

**The Impact of the University of Nevada School of Medicine
on the Nevada Economy**



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John Packham
Shannon Price
And
Thomas R. Harris

John Packham is the Director of the Nevada Rural Hospital Flexibility Program, Nevada Office of Rural Health, University of Nevada School of Medicine.

Shannon Price is a Research Associate in the University Center for Economic Development and Department of Resource Economics at the University of Nevada, Reno.

Thomas R. Harris is a Professor in the Department of Resource Economics and Director of the University Center for Economic Development at the University of Nevada, Reno.

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Thomas R. Harris, Director
University Center for Economic Development
University of Nevada, Reno
Department of Resource Economics
Mail Stop 204
Reno, Nevada 89557-0105
Phone: 775/784-6499



UCED
University of Nevada, Reno
Nevada Cooperative Extension
Department of Resource Economics

The Impact of the University of Nevada School of Medicine on the Nevada Economy

Executive Summary

This report provides a detailed set of estimates of the current and projected impact of the University of Nevada School of Medicine (UNSOM) on the Nevada economy. The study includes estimates of the employment and payroll impacts of UNSOM medical education, patient care activities, and construction in 2006. It also provides estimates of the employment and payroll impact of enhanced spending for UNSOM operations, new faculty, and capital improvement projects.

Highlights of the report include:

- The impact of UNSOM operations (excluding labor costs) was \$36.1 million in total industry output in Nevada in 2006. The 483 people producing this output earned \$24.6 million in employee compensation. Businesses and self-employed individuals earned an additional \$1.5 million.
- In 2006, the spending of 464 UNSOM faculty living in Nevada contributed \$48.7 million in total industry output to the Nevada economy in 2006. Workers producing goods and services purchased by UNSOM faculty earned \$8.7 million in employee compensation and \$1.2 million in other income. Total employment associated with UNSOM faculty spending was 278 jobs.
- The 220 UNSOM medical residents living in Nevada in 2006 were paid \$9.9 million in wages and salaries. UNSOM resident spending contributed \$9 million in total industry output to the Nevada economy in 2006. Workers producing goods and services purchased by UNSOM residents earned \$1.6 million in employee compensation and \$260,000 in other income respectively. Total employment associated with UNSOM resident spending was 52 jobs.
- The 987 UNSOM staff members residing in Nevada were paid \$22 million in wages and salaries in 2006. Of the \$22 million, \$17.6 million was used for personal consumption expenditures. UNSOM staff spending contributed \$20 million in total industry output to the Nevada economy in 2006. Workers producing goods and services purchased by UNSOM staff earned \$3.6 million in employee compensation and \$540,000 in other income respectively. Total employment associated with UNSOM staff spending was 112 jobs.

- UNSOM enrolled 219 medical students in 2006. Using cost of attendance as a proxy for expenditures, those students spent \$5.1 million in Nevada. UNSOM student spending resulted in \$5.8 million in total industry output, \$1 million in employee compensation, and \$159,000 in other income. Student spending supported 32 jobs in the Nevada economy in 2006.
- In summary, UNSOM teaching and patient care activities involved spending \$108.8 million on goods and services in the state of Nevada in 2006, which include operations spending of \$33 million, UNSOM employment of 1,671 workers residing in Nevada and their spending of \$68.3 million, student expenditures of \$5.1 million, and construction and capital improvement expenditures of \$303,000.
- In turn, UNSOM spending on medical education, patient care activities, and capital improvements generated \$120.2 million in total output in Nevada in 2006. Additionally, UNSOM activities generated \$39.5 million in employee compensation and \$3.8 million in other income in other Nevada businesses. In addition to the 1,671 UNSOM faculty, resident, and staff jobs, UNSOM activities directly and indirectly supported another 962 jobs in other business across Nevada in 2006.

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. As this report demonstrates, UNSOM provides much more than medical education and necessary patient care services. The jobs, income, and economic benefits created in other businesses, as well as sales tax revenue generate by all sectors represent additional contributions to the economic health of Nevada.

This report – *The Impact of the University of Nevada School of Medicine on the Nevada Economy* – was prepared for the University of Nevada School of Medicine by the Nevada Rural Health Works Program. This program is a joint research and policy analysis project of the Nevada Office of Rural Health at the University of Nevada School of Medicine, Nevada Cooperative Extension, and the Center for Economic Development at the University of Nevada, Reno. Over the past decade, Nevada Rural Health Works Program has 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.

