



## **The Economic Impacts of 26-50 Bed Prospective Pay System (PPS) Hospitals and 51-100 Bed PPS Hospitals on the Local Economies**

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### **Key Findings:**

- The 26-50 bed PPS hospital sample of 178 hospitals has an average of 39 beds, 235 employees and \$17.2 million labor income.
- The 51-100 bed PPS hospital sample of 169 hospitals has an average of 75 beds, 496 employees and \$36.0 million labor income.
- The 26-50 bed PPS hospital sample has average total impact of 334 employees and \$21.2 million labor income.
- The 51-100 bed PPS hospital sample has average total impact of 715 employees and \$45.4 million labor income.
- A template is provided for PPS hospitals to estimate their economic impact.

15 percent of the jobs in many rural communities are in the health sector.<sup>1</sup> Hospitals often are the second largest employer in rural communities, trailing only local school systems.

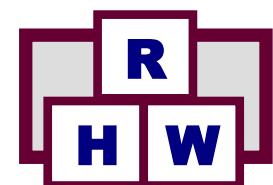
The importance of the health care sector to the local economy has been well documented and the hospital is the cornerstone of the health care sector. Health care and, especially, the hospital, are important to business and industry and to the retirement community, as well as to the health care of all community residents.<sup>2</sup> The economic impact of rural hospitals is of utmost concern with the closure of 78 rural hospitals since January 1, 2010.<sup>3</sup> A report issued in February of 2017 indicated that an 41 percent of existing rural hospitals had a negative profit margin.<sup>4</sup> Survival of rural hospitals is important to the local economy, as well as to the health of the local residents.

Prior studies completed by the National Center for Rural Health Works have illustrated the economic impact of critical access hospitals (25 beds or less) and the economic impact of hospital closures.<sup>5,6</sup> This study illustrates the economic impact of the next larger rural hospitals, the 26-50 bed Prospective Pay System (PPS) hospitals and the 51-100 bed PPS hospitals.

### **Background**

The employment opportunities and the resulting wages, salaries and benefits make the health care system an extremely important part of the local economy. Research from the National Center for Rural Health Works (RHW) indicates that between 10 and

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PPS hospitals are designated by the method of Medicare reimbursement they receive for the particular services they provide. The amount is predetermined by the U.S. Center for Medicare and Medicaid Services (CMS.)

### Scope of Research

The objective of this study is to estimate the economic contributions of a local hospital to employment and labor income in the community and surrounding area. For this study, estimates for two different scenarios were constructed based on CMS cost report database.<sup>7</sup> The data were collected for all the reported hospitals in the 26-50 bed and the 51-100 bed categories. Hospitals located in metropolitan areas were removed as well as hospitals with missing data or possible recording errors. The final sample contained 347 hospitals representing 326 counties and 41 states. The results are illustrated in **Table 1** and described below.

The 26-50 bed PPS hospital data are in the top half of **Table 1**. The sample included a total of 178 hospitals. The average number of beds in the 26-50 bed PPS hospital sample was 39, with a range from 26 to 50 beds. The sample included hospitals from 34 states.

The U.S. Census Bureau 2015 population estimates are shown for the hospital communities and counties. Although some of the hospitals were located in large geographical counties, the elimination of metropolitan designated counties resulted in only hospitals representing smaller communities. For the 26-50 bed PPS hospital sample, the average community population was 9,897 ranging from 432 to 42,537. The average county population was 34,100.

The 51-100 bed PPS hospital data are presented in the bottom half of **Table 1**. The sample included a total of 169 hospitals. The average number of beds in the 51-100 bed PPS hospital sample was 75, with a range from 51 to 100 beds. The sample included hospitals from 36 states. As expected these larger hospitals were located in slightly larger communities. For the 51-100 bed PPS hospital sample, the average community population was 13,436 ranging from 666 to 47,523. The average county population was 49,369.

