



ECONOMIC IMPACT

OF OPIOID USE DISORDER IN MISSOURI

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EXECUTIVE SUMMARY

This brief supports University of Missouri Extension’s Substance Abuse and Mental Health Services Administration (SAMHSA) Rural Opioid Technical Assistance (ROTA) grant. This grant enables the creation of recovery-friendly communities and workplaces throughout the state of Missouri. Educating employers and community leaders about the challenges and consequences of opioid use disorder is an important step in developing Recovery-Friendly communities and workplaces. This brief contributes to these efforts by estimating the economic impacts of workers lost to opioid use disorder in several of Missouri’s key industry sectors.

Although the opioid crisis presents a very clear societal challenge, it raises many concerns for the labor force. Between 1999 and 2018, almost 450,000 Americans died from both prescription and illicit opioid overdoses, and the majority of these deaths occurred among people of prime working age. Economist Alan Krueger found that almost half of the prime-aged men not in the labor force took pain medication daily, and approximately two-thirds of those taking daily pain medication were using prescription drugs.

The loss of these workers from the labor force—often resulting from injury and subsequent use of pain medication—has real implications for the U.S. and Missouri workforce. This is especially true for industries (e.g., construction, extraction, healthcare, etc.) that often involve physical work, and where higher injury rates increase the likelihood of opioid prescriptions and use. This report examines the employment consequences and economic impacts of diminished labor force participation in several of Missouri’s key industry sectors most affected by opioid use disorder—agriculture, mining, utilities, construction, manufacturing, wholesale trade, transportation and warehousing, and healthcare.

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Key Findings

The American Action Forum (AAF) built on Krueger's research by examining the impact of opioid use disorder on labor force participation, and specifically doing so at the state level. The AAF study found that between 1999 and 2015, opioid use disorder reduced the Missouri labor force by 2.7 percent and 3.4 percent amongst prime aged (25 to 54) male and female workers, respectively. When applied to employment data, these findings allow us to estimate the number of Missouri workers lost to opioid addiction. From these estimates, we can determine the direct economic impacts (in terms of lost jobs, labor income, output, etc.) for the industries most affected by opioid use disorder. The resulting impacts vary by industry sector:

- The impacts on the manufacturing sector are characterized by significant job loss and far reaching economic impacts. Based on 2019 employment levels, the reduced labor force participation brought about by opioid use amongst prime age manufacturing workers directly costs the Missouri manufacturing sector roughly 5,500 jobs. However, the impacts of these lost jobs extend beyond the manufacturing sector:
 - The Missouri economy loses an estimated 14,744 total jobs (5,518 direct, 4,801 indirect, and 4,425 induced) due to opioid-related workforce losses in the state's manufacturing workforce; more succinctly—for every 10 manufacturing jobs lost to opioid use disorder, 16.7 jobs are lost elsewhere in the Missouri economy.
 - These job losses have also led to an additional loss of \$934.5 million in labor income, \$1.56 billion in value added (0.5% of Missouri's 2019 State GDP), and \$4.36 billion in output.
 - Wholesale trade, and to a somewhat lesser extent construction and transportation, are other sectors where reduced labor force participation resulting from opioid use results in significant job loss and broad reaching economic impacts.

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- In some instances, the economic impacts of diminished labor force participation caused by opioid use disorder are characterized more by job losses than broader reaching economic impacts. Overall, the total job losses resulting from opioid-related loss of workers in the healthcare industry are comparable in scale to the manufacturing sector. The Missouri economy loses an estimated 15,243 total jobs (9,812 direct, 2,411 indirect, and 3,020 induced) due to opioid-related workforce losses in the state's healthcare workforce, based on 2019 employment levels:
 - A greater relative share of the total job losses is borne by the healthcare sector and the ripple effect of these job losses are not as pronounced as in manufacturing. For every 10 healthcare jobs lost to opioid use disorder, 5.5 jobs are lost elsewhere in the Missouri economy.
 - Due to the scale of the healthcare sector, these job losses also result in an estimated loss of \$854.3 million in labor income, and \$1.17 billion in value added (0.4% of Missouri's 2019 State GDP).
 - In addition to healthcare, agriculture is another sector where the most pronounced economic impact is the loss of workers.
- There are also sectors that employ fewer workers—relative to, for instance, manufacturing or healthcare—but the loss of employment, wages and output resulting from opioid-related job losses significantly ripple throughout the economy. Sectors that exhibit these kinds of impacts include utilities and mining:
 - In total, the Missouri economy loses an estimated 693 jobs (232 direct, 192 indirect, and 269 induced) due to the opioid-related workforce losses in the state's utilities workforce. That means that for every 10 utilities jobs lost to opioid use disorder, 20 jobs are lost elsewhere in the Missouri economy.
 - Similarly, Missouri's mining sector is relatively small, but for every 10 mining jobs lost to opioid use disorder, 16.4 jobs are lost elsewhere in the Missouri economy. Moreover, for every \$100 of lost labor income in the mining sector, the Missouri economy loses more than \$250 elsewhere.

