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**ECONOMIC TOOLS FOR RURAL HEALTH PLANNING**

**By**

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## ECONOMIC TOOLS FOR RURAL HEALTH PLANNING

Everyone knows that hospitals provide access to vital health care services 24 hours a day, seven days a week, and 365 days a year. Other health care providers, such as physicians, are also available throughout the year to provide quality health care services. But the role hospitals and other health care providers play as a major contributor to economic development is often overlooked. The overall purpose of this paper is to demonstrate how important the health care sector is to a local economy and to provide tools which local residents can employ to enhance their health services. More specifically, the paper will:

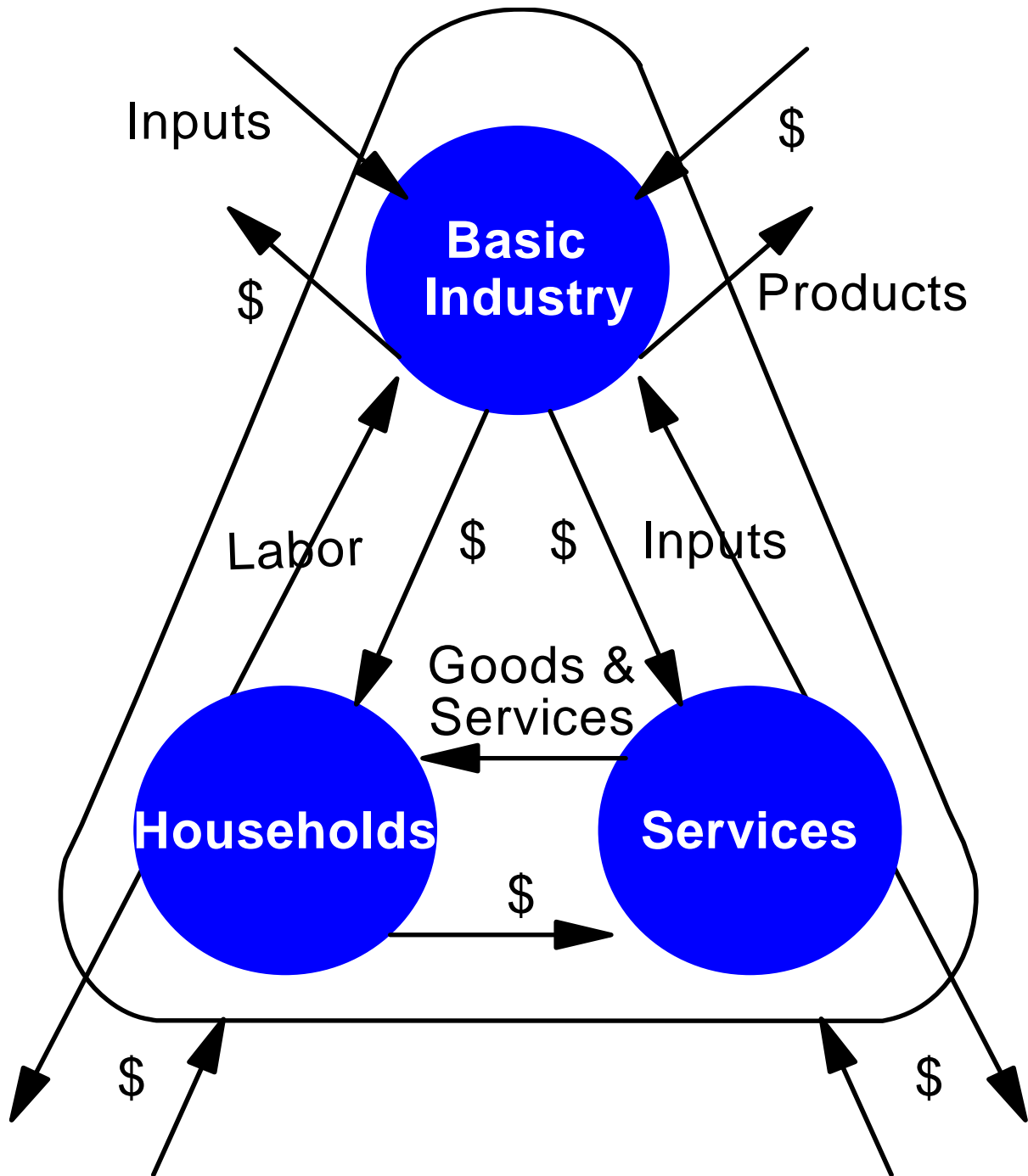
1. Present an economic impact tool of the health care sector on the local economy;
2. Provide a community engagement tool which will enable leaders to evaluate their health services; and,
3. Discuss budget tools that can be used to evaluate economic feasibility of a given health service.