### Approach

The methodology estimates the annual economic impact for each scenario. The PPS hospital generates jobs and labor income from revenues. In turn,

secondary impacts are created as the hospital and the individuals working for the hospital purchase goods and services within the local economy. The direct impacts include the employees and labor income at the PPS hospital. The secondary impacts are calculated with an input-output model and data from IMPLAN. (Additional details on the model and IMPLAN data are given in the **Appendix**.) **Figure 1** illustrates a community economic system whereas a change in any one segment of a community's economy will cause

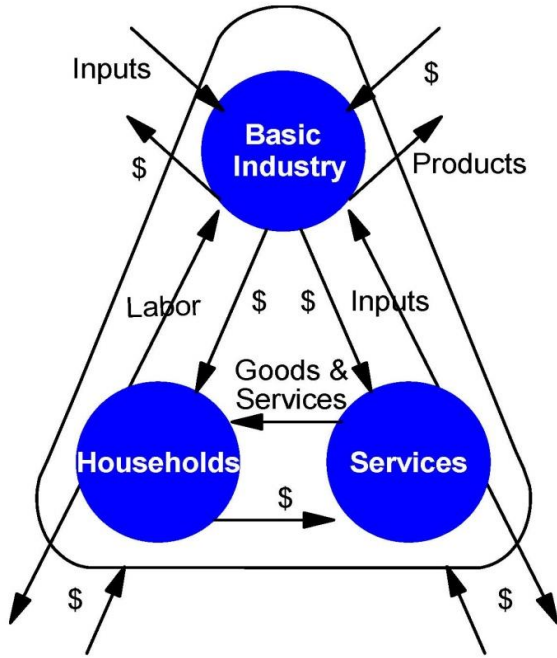
**Table 1**  
**Sample Data for 26-50 Bed and 51-100 Bed Rural PPS Hospitals, 2015**

26-50 Bed Rural PPS Hospitals				
	Numbe	Averag	Minimu	Maximu
<b>Sample Data</b>				
Total Number of Hospitals	178			
Number of beds		39	26	50
Number of states	34			
<b>Population Data, 2015</b>				
Community		9,897	432	42,537
County		34,100	3,106	147,262
51-100 Bed Rural PPS Hospitals				
	Numbe	Averag	Minimu	Maximu
<b>Sample Data</b>				
Total Number of Hospitals	169			
Number of beds		75	51	100
Number of states	36			
<b>Population Data, 2015</b>				
Community		13,436	666	47,523
County		49,369	11,151	186,304

SOURCES: Centers for Medicare & Medicaid Services Cost Reports, 2015; U.S. Department of Health and Human Services, U.S. Census Bureau [www.census.gov (May 2017)].

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reverberations throughout the entire economic system of the community.



Community Economic System  
Figure 1

A multiplier from an input-output model measures the effect created by an increase or decrease in economic activity. The multiplier not only measures the economic activity from the hospital and employees but also includes the economic activity from additional business spending and household spending such as the restaurant workers, equipment vendors and others. The model calculates multipliers for employment (in terms of full- and part-time jobs) and labor income (in terms of wages, salaries and benefits). The model generates multipliers that are medical service area-specific due to differences in locally-available goods and services across different states, counties, or zip codes.

### Economic Impacts

Utilizing available IMPLAN data, the county employment and labor income multipliers were derived for the hospitals in the two PPS hospital samples. The resulting multipliers and economic impacts presented in **Table 2** represent 125 rural counties in 11 states.

<b>Table 2</b>			
<b>Economic Impact of 26-50 bed and 51-100 Bed PPS Hospitals, 2015</b>			
<b>Economic Impact of 26-50 Bed PPS Hospitals</b>			
	Average	Minimum	Maximum
<b>Multipliers</b>			
Employment Multipliers	1.42	1.17	1.73
Labor Income Multipliers	1.23	1.13	1.39
<b>Employment and Labor Income</b>			
Employment	235	14	818
Labor Income	\$17,216,062	\$602,293	\$73,592,213
<b>Average Impacts</b>			
Employment	334		
Labor Income	\$21,175,757		
<b>Economic Impact of 51-100 Bed PPS Hospitals</b>			
	Average	Minimum	Maximum
<b>Multipliers</b>			
Employment Multipliers	1.44	1.18	1.66
Labor Income Multipliers	1.26	1.08	1.40
<b>Employment and Labor Income</b>			
Employment	496	64	1,281
Labor Income	\$36,658,870	\$3,643,102	\$114,879,121
<b>Average Impacts</b>			
Employment	715		
Labor Income	\$45,434,177		

SOURCES: Centers for Medicare & Medicaid Services Cost Reports, 2015; U.S. Department of Health and Human Services, U.S. Census Bureau [www.census.gov (May 2017)]. IMPLAN Group LLC (www.implan.com [2015]).

