REGIONAL HEALTH PLANNING IN SOUTHEAST KANSAS

by

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CHAPTER I

INTRODUCTION

The Problem

In recent years local governments have realized a need for interlocal cooperation in providing public services. Because a person today rarely works, lives, shops, and enjoys recreation within a single jurisdiction, many problems facing local governments do not conform to political boundaries, and are actually multijurisdictional problems.

Health care service is a community problem with an opportunity for area-wide solution. This is evident by observation of recent legislation passed to aid health care planning,[1] and the formation of area-wide health planning councils by consumers and health care providers, namely hospital and nursing home administrators.

In a message to Congress on March 2, 1972, former President Nixon stated that "the United States now spends more than $75 billion annually on health care--and for most people, relatively good service results. Yet despite this large annual national outlay, millions of citizens do not have adequate access to health care."[2] According to Tresa H. Matthews, Social Science Analyst, "rural and urban areas differ widely in their characteristics,

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[1]Public Health Services Act, Title III, Section 314 (a-e) as amended by Section 3 of the Comprehensive Health Planning and Public Health Services Amendments of 1966, Public Law 89-749; Section 2 of the Partnership for Health Amendments to Section III (a) of Public Law 91-296; Public Law 91-515; 42 U.S.C. 246 and Title VI, Public Law 88-443 as amended by Public Law 91-296, 42 U.S.C. 291.

[2]The White House. The President's Message to the Congress, Special on Health, March 2, 1972.

but generally speaking, in rural areas, the physician shortage is more acute; persons must travel longer distances to obtain health care, emergency health services are more deficient; work-related injury rates are higher; and a comprehensive approach to health care delivery often is not present."[3]

Most rural areas have had declining population and increasing average age of residents. Older people need more medical services, such as extended care units, in-home services, rehabilitation units, specialized nursing homes and day care centers and recreational opportunities. On the other hand, a basic medical program for young and middle-aged Americans would include such services as acute coronary care units, psychiatric services, drug abuse centers, modern laboratory, radiologic and pathologic services, and kidney units to name a few. All of these specialized services, in addition to basic preventive, diagnostic and treatment services, cannot be offered by a single community unless it is of sufficient size.

Some rural communities that have built new hospitals have received unsatisfactory results because they failed to ascertain how the new hospital will serve in a comprehensive health system for their community and surrounding communities. If a community does not have adequate and complete primary and secondary services, the residents will seek out large medical centers for health care, taking health care dollars out of the local community. Thus it must be realized that while partial systems do exist in many areas, comprehensive systems are needed to provide the full range of services needed by the people of the community or communities. Figure I-1 shows Macqueen and Elderidge's proposed organizational structure for providing health services and medical care.

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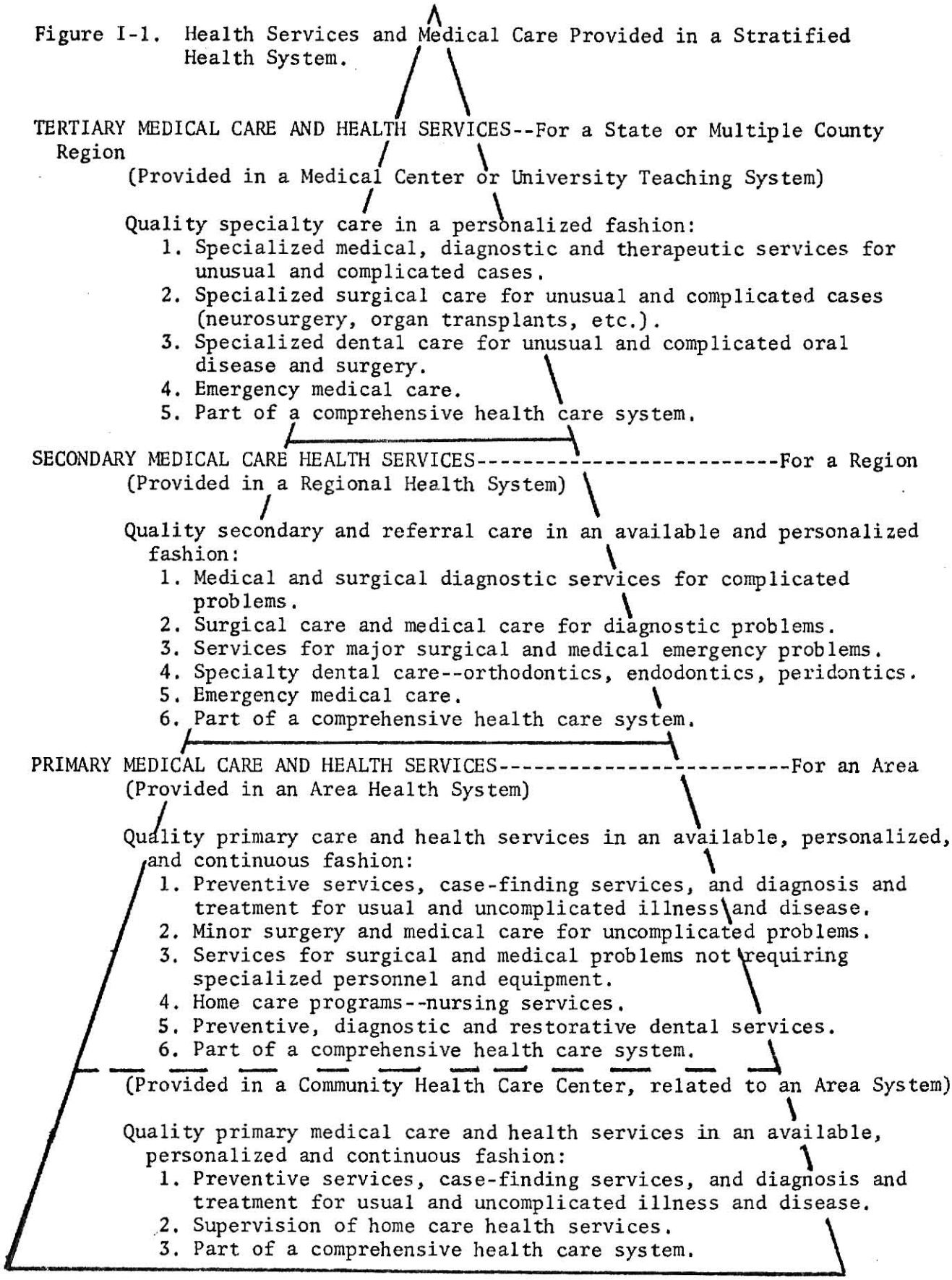
[3]Tresa H. Matthews, Health Services in Rural America, USDA Rural Development Service, Agricultural Information Bulletin No. 362 July 1973, p. 1.

Figure I-1. Health Services and Medical Care Provided in a Stratified Health System.



Source: A Proposed Organizational Structure for Providing Health Services and Medical Care in the State of Iowa. John C. Macqueen,M.D.; Eber Eldridge, Ph.D.

An important factor in providing health care is the sharp rising cost of doing so. From fiscal year 1950 to fiscal 1971, total health expenditures jumped from twelve billion to seventy-five billion, or as a percentage of gross national product, it increased from 4.6 to 7.4 percent. In 1971 this was an average health care bill of $358 per person, which is over two and one-half times the 1960 bill and four and one-half times the 1950 bill (Table I-1).

Medical care prices have increased faster than the consumer price index, as shown in Table I-2. In fiscal years 1946-60 the price index for medical care rose 4.2 percent annually compared to 3 percent for the consumer price index. In 1960-67 medical prices increased twice as fast as the consumer price index. During the next four years health care costs increased at a 6.6 percent average annual rate while the consumer price index increased by a 4.8 percent average annual rate.[4]

Health care costs are projected in Table I-3 to range from $111 billion to $120 billion (7.9 to 8.0 percent of GNP) in 1975 and from $156 billion to $189 billion (8.0 to 8.9 percent estimated GNP) in 1980. This represents an average health bill for each American of $552 in 1975 and $814 in 1980.[5] Hospital care accounted for the largest expenditure of all items tested. It was 39 percent of the total in 1971 and is projected to increase to 49 percent for 1975 to 1980.

Health planning legislation provides funds to State or areawide health agencies to help them form comprehensive plans.[6] Objectives of this

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[4]Ibid., p. 5.

[5]Ibid.

[6]Catalog of Federal Domestic Assistance Programs, Office of Management and Budget, June 1972. Items 13.206, CHP-Areawide Grants, 13.314, CHP-Partnership for Health.

legislation are listed in Appendix A. Enactment of this legislation, according to Matthews, was partially due to legislators realizing that adequate health care involves an allocation of resources among all aspects of health, such as delivery of health care, prevention of ill health, sanitation, control of unhealthy environmental factors, and providing adequate transportation, administration and social services. This program calls for an areawide effort to provide health care and it attempts to involve consumers as well as providers in the planning.[7]

Table I-1. United States Total and Per Capita Health Expenditures, and Health Expenditures as a Percentage of Gross National Product, Selected Years 1929-1971.

Fiscal Year	Health expenditures		Percent of GNP
	Total	Per Capita	
	Billion dollars	Dollars	Percent
1929	3.6	29	3.6
1935	2.8	22	4.1
1940	3.9	29	4.1
1950	12.0	78	4.6
1955	17.3	104	4.6
1960	25.9	142	5.2
1965	38.9	197	5.9
1970	67.8	327	7.1
1971	75.0	358	7.4

Source: 1972 Medical Care Costs and Prices: Background Book. Social Security Administration, Office of Research and Statistics. January.

Previously twenty-five to fifty percent of the funds for areawide planning had to come from within the community, and many rural areas were too poor to afford even that amount. However, recent amendments now encourage states to undertake the responsibility of planning for non-metropolitan

[7] Matthews, p. 25.

areas.[8] Objectives of these amendments are in Appendix A. State planning agencies may now be directly funded for areawide health planning functions for rural areas.[9]

Table I-2. Average Annual Percentage Increase in the United States Consumer Price Index and in its Medical Care Component, Selected Years, 1946-1971.

Fiscal Years	Average Annual Percent Increase	
	CPI, all items	Medical care
	Percent	
1946-60	3.0	4.2
1960-67	1.6	3.2
1967-71	4.8	6.6
1966-67	3.0	6.5
1967-68	3.3	6.4
1968-69	4.8	6.5
1969-70	5.9	6.4
1970-71	5.2	6.9

Source: 1972 Medical Care Costs and Prices: Background Book. Social Security Administration, Office of Research and Statistics. January.

Extremely large metropolitan areas presently have the most comprehensive health care systems because there is sufficient demand to support many uncoordinated facilities with little planning among them. As population declines there is no longer sufficient demand to support duplicate facilities. The same population with adequate planning could still provide facilities and services to meet the needs of the people, but only when all health care activities are fully integrated into a planned comprehensive system.

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[8] Catalog of Federal Domestic Assistance Programs. Items 13.206, 13.207, 13.208, 13.210, 13.224.

[9] "Impact on Department of Health, Education, and Welfare Programs on Nonmetropolitan Areas, Fiscal 1970," in the Economic and Social Conditions of Rural America in the 1970's. Prepared by U.S. Dept. of Health, Education, and Welfare Office of the Secretary, Office of Regional and Community Development, for Committee on Government Operations.

Table I-3. United States Expenditures for Medical Care, by Type of Service, 1971 with Projections for 1975 and 1980.

Type of Service	Fiscal 1971	Fiscal 1975		Fiscal 1980	
		Low	High	Low	High
	Million dollars				
Total	75,012	110,716	120,051	155,703	189,242
Health services and supplies	69,479	104,197	113,480	148,916	180,600
Hospital care	29,628	48,197	52,425	76,393	92,604
Physicians' services	14,245	22,097	23,980	29,200	36,453
Dentists' services	4,660	6,593	7,128	8,389	10,590
Other professional services	1,475	2,226	2,417	2,784	3,506
Drugs and drug sundries	7,470	9,279	9,383	11,343	13,163
Eyeglasses and appliances	1,915	2,890	3,012	3,885	4,446
Nursing-home care	3,365	4,774	5,317	6,090	7,453
Expenses for prepayment and administration	2,296	2,669	2,777	3,288	3,717
Government public health activities	1,618	1,319	1,363	1,581	1,740
Other health services	2,807	4,785	5,178	5,963	6,928
Research and medical facilities construction	5,533	5,887	6,571	6,787	8,642
Research	2,019	2,245	2,460	2,565	3,140
Construction	3,514	3,642	4,111	4,222	5,502

Source: 1972 Medical Care Costs and Prices: Background Book. Social Security Administration, Office of Research and Statistics. January.