### The Economic Impact Tool

The economic impact of health services, as measured by employment and payroll, is significant. However, this does not tell the complete story, as secondary economic impacts are created when the health facilities and their employees spend money. These secondary benefits are measured by multipliers using an input-output model and data from IMPLAN, a model that is widely used by economists and other academics across the U.S. (Appendix A).

### The Multiplier Effect

The concept of community economics and multipliers is illustrated in Figure 1. The triangle depicts a community's economy with basic industry, services, and households. Basic



**Figure 1**

**Concept of Community Economics  
and Economic Multipliers**

Industry buys labor from households and inputs from service providers. The arrows indicate the flow of dollars in exchange for labor and services. Households need to purchase services, such as groceries, clothes, etc., and again dollars flow for the purchase of these services. As soon as businesses and households purchase labor or services outside the community, the impact on the community's economy will decrease. A model is available which can measure the secondary effect on other businesses due to health care expenditures. The model generates employment and income multipliers, which measure all secondary impacts that occur in a community's economy. For example, a hospital employment multiplier of 1.5 would indicate that for each job in the hospital, another 0.5 job is created in other businesses due to the hospital and its employees purchasing goods and services within the community.

The multipliers measure the total impact of the health sector, but can also measure the increase or decrease in business activity. Consider, for instance, the closing of a hospital. The hospital will no longer pay employees, and dollars going to households will stop. Likewise, the hospital will not purchase goods from other businesses, and dollars flowing to other businesses will stop. This decreases income in the household segment of the economy. Since earnings would 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 input. Thus, the change in the economic base works its way throughout the entire local economy as reflected by the multipliers.

#### Application of the Impact Tool

To illustrate the tool, the impact of Hamilton Memorial Hospital District activities is presented. The hospital and health services are located in Hamilton County, Illinois, and its market area is a county with approximately 8,300 residents.

The economic impact of Hamilton Memorial Hospital District is presented in Table 1. Hamilton Memorial Hospital District creates jobs from their operations. Employment (jobs) and income (payroll including wages, salaries, and benefits) from operations were obtained from Hamilton Memorial Hospital District. The Hospital component employs 119 employees. The hospital sector employment multiplier is 1.46; this means for every job in the hospital sector, another 0.46 job is created in other sectors (businesses) in the local economy. The secondary employment generated in the local economy from the hospital sector is estimated to be 55 jobs. The Hospital component has a total impact of 174 jobs on the local economy. The Nursing Home, Home Health Care, and Clinic components employ 65 employees. With the employment multiplier of 1.19, the secondary employment resulting from these services is 12, and the total impact of this component is 77 jobs.

**Table 1**  
**Employment Impact**  
**Of Hamilton Memorial Hospital District from Operations**

Health Care Component	Number of Employees	Employment Multiplier	Secondary Impact	Total Impact
Hospital	119	1.46	55	174
Nursing Home, Home Health Care, and Clinic	<u>65</u>	1.19	<u>12</u>	<u>77</u>
<b>Total Operations Income</b>	<b>184</b>		<b>67</b>	<b>251</b>

SOURCE: Local data from Hamilton Memorial Hospital District, 2006; IMPLAN Multipliers, 2003.

Hamilton Memorial Hospital District has a total employment impact of 251 employees, including 184 employees working directly for the Hamilton Memorial Hospital District, and secondary employment of 67 jobs. The secondary employment is generated in other industry

sectors in Hamilton County due to the spending of Hamilton Memorial Hospital District and the spending of the District's employees.

