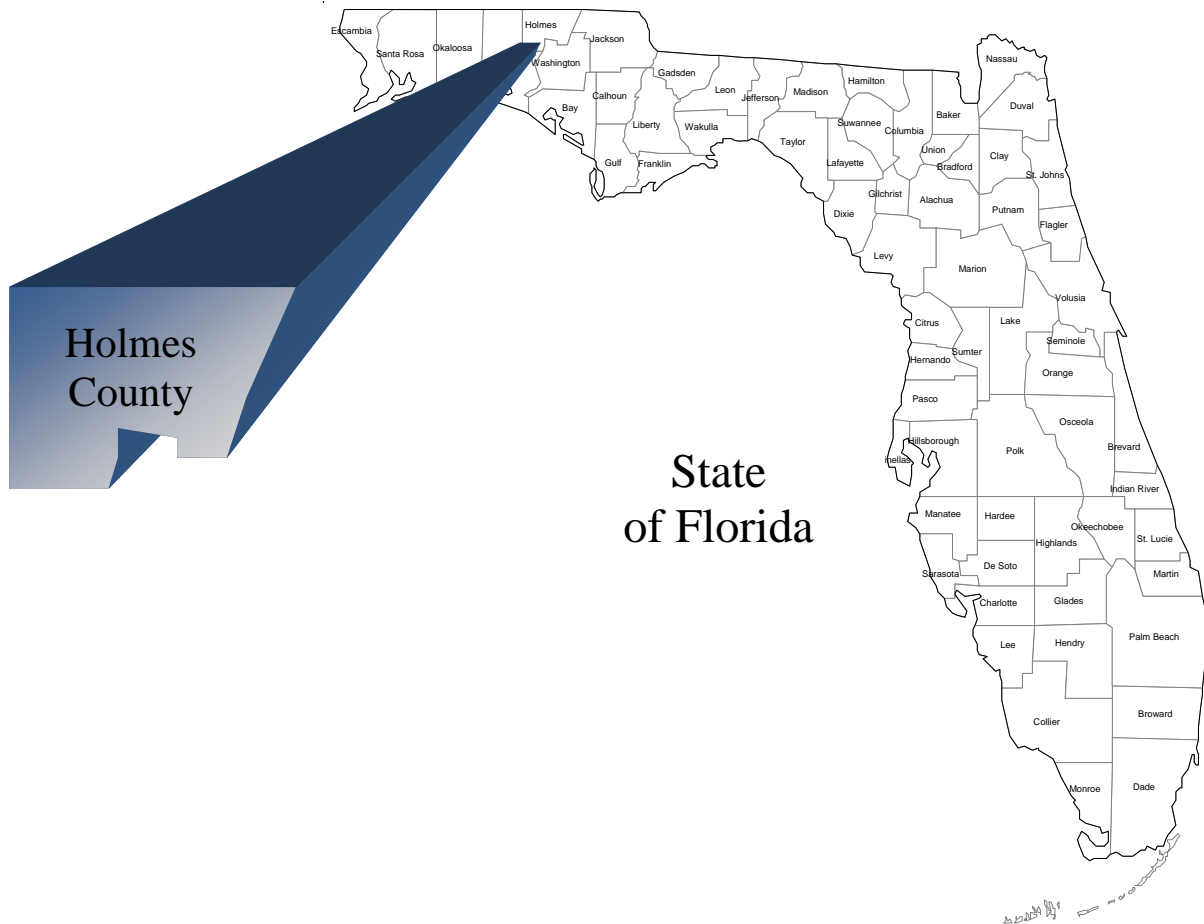


The Economic Impact of the Health Sector on the Economy of the Medical Service Area of Doctors Memorial Hospital in Bonifay, Holmes County, Florida



National Association of Counties Project
Funded by the federal Office of Rural Health Policy

July 2008

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of Doctors Memorial Hospital in Bonifay, Holmes County, Florida**

Prepared for:

Doctors Memorial Hospital, Bonifay, Holmes County, Florida

through

NACo Association of Counties Project

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Medical facilities have a tremendous medical and economic impact on the community in which they are located. This is especially true with health care facilities, such as hospitals and nursing homes. These facilities not only employ a number of people and have a large payroll, but they also draw into the community a large number of people from rural areas that need medical services and may also attract visitors to the area through tourism activities. The overall objective of this study is to measure the economic impact of the health sector on the medical service area of Doctors Memorial Hospital. The specific objectives of this report are to:

1. Review national health trend data;
2. Identify the medical service area of Doctors Memorial Hospital and review demographic and economic data;
3. Summarize the direct economic activities of the health sector in the medical service area of Doctors Memorial Hospital;
4. Present concepts of community economics and multipliers; and
5. Estimate the economic impact of the health sector on the medical service area of Doctors Memorial Hospital.

No recommendations will be made in this report.

National Health Trend Data

The health care sector is an extremely fast-growing sector in the United States, and based on the current demographics, there is every reason to expect this trend to continue.

Data in **Table 1** provide selected expenditure and employment data for the United States.

Table 1
United States Health Expenditures and Employment Data
1970-2006; Projected for 2008, 2011, 2014 & 2017

United States Data					
Year	Total Health Expenditures (\$Billions)	Per Capita Health Expenditures (\$)	Health as % of GDP (%)	Health Sector Employment (000)	Avg. Annual Increase in Employment (%)
1970	\$74.9	\$356	7.2%	3,052 ^a	
1980	253.4	1,100	9.1%	5,278 ^a	7.3%
1990	714.0	2,813	12.3%	7,814 ^a	4.8%
2000	1,353.6	4,790	13.8%	10,858 ^a	3.9%
2001	1,469.6	5,148	14.5%	11,188 ^a	3.0%
2002	1,603.4	5,560	15.3%	11,536 ^a	3.1%
2003	1,732.4	5,952	15.8%	11,817 ^b	N/A
2004	1,852.3	6,301	15.9%	12,055 ^b	2.0%
2005	1,973.3	6,649	15.9%	12,314 ^b	2.1%
2006	2,105.5	7,026	16.0%	12,602 ^b	2.3%
Projections					
2008	2,394.3	7,868	16.6%		
2011	2,905.1	9,322	17.4%		
2014	3,523.6	11,043	18.4%		
2017	4,277.1	13,101	19.5%		

SOURCES: 2008 Bureau of Labor Statistics; 2008 Bureau of Economic Analysis; 2008 Centers for Medicare & Medicaid Services, National Health Expenditures 1970-2006 and National Health Expenditure Projections 2007-2017 (<http://www.cms.hhs.gov/NationalHealthExpendData> [March 2008]).

N/A - Not Available.

^a Based on Standard Industrial Classification (SIC) codes.

^b Based on North American Industry Classification System (NAICS).

Several highlights from the national data are:

- In 1970, health care services as a share of the national gross domestic product (GDP) were 7.2 percent and increased to 16.0 percent in 2006;
- Per capita health expenditures increased from \$356 in 1970 to \$7,026 in 2006;
- Employment in the health sector increased almost 313.0 percent from 1970 to 2006; and
- Annual increases in employment from 2003 to 2006 ranged from 2.0 percent to 2.3 percent.

