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Research Study

The Economic Impact of a Rural Dentist

Gerald A. Doeksen, Fred C. Eilrich and Cheryl F. St. Clair, National Center for Rural Health Works

Key Findings

- The average rural dentist has direct impacts of 5 FTE local jobs and $338,797 in labor income (wages, salaries and benefits) from the clinic
- A rural dentist has a total average employment impact of seven jobs.
- A rural dentist generates an average $338,797 in labor income (wages, salaries and benefits) from the clinic.

Health care facilities and health care providers have a tremendous medical and economic impact on the community in which they are located. This is especially true with dental clinics. In addition to providing important oral health treatment and prevention, these facilities employ a number of people and have a large payroll, which in turn will be returned to the local community as the business and employees spend locally. Employee spending, in addition to the dental clinic purchases from other local businesses stimulates additional economic growth or secondary impacts in many other parts of the local economy. Dental clinics also draw into the community residents from rural areas that need oral health services. Much of this economic activity generates tax revenues that can be used by the local government to fund important community services.

The economic activity created by a dental clinic is an important part of a local economy. Typically, rural communities pay little attention to their health care system until they need it. As a result, the significant economic importance of the health care system to the local community is not immediately apparent. The overall objective of this study is to measure the economic impact of a rural dentist.

Importance of Oral Health

The Surgeon General's report on Oral Health in America, published in 2000, noted that the health of the mouth is an indicator of general health and well-being and that oral diseases are often related to other health issues.[1] The report provided evidence that poor oral health contributes to life threatening diseases and increased mortality. The report also described the "profound disparities" that exist in the oral health of the population in the United States.

In a statement on health reform, the American Dental Hygienists Association identified several data sources that highlight the connection between oral health and overall physical health and well-being. They noted that nearly all oral health disease is preventable and referenced research indicating that the cost of preventive oral health care is significantly less that the cost of treating oral disease. They detailed research results showing that low-income children who had their first preventive dental visit by age one incurred approximately 42 percent lower five-year dental related costs compared to those whose first dental visit occurred between the ages of two and three.[2]

Utilizing data from the U.S. Department of Health and Human Services (HHS), the American Dental Education Association (ADEA) reported that dental disease significantly impacted the nation's domestic productivity and global competitiveness. More than 51 million school hours and 164 million hours of work are lost each year due to dental related absences.[3]

As with other health care issues, non-traumatic dental hospital emergency department (ED) visits can significantly increase the total cost of health care. A research brief by the American Dental Association (ADA) reported that ED visits for dental conditions are increasing, driven primarily by a larger share of visits taking place in EDs rather than dental offices. According to the ADA, without interventions from policy makers, dental ED visits are likely to increase in the future, straining the health care system and increasing overall health care costs.[4]

The Robert Wood Johnson Foundation's Human Capital Blog has noted that "More than a decade later, the 2011 Institute of Medicine reports indicated that the same disparities that existed in 2000 still exist, and in many circumstances have gotten worse."[5] In 2010, HHS launched *Healthy People 2020*, the nation's 10-year blueprint for health promotion and disease prevention. The plan outlines a goal for oral health that recognizes that the health of the mouth and surrounding craniofacial (skull and face) structures is central to a person's overall health and well-being.[6]

The Methodology

To measure the economic impact of a rural dentist, a case study approach was utilized and the average impact of a rural dentist was estimated. Data were collected from 13 dental clinics including 24 dentists in rural Oklahoma, West Virginia, Pennsylvania and Nevada in rural communities. Most of the dentists were practicing in communities with populations fewer than 11,000 and some had less than 1,000 residents. Nine of the dental clinics had multiple dentists. The data were used to estimate the number of jobs created and the labor income generated per dentist. These are called the *direct economic impacts* of a rural dentist. As the dental clinic and employees of the dental clinic spend money locally, *secondary impacts* are created. These were estimated utilizing an input-output model and IMPLAN data. See Appendix for detailed information on the input-output model and the IMPLAN economic assessment tool. The direct and secondary impacts are explained and presented in the next sections. This report focuses on the impact in terms of employment and labor income. Before presenting these impacts, the basic concepts of income and employment multipliers will be presented.

