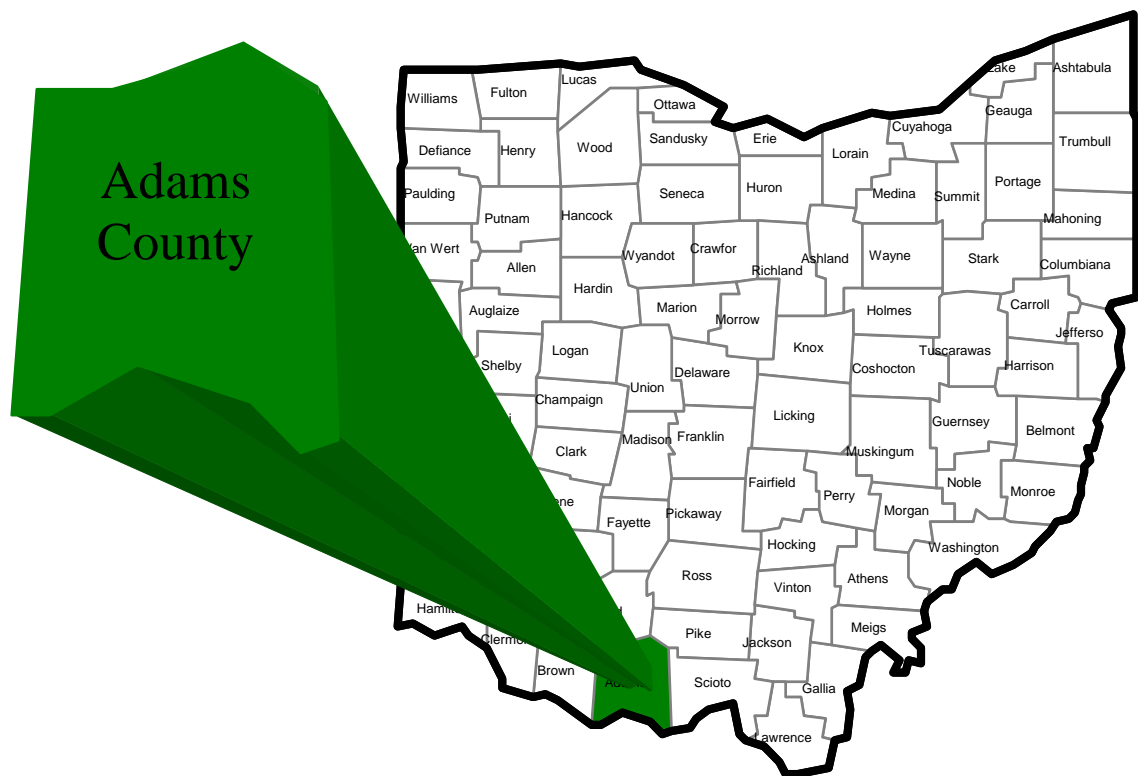


# Adams County, Ohio - Economic Impact of the Health Sector



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National Association of Counties Project

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The Economic Impact of the Health Sector  
on the Economy of Adams County, Ohio

Prepared for:

Adams County, Ohio

through

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## **The Economic Impact of the Health Sector on the Economy of Adams County, Ohio**

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. The overall objective of this study is to measure the economic impact of the health sector on the economy of Adams County. The specific objectives of this report are to:

1. discuss national trends in health care;
2. review county demographic and economic data;
3. summarize the direct economic activities of the health sector;
4. review concepts of community economics and multipliers;
5. estimate the economic impact of the health sector on the economy of Adams County;
6. illustrate the economic impact of the capital improvement project at Adams County Regional Medical Center; and
7. estimate the economic impact of additional employment generated at Adams County Regional Medical Center from the capital improvement project.

No recommendations will be made in this report.

### **National Trends in the Health Care Industry**

*The health care sector is an extremely fast growing sector, and based on the current demographics, there is every reason to expect this trend to continue.* Data in **Table 1** provide selected health expenditures and employment data for the United States; highlights include:

- Health expenditures increased from \$75 billion in 1970 to almost \$2 trillion in 2005;
- Health care services as a share of the national gross domestic product (GDP) were 7.2 percent in 1970 and increased to 16.0 percent in 2005;

**Table 1**  
**United States Health Expenditures and Employment Data**  
**for 1970-2005; Projected for 2008, 2012 & 2016**

