

# THE PROJECTED COSTS OF MARIJUANA LEGALIZATION IN CONNECTICUT

*2018*



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## I. Introduction/Summary

Much has been said about the revenue that marijuana legalization might bring to Connecticut. 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.

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 drugged-driving injuries
4. Increased property damage to vehicles related to 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
  - a. Increased absenteeism
  - b. More workplace accidents among full-time employees

Initial approximations of these preliminary costs indicate that it is unlikely that revenues from legalization would ever exceed its costs. This report concludes that even a conservative cost estimate limited to only the issues above would **cost Connecticut approximately \$216 million in 2020**, which would be the third year of legalization if the policy was implemented in 2018. (According to data from the Connecticut General Assembly's Office of Fiscal Analysis, the legalization program will only be fully operational in its third year of operation.<sup>1</sup>)

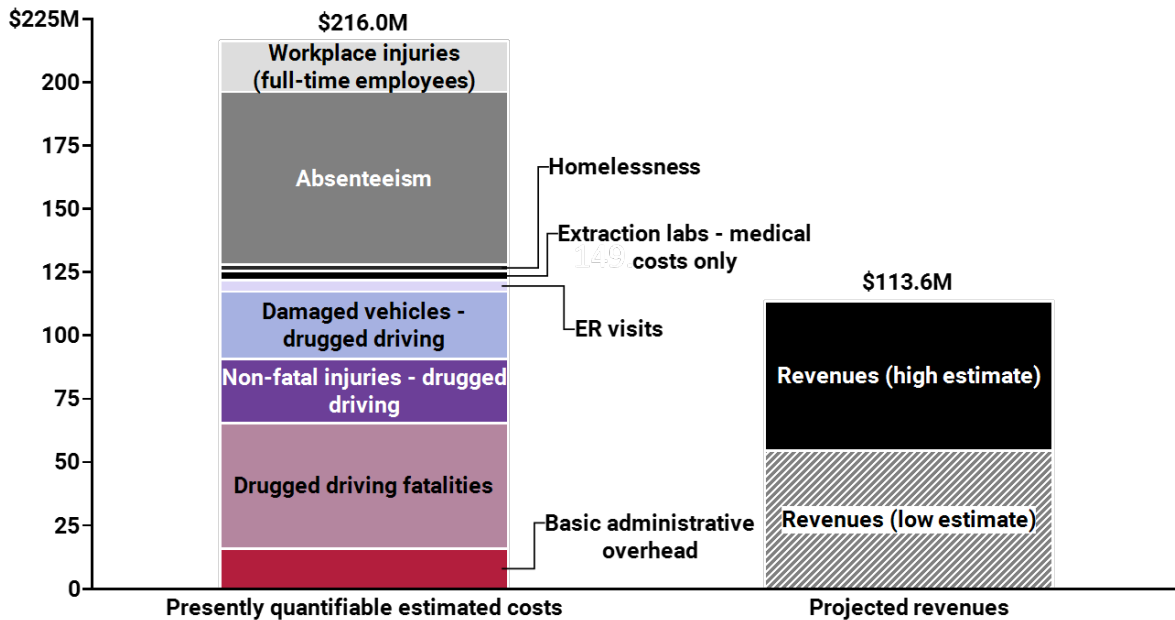
**Such costs exceed, by more than 90 percent, the maximum projected official revenue estimate of \$113.6 million for the third year of the proposed legalization program.** (These costs are almost 300 percent of the minimum revenue estimate of \$54.4 million, but to be conservative, this report uses the maximum estimate.<sup>2</sup>)

Further, even without considering such costs, **the maximum projected revenue estimate would account for just one-half of one percent of the governor's proposed FY 2018–19 budget.**<sup>3</sup> Such a conclusion is also consistent with well-established information about alcohol and tobacco, two legal drugs whose costs to society are at least 10 times the tax revenue their sale generates for the state.<sup>4</sup>

These projected costs are broken down below. (Due to rounding, the "Total" number may not reflect the exact sum of the subtotals of the individual "Cost centers.")