Data on the economic impact of Hamilton Memorial Hospital District on income are presented in Table 2. Data obtained from the District indicate that total income (wages, salaries, and benefits) from the Hospital component is \$4,241,000. Using the hospital sector income multiplier of 1.31, Hamilton Memorial Hospital generates a secondary income of \$1,315,000 and a total income of \$5,556,000. The Nursing Home, Home Health Care, and Clinic component have a direct income of \$1,972,000. Applying the income multiplier of 1.24, the secondary income generated from these services is \$470,000, for a total income impact of \$2,442,000.

**Table 2**  
**Income Impact**  
**of Hamilton Memorial Hospital District from Operating Activities**

Health Care Component	Income (\$1,000)	Income Multiplier	Secondary Impact (\$1,000)	Total Impact (\$1,000)	Retail Sales (\$1,000)	1% Sales Tax (\$1,000)
Hospital	4,241	1.31	1,315	5,556	1,117	11.17
Nursing Home, Home Health Care, and Clinic	<u>1,972</u>	1.24	<u>470</u>	<u>2,442</u>	<u>491</u>	<u>4.91</u>
<b>Total Operations Income</b>	<b>6,123</b>		<b>1,785</b>	<b>7,998</b>	<b>1,608</b>	<b>16.08</b>

SOURCE: Local data from Hamilton Memorial Hospital District, 2006; IMPLAN Multipliers, 2003.

In summary, the total direct income impact of Hamilton Memorial Hospital District is \$6,123,000 and the total secondary income impact resulting from the Hamilton Memorial Hospital District is \$1,785,000. Finally, the total income impact from Hamilton Memorial Hospital District operations is \$7,998,000 annually.

Income also has an impact on retail sales. If the ratio between retail sales and income continues as in the past several years, then direct and secondary retail sales generated by the health sector components and their employees equals \$1,608,000 (Table 2). It must be remembered that these are sales taxes paid by District employees and secondary employees, as the hospital does not pay sales taxes. Each of the health sector components' income impacts is utilized to determine the retail sales and a 1-cent sales tax collection for each component. A 1-cent sales tax is used as an example due to the varying sales tax rates used in different counties. The components are totaled to determine the direct and secondary retail sales generated by the health sector. A 1-cent sales tax collection is estimated to generate \$16,080 annually in the Hamilton Memorial Hospital District as a result of the total health sector impact. This estimate is probably low, as many healthcare employees will spend a larger proportion of their income in local establishments that collect sales tax. The bottom line is that the health sector not only contributes greatly to the medical health of the community, but also to the economic health of the community.

Hamilton Memorial Hospital District is considering and evaluating a major capital improvement project. The capital project has not been finalized at this time, yet the construction activities of a large capital project will be significant and will have a huge impact on the local economy. The impact of construction activities is often overlooked. Since capital expenditures vary by year, data were collected for the proposed capital improvement projects over the next three years. The District is considering plans for a new medical office building, emergency room, and operating room in Year 1 for \$8.4 million; hospital renovations in Year 2 of \$2.6 million; and, further hospital renovations of \$1.9 million in Year 3.



Data from the IMPLAN model were utilized in estimating employment and wages and salaries. The data were checked against industry standard and appear to be very accurate estimates. The construction or capital impacts only occur during the year the expenditures are incurred, but they are very large. The \$8.4 million capital investment in Year 1 is expected to create 120 full and part time jobs and generate \$3.2 million in wages and salaries (Tables 3 and 4). This is the direct employment impact from the construction activities and not the total construction impact which is again estimated with multipliers.

**Table 3**  
**Employment Impact**  
**of Hamilton Memorial Hospital District from Construction Activities**

Year	Direct Employment from Construction	Construction Multiplier	Secondary Impact	Total Impact
1	120	1.28	34	154
2	37	1.28	10	47
3	27	1.28	7	34

SOURCE: Local data from Hamilton Memorial Hospital District, 2006; IMPLAN Multipliers, 2003.

The total impact on employment from Hamilton Memorial Hospital District’s proposed capital expenditures is presented in Table 3. The construction employment multiplier of 1.28 indicates that a 0.28 job is created in other businesses in the local economy due to each job associated with the construction activities. These jobs in other businesses are referred to as secondary jobs. The estimated secondary employment impact is 34 jobs in Year 1, making a total employment impact during Year 1 of 154 jobs. The employment impact of Years 2 and 3 are also presented in Table 3.

