

Measuring the Economic Importance of the Health Sector on a Local Economy: A Brief Literature Review and Procedures to Measure Local Impacts

by

Gerald A. Doeksen
Tom Johnson
Chuck Willoughby

1997

Funded by
Southern Rural Development Center
Box 9656
Mississippi State, MS 39762

For additional copies of this report or for a copy of the disk containing an Excel Spreadsheet program, call the SRCD at (601) 325-3207 or email sandyp@mces.msstate.edu. This material is based upon work supported by the Cooperative State Research Services, U.S. Department of Agriculture under Agreement Number 93-34104-8830.

Measuring the Economic Importance
of the Health Sector on a Local Economy: A Brief
Literature Review and Procedures to Measure Local Impacts

by

Gerald A. Doeksen
Regents Professor and Extension Economist
Oklahoma State University

Tom Johnson
Professor and Extension Economist
Virginia Tech

and

Chuck Willoughby
Extension Assistant
Oklahoma State University

1997

Funded by
The Southern Rural Development Center
Box 9656
Mississippi State University
Mississippi State, MS 39762

Measuring the Economic Importance
of the Health Sector on a Local Economy: A Brief
Literature Review And Procedures to Measure Local Impacts

TABLE OF CONTENTS

I.	INTRODUCTION.....	1
II.	IMPACT OF HEALTH SECTOR ON THE RURAL ECONOMY.....	3
	Impact of Entire Health Sector.....	3
	Impact of Urban Hospitals or Medical Centers.....	3
	Impact of Hospitals on a State's Economy.....	5
	Impact of Rural Hospitals on the Local Economy.....	7
	Impact of Rural Physicians on a Community.....	13
	Historic Observation of Closed Hospitals on a Community's Economy.....	16
	Summary of Impact Studies.....	19
III.	RELATIONSHIP BETWEEN HEALTH SECTOR AND RURAL DEVELOPMENT.....	21
	Health Sector and Industrial Development.....	21
	Health Care and Attracting Retirees.....	23
IV.	PROCEDURES TO MEASURE COMMUNITY IMPACT	
	Overview of Community Economies.....	27
	Models to Measure the Impact of the Health Sector.....	29
	Data Needs for Aggregate and Disaggregate Sector Analysis.....	31
	Aggregate Analysis.....	31
	Detailed Sector Analysis.....	31
	Data Needs for Dynamic Analysis.....	33
	Dynamic Sector Analysis.....	33
V.	SUMMARY.....	43

Appendix A - Blank Data Forms

Appendix B - Step by Step Spreadsheet Instructions

Measuring the Economic Importance
of the Health Sector on a Local Economy: A Brief
Literature Review and Procedures to Measure Local Impacts

INTRODUCTION

Health care issues are being addressed at all governmental levels. National leaders are discussing Medicare and Medicaid issues. State leaders are addressing Medicaid issues. Community leaders are striving to maintain and/or improve health services. Without a viable health sector, rural communities may not have the desired quality of life or economic growth potential. The purpose of this publication is to illustrate the importance of the health sector to the economy of a rural community and present a simple procedure to measure the impact of the health sector on the local economy. More specifically, the objectives are:

1. demonstrate the importance of the health sector on the local economy;
2. summarize the relationship between health care and industrial growth;
3. summarize the relationship between health care and retirement growth; and
4. develop a method that Extension workers can use to measure the impact of the health sector on the local economy.

The economic importance of the health sector can be demonstrated by looking at the percent of total employment and gross national product (GNP) associated with health activities. Recent national data show that health care expenditures make up about 15% of the U.S. GNP (U.S. Bureau of the Census). The magnitude of health expenditures as well as the percent of GNP continues to increase. At the community level, generalized data are not available. In the literature, it is often stated that a rural hospital is often the second largest employer (Doeksen, Cordes and Shaffer). The largest employer is often the school system. If the employment of the hospital is added to the other health components such as physicians, pharmacies, etc., and the total impact of the health sector is included, health generated employment is often 10 to 20 percent of a rural community's employment. The health sector is not only important for jobs, but also important if the community is trying to attract industry or retirees. A review of the literature was conducted relative to the impact of the health sector on the economy and its importance for industrial growth and retiree attraction.

IMPACT OF HEALTH SECTOR ON THE RURAL ECONOMY

With the decline in health services such as hospital closures or lack of physicians, the question as to what is the importance of the health sector on the economy surfaces frequently. The literature search surfaced several studies addressing this issue. The studies are divided into six categories: one that looks at the entire health sector's impact; two that measure the impact of urban hospitals; one that measures the impact of the hospital sector on the state's economy; several that measure the impact of rural hospitals on a community; one that measures the impact of rural physicians on a rural economy; and three that look at communities where hospitals have closed and discuss historical economic impacts. This is a very limited summary of the literature. For a more detailed review, see Doeksen, Cordes and Shaffer.

Impact of Entire Health Sector

A study by Lichty, Jesswein, and McMillan addressed the issue of the impact of the entire health sector on a regional economy. The study area was a seven county region in Northeast Minnesota. The researchers used a large-scale computerized simulation model to estimate the economic impacts. The core of the simulation model was an input-output model¹. The model was first run to create a baseline using historical trends from 1984 through 1990. Then, the simulation model was run removing the entire medical services industry. For summary purposes, regional earnings, population and employment will be discussed (**Table 1**). Earnings for the baseline run were projected to increase from 5 percent from 1984 to 1990. With the medical sector eliminated, 1984 earnings decreased by 25 percent and 1990 earnings decreased by 38 percent. Population and employment as indicated in **Table 1** are projected to also have substantial declines. In 1984, the entire medical sector employed 13,479 people (about 11 percent of total employment). The impact on indirect and induced jobs would result in a reduction of 28,800 jobs in 1984 and 51,301 in 1990.

Impact of Urban Hospitals or Medical Centers

Two research projects have been completed which measure the impacts of large urban medical complexes. Impacts resulting from large complexes are different than for rural hospitals. Large urban medical facilities often receive a much higher proportion of patients from outside the urban areas. This, plus the fact that many of the dollars used to pay for the services come from outside the region, results in this being an export base type industry. Moore measured the impact of

¹The input-output model is a tool used to measure the secondary impacts of a change in the economy. The model does this by linking each sector with the other sectors in the economy. The model requires a large amount of data. A sector is a grouping of similar type industries or businesses. This linkage allows the researcher the ability to measure the impact of one sector on the other sectors. For more information about the input-output model, see Miernyk, 1965.

Table 1
Seven County Northeast Minnesota:
Comparison of Selected Economic Indicators
(Medical Sector Eliminated)

	<u>Base Line</u>		<u>Medical Sector Eliminated</u>	
	1984	1990	1984	1990
Earnings (dollars)	\$1,517,815	\$1,580,849	\$1,133,941	\$982,709
Population	333,060	323,767	321,538	243,262
Employment	125,404	121,305	96,604	70,004

Source: Lichty, Jesswein, and McMillan, 1986.

the Upstate Medical Center in Syracuse, New York. The author employed economic base theory² to measure the impact. The economic base multiplier was 2.63. This means that for every dollar of income brought into the community from outside the region by Upstate Medical Center, a total of \$2.63 was generated in Syracuse. The author concluded:

"The most fundamental conclusion which can be drawn from this study is that large public institutions have the capacity to generate millions of dollars in personal income and employment, through what is, in effect, interregional trade."
(Moore, Economic Geography, 1974, pp. 124-129)

Erickson, Gavin and Cordes addressed a similar issue in measuring the impact of the hospital sector on the Pittsburgh Metropolitan Area. The study area included four counties and contained 53 hospitals. The objective of the study was to measure the role of the hospital sector on interregional trade and to assess its impact on the regional economy. Economic base theory was used to derive the multiplier. The results generated a multiplier of 2.69. The study concluded that the hospital sector had a large export component and it generated regional income and employment equal to \$655 million and 22,000 jobs, respectively. This study illustrated that the hospital sector contributed to the export base of the region. Many do not realize that the hospital sector in a large metropolitan area is an export service (due to attracting patients from outside their area) and can contribute greatly to the stability and growth of the local economy.

Impact of Hospitals on a State's Economy

McConner and Wellever completed a research project to measure the impact that Montana hospitals had on the state's economy. The objective of the study was to measure the economic dimensions of the Montana hospital industry on employment, household income, and the level of output of goods and services produced in the state of Montana.

The methodology used for the report was based on an existing Montana input-output model. The results are summarized in **Table 2**. This study clearly measured the significant economic impact of the hospitals in Montana and their impact on the State economy.

²Economic base theory is another model used to estimate secondary impacts. The model requires less data than the input-output model and as a result is easier to implement. For more details and information about the model, see Shaffer, 1989.

Table 2
Montana Hospitals -
Economic Impact

Item	Type II Multiplier ¹	1987 Total	Total Direct, Indirect and Induced
Total Revenue	1.60	\$402,131,432	\$643,410,291
Salaries, Wages, and Professional Fees	1.61	\$196,664,645	\$316,630,078
Employment	1.30	9,000	11,700

Source: McConner and Wellever.

¹ The Type II multipliers measure the indirect and induced impacts. The indirect impacts are the impacts occurring in other sectors due to business spending. The induced impacts are the impacts occurring in other sectors due to household spending. For more details, see Miernyk, 1965.

Impact of Rural Hospitals on the Local Economy

Rural hospitals differ from urban hospitals in that they generally are not serving residents outside the region. Thus, they do not have significant interregional component associated with the hospital sector in the large urban centers. However, they are often large community employers and while the patients do not generally come from outside the local area, much of the income supporting the local hospital sector is from outside the local area. This differs from most other components of the service sector in rural areas and is because of the existence of health insurance---both public and private.

In terms of the public sector, rural hospitals depend heavily on reimbursement from Medicare. For example, hospitals with average daily patient levels of under 37 in Wisconsin had over 40 percent of their revenue originating from Medicare payments (Wisconsin Department of Development). Most of these small hospitals were located in rural areas. The significance of these federal dollars coming into a rural community and state is great. Prinzinger and Uhimchuk measured the impact of Medicaid dollars from South Carolina and Lee completed a similar study for the state of Mississippi. The Mississippi study illustrated that for each state dollar spent on Medicaid that there was a \$3.69 federal match. Lee estimated that from the \$4.69 Medicaid expenditures that \$3.05 would be used as income (wages and salaries). He applied a state income multiplier of 2.172 to this to arrive at a total income impact of \$6.62 on the economy of Mississippi. He further estimated that the \$6.62 would generate 81 cents in state revenue (taxes, fees, etc.). Thus, for each state dollar spent on the Medicaid program, the state would receive the health benefits that \$4.69 would bring as well as 81 cents in returned state revenue. In summary, Medicare and Medicaid payments are important dollars coming into a rural community. These are dollars spent from external funding sources. Turner and Mallory also stress the importance of outside dollars. They concluded:

"The hospital is one of the few economic entities that brings in money from the outside. The monies brought in are the Medicare and Medicaid funds. These are monetary injections into the local economy. As such, they set off a successive round of spending and responding throughout the local economy. Most communities work very hard at economic development to attract firms that will produce a good to be exported and bring in sales revenue. A hospital does just that. Its services are exported since it brings money in from outside."

