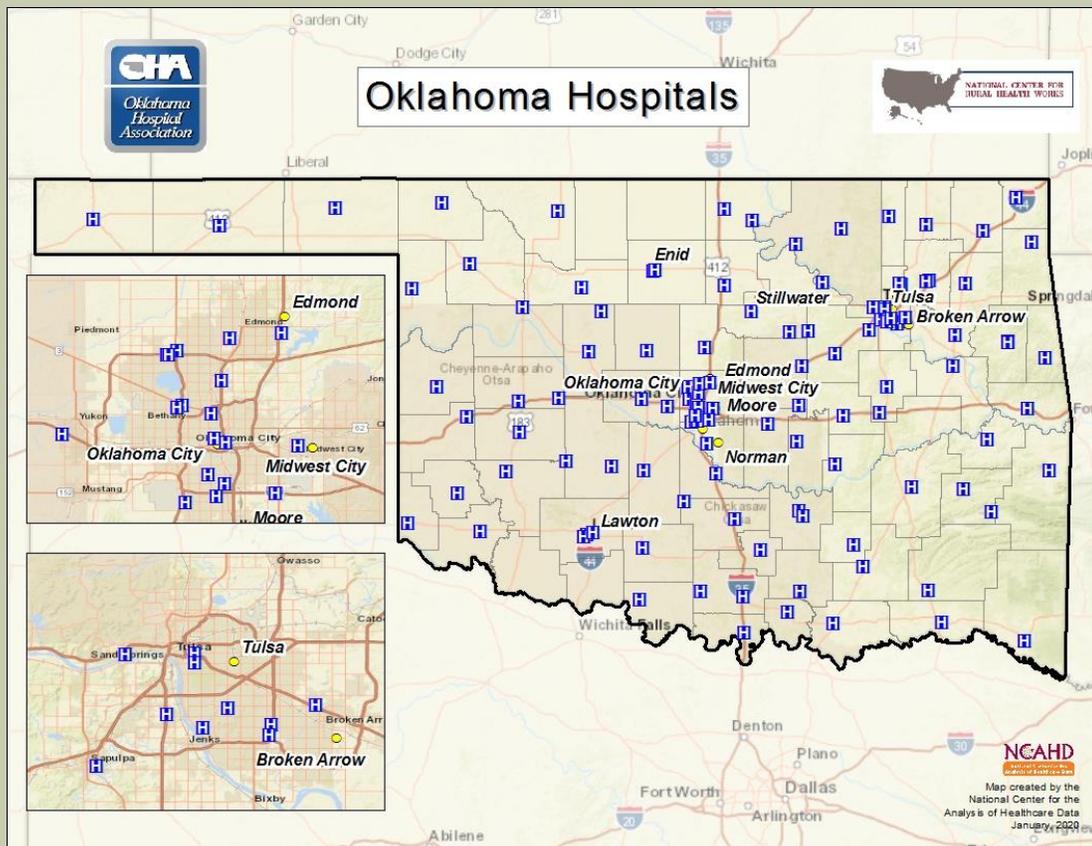


# THE ECONOMIC BENEFITS OF STATE QUESTION 802



May 2020

## Statewide Economic Impact upon Counties/Communities

Research by Ann K. Peton, MPH, Gerald A. Doeksen, PhD

& Spencer A. Jones, National Center for Rural Health Works

## TABLE OF CONTENTS

<b>EXECUTIVE SUMMARY .....</b>	<b>2</b>
<b>METHODOLOGY .....</b>	<b>3</b>
<b>RESULTS .....</b>	<b>4</b>
<b>FEDERAL AND STATE TAX IMPACTS.....</b>	<b>6</b>
<b>RESEARCHERS .....</b>	<b>8</b>
<b>APPENDICES .....</b>	<b>9</b>

---

## EXECUTIVE SUMMARY

The passage of State Question 802 would return \$1.35 billion of Oklahoma's tax money from the federal government in its first year and \$8.5 billion over its first five years. In addition to expanding healthcare to nearly 200,000 citizens, this annual infusion of federal dollars would have significant impact on the Oklahoma economy.

This report lays out the economic benefits of full Medicaid expansion — both statewide and in communities throughout Oklahoma. During the first five years of implementation, this report finds that State Question 802 would:

- Create 27,280 total jobs;
- Generate \$15.6 billion in new economic activity and more than \$6.7 billion in labor income;
- Increase state and local tax revenues by \$488.7 million.

