# The Economic Impact of Lincoln Memorial University Health Sciences Division on the State & Regional Economies


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## EXECUTIVE SUMMARY

Lincoln Memorial University-Health Sciences Division which includes the DeBusk College of Osteopathic Medicine (DCOM), Caylor School of Nursing, 11 branch locations and two University Medical Centers, hereafter referred to as LMU-HSD, provides an outstanding quality educational program to its students. However, many are not aware of the huge economic contributions that LMU-HSD makes to the State of Tennessee and to its primary impact region. The objective of this study is to measure the economic contributions that LMU-HSD provides to the state and region. The economic contributions are measured in employment, income (wages, salaries, and benefits) and retail sales.

The Division creates economic impact from four different activities. These include activities from (1) operations, (2) construction projects, (3) student non-university spending, and (4) visitor spending. The annual operations of the Division involve the number of employees and the resulting wages, salaries, and benefits paid. In FY 2011, estimated employment for LMU-HSD was 197 full- and part-time employees and a payroll of approximately $11.8 million.

Construction impacts occur only during the year the construction activity occurs. In FY 2011, the construction costs were over $601,000. This generates 5 full- and part-time jobs and almost $192,000 in payroll.

Students spend money away from campus for such items as housing, food, gasoline, entertainment, etc. It is estimated that students spent $21.8 million in non-university spending in FY 2011. This created 186 full- and part-time jobs and $8.5 million in payroll. Finally, visitors come to the campus and spend money in the region visiting. Total non-local visitors' spending

for FY 2011 is estimated at $678,594. These expenditures created an estimated 11 full and part-time jobs with a payroll of $285,175.

Using a computer program developed specifically to measure the economic impact of the Division; the study measured the direct economic contribution of LMU-HSD activities and calculated the jobs and income that were created in other businesses in FY 2011. The model was able to measure the economic impact of LMU-HSD on the State of Tennessee as well as on its primary impact region. The impact results for the State of Tennessee are presented in **Executive Table 1**.

Division operations create 97 full and part-time jobs. This activity has an employment multiplier of 1.68 which means that for every job created, another 0.68 job is created in other businesses due to the Division and its employees spending money. The total estimated impact of the LMU-HSD operations was 331 jobs in FY 2011.

Likewise, the model can measure the economic impact of income (wages, salaries and benefits) on the economy. Estimated payroll was $11.8 million in FY 2011. The higher education sector income multiplier is 1.60 which means that for every $1 of income paid by LMU-HSD, another $0.60 of income is generated in other businesses. Thus, the total income impact of LMU-HSD's payroll will be almost $18.9 million. The model also estimates retail sales and state sales taxes generated from this income. From LMU-HSD operational activities, approximately $7.0 million in retail sales will be generated and about $489,000 in state sales taxes will be collected.

When all of the activities are included, the FY 2011 total estimated impact of LMU-HSD on the State of Tennessee economy is 691 full- and part-time jobs, $35.0 million in income (wages, salaries and benefits,) $12.9 million in retail sales and $906,000 in sales tax collections.

The model was also applied to what was identified as the primary impact region. This included three counties in Virginia, ten counties in Kentucky and 14 counties in Tennessee. Total estimated economic impact for FY 2011 on the primary impact region was 679 jobs, approximately $34.7 million in income and $13.5 million in retail sales subject to state sales tax.

This study updates a previous study completed in 2007. LMU-DCOM was in its first operating year with only the initial class of students. LMU-DCOM is now fully operational and had its first graduating classes of Doctor of Osteopathic Medicine (DO) and Physician Assistants (PA) both in 2011. The first class of nursing students also graduated in 2011. Finally, most of Tennessee is designated as medically underserved due to the need for more practicing physicians. Many of the LMU- HSD graduates will remain in Tennessee and some will practice in rural areas of the state. The bottom line is that LMU-HSD contributes greatly to the economies of the State of Tennessee and to its primary impact region. LMU-HSD is extremely important for educational reasons as well as economic reasons.

**Executive Table 1**
**Economic Impact of LMU Health Sciences Division: DeBusk College of Osteopathic Medicine and Branch Locations on the State of Tennessee, FY 2011**

| Sector | Employment | | | Income | | | Sales Tax | |
|---|---|---|---|---|---|---|---|---|
| | Direct | Multiplier | Total Impact | Direct | Multiplier | Total Impact | Retail Sales | 7 Cent Tax |
| College Operations | 197 | 1.68 | 331 | $11,793,755 | 1.60 | $18,870,008 | $6,981,903 | $488,733 |
| Construction | 5 | 1.74 | 9 | $191,745 | 1.88 | $360,481 | $133,378 | $9,336 |
| Student Spending[1] | 186 | 1.80 | 335 | $8,521,776 | 1.79 | $15,253,979 | $5,643,972 | $395,078 |
| Visitor Spending | 11 | 1.42 | 16 | $285,175 | 1.68 | $479,094 | $177,265 | $12,409 |
| **TOTAL** | **399** | | **691** | **$20,792,451** | | **$34,963,562** | **$12,936,518** | **$905,556** |

[1]Total expenditures include non-university spending only. Revenue from campus spending such as tuition, campus housing costs and books purchased at the campus bookstore are captured in LMU-HSD auxiliary revenue.

Source: Employment, spending and income data from LMU-HSD; Multipliers and coefficients from 2011 IMPLAN Data, Minnesota Implan Group Inc., Retail sales data from Tennessee Department of Revenue, U.S. Department of Commerce, Bureau of Economic Analysis.

**The Economic Impact of Lincoln Memorial University Health Sciences Division on the State and Regional Economies**

## INTRODUCTION

Colleges and universities are many things to many people. Viewed through the lens of economics, however, they are also key to the viability of local, state, regional and national economies. From this perspective, they are sources of jobs and income to their employees and students. They are also large consumers which create additional jobs and income to suppliers of materials, services, equipment and capital structures. Colleges and Universities provide entertainment and cultural opportunities. They produce skilled labor, enhance the lifetime income of graduates and increase the productive capacity of the economy. Additionally,they contribute to the fund of knowledge through extension and technology transfer activities. They also spin off and attract research and industrial enterprises (**Appendix A.**)

The objective of this study is to estimate the impact that Lincoln Memorial University Health Sciences Division (LMU-HSD) including DeBusk College of Osteopathic Medicine, Caylor School of Nursing, 11 branch locations and two University Medical Centers has on various levels of the economy. More specifically, the report will:

1. Present financial, student and other data reflecting LMU-HSD activities,
2. Measure the economic impacts that LMU-HSD operation and construction activities as well as student and visitor spending have on the State of Tennessee's economy through increased;
    - employment
    - wages, salaries and benefits
    - retail sales

3. Measure the economic impacts that LMU-HSD operation and construction activities as well as student and visitor spending have on the primary economic impact region including parts of Tennessee, Kentucky and Virginia through increased;

    - employment
    - wages, salaries and benefits
    - retail sales

## RESEARCH METHODOLOGY

This report is an update to a previous study done in 2007 and focuses primarily on the impacts on jobs and income (wages, salaries and benefits) created on an annual basis by LMU-HSD, its employees, its students, and its visitors to the campuses. A review of previous literature relative to impact studies is given in **Appendix A**. Data for this study are from FYs 2011 and 2012. These impacts are concentrated on the local community, but also spill over to the surrounding counties and to the state. Much of the revenue is used to hire faculty, staff and maintenance employees. Most of the income provided directly through these jobs is spent and re-spent, creating additional jobs and income. As a result, the total number of jobs and the total income attributable to LMU-HSD are larger than the number of jobs and wages and salaries that come directly from the Division itself. Revenue not used to hire employees is used to procure various goods and services. The impacted businesses use this revenue to hire employees, pay salaries and purchase materials. This additional economic activity is called the multiplier effect.

To calculate the economic impacts noted above, a widely-accepted input-output model and data from IMPLAN were utilized to estimate the direct, secondary and total