<b>Cost center</b>	<b>Projected annual cost</b>	<b>Percentage of projected revenues (high estimate)</b>	<b>Percentage of projected revenues (low estimate)</b>
Regulatory costs	\$15.9 million	14.0%	29.2%
Increased drugged-driving fatalities	\$49.5 million	43.6%	91.0%
Increased drugged-driving injuries	\$25.4 million	22.3%	46.6%
Increased property damage to vehicles related to drugged driving	\$26.5 million	23.3%	48.7%
Increased ER visits from marijuana intoxication	\$4.4 million	3.8%	8.0%
Marijuana-concentrate extraction lab explosions	\$3.6 million	3.2%	6.6%
Increased homelessness	\$2.7 million	2.4%	4.9%
Workplace: Increased absenteeism	\$68.1 million	59.9%	125.1%
Workplace: Injuries (full-time employees)	\$20.1 million	17.7%	36.9%
<b>TOTAL</b>	<b>\$216.0 million</b>	<b>190.1%</b>	<b>397.1%</b>
<i>Plus additional, presently unquantifiable costs</i>	<i>Unknown</i>	<i>Unknown</i>	<i>Unknown</i>

Estimated value for 2020  
(in millions of 2016 dollars)



*Even a limited number of estimated costs exceed the maximum official revenue estimate by over 90 percent. These costs are almost 300 percent higher than the minimum revenue estimate.*

Also, sufficient information is available to demonstrate that marijuana legalization likely implies additional costs from a variety of other sources not contemplated in this analysis. Though data is not yet robust enough to readily quantify their impact, these additional issues should be considered:

- Additional workplace injuries among part-time employees
- Increases in alcohol use and abuse
- Increases in tobacco use
- Increases in opioid abuse
- Increases in short-term and long-term recovery for marijuana-use disorders
- Greater marijuana use among minors, including students
- Property and other economic damage from marijuana-extraction lab explosions
- Controlling sales to minors, public intoxication, and a black market that has remained stable or possibly even expanded
- Other administrative burdens found in most states with legalization programs, such as:
  - Money for drugged-driving awareness campaigns
  - Drug prevention programs
  - Pesticide control and other agricultural oversight mechanisms
- Long-term health impacts of marijuana use

This last issue represents a major cost from 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, these long-term health impacts represent almost half of the cost of tobacco use to the state of California,<sup>5</sup> and it would be foolish not to acknowledge their likely impact here. Moreover, these costs could be quite significant given 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>6</sup>

## II. Costs

### A. Regulatory Costs

The first and most obvious cost of marijuana legalization is paying for regulation. This includes funding those 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 laws for licensing, prohibiting sales to minors, and restricting or prohibiting public use). These costs can be deceptively hard to calculate, since legalization requires not just the basic labor force 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>7</sup>

The Connecticut General Assembly’s Office of Fiscal Analysis estimates regulatory costs to be 14 percent of total revenues, or \$15.9 million.<sup>8</sup> Given that this cost estimate is from the same official source as the revenues estimate, this working paper will presume its accuracy for the purposes of calculating costs.

### B. Increased Drugged-Driving Fatalities

Marijuana legalization appears to spur increases in problems related to driving while under the influence of marijuana. For example, the percentage of roadway fatalities in the state of Washington in which a driver tested positive for recent marijuana use increased 104.6 percent in the year recreational marijuana sales began (2014).<sup>9</sup> (Note that not all drivers in fatal crashes are tested for marijuana and there may be cases where drivers had marijuana in their systems but were not screened.) This also represents a 64.9 percent increase from the year before the legalization law passed (2011).<sup>10</sup>

In Colorado, a similar dynamic exists. The percentage of all traffic fatalities in that state where the operator tested positive for marijuana use rose 48.9 percent from 2011 (the year before legalization) to 2015.<sup>11</sup> (Again, as in Washington, not all drivers in such crashes were tested for marijuana use.) And the overall number of traffic deaths in which the driver tested positive for marijuana use rose 82.5 percent over the same four-year period—63 deaths in 2011, 115 in 2015.<sup>12</sup> That equates to a 16.2 percent average year-over-year increase, i.e., the compound annual growth rate (CAGR).<sup>13</sup>

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

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

These deaths are very expensive according to official data. When calculating the economic impact of traffic safety regulations, the U.S. Department of Transportation values the average human life at just over \$6.6 million in 2016 dollars.<sup>14</sup> (This is almost identical to a recent estimate from the Canadian Centre on Substance Use and Addiction, which listed the cost of a life lost to drugged driving at Can\$8.53 million.<sup>15</sup>)

