



# **WORKING PAPER ON PROJECTED COSTS OF MARIJUANA LEGALIZATION IN ILLINOIS**

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## **I. Introduction/Summary**

Individuals supporting the commercialization of marijuana often fail to acknowledge the costs resulting from marijuana are from the drug itself, including, but not limited to, drugged driving costs and increased workplace absenteeism. Marijuana already plays a significant role in highway crashes<sup>1</sup>, and it is likely that legalization would only cause an increase in deaths and property damage. Furthermore, insurers are increasingly facing obstacles to successfully serve businesses and individuals alike in states that have legalized marijuana due to unclear protocols in dealing with differences between state and federal policy. Undoubtedly these types of issues will only continue to expand with the normalization and commercialization of marijuana.

To justify legalization, proponents often cite misleading reports of individuals receiving jail time upon being caught with marijuana; not recognizing that in 2016 Illinois decriminalized possession of small amounts of marijuana. Additionally, the issue of legalization is often confused with the matter of medical marijuana, claiming the drug is necessary to aid those in need of medication. Indeed, emerging evidence points to potential therapeutic value in the non-psychoactive components of the hemp plant; however, there is no conclusive evidence that THC - the mind-altering active ingredient in cannabis plants – has any medicinal value<sup>2</sup>. Regardless, any prescribed drug should undergo systematic scrutiny and validation by the FDA. Current legislation does not address this issue, and instead promotes unregulated corporate incentives over public health safety.

Minimizing marijuana use is detrimental to the overall health, moral, and productivity of Illinois and protecting the community from the adverse health effects and unlimited expenses correlating with commercialization. Legalization would only increase marijuana use and be a gateway for higher addiction rates amidst teens and adults.

Catalyst members have partnered with SAM to create this study in an attempt to publish valuable research in regards to the commercialization of marijuana. These members care about the welfare of our society and want the public to be able to make healthy decisions for one another to be as safe and healthy as possible. While we believe that this study has viable financial information about the monetary costs related to Illinois, we also feel that there are experiences far more significant than quantitative cost data. It is crucial to examine this cost study as one element of a larger view on the issue of marijuana in Illinois – an issue that touches families.

It is our job as a society to provide knowledge and establish social systems that support healthy behaviors, as opposed to allowing harmful ones. The public should be fully aware of the costs policies have on their loved ones and peers.

Much has been said about the revenues that marijuana legalization might bring to Illinois. Few, however, discuss the costs of such a policy. Omitting costs is a critical oversight: no policy or business plan would be complete without discussing both sides of the balance sheet. It is also important to note that this study uses similar, if not identical at times, verbiage and calculations as a study conducted with Rhode Island and Connecticut by SAM.

Although a full cost accounting of marijuana legalization would be impossible at present, enough data exists to make rough-and-ready estimates of certain likely direct and short-term costs, such as:

1. Administrative and enforcement costs for regulators
2. Increased drugged driving fatalities
3. Increased serious injuries from drugged driving crashes
4. Increased Property Damage to Vehicles from Drugged Driving
5. Short-term health costs
  - a. More emergency room visits for marijuana poisonings
  - b. Injuries from marijuana concentrate extraction lab explosions/fires
6. Increased rates of homelessness
7. Workplace costs/costs to employers:
  - a. Increased absenteeism
  - b. More workplace accidents

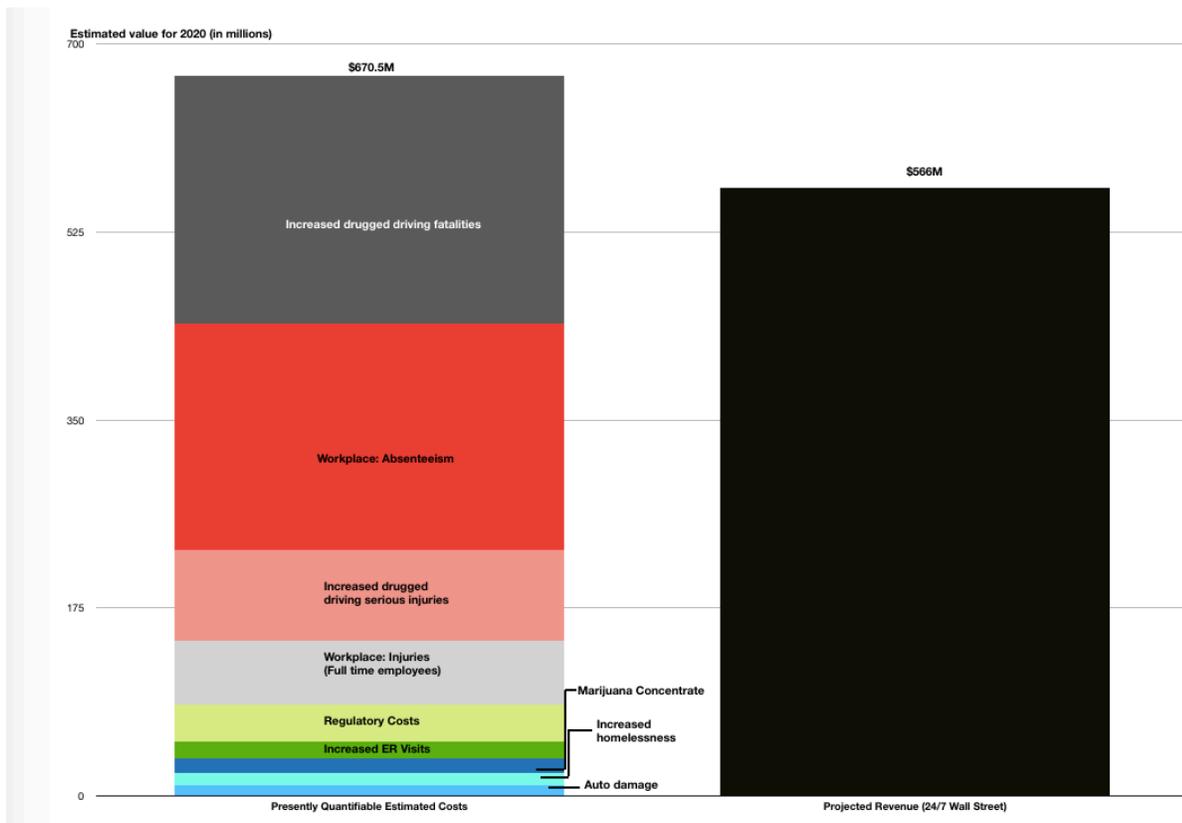
Initial approximations even of these few costs indicate that it is unlikely that revenues from legalization would ever exceed its costs. This report concludes that even conservative cost estimates of only the issues above would cost Illinois approximately \$670.5 million in 2020.