United States Data						
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		
1980	253.9	1,102	9.1%	5,278	7.3%	Employment Based on SIC <sup>1</sup>
1990	714.0	2,813	12.3%	7,814	4.8%	
2000	1,353.3	4,790	13.8%	10,103	2.9%	
2001	1,469.6	5,148	14.5%	10,381	2.8%	
2002	1,602.8	5,559	15.3%	10,673	2.8%	
2003	1,733.4	5,952	15.8%	11,817	N/A	
2004	1,858.9	6,322	15.9%	12,055	2.0%	
2005	1,987.7	6,697	16.0%	12,314	2.1%	
Projections						
2008	2,420.0	6,683	16.5%			
2012	3,173.4	9,148	17.9%			
2016	4,136.9	12,320	19.6%			

SOURCES: Bureau of Labor Statistics; Bureau of Economic Analysis; Centers for Medicare & Medicaid Services, National Health Expenditures 1970-2005 and National Health Expenditure Projections 2006-2016, website: <http://www.cms.hhs.gov/NationalHealthExpendData>, data as of March 2007.

N/A - Not Available

<sup>1</sup> Based on Standard Industrial Classification (SIC) codes for health sector employment.

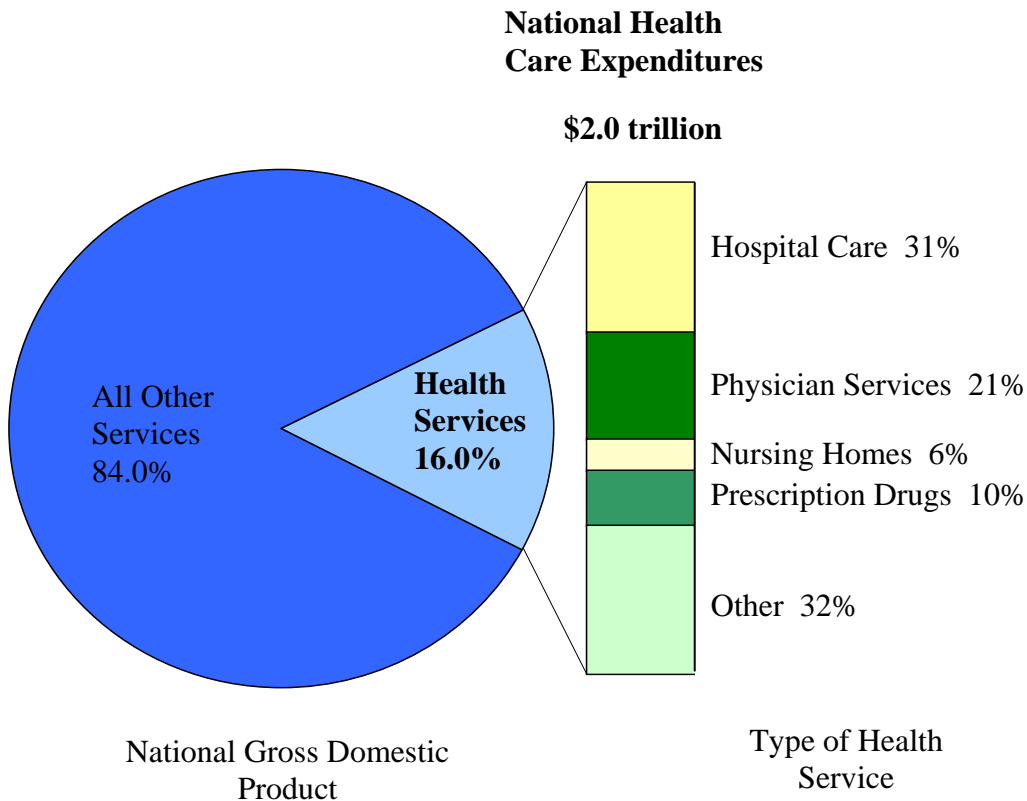
<sup>2</sup> Based on North American Industrial Classification System (NAICS) for health sector employment.

- Per capita health expenditures increased from \$356 in 1970 to \$6,697 in 2005;
- Employment in the health sector increased 250 percent from 1970 to 2002;

- Health expenditures are projected to double from \$2 trillion in 2005 to \$4.1 trillion in 2016;
- Health care services as a share of the national GDP are projected to increase from 16.0 percent in 2005 to 19.6% in 2016; and
- Per capital health expenditures will increase from \$6,697 in 2005 to \$12,320 in 2016.

**Figure 1** illustrates 2005 health expenditures by percent of gross domestic product and by type of health service. The largest health service type was hospitals, representing 31.0 percent of the total. The next largest type of health services was physician services with 21.0 percent of the total.

