UNSOM Health Policy Brief

The Contribution of the University of Nevada School of Medicine to the Nevada Economy

May 2015

John Packham, PhD, Tabor Griswold, PhD, Jeffery Stroup, MS, and Tom Harris, PhD

Key Findings

- **In 2014, the University of Nevada School of Medicine (UNSOM) employed 1,931 Nevadans with a combined $113.9 million in payroll and benefits**
- **Spending by UNSOM employees generated an additional 1,028 jobs and $38.1 million in payroll and benefits in Nevada**
- **UNSOM expenditures of $65.7 million on educational, research, and clinical operations generated an additional $46.8 million in economic activity in the state**
- **The total economic contribution of the School of Medicine to the Nevada economy was $264.5 million in 2014**
- **Every dollar spent by UNSOM in 2014 produced an additional $0.47 in economic activity in Nevada that year**

Overview

This report, *The Contribution of the University of Nevada School Medicine to the Nevada Economy,* provides the most current estimate of the statewide and regional economic impacts of the University of Nevada School of Medicine (UNSOM).

UNSOM provides undergraduate and graduate medical education, and undertakes a wide range of biomedical research. UNSOM practice plans offer care to Nevadans in more than 40 medical specialties. The School's physician practice is the largest in Nevada with doctors and surgeons practicing and teaching medicine in Las Vegas, Reno and rural areas of the state.

The analysis contained in this report reveals that the jobs, payroll, and expenditures made by the School of Medicine generate substantial benefits to the state's economy – contributions typically overlooked in public policy discussions of the role of medical education and training in Nevada.

University of Nevada
School of Medicine

Office of Statewide Initiatives
University of Nevada School of Medicine
411 West Second Street
Reno, Nevada 89503
www.medicine.nevada.edu/statewide

Findings

Table 1 summarizes employment, payroll and benefits, and operating expenditures of the University of Nevada School of Medicine (UNSOM) and subtotals for the school's operations in northern and southern Nevada for the fiscal year ending June 30, 2014 (FY 14). In 2014, the School of Medicine employed 1,931 individuals and spent $113.9 million on employee payroll and benefits. UNSOM employees include academic and administrative faculty, medical residents, classified staff, and research assistants, as well as clinical and nonclinical staff employed by the UNSOM practice plans. An additional $65.7 million was spent by UNSOM on goods and services from other Nevada businesses, including utilities, supplies, and contracts.

Table 1: UNSOM Employment, Payroll, and Operating Expenditures – 2014

UNSOM	Employment		Payroll and Benefits		Expenditures	
	Number of Jobs	Percent	Number ($)	Percent	Number ($)	Percent
UNSOM North	1,019	52.8	50,882,305	44.7	32,657,991	49.7
UNSOM South	912	47.2	63,008,028	55.3	33,070,799	50.3
Total	1,931	100.0	113,890,333	100.0	65,728,791	100.0

In this report, data and corresponding estimates are developed for two general areas of the School's operations: (1) education and research and (2) practice plans. Table 2 provides information on UNSOM employment by region and type of employment activity. In 2014, 1,019 individuals were employed by UNSOM in northern Nevada (52.8% of all UNSOM employees) and 912 individuals were employed in southern Nevada (47.2%).

Table 2: UNSOM Employment – 2014

UNSOM	Education and Research		Practice Plans		Total	
	Number of Jobs	Percent	Number of Jobs	Percent	Number of Jobs	Percent
UNSOM North	815	62.3	204	32.7	1,019	52.8
UNSOM South	493	37.7	419	67.3	912	47.2
Total	1,308	100.0	623	100.0	1,931	100.0%

In 2014, the School of Medicine employed 1,308 individuals in education and research and 623 in its practice plans. Nearly two-thirds of the 1,308 UNSOM employees in education and research worked in northern Nevada (62.3%). In contrast, an even larger majority of the School's 623 practice plan employees worked in southern Nevada (67.3%).

