicians who said that they might possibly return listed a teaching appointment at the University of Minnesota as the most important attraction. Some would return for particular research opportunities, such as the pediatrician who left because there were too many hospitals to attend in the area but who would return for the "... possibility of pursuing investigation in pediatric genetics with the closeness fostered by stimulating developmental biologists."

Of the North Dakota educated physicians who chose to stay in North Dakota, an equal number listed family and professional factors as their reason for staying. Typical of many is the reply of the physician who said:

"This is my home. My family and my wife's family are here. I prefer the people of North Dakota to most areas... I feel the metropolitan area (Fargo) offers good educational opportunities for my children. North Dakota needs physicians."

As for reasons which might make these physicians leave North Dakota, all factors except family received nearly the same number of responses. The most common answers are summed up in one physician's reply that he might leave North Dakota if there were:

"... a need for my specialty elsewhere, association with a four year medical school, better internship and resident hospital coverage, advantage of living near a large city, especially the cultural advantages."

The student loan program authorized by the North Dakota State Legislature has had some influence in holding physicians, since a portion of the loan is forgiven for each year of practice in the state. Several respondents said that these loans were their major reason for selecting North Dakota as a practice location.

The physicians educated at North Dakota who left the state to practice gave professional factors as the major reason. Nearly half of the responses pointed to the lack of a four-year medical school

as an encouragement to practice outside the state. A typical respondent would not have left "... if I could have completed medical school in North Dakota." Leaving North Dakota for completion of medical school, residency, and military training all combine to introduce the North Dakota resident to opportunities in other parts of the country.

As we might expect, in answer to the question of what would have kept these physicians in North Dakota, more than one third of the responses indicated that the presence of a four-year school might have influenced them to practice in the state. Other physicians mentioned the need for a "... desirable residency program" and "an adequate teaching hospital." Specialists often felt that there was not sufficient population to provide a need in the state for their specialties.

As for factors that would bring these physicians back, professional reasons received the largest number of responses. The "possibility of an academic appointment" was mentioned often, as were such professional opportunities as a "... partnership in a urology practice in a large city" or "centers large enough for radiotherapy treatments." When considering the possibility of return, one physician wrote:

"Sometimes I tire of the 'big city' practice and would like to do general practice and surgery in an area where I was *really needed* and could be assured of a good income."

South Dakota alumni follow a similar pattern, with physicians who remained in the state most often listing family and other social and cultural factors as their main reason for doing so. A typical response:

"Family ties and an outstanding medical group within the state needed a doctor; and the pride of being able to return to one's home state to live."

Others mentioned "lack of congestion" and "social climate, standard of living, lack of crowded conditions and social unrest."

Reasons for which these physicians might leave the state in the future were economic and professional. Those who might leave for

professional reasons mentioned the possibility of "return to residency" and "opportunity for post-graduate training."

Those physicians educated at the University of South Dakota School of Basic Medical Sciences but practicing elsewhere overwhelmingly list professional opportunities as the reason for their departure. Again, the lack of a four-year medical school is often mentioned as a deterrent to South Dakota practice, and its presence would probably have kept many physicians in the state. One doctor neatly summed up the reasons for departure in this way:

"I feel South Dakota loses most of its doctors when they leave the area for other training. (1) They become acquainted with other areas. (2) They often marry an out-of-stater at this time. (3) It's extremely *difficult* and *expensive* to look over various areas for a place to practice; the intern and resident do not have funds and often end up accepting a position in the area where training was completed. Many of the members of my class would have been willing to return and would have stayed if there had been an arrangement whereby the state would assist financially during the last three years of training, and then the new physician would have been obligated to practice (at least) two years in the state."

Most physicians who would consider returning to the state mentioned academic appointments or opportunities for their specialty.

In all three states, those physicians who are strongly influenced by family and other social and cultural factors often stayed in the state of their medical education, while the physicians who were strongly influenced by professional factors were more likely to leave. The Dakotas have the added problem, however, of the departure of their students for the last two years of their education, which has the effect of breaking many social and family bonds. This, coupled with the military obligations of young physicians, has certainly contributed to the drain of medical manpower away from the Upper Midwest.

It is interesting to note that economic factors cause approximately the same number of physicians both to remain in and leave the state in which they were educated. The opportunity of earning a good living is apparently common to all practice locations.

TABLE 31: Frequency with Which Location of Physicians' Prior Experiences was the Same as Their Present Practice Location

	High School	College	Medical School	Intern	Residency	Military	None
Minnesota							
No.	70	69	82	77	78	10	48
%	39	39	46	43	44	2	26
North Dakota							
No.	37	25	25	40	42	7	23
%	34	23	23	37	39	6	21
South Dakota							
No.	29	15	15	26	34	7	28
%	29	15	15	26	34	7	28
TOTAL							
No.	136	109	122	143	154	24	99
%	35	28	31	37	40	6	25

TABLE 32: Total Number and Number of Dentists Per 100,000 Population in the Upper Midwest For Selected Years

	1910	1920	1930	1940	1950	1960	1965
MINNESOTA							
Number of Dentists	826	1,276	1,957	2,161	2,142	2,395	2,415
DDS/100,000	40	51	76	77	72	70	67
NORTH DAKOTA							
Number of Dentists	163	255	296	270	262	284	272
DDS/100,000	28	39	43	42	42	45	42
SOUTH DAKOTA							
Number of Dentists	219	241	346	300	288	301	296
DDS/100,000	38	38	50	47	44	44	41
MONTANA							
Number of Dentists	173	283	314	307	273	359	379
DDS/100,000	46	52	58	55	46	53	51

Selection of Practice Location

The physicians who returned these questionnaires supplied information on their experiences which allowed us to examine a number of associations between their experiences prior to selecting a practice location and their present location. These experiences were state of birth, high school graduation, undergraduate college, medical school, internship, residency, military service, and present location. When the present location corresponded with one or more of the seven experiences, the association probably represents an influence on the physician's choice.

Table 31, which tabulates the seven locations for each of the 380 physicians in the sample, indicates that state of residency, internship, and high school graduation, in that order, are most frequently associated with a physician's present location. Medical school, birthplace, and college appear to have some importance, but military service has little influence. However, 25% of the respondents located in a state in which none of the prior experiences had occurred.

When the Minnesota alumni were tabulated separately, the practice location is most commonly in the same state as the physician's medical school, followed by residency and internship. This suggests that the presence of a medical school in a state contributes significantly to the attractiveness of the state. North and South Dakota alumni are most likely to practice in the state in which they took their residency and internship, though 20% to 30% chose to locate in a state in which none of the seven major experiences had occurred.

Since internship and residency appear consistently as positive association or influences on the physician's practice location, it would seem that if a state were able to enlarge or strengthen its post-graduate opportunities, it would then be more likely to keep the physicians it educates, as well as to attract others. Responses from the alumni of all three schools indicate that the quality of training available is the most important factor in choosing an internship. Geographic location was the next most important factor and was followed by salary and housing.

In the fall of 1965, Minnesota offered 254 internships, of which 184, or 72%, were filled. North Dakota offered 12 internships and

filled 3, and South Dakota offered 13 internships and filled 11. South Dakota had apparently offered attractive internship programs and had publicized them well.

In the same year, Minnesota offered 1,306 residencies, of which 87% were filled. North Dakota offered 32 and filled 18 (88%), while South Dakota only filled two of its seven available residencies. Minnesota and North Dakota obviously provide more desirable residency opportunities. One respondent mentioned the "superb surgical experience at Charity Hospital in North Dakota." Many respondents did, however, mention the relatively low salaries that accompany post-graduate opportunities in the region. As one physician states, "Enough pay for internship and residency training would definitely have kept me in Minnesota."

Summary of Physician Migration

Minnesota and South Dakota have attracted about as many physicians from outside the Upper Midwest as they have lost to the rest of the country while North Dakota tends to lose more physicians than it gains. Physicians attracted to the Upper Midwest states come mainly from the North Central region. Physicians educated elsewhere who come to Minnesota are attracted primarily by professional opportunities; over half practice in partnerships, groups or in hospitals. They also find the state's economic, social and cultural circumstances congenial. Physicians attracted to the three western states often respond to the area's need for a physician and to a desire to leave a metropolitan area.

The physicians educated in the Upper Midwest remain in the area because of the professional opportunities available and because of family ties. Those who leave the area generally cite the better professional opportunities offered.

In general, physicians educated in the Upper Midwest tend to remain here if they are strongly influenced by family ties or by a desire for a small town way of life or other social or cultural factors. If they leave, they do so for the sake of better professional opportunities.

The professional experiences which seemingly influence a physician most in selecting an area of practice are the location of his

medical school and the hospitals in which he obtained his internship and residency training.

DENTISTS

A discussion of physicians is not complete without a comparable analysis of dentists, since the first two years of dental education requires faculties and facilities similar to those needed for physicians. In order to judge the health care of the Upper Midwest, one must consider the number and distribution of dentists.

Distribution Throughout Upper Midwest

Table 32 describes the number of dentists and the dentist:population ratios in the four Study states. The shift from general to speciality practice which has been so pronounced for physicians has not yet greatly affected the dental profession. However, specialization is increasing and may soon become an important factor in dental manpower. The following statistics on all dentists should be read with this possibility in mind.

It is clear that Minnesota, which is best served by dentists of the four states, has shown a decline in the dentist:population ratio since 1940. The Dakotas have fewer dentists to serve their population. Though the number fluctuated somewhat, these two states appear to be in more serious need of dentists. Montana has a larger supply of dentists than North or South Dakota, and the ratio between dentists and population is somewhat better. South Dakota, in addition, has been slowly losing dentists since 1930.

The long-term decline in the ratio of dentists to population in Minnesota has been slow. Since it has been slow, the additional dentists needed to have maintained the rate at previous levels would be small. This is illustrated by the changes that have occurred between 1950 and 1960. In this decade the number of Minnesota's dentists actually increased by 253, but the population obviously grew more rapidly since there were two fewer dentists per 100,000 population in 1960 than in 1950. If Minnesota had gained 315 dentists or 62 more than the actual number, it would have maintained its 1950 ratio of 72 dentists per 100,000 popula-

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TABLE 33: Percentage Distribution of Population, of Active Dentists, and Active Dentists Per 100,000 Population by Hospital Planning Region, Minnesota, 1940-60

	1940	% of State Pop.	% of DDS's	DDS/ 100,000	1950	% of State Pop.	% of DDS's	DDS/ 100,000	1960	% of State Pop.	% of DDS's	DDS/ 100,000
Region I		4.19	2.27	42		3.65	1.68	33		2.94	2.04	49
Region II		5.21	2.82	42		4.69	2.80	43		3.83	3.00	55
Region III		0.61	0.32	41		0.57	0.33	41		0.53	0.33	44
Region IV		5.08	3.01	46		4.75	3.22	49		4.26	3.29	54
Region V		10.46	9.72	72		9.69	8.07	60		9.57	7.89	58
Region VI		5.07	3.79	58		4.84	3.36	50		4.64	3.75	57
Region VII		6.21	4.86	61		5.76	4.43	55		4.90	4.46	64
Region VIII		43.32	55.53	99		46.71	58.59	90		51.00	58.12	80
Region IX		4.52	3.10	53		4.26	2.85	48		3.74	2.79	52
Region X		6.79	5.97	64		6.64	6.07	66		6.28	5.55	62
Region XI		8.56	8.61	78		8.45	8.59	73		8.31	8.72	74
TOTAL		100.00	100.00	77		100.00	100.00	72		100.00	100.00	70

TABLE 34: Percentage Distribution of Population, of Active Dentists, and Active Dentists Per 100,000 Population by Hospital Planning Region, North Dakota, 1940-60

	1940	% of State Pop.	% of DDS's	DDS/ 100,000	1950	% of State Pop.	% of DDS's	DDS/ 100,000	1960	% of State Pop.	% of DDS's	DDS/ 100,000
Region I		27.49	22.96	35		27.36	25.19	39		27.80	25.00	40
Region II		20.06	22.96	48		19.93	20.99	44		19.83	20.07	45
Region III		27.63	34.81	53		28.57	35.11	52		28.52	33.09	52
Region IV		24.82	19.26	33		24.14	18.70	33		23.85	21.83	41
TOTALS		100.00	100.00	42		100.00	100.00	42		100.00	100.00	45

tion. Thus, if the state could have increased its annual net gain of about 25 dentists by slightly more than six per year, the decline could have been avoided.

It appears that nearly 60% of recent Minnesota-educated dentists have stayed in the state to practice. Thus, it appears that a

relatively modest increase in the enrollment of the Minnesota Dental School would produce enough dentists to reverse this recent trend. However, greater expansion would be required if the downward trend were to be reversed and the number of available dentists increased.

TABLE 35: Percentage Distribution of Population, of Active Dentists, and Active Dentists Per 100,000 Population by Hospital Planning Region, South Dakota, 1940-60

	1940	% of State Pop.	% of DDS's	DDS/ 100,000	1950	% of State Pop.	% of DDS's	DDS/ 100,000	1960	% of State Pop.	% of DDS's	DDS/ 100,000
Region I		13.82	14.33	48		14.96	15.63	46		18.06	19.93	49
Region II		8.98	5.33	28		8.20	4.17	22		8.62	3.65	19
Region III		18.08	15.33	40		17.37	14.93	38		15.81	12.62	35
Region IV		10.64	9.00	39		10.30	9.38	40		9.34	10.96	52
Region V		7.49	8.00	50		7.32	6.59	40		6.80	6.97	45
Region VI		7.28	7.33	47		6.98	8.33	53		6.61	6.64	44
Region VII		21.63	29.33	63		22.94	29.17	56		24.16	28.23	52
Region VIII		12.07	11.33	44		11.92	11.80	34		10.59	10.96	46
TOTALS		100.00	100.00	47		100.00	100.00	44		100.00	100.00	44

TABLE 36: Percentage Distribution of Population, of Active Dentists, and Active Dentists Per 100,000 Population by Hospital Planning Region, Montana, 1940-60

	1940	% of State Pop.	% of DDS's	DDS/ 100,000	1950	% of State Pop.	% of DDS's	DDS/ 100,000	1960	% of State Pop.	% of DDS's	DDS/ 100,000
Region I		17.90	17.92	55		19.36	19.78	47		19.05	22.84	64
Region II		23.34	21.82	51		23.01	19.78	40		25.30	18.94	40
Region III		14.13	8.79	34		13.16	8.79	31		12.22	7.52	33
Region IV		19.97	19.87	46		20.87	21.61	48		21.44	22.56	56
Region V		24.66	31.60	70		23.59	30.04	59		21.97	28.13	68
TOTALS		100.00	100.00	55		100.00	100.00	46		100.00	100.00	53

Dentists in Hospital Planning Regions

When the dentists practicing in the Upper Midwest are grouped by Hospital Planning regions (Table 33), a pattern similar to that of the physicians is clear. Minnesota has a high number of dentists in the metropolitan areas and in Region XI which contains the Mayo Clinic. North Dakota's distribution is more equitable; South Dakota's distribution shows more variation. Region II, which is

sparsely settled, has a low ratio of dentists to population. Montana has a fairly equally distributed supply of dentists. The trends in distribution of dentists in Minnesota is quite different from that of doctors. In general, the smaller, more rural regions gained dentists between 1950 and 1960 and in many instances between 1940 and 1960. Region V (Duluth) and Region VIII (the Twin Cities) lost ground although the actual number of dentists increased. In South Dakota Region VII (Sioux Falls) the number of dentists per 100,000 population has declined steadily from 1940 to 1960.

TABLE 37: Age Distribution of Minnesota Dentists, 1964

Age	Number
65 and over	616
55-64	432
45-54	430
35-44	487
25-34	435
Median Age: 51 years	

TABLE 38: Percent of All Dentists Educated at Minnesota (Dental School) and Ratio of Minnesota-Educated Dentists Per 100,000 Population For Upper Midwest by State and by Year

YEAR	UPPER MIDWEST		MINNESOTA		NORTH DAKOTA		SOUTH DAKOTA		MONTANA
	Per Cent	Ratio	Per Cent	Ratio	Per Cent	Ratio	Per Cent	Ratio	Per Cent
1965	70	41	86	58	39	17	22	9	23
1960	68	41	85	58	36	16	21	9	23
1950	67	40	83	59	37	15	15	6	23
1940	n.d.a.	n.d.a.	n.d.a.	n.d.a.	n.d.a.	n.d.a.	n.d.a.	n.d.a.	n.d.a.
1930	48	32	66	50	28	12	6	3	5
1920	40	19	58	30	24	10	5	2	5
1910	28	11	44	17	17	5	2	1	1

Age of the Dentist

Table 37 shows the age distribution of dentists in Minnesota in 1964. The median age is 51 years, and 27% of the practicing dentists are age 65 and over and 46% are age 55 or greater. Thus dentists are, on the whole, an older group than the physicians. This high median age presages a high rate of retirement, a comparatively high rate of loss due to deaths, and the need for a high recruitment rate of new dentists to maintain the present size of the dental force.

Migration of Dentists

Minnesota has attracted many dentists from other states. The Appendix Tables list the ten highest ranking sources of dentists; we find that Illinois has educated many dentists for Minnesota, just as it has physicians, though its contribution is declining. The schools which are major suppliers tend to be in the North Central Region.

The University of Minnesota as a Supplier of Dentists

The importance of the University of Minnesota Dental School as a supplier of dentists for the Upper Midwest states is illustrated in Table 38. This school has been supplying an increasing proportion of all the dentists practicing in the area since 1910. Since 1950, about 40% of all the Upper Midwest dentists have received their education at this one school.

As might be expected, the University of Minnesota Dental School supplies a large number of the dentists to its own state. This school's contribution to the state's dental manpower has increased steadily over the years and seemed to reach stability in 1950 when almost 60% of the state's dentists were Minnesota graduates. Minnesota also makes a major contribution to the dental manpower of North Dakota, a contribution that is steadily increasing. Although Minnesota's contribution to South Dakota and Montana is not as great as that of North Dakota, almost a quarter of their dentists are Minnesota graduates.

Factors Which Influence the Dentist's Choice of a Practice Location

A questionnaire similar to that sent the physicians was distributed to graduates of the University of Minnesota Dental School of 1949, 1953, 1957, and 1961. Questionnaires were sent to 291 dentists and 95% were completed and returned.

The dentists in the survey were nearly equally divided between solo practice and groups or partnerships. Twenty-two percent were specialists, and nearly all gained the major portion of their income from private practice.

Most of the dentists who completed the questionnaire made use of space provided for write-in responses to indicate their reasons for choosing a particular practice location. While their answers were varied, they can be grouped in a similar way to the physicians' responses. (see page 52).

The dentists who remained in Minnesota to practice were most strongly influenced in their decision by the presence of Minnesota's ample recreational facilities and by the proximity of their

families. The dentists described themselves as men who are very much attached to the state's rivers, lakes, and forests and are comfortable in the area where most spent their youth. Practice opportunities in Minnesota and the expense of moving to another state to start practice in a strange community were economic factors mentioned often.

The dentists who remained in Minnesota and were influenced by professional factors were usually young men who found it difficult and expensive to take state board examinations in other states. Thus, reciprocity agreements, while making it easier for Minnesotans to leave the state, would also make it easier for those educated elsewhere to select a practice location in the state.

This same group of dentists, when asked what could conceivably attract them to other states, gave climate and economic factors as the most compelling reasons. Several mentioned the high tax burden on professional men, particularly the state's income and property tax rates. Possible ill health of a member of the family was the third most frequent response. While professional reasons were not a strong influence on this group, one dentist stated that his practice location would always depend on the need of a particular area for good dental care. He stated:

“ . . . (There is) a need for dentists in small towns. This does not mean we need more dentists in the state . . . ; relocation of available dentists would more than satisfy the dental manpower 'shortage'.”

The dentists who had left Minnesota to practice were sometimes men who had been non-resident students at the University of Minnesota, and often their choice of practice location was a return home. The largest number of responses from this group indicated that professional opportunities were the greatest single reason for leaving, and the opportunity usually presented itself during military service. Not only did military service draw these dentists away originally, but the travel they enjoyed during their tour of duty was often given as a reason for their not returning to Minnesota. Thus, the federal government not only takes dentists for a specified time, but is sometimes responsible for their decision not to return. Post-graduate training also draws some dentists away

from Minnesota: one dentist chose Denver because “. . . The Denver Dental Society has an excellent graduate training program which I take advantage of.”

The second largest number of respondents gave economic opportunities as their reason for leaving the state of Minnesota, closely followed by climate. Family and other cultural and social factors are not as important to this group, whose profile is so much the reverse of those dentists who remained in Minnesota.

As to what might have kept these dentists in Minnesota, economic factors were mentioned most often. These were followed by professional factors, which usually involved the possibility of graduate training at the University of Minnesota or a teaching appointment there. One dentist called for more counseling of the graduate class:

“I feel more supervision and information should be provided to graduating seniors. Location opportunities should be made available to students.”

When asked what could conceivably bring them back to Minnesota to practice, professional opportunities received the greatest number of responses, most of which mentioned the possibility of graduate training or a teaching position at the University of Minnesota. Their high regard for their alma mater was evident in the response of one dentist who said nothing could make him return to Minnesota to practice, but that he was “. . . extremely proud of my Minnesota degree.”

The dentists in the survey were tabulated by state of birth, high school, undergraduate college, dental school, and military service in order to determine associations between these locations and their present practice locations.

Study of this tabulation showed that the state in which the dentists attended high school shows the most frequent association with their present location, followed by the state in which they attended college and dental school. This is not surprising because preference is given to Minnesota residents who apply for admission to the School of Dentistry at the University of Minnesota. However, dentists are definitely less mobile than physicians who enjoy the same preference. Twenty-seven percent of the dentists sur-

veyed settled in a state in which none of their prior experiences had occurred. Thus the out-migration of dentists, while not as frequent as that of the physicians, is still a significant part of the dental picture.

NURSING NEEDS

The study of nursing personnel was less intensive than that devoted to physicians and dentists. Several considerations led to this decision. These included the high nurses-population ratios in the four states, the comparative brevity of nursing training, and the very rapid growth rate of the nursing profession. Last, the size of the nursing profession and the work that would have been involved precluded assembling the statistics necessary to determine trends such as those shown previously for doctors.

In 1910 there were about 50,000 nurses in the United States, a number that had increased to over a half million in 1960. This tenfold increase in the number of nurses occurred during the period when the total population about doubled. The increasing role of nurses in providing medical care is further illustrated by the fact that in 1910 there were three doctors for every nurse. By 1960 this ratio had been reversed so that there were more than two nurses for every doctor.

The growth of the nursing profession in the Upper Midwest is shown in Table 39. Minnesota and Montana during most of the last half century had more available, active nurses relative to population than the United States as a whole. Their recent rate of increase is greater than that of the country as a whole. South Dakota has always had fewer, whereas North Dakota, as a result of recent changes, now has more active nurses than the whole United States.

In addition to the growth in the number of graduate nurses shown above, there has been a very rapid growth in the number of practical nurses and nurse's aides whose training is for shorter than that of the graduates of collegiate or hospital training programs enumerated above. The rather short time required to train a practical nurse or a nurse's aide will make it relatively easy to respond to future needs. The growth of higher educational facilities and especially the junior colleges will create additional opportunities to obtain training for all levels of nursing. An important question is whether these will keep step with the area's needs for professional personnel. The rapid growth of the nursing profession will no doubt continue, but its future rate should receive continuing attention.

The study of the nursing profession in the future will undoubtedly be a concern of the regional planning bodies which have recently been formed. Utilizing modern data-handling techniques, it will be relatively easy to reproduce the type of statistics shown here for future years.

In Table 40 the nurses in the four-state area have been classified by hospital region and by their activity status. In Minnesota, Region XI has the highest ratio of nurses to population due, no doubt, to the presence of the Mayo Clinic. Region VIII, which centers on the Twin Cities, has the second highest ratio. In general the distribution is quite like that of the doctors. In North Dakota the nurses seem to be quite evenly distributed, whereas in South Dakota there is one area with relatively few nurses. In this area, Region II, there is a small, sparse population in an area largely occupied by an Indian reservation. Montana is quite evenly supplied with nurses though Region V, centered on Helena, has a rather large number.

It will be noted that in all states there are many nurses listed as inactive. Since these nurses maintain their licenses, they may plan to return to nursing in the future. Their large number suggests that local shortages could easily be rectified by recruiting from this group. Experience suggests, however, that there will always be a high rate of loss of young women from the nursing profession and a high rate of replacement from the extensive educational programs available.

TABLE 39: Active Graduate Nurses Per 100,000 Population by Year for Minnesota, North Dakota, South Dakota, Montana and Total for U.S.¹

	1910	1920	1930	1940	1950	1962*
MINNESOTA	66	112	206	253	288	420
NORTH DAKOTA	62	68	125	118	174	331
SOUTH DAKOTA	42	65	120	130	200	272
MONTANA	82	124	168	199	260	354
U.S.	55	98	175	216	249	300

*The 1962 statistics for the four state area which are on punched cards kindly supplied by the American Nursing Association, are slightly higher than the U.S. Public Health Service figures for the same year (Pennell, M. Y., Baker, K. I., *Health Manpower Source Book*, Section 19, U.S. Government Printing Office, 1965).

¹Tibbetts, H. G., Levin, E., *Health Manpower Source Book*, Section 2, Nursing Personnel, U.S. Government Printing Office (1953).

TABLE 40: Number of Nurses (Total and Active) and Nurse Per 100,000 Population Ratios
in the Upper Midwest by Hospital Planning Regions, 1962

State	Region	Active	Ratio	Inactive	Unknown	Total	Ratio
Minnesota	1	316	314.4	68	2	386	384.1
	2	349	266.9	98	1	448	342.6
	3	38	208.9	16	1	55	302.3
	4	475	326.7	145	9	629	432.7
	5	1252	383.1	314	18	1584	484.7
	6	600	378.6	157	2	759	479.0
	7	473	282.9	145	8	626	374.4
	8	8128	466.8	2326	77	10531	604.8
	9	369	289.2	128	3	500	392.0
	10	776	362.0	218	6	1000	466.5
	11	1579	556.6	399	14	1992	702.2
	TOTALS	14355	420.4	4014	141	18510	542.2
North Dakota	1	567	322.5	304	5	876	498.3
	2	447	356.3	212	10	669	533.3
	3	671	371.9	262	4	937	519.4
	4	406	269.1	182	7	595	394.4
	TOTALS	2091	330.6	960	26	3077	486.5
South Dakota	1	401	326.2	183	17	601	488.9
	2	97	165.3	63	4	164	279.4
	3	239	222.0	98	10	347	322.4
	4	128	201.4	55	6	189	297.4
	5	120	259.1	60	8	188	405.9
	6	151	335.8	56	8	215	478.1
	7	538	327.2	241	24	803	488.4
	8	179	248.3	97	10	286	396.7
	TOTALS	1853	272.2	853	87	2793	410.4
Montana	1	397	308.8	231	5	633	492.4
	2	533	312.1	302	8	843	493.7
	3	230	278.8	118	3	351	425.6
	4	515	355.9	267	8	790	545.9
	5	716	482.9	328	11	1055	711.5
	TOTALS	14355	420.4	1246	35	3672	544.1
FOUR STATE TOTALS		20690	383.0	7073	289	28052	519.3

NEW LICENSES IN MINNESOTA

Each year about 300 physicians are licensed to practice in Minnesota for the first time. In order to determine how many new licensees in the State of Minnesota actually established practice in the state, all those physicians licensed for the first time in 1950, 1955 and 1960 were tabulated by the Health Manpower Study staff with the cooperation of the members and staff of the State Board of Medical Examiners. These lists were then compared with A.M.A. directories to find how many were still in practice in succeeding five year intervals and where they were located.

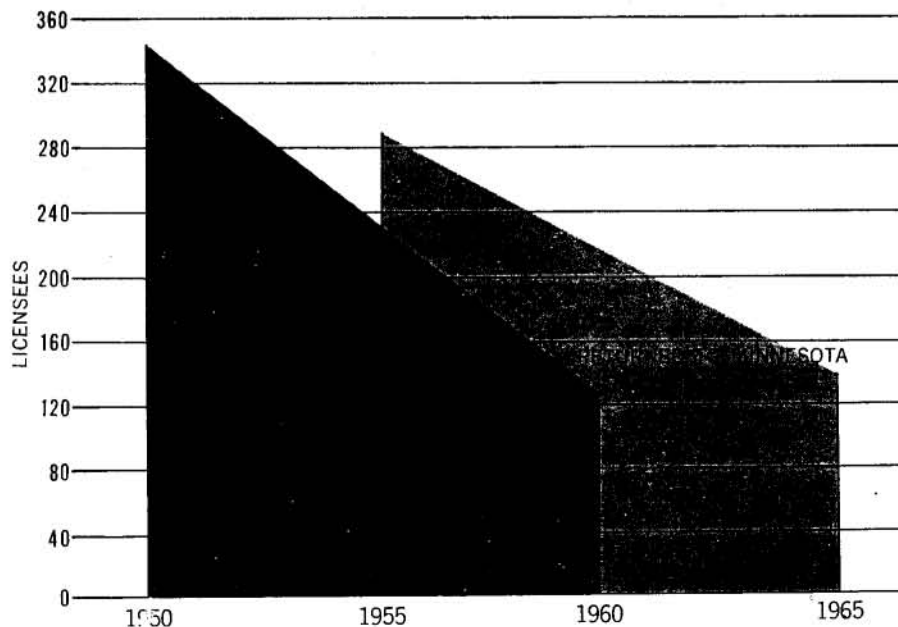
Of the 320 physicians licensed for the first time in Minnesota in 1950, 124 or 39% were actually in practice in 1960, according to the current A.M.A. (1965) directory. (Figure 9) Most of the doctors who are still in Minnesota after ten years are likely to remain here. In the five years from 1960 to 1965 the number had dropped to 107 physicians or 33% of the number licensed. The rate of loss indicated that that group had now become quite stable.

Of the 297 new licensees in 1955, 139 or 47%, were still in practice ten years later in 1965.

The licensees of 1960, who numbered 312, had fallen to 164 or 53% by 1965. Some of these doctors are undoubtedly in practice and some are still in training. This number and per cent will, no doubt, drop further by 1970 when a full ten years have elapsed.

The 124 licensees of 1950 and the 139 licensees of 1955 who were practicing in Minnesota ten years later give a measure of the annual additions to the physician force. It will be noted that these are very similar to the calculated number of expected additions of 140 doctors annually in the period 1965 to 1975. If future licensees distribute themselves in the same way, it appears that less than half will actually establish practice in the state.

FIGURE 9: New Licensees in Minnesota, 1950-60, 1955-65.



FUTURE PHYSICIAN NEEDS

We have shown in a previous section that the ratio of all physicians to population is growing in Minnesota while the proportion of doctors who were classified as personal physicians has shown a very long-term decline. In general, the ratio of active physicians to population has also declined—unless we include the 1965 statistics which are not comparable to those of previous years and which cannot be related to an accurate population census. All of these measurements point to future physician shortages. What then can we expect to happen to the physician supply in the next decade?