These projected costs are broken down as follows:

**Table 1.** Projected costs of individual public liabilities if marijuana is legalized in IL.

<b>Public Liability</b>	<b>Projected Annual Cost</b>	<b>% of Projected revenues (\$566 million*)</b>
Regulatory costs	\$35.4 million	6.3%
Increased drugged driving fatalities	\$231 million	40.8%
Increased drugged driving serious injuries	\$85.2 million	15.1%
Auto Damage	\$9.3 million	1.6%
Increased ER visits	\$15.5 million	2.7%
Marijuana concentrate extraction lab explosions	\$13.3 million	2.3%
Increased homelessness	\$11.9 million	2.1%
Workplace: Absenteeism	\$210.4 million	37.2%
Workplace: Injuries (full-time employees)	\$58.5 million	10.3%
<b>TOTAL</b>	<b>\$670.5 million</b>	<b>118%</b>
<i>Plus additional, presently unquantifiable costs</i>	<i>Unknown</i>	<i>Unknown</i>
<i>*24/7 Wall St. estimate</i>		

**Figure 1.** Total estimated cost as compared to projected revenue for legalization in IL.



Also, sufficient information is available to demonstrate that marijuana legalization may imply additional costs from a variety of other sources not contemplated in this analysis, even though data is not yet robust enough to readily quantify their impact:

- Additional workplace injuries among part-time employees
- Increases in alcohol use and abuse
- Increases in tobacco use
- More opioid abuse
- Increases in short-term/long-term recovery for marijuana use disorders
- Greater marijuana use among underage students
- Property and other economic damage from marijuana extraction lab explosions
- Controlling an expanded black market, sales to minors, and public intoxication
- Other administrative burdens of most state legalization programs, such as:
  - money for drugged driving awareness campaigns;
  - drug prevention programs; and
  - pesticide control and other agricultural oversight mechanisms
- Long-term health impacts of marijuana use

This last issue represents a major cost of the two currently legal, addictive recreational drugs—tobacco and alcohol. Evidence on the long-term negative health effects of marijuana use continues to mount, even though the science on this topic can be compared to scientific knowledge on tobacco’s health impacts in the 1930s.

Indeed, the indirect costs of such long-term health impacts represent almost half of the cost of tobacco to the state of California<sup>3</sup>, and it would be foolish not to acknowledge their likely impact here. Moreover, with a recent scientific study finding “evidence that chronic and heavy cannabis abuse results in long-lasting brain dysfunction in *all users* and in long-lasting schizophrenia-like psychotic symptoms in *more than half of all users*...suggest[ing] a reevaluation of the current classification of cannabis as a ‘soft narcotic’ [emphasis added]”<sup>4</sup>. These costs could be quite significant.

## II. Cost

### A. Regulatory Costs

The first and most obvious cost of marijuana legalization is paying for the regulators who oversee the commercialized marijuana program and who enforce various violations of legalization laws by both businesses and users (*e.g.*, consuming marijuana in public and enforcing licensing laws). These costs can be deceptively hard to calculate, since legalization requires not just the basic manpower to oversee the licensing apparatus, but also requires money for public health, public safety, and agricultural agencies to pay for things like police training, epidemiological monitoring and reporting, and pesticide and contaminant testing<sup>5</sup>.

Compiling accurate figures for all of these programs is challenging, and it is difficult to make comparisons from state to state, since each state's program differs from the others. Nonetheless, the Colorado experience indicates that legalization programs generally contemplate at least a certain baseline of activities: a licensing scheme with an attendant bureaucracy, ongoing training for police officers, agricultural oversight of marijuana growers (including pesticide regulation programs), programs to combat marijuana-impaired driving, and a public awareness campaign. Even though these programs are only a portion of total legalization-related administrative costs, this report focuses solely on these expenditures, resulting in a conservative estimate.

These basic costs totaled over \$15 million in Colorado for the last complete fiscal year (FY 2015-16)<sup>6</sup>:

**Table 2.** Public cost of maintaining legalized marijuana in CO from the 2015-16 fiscal year.

<b>Program Description</b>	<b>Cost</b>	<b>% of Revenue</b>
Marijuana Enforcement Division, Department of Revenue (basic licensing and enforcement)	\$7,880,009	5.0%
Office of Marijuana Coordination, Office of the Governor (policy coordination office)	\$190,097	0.1%
Cannabis health environmental and epidemiological training, outreach and surveillance, Department of Public Health and Environment	\$320,388	0.2%
Marijuana reference library and lab testing, Department of Public Health and Environment	\$376,434	0.2%
Public awareness marijuana education campaign, Department of Public Health and Environment	\$4,650,000	3.0%
Pesticide control and regulation	\$314,633	0.2%
Peace Officers Standards and Training Board expanded training activities, Department of Law	\$1,168,000	0.7%
Development of in-house expertise on regulations, Department of Law	\$436,766	0.3%
<b>TOTAL</b>	<b>\$15,336,327</b>	<b>9.7% **</b>
<p><i>*Total revenue for the 2015-16 FY = \$156,701,018 <sup>7</sup></i></p> <p><i>**As in the rest of this document, individual revenue estimates may not add up exactly to the total due to rounding.</i></p>		

This is a conservative estimate, for two reasons. First, as noted above, it does not include a significant number of the other legalization-related administrative programs in Colorado that cost money in FY 2015-16, including but not limited to:

- Substance use screening, brief intervention, and referral treatment program, Department of Health Care Policy and Financing: \$500,000
- Expansion of program grants for prevention, Department of Human Services: \$3,000,000
- School Health Professional Grant Program to address behavioral health issues in public schools: \$2,280,444
- Substance abuse and treatment contracts, Department of Human Services: \$500,000
- Scientific study of marijuana law enforcement activities, Department of Public Safety: \$159,983
- Poison control centers, Department of Public Health and Environment: \$1,000,000<sup>5</sup>

These costs in Colorado resulting from marijuana legalization totaled \$15,336,327. The ratio of the Colorado and Illinois population is roughly 1:2.31. If we simply multiply Colorado’s \$15 million by 2.31, the grand total is \$35,426,915 dollars per fiscal year for all programs due to legalization. This represents 6.3% of projected revenues.