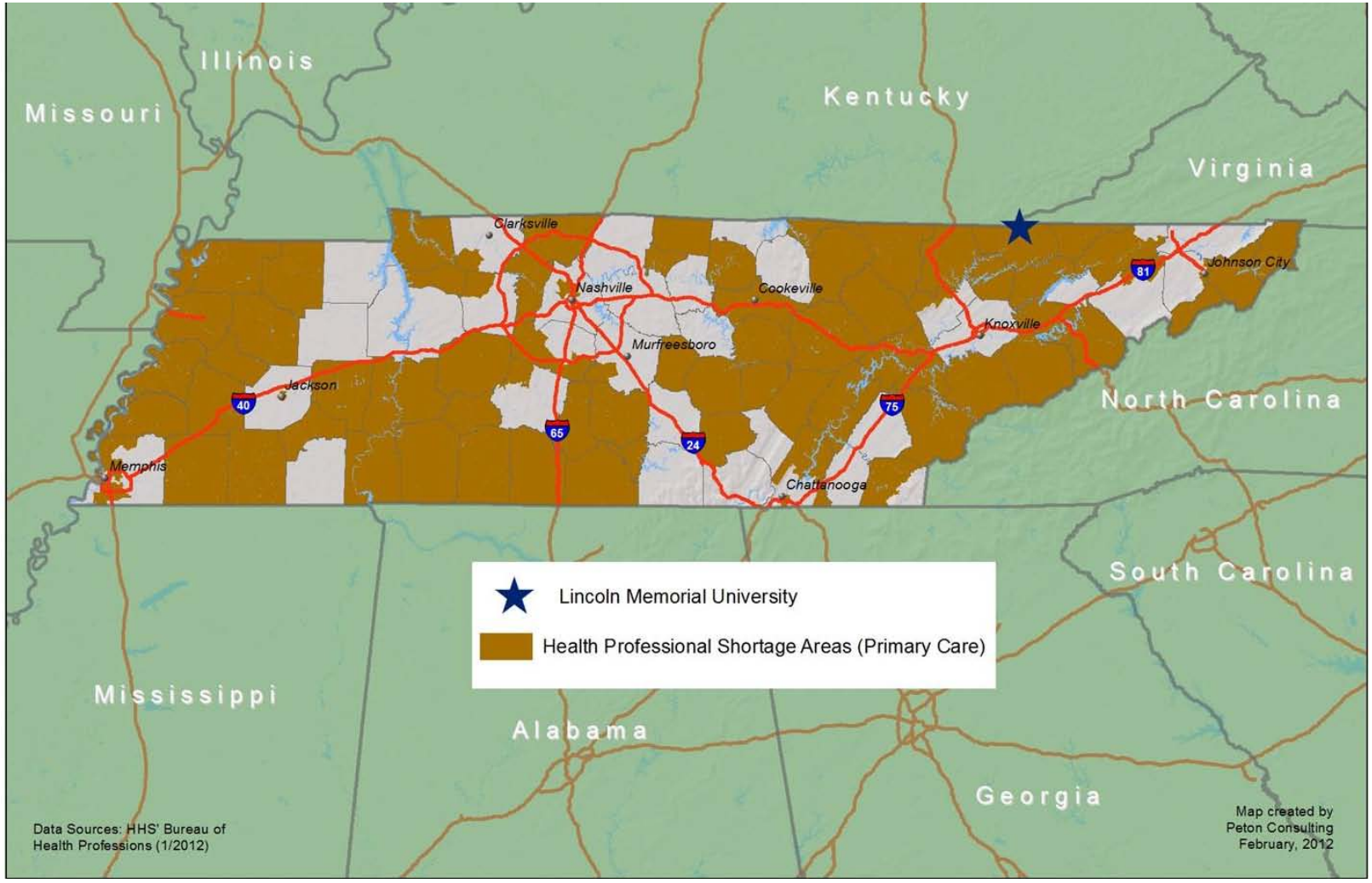
impacts of LMU-HSD on the economy of the State of Tennessee and a primary impact region including parts of Tennessee, Kentucky and Virginia. The economic impact in this report will be quantified as total employment including direct, secondary and total jobs and the associated wages, salaries and benefits. Detailed information on the model used in this report can be found in **Appendix B**. This study is directed by Dr. Gerald A. Doeksen, a renowned economist from Oklahoma State University widely recognized for his research regarding economic impact studies of universities, health systems and industrial changes **(Appendix C)**.

## NEED FOR MEDICAL PROFESSIONALS

LMU-HSD is serving a critical medical shortage area in the state and in the primary impact region. The need for medical personnel and the health sciences division are clearly illustrated on **Figures 1** and **2**.

**Figure 1** illustrates the primary care health professional shortage areas in Tennessee. The immediate region surrounding LMU-HSD that receives the greatest impact was identified by college officials. **Figure 2** presents the underserved areas within the primary impact region.

**Figure 1**
**Tennessee Primary Care Physician Health Professional Shortage Areas**



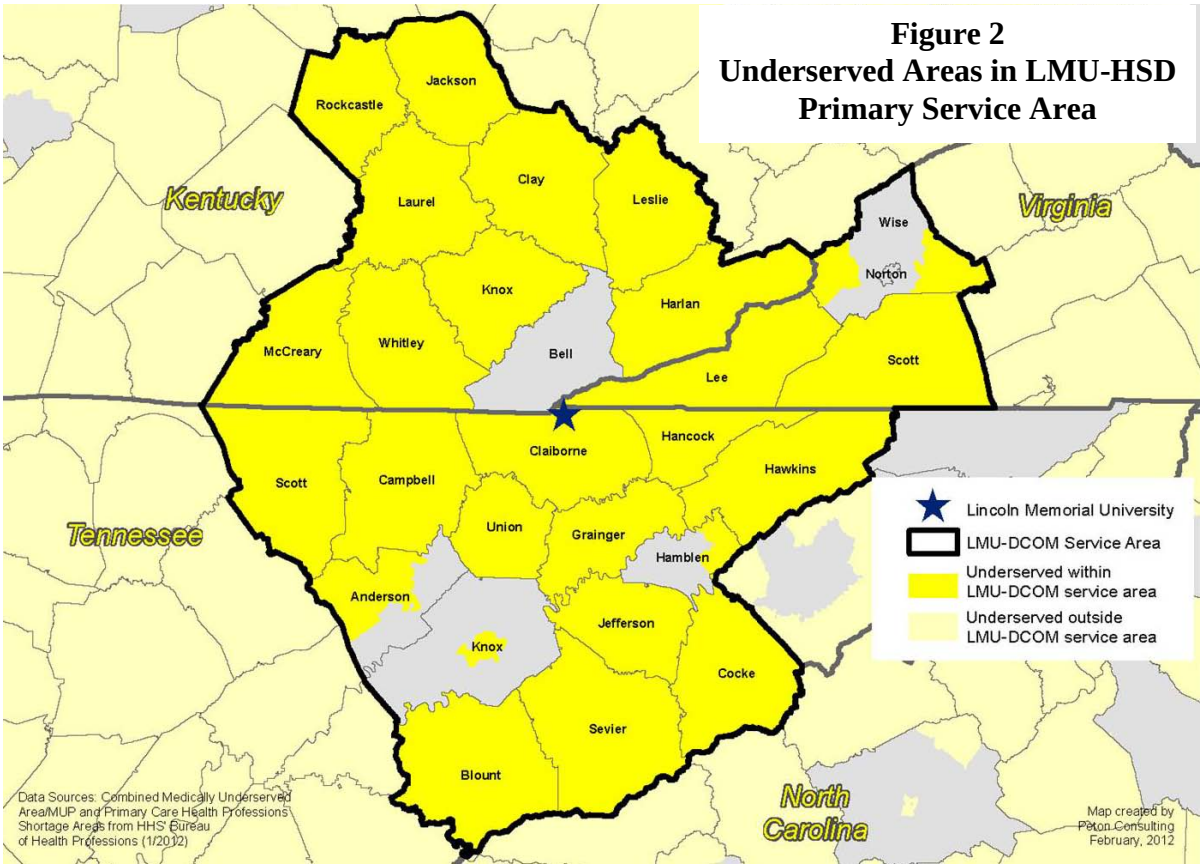



**Figure 2**
**Underserved Areas in LMU-HSD Primary Service Area**

## OVERVIEW OF LMU HEALTH SCIENCES DIVISION

With the continuing shortage of primary care physicians in the Appalachian region, Lincoln Memorial University (LMU) leaders had a vision to open a state-of-the-art medical college. The goal was to train new doctors of osteopathic medicine (DOs) to serve the people of Appalachia. According to college officials, many DOs will work in underserved areas, and approximately 65 percent of DOs will practice in primary care medicine. On May 5, 2006, LMU broke ground on the facility that would house the DeBusk College of Osteopathic Medicine (LMU-DCOM). After working through the accreditation process for two years, LMU received notification in September 2006 that

LMU-DCOM had been granted provisional accreditation. The notification allowed the college to start accepting applications for its inaugural class to begin in the fall of 2007. The inaugural class had an enrollment of 150 students. LMU-DCOM had its inaugural graduating class of DOs in May 2011

LMU-DCOM's curriculum is a four-year, full-time academic and clinical program leading to granting the degree of Doctor of Osteopathic Medicine. The curriculum stresses the interdependence of the biological, clinical, behavioral and social sciences. Emphasis is on educating physicians for primary care medicine, employing the distinctive osteopathic principles for the maintenance of health and treatment of disease. LMU-HSD has added programs for Physician Assistant and nursing graduates as well.

LMU-HSD seeks to advance life in the Cumberland Gap area and throughout the region through its teaching, research and service mission. **Figure 3** illustrates that 50 percent of its students are from an Appalachian County and 33 percent are from a medically underserved area. There are 22 graduate medical education sites (**Figure 4**) and 34 third year CORE medical training sites (**Figure 5**) located across Tennessee as well as Kentucky and Virginia.