Quite obviously in projecting the area's future physician needs, special attention should be given to physicians in active practice as distinguished from the total number. Minnesota is a major center for hospital training, but doctors in training, who contribute substantially to the total physician count, cannot realistically be included in the state's physician supply. The number of active practicing physicians has increased as follows over several periods during the past 25 years.

	1946 to 1950	1950 to 1960	1960 to 1965
Actual Increase	398	69	248
Percent	16	2.3	8.6

The pattern is very irregular. While the population grew by 29% during the entire 25-year period, the number of doctors in active practice increased by 25%.

The irregular growth rate of the number of doctors in active practice makes any prediction from it hazardous. If we used the decade of 1940-50 or the period from 1961-1965 as models, we would expect a high future growth rate whereas the 1950 decade would suggest a very slow rate of increase. Because of this great variation, it is probably safer to use other methods to estimate future active physician growth rates.

The number of actively practicing physicians who will have died by 1975 can be calculated. This number is 562 for the period 1965 to 1975. (See appropriate tables in the Appendix.)

We found, in preparing the Appendix table referred to above, that 22 to 24% of the doctors who were in practice at one census year had left the area by the next census year. From this we can estimate that between 683 and 745 of the active practitioners in 1965 will be lost through out-migration in another decade.

The State of Minnesota is expected to gain 389,030 persons between 1965 and 1975 when the population is expected to total 4,000,898. If the 1960 ratio of 93 active physicians per 100,000 population is to be maintained, there must be a net addition of 335 new physicians to compensate for population growth.*

Calculated deaths	=	562
Estimated net loss through migration	=	683-745
Needed to match population growth	=	362
Total additional physicians needed by 1975	=	1607-1669

The University of Minnesota Medical School has graduated about 140 physicians annually in recent years. About half of these doctors have remained in Minnesota to practice in the past, so we can anticipate that 700 will be added from this source to Minnesota's active physician force in the next decade. Minnesota has attracted about as many physicians from other areas in the recent past as it has produced for itself. Although this in-migration has been declining, we will assume that it will continue at the same rate and will furnish half of Minnesota's doctors, or about 700 new physicians, in the next ten years. The expected recruitment of 1400 physicians falls short by 207 to 269 of the number needed to maintain the present active physician-population ratio. It must be remembered that estimates are only estimates; they are based upon the assumption that present circumstances are applicable to future events, and this may or may not be true. Future changes may rapidly alter Minnesota's recruitment of physicians.

* Because of uncertainties about the 1965 figures, the 1960 statistic which is accurate and furthermore comparable to that of earlier years was used in this calculation. If the 1965 statistic were used, the disparity between the estimated additions and the number needed to keep pace with population growth would be somewhat greater than the estimate shown.

GEOGRAPHIC DISTRIBUTION OF PHYSICIANS AND DENTISTS

PHYSICIANS

The number of physicians in a given geographical area is an important measure of the available medical care, while information concerning the distance people must travel to see a physician is a measure of one constraint upon the availability of physicians.

In order to measure the accessibility of physicians, the Health Manpower Study staff selected 15 miles as the average maximum distance from which a patient could reach a doctor in reasonable time. This 15-mile radius is, to be sure, arbitrary, since in rural areas served by superhighways a patient can reach a physician more quickly than a patient who has to drive a short distance through urban traffic. The specific geography of an area may also affect the accessibility of a physician. The staff selected the 15 mile measure as a workable means of comparing one area with another with full realization that it was a very conservative definition of a tolerable travel distance.

Figure 10 shows the location of general practitioners in the Upper Midwest according to the records of the American Medical Association as of July, 1965. For the most part, the four states are well covered by general practitioners, though the area (and the population) outside the 15-mile circles increases as one moves westward. Certain "problem spots" with no physician appear in each of the three western states.

The location of physicians who are specialists (medical specialists, surgical specialists, and psychiatrists and neurologists) is

shown in Figure 11. There are fewer specialists than general practitioners, and, as one would expect, the specialists tend to practice in large cities. Thus, much of the population has to travel farther to obtain the less frequently needed services of a specialist than those of the general practitioner. F11

Figure 12 shows the 1960 population density in the Upper Midwest. This map was prepared from the United States Census data of that year, and a similar map was constructed for 1950. By the use of the physician distribution maps, the number of persons residing more than 15 miles from a physician could be estimated from the number of population dots found outside of the circles. Dots on the population density map identify a population aggregate, which may not be a town, though in most cases it is. F12

The physicians counted in this estimating process include only those in active practice. Often a community with no physician fell on or within the circle outlining the 15-mile radius about a doctor; this community was considered to have a physician available.

When we examine Figure 13, it is clear that the calculated number of persons who resided more than 15 miles from a physician in Minnesota in 1960 is very small. This group included less than one percent of the state's population and the number furthermore has decreased since 1950. F13

Nearly 10 percent of North Dakota's population lived more than 15 miles from a physician in 1960. This figure rose by 4,000 persons between 1950 and 1960, an increase of nearly 7%. South Dakota had 40,000 persons, or six percent of its population living more than fifteen miles from a physician in 1960, a slight decrease from 1950. Among the four states, Montana had the largest proportion of its population outside of a 15-mile circle from a physician. Somewhat more than 11% of its citizens fell in this group. This proportion has decreased slightly since 1950; however, the 15-mile radius may be far too conservative an estimate of a tolerable distance for eastern Montana and the western parts of the Dakotas.

Overall, the small number of persons in Minnesota who were at some distance from a doctor, by our cautious definition, does not

FIGURE 10: Map of Location of General Practitioners in the Upper Midwest, 1965.

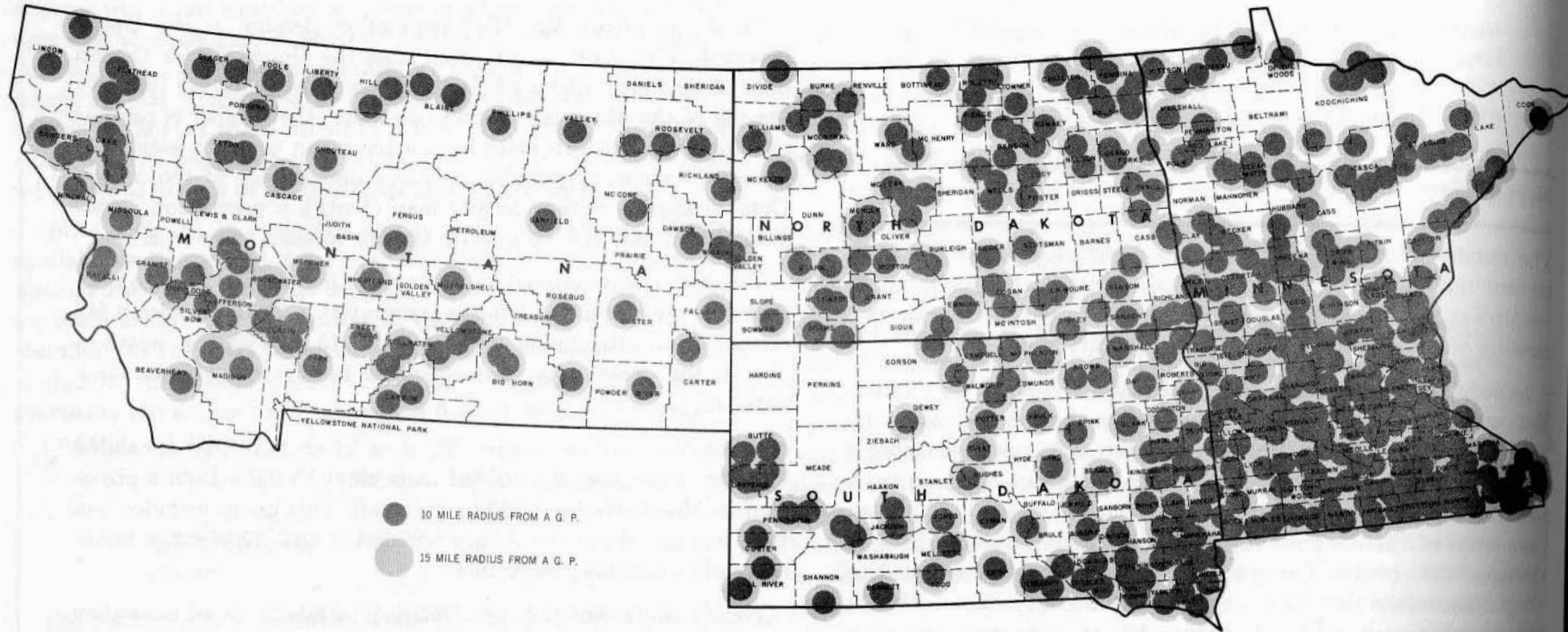


FIGURE 11: Map of Location of Specialists (Medical Specialists, Surgical Specialists, Psychiatrists and Neurologists) in the Upper Midwest, 1965.

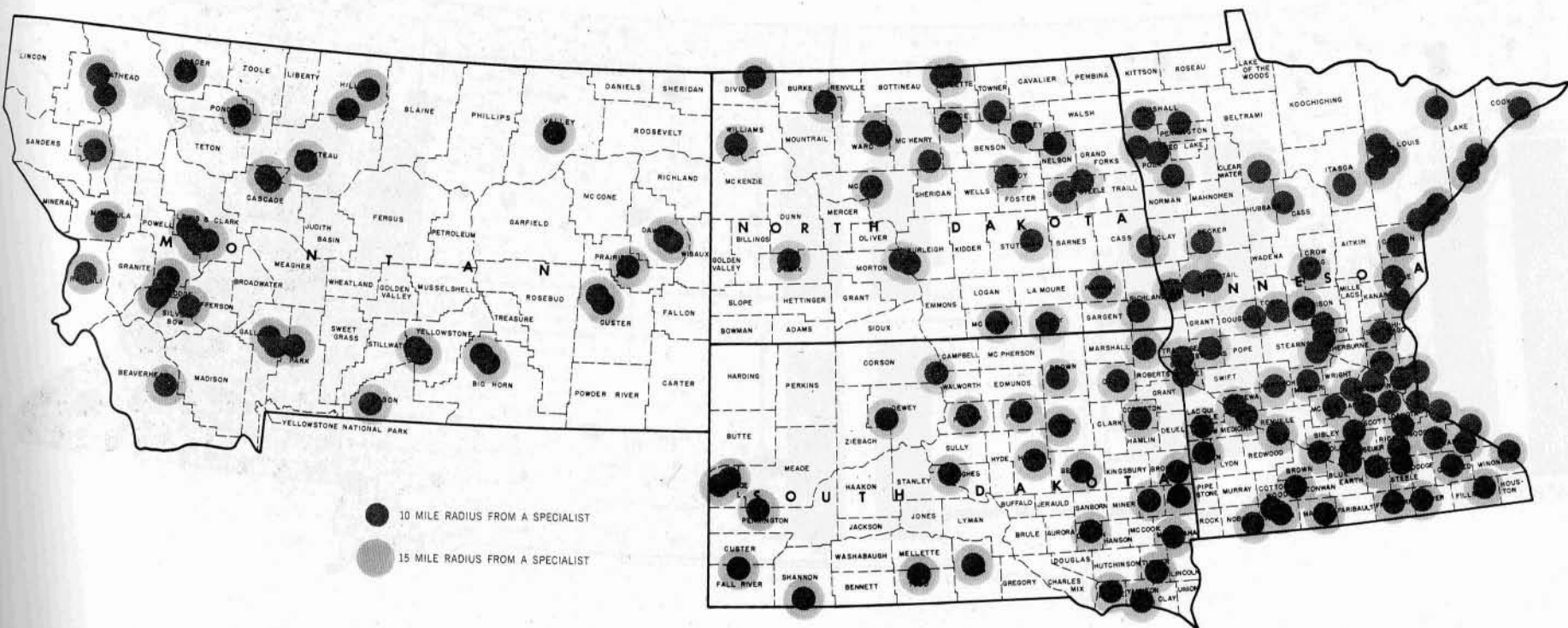


FIGURE 12: Population Density Maps of Upper Midwest States, 1960.

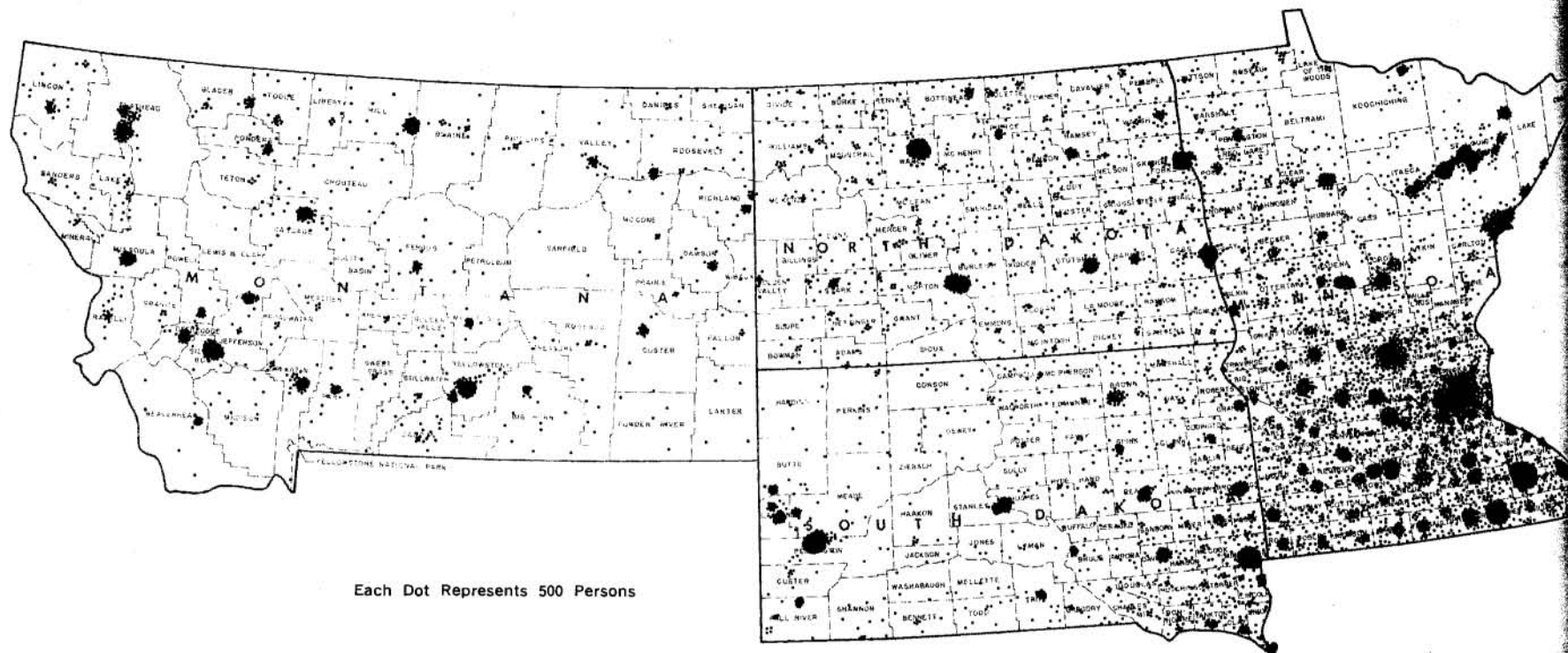


FIGURE 13: Estimated Number of Persons Residing More than 15 Miles From a Physician, 1950 and 1960.

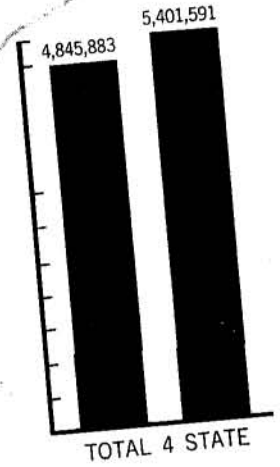
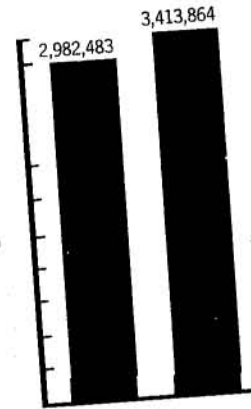
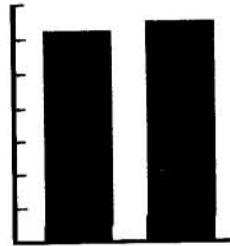
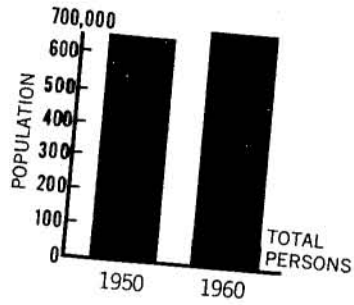


FIGURE 14: Per Cent of No-Physician Towns in 1965 Which Were Covered by a Physician in Previous Years.

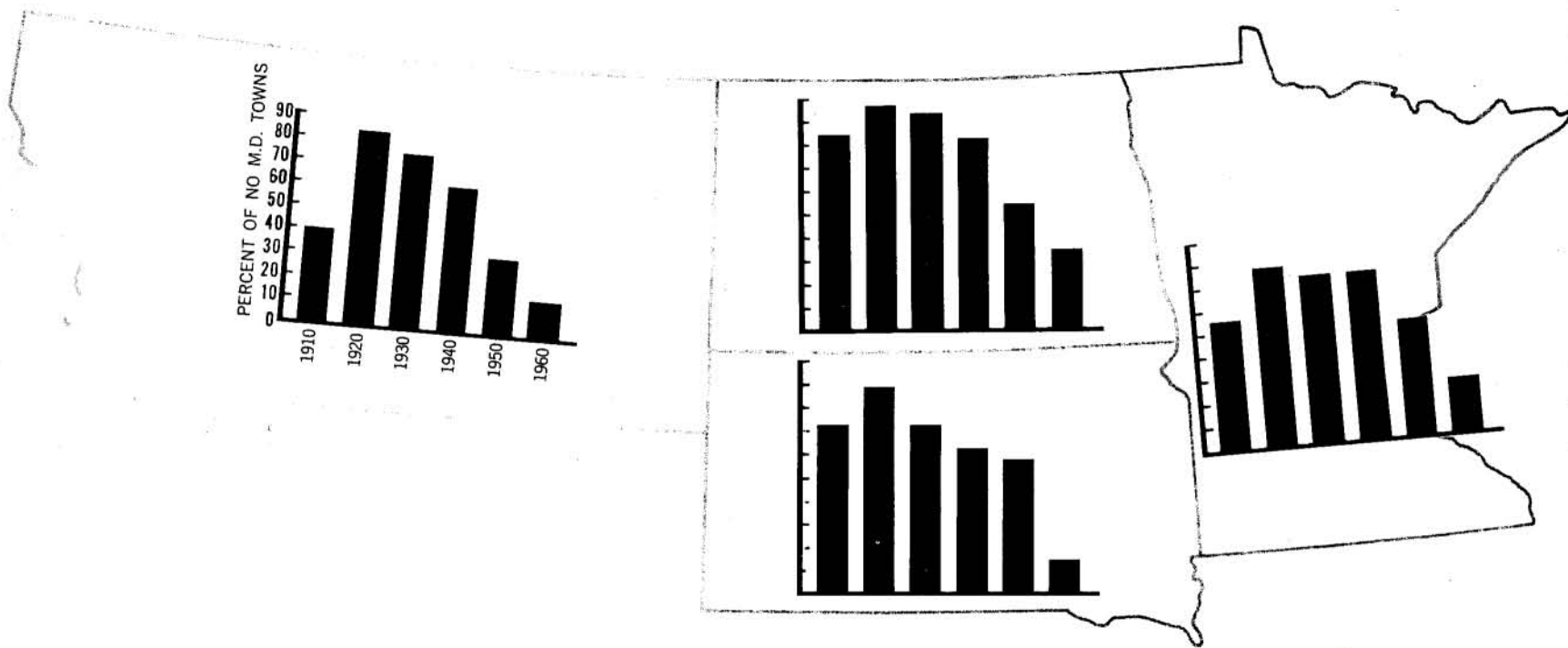
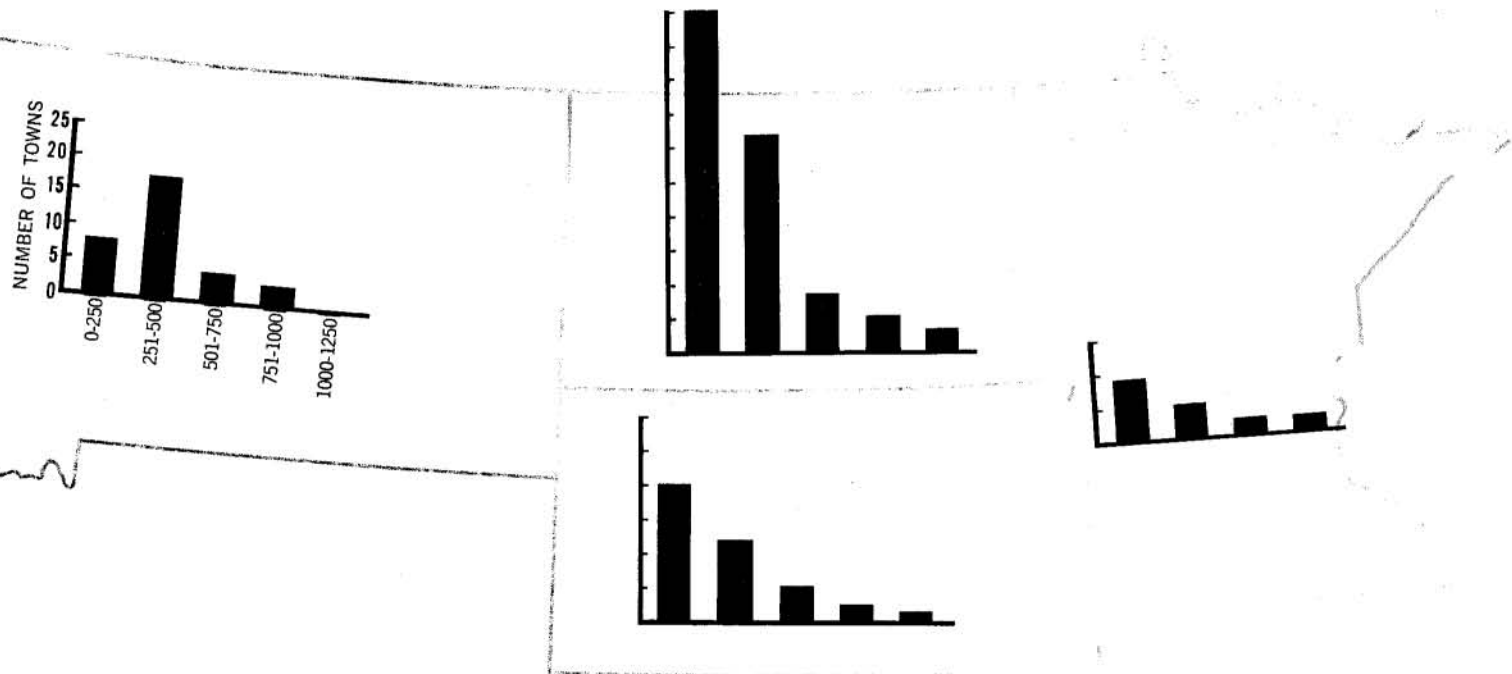


FIGURE 15: Population Range of No-Physician Towns, 1960.



indicate a serious problem. Advisory Commission members from North and South Dakota and Montana did not feel that the larger undoctored population areas of their states posed serious problems. Many of these areas are sparsely settled and would have difficulty supporting a physician. Good roads and reliance upon airplane travel in emergencies have served to reduce the disadvantages of remoteness.

No-Physician Towns

A one-physician town was defined, obviously, as the place that only one physician listed as his practice address and a no-physician town was one without any physician. The one-physician and the no-physician towns were studied in relation to their population, economic characteristics, presence of other health professional persons, growth rates, and their location by county, hospital planning region, and state.

F14 The towns that have no physician now may not always have lacked a doctor; many had one in previous years when active physician-population ratios were higher than at present. As Figure 14 shows, 1920 was the year of greatest coverage. In that year over 70% of these towns had a physician. Modern transportation has caused a loss of many services from small towns, among them the loss of the physician.

F15 When we examine the no-physician towns of 1960, we find that most of them have a population in the range of 0-250 persons. Another sizable number have only 251-500 persons.

The population growth rates, which were determined by the Upper Midwest Economic Study, reveal that in the three states for which data are available most of the no-physician towns have a declining population or are growing at a slower rate than the national average. There is a direct relationship, furthermore, between the size of the town and its rate of growth. Towns with 500 or fewer persons generally have shown a decline in rate of growth, while those with a population of 750 or greater generally have shown a "moderate" or "fast" growth rate.

The small populations and poor growth prospects common to most of the no-physician towns make it unlikely that they will be

able to attract and hold a physician again. However, economic factors could substantially change this outlook. When an industry moves into a community, improvements quickly follow in schools, teachers, libraries, and medical facilities. The accessibility of medical care is so closely related to the economic trends within the four states that a marked improvement in the former can hardly be expected without change in the latter.

One-Physician Towns

In Table 41, the doctors in the one-physician towns in the Upper Midwest are grouped by the age of the physician. The median age of these doctors varies considerably from state to state. Minnesota and North Dakota physicians in this group, with median ages of 55 and 54 years, are quite a bit older than all physicians. The median ages for all Minnesota physicians was 47 years and for North Dakota physicians 44 years, respectively. The median age of doctors in one-physician towns of the area is approximately four years higher than that of the total physician force in the Upper Midwest. The greater Median age of these groups of doctors almost certainly means that fewer young doctors have established practices in these towns in recent as compared with earlier years. The corresponding lower median age of Montana and South Dakota doctors presumably is due to better recruitment of young doctors.¹

Data in Table 42 shows that in Minnesota more than half of the doctors in one-physician towns were educated at the Medical School of the University of Minnesota. In North Dakota and South Dakota, 40 percent of the physicians in such towns were educated in foreign countries. Eighty-four percent of Montana physicians in one-physician towns were educated in states outside the Upper Midwest, while only 4% received their training at the University of Minnesota.

It is not surprising to find that virtually all the doctors in one-physician towns are general practitioners. Only one specialist certified by an American Board is in this group.

The medical schools and the State Medical Societies maintain lists of communities requesting a physician. Tables 44 and 45, which

¹Median age overall for M.D. See Table 18, p. 37.

TABLE 41: Age Distribution of Physicians in One-Physician Towns in the Upper Midwest, 1965

Age	Number
86-90	3
81-85	2
76-80	10
71-75	6
66-70	13
61-65	23
56-60	29
51-55	22
46-50	29
41-45	41
36-40	22
31-35	16
26-30	10

Median Age
 Upper Midwest States 50
 Montana 43
 South Dakota 46
 North Dakota 54
 Minnesota 55

TABLE 42: Number and Percent of Physicians in One-Physician Towns by Place of Education, 1965

PRACTICE LOCATION	PLACE OF EDUCATION								TOTAL TOWNS No.
	MINNESOTA		OTHER STATES		FOREIGN		NO DATA		
	No.	%	No.	%	No.	%	No.	%	
MINNESOTA	68	57.6	42	35.6	6	5.1	2	1.7	118
NORTH DAKOTA	3	7.1	22	52.4	17	40.5			42
SOUTH DAKOTA	1	2.6	22	56.4	16	41.0			39
MONTANA	1	4.0	21	84.0	3	12.0			25

TABLE 43: Number and Percent of Physicians in One-Physician Towns by Type of Practice, 1965

	TYPE OF PRACTICE								TOTAL TOWNS No.
	G.P.		M.S.		S.S.		P. & N.		
	No.	%	No.	%	No.	%	No.	%	
MINNESOTA	112	94.9	2	1.7	3	2.5	1	.0	118
NORTH DAKOTA	37	88.1	2	4.8	3	7.1	0	0	42
SOUTH DAKOTA	38	97.4	0	0	1	2.6	0	0	39
MONTANA	23	92.0	1	4.0	1	4.0	0	0	25

TABLE 44: Number of No-Physician Towns Requesting a Physician

	TOWNS REQUESTING PHYSICIANS	TOTAL NUMBER OF NO-PHYSICIAN TOWNS
MINNESOTA	1	18
NORTH DAKOTA	11	97
SOUTH DAKOTA	8	40
MONTANA	1	32

TABLE 45: Number of One-Physician Towns Requesting a Physician

	TOWNS REQUESTING PHYSICIANS	TOTAL NUMBER OF ONE-PHYSICIAN TOWNS
MINNESOTA	17	118
NORTH DAKOTA	11	42
SOUTH DAKOTA	13	39
MONTANA	1	25

TABLE 46: Relationship Between No-Physician Towns and Dentist Supply, 1965

	TOWNS WITH A DENTIST		NO-PHYSICIAN TOWNS WITH NO DENTIST		TOTAL
	No.	%	No.	%	
MINNESOTA	0	0	18	100.0	18
NORTH DAKOTA	20	20.6	77	79.4	97
SOUTH DAKOTA	3	7.5	37	92.5	40
MONTANA	0	0	32	100.0	32

TABLE 47: Relationship Between One-Physician Towns and Dentist Supply, 1965

	TOWNS WITH A DENTIST		TOWNS WITH NO DENTIST		TOTAL
	No.	%	No.	%	
MINNESOTA	115	97.5	3	2.5	118
NORTH DAKOTA	35	83.3	7	16.7	42
SOUTH DAKOTA	29	74.4	10	25.6	39
MONTANA	18	72.0	7	28.0	25

Source: AMA (1965).

are based on these lists, show that 20 percent or fewer of the no-physician towns have requested a doctor, and 33 percent or fewer of the one-physician towns are known to be seeking a doctor.

It is interesting to consider the no-physician and the one-physician towns in their relation to another professional group, the dentists. A comparison of the two groups shows that more than 80 percent of the no-physician towns in the four states also had no dentist. More than three-fourths of the one-physician towns also contain a dentist. All the no-physician towns in Minnesota and Montana have no dentists. Quite obviously the circumstances of these small towns which attract or fail to attract a physician also influence dentists in a similar manner.

DENTISTS

Figure 16 shows the location of dentists in the Upper Midwest. The number of persons residing more than 15 miles from a dentist was calculated for 1960 and 1950, in a manner similar to the calculation made for the physicians.

Figure 17 shows that the number of persons in Minnesota who live more than 15 miles from a dentist is small—less than one percent in 1960, a slight decrease from 1950 when 1.5% of the population lived more than 15 miles from a dentist. North Dakota, South Dakota and Montana have approximately 10 percent of their populations living more than 15 miles from dentist. Since 1950, North Dakota's percent of population outside the radius has increased slightly, while South Dakota saw a slight and Montana a larger decrease.

No-Dentist Towns

Many of the no-dentist towns were served by a dentist in previous years, as was the case with physicians. The population range of no-dentist towns is similar to that of the no-physician communities. Most of them are in the 0-250 size range and in most of them

FIGURE 16: Map of Location of Dentists in the Upper Midwest, 1965.

