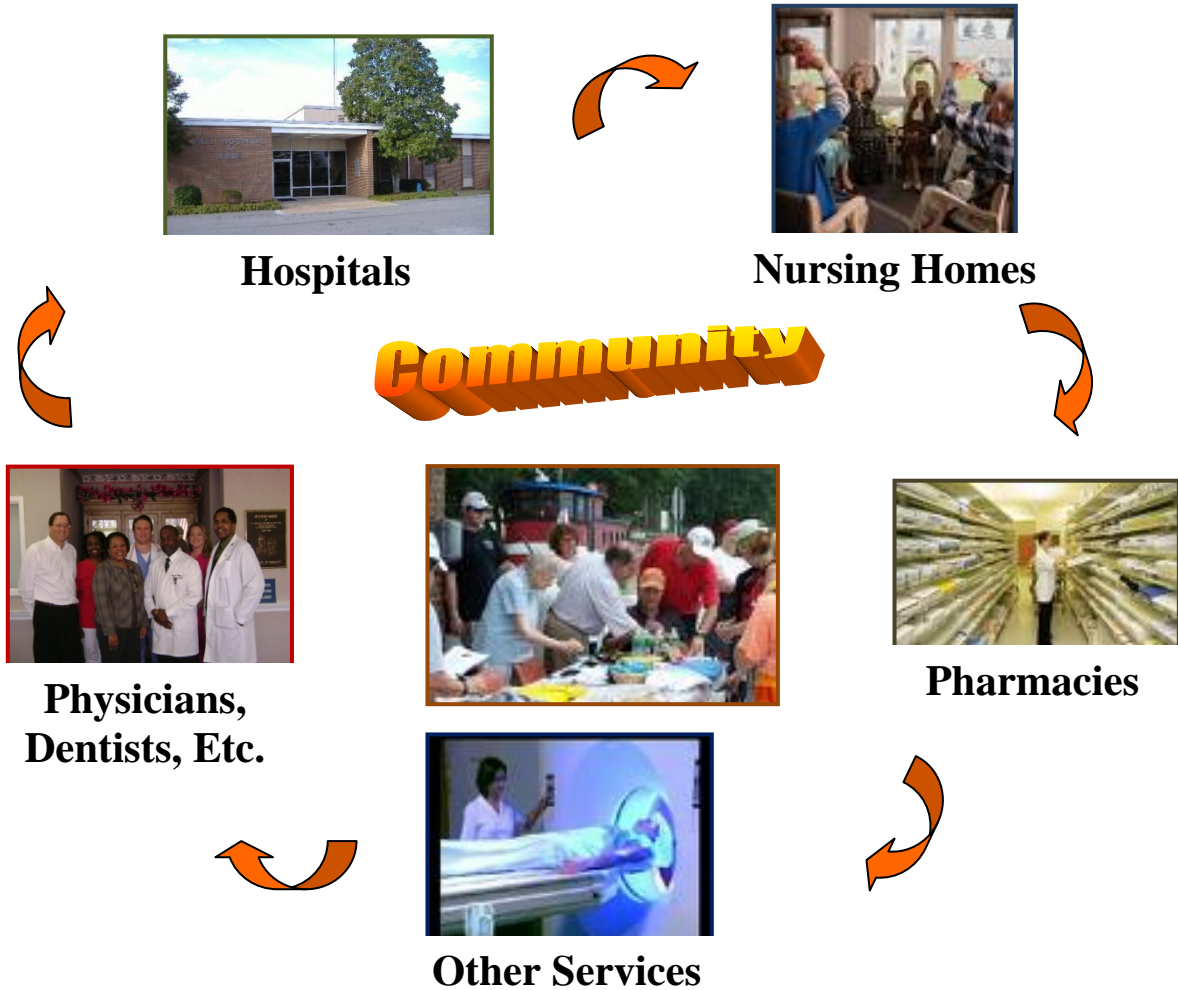


The Economic Impact of the Health Sector on the Economy of St. James Parish, Louisiana



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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 St. James Parish, Louisiana. The specific objectives of this report are to:

1. Review national health trend data;
2. Review demographic and economic data for St. James Parish and the State of Louisiana;
3. Summarize the direct economic activities of the health sector in St. James Parish;
4. Present concepts of community economics and multipliers; and
5. Estimate the economic impact of the health sector on St. James Parish, Louisiana.

