THE ROLE OF GENERAL AVIATION AIRPORTS IN MEDICAL SERVICE DELIVERY TO RURAL KANSAS COMMUNITIES

FINAL REPORT

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16 Abstract

The role and significance of airports in the delivery of health care in rural Kansas has never been investigated. Accordingly the objectives of this research are as follows:

Objective 1 – Compile an inventory of the physical characteristics of Kansas general aviation airports.

Objective 2 – Conduct a survey of air ambulance firms regarding the airport facilities that are required for safe air ambulance service and compare their requirements to actual conditions at value of air ambulance services provided to rural Kansas patients.

Objective 3 – Conduct surveys of Chief Executive Officers (CEO) of rural Kansas hospitals as well as "flying doctors" to determine the types and values of medical services provided at rural Kansas hospitals that are made possible by airports and aviation.

With regard to Objectives 1 and 2 the research discovered that 40 to 55 percent of 142 Kansas airports do not satisfy one or more of the airport safety requirements of air ambulance companies. Despite these conditions, medical service provided by air ambulance companies has been increasing in Kansas. The number of Kansas patients transported by fixed-wing aircraft rose from 1,372 in 1997 to 1,632 in 1998. Total revenue for fixed-wing air ambulance service was $5.7 million in 1998.

One of the most significant findings of this study is that airports allow rural Kansas patients to have access to virtually every medical specialty and procedure. The sample doctors provided 45 medical services in 22 different medical specialties to patients at rural Kansas hospitals.

According to the survey of Kansas hospitals CEOs, the annual economic benefit of the medical services provided by "flying doctors" is estimated to be $7.9 million. The annual economic benefit of the hospital services and personnel associated with the medical services provided by the "flying doctors" is estimated to be $7.2 million. Thus the total economic benefit facilitated by airports and aviation is $15.1 million ($7.9 million + $7.2 million). These benefits are distributed to rural communities throughout Kansas, as a total of 62 Kansas airports were used by at least one doctor to provide medical care to rural Kansas patients.

Airports also permit transfer of rural Kansas patients requiring emergency or highly specialized medical care. Of the patients transferred from Kansas community hospitals, 70 percent were transferred to a major hospital because they needed emergency medical care. The timesaving provided by aircraft is essential to the emergency medical care of these patients.

It is certain that the $20.8 million of medical benefits of Kansas general aviation airports exceed the cost of these airports. Thus government programs that address the problem of airport deterioration are an efficient use of resources. A good example is the state airport development program that was funded by the 1999 Kansas legislature.

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PREFACE

This research project was funded by the Kansas Department of Transportation K-TRAN research program. The Kansas Transportation Research and New-Developments (K-TRAN) Research Program is an ongoing, cooperative and comprehensive research program addressing transportation needs of the State of Kansas utilizing academic and research resources from the Kansas Department of Transportation, Kansas State University, and the University of Kansas. The projects included in the research program are jointly developed by transportation professionals in KDOT and the universities.

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Special thanks go to the managers of air ambulance companies, Kansas community hospital personnel, and all the physicians who completed the surveys on which this report is based. Without their cooperation, this study would not have been possible.

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EXECUTIVE SUMMARY

The Kansas State University (KSU) study entitled *The Economic Impact of General Aviation Airport Deterioration on Kansas Communities* documented the deterioration of Kansas general aviation airports and measured the economic impacts of substandard airports on the users of these airports. The KSU study entitled *Measurement of Aviation-Related Tax Revenue in Kansas* identified aviation-related taxes and tax rates levied by the state of Kansas and measured the revenue generated in recent years by these taxes. Thus the tax study measured the potential level of funding for a state airport development program that would halt the deterioration of Kansas airports. This report is concerned with measuring the medical service delivery benefits of Kansas general aviation airports. The amount of these benefits represents part of the cost of allowing the deterioration of Kansas airports to continue.

Patients requiring a higher level of medical care or emergency care must be quickly transported from rural Kansas hospitals to large population centers where hospitals providing higher levels of specialized care are located. Automobile accident victims must be quickly transported to trauma centers that are capable of providing the necessary emergency medical care. Doctors who provide specialized services require time-saving transportation from their locations to rural Kansas hospitals. The most efficient way to provide these examples of medical care is through reliance on airports and aviation. However, despite the recognition of these potential benefits, the role and significance of airports in the delivery of health care in rural Kansas has never been investigated. Accordingly the objectives of this research are as follows:

Objective 1 - Compile an inventory of the physical characteristics of Kansas general aviation airports.

Objective 2 - Conduct a survey of air ambulance firms, regarding the airport facilities that are required for safe air ambulance service and compare their requirements to actual conditions at rural Kansas airports. The survey also measures the amount of air ambulance activity and the value of air ambulance services provided to rural Kansas patients.

Objective 3 - Conduct surveys of Chief Executive Officers (CEO) of rural Kansas hospitals as well as "flying doctors" to determine the types and value of medical services provided at rural Kansas hospitals that are made possible by airports and aviation.

Objective 1 is accomplished by compiling the length, width, and surface type (i.e. turf, asphalt, or concrete) of each runway at all Kansas general aviation airports. This information is obtained from the 1998 *Kansas Airport Directory* published by the Aviation Division of the Kansas Department of Transportation (KDOT).

Objective 2 is accomplished through personal interviews and surveys of managers of air ambulance companies serving Kansas. The names and addresses of these companies were obtained from a directory provided by the Kansas Board of Emergency Medical Services.

Objective 3 is accomplished through questionnaire surveys of Kansas hospital CEOs and "flying doctors" who use aircraft in their medical practice. The names and addresses of the hospital CEOs were obtained from a directory of Kansas hospitals compiled by the Kansas Hospital Association. There is no directory of "flying doctors" so they were identified from information obtained from a variety of sources such as Kansas hospitals, Kansas airport mangers,

the Federal Aviation Administration (FAA), and the “flying doctors” themselves.

Air ambulance service is often required to transport rural Kansas patients requiring specialized or emergency care to larger hospitals. However, many Kansas airports are ineligible for air ambulance services. Of a total of 142 Kansas airports, 78 (or 55 percent of the total) do not satisfy one or more of the airport safety requirements of air ambulance companies. This is because the 78 airports have one or more of the following characteristics: a turf runway, primary runway length of less that 3,500 feet, primary runway width of less than 50 feet. If the minimum runway length and width are lowered to 3,000 feet and 40 feet (the minimum of the interval specified by managers of air ambulance companies) 57 airports (or 40 percent of the total) would not satisfy the width or length requirement.

Medical service provided by air ambulance companies has been increasing in Kansas. The number of Kansas patients transported by fixed-wing aircraft rose from 1,372 in 1997 to 1,632 in 1998. The direct benefits of air ambulance service in Kansas are measured by the total revenue earned by the industry. Total revenue for fixed-wing air ambulance service was $5.7 million in 1998 while total revenue for rotary-wing air ambulance service was $5.2 million.

Many of the conclusions of this study are based on surveys of CEOs of Kansas community hospitals, and doctors who use airports and aviation in their medical practice, referred to as “flying doctors” in this report. The “flying doctors” cited many advantages of using airports and aviation in their medical practice. The doctors emphasize more efficient use of their time; helping smaller, rural hospitals stay open; allowing treatment of patients in remote areas, and access to a larger market area as the principal advantages of using airports and aircraft in their medical practice.

One of the most significant findings of this study is that airports allow rural Kansas patients to have access to virtually every medical specialty and procedure. The sample doctors provided 45 medical services in 22 different medical specialties to patients at rural Kansas hospitals. Without airports and aviation, rural Kansas patients would have to travel long distances to obtain access to these medical specialties.

According to the survey of Kansas hospital CEOs, the annual economic benefit of the medical services provided by "flying doctors" is estimated to be $7.9 million. The annual economic benefit of the hospital services and personnel associated with the medical services provided by the "flying doctors" is estimated to be $7.2 million. Thus the total economic benefit facilitated by airports and aviation is $15.1 million ($7.9 million + $7.2 million). These benefits are distributed to rural communities throughout Kansas, as a total of 62 Kansas airports were used by at least one doctor to provide medical care to rural Kansas patients.

Airports also permit transfer of rural Kansas patients requiring emergency or highly specialized medical care. Of the patients transferred from Kansas community hospitals, 70 percent were transferred to a major hospital because they needed emergency medical care. The timesaving provided by aircraft is essential to the emergency medical care of these patients.

The views of the "flying doctors" concerning the condition of Kansas general aviation airports are similar to those expressed by other groups of Kansas airport users. A substantial percentage of the "flying doctors" stated that some Kansas airports have inadequate runway length, runways in poor condition, or other aspects of the airport that pose safety hazards to their aircraft.

Part of the cost of allowing airport deterioration to continue is the loss of the medical service benefits of airports described in this report. To identify this cost, CEOs of Kansas community hospitals and the "flying doctors" were asked to describe the impact on them and on rural Kansas medical care if the Kansas airports they use were closed.

As a group, the sample of "flying doctors" identified the following negative effects on rural Kansas medical care of airport closure.

1. Flying doctors would reduce or stop providing their medical services to rural hospitals.

2. It would negatively affect patient care in rural areas.

3. It would produce a reduction in the number of rural area patients the doctor can treat due to time constraints associated with long driving times.

4. It would have a negative effect on community hospitals in rural areas since patients would go to other hospitals for treatment.

5. It would reduce education of rural medical practitioners since specialists will not conduct training in communities without airports.

6. Rural patients would have to travel long distances to large cities to receive specialized medical care.

7. It would decrease the flexibility to schedule medical care delivery in rural areas due to long driving times.

As a group, the Kansas community hospital CEOs identified the following negative effects of airport closure.

1. Emergency medical care patients would have to be transported by ground ambulance to the nearest good airport or a tertiary care hospital. The additional time could be life threatening.