The impact on income is presented in Table 4. The income multiplier is 1.24, which means that for each dollar of wages and salaries paid to construction works, another \$0.24 of wages and salaries are generated in other businesses in the local economy. The secondary income impact for Year 1 is estimated at \$767,000 for a total income impact on the local economy of \$3,965,000. The income impact for Years 2 and 3 are also presented in Table 4.

**Table 4**  
**Income Impact**  
**of Hamilton Memorial Hospital District from Construction Activities**

Year	Direct Income (\$1,000)	Income Multiplier	Secondary Impact (\$1,000)	Total Impact (\$1,000)	Retail Sales (\$1,000)	1¢ Sales Tax (\$1,000)
1	3,198	1.24	767	3,965	797	7.97
2	986	1.24	237	1,223	246	2.46
3	719	1.24	172	891	179	1.79

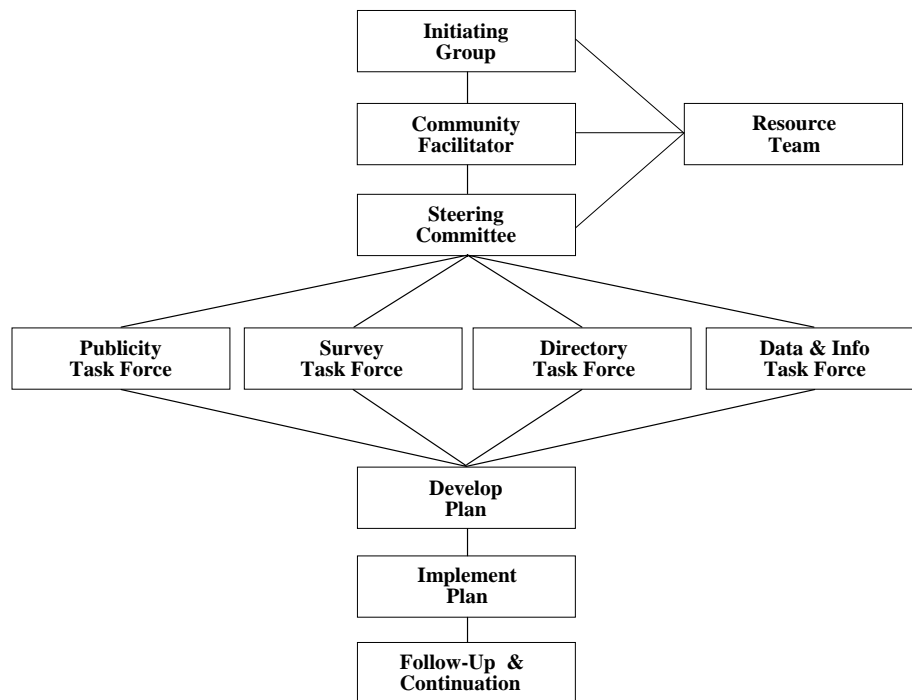
SOURCE: Local data from Hamilton Memorial Hospital District, 2006; IMPLAN Multipliers, 2003.

As with the impact of the operations of the Hamilton Memorial Hospital District, the construction activities have an impact on retail sales. The direct and secondary retail sales generated by the construction activities in Year 1 equal \$797,000 (Table 4). A 1-cent sales tax collection is estimated to generate \$7,970 in Year 1 in the Hamilton Memorial Hospital District as a result of construction activities. The retail sales and sales tax collection impacts for Years 2 and 3 are also illustrated in Table 4.

## The Community Engagement Tool

The community health engagement process is a strategic planning process and assists local communities to (1) identify their health care needs; (2) examine the social, economic, and political realities affecting the local delivery of health care; (3) determine what they want and realistically can achieve in a health care system to meet the community's needs; and, (4) develop and mobilize an action plan based on their analysis and planning.

The initial process consists of a series of five to seven meetings over a four to seven month period. A flow chart is inserted in Figure 2.