**Figure 1.**  
**National Health Expenditures**  
**as a Percent of Gross Domestic Product and by Health Service Type, 2005**



## County Demographic and Economic Data

The population for Adams County, villages in Adams County, and the state of Ohio are illustrated in **Table 2**. The study is based on the medical service area that includes all of Adams County, Ohio. Adams County is located in the south central part of Ohio. West Union is the county seat of Adams County and is the largest population center in the county, followed by the village of Manchester. West Union had a population of 3,096 in 1990 and decreased to 2,932 in the 2000 census, representing a decrease of 5.3 percent. The 2005 estimated population for West

**Table 2**  
**Population of Adams County and the State of Ohio**  
**1990 and 2000 Census, 2005 Census Estimates**

Villages	1990 Census	2000 Census	2005 Estimates	1990-2000 % change	2000-2005 % change
Cherry Fork village	178	127	135	-28.7%	6.3%
Manchester village	2,223	2,039	2,082	-8.3%	2.1%
Peebles village	1,782	1,740	1,845	-2.4%	6.0%
Rome village	99	117	125	18.2%	6.8%
Seaman village	1,013	1,054	1,084	4.0%	2.8%
West Union village	3,096	2,932	3,108	-5.3%	6.0%
Winchester village	978	1,025	1,086	4.8%	6.0%
Balance of Adams County	<u>16,002</u>	<u>18,304</u>	<u>18,989</u>	<u>14.4%</u>	<u>3.7%</u>
Adams County Total	<u>25,371</u>	<u>27,330</u>	<u>28,454</u>	<u>7.7%</u>	<u>4.1%</u>
State of Ohio	<u>10,847,115</u>	<u>11,353,140</u>	<u>11,464,042</u>	<u>4.7%</u>	<u>1.0%</u>

Source: U. S. Census Bureau, 1990 and 2000 census population, 2005 estimated population.

Union is 3,108, representing an increase of 6.0 percent from the 2000 census. Manchester had a population of 2,223 in 1990 and decreased 8.3 percent to 2,039 in 2000. The 2005 estimated population of Manchester was 2,082, an increase of 2.1 percent from the 2000 census. The

village of Peebles had a population of 1,782 in 1990; the population decreased to 1,740 in 2000, representing a 2.4 percent decrease. From 2000 to 2005 the population of Peebles is estimated to increase by 6.0 percent to 1,845.

Overall, Adams County increased 7.7 percent in population from 1990 to 2000 and is estimated to have increased an additional 4.1 percent from 2000 to 2005. The state of Ohio experienced the same trends for these time periods but at a lower percent than Adams County; 4.7 percent and 1.0 percent, respectively.

**Table 3** shows the breakdown by age group for the Adams County population for census years 1990 and 2000 and for the 2005 census estimates. In general, the younger age groups are decreasing in population, while the older age groups are increasing in population over time.

**Table 3**  
**Population by Age Groups for Adams County, Ohio**  
**1990 and 2000 Census and 2005 Census Estimates**

Age Groups	1990 Census	% of Total	2000 Census	% of Total	2005 Estimated	% of Total
<14 years	6,008	23.7%	5,927	21.7%	5,653	19.9%
15-34 years	7,456	29.4%	7,231	26.5%	7,996	28.1%
35-54 years	6,159	24.3%	7,752	28.4%	7,988	28.1%
55-74 years	4,285	16.9%	4,807	17.6%	5,053	17.8%
75+ years	<u>1,463</u>	<u>5.8%</u>	<u>1,613</u>	<u>5.9%</u>	<u>1,764</u>	<u>6.2%</u>
Totals	<u>25,371</u>	<u>100.0%</u>	<u>27,330</u>	<u>100.0%</u>	<u>28,454</u>	<u>100.0%</u>

Source: U. S. Census Bureau, 1990 and 2000 census populations and 2005 estimated population.

