

2019

**AN ANALYSIS
OF THE
ECONOMIC IMPACT
OF
MISSOURI PHYSICIANS**



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EXECUTIVE SUMMARY

Physicians provide and direct care throughout the health care system — they collaborate with and manage other health care workers, order tests, prescribe pharmaceuticals, and diagnose and treat illnesses. Aside from the patient, physicians are at the center of health care delivery. In an average year, 84 percent of adults and 93 percent of children receive physician care.

Just as physicians help improve the health of patients, the places physicians live and work benefit from a healthy economic boost from physicians' personal consumption and medical practice expenditures. Physicians are among the most highly trained professionals in most communities. As a result, physicians' income is generally higher than average. Moreover, the practice of medicine — whether in a small independent practice, a large physician group or as an employed physician — is supply, staff and equipment intensive. As physicians or their employers purchase medical supplies and equipment, rent or build office space, or hire staff, the economic benefit of these expenditures is multiplied. The same is true for physician personal consumption. As these personal and professional expenditures are identified and aggregated, an economic model can be applied



to determine their economic value as they ripple through the economy.

For this report, the employment and practice settings of Missouri's practicing physicians were analyzed and aggregated. In addition, researchers acquired detailed data on the financial operations of 47 different medical specialty practices. This data was used to identify the average amount spent on medical equipment, office rent, medical supplies, and the number of staff — including nurses and nonmedical staff — that physicians employ. Data on physician income, including all practice and wage models — also were collected.

The data reveal **nearly 130,000 Missouri jobs are attributable to physicians through their direct, indirect and induced effects on the economy.**

These jobs paid almost \$10 billion in labor income, wages and benefits in the state. In

addition, more than \$12.3 billion in Missouri's Gross State Product can be linked to physicians. These economic activities generated nearly \$672 million in taxes for state and local governments in Missouri while contributing \$1.966 billion in taxes to the federal government.

The economic benefit from physicians is stable even in times of economic recession or extreme economic growth. Although elective health care may vary based upon national and state economic conditions, nonelective health care services tend to be stable regardless of the status of the economy. In this way, the services provided by physicians — and their economic contributions — are somewhat “recession proof.”



INTRODUCTION

Physicians are an important component of the multifaceted health care system. Parts of the health care system include hospitals, equipment technicians and billing staff. However, when most people think of the provision of health care, they focus on either nurses or doctors. Doctors have the ability to diagnose and treat chronic disease, prescribe medication, repair injuries and promote a patient's general health. In fact, more than two-thirds of all people in the United States have had contact with a doctor during the past six months and 84 percent have seen a doctor in the past year. For children under the age of 18, the numbers are even higher. Almost 93 percent of children have been seen by a physician in the past year.

Comparing the data in **Figures 1 and 2** on adult and child contact with doctors with other data reveal interesting insights.¹ In the past year, only 73 percent of Americans have read a book, 69 percent had a social media account, 47 percent of eligible voters voted in the last election, and 42 percent of Americans possessed a passport thus illustrating the integration of doctors in today's modern society.²

Physicians also have a significant economic impact on a state. In the course of treating patients, they purchase large amounts of medical supplies and equipment, hire nurses and other nonmedical staff, and order diagnostic tests. Furthermore, physicians are highly educated and highly skilled — features which generally denote that a person will have substantial income. The combination of a high income and running a medical practice that has many expenditures means that physicians contribute a lot to economic activity within Missouri. Nearly one out of every two adults has a chronic health condition and more than 25 percent of adults have more than one chronic condition. More than 75 percent of all health care spending in the U.S. is for chronic conditions, which are generally preventable.³ Therefore, a health care system where physicians can meet with patients, intervene, and give proper guidance, can reduce societal health care costs and have an outsized economic impact that is larger than from spending and expenditures alone.

¹National Health Interview Survey, Centers for Disease Control and Prevention, Table A-18, C-82016, <https://www.cdc.gov/nchs/nhis/index.htm>

²See Perrin (2016) for data on reading books; See Pew Research (2018) for data on social media accounts; See U.S. State Department (2018) for data on possession of passports; See Domonoske (2018) for data on eligible voters.

³Yun, S, et. al., 'The Burden of Chronic Diseases in Missouri: Progress and Challenges.' Jefferson City, MO: Missouri Department of Health and Senior Services, June 2013, <https://health.mo.gov/atoz/pdf/burdenofchronicdiseasesinmissouri.pdf>



LESS THAN 6 MONTHS

Figure 1

Length of Time Since Last Contact With a Physician (ADULTS)

Source: National Health Interview Survey, Centers for Disease Control and Prevention, 2016



6 MONTHS - 1 YEAR

LESS THAN 6 MONTHS

Figure 2

Length of Time Since Last Contact With a Physician (CHILDREN)

Source: National Health Interview Survey, Centers for Disease Control and Prevention, 2016

PHYSICIANS IN MISSOURI

In order to become a doctor, one must attend both college and medical school. Typically, those entering the field of medicine will major in their undergraduate studies in biology, chemistry, biomedical sciences, engineering, physics or some other technical or science-based major. Prospective physicians will then attend medical school and obtain a medical degree or a doctor of osteopathy degree if they are graduating from an osteopathic medical school. Finally, physicians will do a residency of at least three years with additional years of residency required for certain specializations. All of these residencies are conducted under the supervision of an attending physician. Medical residents are usually paid a salary of between \$40,000 to \$50,000 a year.

According to the state of Missouri professional registration and medical board, there are 23,721 M.D.s and 3,937 D.O.s licensed to practice medicine in the state of Missouri.⁴ Of these M.D.s,

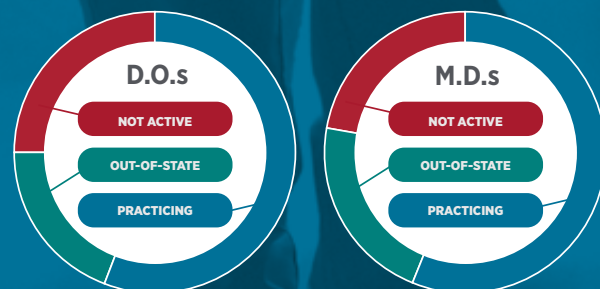
5,121 are currently practicing medicine outside of the state of Missouri while another 5,232 are residing in the state, but are not currently practicing medicine. This leaves 13,368 M.D.s in the state who are actively practicing medicine. Of the D.O.s licensed in the state of Missouri, 751 are working outside of the state of Missouri and 982 are not currently practicing. Therefore, there are 2,204 active D.O.s in Missouri.

Missouri has more physicians per person than the U.S. average and more than 12 other states.⁵ In the U.S., there are about 325.5 persons for every doctor while in Missouri there is one doctor for every 300 persons. **Figure 4** shows the number of people per physician for all 50 states, the District of Columbia, and the U.S. overall average. It should be noted that there is a wide variation between the states. The District of Columbia has one doctor for every 95 persons while Idaho has one doctor for every 580.8 persons. Although the

Figure 3

Current Status of Licensed M.D.s and D.O.s in Missouri

Source: Missouri Board of Healing Arts, 2018

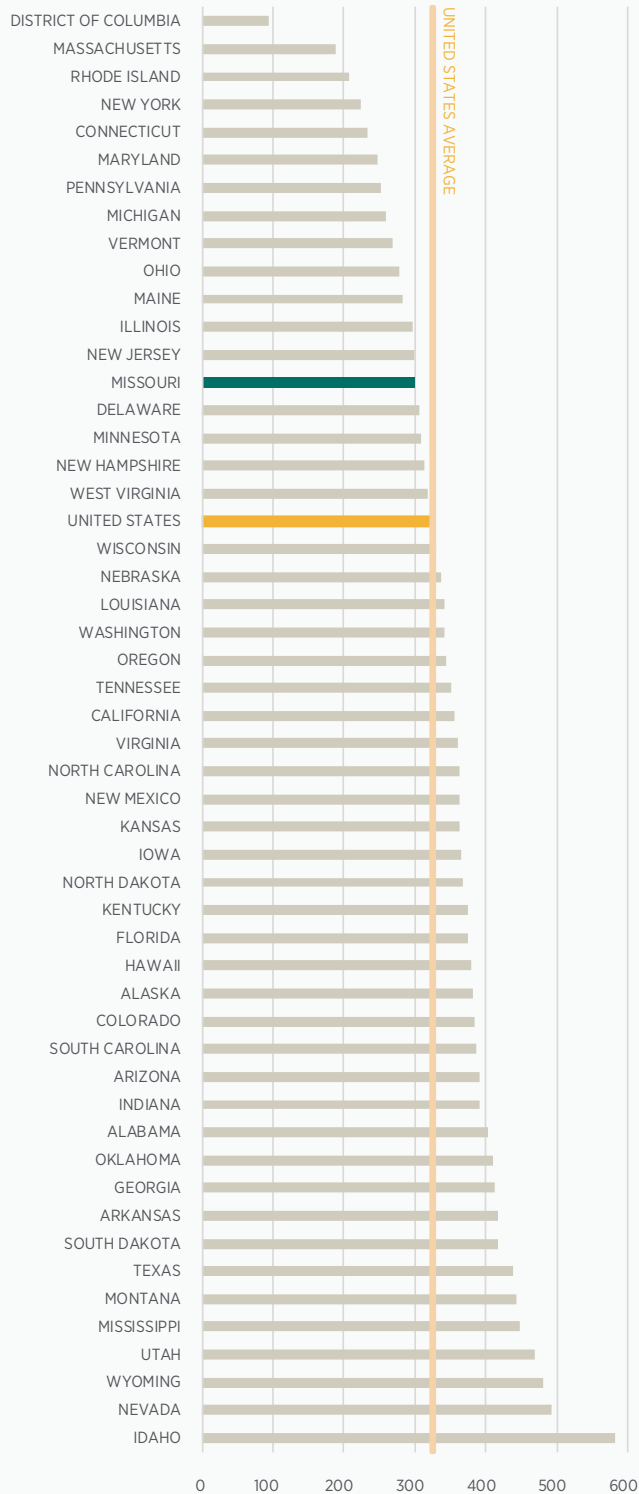


⁴ M.D. refers to Medical Doctor while D.O. refers to Doctor of Osteopathy. Both are able to perform surgeries, prescribe medicine, diagnose and treat illness and injuries, and promote a patient's overall health. In this report, the terms physician and doctor will be used interchangeably and will refer to both M.D.s and D.O.s unless otherwise specified. See the professional registration of doctors in the state of Missouri at <https://pr.mo.gov/listings-heal.asp>.