The Impact of the University of Nevada School of Medicine on the Nevada Economy

This report provides a detailed set of estimates of the impact of the University of Nevada School of Medicine (UNSOM) on the Nevada economy. The study includes estimates of the employment and payroll impacts of UNSOM medical education, patient care activities, and construction in 2006. It also provides estimates of the employment and payroll impact of enhanced spending for UNSOM operations, new faculty, and construction and capital improvements. A complete description of the methodology and data utilized to derive the impact estimates contained in this report are included in the Appendix to this report.

Impact of UNSOM Medical Education, Patient Care Activities, and Capital Improvements on the Nevada Economy – 2006

UNSOM Operations

UNSOM operations spending consists of purchases of goods and services required to support medical education and patient care activities. Operations do not include labor directly employed by the School of Medicine (e.g., faculty, staff, residents). The spending of UNSOM employees is discussed in the following section. Table 1 summarizes the economic impacts of UNSOM operations in 2006. The total direct spending on goods and services by the University of Nevada School of Medicine in 2006 was \$48.1 million. Of the total amount of direct purchases by UNSOM, \$33 million or 68.6% was spent in the State of Nevada; the remainder was spent on goods and services imported from other states. The direct effects of the \$33 million resulted in employee compensation to workers of \$23.9 million, total other income of \$1.3 million, and 455 jobs in the State of Nevada.

Table 1: Economic Impacts of UNSOM Operations (\$ millions) – 2006

UNSOM Operations 2006	Total Industry Output	Total Employee Compensation	Total Other Income	Total Employment
Total UNSOM Operations	\$48.06			
Direct Effects of UNSOM Operations in NV	\$32.98	\$23.93	\$1.34	455
Indirect Effects of UNSOM Operations in NV	\$3.12	\$0.71	\$0.20	28
Total Effects of UNSOM Operations in NV	\$36.10	\$24.64	\$1.54	483
Total Multiplier	1.09	1.03	1.15	1.06

The indirect effects of UNSOM operations represents purchases made by firms producing goods and services used by firms directly supplying the School of Medicine. Indirect purchases resulted in additional total industry output of \$3.1 million, total employee compensation of \$710,000, total other income of \$200,000, and 28 jobs.

In summary, the impact of UNSOM operations in 2006 was \$36.1 million in total industry output. The 483 people producing this output earned \$24.6 million in employee compensation. Businesses and self-employed individuals earned an additional \$1.5 million. Again, a total 483 jobs were associated with the direct and indirect expenditures of the School of Medicine.

The multipliers associated with UNSOM operations consist of a total output multiplier 1.09 and an employee compensation of 1.03. The other income multiplier is 1.15 and the employment multiplier is 1.06. The multipliers used to calculate these impacts are IMPLAN Type I Multipliers (see the Appendix for more information).

UNSOM Employee Spending

In 2006, UNSOM employed 473 faculty, 237 residents, and 1,005 staff for a total of 1,715 jobs. As Table 2 indicates, 464 faculty, 220 residents, and 987 staff resided in the state. The economic impacts detailed in this report refer only to the 1,671 UNSOM employees who resided in Nevada in 2006. A total of \$86.7 million was paid in wages and salaries to UNSOM faculty, residents, and staff in 2006. As Table 3 indicates, \$85.4 million was paid in wages and salaries to employees residing in Nevada.

Table 2: UNSOM Employment – 2006

Employee Category	Employees Living in Nevada	Employees Living Out of State	Total
Faculty	464	9	473
Residents	220	17	237
Staff	987	18	1,005
Total Employees	1,671	44	1,715

Table 3: UNSOM Wages and Salaries (\$ millions) – 2006

Employee Category	Employees Living in Nevada (Disposable Income)	Employees Living Out of State (Disposable Income)	Total (Disposable Income)
Faculty	\$53.5 (\$ 42.8)	\$0.61 (\$0.48)	\$54.1 (\$43.3)
Residents	\$9.9 (\$7.9)	\$0.51 (\$0.41)	\$10.4 (\$8.3)
Staff	\$22.0 (\$ 17.6)	\$0.19 (\$0.15)	\$22.2 (\$17.8)
Total Payroll	\$85.4 (\$68.3)	\$1.3 (\$1.0)	\$86.7 (\$69.4)

The economic impacts discussed in this report are based on the wages and salaries earned by UNSOM employees residing in Nevada. Moreover, an estimated \$68.3 million or 80 percent of total UNSOM payroll was used for personal consumption expenditures. The remaining 20 percent was used for taxes, savings, and other investments, and is thus not included in the calculation of impacts discussed in this report. In total, \$68.3 million was used by UNSOM employees to purchase goods and services in Nevada in 2006. These dollars spent for goods and services were then respent locally, creating additional income and employment for residents of Nevada.