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Overall, this analysis shows the broad-based consequences of opioid use on Missouri's workforce and economy. Mitigating the negative impacts of opioid addiction requires more than just individuals trying to recover and fully participate in the workforce, and more than employers finding and retaining workers. Rather, opioid use disorder has wide reaching economic impacts, and affects entire industries and the economy at large.

As a result, efforts to address these challenges must reflect these wide-reaching impacts—not only in the actions taken—but also by the people and organizations involved. Creating Recovery Friendly Workplaces are an important step in mitigating the impacts of substance use disorder. Recovery Friendly Workplaces foster a workplace culture that promotes employee safety, health, and well-being through support for managers and employees, and by providing education and recovery resources related to the challenges surrounding substance use disorder. Establishing and sustaining Recovery Friendly Workplaces through collaboration with many partners across the state can positively impact Missouri's workforce and ultimately Missouri's economy.

INTRODUCTION

This brief is developed in support of University of Missouri Extension's Rural Opioid Technical Assistance (ROTA) grant. One of the goals of the ROTA grant is to develop a framework and guidelines for the creation of Recovery Friendly Workplaces. Recovery Friendly Workplaces foster a workplace culture that promotes employee safety, health, and well-being through support for managers and employees, and by providing recovery resources related to the challenges surrounding substance use disorders. Recovery Friendly Workplaces provide support and hope for both the employer and employee.

Educating employers and community leaders about the challenges and consequences of opioid and substance use disorder is an important step in creating Recovery Friendly Workplaces. This brief contributes to these efforts by estimating the economic impacts of workers lost to opioid addiction in a number of the state's key economic sectors. Workers unable to participate in the workforce not only directly impacts firms in these industries, but the lost capacity creates a rippling effect throughout the rest of the Missouri economy.

The consequences of the opioid crisis are many, and the relationship between the causes of the crisis and its consequences are somewhat murky. However, there appears to be mutually reinforcing relationships between economic conditions (e.g., declining manufacturing employment and wages) and opioid use that may create a feedback loop of economic and personal despair.¹ However, the impacts of opioid abuse varies between places and different demographic groups. For instance, prescription overdose deaths are highest among non-Hispanic white Americans and overdose rates are higher in South Atlantic and Mountain states. Moreover older populations report less opioid misuse and lower rates of overdose death, but individuals of aged 18 to 59 suffer higher opioid fatality rates.²

1 Case A. and Deaton A. (2015). 'Rising morbidity and mortality in midlife among white non-Hispanic Americans in the 21st century.' *Proceedings of the National Academies of Science USA*, 112(49):15078-15083.

2 Maclean, J.C., Mallatt, JI, Ruhm, C., and Simon, K. (2020). 'Economic studies on the opioid crisis: A review.' *National Bureau of Economic Research*. Working Paper 28067.

INTRODUCTION

Although the opioid crisis presents a very clear societal challenge, it also has significant labor force implications. Between 1999 and 2018, almost 450,000 Americans died from both prescription and illicit opioid overdoses, and the vast majority of these deaths occurred amongst people within the prime working ages of 15 to 64.³ Pain medication can help some workers re-enter the workforce, but addiction to pain medicine prevents many people of working age from fully participating in the labor force. As a result, substance abuse has reduced labor force participation rates beyond what might be expected from broader demographic factors such as an aging population. Economist Alan Krueger found that almost half of the prime-age men not in the labor force took pain medication daily. Moreover, approximately two-thirds of those taking daily pain medication used prescription drugs.⁴

The loss of these workers from the labor force, often resulting from injury and subsequent substance abuse, has real implications for the both the U.S. and Missouri workforce. This especially true for key employing industries (e.g., construction, extraction, healthcare, etc.) that often involve physical work, and where higher injury rates contributes to increased chance for opioid abuse.⁵ Employers from these industries often express difficulty in finding workers, and particularly skilled workers, so the loss of these workers for an extended period of time—or indefinitely—can create significant workforce challenges for employers.