This information permits some rough calculations.<sup>16</sup> In the case of Connecticut, there were an estimated 304 fatalities from roadway crashes in 2015.<sup>17</sup> This number is, unfortunately, rising at an average of about 2.1 percent per year since 2013.<sup>18</sup> Further, although there is no specific data indicating the number of drivers who tested positive for marijuana in fatal crashes, we know from a recent national report that approximately 34.3 percent of drivers tested for drugs are found positive for a substance listed on the federal Fatality Analysis Reporting System (FARS) list (with 12.2 percent testing positive for marijuana).<sup>19</sup> We assume that this national rate applies to Connecticut, even though recent evidence suggests it may underestimate the scope of the problem.<sup>20</sup>

If this trend continues, absent marijuana legalization, Connecticut would be expected to report 330 fatal crashes in 2020, approximately 40 of which would involve marijuana:

Base scenario					
Year	2016	2017	2018	2019	2020
<b>Fatalities</b>	304	310	317	323	330
<b>Fatalities where driver tests positive for marijuana</b>	37	38	39	39	40
<i>(Roadway fatalities continue to rise at 2.1 percent annually. Numbers are rounded to the nearest integer.)</i>					



In contrast, if a legalization law does pass this year—and assuming that the rate of fatal crashes involving a driver testing positive for marijuana would increase at the same 16.2 percent per year average as in Colorado—the current upward trend in roadway fatalities of 2.1 percent per year would increase to 18.3 percent. That translates to 68 marijuana-related roadway fatalities in 2020, year three of the legalization program:

Legalization scenario				
Year	2017	2018	2019	2020
<b>Fatalities where driver tests positive for marijuana</b>	38	45	53	63
<i>(Roadway fatalities related to marijuana use now climb at approximately 18.3 percent annually, instead of 2.1 percent annually. Numbers are rounded to the nearest integer.)</i>				

Compared to the base scenario, this results in about 23 additional deaths in 2020.<sup>21</sup> Twenty-three additional fatalities, valued at slightly more than \$6.6 million per life (per U.S. Department of Transportation data), is a cost of about \$152.2 million in 2016 dollars. It cannot be assumed that marijuana use played a role in all such crashes, since the presence of the unmetabolized psychoactive compound in the plant does not always signify impairment. Therefore, to be conservative, this report assumes that in only one-third of such crashes marijuana use was a factor. (Marijuana use at least doubles the chance of being involved in a crash, thereby making this a safe assumption that likely underestimates the impact.<sup>22</sup>) This scenario yields approximately seven fatalities due to marijuana legalization in 2020, at a total cost of about \$49.5 million, or 43.6 percent of total projected revenues.

### C. Increased Drugged-Driving Injuries

Connecticut also collects robust data on non-fatal roadway injuries, which are also costly to society.<sup>23</sup> The average automobile liability policy claim for personal injuries is approximately \$16,481 in 2016 dollars.<sup>24</sup>

In 2013, the state received reports of 32,324 non-fatal injuries related to roadway crashes. In 2016, there were 38,772, a 6.3 percent average annual increase.<sup>25</sup> Assuming this trend continues through 2020, the state would see 58,736 total non-fatal injuries in 2020. Further assuming that—as with fatal crashes— 12.2 percent of those injuries occurred in a crash where the driver tested positive for marijuana, this translates into 6,034 non-fatal injuries:

<b>Base scenario</b>					
<b>Year</b>	<b>2016</b>	<b>2017</b>	<b>2018</b>	<b>2019</b>	<b>2020</b>
<b>Non-fatal roadway injuries</b>	38,772	41,195	43,770	46,506	49,413
<b>Non-fatal roadway injuries where driver tests positive for marijuana</b>	4,734	5,030	5,345	5,679	6,034
<i>(Non-fatal roadway injuries continue to rise at 6.3 percent annually. Numbers are rounded to the nearest integer.)</i>					

Assuming that the rate of change of non-fatal traffic injuries experiences the same change as traffic fatalities due to marijuana legalization, the number of non-fatal injuries increases at a more rapid pace after 2017:

<b>Legalization scenario</b>				
<b>Year</b>	<b>2017</b>	<b>2018</b>	<b>2019</b>	<b>2020</b>
<b>Non-fatal roadway injuries where driver tests positive for marijuana</b>	5,799	7,103	8,700	10,656
<i>(Non-fatal roadway injuries related to marijuana use now climb at approximately 22.5 percent annually, instead of at 6.3 percent annually. Numbers are rounded to the nearest integer.)</i>				