The difficulties facing rural hospitals are discussed and summarized in articles by Mick and Morloch, and Moscovice. Both of these articles discuss why rural hospitals are in financial trouble, summarizing rural hospitals performance and closure, reviewing alternative delivery systems, and suggesting future research. Both articles indicate the importance of the health sector to the local economy. Through these articles and other sources, six studies were identified which analyzed the impact of a hospital on a rural economy.

Christianson and Faulkner published the first study which measured the impact of a hospital closing on a local economy. They qualified their study by stating:

"The presence of a hospital also might increase the attractiveness of a community for physicians and for retail business and manufacturing firms. Thus, it might indirectly affect the overall level of community economic activity."

Like most studies, they measured the impact of hospital expenditures by employing economic base theory. The study area included rural counties in Idaho, Montana, Nebraska, Nevada, North Dakota, South Dakota, Utah, and Wyoming which contained one hospital. Questionnaires were sent to 180 hospital administrators to gather the necessary data for the economic base model. Results showed that the average hospital spent \$600,000. Depending upon the multiplier used, the total simulated direct, indirect, and induced community income resulting from the hospital was in the range of \$700,000 to \$1,000,000.

The authors concluded that the actual impact of a hospital closing will depend upon the community's response to the closing. There are a large number of possible scenarios. At one extreme the authors stated that:

"The closure could result in out-migration of hospital employees, loss of the community physician, and a gradual decline in the attractiveness of the community as a living environment. In such an instance, the hospital's closure clearly would mean the economic demise of the town."

At the other end, the result might be:

"The closed hospital could be converted to a long-term care facility that employed former hospital personnel. In addition, an emergency medical service system could be created to provide rapid access to acute care for community residents. Under these circumstances, there would be a reasonable probability of retaining the community physician and maintaining the economic and social structure of the community."

Turner and Mallory measured the economic impact of Saunders County Community Hospital in rural Nebraska. The hospital impact study they conducted was slightly different than others as they estimated the income coming to the community from Medicare and Medicaid. They estimated that 73 percent of total hospital revenue, or \$1,278,632, came from Medicare and Medicaid payments. They also estimated that Medicare and Medicaid paid physicians another \$383,196 annually. Thus, total Medicare and Medicaid payments were \$1,661,828. A multiplier of 2 was applied to this to arrive at the total impact of Medicare and Medicaid on the local economy. Their summary statement was:

"The hospital is an export base entity that brings home funds from the outside. As such, it provides a multiplier stimulus that is generally not recognized."

Doeksen, Loewen, and Strawn examined the impact of a rural hospital by applying a simulation model to a community in Eastern Oklahoma. The model is a recursive system of equations built around an input-output model. The base of the simulator model is the input-output model. County input-output models are available for each county in the U.S. through the USDA IMPLAN project³.

Data for the models are organized into a system of accounts. These accounts consist of economic, capital, demographic, community service, and community revenue. The economic account describes the process of economic activity in a given community and includes an input-output model. The capital account allows for creation of additional capacity. Employment, population and income provide the base data for the demographic account. The community service accounts project need, costs and revenue for each service.

The data were gathered and the simulation model applied to the hospital in Stigler, Oklahoma. Stigler is the county seat and the largest community in the county. The Community's 1986 population was estimated at 2,600 people. The community had a county hospital with 54 beds and employed 43 full-time equivalent employees in 1988.

To measure the impact of the hospital, the researchers conducted two runs on the simulation model. The first or baseline run assumed that the hospital and other sectors would maintain the same growth patterns as exhibited during the preceding five years. The second called the impact simulation run, assumed the hospital would close. The results of the study are summarized in **Table 3**. Employment loss during 1988 (the year the hospital is assumed to close) was 51 jobs. This included the 43 hospital jobs. Thus, the indirect or induced loss of jobs in other sectors of the economy was 8 jobs. As employees who lost jobs could not find other employment, migration would begin and more indirect and induced jobs would be lost. The total loss of jobs is 78 in 1992 or five years after the hospital closed. The study also presented estimates of population, income, retail sales and sales tax collection losses from 1988 through 1992. The authors stress that the impact estimates are probably low as the impact simulation run assumes that related health services such as physicians, pharmacies, nursing homes, etc., remain in the community. As related services leave the community, the economic impact of the hospital closure would increase.

Doeksen and Altobelli estimated the impact that three hospitals in Texas would have on their local economy. The model employed is the same simulation model discussed in the previous study for Stigler, Oklahoma. The first scenario reflects the current conditions, with the hospital

³For a description of the project and input-output tables see Alward, Siverts, Olson, Wagner, Serf, and Lindall. Micro IMPLAN Software Manual, University of Minnesota Press, 1989.

Table 3
Changes in Population, Employment, Income, Retail Sales,
and Sales Tax Collections
due to Hospital Closing

Income	Retail Sales	Tax Collection	Year	Stigler Population	Stigler Sales Employment
1988	30	51	\$659,800	\$171,500	\$3,400
1989	60	56	901,400	234,400	4,700
1990	91	63	1,161,500	301,900	6,000
1991	122	69	1,441,700	374,800	7,500
1992	154	78	1,742,800	452,100	9,100

Source: Doeksen, Loewen, Strawn, 1990.

open. This scenario yields five-year projections (baseline scenario) which are based on the actual conditions of the previous five years. In the second scenario, the hospital is assumed to close and the resulting local economic parameters are estimated using the simulation model. The projections of the two scenarios are then compared to determine the economic impact of closure on the community.

The three Texas communities selected for the study were: Crowell, Breckenridge, and Graham. Crowell, with a population of 1,500 is the county seat community in Foard County. The total county population was about 1,900 in 1990. The community is primarily a trade center for the agricultural sector. The county hospital closed in 1987. Prior to closing, the hospital employed 23 people.

Breckenridge is the county seat of Stephens County. The community and county had an estimated population of 6,921 and 9,926, respectively, in 1990. Breckenridge is primarily an agricultural community. It also has a substantial amount of employment in mining and manufacturing. This diversification gives the economy more independence from agricultural cycles and allows the development of a retail trade center and consequently a larger economic base. The 40-bed hospital in Breckenridge employed 54 people and was experiencing economic stress.

Graham, Texas, with an estimated 1990 population of 9,170, is the county seat town of Young County (estimated population of 19,207 in 1990). The economic base is diversified with agriculture, mining, and manufacturing. The community has a large service area and thus, the retail sector is quite large. Graham had an economically sound 43-bed hospital.

The conclusions were that in all three communities, the effects of hospital closure would be detrimental to the vitality of the local economy. As an illustration, the results on employment, income, retail sales, populations, and sales tax for Graham are presented in **Table 4**. The 100 jobs in the hospital result in a total of 128 jobs lost in 1989 and 140 jobs in 1994 if the hospital closed. The 140 jobs lost in 1994 included the 128 jobs lost in 1989. Thus, from 1989 through 1994 an additional loss of 12 jobs occurred. Although the conclusions are clear that the economic impact would be detrimental in all three communities, the issue of relative impact is not as clear. The study concludes:

"It is clear the initial impact on Graham in Young County is greater in terms of absolute numbers. But the analysis of the relative impact leads to a hypothesis that a county as Young, with a more diverse economic base, can better absorb the impacts of a hospital closure than counties like Stephens and Crowell, which have more limited economic opportunities. However, it is important to note that this analysis, with a case-study design and a sample size of three, does not constitute a reasonable test of such a hypothesis."

Table 4

**Impact of Hospital Closing in Graham, Texas
on Selected Variables
from 1989 through 1994**

Year	Employment	Income (\$1,000)	Retail Sales (\$1,000)	Population	One Cent Sales Tax
1989	128	2,045	803	5	8,030
1990	131	2,209	867	9	8,670
1991	133	2,382	935	19	9,350
1992	135	2,565	1,007	29	10,070
1993	137	2,756	1,082	39	10,820
1994	140	2,958	1,161	49	11,610

Source: Doeksen and Altobelli, 1990.

The authors caution users of the empirical results that the model assumes that the other existing medical services will remain unchanged if the hospital closes. Furthermore, the effect that the hospital closing may limit the ability of the community to attract industry, encourage expansion of existing industry, maintain its present population, and attract new residents is not measured by the model.

The most recent study measuring the economic impact of a hospital on rural communities is by McDermott, Cornia, and Parsons. The researchers used survey data and an economic base model. This was the same approach used by Moore, and Christianson and Faulkner. The researchers estimated direct and indirect economic effects of four rural hospitals located in Utah. Hospital A is 20 miles from a regional medical center and serves a rural constituency. Hospitals B and C are in agricultural areas and both are about 80 miles from a major medical center. Hospital D is located in an agricultural and mining area, approximately 150 miles from a major medical center. The estimated employment impacts are presented in **Table 5**.

The direct employment listed in row 1 on **Table 5** is the employment of the hospitals. For example, Hospital A had 330 full-time employees. When these employees were combined with estimated indirect employment of 132 jobs, total area employment resulting from Hospital A was 462 jobs. This represents 4 percent of the service area employment. The authors concluded:

"In evaluating the possible closure of a rural hospital, community leaders should consider the impact this closure will have on the health of the residents who live in communities served. Issues to be reviewed include the continued accessibility of residents to emergency, outpatient, and preventive health care services, and the distance that residents will have to travel to access inpatient health care. In addition, community leaders should also evaluate the impact that a hospital closure will have on the economy of the local community. This is relevant because one of the alternatives to closing a facility that cannot generate revenues sufficient to cover operating expenses is to subsidize the facility, either through private contributions or a tax levy."

Impact of Rural Physicians on a Community

Kleinholz and Doeksen have studied the impact of rural physicians on a community's economy. Again, the community simulation model as discussed above was employed. First, the model generated a baseline tied to the assumption that the physicians would continue to practice. The second run assumed the physicians would not practice in the community. The difference between the two runs measured the impact of the physicians on the community's economy. The study community was Pawhuska, Oklahoma, a community of approximately 5,000 residents located in a relatively isolated part of Oklahoma. Primary data were collected from rural Oklahoma physicians to determine cost and revenue information relative to physicians. These data were entered into the community simulation model to estimate the impact. The community had three

Table 5
Estimated Employment Impact of Four Rural Hospitals in Utah

Item	Hospital			
	A	B	C	D
Number of Jobs Attributed to the presence of the hospital				
Directly (FTE)	330	59	85	192
Indirectly	132	24	19	77
Total	462	83	119	296
Percentage of Average Employment due to Persons of the hospital in the primary service area	4.0	6.5	5.9	9.3

Source: McDermott, Cornia, and Parsons, 1991.