This report considers the direct employment impacts of opioid-related losses in labor force participation in several key industry sectors, including agriculture, mining, utilities, construction, manufacturing, wholesale trade, transportation and warehousing, and healthcare. We also estimate the broader impacts that opioid use disorder has on these industries to show how they ripple through the broader economy. These findings can inform the messages used to generate support for recovery efforts, in part, because this information speaks to specific industries rather than the general population.

3 <https://www.cdc.gov/drugoverdose/epidemic/index.html>

4 Krueger, A.B. (2017). 'Where have all the workers gone? An inquiry into the decline of the U.S. labor force participation rate.' *Brookings Papers on Economic Activity*. 2017(2), 1-87.

5 https://www.cdc.gov/mmwr/volumes/67/wr/mm6733a3.htm?s_cid=mm6733a3_e

INTRODUCTION

The report is organized as follows. In the next section, we describe our approach to estimating economic impacts. As a result, we lay out our assumptions, identify data sources, and define the different types of impacts measured by the economic impact analysis. In the subsequent section, we show the results of the economic impact analysis for each of the 8 key industry sectors. For each sector, we highlight the direct, indirect and induced impacts in terms of employment, labor income, value added and output. These results, therefore, show the consequences of lost workers for both the industry and the Missouri economy more broadly. The report concludes by highlighting several key findings from the analysis.

OUR APPROACH

The prior work noted above—most notably, Krueger’s 2017 analysis demonstrating diminished labor force participation rates resulting from the opioid epidemic—informed our analysis. This observation has implications for both the workforce and the economy at large. Most directly, opioid addiction hinders the ability of many affected workers to fully participate in the workforce. This, in turn, leaves employers with a relatively smaller labor pool from which to draw and diminished capacity to complete work. This also limits economic activity due to decreased output and less labor income available for spending.

Krueger’s analysis estimated the impact of opioids on the entire U.S. labor force, but the American Action Forum (AAF) built on Krueger’s research by again examining the impact of opioid addiction on labor force participation, and specifically doing so at the state level.⁶ The AAF report found that between 1999 and 2015 opioid dependency reduced the labor force participation rates of prime aged workers (25 to 54) by 1.6 percent nationally. These rates varied by gender, as during that period opioid dependency reduced prime aged male and female labor force participation by 1.4 and 1.8 percent, respectively. The AAF study further examined the impacts of opioid dependence on labor force participation by state. West Virginia and Arkansas were the two states most affected, as opioid dependency resulted in a 3.8 percent decline in labor participation. Missouri, (3.0 percent), Georgia (2.9 percent), New York (2.9 percent), and Kentucky (2.8 percent) represented the next most affected group of states.

These estimates offer important inputs for determining the broader economic impacts of opioid addiction. Specifically, the AAF study found that between 1999 and 2015, opioid addiction reduced the Missouri labor force by 2.7 amongst prime aged (25 to 54) male workers, and 3.4 percent amongst prime aged (25 to 54) female workers. By identifying the share of the labor force lost to opioid addiction, we can use then publicly available employment data to estimate the number of Missouri workers lost to opioids. This, in turn, will enable us to determine the direct economic impacts (in terms of lost jobs, labor income, output, etc.) for both the industries most affected by opioid addiction, but also the economy more broadly.

⁶ Gitis, B. 2018 ‘State-by-State: The labor force and economic effects of the opioid crisis.’ American Action Forum. Available at: <https://www.americanactionforum.org/project/opioid-state-summary/#back-to-map>

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Krueger’s analysis estimated the impact of opioids on the entire U.S. labor force, but the American Action Forum (AAF) built on Krueger’s research by again examining the impact of opioid addiction on labor force participation, and specifically doing so at the state level (2). The AAF report found that between 1999 and 2015 opioid dependency reduced the labor force participation rates of prime aged workers (25 to 54) by 1.6 percent nationally. These rates varied by gender, as during that period opioid dependency reduced prime aged male and female labor force participation by 1.4 and 1.8 percent, respectively. The AAF study further examined the impacts of opioid dependence on labor force participation by state. West Virginia and Arkansas were the two states most affected, as opioid dependency resulted in a 3.8 percent decline in labor participation. Missouri, (3.0 percent), Georgia (2.9 percent), New York (2.9 percent), and Kentucky (2.8 percent) represented the next most affected group of states.