⁵ Total doctors here refers to both primary care physicians and specialists combined. Data is from Kaiser Family Foundation, which lists total primary and specialist physicians by state. <https://www.kff.org/state-category/providers-service-use/>

Figure 4

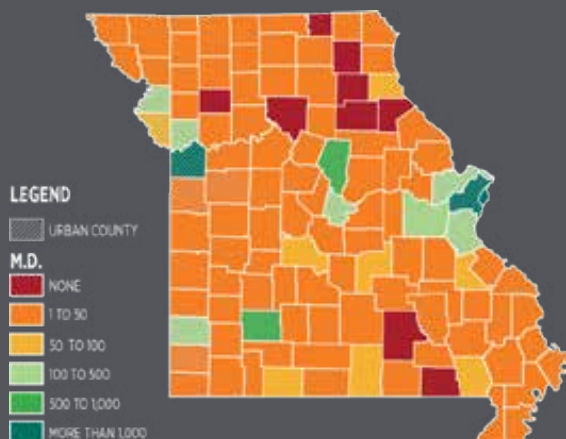
Population per Physician by State



Source: Kaiser Family Foundation, 2018

Figure 5

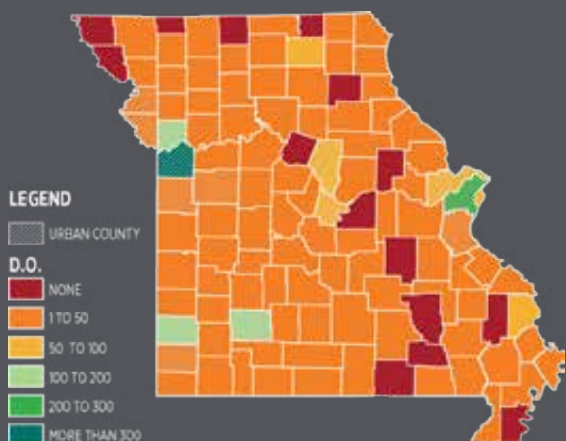
Number of M.D.s
per County



Source: Missouri Board of Healing Arts, 2018

Figure 6

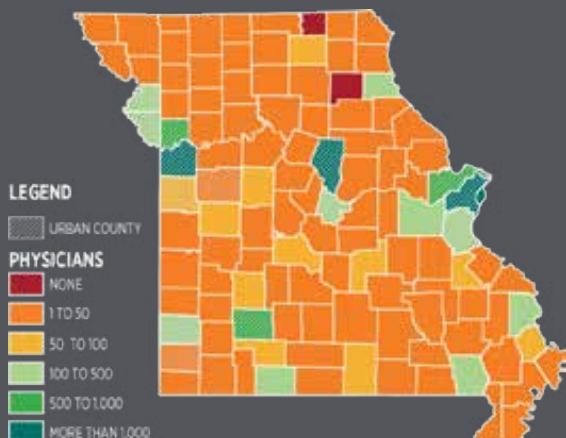
Number of D.O.s
per County



Source: Missouri Board of Healing Arts, 2018

Figure 7

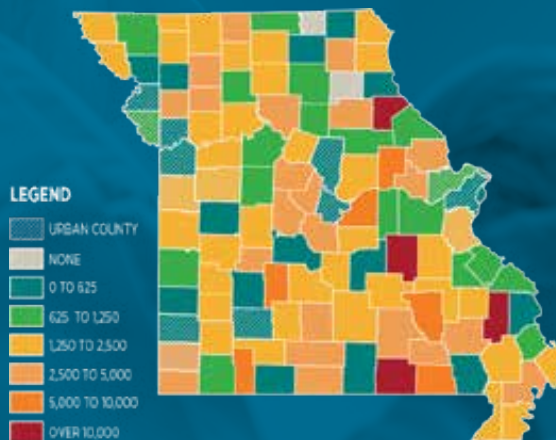
Number of Physicians
per County



Source: Missouri Board of Healing Arts, 2018

Figure 8

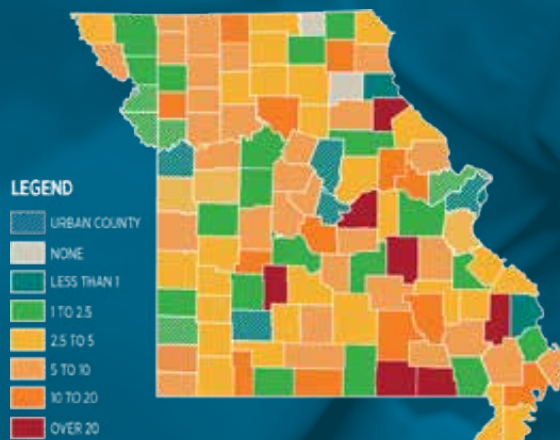
Population per Physician
by County



Source: Missouri Board of Healing Arts, 2018

Figure 9

County Population/Physician
Ratio Relative to the U.S.



Source: Missouri Board of Healing Arts, 2018 and Kaiser Family Foundation, 2018

state of Missouri as a whole has more physicians per person than the national average, this is not true for significant portions of the state. **Figures 5 and 6** show the number of M.D.s and D.O.s per county.

Notice that there are several counties without any M.D.s or D.O.s — specifically nine counties have no M.D.s while 15 counties have no D.O.s. The lack of M.D.s tends to be concentrated in the northeast portion of the state while the counties without D.O.s tend to be concentrated in the eastern portion of the state. **Figure 7** examines the combined number of D.O.s and M.D.s per county. Notice that now, only two counties lack a physician.

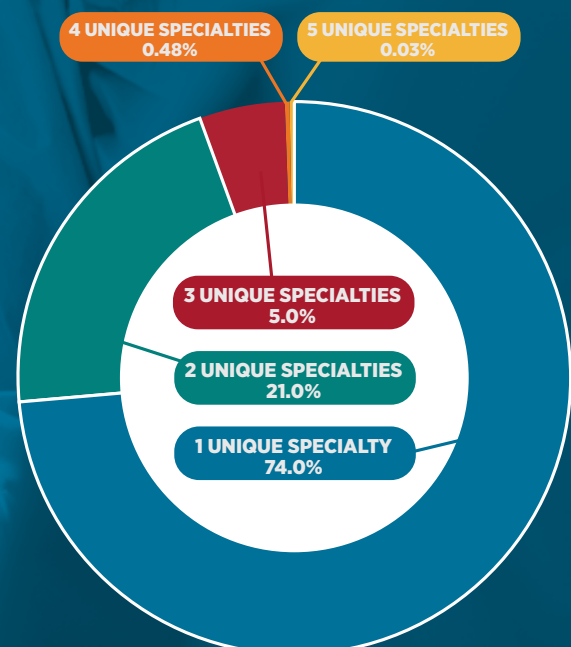
Although **Figures 5 through 7** show the number of M.D.s and D.O.s in each county, **Figures 8 and 9** show the number of physicians adjusted for population. **Figure 8** illustrates the number of people in the county for every physician. Here the reader can see that there are several counties with more than 10,000 persons in the population for every physician. For example, Bollinger County has more than 12,300 persons for every physician while, in contrast, the City of St. Louis has a physician for every 118 persons. **Figure 9** builds upon the analysis of **Figure 8** by examining the county population/physician ratio relative to the U.S. population/physician ratio. Recall that the U.S. ratio is 325.5 persons per physician. If a county has the same number of persons per physician as the U.S., then the value in **Figure 9** would be equal to one. If a county has a larger number of persons per physician than the U.S. average, then the value in **Figure 9** will be larger than one. There are several counties, in darker green, with a value of less than one. This means that these counties have fewer than 325.5 persons per physician — i.e., there are more physicians per person in these counties than relative to the U.S. as a whole. There are other counties in Missouri with ratios far above 20. Once again, Bollinger County has the highest

rate at a county/U.S. ratio of 37.8. In essence Bollinger County, would need an additional 38 physicians for every physician currently in the county to reach the national average.

Physician Specialties

Physicians specialize in one or more fields of study. For M.D.s in Missouri, 74 percent have only one specialty, whereas for D.O.s it is 85 percent. A small number of M.D.s and a very small number of D.O.s have three or more specialties. The number of D.O.s with more than three different specialties is in the single digits. Since the number of D.O.s with multiple specialties is so small, it is not shown in **Figure 10**. Generally, physicians are broken down into primary care physicians and specialists. Primary care physicians include internal medicine, family/general practitioners, obstetrician/gynecologists, pediatricians and geriatricians. Specialists cover fields such as psychiatry, radiology, cardiology, oncology, anesthesiology, etc.

Figure 10 Percentage of M.D.s With Their Number of Unique Specialties



Source: Missouri Board of Healing Arts, 2018

Missouri is ahead of the nation in the percentage of primary care physicians dedicated to geriatrics, internal medicine and pediatrics. This is important since both the young and the elderly on average tend to require more extensive and intensive care than adults. However, on the other hand, Missouri has fewer family, general practitioners and OB/GYN physicians that can catch diseases and other potential maladies before they become chronic conditions in adults.

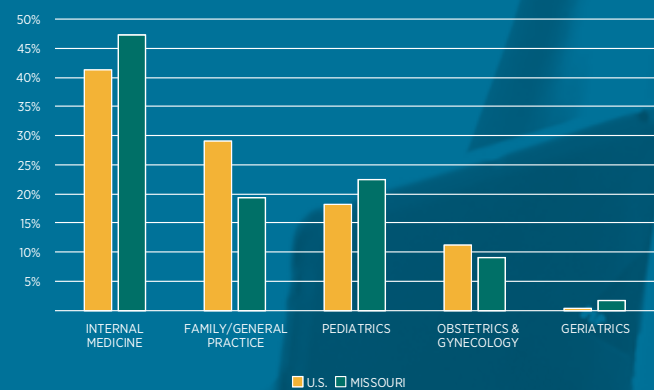
Similarly, as a percentage of specialists, Missouri has a larger percentage of physicians who specialize in surgery and cardiology, but is below the national average in fields such as emergency medicine, radiology, psychiatry and anesthesiology. This can be potentially problematic for primary care physicians who identify issues and then refer patients to a specialist for further examination. For example, in Missouri, there is such a lack of child psychiatrists that teens who are referred by their pediatrician will often see, and be diagnosed by, a psychiatrist from a virtual chat session through telemedicine.⁶ Many psychiatrists feel that this is a less-than-optimal way to see patients — especially for the initial consultation.

When examining the population size relative to the number of primary care physicians and specialists, Missouri once again comes out ahead of the national average. **Figures 13 and 14** depict the number of people per primary care physician and specialist in the 50 states plus the District of Columbia. Here we see that Missouri has

635.5 persons for every primary care physician while the U.S. has 671.

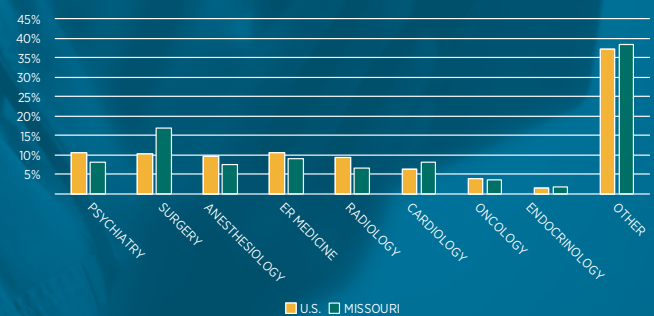
For specialists, Missouri has 568.4 persons while the U.S. average is 632.4 persons per specialist.

Figure 11 Percent of Primary Care Physicians by Field



Source: Kaiser Family Foundation, 2018

Figure 12 Percent of Specialist Physicians by Field

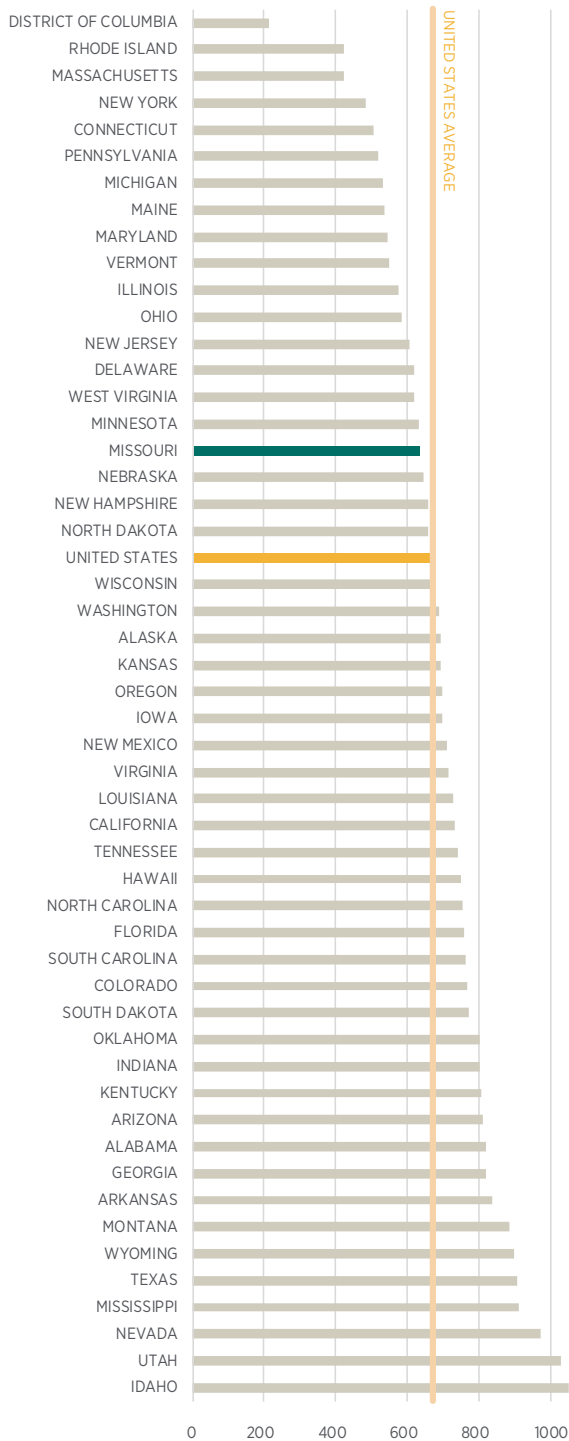


Source: Kaiser Family Foundation, 2018

⁶ Landro, Laura, (2019).