Table 3 contains information on UNSOM spending on payroll and benefits by region and type of employment activity. In 2014, UNSOM employees earned $113.9 million in payroll and benefits – of that total, employees in southern Nevada accounted for $63.0 million in earnings and those employees in northern Nevada accounted for $50.9 million in payroll and benefits.

Table 3: UNSOM Spending on Payroll and Benefits – 2014

UNSOM	Education and Research		Practice Plans		Total	
	Number ($)	Percent	Number ($)	Percent	Number ($)	Percent
UNSOM North	43,785,692	48.1	7,096,614	31.2	50,882,305	44.7
UNSOM South	47,331,895	51.9	15,676,132	68.8	63,008,028	55.3
Total	91,117,587	100.0	22,772,746	100.0	113,890,333	100.0

Table 4 provides information on UNSOM operating expenditures by region and type of employment activity. In 2014, UNSOM spent $65.7 million on operating expenditures: $39.1 million on operating expenses associated with medical education and research and $26.6 million on operating expenditures associated with its practice plans.

Table 4: UNSOM Spending on Educational, Research, and Clinical Operations – 2014

UNSOM	Education and Research		Practice Plans		Total	
	Number ($)	Percent	Number ($)	Percent	Number ($)	Percent
UNSOM North	26,703,795	68.3	5,954,196	22.4	32,657,991	49.7
UNSOM South	12,401,189	31.7	20,669,610	77.6	33,070,799	50.3
Total	39,104,984	100.0	26,623,806	100.0	65,728,791	100.0

Table 5 summarizes total UNSOM spending on payroll, benefits, and operating expenditures detailed in the previous two tables. In 2014, UNSOM spent $130.2 million on education and research with a majority of that spending taking place in northern Nevada (54.1%). During the same year, UNSOM spent $49.4 million in its practice plans, with the vast majority of that spending taking place in southern Nevada (73.6%). Statewide, UNSOM spent a grand total of $179.6 million on payroll, benefits, and operating activities in 2014.

Table 5: UNSOM Total Spending – 2014

UNSOM	Education and Research		Practice Plans		Total	
	Number ($)	Percent	Number ($)	Percent	Number ($)	Percent
UNSOM North	70,489,487	54.1	13,050,810	26.4	83,540,297	46.5
UNSOM South	59,733,084	45.9	36,345,743	73.6	96,078,827	53.5
Total	130,222,571	100.0	49,396,553	100.0	179,619,124	100.0

Tables 6 through 8 provide estimates of the economic contribution of the University of Nevada School Medicine utilizing data contained in the previous tables and economic impact multipliers developed by the IMPLAN Group, LLC for the three geographic regions in each table: northern Nevada, southern Nevada, and the statewide or entire Nevada economy. An important method of assessing the impact of businesses and industry sectors on local economies is through the estimation of multiplier effects. Multiplier or "ripple" effects are a simplified and compact way of representing the effects of business and employee expenditures – for example, spending by the University of Nevada School of Medicine – on state and regional economies, such as northern Nevada and southern Nevada. The multiplier is interpreted as the impact of a one-unit change in sales, employment, or income that results in a corresponding total impact on sales, employment, or income in the larger economy. In essence, the multiplier represents the recycling of dollars and income in a specified geographic unit, such as Clark County or the State of Nevada. This recycling creates new job opportunities and additional wages for residents and business establishments in that geographic unit. An appendix to this report contains additional information on multiplier effects.

Table 6 provides estimates of the economic contribution of the University of Nevada School of Medicine to northern Nevada. In 2014, UNSOM education, research, and practice plans in northern Nevada generated an estimated $50.9 in million in payroll and benefits and employed 1,019 northern Nevadans. When the jobs created by other businesses in northern Nevada as a

result of UNSOM operations are included in the analysis, UNSOM was responsible for an additional 506 jobs and an estimated total employment impact of 1,525 jobs in northern Nevada. Likewise, when the income created by other businesses in northern Nevada as a result of UNSOM education, research, and clinical operating activities is included in the analysis, UNSOM was responsible for an additional $19.0 million in payroll and benefits in other businesses and an estimated total payroll impact of $69.9 million in northern Nevada. Combined, UNSOM spending on payroll and benefits, as well as the School's operational expenditures on goods and services from other businesses in northern Nevada generated $126.0 in total economic activity in northern Nevada.