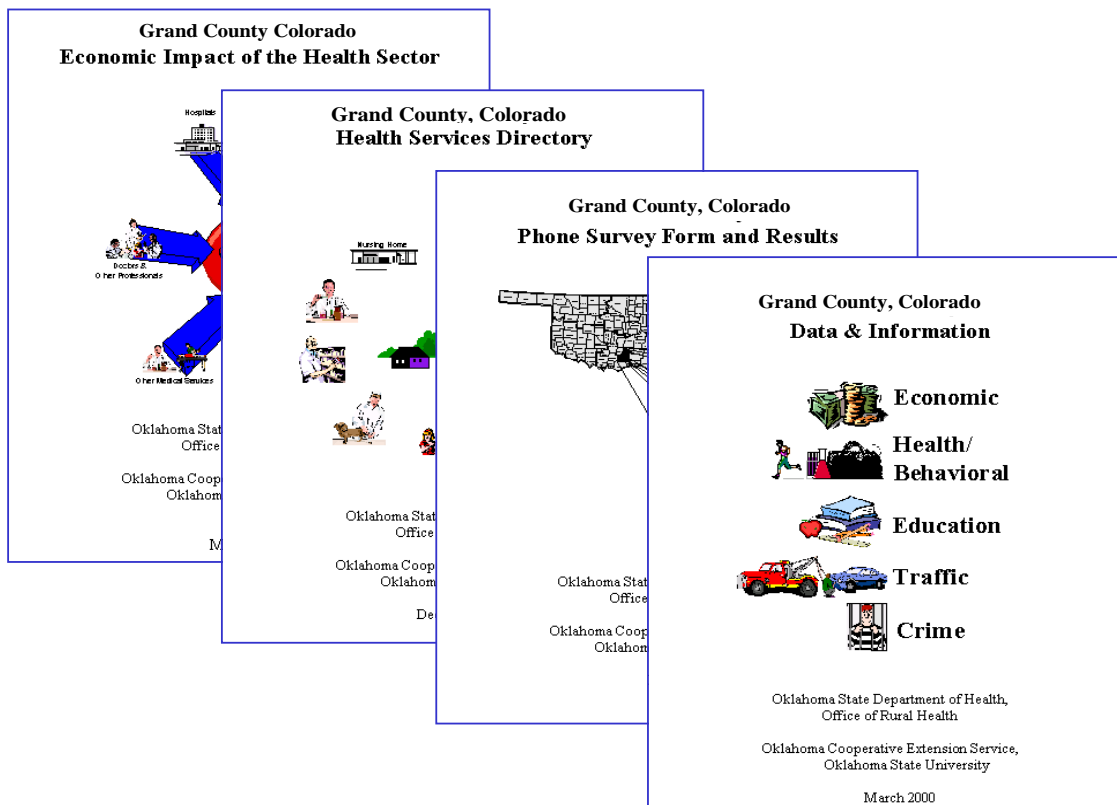
**Figure 2**

**Flow Chart of Community Engagement Process**

First, a small initiating group of individuals from the community meets to review the community health engagement process, discuss the membership of the steering committee, gather the primary data for the economic impact study, and set the date for the first health planning meeting. A broad-based community steering committee is organized, and the first meeting is held to present the economic impact of the health sector on the community. The steering committee is then divided into four task forces: 1) Publicity; 2) Survey; 3) Directory; and, 4) Data and Information.

The next two to three health planning meetings involve the steering committee reviewing information from the task force area. The publicity task force publicizes the process, as well as provides a publicity “blitz” a week or two before the community survey is taken. The directory task force organizes and finalizes a community health service directory. The survey task force develops a survey instrument that will deal with access to health care and health care utilization patterns. The data and information task force presents secondary data in the areas of economics, health and behavior, education, traffic, and crime. This task force reviews the information and looks for strengths and/or weaknesses in the community data. The process results in four products: 1) Economic Impact of the Health Sector; 2) Health Services Directory; 3) Survey Results; and, 4) Data and Information (Figure 3).

After the task forces complete their meetings, the next community health engagement meeting will be to summarize the information received from the task forces. The directory task force will look for duplication of services, possible integration of services, or for services lacking in the community. The survey task force reviews and summarizes the survey results, looking for any areas of need in the community. The data and information task force summarizes the needs as indicated from the data review.



**Figure 3**

**Products from Community Engagement Process**

The results of the task forces are reviewed by the entire steering committee and then prioritized by the group to determine the top three to five issues within the community. From these top issues, the group develops an action plan to deal with an issue or with several issues. The steering committee then shares their proposed action plan with the community at-large for their review and input.