The modeling described in this report was completed using IMPLAN analytical software by the National Center for Rural Health Works (NCRHW).<sup>1</sup> This analysis determined the infusion of federal dollars from Medicaid expansion would generate an additional \$1,122,606,462 in spending statewide for a total of over two billion dollars (\$2,475,662,615) in economic benefits from direct and secondary spending throughout the economy. This increased revenue would generate over seventeen thousand jobs (17,414.9) within the health sector that would contribute an additional \$1,061,924,289 in labor income statewide.

With 70 of the 120 short-term or critical access hospitals located in rural areas, the impact of the expansion would positively impact both urban and rural areas in Oklahoma. For example, Medicaid expansion would generate more than \$683 million in economic activity in Tulsa County and \$852 million in economic activity in Oklahoma County, but less urban counties like Pottawatomie would also generate \$21 million in economic activity and an estimated 209 new jobs. Rural communities would also benefit from the positive economic impact that Medicaid expansion would have in protecting jobs and healthcare services at vulnerable rural hospitals that have been on the verge of closure for years. (A county-by-county breakdown of the economic impact can be found on p. 5 of this report.)

The Oklahoma Hospital Association contracted with NCRHW to study the economic impact of Medicaid expansion in the state. Prior to this report, OHA had previously contracted with the National Center for Rural Health Works (NCRHW) in March, 2015 to conduct an economic impact study of projected revenues, jobs and labor income that might be generated over an eight-year period (2016-2023). (For more information on the first study, please contact Mr. Rick Snyder, OHA).

---

<sup>1</sup> The Oklahoma Hospital Association contracted Leavitt Partners in 2019 to project the enrollment by zip code of Medicaid expansion enrollees in Oklahoma. Leavitt used service area data to estimate the geographic distribution of revenue Oklahoma providers might receive under Medicaid expansion. Revenue was adjusted for the crowd-out effect, in which some private spending is replaced by Medicaid. For details, contact OHA.

## METHODOLOGY

Our research assumed that with the expansion of Medicaid, the money previously spent on healthcare by the consumer (including business), would be subsequently spent within the county or state. Therefore, our analysis was of the total revenue projected by Leavitt for the proposed Medicaid expansion which we aggregated the county level. We generated a model that measured the potential impact upon nine health sectors that are measured through our economic data source, IMPLAN (See **Appendix A** for more information). These sectors include the following types of economic activity attributed to healthcare within all economies:

- Physician Offices
- Dentist Offices
- Offices of other Health practitioners
- Outpatient care centers
- Medical and diagnostic labs
- Home health care services
- Other ambulatory care services
- Hospitals
- Pharmacies

The direct economic impact of the revenue generated from Medicaid expansion includes increases to patient enrollment for any of the services listed above and operational expenses, such as wages, salaries, and benefits, medical supplies, and other hospital operational expenses. (**Note:** This analysis does not include any impact from construction for capital project that may occur from this expansion.) These activities create a “Ripple Effect” in the economy by increasing demand in other sectors due to employee’s spending money in the local and state economy and through the continual purchase of supplies and services of the hospital, which is also known as the secondary economic impact.

We calculate the secondary impact utilizing an input-output model designed to analyze the transactions among the industries within the county including the direct, indirect and induced interrelated circular spending behaviors. For example, an increase in the demand for health services requires more equipment, more labor, and more supplies, which, in turn, requires more labor to produce the supplies, etc. By simultaneously accounting for structural interaction between sectors and industries, input-output analysis gives expression to the general economic equilibrium system. (For more information, see **Appendix A.**)

Our economic model determines how many jobs are generated based upon the health sectors’ statewide or county averages to estimate the number of jobs that are expected from the revenue as well as the jobs to create through secondary spending.

Labor income is an amount estimated to be created through the additional jobs within each of the counties from the proposed Medicaid expansion. The IMPLAN model tracks the spending of labor income based upon the previously mentioned sectors. The spending patterns of those individuals employed in the above mentioned nine sectors within the county become the labor sector multiplier that is applied to the labor income estimated by IMPLAN to be generated for the county through the proposed Medicaid expansion.

The data provided by Leavitt included 120 short term or critical access hospitals located in 70 of Oklahoma's 77 counties. Fifty-one (51) of the counties had a single hospital providing a bulk of the healthcare services in the county.