2. It would eliminate access of rural patients to specialized medical care currently provided by doctors who utilize rural airports to provide these services. Patients requiring specialized medical care would have to travel great distances by ground transport to receive the care they

currently have access to in their community as a result of the airport.

3. Hospitals would lose the revenue they currently receive from services provided in conjunction with the medical services provided by “flying doctors.”

4. It would make it even more difficult to recruit doctors and staff to work in rural hospitals.

5. It would reduce training of rural hospital staff since “flying doctors” provide educational clinics.

6. It would decrease the ability of rural hospital staff to travel to continuing medical education seminars.

7. It reduces the ability to obtain emergency medical supplies in a time-critical emergency.

8. Patients would not come to a hospital for care if that hospital is unable to transfer patients by air ambulance in case of an emergency.

9. The airport provides an alternative landing site for rotary-wing aircraft.

10. The airport and fixed-wing air ambulance service is an alternative if rotary-wing air ambulance service is unavailable.

This research project has measured the following annual airport-related medical benefits.

1. Inter-hospital transfers of rural Kansas patients by fixed-wing aircraft - $5.7 million.

2. Medical services provided by “flying doctors” - $7.9 million.

3. Hospital services and personnel supplied in conjunction with the medical services provided by “flying doctors” - $7.2 million.

It is certain that the $20.8 million of medical benefits of Kansas general aviation airports exceed the costs of these airports. Thus government programs that address the problem of airport deterioration are an efficient use of resources. A good example is the state airport development program that was funded by the 1999 Kansas legislature. This program provides state financial assistance for runway reconstruction and resurfacing, construction or refurbishing of taxiways

and ramps, lighting of taxiways and runways, and navigation aids.

At the local level, airport improvements could be financed by exploring the idea of city-country airport authorities. Also the cost of airport runway resurfacing might be reduced by combining these projects with state highway projects in the area of the airport. In many cases, minor repairs and maintenance such as crack sealing of airport runways are performed by city or county highway departments and this approach should be encouraged in areas where it is not currently applied.

This report documented the decline in Airport Improvement Program (AIP) grants to Kansas airports despite the existence of a ten billion dollar surplus in the Airport and Airway Trust Fund. The downward trend in Kansas AIP grants can be reversed by spending the surplus in the trust fund. Also the list of airport maintenance projects that are eligible for AIP funds should be expanded. The FAA should modify its criteria for allocating AIP funds to general aviation airports. Instead of focusing on the number of aircraft based at the airport, the FAA should evaluate proposed improvements in terms of the economic contribution they will make to the national airport system. This would tend to increase the AIP funds allocated to general aviation airports.

CHAPTER 1

INTRODUCTION

The Research Problem

Three factors have tended to limit the availability of health care in rural Kansas. The rapid advance of medical technology coupled with its high cost have limited the location of the advanced medical technologies to large population centers where these technologies can be efficiently utilized. The second factor is increased specialization in the practice of medicine. Specialized medical personnel locate in large population centers in order to have access to a market large enough to economically support specialization. The third factor is geography, as Kansas is a large area with a relatively low population density. As a result of these factors, plus the element of time criticality in the delivery of medical care, many health care services have to be delivered to the people of rural Kansas through the use of aviation. Patients requiring a higher level of medical care or emergency care must be quickly transported from rural hospitals to large population centers where hospitals providing higher levels of specialized care are located. Automobile accident victims must be quickly transported to trauma centers capable of providing the necessary emergency medical care. Doctors who provide specialized services require time-saving transportation from their locations to rural Kansas hospitals. The only way to efficiently provide the above examples of medical care is through reliance on airports and aviation. However, despite the recognition of these potential benefits, the role and significance of airports in the delivery of health care in rural Kansas has never been investigated.

The medical care benefits cited above are in jeopardy as a result of the deterioration of many Kansas general aviation airports. The K-TRAN study entitled *The Economic Impact of*

General Aviation Airport Deterioration on Kansas Communities concluded that the Kansas system of general aviation airports has deteriorated to a significant degree. The study conducted at Kansas State University (KSU) documented the deterioration of Kansas general aviation airports through surveys of the managers of Kansas airports, members of the Kansas Pilots Association (KPA), and business firms that use Kansas general aviation airports.

The survey of 97 managers of general aviation airports revealed a long list of needed capital improvements with special emphasis on lengthening the runway, resurfacing the runway, lighting improvements, and taxiway improvement. Another indication of airport deterioration obtained from the managers' survey is the runway related limitations placed on the use of many Kansas general aviation airports. Among the limitations most frequently cited by the airport managers are the length of the runway and poor condition of the runway. Several airport managers reported that the condition of the runway had reduced the use of the airport.

Further evidence of the deterioration of Kansas general aviation airports was obtained from the KPA survey that included returned questionnaires from one-third of the membership. About 25 percent of the survey respondents stated that the condition of the runway at some Kansas general aviation airports has deteriorated to the point that landing at these airports creates a safety hazard for their aircraft. Among the safety deficiencies the KPA respondents cited are cracks in the runway pavement, crumbling concrete, and loose gravel on the runway.

Additional evidence of the deterioration of Kansas general aviation airports was obtained from a survey of 114 Kansas companies that have their own aircraft and use Kansas airports. A total of 41 companies (36 percent of the sample) stated that they encounter or specifically avoid Kansas airports that have *runway in poor condition*. One-third of the sample of Kansas

companies stated that they encounter or specifically avoid Kansas general aviation airports which have *inadequate runway length* for safe operation of the company aircraft. A total of 48 companies (42 percent of the sample) cited *non-runway related safety problems* at Kansas general aviation airports with the most frequently cited problems being lack of navigational aids and instrument landing systems.

Historically the principal source of financing for airport capital improvements is the Airport Improvement Program (AIP) funded by the federal government's Airport and Airway Trust Fund which receives money from a variety of user fees levied on passengers, air cargo, and the airlines. Table 1 indicates trends in Kansas AIP grants for fiscal years 1991 through 1998. The data in Table 1 reveal an alarming downward trend in total Kansas AIP grants from $22 million in fiscal year 1991 to only $7.9 million in fiscal year 1995, a 64 percent decrease. Total Kansas AIP grants increased in fiscal years 1996 - 1998 but in fiscal year 1998, they were less than half that of fiscal year 1991.

Maintenance of Kansas general aviation airports has historically been financed by municipal and county governments. Most general aviation airport maintenance is financed by a combination of municipal or county general fund taxes as well as airport revenues such as aviation fuel sales, hanger rental, and land rent. The KSU study discovered that 74 percent of the 95 Kansas airports in the survey spend zero to $10,000 per year on airport maintenance. The most common type of maintenance is sealing cracks in the runway.

Thus it appears that the federal government is withdrawing from its historical role of providing funds for airport capital improvements. Local government resources are not adequate to reverse the deterioration of Kansas general aviation airports. Thus as the condition of Kansas

Table I Kansas
AIP Grants
Fiscal Years 1991 – 1998

Fiscal Year Grants	Amount of AIP Grants	Number of Airports Receiving AIP
1991	$22,049,057	23
1992	16,668,904	20
1993	13,807,799	20
1994	8,893,993	12
1995	7,867,894	13
1996	16,836,945	11
1997	11,820,463	19
1998	10,088,271	16
Total	108,033,326	134
Average Per Year	13,504,165	17

Source: Federal Aviation Administration

general aviation airports worsens and the funds to halt the deterioration declines, the potential exists for a significant reduction of the medical care delivery benefits of airports and aviation.

Research Objectives

This study is concerned with delineating the medical service delivery benefits of Kansas general aviation airports. Accordingly the objectives of this research are as follows:

Objective 1 - Compile an inventory of the physical characteristics of Kansas general aviation airports.

Objective 2 - Conduct a survey of air ambulance firms, regarding the airport facilities required for safe air ambulance service and compare their requirements to actual conditions at rural Kansas airports. The survey also measures the amount of air ambulance activity and the value of air ambulance services provided to rural Kansas patients.

Objective 3 - Conduct surveys of Chief Executive Officers (CEO) of rural Kansas hospitals as well as “flying doctors” to determine the types and value of medical services provided at rural Kansas hospitals that are made possible by airports and aviation.

Methodology

Objective 1 is accomplished by compiling the length, width and surface type (i.e., turf, asphalt or concrete) of each runway at all Kansas general aviation airports. This information is obtained from the 1998 *Kansas Airport Directory* published by the Aviation Division of the Kansas Department of Transportation (KDOT).

Objective 2 is accomplished through personal interviews and surveys of managers of air ambulance companies serving Kansas. The questionnaire for the survey contains questions concerning the airport characteristics that are required for safe provision of air ambulance service. It also contains questions on air ambulance equipment, the number of patients transported, and the value of air ambulance service. The names and addresses of air ambulance companies serving Kansas were obtained from a directory provided by the Kansas Board of Emergency Medical Services.

Objective 3 is accomplished through questionnaire surveys of Kansas hospital CEOs and "flying doctors" who use aircraft in their medical practice. The hospital questionnaire has questions concerning the number of visits to the hospital by "flying doctors" and the types and value of medical services provided by these doctors. The questionnaire also requests information on the number of patients requiring specialized or emergency medical care that were transported from the hospital by aircraft. The names and addresses of the hospital CEOs were obtained from a directory of Kansas hospitals compiled by the Kansas Hospital Association.

The survey questionnaire sent to "flying doctors" has questions on the use of aircraft and airports in their medical practice as well as the doctor's perception of the advantages of using aviation. The "flying doctors" were asked to provide their medical specialties and types of medical services they provide to rural Kansas patients. The doctors were also asked to assess the safety of Kansas general aviation airports that they utilize in their medical practice. There is no directory of "flying doctors" so they were identified from information obtained from a variety of sources such as Kansas hospitals, Kansas airport managers, the Federal Aviation Administration (FAA) and the "flying doctors" themselves.