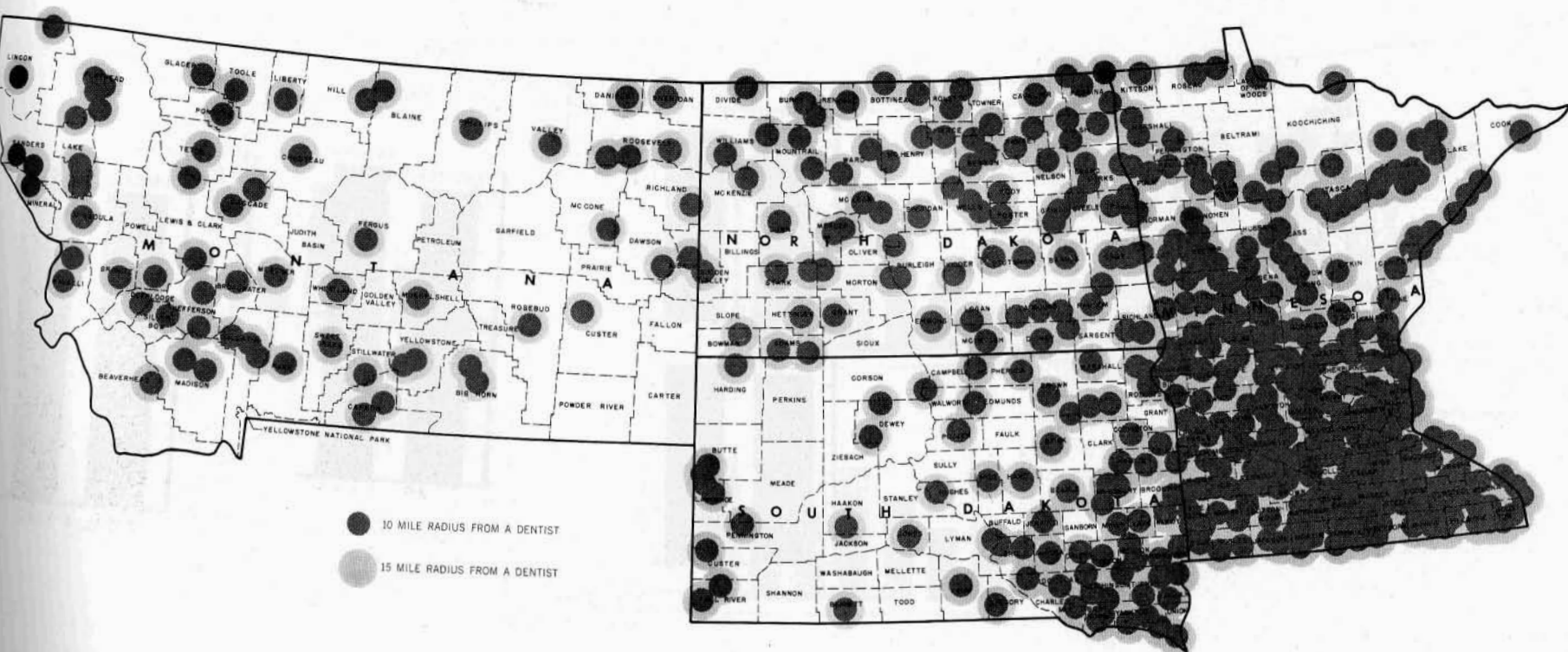


FIGURE 17: Estimated Number of Persons Residing More Than 15 Miles From a Dentist, 1950 and 1960.

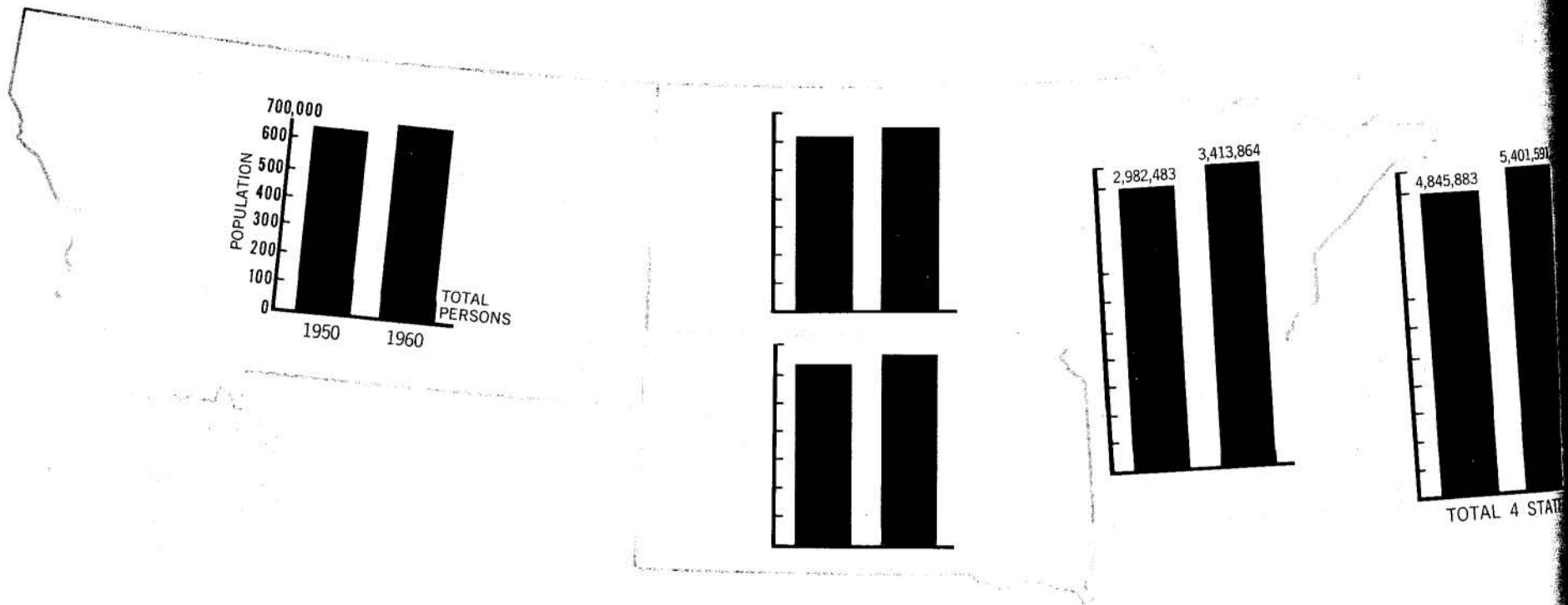


FIGURE 18: Percent of No-Dentist Towns in 1965 Which Were Covered by a Dentist in Previous Years.

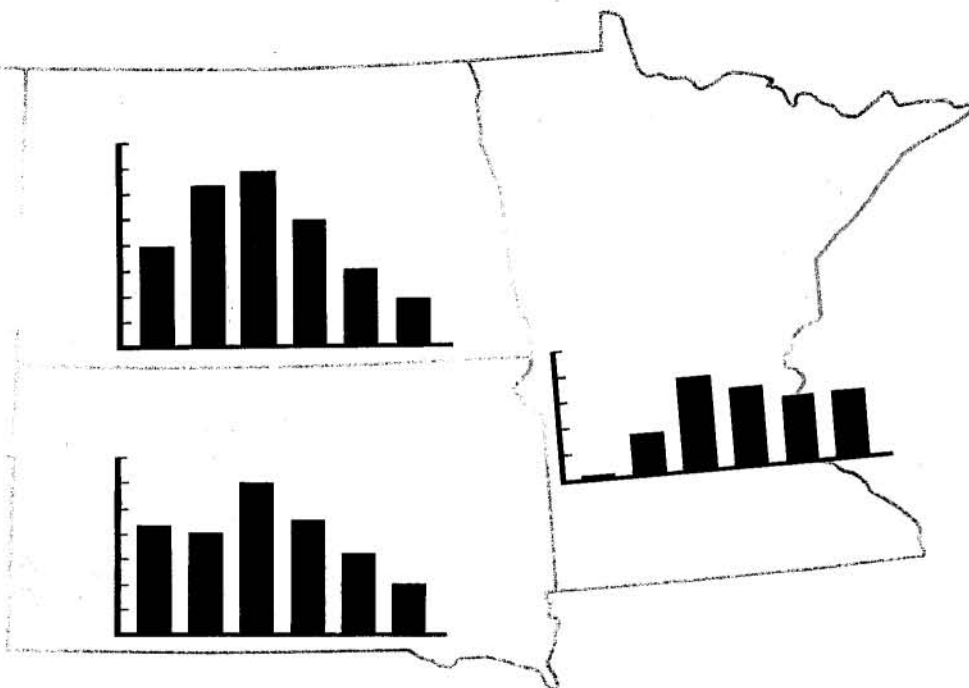
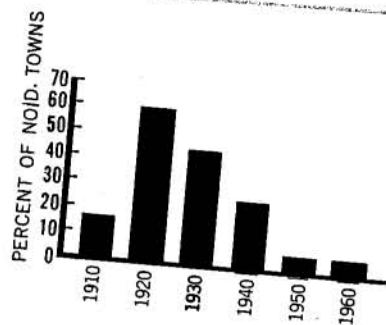
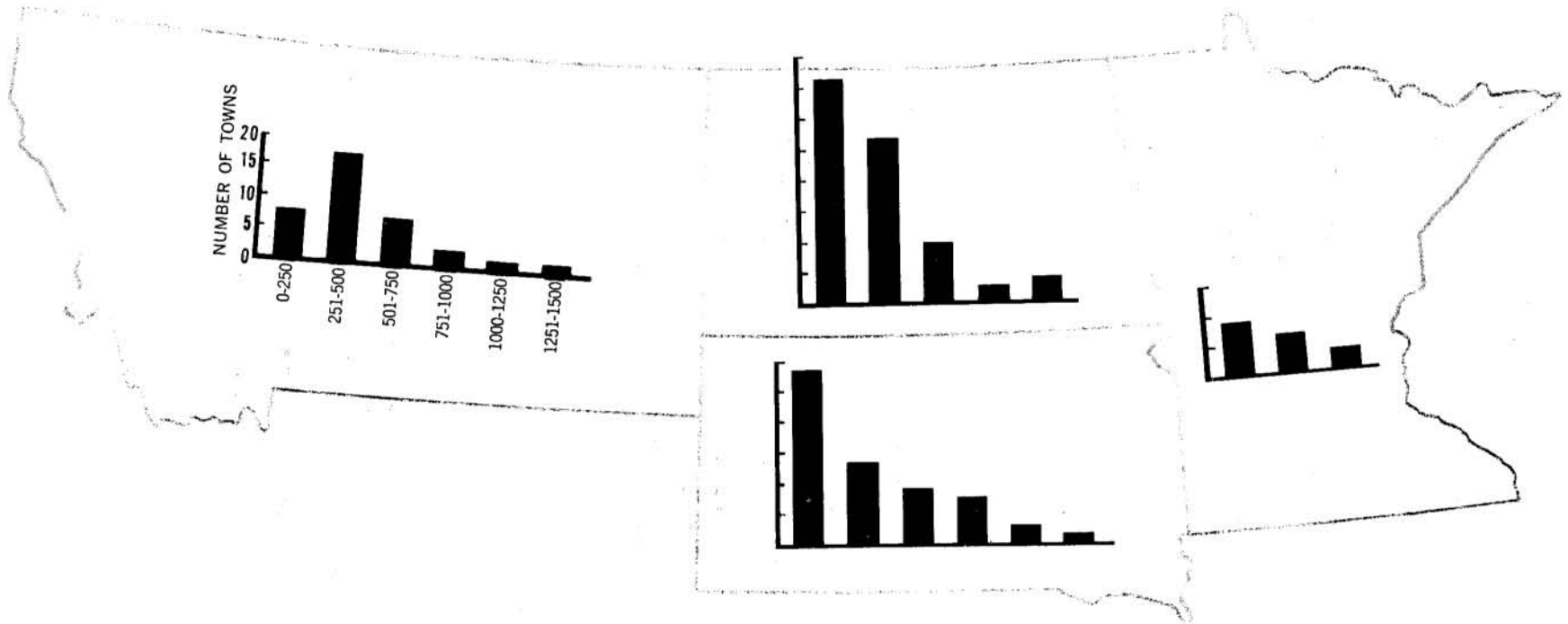


FIGURE 19: Population Range of No-Dentist Towns, 1960.



the population is declining. The number of dentists in these communities has also been steadily declining since the depression years.

One-Dentist Towns

In communities which have only one dentist and are 15 miles from another dentist, the age of the dentist is a significant statistic, since it is related to the recruitment rate of young dentists. Table 48 shows this age distribution.

The median age of 58 is considerably higher than the median age of 50 for all Minnesota dentists, which suggests that young dentists have not been taking up practice in these towns at the same rate as in the states as a whole. The higher median age of this group of dentists also leads to the expectation that dentists will be disappearing from those towns in the near future as these men retire or die off.²

Approximately half the dentists in the one-dentist towns in the Upper Midwest were educated at the University of Minnesota. As Table 49 shows, four-fifths of the Minnesota one-dentist towns are served by graduates of the University of Minnesota School of Dentistry; nearly one-quarter of North Dakota and South Dakota dentists in this group and one-eighth of Montana dentists in one-dentist towns were educated at the University of Minnesota.

Half of the no-dentist towns in South Dakota have no physician, as do nearly three-fourths of the no-dentist towns in the other three states of the Upper Midwest.

TABLE 48: Age Distribution of Dentists in One-Dentist Towns in the Upper Midwest, 1965

Age	Number
86-90	1
81-85	6
76-80	11
71-75	24
66-70	32
61-65	28
56-60	32
51-55	8
46-50	9
41-45	20
36-40	20
31-35	24
26-30	12

Median Age
 Upper Midwest 58
 South Dakota 55.5
 Minnesota 58
 North Dakota 60
 Montana 60.5

TABLE 49: Number and Percent of Dentists in One-Dentist Towns by Place of Education, 1965

STATE OF PRACTICE	DENTAL SCHOOL ATTENDED									
	MINNESOTA		OTHER STATES		FOREIGN		NO DATA		TOTAL NO. OF TOWNS	
	No.	%	No.	%	No.	%	No.	%	No.	%
MINNESOTA	106	82.8	21	16.4	0	0	1	.8	128	100
NORTH DAKOTA	12	24.5	37	75.5	0	0	0	0	49	100
SOUTH DAKOTA	12	27.3	32	72.7	0	0	0	0	44	100
MONTANA	3	12.5	20	83.3	*1	4.2	0	0	24	100

* Canada

Source: ADA (1965).

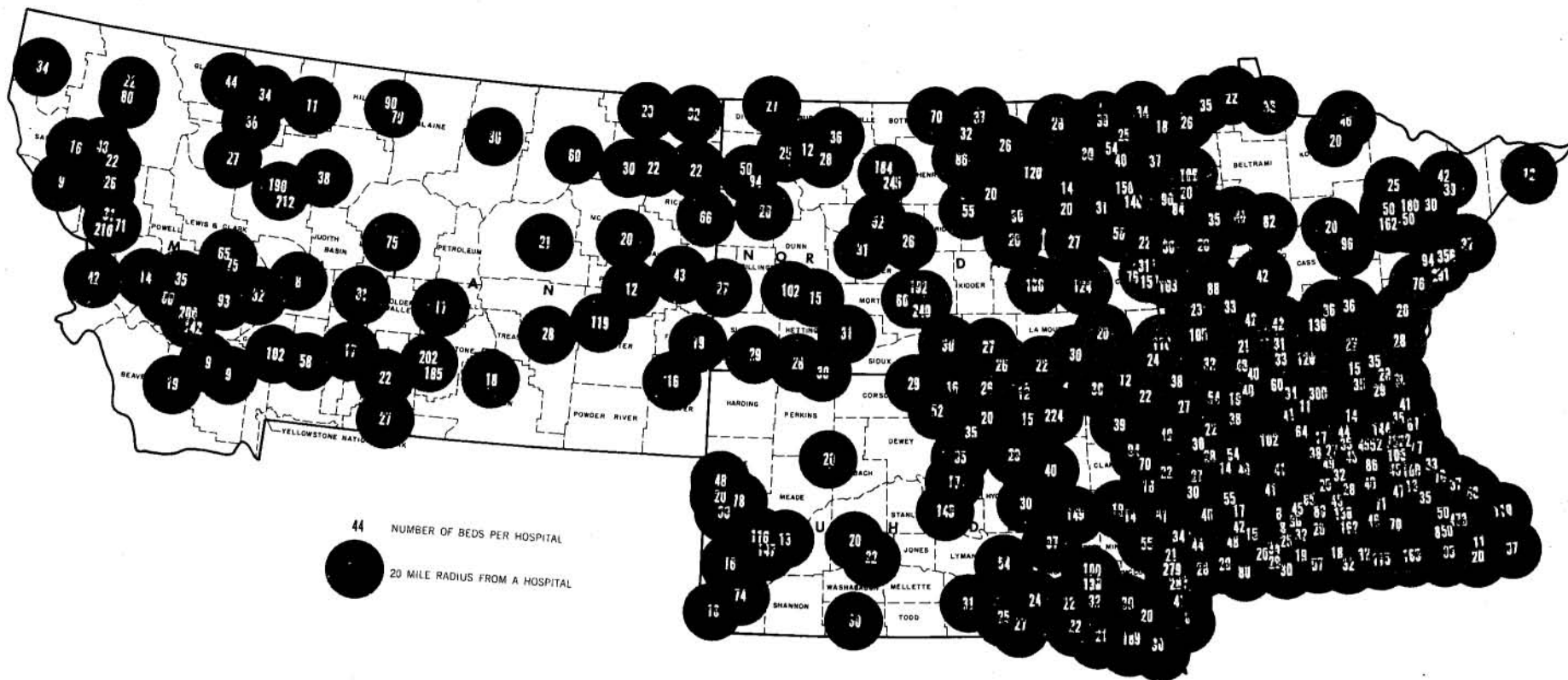
TABLE 50: Relationship Between No-Dentist Towns and Physician Supply, 1965

	TOWNS SERVED BY A PHYSICIAN		TOWNS NOT SERVED BY A PHYSICIAN		TOTAL NUMBER OF TOWNS
	No.	%	No.	%	
MINNESOTA	6	30.0	14	70.0	20
NORTH DAKOTA	25	31.6	54	68.4	79
SOUTH DAKOTA	31	50.0	31	50.0	62
MONTANA	8	21.6	29	78.4	37

Source: ADA (1965).

²Median age overall for D.D.S. See Table 37, p. 56.

FIGURE 20: Map of Location of Hospitals in the Upper Midwest, 1965.



HOSPITAL REGIONS AND PHYSICIAN DISTRIBUTION

Since the practice of medicine is becoming increasingly dependent on hospitals, the Health Manpower Study, with the cooperation of the state hospital associations, mapped all the accredited hospitals in the Upper Midwest as had previously been done for physicians and dentists. Figure 20 shows the distribution of the hospitals.

Since the Health Manpower Study staff was concerned about the distribution and accessibility of professional personal and medical care facilities, the no-physician and one-physician towns were examined by their proximity to a hospital. It is apparent that many of the no-physicians towns do have reasonable access to a hospital; two-thirds of Minnesota's no-physician communities and one-half of South Dakota's are within 20 miles of an accredited hospital. North Dakota and Montana residents may have a greater problem since approximately four-fifths of their no-physician towns are more than 20 miles from a hospital.

Almost all of the one-physician towns in Minnesota are within 20 miles of a hospital; approximately three-fourths of the one-physician towns in North Dakota, South Dakota, and Montana lie within this distance.

In Table 53, the no-physician and one-physician towns in the Upper Midwest are classified by the hospital planning regions described in the previous section.³ As the table demonstrates, in Minnesota the no-physician towns cluster in Regions V (The Duluth area) and I (The Northwestern corner), while the one-physician towns are more widely spread, appearing frequently in Regions II, VII, VIII, X, and XI. Region I is a sparsely settled area which includes large farms and forests. Region V, which includes the iron ore bearing areas, also supports a small population except in centers that have grown up about the mines and the related transportation facilities.

In North Dakota, the no-physician and the one-physician towns appear frequently in all Regions, though Region I centering about Minot has the largest number. South Dakota's Region III stands

TABLE 51: Number and Percent of No-Physician Towns Within and Outside a 20-Mile Radius of a Hospital, 1965

	WITHIN		OUTSIDE		TOTAL NO. OF TOWNS	
	No.	%	No.	%	No.	%
MINNESOTA	12	66.7	6	33.3	18	100
NORTH DAKOTA	23	23.7	74	76.3	97	100
SOUTH DAKOTA	20	50.0	20	50.0	40	100
MONTANA	7	21.9	25	78.1	32	100

Source: AMA (1965), and Hospital Associations.

TABLE 52: Number and Percent of One-Physician Towns Within and Outside a 20-Mile Radius of a Hospital, 1965

	WITHIN		OUTSIDE		TOTAL NO. OF TOWNS	
	No.	%	No.	%	No.	%
MINNESOTA	112	94.9	6	5.1	118	100
NORTH DAKOTA	29	69.0	13	31.0	42	100
SOUTH DAKOTA	30	76.9	9	23.1	39	100
MONTANA	18	72.0	7	28.0	25	100

Source: AMA (1965), and Hospital Associations.

³See Boundaries of Hospital Planning Regions, Figure 8, p. 39.

TABLE 53: Number of No-Physician and One-Physician Towns
by Hospital Planning Region in the Upper Midwest, 1965

	Region	Number of No-Physician Towns	Number of One-Physician Towns
MINNESOTA	I	6	7
	II	1	13
	III	1	3
	IV	1	6
	V	8	7
	VI	1	6
	VII	0	13
	VIII	0	24
	IX	0	6
	X	0	19
		18	118
NORTH DAKOTA	I	39	14
	II	12	8
	III	25	10
	IV	21	10
		97	42
SOUTH DAKOTA	I	6	5
	II	8	4
	III	17	7
	IV	3	6
	V	2	3
	VI	1	2
	VII	0	9
	VIII	2	3
		39	39
MONTANA	I	3	6
	II	13	2
	III	4	7
	IV	11	3
	V	1	7
		32	25

Source: Directory
of the American Medical Association, 1965.

out as containing a large number of no-physician towns, while the one-physician towns are more evenly distributed. Montana has the largest number of no-physician towns in Regions II and IV, while the one-physician towns appear in all Regions.

HOSPITAL REGIONS AND DENTIST DISTRIBUTION

Table 54 describes the no-dentist and one-dentist towns in the Upper Midwest by hospital planning region. In Minnesota, the no-dentist towns, like the no-physician towns, are more frequently found in Regions I and V. In North Dakota they are more evenly distributed through the several Regions, while South Dakota's no-dentist towns are found more often in Regions I, II, and III, and Montana's are in Regions II and IV.

SUMMARY

Several observations can be made from the foregoing analysis of the geographic distribution of physicians, dentists, and hospitals. First, the area coverage appears adequate if we use the very conservative definition of a doctor or dentist within 15 miles radius as equivalent to readily available care. Some persons in the population are beyond the reach of immediate as opposed to readily available medical or dental care, but these are few in number.

The size and growth characteristics of towns with few or no doctors or dentists cannot provoke optimism about their future services. The high median age of doctors and dentists practicing in these towns foreshadows a further decline.

TABLE 54: Number of No-Dentist and One-Dentist Towns by Hospital Planning Region in the Upper Midwest, 1965

	Region	Number of No-Dentist Towns	Number of One-Dentist Towns
MINNESOTA	I	8	5
	II	3	12
	III	1	1
	IV	1	13
	V	7	12
	VI	0	13
	VII	0	14
	VIII	0	27
	IX	0	6
	X	0	16
	XI	0	9
		20	128
NORTH DAKOTA	I	26	15
	II	10	11
	III	21	11
	IV	21	12
		79	49
SOUTH DAKOTA	I	12	3
	II	13	6
	III	27	6
	IV	7	5
	V	1	3
	VI	0	4
	VII	0	9
	VIII	2	8
		62	44
MONTANA	I	3	9
	II	14	3
	III	8	4
	IV	11	2
	V	1	6
		37	24

Source: ADA (1965).

MEDICAL AND DENTAL EDUCATION

MEDICAL EDUCATION

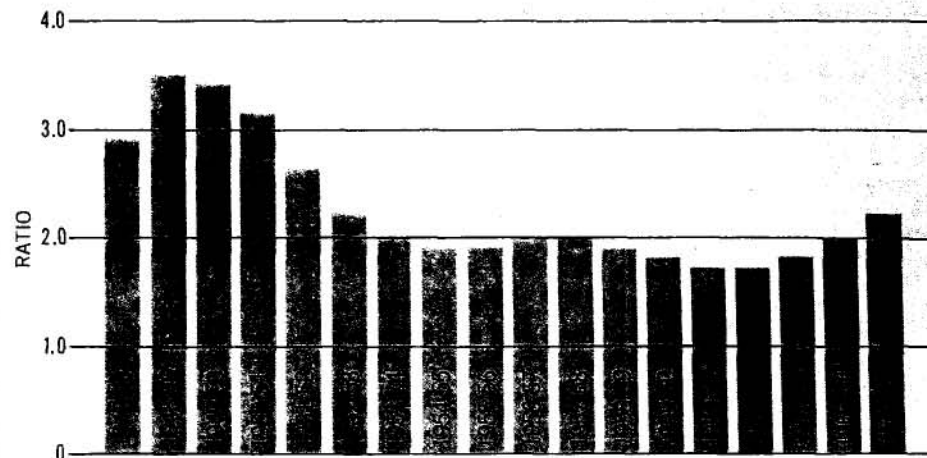
In the Nation

The medical school at the University of Minnesota is at the present time the only four year medical school in the Upper Midwest. It is one of 84 approved medical schools located in 39 states, the District of Columbia, and Puerto Rico. Nearly all of these medical schools are affiliated with a college or university. Fifty-one per cent of them are publicly owned. These state-supported schools invariably give preference to applicants from their particular state, though usually some out-of-state students are accepted. Only South Carolina and Arkansas do not accept non-residents.

In addition to these schools, there are four schools of basic medical sciences in the United States which provide the first two years of the medical school curriculum; their students, naturally, transfer to one of the four-year institutions to complete their course. Two of these schools are located in the Upper Midwest, one at the University of North Dakota and the other at the State University of South Dakota.

We need to remember that our health care needs can be met only if an adequate number of able students apply for admission to these schools. In the years immediately following World War II, the number of applicants to the United States medical schools jumped to an all-time high. Shortly thereafter the number began to drop until the average number of applicants for each available first year position had fallen to 1.7 in 1960-62. Since that time the trend has again been upward, and as Figure 21 shows, in 1964-65

FIGURE 21: Ratio of Applicants to U.S. Medical Schools to First-Year Positions Available, 1947-65.



Source: Prepared by the Staff of the Council on Medical Education and Hospitals, "Medical Education in the United States," *Journal of the American Medical Association*, Vol. 194, No. 7, (Nov. 15, 1965), p. 163.

TABLE 55: Entering Medical Students Per 100,000 Population, U. S. and Upper Midwest States, by State of Residence, 1965

	Rate
Highest ranked State (Neb.)	7.5
Lowest ranked State (Nev.)	1.2
U. S. Median	4.0
North Dakota (3)*	6.7
Minnesota (12)	5.0
South Dakota (15)	4.9
Montana (25)	4.0

* Rank order among states.

Source: Prepared by the Staff of the Council on Medical Education and Hospitals, "Medical Education in the United States," *Journal of the American Medical Association*, Vol. 194, No. 7, (Nov. 15, 1965), p. 213.

the average number of applicants per acceptance reached 2.1. Data from the Association of American Medical Colleges indicate that ten states, including Minnesota, contribute 58% of the students entering all United States medical schools.

In the Upper Midwest

The University of Minnesota, which has the seventh largest medical school in the United States, chose its entering class of 150 students in 1965 from 800 applicants; 87% of those selected were Minnesota residents.

It is apparent from examining Table 55 that the states included in the Health Manpower Study make a larger than ordinary contribution to the supply of physicians in the United States. Three of the four states rank above the national average with respect to entering students per 100,000 population. Only Montana is not in this group and its number is equal to the median figure for the U.S. All eleven states that have neither a four-year nor a two-year medical school rank in the lower half of the distribution. Thus, the presence of a medical school within a state appears to encourage students to study medicine.

Since Minnesota is the only one of the states in the Upper Midwest that contains a four-year medical school, it is interesting to compare it with other states of similar size. These include Kentucky, Louisiana, Maryland, Alabama, and Tennessee. These five states, which like Minnesota have a population between three and four million, have at least one public medical school, and four of the six also contain at least one private school. Only Alabama and Minnesota have a single school within their boundaries; Alabama's total enrollment, however, is less than half that of the University of Minnesota, and it is the only state of the six that falls below the national average with respect to entering students per million population.¹

Because the University of Minnesota Medical School is already large, the Northern Association for Medical Education has sug-

¹See Appendix for Table noting state by state detail.

gested the establishment of a new private medical school in St. Paul, in part as an alternative to further expansion of medical classes at the University of Minnesota. This proposal must be given serious consideration. A private school can draw its students from a wide geographical area, and thus it often enjoys a high quality applicant pool. The Twin Cities, with their many public and voluntary hospitals, should provide an adequate supply of the clinical facilities which a new medical school would find necessary.

However, two major problems confront the founders of a new medical school. The first is a base within a university. Though there are a few medical schools that are not a part of a university, there is little disagreement about the desirability of such a connection. The second need is for a very large amount of money: medical facilities and education are not cheap. The Health Manpower Study Advisory Committee has carefully studied the advantages and disadvantages of the proposal to establish a new medical school, and its opinion is found in the section on Recommendations.

It is important to recognize that there is no such thing as a "medical school" in a limited sense, since the education of physicians is accompanied and enriched by related programs in such fields as dentistry, nursing, public health training, and hospital administration, as well as in basic medical research. Instead of functioning as an independent unit, the medical school has become a central part of a medical center which often includes a large teaching hospital, out-patient clinics, research establishments, and comprehensive libraries in addition to basic instructional facilities for several professions. At the University of Minnesota, for example, there are currently 611 medical students, but the College of Medical Sciences is responsible for the instruction of a total of 1616 students. North Dakota's 83 medical students are only a small part of the total of the 220 students who are the responsibility of its basic science school. South Dakota also has 83 medical students but includes 114 students within its total teaching responsibility.

The schools of basic medical sciences at the University of North Dakota and at the State University of South Dakota were founded

FIGURE 22: Minnesota Alumni by Place of Practice, 1940-49.