Figure 13

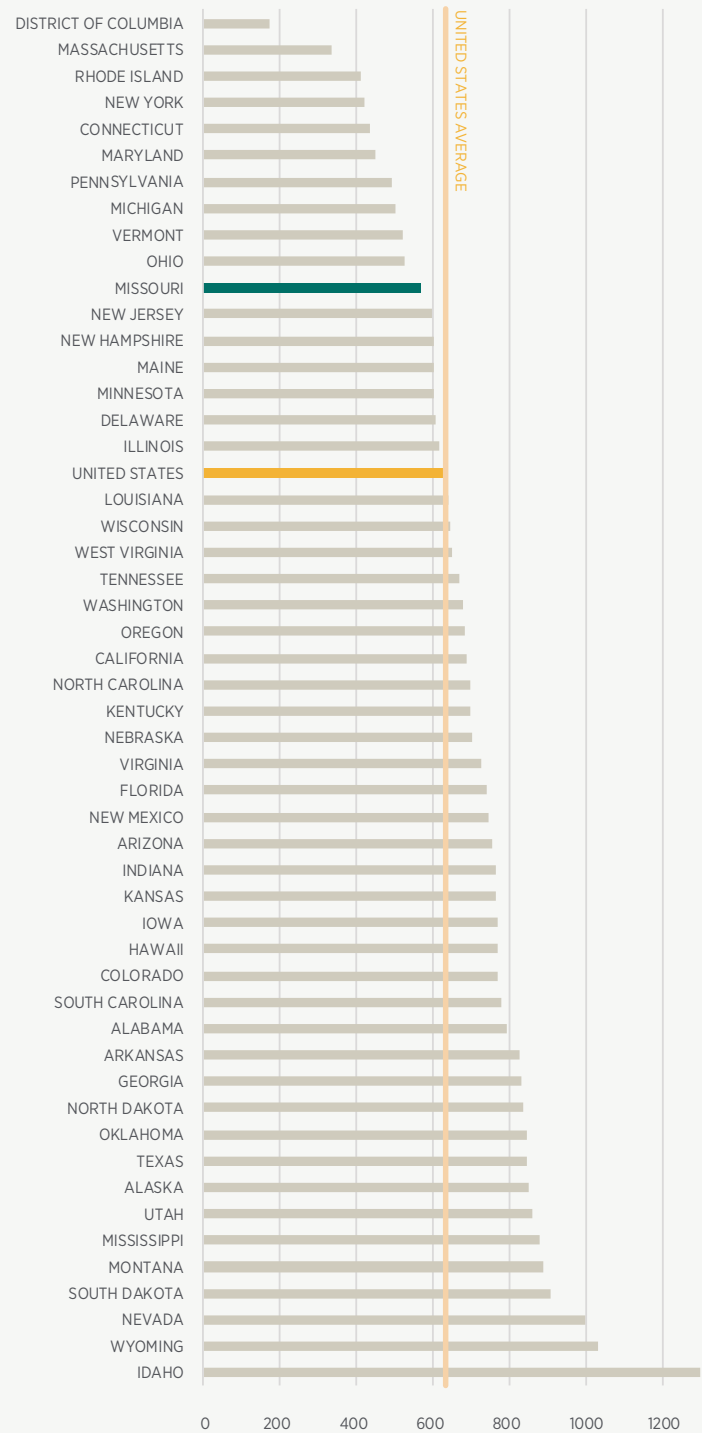
Population per Primary Care Physician by State



Source: Kaiser Family Foundation, 2018

Figure 14

Population per Specialist by State



Source: Kaiser Family Foundation, 2018



Tables 1 through 4 list the top 10 specialties for single-specialty physicians and multi-specialty physicians. Physicians in Missouri were broken up into two different groups — those with a single specialty and those with multiple specialties. Among physicians in Missouri, the top choice of field for M.D.s who only have a single specialty is internal medicine, which is shared by 13 percent of all physicians in Missouri and 17.5 percent of the class of single-specialty physicians. Rounding out the top 10 is ophthalmology. Only slightly more

than 2 percent of all Missouri physicians choose this specialty and of single-specialty physicians, the number is 3.1 percent. **Table 2** outlines similar data for M.D.s who have multiple specialties. Once again, the most popular specialty is internal medicine with interventional cardiology rounding out the top 10. Note that half of all M.D.s who have multiple specialties have at least one of their specialties in internal medicine. The most popular pairing of specialties among M.D.s with two specialties was internal medicine and cardiovascular disease.



Table 1. Top 10 Specialties for Single-Specialty M.D.s

Rank	Specialty	Percent of All M.D.s	Percent of Single-Specialty M.D.s
1	Internal Medicine	13.0	17.5
2	Pediatrics	7.8	10.5
3	Family Practice	6.6	8.9
4	Anesthesiology	4.5	6.0
5	Obstetrics & Gynecology	4.3	5.8
6	Emergency Medicine	3.5	4.7
7	Psychiatry	3.0	4.1
8	Family Medicine	2.9	4.0
9	Orthopedic Surgery	2.8	3.8
10	Ophthalmology	2.3	3.1

Source: Missouri Board of Healing Arts, 2018

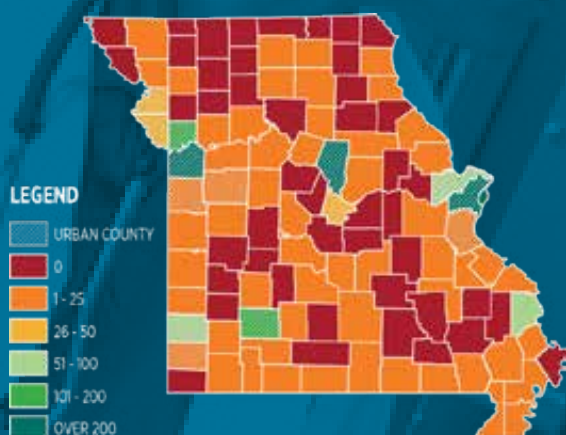
Table 2. Top 10 Specialties for Multi-Specialty M.D.s

Rank	Specialty	Percent of All M.D.s	Percent of Multi-Specialty M.D.s
1	Internal Medicine	13.0	50.3
2	Pediatrics	7.8	17.9
3	Cardiovascular Disease	2.8	10.9
4	Critical Care Medicine	2.3	8.9
5	Pulmonary Disease	2.1	8.1
6	Psychiatry	1.4	5.3
7	Gastroenterology	1.3	5.2
8	Nephrology	1.1	4.1
9	Anesthesiology	1.0	3.7
10	Interventional Cardiology	0.9	3.7

Source: Missouri Board of Healing Arts, 2018

Figure 15

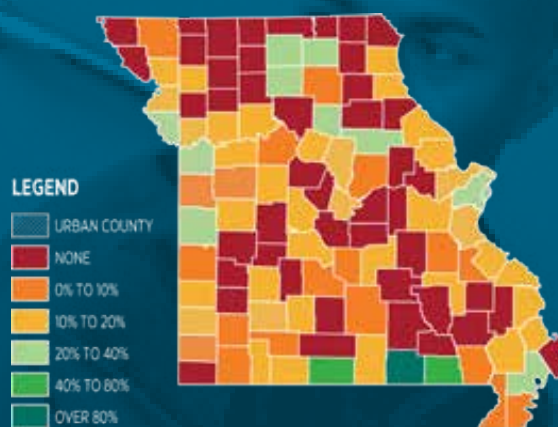
Number of Multi-Specialty Physicians per County



Source: Missouri Board of Healing Arts, 2018

Figure 16

Percentage of Multi-Specialty Physicians to All Physicians



Source: Missouri Board of Healing Arts, 2018

Tables 3 and 4 are similar to **Tables 1 and 2**, except showing data for D.O.s. For D.O.s, the most popular specialty is family practice with slightly more than one-in-five D.O.s choosing this. Rounding out the top 10 is general surgery, which is picked by 2.4 percent of all D.O.s. As with M.D.s, D.O.s who have multiple specialties tend to select internal medicine as one of their fields and 'pair' it with a complementary field. One-third of D.O.s with multiple specialties have chosen internal medicine as one of those fields.

Just as the number of physicians in each county was not equal to the state average, the same is true for M.D.s and D.O.s who have multiple specialties. **Figure 15** shows the number of M.D.s and D.O.s in each county who have more than one specialty. The highest number of multi-specialty physicians tend to reside in the larger urban counties. What is perhaps more interesting is that 46 counties don't have any multi-specialty physicians. **Figure 16** displays the percentage of physicians in a county that have multiple specialties.

Table 3. Top 10 Specialties for Single-Specialty D.O.s

Rank	Specialty	Percent of All D.O.s	Percent of Single-Specialty D.O.s
1	Family Practice	21.8	25.9
2	Internal Medicine	10.5	12.5
3	Emergency Medicine	7.7	9.2
4	Family Medicine	6.8	8.1
5	General Practice	5.1	6.1
6	Pediatrics	5.0	5.9
7	Anesthesiology	4.4	5.3
8	Obstetrics & Gynecology	4.0	4.7
9	Orthopedic Surgery	2.9	3.5
10	Surgery (General)	2.4	2.9

Source: Missouri Board of Healing Arts, 2018

Table 4. Top 10 Specialties for Multi-Specialty D.O.s

Rank	Specialty	Percent of All D.O.s	Percent of Multi-Specialty D.O.s
1	Internal Medicine	13.0	50.3
2	Pediatrics	7.8	17.9
3	Cardiovascular Disease	2.8	10.9
4	Critical Care Medicine	2.3	8.9
5	Pulmonary Disease	2.1	8.1
6	Psychiatry	1.4	5.3
7	Gastroenterology	1.3	5.2
8	Nephrology	1.1	4.1
9	Anesthesiology	1.0	3.7
10	Interventional Cardiology	0.9	3.7