CHAPTER 2

AIR AMBULANCE SERVICE AND KANSAS GENERAL AVIATION AIRPORTS

Characteristics of Kansas General Aviation Airports

Table 2 contains information concerning the length, width, and surface type of 142 Kansas general aviation airports as published in the 1998 *Kansas Airport Directory*. Consolidation of the data in the table results in the following distribution of the length of the primary runway at these airports.

Length of Primary Runway (feet)	Number of Runways in the Category	Percent of Total
1,500-2,500	19	13.4
2,501-3,000	28	19.7
3,001-3,500	28	19.7
3,501-4,500	33	23.2
4,501-5,500	18	12.7
5,501-6,500	6	4.2
6,501-7,500	7	4.9
over 7,500	3	2.2

Thus 33 percent of Kansas general aviation airports have a primary runway length of 3,000 feet or less. Another 19.7 percent are in the 3,001-3,500 foot category.

The Kansas general aviation airports in Table 2 can also be classified by the surface type of the primary runway, which yields the following distribution.

Surface Type of Primary Runway	Number of Runways in the Category	Percent of Total
Turf	35	24.6
Asphalt	94	66.2
Concrete	13	9.2

Based on the above information, turf is the surface type of the primary runway at 24.6 percent of the 142 Kansas general aviation airports. The corresponding percentages for asphalt and concrete are 66.2 and 9.2 respectively.

Managers of air ambulance companies serving Kansas were asked to specify minimum runway length and width as well as type of runway surface that they require to safely provide air ambulance service to an airport. The managers stated that they require an asphalt or concrete surface runway with a minimum length of 3,000 to 3,500 feet and width of 40 to 50 feet. According to the managers, the higher the altitude of the airport and the warmer the air temperature, the longer the runway required for safe operation of air ambulance service. In addition to paved surfaces and minimum runway length and width, air ambulance companies have other requirements of airports to ensure safe provision of air ambulance service. These additional requirements include weather reporting, instrument landing systems for night landings and landings in poor weather, and lighting of runways and taxiways.

A comparison of the data in Table 2 with the safety requirements of air ambulance companies indicates that many Kansas airports are ineligible for air ambulance services. Of the 142 Kansas airports listed in the 1998 *Kansas Airport Directory*, a total of 78 (or 55 percent of the total) do not satisfy one or more of the airport safety requirements of air ambulance companies. This is because the 78 airports have one or more of the following characteristics: a

turf runway, primary runway length of less than 3500 feet, primary runway width of less than 50 feet. If the minimum runway length and width are lowered to 3000 feet and 40 feet (the minimum of the interval specified by air ambulance companies) 57 airports (or 40 percent of the total) would not satisfy the width or length requirement.

Air Ambulance Service in Kansas

The air ambulance companies serving Kansas provide air ambulance service with both fixed-wing and rotary-wing (helicopter) aircraft. Three firms primarily use fixed-wing aircraft and three companies use only rotary-wing aircraft. The aircraft employed by the air ambulance companies includes:

Fixed-Wing Aircraft	Rotary-Wing Aircraft
Beech King-Air C-90 Turbo Prop	Bell 222
Beech King Air	Bell 206
Cessna 414 A	Bolkow 105
MU-2 Propjet	Eurocopter BK 117
	Aero Special 350

Fixed-wing aircraft are preferable to rotary-wing aircraft for longer flights due to the greater speed and less expense of fixed-wing aircraft for these trips. On the other hand, rotary-wing aircraft can fly directly to hospitals or accident sites, whereas fixed-wing aircraft require airports. Also rotary-wing aircraft require less time than fixed-wing aircraft to make trips of 100 miles or less.

Air ambulance service in Kansas has been increasing as the number of Kansas patients transported by fixed-wing aircraft rose from 1,372 in 1997 to 1,632 in 1998, a 19 percent increase. The number of Kansas patients transported by rotary-wing aircraft was somewhat higher: 2,012 in 1997 and 1,979 in 1998.

The direct benefits of air ambulance service in Kansas can be approximated by total revenue earned by the industry. Total revenue for fixed-wing air ambulance service increased from $3,593,500 in 1997 to $5,733,380 in 1998. The corresponding figures for rotary-wing air ambulance service are $4,909,032 and $5,158,592 respectively.

Summary

Many Kansas airports are ineligible for air ambulance service. Over one-half of Kansas airports do not satisfy one or more of the airport safety requirements of air ambulance companies.

Air ambulance service in Kansas has been increasing as the number of Kansas patients transported by fixed-wing aircraft rose from 1,372 in 1997 to 1,632 in 1998. The number of Kansas patients transported by rotary-wing aircraft decreased somewhat from 2,012 in 1997 to 1,979 in 1998. The direct benefits of air ambulance service in Kansas are measured by the total revenue of the industry. Total revenue for fixed-wing air ambulance service was $5.7 million in 1998 while total revenue for rotary-wing air ambulance service was $5.2 million.

Table 2

Length, Width, and Surface Type of Runways at Kansas General Aviation Airports*

	Surface Type		
Airport	Turf	Asphalt	Concrete
Abilene		4100 x 75	
Anthony Municipal	2200 x 150	3598 x 70	
Anthony (Wilcox Field)	2100 x 80		
Argonia Municipal	3200 x 60		
Ashland (Harold Krier)	3200 x 300 3200 x 300		
Atchison (Amelia Earhart)		3000 x 48	
Atwood-Rawlins County	2420 x 75 2400 x 100	5000 x 75	
Augusta Municipal		4200 x 60	
Baldwin City (Vinland Valley Aerodrome)	3220 x 80		
Baxter Spring (Walter Swalley)		2860 x 45	
Belleville Municipal	2000 x 100	3500 x 60	
Beloit (Moritz Memorial)	2381 x 110 1658 x 90		3610 x 60
Benton		2613 x 40	
Bird City (Bressler Field)	2270 x 75 3460 x 70		
Bucklin Airport	2560 x 150		
Burlington (Coffey County)			5500 x 75
Caldwell Municipal	2380 x 110		
Cawker City Airport	3045 x 80		
Chanute (Martin Johnson)	2200 x 120	4256 x 75	

Cimarron Municipal	2450 x 40	2800 x 32	
Clay Center Municipal		4199 x 75	
Coffeyville Municipal		5867 x 100	
		3994 x 75	
Colby (Shaltz Field)	2600 x 80		5109 x 75
Coldwater (Comanche County)		3300 x 46	
Concordia (Blosser Municipal)	2205 x 300	3600 x 60	
Cottonwood Falls (Chase County)	2300 x 155		
Council Grove Municipal	1845 x 120 1690 x 75		
Derby (Cook Field)	1700 x 80	2490 x 40	
Derby (Hamilton Airfield)	2500 x 50		
Dighton Airport	2000 x 110 2000 x 100	2400 x 40	
Dodge City Regional Airport		6899 x 100 4649 x 100	
Dodge City (Wilroads Garden)	2630 x 60		
Dorrance (Thelen Airport)	2720 x 80		
El Dorado (Capt. Jack Thomas)		4204 x 75	4200 x 75
El Dorado (Patty Field)	1800 x 60		
Elkhart-Morton County		4900 x 60	
Ellinwood Municipal	2600 x 140 2150 x 150		
Ellsworth Municipal	2150 x 250	3900 x 48	
Emporia Municipal	3900 x 295	5000 x 100	
Enterprise (Prichard Airstrip)	1900 x 55		
Eureka Municipal	2100 x 50	3503 x 60	
Fort Scott Municipal		4400 x 75	

Fowler Airport	2310 x 60		
Fredonia Airport			4579 x 45
Garden City Municipal		7300 x 100	5700 x 100
Gardener Municipal	3240 x 110 3200 x 60	2960 x 36	
Garnett Municipal	2745 x 160 1800 x 160	2400 x 45	
Goodland (Renner Field)		3501 x 75	5499 x 100
Great Bend Municipal		7999 x 150 4698 x 75	
Greensburg (Paul Windle)	2600 x 60 2400 x 290		
Harper Municipal	2138 x 160	3268 x 38	
Haviland (Gail Ballard)	3100 x 120		
Hays Municipal	2448 x 200	6300 x 100	
Herington (Tri-County)		4184 x 150	
Hiawatha Municipal	3400 x 100		
	2480 x 100		
Hill City Municipal		4000 x 60	
Hillsboro Municipal		3206 x 39	
Horton Municipal	1860 x 300 2215 x 260		
Hoxie-Sheriden County	1750 x 150	4400 x 50	
Hugoton Municipal	2600 x 35	5000 x 75	
Hutchinson Municipal		7001 x 100 4251 x 75	5999 x 150
Independence Municipal		5500 x 150	5500 x 150
Ingalls Municipal			3000 x 75
Iola-Allen County		4100 x 75	

		3046 x 50	
Jetmore Municipal		4200 x 75	
Johnson - Stanton County		2140 x 60	4100 x 60
Junction City Municipal	1927 x 200 1915 x 140	3495 x 75	
Kingman Municipal	2600 x 170	3891 x 50	
Kinsley Municipal		3290 x 60	
LaCrosse-Rush County		3200 x 50	
Lakin Airport	2600 x 90	3400 x 40	
Larned - Pawnee County	3085 x 170 3050 x 165	3559 x 60	
Lawrence Municipal		5002 x 100 3901 x 75	
Leoti (Mark Hoard)		4300 x 40 2450 x 47	
Liberal Municipal		7101 x 150	5726 x 150
Lincoln Municipal	2700 x 370 2700 x 130		
Lucas Airport		2900 x 70	
Lyndon Airport		2170 x 40	
Lyons - Rice County	2550 x 150 1700 x 100	2999 x 50	
Maize Airport	2100 x 70		
Manhattan Regional Airport		3800 x 100	7000 x 150
Mankato Airport	2380 x 100	3650 x 50	
Marion Municipal	2745 x 95 2722 x 50	2540 x 45	
Marysville Municipal	2190 x 75	3008 x 50	
McPherson Airport	2511 x 75	5500 x 100	