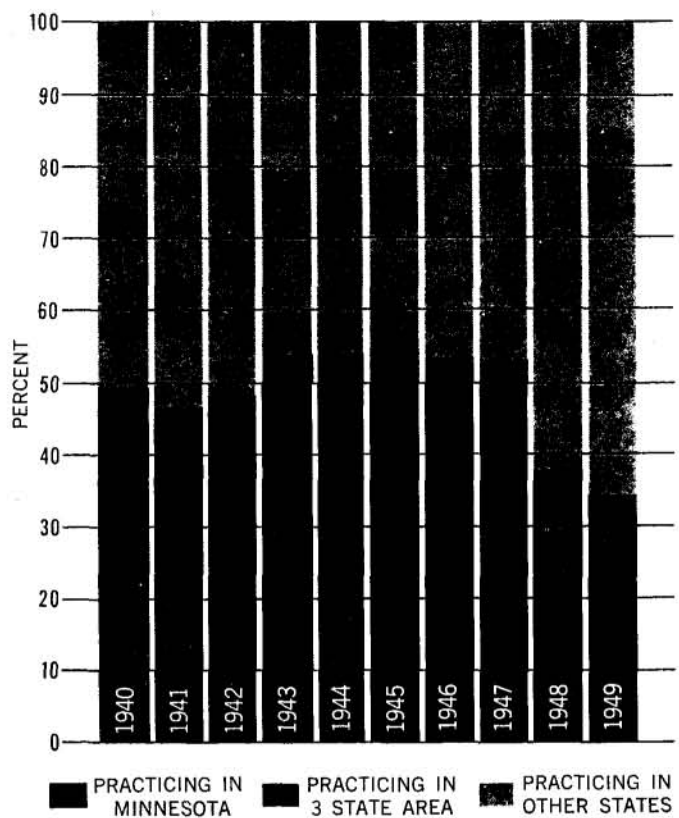
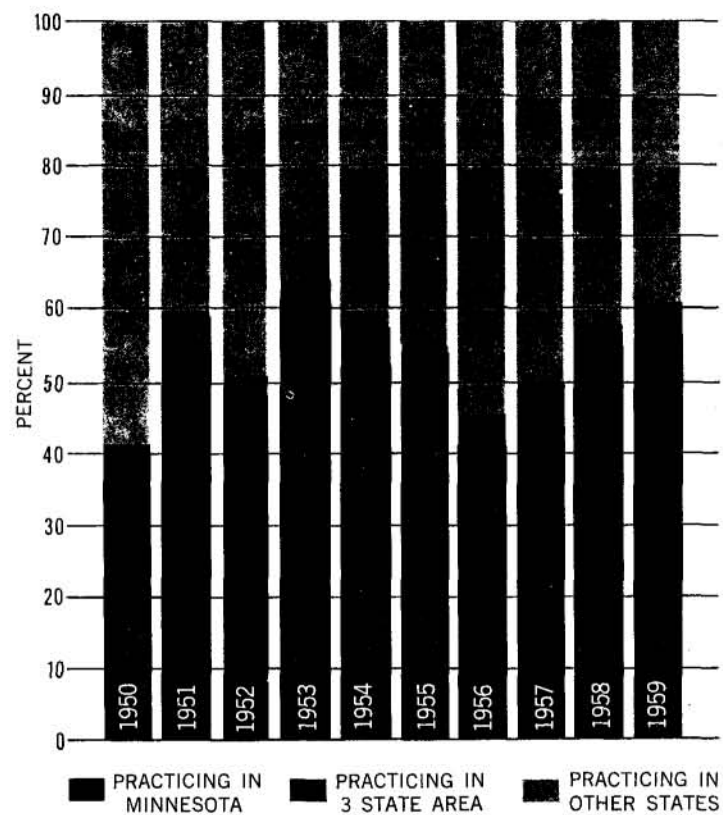


FIGURE 23: Minnesota Alumni by Place of Practice, 1950-59.



in the early 1900's. Through the years they have provided sound instruction in the first two years of medical education; at least one quarter of their students transfer to highly selective schools to complete their medical education, indicating the soundness of the education they received.

Holding Power of the Region

The alumni of the Medical School at the University of Minnesota are practicing in every state and in several foreign countries. Many graduates are serving in the armed forces, the Veteran's Administration, and the Public Health Service. Others hold important teaching and research positions. Thus, Minnesota's Medical School has made a major contribution to the good health of the whole nation.

Many Minnesota alumni, however, have chosen to practice in the Upper Midwest and particularly in Minnesota. Figures 22 and 23 show Minnesota alumni by place of practice from 1940 to 1959. It is evident that, overall, about 50% of the graduates remain in Minnesota to practice, while a small proportion practice in one of the other three Upper Midwest states.

The percent of the total physician force who are Minnesota graduates is indicated for all four states of the Upper Midwest in Table 30.² Since North Dakota, South Dakota, and Montana recruit physicians from the entire United States, the fact that the University of Minnesota, whose graduates constitute less than 2% of the output of all U.S. medical schools, contributes nearly 10% of the physicians in these states demonstrates the close educational ties that relate the four states included in the Health Manpower Study.

The physicians that leave Minnesota to practice settle mainly in the western states. California, in particular, has proved attractive; 485 physicians who graduated in the last 25 years are practicing in that state. Washington and Wisconsin, each with 79 Minnesota-educated physicians, also attract significant numbers of Minnesota

²Table 30 found on page 45.

F24 graduates. When these physicians are tabulated by the U. S. region where they now practice, as is done in Figure 24, and are compared with the number of physicians educated in each region who come to the Upper Midwest to practice, it is evident that the Upper Midwest has a net loss only to the Pacific and the Mountain states.

It will be noted that the four Upper Midwest states have profited in exchanging physicians with other regions of the country. However, our area's net gain in physicians is diminishing and the out-migration is increasing. The North Central group of states has been the major contributor of physicians to the Upper Midwest states. Illinois, with its several medical schools, is mainly responsible. The number of doctors recruited from this region has also been declining for the past 40 years.

The medical alumni of the Universities of North Dakota and South Dakota are also widely distributed throughout the nation. The fact that North and South Dakota students must transfer to complete their education undoubtedly contributes to their failure to return to practice in their home states. Table 56 shows that the greatest percentage of students transfer to medical schools in the North Central States, followed by transfers to schools in states adjoining the Upper Midwest. However, a significant number of students transfer to schools in more distant parts of the country, particularly in the Middle Atlantic states. North Dakota sends many of its students to New England to complete their medical education, while South Dakota sends a sizable number to the Pacific states. Only a small number have transferred to the University of Minnesota in recent years.

TABLE 56: Regions Where North and South Dakota Medical Students Have Received M.D. Degrees, 1950-62

	NORTH DAKOTA		SOUTH DAKOTA	
	Number	Percent	Number	Percent
MINNESOTA	10	2.32	13	3.42
ADJACENT STATES Iowa, Nebraska, Wisconsin, Wyoming, Idaho	73	16.00	80	21.05
PACIFIC STATES California, Oregon, Washington, Alaska, Hawaii	30	7.00	51	13.42
MOUNTAIN STATES Colorado, Utah, Arizona, Nevada, New Mexico	9	2.10	16	4.21
NORTH CENTRAL STATES Illinois, Indiana, Kansas, Michigan, Missouri, Ohio	113	26.30	126	33.16
WEST SOUTH CENTRAL STATES Louisiana, Oklahoma, Texas	41	9.53	32	8.42
EAST SOUTHERN CENTRAL Kentucky, Mississippi, Tennessee, Alabama	18	4.19	5	1.32
SOUTH ATLANTIC Florida, Maryland, North Carolina, South Carolina, Virginia, Washing- ton, D. C., Delaware, Georgia, West Virginia	36	8.37	6	1.58
MIDDLE ATLANTIC New Jersey, New York, Pennsylvania	50	11.63	50	13.16
NEW ENGLAND Connecticut, Massachusetts, Vermont, Maine, New Hampshire, Rhode Island	35	8.14	2	0.53
CANADA	14	3.26	0	0.00
FOREIGN	1	0.23	0	0.00
TOTALS	430	100.00	380	100.0

Source: AMA Directories, and Records from University of North Dakota and University of South Dakota.

FIGURE 25: North Dakota Medical School Alumni by Place of Practice by Decade of Graduation, 1910-59.

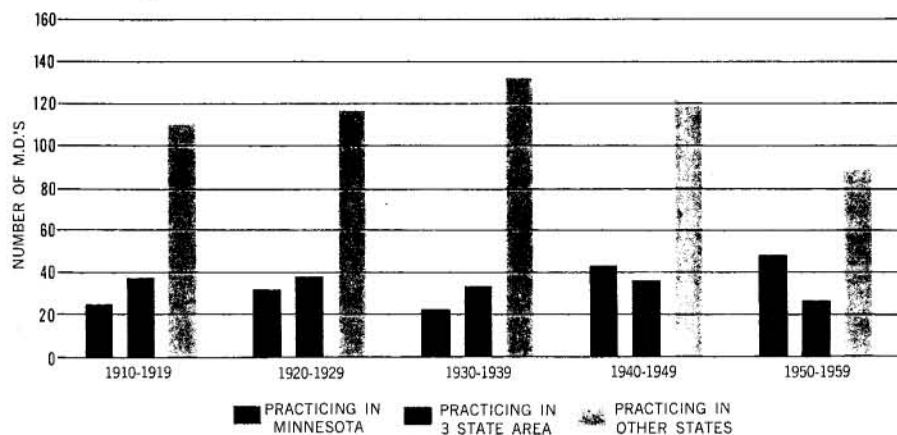
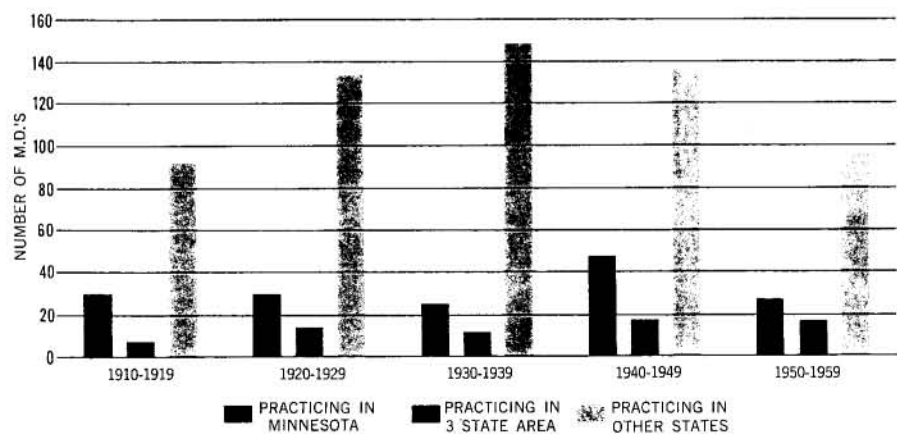


FIGURE 26: South Dakota Medical School Alumni by Place of Practice by Decade of Graduation, 1910-59.



Rather few alumni return to the Dakotas to practice, however, and Figures 25 and 26 show that of the physicians who leave, most go to California.

North Dakota has a student loan program under which a portion of the student's debt is forgiven if he returns to North Dakota to practice. Evidence indicates that this program has had some effect on the number of North Dakota alumni who practice in the state.

Summary

The four state area has a better than average educational record as measured by the number of its students who gain entry to medical school. It has long been fortunate in that it has recruited more physicians from other areas than it has lost through migration. However, this balance has been shifting over a period of many years. Fewer physicians are being recruited from other areas, and more of the practitioners within the area are Minnesota-educated. About half the Minnesota graduates remain in Minnesota as practitioners and a small percentage practice in North Dakota, South Dakota, and Montana. This small group of University of Minnesota Medical School graduates make a substantial contribution to the smaller total physician forces of these three states. A rather small percentage of North Dakota and South Dakota graduates return to their states or to the four state area.

While the Upper Midwest is at the present time performing its educational tasks well, additional educational facilities are going to be needed in the future, and the possibility of a new private medical school in the Twin Cities deserves serious consideration.

DENTAL EDUCATION

In the Nation

In 1964 there were 48 approved schools of dentistry in the United States. Only one school had been added in the five years prior to 1964. All of these schools have college or university affiliations, and 50% of them are publicly owned. The average dental school

enrollment is 283 students. Of 8,969 applicants in 1963, 3,770 were accepted, a ratio of 2.4 applicants to each accepted student.

157 Table 57 ranks the states by dental enrollment per million population. Minnesota ranks third by this measure, and thus makes a sizable contribution to dental manpower in the United States. Montana, which ranks ninth, also is an important source of the nation's dentists, even though it has no dental school. North and South Dakota, however, have low dental enrollments in relation to their populations.

In the Upper Midwest

The University of Minnesota School of Dentistry, which ranks eleventh in size in the nation, is the only dental school in the four states encompassed by the Health Manpower Study. Since it is a public, tax-supported school, the School of Dentistry gives preference for admission to Minnesota residents, a policy that is also extended to residents of neighboring states which have no dental school. Thus North and South Dakotans have come to Minnesota in relatively large numbers to study dentistry. Montana residents also tend to come to the University of Minnesota School of Dentistry, another indication of the educational ties that bind the four states of the Upper Midwest.

Table 38 demonstrates clearly the influence of Minnesota's dental school on the dental manpower of the Upper Midwest.³ Minnesota has educated 86% of its currently practicing dentists, nearly 40% of North Dakota's dentists, and about 22% of those in South Dakota and Montana. The percentage of Minnesota-educated dentists practicing in these states is approximately twice that of the physicians educated in Minnesota and has been increasing in recent years. The close cooperation between educational institutions in the four states has almost certainly been responsible for this.

Holding power of the region

However, when we compare the number of Minnesota-educated dentists who leave the Upper Midwest with the number of dentists

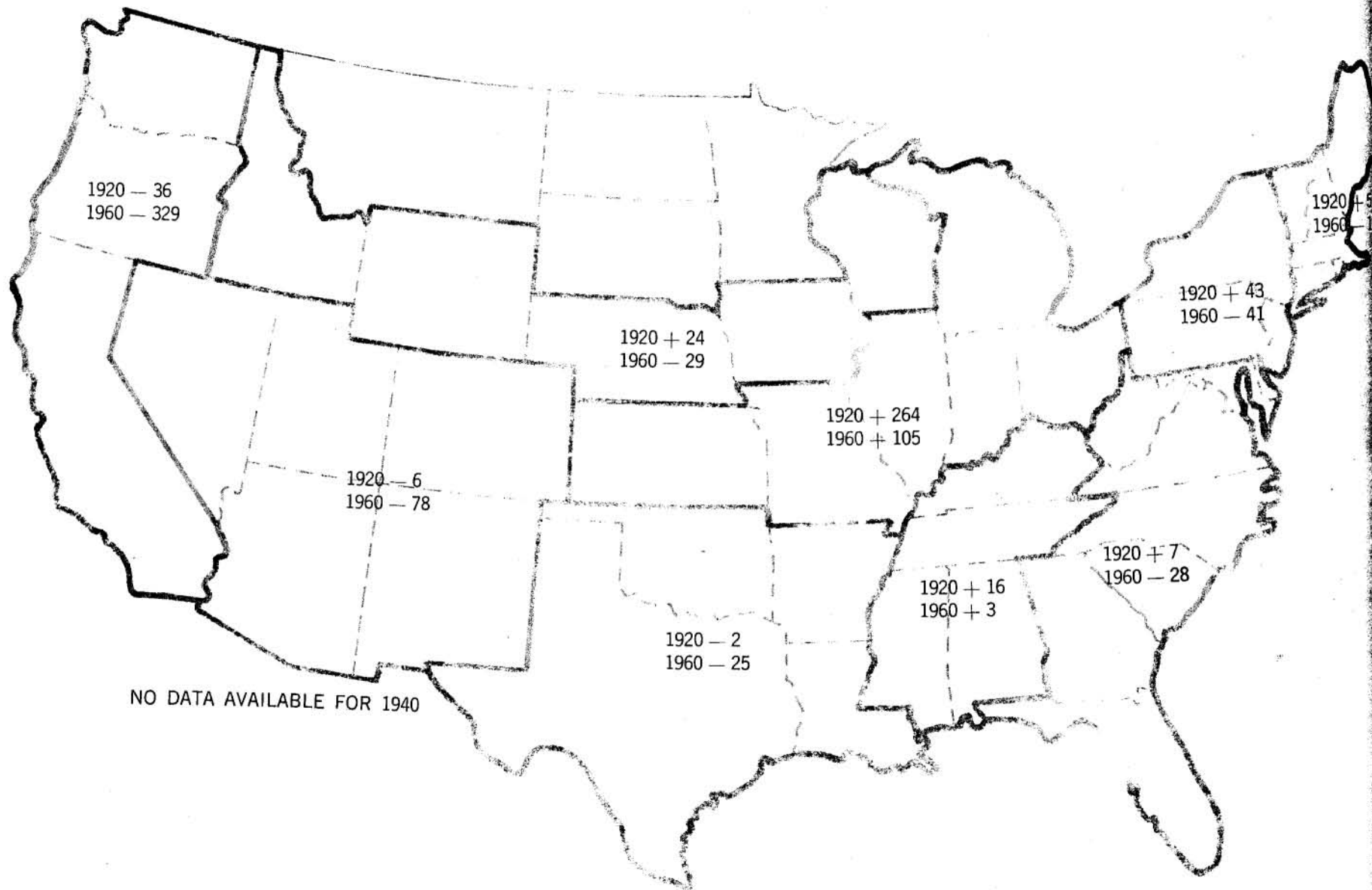
TABLE 57: Enrolled Dental Students Per Million Population, U. S. and Upper Midwest States, by State of Residence, 1964

	Rate
Highest ranked State (Utah)	167
Lowest ranked State (Maine)	21
U. S. Median	66
Minnesota (3)*	101
Montana (9)	85
North Dakota (29)	64
South Dakota (41)	41

* Rank order among States

³Table 38 found on page 56.

FIGURE 27: Number of Minnesota Dental School Graduates, Practicing in Other Regions (Loss), and Number of Graduates of Other Dental Schools, by Location of School, Practicing in Upper Midwest (Gain) by Year.



educated elsewhere who come to practice in the Upper Midwest, it appears that the attraction of the region is declining. The only region from which we gain dentists is the North Central states and their contribution to our dental manpower is diminishing. Furthermore, the federal government is taking an increasing number of Minnesota dentists for the Armed Forces, the Veteran's Hospitals, and the Public Health Service.

Figure 28 shows the distribution of the University of Minnesota dental classes of 1949, 1953, 1957, and 1961. Of a total of 289 students, 56.4% have remained in Minnesota to practice, and nearly 10% practice in the other three states of the Upper Midwest. The tendency for Minnesota graduates to remain in Minnesota has increased in these years.

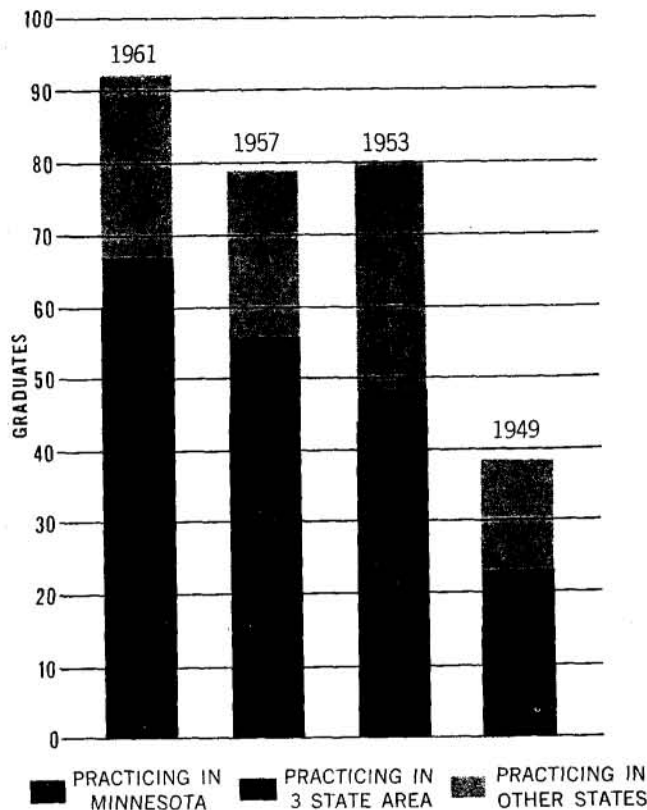
The education of auxiliary personnel is an increasingly important part of dental education, since dental hygienists contribute much to the dentist's efficiency. At the present time, the University of Minnesota has the only approved school of dental hygiene in the four states. Many dentists hop that this facet of dental education will be expanded throughout the Upper Midwest.

Summary

The Dental School at the University of Minnesota, the only dental school in the Upper Midwest, is, like the Medical School at the University, making an important contribution to the health manpower of Upper Midwest. The Dental School supplies a very high proportion of Minnesota's dentists and makes an important contribution to the dental manpower of North and South Dakota and Montana. More of Minnesota's dental graduates remain in the Upper Midwest than is the case with Minnesota-educated physicians.

Although the Upper Midwest states recruited many dentists from other areas in the early part of this century, this has changed and rather few dentists are now being attracted to our area. At the same time, Minnesota's dental graduates are in increasing numbers going to other regions to practice.

FIGURE 28: University of Minnesota Dental Alumni by Place of Practice, (1949, 1953, 1957, 1961).



RECOMMENDATIONS

THE NEED FOR PHYSICIANS IN THE UPPER MIDWEST

Expansion of the University of Minnesota Medical School

Although there is no generally accepted way of estimating the number of physicians needed, the requests for doctors made by many communities to official and other agencies spoke for a substantial unsatisfied demand. It was clear that the current ratio of physicians to population should at least, be maintained.

By estimating the number of physicians who will be lost to Minnesota in the next ten years through death, retirement, or out-migration, and by balancing this figure against the estimated additions to the profession and against the expected population of Minnesota in 1975, the Health Manpower Study estimated that there would be between 200-300 fewer physicians than would be needed to maintain the present ratio of active physicians to population.

Estimates can only serve as rough measures. When we turn to trends in the supply of physicians, we are on firmer ground. The long-term decline in the doctor:population ratio of active and of personal physicians went far toward explaining the insistent feeling that there is already a shortage. As the medical profession differentiates increasingly into specialty practices—some of which do not involve direct patient care—an increased number of physicians will be required merely to meet present demands and needs.

A greatly increased demand for medical care must be anticipated because of Medicare, rapid growth of personal income, improvements in health insurance and population growth. To ac-

commodate this increased demand, there should be some betterment of the present ratio.

The evidence relating to population growth is impressive. Between 1960 and 1975 the state will have gained population equal to the 1960 combined population of Minneapolis, Rochester, Mankato and Austin. The demand for medical care from this expanding population must be taken into consideration.

Since an increase in the size of the University of Minnesota Medical School's entering class of 1967 will not be fully reflected in practice until about eight years later, the anticipated shortage will not begin to be met by more graduates until 1972, at the earliest, or by 1975 when most of the 1967 entrants will complete their hospital training. More than token expansion of the class entering in 1967 may not be possible. By 1975 Minnesota will have to be planning to meet the needs of further population growth.

Any dependence on recruitment of physicians from other states is hazardous. While there is no doubt that physicians trained out-of-state will continue to settle in Minnesota, the factors which cause Minnesota graduates to go to other states will also act on these physicians. Tabulation by the Study staff shows that the number of physicians who are educated elsewhere and who settle in Minnesota tends to be declining.

Therefore the Health Manpower Study Advisory Commission recommends that the University of Minnesota expand its entering class to 200 students at an early date and lay plans for a further expansion to 250 at some time in the future.

Transfer of the North Dakota and South Dakota Medical Students

The low proportion of students from the Dakota schools who returned to their states or to the Upper Midwest to practice impelled the Commission to examine the question of transferring graduates of two-year medical schools at the Universities of North and South Dakota to the University of Minnesota. These students would come to Minnesota with half of their medical education behind them. Smaller financial outlays would be required to accommodate these transfer students than to expand the full four-year curriculum.

Acceptance of any North or South Dakota student who might wish to transfer to the University of Minnesota would promise an early addition to the physician force in Minnesota.

While one cannot state what the effect of such a transfer will be on the number of physicians who might choose to settle in North or South Dakota, one can confidently expect that the number would not diminish and would probably increase.

Students form strong attachments to the area where they finish medical school. Material presented in the body of this report suggests that if the North and South Dakota graduates completed their medical education in this area, more of them would stay in the Upper Midwest.

Therefore, the Commission recommends that students from these two-year schools be encouraged to complete their education at the University of Minnesota. Since most of these students now transfer to other schools, it may be necessary to go beyond their passive acceptance. Cooperation between the sending and the receiving institutions can no doubt assure the transfer of a substantial number to Minnesota.

Possible Need for a Second Medical School

The Commission was deeply interested in the proposal to establish a private medical school in St. Paul. The projected need for physicians in the Upper Midwest made it clear that the Commission should offer an opinion about this proposal.

The Commission was aware of the advantages of a private medical school. A private medical school could recruit its student body from a wide area, as well as from within Minnesota. The western part of the country has relatively few private schools so there would, indeed, be room for another. An additional school would undoubtedly contribute to the medical care of Minnesota and to the Upper Midwest. The competition to achieve excellence that would inevitably arise between a new and an established school in the Twin Cities would undoubtedly have a beneficial effect on both.

The Commission felt strongly that formation of any new medical school should be attendant upon two considerations. First, a

new medical school should be placed in an established institution of higher learning and, second, it should be adequately financed. Establishing any new medical school in the Minneapolis-St. Paul Metropolitan area that is adequately financed and soundly based must take account of the present circumstances.

All the private colleges in Saint Paul and Minneapolis are relatively small and are dedicated to sound programs of undergraduate education. There does exist the possibility of a federation between the private colleges. If this is achieved—which would require some years—then a university home for a private medical school would be a likely possibility. At the present time, however, these colleges are all in the process of expanding facilities and support and, in most cases, the student body. The Commission found varying degrees of interest among the several college presidents in discussions about the possibility of assuming responsibility for a medical school. None would care to hazard their present programs or their potential for future development by assuming responsibility for support of a medical school at this time.

More than half of the medical schools in the United States have annual operating budgets of more than three million dollars. Sums in the neighborhood of 50 million dollars would be needed to provide an assured income in the neighborhood of two million dollars, a relatively modest operating budget. Construction of a medical school would require further large expenditures.

The Northern Association for Medical Education, which has worked for the establishment of a Saint Paul School, has generated a volume of support and a momentum that should not be wasted. With the interests of this group in mind and with the hope that another medical school may become a reality, the Commission recommends that the Northern Association for Medical Education consider establishing a Medical Federation for Graduate Education and Research. Such a Federation would concern itself with internship and residency training programs and research in non-university connected hospitals. Obviously, an organization concerned with these matters would be interested in continuing education for practicing physicians. It is the considered opinion of the Commission that funds can be obtained from private sources for support of this proposal.

There has been a trend in the Twin Cities for hospitals to band together to provide a full range of services and training programs for physicians. Such inter-institutional cooperation promises to provide a very suitable base for sound training and education programs. The Commission hopes that the Federation's activities would ultimately be expanded outside the Twin Cities—certainly to Duluth, Fargo, Grand Forks, Sioux Falls, and as opportunities arise, to other cities. Strong internship and residency programs provide an effective way of recruiting physicians.

The Commission believes that an activity of this kind might well be sponsored by the Northern Association for Medical Education and might well be a step toward a medical school. A successful Postgraduate Federation will be in a strong position to attract the necessary academic and financial support that may eventually bring a medical school into being.

In view of the future need for physicians in Minnesota and other states in the Upper Midwest, the Commission foresees the need for and recommends a second medical school, probably in the Twin Cities. Since there are many mechanisms by which a second medical school might be realized, in addition to the recommendation made above, the Commission did not feel that it should offer an opinion about the auspices under which it should be formed. Similarly, the Commission did not feel that it could now offer an opinion about how soon a second medical school would be needed.

THE NEED FOR THE PERSONAL PHYSICIAN

Recent legislation has made regional planning a fact; a planning group has been appointed and is at work. The regionalization of specialist services and hospitals will be incomplete, however, unless attention is given to the need for personal physicians. The regional organization will need to concern itself with the distribution of medical services and the health care of the rural areas.

The demonstrated decline in the physician:population ratios in rural areas caused the businessmen-members of the Commission to

raise a question about the use of economic tools to improve physician distribution. There has, until the present, been neither an organization nor a source of funds to give attention to the problem of doctor distribution. A regional planning body is now a reality; its purposes include "to improve generally the health manpower and facilities available to the nation." The strategic use of private monies can often usefully supplement much larger government expenditures. The Commission hopes that the Blue Cross and Blue Shield organizations, which have always been distinguished by the service character of their benefits, will see fit to use a small part of their funds in an effort to meet the problems resulting from a changing distribution of medical care services.

While the rural areas of the United States have been losing doctors, group practice in these areas has been growing. This growth suggests a mechanism for distribution of physicians to which the Commission directs the attention of the newly appointed regional planning body. The businessmen-members of the Commission were interested in the possible increase in efficiency and effectiveness of group practice and stated the hope that economic inducements to encourage or to form such practices would also gain support.

The Commission was aware of the efforts being made by the American Academy of General Practice to encourage entry into family practice through specialty certification of this field. The Commission feels that it does not need to offer its opinion about this proposal since it is being considered by a committee with national representation. The data from our study indicates that the greatest present shortage as compared with the past is in personal or family physicians, and it is for this reason that it expresses profound hope that public and voluntary bodies will give major attention to this problem.

Medical students rarely see any model of the personal or family physician in the course of their education. Their models are highly specialized doctors even within fields such as medicine or surgery. Continuity of care is seldom provided at teaching centers. While the effect of these factors on the recruitment of family doctors is problematic, it certainly cannot be favorable.

In view of the need for personal physicians in the area, the Commission recommends that the teaching of skills and attitudes relevant to the responsibility of the personal or family doctor be strengthened at the University of Minnesota Medical School so that the institution's position as the major provider of personal physicians for the Upper Midwest will not be lost.

THE NEED FOR DENTISTS AND DENTAL HYGIENISTS

The National Health Survey has made it plain that United States citizens in middle life have a large amount of dental disease leading, ultimately, to a distressingly high rate of edentulousness. The Commission's dental advisors assured the members that the Upper Midwest states share fully in the dental disease load which is so prevalent in the United States. Since dental care is strongly related to income, increased prosperity and expanded dental insurance plans will mean a significant rise in the demand for care, that will be further stimulated by an increasingly well educated population. To these increased demands must be added the rapidly growing population that will need dental service. The ratio of dental practitioners to population has declined steadily in Minnesota since 1940. At the very least, this decline should be halted. Since dental disease is prevalent and the demand for care will grow, there are compelling reasons for substantially increasing the number of available dentists.

Since the Medical School at the University of Minnesota and the School of Dentistry are closely related and share staff and curricula, the Commission recommends a modest increase in the number of dental students to accompany the expansion of the Medical School. The inadequacies of the physical plant of the School of Dentistry can most economically be corrected by expanding at the same time as the Medical School. The data accumulated and presented to the Commission indicates that a second undergraduate dental college is not required at this time.

The states of North Dakota, South Dakota, and Montana have no undergraduate dental school and have no plans for such. The Commission recommends that serious consideration be given to establishing physical facilities and staff for the formal training of dental hygienists within these state universities.