***B. Increased Drugged Driving Fatalities***

Marijuana legalization appears to spur large increases in driving while under the influence of marijuana. In Colorado, the total percent of traffic fatalities in that state where the operator tested positive for marijuana use rose 48.9% from 2011 (pre-legalization) to 2015 (years into legalization). And the overall number of traffic deaths related to marijuana use rose 82.5% over the same four-year period—63 deaths in 2011 and up to 115 in 2015<sup>8</sup>. That equates to a 16.2% average year-over-year increase, or annual growth rate (CAGR).

$$CAGR = \left( \left( \frac{\text{final value}}{\text{original value}} \right)^{\frac{1}{\# \text{ of years}}} \right) - 1$$

$$CAGR = \left( \left( \frac{115}{63} \right)^{\frac{1}{4}} \right) - 1 = 16.2\%$$

These deaths are very expensive. The U.S. Department of Transportation values the average human life at just over \$6.6 million in 2016 dollars when calculating the economic impact of traffic safety regulations<sup>9</sup>.

This information permits some rough calculations<sup>10</sup>. In the case of Illinois, there were 1011 fatal crashes in 2017<sup>11</sup>. This number is increasing by 2% each year. A report indicates marijuana use in crashes increased by 15% from 2011-2015 and about 16.6% of car crashes contain marijuana<sup>12</sup>. If this trend continued, Illinois would report 1076 crashes in 2020, approximately 177 of which would involve marijuana:

**Table 4.** Estimated vehicular fatalities if marijuana laws remain the same in IL.

<b>Base scenario</b>					
<b>Year</b>	<b>2016</b>	<b>2017</b>	<b>2018</b>	<b>2019</b>	<b>2020</b>
<b>Fatalities</b>	1,000	1,011	1,035	1,055	1,076
<b>Fatalities where driver tests + for marijuana</b>	164	168	171	174	177
<i>(Roadway fatalities continue to increase at 2% annually. Numbers are rounded to the nearest integer.)</i>					

Assuming the rate of fatal crashes involving a driver testing positive for marijuana would increase at the same 16.2% average annual rate that it has in Colorado, and that legalization is implemented in 2018, the current trend in roadway fatalities of 2% per year would increase to 18.2% per year. That translates to 278 marijuana-related roadway fatalities in 2020, the same year for which pro-legalization activists offers their revenue projections<sup>13</sup>:

**Table 5.** Estimated vehicular fatalities if marijuana is legalized in IL.

<b>Legalization scenario</b>				
<b>Year</b>	<b>2017</b>	<b>2018</b>	<b>2019</b>	<b>2020</b>
<b>Fatalities where driver tests + for marijuana</b>	168	199	235	278
<i>(Roadway fatalities related to marijuana use now climb at approximately 18.2% annually, instead of increasing at 2% annually. Numbers are rounded to the nearest integer.)</i>				

Compared to the base scenario, this results in 101 additional deaths in 2020, compared to the base scenario. These 101 additional fatalities, valued at slightly more than \$6.6 million per life using Department of Transportation data, is a cost of about \$666.6 million in 2016 dollars. Illinois is only one third of this - 35 additional fatalities - the cost of these fatalities from legalizing marijuana is \$231 million. To be conservative, this report uses \$231 million as the cost. That represents 40.8% of projected revenues.

**C. Increased Serious Injuries from Drugged Driving Crashes**

One must also consider the costs of non-fatal injuries caused by increased drugged driving. There were 12,844 serious roadway injuries in Illinois in 2015, increasing at approximately 11% annually. Applying the same approach used in the last section, one can project numbers for 2020 if this trend continues without marijuana legalization<sup>14</sup>:

**Table 6.** Estimated vehicular injuries if marijuana laws remain the same in IL.

Base scenario						
Year	2015	2016	2017	2018	2019	2020
<b>Serious injuries</b>	12,844	14,257	15,825	17,566	19,498	21,643
<b>Serious injuries where driver tests + for marijuana</b>	2,132	2,367	2,760	3,063	3,400	3,774
<i>(Serious traffic injuries continue to increase at 11% annually. Numbers are rounded to the nearest integer.)</i>						

Assuming that the rate of change of serious traffic injuries experiences the same change as traffic fatalities due to marijuana legalization, the number of serious injuries increases after 2017:

**Table 7.** Estimated vehicular injuries if marijuana is legalized in IL.

Legalization scenario				
Year	2017	2018	2019	2020
<b>Serious injuries where driver tests + for marijuana<sup>15</sup></b>	2,760	3,511	4,466	5,681
<i>(Serious traffic injuries related to marijuana use now climb at approximately 27.2% annually, instead of 11% annually. Numbers are rounded to the nearest integer.)</i>				

The result is an additional 1,907 serious injuries where a driver tests positive for marijuana in 2020, as compared to the base scenario. Again, to be conservative this report will include only one third of this number. That yields an additional 636 accidents in 2020. Per AAA, the average cost of each roadway injury (not a serious, but of an average injury), is about \$134,000 in 2016 dollars<sup>16</sup>, resulting in an additional cost of \$85.2 million. That represents 15.1% of projected revenues.

Note that this figure does not include the cost of non-serious roadway injuries, which this report does not consider, but will also impact the state.

***D. Increased Property Damage to Vehicles from Drugged Driving***

Since 2014, Illinois has also kept extensive statistics on the number of vehicles damaged in car crashes. It is reasonable to assume that these instances of property damage will also rise when a state legalizes recreational marijuana. Data from collision insurance claims provides a general benchmark of \$3,231 (2016 dollars) for the approximate cost of damage to a vehicle in a roadway crash (this does not include damage to other property, such as buildings or other structures)<sup>17</sup>.