Data in **Table 4** are from the U. S. Census Bureau County Business Patterns and illustrate how health services are growing over time in Adams County. From 1990 through 1997, the health services employment grew 201.4 percent from 216 employees in 1990 to 651 employees

**Table 4**  
**Health Employment and Payroll for Adams County and**  
**Health as Percent of County and State Total Employment and Payroll**  
**Adams County, Ohio, Selected Years**

Time Periods	Employment			Payroll			
	Adams County		State of Ohio	Adams County		State of Ohio	
	Health Employment	Health - % of Total Employment	Health - % of Total Employment	Health Payroll (\$1,000s)	Health - % of Total Payroll	Health - % of Total Payroll	
Based on SIC	1990	216	9.1%	10.2%	\$3,063	11.2%	10.9%
	1995	550	14.2%	11.1%	\$9,601	15.3%	11.9%
	1997	651	16.3%	11.1%	\$12,309	17.5%	11.8%
		% Change in Health Employment	% Change in Total Employment		% Change in Health Payroll	% Change in Total Payroll	
	1990 to 1997	<b>201.4%</b>	<b>102.0%</b>		<b>301.9%</b>	<b>196.3%</b>	
	Employment			Payroll			
	Adams County		State of Ohio	Adams County		State of Ohio	
	Health Employment	Health - % of Total Employment	Health - % of Total Employment	Health Payroll (\$1,000s)	Health - % of Total Payroll	Health - % of Total Payroll	
Based on NAICS	1998	884	19.8%	13.1%	\$15,451	18.5%	12.4%
	2000	782	17.5%	12.9%	\$15,640	16.4%	12.3%
	2002	1019	22.4%	14.3%	\$20,042	21.1%	13.9%
		% Change in Health Employment	% Change in Total Employment		% Change in Health Payroll	% Change in Total Payroll	
	1998 to 2002	<b>15.3%</b>	<b>2.0%</b>		<b>29.7%</b>	<b>14.2%</b>	

Source: U.S. Census Bureau County Business Patterns; 1990-1997 based upon Standard Industrial Classification (SIC) system and 1998-2002 based upon North American Industrial Classification System (NAICS). 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).

Additional footnotes for **Table 4** on next page.

#### **Table 4 Additional Footnotes**

The SIC major group includes establishments primarily engaged in furnishing medical, surgical, and other health services to persons; establishments of associations or groups, such as Health Maintenance Organizations (HMOs), primarily engaged in providing medical or other health services to members are included; hospices are also included in this major group.

The NAICS Health Care and Social Assistance sector includes establishments providing health care and social assistance for individuals. The 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 share 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).

in 1997. During the same time period, the total county employment grew only 102.0 percent. In 1990, county health services employment represented 9.1 percent of total county employment, while the state health services employment represented 10.2 percent of total state employment. In 1997, the county health services employment grew to 16.3 percent of total county employment, while the state health services employment only grew to 11.1 percent of total state employment.

The county health services payroll grew 301.9 percent from \$3.0 million in 1990 to \$12.3 million in 1997; this compares to growth of only 196.3 percent for the total county payroll (**Table 4**). In 1990, county health services payroll represented 11.2 percent of total county payroll, while the state health services payroll represented 10.9 percent of total state payroll. In 1997, the county health services payroll grew to 17.5 percent of total county payroll, while the state health services payroll only grew to 11.8 percent of total state payroll.

The definition of health services changed after 1997 from the Standard Industrial Classification (SIC) system to the North American Industrial Classification System (NAICS).

From 1998 through 2002, county health services employment increased 15.3 percent while county total employment increased only 2.0 percent. In 1998, county health services employment represented 19.8 percent of total county employment while state health services employment represented only 13.1 percent of total state employment. By 2002, county health services employment grew to represent 22.4 percent of total county employment, while state health services employment only increased to 14.3 percent of the total state employment.

The county health services payroll grew 29.7 percent from 1998 through 2002, while the total county payroll grew only 14.2 percent (**Table 4**). In 1998, the county health services payroll accounted for 18.5 percent of the total county payroll, compared to 12.4 percent for the state. In 2002, the county health services payroll increased to account for 21.1% of total county employment, compared to 13.9 for the state.

### **The Direct Economic Activities**

Employment and payroll are the important direct economic activities created in Adams County from the health sector. The health sector is divided into the following components:

- Hospitals
- Offices of Physicians, Dentists, and Other Health Practitioners
- Nursing and Protective Services
- Home Health
- Pharmacies/Health Food Stores
- Other Medical and Health Services

The total health sector in Adams County employs 1,142 full-time and part-time employees and has an estimated payroll including benefits of \$43,693,807 (**Table 5**). The hospital component employs 313 people with an annual payroll of \$11,741,154. The hospital sector includes Adams County Regional Medical Center, providing inpatient and outpatient care, a 24/7 emergency room, a visiting specialty physicians' outpatient clinic, home health services,