Source: Missouri Board of Healing Arts, 2018

Table 5. Top 30 Medical Schools for Missouri M.D.s

Rank	School	Percent of all M.D.s	Number of M.D.s
1	University of Missouri - Columbia	11.7	1,558
2	St. Louis University	8.2	1,098
3	University of Missouri - KC	7.4	991
4	University of Kansas	5.7	756
5	Washington University	5.0	663
6	University of Iowa	1.3	177
7	University of Oklahoma	1.3	173
8	Southern Illinois University	1.1	148
9	Creighton University	1.1	145
10	University of Texas	1.0	139
11	University of Arkansas	1.0	138
12	University of Nebraska	1.0	136
13	Indiana University	1.0	130
14	University of Illinois - Chicago	0.9	122
15	Northwestern University	0.8	107
16	Dow Medical College	0.7	98
17	Vanderbilt University	0.7	92
18	Ross University	0.7	88
19	Tulane University	0.7	87
20	University of Michigan	0.6	85
21	Baylor University	0.6	79
22	John Hopkins University	0.5	73
23	Ohio State University	0.5	69
24	American University of the Caribbean	0.5	68
25	Case Western Reserve University	0.5	68
26	Loyola University	0.5	68
27	Duke University	0.5	65
28	University of Tennessee	0.4	56
29	Harvard	0.4	56
30 (tied)	University of Southwestern Texas	0.4	53
	University of Illinois	0.4	53
Top 10 Schools		43.9	5,848
Top 20 Schools		52.1	6,931
Top 30 Schools		57.4	7,639

Source: Missouri Board of Healing Arts, 2018

Physician Education

There also is data on where each doctor has received their degree. Only the licensed M.D.s who are currently practicing medicine were examined. There were 23,622 M.D.s who provided information about their education. Of these, 5,206 are not currently practicing medicine and 5,106 are practicing outside of the state of Missouri. This leaves 13,310 M.D.s. Of the M.D.s who practice medicine in Missouri, they attended one of 1,196 unique medical schools. **Table 5** lists the top 30 medical schools attended by Missouri physicians. Nearly 12 percent have attended the University of Missouri – Columbia followed closely by St. Louis University at 8.2 percent. Almost 44 percent of all M.D.s in Missouri

have attended one of 10 schools while almost 58 percent have attended one of the 30 schools listed in **Table 5**.

Similar analysis was done with D.O.s in **Table 6**. There were 3,933 D.O.s listed with the school where they received their degree. Of these, 753 are practicing outside of the state of Missouri, 975 are not currently practicing and 2,205 were practicing in Missouri. The D.O.s received their degrees from one of 35 unique schools, 93 percent of them from one of 10 institutions. Almost three-fourths of D.O.s got their degree from either Kansas City University or AT Still University.

Table 6. Top Ten Medical Schools for Missouri D.O.s

Rank	School	Percent of all D.O.s	Number of D.O.s
1	Kansas City University	39.6	873
2	AT Still University	31.8	701
3	Des Moines University	7.4	163
4	Oklahoma State University - Tulsa	5.4	118
5	Midwestern University	3.2	70
6	University of North Texas	1.5	32
7	Michigan State University	1.4	31
8	Lake Erie College of Osteopathic Medicine	1.2	27
9	Philadelphia College of Osteopathic Medicine	1.0	21
10	Lincoln Memorial University	0.6	14
Top 10 Schools		93.0	2,050

Source: Missouri Board of Healing Arts, 2018



Figure 17 shows that medical graduates from Missouri schools are beginning to lag behind the U.S. as a whole. The number of medical graduates in 2002 in both the U.S. and Missouri has been indexed to 100. Since 2002, there has been a steady increase in the number of medical graduates for the U.S. There were about 23 percent more doctors graduating from medical school in 2017 than in 2002. Since the U.S. population increased only 10.2 percent during that same time frame, the U.S. is seeing

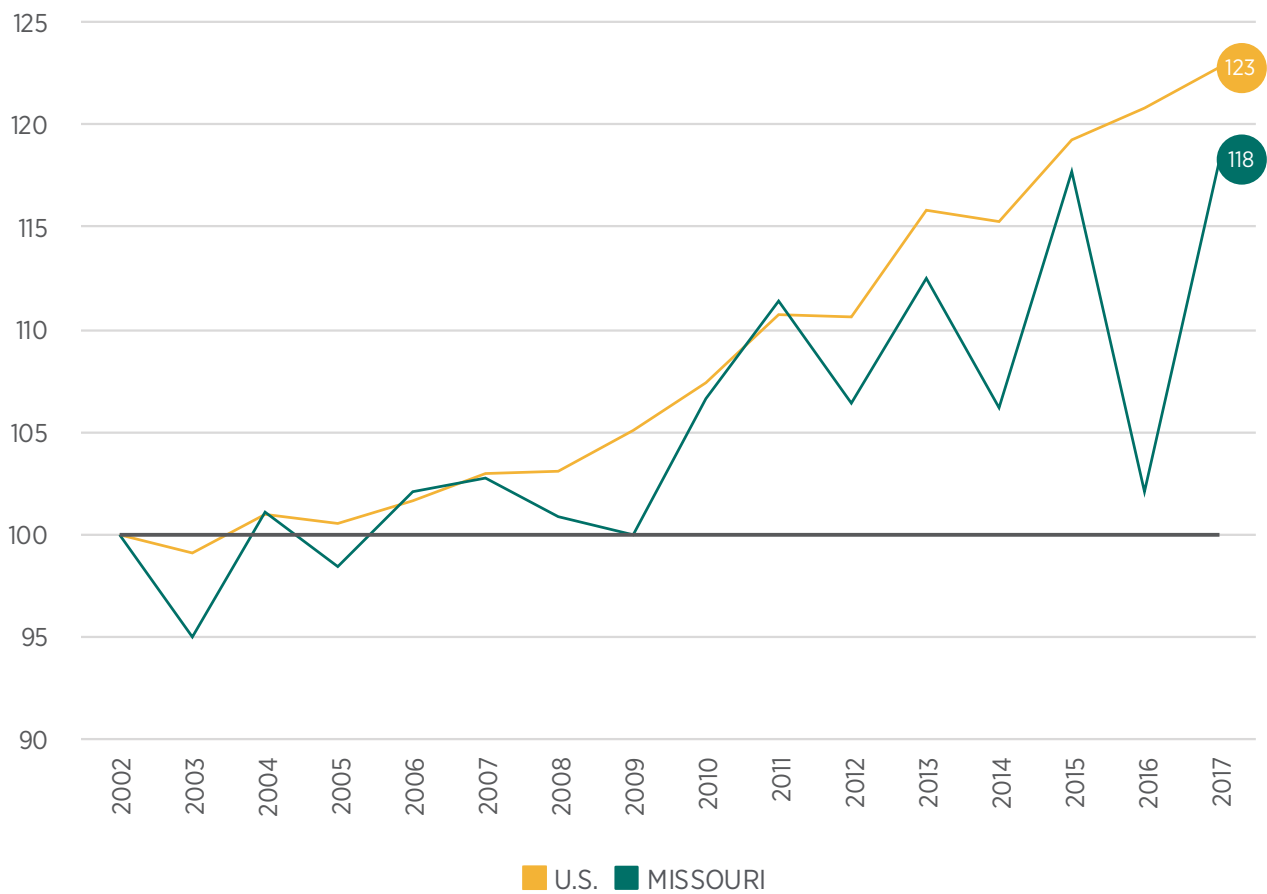
more graduating physicians per person today than at the beginning of the century.⁸ Missouri also has seen an increase in the number of physicians graduating from medical school, but at a lower rate than in the U.S. In 2017, it was only 17 percent higher than in 2002 while the population of Missouri had grown by 4.3 percent. Furthermore, the number of medical school graduates in Missouri shows much more volatility than the nation. In 2016, there was only a 2 percent increase over the numbers in 2002.

⁸ This does not mean that there was an actual increase in the number of *practicing* physicians per person in the U.S. since U.S. medical school graduates could practice in overseas markets. Furthermore, this does not consider the number of physicians in each year who are retiring or otherwise leaving the profession. It is simply a reflection of the 'gross additions' to the 'stock' of physicians in the U.S.





Figure 17 Index of Medical School Graduates U.S. and Missouri (2002 = 100)



Source: Kaiser Family Foundation, 2018

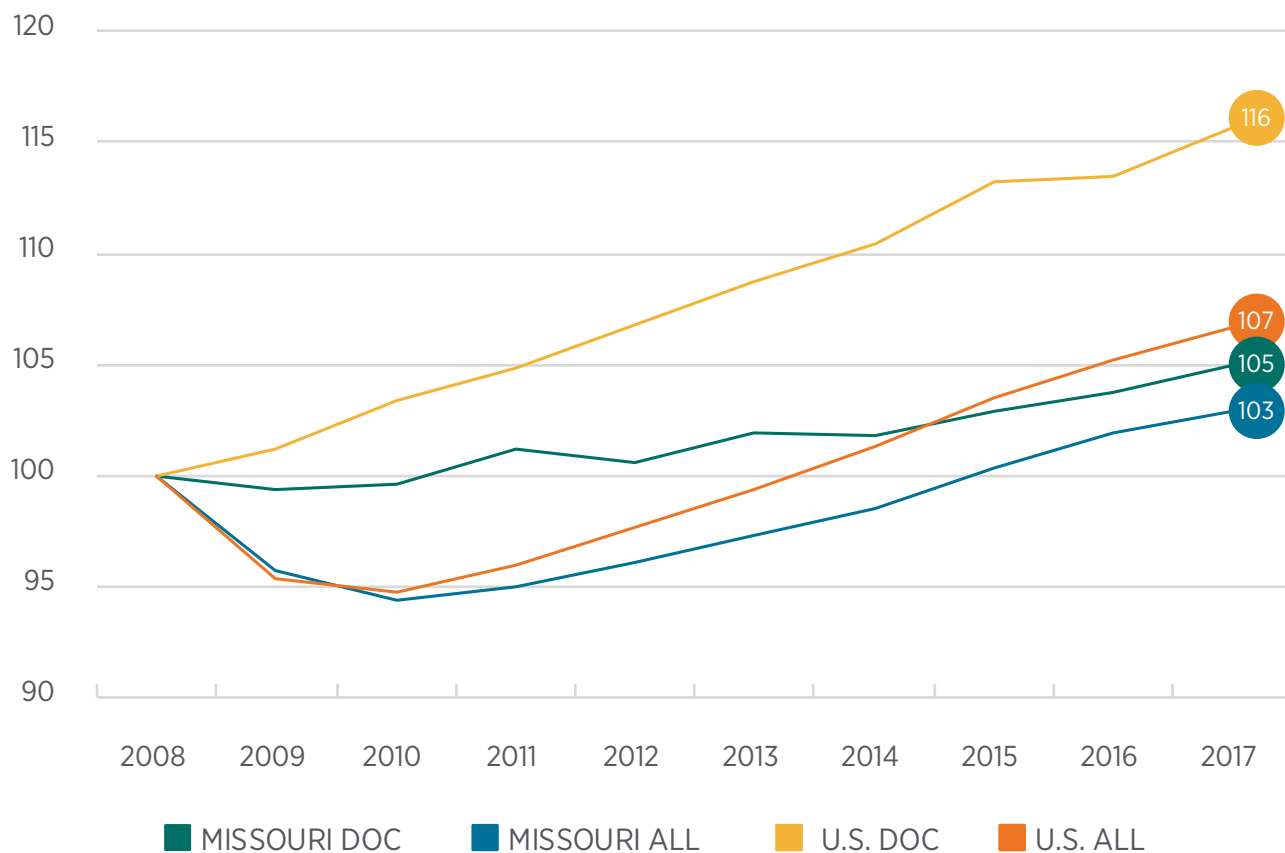


Employment and Salary Conditions for Physicians

Employment in physicians' offices in Missouri and the U.S. has increased faster than the general level of employment. **Figure 18** illustrates this point where all employment levels are indexed to 100 in 2008. U.S. overall employment has increased 6.7 percent while employment among physicians' offices is

up almost 16 percent. Similarly, for Missouri, overall employment has increased 2.9 percent throughout the past decade, while employment among physicians' offices is 5 percent larger.⁹ Interestingly enough, neither overall Missouri employment nor Missouri physicians' offices employment has kept pace with the lower bounding overall U.S. employment. Nevertheless, total wages paid by Missouri