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OUR APPROACH

Identifying Key Inputs

The AAF study examined the diminished labor force participation rates within overall state economies. By contrast, this study focuses on the economic impacts of diminished labor force participation in several key economic sectors. More specifically, we examine the economic impacts of opioid abuse in 8 economic sectors—agriculture, mining, utilities, construction, manufacturing, wholesale trade, transportation and warehousing, and healthcare. To varying degrees, opioid abuse touches every economic sector. As noted above, however, industries that involve greater levels of manual labor tend to have higher incidences of opioid abuse because the increased potential for injury leads to greater use of painkillers. These industry-specific findings are also more compelling for employers because they speak directly to the workforce challenges that they face, more so than an aggregate state number.

In order to calculate these impacts, we used the AAF estimates of the losses to labor force participation by gender in Missouri. Gender is an important consideration when considering the impacts of opioid abuse on different industries because some industries possess a predominantly male workforce (e.g., construction, manufacturing), while others have a largely female workforce (e.g., healthcare). Data provided by the U.S. Census Bureau's Longitudinal Employer-Household Dynamics⁷ (QWI) allowed us to estimate the gender composition for prime age workers (ages 25 to 54) in each of these key industries in Missouri. The QWI is the only publicly available data source that provides relatively timely employment data by both age and gender.

⁷ The longitudinal employer-household dynamics (LEHD) program is a partnership between the U.S. Census Bureau and state labor market information agencies (in Missouri, the Missouri Economic Research and Information Center (MERIC)). The program connects employment records (e.g., Unemployment Insurance) to other administrative records to create datasets that, among other things, allow us to better understand the demographics of an area workforce. The Quarterly Workforce Indicators (QWI) is one of the data products emerging from this program. The QWI provides quarterly information about employment by age, race/ethnicity, gender, and educational attainment. In this instance, we used an average of the 4 available quarters of data which covered Q2 2019 to Q1 2020

OUR APPROACH

Identifying Key Inputs (cont.)

However, we did not use the QWI data for the actual employment estimates of workers effected by opioid use disorder. Similar to the U.S. Bureau of Labor Statistics' industry employment data,⁸ the QWI data only counts jobs that are included in the unemployment insurance program. As a result, these data do not include self-employment. Given the importance of self-employment to industries such as agriculture and construction, we instead elected to use employment data produced by the U.S. Bureau of Economic Analysis which accounts for both wage and salary jobs and self-employment.⁹ The most recently available year for BEA employment data is 2019.

8 The U.S. Bureau of Labor Statistics draws its information from the administrative records of the Unemployment Insurance program. As a result, it only counts 'covered employment' or jobs in firms that participate in the unemployment insurance program (typically, 'wage and salary' jobs). For industries with firms that typically have employees (e.g., manufacturing) this covers the vast majority of employment. There are, however, many industries that have a lot of self-employment (e.g., agriculture, construction, real estate). Since some of these industries involve significant amounts of manual labor and are therefore affected by opioid abuse, we needed to use data that measures 'complete employment'. These data are available from the U.S. Bureau of Economic Analysis which combines wage and salary jobs (covered employment) with the tax records arising from proprietors' income and the self-employed to give a more complete employment picture.

9 For context, in 2019 U.S. BEA measured 3.82 million total jobs in Missouri (incl. wages and salary and proprietors employment). There were 95,569 jobs in agriculture, 7,065 in mining, 12,206 in utilities, 199,474 in construction, 290,839 in manufacturing, 134,000 in wholesale trade, 150,453 in transportation and warehousing, and 462,431 in healthcare.