The economic impact data from the 26-50 bed PPS hospital sample are presented in the top half of **Table 2**. The average employment multiplier is 1.42 and the average labor income multiplier is 1.23. From the CMS database, the employment and labor income were available for each of the sample hospitals. The average employment from the 178 hospitals reporting 26 to 50 beds was 235 and the average labor income was \$17.2 million. The resulting economic impact is

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an average total employment impact of 334 and average labor impact of \$21.2 million.

The economic impact data from the 51-100 bed PPS hospital sample are presented in the bottom half of **Table 2**. The average employment multiplier is 1.44 and the average labor income multiplier is 1.26. The average employment was 496 and the average labor income was \$36.0 million. The resulting economic impact is an average total employment impact of 715 and average labor impact of \$45.4 million.

In comparing the economic impacts of the two groups of PPS hospitals, the 51-100 bed hospital with its larger bed size has resulting larger direct employment and labor income and larger employment and labor income multipliers.

### Template for Estimating Economic Impact

A template is provided to estimate the economic impact of PPS hospitals in the 26-50 bed size and the 51-100 bed size located outside the metropolitan areas.

Direct employment impact from hospital operations includes all full-time and part-time employees of the hospital and any contractual employees paid by the hospital. The hospital operations employment multiplier is the SAM employment multiplier from the hospital sector from IMPLAN (see appendix) for the county location of the hospital; this multiplier is unique to the county location of the hospital. An optional method is to utilize the average multiplier from the samples of the two groups of PPS hospitals included in the study. For the 26-50 bed PPS hospitals, the hospitals operations average employment multiplier is 1.42. For the 51-100 bed PPS hospitals, the hospital operations average employment multiplier is 1.44.

To generate the secondary impact, subtract one from the multiplier and multiply the result times the direct impact. Another way to calculate the secondary impact

is to take the total impact minus the direct impact. The total impact is the direct impact times the multiplier.

Direct labor income impact from hospital operations includes all wages, salaries, and benefits from the hospital employees and any payments for labor for the contractual employees paid by the hospital. The hospital operations labor income multiplier is the SAM labor income multiplier from the hospital sector from IMPLAN for the county location of the hospital; this multiplier is unique to the county location of the hospital. An optional method is to utilize the average multiplier from the samples of the two groups of PPS hospitals included in the study. For the 26-50 bed PPS hospitals, the hospitals operations average labor income multiplier is 1.23. For the 51-100 bed PPS hospitals, the hospital operations average labor income multiplier is 1.26. The secondary and total impacts are the same formulas as shown above for the employment impact.

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**Table 5**  
**Template to Estimate Economic Impact of a PPS Hospital from Operations**

<b>Employment Impact</b>				
	Direct <sup>1</sup>	Multiplier <sup>2</sup>	Secondary <sup>3</sup>	Total <sup>4</sup>
Employment	_____	_____	_____	_____
<b>Labor Income Impact</b>				
	Direct <sup>5</sup>	Multiplier <sup>6</sup>	Secondary <sup>3</sup>	Total <sup>4</sup>
Labor Income	_____	_____	_____	_____

<sup>1</sup> Direct employment impact from operations includes all full-time and part-time employees of the hospital and any contractual employees paid by the hospital.

<sup>2</sup> The hospital operations employment multiplier is the SAM employment multiplier from the hospital sector from IMPLAN for the county location of the hospital; this multiplier is unique to the county location of the hospital. An optional method is to utilize the average multiplier from the samples of the two groups of PPS hospitals included in the study. For the 26-50 bed PPS hospitals, the hospitals operations average employment multiplier is 1.42. For the 51-100 bed PPS hospitals, the hospital operations average employment multiplier is 1.44.