Figure 18 Employment Index (2008 = 100)



Source: Bureau of Labor Statistics, 2018

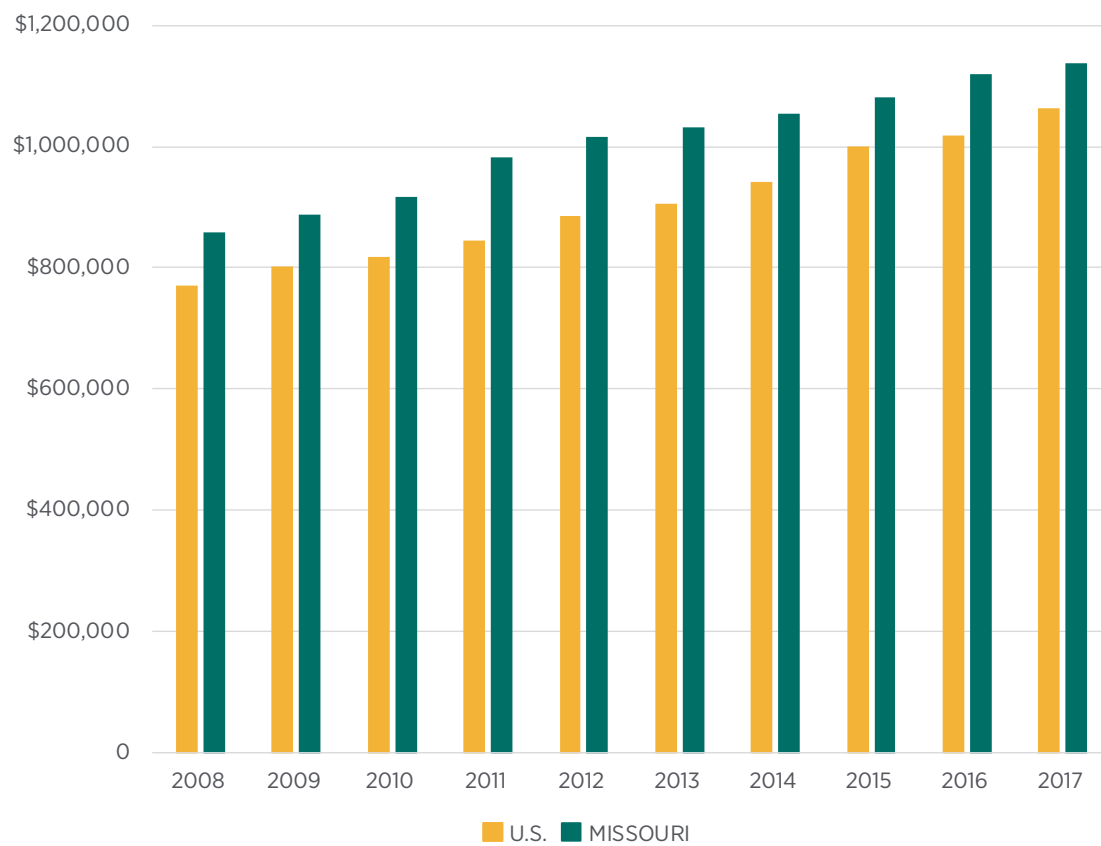
⁹ Bureau of Labor Statistics, State and Metro Employment Data, 2018.

physicians' offices is more than on average for the U.S. as seen in **Figure 19**.

In Missouri, the average private practice has paid \$1.136 million in total wages while nationwide it is \$1.064 million — a difference of 6.7 percent. Interestingly, the size of each of the practices is essentially identical. For example, in the U.S., private physician practices employed 11.98 persons while in Missouri the

average private physician practice employed 11.71 persons. The fact that average employment in Missouri is slightly lower while total wages are higher means that average wages paid by each private physician practice in Missouri is 9.3 percent higher than the national average. In Missouri, the average wage per employee paid by a private physician practice is \$97,076 while it is only \$88,803 nationwide.

Figure 19 Average Total Wages Paid per Private Physician



Source: Bureau of Labor Statistics, 2018

The Bureau of Economic Analysis collects data on how households spend their income.¹⁰ For example, **Table 7** outlines seven selected goods and services that households purchase. On average, households spend 1 percent of their personal consumption expenditures on personal care products but 5.1 percent on financial services. Similarly, households spend about 4.1 percent of their consumption dollars on the service of physicians — the same amount that they spend on recreation. Note that this data is shown as a percentage of PCE and is not as a percentage of income. Households receive gross income from interest, capital gains, labor, etc., which becomes net income after the payment of taxes. Some of this net income is saved or invested and some is consumed. The portion of household net income that is spent to purchase goods and services is considered PCE.

Figure 20 outlines how households have spent their consumption dollars over time. Here, the percentage of PCE that households spent on various goods, e.g. physician services, financial services, restaurants and higher education, is indexed to 100 in 1987. Notice that even though

Table 7 shows that households currently spend a larger percentage of their consumption dollars on physician services (4.1 percent) than higher education (1.3 percent), the growth of spending on higher education has outpaced consumption spending on physician services. At the same time, spending on financial and physician services has increased at roughly the same rate. Finally, households today spend approximately the same percentage of their PCE on dining out as they did 30 years ago.

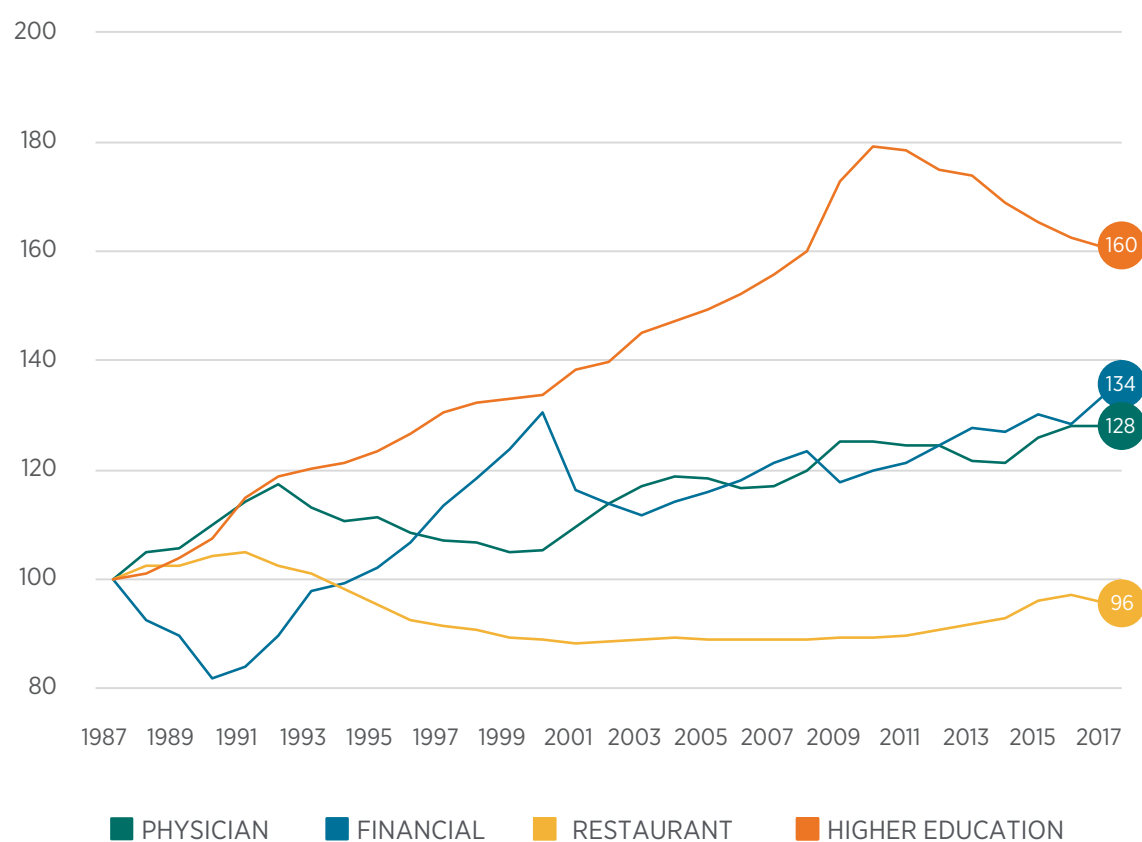
Table 7. Percent of PCE Spent on Selected Goods and Services

Selected Goods or Services	Percent of PCE
Personal Care Products	1.0
Higher Education	1.3
Household Furnishings	2.4
Clothing/Footwear	2.9
Transportation Services	3.3
Recreation	4.1
Physician Services	4.1
Financial Services	5.1

Source: Bureau of Economic Analysis, 2018

¹⁰ Bureau of Economic Analysis, Personal Consumption Expenditures by Type of Product, Table 2.4.5, www.bea.gov.

Figure 20 Index of the Percentage of PCE Spent on Various Services (1987 = 100)



Source: Bureau of Economic Analysis, 2018

Salaries of health care workers in general, and physicians in particular, have seen substantial growth in both the U.S. and Missouri throughout the past 10 years. **Figure 21** shows the percentage change in average salaries for several classes of physicians, all health care workers as a whole, and all workers in both Missouri and the U.S. Psychiatrists in Missouri have seen the largest increase in their salaries with a nearly 61.6 percent increase throughout the past 10 years. This is in comparison to all workers in Missouri who have seen an increase of 22.2 percent. However, not all physicians have seen as large of gains in their salary as psychiatrists have. For example, family/general practitioners and OB/GYNs have seen smaller gains of 20.2 percent and 17.9 percent respectively — which is less than the average worker in Missouri.

Furthermore, surgeons and anesthesiologists have seen salary gains of 23.5 percent and 23.7 percent

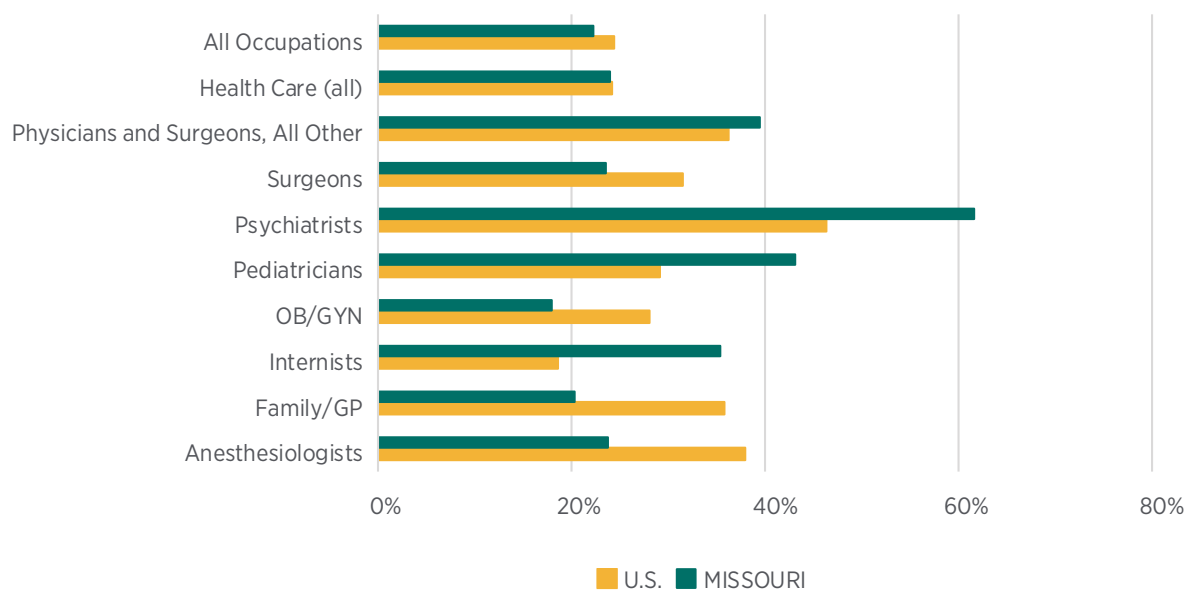
— only slightly higher than the average worker has seen. **Table 8** outlines some of the differences in current pay. Anesthesiologists in Missouri have an average salary of \$249,950 while their average salary nationally is \$265,990. This means that anesthesiologists in Missouri make only 94 cents on the dollar relative to national anesthesiologists. In a similar vein, family/GP physicians are earning nearly 17 percent less than their national counterparts while pediatricians in Missouri make about 4.4 percent more than pediatricians nationally. These salary differentials explain much of the change in relative levels of employment between fields that are outlined in **Figures 11 and 12**. Despite this, the overall combination of higher total wages and higher levels of employment growth in Missouri relative to the overall Missouri employment indicates that **physicians are, and will continue to be, a strong driver within the Missouri economy.**

Table 8. Average Salaries and Differentials for Selected Occupations in Missouri and the U.S.