At the same time, the dental members of the Commission recommend that an increased number of dental hygienists be trained at the University of Minnesota. If possible, they feel that attention should be given to the possibility of recruiting and training men to this field. This will require a change of the existing state law. The supervision of these and other auxiliary dental personnel must continue to be the responsibility of the dental profession. These extremely important auxiliary dental personnel can relieve present and future shortages of dental manpower to a substantial degree. The faculty of the University of Minnesota School of Dentistry should be encouraged to develop experimental educational programs in the training of auxiliaries, in addition to the dental hygienist.

THE FUNCTION OF THE STATE EXAMINING BOARDS

State Examining Boards had an important function when the education and training of physicians or dentists was of the most varied quality.

Now that medical and dental education has achieved uniformly high standards, this function does not need to be pursued as vigorously as formerly. In recognition of the fact that the examinations given by such boards have become less important, the Commission recommends that they now add a new function more consonant with the needs of the time. The substance of this recommendation is as follows:

A mechanism for gathering basic data on physicians and dentists exists through the required annual licensure. The Commission feels that careful tabulation of this registration material, as

well as information on new licentiates, and on losses due to death, migration or retirement, would enable the Boards to construct and publish annually a picture of the total physician and dentist forces within a state. Such an intra-state picture would include data on physician or dentist: population ratios by counties or Hill-Burton hospital regions, the total number of physicians and dentists and changes from previous years. Similar tabulations in each state of the study area would give an accurate and current picture of the profession.

Annual publication of information gathered and handled by modern techniques would add little to or might even reduce the expense of the Board's operations. The small costs involved would be no more than a fraction of the funds expended by the Health Manpower Commission in reconstructing necessary data from directories and other sources to make the many tables that appear in this report.

THE ADVISABILITY OF A CONTINUING STUDY OF HEALTH MANPOWER

Since the large amount of information gathered by the Health Manpower Study staff will provide a basis for succeeding investigation of health manpower in years to come, the Commission recommends that some permanent group be established to provide a continuing surveillance of health manpower and health profession educational facilities.

When the Commission first gave consideration to this recommendation, there was no logical or fully suitable body to take responsibility for continuing surveillance of manpower problems. With the formation of regional planning organizations in all four states of the study area, there are now agencies to carry on this function. In view of the interdependence of the states in the matter of medical and dental manpower, the Commission strongly recommends that joint planning between the Upper Midwest states be undertaken.

OTHER HEALTH MANPOWER PROFESSIONS

The data available about other professional groups within the health professions precluded extensive studies of these groups. It is well recognized that in the health professions—as within other industries—responsibilities are redefined and scarce personnel are replaced by other less scarce types of workers. The productivity of the health professions—and ultimately the satisfaction of the patient population—may rest upon the extent to which the capabilities of nurses, and other medical technologists can be employed to replace the scarcer skills of physicians and dentists.

Mechanisms now exist to provide the type of statistics for other health professions which served as a basis for the many tabulations relative to physicians and dentists. Attention to data collection and tabulation beginning immediately would, in a few years, permit calculations of ratios, distribution, and trend statistics that would provide a basis for informed decisions about needs for all these professional groups.

The Commission strongly recommends that the body charged with regional planning of health services lay plans for continuing regular data collection and study of material relative to such professional groups as nursing, medical technology, physiotherapy, occupational therapy, dental hygienists, and others that are needed to maintain a high quality of medical and dental care and to meet the demands of an affluent and growing population.

The growth of a junior college system provides a mechanism to meet the needs of the many and increasingly diversified professionally and technically trained persons that will be needed in future years. The Commission lastly recommends that the junior colleges incorporate programs for training health manpower among their educational offerings.

APPENDIX A—STUDY METHODS

INTRODUCTION

When our investigation began it was assumed that the requested study of Minnesota's physician needs would be extended to include dentistry, nursing and other health professions. The press of time and the creation of a regional planning organization during the period of study provided both a reason and an excuse for limiting the breadth of the investigation. The physicians and dentists, who during their education often utilize the same laboratories and are taught by the same faculty, could not be economically separated for study purposes so the report, while concerned primarily with physicians, has devoted nearly as much space to dental manpower. The fact that Minnesota and other of the Upper Midwest states were well supplied with nurses as compared with the rest of the country influenced our decision to reduce the attention given to this important professional group. A second reason for not giving greater attention to nursing stemmed from the fact it is a comparatively large profession and the relevant statistics were in a rather undeveloped state, so that deeper study would have increased our effort unduly.

Although original plans called for an investigation limited to Minnesota, it was soon extended to include North and South Dakota and Montana which are part of the same trade area. These economic relationships obviously extend to medical education and medical care. The two medical schools in North and South Dakota were found to accept substantial numbers of Minnesota residents and the Minnesota Dental School gave preference to applicants from these states and Montana. Large numbers of medical and dental graduates of the University of Minnesota practice in North Dakota, South Dakota and Montana. These several factors made it desirable to extend the study to the three other states in the Upper Midwest group.

DATA GATHERING

It was decided at the outset that any decisions about future needs for doctors, dentists or other health personnel would require data on recent trends.

Data on physicians and dentists has to be related to a growing and shifting population. The size of the population is accurately known only for the census years (1960, 1950, 1940, etc.). For this reason, information from the medical directories for the census years was abstracted and data on changes and trends compiled.

The directories published by the American Medical Association, American Dental Association, American Osteopathy Association and others are based upon reports of individuals about their present location and type of practice. The available data have been extensively checked for accuracy although this is not always possible. For example, many of the doctors who were in practice in 1940 or 1950 are now dead. Furthermore, the large size of the practicing physician population precluded checking of all data. Olmsted County, to judge from past records, had large numbers of general practitioners in some census years and fewer in others. With extensive help from the staff of the Mayo Clinic it was possible to ascertain that Mayo Clinic Fellows in some years were classified as general practitioners and in others were not. The confusing statistics for Olmsted County were obviously in error, and the effort needed to rectify them was, unfortunately, very time consuming.

In transferring information from directories to other more efficient records there are inevitably some errors. Pains were taken in this process to minimize errors and many checks were made to ascertain that the information was accurate. Although some errors undoubtedly remain, we are confident that these are not frequent enough to change any of the tabulations significantly. Later independent checks on the directory data has confirmed our confidence in its accuracy.

Experience shows that the requests sent to doctors which serve as a basis for the directories are returned conscientiously and quickly. The directories therefore are likely to list a very high percentage of all the doctors in practice. The doctors' self-description of their fields of practice (general practitioner, surgery, or other) are, as noted above, no better than the doctor's self-description. The general trends shown between 1920 and 1960 are very similar to the trends for the nation at large. This has given us confidence that the trends portrayed are a good description of the change shown—with one exception.

Special attention has been given to the statistics for 1940, 1950, 1960 and 1965 since the experience of these recent years is most relevant to our present problems and those of the immediate future. The method of collecting and classifying data for the medical directories unfortunately changed between 1960 and 1965. This change is thought to have provided a more accurate allocation of doctors to different fields or types of practice than in previous years. The reader will have noticed that the number of physicians of all types apparently increased greatly between 1960 and 1965. It is the opinion of those responsible for compiling the directories that the total number of physicians was enumerated accurately before this change but that allocations to different fields of practice is more accurate at present. It is possible that the increase of active physicians in 1965 may be related to the change in the method of data collection. The 1965 statistics are thus not fully comparable to those of previous years. In addition, the 1965 information cannot be related to a census so calculations of physician:population rates are less accurate. Population estimates for inter-census years are usually not very different from the true figure, but they are less exact. These estimates are limited to a whole state population. The reader will note that there are no 1965 calculations relating to physician:population ratios for counties or Hill-Burton Regions and this is due, of course, to the absence of population estimates for these smaller units.

The problems related to statistics about dentists were less complex. Specialization has not affected the field of dentistry to any great degree. The major problem has been to determine the total number of dentists in each state or other area and it is generally agreed that this figure has been collected with reasonable accuracy for many years for dentists as well as doctors.

Staff members of the Upper Midwest Economic Study were consulted at an early stage of this study. As noted previously, information supplied by the members of this group influenced the decision to extend the study to include North Dakota, South Dakota and Montana in addition to Minnesota. Subsequent results amply justified this decision. The extensive use of the Hill-Burton Hospital Regions was also accepted upon the advice of the study group.

AN EXPLANATION OF RATES

In popular publications the number of doctors, dentists or nurses in an area is often described in terms of the population served by each of these professional persons. Thus, it will be said that the United States has about one doctor per 700 persons, or that Russia has one doctor per 500 persons. When we are studying doctors or dentists it is much simpler to use a different kind of rate in which we compare the number of doctors per 100,000 population. It is both simpler and more understandable to say that one area has 150 physicians per 100,000 population and another as 100. The following table shows how the popular and the technical rates correspond.

Number of Physicians per 100,000 Population	Population per Physician
150	666
125	800
100	1000
85	1175
75	1333
66	1500
50	2000

The reader who is used to thinking in terms of the number of persons served by each doctor will find the conversion easy to make.

DESCRIPTION OF PHYSICIANS' PRACTICES

Throughout the text the physician rates have been described as total, active and personal or family. The total rate is based upon all of the physicians practicing in an area. This is not a very useful rate because it includes very diverse kinds of doctors, including those who are retired, young doctors in hospital training, the bacteriologist in full-time research, general practitioners, salaried physicians working for insurance companies, state health officers, surgeons, psychiatrists and many other specialists.

The active physicians are a more useful rate in that it is limited to doctors who are mostly in active private practice, giving patient care. Retired physicians, young doctors in hospital training, doctors in research or in full-time administration have been eliminated from this group.

The young physicians in hospital training are the largest group excluded from the total to obtain the active physicians classification. Minnesota trains a very large number of doctors but as the text shows, many of these doctors do not stay in Minnesota to practice. Although these young physicians contribute a large amount of medical service, it is not accurate to include them in the state manpower supply.

Most Americans, when asked, state that they have a personal or family doctor. Although some people will give the name of an obstetrician or orthopedist when they are asked to name their personal or family doctor, most people have a general practitioner, internist or pediatrician in mind. These are the doctors who do give care that fits the description of personal or family care—even though many of the latter groups are certified specialists. A few pediatricians—usually a small number located in university hospitals—and somewhat more of the internists practice mainly as consultants. In calculating rates for family or personal doctors we have included all general practitioners and pediatricians but have excluded internists who describe their practice as limited to a medical specialty such as cardiology, endocrinology, gastroenterology or pulmonary disease. The accuracy of this rate is again related to the doctor's self-description of his practice. However, for the purpose of determining trends it is probably a good approximation of what doctors actually practice.

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Table B-28. Active Nurses and Active Nurse/Population Ratios in the Upper Midwest by Hospital Planning Regions, 1962

Table B-29. Active Osteopaths in Upper Midwest, 1910-65

Table B-30. Number of Dentists and Dentist's 100,000 Population in Upper Midwest, 1910-65

Table B-31. Number of Active Dentists and Active Dentists/Population Ratios By Hospital Planning Regions, Minnesota, 1940, 1950, 1960

Table B-32. Number of Active Dentists and Active Dentist/Population Ratios By Hospital Planning Regions, North Dakota, 1940, 1950, 1960

Table B-33. Number of Active Dentists and Active Dentist/Population Ratios By Hospital Planning Regions, South Dakota, 1940, 1950, 1960

Table B-34. Number of Active Dentists and Active Dentist/Population Ratios By Hospital Planning Regions, Montana, 1940, 1950, 1960

Table B-35. Sources of Minnesota's Dentists by States in Which Dental Education Was Obtained, 1910-65

Table B-36. All Dentists Educated in Minnesota (at the University of Minnesota School of Dentistry) Practicing in the Upper Midwest, Compared to All Dentist Practicing in the Upper Midwest, 1910-65

Education

Table C- 1. Entering Students Per 100,000 Population: State in Rank Order, 1965

Table C- 2. Summary of Teaching Responsibilities in the Health Sciences, University of Minnesota, 1965

Table C- 3. Summary of Expenditures, Teaching and Research Programs in the Health Sciences University of Minnesota, 1964-1965

Table C- 4. Practice Location of Mayo Clinic Alumni, 1964

Table C- 5. Number of Graduates of the University of Minnesota Medical School of Practicing in Other Regions of the Country (Losses) and Physicians Educated in Other Regions Practicing in the Upper Midwest (Gains), 1910-65

Table C- 6. Number of Graduated of the University of North Dakota Medical School Practicing in Other Regions of States (Losses) and Physicians Educated in Other Regions Practicing in North Dakota (Gains), 1910-65

Table C- 7. Number of Graduates of the University of South Dakota Medical School Practicing in Other Regions of States (Losses) and Physicians Educated in Other Regions Practicing in South Dakota (Gains), 1910-65

Table C- 8. All Physicians Educated in Minnesota (at the University of Minnesota School of Medicine) Practicing in the Upper Midwest Compared to All Physicians Practicing in the Upper Midwest, 1910-65

Table C- 9. Principle States From Which Minnesota Gains Dentists and States or Armed Services to Which Minnesota Loses Dentists, 1910-65

Table C-10. Enrolled Dental Students Per Million Population, 1964

Table C-11. All Dentists Educated in Minnesota (at the University of Minnesota School of Dentistry), Practicing in the Upper Midwest, 1910-65

Table C-12. Number of Dental Graduates Gained and Lost (Graduates of the University of Minnesota School of Dentistry) to the Upper Midwest, By United States Regions, 1910-65

TABLE A-1
NUMBER OF NON-FEDERAL DENTISTS BY COUNTY GROUP, 1962

County group ¹	Number of dentists	Rate per 100,000 population
United States	97,842	53.1
Metropolitan-adjacent	85,201	56.7
Greater metropolitan	45,744	69.5
Lesser metropolitan	28,430	51.5
Adjacent to metropolitan	11,027	37.9
Isolated	12,641	37.0
Isolated semirural	10,982	39.3
Isolated rural	1,659	26.8

¹Counties within standard metropolitan statistical areas, as defined by the Bureau of the Budget, are here classified as greater metropolitan (if they are part of a SMSA of 1 million or more population) or lesser metropolitan (SMSA population of 50,000 to 1 million). Adjacent counties are counties that are not themselves metropolitan but are contiguous to metropolitan counties. All other counties are classified as isolated; semirural counties contain an incorporated place of 2,500 or more population, rural counties do not.

SOURCE: HEALTH MANPOWER SOURCE BOOK. 18. MANPOWER IN THE 1960's. U. S. Department of Health, Education, and Welfare, Public Health Service, Washington, D.C.: 1964, Table 28, p. 47.

TABLE A-2
DISTRIBUTION OF DENTAL
SPECIALISTS IN THE UPPER MIDWEST, 1964

	Oral Pathology	Oral Surgery	Orthodontists	Periodontists	Prosthodontists	Public Health	Pedo	TOTAL
Minn.	1	15	50	3	2	1	3	75
No. Dak.	0	1	3	0	0	1	0	5
So. Dak.	0	2	6	0	0	0	0	8
Mont.	0	0	10	0	1	0	2	13

SOURCE: FACTS ABOUT STATES FOR THE DENTIST SEEKING A LOCATION, 1964. American Dental Association (Bureau of Economic Research and Statistics): 1964, p.7.

TABLE E-1
PERCENTAGE DISTRIBUTION OF ACTIVE
PHYSICIANS IN MINNESOTA BY TYPE OF PRACTICE, 1910-55

FIELD OF PRACTICE	1910	1920	1930	1940	1950	1960	1965**
General Practitioners	95.0	70.3	63.8	61.6	59.3	41.0	51.6
Medical Specialists	.5	3.8	8.0	7.9	10.7	18.3	13.7
Surgical Specialists	4.3	24.6	26.8	26.5	23.8	31.0	22.8
Psychiatrists and Neurologists	.2	1.3	1.4	1.1	2.2	3.6	3.5
Others*				2.9	4.0	6.1	8.4
BASE FOR CALCULATION	2084	2465	2791	2861	2936	3163	3787

* "Others" includes those in "Occupational Medicine," "Administrative Medicine," "Faculty and Research," and other types of practice which do not fit into the categories mentioned in the left-hand column. However, these physicians described themselves as "irregular practice" and hence are classified as "active" (meaning active private practice). Data for 1910, 1920, 1930 not collected.

** See document for qualification of 1965 data.

PERCENTAGE DISTRIBUTION OF ACTIVE
PHYSICIANS IN NORTH DAKOTA BY TYPE OF PRACTICE, 1910-65

FIELD OF PRACTICE	1910	1920	1930	1940	1950	1960	1965
General Practitioners	99.1	70.4	65.9	61.7	56.2	45.7	47.8
Medical Specialists	0	3.6	4.7	6.1	9.6	17.2	18.3
Surgical Specialists	.9	25.4	28.6	31.4	32.8	35.6	30.5
Psychiatrists and Neurologists	0	.6	.8	.6	1.5	1.4	3.3
Others*				.2	.0	.1	.1
BASE FOR CALCULATION	532	528	490	459	406	435	518

* See note Table B1

TABLE B-3

TABLE B-3
PERCENTAGE DISTRIBUTION OF ACTIVE
PHYSICIANS IN SOUTH DAKOTA BY TYPE OF PRACTICE, 1910-65

FIELD OF PRACTICE	1910	1920	1930	1940	1950	1960	1965
General Practitioners	99.1	77.0	73.6	65.9	58.7	53.4	56.9
Medical Specialists	.2	2.2	2.4	3.6	4.6	11.4	14.2
Surgical Specialists	.7	20.3	22.9	29.2	34.7	33.6	25.8
Psychiatrists and Neurologists	0	.5	1.1	1.1	1.8	1.4	3.1
Others*				.2	.2	.2	0
BASE FOR CALCULATION	590	632	550	438	434	419	515

*See note on Table B-1

TABLE B-4

TABLE B-4
PERCENTAGE DISTRIBUTION OF ACTIVE
PHYSICIANS IN MONTANA BY TYPE OF PRACTICE, 1910-65

FIELD OF PRACTICE	1910	1920	1930	1940	1950	1960	1965
General Practitioners	98.7	77.1	70.7	59.7	58.1	44.6	46.1
Medical Specialists	0	1.6	4.8	7.1	9.8	16.1	18.2
Surgical Specialists	1.3	20.1	23.8	32.4	31.2	37.1	32.8
Psychiatrists and Neurologists	0	1.2	.7	.6	.8	2.2	2.7
Others*				.2	.1	.0	.2
BASE FOR CALCULATION	395	573	458	447	497	547	648

*See note on Table B-1

TABLE B-5

ACTIVE PHYSICIANS AND ACTIVE
PHYSICIAN/POPULATION RATIOS BY HOSPITAL PLANNING REGIONS, MINNESOTA, 1940, 1950, 1960, 1965

	1940					1950					1960					1965			
	Population	% Population	Active M.D.'s	% M.D.'s	MD/100,000	Population	% Population	Active M.D.'s	% M.D.'s	MD/100,000	Population	% Population	Active M.D.'s	% M.D.'s	MD/100,000	Population*	Active M.D.'s	% M.D.'s	MD/100,000*
REGION I	116,990	4.2	70	2.4	60	108,859	3.6	55	1.9	50	100,492	2.9	55	1.7	55		53	1.4	
II	145,402	5.2	87	3.0	60	139,775	4.7	90	3.1	64	130,727	3.8	83	2.6	63		82	2.2	
III	16,930	.6	11	.4	65	16,910	.6	9	.3	53	18,190	.5	9	.3	49		11	.3	
IV	141,731	5.1	92	3.2	65	141,740	4.8	83	2.8	59	145,363	4.3	86	2.7	59		86	2.3	
V	291,976	10.5	259	9.1	89	288,975	9.7	272	9.3	94	326,767	9.6	298	9.4	91		292	7.9	
VI	141,604	5.1	90	3.2	64	144,389	4.8	91	3.1	63	158,447	4.6	87	2.8	55		131	3.6	
VII	173,291	6.2	117	4.1	68	171,700	5.8	133	4.5	77	167,193	4.9	119	3.8	71		108	1.9	
VIII	1,209,538	43.3	1311	44.9	108	1,393,085	46.7	1630	55.7	117	1,741,162	51.0	1713	54.2	98		1946	52.8	
IX	126,316	4.5	102	3.6	81	126,989	4.3	90	3.1	51	127,550	3.7	77	2.4	60		74	2.0	
X	189,494	6.7	184	6.4	97	198,040	6.6	165	5.6	83	214,320	6.3	177	5.6	83		172	4.7	
XI	239,028	8.6	533	18.7	123	252,021	8.4	309	10.6	123	283,653	8.3	459	14.5	162		731	19.8	
TOTALS	2,792,300	100	2856	100	102	2,982,483	100	2927	100	98	3,413,864	100	3163	100	93	3,611,868	3686	100	102

*NOTE: Population estimates available only for state-wide calculations. Totals of active M.D.'s do not correspond exactly with the same totals on Table B-1 due to lack of information about the location of a few active M.D.'s.

TABLE B-6

ACTIVE PHYSICIANS AND ACTIVE PHYSICIAN/POPULATION
RATIOS BY HOSPITAL PLANNING REGIONS, NORTH DAKOTA, 1940, 1950, 1960, 1965

	1940					1950					1960					1965			
	Population	% Population	Active M.D.'s	% M.D.'s	MD/100,000	Population	% Population	Active M.D.'s	% M.D.'s	MD/100,000	Population	% Population	Active M.D.'s	% M.D.'s	MD/100,000	Population*	Active M.D.'s	% M.D.'s	MD/100,000*
Region I	176,463	27.5	107	23.3	61	169,524	27.4	105	25.2	62	175,797	27.8	114	24.3	65		139	25.3	
II	128,748	20.1	97	21.1	75	123,472	19.9	78	18.8	63	125,440	19.8	99	21.1	79		108	19.6	
III	177,367	27.6	152	33.1	86	177,051	28.6	146	35.1	83	180,380	28.5	153	32.6	85		181	32.9	
IV	159,357	24.8	103	22.4	65	149,589	24.1	87	20.9	58	150,829	23.8	103	22.0	68		122	22.2	
TOTALS	641,935	100	459	100	72	619,636	100	416	100	67	632,446	100	469	100	79	640,668	550	100	86

* NOTE: Population estimates available only for total state population.

TABLE B-7

ACTIVE PHYSICIANS AND ACTIVE PHYSICIAN/POPULATION
RATIOS BY HOSPITAL PLANNING REGIONS, SOUTH DAKOTA, 1940, 1950, 1960, 1965

	1940					1950					1960					1965			
	Population	% Population	Active M.D.'s	% M.D.'s	M.D./100,000	Population	% Population	Active M.D.'s	% M.D.'s	M.D./100,000	Population	% Population	Active M.D.'s	% M.D.'s	M.D./100,000	Population*	Active M.D.'s	% M.D.'s	M.D./100,000*
REGION I	88,891	13.8	72	16.2	81	97,688	15.0	67	15.1	69	122,924	18.1	90	20.1	73		41	7.5	
II	57,752	9.0	27	6.1	47	53,546	8.2	24	5.4	45	58,681	8.6	27	6.0	46		50	11.1	
III	116,244	18.1	76	17.1	65	113,374	17.4	71	16.0	63	107,617	15.8	70	15.6	65		153	28.0	
IV	68,420	10.1	45	10.1	66	67,222	10.3	47	10.6	70	63,542	9.3	35	7.8	55		30	5.5	
V	48,151	7.5	28	6.3	58	47,811	7.3	31	7.0	65	46,310	6.8	29	6.5	63		12	2.2	
VI	46,839	7.3	37	8.3	79	45,552	7.0	35	7.9	77	44,965	6.6	32	7.1	71		56	10.2	
VII	139,080	21.6	108	24.3	78	149,768	22.9	121	27.2	81	164,391	24.2	123	27.5	75		147	26.8	
VIII	77,584	12.1	52	11.7	67	77,779	11.9	49	11.0	63	72,084	10.6	42	9.4	58		49	8.9	
STATE TOTALS	642,961	100	445	100	69	652,740	100	445	100	68	680,514	100	448	100	66	711,818	548	100	77

*Note: Population estimates available only for total state population.

ACTIVE PHYSICIANS AND ACTIVE PHYSICIAN/POPULATION
RATIOS BY HOSPITAL PLANNING REGIONS, MONTANA, 1940, 1950, 1960, 1965

	1940					1950					1960					1965				
	Population	% Population	Active MD's	% MD's	MD/100,000	Population	% Population	Active MD's	% MD's	MD/100,000	Population	% Population	Active MD's	% MD's	MD/100,000	Population*	% MD's	Active MD's	% MD's	MD/100,000*
REGION I	100,121	17.9	85	18.1	85	114,454	19.4	110	21.2	96	128,541	19.1	105	17.8	82			149	21.7	
II	130,563	23.3	104	22.1	80	136,005	23.0	111	21.4	82	170,743	25.3	132	22.4	77			168	24.4	
III	79,077	14.1	62	13.2	78	77,754	13.2	53	10.2	68	82,469	12.2	75	12.7	91			55	8.0	
IV	111,720	20.0	92	19.6	82	123,351	20.9	101	19.5	82	144,698	21.4	137	23.3	95			154	22.4	
V	137,975	24.7	127	7.0	92	139,402	23.6	139	26.8	100	148,269	22.0	140	23.8	95			161	23.4	
STATE TOTALS	559,456	100	470	100	84	591,024	100	519	100	88	674,767	100	589	100	87	738,870	687	100	93	

* NOTE: Population estimates available only for total state population.

TABLE C-1

ENTERING STUDENTS PER 100,000
POPULATION: STATES IN RANK ORDER, 1965

STATE	RATE	POPULATION	STATE	RATE	POPULATION	STATE	RATE	POPULATION
1 Nebraska	7.5	1,480,000	24 Mississippi	4.2	2,314,000	* 45 Wyoming	2.9	343,000
1 New York	7.5	17,915,000	* 25 MONTANA	4.0	705,000	46 Alabama	2.8	3,407,000
* 3 NORTH DAKOTA	6.7	645,000	25 Wisconsin	4.0	4,107,000	* 47 Alaska	2.4	250,000
4 Utah	6.4	992,000	* 27 Arizona	3.9	1,581,000	* 48 New Hampshire	2.0	654,000
5 District of Columbia	6.3	808,000	27 Florida	3.9	5,705,000	* 49 Maine	1.7	989,000
6 Arkansas	6.2	1,933,000	29 Georgia	3.8	4,294,000	* 50 Hawaii	1.6	701,000
6 New Jersey	6.2	6,682,000	29 Oregon	3.8	1,871,000	* 51 Nevada	1.2	408,000
8 Pennsylvania	5.6	11,459,000	29 West Virginia	3.8	1,797,000			
9 Oklahoma	5.3	2,465,000	32 Colorado	3.7	1,966,000			
10 Iowa	5.2	2,756,000	32 Massachusetts	3.7	5,338,000			
11 Louisiana	5.1	3,468,000	34 Missouri	3.6	4,409,000			
12 Indiana	5.0	4,825,000	* 34 Rhode Island	3.6	914,000			
12 Maryland	5.0	3,432,000	34 Washington	3.6	2,984,000			
12 MINNESOTA	5.0	3,521,000	37 South Carolina	3.5	2,555,000			
15 Kansas	4.9	2,225,000	* 38 New Mexico	3.3	1,008,000			
* 15 SOUTH DAKOTA	4.9	715,000	38 Texas	3.3	10,397,000			
15 Tennessee	4.9	3,798,000	38 Virginia	3.3	4,378,000			
15 Vermont	4.9	409,000	41 North Carolina	3.2	4,852,000			
19 Connecticut	4.8	2,766,000	* 42 Delaware	3.1	491,000			
20 Kentucky	4.7	3,159,000	43 California	3.0	18,084,000			
21 Michigan	4.6	8,098,000	43 Idaho	3.0	692,000			
22 Illinois	4.5	10,489,000						
23 Ohio	4.4	10,100,000						

* No 4-year medical school.

SOURCE: Prepared by the Staff of the Council on Medical Education and Hospitals, "Medical Education in the United States," Journal of the American Medical Association, Vol. 194, No. 7, (Nov. 15, 1965), p. 213.

TABLE B-9

AGE DISTRIBUTION OF PHYSICIANS IN
ACTIVE PRACTICE, BY TYPE OF PRACTICE, MINNESOTA, 1940, 1950, 1960

1940	AGE		GP	MS	SS	P & N	OTHERS	TOTAL
25-35	No.		673	66	138	8	21	906
	%		36.22	29.20	18.18	25.00	25.30	31.67
36-45	No.		376	69	187	7	17	656
	%		21.35	30.54	24.64	21.88	20.48	22.94
46-55	No.		201	51	180	8	16	456
	%		11.41	22.57	23.72	25.00	19.28	15.91
56-65	No.		265	30	174	8	22	499
	%		15.05	13.27	21.92	25.00	26.51	17.45
65- and over	No.		246	10	80	1	7	344
	%		13.97	4.42	10.54	3.12	8.43	12.03
Total No.		100%	1761	226	759	32	83	2861
Median Age			41.5	42.8	39.0	47.2	48.2	44.0

1950	AGE		GP	MS	SS	P & N	OTHERS	TOTAL
25-35	No.		587	40	49	9	14	699
	%		33.72	12.70	7.02	13.85	11.96	23.81
36-45	No.		440	114	201	22	43	820
	%		25.27	36.19	28.80	33.85	36.75	27.92
46-55	No.		258	78	178	19	24	557
	%		14.82	24.76	25.50	29.23	20.51	18.97
56-65	No.		173	49	132	11	16	381
	%		9.94	15.56	18.91	16.92	13.69	12.98
66- and over	No.		283	34	138	4	20	479
	%		16.25	10.79	19.77	6.15	17.09	16.32
Total No.		100%	1741	315	698	65	117	2936
Median Age			42.4	46.4	51.6	46.8	46.6	54.1

1960	AGE		GP	MS	SS	P & N	OTHERS	TOTAL
25-35	No.		260	60	73	16	17	426
	%		20.05	10.34	7.44	13.79	8.99	13.47
26-45	No.		366	234	328	51	86	1065
	%		28.22	40.34	33.43	43.97	45.50	33.67
46-55	No.		302	150	270	26	51	799
	%		23.28	25.86	27.52	22.42	26.98	25.26
56-65	No.		204	81	179	16	25	505
	%		15.73	13.97	18.25	13.79	13.23	15.97
66- and over	No.		165	55	131	7	10	368
	%		12.72	9.49	13.36	6.03	5.30	11.63
Total No.		100%	1297	580	901	116	189	3163
Median Age			46.7	45.8	49.3	44.2	45.0	47.1

AGE DISTRIBUTION OF PHYSICIANS IN ACTIVE
PRACTICE, BY TYPE OF PRACTICE, NORTH DAKOTA, 1940, 1950, 1960

1940	AGE		GP	MS	SS	P & N	OTHERS	TOTAL
	25-35	No.	63	2	15	0	2	82
		%	22.18	7.14	10.41	0	18.18	17.45
	36-45	No.	46	10	41	1	3	101
		%	16.19	35.71	28.46	33.33	27.27	21.49
	46-55	No.	44	10	28	0	2	84
		%	14.58	35.71	19.43	0	18.18	17.87
	56-65	No.	74	4	36	0	3	117
		%	26.05	14.28	24.99	0	27.27	24.89
	65 and over	No.	57	2	24	2	1	86
		%	20.06	7.14	16.66	66.66	9.09	18.30
Total No.		100%	284	28	144	3	11	470
Median Age			53.6	50.9	50.9	50.9	48.5	52.3

SOURCE: Directories of the American Medical Association, 1940, 1950, 1960.