Industry Sector (NAICS)	Prime Age Female	Prime Age Male	Prime Age Total
Agriculture (11)	542	1,117	1,660
Mining (21)	19	107	125
Utilities (22)	62	171	232
Construction (23)	658	3,143	3,802
Manufacturing (31-33)	1,844	3,675	5,518
Wholesale Trade (42)	868	1,664	2,532
Trans. & Warehousing (48-49)	931	1,796	2,727
Healthcare (62)	8,113	1,698	9,811

TABLE 1

Estimated number of prime age (age 25-54) workers affected by Opioid Use Disorder (OUD) in key sectors

Source: U.S. Bureau of Economic Analysis; Quarterly Workforce Indicators

Table 1 shows the number of prime age workers, in each sector, lost to opioid addiction. These represent the direct employment impacts of opioid abuse. Sectors such as healthcare and manufacturing employ large numbers of workers, and as a result the number of affected workers is much greater than smaller sectors such as mining or utilities. In total, opioid abuse results in an estimated loss of 26,400 workers from these 8 sectors in a given year. Due to the scale of the healthcare sector and its predominantly female workforce, the impact of opioid abuse is split relatively evenly between men and women within these 8 sectors as a whole.

Measuring the Economic Impacts of Opioid addiction

The direct employment impacts only capture part of the economic consequences of opioid addiction. Economic impact studies often show the overall economic consequences of jobs or investment being added to an economy. The analyst models a change to an economy, and then seeks to determine the resulting changes to the overall economy. In a sense, economic impact analysis is akin to throwing a rock in a lake, where the biggest impacts occur where the rock enters the water and then ripples outward. This study takes a slightly different approach in that it focuses on the economic losses caused by opioid addiction, rather than examining the impacts of something added to the economy. More specifically, we consider the economic impacts resulting from lost workers in the Missouri industries (based on the assumptions of diminished labor force participation) that are most affected by opioid addiction.

OUR APPROACH

In order to measure the economic impacts of opioid abuse, we used IMPLAN—an economic modeling software that is widely used in academic and professional research. Using the input data described above, the IMPLAN model estimated the lost output (a measure of business transactions), labor income (including salaries, wages, and benefits), and employment (jobs). The employment estimates are headcount jobs that include both full-time and part-time positions.

The output from the IMPLAN model provides estimates for the direct, indirect and induced effects of workers lost in each of the key Missouri industries. Direct effects capture spending by employers for personnel (i.e., jobs), goods and services, utilities, and capital equipment and projects. In this study, the direct impacts will primarily show the direct loss of workers and its associated output.

Indirect effects are the economic impacts that come from the direct interaction of firms with the broader regional economy. For example, a construction firm who loses 10 workers to opioid abuse completes fewer projects and therefore is spending less on construction equipment and supplies and subcontractors. Those suppliers and subcontractors, subsequently hire fewer workers, buy less fuel for their delivery vans, or use fewer accounting services. Input-output models also account for spending that leaves the region. For example, little of the purchase value of gasoline used in delivery vehicles stays in the region since the fuel is refined elsewhere.

The **induced effects** represent the value of spending by employees, and a portion of spending by employees of the firms receiving indirect impacts, on goods and services in the region. For instance, workers lost to opioid abuse not only reduces output, but their lost wages also limit the retail purchases. When added together, the direct, indirect, and induced spending effects are greater than direct economic impact of opioid abuse and this in turn represents the “multiplier” effect.

RESULTS BY INDUSTRY SECTOR

As previously noted, the economic impacts of opioid abuse, vary due to the relative size of the industry in Missouri and the gender balance. For instance, healthcare is the largest of these industries, but also heavily staffed by women. By contrast, mining employs a relatively fewer people in the state but those workers are predominantly men. Below are the economic impacts of opioid abuse for eight affected industries, measured in terms of employment,¹⁰ labor income,¹¹ value-added,¹² and output.¹³ These findings show that at the current employment levels, these are the direct, indirect and induced losses that occur within Missouri due to the suppressed labor force participation rates resulting from opioid abuse among workers aged 25 to 54.

This information is helpful not only for demonstrating the impacts of opioid abuse on each industry. They also show the extent to which the losses in those industries ripple throughout the broader Missouri economy and cause additional lost jobs, income, and output. This information can therefore help people to more fully appreciate the consequences of the labor lost to addiction.

¹⁰ Jobs presented here are in headcount jobs, not full-time equivalents.

¹¹ Labor income includes the sum of employee compensation (wages and benefits) and proprietor income.

¹² Value-added is the total value of the wealth created by the industry activity. In this context, it is equivalent to Gross Domestic Product.

¹³ Output is the total value of an industry's production. It includes both value-added and intermediate inputs (sales to other industries).