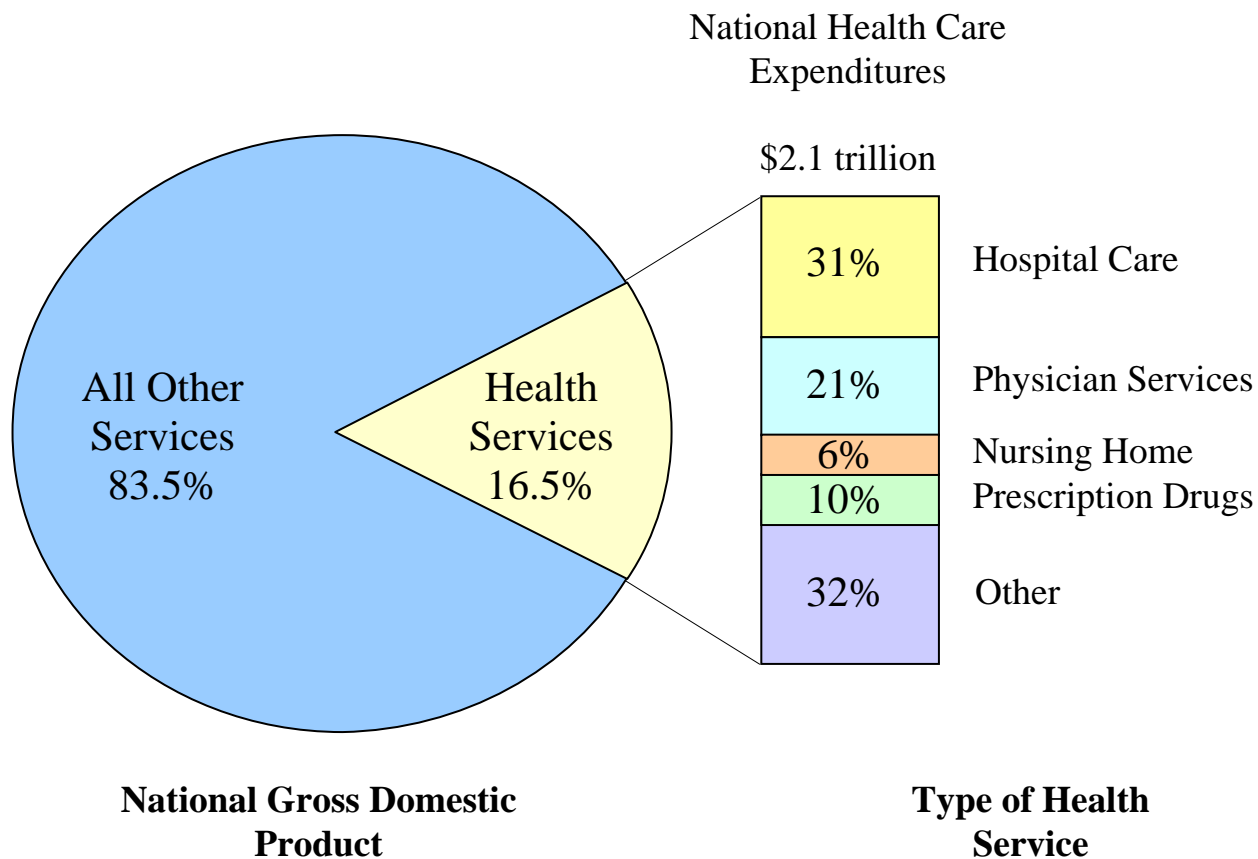
In addition, the Bureau of Labor Statistics projects substantial increases in health care expenditures from 2008 through 2017. In fact, the U. S. Department of Health and Human Services, Centers for Medicare and Medicaid Services, predicts that health care expenditures will account for 18.4 percent of GDP by 2014 and increase to 19.5 percent of GDP in 2017. Per capita health care expenditures are projected to increase to \$11,043 in 2014 and to \$13,101 in 2017. Total health expenditures are projected to increase to almost \$4.3 trillion in 2017.

Figure 1 illustrates 2006 health expenditures by percent of gross domestic product and by type of health service. The largest health service type was hospital care, representing 31.0 percent of the total. The next largest type of health services was physician services with 21.0 percent of the total.

Medical Service Area Demographic and Economic Data

The medical service area (MSA) of Doctors Memorial Hospital is basically all of Holmes County. Data presented in **Table 2** show the populations and percent changes for the cities and towns, Holmes County and the State of Florida for census years 1990 and 2000 and census estimated years 2006 and 2007. The majority of cities and towns are showing an increase in

Figure 1
National Health Expenditures
As a Percent of Gross Domestic Product
and by Health Service Type, 2006



population from 1990 to 2000, with the exception of Bonifay city and Westville town. All cities and towns show an increase in population from 2000 to 2006 and 2007. The unincorporated area of Holmes County (balance) shows increases in population from 1990 to 2000 and 2000 to 2006 and 2007. Holmes County shows an increase from 1990 to 2000 and 2000 to 2006, and a decrease from 2000 to 2007. The State of Florida shows increases in population for all years.