Meade Municipal			4800 x 75
Medicine Lodge Airport	2270 x 90 1690 x 80	3200 x 42	
Minneapolis City-County		4015 x 50	
Moline - Elk County		2510 x 40	
Montezuma Municipal		4000 x 120	
Moundridge Municipal		3400 x 50	
Neodesha Municipal	2050 x 37	2998 x 46	
Ness City Municipal		3156 x 50	
Newton City – County		7002 x 100 3500 x 75	
Norton Municipal	2117 x 250	3571 x 50	
Norwich Airport	3050 x 80		
Oakley Municipal	2270 x 110	4999 x 75	
Oberlin Municipal	3150 x 100 2200 x 190	3792 x 50	
Olathe (Cedar Air Park)	2440 x 75		
Olathe (Johnson Co. Executive)		4099 x 75	
Olathe (New Century)		7339 x 190 5130 x 100 4210 x 100	
Onaga Airport	2340 x65		
Osage City Municipal		2560 x 40	
Osborne Municipal	2900 x 80	4000 x 60	
Oswego Municipal		2500 x 50	
Ottawa Municipal	2190 x 86 1785 x 95	4500 x 75	
Oxford Municipal	3380 x 60		
Paola - Miami County	2700 x 55	2805 x 25	

Parsons - Tri-City		5687 x 100	4007 x 100 4006 x 100
Phillipsburg Municipal	2743 x 140	3800 x 60	
Pittsburg (Atkinson Municipal)		4900 x 100 4001 x 93 3007 x 97	
Plainville Airpark	2600 x 120		
Pleasanton (Gilmore Airport)		2870 x 35	
Prairie View (Van Pak)	2590 x 128		
Pratt Industrial		5500 x 100	
Russell Municipal	1796 x 300	4401 x 75	
Sabetha Municipal	1380 x 100	3100 x 40	
St. Francis (Cheyenne Co. Municipal)	2900 x 128 2307 x 280 1700 x 280	3136 x 50	
Salina Municipal		13,337 x 200 8500 x 100 3640 x 75	
Satanta Municipal		3250 x 30	
Scott City Municipal	2500 x 60	5000 x 72	
Sedan Municipal	3160 x 87 1790 x 100		
Seneca Municipal	2400 x 100		
Smith Center Municipal	2500 x 90	3600 x 50	
Stafford Municipal	2560 x 250 1900 x 80 1580 x 260		
Stillwell (Hillside Airport)	1800 x 75		
Stockton Municipal	3500 x 240		
Syracuse - Hamilton County	2625 x 70	3000 x 40	

Topeka (Forbes Field)		12,819 x 200 8002 x 200	
Topeka (Phillip Billard)		5099 x 150 4330 x 75 3010 x 100	
Tribune Municipal	2100 x 35	5100 x 45	
Ulysses Airport		5731 x 48	6000 x 100
Trego Wakeeney Airport		4000 x 50	
Wamego Municipal		3170 x 30	
Washington County		3400 x 60	
Wellington Municipal		3538 x 50	
Wichita (Col. James Jabara)			6100 x 100
Wichita (Riverside Airport)		2675 x 30	
Wichita (Westport)		2520 x 30	
Wichita (Westport Auxiliary)	2550 x 70		
Winfield (Strother Field)		5510 x 100 4110 x 75	
Yates Center Airport	3000 x 150		

*Runway dimensions measured in feet
Source: Kansas Department of Transportation, Division of Aviation, 1998 Kansas,4irport Directory.

CHAPTER 3

AIRPORTS AND THE DELIVERY OF MEDICAL CARE TO RURAL KANSAS COMMUNITIES

The Hospital CEO and Flying Doctor Surveys

Based on a directory supplied by the Kansas Hospital Association, questionnaires were sent to the Chief Executive Officers (CEOs) of 123 Kansas community hospitals. The large hospitals located in Wichita, Topeka, and Kansas City were not included in the survey. The survey was conducted during the fall of 1998 and winter of 1999. A total of 95 hospital CEOs completed the questionnaire resulting in a return rate of 77.2 percent (95/123 x 100). If it is assumed that the 28 hospitals that did not return the questionnaire have the same characteristics as the 95 hospitals who participated in the survey, then the data from the returned questionnaires can be expanded to represent the entire population of 123 hospitals. The expansion factor is the reciprocal of the questionnaire return rate, 1/0.772, or 1.2953.

Initially it was hoped that the population of doctors who use airports in their medical practice could be determined by comparing a directory of Kansans that have a pilot's license to the *1998 Contracting Provider Directory* published by Blue Cross, Blue Shield of Kansas. However, due to confidentiality restrictions, the Federal Aviation Administration (FAA) was unable to provide a directory of Kansans who have pilot's licenses. Thus the total number of doctors who use aviation to provide medical service in Kansas is unknown. Therefore, the data of the returned questionnaires cannot be expanded to represent the entire population of "flying doctors."

Names and addresses for the survey of “flying doctors” were obtained from a variety of sources including managers of Kansas general aviation airports, Kansas hospital personnel, and the “flying doctors” themselves. Information was also collected from a directory of aviation medical examiners published by the FAA. Aviation medical examiners are doctors authorized by the FAA to give physical examinations for pilot certification. The survey was conducted during the fall of 1998 and winter of 1999. Returned questionnaires were received from 49 doctors although not every question was answered by each doctor. As noted above, the total number of doctors who use airports to provide medical care in Kansas is not known. However, it is believed that questionnaires were received by more than half of the total population of ”flying doctors.” Hopefully, the information received from the sample of “flying doctors” is representative of the entire population.

Flying Doctor Aircraft Use and Activity

Of the sample of 49 “flying doctors,” a total of 28 own an aircraft that they use in their medical practice. Other doctors in the sample use air-taxi service, lease aircraft, or rent aircraft as needed.

Table 3 contains the year, make, and model of aircraft owned by “flying doctors.” Examination of the table reveals that the majority of the sample doctors own Cessna or Beech aircraft with a minority of the sample flying Piper or Mooney aircraft.

Table 4 contains the base airports of sample “flying doctors” who own aircraft. The table indicates that sample doctors own aircraft based at 14 Kansas airports as well as Albion, Lincoln,

Table 3

Aircraft Owned by Flying Doctors

Year, Make and Model of Aircraft	
Cessna	Beech
1987 Cessna P2 ION	1985 Beech Bonanza
A36 1981 Cessna 414 AW	1983 Beech Bonanza A36
1980 Cessna 21 0 T	1981 Beech Bonanza
A36 1979 Cessna 210 N	1980 Beech Bonanza A36
1976 Cessna Cardinal 177	1978 Beech Bonanza V35 1975
Cessna 185	1977 Beech Bonanza A36
1974 Cessna Cardinal	1973 Beech Bonanza A36
1970 Cessna 3 1 0 Q	1971 Beech Bonanza F-33 A
1963 Cessna 182	1965 Beech Bonanza 1952
Cessna 170	
Piper	Others
1979 Piper Seneca	1998 Malibu Mirage
1974 Piper Navajo Twin	1980 Mooney 231
1964 Piper Cherokee	1979 Mooney M20J
1960 Piper PA - 24-250	Turbo Mooney 231

Table 4

Base Airports of Flying Doctors Who Own Aircraft

Kansas Airports	Out-of-State Airports
Augusta	Albion, Nebraska
Coffeyville	Lincoln, Nebraska
Garden City	Omaha, Nebraska
Hays	Colorado Springs, Colorado
Hanover	Englewood, Colorado
Hutchinson	Stillwater, Oklahoma
Kansas City	Tulsa, Oklahoma
Liberal	
Newton	
Salina	
Topeka (Forbes Field)	
Wellington	
Wichita (Mid-Continent Airport)	
Wichita (Colonel James Jabara)	

and Omaha, Nebraska; Colorado Springs and Englewood, Colorado; and Stillwater and Tulsa, Oklahoma.

Airports and aircraft are a major component of the medical practice of the sample of doctors. As a group, 48 sample doctors made 2,256 medical practice-related flights per year or about four flights per month. These flights account for 71 percent of the total annual flights made by these doctors. About half of the sample doctors said that 90 percent or more of their annual flights are related to their medical practice. Of the 2,256 annual medical practice-related flights made by the sample doctors, 70 percent have a Kansas destination; 20 percent have a destination in a state bordering Kansas, with the remaining 10 percent having a destination in some other state. The average one-way distance of these flights is 189 miles.

The above medical practice-related flight data of the sample doctors can be related to similar information from the Kansas hospital CEO survey. Of the 95 hospital CEOs that responded to the survey, 52 (or 55 percent) reported that "flying doctors" treat patients at their hospital with a total of 1,626 doctor visits in the previous 12 months. Multiplying the 1,626 visits by "flying doctors" to Kansas hospitals by the expansion factor of 1.2953 results in an estimated 2,106 visits for the entire population of 123 Kansas community hospitals. As noted in the above paragraph, 70 percent of the 2,256 annual medical practice-related flights by the 48 sample doctors have a Kansas destination, which is 1,579 (0.70 x 2256) flights. This number (1,579) is about 75 percent of the 2,106 estimated visits to Kansas hospitals reported by hospital CEOs. Thus the sample of "flying doctors" may account for as much as 75 percent of the total Kansas hospital visits by doctors using airports in their medical practice.

The “flying doctors” in the sample cited many advantages of using airports and aircraft in their medical practice. On the questionnaire, doctors were asked to check all of the following advantages of using aircraft that apply to their particular situation. On the right are the number of doctors that cited each potential advantage.