In 2014, Illinois received reports of 81,498 incidents of damage to vehicles related to roadway crashes, while in 2015 that number was 83,392, a 2.3% increase<sup>18</sup>. Assuming this trend continues through 2020, the state would see 93,433 total damaged vehicles in 2020. Further assuming that, as with fatal crashes, 16.6% of those injuries occurred in a crash where the driver tested positive for marijuana, this translates into 15,510 damaged vehicles:

**Table 8.** Estimated vehicular damage if marijuana laws remain the same in IL

<b>Base scenario</b>					
<b>Year</b>	<b>2016</b>	<b>2017</b>	<b>2018</b>	<b>2019</b>	<b>2020</b>
<b>Vehicles damaged in roadway crashes</b>	85,310	87,272	89,279	91,332	93,433
<b>Vehicle damages in crashes where driver tests + for marijuana</b>	14,161	14,487	14,820	15,161	15,510
<i>(Number of vehicles damaged continues to rise at 2.3% annually. Numbers are rounded to the nearest integer.)</i>					

Assuming a rate of change similar to traffic fatalities and traffic injuries due to marijuana legalization, the number of vehicles damaged in traffic crashes increases at a more rapid pace after 2017.

**Table 9.** Estimated vehicular damage if marijuana is legalized in IL.

Legalization scenario				
Year	2017	2018	2019	2020
<b>Vehicle damages in crashes where driver tests + for marijuana</b>	14,487	17,167	20,343	24,106
<i>(Number of vehicles damaged related to marijuana use now climb at approximately 18.5% annually, instead of at 2.3% annually. Numbers are rounded to the nearest integer.)</i>				

The result is approximately 8,596 more damaged vehicles in 2020 related to a driver testing positive for marijuana, as compared to the base scenario. Again, to be conservative this report will include only one third of this number. That yields an additional 2,865 damaged vehicles in 2020. As the average cost of each damaged vehicle is about \$3,231 in 2016 dollars, this results in an additional cost of \$9.3 million. This represents 1.6% of projected revenues.

### ***E. Short-term health consequences***

#### **1. Increased ER visits for marijuana poisonings**

Legalization of non-medical marijuana appears directly related to increases in emergency room visits related to marijuana use. Hospitalizations related to marijuana in Colorado have increased over 81.4% from the year prior to legalization (2011) through 2015—from 6,305 in 2011 to 11,439 in 2014<sup>19</sup>. Thus, three years after legalization, Colorado saw 5,134 additional ER visits related to marijuana use, or about 958 new cases for each million residents, given the state’s population at that time<sup>20</sup>.

Illinois' current population is 12.77 million<sup>21</sup>. Conservatively assuming that this population does not change by 2020, we are left with an estimated 12,234 additional marijuana-related ER visits as a product of legalization, assuming that the same increase in ER visits per million residents in Colorado after three years of legalization holds true in Illinois.

$$12.77 \text{ million people in IL} * \left( \frac{958 \text{ new ER cases per yr}}{1 \text{ million resident visits in IL}} \right) = 12,234 \text{ new ER visits in IL}$$

Per a 2013 study, the median charge for an emergency room visit was approximately \$1,270 in 2016 dollars<sup>22</sup>. That results in costs of approximately \$15.5 million, or about 2.7% of projected revenues.

This is also likely a conservative estimate. One observational study provides an estimate of hospital costs specifically related to marijuana (not just intoxication). That study analyzed marijuana-related costs in a 522-bed acute care hospital facility in Colorado Springs, part of a hospital network with some of the busiest emergency rooms in the state, which sees over 104,000 emergency visits annually<sup>23</sup>. It indicates marijuana-related costs at hospitals running into the hundreds of millions of dollars per year, with individual visits reaching the hundreds of thousands of dollars. A lack of more specific data makes it impossible to categorize costs by condition, but it does suggest that the above \$1,270/visit estimate might lie at the low end of the possible range<sup>23</sup>.

## 2. Marijuana concentrate extraction lab explosions

Marijuana legalization has also generated significant short-term health costs from an increase in injuries from marijuana concentrate extraction labs. These labs use volatile solvents like butane to extract concentrated THC from marijuana plant material, which easily pools in enclosed spaces and can explode if a spark or flame is introduced. The resulting explosions not only hurt those present, they also crease major property damage and dislocation of nearby residents or businesses<sup>24</sup>.

In Oregon, where the state police have kept statistics on this trend, data is available on the health costs to treat those injured in extraction lab explosions, which have also occurred in legal marijuana business, despite regulation<sup>25</sup>. In the first twelve months after retail legalization (July 2015 – July 2016), the number of burn victims from marijuana concentrate extraction increased from 7 to 30, and the associated health care costs for these victims also increased by \$4.1 million, from \$1.1 million to \$5.2 million<sup>25</sup>. This reversed a downward trend, as seen in the graphic below (note how costs declined from 2013-2014 but then rose sharply the following year when non-medical use was legalized).



**Figure 2.** Marijuana concentrate extraction burns have increased over the years since Oregon legalized marijuana. Graphic from Oregon State Police.

This increase in cost translates into approximately one dollar per resident of the state—costs increased by \$4.1 million, and Oregon’s population in 2016 was 4.093 million<sup>26</sup>. Much of those costs had to be paid from Medicare and Medicaid funds<sup>27</sup>.

To arrive at a rough projection of total costs in Illinois extraction lab explosions seen in just one year in Oregon will occur during the period 2018-2020 in Illinois and assume that the state’s population remains stable at approximately 12.7 million people<sup>28</sup>, that translates into a cost in 2020 of \$13.3 million, or about 2.3% of projected revenues.

Moreover, the above figure does not include the costs of property damage, dislocation/relocation of any residents or businesses occupying the buildings where the explosions occurred, or other economic losses. Some of these losses are significant. For example, an extraction lab explosion in an apartment building in Washington state resulted in over \$2 million in property damage and the death of a neighbor<sup>29</sup>. A similar blast in Washington state produced about \$100,000 in property damage<sup>30</sup>. A third lifted the building containing the lab six inches off its foundations, creating an unspecified amount of property damage<sup>31</sup>.