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
1970-2008; Projected for 2009, 2012, 2015 & 2018

Year	Total Health Expenditures (\$Billions)	Per Capita Health Expenditures (\$)	Health as % of GDP (%)	Health Sector Employment (000)	Ave. 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	714.1	2,814	12.3%	7,814 ^a	4.8%
2000	1,352.9	4,789	13.6%	10,858 ^a	3.9%
2001	1,469.2	5,150	14.3%	11,188 ^a	3.0%
2002	1,602.4	5,564	15.1%	11,536 ^a	3.1%
2003	1,735.2	5,973	15.6%	11,817 ^b	N/A
2004	1,855.4	6,328	15.6%	12,055 ^b	2.0%
2005	1,982.5	6,701	15.7%	12,314 ^b	2.1%
2006	2,112.5	7,071	15.8%	12,602 ^b	2.3%
2007	2,239.7	7,423	15.9%	12,946 ^b	2.7%
2008	2,338.7	7,681	16.2%	13,469 ^b	4.0%
Projections					
2009	2,509.5	8,160	17.6%		
2012	2,930.7	9,282	18.0%		
2015	3,541.3	10,929	18.9%		
2018	4,353.2	13,100	20.3%		

SOURCES: 2010 Bureau of Labor Statistics (www.bls.gov [January 2010]); 2010 Centers for Medicare & Medicaid Services, National Health Expenditures 1970-2008 and National Health Expenditure Projections 2008-2018 (<http://www.cms.hhs.gov/nationalhealthexpenddata> [January 2010]).

N/A - Not Available.

^a Based on Standard Industrial Classification (SIC) codes for health sector employment.

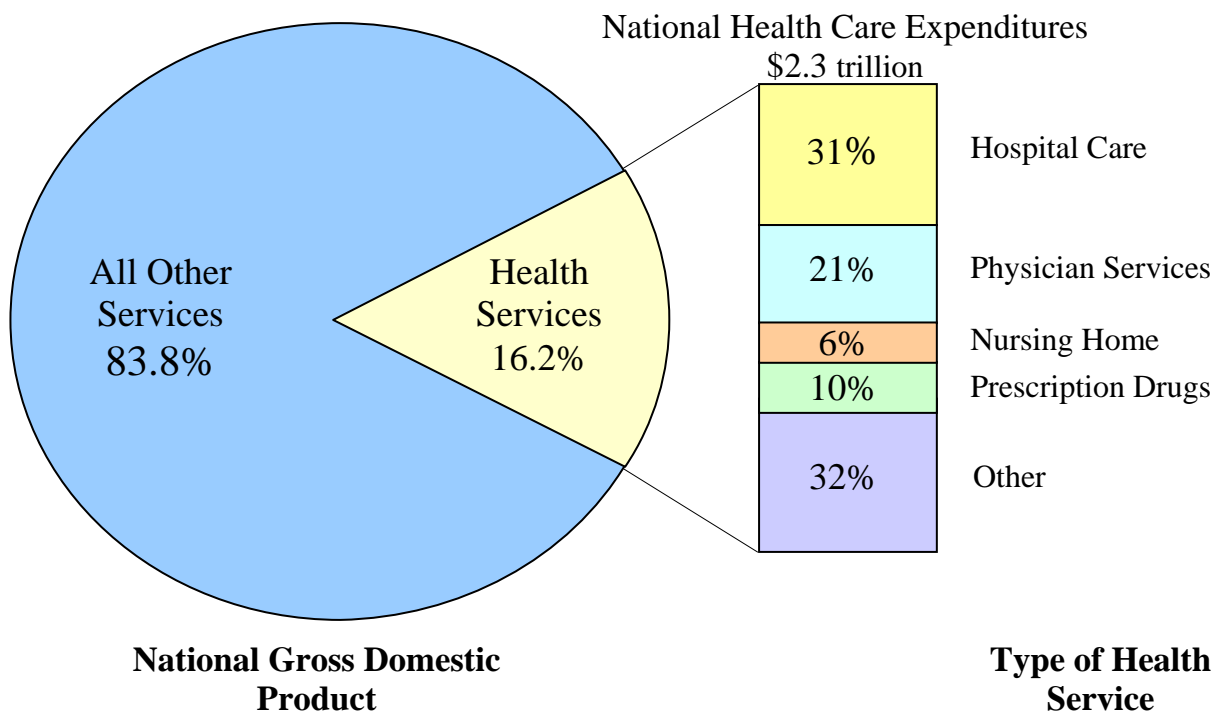
^b Based on North American Industrial Classification System (NAICS) for health sector employment.