65,000 to 100,000 population is required to support a medical system offering all but the extremely specialized services.[10] But a region of such population having several communities with their own independent medical systems will be limited to offering only the "essential services" in each community. While that region has only the minimal level of health care at the present, it has the population base to support a comprehensive health care system.

A comprehensive system offering health care does not have to consist of one regional facility but can be a system using existing small hospitals,

[10] J. B. Eustis and M. A. Warren, Rural Medical Facilities & Services, Upper Midwest Council, Minneapolis, Minnesota, Economic Development, Northern Natural Gas Company, Omaha, Nebraska. September 1973.

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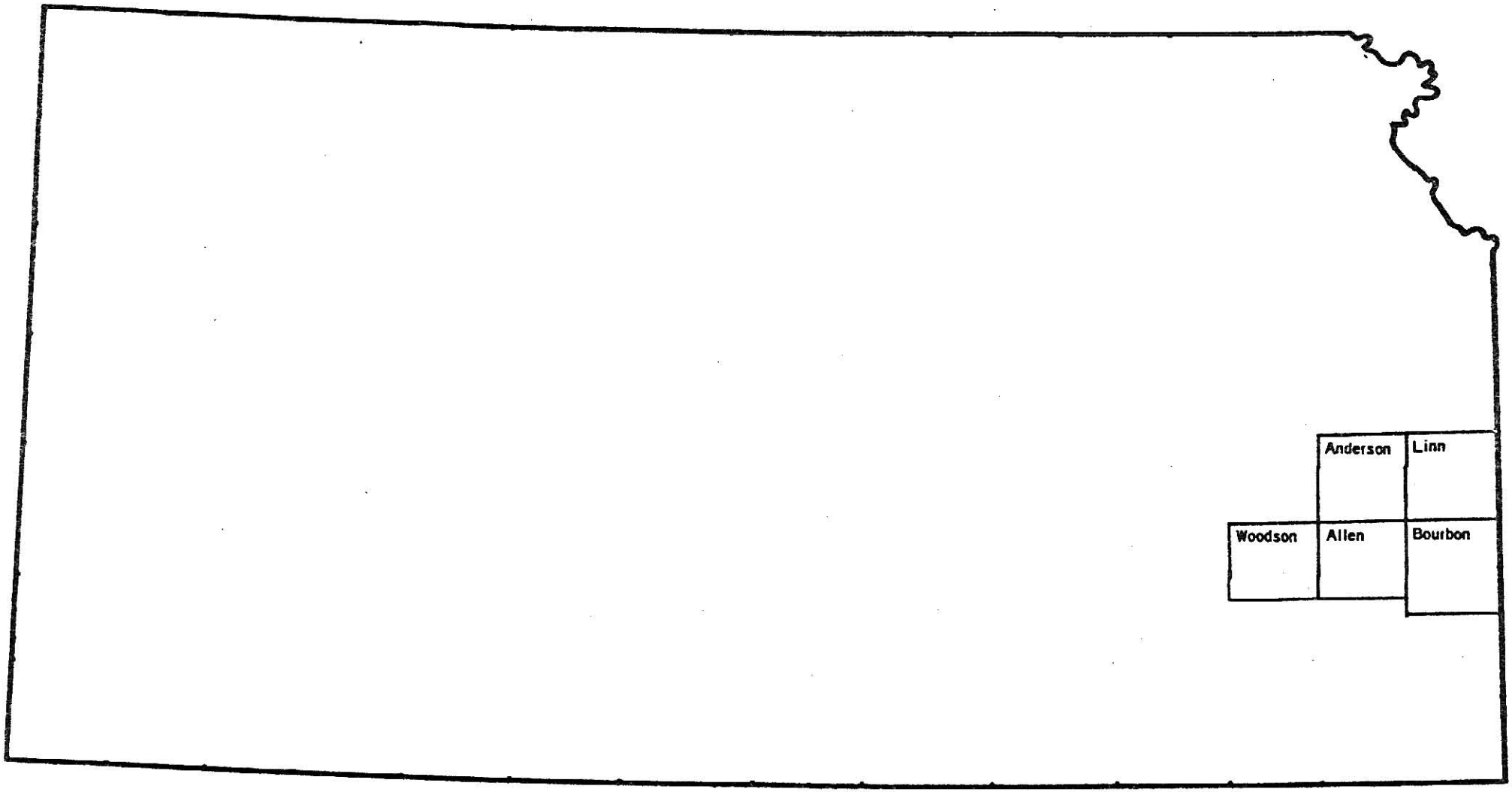

Figure I-2. Location of Five-County Area in Southeast Kansas.

each specializing in separate functions which in total would provide all facilities and services offered by a single regional facility. In similar order, a modern nursing home system can be one in which each home in a region offers flat level care plus a specialized service.

This study has chosen to work with a health planning council in existence. Administrators of health service facilities and consumers have formed the Five-County Area-Wide Health Planning Council located in Anderson, Allen, Woodson, Bourbon, and Linn counties, shown in Figure I-2. These counties represent parts of economic development region 02 and subregion 013.

Although a health care system has many components such as doctors, clinics, pharmacies, hospitals, public health officers, home nurses and nursing homes, this study concentrates on only one component, the hospitals. The selection of this component does not mean that the others are unimportant or do not require coordination. Rather, hospitals were selected because they are largely in the public domain (two or the three in the area are county hospitals while the third is church operated), and because of the high investment costs for hospitals and their equipment which translate into high service costs if used insufficiently.

The hospital is the converging point for highly specialized skills and mechanical devices, joined together for the purpose of preserving and restoring health. The effective correlation of related but separate medical units in a community can be acquired by development of a comprehensive system based upon the hospital as the core of the system.[11] The hospital is the common meeting point for the patient, community, and professional groups of medical care. It provides many specialized and expensive facilities, and

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[11] Health is a Community Affair, National Commission on Community Health Services. Harvard University Press, 1966.

it has an advantageous location in the community to coordinate various health activities, both voluntary and public.

The selection of hospitals for study does not deny the importance of or need for planning for the other components. In rural areas the doctor shortage is severe and measures to encourage doctors to choose to serve rural communities are needed. Also a rural area with high concentrations of elderly people needs nursing home facilities. The present nursing home facilities are operating near capacity at 90 percent utilization, and there is at present no problem of excess capacity.

Objectives

The objective here was to study three alternative hospital systems for the five county area for their impacts on per capita costs and for their potential for adding services without increasing per capita costs. Secondary to the above objective is the question of the appropriateness of the boundaries of the Five-County Area-Wide Health Planning Council for a comprehensive health care system.

The alternative hospital systems considered are: 1) a full utilization system, 2) an eighty percent utilization system, and 3) a single regional hospital operating at eighty percent utilization. Alternatives one and two utilize the three existing hospitals while the last one calls for the construction of a new facility. The second alternative is similar to the first except that it has twenty percent over capacity to allow for utilization fluctuations.

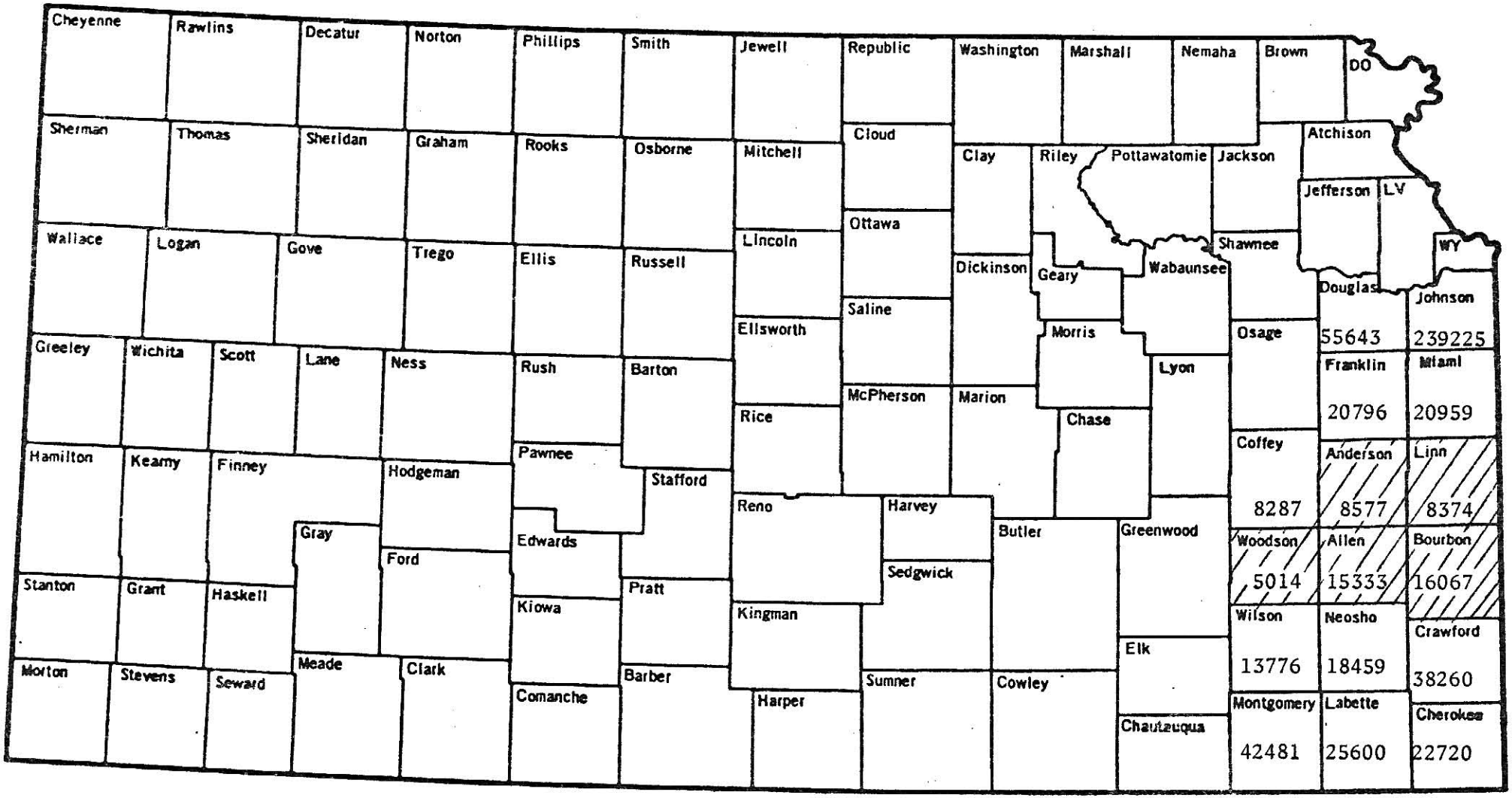
The approach was to determine the level of services presently consumed, the available capacities, and the cost difference for each model.

CHAPTER II

THE FIVE COUNTY AREA: CAPACITY, UTILIZATION, AND COSTS

The study area is the five county area of Allen, Anderson, Bourbon, Linn and Woodson Counties in Southeast Kansas. The map in Figure II-1 gives the county population for each county in the area and for counties immediately north and south of the area. The five county area is the most sparsely populated portion of Eastern Southeast Kansas. Of the five counties in the study area Bourbon has the largest population with 16,067, and Woodson the smallest with 5,014. The average county population in the area is 10,673.

Except for Woodson County each county in the area is adjacent to a county outside the area having greater population than any county in the area. Since the major problem of providing comprehensive health services in rural areas is that of having an adequate population base that can fully utilize the facilities, it seems appropriate to suggest that the planning area reconsider its planning boundaries. Woodson, Allen and Bourbon Counties would gain a greater population base by joining the counties to the south while Linn and Anderson have more to gain by joining the counties north of themselves. Although reformulating planning region boundaries would increase population bases, there may be other factors which make such a move impossible or undesirable. The purpose of this study is to analyze the hospital system for the previously defined five county area.



*Shaded area is five-county area under study.

Figure II-1. Population of Counties in and Adjoining the Five-County Area.