#### ***F. Increased Homelessness***

Another documented problem in post-legalization Colorado is a strong uptick in the homeless population. Denver saw its monthly homeless shelter usage increase by 50% post- legalization (July 2012 to November 2015)<sup>32</sup>. Shelter workers estimate that 20 to 30% of these new arrivals are there due to the state’s marijuana policies—or about 10 to 15 percentage points of the 50-point increase. To be conservative, this report assumes that only about one quarter of the increase is a direct consequence of legalization, or 3% over three and one third years.

$$CAGR = \left( (1.03)^{\frac{1}{3.33}} \right) - 1 = 0.0089 = 0.89\% \text{ average increase per year}$$

A rough estimate of the additional costs of homelessness stemming from legalization can be calculated using the Colorado trend. Illinois' homeless population was 10,798 in 2017<sup>33</sup>. Assuming that the Colorado trend will manifest itself in Illinois, and that shelter usage is a useful proxy for homelessness, one can calculate that in 2020, the homeless population will include 291 more people than it would have without legalization.

*Increase in homeless due to legalization*

$$\begin{aligned} &= \text{Number of homeless in 2017} * ((1 + \text{CAGR})^{\# \text{ of years}} - 1) \\ &= 10,798 * (1.0089^3 - 1) \\ &= 291 \text{ additional homeless persons in 2020 due to legalization} \end{aligned}$$

The social cost of homelessness is not trivial. In Colorado, the cost is estimated at \$45,183 per homeless person per year in 2016 dollars, to cover costs from emergency care to shelter to legal issues<sup>34</sup>. In Rhode Illinois, estimates are similar—approximately \$36,594 per homeless person per year in 2016 dollars<sup>35</sup>.

$$291 * \$40,889 = \$11.90 \text{ million}$$

This yields a cost of \$11.9 million, or 2.1% of total projected marijuana revenues.

**G. Workplace costs**

According to the National Council on Alcoholism and Drug Dependence (NCADD), illegal drug use is responsible for annual economic losses of over \$80 billion<sup>36</sup>. As marijuana is by far the most widely used illegal drug, it is unsurprising that its use would trigger significant losses on its own<sup>37</sup>.

Unlike cigarettes, marijuana's psychoactive properties intoxicate and create tangible problems in the workplace. A peer-reviewed study of thousands of employees indicated that marijuana users were unjustifiably absent from work 77% more often than non-users and had a rate of workplace injuries 85% higher than that control group. They were also involved in workplace disciplinary incidents as a rate 55% higher than the control group<sup>38</sup>, but there is less data available to quantify the costs of such behavior on employers' bottom line.

Data from the National Drug Use and Health (NSDUH), the nation’s premier annual survey on drug, alcohol, and tobacco use, supports this conclusion. Per the 2014 NSDUH, the last year for which detailed survey data is currently available, people who used marijuana in the last month were, *even when controlling for alcohol use*:

- 40% more likely to have missed at least one day of work in the last month due to injury or sickness; and
- 106% more likely – that is, more than twice as likely – to have missed at least one day of work in the last month because they “just didn’t want to be there”<sup>39</sup>.

### 1. Absenteeism

Unscheduled absenteeism in the general workforce has a defined price tag; a 2005 study reported an average cost of \$2,652 in unscheduled absenteeism costs for the average salaried worker, and \$3,591 in such costs for the average part-time worker<sup>40</sup>. In 2016 dollars, that translates to \$3,258 and \$4,412, respectively.

The total Illinois employed labor force at the end of 2017 was 6,500,400<sup>41</sup>. To be conservative for the purposes of this section’s cost analysis, this report assumes that all such employees were salaried, since absenteeism for full-time employees is less costly than for part-time employees.

The report also assumes that last-month marijuana use is a good indicator for people likely to test positive for marijuana use in the workplace. Per the NSDUH, the marijuana use rate among those 18 years old and up (those most likely to be in the workforce) has increased an average of 15.0% per annual period in Colorado from 2012-13 to 2014-15<sup>42</sup>.

$$\left( \frac{17.12\% \text{ use rate in } 2014 - 15}{12.86\% \text{ use rate in } 2012 - 13} \right)^{\frac{1}{2}} - 1 = 15.4\% \text{ avg. increase in use rate per period}$$

In Illinois, 8.03% of people ages 18 and up have used marijuana in the past month<sup>43</sup>. If one assumes that (a) this use rate stays stable through the theoretical beginning of legalization in 2018, and (b) the use rate will then increase for this age group in Illinois post-legalization at the same rate that it did in Colorado, one can estimate that in 2020, the use rate for ages 18 and up will be 10.33% in 2020, an increase of 2.3%. Conservative assuming that of these additional last-month marijuana users, only one in every two (1.15% of the total workforce) start to use marijuana in a way that creates absenteeism problems, that translates into 83,855 additional employees with absenteeism problems.

$$6,500,400 \text{ employees} * .0129 = 83,855 \text{ add'l employees with absenteeism problems}$$

If these employees, per the academic study cited above, have absenteeism rates 77% higher than their non-using colleagues, that means that they are responsible for additional absenteeism costs of \$2,509 per employee per year ( $\$3,258 * 0.77 = \$2,509$ ). That yields a total of \$210.4 million annually, or 37.2% of total projected revenues.

$$83,855 \text{ employees} * \frac{\$2,509 \text{ employee}}{\text{year}} = \$210,392,190 \text{ million}$$

## 2. Marijuana-related workplace injuries (full-time employees)

As noted above, marijuana users are also 85% more likely to suffer workplace injuries than non-users<sup>44</sup>, and thus the increase in expected marijuana use post-legalization among the working-age population is also likely to result in more workplace injuries, both fatal and non-fatal. The amount of fatal workplace injuries that occurred in 2015 was 172<sup>45</sup>. Illinois averages 3.2 cases of non-fatal workplace injuries and illnesses per every 100 full-time workers<sup>46</sup>. On a national level, due to increasingly good worker safety practices, the rate of non-fatal injuries has been slowly falling, at about 2.5% per year on average from 2010 to 2015, the last year federal data is available. That means by 2020, the rate will have reached 2.38 injuries per year per 100 full-time workers.