**Table 5**  
**Direct Impact of Health Services**  
**in Adams County, Ohio, 2007**

Health Care Entity	Number of Employees	Income (Wages, Salaries, & Proprietors' Income, & Benefits)
Hospitals	313	\$11,741,154
Offices of Physicians, Dentists, & Other Health Practitioners	173	\$10,758,274
Nursing & Protective Services	257	\$7,644,662
Home Health	222	\$6,756,216
Pharmacies/Health Food Stores	57	\$2,362,566
Other Medical & Health Services	<u>120</u>	<u>\$4,430,935</u>
<b>TOTALS</b>	<b>1,142</b>	<b>\$43,693,807</b>

SOURCE: Local data for hospital; local employment data for all other health services; income data for all services but the hospital were estimated utilizing average incomes from the U. S. Bureau of Labor Statistics online ([www.bls.gov](http://www.bls.gov) [4/12/07]).

physical therapy, occupational therapy, speech pathology, audiology, and a sleep laboratory.

The offices of physicians, dentists, and other health practitioners' component employs 173 full-time and part-time employees, with an annual payroll of \$10,758,274. This component includes twelve physician clinics or offices, one federally qualified community health center, four dental offices, a sports medicine center, two chiropractor offices, two mental health facilities, and two optometry practices. Nursing and protective services employ 257 people with an annual payroll of \$7,644,662. This component includes two nursing homes, two homes for the elderly, and two residential care facilities. Home health employs 222 full-time and part-time employees with an

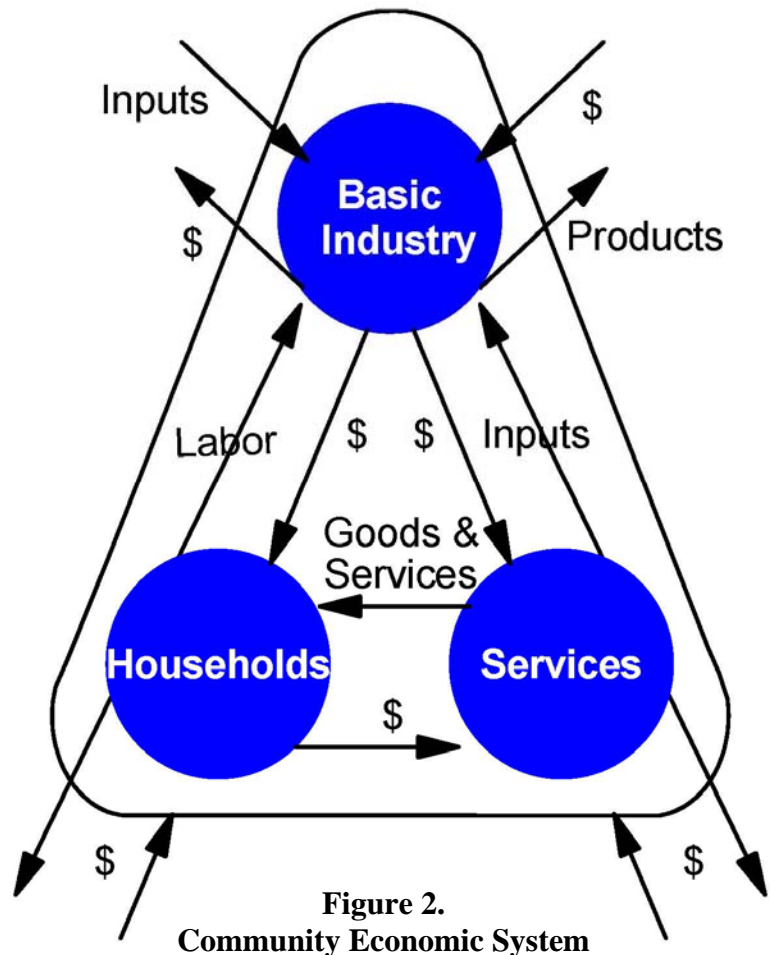
annual payroll plus benefits of \$6,756,216. Home health includes twelve different home health agencies. Pharmacies/health food stores include 57 employees with an income (payroll plus benefits) of \$2,362,566. This component includes three pharmacies, two health food stores, and two durable medical equipment providers. The other medical and health services component employs 120 employees with an annual payroll of \$4,430,935. The other medical and health services component includes one dialysis center, two emergency medical services, one school nurse, the Department of Jobs and Family Services, the Adams County Child and Family Health Clinic, and Adams County Health Department. It should be noted that many rural communities have a large number of elderly, and the ranchers and farmers often retire in the towns. Thus, nursing and protective services 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 Adams County. 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**). It is evident from the interrelationships illustrated in **Figure 2** that a change in any one segment of a community's economy will have reverberations throughout the entire economic system of the community.