Table 6: UNSOM Contributions to the Northern Nevada Economy – 2014

UNSOM Northern Nevada – Education and Research Contributions				
Contribution Type	**Direct Effect**	**Ripple Effect**	**Total Effect**	**IMPLAN Multiplier**
Employment	815	405	1,220	1.4967
Payroll & Benefits $	43,785,692	16,388,985	60,174,677	1,3743
Operating Expenses $	26,703,795	19,157,303	45,861,098	1.7174
UNSOM Northern Nevada – Practice Plans Economic Contributions				
Contribution Type	**Direct Effect**	**Ripple Effect**	**Total Effect**	**IMPLAN Multiplier**
Employment	204	101	305	1.4967
Payroll & Benefits $	7,096,614	2,656,263	9,752,877	1.3743
Operating Expenses $	5,954,196	4,271,540	10,225,736	1.7174
UNSOM Northern Nevada – Total Economic Contributions				
Contribution Type	**Direct Effect**	**Ripple Effect**	**Total Effect**	**IMPLAN Multiplier**
Employment	1,019	506	1,525	1.4967
Payroll & Benefits $	50,882,305	19,045,247	69,927,552	1.3743
Operating Expenses $	32,657,991	23,428,843	56,086,834	1.7174
Total Economic Contributions in Northern Nevada: $126,014,386				

Table 7: UNSOM Contributions to the Southern Nevada Economy – 2014				
UNSOM Southern Nevada – Education and Research Contributions				
Contribution Type	**Direct Effect**	**Ripple Effect**	**Total Effect**	**IMPLAN Multiplier**
Employment	493	289	782	1.587
Payroll & Benefits $	47,331,895	15,132,007	62,463,902	1.3197
Operating Expenses $	12,401,189	8,850,729	21,251,918	1.7137
UNSOM Southern Nevada – Practice Plans Economic Contributions				
Contribution Type	**Direct Effect**	**Ripple Effect**	**Total Effect**	**IMPLAN Multiplier**
Employment	419	246	665	1.587
Payroll & Benefits $	15,676,132	5,011,659	20,687,791	1.3197
Operating Expenses $	20,669,610	14,551,901	35,421,511	1.7137
UNSOM Southern Nevada – Total Economic Contributions				
Contribution Type	**Direct Effect**	**Ripple Effect**	**Total Effect**	**IMPLAN Multiplier**
Employment	912	535	1,447	1.587
Payroll & Benefits $	63,008,028	20,143,667	83,151,695	1.3197
Operating Expenses $	33,070,799	23,602,629	56,673,428	1.7137
Total Economic Contributions in Southern Nevada: $139,825,123				

Table 7 provides estimates of the economic contribution of the University of Nevada School of Medicine to southern Nevada. In 2014, UNSOM education, research, and practice plans in southern Nevada generated an estimated $63.0 in million in payroll and benefits and employed 912 southern Nevadans. When the jobs created by other businesses in southern Nevada as a result of UNSOM operations are included in the analysis, UNSOM was responsible for an additional 535 jobs and an estimated total employment impact of 1,447 jobs in southern Nevada. Likewise, when the income created by other businesses in southern Nevada as a result

of UNSOM education, research, and clinical operating activities is included in the analysis, UNSOM was responsible for an additional $20.1 million in payroll and benefits in other businesses and an estimated total payroll impact of $83.2 million in southern Nevada. Combined, UNSOM spending on payroll and benefits, as well as the School's operational expenditures on goods and services from other businesses in southern Nevada generated $139.8 in total economic activity in southern Nevada.