Advantage	Number of Doctors Checking the Response
(a) a larger market area	26
(b) an increased income	15
(c) more efficient use of my time	46
(d) allows me to treat patients in remote areas	31
(e) help smaller, rural hospitals stay open	33
(f) tax deductibility of flying expenses	13
(g) other	6

Based on the above data, sample doctors emphasize more efficient use of time; helping smaller, rural hospitals stay open; allowing treatment of patients in remote areas; and access to a larger market area as the principal advantages of using airports and aircraft in their medical practice.

The most significant finding of this research is that airports permit rural Kansas patients to have access to virtually every medical specialty and procedure. Table 5 displays the 22 medical specialties of the 49 “flying doctors” in the sample. Without airports and aviation, rural Kansas patients would have to travel long distances to major hospitals to obtain access to these medical specialties.

Table 5

Medical Specialties of Flying Doctors
Medical Specialty
Aerospace Medicine
Cardiology
Eye, Ear, Nose & Throat
Endocrinology
Emergency Medicine
Family Practice General Surgery
Geriatrics
Gastroenterology
Internal Medicine
Neurology
Neonatal & Prenatal Medicine
Opthamology
Orthopedics
Obstetrics
Physical Rehabilitation
Pathology
Podiatry
Psychiatry
Pulmonary Diseases
Rheumatology
Urology

Table 6 displays the 45 medical procedures performed by the 49 sample doctors at rural Kansas hospitals. One is impressed by the depth and comprehensiveness of medical care provided to rural Kansas patients made possible by airports and aviation.

Estimates of the economic benefit of the medical services provided by "flying doctors" can be obtained from the Kansas hospital CEO questionnaire. The CEOs were asked to estimate the dollar value of the medical services performed by "flying doctors" at their hospital in the previous 12 months. The total estimated value of the responding CEOs is $6,078,222 and when this figure is multiplied by the expansion factor (1.2953) the estimated benefit for the entire Kansas community hospital population is $7,873,121.

The Kansas hospital CEOs were also asked to estimate the dollar value of hospital services and personnel associated with the medical services provided at their hospital by "flying doctors" during the previous 12 months. The total estimated value of the responding CEOs is $5,590,685, which when multiplied by the expansion factor (1.2953) results in a total estimated benefit of $7,241,614 for the entire Kansas community hospital population. Thus the total economic benefit of the medical services facilitated by airports and aviation is $15,114,735 ($7,873,121 + $7,241,614).

These medical service benefits are distributed to rural communities throughout the state of Kansas. Table 7 displays the Kansas general aviation airports used by the sample 49 "flying doctors" to deliver medical services. A total of 62 Kansas airports were used by at least one doctor to provide medical service to rural Kansas patients.

Table 6

Medical Procedures Performed by Flying Doctors at Rural Kansas Hospitals

Medical Procedure
Bone Marrow Studies
Botulinum Toxin Injection
Cataract Surgery Clinic Visits
Consultations
Cystoscopy
Cardiac Outpatient Exams
Carotid Duplex
Cesarean Births
Chemotherapy Administration
Diagnosis of Endocrine Disorders
Echocardiography
Endoscopic Exams
Education of Community Hospital Staff
Electromyography
Eye surgery
Eye exams
EMG Tests
Foot surgery
Forensic Evaluations
General Medical Care
Heart Catheterizations

Hernia Repair

In-patient Consultations

Lumbar Puncture

Medication Management

Nerve Conduction Tests

Neurological Surgery

Neonatal Stabilization

Office Visits

Obstetrical Surgery

Outpatient Consultation

Outpatient Surgery

Pacemaker Follow-up and Programming

Physical Exams

Psychiatric Evaluations

Postoperative Examinations

Pacemaker Exchanges

Skin Surgery and Cancer Treatments

Stress Tests

Surgery-Major and Minor

Treadmill Testing

Tonsillectomy

Urology Surgery

Venous Studies

Table 7

Kansas General Aviation Airports Used by
Flying Doctors in Their Medical Practice

Kansas Airport	Number of Flying Doctors Using the Airport
Goodland	16
Topeka (Forbes Field & Billiard Airports)	10
Hays	6
Wichita (Mid-Continent & Colonel James Jabara Airports)	5
Kansas City (Downtown Airport)	4
Garden City	4
Salina	4
Great Bend	4
St. Francis	4
Dodge City	3
Tribune	3
Marysville	3
Belleville	3
Manhattan	3
Liberal	3
Phillipsburg	3
LaCrosse	3
Colby	3
Scott City	3
Junction City	2

Johnson	2
Atwood	2
Elkhart	2
Independence	2
Ulysses	2
Oakley	2
Concordia	2
Syracuse	2
Russell	1
Osborne	1
Parsons	1
Satanta	1
Oberlin	1
Hiawatha	1
Sabetha	1
Holton	1
Horton	1
Onaga	1
Wamego	1
Council Grove	1
Herington	1
Seneca	1
Hutchinson	1
Ft. Leavenworth	1
Abilene	1
McPherson	1
Lawrence	1

Pratt	1
Emporia	1
Coffeyville	1
Chanute	1
Johnson County	1
Stafford	1
Eureka	1
Neodesha	1
Meade	1
Jetmore	1
Ellsworth	1
Ness City	1
Kinsley	1
Ashland	1
Leoti	1

Up to this point we have discussed the types and value of medical services that "flying doctors" provide to rural Kansas patients. However, airports and aircraft are also needed to transfer rural Kansas patients to another hospital for specialized or emergency medical care. Kansas hospital CEOs were asked how many patients of their hospital were transported by fixed-wing aircraft to another hospital to receive specialized or emergency medical care in the previous 12 months. The total number of patients for the responding CEOs was 935, which when multiplied by the expansion factor of 1.2953 results in a total of 1,211 transferred patients for the entire population of Kansas community hospitals. Of the 1,211 patients, the majority (70 percent) required emergency medical care. This further highlights the essential role of airports in the health care of rural Kansans. Not only do airports facilitate the provision of specialized medical care by "flying doctors," but also permit transfer of patients requiring emergency medical care when the speed provided by aircraft is essential to the patient's life.

Flying Doctor Assessment of Kansas General Aviation Airports

The KSU study entitled *The Economic Impact of General Aviation Airport Deterioration on Kansas Communities* documented the declining condition of the Kansas airport system. The deterioration was documented by surveys of Kansas airport managers, members of the Kansas Pilots Association, and Kansas companies that employ aircraft as an essential part of their business. Since the "flying doctors" surveyed in this study constitute a large group of Kansas airport users, they were asked to provide their assessment of the condition of Kansas airports to determine if their impressions conform to those of the groups previously surveyed. The "flying

doctors" were asked to assess the safety of the Kansas airports they encounter in their medical practice with respect to runway length, runway condition, and other aspects of the airport.

When asked if the *runway length* of the Kansas airports they use is adequate to operate their aircraft safely, 42 of the sample doctors responded in the affirmative. The other seven doctors (14 percent of the sample) cited examples of inadequate runway length of some Kansas airports. One doctor stated that he could not safely use an airport with less than a 3,800 foot runway, while two doctors specified 3,000 feet as the minimum runway length for safe operation. The other four doctors named 11 Kansas general aviation airports with inadequate runway length.

When asked if the *runway condition* of the Kansas airports they use poses a safety hazard for their aircraft, 37 of the sample doctors responded in the negative. However, nine doctors (20 percent of the sample that answered the question) identified 19 Kansas general aviation airports with runways in poor condition.

The "flying doctors" were asked to identify *other aspects* of the Kansas airports they use that create safety hazards for their aircraft. Of the 46 doctors that responded to this question, 33 stated that there are no other aspects of the Kansas airports they use in their medical practice that create a safety hazard for their aircraft. However, 13 doctors (28 percent of the sample that responded to this question) identified safety hazards at Kansas general aviation airports that they use in their medical practice including the following:

1. No instrument landing systems (ILS) at 13 Kansas airports.
2. Global positioning satellite (GPS) or nondirectional beacon (NDB) not working at two Kansas airports.
3. No Instrument Flight Rules (IFR) at six Kansas airports, only day Visual Flight Rules

(VFR).

4. High pole lines at one Kansas airport.
5. No control towers at three Kansas airports.
6. Local air traffic not abiding by Federal Aviation Regulations (FAR) at 11 Kansas airports.
7. Loose rock in the apron area at one Kansas airport.

To further evaluate the condition of Kansas general aviation airports, the "flying doctors" were asked if there are any Kansas airports that they avoid using. Of the 46 doctors that responded to this question, 34 stated that there are no Kansas airports that they specifically avoid. However, 12 doctors (26 percent of the sample that answered this question) identified 11 Kansas airports that they avoid using. Among the reasons for avoiding these airports are rough runways, inadequate runway length, poor lighting, soft and debris-strewn runways, turf runways, and narrow runways.

In summary, a substantial percentage of the "flying doctors" stated that some Kansas airports have inadequate runway length, runways in poor condition, or other aspects of the airport that pose safety hazards to their aircraft. This finding is similar to the views on this topic expressed by the KPA sample and the business firm users of Kansas airports.

Impacts on Medical Service Benefits of Airport Deterioration

If the deterioration of Kansas general aviation airports continues unabated, the medical benefits provided to rural Kansans, facilitated by airports, will decline and ultimately cease to exist. Thus the loss of medical service benefits to rural Kansans can be viewed as part of the cost of airport deterioration. To identify the negative impacts on medical service benefits of airport deterioration, hospital CEOs and "flying doctors" were asked to describe the impact on them and

on rural Kansas medical care if the Kansas airports they use were closed.

As a group, the sample of "flying doctors" identified the following negative effects on medical care of airport closure.

1. Flying doctors would reduce or stop providing their medical services to rural hospitals.
2. It would negatively affect patient care in rural areas.
3. It would produce a reduction in the number of rural area patients the doctor can treat due to time constraints associated with long driving times.
4. It would have a negative effect on community hospitals in rural areas since patients would go to other hospitals for treatment.
5. It would reduce education of rural practitioners since specialists will not conduct training in communities without airports.
6. Rural patients would have to travel long distances to large cities to receive specialized medical care.
7. It would decrease the flexibility to schedule medical care delivery in rural areas due to long driving times.