Table 6

**Employment and Income Effects of Physicians
in a Rural Oklahoma Community**

Item	Physicians and Workers in Office	Total Community Effect	Multiplier
Employment	15.2	27	1.78
Income	\$365,471	\$556,480	1.52
Retail Sales		\$419,195	
Sales Tax (3%)		\$12,575	

Source: Kleinholz and Doeksen, 1991.

full-time physicians and one retired physician who worked one day a week. Thus, it was assumed that 3.2 FTE's of physician services were available. The results of the impact study are presented in **Table 6**. It was estimated that the physicians and their offices accounted for 15.2 jobs. Based on an employment multiplier of 1.78, the total community employment effect was 27 jobs. The results also illustrated the impact of the physicians on income, retail sales, and sales tax collections.

The authors note that the model only measured the impact of the physicians. Again, it was assumed that the other medical services would continue as currently provided. In reality, this is not realistic as the hospital, nursing home, etc. would not likely continue to operate without the physicians. Should one physician move or retire, the impact would be 4.75 direct jobs (physician and employees) and 8.4 total jobs created throughout the economy. The study concludes that a physician plays a vital role in the economy of the host community.

Historical Observations of Closed Hospitals on a Community's Economy

Two studies which did not measure the exact economic impact of a hospital closing but rather the impact of access to care and the impact on sense of community were completed by Doelker and Bedics, and Hart, Pirani, and Rosenblatt. Doelker and Bedics conducted a survey of residents to determine what happened after the Century Memorial Hospital closed in 1986. The hospital was located in Century, a community in Northwestern Florida. Personal interviews were conducted with 50 citizens to determine their perceptions of the impact of the hospital closing in their community. The survey results concluded that:

"...the residents stated that they believe the closing of the hospital had a negative impact on the residents of Century, both in loss of health services available and in their sense of community."

The loss of access to health service was evident after the hospital closed because the two local physicians relocated. However, one of the two physicians maintained a part-time office in Century. Because of inadequate transportation, the subsequent reduction in physician services made it more difficult for people to get to a physician, plus the added burden of travel costs.

The loss of community was summarized as follows:

"The closing of the hospital also brought a loss of a sense of community for many Century residents. The hospital cafeteria had been used by the community for social and business lunches and served as a gathering spot for residents."

The Montana Hospital study (McConner and Wellever), also discussed the sense of community resulting from a hospital. The authors concluded:

"Hospitals, along with schools and churches, are among the most prominent institutions in most communities. Hospitals are often either the largest or the next to the largest employer in a community. They play an important role in the life of a

Montana community as families remember the hospital as the place "where Johnnie

was born", "where Dad got well" or "where Grandma died". In many cases, as well as being of economic importance, they are an important part of defining what a particular community means to the people who live in that community.

"Just as the availability of good schools is important to a community seeking to promote economic development, so is the presence of a viable hospital. Viable hospitals will also encourage existing businesses to remain in a community. If a hospital were to close, many of the medical staff are likely to leave town. Nursing homes would become more difficult to retain and a community may lose another major employer."

Hart, Pirani, and Rosenblatt surveyed 132 mayors in communities where the sole hospital had closed between 1980 and 1988. Through a mail and following telephone survey process, they generated a 98.5 percent overall response rate. The study was primarily descriptive. When asked an open-ended question relative to the consequences of the hospital closure, the three effects mentioned most frequently are presented in **Table 7**. The negative economic effect of the hospital closure was mentioned relatively frequently. For example, it was listed first by 18.8 percent of the respondents. Additionally, the negative economic effects of hospital closure were mentioned at least once by more respondents than any other response.

Another survey question asked of the mayors was to specify what effects the hospital closure had on their community's economy. Forty-one percent responded that it hurt their economy greatly, 51 percent said somewhat, and only 7 percent said it did not effect the economy. Then, the mayors that indicated that the community's economy was hurt were asked to indicate the most important way in which the economy was hurt. The result was:

"Of the 74 respondents, 70.7 percent specified job loss as the important effect, while 14.1 percent noted tax and retail revenue loss as most important. Other respondents indicated that the community lost potential retirees and new industry (7.6%), lost professionals and businesses (4.3%), and the health care costs increased (2.2%)."

A recent paper by Hart, Pirani, and Rosenblatt illustrates what happens to physicians after a hospital closes. The study looked at the 132 towns where hospitals had closed during the 80's and compared the number of physicians in the communities two years before closure and two years after closure. During this period 49 percent of the towns had lost physicians and 23 percent had gained physicians. In total, the towns with hospital closures, experienced a decline of 12.8 percent in the number of physicians during the 80's. This compares with an increase of 21.6 percent in the overall number of rural patient care physicians during the decade. The study strongly suggests an association exists between rural hospital closure and local physician supply.

Table 7
Most Common Listed Effects
of Hospital Closure (1980-1988)

Closure Effect	% First Listed	% Listed 1st, 2nd, or 3rd
Loss of services, quality and health	34.7	56.4
Must travel further	33.7	60.4
Economic effects	18.8	63.4

Source: Hart, Pirani, and Rosenblatt, 1991.

Summary of Impact Studies

Without a doubt, all of the impact studies illustrate the importance of the health sector on the economy of the region, state, or community. In general and as expected, the regional or state impacts were larger. Many of the income or employment multipliers were in excess of 2. This is compared to county or community economic multipliers which generally ranged from 1.2 to 1.8. In addition to these impacted secondary impacts as illustrated in the multipliers, the direct impacts are often much larger than residents realize. For example, in rural areas the hospital is often the largest or second largest employer, and many residents are employed with other health services such as the physicians offices, nursing home, pharmacies, etc. If all health related jobs are included and if the secondary impacts of these are included, it would appear that 15 to 20 percent of total community employment is health related or supported.

Another important aspect of health services is that a large proportion of these services are paid for by Medicare or Medicaid funds. These are dollars coming from outside the community which a community will lose if health services are decreased or closed.

RELATIONSHIP BETWEEN HEALTH SECTOR AND RURAL DEVELOPMENT

Most rural development and health experts agree with the hypothesis that a rural area needs a quality health sector if it is to grow and prosper. This section of the literature review summarizes articles and research which address this issue.

Health Sector and Industrial Development

Three reasons were found as to why health care services were important for industrial development. First, industry is looking for a very productive labor force. A productive labor force must be healthy. Thus, investments in health care are expected to yield dividends in the form of increased labor productivity. Selected studies (Chirilos and Nostel; Scott, Smith and Rungeling) suggest that health care can play an important role in labor productivity.

Second, a quality health care sector can be very important in helping communities attract and retain job-creating businesses and industries. Employees and participating management may offer strong resistance if they are asked to move into a community with substandard services. Lyne (1990) reported on a recent site selection survey of corporate executives. The survey respondents gave priority to data delineating the availability of health care. The top rated health care location factors were:

1. availability of publicly run hospitals;
2. availability of privately run hospitals;
3. high percentage of doctors per 1,000 people; and
4. high percentage of available hospital beds per 1,000 people.

Another study by Lyne (1988) concluded that:

"Facility planners paint a dramatic picture of the decisive role quality-of-life (QOL) factors are playing in their location decisions. In fact, almost half say QOL considerations are controlling both initial screening and final site selection."

The study created a QOL factor ranking that included 12 factors. Health care placed sixth in the overall rankings (**Table 8**).

A third reason that the health care sector appears to be important for industrial development involves cost consideration. The site selection survey reported by Lyne (1990) concluded that corporations are taking a serious look at health care costs. Sites which provide health care services at a low cost are sometimes given priority. In fact, seventeen percent of the respondents indicated that their companies are using health care costs as a tie-breaking factor between comparable sites. States frequently cited as having low health care costs included Alabama, Arizona, Iowa, Kentucky, Mississippi, Nebraska, Tennessee, South Dakota, Texas, and Utah.

Table 8
Overall QOL Factor Rankings

Factor	Score
1. Availability of Major Airport	3.12
2. Physical Environment	3.08
3. Transportation System	3.00
4. Nearby Colleges and Universities	2.70
5. Education K-12	2.54
6. Health Care	2.50
7. Cost of Housing	2.45
8. Recreational Amenities	2.44
9. Cultural Amenities	2.42
10. Two-career Family Economic Opportunities	2.41
11. Cost of Living	2.30
12. Climate	2.10

Source: Lyne, 1988.

Several researchers indicate that there is a relationship between infrastructure and attracting businesses and industry. Since health is a very important component of a community's infrastructure, these research results are very important. McGuire conducted a detailed review of the literature and reports:

"...the evidence appears to be that there is a positive and perhaps strong relationship between infrastructure investment and economic development."

Cummings, Schulze, and Mehr, and Helms concluded that there is a relationship between infrastructure and attracting businesses and workers.

Health Care and Attracting Retirees

As noted earlier, attraction of retirees can be an effective economic development strategy. However, the number of studies which measured the importance of health care in influencing or attracting retirees is small. Toseland and Rasch conducted a survey of 878 older persons in 28 communities in the U.S. The survey respondents were selected from 36 unplanned communities and two retirement communities. Respondents were 55 years of age or older. Regression techniques were used to analyze the data. The four items which topped the list as the best predictors of retirement location were safety, recreational facilities, dwelling units, and health care.

A study by Serow analyzed the determinants of interstate in-migration and out-migration for persons 5 to 54 years of age and for persons aged 55 and over. Although the study primarily analyzed the differences in in-migration and out-migration of these two groups, some specific results were available for the elderly group. The regression results indicated that climate and crime were the most important variables predicting in-migration and out-migration for the elderly group. While health care facilities were of lesser importance, they had the expected sign in the regression analysis and were included in the equation for predicting migration.

Reginier and Gelwicks report on preferred supportive services for middle and higher income persons living in either single family homes or apartments. A survey was taken of 221 people 60 years old or older. Results showed that 59.5 percent of in-movers considering a retirement community said health services were in the "must have" category. The only service category above health care was protective services. Another part of the study created a preference index of specific services. Of the 22 services in the survey, the top ten are listed in **Table 9**. Interpreting the table by using the pharmacy as an example, 70.3 percent of the survey respondents indicated that a pharmacy was a "must have" service and 2.7 percent said they "would not want". The difference was the index score. It is clear that health services were extremely important as 4 of the first 10 services were health related.

Table 9
Potential In-Mover Differential Preference
Index of Service and Features

Service	% Most Differential Approved	% Least Approved	Index
Security	73.0	5.4	67.6
Pharmacy	70.3	2.7	67.6
Beauty/Barber Shop	67.6	1.2	61.4
Small Convenience Grocery	64.9	2.7	62.2
Infirmary	63.5	1.4	62.1
Nurse-On-Call	66.2	8.1	58.1
Public Transportation	62.2	5.4	56.8
Restaurant	50.0	2.7	47.3
Physical Therapy	50.0	8.1	41.9

Source: Reginier and Gelwicks, 1981.