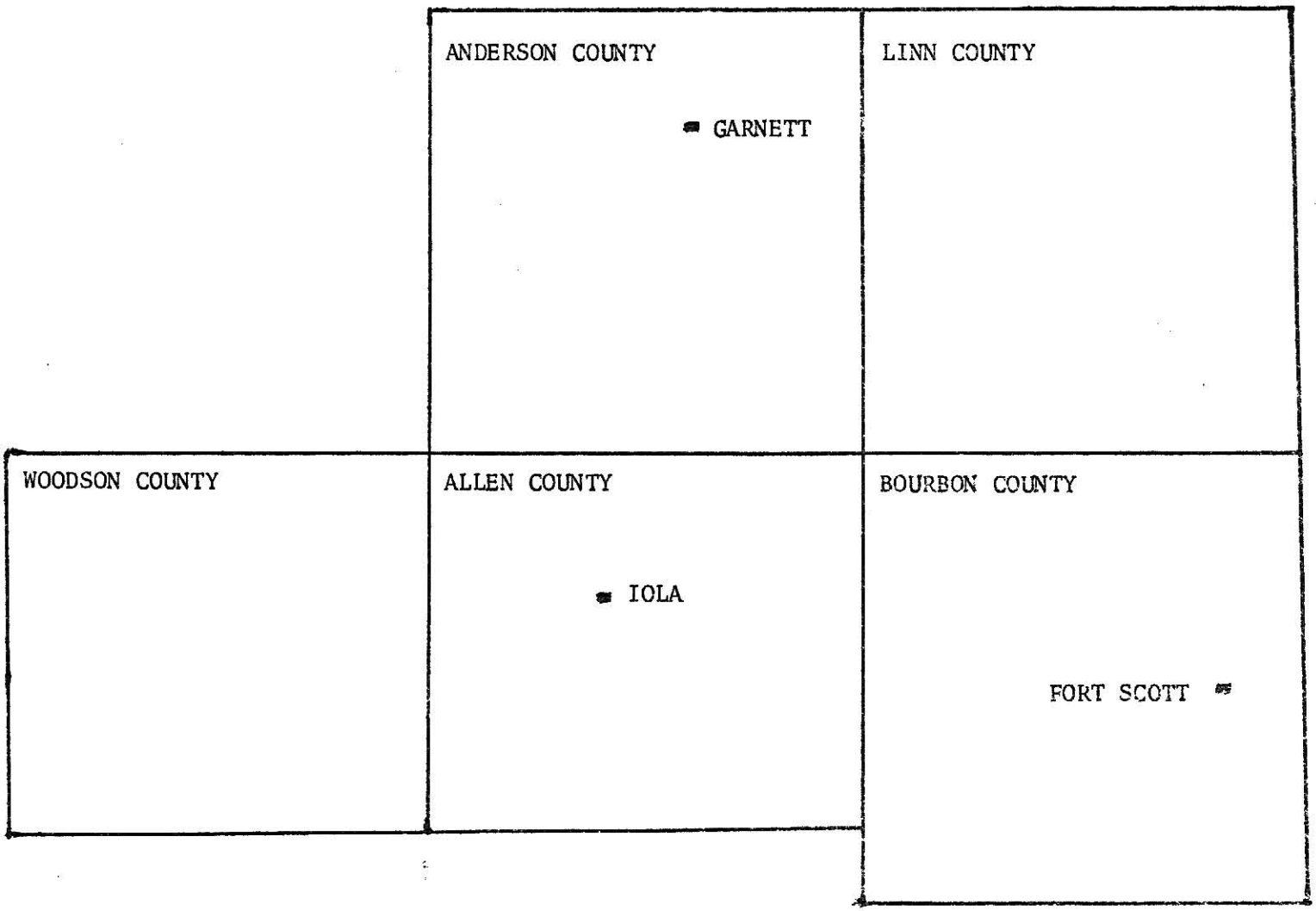
Existing Capacity

The study area is served by three hospitals: Anderson County Hospital at Garnett, Allen County Hospital at Iola and Mercy Hospital at Fort Scott (Figure II-2). Hospital annual capacities are given in Table II-1 by categories of services and by hospital. Hospital cost records are classified by cost centers where a cost center represents a specific operating component of the hospital. A cost center may be involved in the direct provision of health care such as obstetrics while other cost centers such as accounting (see Table II-1) is an overhead cost which must be prorated among the services. The health service categories correspond to hospital cost centers providing direct patient services.

Some facility capacities are rather easily determined and are quite accurate, such as bed capacity, but others are difficult to determine such as operating room capacity. The difficulty in determining capacities for certain services is due to the differences in the intensity with which the facility is used for each patient. The intensity of utilization during a treatment will depend upon the type of illness, patient condition, procedures prescribed by physician and personnel available. This variability in intensity of utilization should be kept in mind when viewing these capacities. The capacities are based on somewhat inexact definitions of average use. Capacities per service are shown in Table II-2.

Ambulance capacity is an estimation of the peak capacity per day because this service is prepared to run whenever the situation arises. This capacity is determined under the following assumptions: each service unit has two van-style ambulances, there are four stretchers per ambulance,

Figure II-2. Hospital Locations in Five-County Area under Study.



■ Indicates city with a hospital

Table II-1. Classification of Hospital Cost Centers.

Patient Services	Overhead and Supporting Activities
Ambulance Service	Accounting
Anesthesiology	Accounts Receivable
Blook Bank	Administration and General
Coronary Care	Business offices
Delivery Room	Cafeteria
EKG	Cashiers
Emergency Room	Central Services and Supply
Inhalation Therapy	Chapel
Intravenous Therapy	Data Processing
Laboratory	Depreciation
Nuclear Medicine	Dietary
Nursery	Education
Nursing Service	Fiscal Administration
Obstetrical Unit	Housekeeping
Operating Room	Interest
Pharmacy	Laundry
Physical Therapy	Medical Records
Radiology	Plant Maintenance
Recovery Room	Nursing Administration
Social Services	Purchasing
Ultrasound Scanning	Religion
	Utilities

Table II-2. Total Annual Hospital Capacities in the Five-County Area Under Study.

Service	Allen County Hospital	Anderson County Hospital	Mercy Hospital	Total
		Patients Per Year		
Ambulance				192[1]
Anesthesiology	1200	1040	3900	6140
Bed Capacity[2]	3770	3016	6424	13210
Blood Bank[3]	--	--	--	--
Coronary Care	(NO)[5]	(NO)	690	690
Delivery Room	2080	1080	1560	4680
EKG	6240	8320	5200	19760
Emergency Room	10400	10400	7800	28600
Inhalation Therapy	7800	10400	4160	22360
Intravenous Therapy[4]	(NO)[5]	20800	--	20800
Laboratory	13000	13000	14300	40300
Nuclear Medicine	(NO)[5]	(NO)[5]	10580	10580
Nursery	1062	972	1714	3748
Obstetrical Unit	424	530	1285	2239
Operating Room	1200	1040	3900	6140
Pharmacy[3]	--	--	--	--
Physical Therapy	8400	2600	18200	29200
Radiology	18000	10400	13000	41400
Recovery Room	1200	1040	3900	6140
Social Services	(NO)[5]	--	(NO)[5]	--
Ultrasound Scanning	(NO)[5]	(NO)[5]	1560	1560

[1] This is a per service unit capacity per day with 2 ambulances per unit, 4 stretchers per ambulance, operating at 3 hours per run, 24 hours per day.

[2] Bed capacity is determined by multiplying number of beds by the turnover rate and projecting the product to an annual figure.

[3] Capacities for these items are not feasible.

[4] This service at Mercy Hospital is considered part of ancillary services and the total is not a true representation of what exists in the area.

[5] Not offered at this hospital.

the average time per run is three hours, and the service is offered 24 hours per day.

The bed capacity represents the number of patients that could be admitted, based on the average length of stay of patients for each facility. The average length of stay is divided into 365 and the dividend is multiplied by the number of beds to determine each hospital's capacity. These capacities were totaled to find the aggregate capacity.

Capacities for blood bank and pharmacy services were not calculated. Generally, these services are quite flexible to changing capacities. In the event that the capacity of either is exceeded there is still what is termed a call capacity. If a hospital is short of pharmaceuticals it can obtain supplies from a local pharmacy or if it is short of blood, it will obtain blood from another hospital.

Utilization of Services

It is assumed that the present level of utilization of health services in the area represents the quantity of health services demanded by the people of the region. This may not be accurate because the number of people from the area traveling to other hospitals for treatment is unknown. Such information would improve our estimates of the quantity demanded of each service. Table II-3 shows actual utilization, percent capacity utilized, and percent of population utilizing each service for the Five-County area.

COSTS OF SERVICES

The cost data, found in Table II-4, is for the 1973 fiscal year as taken from the three hospitals in the area. Overhead and supporting

Table II-3. Annual Utilization of Hospital Services in the Five-County Area.

Service	Actual Utilization[1/]	Percent of Capacity Utilized[2/]	Percent of Area Population Utilizing Services
	Patients Per Year		
Anesthesiology	3156	51.40	6.069
Beds	8916	67.49	16.822
Blood Bank	No Data Available		
Coronary Care	3322	46.66	.608
Delivery Room	672	14.36	1.268
EKG	8166	41.33	15.408
Emergency Room	13452	47.03	25.381
Inhalation Therapy	12846	57.45	24.238
Intravenous Therapy	No Data Available		
Laboratory	10784	35.10	20.347
Nuclear Medicine	318	3.22	.600
Nursery	672	17.93	1.268
Obstetrical Unit	780	34.84	1.472
Operating Room	3156	51.40	6.069
Physical Therapy	25692	87.99	49.408
Radiology	28434	68.69	53.649
Recovery Room	3156	51.40	6.069
Social Services	No Data Available		
Ultrasound Scanning	233	14.93	.440

1/ Reported number of patients treated by hospitals in the Five-County Area.

2/ Actual Utilization divided by Actual Capacity from Table II-2.

Table II-4. Annual Costs of Services Provided in Five-County Area, 1973.

Service	Fixed Cost[1]	Variable Cost[1]	Total Cost
		Dollars Per Year	
Ambulance Service[2]	28455	64617	93072
Anesthesiology	19395	469453	488848
Blood Bank	22776	211	2487
Coronary Care[3]	307		
Delivery Room	16531	92198	108729
EKG	3791	965343	969134
Emergency Room	10944	1432790	1443734
Inhalation Therapy	51312	1586820	1638132
Intravenous Therapy	3108	117	3225
Laboratory	111136	864772	975908
Nuclear Medicine[3]	165		
Nursery	10980	122656	133636
Nursing Service	1422407	744015	2166422
Obstetrical Unit	27093	171885	198978
Operating Room	80658	570871	651529
Pharmacy	113135	89134	202269
Physical Therapy	26138	3776110	3802248
Radiology	107198	3506490	3613688
Recovery Room	6244	468871	475115
Social Service	NA[4]		
Ultrasound Scanning	NA[4]		
	2089662	14976502	17066164

[1] These costs are determined by the method described in Chapter III of this study.

[2] This is a cost for seven ambulance service units.

[3] This is a total per patient cost taken from outside the area and is not included in the totals.

[4] Not available.

activity cost centers occur because there are many functions besides those directly involved in treating patients to make health services available to the public. These cost centers have been prorated to patient service by square footage or number of patients treated, depending on the type of activity, to determine the cost of providing each service.

Ultrasound scanning, coronary care and nuclear medicine services are offered only at Mercy Hospital in Fort Scott and social services are offered only at Anderson County Hospital in Garnett. Although available, costs on these services are not reported by service because these hospitals' individual cost could then be identified in the study which would violate the individual hospital's requests that their information be kept confidential. However, a total for these four services is reported, based on the costs obtained from the three hospitals. This study also desired to show a cost per service for these services by using data from other sources. However, cost data were not available from other hospitals of similar size but certain data were available from the University of Kansas Medical Center in Kansas City and the Wesley Memorial Hospital in Chicago. Since the cost data shown for these services is from facilities in some of the major metropolitan areas of the United States, it should be pointed out that these costs may differ from actual costs in the five-county area because of differences in geographical location, salaries, paramedics, licensing costs, doctors fees, procedures, labor union agreements, and pharmaceutical costs, to name a few. Coronary care service is not a recognized service in Mercy Hospital because it does not operate with a separate nursing unit. A coronary care unit will have higher costs if it has a separate nursing unit. Cost data from other hospitals for this

service is for a complete cardio-vascular unit because coronary care costs could not be separated out. Ultrasound scanning service is a rather rare service. Cost data for that service were unavailable for this study. Social service costs are included with other cost centers at other hospitals, and could not be determined separately from others.