The community resource team, consisting of representatives from the Oklahoma Cooperative Extension Service and the Oklahoma Office of Rural Health, provides facilitation of these five to seven meetings. The community health engagement process assists with the development of the action plan and continues to help the community in the implementation of

the plan. The resource team is continuously available for updating products and for providing follow-up services that might include a variety of budget studies. Budget studies available include emergency medical services, adult day services, assisted living facilities, and primary care physicians. Check the following websites for a list of available budget studies and more details of the community engagement process:

- Oklahoma Rural Health Works Website: [www.okruralhealthworks.org](http://www.okruralhealthworks.org)
- National Rural Health Works Website: [www.ruralhealthworks.org](http://www.ruralhealthworks.org)

### The Budget Tool

As the community engagement process is implemented and completed, priorities will be identified. The engagement process generally surfaces two types of priorities. These include behavior type actions and service type actions. The behavior actions include such items as reducing teenage pregnancy or reducing drunk driving. Service type actions include adding or evaluating a specific service such as hiring an additional pediatrician or starting a kidney dialysis unit.

The resource team needs to be ready to assist in evaluating proposed services. It is crucial that the decision makers know whether the service is economically feasible. If not, decision makers need to know how much they will have to subsidize the service in order for it to break even. This portion of the paper will present basic budget analysis methodology and summarize a budget study for a kidney dialysis unit.

#### Basic Budget Analysis Methodology

Before a health service can be initiated, it is imperative that the service be economically analyzed. Some health services identified and ranked extremely high by the community engagement process are not economically feasible or will require additional resources. If this is

the case, all data and facts must be known before action is initiated. Analyzing the issue may be quite simple or may be very difficult. Some issues will require technical assistance from experts outside the committee and community. Knowledge of where to obtain assistance and willingness to ask is important. The methodology involved in analyzing an issue is quite basic and is outlined in Table 5. To illustrate this methodology, a kidney dialysis center will be presented.

**Table 5**  
**Basic Methodology for Analyzing an Issue**

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I.	Estimate Needs
II.	Project Costs
	A. Capital or Start-Up Costs
	B. Annual Operating Costs
III.	Estimate Revenue
IV.	If Doesn't Break-Even, Other Sources of Funds

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#### Budget for Kidney Dialysis Center

After completing the community engagement process in Lincoln County, Oklahoma (a county in central Oklahoma with approximately 32,000 residents), the community engagement committee identified a need for a kidney dialysis unit. The resource team utilized research<sup>1</sup> to conduct a budget study. Kidney dialysis demand coefficients presented in Table 6 were used to estimate the need for services in Lincoln County. Each demand coefficient estimates the number of kidney dialysis patients expected in that age group per 100,000 population. Applying these coefficients with the population of Lincoln County yields an estimated need of 22 patients. To serve these patients, a facility operating Monday, Wednesday, and Friday was designed (Table 7).

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<sup>1</sup> For the complete study, see Lawler, Mary and Gerald A. Doeksen. A Guidebook for Estimating the Economic Viability of a Hemodialysis Center. ([www.ruralhealthworks.org](http://www.ruralhealthworks.org)), 2003.

**Table 6**

**Kidney Dialysis Demand Coefficients**

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<u>Age</u>	<u>Coefficient</u>
0-19	1.6
20-44	35.6
45-64	134.4
65-74	272.2
75+	230.0

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**Table 7**

**Sample Dialysis Facility For Lincoln County, Oklahoma**

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<b>Patients</b>	<b>Stations</b>	<b>Treatment Schedule</b>				
		<b>Mon</b>	<b>Tues</b>	<b>Wed</b>	<b>Thur</b>	<b>Fri</b>
22	8	3	0	3	0	3

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Once the need was estimated, then capital and operating costs were estimated. The results of the costs analysis are presented on Tables 8-10. Capital costs were estimated at \$506,700 (Table 8). The annual capital costs were estimated assuming a seven percent loan and seven year life for the machine. The construction and other equipment were assumed financed with a seven percent loan for ten years. Annual capital expenses were estimated at \$78,572 (Table 9). Operating costs were estimated at \$715,922 (Table 10).