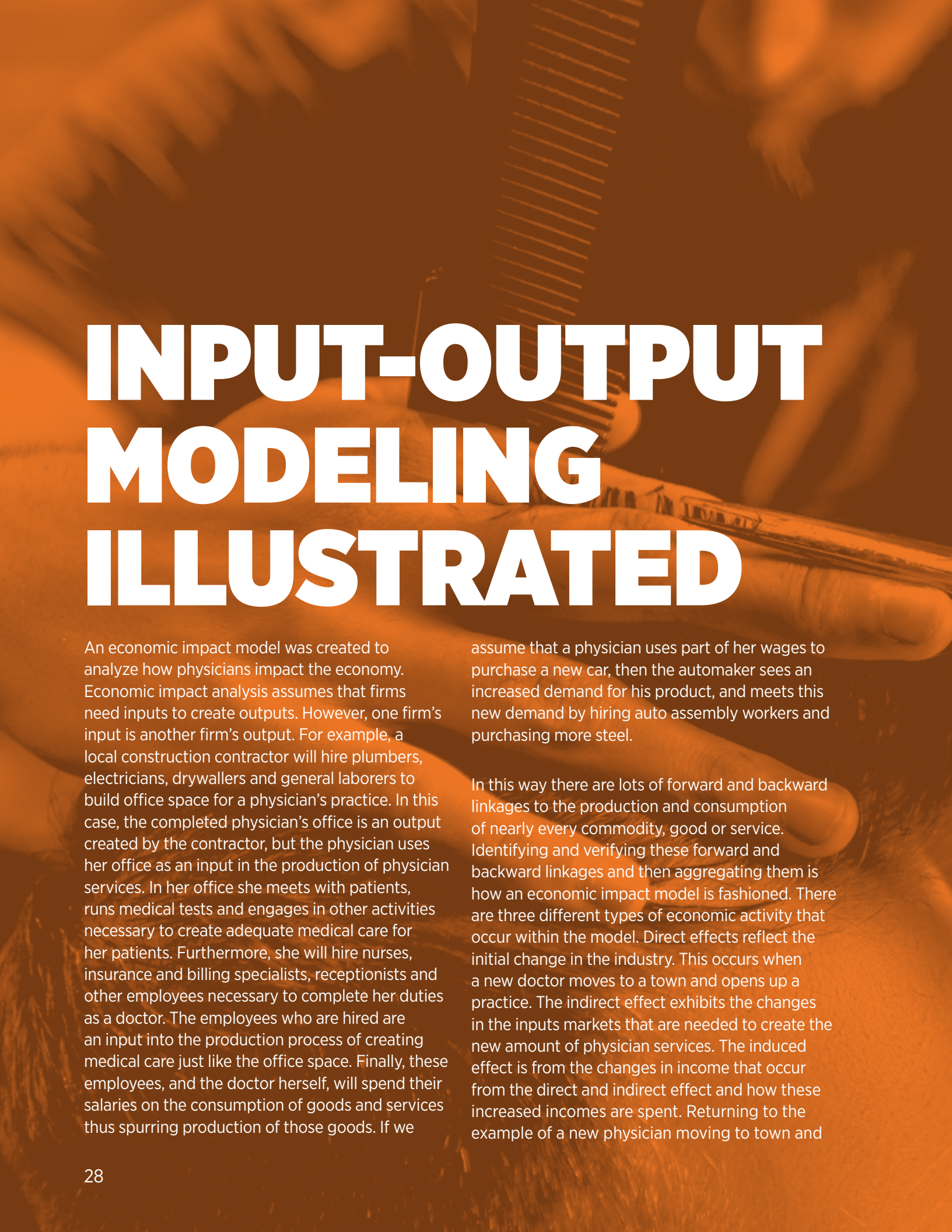
Occupation	Average Salary Missouri	Average Salary U.S.	Difference	Missouri Salary as a Percent of U.S. Salary
Anesthesiologists	\$249,950	\$265,990	-\$16,040	94.0
Family/GP	\$172,940	\$208,560	-\$35,620	82.9
Internists	\$232,980	\$198,370	\$34,610	117.4
OB/GYN	\$219,750	\$235,240	-\$15,490	93.4
Pediatricians	\$195,800	\$187,540	\$8,260	104.4
Psychiatrists	\$235,180	\$216,090	\$19,090	108.8
Surgeons	\$249,740	\$251,890	-\$2,150	99.1
Physicians/Surgeons (other)	\$224,880	\$211,390	\$13,490	106.4
Health Care (all)	\$70,530	\$80,760	-\$10,230	87.3
All Occupations	\$45,520	\$50,620	-\$5,100	89.9

Source: Bureau of Labor Statistics, 2018

Figure 21 Percentage Change in Average Salary (2007 to 2017)



Source: Bureau of Labor Statistics, 2018



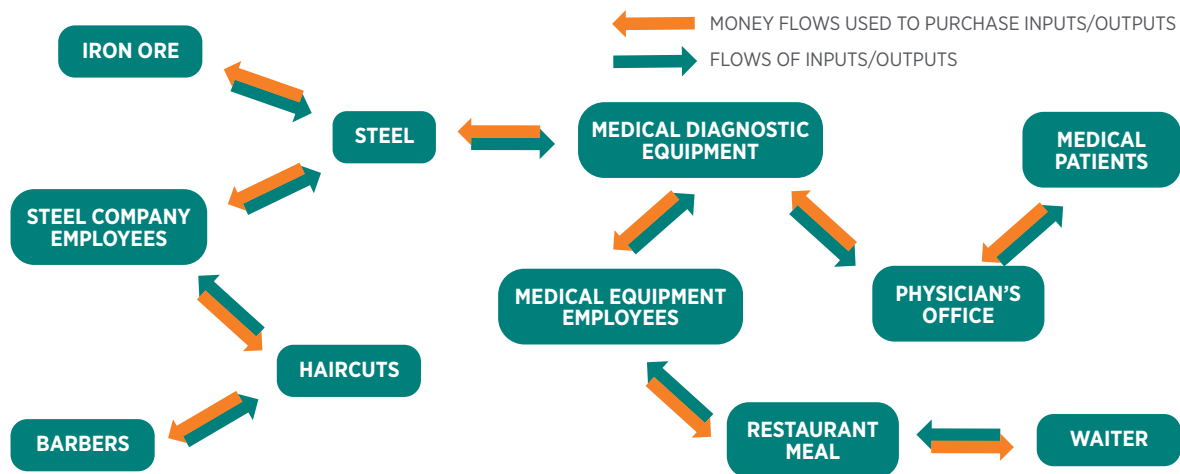
INPUT-OUTPUT MODELING ILLUSTRATED

An economic impact model was created to analyze how physicians impact the economy. Economic impact analysis assumes that firms need inputs to create outputs. However, one firm's input is another firm's output. For example, a local construction contractor will hire plumbers, electricians, drywallers and general laborers to build office space for a physician's practice. In this case, the completed physician's office is an output created by the contractor, but the physician uses her office as an input in the production of physician services. In her office she meets with patients, runs medical tests and engages in other activities necessary to create adequate medical care for her patients. Furthermore, she will hire nurses, insurance and billing specialists, receptionists and other employees necessary to complete her duties as a doctor. The employees who are hired are an input into the production process of creating medical care just like the office space. Finally, these employees, and the doctor herself, will spend their salaries on the consumption of goods and services thus spurring production of those goods. If we

assume that a physician uses part of her wages to purchase a new car, then the automaker sees an increased demand for his product, and meets this new demand by hiring auto assembly workers and purchasing more steel.

In this way there are lots of forward and backward linkages to the production and consumption of nearly every commodity, good or service. Identifying and verifying these forward and backward linkages and then aggregating them is how an economic impact model is fashioned. There are three different types of economic activity that occur within the model. Direct effects reflect the initial change in the industry. This occurs when a new doctor moves to a town and opens up a practice. The indirect effect exhibits the changes in the inputs markets that are needed to create the new amount of physician services. The induced effect is from the changes in income that occur from the direct and indirect effect and how these increased incomes are spent. Returning to the example of a new physician moving to town and

Figure 22 Index of the Percentage of PCE Spent on Various Services



Source: Bureau of Economic Analysis, 2018

opening a new practice, the purchase of medical diagnostic equipment would be an input used by the physician when she treats a patient. The company who makes the medical diagnostic equipment must now buy more steel and hire employees to build the equipment. The employees of the medical equipment company now have more income, which they use on goods, such as restaurant meals, new kitchen cabinets and haircuts. These restaurant meals, haircuts and new kitchen cabinets are the induced effects whereas the purchase of the new medical diagnostic equipment was the indirect effect. Of course, both of these effects continue to create ripples in the economy. In this way, the initial impact of the new physician office creates a multiplier effect that is larger than the initial effect. **Figure 22** visualizes these forward and backward linkages.

There have been substantial changes in the ownership status and form of medical practice throughout the last few years. Currently, only 47 percent of physicians are considered an owner in a medical practice with the remaining 53 percent being an employee. However, this does not mean that all of the physicians who are employees are employed by a hospital. Only 7 percent of

physicians nationwide fall into that category with another 9 percent being directly employed by another entity such as an urgent care facility, health maintenance organization, etc, but which may be owned by a hospital. Most physicians work in a medical practice. Solo practices comprise 16.5 percent of physicians with group practices of various sizes filling up the remaining 67 percent. Of course some of the physicians who work in a group practice are not owners, but are employees of the practice.

How physicians are paid depends upon whether they are an employee or an owner. Physicians who are employees receive 97.1 percent of their income based upon salary, productivity or other forms of pecuniary bonuses. For owners, approximately 18.5 percent of their compensation derives from the financial performance of the medical practice with the remaining compensation coming from salary, productivity and other forms of bonuses. Therefore, it is necessary to understand the financial performance of medical practices and to not simply restrict physician compensation to salary when conducting the economic impact analysis.

¹¹ See Kane, (2017).

¹² Productivity is measured with Relative Work Units (RVUs) and is related to Medicare reimbursement.

RVUs are calculated as a reflection of physician work, practice expense (i.e. overhead), and the cost of malpractice insurance premiums.

¹³ See Rama, (2018).