## RESULTS

The statewide estimated revenue from Medicaid expansion (\$1,353,056,153) will generate an additional \$1,122,606,462 in secondary revenue for a total revenue of over \$2.5 Billion dollars (**Table 1**). The multiplier of 1.83 means that for every \$1 spent statewide, an additional \$0.83 is generated in secondary spending. The \$1,353,056,153 of additional spending generated 9,779.1 jobs in the health sector. The employment multiplier of 1.78 results in an additional 7,635.8 jobs for a total of 17,414.9 jobs in total from the expansion revenue. Labor income is an averaged health-sector wage that is multiplied times the employment (9,779.1), \$716,651,815. The income multiplier of 1.48 results in a total of \$1,061,924,289 of income generated throughout the state due to the proposed Medicaid expansion.

For each of the counties researched, we aggregated the revenue that was estimated to be generated within the county through Medicaid expansion. We applied the same economic modeling to each of the counties to determine both the direct and secondary impact on county revenue, jobs and labor income (see **Table 2** below for results).

	<b>Direct Revenue</b>	<b>Statewide Multiplier</b>	<b>Secondary Revenue</b>	<b>Total Revenue</b>
<b>Revenues</b>	\$1,353,056,153	1.83	\$1,122,606,462	\$2,475,662,615
<b>Employment</b>	9,779.1	1.78	7,635.8	17,414.9
<b>Labor Income</b>	\$716,651,815	1.48	\$345,272,474	\$1,061,924,289

Data Source: Research results conducted by NCRHW using IMPLAN and Leavitt Medicaid Expansion Revenue Analysis