Table 2
Census Population, Population Estimates, and Percent Changes
for Holmes County Cities and Towns, Holmes County, and the State of Florida

	Census Population		Estimated Population		<u>10 Years</u>	<u>6 Years</u>	<u>7 Years</u>
	1990	2000	2006	2007	'90-'00	'00-'06	'00-'07
Bonifay city ¹	2,612	2,466	2,688	2,705	-5.6%	9.0%	9.7%
Esto town	253	356	364	379	40.7%	2.2%	6.5%
Noma town	207	213	218	222	2.9%	2.3%	4.2%
Ponce de Leon town	406	457	469	498	12.6%	2.6%	9.0%
Westville town	257	221	230	224	-14.0%	4.1%	1.4%
Balance of Holmes County	<u>12,043</u>	<u>14,652</u>	<u>15,172</u>	<u>15,217</u>	<u>21.7%</u>	<u>3.5%</u>	<u>3.9%</u>
Holmes County ¹	<u>15,778</u>	<u>18,365</u>	<u>19,141</u>	<u>19,245</u>	<u>16.4%</u>	<u>4.2%</u>	<u>4.8%</u>
State of Florida	<u>12,937,926</u>	<u>15,982,378</u>	<u>18,057,508</u>	<u>18,251,243</u>	<u>23.5%</u>	<u>13.0%</u>	<u>14.2%</u>

SOURCE: U.S. Census Bureau; 1990 & 2000 Census Population; 2005, 2006, and 2007 estimates for Holmes County and the State of Florida are taken from Census Population Estimates (www.census.gov [February 2008]).

¹2000 Census populations for Bonifay city and Holmes County have been adjusted by 1,612 to exclude the prison population.

Table 3 presents population and population projections for Holmes County and the State of Florida. From 2000 to 2010, Holmes County is projected to increase by 10.2 percent. From 2000 to 2030, Holmes County is projected to increase by 26.7 percent. The State of Florida is projected to increase by 25.0 percent from 2000 to 2010, and when comparing 2000 to 2030, the increase is projected to be 65.9 percent.

Table 4 compares the employment and payroll for the health services sector to the total of all other sectors for both Holmes County and the State of Florida. From the data, health services employment grew 9.1 percent from 1998 to 2005 in Holmes County, while total county employment decreased by 13.6 percent. Health services as a percent of total county employment

Table 3
Population, Population Projections, and Percent Changes
for Holmes County and the State of Florida

	Census Population 2000	Projected Population				
		2010	2015	2020	2025	2030
Holmes County ¹	18,365	20,236	21,083	21,889	22,604	23,261
State of Florida	15,982,378	19,974,199	23,552,136	26,513,332	25,085,972	26,513,332
		Percent Changes				
		'00-'10	'00-'15	'00-'20	'00-'25	'00-'30
Holmes County ¹		10.2%	14.8%	19.2%	23.1%	26.7%
State of Florida		25.0%	47.4%	65.9%	57.0%	65.9%

SOURCE: Data from the Demographic Estimating Conference Database, Updated August 2007, (<http://edr.state.fl.us/population.htm> [February 2008]); U.S. Census Bureau, 2000 Census Population (www.census.gov [February 2008]).

¹2000 Census population Holmes County has been adjusted by 1,612 to exclude the prison population.

grew from 24.3 percent in 1998 to 30.7 percent in 2005, compared to the state's health services portion of state employment decreasing from 12.9 percent in 1998 to 12.2 in 2005. Health services payroll in Holmes County grew 36.2 percent from 1998 to 2005, while the total county payroll increased by 24.3 percent. Health services as a percent of total county payroll grew from 27.9 percent in 1998 to 30.5 percent in 2005, compared to the state's health services payroll as a percentage of total state payroll decreasing from 14.6 percent in 1998 to 13.7 percent in 2005.