A study by Congelosi and McAlhany explored the importance of services and activities as viewed by residents, potential residents and administrators of congregate living facilities. These facilities are defined as dormitory-type facilities in which residents lease, rent, or purchase rooms and share a centralized dining room and other various facilities such as maid service. A survey was sent to the administrators of 80 facilities in North Carolina, Georgia, and South Carolina. Focus group interviews were conducted in eight of the congregate facilities to obtain resident opinions. Four focus group interviews were conducted with elderly persons not currently residing in a congregate facility. These persons were classified as potential residents. Survey respondents were asked to rank the importance of 34 nonphysical, physical, or service activities. The top 10 services or activities are listed in **Table 10**. The only activities relative to health care were a visiting doctor and a physical therapist. The residents and potential residents ranked a visiting doctor as number 10 and the administrators ranked a visiting doctor as ninth in importance. The residents ranked a physical therapist as the ninth most important service.

Table 10

Top 10 Services and Activities as Ranked by Administrators, Residents, and Potential Residents of Congregate Facilities

Services and Activities

Rank	Resident	Potential Residents	Administrators
1	Library	Walking/Exercise	Cable TV
2	Walking/Exercise	Picnicking	Beauty/Barber Shop
3	Security Guards	Library	Scheduled Transportation
4	Scheduled Transportation	Cable TV	Concerts
5	Washers/Dryers	Beauty/Barber Shop	Security Guards
6	Shopping Trips	Scheduled Transportation	Shopping Trips
7	Cable TV	Security Guards	Walking/Exercise
8	Beauty/Barber Shop	Washer/Dryer	Washer/Dryer
9	Physical Therapist	Shopping Trips	Visiting Doctor
10	Visiting Doctor	Visiting Doctor	Library
	Picnicking	Movies	

Source: Congelosi and McAlhany, 1989.

PROCEDURES TO MEASURE COMMUNITY IMPACT

This section will briefly review community economics and provide three methods to use to estimate specific community health impacts. An understanding of community economics is extremely important as leaders attempt to retain health dollars in their community.

Overview of a Community's Economy

The foundation of a community's economy are those businesses which sell some or all of their goods and services to buyers outside of the community. Such a business is a basic industry. The flow of products out of, and dollars into, a community are represented by the two arrows in the upper right portion of **Figure 1**. To produce these goods and services for "export" outside the community, the basic industry purchases inputs from outside the community, (upper left portion of **Figure 1**), and inputs from service industries located within the community, (right side of **Figure 1**). The flow of labor, goods, and services in the community is completed by households using their earnings to purchase goods and services from the community's service industries (bottom of **Figure 1**). It is evident from the interrelationships illustrated in **Figure 1** that a change in any one segment of a community's economy will have reverberations throughout the entire economic system of the community.

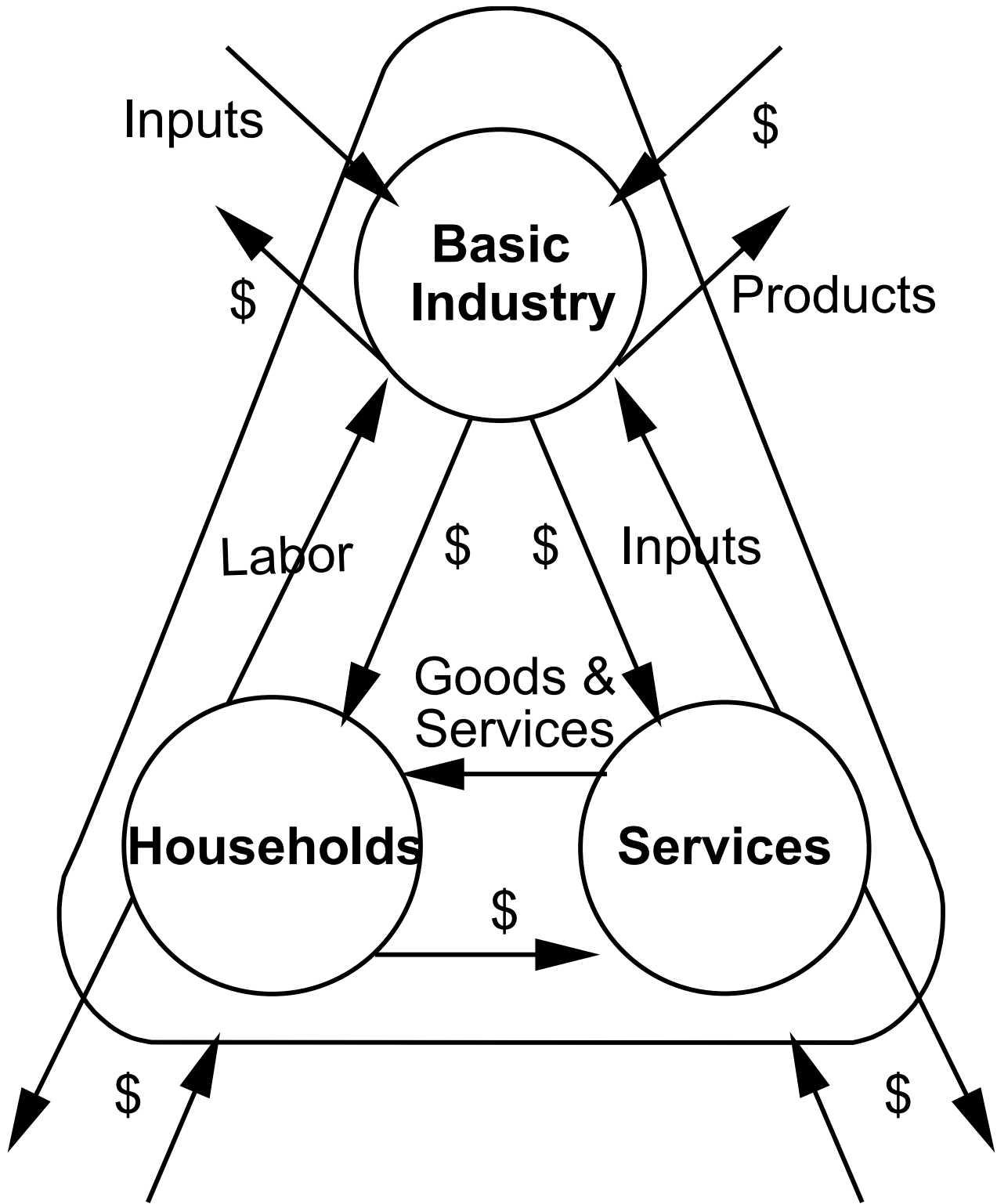
Consider for instance the closing of a hospital. The services sector will no longer pay employees, and dollars going to households will stop. Likewise, the hospital will not purchase goods from other businesses, and dollar flow to other businesses will stop. This decreases income in the "households" segment of the economy. Since earnings decrease, households decrease their purchases of goods and services from businesses within the "services" segment of the economy. This in turn decreases these businesses' purchases of labor and inputs. Thus, the change in the economic base works its way throughout the entire local economy.

The total impact of a change in the economy consists of direct, indirect, and induced impacts. Direct impacts are the changes in the activities of the impacting industry, such as the closing of a hospital. The impacting business, such as the hospital, changes its purchases of inputs as a result of the direct impact. This produces indirect impacts in the business sectors. Both the direct and indirect impacts change the flow of dollars to the community's households. The households alter their consumption accordingly. The effect of this change in household consumption upon businesses in a community is referred to as an induced impact.

A measure is needed that yields the effects created by an increase or decrease in economic activity. In economics, this measure is called the multiplier effect. A Type III multiplier is used in this report. It is defined as:

TYPE III - is the ratio between direct employment, or that employment used by the industry initially experiencing a change in final demand and the direct, indirect and induced employment.

FIGURE 1
OVERVIEW OF COMMUNITY ECONOMIC SYSTEM



A Type III employment multiplier of 3.0 indicates that if one job is created by a new industry, 2.0 jobs are created in other sectors due to business (indirect) and household (induced) spending. Secondary benefits as specified in the previous section include the indirect and induced effects.

Models to Measure the Impact of the Health Sector

Because a large number of users have a need to estimate health sector impact and because different detail of analysis is needed, three methodologies have been developed. These include:

1. Single or aggregate health sector method;
2. Disaggregated health sector method; and
3. A dynamic health sector method.

The single or aggregate method simply involves gathering primary community health data and IMPLAN health sector multipliers. The disaggregate method employs a spreadsheet, primary community health data, and sector IMPLAN multipliers. The dynamic model employs a spreadsheet, primary community health data, sector IMPLAN multipliers, and estimated future health activities. Data needs for the aggregate and detailed sector analysis are basically the same. Because of this, their data needs will be presented jointly. However, the output will be presented separately. The dynamic method requires the data of the aggregate method plus additional future estimates. It will be presented separately as it generates a significant amount of additional output.

Data Needs for Aggregate and Disaggregate Sector Analysis

Both the aggregate and detailed sector approach requires specific local data. Local leaders need to supply health sector employment and personal income data. For illustration purposes, consider XYZ community. Data needs are reflected in **Table 11**. It is imperative that all employment data and as much personal income data as possible, are completely provided. If income data are not provided, income needs can be estimated based on employment type (i.e.; nurses, doctors, secretaries, etc.). The aggregate method utilizes only the total figures on **Table 11**, whereas the disaggregate method utilizes sector health data. The disaggregated sector model will provide more accuracy as specific sectors are weighted according to business activity. A blank form of **Table 11** is presented in **Appendix A**. Professionals desiring to employ either the aggregate or disaggregate method can request that local decision makers complete this form.

Another data need is the local retail sales capture ratio. This is the ratio of personal income dollars spent locally on items on which sales taxes are collected. A method to obtain this is simply to calculate the ratio of retail sales to community personal income. Retail sales may have to be developed from sales tax collection data. For instance, if a community has a one percent sales tax rate and collects annually \$10,000, the retail sales would be \$1,000,000. This in turn is used with the personal income estimate to determine the local retail sales capture ratio. For the example, the retail sales capture ratio is .3. The sales tax rate for XYZ community is assumed to be 1 percent.

Table 11

**Local Annual Data Needed for
Health Sector Impact Analysis
(Aggregate Sector and Detailed Sector)**

Sector		Employees	Payroll
Hospital	Subtotal	65	\$1,561,968
Physicians, Dentist and other Professionals			
Physicians		24	740,000
Dentist		9	248,000
Optometrists		3	133,500
Other Physicians		<u>0</u>	<u>0</u>
	Subtotal	36	1,121,500
Nursing Homes and other Residential Facilities			
Nursing Homes		100	1,510,000
Retirement Centers		<u>0</u>	<u>0</u>
	Subtotal	100	1,510,000
Other Medical and Health			
Home Health Care		7	175,000
County Health Department		7	175,000
Other Medical Services		<u>0</u>	<u>0</u>
	Subtotal	14	350,000
Pharmacies	Subtotal	<u>16</u>	<u>488,000</u>
	TOTAL	<u>231</u>	<u>\$5,031,468</u>

Once the local decision makers provide the data in **Table 11**, the retail sales capture ratio is calculated and the sales tax rate is determined, the professional can simply obtain the county IMPLAN multipliers for the health sector and complete the analysis. The IMPLAN model has

the following health sectors:

- Hospitals (492)
- Doctors and Dentists (490)
- Nursing and Residential Facilities (491)
- Other Medical and Health Services (493)
- Pharmacies (455)

For the aggregate analysis, these five sectors are combined into one health sector and one income and employment multiplier is calculated. For the disaggregated approach, multipliers are obtained for each sector.