**Figure 3**

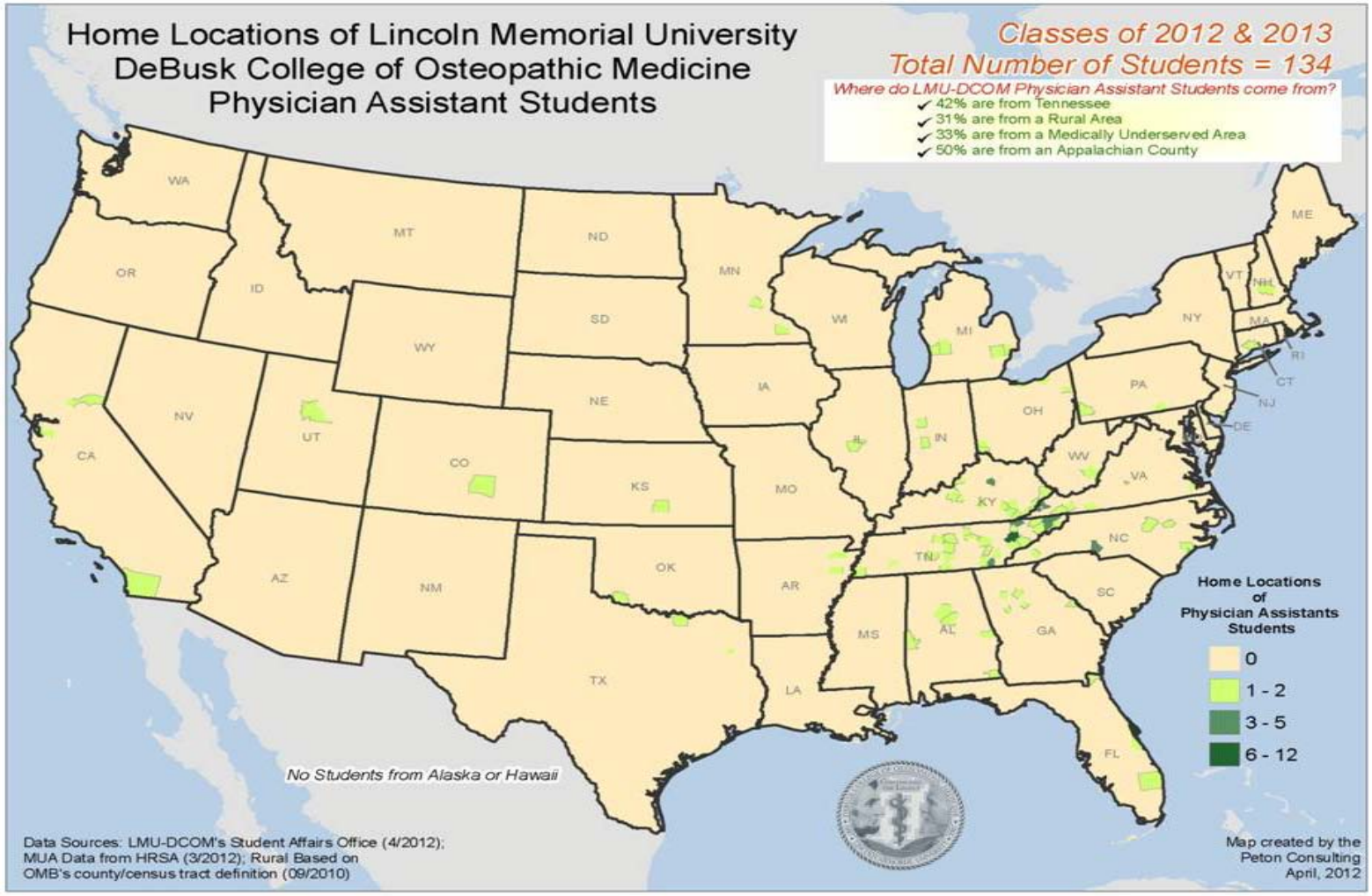
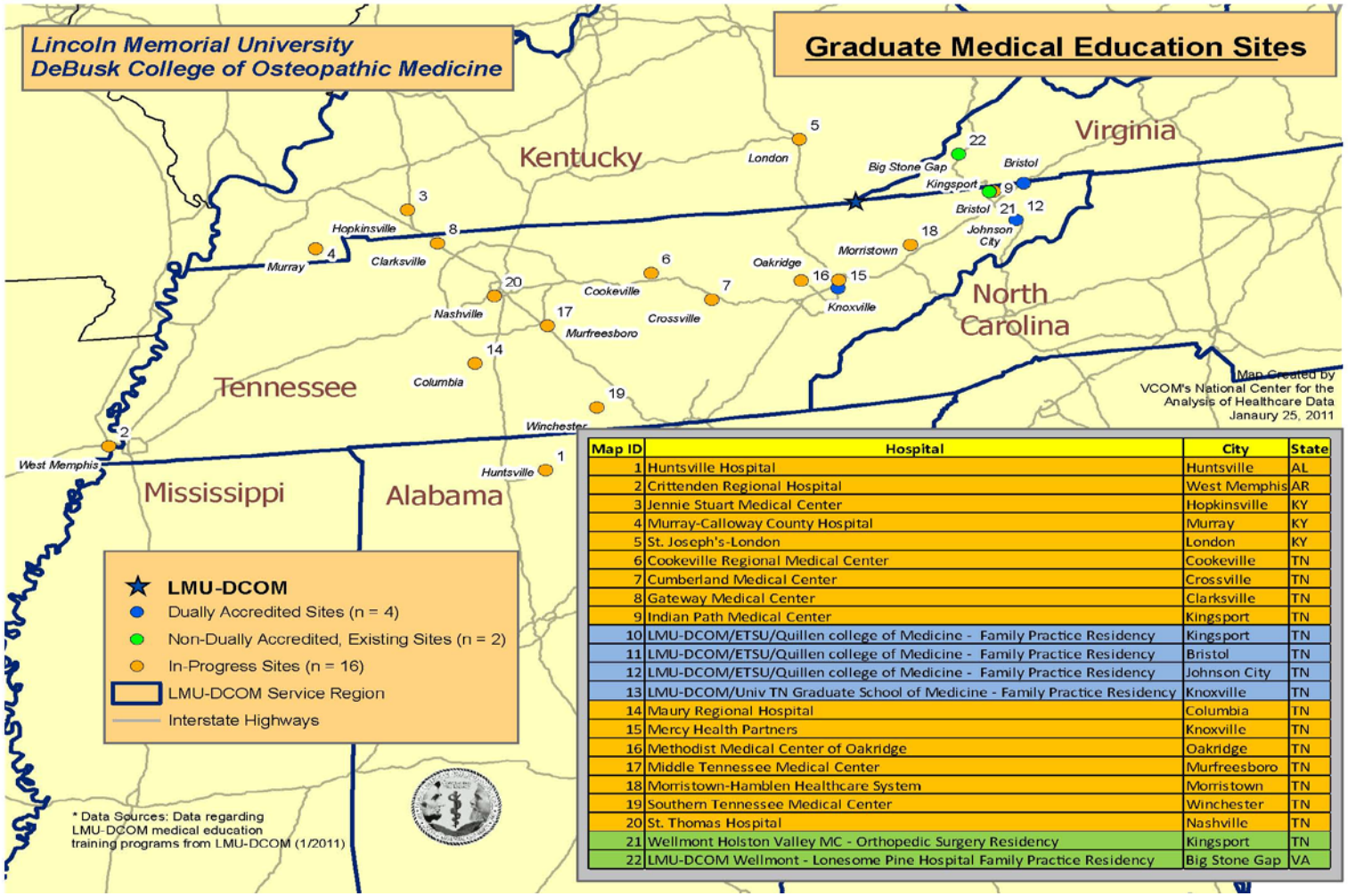
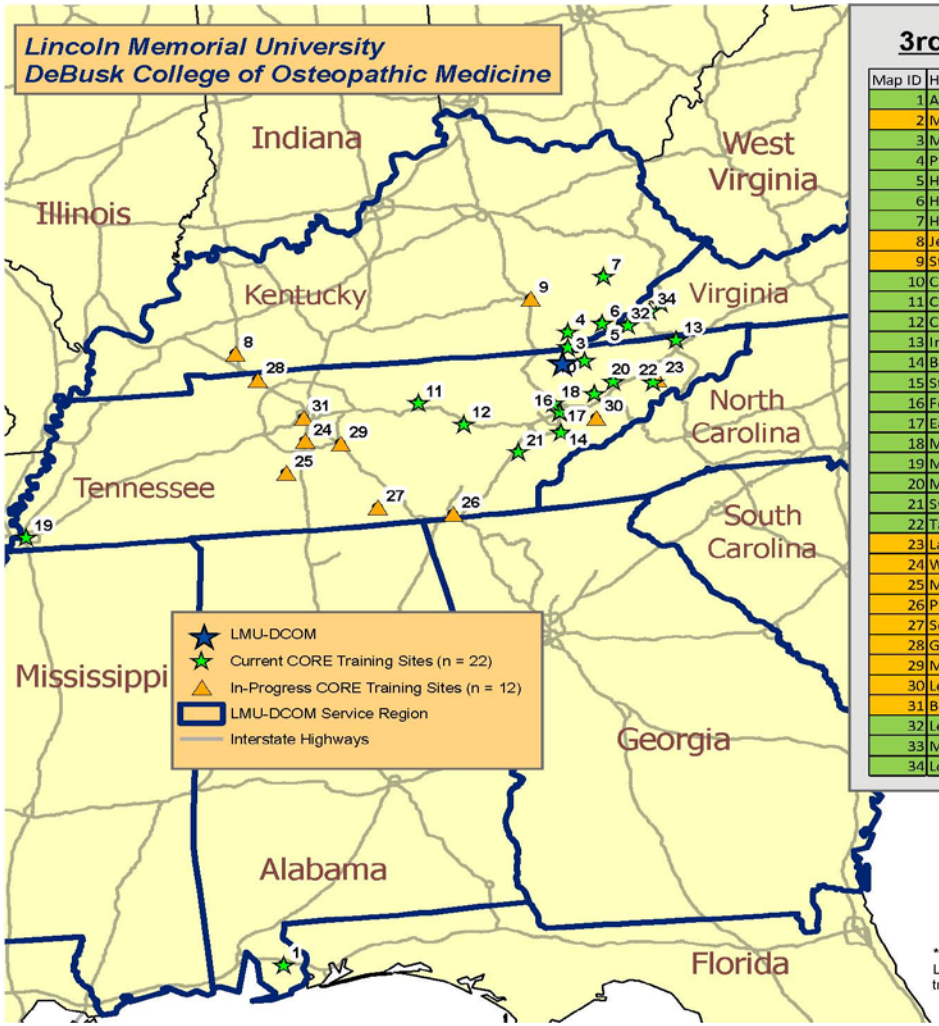