Data for medical practice revenue and expenses for 47 different types of medical practices were examined to ascertain their economic impact. These practices include medical fields such as pediatrics, neurology, vascular surgery, OB/GYN, family/general practice, noninvasive cardiology, radiology, etc. Financial data included expenses such as rent, utilities, medical equipment repairs, wages and fringe benefits paid to nonphysician medical and nonmedical staff, malpractice insurance and so forth. Selected medical fields are presented in **Table 9** and average practice expense is indexed to average practice income which has been set equal to 100. The different medical practice expenses have been aggregated under similar categories such as medical supplies, facility expenses, medical equipment, general administration expenses, and nondoctor personnel expenses. These nondoctor personnel expenses include wages, fringe benefits and retirement plans for nonphysician medical staff, such as nurses, as well as other staff, such as receptionists and those responsible for insurance

billing. Other data outlined in **Table 9** include the number of physicians, nonphysician medical staff and other staff per practice. For example, facility expenses for the average pediatric practice are 6 percent of total practice income and the average pediatric practice has 4.3 doctors, 3.3 nonphysician medical staff and 15.7 other staff. The last row in **Table 9** outlines these numbers for all of the 47 different medical practices.¹⁴

Currently, there are 15,572 active physicians working in the state of Missouri. Of these, 3,083 are employed full-time for a hospital while another 1,070 work part-time for a hospital. There also is a substantial number of residents who are employed by hospitals — 1,909 residents are employed full-time while 29 are employed part-time. In terms of full-time equivalents, hospitals employ 3,332 physicians and 1,883 medical residents. The remaining number of physicians are employed by either government or government-related entities, private corporations, or are in a medical practice.¹⁵

Table 9. Physician Practice Statistics

Selected Fields	Expenses Index (Practice Income = 100)					Average Persons per Practice		
	Personnel (Nondoctor)	Med Supplies	Facility	Med Equip	Gen Admin	Doctor	Nonphysician Medical	Other
Pediatrics	25.6	17.6	6	2.4	10.9	4.3	3.3	15.7
Family	34.5	9.6	7.2	2.5	13.9	2	2.2	9.8
Anesthesiology	33.5	5.4	10.9	1.5	10.5	14.3	4.8	4.1
OB/GYN	29	9.1	8.1	2.7	15.1	4	2.8	16
Orthopedic	26.5	5.7	7	3	13.9	3.1	3.6	14.5
D.O.	25	4.9	10.3	4.1	14.1	1.7	1	4
Oncology	10.9	68	2.8	0.7	3.7	3.8	5.6	32.8
Urology	26.5	13.5	7.8	2	13.7	3.2	1.9	15.9
Average (all 47)	23.9	10.8	6.6	2.5	13.5	4.6	2.6	10.9

Source: National Society of Healthcare Professional Business Consultants, 2016

¹⁴ This data is proprietary data provided by the National Society of Healthcare Professional Business Consultants. To protect privacy, all expense data was taken as a percentage of practice income, which was set equal to 100. Doctor income relative to practice income is not reported since the Bureau of Labor Statistics produces physician income estimates. If doctor income and all expense categories were reported in Table 9, one could then reverse engineer estimates of practice income.

¹⁵ Examples would include physicians employed by county health departments, universities, and other state and federal governments. In addition, some large corporations also employ physicians to conduct health examinations of employees or to work at an on-site health clinic.

RESULTS

Data on the spending of physicians were aggregated for all of the M.D.s and D.O.s in the state. There was a total of 15,572 M.D.s and D.O.s in the state. The economic impact of these physicians is more than just their salary and the related impact that comes from their consumption spending. Recall that hospitals directly employ approximately 3,332 physicians. The remaining physicians are in partnerships/groups, self-employed, part of an academic health center or health care corporation, etc. This requires spending on buildings, staff salaries and benefits, medical equipment and supplies, and so on. The data on spending by different medical practices, average practice size, physician salaries, etc., that were discussed in the previous section were used to determine spending by Missouri physicians based upon their specialty. This spending was aggregated and IMPLAN was used to create the economic impact results.¹⁶

Tables 10, 11 and 12 outline the economic impact from physicians in the state of Missouri. This impact is broken out by the different Workforce Development Regions in Missouri as well as by urban and rural counties.¹⁷ The results are stated

in terms of the direct, indirect and induced effects as it concerns full-time equivalent employment, wages and value added. The numbers in **Tables 11 and 12** for value added and wages are in thousands of dollars. Although the term employment is straightforward, some of the other terms deserve clarification. Wages refer not only to one's paycheck, but include the level of fringe benefits that accompany a job. Value added is similar to Gross State Product. GSP is the state-level measure of output and is equivalent to the output measure for the nation known as Gross Domestic Product. GDP and GSP measure the increase in value added from an economic activity such that the focus is on the value of the final product. For example, a local Missouri steel company sells \$5,000 worth of steel to the Ford plant in Kansas City to produce a car that Ford sells for \$30,000. This steel purchase is a separate transaction from the selling of the car — but the steel purchase is also an input into the final value of the car. One could count both the selling of the car, \$30,000, and the selling of the \$5,000, but this would total \$35,000 and would be counting the steel 'twice.'¹⁸

Table 10. Economic Impacts From Physicians in Missouri — Employment

Region	Direct	Indirect	Induced	Total
Northwest	1,381	407	1,121	2,909
Northeast	1,147	305	840	2,292
Kansas City	12,205	3,664	10,110	25,979
West Central	1,040	277	760	2,077
Central	6,456	1,938	5,346	13,741
St. Louis	27,525	9,352	25,895	62,772
Southwest	1,849	545	1,502	3,896
Ozark	4,795	1,088	2,969	8,852
South Central	921	297	822	2,040
Southeast	2,413	738	2,037	5,189
Missouri	59,729	18,612	51,392	129,729
Urban	50,244	15,652	43,231	109,127
Rural	9,485	2,960	8,161	20,602

Source: National Society of Healthcare Professional Business Consultants, 2016 and IMPLAN Group data, 2016

Table 11. Economic Impacts From Physicians in Missouri — Labor Income (thousands of dollars)

Region	Direct	Indirect	Induced	Total
Northwest	\$155,969	\$22,522	\$39,720	\$218,211
Northeast	\$129,584	\$18,712	\$38,180	\$186,476
Kansas City	\$1,378,560	\$199,064	\$447,501	\$2,025,125
West Central	\$117,444	\$16,959	\$33,429	\$167,832
Central	\$729,175	\$105,293	\$214,840	\$1,049,308
St. Louis	\$3,108,859	\$448,919	\$1,071,318	\$4,629,096
Southwest	\$208,874	\$30,161	\$57,367	\$296,402
Ozark	\$541,599	\$78,207	\$186,636	\$806,442
South Central	\$104,023	\$15,021	\$37,926	\$156,970
Southeast	\$272,597	\$39,363	\$80,317	\$392,277
Missouri	\$6,746,684	\$974,653	\$2,207,234	\$9,928,136
Urban	\$5,710,769	\$825,000	\$1,867,957	\$8,403,727
Rural	\$1,035,915	\$149,653	\$339,277	\$1,524,409

Source: National Society of Healthcare Professional Business Consultants, 2016 and IMPLAN Group data, 2016

Table 12. Economic Impacts From Physicians in Missouri — Value Added (thousands of dollars)

Region	Direct	Indirect	Induced	Total
Northwest	\$153,786	\$38,262	\$81,540	\$273,588
Northeast	\$127,726	\$31,778	\$71,553	\$231,057
Kansas City	\$1,359,414	\$338,222	\$815,897	\$2,513,533
West Central	\$115,764	\$28,802	\$62,538	\$207,104
Central	\$719,004	\$178,888	\$417,161	\$1,315,053
St. Louis	\$3,065,748	\$762,758	\$1,901,290	\$5,729,796
Southwest	\$205,908	\$51,230	\$111,234	\$368,372
Ozark	\$534,016	\$132,863	\$320,508	\$987,387
South Central	\$102,520	\$25,507	\$65,629	\$193,656
Southeast	\$268,711	\$66,855	\$150,533	\$486,099
Missouri	\$6,652,592	\$1,655,457	\$3,997,620	\$12,305,670
Urban	\$5,631,124	\$1,401,271	\$3,383,809	\$10,416,203
Rural	\$1,021,468	\$253,894	\$614,074	\$1,889,467

Source: National Society of Healthcare Professional Business Consultants, C, 2016 and IMPLAN Group data, 2016

Physicians in Missouri are responsible for creating 129,729 jobs. To put this in perspective, this is larger than the entire population of Columbia, Missouri. Furthermore, physicians pay about \$6.746 billion in wages directly to their staff and to themselves. The activities of physicians and their staff help to create an additional \$3.2 billion in wages for a total of \$9.928 billion in wages.

The total wages in Missouri produced by the total economic impact of physicians is more than twice as large as the total amount of retail sales in the entire city of St. Louis. Finally we see that physicians contribute about \$12.3 billion to Missouri GSP — this is about 7.2 percent of the state's GSP.¹⁹

Table 13 shows the various multipliers for employment, wages and value added associated for each region. Since the inputs, outputs and operations of physicians is very similar across all regions, the multipliers vary only slightly from region to region. The multipliers allow one to calculate how much additional output, wages or employment there will be from additional work

done by the physician. For example, for every initial job created by a physician in St. Louis, there will be an additional 1.28 jobs created in the Missouri economy for a total of 2.28 jobs. Similarly, for every \$100 in wages paid by a physician in Kansas City, there will be an additional \$47 in wages earned by other employees in the Missouri economy for a total increase in wages of \$147.

Figure 23 shows the size of the economic impact from physicians on GSP relative to GSP contributions from other sectors in millions of dollars.²⁰ As one can see, the economic impact from physicians is larger than the contribution to GSP from several 'key sectors' that are often touted in regional economic development planning. **For example, the contribution to GSP from all forms of transportation in the state (rail, truck, air, pipeline, water, freight/passenger), is smaller than the economic impact from physicians. Similarly, the contribution to GSP from hotels and food services in the state is only \$8.4 billion — 70 percent of the size of the economic impact from physicians.**

¹⁹ U.S. Census Bureau and Missouri Department of Revenue, 2018.

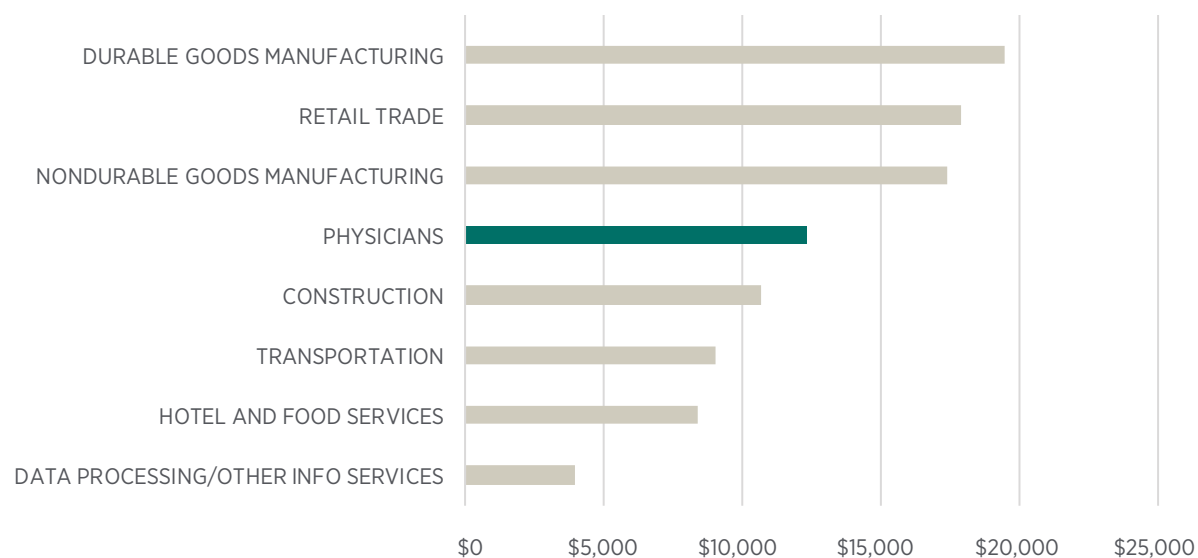
²⁰ Bureau of Economic Analysis, Regional and State level GSP data, www.bea.gov.