Throughout the study when a cost is shown for coronary care or nuclear medicine, it is from sources outside the five-county area. However, the total cost for each alternative system, which is the total of costs of providing patient services, includes the cost data provided by the three hospitals in the area and does not include cost data for other hospitals.

Table II-5 shows that population in the five-county area declined steadily from 1960 to 1970, with the exception of 1966.[1] Since 1970, population in the five-county area has been increasing each year except 1973, which shows approximately 52000 population. Since 1973 is the year under study, the 52000 population base will be used in this study. Also, because Eustis[2] quotes 65,000 as the minimum population base required to support a medical system with a full range of services other than the extremely specialized services, this study will determine the necessary adjustments in capacity and costs for such a population. Such information would indicate the health services cost advantage of population growth or reorganizing health care area boundaries. Table II-6 shows the cost per capita for both bases according to the 1973 costs provided by the three hospitals in the area.

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[1] Actual and Projected Public Expenditures for Capital. Improvements in Capital by Region, 1960-1980.

[2] J. B. Eustis and M. A. Warren, Rural Medical Facilities & Services, Upper Midwest Council, Minneapolis, Minnesota, Economic Development, Northern Natural Gas Company, Omaha, Nebraska. September 1973.

Table II-5. Five County Population, 1960-74.

Year	Total Population
1960	57232
1961	56971
1962	56875
1963	56313
1964	56157
1965	55654
1966	56325
1967	55549
1968	55721
1969	54994
1970	51318
1971	52142
1972	52625
1973	52060
1974	53365

Source: Actual and Projected Public Expenditures for Capital Improvements in Kansas by Region 1960-1980.

Table II-6. Per Capita Cost with Present Hospital Services in Five-County Area[1]

Service	52,000 Population, ($/ person)	65,000 Population, ($/ person)
Ambulance Service	.547	.438
Anesthesiology	.373	.298
Blood Bank	.438	.350
Coronary Care	NA[2]	
Delivery Room	.318	.254
EKG	.073	.058
Emergency Room	.210	.168
Inhalation Therapy	.987	.789
Intravenous Therapy	.050	.048
Laboratory	2.137	1.709
Nuclear Medicine	NA[2]	
Nursery	.211	.169
Nursing Service	27.35	21.883
Obstetrical Unit	.521	.417
Operating Room	1.551	1.241
Pharmacy	2.176	1.741
Physical Therapy	.503	.397
Radiology	2.062	1.649
Recovery Room	.120	.096
Social Service	NA[2]	
Ultrasound Scanning	NA[2]	
Total	40.186	32.142

[1] Fixed Costs of services were obtained from Table II-4.

[2] Not Available.

CHAPTER III

THE COMPREHENSIVE SYSTEM

Introduction

This chapter compares the alternative patterns of utilizing existing hospitals (a full utilization system and an eighty percent utilization system) for their potential cost savings to the citizens of the five county area. The alternatives are analyzed for populations of 52,000 and of 65,000. Cost savings are achieved by eliminating excess capacities. Generally, different hospital services are provided by separate service units that require special equipment and personnel. Such service units are assumed to be indivisible. Thus savings can be obtained only by removing discrete units from service. The cost savings achieved through such coordination could be returned to the citizens or provide additional services without increasing per capita costs.

Economies of Scale in Hospitals

The fundamental concept underpinning the notion that cost savings are possible through comprehensive health services planning is economies of scale. Economies of scale are the reductions in long run average costs realized as the size of operation increases. Economies of scale can result from increased specialization of labor, better use of equipment, better use of management resources, and ability to take better advantage of different techniques of production.

Many hospital services require such highly trained personnel that specialization is required just to offer the service. Specialization exists

regardless of whether or not the size is sufficient to normally justify specialization. In those cases economies are obtained not by increasing specialization but rather by making fuller use of existing specialists. Similarly diagnostic and treatment equipment come in discrete capacity size units. Economies of scale may be obtained by making better use of equipment. Also larger scale provides greater flexibility in combining different sizes of equipment to provide the most efficient combination. Hospital services involve considerable management and record keeping. The extent to which economies might be realized here depends upon the nature of the organization and control permissible in hospital operations. Finally, larger scale operations are capable of providing a wider range of services since they have the patient load which will adequately utilize those specialties.

Diseconomies of scale are the increases in long run average costs realized as size increases. Diseconomies of scale usually result from limitation in managerial control. As the organization increases in size, managerial costs or the costs of coordination may increase faster than output. This is particularly true when the tasks performed are complex, the activities engaged in (i.e., types of services performed) are many, and the supervision is heavy. Hospitals appear to have conditions conducive to these diseconomies of scale or at least lack the conditions which would provide strong economies of scale from better use of management.

Usually, an industry will exhibit both diseconomies and economies of scale. For some sizes economies dominate; in other diseconomies dominate (Figure III-1). Up until output level X is reached, economies of scale dominate (i.e., unit costs fall as output increases). After that

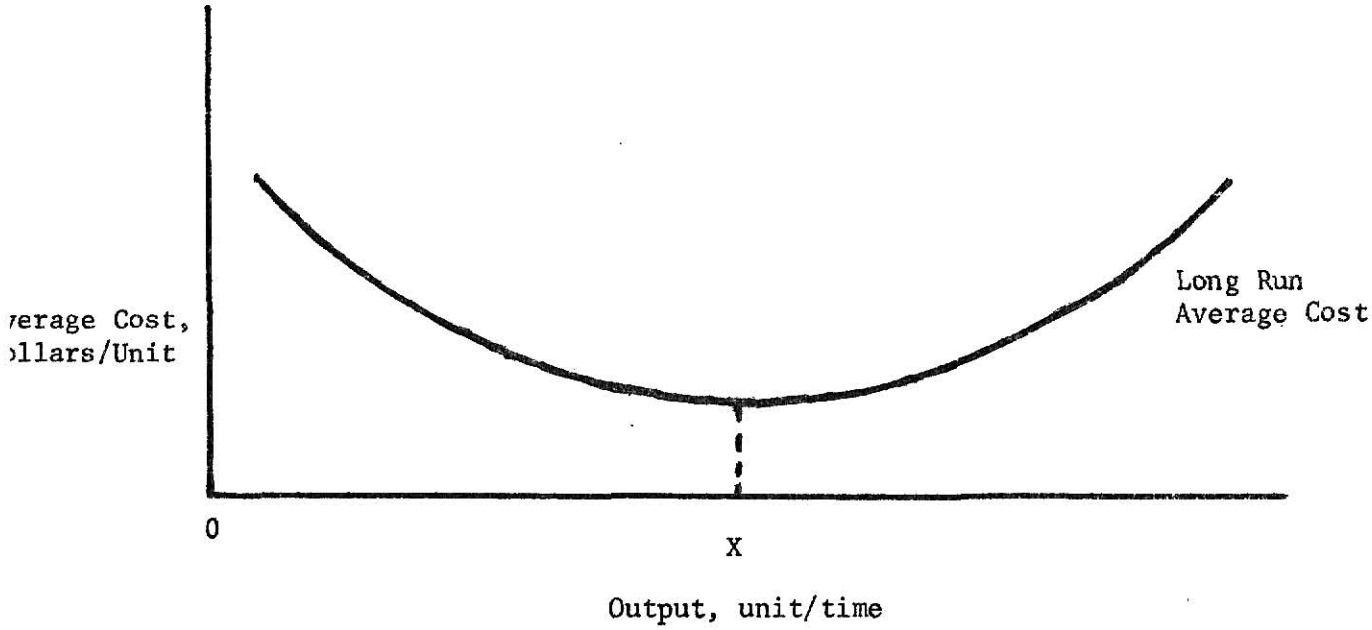

Figure III-1. Graphic Illustration of Economies of Scale.

point we can see that long run average costs increase which means that there are diseconomies of scale.

Another aspect is the diseconomies associated with an expanding geographic region to service. This is not a diseconomy of scale at the hospital, but one that enters when one considers all the costs of hospitalization including transportation. A community with low population densities will have to take in considerable additional geographic territory to add a few more people to its base. Assume that the hospital was initially located so as to minimize transportation, and that the annexed area is on the outer fringe of the original territory. Then the people in the annexed area will have higher transportation costs getting to the one hospital than those in the original territory, thus increasing average travel costs. Unless average hospital costs decline faster than travel costs increase as size increases, the increasing travel costs will result in higher average total costs (hospital and travel) as output increases. Since a hospital provides services to the citizens, it is proper to look at the total costs to the citizens and transportation costs cannot be ignored.

Measurement of economies of scale would require correlating per unit costs with output and other pertinent factors. Such measurements are difficult to perform with hospitals for several reasons. Hospitals are multiproduct firms. They offer a wide array of services. With more than one output it is necessary to develop a composite output or service which provides a unique solution to the measure of total output. But composite goods fail to recognize differences in desirability of offering a particular mix of goods and services. How then is one to compare hospitals with different mixes of outputs or study a single hospital over time where the

mix is changing? The problem cannot be assumed away by assuming that each service could be offered independently because patients come to the hospital for total health care and not of a narrowly defined service. Usually, a hospital patient will in any visit to the hospital use the services of several hospital cost centers providing direct services.

Another problem of measuring economies of scale is obtaining a sufficient number of observations to investigate the range of sizes under consideration and to verify the results. The study area contains only three hospitals, somewhat uniform in size. Therefore the study area does not provide information for studying economies of size.

Lave and Lave[1] have attempted to measure economies of scale in hospitals in Western Pennsylvania. They find that if economies of scale exist in hospitals, they are not strong. While regression signs indicated economies of scale they rarely attained statistical significance. This is consistent with the findings of others, particularly Ingbar and Taylor,[2] Berry,[3] and Feldstein.[4] Lave and Lave[5] find that marginal cost is eighty percent of average cost when using a six month study period while Feldstein found that marginal cost is only twenty percent of average cost when using one month study periods. This result is to be expected. As the time

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[1]Judith R. Lave and Lester B. Lave, "Hospital Cost Functions," The American Economic Review, George Banta Co., Inc., Menasha, Wisconsin, June 1970.

[2]M. Ingbar and L. Taylor, Hospital Costs in Massachusetts, Cambridge, 1968.

[3]R. Berry, "Returns to Scale in the Production of Hospital Services," Health Services Research, Summer 1967, Vol. 2, 1923-1939.

[4]M. Feldstein, Economic Analysis for Health Service Efficiency, Amsterdam 1967.

[5]Lave and Lave, loc. cit.

period becomes shorter the percent of costs that are variable becomes less. However, if marginal costs are always somewhat less than average costs economies of scale exist.

Economies through Better Utilization

Past studies indicate that economies of scale in hospitals do not appear to be very strong. Furthermore, estimation of cost curves for hospitals in Kansas is beyond the scope of this study. The scope is to study the feasibility of comprehensive health care in the five county area based upon the present knowledge of hospital costs. The approach selected here is to reduce per unit costs by increasing the degree of utilization in existing facilities. Hospital service centers come in somewhat discrete units, especially at the small capacities. For example, the smallest capacity available for electrocardiograms is that capacity which one machine and personnel available to operate the machine could accommodate.

The hospital is an aggregation of a moderate number of indivisible units of operation which are coordinated to provide total hospital care. Thus when studying the optimal configuration of services among hospitals it is necessary to keep in mind the discrete nature of the service units where the service unit is an indivisible incremental capacity step within a service center such as physical therapy or radiology. Reduction in costs will be made in terms of service units or incremental capacity, which may be retired and still provide the required capacities.

Two different utilization levels will be studied at two populations to show the effect on cost, changing utilization rates and changing population bases. Service usage as close to capacity as is possible with discrete units was achieved by altering the number of service units. In all except one case capacities were adjusted so as to either just meet the

capacity requirement if possible or to exceed the capacity requirement if the discrete units could not exactly attain the capacity requirement. In one case, utilization of laboratories was within 0.3% of the requirement and this level of service was used instead of the next capacity level.