County Economics and Multipliers

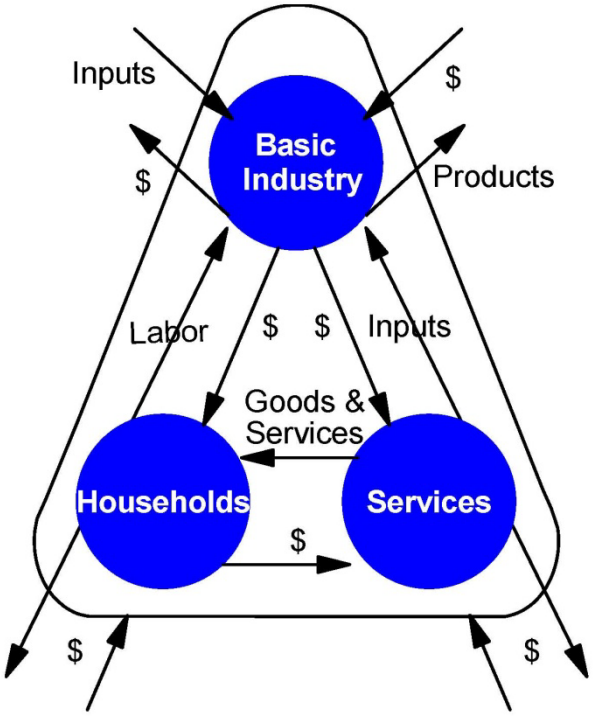
Figure 1 illustrates the major flow of goods, services, and dollars of any economy. The foundation of a county's economy includes those businesses which sell some or all of their goods and services to buyers outside of the county. Such a business is considered to be a "basic" industry. The flow of products out of, and dollars into, a county are represented by the two arrows in the upper right portion of **Figure 1**. To produce these goods and services for "export" outside the county, the basic industry purchases inputs from outside of the county (upper left portion of **Figure 1**), labor from the residents or "households" of the county (left side of **Figure 1**), and inputs from service industries located within the county (right side of **Figure 1**). The flow of labor, goods, and services in the county is completed by households using their earnings to purchase goods and services from the county's service industries (bottom of **Figure 1**). The interrelationships in **Figure 1** illustrate that a change in any one segment of a county's economy will have reverberations throughout the entire economic system of the county.

Consider, for instance, the closing of a dental clinic. The dollars going to households will stop as employees will no longer receive wages, salaries and benefits. Likewise, the dental clinic will not purchase goods from other businesses and dollar flow to other businesses will cease. This, in turn, decreases these businesses' purchases of labor and

inputs. Thus, the change in the economic impacts the entire local economy.

The total impact of a change in the economy consists of direct, indirect, and induced impacts. *Direct impacts* are activities of the business such as employment and wages, salaries and benefits, and any purchases from other businesses. These other businesses then pay employees and make additional purchases. This produces an *indirect impact* in the economy.

Both the direct and indirect impacts change the flow of dollars to the county's households. The households alter their consumption accordingly. The effect of this change in household consumption upon businesses in a county is referred to as an *induced impact*.



Community Economic System
Figure 1

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 to indicate the ratio between direct impacts and the total impact.

An employment multiplier of 2.0 indicates that if one job is created by a new industry, 1.0 job is created in other sectors due to business (indirect) and household (induced) spending.

Direct Impacts of a Rural Dentist

Data in **Table 1** present the estimated average direct impact of a rural dentist based on the data collected from the thirteen dental clinics included in this study. Employment varies depending on the demands of the patients. Many patients do not have regular dental cleaning resulting in some clinics without full-time hygienists. These clinics often employ a greater number of dental assistants. The employment of full- and part-time employees also varies. Some clinics employ one or two full-time dental assistants whereas other clinics hire four to five part-time employees. All employment was converted to full-time equivalent (FTE) employees. Based on these data, the average direct impact of a rural dentist is five FTE (including the dentist) jobs. These jobs include a dental hygienist, 1.5 dental assistants and 1.5 office/reception employees. The average direct impact of a rural dentist was five jobs with labor income of $338,797. The secondary impacts are estimated using the input-output model.

Table 1
Average Direct Impacts of a Rural Dentist

Employees	Full- time equivalent Employees	Labor Income
Dentist	1	$185,603
Dental Hygienist	1	$60,482
Dental Assistants	1.5	$44,192
Office/Receptions	1.5	$48,520
Total	**5**	**$338,797**

Source: Average of direct impacts from the thirteen case studies of rural dentists

Total Impacts of a Rural Dentist

The data in **Tables 2 and 3** illustrate the secondary and total impacts that a rural dentist creates on an annual basis. The secondary jobs are created in other businesses in the rural counties. Most of the labor income provided directly through these jobs is

spent and re-spent, creating additional jobs and labor income. Employment and labor income multipliers for the thirteen counties were calculated using the IMPLAN model. The average of these multipliers was used to estimate secondary impacts. The model calculates multipliers for employment (full- and part-time jobs) and labor income (wages, salaries and benefits and proprietor income.)