Home Locations of Lincoln Memorial University
DeBusk College of Osteopathic Medicine
Physician Assistant Students
Classes of 2012 & 2013
Total Number of Students = 134
Where do LMU-DCOM Physician Assistant Students come from?
42% are from Tennessee
31% are from a Rural Area
33% are from a Medically Underserved Area
50% are from an Appalachian County
WA
OR
CA
ID
NV
MT
WY
UT
AZ
CO
NM
ND
SD
NE
KS
OK
TX
MN
IA
MO
AR
LA
WI
IL
MS
MI
IN
KY
TN
AL
OH
WV
GA
FL
SC
NC
VA
PA
NY
ME
VT
NH
MA
RI
CT
NJ
DE
No Students from Alaska or Hawaii
Home Locations of Physician Assistants Students
0
1 - 2
3 - 5
6 - 12
Data Sources: LMU-DCOM's Student Affairs Office (4/2012); MUA Data from HRSA (3/2012); Rural Based on OMB's county/census tract definition (09/2010)
Map created by the Peton Consulting April, 2012

**Figure 4**




| Map ID | Hospital | City | State |
|---|---|---|---|
| 1 | Huntsville Hospital | Huntsville | AL |
| 2 | Crittenden Regional Hospital | West Memphis | AR |
| 3 | Jennie Stuart Medical Center | Hopkinsville | KY |
| 4 | Murray-Calloway County Hospital | Murray | KY |
| 5 | St. Joseph's-London | London | KY |
| 6 | Cookeville Regional Medical Center | Cookeville | TN |
| 7 | Cumberland Medical Center | Crossville | TN |
| 8 | Gateway Medical Center | Clarksville | TN |
| 9 | Indian Path Medical Center | Kingsport | TN |
| 10 | LMU-DCOM/ETSU/Quillen college of Medicine - Family Practice Residency | Kingsport | TN |
| 11 | LMU-DCOM/ETSU/Quillen college of Medicine - Family Practice Residency | Bristol | TN |
| 12 | LMU-DCOM/ETSU/Quillen college of Medicine - Family Practice Residency | Johnson City | TN |
| 13 | LMU-DCOM/Univ TN Graduate School of Medicine - Family Practice Residency | Knoxville | TN |
| 14 | Maury Regional Hospital | Columbia | TN |
| 15 | Mercy Health Partners | Knoxville | TN |
| 16 | Methodist Medical Center of Oakridge | Oakridge | TN |
| 17 | Middle Tennessee Medical Center | Murfreesboro | TN |
| 18 | Morristown-Hamblen Healthcare System | Morristown | TN |
| 19 | Southern Tennessee Medical Center | Winchester | TN |
| 20 | St. Thomas Hospital | Nashville | TN |
| 21 | Wellmont Holston Valley MC - Orthopedic Surgery Residency | Kingsport | TN |
| 22 | LMU-DCOM Wellmont - Lonesome Pine Hospital Family Practice Residency | Big Stone Gap | VA |

**Figure 5**




## 3rd Year CORE Hospital Training Sites

| Map ID | Hospital | City | State |
|---|---|---|---|
| 1 | Alabama Medical Education Consortium (AMEC) | Robertsdale | AL |
| 2 | Memorial Health System | Colorado Springs | CO |
| 3 | Middlesboro ARH Hospital | Middlesboro | KY |
| 4 | Pineville Community Hospital Association | Pineville | KY |
| 5 | Harlan ARH | Harlan | KY |
| 6 | Harlan ARH | Harlan | KY |
| 7 | Hazard ARH Hospital | Hazard | KY |
| 8 | Jennie Stuart Medical Center | Hopkinsville | KY |
| 9 | St. Joseph - London | London | KY |
| 10 | Claiborne County Hospital and Nursing Home | Tazewell | TN |
| 11 | Cookeville Regional Medical Center | Cookeville | TN |
| 12 | Cumberland Medical Center | Crossville | TN |
| 13 | Indian Path Medical Center | Kingsport | TN |
| 14 | Blount Memorial Hospital | Maryville | TN |
| 15 | St. Mary's Jefferson Memorial Hospital | Jefferson City | TN |
| 16 | Fort Sanders Regional Medical Center | Knoxville | TN |
| 17 | East Tennessee Children's Hospital | Knoxville | TN |
| 18 | Mercy Medical Center North | Powell | TN |
| 19 | Methodist Healthcare | Memphis | TN |
| 20 | Morristown Hamblen Hospital | Morristown | TN |
| 21 | Sweetwater Hospital Association | Sweetwater | TN |
| 22 | Takoma Regional Hospital | Greeneville | TN |
| 23 | Laughlin Memorial Hospital | Greeneville | TN |
| 24 | Williamson Medical Center | Franklin | TN |
| 25 | Maury Regional Medical Center | Columbia | TN |
| 26 | Parkridge Medical Center | Chatanooga | TN |
| 27 | Southern Tennessee Medical Center | Winchester | TN |
| 28 | Gateway Medical Center | Clarksville | TN |
| 29 | Middle Tennessee Medical Center | Murfreesboro | TN |
| 30 | LeConte Medical Center | Sevierville | TN |
| 31 | Baptist Hospital | Nashville | TN |
| 32 | Lee Regional Medical Center | Pennington Gap | VA |
| 33 | Mountain View Regional Medical Center | Norton | VA |
| 34 | Lonesome Pine Hospital | Big Stone Gap | VA |

* Data Sources: Data regarding LMU-DCOM medical education training programs from LMU-DCOM (1/2011)

Map Created by VCOM National Center for the Analysis of Healthcare Data Janaury 20, 2011

**LMU-DCOM Revenues**

LMU-DCOM finances its day-to-day operations with revenues derived primarily from tuition and fees. Student fees include registration, information technology, student activities, etc. Total revenues for LMU-DCOM by major funding source are shown in **Table 1**. In FY 2011, the college's income was $22.1 million.

**Table 1**
**Sources of Operating Revenues for LMU-DeBusk College of Osteopathic Medicine and Branch Locations, FY 2011**

| Source | Revenue | Percent |
|---|---|---|
| Tuition and Fees | $21,253,002 | 96.1 |
| Deposit Forfeitures | $30,500 | 0.1 |
| Housing | $834,125 | 3.8 |
| **TOTAL Operating Revenue** | **$22,117,627** | **100.0** |

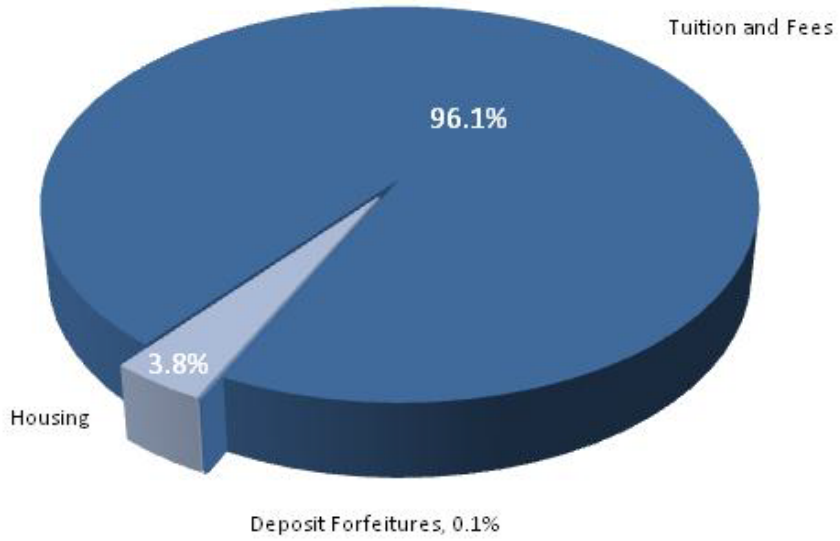
Source: LMU-DCOM financial reports

**Figure 6** further illustrates the revenue sources for LMU-DCOM. Over 96 percent of FY 2011 revenues were from tuition and fees. Revenue from housing totaled 3.8 percent and the remaining revenues came from deposit forfeitures

**LMU-DCOM Expenditures**

Total expenditures by category for FY 2011 are given in **Table 2**. **Figure 7** illustrates the proportions of college expenditures by category. Employee wages, salaries and benefits is the largest category utilizing 69.0 percent of total expenditures. Clinical and rotation fees totaled 6.4 percent. Student support expenditures including scholarships and federal assistance were 4.7 percent or $452,835. Total expenditures for FY 2011 were $9.6 million.