For the full utilization alternative capacities were selected to satisfy the 100 percent utilization or a lesser utilization if required by the discrete nature of the service units. For the eighty percent utilization alternatives capacities were selected to at least satisfy the eighty percent utilization constraint.

Estimation of cost savings from altering service capacities requires first the calculation of costs by service center and by type of cost. Costs were collected by service center from the three hospitals. As was mentioned before, instances where the cost data can be identified directly with a hospital the costs are not presented at the request of the cooperating hospitals.

Costs within a direct patient service center were classified as either fixed costs or variable costs. The classification is as follows:

fixed cost (short run)	variable cost
technician salaries	doctors fees
professional education workshops	non-professional salaries
supplies, medical and other	miscellaneous expenses
equipment reserves	
equipment lease and rental	
repairs and maintenance	
dues and subscriptions	

Fixed costs were then calculated on a per patient basis at capacity to find the average fixed cost of each service, then cost savings were calculated by determining the reduction in capacities possible and multiplying this figure by the per patient fixed cost at capacity.

Utilization rates for ambulance service, blood bank, intravenous

therapy, pharmacy, and social services were not provided by the three area hospitals and therefore the estimated population base they can serve could not be determined. Estimated population base that could be served by all other services operating at eighty percent utilization is shown in Table III-1.

Alternative Systems for 52,000 Population

Because services are characterized by discrete units (the cause of discontinuous cost functions) the full utilization system and the eighty percent utilization system using existing facilities are quite similar. The models are essentially the same, except for capacities of inhalation therapy, physical therapy, and beds.

The full utilization system has beds utilized at 100 percent which is assumed possible by altering the number of beds in combination at the three hospitals, based on turnover rates, to achieve such a high level of utilization. This rate will not allow for fluctuating consumption and should not be considered practical. Bed capacity in the eighty percent utilization system was determined under the same assumptions as in the full utilization system but as intended, this capacity allows for fluctuations in consumption.

Inhalation therapy and physical therapy would be utilized at a rather high rate, 90 and 88 percent respectively in the full utilization system. The capacity for inhalation therapy is quite easily adjusted because of the number of discrete units involved. This allows for the estimated capacity to offer to be very close to estimated needed capacity with a utilization rate of 79 percent.

Laboratory services are utilized at slightly above 80 percent (80.28) in the full utilization system. The eighty percent utilization system

Table III-1. Population Present Health Facilities Could Accommodate When Operating at Eighty Percent Utilization.

Service	Percent Population Utilizing Service, Annual Basis	Capacity Population (per year)
Ambulance	NA[1/]	
Anesthesiology	5.955	82485
Beds	16.822	62822
Blood Bank	NA[1/]	
Coronary Care	.608	90789
Delivery Room	1.268	295268
EKG	15.408	102596
Emergency Room	25.381	90146
Inhalation Therapy	24.238	73801
Intravenous Therapy	NA[1/]	
Laboratory	20.347	158450
Nuclear Medicine	.600	1410666
Nursery	1.268	236467
Obstetrical Unit	1.472	121685
Operating Room	5.955	82485
Pharmacy	NA[1/]	
Physical Therapy	48.475	48190
Radiology	53.649	61735
Recovery Room	5.955	82485
Social Service	NA[1/]	
Ultrasound Scanning	.440	283636

[1/] NA indicates data not available.

estimates the 100 percent equivalent to be a little more than the capacity of one laboratory. If this service is to operate at 80 percent or less an additional laboratory is needed. If the laboratory can operate at the 80.28 percent utilization rate only one laboratory is needed, assuming those estimates are based on accurate data. Because the capacities are themselves estimates, and in this case possibly not highly accurate, this study will use only one laboratory in the eighty percent utilization system.

Under the circumstances of discrete units neither system meets the desired level of services very closely. This is easily seen by observing the estimated excess capacities that exist for almost all services (Tables III-2 and III-4).

Costs of providing the two systems for 52,000 population base differ by $13379 or about $.26 per capita. The variable cost is assumed to remain the same as existing because the number of consumers is assumed to be constant.

Nursing service is a cost center that has capacity directly related to hospital occupancy. Nurses are the specialized personnel that are applied to the other services in a somewhat "fixed" ratio to have a certain capacity.

Costs of providing coronary care, nuclear medicine, and ultrasound scanning by hospitals in the area under study are not reported by service because these hospitals' individual costs could be identified in this study, which would violate the individual hospital's requests to keep data confidential. Any cost reported individually for any of these four services is an external cost from an outside source: that being either the University of Kansas Medical Center in Kansas City or Wesley Memorial Hospital in Chicago. The total of the costs provided by the area hospitals for these four services is $28361 or $0.546 per capita. All costs for alternative systems include

Table III-2. Estimated Capacities and Utilization Rates for Full Utilization System for 52,000 Population.

Service	Needed Capacity	Total Capacity to Offer	Excess Capacity	Estimated Utilization Rate	Number of Units	Number of Facilities Having Service
	----- Patients per year----			Percent		
Ambulance[1/]	--	--	--	--	7	7
Anesthesiology	3156	4605	1449	69	3	3
Beds	8916	8916	0	100	3	3
Blood Bank	Insufficient Data				3	3
Coronary Care	322	690	368	47	1	1
Delivery Room[1/]	672	4680	4008	14	3	3
EKG	8166	13173	5007	62	2	2
Emergency Room[1/]	13452	28600	15148	47	3	3
Inhalation Therapy	12846	14231	1385	90	7	3
Intravenous Therapy	Insufficient Data				2	2
Laboratory	10784	13433	2649	80	1	1
Nuclear Medicine	318	10580	10262	3	1	1
Nursery[1/]	672	3748	3076	18	3	3
Nursing Service[2/]	--	--	--		3	3
Obstetrical Unit[1/]	780	2239	1459	35	3	3
Operating Room	3156	4605	1449	69	3	3
Pharmacy	--	--	--	--	3	3
Physical Therapy	25692	29200	3508	88	3	3
Radiology	28434	41400	12966	69	3	3
Recovery Room	3156	4605	1449	69	3	3
Social Services	Insufficient Data				1	1
Ultrasound Scanning	233	1560	1327	15	1	1

[1/] These capacities are the same as existing capacity, assuming people are willing and able to pay for excess capacity in these services.

[2/] Nursing service capacity is adjusted according to occupancy.

Table III-3. Cost of Full Utilization System for 52,000 Population.

Service	Estimated Fixed Cost	Number of Units Eliminated	Amount Saved[1/]	Estimated Fixed Cost Per Capita[1/]	Amount Saved Per Capita[1/]
	Dollars		--------- Dollars ---------		
Ambulance[2/]	28455	0	0	.547	0
Anesthesiology	14546	1	4849	.280	.390
Beds[3/]	--	--	--	--	--
Blood Bank[4/]	22776	0	0	.438	0
Coronary Care[5/]	307	0	0		0
Delivery Room[4/]	16531	0	0	.318	0
EKG	2527	1	1264	.049	.024
Emergency Room[4/]	10944	0	0	.210	0
Inhalation Therapy	32657	3	18655	.628	.359
Intravenous Therapy	3108	0	0	.060	0
Laboratory	37044	2	74092	.712	1.425
Nuclear Medicine[5/]	165	0	0		0
Nursery[4/]	10980	0	0	.211	0
Nursing Service	1422407	0	0	27.354	0
Obstetrical Unit[4/]	27093	0	0	.521	0
Operating Room	60494	1	20164	1.163	.388
Pharmacy	113135	0	0	2.176	0
Physical Therapy	26138	0	0	.503	0
Radiology	107198	0	0	2.062	0
Recovery Room	4683	1	1561	.090	.030
Social Service	--	0	0	--	0
Ultrasound Scanning		0	0		0
Total	1969077		120585	37.868	2.319

1/ The amount saved can only be realized when sunk costs are expended or salvaged.

2/ Ambulance costs are for seven units.

3/ Bed costs are included in equipment depreciation and have been allocated to services.

4/ The capacity of these services is assumed not to change.

5/ This is a total per patient cost taken from sources outside the five-county area and is not included in the totals.

Table III-4. Estimated Capacities and Utilization Rates for Eighty Percent Utilization System for 52,000 Population.

Service	Needed Capacity	Total Capacity Offered	Capacity Above Needed	Estimated Utilization Rate	Number of Service Units	Number of Facilities Having Service
	---- Patients per year---			Percent		
Ambulance[1/]						
Anesthesiology	3945	4605	660	69	3	3
Beds	11145	11145	0	80	3	3
Blood Bank	--	--	--	--	3	3
Coronary Care	402	690	288	47	1	1
Delivery Room[1/]	840	4680	3840	14	3	3
EKG	10208	13173	2965	62	2	2
Emergency Room[1/]	16815	28600	11785	47	3	3
Inhalation Therapy	16058	16264	206	79	8	3
Intravenous Therapy	--	--	--	--	2	2
Laboratory	13480	13433	47	80	1	1
Nuclear Medicine	398	10580	10182	3	1	1
Nursery[1/]	840	3748	2908	18	3	3
Nursing Service[2/]	--	--	--	--	3	3
Obstetrical Unit[1/]	975	2239	1264	35	3	3
Operating Room	3945	4605	660	69	3	3
Pharmacy	--	--	--	--	3	3
Physical Therapy	32115	34256	2141	74	4	3
Radiology	35542	41400	5858	69	3	3
Recovery Room	3945	4605	660	69	3	3
Social Services	--	--	--	--	1	1
Ultrasound Scanning	291	1560	1269	15	1	1

[1/] These capacities offered are the same as existing capacities, assuming people are willing and able to pay for excess capacities in these services.

[2/] Nursing service capacity is adjusted according to occupancy.

this figure provided by the area hospitals and does not include the external costs from outside sources. External cost data is used only to give an indication of costs for these services.

Even though differences in the models are small the savings of per capita fixed costs over actual per capita fixed costs of providing services would be $2.32 per capita or $120585 for the full utilization system and $2.06 per capita or $107206 total for the eighty percent utilization system. Table III-3 estimates the per capita fixed cost for providing the full utilization system to be $37.87 and Table III-5 shows $38.125 per capita fixed cost for providing the eighty percent utilization system. This compares with present per capita costs of $40.186.

Utilization rates are quite low for delivery room, nuclear medicine, nursery, and ultrasound scanning services, but this is not to say there is no justification for the services. A justified service may be defined as one that people are willing and able to pay the price for. This study assumes these services to be justified.

Adjustments that would need to be made by health care providers to meet the specifications of the full utilization system would be to reduce discrete units of capacities of anesthesiology, beds, electrocardiogram, inhalation therapy, laboratory, operating room, and recovery room to the number of units shown in Table III-2. The number of units eliminated is shown in Table III-3.

Adjusting to the eighty percent utilization system would require reducing discrete units of capacity of anesthesiology, beds, electrocardiogram, inhalation therapy, laboratory, operating room and recovery room, and increasing physical therapy (Table III-4).

While the capacity change would move the hospital system in a

Table III-5. Cost of Eighty Percent Utilization System, 52,000 Population.

Service	Estimated Fixed Cost	Number of Units Eliminated	Amount Saved[1/]	Estimated Fixed Cost Per Capita	Amount Saved Per Capita[1/]
	dollars		-------- dollars----------		
Ambulance[2/]	28455	0	0	.547	0
Anesthesiology	14546	1	4849	.280	.093
Beds[3/]	--	--	--	--	--
Blood Bank	22776	0	0	.438	--
Coronary Care[5/]	307	0	0	0	0
Delivery Room[4/]	16531	0	0	.318	0
EKG	2527	1	1264	.049	0.024
Emergency Room[4/]	10944	0	0	.210	0
Inhalation Therapy	37323	2	13989	.718	.269
Intravenous Therapy	3108	0	0	.060	0
Laboratory	37044	2	74092	.712	1.425
Nuclear Medicine[5/]	165	0	0		0
Nursery[4/]	10980	0	0	.211	0
Nursing Service	1422407	0	0	23.354	0
Obstetrical Unit[4/]	27093	0	0	.521	0
Operating Room	60494	1	20164	1.163	.388
Pharmacy	113135	0	0	2.176	0
Physical Therapy	34851	+1	-8713	.670	-.168
Radiology	107198	0	0	2.062	0
Recovery Room	4683	1	1561	.090	.030
Social Services		0	0		0
Ultrasound Scanning		0	0		0
Total	1982456		107206	38.125	2.061

1/ The amount saved is only realized when sunk costs are expended or salvaged.