Consider, for instance, the closing of a hospital. The services section 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 Adams County, Ohio**

Employment and income multipliers for the area have been calculated by use of the IMPLAN model. It 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 hospital component is 1.43. This indicates that for each

job created in that sector, a 0.43 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**.

**Table 6**  
**Employment Impact of Health Services**  
**in Adams County, Ohio, 2007**

Health Care Entity	Number of Employees	Employment Multiplier	Secondary Impact	Total Impact
Hospital	313	1.43	135	448
Offices of Physicians, Dentists, & Other Health Practitioners	173	1.40	69	242
Nursing & Protective Services	257	1.25	64	321
Home Health	222	1.22	49	271
Pharmacies/Health Food Stores	57	1.26	15	72
Other Medical & Health Services	<u>120</u>	1.30	<u>36</u>	<u>156</u>
Totals	<b><u>1,142</u></b>		<b><u>368</u></b>	<b><u>1,510</u></b>

SOURCE: Health care employment data provided from local sources; multipliers from Minnesota IMPLAN Group, Inc., 2004 IMPLAN Data.

Applying the employment multipliers to the employment for each of the health sector components yields an estimate of each component's employment impact on Adams County (**Table 6**). For example, the hospital has employment of 313 employees; applying the employment multiplier of 1.43 to the employment number of 313 brings the total employment

impact of the hospital to 448 employees ( $313 \times 1.43 = 448$ ). The secondary impact of the hospital is 135 employees ( $313 \times 0.43 = 135$ ); these are the jobs created in other industry sectors in the Adams County economy as a result of the spending of the hospital and the spending of the 313 hospital employees. The offices of physicians, dentists and other health practitioners have a direct impact of 173 employees and after the application of the multiplier of 1.40, the secondary impact is 69 employees and the total impact comes to 242 employees. All the employment multipliers are applied in **Table 6**, resulting in a total employment impact of the health sector in Adams County estimated at 1,510 employees and a secondary employment impact of 368 employees.

The income multiplier for the hospital sector is 1.27 (**Table 7**). This indicates that for each dollar created in that sector, \$0.27 are 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 (wages, salaries, and proprietor income plus benefits) for each of the health sector components yields an estimate of each component's income impact on Adams County (**Table 7**). The hospital component has a total payroll of \$11,741,154; applying the income multiplier of 1.27 brings the total hospital income impact to \$14,911,266 ( $\$11,741,154 \times 1.27 = \$14,911,266$ ). The secondary income impact from the hospital component is \$3,170,112, which is the income generated in the other industry sectors in the Adams County economy due to the hospital spending and the hospital employees' spending. All the income multipliers are applied to the income for each component and the resulting

**Table 7**  
**Income Impact of Health Services**  
**in Adams County, Ohio, 2007**

Health Care Component	Income (\$\$)	Income Multiplier	Secondary Impact	Total Impact	Retail Sales	1.5% Sales Tax
Hospitals	\$11,741,154	1.27	\$3,170,112	\$14,911,266	\$5,517,168	\$82,758
Offices of Physicians, Dentists, & Other Health Practitioners	\$10,758,274	1.20	\$2,151,655	\$12,909,929	\$4,776,674	\$71,650
Nursing & Protective Services	\$7,644,662	1.22	\$1,681,826	\$9,326,488	\$3,450,801	\$51,762
Home Health	\$6,756,216	1.17	\$1,148,557	\$7,904,772	\$2,924,766	\$43,871
Pharmacies/ Health Food Stores	\$2,362,566	1.24	\$567,016	\$2,929,582	\$1,083,945	\$16,259
Other Medical & Health Services	<u>\$4,430,935</u>	1.27	<u>\$1,196,353</u>	<u>\$5,627,288</u>	<u>\$2,082,097</u>	<u>\$31,231</u>
<b>Totals</b>	<u><b>\$43,693,807</b></u>		<u><b>\$9,915,518</b></u>	<u><b>\$53,609,325</b></u>	<u><b>\$19,835,451</b></u>	<u><b>\$297,531</b></u>

SOURCE: Hospital income provided by local sources; income data for all services (except hospital) were estimated utilizing average incomes from the U. S. Bureau of Labor Statistics online (www.bls.gov [4/12/07]); multipliers from Minnesota IMPLAN Group, Inc., 2004 IMPLAN Data.

secondary and total income impacts are shown for each component. The total secondary income impact of the health sector in Adams County is estimated to be \$9,915,518, with the total income impact of the health sector in Adams County estimated to be \$53,609,325 (**Table 7**).