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 16.2 percent in 2008;
- Per capita health expenditures increased from \$356 in 1970 to \$7,681 in 2008;
- Employment in the health sector increased over 341.3 percent from 1970 to 2008; and
- Annual increases in employment from 2003 to 2008 ranged from 2.0 percent to 4.0 percent.

In addition, the Bureau of Labor Statistics projects substantial increases in health care expenditures from 2008 through 2018. 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 18.9 percent of GDP by 2015 and increase to 20.3 percent of GDP in 2018. Per capita health care expenditures are projected to increase to \$10,929 in 2015 and to \$13,100 in 2018. Total health expenditures are projected to increase to almost \$4.4 trillion in 2018.

Figure 1. National Health Expenditures as a Percent of Gross Domestic Product and by Health Service Type, 2008



St. James Parish Demographic and Economic Data

The medical service area (MSA) is comprised of St. James Parish, which is located in southeast Louisiana (**Figure 2**). Data in **Table 2** show the populations for the cities and towns, St. James Parish and the State of Louisiana for census years 1990 and 2000 and census estimated year 2008. The largest population center in St. James Parish is Lutcher town with a 2000 Census population of 3,907. From the 1990 to the 2000 Census, St. James Parish population increased by 1.6 percent. St. James Parish population was estimated to increase by 0.1 percent from Census 2000 to the Census estimate for 2008. The State of Louisiana showed an increase of 5.9 percent from 1990 to 2000 and an estimated decrease of 1.3 percent from 2000 to 2008.

Table 2
Census Population, Population Estimates, and Percent Changes
for St. James Parish Cities and Towns, St. James Parish, and the State of Louisiana

	<u>Census</u>		<u>Estimates</u>	<u>10 Years</u>	<u>8 Years</u>
	1990	2000	2008	'90-'00	'00-'08
Gramercy town	2,412	3,066	3,254	27.1%	6.1%
Lutcher town	3,907	3,735	3,464	-4.4%	-7.3%
Balance of Parish	14,560	14,415	14,513	-1.0%	0.7%
St. James Parish	<u>20,879</u>	<u>21,216</u>	<u>21,231</u>	1.6%	0.1%
State of Louisiana	<u>4,219,973</u>	<u>4,468,976</u>	<u>4,410,796</u>	5.9%	-1.3%

SOURCE: U.S. Census Bureau; 1990 & 2000 Census population; 2008 Census population estimates (www.census.gov [January 2010]).

Figure 2 shows the location of St. James Parish Hospital, along with surrounding parishes and hospitals. St. James Parish is west of New Orleans metropolitan area and is southeast of Baton Rouge metropolitan area with the Mississippi River running through the Parish.

Figure 2
St. James Parish with Surrounding Hospitals and Metropolitan Areas



Parish	City	Hospital
Ascension	Gonzales	Ascension Hosp.
Ascension	Gonzales	Saint Elizabeth Hosp.
Ascension	Gonzales	Promise Hosp.
Ascension	Donaldsonville	Prevost Memorial Hosp.
Assumption	Napoleonville	Assumption Community Hosp.
Lafourche	Golden Meadow	Lady of the Sea Gen'l Hosp.
Lafourche	Lockport	Saint Anne Gen'l Hosp.
Lafourche	Thibodaux	Saint Joseph Hosp.
Lafourche	Thibodaux	Thibodaux Reg. Med. Ctr.
Livingston	Denham Springs	Ochsner Health Center
St. Charles	Luling	Saint Charles Parish Hosp.
St. John the Baptist	Reserve	River Parishes Hosp.

Table 3 presents 2000 population and population projections from 2010 to 2020 for St. James Parish and the State of Louisiana. From 2000 to 2010, St. James Parish is projected to increase in population by 5.2 percent. From 2000 to 2020, St. James Parish is projected to increase in population by 12.0 percent. The State of Louisiana is projected to increase by 4.8 percent from 2000 to 2010, 8.3 percent from 2000 to 2015, and 11.7 percent from 2000 to 2020.