<sup>3</sup> To generate the secondary impact, subtract one from the multiplier and multiply the results times the direct impact. Another way to calculate the secondary impact is to take the total impact minus the direct impact.

<sup>4</sup> The total impact is the direct impact times the multiplier.

<sup>5</sup> Direct labor income impact from operations includes all wages, salaries, and benefits from the hospital employees and any payments for labor for the contractual employees paid by the hospital.

<sup>6</sup> The hospital operations labor income multiplier is the SAM labor income multiplier from the hospital sector from IMPLAN for the county location of the hospital; this multiplier is unique to the county location of the hospital. An optional method is to utilize the average multiplier from the samples of the two groups of PPS hospitals included in the study. For the 26-50 bed PPS hospitals, the hospitals operations average labor income multiplier is 1.23. For the 51-100 bed PPS hospitals, the hospital operations average labor income multiplier is 1.26.

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## APPENDIX

### IMPLAN Software Model and Data Used to Derive Multipliers

#### 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 an area, 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, an area 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.

The basis of IMPLAN was developed by the U. S. Forest Service to construct input/output accounts and models. The complexity of this type of modeling had hindered practitioners from constructing models specific to a community requesting an analysis. The University of Minnesota utilized the U.S. Forest Service model to further develop the methodology and expand the data sources to form the model known as IMPLAN. The founders of IMPLAN, Scott Lindall and Doug Olson, joined the University of Minnesota

in 1984 and, as an outgrowth of their work with the University of Minnesota, entered into a technology transfer agreement with the University of Minnesota that allowed them to form Minnesota IMPLAN Group, Inc. (MIG).

In 2013, Minnesota IMPLAN Group, Inc. was purchased by IMPLAN Group, LLC. In 2015, IMPLAN Group, LLC became IMPLAN and relocated to:

IMPLAN  
16905 Northcross Drive, Suite 120  
Huntersville, NC 28078

IMPLAN support can be reached by phone at 800-507-9426 or by email on their web page at: <http://implan.com/company/contact-us/>.

#### IMPLAN Software and Data

At first, IMPLAN focused on database development and provided data that could be used in the Forest Service version of the software. In 1995, IMPLAN took on the task of writing a new version of the IMPLAN software from scratch that extended the previous Forest Service version by creating an entirely new modeling system – an extension of input-output accounts and resulting Social Accounting Matrices (SAM) multipliers. Version 2 of the new IMPLAN software became available in May of 1999. The latest development of the software is now available, IMPLAN Version 3 Software System, the new economic impact assessment software system.

With IMPLAN Version 3 software, the packaging of products has changed. Version 3 utilizes 2007 or later data. When data are ordered, the data cost plus shipping are the only costs. Version 3.0 software is included in the cost of the data. There are no additional fees to upgrade to IMPLAN Version 3.0. Data files are subject to licensing restrictions. Version 2 is no longer compatible with 2008 and later data sets.

Version 3 allows the user to do much more detailed analyses. Users can continue to create detailed economic impact estimates. Version 3.0 takes the analysis further, providing a new method for estimating regional imports and exports is being implemented - a trade model.

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IMPLAN can construct a model for any state, region, area, county, or zip code area in the United States by using available national, state, county, and zip code level data. Impact analysis can be performed once a regional input/output model is constructed.

IMPLAN also provide an additional feature that shows the state and local tax impacts and the federal tax impacts for a particular industry or a scenario for a specific employer.

IMPLAN online is an additional feature offered, allowing users to subscribe to online availability of the data and software. To purchase IMPLAN online, contact the company. Model economic impacts can be done from anywhere by utilizing IMPLAN online. IMPLAN online subscribers always have access to the latest data releases and most current software updates. Plus, subscribers also receive access to historical datasets (back to 2010) in addition to the data year of their selection.

### **IMPLAN Data**

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 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 (or Type SAM) 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).