Aggregate Analysis

Aggregate analysis output for community XYZ is presented in **Table 12**. Data to complete this analysis were obtained from **Table 11** and from IMPLAN. For XYZ community, the health sector income multiplier from IMPLAN was 1.23 and the employment multiplier was 1.32. By using these multipliers with the direct information, impact estimates for the health sector are derived. Users merely have to take the direct impact data from **Table 11**, and use the multipliers to derive the total direct and secondary impacts ($1.32 \times 231 = 305$ for employment and $1.23 \times \$5,031,468 = \$6,188,706$ for income). The sales capture ratio is applied to the income estimate to derive the retail sales estimate ($\$6,188,706 \times .3 = \$1,856,611$). Finally, the sales tax rate is multiplied times the retail sales to estimate sales tax collections ($\$1,856,611 \times .01 = \$18,566$). The total health sector impact for community XYZ is 305 jobs, \$6,188,706 personal income and \$1,856,611 retail sales, and \$18,566 sales tax collections. This procedure can be completed in a few minutes with a simple calculator. **Appendix Table 2** was created such that a user simply has to complete the table and the impact analysis is complete.

Detailed Sector Analysis

A spreadsheet was developed for this project to make it extremely easy to conduct a detailed health sector analysis for a community. Data from **Table 11**, the retail sales capture ratio and sales tax rate as discussed above are needed. These are entered on the spreadsheet as it appears on the screen in the same format as **Table 11**. In addition, the spreadsheet needs IMPLAN multipliers for the specific health sectors. These are presented in **Table 13** as they appear on the spreadsheet. Once these are entered, the spreadsheet will produce the output as presented in **Table 14**.

Table 12

**Employment, Income, Retail Sales, and
Sales Tax Collections Resulting From
Health Sector for Community XYZ**

Item	Health Sector Workers (Direct Impact)	Total Community Effect (Direct and Secondary Impacts)	Multiplier
Employment	231	305	1.32
Income	\$5,031,468	\$6,188,706	1.23
Retail Sales	\$1,509,440	\$1,856,611	
Sales Tax	\$15,094	\$18,566	

The data on the table clearly demonstrates the impact for each health sector and for the total health sector. For example, the hospital has 65 employees and the IMPLAN multiplier for that sector is 1.46. Total employment impact is 95. Total income from the hospital activities is \$2,239,727, retail sales \$671,918, and one cent sales tax collections are \$6,719. The spreadsheet also produces a pie chart which illustrates employment by sector. The pie chart is presented in **Figure 2**.

Data Needs for the Dynamic Analysis

The positive aspect of the dynamic approach is that growth or decline can be measured over time. This is especially crucial if large health projects are going to be constructed in the future or if components of the health sector are closing. Data needs for the dynamic analysis include the primary data in **Table 11**, the IMPLAN multipliers in **Table 13**, and future employment or construction needs as depicted in **Table 15**. For this table, local decision makers must estimate how they anticipate employment to change over the next five years. For example, the hospital administrator has an idea where he/she plans on expanding or contracting services and thus can estimate future hospital employment.

If total construction costs are known, the model estimates jobs created during the construction phase. The new jobs created in the health sector have to be estimated and included in the employment estimate of **Table 15**. A blank form of **Table 15** is presented in **Appendix Table 3** for easy use by local officials and professionals using this spreadsheet.

Dynamic Sector Analysis

If the dynamic sector analysis is completed for XYZ community and the data are assumed as presented in **Tables 11, 13, and 15**, output consists of a detailed sector analysis exactly like **Table 14, Table 16, and Figures 3 through 7**. Multi-year data are presented in **Table 16**. Included in this table are estimates of health sector employment and income for the next five years and aggregate estimates of revenue, retail sales and sales tax collections. For XYZ community, employment in year 2000 is estimated at 470 with 95 being in the hospital, 55 in doctors and dentists offices, etc. Likewise, the data in **Table 16** indicates total income and health sector income impacts. **Figures 3, 4, and 5** indicate how jobs, income, and tax revenues are expected to change over time. **Figures 6 and 7** provide data relative to sector employment for the first and final year of the analysis.

Figure 2.
Total Employment Generated by Health Activities

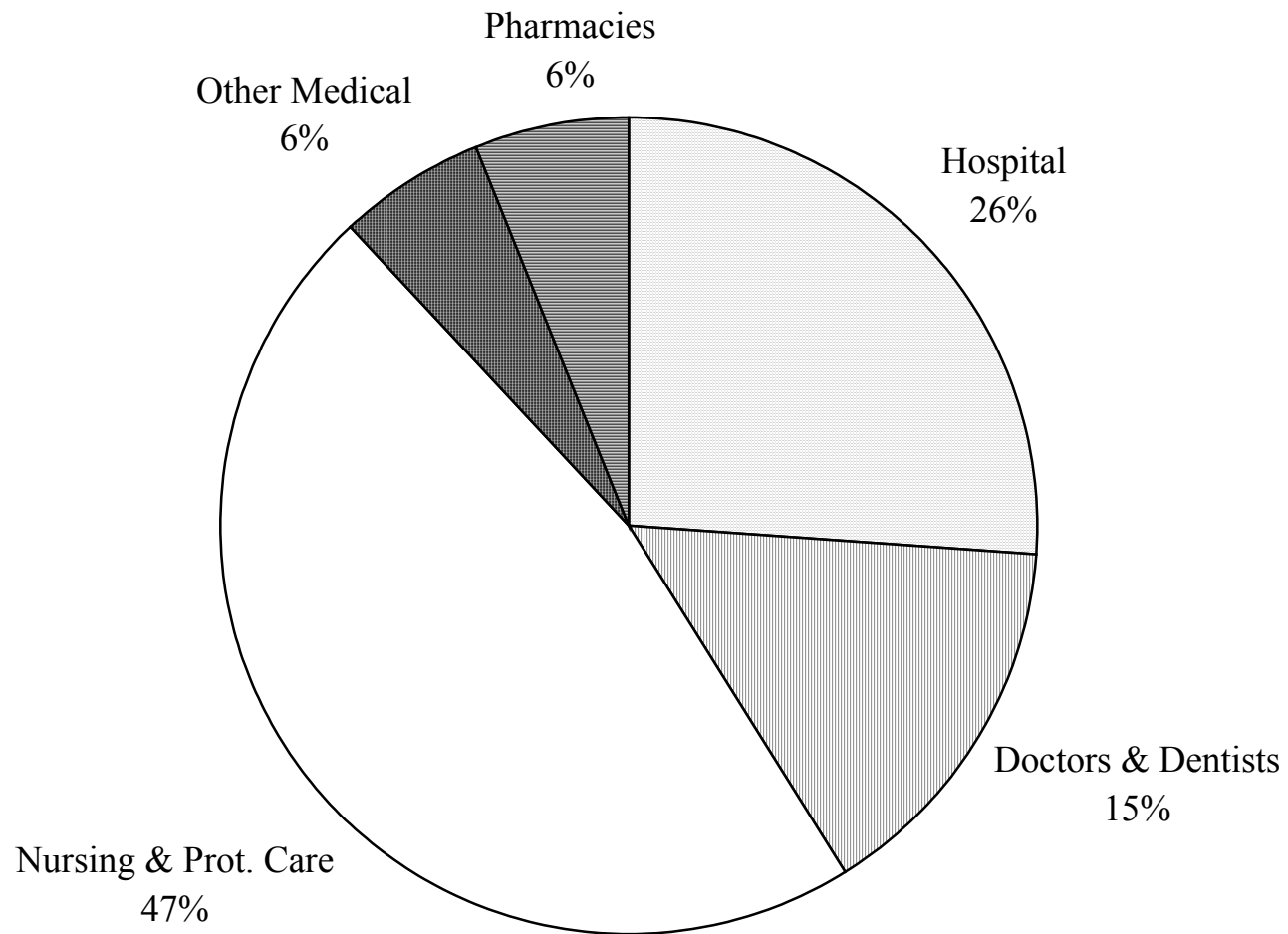


Table 13
 IMPLAN Data Needed for
 Spreadsheet for Measuring
 Aggregate Impacts over Time

LOCAL MULTIPLIERS								
IMPLAN	Output Table 602		Income Table 603			Employment Table 606		
	Sector	Total	Direct	Total	Multiplier	Direct	Total	Multiplier
Construction	49	1.3927	0.2666	0.4017	1.50	13.5501	22.5224	1.66
Miscellaneous Retail	455	1.9155	0.5370	0.8304	1.55	47.5555	68.4825	1.44
Doctors/Dentists	490	1.4697	0.5109	0.6701	1.31	19.3280	29.7326	1.54
Hospitals	492	1.9867	0.7354	1.0545	1.43	49.0544	71.6250	1.46
Nursing & Protective Care	491	1.4885	0.4150	0.5657	1.36	15.0808	25.2716	1.68
Other Medical & Health	493	1.6181	0.5370	0.8304	1.55	21.9654	35.1489	1.60

Table 14

Specific Health Sector Impacts for Static Analysis

	Hospitals	Physicians, Dentists & Other Professionals	Nursing & Protective Care	Other Medical and Health Services	Pharmacies	Total
Employment						
Direct	65	36	100	14	16	231
Multiplier	1.46	1.54	1.68	1.60	1.44	
Total	95	55	168	22	23	363
Income						
Direct	\$1,561,968	\$1,121,500	\$1,510,000	\$350,000	\$488,000	\$5,031,468
Multiplier	1.43	1.31	1.36	1.55	1.55	
Total	\$2,239,727	\$1,470,967	\$2,058,330	\$541,229	\$754,628	\$7,064,881
Revenues						
Direct	\$2,123,971	\$2,195,146	\$3,638,554	\$651,769	\$908,752	\$9,518,192
Multiplier	1.99	1.47	1.49	1.62	1.92	
Total	\$4,219,692	\$3,226,206	\$5,415,988	\$1,054,628	\$1,740,715	\$15,657,229
Retail Sales	\$671,918	\$441,290	\$617,499	\$162,369	\$226,388	\$2,119,464
Sales Taxes	\$6,719	\$4,413	\$6,175	\$1,624	\$2,264	\$21,195

Table 15
Additional Data Needs
for Dynamic Analysis

Employment Changes	1996	1997	1998	1999	2000
Hospitals	65	65	65	65	65
Doctor & Dentists Offices	36	36	36	36	36
Nursing and Protective Care Facilities	100	100	150	150	150
Other Medical & Health	14	14	14	14	14
Pharmacies	<u>16</u>	<u>16</u>	<u>16</u>	<u>16</u>	<u>16</u>
TOTAL	231	231	281	281	281
Construction Plans					
Hospitals	0	0	0	0	0
Doctors & Dentists Offices	0	0	0	0	0
Nursing & Protective Care Facilities	0	1,000,000	0	0	1,000,000
Other Medical & Health Facilities	0	0	0	0	0
Pharmacies	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>
TOTAL	<u>0</u>	<u>1,000,000</u>	<u>0</u>	<u>0</u>	<u>1,000,000</u>