1950	AGE		GP	MS	SS	P & N	OTHERS	TOTAL
	25-35	No.	62	6	8	0	0	76
		%	27.17	15.38	6.01	0	0	18.27
	36-45	No.	49	13	39	2	4	107
		%	21.92	33.33	29.32	33.33	40.00	25.72
	46-55	No.	30	10	38	2	2	82
		%	13.15	25.63	28.56	33.33	20.00	19.71
	56-65	No.	24	4	22	0	1	51
		%	10.52	10.25	16.53	0	10.00	12.25
	65 and over	No.	62	6	26	2	3	99
		%	27.18	15.38	19.53	33.33	30.00	23.80
Total No.		100%	228	39	133	6	10	415
Median Age			46.0	50.2	50.2	50.2	51.0	48.7

SOURCE: Directories of the American Medical Association, 1940, 1950, 1960.

1960	AGE		GP	MS	SS	P & N	OTHERS	TOTAL
	25-35	No.	52	13	12	1	3	81
		%	26.00	17.32	7.73	16.66	12.50	17.61
	35-45	No.	60	27	61	2	9	159
		%	30.00	35.99	39.34	33.32	37.50	34.57
	46-55	No.	36	20	40	3	5	104
		%	18.00	26.66	25.79	49.99	20.82	22.61
	56-65	No.	19	8	26	0	7	60
		%	9.50	10.66	15.76	0	29.16	13.04
	66 and over	No.	33	7	16	0	0	56
		%	16.50	9.32	10.31	0	0	12.17
Total No.		100%	200	75	155	6	24	460
Median Age			44.1	46.1	46.1	46.1	46.0	45.5

SOURCE: Directories of the American Medical Association, 1940, 1950, 1960.

TABLE B-11
AGE DISTRIBUTION OF PHYSICIANS IN ACTIVE
PRACTICE, BY TYPE OF PRACTICE, SOUTH DAKOTA, 1940, 1950, 1960

1940	AGE		GP	MS	SS	P & N	OTHERS	TOTAL
25-35	No.		54	3	11	0	0	68
	%		18.55	18.75	8.59	0	0	15.21
36-45	No.		41	4	34	0	3	82
	%		14.08	25.00	26.55	0	42.85	18.34
46-55	No.		39	3	35	2	0	79
	%		13.39	18.75	27.33	40.00	0	17.67
56-65	No.		76	5	36	3	2	122
	%		26.10	31.25	28.12	60.00	28.57	27.23
66 and Over	No.		81	1	12	0	2	96
	%		27.83	6.25	9.37	0	28.57	21.48
TOTAL No. (100%)			291	16	128	5	7	477
Median Age			57.4	51.6	51.6	51.6	58.5	55.2

SOURCE: Directory of the American Medical Association, 1940, 1950, 1960.

1950	AGE		GP	MS	SS	P & N	OTHERS	TOTAL
25-35	No.		87	4	16	2	2	111
	%		34.00	20.00	10.59	25.00	18.18	24.94
36-45	No.		48	8	41	1	2	100
	%		18.81	40.00	27.14	12.50	18.18	22.47
46-55	No.		28	3	36	3	6	76
	%		10.97	15.00	23.83	37.50	54.54	17.08
56-65	No.		23	1	32	1	1	58
	%		9.01	5.00	21.18	12.50	9.09	13.03
66 and Over	No.		69	4	26	1	0	100
	%		27.05	20.00	17.21	12.50	0	22.47
TOTAL NO. (100%)			255	20	151	8	11	445
Median Age			44.4	50.2	50.2	50.2	48.5	47.5

SOURCE: Directory of the American Medical Association, 1940, 1950, 1960.

1960	AGE		GP	MS	SS	P & N	OTHERS	TOTAL
25-35	No.		35	5	6	0	3	49
	%		15.61	10.41	4.25	0	10.34	10.94
36-45	No.		90	27	53	2	18	190
	%		40.17	56.24	37.58	33.33	62.06	42.41
46-55	No.		38	11	40	3	5	97
	%		16.96	22.91	28.36	50.00	17.23	21.65
56-65	No.		32	2	31	0	2	67
	%		14.27	4.16	21.97	0	6.88	14.96
66 and Over	No.		29	3	11	1	1	45
	%		12.94	6.24	7.79	16.67	3.44	10.04
TOTAL NO. (100%)			224	48	141	6	29	448
Median Age			44.6	46.8	46.8	46.8	42.4	45.2

SOURCE: Directories of the American Medical Association, 1940, 1950, 1960.

AGE DISTRIBUTION OF PHYSICIANS IN ACTIVE
PRACTICE, BY TYPE OF PRACTICE, MONTANA, 1940, 1950, 1960

1940	AGE		GP	MS	SS	P & N	OTHERS	TOTAL
25-35	No.		53	4	25	0	1	83
	%		19.77	12.50	17.23	0	4.34	17.62
36-45	No.		52	9	43	2	6	112
	%		19.40	28.12	29.65	66.67	26.07	23.78
46-55	No.		32	8	29	0	6	75
	%		11.93	25.00	19.99	0	26.07	15.92
56-65	No.		82	8	38	1	6	135
	%		30.59	25.00	26.20	33.33	26.07	28.66
66 and Over	No.		49	3	10	0	4	66
	%		18.27	9.37	6.88	0	17.38	14.01
TOTAL No. (100%)			268	32	145	3	23	471
Median Age			54.9	47.9	47.9	47.9	53.5	51.3

SOURCE: Directories of the American Medical Association, 1940, 1950, 1961

1950	AGE		GP	MS	SS	P & N	OTHERS	TOTAL
25-35	No.		53	4	25	0	1	83
	%		19.77	12.50	17.23	0	4.34	17.62
36-45	No.		52	9	43	2	6	112
	%		19.40	28.12	29.65	66.67	26.07	23.78
46-55	No.		32	8	29	0	6	75
	%		11.93	25.00	19.99	0	26.07	15.92
56-65	No.		82	8	38	1	6	135
	%		30.59	25.00	26.20	33.33	26.07	28.66
66 and Over	No.		49	3	10	0	4	66
	%		18.27	9.37	6.88	0	17.38	14.01
TOTAL NO. (100%)			268	32	145	3	23	471
Median Age			54.9	47.9	47.9	47.9	53.5	51.3

SOURCE: Directories of the American Medical Association, 1940, 1950, 1960

1960	AGE		GP	MS	SS	P & N	OTHERS	TOTAL
25-35	No.		38	10	9	0	5	62
	%		15.55	11.36	4.43	0	11.90	10.53
36-45	No.		84	44	73	8	21	230
	%		34.42	50.00	35.95	66.66	50.00	39.05
46-55	No.		56	26	68	4	10	164
	%		22.94	29.53	33.49	33.32	23.80	27.84
56-65	No.		38	5	30	0	4	77
	%		15.56	5.67	14.77	0	9.52	13.07
66 and Over	No.		28	3	23	0	2	56
	%		11.46	3.40	11.32	0	5.76	9.51
TOTAL NO. (100%)			244	88	203	12	42	589
Median Age			46.0	46.9	46.9	46.9	43.6	46.2

SOURCE: Directories of the American Medical Association, 1940, 1950, 1960

TABLE B-13

CALCULATED LOSSES OF PHYSICIANS BY DEATH
AND BY OTHER MEANS (Out-Migration, etc.) FOR MINNESOTA, BETWEEN 1940 and 1950

1	2	3	4	5	6	7	8	9	10
BIRTH	AGE IN 1940	LISTED IN AMA 1940	EXP. 10 YR. MORTALITY	EXP. DEATHS IN 10 YEARS	AGE IN 1950	LISTED IN AMA 1950	MATCHES 40-50	NEW IN AMA 1950	OUT MIGRATION
1916-1920	20-24	0	.025	0	30-34	378	0	378	0
1911-1915	25-29	355	.030	10.65	35-59	421	114 (32%)	307	230.35
1906-1910	30-34	539	.040	21.56	40-44	413	294 (54%)	119	223.44
1901-1905	35-39	398	.058	23.08	45-49	326	281 (80%)	45	93.92
1896-1900	40-44	292	.086	25.11	50-54	253	222 (76%)	31	44.89
1891-1895	45-49	253	.126	31.88	55-59	214	188 (74%)	26	33.12
1886-1890	50-54	211	.183	38.61	60-64	182	149 (71%)	33	23.39
1881-1885	55-59	255	.256	65.28	66-69	185	165 (65%)	20	24.72
1876-1880	60-64	239	.353	84.37	70-74	151	133 (56%)	18	21.63
1871-1875	65-69	197	.483	95.15	75-79	100	90 (46%)	10	11.85
1866-1870	70-74	103	.638	65.71	80-84	38	36 (35%)	2	1.29
1861-1865	75-79	50	.786	39.30	85-89	19	16 (32%)	3	- 5.30
1856-1860	80-84	25	.897	22.42	90-94	3	3 (12%)	0	- .42
1851-1855	85-89	3	.958	2.87	95-99	0	0	0	.13
1846-1850	90+	0	1.000	0	100+	0	0	0	0
TOTALS		2920		525.99		2683	1691	392	703.01

SOURCE: Calculated from data supplied by the United States Office of Vital Statistics, and from the Directories of the American Medical Association.

Footnote to Table B-13

The large amount of work involved in assembling statistics on the practicing doctors in each census year precluded studies on the intercensus years. Yet it is clear that doctors are entering and leaving practice continuously. It was important to determine why doctors were leaving practice so Table B-13 and the following tables were constructed to furnish estimates of losses through deaths or other means.

In this table the computer was used to match the doctors who were in practice in 1940 with those who were still in practice in 1950. The careful reader will note that the total numbers in this table are slightly different than the numbers presented in other tables. This is due to the fact that the computer would not accept a physician as a match if the directory information did not unmistakably identify the doctor as the same one in both years. Fortunately, the number of doctors not matched is very small and cannot seriously affect the results.

It will be noted that the doctors listed in column 3 in 1940 have been matched in column 8 with the doctors who were still present in 1950. Of the 2920 doctors listed in 1940, 1691 were still practicing in Minnesota in 1950. The death rates at all ages are accurately known and this allowed us to calculate the approximate number of doctors who died during the ten-year period. This number was 526 (total for column 5). A further 703 doctors (column 10) who were in practice in 1940 had left the state or left practice by 1950. This group of physicians has been described under column 10 as out-migration. For example, of the 539 doctors age 30-34 in 1940, only 294 or about a third remained in Minnesota in 1950. Of these, 22 probably died and 223 had left the state. Doctors who were between ages 35-54 in 1940 were the most stable group. Seventy to 80% of these doctors were also found to be in practice in 1950.

Among the 239 doctors who were age 60-64 in 1940, only 133 were still in practice in 1950. About 84 of these doctors died and only 22 were lost for other reasons. No doubt among these older doctors listed under column 20 there were many who retired.

The calculations shown in this series of tables have served as a basis for calculating the expected losses and gains from the physician force in each state between 1955 and 1975 as shown in the text. These calculations have also served to clarify Minnesota's problems in recruiting and holding physicians. In addition to replacing the doctors who die, the state must also replace a substantial number of physicians who settle in Minnesota and ultimately leave the state or leave practice.

TABLE B-14

CALCULATED LOSSES OF PHYSICIANS BY DEATH
AND BY OTHER MEANS (Out-Migration, etc.) FOR MINNESOTA, BETWEEN 1950 and 1960

1 BIRTH	2 AGE IN 1950	3 LISTED IN AMA 1950	4 EXP. 10 YEARS MORT- ALITY	5 EXP. DEATHS IN 10 YEARS	6 AGE IN 1960	7 LISTED IN AMA 1960	8 MAT- CHES 50-60	9 NEW IN AMA 1960	10 OUT MIGRA- TION
1926-1930	20-24	3	.0167	.050	30-34	341	1	340	1.95
1921-1925	25-29	227	.0190	4.313	35-39	615	146	469	76.69
1916-1920	30-34	378	.0259	9.790	40-44	450	234	216	134.21
1911-1915	35-39	421	.0394	16.587	45-49	411	310	101	94.41
1906-1910	40-44	419	.0616	25.441	50-54	387	326	61	61.56
1901-1905	45-49	398	.0943	30.741	55-59	295	253	42	42.26
1896-1900	50-54	253	.1420	35.926	60-64	216	175	41	42.07
1891-1895	55-59	214	.2083	44.576	65-69	159	132	27	37.42
1886-1890	60-64	182	.2979	54.218	70-74	89	76	13	51.78
1881-1885	65-69	185	.4211	77.903	75-79	67	60	7	47.10
1876-1880	70-74	151	.5767	87.082	80-84	34	30	4	33.92
1871-1875	75-79	100	.7539	75.390	85-89	13	10	3	14.61
1866-1870	80-84	38	.8711	33.102	90-94	3	3	0	1.90
1861-1865	85-89	19	.9478	18.008	95-99	0	0	0	.99
1856-1860	90+	3	.9829	2.949	100+	0	0	0	.05
TOTALS		2913		516.076		3080	1756	1302	640.92

SOURCE: See B-13

TABLE B-15

CALCULATED LOSSES OF PHYSICIANS BY DEATH
AND BY OTHER MEANS (Out-migration, etc.) FOR NORTH DAKOTA, BETWEEN 1940 and 1950

1 BIRTH	2 AGE IN 1940	3 LISTED IN AMA 1940	4 EXP. 10 YR. MORT- ALITY	5 EXP. DEATHS IN 10 YEARS	6 AGE IN 1950	7 LISTED IN AMA 1950	8 MATCHES 40-50	9 NEW IN AMA 1950	10 OUT MIGRA- TION
1916-1920	20-24	0	.025	0	30-34	55	0	55	0
1911-1915	25-29	21	.030	.630	35-39	53	0	45	12.37
1906-1910	30-34	47	.040	1.880	40-44	51	28	23	17.12
1901-1905	35-39	62	.058	3.596	45-49	54	39	15	19.404
1896-1900	40-44	45	.086	3.870	50-54	33	29	4	12.13
1891-1895	45-49	30	.126	3.780	55-59	20	17	3	9.22
1886-1890	50-54	49	.183	8.967	60-64	31	30	1	10.033
1881-1885	55-59	45	.256	11.520	65-69	30	27	3	6.480
1876-1880	60-64	71	.353	25.063	70-74	41	38	3	7.937
1871-1875	65-69	45	.483	21.735	75-79	17	15	2	8.265
1866-1870	70-74	28	.638	17.864	80-84	10	7	3	3.136
1861-1865	75-79	15	.876	11.790	85-89	1	1	0	2.21
1856-1860	80-84	5	.897	4.485	90-94	1	1	0	-.485
1851-1855	85-89	1	.958	.958	95-99	0	0	0	.042
1846-1850	90+	0	1.000	0	100+	2	0	2	0
TOTALS		464		116.138		399	240	159	107.778

Source: See II, 26.

TABLE B-16

CALCULATED LOSSES OF PHYSICIANS BY DEATH
AND BY OTHER MEANS (Out-migration, etc.) FOR NORTH DAKOTA, BETWEEN 1950 and 1960

1 BIRTH	2 AGE IN 1950	3 LISTED IN AMA 1950	4 EXP. 10 YR. MORT- ALITY	5 EXP. DEATHS IN 10 YEARS	6 AGE IN 1960	7 LISTED IN AMA 1960	8 MATCHES 50-60	9 NEW IN AMA 1960	10 OUT MIGRA- TION
1926-1930	20-24	0	.0167	0	30-34	63	0	63	0
1921-1925	25-29	15	.0190	.285	35-39	94	5	89	9.715
1916-1920	30-34	55	.0259	1.424	40-44	65	28	37	25.576
1911-1915	35-39	53	.0394	2.088	45-49	56	35	21	15.912
1906-1910	40-44	51	.0616	3.141	50-54	48	36	12	11.859
1901-1905	45-49	54	.0943	5.092	55-59	38	33	5	15.908
1896-1900	50-54	33	.1420	4.686	60-64	22	20	2	8.314
1891-1895	55-59	20	.2083	4.166	65-69	14	11	3	4.834
1886-1890	60-64	31	.2979	9.234	70-74	16	14	2	7.766
1881-1885	65-69	30	.4211	12.633	75-79	16	14	2	3.367
1876-1880	70-74	41	.5767	23.644	80-84	7	7	0	10.356
1871-1875	75-79	17	.7539	12.816	85-89	2	2	0	2.184
1866-1870	80-84	10	.8711	8.711	90-94	1	1	0	.289
1861-1865	85-89	1	.9478	.947	95-99	0	0	0	.053
1856-1860	90+	1	.9829	.982	100+	0	0	0	.018
TOTALS		412		89.849		442	206	236	116.151

Source: See II, 26.

TABLE B-17

CALCULATED LOSSES OF PHYSICIANS BY DEATH
AND BY OTHER MEANS (Out-Migration, etc.) FOR SOUTH DAKOTA, BETWEEN 1940 and 1950

1 BIRTH	2 AGE IN 1940	3 LISTED IN AMA 1940	4 EXP. 10 YEARS MORT- ALITY	5 EXP. DEATHS IN 10 YEARS	6 AGE IN 1950	7 LISTED IN AMA 1950	8 MAT- CHES 40-50	9 NEW IN AMA 1950	10 OUT MIGRA- TION
1916-1920	20-24	0	.025	0	30-34	70	0	70	0
1911-1915	25-29	13	.030	.390	35-39	52	7	45	5.610
1906-1910	30-34	39	.040	1.560	40-44	49	24	25	13.440
1901-1905	35-39	48	.058	2.784	45-49	48	35	13	10.216
1896-1900	40-44	47	.086	4.042	50-54	39	26	13	16.958
1891-1895	45-49	31	.126	3.906	55-59	26	22	4	5.094
1886-1890	50-54	38	.183	6.954	60-64	25	23	2	8.046
1881-1885	55-59	54	.256	13.824	65-69	29	28	1	12.176
1876-1880	60-64	73	.353	25.769	70-74	38	31	7	16.231
1871-1875	65-69	49	.483	23.667	75-79	27	25	2	.333
1866-1870	70-74	32	.638	20.416	80-84	12	11	1	.584
1861-1865	75-79	14	.786	11.004	85-89	4	4	0	-1.004
1856-1860	80-84	2	.897	1.794	90-94	0	0	0	.206
1851-1855	85-89	1	.958	.958	95-99	0	0	0	.042
1846-1850	90+	0	1.000	0	100+	1	0	1	0
TOTALS		441		117.068		420	236	184	87.932

SOURCE: See II, 26.

CALCULATED LOSSES OF PHYSICIANS BY DEATH AND
BY OTHER MEANS (Out-migration, etc.) FOR SOUTH DAKOTA, BETWEEN 1950 and 1960

1 BIRTH	2 AGE IN 1950	3 LISTED IN AMA 1950	4 EXP. 10 YEARS MORT- ALITY	5 EXP. DEATHS IN 10 YEARS	6 AGE IN 1960	7 LISTED IN AMA 1960	8 MAT- CHES 50-60	9 NEW IN AMA 1960	10 OUT MIGRA- TION
1926-1930	20-24	0	.0167	0	30-34	39	0	39	0
1921-1925	25-29	25	.0190	.475	35-39	99	8	91	16.525
1916-1920	30-34	70	.0259	1.813	40-44	91	37	54	31.187
1911-1915	35-39	52	.0394	2.048	45-49	52	38	14	11.952
1906-1910	40-44	49	.0616	3.018	50-54	45	30	15	15.982
1901-1905	45-49	48	.0943	4.526	55-59	40	29	11	14.474
1896-1900	50-54	39	.1420	5.538	60-64	27	20	7	13.462
1891-1895	55-59	26	.2083	5.415	65-69	15	14	1	6.585
1886-1890	60-64	25	.2979	7.447	70-74	11	9	2	8.553
1881-1885	65-69	29	.4211	12.211	75-79	11	11	0	5.789
1876-1880	70-74	38	.5767	21.914	80-84	6	6	0	10.086
1871-1875	75-79	27	.7539	20.355	85-89	2	2	0	4.645
1866-1870	80-84	12	.8711	10.453	90-94	0	0	0	1.547
1861-1865	85-89	4	.9478	3.791	95-99	0	0	0	.209
1856-1860	90+	0	.9829	0	100+	0	0	0	0
TOTALS		444		99.004		438	204	184	140.996

SOURCE: See II.26

TABLE B-19

CALCULATED LOSSES OF PHYSICIANS BY DEATH AND BY
OTHER MEANS (Out-migration, etc.) FOR MONTANA, BETWEEN 1940 and 1950

BIRTH	AGE IN 1940	LISTED IN AMA 1940	EXP. 10 YR. MORT- ALITY	EXP. DEATHS IN 10 YEARS	AGE IN 1950	LISTED IN AMA 1950	MAT- CHES 40-50	NEW IN AMA 1950	OUT MIGRA- TION
1916-1920	20-24	0	.025	0	30-34	68	0	68	0
1911-1915	25-29	15	.030	.450	35-39	91	9	82	5.55
1906-1910	30-34	60	.040	2.400	40-44	79	37	42	20.60
1901-1905	35-39	64	.058	3.712	45-49	59	43	16	17.288
1896-1900	40-44	43	.086	3.698	50-54	44	34	10	5.302
1891-1895	45-49	37	.126	4.662	55-59	34	29	5	3.338
1886-1890	50-54	44	.183	8.052	60-64	32	29	3	6.948
1881-1885	55-59	61	.256	15.616	65-69	37	26	11	19.384
1876-1880	60-64	67	.353	23.651	70-74	27	24	3	19.349
1871-1875	65-69	46	.483	22.218	75-79	21	19	2	4.782
1866-1870	70-74	18	.638	11.484	80-84	7	6	1	.516
1861-1865	75-79	10	.786	7.860	85-89	3	3	0	-.86
1856-1860	80-84	2	.897	1.794	90-94	1	1	0	-.794
1851-1855	85-89	3	.958	2.874	95-99	0	0	0	.126
1846-1850	90+	0	1.000	0	100+	0	0	0	0
TOTALS		470		108.471		503	260	253	101.533

SOURCE: See II. 26

TABLE B-20

CALCULATED LOSSES OF PHYSICIANS BY DEATH
AND BY OTHER MEANS (Out-Migration, etc.) FOR MONTANA BETWEEN 1940 and 1960

BIRTH	AGE IN 1950	LISTED IN AMA 1950	EXP. 10 YR. MORTALITY	EXP. DEATHS IN 10 YEARS	AGE IN 1960	LISTED IN AMA 1960	MATCHES 50 - 60	NEW IN AMA 1960	OUT-MIGRATION
1926-1930	20-24	0	.0167	0	30-34	52	0	52	0
1921-1925	25-29	14	.0190	.266	35-39	135	4	131	9.734
1916-1920	30-34	68	.0259	1.761	40-44	95	37	58	29.229
1911-1915	35-39	91	.0394	3.585	45-49	99	72	27	15.415
1906-1910	40-44	79	.0616	4.866	50-54	65	56	9	18.134
1901-1905	45-49	59	.0943	5.563	55-59	42	32	10	21.437
1896-1900	50-54	44	.1420	6.248	60-64	35	31	4	7.752
1891-1895	55-59	34	.2083	7.082	65-69	19	17	2	9.918
1886-1890	60-64	32	.2979	9.532	70-74	16	14	2	8.468
1881-1885	65-69	37	.4211	15.580	75-79	14	13	1	8.420
1876-1880	70-74	27	.5767	15.570	80-84	2	2	0	9.430
1871-1875	75-79	21	.7539	15.831	85-89	2	2	0	3.169
1866-1870	80-84	7	.8711	6.097	90-94	0	0	0	.903
1861-1865	85-89	3	.9478	2.843	95-99	0	0	0	.157
1856-1860	90+	1	.9829	.982	100+	0	0	0	.018
TOTALS		517		95.806		576	280	296	141.194

SOURCE: Sec II. 26

TABLE B-21

SOURCES OF MINNESOTA'S PHYSICIANS
BY STATES IN WHICH MEDICAL EDUCATION WAS OBTAINED, 1910-65

	MINN. 828	MINN. 981	MINN. 1391	MINN. 1684	MINN. 1897	MINN. 1908	MINN. 2035						
1 Ill.	486	1 Ill.	601	1 Ill.	518	1 Ill.	470	1 Ill.	398	1 Ill.	241	1 Ill.	238
2 Pa.	112	2 Pa.	120	2 Pa.	118	2 Pa.	89	2 Pa.	106	2 Neb.	118	2 Neb.	121
3 N.Y.	110	3 Mich.	108	3 Md.	76	3 Md.	66	3 Neb.	87	3 Mo.	60	3 Mo.	83
4 Mich.	103	4 N.Y.	80	4 Iowa	67	4 Neb.	64	4 Mass.	80	4 Mass.	47	4 Mass.	56
5 Ohio	67	5 Md.	68	5 Mich.	64	5 Mass.	58	5 Md.	62	5 Pa.	40	5 Pa.	53
				Mo.	64								
6 Que.	62	6 Iowa	59	6 Ont.	60	6 Mo.	57	6 Mo.	54	6 Wisc.	33	6 Ger.	50
		Mo.	59							Ger.	33		
7 Iowa	58	7 Ont.	54	7 Neb.	53	7 Ont.	53	7 Ont.	40	7 Md.	31	7 Wisc.	37
8 Ont.	51	8 Ohio	50	8 Mass.	47	8 Iowa	42	8 Wisc.	39	8 Ont.	28	8 Iowa	38
9 Mo.	44	9 Que.	44	9 Que.	42	9 Que.	35	9 Iowa	29	9 Man.	23	9 Man.	36
10 Md.	30	10 Mass.	42	10 Ky.	28	10 Mich.	32	10 Ind.	26	10 Iowa	20	10 N.Y.	35
	147		198		163		140		238		157		346
TOTAL GAIN	1270		1483		1300		1159		1159		831		1093

SOURCE: Directories of the American Medical Association, 1909, 1921, 1931, 1940, 1950, 1961-1965.

TABLE B-22

SOURCES OF NORTH DAKOTA'S PHYSICIANS
BY STATES IN WHICH MEDICAL EDUCATION WAS OBTAINED, 1910-65

1910		1920		1930		1940		1950		1960		1965	
RANK	SOURCE	RANK	SOURCE	RANK	SOURCE	RANK	SOURCE	RANK	SOURCE	RANK	SOURCE	RANK	SOURCE
1	Ill. 128	1	Ill. 173	1	Ill. 180	1	Ill. 97	1	Ill. 72	1	Ill. 77	1	Ill. 77
2	Ont. 69	2	Ont. 49	2	Ont. 36	2	Ont. 25	2	Man. 21	2	Man. 40	2	Pa. 37
									Minn. 10				
3	Mich. 41	3	Mich. 34	3	Man. 27	3	Man. 23	3	Mo. 9	3	Pa. 24	3	Man. 30
4	Iowa 32	4	Iowa 28	4	Mo. 20	4	Wis. 15	4	Neb. 7	4	Neb. 22	4	Neb. 24
5	Que. 30	5	Wis. 23	5	Mich. 19	5	Neb. 11	5	Que. 6	5	D. C. 7	5	Que. 7
											Md. 7		
											Mo. 7		
											N. C. 7		
											Que. 7		
6	Mo. 14	6	Pa. 18	6	Iowa 17	6	Mo. 10	6	Iowa 4	6	Ky. 5	6	N. Y. 5
	N. Y. 14												N. C. 5
	Pa. 14												Ger. 5
	Wis. 14												India 5
													Latvia 5
7	Norway 12	7	Mo. 16	7	Wis. 16	7	Md. 9	7	Ont. 3	7	Mass. 5	7	Kan. 4
			Que. 16								Ont. 5		Tenn. 4
											Latvia 5		Vt. 4
											Poland 5		Eng. 4
													Poland 4
8	Ohio 11	8	Ind. 9	8	Que. 14	8	Mich. 8	8	Ark. 2	8	N. Y. 3	8	Ky. 3
									Ger. 2		Austria 3		Mass. 3
											Ger. 3		Ont. 3
											Neth. 3		N.H. Is. 3
9	Man. 10	9	Md. 8	9	Pa. 13	9	D. C. 7	9	Ky. 1	9	Ark. 2		Austria 3
									Md. 1		Vt. 2		Scot. 3
10	Ky. 7								S. C. 1		Scot. 2		Japan 3
	Neb. 7	10	Ohio 6	10	Md. 8	10	Iowa 6	6	Vt. 1		Italy 2		Turkey 3
			Norway 6						Norway 1				
									Austria 1				
	Others 21		Others 54		Others 38		Others 20		Switz. 1		Others 17		Others 28
									Scot. 1				
									Cuba 1				
									Italy 1				
									Neth. 1				
									Leb. 1				
									Others 0				

Source: Directories of the American Medical Association, 1910, 1920, 1930, 1940, 1950, 1960, 1965; Alumni Directory of the University of North Dakota Medical School.

TABLE B-23

STATES TO WHICH NORTH DAKOTA
LOST PHYSICIANS, BY NET LOSS, 1910-65

1910*	1920	1930	1940	1950	1960	1965
	RANK SOURCE	RANK SOURCE	RANK SOURCE	RANK SOURCE	RANK SOURCE	RANK SOURCE
	MONT. 3					
	S.D. 2					
1.	Wash. 2	1. Cal. 13	1. Cal. 38	1. Cal. 83	1. Cal. 102	1. Cal. 115
		2. Wash. 11	2. Wash. 21	2. Wash. 35	2. Wash. 41	2. Wash. 41
				MONT. 16	MINN. 35	MINN. 37
		3. Hawaii 4	3. N.Y. 19	3. Ore. 15	3. USVA 22	3. USVA 35
		MONT. 4	MONT. 13			
		4. N.Y. 3	4. Phil.Is. 11	4. Ohio 13	4. Ore. 19	4. Ore. 25
						USArmy 25
		S.D. 3				MONT. 21
		5. N.J. 2	5. Hawaii 10	5. Ga. 12	5. U.S.Army 8	5. USAF 20
		Ohio 2			USAF 18	
		Pa. 2			MONT. 15	
		6. Col. 1	6. Ohio 9	6. Col. 11	6. USN 15	6. Col. 16
		Conn. 1	S.D. 7			S.D. 15
		D.C. 1	7. Ore. 6	7. N.Y. 9	7. Col. 14	7. Hawaii 14
		Ga. 1			Ind. 14	USPHS 14
		Idaho 1				USN 14
		Mass. 1		S.D. 7		
		Utah 1	8. Ariz. 5	8. Ariz. 6	8. Fla. 12	8. Ariz. 11
		Wyo. 1		Hawaii 6	Hawaii 12	Fla. 11
				Ind. 6		Ind. 11
				Va. 6		
			9. Conn. 4	9. D.C. 5	9. Ohio 11	9. Id. 10
			N.J. 4	Mich. 5		Mich. 10
				N.J. 5		
					S.D. 11	
			10. Ala. 3	10. Tenn. 4	10. N.J. 9	10. Iowa 8
			Fla. 3	Utah 4		
			Wyo. 3			
			Others 15	Others 21	Others 57	Others 52

* The University of North Dakota graduated its first class from the Basic Science School in 1909; therefore, they could not lose any physicians until after 1909.