Table 3
Population, Projected Population and Projected Percent Changes
for St. James Parish and the State of Louisiana

	<u>Census Population</u> 2000	2010	<u>Projected Population</u>	
			2015	2020
St. James Parish	<u>21,216</u>	22,310	23,020	23,770
State of Louisiana	<u>4,468,976</u>	4,683,030	4,840,140	4,991,410
		<u>Percent Change</u>		
		<u>10 Years</u> '00-'10	<u>15 Years</u> '00-'15	<u>20 Years</u> '00-'20
St. James Parish	<u>21,216</u>	5.2%	8.5%	12.0%
State of Louisiana	<u>4,468,976</u>	4.8%	8.3%	11.7%

SOURCE: 2000 Census Population, U.S. Census Bureau (www.census.gov [January 2010]); Louisiana Population Data Center, Louisiana State University (www.lapop.lsu.edu [January 2010]).

Table 4 utilizes County Business Pattern data from the U. S. Census Bureau to compare the employment and payroll for the health services sector to the total of all other sectors for both St. James Parish and the State of Louisiana. From the data, health services employment increased by 16.9 percent from 1999 to 2007 in St. James Parish, while total parish employment decreased by 1.1 percent. Health services as a percent of total parish employment grew from 6.4 percent

Table 4
Employment and Payroll for Health Services and Total Parish Services
for St. James Parish and the State of Louisiana

Based on NAICS*	Employment			
	Health Services Employment	Total Parish Employment	Health Services as a % of Total Parish Employment	Health Services as a % of Total State Employment
1999	384	5,966	6.4%	14.6%
2000	384	5,707	6.7%	14.6%
2001	364	5,560	6.5%	14.7%
2002	339	5,395	6.3%	15.5%
2003	364	4,977	7.3%	15.8%
2004	379	5,401	7.0%	16.0%
2005	466	6,013	7.7%	16.4%
2006	406	5,634	7.2%	15.9%
2007	449	5,903	7.6%	15.7%
% Change '99 - '07	16.9%	-1.1%		

Based on NAICS*	Payroll			
	Health. Services Payroll (\$1,000s)	Total Parish Payroll (\$1,000s)	Health Services as a % of Total Parish Payroll	Health Services as a % of Total State Payroll
1999	7,741	210,548	3.7%	14.5%
2000	7,649	212,559	3.6%	14.5%
2001	7,782	216,851	3.6%	14.6%
2002	8,973	220,029	4.1%	15.7%
2003	9,353	193,769	4.8%	15.6%
2004	10,088	227,874	4.4%	16.0%
2005	12,969	295,916	4.4%	15.7%
2006	12,427	301,273	4.1%	15.0%
2007	14,001	338,901	4.1%	15.0%
% Change '99 - '07	80.9%	61.0%		

SOURCE: U.S. Census Bureau, County Business Patterns; 1998-2007 data (www.census.gov [January 2010]).

* 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.

NOTE: Data from County Business Patterns exclude 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).

percent in 1999 to 7.6 percent in 2007, compared to the state's health services portion of state employment increasing from 14.6 percent in 1999 to 15.7 in 2007. Health services payroll in St. James Parish increased by 80.9 percent from 1999 to 2007, while the total parish payroll increased by 61.0 percent. Health services as a percent of total parish payroll increased from 3.7 percent in 1999 to 4.1 percent in 2007, compared to the state's health services portion of state payroll increasing from 14.5 percent to 15.0 percent.

The Direct Economic Activities

Employment and payroll are the important direct economic activities created by the health services in St. James Parish. The health sector is divided into the following components:

- Hospitals
- Physicians, dentists, & other medical professionals
- Nursing and protective care
- Home health care
- Pharmacies/Durable medical equipment
- Other health and medical services

The total health sector in St. James Parish employs 408 full- and part-time employees with total wages, salaries, benefits, and proprietors' income (defined as "income") of \$19.2 million (**Table 5**). The hospital component has 156 total full- and part-time employees with income of \$8.1 million. The hospital component is comprised of St. James Parish Hospital, which includes the following services:

- A 20-bed acute care critical access hospital;
- Emergency room 24 hours a day staffed with physicians;
- Traditional acute care services (radiology, laboratory, etc.);
- Specialty physician clinic with specialists in Cardiology, Gastroenterology, Nerve Conduction, Orthopedics, Podiatry, Psychiatry, Surgery and Wound Care, Urology, and Wound Care; and
- Physical therapy.