Table 4
Employment and Payroll from County Business Patterns*
for Holmes County and the State of Florida

Employment				
Based on NAICS ¹	Health Services Employment	Total County Employment	Hlth Svcs as a % of Total Co. Employment	Hlth Svcs as a % of Total State Employment
1998	549	2,257	24.3%	12.9%
1999	675	2,299	29.4%	12.3%
2000	551	2,232	24.7%	11.9%
2001	441	2,065	21.4%	12.0%
2002	430	2,031	21.2%	12.3%
2003	435	1,763	24.7%	12.5%
2004	591	2,046	28.9%	12.5%
2005	599	1,950	30.7%	12.2%
% Change '98-'05	9.1%	-13.6%		

Payroll (\$1,000s)				
Based on NAICS ¹	Health Services Payroll	Total County Payroll	Health Services as a % of Total Co. Payroll	Health Services as a % of Total State Payroll
1998	9,405	33,757	27.9%	14.6%
1999	9,661	34,624	27.9%	13.7%
2000	8,101	34,089	23.8%	13.2%
2001	8,472	33,916	25.0%	13.4%
2002	9,209	35,107	26.2%	13.9%
2003	8,322	31,827	26.1%	14.1%
2004	12,498	40,183	31.1%	14.3%
2005	12,806	41,976	30.5%	13.7%
% Change '98-'05	36.2%	24.3%		

Source: U.S. Census Bureau, County Business Patterns, 1998-2005 data (www.census.gov [February 2008]).

¹ The Health Care and Social Assistance NAICS sector comprises establishments providing health care and social assistance for individuals. The sector includes both health care and social assistance because it is sometimes difficult to distinguish between the boundaries of these two activities. Industries in this sector are arranged on a continuum starting with those establishments providing medical care exclusively, continuing with those providing health care and social assistance, and finally finishing with those providing only social assistance. The services provided by establishments in this sector are delivered by trained professionals. All industries in the sector shared this commonality of process, namely, labor inputs of health practitioners or social workers with the requisite expertise. Many of the industries in the sector are defined based on the educational degree held by the practitioners included in the industry.

*Data are excluded for self-employed persons, employees of private households, railroad employees, agricultural production workers, and for most government employees (except for those working in wholesale liquor establishments, retail liquor stores, Federally-chartered savings institutions, Federally-chartered credit unions, and hospitals).

The Direct Economic Activities

Employment and payroll are the important direct economic activities created by the health services in the MSA of Doctors Memorial Hospital. The health sector is divided into the following components:

- Hospitals
- Physicians, Dentists, & Other Health Professionals
- Nursing Homes & Protective Care
- Pharmacies
- Home Health
- Other Health & Medical Services

The total health sector in the MSA of Doctors Memorial Hospital employs 561 full- and part-time employees and has an estimated income (wages, salaries, proprietors' income, and benefits) of \$18.9 million (**Table 5**). Hospitals are the first health sector component. The hospitals' component includes Doctors Memorial Hospital, a 20-bed acute care critical access hospital facility offering a variety of in-patient and out-patient services including: medical/surgical care, a comprehensive swing bed rehabilitation program, 24-hour emergency care, diagnostic imaging services including CT scans, mobile MRI and ultrasound, respiratory services, ICU, physical, speech and occupational therapy, laboratory services and social services.

The next health component includes all physicians, dentists, and other health professionals and their office staffs. The MSA of Doctors Memorial Hospital includes seven family physician practices, two dental practices, one optometry practice, and one chiropractor practice. The nursing homes and protective care component includes one nursing home and two assisted living facilities. The pharmacies' component includes four pharmacies. The other health and medical services' component includes one home health care agency, emergency

Table 5
Direct Economic Activities of Health Services in the Medical Service Area
of Doctors Memorial Hospital in Bonifay, Holmes County, Florida