**Table 10:** Estimated work injuries if marijuana laws remain the same in IL.

Base scenario						
Year	2015	2016	2017	2018	2019	2020
<b>Injuries per 100 full-time workers</b>	3.2	3.12	3.04	2.96	2.89	2.82
<i>(Average decrease of 2.5% per year.)</i>						

An 85% increase in injury rates for marijuana users means that the subset of employees’ post-legalization that start using marijuana will be responsible for an additional 2.38 injuries for every 100 full-time workers.

$$\frac{\left(\frac{2.8 \text{ injuries}}{\text{year}}\right)}{100 \text{ workers}} * 85\% = 2.38 \text{ additional injuries per 100 workers per year}$$

Illinois has about 6,500,400 current employees<sup>47</sup>. In 2016, the U.S. workforce was approximately 81.7% full-time<sup>48</sup>, and in the absence of state data, it is reasonable to assume that the same proportion holds in Illinois, yielding 5,310,827 full-time employees. Using this logic one can assume that by 2020, legalization in Illinois will result in a 1.15% increase in the number of monthly marijuana users ages 18 and up. Again, to be conservative, let us assume that just a half of these new monthly marijuana users, or 1.79% of the total workforce, will use marijuana in a manner that places them at greater risk for an injury.

This means that in 2020, about 61,075 workers will be injured at this higher rate as a result of legalization. They will have, on average, an additional 2.38 injuries annually for every 100 workers, or 1,454 additional injuries.

$$5,310,827 \text{ full time workers in IL} * 1.15\% = 61,075 \text{ workers}$$

$$61,075 \text{ workers} * \frac{\left(\frac{2.38 \text{ injuries}}{\text{year}}\right)}{100 \text{ workers}} = 1,454 \text{ additional injuries}$$

Per the National Safety Council, each additional workplace injury costs, on average, approximately \$40,210 in 2016 dollars, including wage losses, medical expenses, administrative expenses, and employer costs (property damage is excluded)<sup>49</sup>. Thus, 1,454 additional workplace injuries annually yield a total cost of \$58.5 million. That, taken alone, represents 10.3% of the total projected revenues. Finally, note again that this figure only addresses full-time employees. Additional injuries among part-time employees, almost 20% of the total workforce, are not included here.

## ***H. Additional information regarding costs***

### ***1. Long-term health effects***

Evidence on the long-term negative health effects of marijuana use continues to mount, even though the science on this topic can be compared to scientific knowledge on tobacco's health impacts in the 1930s. For example, in January 2017, The National Academy of Sciences (NAS), issued a landmark report written by top scientists, *The Health Effects of Cannabis and Cannabinoids: Current State of Evidence and Recommendations for Research*. The report reviewed over 10,000 peer-reviewed academic articles for the health consequences of marijuana use.

The report concluded that marijuana use is connected to, among other problems:

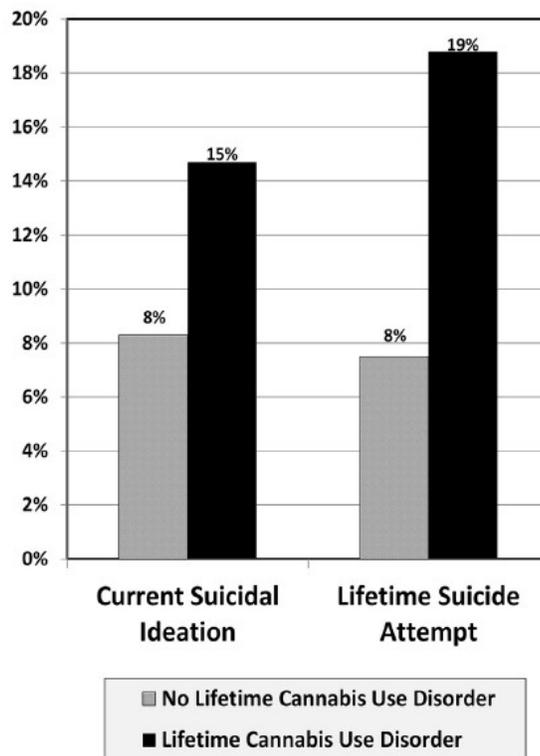
- respiratory problems;
- mental health issues (like psychosis, social anxiety, and thoughts of suicide);
- increased risk of car accidents;
- progression to and dependence on other drugs, including studies showing connections to cocaine and heroin use;
- learning, memory, and attention loss (possibly permanent in some cases);
- suicidal ideation (thoughts of suicide); and
- low birth weight<sup>50</sup>.

Similarly, a December 2016 report by the office of the U.S. Surgeon General, highlights the dangers of marijuana use and stands as a further warning of the large impending public health costs of marijuana legalization policies. Among the report’s findings:

- **Long-term health consequences of marijuana use:** mental health problems, chronic cough, frequent respiratory infections, increased risk for cancer, and suppression of the immune system.
- **Other serious health-related issues stemming from marijuana use:** breathing problems; increased risk of cancer of the head, neck, lungs, and respiratory tract; possible loss of IQ points when repeated use begins in adolescence; babies born with problems with attention, memory, and problem solving (when used by the mother during pregnancy).
- **Increased risk for traffic accidents:** Marijuana use “is linked to a roughly two-fold increase in accident risk.”
- **Increased risk of schizophrenia:** “[T]he use of marijuana, particularly marijuana with a high THC content, might contribute to schizophrenia in those who have specific genetic vulnerabilities.
- **Increased risk of addiction from high-potency marijuana available in legalized states:** “Concern is growing that increasing use of marijuana extracts with extremely high amounts of THC could lead to higher rates of addiction among marijuana users.”
- **Permanent Loss of IQ:** “One study followed people from age 13 to 38 and found that those who began marijuana use in their teens and developed a persistent cannabis use disorder had up to an eight-point drop in IQ, even if they stopped using in adulthood<sup>51</sup>.”

In some cases, the costs can be extremely high. A recent study published by the *Journal of Psychiatric Research* found that marijuana-dependent Iraq/Afghanistan-era veterans have an increased risk of suicidal thoughts and attempted suicide. More than 3,000 veterans were sampled, and the study design also controlled for factors including PTSD, depression, alcohol dependence, and other drug disorders<sup>52</sup>:

Another study expanded on the aforementioned National Academies of Sciences report and found only limited evidence that marijuana or cannabinoids could effectively treat symptoms of PTSD<sup>53</sup>. In fact, the NAS report revealed a stronger association between marijuana use and social anxiety disorders, depressive disorders, and schizophrenia<sup>54</sup>. A 2015 Yale University study also showed a connection between marijuana use and PTSD symptoms<sup>55</sup>.



**Figure 2.** Iraq/Afghanistan-era veterans with cannabis use disorder attempted suicide at over twice the rate of the control group, even when controlled for PTSD, depression, alcohol dependence, and other drug disorders, among other factors (Kimbrel et al., 2017)<sup>55</sup>.