Figure 6
Sources of Operating Revenues for LMU-DeBusk College of Medicine
Fiscal Year 2011




**Division Employment and Salaries**

Employment and wages, salaries and benefits for LMU-DCOM as well as the entire division (LMU-HSD) are detailed below in **Table 3**. There were 27 full-time faculty and other professionals attributed to the LMU-DCOM payroll in FY 2011. Wages, salaries and benefits for professionals totaled $4.4 million. In addition wages, salaries and benefits for 30 full and part-time staff were estimated at $2.3 million. Total employee expenses for the Division were $11.8 million. Data for total LMU-HSD employment were unavailable and were estimated based on average salary data from LMU-DCOM and the aggregate LMU system. The Division had an estimated 111 professionals and 86 staff for a total of 197 employees.

**Table 2**
**Total Expenditures by Category for LMU-DeBusk College of Osteopathic Medicine and Branch Locations, FY 2011**

| Funding Category | Expenditures | Percent |
|---|---|---|
| Employee Wages Salaries and Benefits | $6,650,045 | 69.0 |
| Student Support | $452,835 | 4.7 |
| Office Expenses | $150,222 | 1.6 |
| Travel | $235,598 | 2.4 |
| Memberships | $89,247 | 0.9 |
| Accreditation | $56,055 | 0.6 |
| Equipment | $512,548 | 5.3 |
| General Insurance | $166,149 | 1.7 |
| Clinical Rotation Fees | $617,245 | 6.4 |
| Advertising | $117.123 | 1.2 |
| Consultants and Misc. | $451,562 | 4.7 |
| Library Resources | $144,787 | 1.5 |
| **TOTAL Expenditures** | **$9,643,416** | **100.0** |

Source: LMU-DCOM financial reports

**Division Construction Expenditures**

Construction is another important activity. Approximately $602,000 was spent on new construction and building improvements in FY 2011 and slightly over $2.0 million are estimated to be spent in FY 2012 (**Table 4**). Construction expenditures impact the local community and surrounding region as contractors purchase building materials and employ construction workers, many of whom travel from other towns and spend part of their wages on food, drink and lodging.

Figure 7
Total Expenditures by Category for LMU-DCOM
Fiscal Year 2011

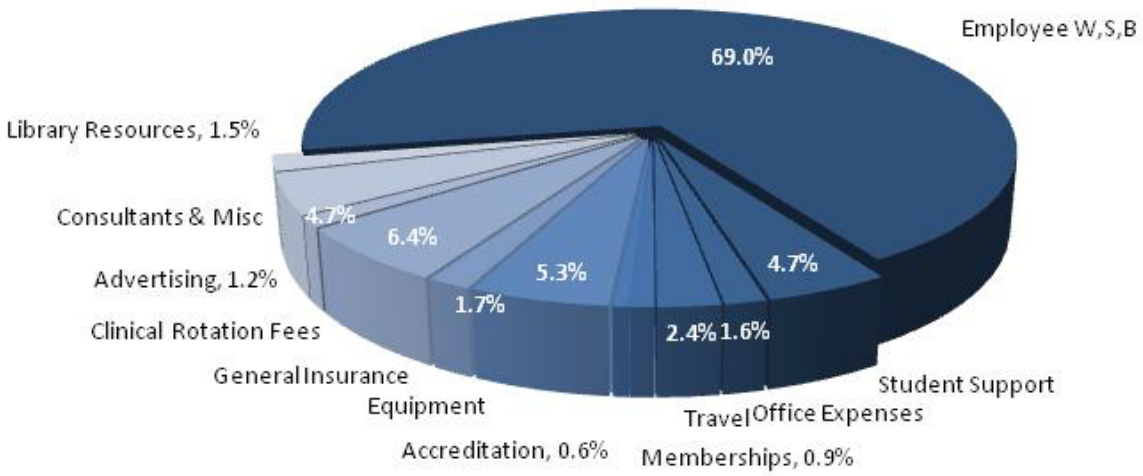



**Table 3**
**Number of Faculty, Staff and Student Employees at LMU Health Sciences Division: DeBusk College of Osteopathic Medicine and Branch Locations, FY 2011**

| Category | Full-time | Part-time | Wages Salaries Benefits |
|---|---|---|---|
| **LMU-DCOM** | | | |
| Professional | 27 | 3 | $4,396,405 |
| Staff | 28 | 2 | $2,253,640 |
| Student | 0 | 0 | $0 |
| TOTAL LMU-DCOM | **55** | **5** | **$6,650,045** |
| **LMU-HSD**[1] | | | |
| Professional | 111 | | $7,796,958 |
| Staff | 86 | | $3,996,797 |
| **TOTAL LMU-HSD** | **197** | | **$11,793,755** |

[1]Estimated based on average total salaries from LMU system
Source: LMU Academic Affairs

**Table 4**
**Total Construction Expenditures for LMU Health Sciences Division: DeBusk College of Osteopathic Medicine and Branch Locations from FYs 2011 and 2012**

| | |
|---|---|
| Fiscal Year 2011 | $601,661 |
| Fiscal Year 2012 | $2,039,711 |
| **TOTAL Construction Expenditures** | **$2,641,372** |

Source: LMU financial reports

**Student Enrollment and Non-University Spending**

During 2011, total student enrollment for LMU-HSD ranged from 1,569 in the spring to 1,794 in the fall semester. An estimated 388 students attended classes during the 2011 summer session. A detailed listing by class of students enrolled in the Division is given in **Table 5**.

Student spending can be a challenge to estimate due to the wide-range of spending patterns, number of commuter students and the varied student traffic associated with the 11 extended campus sites. Estimated total student spending is provided in **Table 6**. These costs represent only the non-university portion of student spending by full- time students. Tuition, fees, campus housing costs and a large portion of book purchases are not included as they are paid directly to the Division and are captured through Division revenues. This method was believed to best approximate student expenditures.

It was estimated that the 1,341 spring full-time students spent approximately $9.7 million and the 1,512 students enrolled full-time in the fall spent almost $11.0 million away from campus. The full-time summer semester students spent $1.1 million for a total of $21.8 million in 2011.

**Table 5**
**Estimated Student Enrollment for LMU Health Sciences Division: DeBusk College of Osteopathic Medicine and Branch Locations, 2011**

| Student Category | Spring 2011 | Summer 2011 | Fall 2011 |
|---|---|---|---|
| DCOM | 592 | 0 | 613 |
| Physician Assistant | 89 | 168 | 135 |
| Allied Health | 165 | 24 | 163 |
| Nursing | 644 | 182 | 777 |
| Veterinary Tech | 79 | 14 | 106 |
| **TOTAL Student Enrollment** | **1,569** | **388** | **1,794** |
| **TOTAL Full-Time Enrollment** | **1,341** | **290** | **1,512** |

Source: LMU enrollment statistics

**Table 6**
**Components of LMU Health Sciences Division: DeBusk College of Osteopathic Medicine and Branch Locations Non-University Student Spending, 2011[1]**

| Student Category | Spring 2011 | Summer 2011 | Fall 2011 |
|---|---|---|---|
| **Students in Campus Housing** | | | |
| Full-time Students | 365 | 47 | 401 |
| Spending per Student | $3,720 | $1,860 | $3,720 |
| Total Student Spending | $1,357,800 | $87,420 | $1,491,720 |
| **Students in Off-Campus Housing** | | | |
| Full-time Students | 976 | 243 | 1,111 |
| Spending per Student | $8,529 | $4,265 | $8,529 |
| Total Student Spending | $8,324,304 | $1,036,395 | $9,475,719 |
| **TOTAL Student Expenditures** | **$9,682,104** | **$1,123,815** | **$10,967,439** |

[1]Total expenditures include non-university spending only. Revenue from campus spending such as tuition, campus housing costs and books purchased at the campus bookstore are captured in LMU-HSD auxiliary revenue.

Source: Based on proposed student budget available on LMU website, http://www.lmunet.edu

**Visitor Days and Spending**

Colleges attract a large number of visitors each year for various events and activities. Parents bring their sons and daughters to enroll, help them with their living arrangements and attend some of their activities. Alumni revisit the campus for athletic events and to attend banquets and other special events. In addition, several visitors are brought to campus by administrators and faculty to attend conferences and other miscellaneous meetings. Each time a non-local visitor comes to campus, they spend money at the local restaurants and often buy gas before they leave. Some of the activities require an overnight stay which generates revenue for the local lodging businesses. These are all local expenditures that occur due to the college's presence. Data in **Table 7** show that in 2011, the estimated 5,473 visitors to LMU-HSD spent $678,594 while participating in on-campus activities.