The result is approximately an additional 4,622 injuries where a driver tests positive for marijuana in 2020, as compared to the base scenario. Again, this report assumes that marijuana use is a direct factor in only in one-third of such crashes, as the presence of the unmetabolized psychoactive compound in the plant does not always mean impairment. That yields an additional 1,541 injuries in 2020. As the average cost of each roadway injury is about \$16,481 in 2016 dollars,<sup>26</sup> resulting in an additional cost of \$25.4 million. That represents 22.3 percent of projected revenues.

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

Since 2015, Connecticut has also kept extensive statistics on the number of vehicles damaged in car crashes.<sup>27</sup> 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 \$3,355 (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>28</sup>

In 2015, Connecticut received reports of 188,216 incidents of damage to vehicles related to roadway crashes, while in 2016 that number was 199,701, a 6.1 percent increase.<sup>29</sup> Assuming

this trend continues through 2020, the state would see 253,090 total damaged vehicles in 2020. Further assuming that, as with fatal crashes, 12.2 percent of those injuries occurred in a crash where the driver tested positive for marijuana, this translates into 30,904 damaged vehicles:

<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>	199,701	211,887	224,816	238,535	253,090
<b>Vehicles damaged in crashes where driver tests positive for marijuana</b>	24,385	25,873	27,452	29,127	30,904
<i>(Number of vehicles damaged continues to rise at 6.1 percent 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:

<b>Legalization scenario</b>				
<b>Year</b>	<b>2017</b>	<b>2018</b>	<b>2019</b>	<b>2020</b>
<b>Vehicles damaged in crashes where driver tests positive for marijuana</b>	29,832	36,496	44,648	54,622
<i>(Number of vehicles damaged related to marijuana use now climb at approximately 22.3 percent annually, instead of at 6.1 percent annually. Numbers are rounded to the nearest integer.)</i>				

The result is approximately 23,718 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 assumes that marijuana use is a direct factor in only in one-third of such crashes. That yields an additional 7,906 damaged vehicles in 2020. As the average cost of each damaged vehicle is about \$3,355 in 2016 dollars,<sup>30</sup> this results in an additional cost of \$26.5 million. This represents 23.3 percent of projected revenues.

## **E. Short-Term Health Consequences**

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

Legalization of non-medical marijuana appears to be directly related to increases in emergency room visits related to marijuana use. Hospitalizations in Colorado have increased over 81.4 percent from 2011 (the year prior to legalization) through 2015—from 6,305 to 11,439.<sup>31</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.<sup>32</sup>

Connecticut's current population is approximately 3.58 million people and is slowly rising.<sup>33</sup> Conservatively assuming that this population does not change by 2020, that yields approximately 3,428 additional marijuana-related ER visits due to legalization, assuming the same increase in ER visits per million residents as was the case in Colorado.

$$3.576 \text{ million people in CT} * \left( \frac{958.6 \text{ new ER cases per yr}}{1 \text{ million residents}} \right) \approx 3,428 \text{ new ER visits in CT}$$

Per a 2013 study, the median cost of an emergency room visit was approximately \$1,270 in 2016 dollars.<sup>34</sup> That results in costs of approximately \$4.4 million, or about 3.8 percent of projected revenues.

This is also likely a conservative estimate. One observational study exists that attempts to estimate hospital costs specifically related to marijuana (not just intoxication).<sup>35</sup> That study analyzed marijuana-related costs in a 522-bed acute care facility in Colorado Springs, part of a hospital network with some of the busiest emergency rooms in the state (with over 104,000 emergency visits annually).<sup>36</sup> It indicates marijuana-related costs at hospitals running into the hundreds of millions of dollars per year, with individual visits costing in the hundreds of thousands of dollars.<sup>37</sup> A lack of more specific data makes it impossible to categorize costs by condition, but it does suggest that the \$1,270/visit estimate above might be at the low end of the possible range. If hospital costs from marijuana-concentrate extraction lab explosions (discussed immediately below) are any indication, then a significant portion of these costs would likely be paid by Medicare and Medicaid.<sup>38</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.<sup>39</sup> The resulting explosions not only hurt those present, they also cause major property damage and dislocation of nearby residents or businesses.<sup>40</sup>