Of the 95 Kansas hospital CEOs that responded to the survey, 20 stated that losing the community airport would have no effect on the hospital. All but one of these were in the group of hospital CEOs who reported that "flying doctors" do not provide medical services at their hospital. Another 16 hospital CEOs said that closure of the community airport would have little effect or an unknown effect on their hospital. Most of those reporting little effect of airport closure are CEOs of hospitals that are located relatively close to major hospitals or that rely on helicopters for patient transfers. Another nine hospital CEOs did not respond to the question. As a group, the remaining 50 hospital CEOs reported the following negative effects of airport

closure.

1. Emergency medical care patients would have to be transported by ground ambulance to the nearest good airport or a tertiary care hospital. The additional time could be life threatening.

2. It would eliminate access of rural patients to specialized medical care currently provided by doctors who utilize rural airports to provide these services. Patients requiring specialized medical care would have to travel great distances by ground transport to receive the care they currently have access to in their community as a result of the airport.

3. Hospitals would lose the revenue they currently receive from services provided in conjunction with the medical services provided by "flying doctors."

4. It would make it even more difficult to recruit doctors and staff to work in rural hospitals.

5. It would reduce training of rural hospital staff since "flying doctors" provide educational clinics.

6. It would decrease the ability of rural hospital staff to travel to continuing medical education seminars.

7. It reduces the ability to obtain emergency medical supplies in a time-critical emergency.

8. Patients would not come to a hospital for care if that hospital is unable to transfer patients by air ambulance in case of an emergency.

9. The airport provides an alternative landing site for rotary-wing aircraft.

10. The airport and fixed-wing air ambulance service is an alternative if rotary-wing air ambulance service is unavailable.

The negative effects of airport closure on medical service in rural Kansas is reinforced by the following quotes of Kansas hospital CEOs in response to the question concerning the effects of airport closure.

"If the airport was closed it would be life threatening to the emergency patients that are transported by fixed-wing aircraft."

"It would reduce by 50 percent the revenue the hospital obtains from supplying health services associated with the medical services provided by "fly-in doctors."

"Devastating financial and clinical repercussions would result from rural airport closures. Rural counties have only volunteer ground ambulance support, making the ability to reach patients by air even more crucial. As we expand into tertiary level services including open heart, air transport capabilities will be crucial."

"This is an area of great concern for this community. We currently have an airport with a grass runway. Fixed-wing air transport cannot land at our airport. We have to transport emergency transfers by land to a neighboring town 30 miles away. We are a critical access hospital and are totally dependent on tertiary hospitals for emergency transfers. The cost of paving the runway is prohibitive for our town and the only way this community will obtain a paved runway will be through some kind of assistance. I can not stress how vital this issue is to health care for this community."

"With the advances in tele-medicine the financial effect might be less; however the mortality of emergency patients could be greatly affected."

"Airport closure would have several negative impacts on our hospital including reduced revenue, a lower referral base, and a lower ability to recruit doctors to the hospital."

"Our hospital would lose emergency services and physician consulting clinic services."

"The community and surrounding area would suffer a tremendous negative impact in the ability to receive specialized medical care and treatment. The majority of patients would be required to travel three or more hours to obtain similar care, while the resultant financial loss would be severely detrimental to the third largest employer in the community. Emergency transfer patients would have to rely solely on ground ambulance.

The loss of the airport would not only be devastating to the hospital and patients, but also to numerous other area businesses and services who require air transportation as a critical resource for their success."

"Loss of the airport would cause increased transfer time delays in advanced treatments."

"Access to essential trauma, cardiac, and other intensive services would be reduced."

"As of now, we must use an airport located 25 miles away for fixed-wing transfers since air ambulances can not land at our airport. We must get this fixed."

"It would stop rural patients from having access to specialized doctors. KEEP OUR AIRPORT!"

"Approximately $35,000 in revenue would be lost, which is a substantial amount in a rural hospital. Loss of that revenue would be devastating for our hospital."

"Loss of the airport would cause difficulty in recruitment of staff and in caring for emergency/specialized medical care patients. Overall, it would be disastrous to health care and the local economy."

"It would be catastrophic."

"Airport closure would cause loss of access to specialized emergency care on a timely basis and to specialist services on follow-up care."

"We would have a change in our ability to make prompt appropriate transfers in emergencies. It would become even more difficult to recruit/retain physicians. The financial impact would be more indirect and difficult to measure."

"It would greatly impact the time required to get the patient to the airplane and transferred, thus affecting the quality of care."

"It would lower our ability to care for ER patients and eliminate cardiology revenue."

"It would eliminate our access to medical subspecialties."

"Loss of the airport would result in increased cost and increased travel time by ground ambulance to another airport. The financial effect on the hospital would not be as great as the possibility of medical complication during ground transport."

"The level of patient care would be reduced and care of cardiac and respiratory patients would be jeopardized."

"If the airport closed, we would lose the specialist who comes to our hospital monthly. This would cause our patients to go to other hospitals for their health care."

"It would require ground transportation of patients to the closest airport equipped for fixed-wing air ambulance service."
"It would have a very adverse effect on the health care of the elderly in our community."

"It would severely cripple our ability to continue providing obstetrical (OB) services in our community if not end it entirely. We are the only facility in the county doing OB deliveries and the nearest alternative site for OB services is 60 miles away."

"It would result in a decrease in hospital revenue as more patients would seek health care in other towns."

"Although the hospital primarily uses helicopters for the transfer of emergency patients, there

have been occasions when bad weather prevented the helicopter from landing at the hospital. In these cases we depend on fixed-wing aircraft to transport emergency patients."

"We are a small rural hospital and we use fixed-wing aircraft to fly cardiac and trauma patients to tertiary care hospitals. Before the airport was improved we had to transport patients by ground EMS to other airports for the air ambulance to transport them."

"The loss of the airport would have a significant negative impact on the quality of health care provided to our patients."

"It would have a devastating effect on the health care of our patients. It is 200 miles by ground transfer to the closest health care facility with services that are not available here. It would require thousands of trips of 150 to 200 one-way miles to obtain specialized medical care not available at our hospital."

"Local airports improve our ability to recruit physicians, to acquire emergency medical supplies, and travel for continuing education."

"It would primarily affect our patients who require specialized medical care or emergency medical care that must be transported expeditiously by fixed-wing aircraft. It is not as much a financial issue as it is a patient risk-benefit issue."

"Even though we have little need to send patients via fixed-wing aircraft, the loss of our airport would be dramatic on the hospital. We have frequent fly-in visits from medical education and medical equipment personnel. Occasionally we have repair parts for medical equipment brought to us by air.

It is quite possible, with turnover, we could have a totally different medical staff in 3 years, many of whom would want airport access in our town."

"Due to distance and time factors, air transport is essential for emergency tertiary care. If we were unable to provide air transport it would severely limit the usefulness of our emergency department in providing quality stabilization and transport of critical patients."

"It would decrease our quality of care in getting our cardiac and trauma patients to Hays or Wichita."

"It would have a negative impact on getting patients to tertiary care centers."

"Closure of airports in our area is not a financial concern but it is a very serious concern with regard to the quality of care issue. A critically ill or injured patient requires definitive care at a tertiary hospital. Air transportation is the only way to move a patient in a time-critical situation."

"I am sure it would have a negative economic impact on our community. We need the airport for emergency situations when helicopter service is not available. More important than the negative impact on our community, lives can and have been saved by the back-up service of fixed-wing

aircraft."

"We are a small rural hospital that is trying to provide the best care possible to our patients and part of that care involves being able to transfer patients quickly to larger facilities if that becomes necessary. Patients transferred for emergency medical care are usually transferred to Wichita, KU Medical Center, or Denver. These trips would be at least four to five hours by ground. A transfer time of four to five hours will often be the difference between life and death. It is impossible to put a price on that. As you can see, the number of patients that required transfer from our hospital to major medical centers is small, but that doesn't dismiss the importance of each case.

We want to encourage people to live in rural areas, with all the advantages of rural life but with connections to urban areas. Health care is important to all our residents, but especially to the large percentage of elderly residents in our area. Our residents will not want to live in a community that does not have timely access to major medical centers. Our population continues to decline, and we can't afford to lose any more residents. Our airport is a vital part of our community; it might not be used as frequently as urban airports but is just as necessary. In this day and age we can't be without that connection to the outside world. Our little community is not an island that stands alone.

At this time the consulting physicians that come to our hospital do not fly in, but we are continually recruiting visiting physicians and need to have that option available."

"It would substantially reduce our ability to recruit doctors and staff."

"Other airports are at least 30 miles from our hospital. This means that patients requiring fixed-wing transport would have to be transported by ground EMS to the closest airport. This could be the difference between life or death for the patient.

Furthermore, it is possible that patients would not come to this hospital for care if we are unable to fly patients to other hospitals from here."

"It would harm our ability to recruit physicians."

Summary

The conclusions of this chapter are based on surveys of CEOs of Kansas community hospitals and doctors who use airports and aviation in their medical practice.

The sample of "flying doctors" cited many advantages of using aircraft and airports in their medical practice. Sample doctors emphasize more efficient use of time; helping smaller, rural hospitals stay open; allowing treatment of patients in remote areas; and access to a larger market area as the principal advantages of using airports and aircraft in their medical practice.

One of the most significant findings of this research is that airports allow rural Kansas patients to have access to virtually every medical specialty and procedure. The doctors in the survey provided 45 medical services in 22 different medical specialties to patients at rural Kansas hospitals. Without airports and aviation, rural Kansas patients would have to travel long distances to obtain access to these medical specialties.