UNSOM Faculty Spending

In 2006, the 464 UNSOM faculty members residing in Nevada were paid \$53.5 million in wages and salaries. Of the \$53.5 million, \$42.8 million was used for personal consumption expenditures. In other words, as shown in Table 4, the disposable income spent by UNSOM faculty in 2006 resulted in a direct effect of \$42.8 million in total industry output in Nevada. It also added \$7 million in employee compensation to workers producing the goods and services purchased by UNSOM faculty, as well as adding \$850,000 in other income. In total, the 464 UNSOM faculty members directly supported an additional 226 jobs in Nevada.

Table 4: Economic Impacts of UNSOM Faculty Spending (\$ millions) – 2006

UNSOM Faculty Spending – 2006	Total Industry Output	Total Employee Compensation	Total Other Income	Total Employment
Total Faculty Wages	\$53.47			
Direct Effects of Faculty Spending	\$42.78	\$6.96	\$0.85	226
Indirect Effects of Faculty Spending	\$5.91	\$1.72	\$0.37	52
Total Effects of Faculty Spending	\$48.69	\$8.68	\$1.22	278
Total Multiplier	1.14	1.25	1.44	1.23

Indirectly, there were another \$5.9 million in total industry output, \$1.7 million in employee compensation, and \$370,000 in other income. There were 52 jobs associated indirectly with UNSOM faculty spending.

In summary, UNSOM faculty spending contributed \$48.7 million in total industry output to the Nevada economy in 2006. Workers producing goods and services purchased by UNSOM faculty earned \$8.7 million and \$1.2 million in employee compensation and other income respectively. Total employment associated with UNSOM faculty spending was 278 jobs.

The multiplier for total industry output was 1.14, the employee compensation multiplier was 1.25, the other income multiplier was 1.44, and the employment multiplier was 1.23. The

multipliers used to calculate these impacts are IMPLAN Type I Multipliers (see the Appendix for more information).

UNSOM Resident Spending

In 2006, the 220 UNSOM medical residents living in Nevada were paid \$9.9 million in wages and salaries. Of the \$9.9 million, \$7.9 million was used for personal consumption expenditures. In other words, as shown in Table 5, the disposable income spent by UNSOM residents in 2006 resulted in a direct effect of \$7.9 million in total industry output in Nevada. It also added \$1.3 million in employee compensation to workers producing the goods and services purchased by UNSOM residents, as well as adding \$190,000 in other income. In total, the 220 UNSOM residents directly supported an additional 42 jobs in Nevada.

Table 5: Economic Impacts of UNSOM Resident Spending (\$ millions) – 2006

UNSOM Resident Spending – 2006	Total Industry Output	Total Employee Compensation	Total Other Income	Total Employment
Total Resident Wages	\$9.91			
Direct Effects of Resident Spending	\$7.93	\$1.30	\$0.19	42
Indirect Effects of Resident Spending	\$1.12	\$0.32	\$0.07	10
Total Effects of Resident Spending	\$9.05	\$1.62	\$0.26	52
Total Multiplier	1.14	1.25	1.37	1.24

Indirectly, there were another \$1.1 million in total industry output, \$320,000 in employee compensation, and \$70,000 in other income. There were 10 jobs associated indirectly with UNSOM resident spending.

In summary, UNSOM resident spending contributed \$9 million in total industry output to the Nevada economy in 2006. Workers producing goods and services purchased by UNSOM residents earned \$1.6 million and \$260,000 in employee compensation and other income respectively. Total employment associated with UNSOM resident spending was 52 jobs.

The multiplier for total industry output was 1.14, the employee compensation multiplier was 1.25, the other income multiplier was 1.37, and the employment multiplier was 1.24. The multipliers used to calculate these impacts are IMPLAN Type I Multipliers (see the Appendix for more information).