In Oregon, where the state police have kept statistics on this trend, data is available about the health costs to treat those injured in extraction lab explosions—which have also occurred in legal marijuana businesses, despite regulation.<sup>41</sup> In the first 12 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 to \$5.2 million).<sup>42</sup> This reversed a downward trend, as seen in the graphic below:

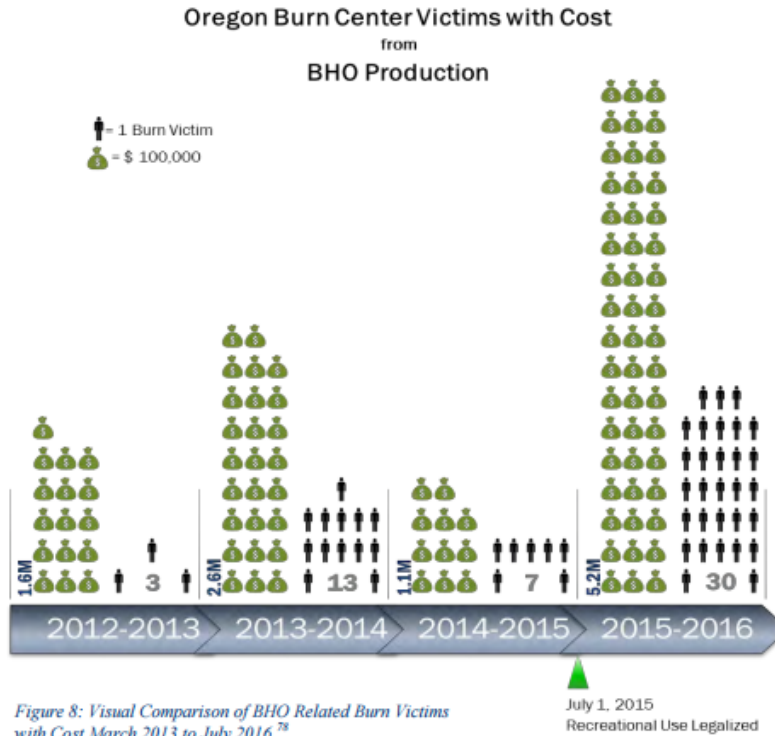


Figure 8: Visual Comparison of BHO Related Burn Victims with Cost March 2013 to July 2016<sup>78</sup>

*Graphic from Oregon State Police. Note how costs declined from 2013–2014 but then rose sharply the following year when non-medical use was legalized.*

This increase in costs translates into approximately one dollar per resident of the state (an increase of \$4.1 million and an Oregon population in 2016 of 4.093 million).<sup>43</sup> Much of those costs were paid with taxpayer dollars via Medicare and Medicaid.<sup>44</sup>

To arrive at a rough projection of total costs in Connecticut, the same metric can be applied. If one conservatively estimates that the same type of increase in extraction lab explosions seen in just one year in Oregon will occur during the first three years of legalization in Connecticut, and assuming that the state’s population remains stable at approximately 3.58 million people,<sup>45</sup> that translates into a cost of \$3.6 million in 2020, or about 3.2 percent 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 resulted in over \$2 million in property damage and the death of a neighbor.<sup>46</sup> A similar blast produced about \$100,000 in property damage.<sup>47</sup> A third lifted the building containing the lab 6 inches off its foundations, creating an unspecified amount of property damage.<sup>48</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 percent post legalization (July 2012—November 2015).<sup>49</sup> Shelter workers estimate that 20 to 30 percent of these new arrivals are there due to the state’s marijuana policies—or about 10 to 15 percent of the total.<sup>50</sup> This report uses the 10 percent figure as a conservative estimate.

The social cost of homelessness is not trivial. In Colorado, to cover costs such as emergency care, shelter, and legal issues, the cost is estimated at \$45,183 per homeless person per year in 2016 dollars.<sup>51</sup> In Connecticut, estimates are similar—approximately \$33,000 per homeless person per year in 2016 dollars.<sup>52</sup>

A rough estimate of the additional costs of homelessness stemming from legalization can be calculated using Colorado trends. Connecticut’s homeless population was 4,506 in 2013 and 3,911 in 2016, decreasing at a rate of about 4.6 percent per year on average (CAGR).<sup>53</sup> If this trend continues through 2020, one can assume that the total homeless population will fall to 3,238.