SOURCE: See B-22

TABLE B-24
 PHYSICIANS GAINED AND LOST BY NORTH DAKOTA,
 BY PLACE OF MEDICAL EDUCATION, BY STATE, 1910-65

	1910*		1920		1930		1940		1950		1960		1965	
	Gain	Loss	Gain	Loss	Gain	Loss	Gain	Loss	Gain	Loss	Gain	Loss	Gain	Loss
Alabama	-	-	-	-	1	-	-	3	-	3	-	3	1	1
Alaska	-	-	-	-	-	-	-	-	-	1	-	-	-	-
Arizona	-	-	-	-	-	2	-	5	-	6	-	7	-	11
Arkansas	-	-	-	-	-	-	-	-	3	1	3	1	2	2
California	-	-	2	1	1	14	5	43	6	89	9	11	8	123
Colorado	1	-	-	-	-	1	3	3	-	11	3	17	2	18
Connecticut	-	-	-	-	-	1	-	4	-	3	1	3	1	5
Delaware	-	-	-	-	-	-	-	-	-	-	-	1	-	1
Dist. of Col.	1	-	5	-	2	3	8	1	5	7	8	1	-	2
Florida	-	-	-	-	-	-	-	3	-	5	-	12	1	12
Georgia	-	-	-	-	-	1	-	-	-	-	-	2	1	3
Hawaii	-	-	-	-	-	4	-	10	-	12	-	12	-	14
Idaho	-	-	-	-	-	1	-	2	-	6	-	8	-	10
Illinois	128	-	175	2	129	29	136	39	125	53	112	35	109	32
Indiana	3	-	9	-	6	2	7	5	5	11	2	16	4	15
Iowa	32	-	28	-	20	3	17	11	14	10	9	17	15	23
Kansas	-	-	2	-	3	1	6	3	3	3	7	7	13	9

* 1909 was the first class to graduate from the University of North Dakota; therefore there could be no loss until at least 1911, when these first graduates completed their medical education at another university.

SOURCE: See II, 35.

	1910*		1920		1930		1940		1950		1960		1965	
	Gain	Loss	Gain	Loss	Gain	Loss	Gain	Loss	Gain	Loss	Gain	Loss	Gain	Loss
Kentucky	7	-	5	-	6	3	1	2	4	3	6	-	5	2
Louisiana	1	-	-	-	2	-	-	-	1	1	3	3	4	3
Maine	-	-	1	-	-	-	-	1	-	-	-	-	-	-
Maryland	5	-	8	-	9	1	9	-	4	3	7	-	5	3
Massachusetts	2	-	3	-	-	1	6	4	6	8	9	4	8	5
Michigan	41	-	35	1	23	4	19	11	13	18	10	17	9	19
MINNESOTA	111	-	105	6	129	32	125	57	105	95	67	102	63	122
Mississippi	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Missouri	14	-	17	1	21	1	15	5	13	4	10	3	11	10
MONTANA	-	-	-	3	-	4	-	13	-	16	-	18	-	21
Nebraska	7	-	5	-	8	2	16	5	13	6	25	3	28	4
Nevada	-	-	-	-	-	-	-	-	-	-	-	2	-	2
New Hampshire	2	-	2	-	-	-	-	-	-	-	-	-	-	-
New Jersey	-	-	-	-	-	2	-	4	-	5	-	9	-	7
New Mexico	-	-	-	-	-	-	-	-	-	1	-	2	-	3
New York	14	-	7	2	3	6	7	26	5	14	15	12	19	14
North Carolina	-	-	-	-	-	-	-	2	2	2	11	4	14	9
NORTH DAKOTA	-	-	15	-	35	-	76	-	109	-	155	-	183	-
Ohio	11	-	6	-	4	6	2	11	2	15	2	13	9	14
Oklahoma	-	-	-	-	-	-	-	2	1	2	1	3	2	5

Table B-24

	1910*		1920		1930		1940		1950		1960		1965	
	Gain	Loss	Gain	Loss	Gain	Loss	Gain	Loss	Gain	Loss	Gain	Loss	Gain	Loss
Oregon					1	3	2	8	2	17	1	20	3	28
Pennsylvania	14	-	18	-	17	4	19	8	27	20	33	9	47	10
Rhode Island														
South Carolina							-	1	1	-			1	-
SOUTH DAKOTA	-	-	-	2	1	4	2	7	1	8	1	11	1	16
Tennessee	1	-	3	-	4	1	2	1	-	4	2	2	5	1
Texas					1	-	-	1	4	4	6	7	11	9
Utah					-	1	-	1	-	4	-	3	1	2
Vermont	2	-	3	-	2	-			1	-	2	-	4	-
Virginia							1	-	1	7	3	3	1	6
Washington			-	2	-	11	-	21	-	39	3	44	6	47
West Virginia											-	5	-	1
Wisconsin	14	-	24	1	22	6	25	10	18	18	14	17	24	27
Wyoming					-	1	-	3	-	3	-	4	-	6
Puerto Rico														
Alberta	-	-	-	-	-	-	1	-	-	-	1	-	2	-
Manitoba	10	-	6	1	27	-	23	-	21	-	40	-	30	-
Nova Scotia													1	-
Ontario	69	-	49	-	36	-	25	-	4	1	5	-	3	-
Quebec	30	-	16	-	14	-	11	-	6	-	7	-	7	-
Foreign	15	-	8	-	12	-	10	5	10	5	39	-	57	-
U.S. Armed Forces & V.A.	-	-	-	-	-	-	-	-	-	-	-	78	-	115

Table B-24

	1910*		1920		1930		1940		1950		1960		1965	
	Gain	Loss	Gain	Loss	Gain	Loss	Gain	Loss	Gain	Loss	Gain	Loss	Gain	Loss
England	1	-	1	-	1	-							4	-
Norway	12	-	6	-	6	-	2	-	1	-	1	-	1	-
Austria			1	-	1	-	2	-	1	-	3	-	3	-
Denmark	1	-			1	-								
Germany	1	-			2	-	2	-	2	-	3	-	5	-
Switzerland					1	-	1	-	1	-	1	-		
Africa							-	1						
Czechlovakia							-	1						
Scotland							3	-	1	-	2	-	3	-
New Brunswick							-	1						
New Guinea							-	1	-	1				
Saskatchewan									-	1	1	-		
Canal Zone									-	3				
Cuba									1	-			1	-
Italy									1	-	2	-	2	-
Netherlands									1	-	3	-	2	-
Lebanon									1	-	1	-	1	-
British Columbia											1	-		
Estonia											1	-	1	-
France											1	-		
Greece											1	-	1	-

Table B-24

	1910*		1920		1930		1940		1950		1960		1965	
	Gain	Loss	Gain	Loss	Gain	Loss	Gain	Loss	Gain	Loss	Gain	Loss	Gain	Loss
India											1	-	5	-
Japan											1	-	3	-
Latvia											5	-	5	-
Nicaragua											1	-	1	-
Poland											5	-	4	-
Turkey											1	-	3	-
USSR											1	-	2	-
U S Army											1	-		
USVA											-	18	-	25
USPHS											-	22	-	35
US Navy											-	3	-	14
US Air Force											-	15	-	14
Temp. For.											-	18	-	20
Bulgaria											-	2	-	7
Korea											1	-	1	-
Mexico													2	-
Ceylon													1	-
Spain													1	-
Formosa													1	-
Ireland													1	-

TABLE B-25

SOURCES OF SOUTH DAKOTA'S PHYSICIANS BY
STATES IN WHICH MEDICAL EDUCATION WAS OBTAINED, 1910-65

1910	1920	1930	1940	1950	1960	1965
RANK SOURCE	RANK SOURCE	RANK SOURCE	RANK SOURCE	RANK SOURCE	RANK SOURCE	RANK SOURCE
1. Ill. 220	1. Ill. 260	1. Ill. 193	1. Ill. 138	1. Ill. 109	1. Neb. 67	1. Neb. 69
2. Iowa 95	2. Iowa 82	2. Iowa 60	2. Neb. 62	2. Neb. 62	2. Ill. 65	2. Ill. 64
3. Mo. 44	3. Mo. 56	3. Mo. 49	3. Mo. 37	3. Pa. 15	3. Ger. 18	3. Pa. 27
		Neb. 49				
MINN. 40		MINN. 39				
4. Neb. 26	4. Neb. 39	4. Pa. 16	4. Iowa 31	4. Iowa 14	4. Pa. 17	4. Ger. 18
	MINN. 36		MINN. 17	MINN. 11		
5. N.Y. 25	5. Ohio 19	5. Mich. 15	5. Tenn. 9	5. Mo. 9	5. Tenn. 8	5. Tenn. 9
					Latvia 8	
6. Ohio 22	6. N.Y. 17	6. Tenn. 10	6. Mich. 7	6. Ky. 6	6. Hungary 7	6. Hungary 7
7. Mich. 20	7. Mich. 16	7. Ky. 9	7. Colo. 6	7. Md. 5	7. D.C. 6	7. Md. 6
						Latvia 6
						MINN. 5
8. Ind. 14	8. Ind. 15	8. Ind. 8	8. Ky. 5	8. Mass. 4	8. Man. 5	8. D.C. 4
Pa. 14				Tenn. 4		Mass. 4
				Switz. 4		Mo. 4
						Neth. 4
						Phil.Is. 4
9. Tenn. 13	9. Pa. 14	9. N.Y. 6	9. Mass. 4	9. Aust. 3	9. Md. 4	9. Kan. 3
					Eng. 4	Man. 3
					Neth. 4	Aust. 3
						Mex. 3
10. Ky. 12	10. La. 13	10. Col. 5	10. Md. 3			
	Tenn. 13		Que. 3			
Others 61	Others 58	Others 28	Others 12	Others 10	Others 25	Others 25
	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.

SOURCE: Directories of the American Medical Association, 1909, 1921, 1931, 1940, 1950, 1961, 1965; Class lists from the University of South Dakota Medical School.

TABLE B-26

STATES TO WHICH SOUTH DAKOTA
LOST PHYSICIANS, BY NET LOSS, 1910-1965

1910	1920	1930	1940	1950	1960	1965
	RANK SOURCE	RANK SOURCE	RANK SOURCE	RANK SOURCE	RANK SOURCE	RANK SOURCE
	1. Idaho 1	1. Cal. 7	1. Cal. 25	1. Cal. 46	1. Cal. 67	1. Cal. 82
	2. Wis. 1	2. N.J. 4	2. Wash. 24	2. Wash. 22	2. USVA 27	2. Wash. 24
		3. Wis. 3	3. N.J. 5	3. USVA 18	3. Wash. 25	3. USVA 22
			Temp. For. 5			
		4. Wash. 2	4. Kan. 4	4. N.Y. 9	4. USN 18	4. USA 21
		Wyo. 2	N.Y. 4	Ohio 9		
		Form. 2	Ohio 4			
			Wyo 4			
	5. Ala. 1	5. Fla. 3	5. Mich. 7	5. USAF 17	5. USAF 17	5. Ariz. 18
	Fla. 1	N.M. 3	N.J. 7			USN 18
	N.M. 1	N.C. 3	Wisc. 7			
	N.C. 1	Wis. 3	6. Ore. 6	6. USA 14	6. USA 14	6. Ore. 13
	Ore. 1		USN 6			
	R.I. 1		7. Ariz. 5	7. Ind. 12	7. USAF 10	
	Ut. 1		Ind. 5	Ore. 12		
	P. Rico 1			Wis. 12		
	Phil. Isl		8. Fla. 4	8. Ariz. 11	8. Fla. 7	
			Kan. 4		Ind. 7	
			N.C. 4		Wyo. 7	
			USA 4			
			USAF 4			
			9. Col. 3	9. Iowa 10	9. Mich. 5	
			Conn. 3	Mich. 10	N.J. 5	
					Temp. For. 5	
			N.M. 3	10. Tex. 9	10. Ky. 4	
			Tex. 3		Nev. 4	
			Wyo. 3		N.M. 4	
					Okla. 4	
					Tex. 4	
					USPHS 4	
		Others 14	Others 14	Others 75	Others 19	
	MONT.* 2	MONT.* 5	MONT.* 7	MINN. 2	MONT.* 13	
				MONT.* 11		

* No Medical School

SOURCE: See B-25

NOTE: The University of South Dakota graduated its first class from the Basic Science School in 1909; therefore, they could not lose any physicians until after 1909.

PHYSICIANS GAINED AND LOST
 BY SOUTH DAKOTA, BY PLACE OF MEDICAL EDUCATION, BY STATE, 1910-65

	1910		1920		1930		1940		1950		1960		1965	
	Gain	Loss	Gain	Loss	Gain	Loss	Gain	Loss	Gain	Loss	Gain	Loss	Gain	Loss
Alabama	1	---			---	1	---	1	---	1			---	1
Alaska											---	2	---	2
Arizona							---	2	---	5	---	11	---	18
Arkansas					2	---	3	1	1	---	3	1	4	1
California			1	---	1	8	2	27	4	50	3	70	7	89
Colorado			3	---	5	---	7	1	5	8	6	9	6	7
Connecticut	1	---	1	---					---	3	---	1	---	1
Delaware														
Dist. of Col.	7	---	7	---	3	1	3	3	4	5	8	2	6	2
Florida					---	1	---	3	---	4	---	7	1	8
Georgia			1	---	3	---	1	---						
Hawaii							---	1	---	2	---	1	---	1
Idaho			---	1							---	1	---	3
Illinois	220	---	264	4	218	25	186	48	158	49	116	51	109	45
Indiana	14	---	15	---	11	3	7	7	7	12	4	16	4	1-1
Iowa	95	---	85	3	72	12	55	24	39	25	25	35	34	36
Kansas			2	---	1	1	1	5	2	6	3	7	9	6
Kentucky	12	---	13	---	9	---	7	2	10	4	5	4	2	6

SOURCE: See B-25

	1910		1920		1930		1940		1950		1960		1965	
	Gain	Loss	Gain	Loss	Gain	Loss	Gain	Loss	Gain	Loss	Gain	Loss	Gain	Loss
Louisiana	1	---			1	1	2	1	1	1	2	4	4	3
Maine	1	---					---	1	---	2	---	1	---	1
Maryland	9	---	6	---	4	---	4	1	7	2	5	1	6	---
Massachusetts	5	---	5	---	4	---	6	2	6	2	3	2	6	2
Michigan	20	---	18	2	17	2	11	4	8	15	6	16	11	16
MINNESOTA	40	---	39	3	51	12	41	24	45	34	40	42	48	43
Mississippi														
Missouri	44	---	58	2	50	1	43	6	21	12	10	9	15	11
MONTANA					---	2	---	5	---	7	---	11	---	13
Nebraska	26	---	41	2	51	2	68	6	70	8	77	10	86	17
Nevada									---	2	---	4	---	4
New Hampshire	2	---	2	---										
New Jersey					---	4	---	5	---	7	---	7	---	5
New Mexico					---	1	---	3	---	3	---	3	---	4
New York	25	---	17	---	11	5	4	8	5	14	8	15	13	16
No. Carolina					---	1	---	3	---	4	2	4	4	3
NORTH DAKOTA			2	---	4	1	7	2	8	1	11	1	16	1
Ohio	22	---	22	1	12	11	9	13	8	17	11	14	16	14
Oklahoma					1	---	1	2	1	1	---	6	1	5
Oregon	1	---			1	2	2	4	2	8	2	14	2	15
Pennsylvania	14	---	14	---	16	---	6	4	24	9	24	7	36	9

Table B-27

	1910		1920		1930		1940		1950		1960		1965	
	Gain	Loss	Gain	Loss	Gain	Loss	Gain	Loss	Gain	Loss	Gain	Loss	Gain	Loss
Rhode Island					---	1								
South Carolina							---	1						
SOUTH DAKOTA			13		29		55		92		111		125	
British Columbia														
Tennessee	13	---	13	---	10	---	9	---	9	5	9	1	10	1
Texas					1	1	1	3	2	5	6	15	11	15
Utah					---	1	---	2	1	3	1	5	1	4
Vermont	2	---	1	---					2	---	3	---	2	---
Virginia	2	---	3	---					1	---	1	1	1	1
Washington					---	2	---	24	---	22	3	28	2	26
West Virginia							---	1	---	1	---	1	---	1
Wisconsin	1	---	2	3	5	8	6	9	6	13	9	21	19	18
Wyoming					---	2	---	4	---	3	---	6	---	7
Saskatchewan														
Puerto Rico					---	1								
Alberta											1	---		
Manitoba							1	---			5	---	3	---
Nova Scotia														
Ontario	11	---	8	---	3	---	2	---	1	---	1	---		
Quebec	5	---	7	---	4	---	3	---	2	1	1	---		
Foreign	12	---	11	---	1	3	3	5	11	---	55	3	60	5
U.S. Armed Forces and V.A.									---	35	---	83	---	75

TABLE B-28

ACTIVE NURSES AND ACTIVE NURSE/POPULATION
RATIOS IN THE UPPER MIDWEST BY HOSPITAL PLANNING REGIONS, 1962

State	Region	Active	Ratio	Inactive	Unknown	Total	Ratio
Minnesota	1	316	314.4	68	2	386	384.1
	2	349	266.9	98	1	448	342.6
	3	38	208.9	16	1	55	302.3
	4	475	326.7	145	9	629	432.7
	5	1252	383.1	314	18	1584	484.7
	6	600	378.6	157	2	759	479.0
	7	473	282.9	145	2	626	374.4
	8	8128	466.8	2326	77	10531	604.8
	9	369	289.2	128	3	500	392.0
	10	776	362.0	218	6	1000	466.5
	11	1579	556.6	399	14	1992	702.2
TOTALS		14355	420.4	4014	141	18510	542.2
North Dakota	1	567	322.5	304	5	876	498.3
	2	447	356.3	212	10	669	533.3
	3	671	371.9	262	4	937	519.4
	4	406	269.1	182	7	595	394.4
	TOTALS		2091	330.6	960	26	3077
South Dakota	1	401	326.2	183	17	601	488.9
	2	97	165.3	63	4	164	279.4
	3	239	222.0	98	10	347	322.4
	4	218	201.4	55	6	189	297.4
	5	120	259.1	60	8	188	405.9
	6	151	335.8	56	8	215	478.1
	7	538	327.2	241	24	803	488.4
	8	179	248.3	97	10	286	396.2
TOTALS		1853	272.2	853	87	2793	410.4
Montana	1	397	308.8	231	5	633	492.4
	2	533	312.1	302	8	843	493.7
	3	230	278.8	118	3	351	425.6
	4	515	355.9	267	8	790	545.9
	5	716	482.9	328	11	1055	711.5
TOTALS		2391	354.3	1246	35	3672	544.1
FOUR STATE TOTALS		20690	383.0	7073	289	28052	519.3

SOURCE: American Nurses Association

TABLE B-29
ACTIVE OSTEOPATHS
IN THE UPPER MIDWEST, 1910-65

	1910	1920	1930	1940	1950	1960	TOTALS		
							ACTIVE	INACTIVE	
MINNESOTA	123	83	161	141	N.D.	82	59	11*	70
NORTH DAKOTA	21	4	...	22	N.D.	13	11	0	11
SOUTH DAKOTA	63	21	...	70	N.D.	46	39	2*	41
MONTANA	44	40	...	81	N.D.	48	19	20*	39
STATE TOTALS	251	148	...	314	N.D.	189	128	33*	161

SOURCES: Osteopathic Directory of 1910 and 1919-20; State of Minnesota Licensed Physicians and Surgeons, Osteopaths, Chiropractors, Midwives and Masseurs, 1st edition (January 1930), State Board of Health; 1940 Directory of Osteopathic Physicians, A.O.A.; Yearbook and Directory of Osteopathic Physicians, A.O.A.; 1960, 1965.

* Osteopaths are older than doctors of medicine. This accounts for the large proportion retired or not in practice.

TABLE B-30
NUMBER OF DENTISTS AND
DENTIST'S/100,000 POPULATION IN THE UPPER MIDWEST, 1910-65

	1910	1920	1930	1940	1950	1960	1965
MINNESOTA							
Number of Dentists	826	1,276	1,957	2,161	2,142	2,395	2,415
D.D.'s / 100,000	40	51	76	77	72	70	67
NORTH DAKOTA							
Number of Dentists	163	255	296	270	262	284	272
D.D.'s / 100,000	28	39	43	42	42	45	42
SOUTH DAKOTA							
Number of Dentists	219	241	346	300	288	301	296
D.D.'s / 100,000	38	38	50	47	44	44	41
MONTANA							
Number of Dentists	173	283	314	307	273	359	379
D.D.'s / 100,000	46	52	58	55	46	53	51

TABLE B-31
NUMBER OF ACTIVE DENTISTS AND
DENTIST/POPULATION RATIOS BY HOSPITAL PLANNING REGIONS, MINNESOTA 1940, 1950, 1960

MINN.	1960			Ratio/ 100, th. 1950			Ratio/ 100, th. 1940			Ratio/ 100, th. 1960					
	Population	No.	Active	%	Pop.	No.	Active	%	Pop.	No.	Active	%			
State Totals	3,413,864	100	2395	100	70	2,982,483	100	2142	100	72	2,792,300	100	2161	100	77
Region I	100,492	2.34	49	2.07	49	108,859	3.65	36	1.68	33	116,990	4.19	49	2.27	42
Region II	130,727	3.83	72	3.00	55	139,775	4.69	60	2.80	43	145,402	5.21	61	2.82	42
Region III	18,190	0.53	8	0.33	44	16,910	0.57	7	0.33	41	16,930	0.61	7	0.32	41
Region IV	145,363	4.26	79	3.29	54	141,740	4.75	69	3.22	49	141,731	5.08	65	3.01	46
Region V	326,767	9.57	189	7.89	58	288,975	9.69	173	8.07	60	291,976	10.7	210	9.72	72
Region VI	158,447	4.64	90	3.75	57	144,389	4.84	72	3.36	50	141,604	5.07	82	3.79	58
Region VII	167,193	4.90	107	4.46	64	171,700	5.76	95	4.43	55	173,291	6.21	102	4.86	61
Region VIII	1,741,162	51.0	1392	58.1	80	1,393,085	46.7	1255	58.6	90	1,209,538	43.3	1200	55.5	99
Region IX	127,550	3.74	67	2.79	52	126,989	4.26	61	2.85	48	126,316	4.52	67	3.10	53
Region X	214,320	6.28	133	5.55	62	198,040	6.64	130	6.07	60	189,494	6.79	129	5.97	64
Region XI	283,653	8.31	209	8.72	74	252,021	8.45	184	8.59	73	239,028	8.56	186	8.61	78

TABLE B-32

NUMBER OF ACTIVE DENTISTS AND ACTIVE DENTIST/POPULATION
RATIOS BY HOSPITAL PLANNING REGIONS, NORTH DAKOTA, 1940, 1950, 1955

	1960 POP.	% OF STATE POP.	ACTIVE DENT.'S	% OF DENT.'S	DENT.'S PER 100,000	1950 POP.	% OF STATE POP.	ACTIVE DENT.'S	% OF DENT.'S	DENT.'S PER 100,000	1940 POP.	% OF STATE POP.	ACTIVE DENT.'S	% OF DENT.'S	DENT.'S PER 100,000
No. Dakota															
State Totals	632,446	100.00	284	100.00	45	619,636	100.00	262	100.00	42	641,935	100.00	270	100.00	42
Region I	75,797	27.80	71	25.00	40	169,524	27.36	66	25.19	39	176,463	27.49	62	22.96	35
Region II	125,440	19.83	57	20.07	45	123,472	19.93	55	20.99	44	128,748	20.06	62	22.96	48
Region III	180,380	28.52	94	33.09	52	177,051	28.57	92	35.11	52	177,367	27.63	94	34.81	53
Region IV	150,829	23.85	62	21.83	41	149,589	24.14	49	18.70	33	159,357	24.82	52	19.26	33

TABLE B-33

NUMBER OF ACTIVE DENTISTS AND ACTIVE DENTIST/POPULATION
RATIOS BY HOSPITAL PLANNING REGIONS, SOUTH DAKOTA, 1940, 1950, 1955

	1960 POP.	% OF STATE POP.	ACTIVE DENT.'S	% OF DENT.'S	DENT.'S PER 100,000	1950 POP.	% OF STATE POP.	ACTIVE DENT.'S	% OF DENT.'S	DENT.'S PER 100,000	1940 POP.	% OF STATE POP.	ACTIVE DENT.'S	% OF DENT.'S	DENT.'S PER 100,000
So. Dakota															
State Totals	680,514	100.00	301	100.00	44	652,740	100.00	288	100.00	44	642,961	100.00	300	100.00	47
Region I	122,924	18.06	60	19.93	49	97,688	14.96	45	15.63	46	88,891	13.82	43	14.33	48
Region II	58,681	8.62	11	3.65	19	53,546	8.20	12	4.17	22	57,752	8.98	16	5.33	28
Region III	107,617	15.81	38	12.62	35	133,374	17.37	43	14.93	38	116,244	18.08	46	15.33	40
Region IV	63,542	9.34	33	10.96	52	67,222	10.30	27	9.38	40	68,420	10.64	27	9.00	39
Region V	46,310	6.80	21	6.97	45	47,811	7.32	19	6.59	40	48,151	7.49	24	8.00	50
Region VI	44,965	6.61	20	6.64	44	45,552	6.98	24	8.33	53	46,839	7.28	22	7.33	47
Region VII	164,391	24.16	85	28.23	52	149,768	22.94	84	29.17	56	139,080	21.63	88	29.33	63
Region VIII	72,084	10.59	33	10.96	46	77,779	11.92	34	11.80	44	77,584	12.07	34	11.33	44

TABLE B-34

NUMBER OF ACTIVE DENTISTS AND ACTIVE
DENTIST/POPULATION RATIOS BY HOSPITAL PLANNING REGIONS, MONTANA, 1940, 1950, 1960

	1960 POP.	% OF STATE POP.	ACTIVE DENT.'S	% OF DENT.'S	DENT.'S PER 100,000	1950 POP.	% OF STATE POP.	ACTIVE DENT.'S	% OF DENT.'S	DENT.'S PER 100,000	1940 POP.	% OF STATE POP.	ACTIVE DENT.'S	% OF DENT.'S	DENT.'S PER 100,000
Montana															
State Totals	674,767	100.00	359	100.00	53	591,024	100.00	273	100.00	46	559,456	100.00	307	100.00	55
Region I	128,541	19.05	82	22.84	64	114,454	19.36	54	19.78	47	100,121	17.90	55	17.92	55
Region II	170,743	25.30	68	18.94	40	136,005	23.01	54	19.78	40	130,563	23.34	67	21.82	51
Region III	82,469	12.22	27	7.52	33	77,754	13.16	244	8.79	31	79,077	14.13	27	8.79	34
Region IV	144,698	21.44	81	22.56	56	123,351	20.87	59	21.61	48	111,720	19.97	61	19.87	46
Region V	148,269	21.97	101	28.13	68	139,402	23.59	82	30.04	59	137,975	24.66	97	31.60	70

TABLE B-35
SOURCES OF MINNESOTA'S DENTISTS
BY STATES IN WHICH DENTAL EDUCATION WAS OBTAINED, 1910-65

1910		1920		1930		1940	1950		1960		1965	
RANK	SOURCE	RANK	SOURCE	RANK	SOURCE	NO DATA	RANK	SOURCE	RANK	SOURCE	RANK	SOURCE
MINN.	271	MINN.	241									
1. Ill.	166	1. Ill.	224	1. Ill.	298		1. Ill.	163	1. Ill.	125	1. Ill.	89
				MINN.	244							
2. Pa.	50	2. Pa.	40	2. Neb.	34		2. Neb.	42	2. Neb.	47	2. Neb.	48
3. Mich.	30	3. Mich.	29	3. Wisc.	33		3. Mo.	17	3. Mo.	16	3. Mo.	20
4. Iowa	20	4. Iowa	19	4. Pa.	4		4. Iowa	7	4. Pa.	7	4. Iowa	16
5. Ind.	12	5. Ind.	14	5. Iowa	24		5. Ind.	6	5. Ky.	6	5. Pa.	8
		Ohio	12				Ky.	6				
6. Ky.	8	6. Ky.	12	6. Ind.	20		6. Pa.	3	6. Iowa	3	6. Ind.	4
	8											
7. Mass.	6	7. Md.	8	7. Ky.	18		7. Ga.	2	7. La.	2	7. Ky.	3
		Ohio	8	Mich.	18		La.	2			La.	3
		Wisc.	8				Md.	2			Foreign	3
8. N.Y.	5	8. Mass.	7	8. Mo.	15		8. Ont.	1	8. Md.	1	8. Ga.	1
	5								Ont.	1		
									Foreign	1		
9. Mo.	4	9. D.C.	4	9. Md.	9							
		Tenn.	4									
10. Ga.	2	10. Mo.	3	10. D.C.	6							
Others	3	Neb.	3	Others	4							
		N.Y.	3									
		Others	2									

SOURCE: Polk's Dental Register and Directory, 1910, 1917, 1928. American Dental Directory, 1950, 1960, 1965. American Dental Association, Chicago, Illinois.