Table 8 provides estimates of the economic contribution of the University of Nevada School of Medicine to the entire State of Nevada. In 2014, UNSOM education, research, and practice

Table 8: UNSOM Contributions to the Nevada Economy – 2014

UNSOM Statewide – Education and Research Contributions				
Contribution Type	**Direct Effect**	**Ripple Effect**	**Total Effect**	**IMPLAN Multiplier**
Employment	1,308	696	2,004	1.5323
Labor Income $	91,117,587	30,497,056	121,614,643	1.3347
Operating Expenses $	39,104,984	27,838,838	66,943,822	1.7119
UNSOM Statewide – Practice Plans Economic Contributions				
Contribution Type	**Direct Effect**	**Ripple Effect**	**Total Effect**	**IMPLAN Multiplier**
Employment	623	332	955	1.5323
Labor Income $	22,772,746	7,622,038	30,394,784	1.3347
Operating Expenses $	26,623,806	18,953,487	45,577,293	1.7119
UNSOM Statewide – Total Economic Contributions				
Contribution Type	**Direct Effect**	**Ripple Effect**	**Total Effect**	**IMPLAN Multiplier**
Employment	1,931	1,028	2,959	1.5323
Labor Income $	113,890,333	38,119,094	152,009,427	1.3347
Operating Expenses $	65,728,791	46,792,326	112,521,116	1.7119
Grand Total Statewide Economic Contributions in Nevada: $264,530,543				

plans in Nevada generated an estimated $113.9 in million in payroll and benefits and employed 1,931 Nevadans. When the jobs created by other businesses in Nevada as a result of UNSOM educational, research, and clinical operating activities are included in the analysis, UNSOM was responsible for an additional 1,028 jobs for an estimated total employment impact of 2,959 jobs in Nevada. Likewise, when the income created by other businesses in Nevada as a result of UNSOM operations is included in the analysis, UNSOM was responsible for an additional $38.1 million in payroll and benefits in other businesses and an estimated statewide payroll impact of $152.0 million in 2014. Combined, UNSOM spending on payroll and benefits, as well as the School's operational expenditures on goods and services from other businesses across Nevada generated $264.5 in total economic activity in Nevada in 2014.

Discussion

The estimates contained in this brief provide a snapshot of the University of Nevada School of Medicine's current contributions to the state's economy. However, these estimates do not capture every economic contribution of the School, such as the impact of construction and other major capital improvements undertaken by the School of Medicine. Nor does the report capture the economic value of a healthier population and an economically more productive workforce in Nevada – improvements that are, to no small degree, a result of research undertaken at the School of Medicine, and medical care provided by physicians who have received their undergraduate and graduate medical education from the University of Nevada School of Medicine over the past four decades.

In summary, the University of Nevada School of Medicine has been responsible for substantial economic contributions in both northern and southern regions of Nevada. In 2014, for every dollar spent by UNSOM on payroll, benefits, and operations in southern Nevada, another $0.46 in economic activity was generated in southern Nevada. Similarly, for every dollar spent by UNSOM on payroll, benefits, and operations in northern Nevada, another $0.51 in economic activity was generated in northern Nevada. In 2014, University of Nevada School of Medicine spending on employee salaries and business operations resulted in a total impact of $264.5 million in economic activity in Nevada. In other words, for every dollar spent by UNSOM on payroll, benefits, and operations statewide, another $0.47 in economic activity was generated in other businesses across the state. As policymakers consider the medical education and health care priorities for Nevada, they should bear in mind the importance of the University of Nevada School of Medicine to the state's economy.

Appendix

The Multiplier Effect

An important method of assessing the impact of businesses and industry sectors on local economies is through the estimation of multiplier effects. Multiplier effects are a simplified and compact way of representing the effects of business and employee expenditures on the local economy. The multiplier is interpreted as the impact of a one-unit change in sales, employment, or income that results in a corresponding total impact on sales, employment, or income in the larger economy. In essence, the multiplier represents the recycling of dollars and income in a specified geographic unit, such as Clark County or the State of Nevada. This recycling creates new job opportunities and additional wages for residents and business establishments.

There are three types of multiplier effects based on the type of economic impact analysis undertaken: direct, indirect, and induced. These types are illustrated in Table 9 with examples from the hospital industry. The *direct multiplier effect* is based on an industry's initial economic impact on the region's economy.