Table 5
Direct Economic Activities of the Health Sector
in St. James Parish, Louisiana

	Total Full - and Part- Time Employment	Total Payroll with Benefits
Hospital Includes St. James Parish Hospital	156	\$8,095,000
Physicians, Dentists & Other Medical Professionals Includes six physician practices with three internists, nine family practitioners and one family practitioner/general surgeon, one pediatrician, one chiropractor, and two nurse practitioners, four dental clinics, and one independent chiropractor practice	82	\$5,037,687
Pharmacies/Durable Medical Equipment Includes four pharmacy locations with one providing durable medical equipment	25	\$930,483
Other Health and Medical Services Includes two home health agencies, one nursing home, two kidney dialysis locations, emergency medical services, health department, one outpatient rehabilitation facility, and school nurses	<u>145</u>	<u>\$5,146,744</u>
TOTALS	<u>408</u>	<u>\$19,209,914</u>

SOURCE: Local employment and labor income data provided by St. James Parish Hospital; Employment data provided from local sources; All local labor income data (except the hospital) calculated based on state average incomes for occupation groups from "May 2008 State Occupational Employment and Wages Estimates Louisiana," U.S. Department of Labor, Bureau of Labor Analysis (www.bls.gov [January 2010]).

The next health component includes all physicians, dentists, and other medical professionals and their office staffs, representing 82 full- and part-time employees with income of \$5.0 million. This component includes six physician practices with three internists, nine family practitioners and one family practitioner/general surgeon, one pediatrician, one chiropractor, and two nurse practitioners, four dental clinics, and one independent chiropractor practice. The pharmacies' component includes four pharmacy locations and one with durable

medical equipment, representing total full- and part-time employment of 25 and total income of \$0.9 million.

Two of the health components, nursing and protective care and home health care, have been combined with the other health and medical services to ensure the privacy of individual employers. The other health and medical services' component includes 145 full- and part-time employees with an income of \$5.1 million. This component includes two home health agencies, one nursing home, two kidney dialysis locations, emergency medical services, health department, one outpatient rehabilitation facility, and school nurses.

In summary, the health sector is vitally important as a parish employer and important to the economy of St. James Parish. The health sector definitely employs a large number of residents. The health sector and the employees in the health sector purchase goods and services from businesses in St. James Parish. 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 3 illustrates the major flows of goods, services, and dollars of any economy. The foundation of a community's economy is 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 3**. 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 3**), labor from the residents or "households" of the community (left side of