Health Service	Total Full-Time & Part-Time Employment	Total Income* (including Benefits)
Hospitals (Includes Doctors Memorial Hospital, a 20-bed acute care critical access hospital, providing inpatient and outpatient care & 24-hour emergency room treatment)	150	\$4,100,000
Physicians, Dentists, & Other Health Professionals (Includes seven physician practices, two dental practices, one optometry practice, & one chiropractor practice)	55	\$3,788,968
Nursing Homes & Protective Care (Includes one nursing home & two assisted living facilities)	224	5,826,801
Pharmacies (Includes four pharmacies)	31	\$1,239,350
Other Health & Medical Services (Includes one home health care agency, emergency medical services [ambulance], county health department, a mental health agency, & one medical equipment provider)	<u>101</u>	<u>\$3,969,275</u>
Total Health Services	<u>561</u>	<u>\$18,924,394</u>

SOURCE: All employment data and income data for hospital only from local decision makers; all other income estimated from state average salaries from U. S. Department of Labor, Bureau of Labor Statistics, May 2007 State Occupational Employment and Wage Estimates for Louisiana (July 2008, [www.bls.gov]).

* Income is defined as all personal income including wages, salaries, proprietor income, and benefits.

medical services (ambulance), county health department, a mental health agency, and one medical equipment provider.

Doctors Memorial Hospital employs a total of 150 full- and part-time employees with an income of \$4.1 million. The physicians, dentists, and other health professionals' component employs 55 people with annual income of \$3.8 million. The nursing homes and protective care component employs 224 people with an income of \$5.8 million. The pharmacies component employs 31 people with annual income of \$1.2 million, while the other health and medical services' component has 101 employees with income of \$4.0 million. Notably, many rural communities have a large number of elderly, and the ranchers and farmers often retire in the towns. Thus, nursing homes and protective care are an important component of the health sector.

In summary, the health sector is vitally important as a community employer and important to the community's economy. The health sector definitely employs a large number of residents. The health sector and the employees in the health sector purchase a large amount of goods and services from businesses in the MSA of Doctors Memorial Hospital. These impacts are referred to as secondary impacts or benefits to the economy. Before the secondary impacts of the health sector are discussed, basic concepts of community economics will be discussed.

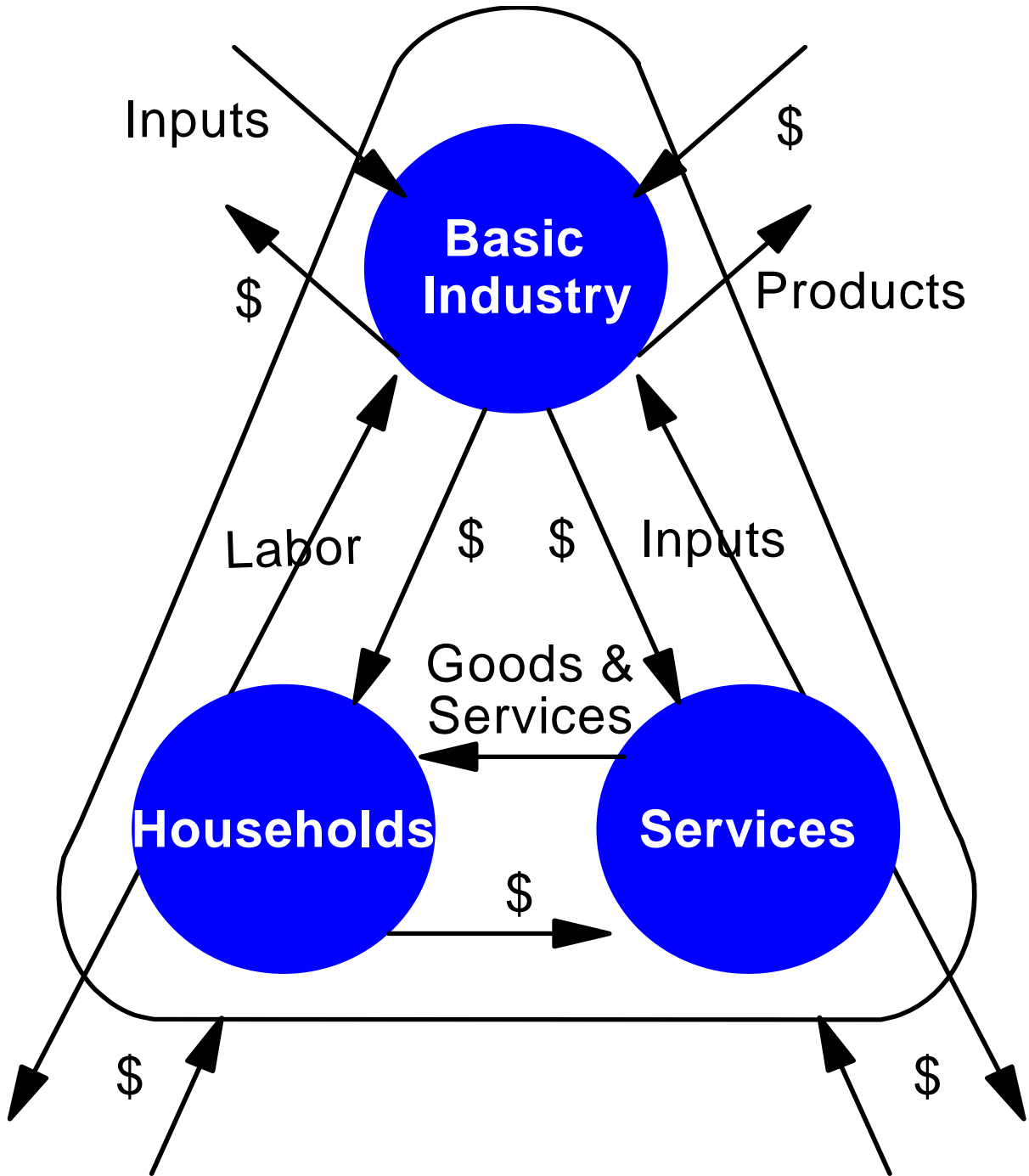
Some Basic Concepts of Community Economics and Income and Employment Multipliers