The annual economic benefit of the medical services provided by "flying doctors" is estimated to be $7,873,121. The annual economic benefit of hospital services and personnel associated with the medical services provided by "flying doctors" is estimated to be $7,214,614. Thus the total economic benefit facilitated by airports and aviation is $15,114,735 ($7,873,121 + $7,241,614).

The medical service benefits of "flying doctors" are distributed to rural communities throughout Kansas. A total of 62 Kansas airports were used by at least one doctor to provide medical service to rural Kansas patients.

Not only do airports facilitate the provision of specialized medical care by "flying doctors" but they also permit transfer of rural Kansas patients requiring emergency or highly specialized

medical care. Of the patients transferred from Kansas community hospitals, 70 percent were transferred to a major hospital because they required emergency medical care. The speed provided by aircraft is essential to the emergency medical care of these patients.

The "flying doctors" were asked to assess the safety of the Kansas airports they encounter in their medical practice with respect to runway length, runway condition, and other aspects of the airport. A substantial percentage of the "flying doctors" stated that some Kansas airports have inadequate runway length, runways in poor condition, or other aspects of the airport that pose safety hazards to their aircraft. This finding is similar to the views on this topic expressed by the KPA sample and business firm users of Kansas airports published in a previous K-TRAN report.

To identify the negative impacts on medical service benefits of airport deterioration, Kansas hospital CEOs and "flying doctors" were asked to describe the impact on them and on rural Kansas medical care if the Kansas airports they use were closed.

As a group, the sample of "flying doctors" identified the following negative effects on rural Kansas medical care of airport closure.

1. Flying doctors would reduce or stop providing their medical services to rural hospitals.
2. It would negatively affect patient care in rural areas.
3. It would produce a reduction in the number of rural area patients the doctor can treat due to time constraints associated with long driving times.
4. It would have a negative effect on community hospitals in rural areas since patients would go to other hospitals for treatment.
5. It would reduce education of rural practitioners since specialists will not conduct training in communities without airports.

6. Rural patients would have to travel long distances to large cities to receive specialized medical care.

7. It would decrease the flexibility to schedule medical care delivery in rural areas due to long driving times.

As a group, the Kansas community hospital CEOs identified the following negative effects of airport closure.

1. Emergency medical care patients would have to be transported by ground ambulance to the nearest good airport or a tertiary care hospital. The additional time could be life threatening.

2. It would eliminate access of rural patients to specialized medical care currently provided by doctors who utilize rural airports to provide these services. Patients requiring specialized medical care would have to travel great distances by ground transport to receive the care they currently have access to in their community as a result of the airport.

3. Hospitals would lose the revenue they currently receive from services provided in conjunction with the medical services provided by "flying doctors."

4. It would make it even more difficult to recruit doctors and staff to work in rural hospitals.

5. It would reduce training of rural hospital staff since "flying doctors" provide educational clinics.

6. It would decrease the ability of rural hospital staff to travel to continuing medical education seminars.

7. It reduces the ability to obtain emergency medical supplies in a time-critical emergency.

8. Patients would not come to a hospital for care if that hospital is unable to transfer patients by air ambulance in case of an emergency.

9. The airport provides an alternative landing site for rotary-wing aircraft.

10. The airport and fixed-wing air ambulance service is an alternative if rotary-wing air ambulance service is unavailable.

CHAPTER 4

CONCLUSIONS AND RECOMMENDATIONS

Conclusions

Many health care services have to be delivered to the people of rural Kansas through the use of airports and aviation. Patients requiring a higher level of medical care or emergency care must be quickly transported from rural hospitals to large population centers where hospitals providing higher levels of specialized care are located. Automobile accident victims must be quickly transported to trauma centers capable of providing the necessary emergency medical care. Doctors who provide specialized medical services require timesaving transportation from their locations to rural Kansas hospitals. The only way to efficiently provide these examples of medical care is through reliance on airports and aviation. The medical care benefits cited above are in jeopardy as a result of the deterioration of many Kansas general aviation airports. Thus it is important to delineate the medical service delivery benefits of Kansas general aviation airports in order to measure the cost of allowing continued airport deterioration.

Air ambulance service is often required to transport rural Kansas patients requiring specialized or emergency care to larger hospitals. However, many Kansas airports are ineligible for air ambulance services. Of a total of 142 Kansas airports, 78 (or 55 percent of the total) do not satisfy one or more of the airport safety requirements of air ambulance companies. This is because the 78 airports have one or more of the following characteristics: a turf runway, primary runway length of less than 3,500 feet, primary runway width of less than 50 feet. If the minimum runway length and width are lowered to 3,000 feet and 40 feet (the minimum of the interval

specified by managers of air ambulance companies) 57 airports (or 40 percent of the total) would not satisfy the width or length requirement.

Medical service provided by air ambulance companies has been increasing in Kansas. The number of Kansas patients transported by fixed-wing aircraft rose from 1,372 in 1997 to 1,632 in 1998. The direct benefits of air ambulance service in Kansas are measured by the total revenue earned by the industry. Total revenue for fixed-wing air ambulance service was $5.7 million in 1998, while total revenue for rotary-wing air ambulance service was $5.2 million.

Many of the conclusions of this study are based on surveys of CEOs of Kansas community hospitals and doctors who use airports and aviation in their medical practice, referred to as "flying doctors" in this report. The "flying doctors" cited many advantages of using airports and aviation in their medical practice. The doctors emphasize more efficient use of their time; helping smaller, rural hospitals stay open; allowing treatment of patients in remote areas, and access to a larger market area as the principal advantages of using airports and aircraft in their medical practice.

One of the most significant findings of this study is that airports allow rural Kansas patients to have access to virtually every medical specialty and procedure. The doctors provided 45 medical services in 22 different medical specialties to patients at rural Kansas hospitals. Without airports and aviation, rural Kansas patients would have to travel long distances to obtain access to these medical specialties.

According to the survey of Kansas hospital CEOs, the annual economic benefit of the medical service provided by "flying doctors" is estimated to be $7.9 million. The annual economic benefit of the hospital services and personnel associated with the medical services provided by the "flying doctors" is estimated to be $7.2 million. Thus the total economic benefit facilitated by airports and aviation is $15.1 million ($7.9 million + $7.2 million). These benefits are distributed

to rural communities throughout Kansas, as a total of 62 Kansas airports were used by at least one doctor to provide medical care to rural Kansas patients.

Airports also permit transfer of rural Kansas patients requiring emergency or highly specialized medical care. Of the patients transferred from Kansas community hospitals, 70 percent were transferred to a major hospital because they needed emergency medical care. The timesaving provided by aircraft is essential to the emergency medical care of these patients.

The views of the "flying doctors" concerning the condition of Kansas general aviation airports are similar to those expressed by other groups of Kansas airport users. A substantial percentage of the "flying doctors" stated that some Kansas airports have inadequate runway length, runways in poor condition, or other aspects of the airport that pose safety hazards to their aircraft.

Part of the cost of allowing airport deterioration to continue is the loss of the medical service benefits of airports described in this report. To identify this cost, CEOs of Kansas community hospitals and the "flying doctors" were asked to describe the impact on them and on rural Kansas medical care if the Kansas airports they use were closed.

As a group, the sample of "flying doctors" identified the following negative effects on rural Kansas medical care of airport closure.

1. Flying doctors would reduce or stop providing their medical services to rural hospitals.

2. It would negatively affect patient care in rural areas.

3. It would produce a reduction in the number of rural area patients the doctor can treat due to time constraints associated with long driving times.

4. It would have a negative effect on community hospitals in rural areas since patients would go to other hospitals for treatment.

5. It would reduce education of rural practitioners since specialists will not conduct training in

communities without airports.

6. Rural patients would have to travel long distances to large cities to receive specialized medical care.

7. It would decrease the flexibility to schedule medical care delivery in rural areas due to long driving times.

As a group, the Kansas community hospital CEOs identified the following negative effects of airport closure.

1. Emergency medical care patients would have to be transported by ground ambulance to the nearest good airport or a tertiary care hospital. The additional time could be life threatening.

2. It would eliminate access of rural patients to specialized medical care currently provided by doctors who utilize rural airports to provide these services. Patients requiring specialized medical care would have to travel great distances by ground transport to receive the care they currently have access to in their community as a result of the airport.

3. Hospitals would lose the revenue they currently receive from services provided in conjunction with the medical services provided by "flying doctors."

4. It would make it even more difficult to recruit doctors and staff to work in rural hospitals.

5. It would reduce training of rural hospital staff since "flying doctors" provide educational clinics.

6. It would decrease the ability of rural hospital staff to travel to continuing medical education seminars.

7. It reduces the ability to obtain emergency medical supplies in a time-critical emergency.

8. Patients would not come to a hospital for care if that hospital is unable to transfer patients by air ambulance in case of an emergency.

9. The airport provides an alternative landing site for rotary-wing aircraft.

10. The airport and fixed-wing air ambulance service is an alternative if rotary-wing air ambulance service is unavailable.

Recommendations

This research project has measured the following annual airport-related medical benefits.

1. Inter-hospital transfers of rural Kansas patients by fixed-wing aircraft - $5.7 million.
2. Medical services provided by “flying doctors” - $7.9 million.
3. Hospital services and personnel supplied in conjunction with the medical services provided by “flying doctors” - $7.2 million.

It is certain that the $20.8 million of medical benefits of Kansas general aviation airports exceed the costs of these airports. Thus government programs that address the problem of airport deterioration are an efficient use of resources. A good example is the state airport development program that was funded by the 1999 Kansas legislature. This program provides state financial assistance for runway reconstruction and resurfacing, construction or refurbishing of taxiways and ramps, lighting of taxiways and runways, and navigation aids.

At the local level, airport improvements could be financed by exploring the idea of city-country airport authorities. The cost of airport runway resurfacing might be reduced by combining these projects with state highway projects in the area of the airport. In many cases, minor repairs and maintenance such as crack sealing of airport runways are performed by city or county highway departments and this approach should be encouraged in areas where it is not currently applied.