Figure 3
Community Economic System

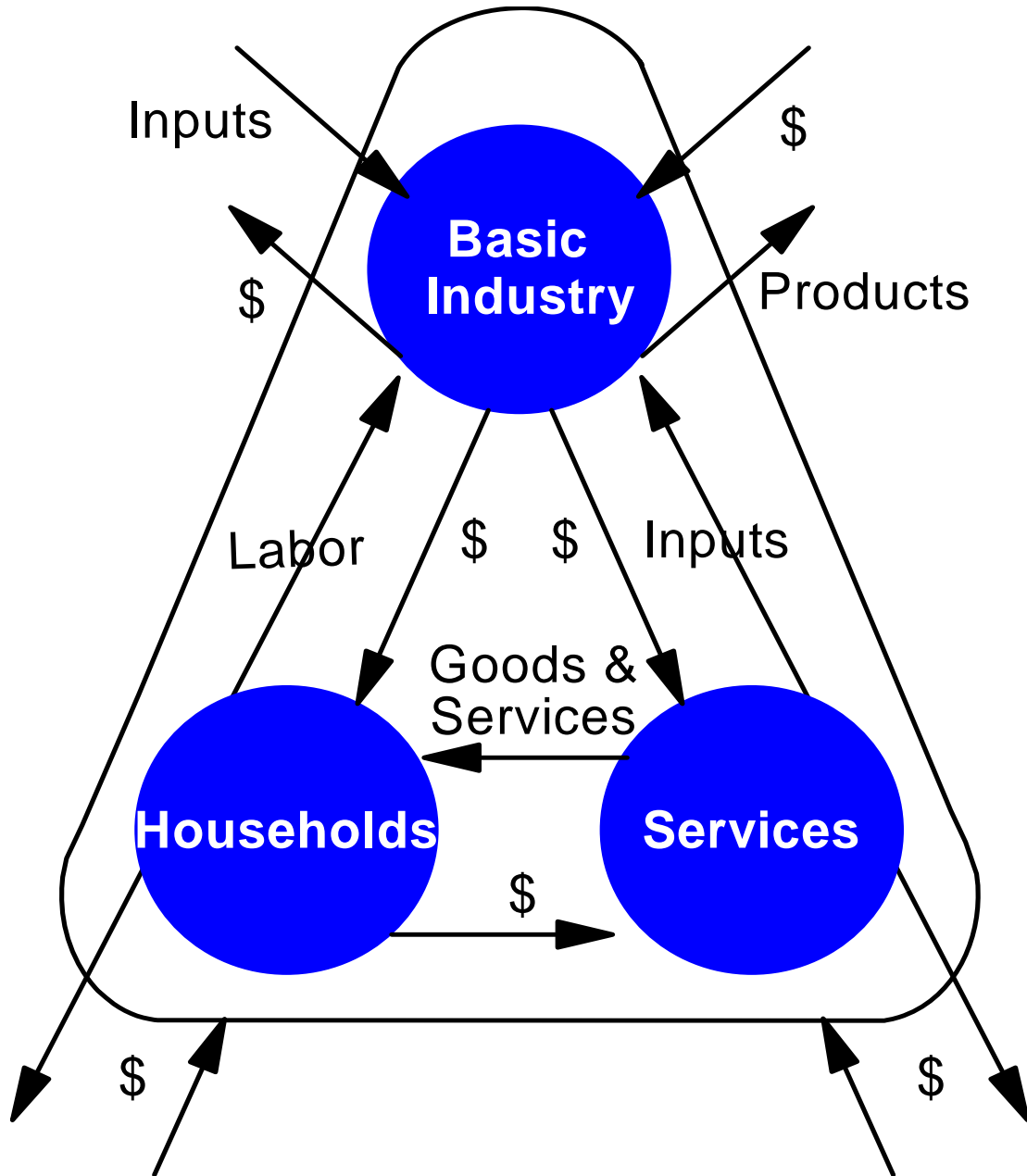


Figure 3), and inputs from service industries located within the community (right side of **Figure 3**). The flow of labor, goods, and services in the community is completed by households using their earnings to purchase goods and services from the community's service industries (bottom of **Figure 3**). **Figure 3** 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.

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 St. James Parish

Employment and income multipliers for St. James Parish 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 1.31. This indicates that for each job created in that sector, 0.31 jobs are 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**.

Table 6
Impact of Health Sector Employment
in St. James Parish, Louisiana

Health Sector Component	Direct Impact	Multiplier	Secondary Impact	Total Impact
Hospitals	156	1.31	48	204
Physicians, Dentists & Other				
Medical Professionals	82	1.28	23	105
Pharmacies/DME	25	1.27	7	32
Other Health & Medical Services	<u>145</u>	1.27	<u>39</u>	<u>184</u>
TOTALS	<u>408</u>		<u>117</u>	<u>525</u>

SOURCE: Employment data provided from local sources; Multipliers from Minnesota IMPLAN Group, Inc.

Applying the employment multipliers to the employment for each of the health sector components yields an estimate of each component's employment impact on St. James Parish (**Table 6**). For example, the hospitals' component has employment of 156 employees; applying the employment multiplier of 1.31 to the employment of 156 brings the total employment impact of the hospital to 204 ($156 \times 1.31 = 204$). The secondary impact of the hospital is 48 employees ($156 \times 0.31 = 48$); these are the jobs created in other industry sectors in the economy of St. James Parish as a result of the spending of the hospital and the spending of the hospital employees. All the employment multipliers are applied to the health sector components in **Table 6**, resulting in a total employment impact of the health services in St. James Parish of 525 employees including the secondary employment impact of 117 employees.