Table 13. Economic Impact Multipliers by Region

Region	Employment	Labor Income	Value Added
Northwest	2.10	1.40	1.78
Northeast	2.00	1.44	1.81
Kansas City	2.13	1.47	1.85
West Central	2.00	1.43	1.79
Central	2.13	1.44	1.83
St. Louis	2.28	1.49	1.87
Southwest	2.10	1.42	1.79
Ozark	1.84	1.49	1.85
South Central	2.21	1.51	1.89
Southeast	2.15	1.44	1.81
Missouri	2.17	1.47	1.85

Source: IMPLAN Group data, 2016

Figure 23 Contribution to Missouri GSP in Millions of Dollars — Selected Industries

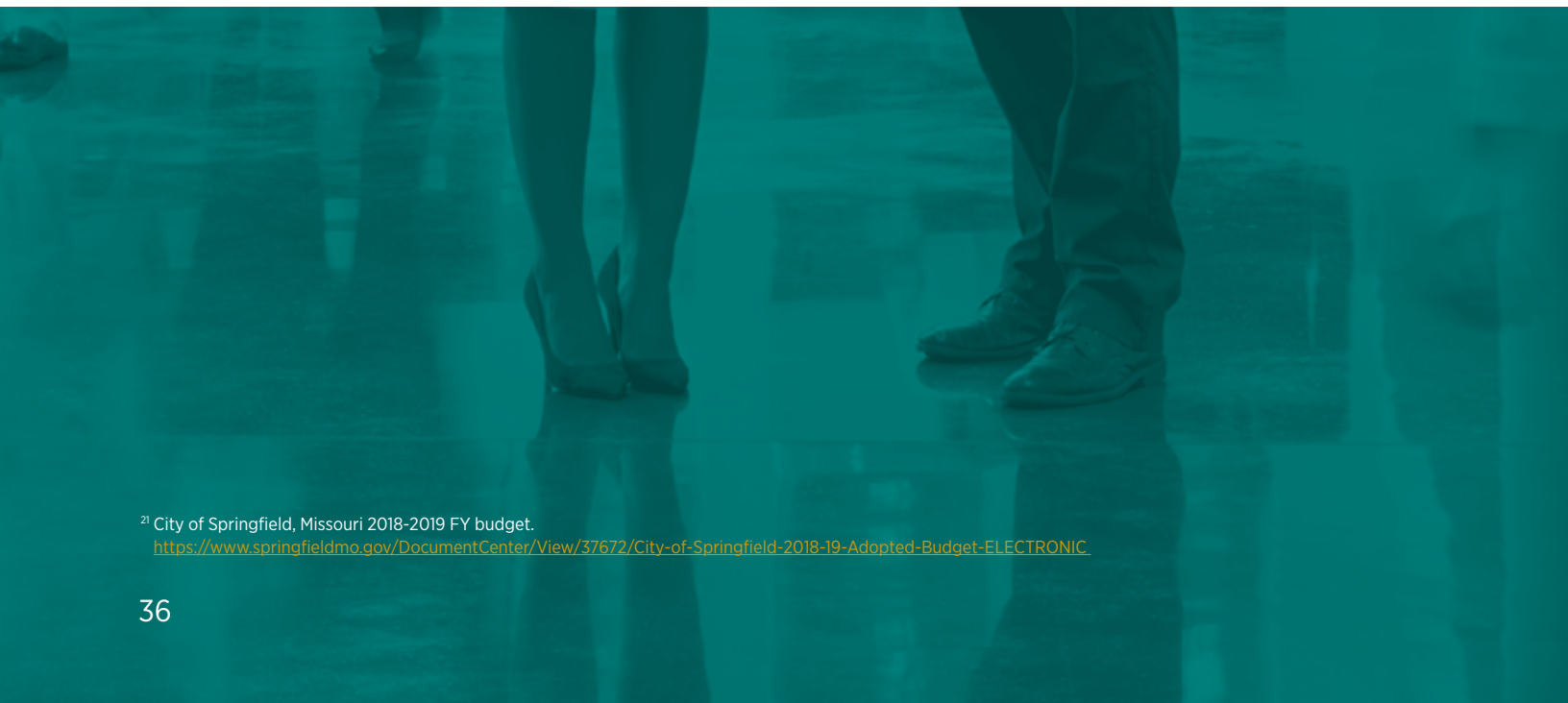


Source: Bureau of Economic Analysis, 2018



Physicians, and the economic activity that they stimulate, help to create sizeable tax revenues as well. **Tables 14 and 15** list these for both state/local and federal governments in thousands of dollars. Here we see that physicians, and the economic impact that they create, produces \$2.638 billion in taxes for federal and state/local

governments. Of this, \$671,823 million accrues to state and local governments. When one considers that the third largest city in Missouri, Springfield, has a city budget of \$365 million in the 2018-2019 fiscal year, one can get a sense of how much tax revenue accumulates in state and local government coffers from physicians.²¹



²¹ City of Springfield, Missouri 2018-2019 FY budget.

<https://www.springfieldmo.gov/DocumentCenter/View/37672/City-of-Springfield-2018-19-Adopted-Budget-ELECTRONIC>

Table 14. State and Local Taxes Collected Resulting From Physicians' Economic Impact
(thousands of dollars)

	Employee Compensation	Proprietor Income	Indirect Business Tax	Households	Corporations	Total
Northwest	\$60	\$0	\$9,758	\$5,593	\$217	\$15,629
Northeast	\$50	\$0	\$8,105	\$4,645	\$181	\$12,981
Kansas City	\$534	\$0	\$86,250	\$49,435	\$1,922	\$138,141
West Central	\$45	\$0	\$7,346	\$4,210	\$164	\$11,765
Central	\$282	\$0	\$45,619	\$26,147	\$1,016	\$73,064
St. Louis	\$1,204	\$0	\$194,510	\$111,485	\$4,334	\$311,532
Southwest	\$81	\$0	\$13,065	\$7,488	\$291	\$20,925
Ozark	\$210	\$0	\$33,882	\$19,420	\$755	\$54,266
South Central	\$40	\$0	\$6,505	\$3,729	\$145	\$10,419
Southeast	\$106	\$0	\$17,049	\$9,772	\$380	\$27,307
Missouri	\$2,596	\$0	\$419,462	\$240,417	\$9,346	\$671,823
Urban	\$2,197	\$0	\$355,056	\$203,503	\$7,911	\$568,668
Rural	\$399	\$0	\$64,406	\$36,914	\$1,435	\$103,155

Source: National Society of Healthcare Professional Business Consultants, 2016 and IMPLAN Group data, 2016

Table 15. Federal Taxes Collected Resulting From Physicians' Economic Impact
(thousands of dollars)

	Employee Compensation	Proprietor Income	Indirect Business Tax	Households	Corporations	Total
Northwest	\$25,672	\$713	\$1,269	\$15,156	\$2,923	\$45,733
Northeast	\$21,322	\$592	\$1,054	\$12,588	\$2,428	\$37,984
Kansas City	\$226,908	\$6,302	\$11,218	\$133,965	\$25,839	\$404,232
West Central	\$19,325	\$537	\$955	\$11,409	\$2,201	\$34,427
Central	\$120,014	\$3,333	\$5,934	\$70,856	\$13,666	\$213,803
St. Louis	\$511,719	\$14,213	\$25,299	\$302,115	\$58,271	\$911,618
Southwest	\$34,371	\$955	\$1,699	\$20,293	\$3,914	\$61,232
Ozark	\$89,137	\$2,476	\$4,407	\$52,626	\$10,150	\$158,796
South Central	\$17,114	\$475	\$846	\$10,104	\$1,949	\$30,489
Southeast	\$44,854	\$1,246	\$2,218	\$26,481	\$5,108	\$79,906
Missouri	\$1,103,528	\$30,651	\$54,559	\$651,514	\$125,661	\$1,965,913
Urban	\$934,087	25,944	\$46,182	\$551,478	\$106,367	\$1,664,058
Rural	\$169,441	4,707	\$8,377	\$100,036	\$19,294	\$301,855

Source: National Society of Healthcare Professional Business Consultants, 2016 and IMPLAN Group data, 2016



Table 16 outlines the ten largest industries impacted by physicians and ranks them by the impact on employment, wages and value added. As before, all dollar amounts are in thousands of dollars. An examination of the list shows similar industries impacted. These include hospitals, wholesale trade, employment services and company management, which are listed in each of the three rankings. The summation of these lists

of top 10 industries is listed at the bottom. The ten most impacted industries record employment of 85,819 out of the 129,729 total jobs created. This is about two-thirds of the total employment from the economic impact of physicians. In addition, the top 10 industries measured by wages are 80 percent of the total wages created while value added is 76 percent.



Table 16. Top 10 Industries Affected by Physicians' Economic Impact (in thousands of dollars)

Rank	Industry	Employment	Industry	Wages	Industry	Value Added
1	Offices of physicians	\$61,017	Offices of physicians	\$6,892,164	Offices of physicians	\$6,796,043
2	Real estate	\$4,750	Hospitals	\$207,463	Owner-occupied dwellings	\$536,756
3	Full-service restaurants	\$3,938	Management of companies and enterprises	\$186,045	Real estate	\$533,511
4	Limited-service restaurants	\$3,449	Wholesale trade	\$152,055	Wholesale trade	\$274,403
5	Employment services	\$3,019	Employment services	\$109,580	Hospitals	\$248,467
6	Hospitals	\$2,912	Management consulting services	\$84,897	Monetary authorities/depository credit intermediation	\$240,581
7	Wholesale trade	\$1,832	Insurance carriers	\$82,678	Management of companies and enterprises	\$230,637
8	Retail - General merchandise stores	\$1,667	Full-service restaurants	\$82,455	Insurance carriers	\$208,070
9	Management of companies and enterprises	\$1,639	Monetary authorities/depository credit intermediation	\$81,736	Employment services	\$175,732
10	Individual and family services	\$1,598	Insurance agencies, brokerages, and related activities	\$76,520	Limited-service restaurants	\$146,596
Top 10 Total		\$85,819	Top 10 Total	\$7,955,593	Top 10 Total	\$9,390,795

Source: National Society of Healthcare Professional Business Consultants, 2016 and IMPLAN Group data, 2016



CONCLUSIONS

Physicians provide an important service to society. They help to ensure that the populace is healthy and often are the first line of defense against chronic diseases and injuries. In Missouri, there is a higher concentration of physicians relative to the population as a whole when compared to the nation overall. This does not carry over to the county level though as there are many counties that have relatively few doctors. Data show that there are two counties in Missouri without any actively practicing physicians.

At the same time, some physician specialties such as pediatrics, psychiatry and internists are paid more in Missouri than the national average. However, other fields such as family and general practitioners and OB/GYNs are paid less. This pay differential is probably responsible for Missouri having fewer of these physicians per person than the national average.

The economic impact of physicians on the state economy is large. There are roughly 15,572 doctors in the state of Missouri who are currently practicing medicine. These physicians can be employed in any number of ways including working directly for a hospital, working for a clinic or practice that is group owned or owned by a hospital, working for a government or other government-related entity such as a university, employed by a private firm or simply self-employed. Of course, any combination of the above also is possible. Data on physician wages and the expenditures from 47 different medical specialty practices were analyzed and aggregated for physicians across the state. **Overall, physicians' economic impact is more than \$12.3 billion dollars — approximately 7 percent of Missouri's GSP. They also help to create almost 130,000 jobs that pay almost \$10 billion in wages.**

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