TABLE B-36

ALL DENTISTS EDUCATED IN MINNESOTA
(at the University of Minnesota School of Dentistry)
PRACTICING IN THE UPPER MIDWEST COMPARED TO ALL DENTISTS PRACTICING IN THE UPPER MIDWEST, 1910-65

YEAR	No. of Dentists	TOTAL Minn. Educated		No. of Dentists	MINN. Minn. Educated		No. of Dentists	N. D. Minn. Educated		No. of Dentists	S. D. Minn. Educated		No. of Dentists	MONTANA Minn. Educated	
		No.	%		No.	%		No.	%		No.	%		No.	%
1965	3362	2334	69.42	2415	2078	86.04	272	107	39.34	296	63	21.28	379	86	22.69
1960	3265	2232	68.36	2340	1991	85.08	275	100	36.23	300	62	20.67	349	79	22.64
1950	2927	1958	66.89	2132	1761	82.60	256	94	36.72	274	42	15.33	265	61	23.02
1940	3038	n.d.	n.d.	2161	n.d.	n.d.	270	n.d.	n.d.	300	n.d.	n.d.	307	n.d.	n.d.
1930	2913	1411	48.44	1957	1294	66.12	296	82	27.70	346	19	5.49	314	16	5.10
1920	1995	797	39.95	1216	707	58.14	255	62	24.31	241	13	5.39	283	15	5.30
1910	1381	393	28.46	826	359	43.46	163	28	17.18	219	4	1.83	173	2	1.16

SOURCES: Polk's Dental Registers and Directories (1910, 1920, 1930) ADA Distribution of Dentists in the United States (1940) ADA Directories (1950, 1960, 1965)

TABLE C-2

SUMMARY OF TEACHING RESPONSIBILITIES IN
THE HEALTH SCIENCES, UNIVERSITY OF MINNESOTA 1965

<u>College of Medical Sciences</u>	<u>Full-time</u>	<u>College of Medical Sciences</u>	<u>Student Equivalents</u>
<u>Medical School</u>	<u>Student Equivalents</u>	<u>School of Nursing</u>	
Medical Students	603-	Bachelors & Masters	296
Graduate Students (Med. fellows, et al)	501-	Practical Nursing	45
Dental Students	154	TOTAL - School of Nursing	341
Pharmacy Students	62	College of Medical Sciences	
Arts College & Other Students	118-	TOTAL	2541
Medical Technologists	111-	<u>School of Dentistry</u>	
Laboratory Aides	60-	Dental Students	400
Occupational Therapists	49-	Dental Hygienists	89
Physical Therapists	48-	Dental Assistants	36
X-ray Technologists	95-	Graduate Students	33
TOTAL - Medical School	1801	School of Dentistry - TOTAL	558
<u>School of Public Health</u>		Health Sciences - TOTAL	3099
Masters Programs	133		
Ph. D. Programs	26		
Arts College & Other Students	240		
TOTAL - School of Public Health	399		

SOURCE: Dr. Robert Howard Dean, University of Minnesota Medical School

TABLE C-3

SUMMARY OF EXPENDITURES, TEACHING AND RESEARCH PROGRAMS
IN THE HEALTH SCIENCES, UNIVERSITY OF MINNESOTA, 1964-1965

	Salaries & Wages	Supplies, Expense & Equipment	Total
<u>College of Medical Sciences</u>			
Administration*	104,870	11,834	116,704
School of Nursing*	266,929	10,360	277,289
School of Public Health*	316,979	21,610	338,589
Medical School*	2,304,727	120,721	2,425,448
University Hospitals (teaching hosp.)	xxxxxx	xxxxxx	14,626,281
Research grants**	xxxxxx	xxxxxx	9,549,573
Research training grants**	xxxxxx	xxxxxx	3,514,733
TOTAL - College of Medical Sciences	xxxxxx	xxxxxx	30,848,617
<u>School of Dentistry</u>			
Dental School*	716,463	177,568	894,131
Research grants**	xxxxxx	xxxxxx	121,216
Research training grants**	xxxxxx	xxxxxx	36,568
Clinic fees**	xxxxxx	xxxxxx	290,256
TOTAL - School of Dentistry	xxxxxx	xxxxxx	1,342,071
TOTAL - College of Medical Sciences plus School of Dentistry			32,190,688

* Basic instructional costs as provided by legislative appropriation.

** Figures for 1963-64, rather than 1964-65

NOTE: With the exception of the figures provided for University Hospitals, these figures do not include costs of physical plant operation and maintenance: heat, light, janitorial service, police protection, etc. Such costs are provided centrally at the University of Minnesota and not included in college budgets.

SOURCE: Dr. Robert Howard, Dean, University of Minnesota Medical School

TABLE C-4
PRACTICE LOCATION
OF MAYO CLINIC ALUMNI, 1964

STATE	TOTAL	STATE	TOTAL	STATE	TOTAL
ALABAMA	34	KENTUCKY	44	NORTH DAKOTA	35
ALASKA	1	LOUISIANA	43	OHIO	109
ARIZONA	77	MAINE	7	OKLAHOMA	35
ARKANSAS	13	MARYLAND	32	OREGON	66
CALIFORNIA	562 = 16.2	MASSACHUSETTS	55	PENNSYLVANIA	147
COLORADO	73	MICHIGAN	102	RHODE ISLAND	7
CONNECTICUT	25	MINNESOTA	413 = 10.9	SOUTH CAROLINA	11
DELAWARE	2	MISSISSIPPI	15	SOUTH DAKOTA	16
DIST. OF COLUMBIA	65	MISSOURI	56	TENNESSEE	61
FLORIDA	105	MONTANA	28	TEXAS	103
GEORGIA	34	NEBRASKA	46	UTAH	28
HAWAII	14	NEVADA	9	VERMONT	2
IDAHO	13	NEW HAMPSHIRE	13	VIRGINIA	61
ILLINOIS	192	NEW JERSEY	49	WASHINGTON	130
INDIANA	95	NEW MEXICO	23	WEST VIRGINIA	16
IOWA	63	NEW YORK	134	WISCONSIN	129
KANSAS	36	NORTH CAROLINA	38	CANADA	213

TOTAL U.S. 3468

TABLE C-5

NUMBER OF GRADUATES OF THE UNIVERSITY OF MINNESOTA MEDICAL SCHOOL PRACTICING IN
OTHER REGIONS OF THE COUNTRY (Losses) AND PHYSICIANS EDUCATED IN OTHER REGIONS PRACTICING IN THE UPPER MIDWEST (Gains), 1910-65

REGION	1910			1920			1930			1940			1950			1960			1965		
	Gain	Loss	Net	Gain	Loss	Net	Gain	Loss	Net	Gain	Loss	Net	Gain	Loss	Net	Gain	Loss	Net	Gain	Loss	Net
ADJACENT STATES (Id., Ia., Neb., Wis., Wyo.)	268	36	+232	402	49	+353	458	86	+372	510	129	+381	527	139	+388	581	179	+402	657	185	+472
PACIFIC STATES (Alaska, Cal., Hawaii, Ore., Wash.)	8	66	-58	18	109	-91	29	234	-205	60	266	-206	79	428	-349	101	739	-638	161	794	-633
MOUNTAIN STATES (Ariz., Col., Nev., N. M., Ut.)	9	5	+4	16	5	+11	18	12	+6	24	22	+2	40	42	-2	56	102	-46	65	133	-68
NORTH CENTRAL STATES (Ill., Ind., Kan., Mich., Mo., O.)	410	8	+402	781	38	+1743	1478	96	+1382	1391	141	+1249	1297	198	+1099	1028	208	+820	1127	255	+872
WEST SOUTH CENTRAL STATES (Ark., La., Okla., Tex.)	4	1	+3	9	3	+6	26	11	+15	44	39	+5	81	50	+31	86	81	+5	129	90	+39
EAST SOUTH CENTRAL STATES (Ala., Ky., Miss., Tenn.)	68	3	+65	88	3	+85	83	6	+77	59	13	+46	70	11	+59	57	29	+28	68	29	+39
SOUTH ATLANTIC STATES (Del., D. C., Fla., Ga., Md., N. C., S. C., Va., W. Va.)	84	16	+68	173	11	+162	168	24	+145	176	49	+127	186	49	+137	158	72	+86	181	133	+68
MIDDLE ATLANTIC STATES (N. J., N. Y., Pa.)	353	7	+346	326	13	+313	282	65	+217	239	103	+136	305	93	+212	307	132	+175	394	190	+204
NEW ENGLAND STATES (Conn., Me., Mass., N. H., R. I., Vt.)	90	6	+84	95	7	+88	80	9	+71	103	15	+88	133	28	+105	124	39	+85	144	39	+105
CANADA	290	2	+288	222	1	+221	236	5	+231	198	6	+192	137	5	+132	146	1	+145	156	3	+153
OTHER FOREIGN	76	1	+75	63	4	+59	45	24	+21	52	20	+32	46	15	+31	195	37	+158	372	36	+336
FEDERAL SERVICE	0*	3	-3	0*		0*		0*	132	-132	0*	77	-77	0*	376	-376	0*	250	-250		
TOTALS FOR 4-STATE AREA	2660	154	+2506	3193	243	+2950	2903	572	+2331	2856	935	+1921	2901	135	+1766	2839	1995	+844	3454	2117	+1337

TABLE C-6

NUMBER OF GRADUATES OF THE UNIVERSITY OF NORTH DAKOTA MEDICAL SCHOOL PRACTICING
IN OTHER REGIONS OR STATES (Losses) AND PHYSICIANS EDUCATED IN OTHER REGIONS PRACTICING IN NORTH DAKOTA (Gains), 1910-65

REGION	1910			1920			1930			1940			1950			1960			1965		
	Gains	Loss	Net	Gain	Loss	Net	Gain	Loss	Net	Gain	Loss	Net	Gain	Loss	Net	Gains	Loss	Net	Gain	Loss	Net
REMAINDER OF 4-STATE AREA (S.D., Minn., Mont.)	111	0*	+111	105	11	+94	129	40	+89	125	77	+48	105	119	-14	67	268	-201	63	176	-113
ADJACENT STATES (Id., Iw., Neb., Wisc., Wyo.)	53	0	+53	57	1	+56	50	13	+37	58	31	+27	45	43	+2	48	49	-1	67	70	-3
PACIFIC STATES (Alaska, Cal., Hawaii, Ore., Wash.)	0	0	---	2	3	-1	2	32	-30	7	82	-75	8	158	-150	13	187	-174	17	212	-195
MOUNTAIN STATES (Ariz., Col., Nev., N.M. Ut.)	1	0	+1	0	0	---	0	4	-4	3	9	-6	0	21	-21	3	31	-28	3	36	-33
NORTH CENTRAL STATES (Ill., Ind., Kan., Mich., Mo., O.)	197	0	+197	244	4	+240	186	43	+143	185	74	+111	61	204	-43	143	91	+52	155	99	+56
WEST SOUTHERN CENTRAL STATES (Ark., La., Okla., Tex.)	1	0	+1	0	0	---	3	0	+3	0	3	-3	9	8	+1	13	14	-1	19	19	---
EAST SOUTHERN CENTRAL STATES (Ala., Ky., Miss., Tenn.)	8	0	+8	8	0	+8	11	4	+7	3	6	-3	4	10	-6	8	5	+3	11	4	+7
SOUTH ATLANTIC STATES (Del., Fla., Ga., Md., N.C., S.C., Va., W.Va.)	6	0	+6	13	0	+13	11	5	+5	18	7	+11	13	24	-11	24	43	-19	23	37	-14
MIDDLE ATLANTIC STATES (N.J., N.Y., Pa.)	28	0	+28	25	2	+23	20	12	+8	26	38	-12	32	39	-7	48	30	+18	66	31	+35
NEW ENGLAND STATES (Conn., Me., Mass., N.H., R.I., Vt.)	6	0	+6	9	0	+9	2	2	---	6	9	-3	7	11	-4	12	7	+5	13	10	+3
CANADA	109	0	+109	71	1	+70	77	0	+77	60	1	+59	31	4	+27	54	0	+54	43	0	+43
OTHER FOREIGN	15	0	+15	8	0	+8	12	0	+12	10	3	+7	10	4	+6	38	2	+36	57	7	+50
FEDERAL SERVICE	0*	0	---	0*	0	---	0*	0	---	0*	0	---	0*	0	---	0*	76	-76	0	108	-108

* No Medical School

NOTE: Any North Dakota graduates who receive their M.D.s outside of the 4-state area and who returned to North Dakota to practice are counted as imports from the state where they received their M.D. 1909 was the first graduate class from North Dakota.

SOURCE: Directories of the American Medical Association, 1909, 1921, 1931, 1940, 1950, 1961, 1965; Alumni Directory, University of North Dakota Medical School.

TABLE C-11

ALL DENTISTS EDUCATED IN MINNESOTA
(at the University of Minnesota School of Dentistry),
PRACTICING IN THE UPPER MIDWEST, 1910-65

YEAR	TOTALS	MINNESOTA	MONTANA	NORTH DAKOTA	SOUTH DAKOTA
1965	2334	2078	86	107	63
1960	2232	1991	79	100	62
1950	1958	1761	61	94	42
1940	n.d.	n.d.	n.d.	n.d.	n.d.
1930	1411	1294	16	82	19
1920	797	707	15	62	13
1910	393	359	2	28	4

SOURCES: Polk Dental Directories (1910, 1920, 1930) ADA Directories (1950, 1960).

TABLE C-7

NUMBER OF GRADUATES OF THE UNIVERSITY OF SOUTH DAKOTA MEDICAL SCHOOL PRACTICING IN
OTHER REGIONS OR STATES (Losses) AND PHYSICIANS EDUCATED IN OTHER REGIONS PRACTICING IN SOUTH DAKOTA, (Gains), 1910-65

REGION	1910			1920			1930			1940			1950			1960			1965		
	Gain	Loss	Net	Gain	Loss	Net	Gain	Loss	Net	Gain	Loss	Net	Gain	Loss	Net	Gain	Loss	Net	Gain	Loss	Net
ADJACENT STATES (Id., Ia., Neb., Wisc. Wyo.)	122	0	+122	128	9	+119	128	24	+104	129	43	+86	115	49	+66	111	73	+38	139	81	+58
PACIFIC STATES (Alaska, Cal., Hawaii, Ore., Wash.)	1	0	+1	1	0	+1	2	12	-10	4	56	-52	6	82	-76	8	115	-107	11	133	-122
MOUNTAIN STATES (Ariz., Col., Nev., N.M. Ut.)	0	0	---	3	0	+3	5	2	+3	7	8	-1	6	21	-15	7	32	-25	7	37	-30
NORTH CENTRAL STATES (Ill., Ind., Kan., Mich., Mo., O.)	320	0	+320	379	9	+370	309	43	+266	257	83	+174	204	111	+93	150	113	+37	164	103	+61
WEST SOUTH CENTRAL STATES (Ark., La., Okla., Tex.)	1	0	+1	0	0	---	5	2	+3	7	7	---	5	7	-2	11	26	-15	20	24	-4
EAST SOUTH CENTRAL STATES (Ala., Ky., Miss., Tenn.)	26	0	+26	26	0	+26	19	1	+18	16	3	+13	19	10	+9	14	5	+9	12	8	+4
SOUTH ATLANTIC STATES (Del., D.C., Fla., Ga., Md., N.C., S.C., Va., W. Va.)	18	0	+18	17	0	+17	10	3	+7	8	12	-4	12	16	-4	16	16	---	18	15	+3
MIDDLE ATLANTIC STATES (N.J., N.Y., Pa.)	39	0	+39	31	0	+31	27	9	+18	10	17	-7	29	30	-1	32	29	+3	49	30	+19
NEW ENGLAND STATES (Conn., Me., Mass., N.H., R.I., Vt.)	11	0	+11	9	0	+9	4	1	+3	6	3	+3	8	9	-1	6	4	+2	8	4	+4
CANADA	16	0	+16	15	0	+15	7	0	+7	6	0	+6	3	1	+2	8	0	+8	3	0	+3
OTHER FOREIGN	12	0	+12	11	0	+11	1	4	-3	3	5	-2	11	2	+9	55	3	+52	62	5	+57
FEDERAL SERVICE	0*	0	---	0*	0	---	0*	0	---	0*	0	---	0*	33	-33	0*	83	-83	0*	75	-75
REMAINDER OF 4-STATE AREA (Minn., N.D., Mont.)	40	0*	+40	39	3	+36	51	15	+36	41	31	+10	45	37	+8	40	54	-14	48	57	-9

SOURCE: Directories of the American Medical Association, 1909, 1921, 1931, 1940, 1950, 1960, 1965; Class lists, University of South Dakota Medical School.

TABLE C-8

ALL PHYSICIANS EDUCATED IN MINNESOTA
(at the University of Minnesota School of Medicine)

PRACTICING IN THE UPPER MIDWEST COMPARED TO ALL PHYSICIANS PRACTICING IN THE UPPER MIDWEST, 1910-65

YEAR	TOTAL			MINN.			N. D.			S. D.			MONTANA		
	Total No. of MD's	Minn. Educated		Total No. of MD's	Minn. Educated		Total No. of MD's	Minn. Educated		Total No. of MD's	Minn. Educated		Total No. of MD's	Minn. Educated	
		No.	%		No.	%		No.	%		No.	%		No.	%
1965	5,703,224	2217	39	3,611,868	2035	56	640,668	62	10	711,818	47	7	738,870	73	10
1960	5,401,591	2087	39	3,413,864	1908	56	632,446	57	11	680,514	40	6	674,767	72	11
1950	4,845,883	2123	44	2,982,483	1896	64	519,636	105	17	652,740	45	7	591,024	77	13
1940	4,636,652	1918	41	2,792,300	1684	60	641,935	125	19	642,961	43	7	559,456	66	12
1930	4,475,253	1601	36	2,563,953	1381	54	680,845	129	19	692,849	51	7	537,606	40	7
1920	4,219,433	1159	27	2,387,125	981	41	646,872	105	16	636,547	39	6	548,889	34	6
1910	3,612,705	1008	28	2,075,708	828	40	577,056	111	19	583,888	40	7	376,053	29	8

SOURCES: AMA Directories (1910, 1920, 1930, 1940, 1950, 1960, 1965)
I.B.M. Cards from the AMA for 1965

TABLE C-9

PRINCIPAL STATES FROM WHICH MINNESOTA GAINS DENTISTS
AND STATES OR ARMED SERVICES TO WHICH MINNESOTA LOSES DENTISTS, 1910-65

1965					1965				
RANK	STATE	GAIN	LOSS	NET GAIN	RANK	STATE	GAIN	LOSS	NET LOSS
1	Ill.	109	20	89	1	Calif.	3	222	218
2	Neb.	52	4	48	2	Wash.	82	82
3	Mo.	22	2	20	2	U.S.A	...	82	82
4	Ia.	31	15	16	3	U.S.A	...	70	70
5	Pa.	8	...	8	4	U.S.A.F.	...	49	49
6	Ind.	9	5	4	5	Ore.#	2	44	42
7	Ky.	5	2	3	6	Colo.	...	41	41
7	La.	3	...	3	7	Wis.	68	106	38
7	Foreign	3	...	3	8	Ariz.#	...	36	36
8	Ge.	4	3	1	9	N.Y.	4	39	35
					10	Tex.	2	25	23
# And U.S. Veterans Administration									
						...		42	42

1960					1960				
RANK	STATE	GAIN	LOSS	NET GAIN	RANK	STATE	GAIN	LOSS	NET LOSS
1	Ill.	149	24	125	1	Cal.	3	198	195
2	Neb.	49	2	47	2	Wash.	91	91
3	Mo.	21	5	16	3	U.S.A	...	72	72
4	Pa.	7	...	7	4	U.S.A.F.	...	64	64
5	Ky.	7	1	7	5	U.S.V.A.	...	54	54
6	Ia.	20	17	3	6	Wis.	61	110	49
7	La.	2	...	2	7	U.S.N.	...	44	44
8	Md.	1	...	1	8	N.Y.	1	42	41
8	Ontario	1	...	1	9	Colo.	...	37	37
8	Foreign	1	...	1	10	Ore.	1	30	29

1950					1950				
RANK	STATE	GAIN	LOSS	NET GAIN	RANK	STATE	GAIN	LOSS	NET LOSS
1	Ill.	186	23	163	1	Cal.	1	113	112
2	Neb.	46	4	42	2	Wash.	81	81
3	Mo.	17	...	17	3	U.S.V.A.	...	55	55
4	Ia.	20	13	7	4	N.Y.	...	51	51
5	Ind.	11	5	6	5	Wisc.	50	98	48
6	Ky.	8	2	6	6	U.S.A.	...	31	31
7	Pa.	4	1	3	7	U.S.N.	...	29	29
8	Ge.	2	...	2	8	Mich.	8	28	20
8	La.	2	...	2	9	Tex.	...	19	19
8	Md.	2	...	2	10	Colo.	1	18	17
9	Ontario	1	...	1					

Table C-9

1930					1930				
RANK	STATE	GAIN	LOSS	NET GAIN	RANK	STATE	GAIN	LOSS	NET LOSS
1	Ill.	311	13	298	1.	*Wash.	...	45	45
2	Neb.	37	3	34	2	Cal.	...	38	38
3	Wisc.	66	33	33	3	Colo.	2	11	9
4	Pa.	29	3	26	4	Tex.	...	8	8
5	Ia.	36	12	24	5	Ore.	...	6	6
6	Ind.	25	5	20	6	*Fla.	...	5	5
7	Ky.	19	1	18	7	*Ida.	...	4	4
	Mich.	26	8	18	8	*Ariz.	...	3	3
8	Mo.	17	2	15		Va.	...	3	3
9	Md.	10	1	9	9	*Sask.	...	2	2
10	D.C.	7	1	6		*Okla.	...	2	2
						*S.C.	...	2	2
						*Utah	...	2	2
					10	*Ala.	...	1	1
						*Alaska	...	1	1
						*Ark.	...	1	1
						*Conn.	...	1	1
						*Miss.	...	1	1
						*Nev.	...	1	1
						*N. Mex.	...	1	1
						Phil. Is.	...	1	1

1920					1920				
RANK	STATE	GAIN	LOSS	NET GAIN	RANK	STATE	GAIN	LOSS	NET LOSS
1.	Ill.	228	4	224	1	*Wash.	...	30	30
2	Penn.	40	...	40	2	*Ida.	...	6	6
3	Mich.	29	...	29	3	Calif.	3	6	3
4	Ia.	24	5	19	3	Colo.	1	4	3
5	Ind.	14	...	14	3	Ore.	...	3	3
6	Ky.	12	...	12	4	La.	...	2	2
7	Md.	8	...	8	4	*Utah	...	2	2
7	Ohio	9	1	8	5	*Conn.	...	1	1
7	Wisc.	21	13	8	5	*Fla.	...	1	1
8	Mass.	8	1	7	5	*Md.	...	1	1
9	D.C.	4	...	4	5	*N. Mex.	...	1	1
10	Mo.	6	3	3	5	Va.	...	1	1
10	Neb.	5	2	3	5	Phil. Is.	...	1	1
10	N.Y.	6	3	3	5	*Br. Colum...	...	1	1
					5	*Sask.	...	1	1

1910					1910				
RANK	STATE	GAIN	LOSS	NET GAIN	RANK	STATE	GAIN	LOSS	NET LOSS
1	Ill.	169	3	166	1	*Wash.	...	16	16
2	Penn.	50	...	50	2	*Ida.	...	3	3
3	Mich.	30	...	30	3	La.	...	2	2
4	Ia.	25	3	22	4	Calif.	2	3	1
5	Ind.	12	...	12	4	*Conn.	...	1	1
5	Ohio	12	...	12	4	Neb.	1	2	1
6	Ky.	8	...	8	4	*N. Mex.	...	1	1
6	Md.	8	...	8	4	Ore.	...	1	1
7	Mass.	7	1	6	4	*Utah	...	1	1
8	N.Y.	6	1	5	4	Phil. Is.	...	1	1
8	Tenn.	5	...	5					
9	Mo.	6	2	4					
10	Ga.	2	...	2					

TABLE C-12

NUMBER OF DENTAL GRADUATES GAINED AND LOST
(Graduates of the University of Minnesota School of Dentistry) TO THE UPPER MIDWEST, BY UNITED STATES REGIONS, 1910-65

	1910			1920			1930			1940			1950			1960			1965		
	Gain	Loss	Net	Gain	Loss	Net	Gain	Loss	Net	Gain	Loss	Net	Gain	Loss	Net	Gain	Loss	Net	Gain	Loss	Net
ADJACENT STATES (Id., Iw., Neb., Wis., Wyo.)	34	15	+19	50	26	+24	139	52	+87	N.D.			116	134	-18	130	159	-29	151	152	-1
PACIFIC STATES (Alaska, Cal., Hawaii, Ore., Wash.)	2	20	-18	3	39	-36	0	90	-90				3	211	-208	4	333	-329	5	366	-361
MOUNTAIN STATES (Ariz., Col., Nev., N.M., Ut.)	2	3	-1	1	7	-6	2	16	-16				1*	34	-33	0*	78	-78	0	94	-94
NORTH CENTRAL STATES (Ill., Ind., Kan., Mich., Mo., O.)	229	5	+224	286	22	+264	387	39	+348				226	72	+154	189	84	+105	149	66	
WEST SOUTH CENTRAL STATES (Ark., La., Okla., Tex.)	0	2	-2	0	2	-2	1	12	-11				2	25	-23	4	29	-25	5	31	-26
EAST SOUTH CENTRAL STATES (Ala., Ky., Miss., Tenn.)	13	0	+13	16	0	+16	21	5	+16				8	10	-2	7	4	+3	5	5	0
SOUTH ATLANTIC STATES (Del., Fla., Ga., Md., N.C., S.C., Va., W.Va.)	10	0	+10	9	2	+7	12	11	+1				5	13	-8	3	31	-28	6	38	-32
MIDDLE ATLANTIC STATES (N.J., N.Y., Pa.)	56	1	+55	46	3	+43	33	8	+25				4	58	-54	8	49	-41	12	48	-36
NEW ENGLAND STATES (Conn., Me., Mass., N.H., R.I., Vt.)	7	1	+6	8	3	+5	5	6	-1				0	17	-17	0	19	-19	0	17	-17
CANADA	1	0	+1	1	2	-1	2	5	-3				1	0	+1	1	0	+1	0	0	0
OTHER FOREIGN	0	1	-1	0	1	-1	0	1	-1				0	2	-2	1	2	-1	3	2	+1
FEDERAL SERVICE	0*	0	0	0*	0	0	0*	0	0				0*	141	-141	0*	254	-254	0*	263	-263
TOTAL	328	22	+306	359	46	+313	477	122	+355				155	506	-351	109	804	-695	84	830	-746

* No Dental Schools

TABLE C-10

ENROLLED DENTAL STUDENTS
PER MILLION POPULATION, 1964

POPULATION:		191,334,000	TOTAL STUDENTS		13,692		
1.	Utah*	167	17.	Nebraska	35.	N. Ham.*	55
2.	Oregon	108	19.	Mich.	35.	So. Carolina*	55
3.	MINN.	101	20.	Calif.	37.	Wyoming*	52
4.	Nevada*	93	21.	Indiana	38.	Arkansas*	50
5.	New York	90	22.	Colorado*	39.	Tenn.	47
6.	D.C.	88	23.	Maryland	39.	Arizona*	47
7.	Wash.	87	23.	Wisconsin	41.	Georgia	46
8.	N. Jersey	86	25.	Texas	41.	No. Carolina	46
9.	MONTANA*	85	25.	Florida*	43.	Missouri	43
10.	Hawaii*	84	27.	Delaware*	44.	SOUTH DAKOTA*	41
11.	Oklahoma*	83	27.	Penn.	44.	Virginia	41
12.	Kansas*	82	29.	NO. DAKOTA*	46.	No. Carolina	40
13.	Mass.	81	30.	Louisiana	47.	Mississippi*	38
14.	Iowa	80	31.	Conn.*	48.	R.I.*	37
15.	Ohio	78	31.	Kentucky	49.	Alaska*	32
15.	N. Mex.*	78	33.	W. Virginia	50.	Vermont*	27
17.	Illinois	77	35.	Alabama	51.	Maine*	21

APPENDIX C—GLOSSARY

ADA—American Dental Association

AMA—American Medical Association

ANA—American Nurses Association

CARIES—Tooth decay

DMF RATIO—Ratio of Decayed, Missing and Filled Teeth

EDENTULOUS—Without teeth

GROSS NATIONAL PRODUCT—(GNP.) The money value of all the goods and services produced in a nation during some stated period of time, typically a year. Expressed in units such as dollars per year, pounds per year and the like.

MEAN—The statistical term for an average.

MEDIAN—The midpoint of a set of values; it can be said that half (50%) of the values lie below the median, and half 50% of the values lie above it. Median age is usually more accurate than mean or average age because the median is not influenced by extreme values such as a very old dentist or physician.

MEDICAL SPECIALISTS—In this report, (abbreviated as MS in text) the category Medical Specialists includes doctors who describe their practice as internal medicine, pediatrics, as well as the more highly specialized fields of allergy, dermatology, cardiac disease, gastroenterology and pulmonary disease. Periodontal refers to the supporting and other tissues surrounding the teeth. A periodontist is a dentist who specializes in the diseases affecting the supporting structures of the teeth.

N—Stands for number in a discussion of size of population being considered.

N.D.A.—No Data Available

PERIODONTIST—The branch of dentistry concerned with diseases of the supporting and surrounding structures of the teeth.

PSYCHIATRISTS, NEUROLOGIST—Sometimes abbreviated PN and refers to physicians who are either psychiatrists or neurologists or both.

RATIO—An approximate relation between numbers; e.s. physicians/100,000 persons.

STANDARD METROPOLITAN STATISTICAL AREA— Sometimes abbreviated SMSA refers to a county or group of contiguous counties, which contains at least one city of 50,000 inhabitants or more or "twin cities" with a combined population of at least 50,000.

SURGICAL SPECIALISTS—(Abbreviated as SS in text) Included in this classification are anesthesiology, proctology, general surgery, industrial surgery, neurosurgery, obstetrics and gynecology, orthopedic, otolaryngology, rhinology, ophthalmology, plastic surgery, thoracic surgery and neurology.

UPPER MIDWEST—In this report refers to the four states of Minnesota, North Dakota, South Dakota, and Montana.

URBAN—Incorporated or unincorporated places with 2,500 inhabitants or more in 1960.

Health Manpower for Upper Midwest

PAGE	ERROR	CORRECTION						
22	diesases	diseases						
25(Table 5)	MINNESOTA Great Metropolitan	Greater Metropolitan						
61(Figure 9)	Graph incomplete	Darkened area should be extended from 1960 to 1965 to a scale of 107 and so to coincide with the text's description.						
62	1946- to 1950	1940 to 1950						
70	A one-physician town was defined, obviously as the place that only one physician listed as his practice address and a no-physician town was one without a physician.	Add: and 15 or more miles from another place with one or more active physicians.						
77	In communities which have only one dentist and are 15 miles from another dentist,	Delete: and are 15 miles from another dentist,						
80(Table 53)	data for MINNESOTA Region XI missing	<table border="1"> <thead> <tr> <th>Region XI</th> <th>Number of No-Physician Towns</th> <th>Number of One-Physician Towns</th> </tr> </thead> <tbody> <tr> <td></td> <td>0</td> <td>14</td> </tr> </tbody> </table>	Region XI	Number of No-Physician Towns	Number of One-Physician Towns		0	14
Region XI	Number of No-Physician Towns	Number of One-Physician Towns						
	0	14						
(Note: Totals not changed; other data okay unchanged.)								
90(Figure 25)	Legend: Practicing in Minnesota	Practicing in North Dakota						
90(Figure 26)	Legend: Practicing in Minnesota	Practicing in South Dakota						
93	hop	hope						
APPENDIX B:								
128	Table C-1 appears to be missing	Found on page 107						
131(Table C-8)	Column captioned, Total No. of MD's	Total population						
134	Table C-11 appears to be missing	Found on page 130						
APPENDIX C:								
135	MEDICAL SPECIALISTS	Delete: Periodontal refers to the supporting and other tissues surrounding the teeth. A periodontist is a dentist who specializes in the diseases affecting the supporting structures of the teeth.						
135	PSYCHIATRISTS	PSYCHIATRIST						
135	e.s.	e.g.						