Table 16

Annual Health Sector Impacts on Community Employment and Income

SECTOR	1995	1996	1997	1998	1999	2000
Employment						
Hospital	95	95	95	95	95	95
Doctors & Dentists	55	55	55	55	55	55
Nursing and Protective Care	168	168	168	251	251	251
Other Medical & Health	22	22	22	22	22	22
Pharmacies	23	23	23	23	23	23
Construction	0	0	23	0	0	23
TOTAL	363	363	386	447	447	470
Income						
Hospital	2,240	2,240	2,240	2,240	2,240	2,240
Doctors & Dentists	1,471	1,471	1,471	1,471	1,471	1,471
Nursing and Protective Care	2,058	2,058	2,058	3,087	3,087	3,087
Other Medical & Health	541	541	541	541	541	541
Pharmacies	755	755	755	755	755	755
Construction	0	0	402	0	0	402
TOTAL	7,065	7,065	7,467	8,094	8,094	8,496
Total Revenues (\$'000)	9,518	9,518	10,518	11,337	11,337	12,337
Total Retail Sales (\$'000)	2,119	2,119	2,240	2,428	2,428	2,549
Total Sales Taxes (\$'000)	21	21	22	24	24	25

Figure 3
Impact of Community Medical Sector -- Output and Income

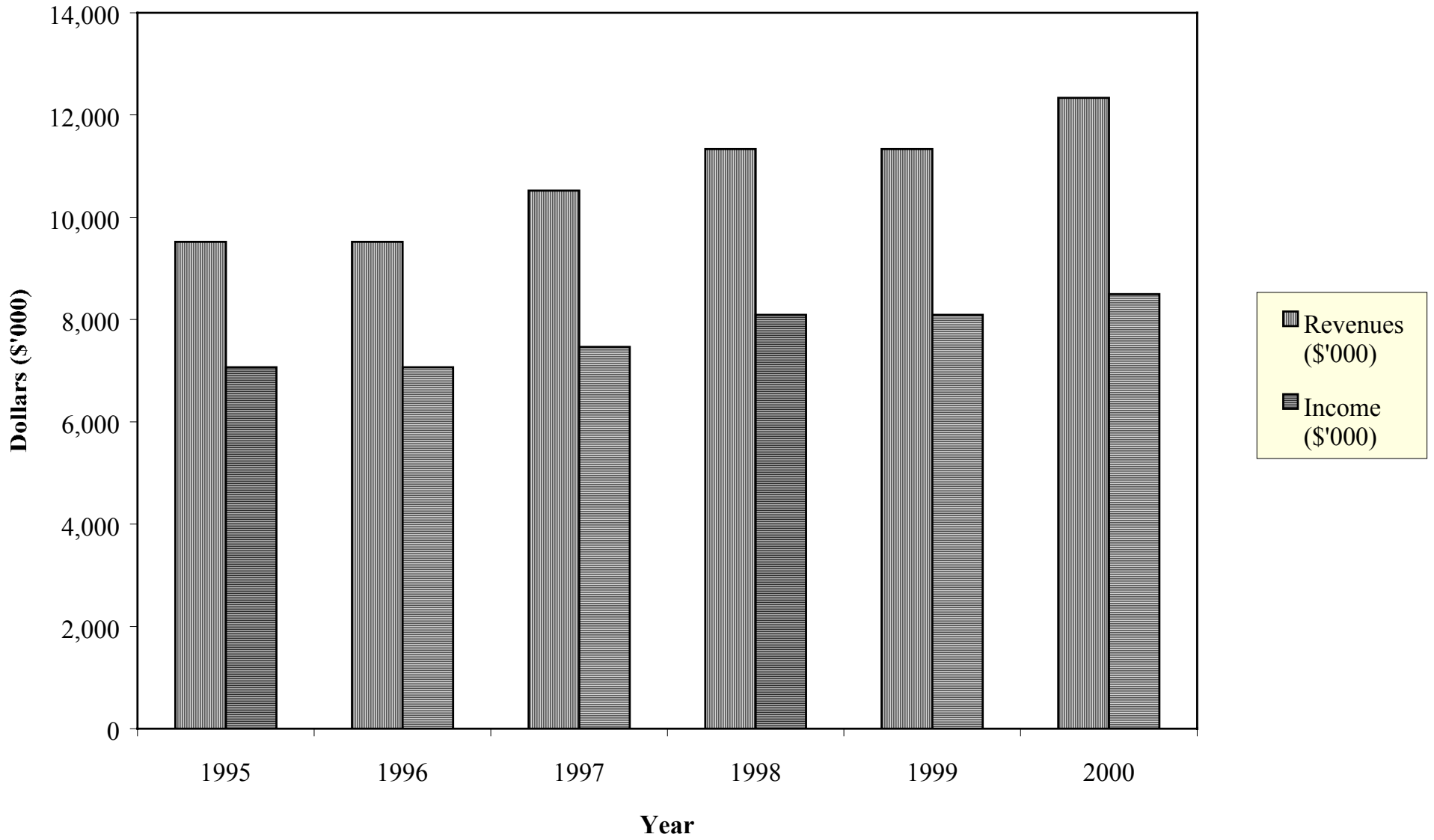


Figure 4
Impact of Community Medical Sector -- Jobs

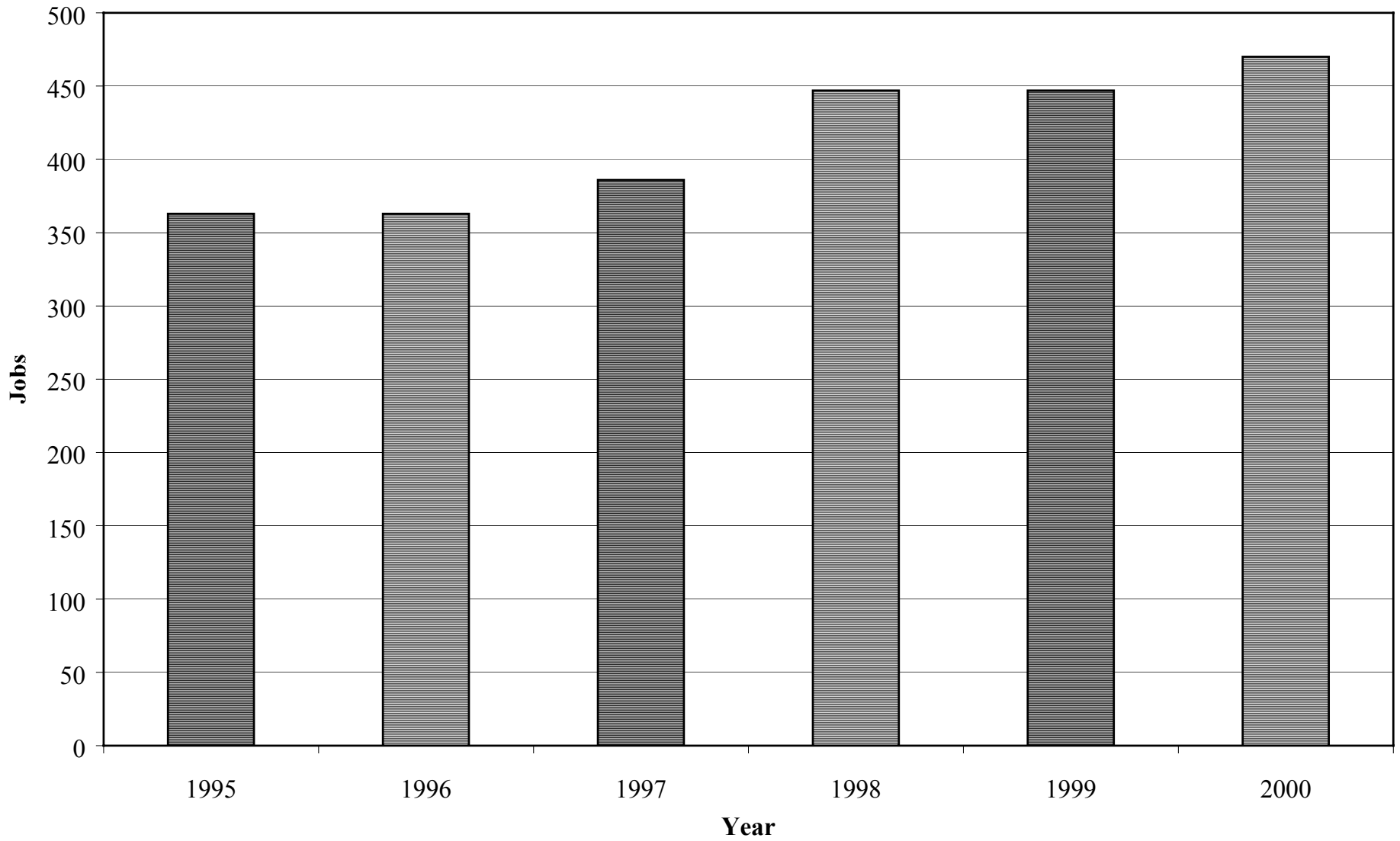


Figure 5
Impact of Community Medical Sector -- Tax Revenues

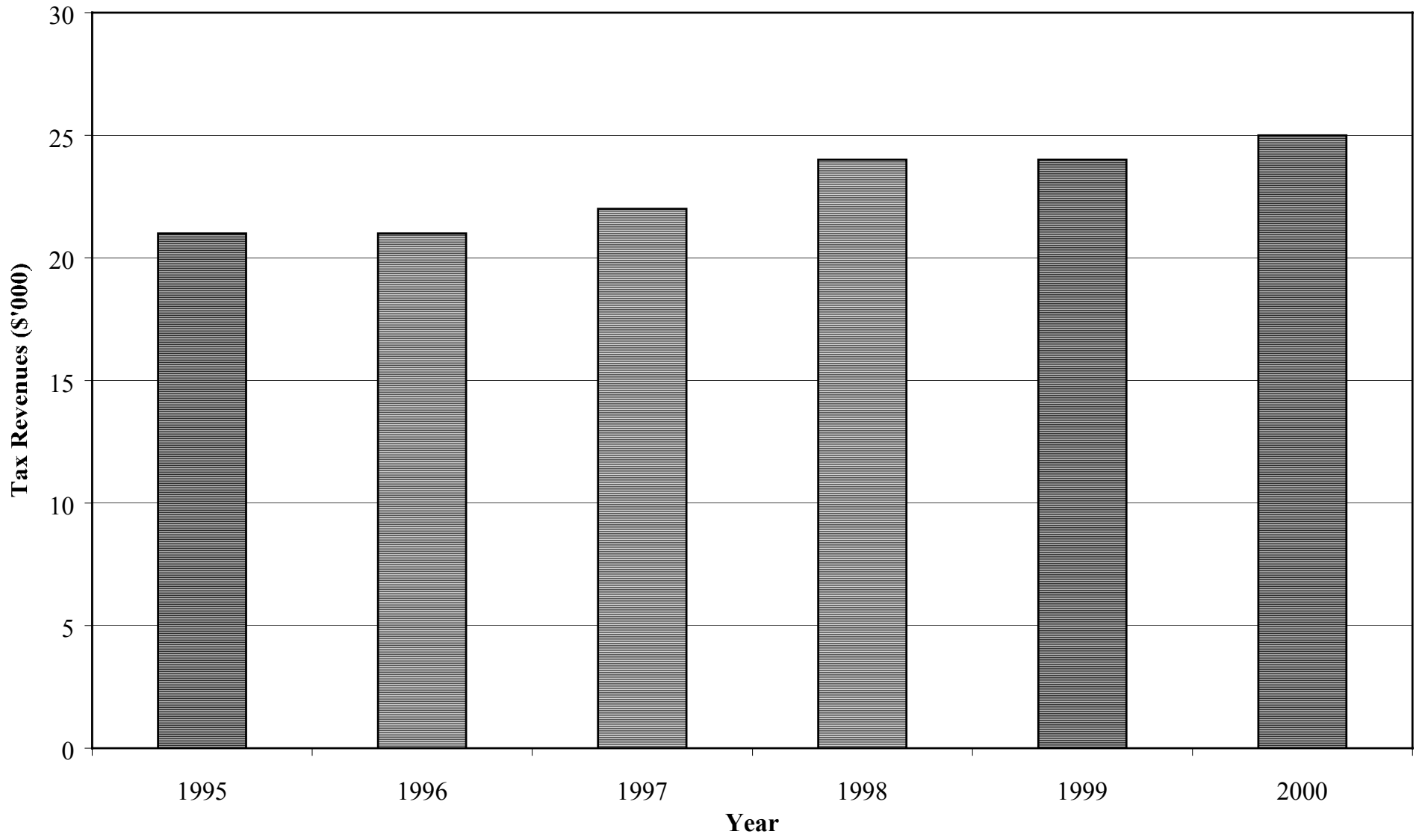


Figure 6
Total Employment Generated by Health Activities in First Year

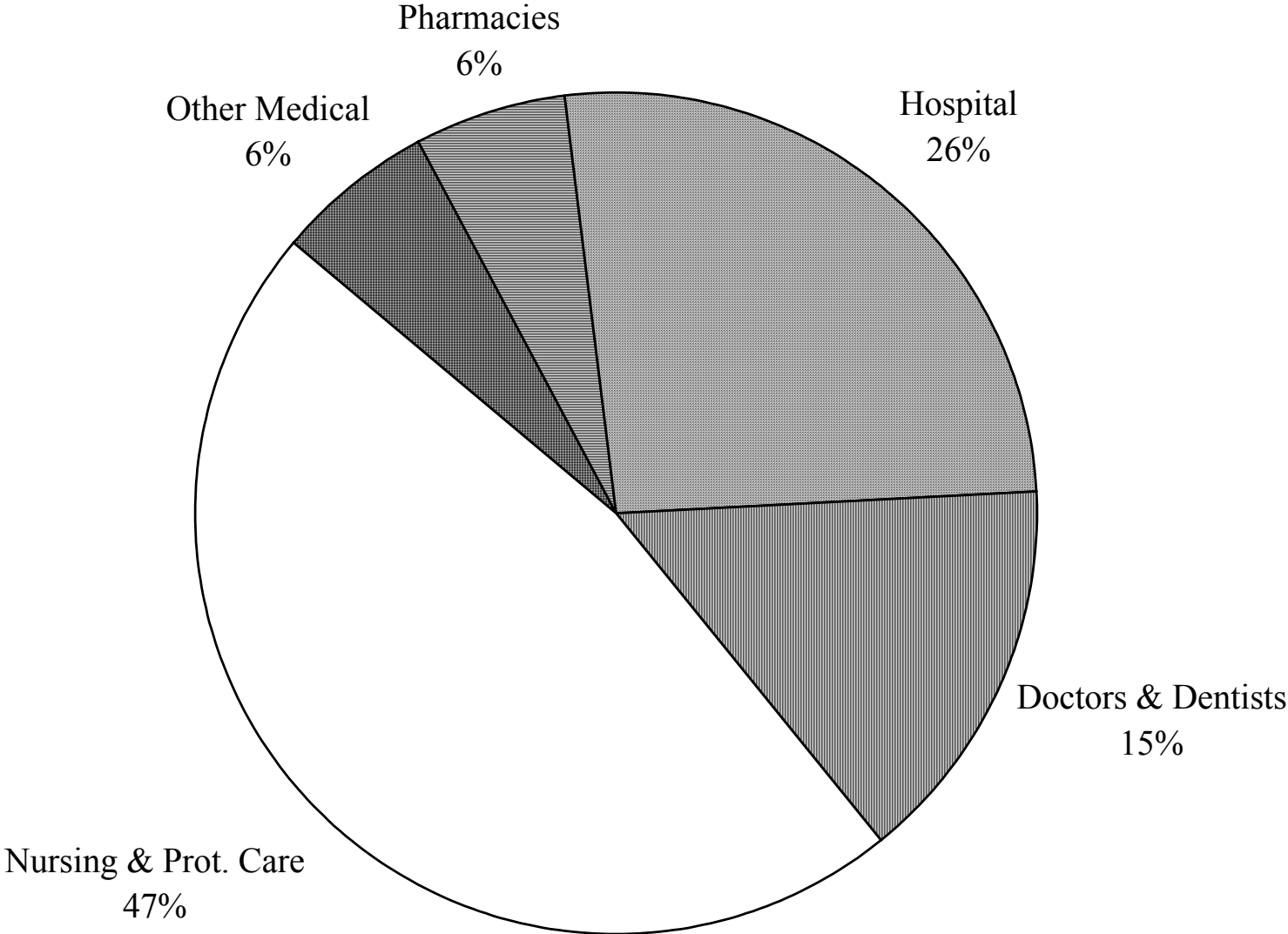
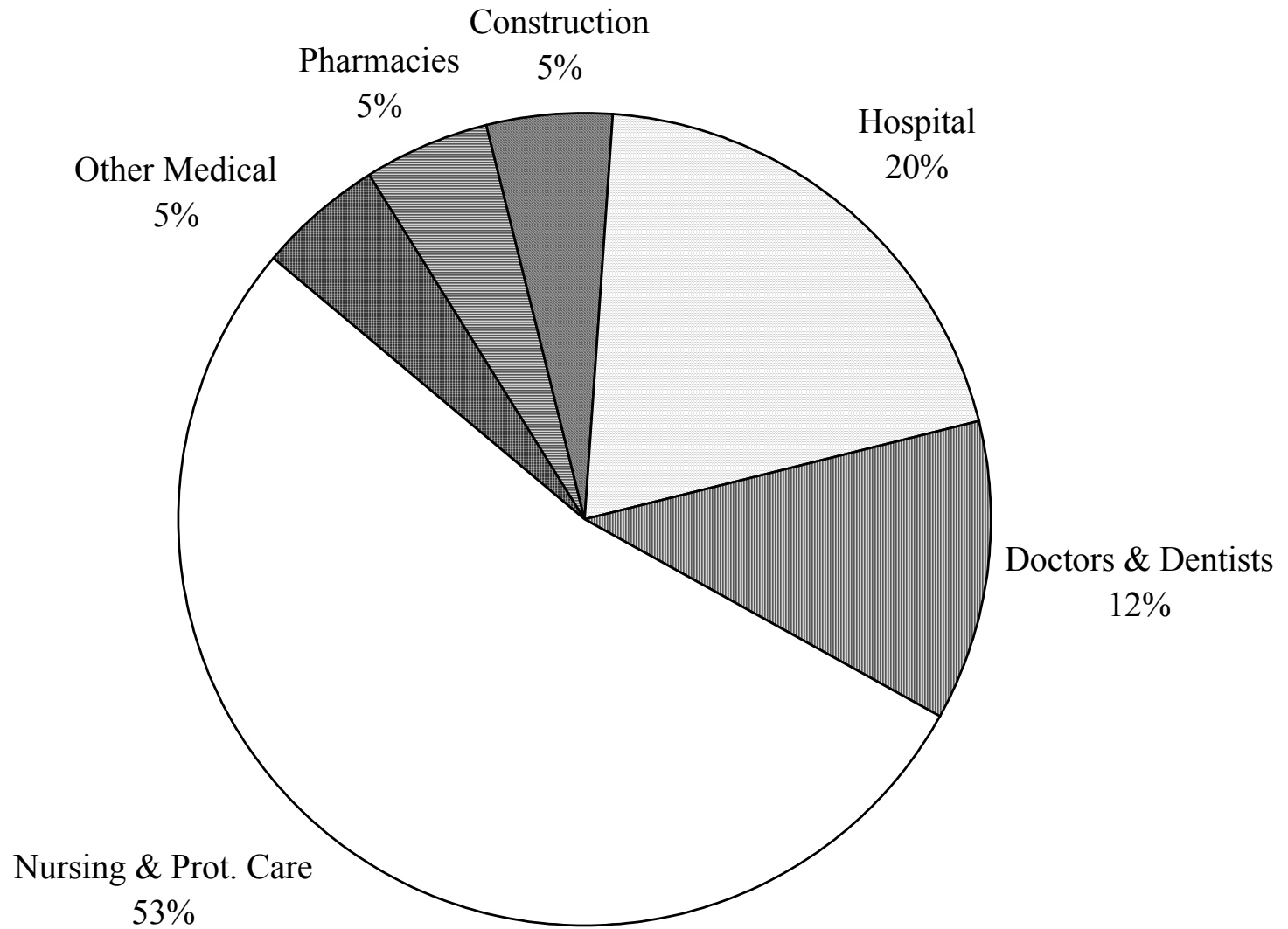


Figure 7
Total Employment Generated by Health Activities in Final Year



SUMMARY

Because of the intense interest by local decision makers to maintain a viable health sector to promote economic development, this study was completed. The study reviews the literature of studies completed that measure the economic importance of the health sector as well as develops three procedures to measure the impact. The literature review resulted in the conclusion that the direct and secondary impacts on community employment and income often account for 15 to 20 percent of the total community's employment and income. In addition, the literature strongly supports the conclusion that a viable health sector is needed if a community wants to attract industry, business, or retirees.

Three procedures were developed which can be used to measure the economic impact of the health sector on a local economy. An aggregate approach measures employment and income impacts for the health sector. A disaggregate approach employs a spreadsheet and measures the economic impact of five health sectors. These include hospitals; doctors and dentists; nursing home and residential facilities; other medical and health services; and pharmacies. A dynamic approach was also developed via a spreadsheet to measure disaggregate health sector impacts for the next five years. All three approaches can easily be completed with the spreadsheet and this publication.