The average employment multiplier for a rural dentist is 1.36 (**Table 2**). This indicates that for each job created by the dentist, 0.36 jobs are created throughout the county due to business (indirect) and household (induced) spending. Applying the average employment multiplier to the average dental employment of five employees yields a secondary impact of two employees (1.82 rounded to 2). ***The total estimated average direct FTE employment of a rural dentist is five, the secondary average employment impact estimate is two jobs and the total average employment impact is estimated to be seven throughout a rural county economy.***

Table 2
Average Employment Impact of a Rural Dentist

Health Service	Direct Impact	Employment Multiplier	Secondary Impact	Total Impact
Dentist	5	1.36	2	7

SOURCE: Average direct employment impact from thirteen case studies of rural Oklahoma, West Virginia, Pennsylvania and Nevada dentists, average employment multiplier from the same thirteen case studies, case study county employment multipliers derived from IMPLAN data; IMPLAN Group LLC. [www.implan.com].

The average labor income multiplier for a rural dentist is 1.18 (**Table 3**). This indicates that for each dollar created in that sector, an additional $0.18 is created throughout the county due to business (indirect) and household (induced) spending. The dentist creates an average labor income of $338,797. Applying the average labor income multiplier of 1.18 to the average direct impact results in an estimated average secondary income impact from the dentist of $62,287. This is income generated in the other industry sectors in the economy of the county due to the dentist, the practice and the employee spending. ***The total average direct labor income of a rural dentist is estimated to be $338,797 and the average total income impact is estimated to be $401,084 throughout the county.***

Table 3
Average Labor Income Impact of a Rural Dentist

Health Service	Direct Impact	Income Multiplier	Secondary Impact	Total Impact
Dentist	$338,797	1.18	$62,286	$401,084

SOURCE: Average direct labor income impact from the thirteen case studies of rural Oklahoma, West Virginia, Pennsylvania and Nevada dentists, average labor income multiplier from the same thirteen case studies, case study county labor incomes derived from IMPLAN data; IMPLAN Group LLC. [www.implan.com].

Summary

The operating activities of a dentist have a significant impact on the economy of a rural county. This report measures the average impact that a dentist has on a rural county using data from the thirteen case studies. The operating impact of the dentist occurs each and every year that the dentist is in practice. These are ***long term economic benefits to a rural county*** in addition to having a healthier population**.**

A dentist generates five FTE jobs (including the dentist) on average. A dentist generates an average $338,797 in labor income from the five jobs. When the secondary benefits are included, the total average employment impact will be seven jobs with total average labor income impact of $401,084. The economic impacts generated by a dentist are critical to the economy of a rural county.

The fact that the dentist provides quality dental services enhances the opportunity to attract new business and industry to a rural county. This could, in turn, result in new jobs and new families moving into the area. Research indicates that retirees are attracted to communities with quality health care and dental services. These factors illustrate that a dentist is critically important to the economy of a rural county. Given this, not only do oral health care

services contribute to the health and wellness of the residents in a rural county, but also to the overall economic strength of that county.

The importance of a rural dentist and the medical contribution that the dentist makes to the community can be easily revealed with improvements in residents' oral health and higher quality of life indicators. However, the economic contribution is not typically quantified. This study demonstrates that economic contributions are important as well. The data utilized in this study were limited, but individual similarities from the thirteen case studies suggest the results are representative of a rural dentist.

References

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Appendix
IMPLAN Software and Data from Minnesota IMPLAN Group, Inc. (MIG):
Model and Data Used to Derive Multipliers
IMPLAN Software and Data from IMPLAN Group, LLC:
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 and relocated to:

IMPLAN Group, LLC
16740 Birkdale Commons Parkway Suite 206
Huntersville, NC 28078

Support hours are 8 am – 7 pm Eastern time and can be reached by email at info@implan.com or by phone at 651-439-4421 or 704-727-4141

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

and the new IMPLAN appliance are included in the cost of the data. There are no additional fees to upgrade to IMPLAN Version 3.0. Data files are licensed to an individual user. 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. 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 Multipliers

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).