2/ Ambulance costs are for seven units.

3/ Bed costs are included in equipment depreciation and have been allocated to services.

4/ The capacity of these services is assumed not to change.

5/ This is a total per patient cost taken from sources outside the five-county area and is not included in the totals.

direction to reduce costs by eliminating unnecessary discrete units to improve efficiency, electrocardiogram, and laboratory services would be reduced to two and one hospitals, respectively, which would lead to increased transportation costs for electrocardiogram patients and laboratory samples. Table III-6 displays the estimated increased costs of transferring electrocardiogram patients and laboratory samples between existing hospitals.

Table III-6. Estimated Travel Costs Between Hospitals.

Travel and Distance	EKG Trip per patient	Lab Trip per patient
Garnett-Iola, 64 miles round trip	$9.60	$12.80
Iola-Fort Scott, 80 miles round trip	$12.00	$16.00
Garnett-Fort Scott, 128 miles round trip	$19.20	$25.60

Alternative Systems for 65,000 Population

Systems for the 65,000 population base not only compare closely to each other but also the full utilization system for 65,000 compares extremely close to the eighty percent utilization system for the 52,000 base. These two systems have exactly the same levels of needed capacity and therefore the same capacity offered and excess capacity. They differ, however, in utilization rates and also costs per capita.

It was assumed by this study that ambulance service, delivery room, emergency room, obstetrical unit, and nursery had ample overcapacities that no additional capacity is needed for a 65,000 population base.

Compared to the least services system the eighty percent utilization system for 65,000 would have increased capacity for the following services:

anesthesiology
beds
inhalation therapy
laboratory
operating room
physical therapy
radiology
recovery room

On a cost basis the eighty percent utilization system displays some negative figures in the amount saved and amount saved per capita columns (Table III-10). These should be interpreted as the additional net amount that would be required to provide services at the levels indicated in this system. The fixed cost of this model is $32.327 per capita which is $1.823 per capita more than the full utilization system cost of $30.494 per capita. Also according to the eighty percent utilization system the only services that do not need additional capacity above what is currently offered are electrocardiogram, inhalation therapy, and laboratory. The services that require additional capacity are beds, physical therapy, and radiology. The number of discrete units for each service is shown in Table III-9.

The per capita cost is $32.327 for the eighty percent utilization system which is $0.18 higher than the cost per capita than would exist if there was a 65,000 base and the same level of services. This increase is caused mainly by adding another radiology unit. However the per capita cost in this model is $7.869 less than the existing situation because most of the service capacities are capable of serving the 65,000 population base, assuming the percent of population that utilized the services remains constant.

Table III-7. Estimated Capacities and Utilization Rates for Full Utilization System, 65,000 Population.

Service	Needed Capacity	Total Capacity to Offer	Excess Capacity	Estimated Utilization Rate	Number of Units	Number of Facilities Offering Service
	---- Patients per Year---			Percent		
Ambulance[1/]						
Anesthesiology	3945	4605	660	86	3	3
Beds	11145	11145	0	100	3	3
Blood Bank	--	--	--	--	3	3
Coronary Care	402	690	288	58	1	1
Delivery Room[1/]	840	4680	3840	18	3	3
EKG	10208	13173	2965	77	2	2
Emergency Room[1/]	16815	28600	11785	59	3	3
Inhalation Therapy	16058	16264	206	99	8	3
Intravenous Therapy	--	--	--	--	2	2
Laboratory	13480	13433	47	80	1	1
Nuclear Medicine	398	10580	10182	4	1	1
Nursery[1/]	840	3748	2908	22	3	3
Nursing Service[2/]	--	--	--	--	3	3
Obstetrical Unit[1/]	975	2239	1264	44	3	3
Operating Room[1/]	3945	4605	660	86	3	3
Pharmacy	--	--	--	--	3	3
Physical Therapy	32115	34256	2141	.938	4	3
Radiology	35542	41400	5858	86	3	3
Recovery Room	3945	4605	660	86	3	3
Social Services	--	--	--	--	1	1
Ultrasound Scanning	291	1560	1269	19	1	1

[1/] These capacities are the same as existing capacity, assuming people are willing and able to pay for excess capacity in these services.

[2/] Nursing service capacity is adjusted according to occupancy.

Table III-8. Cost of Full Utilization System, 65,000 Population.

Service	Estimated Fixed Cost	Number of Units Eliminated	Amount Saved[1]	Estimated Fixed Cost Per Capita	Amount Saved Per Capita[1]
	Dollars		---------- Dollars ----------		
Ambulance[2]	28455	0	0	.438	0
Anesthesiology	14546	1	4849	.224	.075
Beds[3]	--	--	--	--	--
Blood Bank[4]	22776	0	0	.350	0
Coronary Care[5]	307	0	0		
Delivery Room[4]	16531	0	0	.254	0
EKG	2527	1	1264	.039	.019
Emergency Room[4]	10944	0	0	.168	0
Inhalation Therapy	37323	2	13989	.574	.215
Intravenous Therapy	3108	0	0	.048	0
Laboratory	37044	2	74092	.570	1.140
Nuclear Medicine[5]	165	0	--	--	--
Nursery[4]	10980	0	0	.169	0
Nursing Service	1422407	0	0	21.883	0
Obstetrical Unit[4]	27093	0	0	.417	0
Operating Room	60494	1	20164	.931	.310
Pharmacy	113135	0	0	1.741	0
Physical Therapy	34851	+1	-8713	.536	-.134
Radiology	107198	0	0	1.649	0
Recovery Room	4683	1	1561	.072	.024
Social Services		0	0		0
Ultrasound Scanning		0	0		0
Total	1982456		107206	30.499	1.649

[1] The amount saved is only realized when sunk costs are expended or salvaged.

[2] Ambulance costs are for seven units.

[3] Bed costs are included in equipment depreciation and have been allocated as services.

[4] The capacity of these services is assumed not to change.

[5] This is a total per patient cost taken from sources outside the five-county area and is not included in the totals.

Table III-9. Estimated Capacities and Utilization Rates for Eighty Percent Utilization System, 65,000 Population.

Service	Needed Capacity	Total Capacity to Offer	Excess Capacity	Estimated Utilization Rate	Number of Units	Number of Facilities Offering Service
	---- Patients Per Year--			Percent		
Ambulance[1]					7	7
Anesthesiology	4931	6140	1209	64	4	3
Beds	13932	13932	0	80	3	3
Blood Bank	Insufficient Data				3	3
Coronary Care	504	690	186	53	1	1
Delivery Room[1]	1050	4680	3630	18	3	3
EKG	12760	13173	413	77	2	2
Emergency Room[1]	21019	28600	7581	59	3	3
Inhalation Therapy	20073	20330	257	79	10	3
Intravenous Therapy	Insufficient Data				2	2
Laboratory	16850	26866	10016	50	2	2
Nuclear Medicine	498	10580	10082	4	1	1
Nursery[1]	1050	3748	2698	22	3	3
Nursing Service[2]	--	--	--	--	3	3
Obstetrical Unit[1]	1219	2239	1020	44	3	3
Operating Room	4931	6140	1209	64	4	3
Pharmacy	Insufficient Data				3	3
Physical Therapy	40143	58368	18255	69	6	3
Radiology	44429	55200	10771	64	4	3
Recovery Room	4931	6140	1209	64	4	3
Social Services	Insufficient Data				1	1
Ultrasound Scanning	364	1560	1196	19	1	1

[1] These capacities are the same as existing capacity, assuming people are willing and able to pay for excess capacity in these services.

[2] Nursing service capacity is adjusted according to occupancy.

Table III-10. Cost of Eighty Percent Utilization System, 65,000 Population.

Service	Estimated Cost	Number of Units Eliminated	Amount Saved[1/]	Estimated Fixed Cost Per Capita	Amount Saved Per Capita[1/]
	Dollars		---------- Dollars---------		
Ambulance[2/]	28455	0	0	.438	0
Anesthesiology	19395	0	0	.298	0
Beds[3/]	--	--	--	--	--
Blood Bank	22776	0	0	.350	0
Coronary Care[5/]	307	0	0		
Delivery Room[4/]	16531	0	0	.254	0
EKG	2527	1	1264	.039	.019
Emergency Room[4/]	10944	0	0	.168	0
Inhalation Therapy	46654	0	4158	.718	.072
Intravenous Therapy	3108	0	0	.048	0
Laboratory	74089	1	37047	1.140	.570
Nuclear Medicine[5/]	165	0	0		
Nursery[4/]	10980	0	0	.169	0
Nursing Service	1422407	0	0	21.883	0
Obstetrical Unit[4/]	27093	0	0	.417	0
Operating Room	80658	0	0	1.241	0
Pharmacy[4/]	113135	0	0	1.741	0
Physical Therapy	44320	3	-18183	.632	-.280
Radiology	142930	1	-35732	2.199	-.550
Recovery Room	6244	0	0	.096	0
Social Services		0	0	--	0
Ultrasound Scanning		0	0	--	0
Total	2100067		-184992	32.317	-0.169

[1/] The amount saved can only be realized when sunk costs are expended.

[2/] Ambulance costs are for seven units.

[3/] Bed costs are included in equipment depreciation and have been allocated to services.

[4/] The capacity of these services is assumed not to change.

[5/] This is a total per patient cost taken from outside the area and is not included in the totals.

CHAPTER IV

THE REGIONAL HOSPITAL

Introduction

The last alternative considered here is a single hospital serving the five-county region. This would involve either enlarging one of the present hospitals or building a new facility; other hospitals would be phased out. This chapter is mainly concerned with aspects of a regional hospital other than economies of scale. If economies of scale exist in the hospital industry, they are not very strong.[1] According to Lave and Lave,[2] difficulty is encountered in determining economies of scale in a multi-product firm, such as a hospital. Data limitations have prevented an economies of scale analysis in this study, but this chapter will recognize other aspects of a regional hospital that seem worthy of consideration.

A new hospital or an addition to existing facilities would have to meet the licensing requirements according to Kansas Statutes Annotated 65-427:

> 65-427. Licensure. After July 1, 1948, no person or governmental unit, acting severally or jointly with any other person or governmental unit shall establish, conduct or maintain a hospital in this state without a license under this law. [L. 1947, ch. 329. 3; June 30.]

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[1] Judith R. Lave and Lester B. Lave, "Hospital Cost Functions," The American Economic Review, George Banta Co., Inc., Menasha, Wisconsin, June 1970; M. Ingbar and L. Taylor, Hospital Costs in Massachusetts, Cambridge, 1968; R. Berry, "Returns to Scale in the Production of Hospital Services," Health Services Research, Summer 1967, Vol. 2, 1923-1939; M. Feldstein, Economic Analysis for Health Service Efficiency, Amsterdam 1967.

[2] Lave and Lave, loc. cit.

The legal authority is the Kansas Statutes Annotated 65-425 which defines a hospital as follows:

> 65-425. Definitions.
> (a) "Hospital" means a place devoted primarily to the maintenance and operation of facilities for the diagnosis, treatment or care for not less than twenty-four hours in any week of four or more nonrelated individuals suffering from mental or physical illness, disease, injury, or deformity, or a place devoted primarily to providing for not less than twenty-four hours in any week of obstetrical or other medical or nursing care for four or more nonrelated individuals. The term "hospital" shall include public health centers, ambulatory surgical centers and recuperation centers but shall not include maternity homes or institutions primarily devoted to domiciliary care, such as boarding homes and homes for the aged or to homes or institutions which, as an exercise of religious freedom, are conducted in conformity with the practice of the religious tenets of any church in the ministration to the sick or suffering by spiritual means, and provided that quarantine regulations relating to contagious diseases are not infringed upon.

Licensing procedure and general requirements are listed in Appendix B.

Unlike licensing, accreditation by the Joint Commission on Accreditation of Hospitals is a voluntary action, which serves to show the public the hospital is meeting strict requirements to offer high quality services. It is a costly procedure and adds to the cost of providing services.