Table 9: Illustration of Economic Impact Multipliers

Type of Multiplier	Direct	Indirect	Induced
Employment Multiplier	UNSOM jobs	UNSOM supplier jobs	Local retail and service jobs related to UNSOM employee spending
Income Multiplier	UNSOM employee payroll and benefits	UNSOM supplier employee payroll and benefits	Local retail and service income related employee spending
Output Multiplier	UNSOM expenditures	UNSOM Supplier Expenditures	Local retail and service expenditures related to UNSOM spending

For example, if a medical school has annual expenditures of $5 million on goods and services to support medical school operating activities, then this figure becomes the direct economic impact on the community.

The *indirect multiplier effect* is based on industry-to-industry transactions only. For example, indirect effects would include medical school purchases of educational and medical supplies,

local laundry services, food, and other contracted services. Finally, the *induced multiplier effect* includes both the industry-to-industry transactions and household purchases, including employee spending. The total economic impact is thus defined as the direct plus indirect and induced economic impacts.

The direct, indirect, and induced multiplier effects can be classified as output (expenditures), employment and income (payroll and benefits) multipliers. An output multiplier of 2.0 indicates that if one dollar is spent by the medical school, an additional dollar is spent in other sectors due to business and household spending. An employment multiplier of 2.0 indicates that if one job is created in the health care sector, 1.0 additional job was created in other sectors due to business and household spending. Likewise, an income (payroll and benefits) multiplier of 2.0 indicates that for every dollar of income (payroll and benefits) created in the health sector, an additional dollar of income (payroll and benefits) is created in other sectors due inter-industry spending by health businesses and employees.

Model and Data Used to Estimate Multipliers

The economic impacts presented in this report are measured by multipliers using an input-output model and data from IMPLAN, a model that is widely used by economists and other academics in the United States. A computer spreadsheet that uses state IMPLAN multipliers was originally developed to enable community development specialists to measure the secondary benefits of the health sector on state, regional, or county economies. The complete methodology 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).

Input-output (I/O) analysis is designed to analyze the transactions among industries in an economy (Miernyk 1965). These models are largely based on the work of Wassily Leontief during the 1930s. 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, and so on. By simultaneously accounting for structural interaction between sectors and industries, I/O analysis gives expression to the general economic equilibrium systems.

The analysis utilizes assumptions based on linear and fixed coefficients and limited substitutions among inputs and outputs (I/O). The analysis assumes that average and marginal I/O coefficients are equal. Nonetheless, the framework has been widely accepted and used by

economists and policymakers. 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 interdependencies of an economy. From the coefficients, various predictive devices (multipliers) can be computed, which can be useful in analyzing economic changes in a state, region, or county. Multipliers indicate the relationship between some observed change in the economy and the total change in economic activity created through the economy.

Typically, the complexity of I/O modeling has hindered practitioners from constructing models specific to a community requesting an analysis. Too often, inappropriate 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, region, county, or zip code data. Impact analysis can be performed once a regional I/O model is constructed.

Four main sets of multipliers are estimated by IMPLAN, corresponding to four measures of regional economic activity: (1) total industry output, (2) labor income, (3) value added, and (4) employment. Multipliers for four components of value added can also be estimated. 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 construction of a medical school or the closing of a medical school campus. For construction expenditures, the construction sector exerts the impact received from medical school expenditures, in areas such as local purchase of cement, electricity supplies, and local labor. The focus business changes its purchases and inputs as a result of the direct impacts. This produces indirect impacts in other business sectors. Indirect impacts are the additional expenditures made by local economic sectors after the direct effects. The event occurs when a firm such as the medical school buys accounting services from a local accountant that buys paper for analysis which increases the economic activity of the local office supplier and the local office supplier may buy extra accounting time to keep records of the expanded purchases.

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. The effect of the changes in household consumption on businesses in a community is referred to as an induced effect. For example, as people receive their paychecks, they purchase goods and services such as restaurant sales. This causes expansion in restaurants which filters through the economy Induced impacts are those from expanded local household activity.