Figure 2 illustrates the major flows of goods, services, and dollars of any 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 2**. To produce these goods and services for "export" outside the

community, the basic industry purchases inputs from outside of the community (upper left portion of **Figure 2**), labor from the residents or "households" of the community (left side of **Figure 2**), and inputs from service industries located within the community (right side of **Figure 2**). 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 2**). **Figure 2** illustrates the interrelationship between a change in any one segment of a community's economy, resulting in 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 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 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 an indirect impact 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.

Figure 2.
Community Economic System



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. Multipliers are used in this report. An employment multiplier is defined as:

“...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.”

An 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 Impacts of the Health Sector on the Economy of the MSA of Doctors Memorial Hospital

Employment and income multipliers for Holmes County have been calculated by use of the IMPLAN model. IMPLAN was developed by the U.S. Forest Service and is a model which allows for development of county multipliers. Additional information on IMPLAN is included in **Appendix A**.

The employment multipliers for the components of the health sector are shown in **Table 6**. The employment multiplier for the hospitals' component is 1.29. This indicates that for each job created in that sector, a 0.29 job is created throughout the area due to business (indirect) and household (induced) spending. The employment multipliers for the other health sector components are also shown in **Table 6**.

Applying the employment multipliers to the employment for each of the health sector components yields an estimate of each component's employment impact on the MSA of Doctors Memorial Hospital (**Table 6**). For example, the hospitals' component has employment of 150 employees; applying the employment multiplier of 1.29 to the 150 brings the total employment

Table 6
Employment Impact of Health Services
on the Medical Service Area of Doctors Memorial Hospital
in Bonifay, Holmes County, Florida

Health Sector Component	Number of Employees	Employment Multiplier	Secondary Impact	Total Impact
Hospitals	150	1.29	44	194
Physicians, Dentists, & Other Health Professionals	55	1.25	14	69
Nursing Homes & Protective Care	224	1.16	36	260
Pharmacies	31	1.15	5	36
Other Health & Medical Services*	<u>101</u>	1.33	<u>33</u>	<u>134</u>
TOTALS	561		132	693

SOURCE: Local employment data for all health services; multipliers from IMPLAN 2006 data, Minnesota IMPLAN Group, Inc. (July 2008 [www.implan.com]).