**Table 2 - County Aggregates of Medicaid Expansion (Revenue, Jobs and Labor Income)**

County	County Total Revenue from Expansion	County Revenue Secondary Impact	County Total Medicaid Revenue from Expansion	County Jobs from Expansion Revenue	County Secondary Jobs from Expansion Revenue	County Total Jobs from Expansion Revenue	County Labor Income from Expansion Revenue	Secondary Income from Labor Income	County Total Labor Income from Expansion
Adair	\$4,634,344.70	\$1,574,325	\$6,208,670	37.0	13.0	50.0	\$2,018,590	\$407,753	\$2,426,343
Atoka	\$1,569,716.57	\$632,623	\$2,202,340	18.7	5.5	24.2	\$955,170	\$158,250	\$1,113,420
Beaver	\$968,955.38	\$226,109	\$1,195,064	14.5	1.9	16.4	\$357,141	\$36,082	\$393,223
Beckham	\$6,255,602.88	\$2,704,715	\$8,960,318	52.9	22.8	75.7	\$2,978,354	\$713,720	\$3,692,074
Blaine	\$939,733.16	\$234,889	\$1,174,622	8.6	1.8	10.4	\$420,924	\$67,638	\$488,562
Bryan	\$23,122,856.52	\$11,813,677	\$34,936,534	176.3	88.4	264.7	\$13,397,016	\$3,443,851	\$16,840,867
Caddo	\$1,856,443.99	\$752,317	\$2,608,761	22.5	5.5	28.0	\$864,268	\$212,206	\$1,076,474
Canadian	\$12,615,533.98	\$5,553,087	\$18,168,621	126.7	44.0	170.7	\$6,295,831	\$1,496,512	\$7,792,343
Carter	\$21,362,374.85	\$11,136,559	\$32,498,934	159.8	86.6	246.4	\$11,392,047	\$3,323,310	\$14,715,357
Cherokee	\$19,534,184.25	\$7,894,059	\$27,428,243	195.8	63.8	259.6	\$10,158,144	\$1,896,463	\$12,054,607
Choctaw	\$5,025,733.57	\$2,116,294	\$7,142,028	70.5	16.0	86.5	\$2,802,571	\$524,948	\$3,327,519
Cimarron	\$684,761.15	\$116,284	\$801,045	9.1	1.1	10.2	\$323,501	\$28,052	\$351,553
Cleveland	\$73,663,342.43	\$44,779,140	\$118,442,482	636.1	366.0	1002.1	\$41,565,204	\$12,523,042	\$54,088,246
Coal	\$1,407,236.06	\$365,255	\$1,772,491	11.4	3.0	14.4	\$590,385	\$79,820	\$670,205
Comanche	\$48,793,883.92	\$20,003,758	\$68,797,642	396.0	148.3	544.3	\$25,834,055	\$5,739,035	\$31,573,090
Craig	\$2,118,196.99	\$991,152	\$3,109,349	31.5	8.3	39.8	\$1,202,291	\$271,641	\$1,473,932
Creek	\$7,086,684.95	\$2,822,588	\$9,909,273	64.5	22.8	87.3	\$3,726,952	\$722,704	\$4,449,656
Custer	\$5,583,424.31	\$2,907,271	\$8,490,695	52.7	22.9	75.6	\$2,827,174	\$756,348	\$3,583,522
Delaware	\$7,412,710.66	\$3,666,797	\$11,079,508	67.4	29.7	97.1	\$3,700,682	\$917,295	\$4,617,977
Dewey	\$557,623.07	\$190,223	\$747,846	5.6	1.5	7.1	\$197,805	\$48,149	\$245,954
Ellis	\$503,146.71	\$182,969	\$686,116	4.6	1.8	6.4	\$232,301	\$37,809	\$270,110
Garfield	\$27,127,796.43	\$15,282,954	\$42,410,750	203.8	119.1	322.9	\$13,200,982	\$4,522,298	\$17,723,280
Garvin	\$1,791,380.01	\$678,351	\$2,469,731	16.6	5.2	21.8	\$956,084	\$185,330	\$1,141,414
Grady	\$3,539,301.22	\$1,237,393	\$4,776,694	40.5	10.3	50.8	\$2,121,303	\$294,624	\$2,415,927
Greer	\$560,308.90	\$145,480	\$705,789	4.4	1.1	5.5	\$265,117	\$32,504	\$297,621
Harmon	\$683,456.69	\$173,517	\$856,974	6.2	1.4	7.6	\$328,810	\$41,188	\$369,998
Harper	\$567,693.73	\$144,194	\$711,888	8.0	1.3	9.3	\$265,033	\$30,412	\$295,445
Haskell	\$1,592,649.76	\$568,700	\$2,161,350	15.2	4.7	19.9	\$774,286	\$155,965	\$930,251
Hughes	\$1,462,863.79	\$398,263	\$1,861,127	17.2	3.4	20.6	\$828,415	\$88,235	\$916,650
Jackson	\$7,932,969.83	\$3,434,826	\$11,367,796	56.2	27.3	83.5	\$3,813,324	\$1,004,018	\$4,817,342
Jefferson	\$90,955.62	\$25,365	\$116,321	1.3	0.2	1.5	\$48,630	\$5,450	\$54,080
Johnston	\$756,775.47	\$164,583	\$921,358	11.7	1.7	13.4	\$203,835	\$40,702	\$244,537
Kay	\$9,449,216.37	\$5,290,531	\$14,739,747	74.0	40.8	114.8	\$4,910,089	\$1,647,400	\$6,557,489
Kingfisher	\$954,333.15	\$355,451	\$1,309,784	8.7	2.7	11.4	\$494,200	\$83,647	\$577,847