UNSOM Staff Spending

In 2006, the 987 UNSOM classified staff employees residing in Nevada were paid \$22 million in wages and salaries. Of the \$22 million, \$17.6 million was used for personal consumption expenditures. In other words, as shown in Table 6, the disposable income spent by UNSOM staff in 2006 resulted in a direct effect of \$17.6 million in total industry output in Nevada. It also added \$2.9 million in employee compensation to workers producing the goods and services purchased by UNSOM staff, as well as adding \$400,000 in other income. In total, the 987 UNSOM staff members directly supported an additional 91 jobs in Nevada.

Table 6: Economic Impacts of UNSOM Staff Spending (\$ millions) – 2006

UNSOM Staff Spending – 2006	Total Industry Output	Total Employee Compensation	Total Other Income	Total Employment
Total Staff Wages	\$22.04			
Direct Effects of Staff Spending	\$17.63	\$2.91	\$0.40	91
Indirect Effects of Staff Spending	\$2.43	\$0.70	\$0.14	21
Total Effects of Staff Spending	\$20.06	\$3.61	\$0.54	112
Total Multiplier	1.14	1.24	1.35	1.23

Indirectly, there were another \$2.4 million in total industry output, \$700,000 in employee compensation, and \$140,000 in other income. There were 21 jobs associated indirectly with UNSOM staff spending.

In summary, UNSOM staff spending contributed \$20 million in total industry output to the Nevada economy in 2006. Workers producing goods and services purchased by UNSOM staff earned \$3.6 million and \$540,000 in employee compensation and other income respectively. Total employment associated with UNSOM staff spending was 112 jobs.

The multiplier for total industry output was 1.14, the employee compensation multiplier was 1.24, the other income multiplier was 1.35, and the employment multiplier was 1.23. The multipliers used to calculate these impacts are IMPLAN Type I Multipliers (see the Appendix for more information).

UNSOM Student Spending

In 2006, UNSOM enrolled 219 medical students. Since information on student income or loans was not available, cost of attendance estimates provided by UNSOM were used to determine student expenditures. Using cost of attendance as a proxy for expenditures, students spent \$5.1 million in Nevada in 2006.

In other words, as shown in Table 7, the direct purchases of students directly resulted in \$5.1 million of total output in the Nevada economy. Workers producing that output earned \$840,000 in employee compensation and \$117,000 in other income. There were a total of 26 jobs directly associated with student spending.

Table 7: Economic Impacts of UNSOM Student Spending (\$ millions) – 2006

UNSOM Student Spending – 2006	Total Industry Output	Total Employee Compensation	Total Other Income	Total Employment
Direct Effects of Student Spending	\$5.10	\$0.84	\$0.12	26
Indirect Effects of Student Spending	\$0.71	\$0.20	\$0.04	6
Total Effects of Student Spending	\$5.81	\$1.04	\$0.16	32
Total Multiplier	1.14	1.24	1.36	1.23

Indirectly, UNSOM students contributed another \$706,000 in total output, \$204,000 in employee compensation, and \$42,000 in other income. There were 6 jobs indirectly related to UNSOM student spending.

In summary, UNSOM student spending resulted in \$5.8 million in total industry output, \$1 million in employee compensation, and \$159,000 in other income. Student spending supported 32 jobs in the Nevada economy in 2006.

The multiplier for total industry output was 1.14, the employee compensation multiplier was 1.24, the other income multiplier was 1.36, and the employment multiplier was 1.23. The multipliers used to calculate these impacts are IMPLAN Type I Multipliers (see the Appendix for more information).

UNSOM Capital Improvements

In 2006, there were some minor construction and capital improvement projects that took place at UNSOM. The School of Medicine spent \$570,000 on construction, excluding labor costs, \$303,000 of which was spent in Nevada.

Table 8 summarizes the impacts of the capital improvements on the Nevada economy. This construction spending directly resulted in \$303,000 of total output in the Nevada economy. Workers producing that output earned \$140,000 in employee compensation, and \$17,000 in other income. There were a total of 3 jobs directly associated with construction spending.

Table 8: Economic Impacts of UNSOM Capital Improvements – 2006

UNSOM Capital Improvements – 2006	Total Industry Output	Total Employee Compensation	Total Other Income	Total Employment
Direct Effects of Capital Improvements Spending	\$303,000	\$140,000	\$17,000	3
Indirect Effects of Capital Improvements Spending	\$71,000	\$20,000	\$4,000	1
Induced Effects of Capital Improvements Spending	\$140,000	\$40,000	\$6,000	1
Total Effects of Capital Improvements Spending	\$514,000	\$200,000	\$27,000	5
Total Multiplier	1.70	1.43	1.59	1.67

Indirectly, UNSOM construction and capital improvements expenditures contributed another \$71,000 in total industry output, \$20,000 in employee compensation, and \$4,000 in other income. There was 1 job indirectly related to UNSOM construction spending.