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 \$19,835,451 (**Table 7**). Each of the health sector components' income impacts were utilized to determine the retail sales and a 1.5 percent sales tax collection for each component. Then the health sector components are totaled to determine the direct and secondary retail sales generated by the health sector. A 1.5 percent sales tax collection is estimated to generate \$297,531 in Adams County 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.

#### **The Impact from Adams County Regional Medical Center's Capital Improvement Project**

Adams County Regional Medical Center is in the midst of a major capital improvement project. The construction activities of a large capital improvement project have a significant impact on the local economy. The capital project will be completed in mid-2007. The impact of construction activities is often overlooked. Data were collected for the capital improvement project over a three year period, 2005, 2006 and 2007. Adams County Regional Medical Center had capital expenditures of \$7.0 million in 2005, \$14.0 million in 2006, and expects total capital expenditures of \$7.0 million in 2007. Data in **Table 8** show the capital investment for the proposed capital improvement projects during the three year construction period, as well as the construction employment and income estimated from county data.

**Table 8**  
**Employment and Income Generated from**  
**Adams County Regional Medical Center's Capital Improvement Plans**  
**in Adams County, Ohio**

Year	Capital Investment (millions)	Employees (Full and Part Time)	Wages, Salaries & Benefits
2005	\$7.0	110	\$3.0
2006	\$14.0	221	\$5.9
2007	\$7.0	110	\$2.9

Source: Capital investment amounts from local sources; employment and income estimated utilizing Minnesota IMPLAN Group, Inc., 2004 IMPLAN data.

Data from the IMPLAN model were utilized to estimate employment and income. The data were checked against industry standard and appear to be very accurate estimates. The capital improvement or construction impacts occur only during the year the capital expenditures are incurred, but they are significant. The \$7.0 million capital investment in 2005 was estimated to generate 110 full-time and part-time construction jobs and \$3.0 million in income (**Table 8**). In 2006, the \$14.0 million in capital expenditures was estimated to generate 221 construction jobs and \$5.9 million in income. In 2007, the \$7.0 million capital investment is estimated to generate 110 construction jobs with income of \$2.9 million. This is the direct employment and income from the construction activities and not the total construction impact which is again estimated with multipliers.

The total impact on employment from Adams County Regional Medical Center's capital improvements is presented in **Table 9**. The construction employment multiplier of 1.30 indicates that a 0.30 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

**Table 9**  
**Employment Impact from Adams County Regional Medical Center's**  
**Construction Activities in Adams County, Ohio**

Year	Number of Construction Jobs	Construction Multiplier	Secondary Jobs	Total Jobs
2005	110	1.30	33	143
2006	221	1.30	66	287
2007	110	1.30	33	143

Source: Multiplier from Minnesota IMPLAN Group, Inc., 2004 IMPLAN data.

construction employment multiplier is assumed to remain the same during the three year construction period. The secondary employment impact was 33 jobs for 2005, with estimated total employment impact of 143 jobs. In 2006, the secondary employment impact was 66 construction jobs with total employment impact of 287 construction jobs. In 2007, the secondary employment impact is 33 jobs, with a total employment impact of 143 construction jobs.

The impact on income is presented in **Table 10**. The income multiplier is 1.27, which means that for each dollar of income paid to construction works, another \$0.27 of income are generated in other businesses in the local economy. Again, it is assumed that the multiplier will remain the same during the three year construction period. The secondary income impact for 2005 was estimated at \$0.8 million and the total income impact on the local economy was estimated to be \$3.8 million in construction income. In 2006, the estimated secondary income impact was \$1.6 million and the total estimated income impact was \$7.5 million in construction income. During year 2007, it is estimated that the secondary income impact will be \$0.8, bringing the total estimated income impact in 2007 to \$3.7 million.

**Table 10**  
**Income Impact from Adams County Regional Medical Center's**  
**Construction Activities in Adams County, Ohio**

Year	Income (millions)	Income Multiplier	Secondary Impact (millions)	Total Impact (millions)	Retail Sales (millions)	1.5% Sales Tax (\$\$)
2005	\$3.0	1.27	\$0.8	\$3.8	\$1.4	\$21,000
2006	\$5.9	1.27	\$1.6	\$7.5	\$2.8	\$42,000
2007	\$2.9	1.27	\$0.8	\$3.7	\$1.4	\$21,000

Source: Multiplier from Minnesota IMPLAN Group, Inc., 2004 IMPLAN data.