Kiowa	\$1,836,507.13	\$486,728	\$2,323,235	16.7	3.4	20.1	\$1,051,404	\$111,523	\$1,162,927
Latimer	\$1,613,360.92	\$503,487	\$2,116,848	19.8	4.1	23.9	\$874,730	\$106,637	\$981,367
Le Flore	\$14,517,050.81	\$6,559,640	\$21,076,691	241.7	56.1	297.8	\$8,095,203	\$1,635,867	\$9,731,070
Lincoln	\$749,665.67	\$263,713	\$1,013,379	7.5	2.0	9.5	\$284,199	\$62,679	\$346,878
Logan	\$2,121,005.10	\$773,521	\$2,894,526	20.9	6.6	27.5	\$1,038,671	\$191,181	\$1,229,852
Love	\$970,212.38	\$235,884	\$1,206,096	10.9	1.6	12.5	\$556,483	\$55,575	\$612,058
Major	\$524,481.59	\$157,271	\$681,753	5.2	1.3	6.5	\$212,886	\$30,641	\$243,527
Marshall	\$1,504,845.90	\$608,470	\$2,113,316	16.1	4.9	21.0	\$788,308	\$155,204	\$943,512
Mayes	\$2,066,300.14	\$912,276	\$2,978,576	17.0	7.3	24.3	\$948,246	\$241,331	\$1,189,577
McClain	\$2,240,532.19	\$988,393	\$3,228,925	26.4	8.5	34.9	\$1,124,392	\$223,230	\$1,347,622
McCurtain	\$7,881,814.75	\$3,653,669	\$11,535,484	71.9	30.4	102.3	\$3,717,615	\$910,758	\$4,628,373
Murray	\$1,602,759.40	\$591,178	\$2,193,937	23.6	5.1	28.7	\$1,139,432	\$153,836	\$1,293,268
Muskogee	\$25,371,430.35	\$12,690,686	\$38,062,116	212.0	96.7	308.7	\$12,967,644	\$3,755,753	\$16,723,397
Noble	\$1,082,808.35	\$288,226	\$1,371,034	10.9	2.0	12.9	\$693,007	\$68,646	\$761,653
Nowata	\$445,382.66	\$140,176	\$585,559	3.1	1.1	4.2	\$223,438	\$33,114	\$256,552
Okfuskee	\$727,341.70	\$181,402	\$908,744	8.2	1.3	9.5	\$289,932	\$33,656	\$323,588
Oklahoma	\$466,850,101.51	\$385,257,056	\$852,107,158	2908.6	2,485.9	5394.5	\$255,865,474	\$132,418,643	\$388,284,117
Okmulgee	\$3,828,693.37	\$1,408,805	\$5,237,498	38.5	12.4	50.9	\$1,940,966	\$356,119	\$2,297,085
Osage	\$356,500.09	\$124,276	\$480,776	4.1	0.9	5	\$161,484	\$23,976	\$185,460
Ottawa	\$9,236,226.16	\$4,129,164	\$13,365,390	92.2	34.7	126.9	\$3,778,807	\$1,074,518	\$4,853,325
Pawnee	\$187,374.53	\$51,502	\$238,877	1.4	0.4	1.8	\$79,267	\$10,630	\$89,897
Payne	\$23,315,678.63	\$12,254,368	\$35,570,047	204.6	95.4	300	\$11,795,943	\$3,183,186	\$14,979,129
Pittsburg	\$16,133,783.14	\$7,765,265	\$23,899,048	180.7	60.7	241.4	\$9,621,051	\$2,097,960	\$11,719,011
Pontotoc	\$14,260,493.16	\$8,653,657	\$22,914,150	107.6	68.1	175.7	\$6,757,693	\$2,484,325	\$9,242,018
Pottawatomie	\$13,984,612.11	\$7,319,589	\$21,304,201	149.9	59.7	209.6	\$6,794,081	\$2,296,320	\$9,090,401
Pushmataha	\$1,944,325.48	\$783,427	\$2,727,752	28	6.6	34.6	\$1,479,689	\$179,445	\$1,659,134
Roger Mills	\$261,749.53	\$54,414	\$316,164	3.4	0.5	3.9	\$78,598	\$8,560	\$87,158
Rogers	\$7,756,961.17	\$3,434,349	\$11,191,310	68.5	27.5	96	\$3,947,736	\$916,990	\$4,864,726
Seminole	\$1,800,451.11	\$641,302	\$2,441,753	20.9	5.4	26.3	\$756,739	\$157,355	\$914,094
Sequoyah	\$5,016,055.76	\$2,272,828	\$7,288,884	66	20.2	86.2	\$2,807,430	\$541,177	\$3,348,607
Stephens	\$13,280,399.99	\$7,220,353	\$20,500,753	108.2	58.8	167	\$6,229,318	\$2,029,157	\$8,258,475
Texas	\$3,765,662.36	\$1,303,550	\$5,069,212	36.9	9.7	46.6	\$2,174,014	\$356,293	\$2,530,307
Tulsa	\$377,280,780.22	\$306,085,216	\$683,365,996	2466.2	1,904.6	4370.8	\$199,486,505	\$96,352,626	\$295,839,131
Wagoner	\$4,013,466.21	\$1,410,878	\$5,424,344	47.8	11.8	59.6	\$1,839,588	\$256,384	\$2,095,972
Washington	\$16,059,248.79	\$8,594,580	\$24,653,829	126.9	66.6	193.5	\$8,632,601	\$2,740,753	\$11,373,354
Washita	\$592,031.18	\$154,066	\$746,097	6.6	1.2	7.8	\$270,065	\$35,007	\$305,072
Woods	\$1,329,919.56	\$486,661	\$1,816,581	15.4	3.6	19	\$732,706	\$105,803	\$838,509
Woodward	\$4,339,948.81	\$1,965,646	\$6,305,595	32.4	15.3	47.7	\$2,013,789	\$504,328	\$2,518,117