The Regional Hospital

The original intention of the study was to compare the aggregate total cost per patient day in this area to total costs per patient day of facilities with 264 to 508 bed capacity. The lower end, 264, is the total number of beds in the three hospitals and the upper end, 508, is the number of beds that would exist if the beds per 100,000 population in the region were equivalent to the national average number of beds per 100,000 population, which is 977.3 for rural areas as shown in Table IV-1. However, data from facilities of this size were not available, so an aggregate cost per

Table IV-1. Number of Hospitals and Hospital Beds, and Hospital Beds per 100,000 Population, by Metropolitan and non-Metropolitan Areas, 1970.

Hospitals	Metropolitan		Nonmetropolitan		Metropolitan beds	Nonmetropolitan beds
	Hospitals	Beds[1]	Hospitals	Beds[1]	Number per 100,000 population	
	Number					
Total	3,449	1,074,585	3,674	528,546	719.2	977.3
Federal	236	114,874	172	43,465	76.9	80.4
Non-federal	3,213	959,711	3,502	485,081	642.4	897.0
Psychiatric	357	309,559	162	200,439	207.2	370.6
Tuberculosis	66	13,794	35	5,283	9.2	9.8
Other long term	186	47,486	50	11,834	31.8	21.9
Community[2]	2,604	588,872	3,255	267,525	394.1	494.7
Resident population	149,404,900		54,080,400			

[1] Beds as of Sept. 1970.

[2] Non-Federal, short-term general and other special hospitals listed by the American Hospital Association.

Source: American Hospital Association. Register of Hospitals, 1970.

patient day for the area was determined and this was compared to the Kansas and United States average cost per patient day in Table IV-2.

Table IV-2 shows the average of the total costs per patient day in the five-county area are less than the national average and slightly more than the Kansas average. If the regional hospital system's total cost per patient day would approximate the national average cost per patient day, a move to a regional facility wouldincrease hospital costs over the existing situation. If the regional facility's total cost per patient day would approximate the Kansas total cost per patient day, building a regional hospital would reduce hospital costs from the existing situation (assuming existing facilities could be salvaged).

Table IV-2. Comparison of Total Hospital Costs Per Patient Per Day, 1973.

Area	Cost/Patient/Day
United States[1/]	$114.69
Kansas[2/]	$92.00
Five County Region	$92.24
Difference from United States	$22.45
Difference from Kansas	-$ .24

1/ Source: American Hospital Association
2/ Source: Kansas Hospital Association

Assuming that the total cost per patient day for the regional hospital approximates the Kansas average hospital cost, the total health care cost with the regional hospital (hospital and transportation) probably would be greater than that for the present system because of the greater transportation costs with the regional hospital.

Regional Hospital Location

One of the considerations in locating a regional hospital is to find a point that allows for minimum patient transfer costs. This point was determined by the grid analysis method.[3] Figure IV-1 shows the grid over the five-county area with the estimated number of patients per grid. These estimates were made by multiplying the overall utilization rate (16.75%) by the population of the cities in each grid element, and the products were used in the following equations to determine the regional location.

$$V = \frac{\sum_R T_R \; D_R}{\sum_R T_R}$$

$$H = \frac{\sum_K T_K \; D_K}{\sum_K D_K}$$

where:

V = the Y coordinate of the least transportation cost point (the distance from the base line)

H = the X coordinate of the least transportation cost point (the distance from the first vertical line)

T_R = the sum of the patient quantities in row R

T_K = the sum of the patient quantities in column K

D_R = the Y coordinate of the center of each grid element

D_K = the X coordinate of the center of each grid element

Using this method, the location representing minimum patient transportation costs is approximately 2 1/4 miles southeast of Mildred, Kansas. This is approximately twenty-eight miles from Garnett, twenty-three miles from Iola, and thirty-three miles from Fort Scott, using existing highways.

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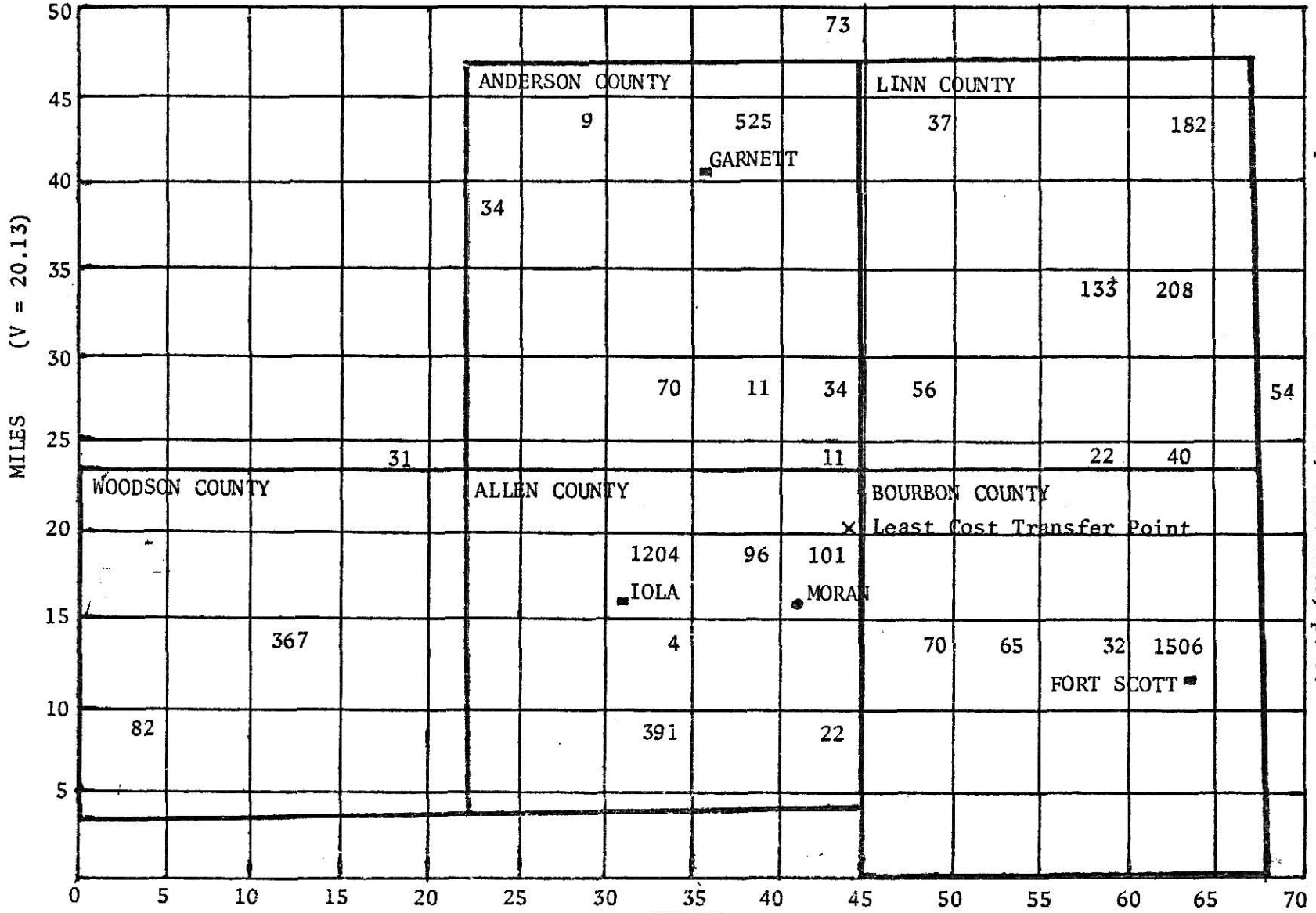
[3] Lowell D. Hill, Agricultural Market Planning in Resource Development, University of Illinois College of Agriculture, Special Publication No. 9, Dec. 1965.

Figure IV-1. Grid Analysis Chart Overlying Five-County Area with Estimated Number of Patients Per Five-Mile Grid, Hospital Locations, Least Cost Transfer Location, and Single Regional Hospital Location.



■ indicates hospital locations
× indicates least cost transfer point
● indicates proposed location of regional hospital

Source: Lowell D. Hill, Agricultural Market Planning in Resource Development, University of Illinois College of Agriculture, Special Publication No. 9, Dec. 1965, p. 5.

Although this is the least cost location, the feasibility of supporting a hospital in isolation, and citizen and political acceptance must be considered. This study assumes the closest town with potential to support a hospital is Moran, which is approximately 12 miles from Iola, 28 miles from Fort Scott, and 36 miles from Garnett. This would require arrangements for the duty doctor to stay at the hospital or in Moran so he may get to the hospital in a reasonable length of time when needed.

A regional facility would increase patient transportation costs. This additional cost is for the miles that patients would travel to the regional hospital in Moran from the existing hospitals. Based on the number of admissions at each facility, the distance between the existing facility and the regional facility location, and a rate of fifteen cents per mile of travel, the additional minimum patient transportation cost is estimated to be $67709 per year. This does not include the value of the time lost by the patient in traveling to the regional facility. The value of a patient's time will vary with type of illness and condition.

Physician transfer costs must also be considered. Using an average of two visits to patients in the hospital per day, the additional costs from existing facilities were determined to be as follows:

Garnett	$7884 per doctor per year
Iola	$2628 per doctor per year
Fort Scott	$6132 per doctor per year

The regional hospital presents a problem of distance and travel to the outer areas of the region when emergency situations arise. Assuming people are willing to pay to have emergency facilities readily available, this study has compiled an emergency station model.

The emergency station model shown in Table IV-3 consists mainly of ambulance service, emergency room, and an obstetrical unit for childbirth.

Capacities of emergency stations would depend on an estimated maximum amount of consumers at one point in time and the length of time a patient would be at the emergency station before being released or transferred to the regional hospital.

Table IV-3. Estimated Cost of Emergency Station Model by Service.

Service	Fixed Cost Per Year[1/]	52000 base Per Capita Cost	65000 base Per Capita Cost
Ambulance	$4064	$.077	$.063
Emergency Room	2409	.049	.037
Obstetrical Unit	1962	.037	.030
Totals	8436	.163	.130

[1/] Costs are averages per unit of service based on data provided by area hospitals.

This transfer cost to the regional facility in Moran was assumed to be $0.15 per mile round trip and the estimated costs are shown in Table IV-4.

A regional hospital has potential drawbacks besides the higher transportation costs involved. One such problem is the most central location or locations within the five-county area tend to be the most sparsely populated portion of the region. There is really not a good location to have a centralized hospital so that it would be the central hub of the comprehensive health care system. Doctors will desire a community that offers more in the way of a standard of living than a sparsely populated rural area. The hospital will need to draw nurses aids and other personnel which is assumed

to be easier to do if the hospital is located in a community of reasonable size.

A hospital does not operate in total isolation from the rest of the community. There are other services that the hospital or people using the hospital use in the community besides the hospital. For example, the hospital needs suppliers for supplying this produce; people that come to visit patients at the hospital will want a place where they can stop and shop for many items they wish to buy for the patient or for their own use.

Table IV-4. Patient Transfer Costs from Emergency Stations to Regional Hospital.

Origin[1/]	Mileage	Cost
Garnett	72	$10.80
Iola	24	$ 3.60
Fort Scott	56	$ 8.40
Humboldt	40	$ 6.00
Mound City	62	$ 9.30
Yates Center	66	$ 9.90
Pleasanton	74	$11.10

1/ These cities were chosen by location and population.

It is also possible that doctor-patient relationships would be affected. It is assumed the doctors would be visiting patients twice per day but even at this rate the distance between the regional hospital and current doctor locations would hinder not only these two visits but also any others that may be necessary. It would have to be considered under this

situation, whether the doctor would continue with his patient after admitted or if the patient would be transferred to another doctor located at the regional hospital.

According to hospital administrators in the five-county area, doctors tend to locate in a community with a hospital. This may be because of hospital persuasion, but a problem of keeping doctors at their current locations may be encountered.

In essence, no good central locations exist and it is doubtful a hospital could be supported or even function properly as the central hub of a comprehensive system if located in such a lowly populated area.

Also, by data available for this study, a regional hospital may increase health care costs by itself. However, the increased offerings of more specialized and more expensive services demanded by the citizens may justify any added cost. Existing facilities would need to be salvaged or depreciated out. Increased patient transfer costs, physician transfer costs, and emergency station costs would be further increases in the cost of providing health services.