Selected References

- Alward, Greg, Eric Siverts, Doug Olson, John Wagnor, David Serf, and Scott Lindall. Micro IMPLAN Software Manual. University of Minnesota Press, 1989.
- Chirilos, Thomas N. and Gilbert Nostel. "Further Evidence on the Economic Effects of Poor Health." Review of Economics and Statistics. 67(1), February 1985, pp. 61-69.
- Christianson, Jon B. and L. Faulkner. "The Contribution of Rural Hospitals to Local Economies." Inquiry. 18(1), 1981, pp. 46-60.
- Congelosi, J. D. and J. W. McAlhany. "Congregate Retirement Communities." Journal of Health Care Marketing. 9(1), 1989, pp. 48-54.
- Cummings, Ronald G., William D. Schulze, and Arthur F. Mehr. "Optional Municipal Investments in Boomtowns: An Empirical Analysis." Journal of Environmental Economics and Management. 5(3), 1978, pp. 252-267.
- Doeksen, Gerald A. and Joyce Altobelli. The Economic Impact of Rural Hospital Closure: A Community Simulation. The University of North Dakota Rural Health Research Center. 1990.
- Doeksen, Gerald A., Sam Cordes, and Ron Shaffer. Health Care's Contribution to Rural Economic Development. Unpublished paper prepared for Federal Office of Rural Health. December 1992.
- Doeksen, Gerald A., R. A. Loewen, and D. A. Strawn. "A Rural Hospital's Impact on a Community's Economic Health." The Journal of Rural Health. 6(1), 1990, pp. 53-64.
- Doeksen, Gerald A. and Deborah A. Miller. "Rural Physicians Make Good Economic Sense." Oklahoma Medical Association Journal. Vol. 81, Sept. 1988, pp. 568-574.
- Doelker, Richard E. Jr. and Bonnie C. Bedics. "Impact of Rural Hospital Closings on the Community." Social Work. November 1989, pp. 541-543.
- Erickson, R. A., N. I. Gavin, and S. Cordes. Service Industries in Inter-regional Trade: The Economic Impacts of the Hospital Sector. Growth and Change: A Journal of Public, Urban, and Regional Policy. 17(1), 1986, pp. 17-27.
- Hart, Gary L., Michael J. Pirani, and Roger A. Rosenblatt. Rural Hospital Closure and Local Physician Supply. Rural Health Working Paper Series #16, WAMI Rural Health Research Center. December 1991.
- Hart Gary, Michael J. Pirani, and Roger A. Rosenblatt. "Causes and Consequences of Rural Small Hospital Closures from the Perspective of Mayors." The Journal of Rural Health. 7(3), Summer 1991, pp. 222-245.

- Helms, L. Jay. "The Effect of State and Local Taxes on Economic Growth: A Time Series - Cross Sections Approach." Review of Economics and Statistics. 67(4), November 1985, pp. 574-5.
- Kleinholz, Sharon and Gerald A. Doeksen. "The Impact of Rural Hospitals and Rural Physicians on the Economy of a Rural Community." Paper presented at the 1991 Western Multi-Conference on Simulation in Anaheim, California. January 16, 1991.
- Lee, Daniel K. "Economic Impact of the Mississippi Medicaid Program on the Economy of Mississippi." Unpublished paper for the Center for Policy, Research and Planning, Institutions of Higher Learning, State of Mississippi, Jackson, MS. December 1988.
- Lichty, R. W., W. A. Jesswein, and D. J. McMillan. "Estimating Medical Industry Impacts on a Regional Economy." Medical Care. 24(4), 1986, pp. 350-358.
- Lyne, Jack. "Health Care and Education?: Important QOL Factors, but Who's Accurately Measuring Them?" Site Selection. 35(5), 1990, pp. 832-838.
- Lyne, Jack. "Quality-of-Life Factors Dominate Many Facility Location Decisions." Site Selection Handbook. Vol. 33, August 1988, pp. 868-870.
- McConner, R. J. and A. L. Wellever. The Economic Impact of Montana Hospitals. Department of Agricultural Economics Staff Paper 89-2, Montana State University, Bozeman, MT. 1989.
- McDermott, R. E., G. C. Cornia, and R. J. Parsons. "The Economic Impact of Hospitals in Rural Communities." The Journal of Rural Health. 7(2), 1991, pp. 117-132.
- McGuire, T. On the Relationship Between Infrastructure Investment and Economic Development. Stony Brook: State University of New York. 1986.
- Mick, Stephens S. and Laura L. Morloch. "America's Rural Hospitals: A Selective Review of 1980's Research." The Journal of Rural Health. 6(4), October 1990, pp. 437-466.
- Miernyk, W. H. Elements of Input-Output Economics. Random House. 1965.
- Moore, C. L. "The Impact of Public Institutions on Regional Income; Upstate Medical Center as a Case in Point." Economic Geography. 50(2), 1974, pp. 124-129.
- Moscovice, Iva S. "Rural Hospitals: A Literature Synthesis and Health Services Research Agenda." Health Services Research. 23(6), 1989, pp. 891-930.
- Prinzinger, Joseph M. and George A. Uhimchuk. "The Effects of the Medicaid Reinforced Multiplier: Using South Carolina as an Example." Paper presented at the American Economic Association and Allied Social Services Association Meetings. December 1987.

- Reginer, V. and L. E. Gelwicks. "Preferred Supportive Services for Middle to Higher Income Retirement Housing." The Gerontologist. 21(1), 1981, pp. 54-58.
- Scott, Loren C., Lewis H. Smith, and Brian Rungeling. "Labor Force Participation in Southern Rural Labor Markets." American Journal of Agricultural Economics. 59(2), May 1977, pp. 266-274.
- Serow, W. J. "Determinants of Interstate Migration: Differences Between Elderly and Non-Elderly Movers." Journal of Gerontology. 42(1), 1987, pp. 95-100.
- Shaffer, Ron. Community Economics: Economic Structure and Change in Smaller Communities. Iowa State University Press, Ames, Iowa. 1989.
- Toseland, R. and J. Rasch. "Factors Contributing to Older Persons' Satisfaction with their Communities." The Gerontologist. 18(4), 1978, pp. 395-402.
- Turner, Keith K. and Fran Mallory. Economic Impact Study - Saunders County Community Hospital. Report prepared by College of Business Administration, University of Nebraska, Omaha, NE. October 1991.
- U. S. Bureau of the Census. Statistical Abstract of the United States. 1994 and 1995.
- Wisconsin Department of Development, Division of Community Development. "Rural Health Briefing Package." Prepared by M. Jane Thomas for Rural Development Issues Conference. February 1992.

Appendix A
Appendix Table 1

**Form to Collect Local Data for
Aggregate Sector and Detailed Sector**

Sector		Employees	Payroll
Hospital	Subtotal	_____	_____
Physicians, Dentist and other Professionals		_____	_____
Physicians		_____	_____
Dentist		_____	_____
Optometrists		_____	_____
Other Physicians		_____	_____
	Subtotal	_____	_____
Nursing Homes and other Residential Facilities			
Nursing Homes		_____	_____
Retirement Centers		_____	_____
	Subtotal	_____	_____
Pharmacies		_____	_____
Other Medical and Health			
Home Health Care		_____	_____
County Health Department		_____	_____
Other Medical Services		_____	_____
	Subtotal	_____	_____
TOTALS		=====	=====

Appendix A
Appendix Table 2

**Form For Employment, Income, Retail Sales,
Multipliers, and Sales Tax Collections
For a Community**

Item	Health Sector Workers (Direct Impact)	Total Community Effort (Direct and Secondary Impacts)	Multiplier
Employment	_____ 1	_____ 2	_____ 3
Income	_____ 1	_____ 2	_____ 3
Retail Sales	_____ 4	_____ 4	_____ 3
Sales Tax Collections	_____ 5	_____ 5	_____ 4

¹ Numbers taken from **Table 2**.

² Numbers derived by multiplying IMPLAN multipliers times column 1 number

³ Multipliers derived from County IMPLAN model

⁴ Number derived by multiplying income times retail sales capture rates

⁵ Number derived by multiplying retail sales times sales tax rate

**Appendix A
Appendix Table 3**

**Additional Data Needs for the
Dynamic Analysis**

Construction Plans	1996	1997	1998	1999	2000
Hospital	_____	_____	_____	_____	_____
Doctor & Dentist office Nursing & Protective	_____	_____	_____	_____	_____
Care Facilities	_____	_____	_____	_____	_____
Other Medical & Health Facilities	_____	_____	_____	_____	_____
TOTALS	=====	=====	=====	=====	=====
Employment Changes					
Hospitals	_____	_____	_____	_____	_____
Doctors & Dentists Offices	_____	_____	_____	_____	_____
Nursing and Protective Care Facilities	_____	_____	_____	_____	_____
Pharmacies	_____	_____	_____	_____	_____

Appendix B
Appendix Table 1

IMPLAN Data

Cell: A1
Formula: LOCAL MULTIPLIERS
Note: IMPLAN Data Sheet: This sheet contains the necessary multipliers to run the Medical Sector Impact Worksheet. It is designed to accept IMPLAN multiplier ratios from tables 602, 603, and 606.

INSTRUCTIONS:

1. Run (or have someone run) the IMPLAN model for the desired county (the smallest unit possible with the IMPLAN) and generate the multipliers.
2. For sectors 49, 455, 490, 491, 492, and 493, extract the Total ratios from table 602 (Total Industrial Output), the direct and total ratios from tables 603 and 606 (wage income and employment respectively).
3. Enter the ratios in the IMPLAN Data sheet.
4. Click on the Static Data Sheet or the Dynamic Data Sheet buttons at the bottom of the screen.
5. Enter data in the sheet as directed.
6. View results of the impact analysis.

To close this window, click "File Close"

Appendix B
Appendix Table 2

IMPLAN Data

Cell: B12

Formula: 0.3

Note: Retail Capture Ratio: Enter the proportion of new community income that will be spent on taxable retail sales.

This ratio can be estimated by dividing the most recent taxable retail sales by total community income for the same year.

To close this window, click "File Close"

Appendix B
Appendix Table 3

Cell: B13
Formula: 0.01
Note: Sales Tax Rate: Enter the local tax rate on the taxable sales in the box above.

Note: if the community collects more than one type of tax, calculate each separately by entering the appropriate capture ratio and sales tax rate.

To close this window, click "File Close"

The Southern Rural Development Center (SRDC) is one of four USDA sponsored regional centers in the nation. The Center coordinates rural development research and extension (education) programs cooperatively with the 29 land-grant institutions in the South. The Center supports and strengthens individual effort in rural areas by drawing upon multi-disciplinary networks of university research and extension faculty in the region. The Center is co-sponsored by Mississippi State University and Alcorn State University.

Southern
Rural
Development
Center



Southern Rural Development Center
Box 9656
Mississippi State, MS 39762

Mississippi State University does not discriminate on the basis of race, color, religion, national origin, sex, age, handicap/disability, or veteran status.