**Table 8**

**Estimated Capital Costs For Kidney Dialysis Unit**

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Construction	\$ 276,612
Water treatment	\$ 27,300
Bio-medical equipment	\$ 8,549
Clinical equipment	\$ 160,922
Other	<u>\$ 33,317</u>
<b>TOTAL</b>	<b>\$ 506,700</b>

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**Table 9**

**Annual Capital Costs For Kidney Dialysis Unit**

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Total Capital Costs	\$ 506,700
Annual Capital Costs	\$ 78,572

Based on 7 years @ 7 % on Dialysis  
Machines, and 10 years @ 7% on  
Construction and All Other  
Equipment.

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**Table 10**

**Estimated Operating Costs For Kidney Dialysis Unit**

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Personnel	\$ 217,826
Maintenance	\$ 26,062
Supplies	\$ 7,568
Bio-Medical supplies	\$ 355,853
Utilities	\$ 72,190
Building lease	\$ 28,000
Communication	\$ 5,952
Insurance	<u>\$ 2,471</u>
<b>Total</b>	<b>\$715,922</b>

---

Projected revenue for this proposed system is \$813,980 (Table 11). This assumes the regional Medicare rate of \$233 per treatment and private insurance rate of \$1,023 per treatment. These data were obtained from operating kidney dialysis units. The feasibility of the kidney dialysis unit is summarized in Table 12. The annual revenue is \$813,980 and costs are \$794,494. This leaves a small profit of \$19,494.

**Table 11**

**Estimated Revenue For Kidney Dialysis Unit**

2,949 treatments @ \$233	\$687,117
140 treatments at \$1,023	\$143,220
Adjustment for Non-Reimbursed	<u>(\$16,357)</u>
<b>Total Revenue</b>	<b>\$813,980</b>

**Table 12**

**Determining Feasibility For Kidney Dialysis Unit**

Total Revenue	\$813,980
Total Annual Capital Costs	\$ 78,572
Total Annual Operating Costs	<u>\$715,922</u>
Total Annual Capital & Operating Costs	<u>\$794,494</u>
<b>Total Revenues less Total Costs</b>	<b>\$ 19,494</b>

The resource team completes the budget study but makes no recommendations. The decision on a project is left up to the community leaders. The resource team's job is to provide the best data and information such that community leaders can make an informed decision.

Budget studies have been completed for a number of health services. These are summarized in Table 13. The reports and example budget applications are available on the website for the National Center for Rural Health Works ([www.ruralhealthworks.org](http://www.ruralhealthworks.org)).

**Table 13**

**Available Budget Studies from Oklahoma Cooperative Extension Service**

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Types of Studies

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Primary Care Physician  
Obstetrics/Gynecology Physician  
Pediatrician  
Emergency Medical Services (Basic and Advanced)  
First Responder Systems  
Outpatient Rehabilitation  
Adult Day Services  
Kidney Dialysis  
Assisted Living Facilities  
Federal Qualified Health Center  
Rural Health Clinics  
Specialty Physicians

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Summary

Quality health services are indeed needed for medical reasons. This paper also documents the fact that quality medical services are tremendously beneficial for economic reasons. The health care sector is growing and employs a large number of residents. In fact, the health care sector often employs 15-20 percent of the employment base of rural communities. This paper presents tools that measure the economic impact of the health sector and that assist community leaders in evaluating and enhancing their health services. Tools presented are:

1. A tool that measures the economic impact of the health sector;
2. A tool (community engagement tool) that allows community leaders to evaluate their health services; and,
3. Tools (budget) that allow community leaders to evaluate the feasibility of specific health services.

The tools are applied to rural communities and presented in this paper. The tools are easily transferable to other countries, such that quality rural health services can be enhanced and available for rural residents.

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- Minnesota IMPLAN Group, Inc. User's Guide, Analysis Guide, Data Guide: IMPLAN Professional Version 2.0 Social Accounting & Impact Analysis Software, 2<sup>nd</sup> Edition, June 2000.