Although science on marijuana is not nearly well-developed enough to create cost models for long-term use similar to those with tobacco (such as this exhaustive 2014 University of California, San Francisco study on the costs of tobacco use in California), the existing science already casts a long shadow. Indirect costs from long-term negative effects of smoking accounted for almost one-half of the total cost of smoking to the state in that study; suggesting that similar dynamics may well exist with marijuana<sup>56</sup>.

Additionally, an increasingly large body of evidence suggests that heavy marijuana use can have serious long-term effects. A 2017 study found “evidence that chronic and heavy cannabis abuse results in *long-lasting brain dysfunction in all users* and in long-lasting schizophrenia-like psychotic symptoms in more than half of all users...suggest[ing] a reevaluation of the current classification of cannabis as a ‘soft narcotic’ [emphasis added]<sup>57</sup>.” And another study in 2016 found that men who had begun using marijuana heavily in their late teens were 40% more likely to die by the time they reached 60 compared to those who had not used the drug<sup>58</sup>. This correlation remained even after controlling for confounding factors such as alcohol use, mental illness, and social problems<sup>59</sup>.

The fact that marijuana use is associated with a wide spectrum of both physical and mental health problems is ominous in terms of long-term health care costs. Any cost study should at least acknowledge that such long-term health costs are likely to occur and are likely to be large, even if they cannot readily be quantified at present.

## 2. Other costs

As noted in the introduction, additional costs of marijuana legalization in Colorado and Washington state have been identified, even though insufficient data exists to attempt to quantify them. These include, but are not limited to:

- Additional workplace injuries among part-time employees:

As noted above, this report only estimates the additional cost of workplace injuries among full-time employees. Additional injuries among part-time employees—which constitute almost 20% of the workforce—are an additional burden.

- Increases in alcohol use and abuse:

Despite rhetoric to the contrary, alcohol consumption has risen slightly in Colorado after legalizing marijuana in 2012<sup>60</sup>. This is unsurprising: many marijuana users like using the drug along with alcohol, instead of as a substitute, and those who use both substances are twice as likely to use both at the same time, rather than just one<sup>61</sup>. Those who smoked pot and drank at the same time were 2.3 times more likely to have driven drunk, three times more likely to have dealt with social consequences as a result of their drinking, and more than twice as likely to have experienced other social harms like fighting and relationship problems as compared to those who only consume alcohol<sup>62</sup>.

The marijuana industry's response to this demand has been to move rapidly to develop alcoholic beverages that contain THC<sup>63</sup>. The CEO of large alcohol company Constellation Brands, Inc., which owns the Svedka vodka and Corona beer brands recently announced that "We're looking at it ... There are going to be alcoholic beverages that will also contain cannabis<sup>64</sup>."

Additionally, marijuana use increases the risk of alcoholism, with all of its associated social costs. A 2016 study of over 27,000 adults showed that marijuana users are five times more likely to develop an alcohol use disorder compared to non-users and are more likely to see that problem persist<sup>65</sup>. This was true even among marijuana users that did not have any history of problems with alcohol use<sup>66</sup>.

- Increases in tobacco use:

Evidence is also mounting that marijuana use is associated with tobacco use disorders, including the seminal 2017 National Academies of Sciences report on marijuana<sup>67</sup>. Public health experts warn that the marijuana industry's push to relax smoking laws, such as Denver's new law allowing marijuana smoking in restaurants and cafés, could encourage rises in tobacco use, as well<sup>68</sup>.

- More opiate abuse:

Marijuana use is also closely linked with opiate abuse and its attendant costs. More than four in 10 people who ever use marijuana will go on to use other illicit drugs, per a large, nationally representative sample of U.S. adults<sup>69</sup>. And according to the Centers for Disease Control (CDC), marijuana users are three times more likely to be addicted to heroin than non-users<sup>70</sup>.

Prescription opioid abuse among marijuana users is also a problem. The National Academy of Sciences found that “with regard to opioids, cannabis use predicted continued opioid prescriptions 1 year after injury... marijuana use was [also] associated with reduced odds of achieving abstinence from alcohol, cocaine, or polysubstance use after inpatient hospitalization and treatment for substance use disorders<sup>71</sup>.” And another study indicated that women who use marijuana during methadone treatment are far more likely to continue using opioids than those who do not<sup>72</sup>.

- Increases in short-term/long-term recovery for marijuana use disorders

The percentage of people in drug treatment for marijuana use in Colorado reporting heavy use of the drug (more than 21 days per month), increased from 30% in 2011 (pre- legalization) to 36% in 2014<sup>73</sup>. It is to date unclear what the costs of such heavy use will be, such as longer stays in treatment facilities or relapses, but the trend is a concern.

- Greater marijuana use among underage students:

Since legalization, marijuana offenses in Colorado elementary and high schools have increased 34% in the first two years since legalization, resulting in almost 600 such new cases<sup>74</sup>. The economic cost of these problems at school is unknown, but is certainly greater than zero.

Moreover, daily marijuana users under age 17 were 60% more likely to drop out of high school than teens who did not use marijuana<sup>75</sup>. According to a 2011 study, the lifetime cost to society of a high school dropout is estimated at just over \$1 million in 2016 dollars—\$251,526 in fiscal costs and \$751,355 in indirect social impacts<sup>76</sup>.

- Secondhand smoke exposure:

The effects of secondhand marijuana smoke exposure are not nearly as well-known as those of tobacco smoke, but an initial study indicates that it may be at least as harmful to cardiovascular function<sup>77</sup>. These costs are not included in the analysis above. Secondhand tobacco smoke exposure results costs U.S. society about \$5.6 billion per year in lost productivity alone<sup>78</sup>.

- Property and other economic damage from marijuana extraction lab explosions:

As noted above, the cost of marijuana extraction lab accidents include, but are not confined to, medical expenses. They also often include extensive property damage and other economic consequences stemming from it, such as relocation of residents, which can run into the millions of dollars per incident.