CHAPTER V

SUMMARY AND CONCLUSIONS

In search of a comprehensive system that has the most potential of providing hospital services without increasing per capita costs, this study first questioned the appropriateness of the boundaries of the Five-County Area-Wide Health Planning Council. The major problem with a comprehensive health care system in rural areas is that of having an adequate population base to support and utilize the services. Since all counties in the region except Woodson county are adjacent to a county outside the area with a greater population it appears the planning area may wish to reconsider its boundaries. Determining the actual change in per capita costs that would occur with boundary relocation was beyond the scope of this study. Also there may be other factors that would not permit a change in boundaries.

The data in Chapter III show that adjusting capacities of services to a desired level may be difficult because many services come in discrete units. The full utilization system and the eighty percent utilization system are quite similar because of the factor of discrete units, but they would reduce costs of providing hospital services by $2.32 per capita and $2.18 per capita respectively, when unnecessary discrete units are salvaged.

Since a population of 65,000 is quoted by Eustis[1] as the minimum population base for a comprehensive system with all but the extremely specialized services, this study determined the necessary changes in capacities and costs for such a population base.

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[1] J. B. Eustis and M. A. Warren, Rural Medical Facilities & Services, Upper Midwest Council, Minneapolis, Minnesota. Economic Development, Northern Natural Gas Company, Omaha, Nebraska. September 1973.

The full utilization system for a 65,000 population has the same level of service capacities as the eighty percent utilization system for 52,000 population. However, the larger population base with the same total cost would have a per capita cost of $30.499 which is $7.63 less than the per capita cost of $38.128 for the smaller population base.

The eighty percent utilization system for 65,000 population would have facilities most comparable to present facilities of any alternative considered. After increasing capacity of beds, physical therapy, and radiology, which is required so intended utilization is not above eighty percent capacity, the per capita fixed cost would be $32.33 which is $8.86 less than the existing situation, because of the larger population.

A single regional hospital may not only increase hospital costs but also increase other costs such as patient transfer costs, and emergency station costs for outlying areas. But the higher hospital costs may only reflect the addition of services that are now obtained outside the area.

There is no good central location for a regional hospital in the five-county area. It is unlikely a regional hospital could be supported in a rural area.

New services for the various systems were not costed. To do so would require knowing the services needed and finding costs for these services which was beyond the scope of this study. A study on additional services would be a useful tool to the health planning council in this region to use in planning the comprehensive health care system of the future.

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APPENDIX A

Public Health Service Act, Title III, Section 314, as amended by Section 3 of the Comprehensive Health Planning and Public Health Service Amendments of 1966, Public Law 89-749; Section 2 of the Partnership for Health Amendments of 1967, Public Law 90-174; and Title II of the 1970 Amendments to Section III (a) of Public Law 91-296; Public Law 91-515: 42 U.S.C. 246.

Objectives of Section 314 (a), Grants to States

Provide financial support for State programs in comprehensive health planning, concerned with services, manpower, and facilities to meet the physical, mental, and environmental needs of all people of the State.

Objective of Section 314 (b), Areawide Grants

To provide financial support for areawide comprehensive health planning, including assessing health needs and alternatives, determining gaps and overlaps in existing health programs, and recommending courses of action that may be taken to achieve the targeted priority health goals.

Objective of Section 314 (c), Training, Studies, and Demonstrations

To provide financial support for projects which will train manpower and develop tools and techniques for State and areawide comprehensive health planning programs. Long-term graduate degree programs are supported as well as continuing education and consumer training programs. Primary emphasis is on long-term training.

Objective of Section 314 (d), Formula Grants

Assist States in establishing and maintaining adequate community, mental and environmental public health services, including training of personnel for State and local public health work.

Objective of Section 314 (e), Health Services Development-Project Grants

To support a full range of public health services to meet special needs at the community level, especially health programs of regional or national significance; develop and support, for an initial period, new programs of health services, including related training; and development of comprehensive health centers. In 1972, priorities will be focused on the maintenance of existing centers to Health Maintenance Organizations, and expansion of population and service coverage in existing centers.

Public Health Services Act, Title VI; Public Law 88-443 as amended by Public Law 91-296; 42 U.S.C. 291

Health Facilities Construction-Grants

To assist the States in planning for and providing of hospitals, public health centers, State health laboratories, outpatient facilities, emergency rooms, neighborhood health centers, long-term care facilities (nursing homes, chronic disease hospitals and long-term units of hospitals), rehabilitation facilities, and other related health facilities.

Health Facilities Construction-Technical Assistance

To elevate the quality of design, construction and operation of facilities through the provision of consultation services which include development of guide materials.

Health Facilities Construction-Loan and Loan Guarantees

To assist the States in the planning for and provision of hospitals, public health centers, State health laboratories, outpatient facilities, emergency rooms, neighborhood health centers, long term care facilities (nursing homes, chronic disease hospitals and long-term units of hospitals), rehabilitation facilities, and other related health facilities.

APPENDIX B

28-34-2. LICENSING PROCEDURE.

a. Before construction is begun, plans and specifications covering the construction of new buildings, additions, or material alterations to existing buildings shall be submitted to the Licensing Agency for review and approval or recommendations with respect to compliance with these regulations. A written narrative describing the intended use of the proposed construction shall accompany the plans and specifications.

b. No system of water supply, plumbing, sewerage, and garbage or refuse disposal for these institutions shall be installed nor shall any such existing system by materially altered or extended until complete plans and specifications for the installation, alteration, or extension, together with such information as the Licensing Agency may require, have been submitted and approved.

c. Hospitals shall be licensed to provide only those services for which they are qualified, except in emergencies.

d. The application for a license to establish or maintain a hospital shall be submitted to the Licensing Agency. Such application shall be made in writing on a form provided by the Licensing Agency for a license for a new facility or for the renewal of a license for an existing facility. Applications for a license for a new facility shall be submitted at least 120 days prior to opening.

e. Upon application for a license from a facility never before licensed, an inspection shall be made by the duly appointed representative of the Licensing Agency. Every building, institution or establishment for which a license has been issued shall be periodically inspected for compliance with the regulations of the Licensing Agency.

f. A license shall be issued for a period of one year beginning January 1 and, unless suspended or revoked, shall expire on the following December 31. The license may be suspended or revoked at any time for non-compliance with the regulations of the Licensing Agency. The Licensing Agency shall be notified at the time of any change in ownership, location or lease of a hospital, and a new application shall be submitted to the Licensing Agency in the event of such a change.

g. The current license certificate issued by the Licensing Agency shall be suitably framed and conspicuously posted on the premises. The license certificate shall remain the property of the Licensing Agency.

h. When a hospital provides a separate unit for a specialized type of care, such as psychiatric, tuberculosis, chronic illness, geriatric, or related hospital services, such a unit shall be considered as a specialized unit of the hospital. For licensing purposes, one license shall be issued to a hospital having one or more specialized units provided such units conform to all applicable regulations. Separate licenses will be required for institutions which are dissimilar or which are not maintained on reasonably proximate premises even though they are under the same management. Separate administrative units not qualified for hospital licensing shall be subject to individual licensing.

i. Any institution not licensed under these regulations and engaged in the care and treatment of humans shall be prohibited from using the term "hospital" in connection with its name or designation. (Authorized by K.S.A. 65-431; effective January 1, 1969.)

28-34-3. GENERAL REQUIREMENTS.

a. All applicable local and state fire, safety, sanitation, and building codes shall be met.

b. Devices for restraining a patient shall be applied only on the order of a physician to aid in the prevention of injury to the patient or others, or in accordance with policies established by the medical staff.

c. There shall be provisions for the isolation of cases of communicable diseases as required by law and the regulations of the State Department of Health to aid in the control of communicable diseases.

d. Every hospital shall have written policies regarding abortion and sterilization. Hospitals permitting therapeutic abortion or sterilization procedures shall have policies in conformance with Kansas Statutes.

e. Principles for an emergency plan shall be developed in writing for each building to be used as a guide in the event of fire or other emergency where a quick evacuation of the building may be required. Periodic drills shall be held to prepare employees for an emergency. Records of drills shall be kept. A fire alarm shall be transmitted to the fire department headquarters if there is reason to believe that a fire may exist in any part of the building.

f. A disaster plan shall be developed in writing as a guide in the event a disaster should occur. Periodic drills shall be held to prepare staff and employees for a disaster. Records of drills shall be kept.

g. Each hospital shall have adequate communication facilities.

h. Smoking shall be prohibited in areas such as the operating, delivery rooms, anesthetizing locations, rooms where oxygen and other volatile gases are administered or stored, nursery, kitchen, and other

hazardous areas. No smoking signs shall be posted in areas where smoking is prohibited.

i. Currently acceptable procedures to minimize sources and transmission of infections shall be employed. Adequate surveillance methods shall be used.

j. Combustible materials and supplies shall be stored and handled in a safe and approved manner, and in conformance with applicable codes and regulations.

k. Hospitals shall comply with applicable regulations of Kansas Administrative Regulations regarding child abuse and reporting or infections and diseases.

l. All dead bodies and reportable stillbirths shall be disposed of as required by the Kansas Statutes.

m. Volatile supplies shall be stored and kept in a safe manner.

n. All anesthetics shall be given by a physician, or shall be given under the supervision of a physician.

o. Policies governing the use of anesthetics shall be written.

p. Fire extinguishers shall be of types and makes that are approved of by Underwriter's Laboratories. Extinguishers shall be inspected and filled annually to make sure that they have not been tampered with or removed from their designated places, to see that they are not empty, and to detect any defects or injuries. Extinguishers capable of producing toxic substances shall be prohibited.

q. Hospitals shall maintain on file a copy of these regulations, as provided by the Licensing Agency, and copies of the following publications adopted, wholly or in part, by reference:

1. "Laws, Rules and Regulations Relating to Communicable and Other Reportable Diseases in Kansas," published by The Kansas State Department of Health, State Office Building, Topeka, Kansas 66612, Revised 1959.

2. "Recommended Dietary Allowances, Revised 1968," Food and Nutrition Board of the National Academy of Science, National Research Council, Washington, D. C.

3. "Standards and Recommendations for Hospital Care of Newborn Infants," published by the American Academy of Pediatrics, Inc., 1801 Hinman Avenue, Evanston, Illinois 60204, revised 1964.

4. "Procedures and Layout for the Infant Formula Room," revised 1965, published by the American Hospital Association, 840 North Lake Shore Drive, Chicago, Illinois 60611.

5. "Regulations No. 5, Regulatory Taxes on Narcotic Drugs, Opium, Coca Leaves, Isonipecaine or Opiates," Part 151 of Title 26 (1954) Code of Federal Regulations, United States Treasury Department, Bureau of Narcotics and the Internal Revenue Service, revised October 1964. For sale by the Superintendent of Documents, U. S. Government Printing Office, Washington, D. C.

6. "General Standards of Construction and Equipment for Hospital and Medical Facilities," Public Health Service Publication No. 930-A-7, 1967 Revision. For sale by the Superintendent of Documents, U. S. Government Printing Office, Washington, D. C. 20402.

7. "Standards for a Blood Transfusion Service," Fourth Edition, Revised 1966, American Association of Blood Banks, 30 North Michigan

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REGIONAL HEALTH PLANNING IN SOUTHEAST KANSAS

by

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B. S., Kansas State University, 1972

AN ABSTRACT OF A MASTER'S THESIS

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Costs of health care provided by uncoordinated local hospitals are compared with costs for the same care provided by a comprehensive area-wide health care system. The study area is the area under the Five County Area-Wide Health Planning Council for Allen, Anderson, Bourbon, Linn and Woodson Counties in Southeast Kansas.

The first finding was that the counties in the study area have low populations compared to the other Southeast Kansas Counties. Splitting the area by placing the Anderson and Linn Counties with counties to the north and Woodson, Allen and Bourbon Counties with counties to the south would increase the population base for supporting health services. That is important because the present population base limits the ability of the area to support full health care.

Alternative patterns of using existing hospital facilities are studied as well as converting to a single regional hospital. Adjusting present service facilities to desired capacities is difficult because many services come in discrete units, especially at low capacities. Designing for 80 percent utilization with 52,000 population and eliminating excess capacity would reduce annual hospital costs $2.18 per person. If population was 60,000 the annual cost reduction would be $8.86 per person at 80 percent utilization.

The area is not well suited for a single regional hospital. There is no major town that would provide an approximately central location within the county for the regional hospital. Locating a regional hospital in an isolated rural area would not be recommended.