RESULTS BY INDUSTRY SECTOR

Agriculture

The decrease in labor force participation caused by opioid addiction amongst prime age agricultural workers will directly cost the Missouri agricultural sector an estimated 1,660 jobs, \$14 million in labor income, \$51.6 million in value added, and \$157.5 million in output.

- The impact of these losses extend beyond the agricultural sector; in total, the Missouri economy loses an estimated 2,052 total jobs (1,660 direct, 219 indirect, and 172 induced) due to the opioid-caused workforce losses in the state’s agricultural workforce.
- Overall, for every one agriculture job lost to opioid addiction, 0.24 jobs are lost elsewhere in the Missouri economy
- In addition, the loss of these agricultural workers cost the broader Missouri economy:
 - \$36.2 million in labor income,
 - \$94.6 million in value added, and
 - \$236.8 million in output.

Impact Type	Employment	Labor Income	Value Added	Output
Direct Effect	-1,660	-\$13,981,700	-\$51,558,700	-\$157,546,400
Indirect Effect	-219	-\$13,675,200	-\$28,748,000	-\$53,644,600
Induced Effect	-172	-\$8,520,000	-\$14,282,800	-\$25,650,100
Total Effect	-2,052	-\$36,176,900	-\$94,589,600	-\$236,841,100

TABLE 2

Economic impacts of Opioid Use Disorder on Missouri's agricultural sector

RESULTS BY INDUSTRY SECTOR

Mining

The decrease in labor force participation caused by opioid addiction amongst prime age mining workers will directly cost the Missouri mining sector an estimated 125 jobs, \$5 million in labor income, \$15.1 million in value added and \$46.3 million in output.

- The impact of these losses extend beyond the mining sector; in total, the Missouri economy loses an estimated 330 total jobs (125 direct, 121 indirect, and 85 induced) due to the opioid-caused workforce losses in the state’s mining workforce.
- Overall, for every one mining job lost to opioid addiction, 1.64 jobs are lost elsewhere in the Missouri economy.
- In addition, the loss of these mining workers cost the broader Missouri economy:
 - \$17.7 million in labor income,
 - \$35.2 million in value added, and
 - \$83 million in output.

Impact Type	Employment	Labor Income	Value Added	Output
Direct Effect	-125	-\$5,018,200	-\$15,135,200	-\$46,304,700
Indirect Effect	-121	-\$8,485,900	-\$13,129,800	-\$24,188,600
Induced Effect	-85	-\$4,153,800	-\$6,976,100	-\$12,548,800
Total Effect	-330	-\$17,657,900	-\$35,241,000	-\$83,042,200

TABLE 3

Economic impacts of Opioid Use Disorder on Missouri's mining sector

RESULTS BY INDUSTRY SECTOR

Utilities

The decrease in labor force participation caused by opioid addiction amongst prime age utility workers will directly cost the Missouri utilities sector an estimated 232 jobs, \$32.4 million in labor income, \$98.3 million in value added, and \$236.1 million in output.

- The impact of these losses extend beyond the utilities sector; in total, the Missouri economy loses an estimated 693 total jobs (232 direct, 192 indirect, and 269 induced) due to the opioid-caused workforce losses in the state’s utilities workforce.
- Overall, for every one utilities job lost to opioid addiction, 2 jobs are lost elsewhere in the Missouri economy.
- In addition, the loss of these utilities workers cost the broader Missouri economy:
 - \$56.7 in labor income,
 - \$137.3 million in value added, and
 - \$307 million in output.

Impact Type	Employment	Labor Income	Value Added	Output
Direct Effect	-232	-\$32,382,000	-\$98,309,100	-\$236,068,100
Indirect Effect	-192	-\$11,211,100	-\$17,090,200	-\$31,653,700
Induced Effect	-269	-\$13,116,500	-\$21,899,100	-\$39,227,200
Total Effect	-693	-\$56,709,600	-\$137,298,400	-\$306,949,000

TABLE 4

Economic impacts of Opioid Use Disorder on Missouri's utilities sector

RESULTS BY INDUSTRY SECTOR

Construction

The decrease in labor force participation caused by opioid addiction amongst prime age construction workers will directly cost the Missouri construction sector an estimated 3,802 jobs, \$227.1 million in labor income, \$256.6 million in value added, and \$516.5 million in output.