**Table 7**
**Estimated Annual Expenditures from Visitors to LMU Health Sciences Division: DeBusk College of Osteopathic Medicine and Branch Locations, FY 2011**

| | Visitors | Daily Spending | Total Expenditures |
|---|---|---|---|
| Student Visitors and Parent Activities | 1,943 | $156 | $303,108 |
| Alumni Activities | 0 | $109 | $0 |
| College Activities | 3,319 | $109 | $361,771 |
| Faculty and Staff Visitors | 211 | $65 | $13,715 |
| **TOTAL Visitor Expenditures** | **5,473** | | **$678,594** |

Source: Visitor days was obtained from LMU Enrollment Management and Student Services and estimated daily spending was based on University of Arizona research and LMU-HSD officials.

## THE IMPACT OF LMU-HSD ON THE TENNESSEE ECONOMY IN FY 2011

As stated earlier, this report focuses on the economic impact as it relates to jobs, and wages, salaries and benefits resulting from activities associated with LMU-HSD. These activities are divided into the following categories

1. Operations;
2. Construction;
3. Student Non-University Spending; and
4. Visitor Spending.

The previous section clearly documents that the direct activities of these categories are significant. However, this does not tell the complete story. Secondary economic impacts are created when the Health Sciences Division and division employees, construction firms and their employees, students, and visitors all spend money. These secondary benefits are measured by economic multipliers.

### The Multiplier Effect

To further illustrate the multiplier effect, consider the opening of a new medical school. The medical school purchases goods and services from other businesses and the dollars flowing to those businesses increase. Likewise, the medical school will hire employees who purchase goods and services locally. The purchases of the medical school and its employees will create additional jobs and wages and salaries throughout the local economy.

A multiplier from an input-output model such as IMPLAN can measure the effect created by an increase or decrease in economic activity. For example, an employment multiplier of 1.75 indicates that if one job is created by the medical school, then an

additional 0.75 job is created in other businesses due to the medical school and employee spending. The model calculates employment and income multipliers.

**Economic Impact from Operational Activities**

The economic impact from activities related to operations is presented in **Table 8**. Employment (full and part-time) and income (payroll including wages, salaries, and benefits) from operational activities were estimated in **Table 3**. These activities occur every year. Estimated LMU-HSD employment was 197 employees in FY 2011. The higher education sector employment multiplier is 1.68. This means that for every job in the Division, another 0.68 job is created in other businesses in the state. The secondary employment generated in the state from LMU-HSD is estimated at 134 jobs. LMU-HSD had an estimated total impact of 331 jobs in the State of Tennessee in FY 2011

Data on the income from employees are also presented in **Table 8**. Data from LMU-HSD indicate that total income was $11.8 million from operational activities. Using the higher education sector income multiplier of 1.60, LMU-HSD generated secondary income of $7.1 million for a total impact of $18.9 million.

Income also has an impact on retail sales. The retail sales capture ratio can be used to estimate the impact of operational activities on retail sales. This ratio indicates the percent of personal income spent on items that generate sales tax. Data from the Tennessee Department of Revenue indicate that 37.0 percent of the income is spent in retail stores that collect state sales taxes. Thus, it is estimated that $7.0 million would be generated in retail sales from operations. Given the current 7.0 percent state sales tax rate in Tennessee, an estimated state sales tax collection of $488,733 will occur as a result of the retail sales from operational activities.

**Table 8**
**Employment, Income and Retail Sales Impact of LMU Health Science Division: DeBusk College of Osteopathic Medicine and Branch Locations on the State of Tennessee from Operational Activities, FY 2011**

| Category | | Amount |
|---|---|---|
| **Employment Impact** | | |
| LMU-HSD Employment | | 197 |
| Higher Ed. Sector Employment Multiplier | 1.68 | |
| Secondary Employment Impact | | 134 |
| **TOTAL Employment Impact** | | **331** |
| **Income Impact** | | |
| LMU-HSD Income | | $11,793,755 |
| Higher Ed Sector Income Multiplier | 1.60 | |
| Secondary Income Impact | | $7,076,253 |
| **TOTAL Income Impact** | | **$18,870,008** |
| **Retail Sales and Sales Tax Impact** | | |
| Retail Sales | | $6,981,903 |
| State Sales Tax (7%) | | $488,733 |

Source: Employment and income data from LMU-HSD; 2011 IMPLAN Data, Minnesota Implan Group Inc., Retail sales data from Tennessee Department of Revenue, U.S. Department of Commerce Bureau of Economic Analysis.

**Economic Impact from Construction Activities**

In many years, LMU-HSD will spend a significant amount on construction activities. This impact is often overlooked. It must be remembered that these impacts only occur during the year of construction and are not recurring. In FY 2011, LMU-HSD spent $601,661 on construction projects and in FY 2012 the estimated expenditures will increase to over $2.0 million (**Table 9**). From IMPLAN, the statewide ratios for employment and wages generated per million dollars of construction were used to estimate employment and income for each fiscal year. In FY 2011, the capital investment is estimated to create 5 full- and part-time jobs and approximately $191,745 in wages, salaries and benefits (**Table 9**). However like other expenditures, dollars invested in

construction activities will have additional impact on the local community. The total employment impact from LMU-HSD construction activities is presented in **Table 10**.

**Table 9**
**Employment and Income Generated from LMU Health Sciences Division: DeBusk College of Osteopathic Medicine and Branch Locations**
**Capital Investment Projects, FYs 2011 and 2012**

| Year | Capital Investment | Full-time and Part-time Employees | Wages, Salaries and Benefits |
|---|---|---|---|
| FY 2011 | $601,661 | 5 | $191,745 |
| FY 2012 | $2,039,711 | 17 | $651,933 |

Source: LMU-HSD, 2011; 2011 IMPLAN Data, Minnesota Implan Group Inc.

**Table 10**
**Employment Impact of LMU Health Sciences Division: DeBusk College of Osteopathic Medicine and Branch Locations on the State of Tennessee from Construction Activities, FYs 2011 and 2012**

| Year | Direct Employment | Construction Employment Multiplier | Secondary Employment Impact | Total Employment Impact |
|---|---|---|---|---|
| FY 2011 | 5 | 1.74 | 4 | 9 |
| FY 2012 | 17 | 1.74 | 13 | 30 |

Source: 2011 IMPLAN Data, Minnesota Implan Group Inc.

The construction employment multiplier of 1.74 indicates that 0.74 job will be created in other businesses in the state due to construction activities. Those jobs in other businesses are referred to as secondary jobs. The estimated secondary employment impact for FY 2011 was an additional 4 jobs, resulting in a total employment impact of 9 jobs from construction activities.

The impact on income is presented in **Table 11**. The construction income multiplier is 1.88, which means that for each dollar of wages and salaries paid to construction workers, another $0.88 of wages will be generated in other businesses in the state. The estimated secondary income for FY 2011 is another $168,736 and the total income from construction activities is $360,481. Retail sales are estimated at $133,378 with a 7.0 percent state sales tax generating $9,336 from construction activities.

**Table 11**
**Income and Retail Sales Impact of LMU Health Sciences Division: DeBusk College of Osteopathic Medicine and Branch Locations on the State of Tennessee from Construction Spending, FYs 2011-2012**

| Year | Direct Income | Construction Income Multiplier | Secondary Income Impact | Total Income Impact | Retail Sales | Sales Taxes |
|---|---|---|---|---|---|---|
| 2011 | $191,745 | 1.88 | $168,736 | $360,481 | $133,378 | $9,336 |
| 2012 | $651,933 | 1.88 | $573,701 | $1,225,634 | $453,485 | $31,744 |

Source: Construction data from LMU-HSD; 2011 IMPLAN Data, Minnesota Implan Group Inc., Retail sales data from Tennessee Department of Revenue, U.S. Department of Commerce Bureau of Economic Analysis.

**Economic Impact from Student Non-University Spending**

When students attend classes at any of the programs in the Division, they spend money for housing, food, entertainment, etc. The money they spend locally, away from the university, stimulates additional economic activity that in turn generates jobs and income in other businesses. Student non-university expenditures were estimated in a previous section (**Table 6**). Using ratios of expenditures to employment and income from IMPLAN, the employment and income generated from non-university spending were estimated. **Table 12** contains the estimates.

**Table 12**
**Employment, Income and Retail Sales Impact of LMU Health Sciences Division: DeBusk College of Osteopathic Medicine and Branch Locations on the State of Tennessee from Student Spending, FY 2011**

| Category | | Amount |
|---|---|---|
| **Employment Impact** | | |
| Jobs from Student Non-University Spending | | 186 |
| Retail Trade and Services Employment Multiplier | 1.80 | |
| Secondary Employment Impact | | 149 |
| **TOTAL Employment Impact** | | **335** |
| **Income Impact** | | |
| Income from Student Non-University Spending | | $8,521,776 |
| Retail Trade and Services Income Multiplier | 1.79 | |
| Secondary Income Impact | | $6,732,203 |
| **TOTAL Income Impact** | | **$15,253,979** |
| **Retail Sales and Sales Tax Impact** | | |
| Retail Sales | | $5,643,972 |
| State Sales Tax (7%) | | $395,078 |

Source: Student spending data from LMU-HSD; 2011 IMPLAN Data, Minnesota Implan Group Inc., Retail sales data from Tennessee Department of Revenue, U.S. Department of Commerce Bureau of Economic Analysis.