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

$$CAGR = \left( \left( \frac{3,911}{4,506} \right)^{\frac{1}{3}} \right) - 1 = -0.04611 \approx 4.6\% \text{ avg. decrease per year}$$

$$3,911 \text{ homeless in 2016} * (1 - 0.04611)^4 \approx 3,238 \text{ homeless in 2020}$$

The Colorado experience indicates a 10 percent rise in shelter usage based on marijuana legalization over approximately the first three years of that program. Assuming that the same trend will manifest itself in Connecticut, and that shelter usage is a useful proxy for homelessness over this period, one can calculate that in 2020 (year three of legalization) the homeless population will be 10 percent higher that year than it would have been without legalization. Further, to be conservative, the report assumes that only one-quarter of these new arrivals are a direct consequence of such policies, e.g., a 2.5 percent increase over three years.<sup>54</sup>

In other words, instead of continuing to fall at an average of 4.6 percent per year in the next three years, homelessness will likely fall only at about 4.0 percent per year, attenuating the current decline.

In that case, legalization implies an additional 81 homeless individuals in 2020, with an attendant annual cost of about \$2.7 million, measured in 2016 dollars. This represents 2.4 percent of total projected marijuana revenues.<sup>55</sup>

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$3,238 * 2.5\% \text{ increase by 2020} \approx 81 \text{ additional homeless in Connecticut by 2020}$

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$81 * \$30,000 \approx \$2.7 \text{ million}$

## G. Workplace Costs

According to a 2011 report by the U.S. Department of Justice, illegal drug use is responsible for annual productivity losses of over \$120 billion.<sup>56</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>57</sup> These workplace costs are of particular concern in Connecticut, which was ranked 43rd out of the 50 states in CNBC's "America's Top States for Business 2016" scorecard.<sup>58</sup>

Unlike cigarettes, marijuana's psychoactive properties intoxicate individuals 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 percent more often than nonusers, and had a rate of workplace injuries 85 percent higher than the control group.<sup>59</sup> (They were also involved in workplace disciplinary incidents as a rate 55 percent higher than the control group,<sup>60</sup> but there is less data available to quantify the costs of such behavior on employers' bottom lines.)

Data from the National Survey on Drug Use and Health (NSDUH), the nation's premier annual survey on drug, alcohol, and tobacco use, supports this conclusion. Per the NSDUH for 2014, 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 percent more likely to have missed at least one day of work in the last month due to injury or sickness
- 106 percent more likely (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>61</sup>

Again, these statistics control for alcohol use, suggesting a strong relationship between marijuana use and these negative workplace outcomes.

### 1. Absenteeism

Unscheduled absenteeism in the general workforce has a defined price tag. A 2005 study reported an average annual cost of \$2,652 in unscheduled absenteeism costs for the average salaried worker, and \$3,591 in annual costs for the average part-time worker.<sup>62</sup> In 2016 dollars, that translates to \$3,258 and \$4,412 per year, respectively.



The total Connecticut seasonally adjusted employed labor force at the start of 2017 was 1,684,000, excluding farm workers.<sup>63</sup> For the purposes of this section’s cost analysis, this report conservatively assumes that all such employees were full-time, since absenteeism for full-time employees is less costly than for part-time employees.

The report also assumes that marijuana use in the last month is a good indicator for individuals who will likely 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 percent per annual period in Colorado from 2012–2013 to 2014–2015.<sup>64</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 Connecticut, about 9.7 percent of residents 18 years old and older have used marijuana in the past month. If one conservatively assumes that, (a) this use rate stays stable through the beginning of legalization (instead of increasing, as it has done for the last several years), and (b) the use rate will then increase for this age group in Connecticut after legalization at the same rate it did in Colorado, then it can be estimated the use rate will be about 12.9 percent in 2020, an increase of 3.2 percent.

$$9.722\% \text{ current use rate} * (115.4\%)^2 \approx 12.947\% \text{ use rate in } 2020$$

Assuming conservatively that of these additional last-month marijuana users, only one in two (approximately 1.6 percent of the total workforce) start to use marijuana in such a way as to create absenteeism problems, then this translates into 27,153 employees with additional absenteeism problems.

$$1,684,000 \text{ employees} * 1.6124\% \approx 27,153 \text{ employees with add'l absenteeism problems}$$

If these employees, per the academic study cited above, have absenteeism rates 77 percent 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 x 77 percent = \$2,509). That yields a total of \$68.1 million annually, or 59.9 percent of total projected revenues for 2020.

$$27,153 \text{ employees} * \frac{\$3,258 \text{ employee}}{\text{year}} * 77\% \approx \$68.1 \text{ million}$$

(This estimate is a conservative one, given that it treats all employees as full-time employees, who have lower average annual absenteeism costs than their part-time counterparts.)