Information on the number of construction workers employed and their wages and salaries was not available. This report uses the average construction worker employment and salaries provided from IMPLAN to determine the impacts of these workers on the Nevada economy. The induced effect of construction spending represents the impact of construction worker spending on goods and services in Nevada. Construction worker spending contributed \$140,000 in industry output. Also, this spending supported one job, \$40,000 in employee compensation and \$6,000 in other income.

In summary, UNSOM construction and capital improvements spending resulted in \$514,000 in total industry output, \$200,000 in employee compensation, and \$27,000 in other income. Construction spending resulted in the creation of 5 jobs in the Nevada economy in 2006.

The multiplier for total industry output was 1.70, the employee compensation multiplier was 1.43, the other income multiplier was 1.59, and the employment multiplier was 1.67. The multipliers used to calculate these impacts are IMPLAN Type II Multipliers (see Appendix for more information).

Total Impact of the UNSOM Medical Education, Patient Care Activities, and Capital Improvements on the Nevada Economy – 2006

Table 9 summarizes the total economic impact of the University of Nevada School of Medicine in 2006. In 2006, UNSOM activities involved spending \$108.8 million on goods and services in the state of Nevada, which include operations spending of \$33 million, UNSOM employment of 1,671 workers residing in Nevada and their spending of \$68.3 million, student expenditures of \$5.1 million, and construction and capital improvement expenditures of \$303,000.

Table 9: Total Economic Impact of UNSOM Medical Education, Patient Care Activities, and Capital Improvements on the Nevada Economy (\$ millions) – 2006

Type of Economic Impacts	Total Industry Output	Total Employee Compensation	Total Other Income	Total Employment
Direct Economic Impacts				
Direct Impacts of UNSOM Operations Spending	\$32.98	\$23.93	\$1.34	455
Direct Impacts of UNSOM Faculty Spending	\$42.78	\$6.69	\$0.85	226
Direct Impacts of UNSOM Resident Spending	\$7.93	\$1.30	\$0.19	42
Direct Impacts of UNSOM Staff Spending	\$17.63	\$2.91	\$0.40	91
Direct Impacts of UNSOM Student Spending	\$5.10	\$0.84	\$0.12	26
Direct Impacts of UNSOM Construction Spending	\$0.30	\$0.14	\$0.02	3
Subtotal Direct Impacts	\$106.72	\$35.81	\$2.92	843
UNSOM Employment				1,671
<i>Total Direct Impacts</i>	<i>\$106.72</i>	<i>\$35.81</i>	<i>\$2.92</i>	<i>2,514</i>
Indirect Economic Impacts				
Indirect Impacts of UNSOM Operations Spending	\$3.12	\$0.71	\$0.20	28
Indirect Impacts of UNSOM Faculty Spending	\$5.91	\$1.72	\$0.37	52
Indirect Impacts of UNSOM Resident Spending	\$1.12	\$0.32	\$0.07	10
Indirect Impacts of UNSOM Staff Spending	\$2.43	\$0.70	\$0.14	21
Indirect Impacts of UNSOM Student Spending	\$0.71	\$0.20	\$0.04	6
Indirect and Induced Impacts of UNSOM Construction Spending	\$0.21	\$0.06	\$0.01	2
<i>Total Indirect Impacts</i>	<i>\$13.50</i>	<i>\$3.71</i>	<i>\$0.83</i>	<i>121</i>
Total Economic Impact (\$ millions)	\$120.22	\$39.52	\$3.75	2,633

The \$106.7 million in total UNSOM expenditures directly resulted in \$106.7 million in total industry output change. This spending is associated with \$35.8 million in employee compensation, \$2.9 million in other income, and 843 jobs. When combined with the 1,671 individuals employed by UNSOM in 2006, the School of Medicine directly supported 2,514 employees in the State of Nevada.

The \$106.7 million in direct spending resulted in indirect spending on other goods and services in Nevada, and was associated with \$13.5 million in total industry output, \$3.7 million in employee compensation, \$830,000 in other income, and 119 jobs.