To measure the total impact, a Type II multiplier assumes all expanded household activity will remain in the study area. From journey to work data, the impact is a larger area due to employee movement. The Social Accounting Matrix (SAM) multiplier is used to address the leakage of household income from workers working in the study area but living outside the study area. The Type SAM 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 effects divided by direct effects). The default SAM multiplier internalizes household income and expenditures. This calculation produces a lower induced effect yet is more in line with the flow of employment in and out of the study area. The SAM multiplier may also be modified in special cases to internalize other final demand categories such as state government spending.

Minnesota IMPLAN Group, Inc. (MIG)

Dr. Wilbur Maki at the University of Minnesota utilized the input/output model and database work from the U. S. Forest Service's Land Management Planning Unit in Fort Collins to further develop the methodology and to expand the data sources. Scott Lindall and Doug Olson joined the University of Minnesota in 1984 and worked with Maki and the model. As an outgrowth of their work with the University of Minnesota, Lindall and Olson entered into a technology transfer agreement with the University of Minnesota that allowed them to form MIG. At first, MIG focused on database development and provided data that could be used in the Forest Service version of the software. In 1995, MIG took on the task of writing a new version of the IMPLAN software from scratch. This new version extended the previous Forest Service version by creating an entirely new modeling system that included creating Social Accounting Matrices (SAMs) – an extension of input-output accounts, and resulting SAM multipliers. Version 2 of the new IMPLAN software became available in May of 1999. For more information about Minnesota IMPLAN Group, Inc., please contact Scott Lindall or Doug Olson by phone at 651-439-4421 or by email at info@implan.com or review their website at www.implan.com.

Sources

Employment, payroll, and operating expenses data was supplied by the University of Nevada School of Medicine budget office.

Alward, G., Sivertz, E., Olson, Dl, Wagnor, J., Serf, D., and Lindall, S. (1989). Micro IMPLAN Software Manual. Stillwater, MN. Universityof Minnesota Press.

Doeksen, G. A., Johnson, T., and Willoughby, C. (1997). Measuring the Economic Importance of the Health Sector on a Local conomy: A Brief Literature Review and Procedures to Measure Local Impacts. Southern Rural Development Center. SRDC Pub. No. 202. 1997.

Miernyk, W.H. (1965). The Element of Input-Output Analysis. New York, NY; Random House.

Minnesota IMPLAN Group, Inc. User's Guide, Analysis Guide, Data Guide: IMPLAN Professional Version 2.0 Social Accounting & Impact Analysis Software, 2nd Edition, June 2000.

About this Report

This policy brief – *The Contribution of the University of Nevada School of Medicine on the Nevada Economy* (May 2015) was prepared for the University of Nevada School of Medicine by John Packham and Tabor Griswold from the UNSOM Office of Statewide Initiatives and the Tom Harris and Jeffery Stroup from the Center for Economic Development at the University of Nevada, Reno. Over the past decade, these two offices have provided local and state leaders with the information and assistance needed to make the best possible decisions about the role of hospitals, the health sector, and medical education in economic development.

For additional information on this report, please contact Dr. Packham at (775) 784-1235 or jpackham@medicine.nevada.edu. A complete list of the reports and publications produced by the Office of Statewide Initiatives at the University of Nevada School of Medicine can be found at http://www.medicine.nevada.edu/statewide/.

Acknowledgements

Financial and employment data utilized in this report were provided by the UNSOM Office of Budget and Finance for the Fiscal Year 2014 (July 1, 2013 to June 30, 2014). Employment, payroll, and output estimates were prepared utilizing economic impact modeling (IMPLAN Version 3.0) and multipliers developed by the Minnesota IMPLAN Group, Inc. (www.implan.com). Employment numbers were obtained from the University of Nevada School of Medicine.

Suggested Citation

Packham, J. F., Griswold, M. T., Stroup, J.L. Harris, T.R. (2015). The Contribution of the University of Nevada School of Medicine on the Nevada Economy. UNSOM Health Policy Brief (May 2015). Reno, NV: University of Nevada School of Medicine.

University of Nevada
School of Medicine