- The impact of these losses extend beyond the construction sector; in total, the Missouri economy loses an estimated 6,518 total jobs (3,802 direct, 982 indirect, and 1,733 induced) due to the opioid-caused workforce losses in the state’s construction workforce.
- Overall, for every one construction job lost to opioid addiction, 0.71 jobs are lost elsewhere in the Missouri economy.
- In addition, the loss of these construction jobs cost the broader Missouri economy:
 - \$364.8 million in labor income,
 - \$490.3 million in value added, and
 - \$994.6 million in output.

Impact Type	Employment	Labor Income	Value Added	Output
Direct Effect	-3,802	-\$227,064,600	-\$256,612,700	-\$516,487,300
Indirect Effect	-982	-\$52,701,400	-\$90,456,500	-\$170,682,100
Induced Effect	-1,733	-\$85,025,000	-\$143,248,800	-\$257,424,900
Total Effect	-6,518	-\$364,791,000	-\$490,317,900	-\$944,594,400

TABLE 5

Economic impacts of Opioid Use Disorder on Missouri's construction sector

RESULTS BY INDUSTRY SECTOR

Manufacturing

The decrease in labor force participation caused by opioid addiction amongst prime age manufacturing workers will directly cost the Missouri manufacturing sector an estimated 5,518 jobs, \$436.3 million in labor income, \$725.9 million in value added, and \$2.83 billion in output.

- The impact of these losses extend beyond the manufacturing sector; in total, the Missouri economy loses an estimated 14,744 total jobs (5,518 direct, 4,801 indirect, and 4,425 induced) due to the opioid-caused workforce losses in the state’s manufacturing workforce.
- Overall, for every one manufacturing job lost to opioid addiction, 1.67 jobs are lost elsewhere in the Missouri economy.
- In addition, the loss of these manufacturing workers cost the broader Missouri economy:
 - \$934.5 billion in labor income,
 - \$1.56 billion in value added (0.5% of Missouri’s 2019 State GDP), and
 - \$4.36 billion in output.

Impact Type	Employment	Labor Income	Value Added	Output
Direct Effect	-5,518	-\$436,335,800	-\$725,895,800	-\$2,830,218,000
Indirect Effect	-4,801	-\$281,727,300	-\$472,092,400	-\$883,980,200
Induced Effect	-4,425	-\$216,435,400	-\$363,442,200	-\$645,162,700
Total Effect	-14,744	-\$934,498,600	-\$1,561,430,400	-\$4,359,360,900

TABLE 6

Economic impacts of Opioid Use Disorder on Missouri's manufacturing sector

RESULTS BY INDUSTRY SECTOR

Wholesale Trade

The decrease in labor force participation caused by opioid addiction amongst prime age wholesale trade workers will directly cost the Missouri wholesale trade sector an estimated 2,532 jobs, \$224.9 million in labor income, \$433.3 million in value added, and \$774.4 million in output.

- The impact of these losses extend beyond the wholesale trade sector; in total, the Missouri economy loses an estimated 6,324 total jobs (2,532 direct, 1,807 indirect, and 1,985 induced) due to the opioid-caused workforce losses in the state’s wholesale trade workforce.
- Overall, for each wholesale trade job lost to opioid addiction, 1.5 jobs are lost elsewhere in the Missouri economy.
- In addition, the loss of these wholesale trade workers cost the broader Missouri economy:
 - \$432.7 million in labor income,
 - \$769.3 million in value added, and
 - \$1.38 billion in output.

Impact Type	Employment	Labor Income	Value Added	Output
Direct Effect	-2,532	-\$224,904,400	-\$433,332,600	-\$774,359,200
Indirect Effect	-1,807	-\$112,634,100	-\$177,139,600	-\$316,570,700
Induced Effect	-1,985	-\$95,121,600	-\$158,876,600	-\$285,969,800
Total Effect	-6,324	-\$432,660,200	-\$769,348,800	-\$1,376,899,700

TABLE 7

Economic impacts of Opioid Use Disorder on Missouri's wholesale trade sector

RESULTS BY INDUSTRY SECTOR

Transportation and Warehousing

The decrease in labor force participation caused by opioid addiction amongst prime age transportation and warehousing workers will directly cost the Missouri transportation and warehouse sector an estimated 2,727 jobs, \$147.5 million in labor income, \$200.7 million in value added, and \$372.6 million in output.