With the passage of State Question 802, state revenue, employment and the subsequent labor income from these jobs, will annually bring the following benefits:

<b>Table 3 - Statewide Projected Impact of Medicaid Expansion</b>						
<b>Revenue</b>						
	<b>2020</b>	<b>2021</b>	<b>2022</b>	<b>2023</b>	<b>2024</b>	<b>5-Year Totals 2020-2024</b>
Projected Medicaid Payments for Expansion	\$1,353,056,153	\$1,504,023,432	\$1,678,044,439	\$1,883,259,769	\$2,119,545,196	<b>\$8,537,928,989</b>
Statewide Multiplier	1.83	1.83	1.83	1.83	1.83	
Secondary Revenue	\$1,122,606,462	\$1,247,861,311	\$1,392,243,424	\$1,562,506,909	\$1,758,548,697	<b>\$7,083,766,803</b>
Annual Total Revenue Impact from Projected Medicaid Expansion	\$2,475,662,615	\$2,751,884,743	\$3,070,287,863	\$3,445,766,678	\$3,878,093,893	<b>\$15,621,695,792</b>
<b>Employment</b>						
						<b>2020-2024</b>
Employment	9,779.1	1,091.1	1,257.7	1,483.2	1,707.7	<b>15,318.8</b>
Statewide Multiplier	1.78	1.78	1.78	1.78	1.78	
Secondary Employment (subsequent years indicate only the additional jobs)	7,635.8	852.0	982.1	1,158.1	1,333.5	<b>11,961.5</b>
Annual Total Employment Impact from Projected	17,414.9	1,943.1	2,239.8	2,641.3	3,041.2	<b>27,280.3</b>
<b>Labor Income</b>						
						<b>2020-2024</b>
Estimated Labor Income Created by Medicaid Expansion	\$716,651,815	\$796,612,261	\$888,783,211	\$997,476,363	\$1,122,625,922	<b>\$4,522,149,572</b>
Statewide Multiplier	1.48	1.48	1.48	1.48	1.48	
Secondary Labor Income	\$345,272,474	\$383,796,261	\$428,202,890	\$480,569,679	\$540,864,924	<b>\$2,178,706,228</b>
Annual Total Impact from Labor Income Projected Medicaid Expansion	\$1,061,924,289	\$1,180,408,522	\$1,316,986,101	\$1,478,046,042	\$1,663,490,846	<b>\$6,700,855,800</b>

## FEDERAL AND STATE TAX IMPACTS

The federal, state and local taxes are derived from IMPLAN. Federal tax impacts are divided into four major categories and are provided for each year (2020 – 2024). The total federal tax impact for 2020 – 2024 from social insurance tax (employee, employer, and proprietor income contributions) totals \$740.1 million, from tax on production and imports (excise tax, custom duty, and federal non-taxes) totals \$44.3 million, from corporate profits tax total \$37.9 million, and from households income tax (federal income tax paid by employees) totals \$391.7 million. The total 5-year estimated federal tax impact of the expansion is over \$1.2 Billion dollars. (See **Table 4** for additional information)

State and local tax impacts are divided into four major categories with select sub-categories. The total state and local tax impact for 2020 - 2024 from social insurance taxes (employee and employer contributions) total \$18.6 million. The production and imports taxes include sales tax of \$186 million, property tax of \$86.2 million, and other production and imports taxes (motor vehicle licenses, severance tax, other taxes, and state and local non-taxes) of \$39.6 million. Corporate taxes (dividends and corporate profits tax) total \$5.9 million. Personal taxes (households/employees) include households income tax (state income tax paid by employees) of \$109.2 million, property taxes of \$1.7 million, and other personal taxes (non-taxes [fines and fees], motor vehicle licenses, and other taxes) of \$41.3 million. The total state and local tax impacts from the proposed Medicaid expansion for 2020-2024 is \$488.7 million. (See **Table 5** for additional information)