In summary, University of Nevada School of Medicine spending on medical education, patient care activities, and capital improvements generated \$120.2 million in total direct and indirect output in 2006. Additionally, UNSOM activities generated \$39.5 million in employee compensation and \$3.8 million in other income in other Nevada businesses. In addition to the

1,671 UNSOM faculty, resident, and staff jobs, UNSOM activities directly and indirectly supported another 962 jobs in other business across Nevada in 2006.

Estimated Impact of Enhanced Spending on UNSOM Operations, Faculty Wages and Spending, and Capital Improvements on the Nevada Economy

The following three tables provide estimates of the employment and payroll impact of enhanced UNSOM spending on patient care and teaching operations, faculty wages, and construction. In each case, the estimates are based on a hypothetical enhancement of \$10 million in new spending.

Estimated Economic Impact of Enhanced UNSOM Spending on Operations

Table 10 provides estimates of the income and employment impact of a hypothetical \$10 million dollars in enhanced UNSOM spending on operations. The estimates do not include labor expenditures and, as was the case in previous sections, conservatively assume that a portion of UNSOM operations spending on goods and services occurs in Nevada (68%), with the remainder spent on goods and services imported from other states (32%). The multipliers used to generate these estimates are the same multipliers used in previous sections to estimate UNSOM impacts from operations for 2006.

Table 10: Estimated Economic Impacts of Enhanced UNSOM Spending of \$10 Million on Operations (\$ millions)

UNSOM Operations	Total Industry Output	Total Employee Compensation	Total Other Income	Total Employment
Enhanced Spending on UNSOM Operations	\$10.00			
Direct Effects of UNSOM Operations in NV	\$6.83	\$4.98	\$0.28	94
Indirect Effects of UNSOM Operations in NV	\$0.65	\$0.15	\$0.04	6
Total Effects of UNSOM Operations in NV	\$7.48	\$5.13	\$0.32	100
Total Multiplier	1.09	1.03	1.15	1.06

The data in Table 10 indicates that every \$10 million dollars in enhanced spending on UNSOM operations will produce an estimated \$4.98 million in employee compensation, total other income of \$280,000, and 94 jobs in the State of Nevada. Indirect purchases will produce an additional total industry output of \$650,000, total employee compensation of \$150,000, total other income of \$320,000, and 6 additional jobs.

In summary, the estimated impact of the hypothetical enhancement of \$10 million in UNSOM operations is \$7.48 million in total industry output in the State of Nevada. The 100 people producing this output will earn an estimated \$5.13 million in employee compensation. Businesses and self-employed individuals earned an additional \$320,000.

Estimated Economic Impact of Enhanced UNSOM Spending on Faculty Wages

Table 11 provides estimates of the income and employment impact of a hypothetical \$10 million dollars in enhanced UNSOM spending on faculty wages. This scenario assumes that \$8.0 million (80%) was used for personal consumption expenditures. The multipliers used to generate these estimates are the same multipliers used in previous sections to estimate UNSOM impacts from faculty spending for 2006.

Table 11: Estimated Economic Impacts of Enhanced UNSOM Spending of \$10 Million on Faculty Wages (\$ millions)

UNSOM Faculty Spending	Total Industry Output	Total Employee Compensation	Total Other Income	Total Employment
Enhanced Spending on UNSOM Faculty Wages	\$10.00			
Direct Effects of Faculty Spending	\$8.00	\$1.30	\$0.16	42
Indirect Effects of Faculty Spending	\$1.10	\$0.32	\$0.07	10
Total Effects of Faculty Spending	\$9.10	\$1.62	\$0.23	52
Total Multiplier	1.14	1.25	1.44	1.23

As shown in Table 11, the \$8.0 million in disposable income spent by UNSOM faculty in this scenario will result in a direct effect of \$8.0 million in total industry output in Nevada. It will also add \$1.3 million in employee compensation to workers producing the goods and services purchased by UNSOM faculty, and add \$160,000 in other income. In total, enhanced UNSOM faculty spending will directly support an additional 42 jobs in Nevada.

Indirectly, enhanced faculty spending will result in an additional \$1.1 million in total industry output, \$320,000 in employee compensation, and \$70,000 in other income. Additionally, 10 jobs will be created indirectly as a result of enhanced UNSOM faculty spending.

In summary, the estimated impact of the hypothetical enhancement of \$10 million in UNSOM faculty wages is \$9.1 million in total industry output in the State of Nevada. The 52 people producing this output will earn an estimated \$1.62 million in employee compensation. Businesses and self-employed individuals will earn an additional \$230,000.