Jobs created from this student spending were estimated at 186. The employment multiplier for retail trade and services was utilized to measure the multiplier impact. The employment multiplier for this sector was 1.80. Thus, 149 secondary jobs were created in other businesses and the estimated total employment impact from student non-university spending is 335 jobs.

Income generated from these student expenditures is estimated at $8.5 million. The income multiplier for retail trade and services was utilized to estimate the secondary income impact of $6.7 million. The total income impact from student non-university spending was $15.3 million. This income generates $5.6 million in retail sales and $395,078 in state sales tax.

**Economic Impact from Visitor Spending**

LMU-HSD activities attract many visitors to campus. These visitors spend dollars that contribute to the local economy. Data in **Table 7** estimates that 5,473 visitors spent $678,594 in FY 2011. These data were converted to jobs and income based on ratios of expenditures to jobs and income from IMPLAN. The impact of visitor spending is presented in **Table 13.**

Full- and part-time-jobs created in businesses due to visitor spending were estimated at 11. The employment multiplier of 1.42 estimated that five secondary jobs were created. The total impact on employment was 16 jobs generated due to visitor spending at LMU-HSD.

Income generated from visitor spending was estimated at $285,175. The estimated secondary impact was $193,919 using the retail trade and services sector income multiplier of 1.68. This yielded a total income impact from visitor spending of $479,094. This income resulted in retail sales of $177,265 and $12,409 in state sales tax collections with a 7.0 percent rate.

**Summary of LMU-HSD Impacts**

In summary, LMU-HSD's total impact as it relates to jobs, income, retail sales and sales tax on the State of Tennessee economy is presented in **Table 14**. Total estimate for FY 2011 was 399 direct jobs. When including the secondary impacts, the total employment impact will be 691 jobs. The direct income activities were estimated at over $20.8 million with $35.0 million total income impact from LMU-HSD on the State of Tennessee. These dollars resulted in over $12.9 million in retail sales and $905,556 in state sales taxes

**Table 13**
**Employment, Income and Retail Sales Impact of LMU Health Sciences Division: DeBusk College of Osteopathic Medicine and Branch Locations on the State of Tennessee from Visitor Spending, FY 2011**

| Category | | Amount |
|---|---|---|
| **Employment Impact** | | |
| Jobs from Visitor Spending | | 11 |
| Retail Trade and Services Employment Multiplier | 1.42 | |
| Secondary Employment Impact | | 5 |
| **TOTAL Employment Impact** | | **16** |
| **Income Impact** | | |
| Income from Visitor Spending | | $285,175 |
| Retail Trade and Services Income Multiplier | 1.68 | |
| Secondary Income Impact | | $193,919 |
| **TOTAL Income Impact** | | **$479,094** |
| **Retail Sales and Sales Tax Impact** | | |
| Retail Sales | | $177,265 |
| State Sales Tax (7%) | | $12,409 |

Source: Visitor data from LMU-HSD; 2011 IMPLAN Data, Minnesota Implan Group Inc., Retail sales data from Tennessee Department of Revenue, U.S. Department of Commerce Bureau of Economic Analysis.

**Table 14**
**Economic Impact of LMU Health Sciences Division: DeBusk College of Osteopathic Medicine and Branch Locations on the State of Tennessee, FY 2011**

| Sector | Employment | | | Income | | | Sales Tax | |
|---|---|---|---|---|---|---|---|---|
| | Direct | Multiplier | Total Impact | Direct | Multiplier | Total Impact | Retail Sales | 7 Cent Tax |
| College Operations | 197 | 1.68 | 331 | $11,793,755 | 1.60 | $18,870,008 | $6,981,903 | $488,733 |
| Construction | 5 | 1.74 | 9 | $191,745 | 1.88 | $360,481 | $133,378 | $9,336 |
| Student Spending[1] | 186 | 1.80 | 335 | $8,521,776 | 1.79 | $15,253,979 | $5,643,972 | $395,078 |
| Visitor Spending | 11 | 1.42 | 16 | $285,175 | 1.68 | $479,094 | $177,265 | $12,409 |
| **TOTAL** | **399** | | **691** | **$20,792,451** | | **$34,963,562** | **$12,936,518** | **$905,556** |

[1]Total expenditures include non-university spending only. Revenue from campus spending such as tuition, campus housing costs and books purchased at the campus bookstore are captured in LMU-HSD auxiliary revenue.

Source: Employment, spending and income data from LMU-HSD; Multipliers and coefficients from 2011 IMPLAN Data, Minnesota Implan Group Inc., Retail sales data from Tennessee Department of Revenue, U.S. Department of Commerce Bureau of Economic Analysis.

## THE IMPACT OF LMU-HSD ON THE PRIMARY IMPACT REGION ECONOMY in FY 2011

LMU-HSD is located on the extreme northern border of Tennessee. Thus, it was decided to measure the economic impact of the Health Sciences Division on its primary impact region. The region detailed in **Figure 8** also identifies the primary Osteopathic medical students' home locations. Most of the economic impact will occur in this region. The region consists of three counties in Virginia, ten counties in Kentucky, and 14 counties in Tennessee as identified by LMU-HSD.

The methodology presented in the previous section was utilized to estimate the economic impact of LMU-HSD on the impact region. Again, the study analyzed the impact relative to four activities. These include the economic activity resulting from LMU-HSD:

1. Operations;
2. Construction;
3. Student Non-University Spending; and
4. Visitor Spending.

Construction activity only occurs during the construction year, whereas the other activities occur every year. Since the same methodology was used as in the previous section, only the summary impact table is presented. Data relative to the employment, income, and retail sales are presented in **Table 15**.

LMU-HSD estimated employment was 197 employees and the regional higher education sector employment multiplier is 1.63. This means that for each job created at LMU-HSD, another 0.63 jobs will be created in other businesses due to LMU-HSD and the Division's employees spending money in the region. The total estimated employment

impact from LMU-HSD operations is 321 jobs. The economic impact of construction, student spending and visitor spending activities was also measured and yielded a total impact of 679 jobs in the region. Income in FY 2011 for LMU-HSD operations was $11.8 million. With the region's higher education sector income multiplier of 1.58, the total impact on income in the primary impact region due to operational activities was $18.6 million. In total, when including all activities of LMU-HSD, the total estimated income impact in the region was $34.7 million.

By applying the regional sales capture ratio of 38.8 percent to the income impacts generated from all four activities, it was estimated that the impact on retail sales was $13.5 million of retail purchases. A one-cent sales tax would generate over $134,000 in sales tax. Total impact on sales tax collection was not estimated due to the different tax rates throughout the region.

The tremendous educational contributions that LMU-HSD provides to the State of Tennessee and to its primary impact region are well understood. This study clearly documents that LMU-HSD also has a significant economic impact on both the State of Tennessee and the school's primary impact region.