**Table 4 - Projected State and Local Tax Impacts of the Proposed Medicaid Expansion  
2020 - 2024**

	2020	2021	2022	2023	2024	5-Year Totals 2020-2024
<b>Social Insurance Tax</b>	\$2,951,940	\$3,281,302	\$3,660,961	\$4,108,676	\$4,624,176	<b>\$18,627,055</b>
<b>Production and Imports Taxes</b>						
Sales Tax	\$29,491,114	\$32,781,586	\$36,574,536	\$41,047,396	\$46,197,454	<b>\$186,092,086</b>
Property Tax	\$13,665,655	\$15,190,402	\$16,947,987	\$19,020,629	\$21,407,077	<b>\$86,231,750</b>
Other	\$6,278,293	\$6,978,794	\$7,786,264	\$8,738,480	\$9,834,864	<b>\$39,616,695</b>
<b>Corporate Taxes</b>	\$930,964	\$1,034,836	\$1,154,570	\$1,295,768	\$1,458,343	<b>\$5,874,481</b>
Income Tax	\$17,310,874	\$19,242,337	\$21,468,745	\$24,094,249	\$27,117,265	<b>\$109,233,470</b>
Property Tax	\$272,759	\$303,192	\$338,273	\$379,642	\$427,274	<b>\$1,721,140</b>
Other	\$6,544,048	\$7,274,201	\$8,115,853	\$9,108,375	\$10,251,168	<b>\$41,293,645</b>
<b>Annual Totals</b>	<b>\$77,445,647</b>	<b>\$86,086,650</b>	<b>\$96,047,189</b>	<b>\$107,793,215</b>	<b>\$121,317,621</b>	<b>\$488,690,322</b>

**Table 5 - Projected Federal Tax Impacts of the Proposed Medicaid Expansion  
2020 - 2024**

	2020	2021	2022	2023	2024	5-Year Totals 2020-2024
<b>Social Insurance Tax</b>	\$117,288,789	\$130,375,286	\$145,460,182	\$163,249,140	\$183,731,385	<b>\$740,104,782</b>
<b>Tax on Production and Imports</b>	\$7,013,741	\$7,796,299	\$8,698,360	\$9,762,119	\$10,986,935	<b>\$44,257,454</b>
<b>Corporate Profits Tax</b>	\$6,002,352	\$6,672,065	\$7,444,048	\$8,354,412	\$9,402,609	<b>\$37,875,486</b>
<b>Household Income Tax</b>	\$62,081,652	\$69,008,416	\$76,992,934	\$86,408,740	\$97,250,116	<b>\$391,741,858</b>
<b>Annual Totals</b>	<b>\$192,386,534</b>	<b>\$213,852,066</b>	<b>\$238,595,524</b>	<b>\$267,774,411</b>	<b>\$301,371,045</b>	<b>\$1,213,979,580</b>

---

## RESEARCHERS

**Gerald A. Doeksen** – For this project, Dr. Doeksen worked as a consultant for the NCRHW. His background is as follows: After receiving his Ph.D. degree from Oklahoma State University in 1972, Dr. Doeksen began his career as an Extension Economist. Dr. Doeksen’s major rural/community development related achievements can be divided into two time periods. These include his early work with input-output theory and applications and his pioneering efforts with community reserve budgets. His later years involved creating **The National Center for Rural Health Works**. Dr. Doeksen’s early work with input-output analyses (tool used to estimate economics impact) is referenced in textbooks such as Harry W. Richardson’s book titled “Input-Output and Regional Economics”. He has given groundbreaking work related to aggregation and size of multipliers, Dr. Doeksen’s Master’s thesis and Ph.D dissertation both utilized input-output analyses.

**Ann K. Peton** - For the past 3 years, Ms. Ann K. Peton has been the Director of the **National Center for Rural Health Works**, having transitioned the research center and federal grant from Oklahoma State University in August 2016. Additionally, she has been the Director of the **National Center for the Analysis of Healthcare Data (NCAHD)** for the last 13 years. She established the NCAHD in partnership with Dixie Tooke-Rawlins, DO, President of the Edward Via College of Osteopathic Medicine. The mission of NCAHD is to provide data mapping and analysis support of your advocacy, medical education planning/expansion, research, and other healthcare workforce planning using both your data and ours which includes the nation’s most complete collection of physician and non-physician data, demographic, socio-economic, and political data. Both centers are located in Blacksburg, Virginia.

In August of 2016, the FORHP agreed to the transition of the National Center for Rural Health Works (NCRHW) to VCOM with Ann as the Director in order to continue the important economic impact analysis research this center has created for the nation over the last 26 years. NCRHW’s work focuses in three areas of support: 1) creation/updating of economic impact tools, surveys and needs assessment for public usage, 2) education of rural stakeholders of these products through workshops, webinars and the website, and 3) technical support to the various stakeholders as they use the products and federal partners statistical requests.

With over 30 years’ experience working with local, state and national entities and individuals regarding geographic information systems (GIS) applications and usage, Ms. Peton established NCAHD in order to create and provide the most complete and consistent set of healthcare workforce data and mapping tools in the nation for physicians and seventeen other non-physician healthcare providers. Successful partnerships with AMA, AOA, HRSA and many other healthcare centers, national provider organizations and other stakeholders has affirmed NCAHD as a leader in support healthcare research, hospital network planning, grant writing and advocacy concerning healthcare workforce policy issues.