This report documented the decline in AIP grants to Kansas airports despite the existence of a ten billion dollar surplus in the Airport and Airway Trust Fund. The downward trend in Kansas AIP grants can be reversed by spending the surplus in the trust fund. Also the list of airport maintenance projects that are eligible for AIP funds should be expanded. The FAA should modify its criteria for allocating AIP funds to general aviation airports. Instead of focusing on the number of aircraft based at the airport, the FAA should evaluate proposed improvements in terms of the economic contribution they will make to the national airport system. This would tend to increase the AIP funds allocated to general aviation airports.

APPENDIX A

AIR AMBULANCE COMPANY QUESTIONNAIRE

Air Ambulance Survey

A. Kansas Airports and Air Ambulance Service

1. What is the minimum airport runway length you require to safely use the airport for air ambulance service? Is there a minimum runway width?

2. What type of airport runway surface do you require to safely use the airport for air ambulance service?

3. What other airport characteristics do you require to safely use the airport for air ambulance service?

4. Do you have a list of Kansas airports that do not meet the requirements specified in the previous 3 questions? If so, please name the airports and the requirements that each airport fails to meet.

5. Are there any Kansas airports that you recently (previous 5 years) decided to no longer serve? If so, what are the names of the airports and the reasons you no longer serve them?

B. Air Ambulance Equipment

1. What is the year, make, and model of each of the aircraft in your air ambulance fleet?

2. What is the effective range of each of the aircraft you mentioned in the previous question?

C. Air Ambulance Activity

1. In 1996, 1997 and 1998 (estimated), what was your number of patients transported by fixed-wing air ambulance for each Kansas airport you served? Please attach a separate sheet with the patient numbers by Kansas airport.

2. In 1996, 1997 and 1998 (estimated), what was your number of patients transported by rotary-wing air ambulance for each Kansas airport you served? Please attach a separate sheet with the patient numbers by Kansas airport.

D. Air Ambulance Finances

1. How are air ambulance services billed? i.e. by the hour?, by the length of the flight?

2. Your answer to the following question will be kept **STRICTLY CONFIDENTIAL**. Only summarys for the entire Kansas air ambulance industry will be published in the report.

In 1996, 1997 and 1998 (estimated), what was the total revenue of your air ambulance company?

1996 Total Revenue _____
1997 Total Revenue _____
1998 Total Revenue (est.) _____

3. In 1996, 1997 and 1998 (estimated), what percent of your company's total revenue came from flights with a Kansas origin and/or destination?

1996 Percent _____
1997 Percent _____
1998 Percent (est.) _____

APPENDIX B

CHIEF EXECUTIVE OFFICERS OF KANSAS COMMUNITY HOSPITALS QUESTIONNAIRE

Airports and Hospital Survey

Hospital Name:
Name of Person
Completing this Survey:

A. Airports, Hospitals and Doctors

1. How many airports are there within 15 minutes driving time of your location? Please list them by name on the following lines

_____

2. Do doctors from other areas fly-in to your location to treat patients at your hospital?
Yes
No

3. If the answer to the previous question is yes, how many visits did "fly-in" doctors make to your hospital in the previous 12 months?

4. What types of medical services or treatments did the "fly-in" doctors provide at your hospital in the previous 12 months?

5. What is your estimate of the dollar value of the medical services of the "fly-in" doctors you identified in the previous question? (previous 12 months)

6. What is your estimate of the dollar value of the hospital staff and other expenses associated with the medical services provided by the "fly-in" doctors (i.e. nurses salaries, room charges, etc)?

7. If the airports you identified in question 1 were closed, what would be the <u>reduction</u> in visits to your hospital by "fly-in" doctors?
zero
25 percent _____
50 percent _____
75 percent _____
100 percent
B. Airports and Hospital Patients

1. In the previous 12 months, how many patients of your hospital were transported by fixed-wing aircraft to another hospital to receive specialized or emergency medical care not available at your hospital?
Number of patients requiring specialized medical care
Number of patients requiring emergency medical care

2. In the previous 12 months, were any patients transported by fixed-wing aircraft from your hospital to another hospital for reasons other than these mentioned in the previous question?
Yes
No
Reason for transfer if yes:

3. In the previous 12 months, how many patients of your hospital were transported by helicopter to another hospital to receive specialized or emergency medical care not available at your hospital?
Number of patients requiring specialized medical care
Number of patients requiring emergency medical care

4. If the airports in your area were closed, what financial and other effects would it have on your hospital?

APPENDIX C

QUESTIONNAIRE FOR DOCTORS WHO USE AIRPORTS AND AVIATION IN THEIR MEDICAL PRACTICE

Doctors and Aviation Survey

A. Aircraft

1. Do you: (check all that apply)

   (a) own a plane(s) _____
   (b) lease a plane(s) _____
   (c) use air-taxi service _____
   (d) rent aircraft as needed _____

2. If you own a plane, what is the year, make, and model of the aircraft?

3. If you own an aircraft, at which airport is the aircraft based? Identify by city and state.

4. How many years have you been using aircraft in your medical practice?

B. Aircraft Use and Activity

1. On the average, how many flights a month do you make in your medical practice?

2. What percent of the flights you make in your medical practice have the destination in the following states?

   (a) Kansas _____
   (b) Missouri _____
   (c) Nebraska _____
   (d) Oklahoma _____
   (e) Colorado _____
   (f) Iowa _____
   (g) Other states _____

3. What percentage of the flights you make annually are related to your medical

practice?

4. On the average, what is the one-way distance of the flights you make in your medical practice?

C. Aircraft and Medical Service Benefits

1. What are the advantages of using aircraft in your medical practice? (Check all that apply)

(a) a larger market area _____
(b) an increased income _____
(c) more efficient use of my time _____
(d) allows me to treat patients in remote areas _____
(e) help smaller, rural hospitals stay open _____
(f) tax deductability of flying expenses _____
(g) other (please describe below) _____

2. What is your medical specialty? Please describe below.

3. Please describe the medical procedures you perform at the destination when you use your aircraft.

4. To help economically justify a Kansas airport development program to rehabilitate Kansas airports, some measure of the value of your aircraft-related medical services is required. Your answers to the following two questions will be kept **STRICTLY CONFIDENTIAL**.

(a) What proportion of your annual income is obtained from medical services you performed when you used aircraft to travel to the destination?

(b) Check the annual income category that applies to you.

(a) up to $50,000
(b) $50,000 - $90,000
(c) $91,000 - $130,000
(d) $131,000 - $170,000
(e) $171,000 - $210,000
(f) $211,000 - $250,000
(g) $251,000 - $290,000
(h) $291,000 - $330,000
(i) over $330,000

D. Physician Assessment of Kansas General Aviation Airports

1. Please name the Kansas general aviation airports you fly to most frequently as a result of your medical practice.

2. With respect to the Kansas airports you named in the previous question, is the length of the runway adequate to operate your aircraft safely? If not, please name the airports with inadequate runway length.

3. With respect to the Kansas airports you named in question 1 above, does the condition of the runway pose a safety hazard for your aircraft? If so, please name the airports with hazardous runway conditions.

4. With respect to the Kansas airports you named in question 1 above, are there any other aspects of the airport that pose a safety hazard to your aircraft? If so, please name the airport and describe the safety hazard.

5. Are there any Kansas general aviation airports that you avoid using? If so, please name the airport and your reasons for avoiding the airport.

6. If the Kansas general aviation airports that you use in your medical practice were closed, what impact would this have on you?

7. Please estimate the monetary value of the impact you described in the previous question.

APPENDIX D

KANSAS AIRPORT IMPROVEMENT PROGRAM (AIP) GRANTS BY AIRPORT, FISCAL YEARS 1991-1998

Kansas Airport Improvement Program (AIP) Grants by Airport
Fiscal Years 1991-1998

Airport	Grant Amount
Wichita Mid-Continent	$34,293,837
Salina Municipal	8,411,345
Topeka Forbes Field	5,397,670
Garden City Municipal	4,546,251
Johnson County Executive	4,198,886
McPherson	3,816,438
Independence Municipal	3,684,060
Manhattan Municipal	3,231,516
Hays Municipal	3,045,621
Colonel James Jabara (Wichita)	2,740,717
Allen County (Iola)	2,673,100
New Century AirCenter (Olathe)	2,570,316
Phillip Billard- Topeka	2,469,770
Ulysses	2,369,610
Liberal Municipal	2,132,798
Newton City-County	2,035,100
Strother Field (Winfield - Arkansas City)	1,731,960
Meade Municipal	1,715,265
Atkinson (Pittsburg)	1,688,347
Captain Jack Thomas (El Dorado)	1,646,410
Hutchinson Municipal	1,562,042
Coffeyville Municipal	1,554,647
Augusta Municipal	1,377,035
Pratt Industrial	1,296,945
Renner Field (Goodland)	1,267,175
Great Bend Municipal	1,026,155
Ft. Scott Municipal	962,762
Lawrence Municipal	901,864
Scott City Municipal	838,170
Emporia Municipal	519,343
Dodge City Municipal	497,427
Ottawa Municipal	446,848
Phillipsburg Municipal	328,874
Miami County (Paola)	234,028
Hugoton Municipal	176,436
Hill City Municipal	64,575
Hiawatha-Horton	56,462
Larned-Pawnee County	55,296
Greensburg	48,600

Hoxie-Sheridan County	47,700
Junction City	45,135
Kingman Municipal	45,000
Syracuse- Hamilton County	45,000
Sharon Springs Municipal	43,200
Gardner Municipal	43,200
Columbus-Oswego	38,070
Blosser Municipal (Concordia)	22,320
Number of Airports Receiving AIP Grants	47
Total Amount of AIP Grants	108,033,326

Source: Federal Aviation Administration, Kansas City, Missouri Office