- Controlling an expanded black market, use by minors, and public intoxication:

An increase in the number of marijuana extraction lab explosions is just one indicator of expanded black market activity that requires public resources. New data from Oregon, which legalized marijuana in 2014, shows that 70% of marijuana market activity is illegal—more than two of every three transactions<sup>79</sup>. Comments by the Colorado Attorney General indicate a similar dynamic in that state<sup>80</sup>. Indeed, recent reports suggest Mexican drug traffickers are using Colorado's lax marijuana laws to relocate marijuana growing operations from Mexico to Colorado<sup>81</sup>.

Moreover, as consumption levels among minors has risen, so has the need to enforce the law surrounding underage possession and use. In the two years following legalization in Colorado, the number of minors arrested for using marijuana increased 5%<sup>82</sup>.

Citations for public use of marijuana—also illegal even under legalization—have also risen in Colorado<sup>83</sup>.

Controlling all of these phenomena can cost significant state resources, none of which are considered in pro-legalization activists' proposals.

- Other administrative costs of state legalization programs:

As noted above, administrative costs for state legalization initiatives extend far beyond paying the employees of the principal regulatory bodies. Many states that have legalized the drug also spend significant sums on other enforcement-related programs such as meeting an expanded need for substance abuse and treatment<sup>84</sup>. These costs are significant, but are not included here.

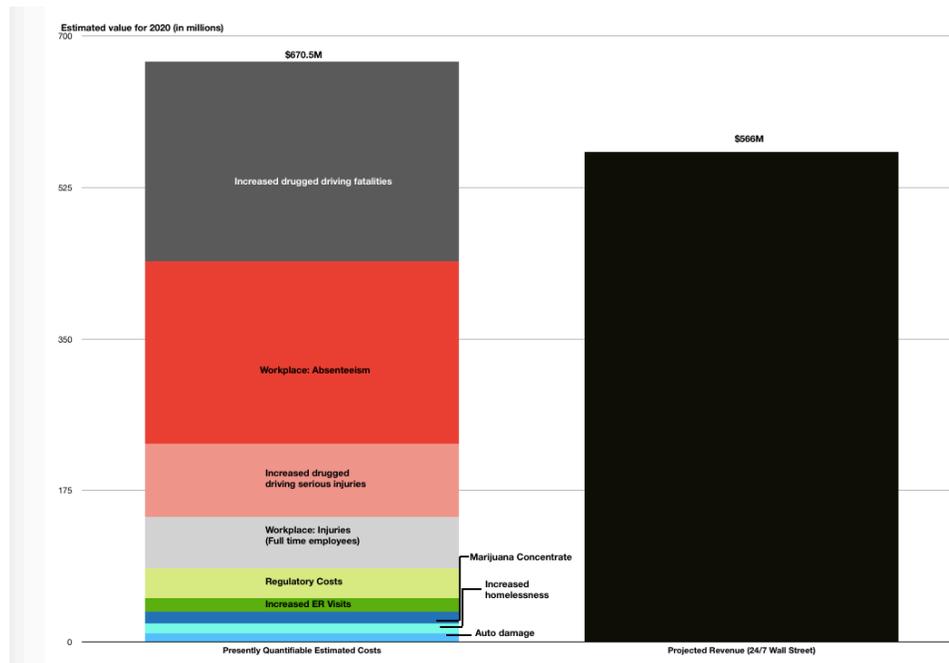
### **III. Conclusion**

Even under this conservative scenario and omitting important cost centers such as long-term health costs, marijuana legalization will cost Illinois approximately \$670.5 million in 2020, 118% more than the \$566 million in revenues that pro-legalization activists project for that year if their proposed legislation passes. Illinois' employers will shoulder a significant portion of these costs—those from additional workplace injuries and absenteeism.

**Table 11.** Projected costs by 2020 for IL if marijuana is legalized.

<b>Public Liability</b>	<b>Projected annual cost</b>	<b>% of Projected Revenues (\$566 million*)</b>
Regulatory costs	\$35.4 million	6.3%
Increased drugged driving fatalities	\$231 million	40.8%
Increased drugged driving serious injuries	\$85.2 million	15.1%
Auto Damage	\$9.3 million	1.6%
Increased ER visits	\$15.5 million	2.7%
Marijuana concentrate extraction lab explosions	\$13.3 million	2.3%
Increased homelessness	\$11.9 million	2.1%
Workplace: Absenteeism	\$210.4 million	37.2%
Workplace: Injuries (full-time employees)	\$58.5 million	10.3%
<b>TOTAL</b>	<b>\$ 670.5 million</b>	<b>118%</b>
<i>Plus additional, presently</i>	<i>Unknown</i>	<i>Unknown</i>
<i>*24/7 Wall St. estimate</i>		

**Figure 3.** Projected cost as compared to revenue for 2020 if marijuana is legalized in IL.



Finally, it warrants repeating that the above numbers represent a very conservative model, and do not include a large list of likely cost centers, including:

- Additional workplace injuries among part-time employees
- Increases in alcohol use and abuse
- Increases in tobacco use
- More opioid abuse
- Increases in short-term/long-term recovery for marijuana use disorders
- Greater marijuana use among underage students
- Property and other economic damage from marijuana extraction lab explosions
- Controlling an expanded black market, sales to minors, and public intoxication
- Other administrative burdens of most state legalization programs, such as:
  - money for drugged driving awareness campaigns;
  - drug prevention programs; and
  - pesticide control and other agricultural oversight mechanisms
- Long-term health impacts of marijuana use

Not the least of these additional costs are the long-term health consequences of marijuana use, which remain largely unknown. Illinois lawmakers should bear these economic costs in mind when considering marijuana legalization proposals—not just projected revenues.

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- <sup>9</sup> Fatality Analysis Reporting System and Colorado Department of Transportation (CDOT), as reported in Rocky Mountain HIDTA Investigative Support Center Strategic Intelligence Unit. *The Legalization of Marijuana in Colorado: The Impact, Volume 4*. Sept. 2016. Retrieved from <http://www.rmhidta.org/html/2016%20FINAL%20Legalization%20of%20Marijuana%20in%20Colorado%20The%20Impact.pdf>. This report also assumes, with respect to the various cost centers analyzed here, that the baseline for costs is the time period just prior to recreational legalization. Colorado, Washington state, Oregon, and Rhode Island have all had medical marijuana programs in place for over a decade (2000, 1998, 1998, and 2006, respectively), and as much purported medical use in many of those states was de facto recreational use, the situation just prior to the passage recreational legalization laws serves as a reasonable baseline for their impact.
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