## **Appendix A**

### **Model and Data Used to Estimate Employment and Income Multipliers**

A computer spreadsheet that uses state IMPLAN multipliers was developed to enable community development specialists to easily measure the secondary benefits of the health sector on a state, regional or county economy. The complete methodology, which includes an aggregate version, a disaggregate version, and a dynamic version, is presented in Measuring the Economic Importance of the Health Sector on a Local Economy: A Brief Literature Review and Procedures to Measure Local Impacts (Doeksen, et al., 1997). A brief review of input-output analysis and IMPLAN are presented here.

#### A Review of Input-Output Analysis

Input-output (I/O) (Miernyk, 1965) was designed to analyze the transactions among the industries in an economy. These models are largely based on the work of Wassily Leontief (1936). Detailed I/O analysis captures the indirect and induced interrelated circular behavior of the economy. For example, an increase in the demand for health services requires more equipment, more labor, and more supplies, which, in turn, requires more labor to produce the supplies, etc. By simultaneously accounting for structural interaction between sectors and industries, I/O analysis gives expression to the general economic equilibrium system. The analysis utilizes assumptions based on linear and fixed coefficients and limited substitutions among inputs and outputs. The analysis also assumes that average and marginal I/O coefficients are equal.

Nonetheless, the framework has been widely accepted and used. I/O analysis is useful when carefully executed and interpreted in defining the structure of a region, the interdependencies among industries, and forecasting economic outcomes.

The I/O model coefficients describe the structural interdependence of an economy. From the coefficients, various predictive devices can be computed, which can be useful in analyzing economic changes in a state, a region or a county. Multipliers indicate the relationship between some observed change in the economy and the total change in economic activity created throughout the economy.

### MicroIMPLAN

MicroIMPLAN is a computer program developed by the United States Forest Service (Alward, et al., 1989) to construct I/O accounts and models. Typically, the complexity of I/O modeling has hindered practitioners from constructing models specific to a community requesting an analysis. Too often, inappropriate U.S. multipliers have been used to estimate local economic impacts. In contrast, IMPLAN can construct a model for any county, region, state, or zip code area in the United States by using available state, county, and zip code level data. Impact analysis can be performed once a regional I/O model is constructed.

Five different sets of multipliers are estimated by IMPLAN, corresponding to five measures of regional economic activity. These are: total industry output, personal income, total income, value added, and employment. Two types of multipliers are generated. Type I multipliers measure the impact in terms of direct and indirect effects. Direct impacts are the changes in the activities of the focus industry or firm, such as the closing of a hospital. The focus business changes its purchases of inputs as a result of the direct impacts. This produces indirect impacts in other business sectors. However, the total impact of a change in the economy consists of direct, indirect, and induced changes. Both the direct and indirect impacts change the flow of dollars to the state, region, or county's households. Subsequently, the households alter their consumption accordingly. The effect of the changes in household consumption on

businesses in a community is referred to as an induced effect. To measure the total impact, a Type II multiplier is used. The Type II multiplier compares direct, indirect, and induced effects with the direct effects generated by a change in final demand (the sum of direct, indirect, and induced divided by direct). IMPLAN also estimates a modified Type II multiplier, called a Type III multiplier that also includes the direct, indirect, and induced effects. The Type III multiplier further modifies the induced effect to include spending patterns of households based on a breakdown of households by nine different income groups.

#### Minnesota IMPLAN Group, Inc. (MIG)

Dr. Wilbur Maki at the University of Minnesota utilized the input/output model and database work from the U. S. Forest Service's Land Management Planning Unit in Fort Collins to further develop the methodology and to expand the data sources. Scott Lindall and Doug Olson joined the University of Minnesota in 1984 and worked with Maki and the model.

As an outgrowth of their work with the University of Minnesota, Lindall and Olson entered into a technology transfer agreement with the University of Minnesota that allowed them to form MIG. At first, MIG focused on database development and provided data that could be used in the Forest Service version of the software. In 1995, MIG took on the task of writing a new version of the IMPLAN software from scratch. This new version extended the previous Forest Service version by creating an entirely new modeling system that included creating Social Accounting Matrices (SAMs) – an extension of input-output accounts, and resulting SAM multipliers. Version 2 of the new IMPLAN software became available in May of 1999. For more information about Minnesota IMPLAN Group, Inc., please contact Scott Lindall or Doug Olson by phone at 651-439-4421 or by email at [info@implan.com](mailto:info@implan.com) or review their website at [www.implan.com](http://www.implan.com).