- The impact of these losses extend beyond the transportation and warehousing sector; in total, the Missouri economy loses an estimated 4,347 total jobs (2,727 direct, 563 indirect, and 1,057 induced) due to the opioid-caused workforce losses in the state's transportation and warehousing workforce.
- Overall, for every transportation and warehousing job lost to opioid addiction, 0.59 jobs are lost elsewhere in the Missouri economy.
- In addition, the loss of these transportation and warehousing workers cost the broader Missouri economy:
 - \$230.5 million in labor income,
 - \$343.3 million in value added, and
 - \$633.1 million in output

Impact Type	Employment	Labor Income	Value Added	Output
Direct Effect	-2,727	-\$147,539,500	-\$200,669,700	-\$372,458,800
Indirect Effect	-563	-\$31,239,900	-\$55,182,100	-\$103,390,500
Induced Effect	-1,057	-\$51,715,100	-\$87,496,500	-\$157,216,300
Total Effect	-4,347	-\$230,494,500	-\$343,348,300	-\$633,065,700

TABLE 8

Economic impacts of Opioid Use Disorder on Missouri's transportation and warehousing sector

RESULTS BY INDUSTRY SECTOR

Healthcare

The decrease in labor force participation caused by opioid addiction amongst prime age healthcare workers will directly cost the Missouri healthcare sector an estimated 9,812 jobs, \$577.9 million in labor income, \$670.7 million in value-added, and \$1.13 billion in output.

- The impact of these losses extend beyond the healthcare sector; in total, the Missouri economy loses an estimated 15,243 total jobs (9,812 direct, 2,411 indirect, and 3,020 induced) due to the opioid-caused workforce losses in the state's healthcare workforce.
- Overall, for every healthcare job lost to opioid addiction, 0.55 jobs are lost elsewhere in the Missouri economy.
- In addition, the loss of these healthcare workers cost the broader Missouri economy:
 - \$854.3 million in labor income,
 - \$1.17 billion in value added (0.4% of Missouri's 2019 State GDP), and
 - \$2.03 billion in output.

Impact Type	Employment	Labor Income	Value Added	Output
Direct Effect	-9,812	-\$577,873,000	-\$670,739,000	-\$1,128,375,000
Indirect Effect	-2,411	-\$137,940,500	-\$238,807,600	-\$432,971,600
Induced Effect	-3,020	-\$138,476,300	-\$258,026,600	-\$470,723,900
Total Effect	-15,243	-\$854,289,800	-\$1,167,573,200	-\$2,032,070,500

TABLE 9

Economic impacts of Opioid Use Disorder on Missouri's healthcare sector

KEY TAKEAWAYS

The loss of workers to opioid addiction can place a real drag on the Missouri economy. Many employers already express difficulty in finding workers to fill key positions, especially positions that require specialized skills. Diminished labor force participation caused by substance abuse can shrink the talent pool even more. This creates even more hiring and retention challenges for employers, particularly those in rural places with declining populations. However, the challenges resulting from opioid abuse extend beyond just employers finding workers. For instance, the lost income resulting by not fully participating in the workforce, can hurt retail spending in communities and regions across the state.

Diminished labor force participation can also reduce economic activity throughout the state. As shown by the analysis above, the loss of workers in large employing sectors like healthcare and manufacturing can be significant. However, the diminished labor force can also limit the capacity and productivity of businesses. The resulting knock-on effects of these losses in key industries can place a drag on the state's overall economy. Sectors such as manufacturing are important components of the state's economic base, not only because they create significant numbers of good paying jobs but because manufacturers also generate large amounts of intermediate spending. This is one of the reasons why the resulting impacts from the job losses in manufacturing led to the significant loss of employment elsewhere in the Missouri economy. Similar impacts were found in sectors such as mining and utilities, although those sectors employ far fewer people.

Given that economic impacts extend far beyond individual workplaces, addressing these challenges requires collaboration between employers, industries and communities. In order to spur these groups to action, industry and community leaders need to understand how losing workers to opioid addiction not only hurts individual businesses but the economy more broadly. Addressing these issues, therefore, can lead to both greater individual and shared prosperity. Recognizing these shared challenges can help motivate employers and community leaders to take steps to get recovering addicts back into the labor force. Making treatment more widely available and putting these workers in positions to succeed and avoid relapse are important and worthwhile steps toward addressing this societal challenge.

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