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



As noted above, marijuana users also suffer 85 percent more workplace injuries than nonusers.<sup>65</sup> 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.

Current fatal accident rates in Connecticut are about 2.6 per every 100,000 employees,<sup>66</sup> so the increase in fatal workplace accidents (unlike roadway deaths) is unlikely to be readily quantifiable over a three-year period in a state with a relatively small population.

Non-fatal accidents, however, are much more common. In 2015 the Connecticut workplace averaged 3.5 cases of non-fatal workplace injuries and illnesses per every 100 full-time workers.<sup>67</sup> According to national data, 95.2 percent of those incidents are injuries and not illnesses.<sup>68</sup> This means that in 2015, there were approximately 3.33 injuries for every 100 full-time workers.

Due to increasingly good worker safety practices, the rate of non-fatal injuries in the state has been falling at a rate of about 4.5 percent per year on average from 2010 to 2015. At that rate, by 2020, the rate will have reached 2.65 injuries per year per 100 full-time workers:

Base scenario						
Year	2015	2016	2017	2018	2019	2020
<b>Injuries per 100 full-time workers</b>	3.33	3.18	3.04	2.90	2.77	2.65
<i>(Average decrease of 4.5 percent per year.)</i>						

An 85 percent 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 2.25 injuries for every 100 full-time workers.

$$\frac{\left(\frac{2.65 \text{ injuries}}{\text{year}}\right)}{100 \text{ workers}} * 85\% = 2.25 \text{ additional injuries per 100 workers per year}$$

Connecticut has about 1,684,000 current employees, excluding farm workers. In 2016, the U.S. workforce was approximately 81.7 percent full-time<sup>69</sup> and, in the absence of readily available state data, it is reasonable to assume that the same proportion holds in Connecticut, yielding 1,375,828 full-time employees.

Referring to the subsection above, one can assume that by 2020 (year three of the legalization program), Connecticut will experience an approximate 3.2 percent 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 about 1.6 percent 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 22,184 workers (1,375,828 total full-time workers x 1.6124 percent) will be injured at this higher rate as a result of legalization. They will result, on average, in an additional 2.25 injuries annually for every 100 workers, or 500 additional injuries.

$$\overline{1,375,828 \text{ full time workers in CT} * 1.6124\% \approx 22,184 \text{ workers}}$$

$$\overline{(22,184 \text{ workers} * \frac{(2.253 \text{ injuries})}{\text{year}})} \approx 500 \text{ additional injuries}$$

Per the National Safety Council, each additional workplace injury costs, on average, approximately \$40,210 in 2016 dollars, which includes wage losses, medical expenses, administrative expenses, and employer costs (property damage is excluded).<sup>70</sup> Thus, 500 additional workplace injuries annually result in a total approximate cost of \$20.1 million. That, taken alone, represents 17.7 percent of the total projected revenues—costs largely borne by private sector employers and insurance companies. Insurance claims have become a growing concern among companies in legalized states. If marijuana use is allowed or drug testing ignored, then employers are at risk of liability claims when a marijuana-related injury or illness occurs onsite.<sup>71</sup>

Finally, note again that this figure only addresses full-time employees. Additional injuries among part-time employees, almost 20 percent of the total workforce, are not included here.