The retail sales resulting from the spending of the construction employment, as well as the secondary employment, have also been calculated. For 2005, total retail sales were estimated to be \$1.4 million, resulting in \$21,000 from a 1.5% sales tax. In 2006, the estimated retail sales were \$2.8 million, resulting in \$42,000 from a 1.5% sales tax. During 2007, the retail sales are estimated to be \$1.4 million, with \$21,000 from a 1.5% sales tax. The impacts from capital expenditures only occur during construction years.

**New Employment Resulting from Capital Improvement Project  
at Adams County Regional Medical Center**

The capital improvement project will increase capacity to provide additional health care services. Employment is projected to increase at Adams County Regional Medical Center by nine employees in 2008, ten additional employees in 2009, and another nine employees by 2010 (**Table 11**). This will increase the direct impact of the Adams County Regional Medical Center by 28 employees at the end of 2010. Assuming that the hospital employment multiplier remains the same for these future years, the multiplier of 1.43 is applied to each year's employment to generate the secondary and total employment impact. The total secondary employment impact is

**Table 11**  
**New Employment from Capital Improvement**  
**of Adams County Regional Medical Center in Adams County, Ohio, 2008-2010**

Year	Number of Employees	Employment Multiplier	Secondary Impact	Total Impact
2008	9	1.43	4	13
2009	10	1.43	4	14
2010	<u>9</u>	1.43	<u>4</u>	<u>13</u>
Totals	<b>28</b>		<b>12</b>	<b>40</b>

SOURCE: Projected health care employment data provided from local sources; multipliers from Minnesota IMPLAN Group, Inc., 2004 IMPLAN Data.

estimated to be 12 employees and the total employment impact is estimated to be 40 employees by the end of 2010. These are employees of the Adams County Regional Medical Center that will continue each year of operation.

The income resulting from the new employment is shown in **Table 12**. The average wage of the Adams County Regional Medical Center in 2007 was utilized to generate the income. The new income generated will be \$334,685 in 2008, \$371,872 in 2009, and \$347,080 in 2010. Assuming that the hospital income multiplier remains the same for these future years, the multiplier of 1.27 is applied to each year's income to generate the secondary and total income impact. The secondary income impact is estimated to be \$284,482 and the total income impact is estimated to be \$1,338,119. The additional income generated by the new employment will continue each year of operation after 2010.

**Table 12**  
**New Income Impact from Capital Improvement**  
**of Adams County Regional Medical Center in Adams County, Ohio, 2008-2010**

Year	Income (\$\$)	Income Multiplier	Secondary Impact	Total Impact	Retail Sales	1.5% Sales Tax
2008	\$334,685	1.27	\$90,365	\$425,050	\$157,269	\$2,359
2009	\$371,872	1.27	\$100,405	\$472,277	\$174,742	\$2,621
2010	<u>\$347,080</u>	1.27	<u>\$93,712</u>	<u>\$440,792</u>	<u>\$163,093</u>	<u>\$2,446</u>
<b>Totals</b>	<b>\$1,053,637</b>		<b>\$284,482</b>	<b>\$1,338,119</b>	<b>\$495,104</b>	<b>\$7,426</b>

SOURCE: Hospital income estimated from 2007 hospital average income; multipliers from Minnesota IMPLAN Group, 2004 IMPLAN data.

The retail sales resulting from the new employment, as well as the secondary employment, have also been calculated. These calculations are based on the assumption that the ratio of retail sales to total personal income and that the 1.5% sales tax rate remain the same during these future years. For 2008, total retail sales were estimated to be \$157,269, resulting in \$2,359 from a 1.5% sales tax. In 2006, the estimated retail sales were \$174,742, resulting in \$2,621 from a 1.5% sales tax. During 2007, the retail sales are estimated to be \$163,093, with \$2,446 from a 1.5% sales tax. For the three year period, the total retail sales are estimated to be \$495,104, with \$7,246 from a 1.5% sales tax.

### Summary

The economic impact of the health sector upon the economy of Adams County 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 community are greatly affected. For the attraction of industrial firms, businesses, and retirees, it is crucial that the area have a quality health sector. The construction impact is also significant to the local economy; however, the construction impact only occurs during the construction years, while the operations' impacts of the hospital and the other health components continue every year. 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](mailto:info@implan.com) or review their website at [www.implan.com](http://www.implan.com).