Estimated Economic Impact of Enhanced UNSOM Spending on Capital Improvements

Finally, Table 12 provides estimates of the income and employment impact of a hypothetical \$10 million dollars in enhanced UNSOM spending on construction and capital improvements. This scenario assumes that 100% of construction and capital improvement dollars will be spent in Nevada.

Table 12: Estimated Economic Impacts of Enhanced UNSOM Spending of \$10 Million on Capital Improvements (\$ millions)

UNSOM Capital Improvements	Total Industry Output	Total Employee Compensation	Total Other Income	Total Employment
Enhanced Spending on UNSOM Cap Improvements	\$10.00			
Direct Effects of Capital Improvements Spending	\$10.00	\$4.60	\$0.59	98
Indirect Effects of Capital Improvements Spending	\$2.35	\$0.79	\$0.13	22
Induced Effects of Capital Improvements Spending	\$4.48	\$1.27	\$0.19	40
Total Effects of Capital Improvements Spending	\$16.83	\$6.66	\$0.91	160
Total Multiplier	1.68	1.45	1.55	1.63

As shown in Table 12, enhanced spending of \$10 million on capital improvements will result in \$4.6 million for workers producing that output and \$590,000 in other income. An estimated total of 98 jobs directly will be generated as a result of enhanced construction spending.

Indirectly, UNSOM construction and capital improvements expenditures will generate \$2.35 million in total industry output, \$790,000 in employee compensation, \$130,000 in other income, and 22 jobs indirectly related to enhanced UNSOM construction spending. The induced effect of construction spending represents the impact of construction worker spending on goods and services in Nevada. Table 12 indicates that construction worker spending will contribute an estimated \$4.48 million in industry output. Also, this spending will support an estimated 40 jobs, \$1.27 million in employee compensation and \$91,000 in other income.

In summary, the estimated impact of a hypothetical enhancement of \$10 million in UNSOM construction and capital improvements is \$16.8 million in total industry output in the State of Nevada, \$6.7 million in employee compensation, and an additional \$910,000 in other income. Construction spending will result in the creation of 160 jobs to the Nevada economy.

In conclusion, each of the hypothetical enhancements of \$10 million in new UNSOM spending – i.e., enhanced spending on operations, enhanced spending on faculty wages, and enhanced spending on construction and capital improvements – would result in significant, immediate contributions to the Nevada economy in terms of new jobs and income. In addition to providing additional medical education opportunities and patient care services to Nevada residents, the jobs, income, and other economic benefits that would be generated by enhanced spending by the University of Nevada School of Medicine represent substantial contributions to the economic health of Nevada.

Appendix: Economic Impact Analysis Methodology

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 13 with examples from the hospital industry. The *direct multiplier effect* is based on an industry's initial economic impact on the region's economy. For example, if a hospital has annual expenditures of \$5 million on goods and services to support hospital 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 hospital purchases of 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.

Table 13: Illustration of Economic Impact Multipliers

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

The direct, indirect, and induced multiplier effects can be classified as output, employment and income multipliers. An output multiplier of 2.0 indicates that if one dollar is spent by the hospital, 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 jobs are created in other sectors due to business and household spending. Likewise, an income multiplier of 2.0 indicates that for every dollar of income created in the health sector, an additional dollar of income 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. 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 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.

Five different sets of multipliers are estimated by IMPLAN, corresponding to five measures of regional economic activity: (1) total industry output, (2) personal income, (3) total income, (4) value added, and (5) employment. Three 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 hospital or the closing of a hospital. The focus business changes its purchases and inputs as a result of the direct impacts. This produces indirect impacts in other business sectors. However, the total impact of a change in the economy consists of direct, indirect, and induced changes. Both the direct and indirect impacts change the flow of dollars to the state, region, or county's households. Subsequently, the households alter their consumption. 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 effects divided by direct effects). IMPLAN also estimates a modified Type II multiplier that also includes the direct, indirect, and induced effects. The Type III multiplier further modifies the induced effect to include spending patterns of households based on a breakdown of households by nine different income groups.

Additional information on the data, methodology, and software requirements of I/O modeling and IMPLAN analysis can be found in guides developed by Doeksen, et al. (1997), Alward, et al., (1989), and the Minnesota IMPLAN Group (MIG) (2000).

References

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