**Figure 8**

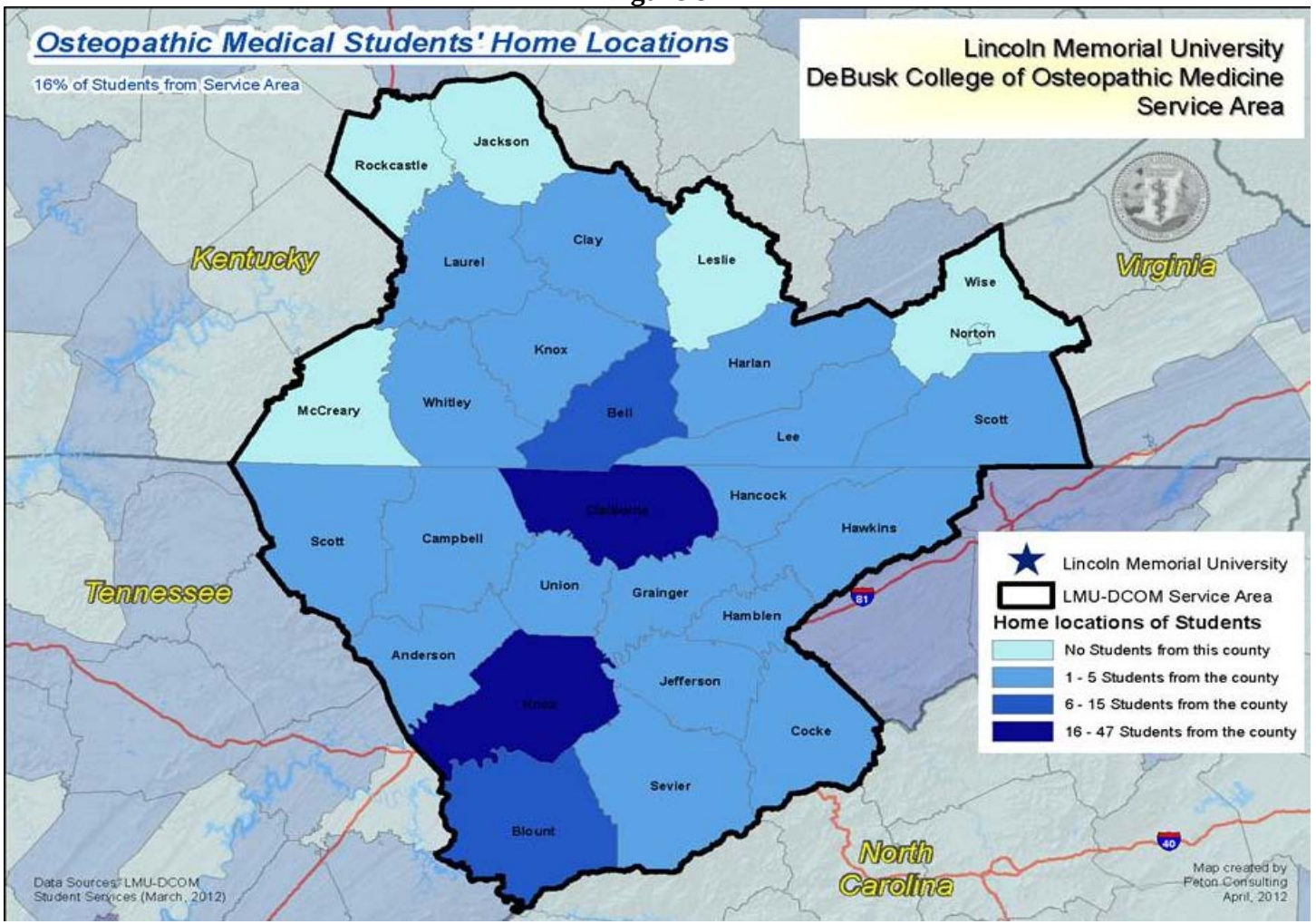

Osteopathic Medical Students' Home Locations
16% of Students from Service Area
Lincoln Memorial University
DeBusk College of Osteopathic Medicine
Service Area
Kentucky
Virginia
Tennessee
North Carolina
Rockcastle
Jackson
Laurel
Clay
Leslie
Wise
Norton
Knox
Harlan
McCreary
Whitley
Bell
Lee
Scott
Hancock
Hawkins
Campbell
Union
Grainger
Hamblen
Anderson
Jefferson
Cocke
Sevier
Blount
Lincoln Memorial University
LMU-DCOM Service Area
Home locations of Students
No Students from this county
1 - 5 Students from the county
6 - 15 Students from the county
16 - 47 Students from the county
Data Sources: LMU-DCOM Student Services (March, 2012)
Map created by Peton Consulting April, 2012

**Table 15**
**Economic Impact of LMU Health Sciences Division: DeBusk College of Osteopathic Medicine and Branch Locations on the Primary Impact Region, FY 2011**

| Sector | Employment Direct | Employment Multiplier | Employment Total Impact | Income Direct | Income Multiplier | Income Total Impact | Retail Sales |
|---|---|---|---|---|---|---|---|
| College Operations | 197 | 1.63 | 321 | $11,793,755 | 1.58 | $18,634,133 | $7,230,044 |
| Construction | 5 | 1.78 | 9 | $191,745 | 1.84 | $352,811 | $136,891 |
| Student Spending[1] | 186 | 1.79 | 333 | $8,521,776 | 1.79 | $15,253,979 | $5,918,544 |
| Visitor Spending | 11 | 1.41 | 16 | $285,175 | 1.64 | $467,687 | $181,463 |
| **TOTAL** | **399** | | **679** | **$20,792,451** | | **$34,708,610** | **$13,466,942** |

[1]Total expenditures include non-university spending only. Revenue from campus spending such as tuition, campus housing costs and books purchased at the campus bookstore are captured in LMU-HSD auxiliary revenue.

Source: Employment and income data from LMU-HSD; Multipliers and coefficients from 2011 IMPLAN Data, Minnesota Implan Group Inc., Retail sales data from Tennessee Department of Revenue, U.S. Department of Commerce Bureau of Economic Analysis.

# Appendix A

# Review of Literature Relative to Impact Studies

## Appendix A
## Review of Literature Relative to Impact Studies

For many years, researchers have been interested in quantifying the benefits, beyond the provision of degrees, of universities and colleges. One of the first detailed guides to measure the economic benefits of a college or university to the local community was requested by the American Council on Education (ACE) in 1968.[2] Based on some previous impact studies, Caffrey and Isaacs identified four primary groups that generated economic activity through spending. These four categories were: 1. the college, 2. faculty and staff, 3. students, and 4. visitors to the college. They developed several models and sub-models to estimate the spending. These models have provided the foundation for numerous economic impact studies since and are still being adopted today. For example, the Association of American Medical Colleges has been measuring the economic impact of their member institutions on the individual states in which they were located for a number of years. The results are based on adaptations of the ACE models with the latest study completed in 2006.[3]

Since the development of the ACE models, technology has simplified the process for deriving multipliers. The original ACE model depends upon numerous surveys to faculty, staff, students, local businesses and community residents and relies heavily upon proportional spending calculations to estimate indirect economic impact. It is a difficult model to implement and is less applicable to some colleges such as community colleges.[4] The proportion of money spent locally can be difficult to estimate. More recently, computer models have been created utilizing input-output analysis that not only make estimating the multiplier effect more reasonable, but allow different multipliers to be created for local, regional or state impacts (**Appendix B**). Two frequently used

computer models are the Regional Input-Output Modeling System (RIMS II) published by the U.S. Bureau of Economic Analysis and MicroIMPLAN developed by the United States Forest Service. These computer models have been used to estimate the impact of universities, medical schools, hospital construction and physician clinics, just to name a few.[5-11] For example, a detailed study estimating the impacts of the University of Nevada School of Medicine (UNSOM) on the Nevada economy was complete using the IMPLAN model.[5] The study includes estimates of the employment and payroll impacts of UNSOM medical education, patient care activities and construction in 2006.In 2001, the National Association of State Universities and Land-Grant Universities surveyed its members for their most recent economic impact reports. They published a summary analysis based on data from 96 member institutions and 10 member university systems.[12]

## Appendix A References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# Appendix B

# Model and Data Used to Estimate Employment and Income Multipliers

## Appendix B
## 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 state, region, county, 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. 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 addition of another physician and corresponding medical staff to the medical service area. The increased purchases of inputs by the new physician clinic as a result of the direct impact are the indirect impact on the business sectors.

Two types of multipliers are generated. Type I multipliers measure the impact in terms of direct and indirect effects. 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 SAM multiplier, which also includes the direct, indirect, and induced effects. The Type SAM multiplier further modifies the induced effect to include spending patterns of households based on a breakdown of households by nine different income groups.

**Minnesota IMPLAN Group, Inc. (MIG)**

Dr. Wilbur Maki at the University of Minnesota utilized the I/O model and database work from the U. S. Forest Service's Land Management Planning Unit in Fort Collins to further develop the methodology and to expand the data sources. Scott Lindall and Doug Olson joined the University of Minnesota in 1984 and worked with Maki and the model.

As an outgrowth of their work with the University of Minnesota, Lindall and Olson entered into a technology transfer agreement with the University of Minnesota that allowed them to form MIG. At first, MIG focused on database development and provided data that could be used in the Forest Service version of the software. In 1995,

MIG took on the task of writing a new version of the IMPLAN software from scratch. This new version extended the previous Forest Service version by creating an entirely new modeling system that included creating Social Accounting Matrices (SAMs) – an extension of input-output accounts, and resulting SAM multipliers. Version 2 of the new IMPLAN software became available in May of 1999. For more information about Minnesota IMPLAN Group, Inc., please contact Scott Lindall or Doug Olson by phone at 651-439-4421 or by email at info@implan.com or review their website at www.implan.com.

## Appendix B References

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# Appendix C

# Dr. Doeksen's Professional Accomplishments

## Appendix C
## Dr. Doeksen's Professional Accomplishments

Dr. Doeksen has 40 years of experience working with economic impact models. He has applied impact models to a variety of situations and also has advanced the theory of impact models. Dr. Doeksen's Master's thesis and Ph.D. dissertation both utilized input-output analysis, which is the most frequently used impact model. Both his thesis and dissertation received national awards.

Dr. Doeksen's early work in input-output analysis is referenced in textbooks such as Harry W. Richardson's book titled Input-Output and Regional Economics. He is given credit for groundbreaking work related to aggregation and size of multipliers.

Over the years, Dr. Doeksen has over 60 journal articles and publications regarding impact analysis. He has been involved with over 350 economic impact studies. These include such applications as to measure the economic impact of a university hospital, critical access hospital, golf course, manufacturing plant, large urban health clinic, medical program on a state's economy, dental practices, recreational facility, hotel, agricultural services, agricultural programs, etc. Results were used by local, state and federal policy makers to influence and justify political action. In addition, Dr. Doeksen is constantly being invited to speak at state, regional, national, and international conferences. He makes over 30 speaking engagements each year. Dr. Doeksen has recently received a lifetime achievement award from the Southern Agricultural Economics Association and the Bonnie Teeter Lifetime Achievement Award from the Southern Rural Development Center. Finally the Oklahoma Rural Health Association named his community development assessment model as the program of the year.

Dr. Doeksen's latest work with impact models is the founding of the National Center for Rural Health Works. The Center has been in operation over 10 years and its primary purpose is to train professionals in other states to measure the impact of health services on the rural economies. The Center is funded by the Federal Office of Rural Health Policy. Programs have been started in over 32 states. Dr. Doeksen continues to operate as Director and is continually developing new applications of the economic impact models.

In summary, Dr. Doeksen is nationally known for his economic impact studies and research applications. These applications relate to rural economies, many of which focus on various segments of the health sector.