*The multiplier for Other Health & Medical Services is based on two sectors from IMPLAN.

impact of the hospital to 194 ($150 \times 1.29 = 194$). The secondary impact of the hospital is 44 employees ($150 \times 0.29 = 44$); these are the jobs created in other industry sectors in the economy of the MSA as a result of the spending of the hospital and the spending of the 150 hospital employees. All the employment multipliers are applied to the health sector components in **Table 6**, resulting in a total employment impact of the Doctors Memorial Hospital of 693 employees and a secondary employment impact of 132 employees.

The income multiplier for the hospitals' component is 1.25 (**Table 7**). This indicates that for each dollar created in that sector, \$0.25 is created throughout the area due to business (indirect) and household (induced) spending. The income multipliers for the other health sector

components are also given in **Table 7**. Applying the income multipliers to the income for each of the health sector components yields an estimate of each component's income impact on the MSA of Doctors Memorial Hospital (**Table 7**). All the health services in the MSA of Doctors Memorial Hospital had a total income impact of \$22.6 million and generated \$3.7 in secondary income in other industries in the MSA.

Income also has an impact on retail sales. If the county ratio between retail sales and income continues as in the past several years, then direct and secondary retail sales generated by the health sector and its employees equals \$5.6 million (**Table 7**). The income impacts were utilized to determine the retail sales and a one percent sales tax collection for each component. Then the health sector components were totaled to determine the total retail sales generated by the health sector. A one percent county sales tax collection was estimated to generate \$56,473 in the MSA of Doctors Memorial Hospital as a result of the total health sector impact (**Table 7**). This estimate is probably low, as many health care 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.

Summary

The economic impact of the health sector upon the economy of the MSA of Doctors Memorial Hospital is tremendous. The health sector employs a large number of residents, similar to a large industrial firm. The secondary impact occurring in the community is extremely large and measures the total impact of the health sector. If the health sector increases or decreases in size, the medical health of the community as well as the economic health of the

Table 7
Income¹ Impact of Health Services
on the Medical Service Area of Doctors Memorial Hospital
in Bonifay, Holmes County, Florida

Health Service	Direct Impact	Income Multiplier	Secondary Impact	Total Impact	Retail Sales	1% Sales Tax
Hospitals	\$4,100,000	1.25	\$1,025,000	\$5,125,000	\$1,281,250	\$12,813
Physicians, Dentists, & Other Health Professionals	\$3,788,968	1.16	\$606,235	\$4,395,203	\$1,098,801	\$10,988
Nursing Homes & Protective Care	\$5,826,801	1.14	\$815,752	\$6,642,553	\$1,660,638	\$16,606
Pharmacies	\$1,239,350	1.15	\$185,903	\$1,425,253	\$356,313	\$3,563
Other Health & Medical Services ²	<u>\$3,969,275</u>	1.26	<u>\$1,032,012</u>	<u>\$5,001,287</u>	<u>\$1,250,322</u>	<u>\$12,503</u>
TOTALS	<u>\$18,924,394</u>		<u>\$3,664,902</u>	<u>\$22,589,296</u>	<u>\$5,647,324</u>	<u>\$56,473</u>

SOURCE: Hospital income provided by local sources; income data for all other health services (except hospital) were estimated utilizing state average incomes from the U. S. Department of Labor, Bureau of Labor Statistics, May 2007 State Occupational Employment and Wage Estimates for Louisiana (www.bls.gov [July 2008]); multipliers from 2006 IMPLAN data, Minnesota IMPLAN Group, Inc. (www.implan.com [July 2008]).

¹ Income is defined as all personal income including wages, salaries, proprietor income, & benefits.

² The multiplier for Other Health & Medical Services is based on two sectors from IMPLAN.

community are greatly affected. For the attraction of industrial firms, businesses, and retirees, it is crucial that the area have a quality health sector. Often overlooked is the fact that a prosperous health sector contributes to the economic health of the community.

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APPENDIX A

Model and Data Used to Estimate Employment and Income Multipliers

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 difference 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 or review their website at www.implan.com.