The income multiplier for the hospitals' component is 1.23 (**Table 7**). This means for each dollar created in that sector, \$0.23 is created throughout the area due to business (indirect) and household (induced) spending. To apply the income multiplier, multiply the total income for the hospital of \$8.1 million times the income multiplier of 1.23, resulting in total income impact for the hospital of almost \$10.0 million. The secondary impact from the hospital is \$1.9 million. 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 St. James Parish (**Table 7**). All the health services in St. James Parish had a total income impact of \$23.4 million and generated \$4.1 million in secondary income in other industries in St. James Parish.

Income also has an impact on retail sales. If the parish 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 \$2.5 million (**Table 7**). The income impacts were

Table 7
Economic Impact of the Health Sector Income¹
in St. James Parish, Louisiana

Health Sector Component	Direct Impact	Multiplier	Secondary Impact	Total Impact
Hospitals	\$8,095,000	1.23	\$1,861,850	\$9,956,850
Physicians, Dentists & Other Medical Professionals	\$5,037,687	1.16	\$806,030	\$5,843,717
Pharmacies/DME	\$930,483	1.20	\$186,097	\$1,116,580
Other Health & Medical Services	<u>\$5,146,744</u>	1.25	<u>\$1,286,686</u>	<u>\$6,433,430</u>
TOTALS	<u>\$19,209,914</u>		<u>\$4,140,663</u>	<u>\$23,350,577</u>

Health Sector Component	Retail Sales ²	One Cent Sales Tax
Hospitals	\$1,045,469	\$10,455
Physicians, Dentists & Other Medical Professionals	\$613,590	\$6,136
Pharmacies/DME	\$117,241	\$1,172
Other Health & Medical Services	<u>\$675,510</u>	<u>\$6,755</u>
TOTALS	<u>\$2,451,810</u>	<u>\$24,518</u>

SOURCE: Local hospital income data provided by St. James Parish Hospital; all local labor income data (except the hospital) calculated based on state average incomes for occupation groups from "May 2008 State Occupational Employment and Wages Estimates Louisiana," U.S. Department of Labor, Bureau of Labor Analysis (www.bls.gov [January 2010]); Multipliers from Minnesota IMPLAN Group, Inc.; Retail sales tax capture ratio calculated from the ratio of personal income from U. S. Department of Commerce, Bureau of Economic Analysis (www.bea.gov [January 2010]) and gross sales subject to sales tax for St. James Parish from Louisiana Department of Revenue (<http://revenue.louisiana.gov> [January 2010]).

¹ Income is the total of all wages, salaries, and benefits, and proprietor income.

² Based on local retail sales capture ratio of 10.5%.

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 parish sales tax collection was estimated to generate \$24,518 in St. James Parish 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 parish, but also to the economic health of the parish.

Summary

The economic impact of the health sector upon the economy of St. James Parish is tremendous. The health sector employs a large number of residents, similar to a large industrial firm. The secondary impact occurring in the county 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 county as well as the economic health of the county 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 St. James Parish.

References

- Alward, G., Sivertz, E., Olson, D., Wagnor, J., Serf, D., and Lindall, S. Micro IMPLAN Software Manual. Stillwater, MN, University of Minnesota Press. 1989.
- Doeksen, Gerald A., Johnson, Tom, and Willoughby, Chuck. Measuring the Economic Importance of the Health Sector on a Local Economy: A Brief Literature Review and Procedures to Measure Local Impacts. Southern Rural Development Center. SRDC Pub. No. 202. 1997.
- Miernyk, W.H. The Element of Input-Output Analysis. New York, NY; Random House. 1965.
- Minnesota IMPLAN Group, Inc. User's Guide, Analysis Guide, Data Guide: IMPLAN Professional Version 2.0 Social Accounting & Impact Analysis Software, 2nd Edition. June 2000.
- Siverts, Eric, Charles Palmer, Ken Walters, and Greg Alward. IMPLAN USER'S GUIDE. U.S. Department of Agriculture, Forest Service, Systems Application Unit, Land Management Planning, Fort Collins, Colorado. 1983.

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.

Version 3 of the IMPLAN software has been further modified and refined and became available in the fall of 2009. For more information about Minnesota IMPLAN Group, Inc.,

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