**Spencer A. Jones** – Intern with 2 years’ experience in working for NCRHW conducting economic impact analysis and other research. Spencer graduated December, 2019 with a degree in Statistics from Virginia Tech. He recently completed an Internship (summer, 2019) with the National Association of Rural Health Clinics (NARHC) in Washington, D.C.

## APPENDICES

### Appendix A - IMPLAN Software and Data Model Used to Derive Multipliers

#### **A Review of Input-Output Analysis**

Input-output (I/O) (Miernyk, 1965) was designed to analyze the transactions among the industries in an economy. These models are largely based on the work of Wassily Leontief (1936). Detailed I/O analysis captures the indirect and induced interrelated circular behavior of the economy. For example, an increase in the demand for health services requires more equipment, more labor, and more supplies, which, in turn, requires more labor to produce the supplies, etc. By simultaneously accounting for structural interaction between sectors and industries, I/O analysis gives expression to the general economic equilibrium system. The analysis utilizes assumptions based on linear and fixed coefficients and limited substitutions among inputs and outputs. The analysis also assumes that average and marginal I/O coefficients are equal.

Nonetheless, the framework has been widely accepted and used. I/O analysis is useful when carefully executed and interpreted in defining the structure of an area, the interdependencies among industries, and forecasting economic outcomes.

The I/O model coefficients describe the structural interdependence of an economy. From the coefficients, various predictive devices can be computed, which can be useful in analyzing economic changes in a state, an area or a county. Multipliers indicate the relationship between some observed change in the economy and the total change in economic activity created throughout the economy.

- The basis of IMPLAN was developed by the U. S. Forest Service to construct input/output accounts and models. The complexity of this type of modeling had hindered practitioners from constructing models specific to a community requesting an analysis. The University of Minnesota utilized the U.S. Forest Service model to further develop the methodology and expand the data sources to form the model known as IMPLAN. The founders of IMPLAN, Scott Lindall and Doug Olson, joined the University of Minnesota in 1984 and, as an outgrowth of their work with the University of Minnesota, entered into a technology transfer agreement with the University of Minnesota that allowed them to form Minnesota IMPLAN Group, Inc. (MIG).

#### **IMPLAN Software and Data**

At first, IMPLAN focused on database development and provided data that could be used in the Forest Service version of the software. In 1995, IMPLAN took on the task of writing a new version of the IMPLAN software from scratch that extended the previous Forest Service version by creating an entirely new modeling system – an extension of input-output accounts and resulting Social Accounting Matrices (SAM) multipliers. Version 2 of the new IMPLAN software became available in May of 1999. The latest development of the software is now available, IMPLAN Version 3 Software System, the new economic impact assessment software system.

With IMPLAN Version 3 software, the packaging of products has changed. Version 3 utilizes 2007 or later data. When data are ordered, the data cost plus shipping are the only costs. Version 3.0 software and the new IMPLAN

---

appliance are included in the cost of the data. There are no additional fees to upgrade to IMPLAN Version 3.0. Data files are licensed to an individual user. Version 2 is no longer compatible with 2008 and later data sets.

Version 3 allows the user to do much more detailed analyses. Users can continue to create detailed economic impact estimates. Version 3.0 takes the analysis further, providing a new method for estimating regional imports and exports is being implemented - a trade model. IMPLAN can construct a model for any state, region, area, county, or zip code area in the United States by using available national, state, county, and zip code level data. Impact analysis can be performed once a regional input/output model is constructed.

### **IMPLAN Multipliers**

Five different sets of multipliers are estimated by IMPLAN, corresponding to five measures of regional economic activity. These are: total industry output, personal income, total income, value added, and employment. Two types of multipliers are generated. Type I multipliers measure the impact in terms of direct and indirect effects. Direct impacts are the changes in the activities of the focus industry or firm, such as the closing of a hospital. The focus business changes its purchases of inputs as a result of the direct impacts. This produces indirect impacts in other business sectors. However, the total impact of a change in the economy consists of direct, indirect, and induced changes. Both the direct and indirect impacts change the flow of dollars to the households. Subsequently, the households alter their consumption accordingly. The effect of the changes in household consumption on businesses in a community is referred to as an induced effect. To measure the total impact, a Type II (or Type SAM) multiplier is used. The Type II multiplier compares direct, indirect, and induced effects with the direct effects generated by a change in final demand (the sum of direct, indirect, and induced divided by direct).