## H. Additional, But Presently Unquantifiable Costs

### 1. Long-term health effects

Evidence concerning 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 and concluded that marijuana use is connected to, among other problems:

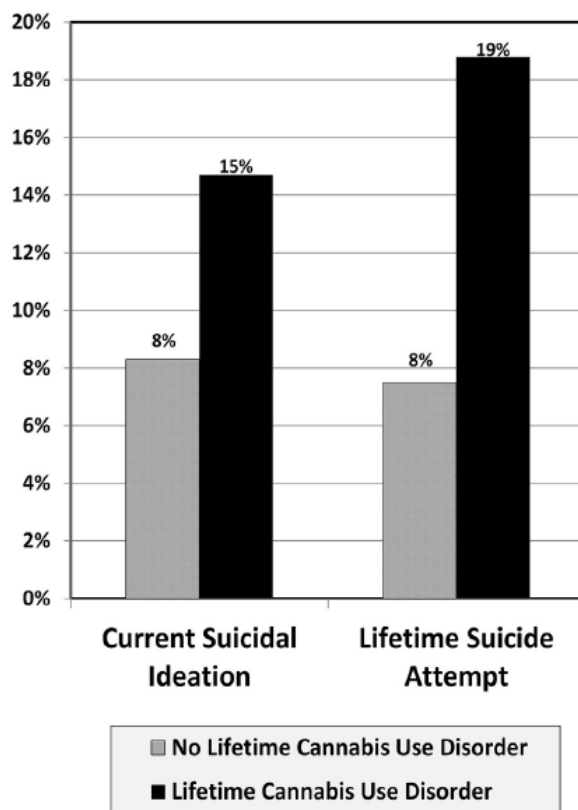
- Respiratory problems
- Mental health issues (like psychosis, social anxiety, and thoughts of suicide)
- Increased risk of car crashes
- Progression to and dependence on other drugs, including studies showing connections to cocaine and heroin use
- Learning, memory, and attention loss (possibly permanent in some cases)
- Suicidal ideation (thoughts of suicide)

- Low birth weight<sup>72</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 significant 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 attention, memory, and problem solving issues (when used by the mother during pregnancy)
- **Increased risk for traffic crashes:** 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:** “[C]oncern 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>73</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 controlled for factors including PTSD, depression, alcohol dependence, and other drug disorders:<sup>74</sup>



**Fig. 1.** Bivariate association between lifetime cannabis use disorder and current suicidal ideation and lifetime history of suicide Attempts.

*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 and other factors.*

This study expands on the above-mentioned National Academies of Sciences report, which found only limited evidence that marijuana or cannabinoids could be effective in treating symptoms of PTSD.<sup>75</sup> In fact, the NAS report revealed a stronger association between marijuana use and social anxiety disorders, depressive disorders, and schizophrenia.<sup>76</sup> A 2015 Yale University study also showed a connection between marijuana use and PTSD symptoms.<sup>77</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>78</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>79</sup> Another study in 2016 found that men who had begun using marijuana heavily in their late teens were 40 percent more likely to die by the time they reached 60 compared to those who had not used the drug.<sup>80</sup> This correlation remained even after controlling for factors such as alcohol use, mental illness, and social problems.<sup>81</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 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 percent 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>82</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>83</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>84</sup>

The marijuana industry’s response to this demand has been to move rapidly to develop alcoholic beverages that contain THC.<sup>85</sup> The CEO of large alcohol company Constellation Brands, Inc., which owns the Svedka vodka and Corona beer brands, recently announced: “We’re looking at it ... There are going to be alcoholic beverages that will also contain cannabis.”<sup>86</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 nonusers, and are more likely to see that problem persist.<sup>87</sup> This was true even among marijuana users that did not have any history of problems with alcohol use.<sup>88</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>89</sup> And 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 a rise in tobacco use as well.<sup>90</sup>
- **More opiate abuse:** Marijuana use is also closely linked with opiate abuse and its attendant costs. More than 4 in 10 people who have ever used marijuana will go on to use other illicit drugs, per a large, nationally representative sample of U.S. adults.<sup>91</sup> And according to the Centers for Disease Control and Prevention (CDC), marijuana users are three times more likely to be addicted to heroin than nonusers.<sup>92</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 one 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>93</sup> 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>94</sup>

- **Increases in short-term and 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 percent in 2011 (pre-legalization) to 36 percent in 2014.<sup>95</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 percent in the first two years since legalization, resulting in almost 600 new cases.<sup>96</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 percent more likely to drop out of high school than teens who did not use marijuana.<sup>97</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>98</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>99</sup> These costs are not included in the analysis above. Secondhand tobacco smoke exposure costs U.S. society about \$5.6 billion per year in lost productivity alone.<sup>100</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, 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 percent of marijuana-market activity is illegal, i.e., more than two of every three transactions are not legal.<sup>101</sup> Comments by the Colorado attorney general indicate a similar dynamic in that state.<sup>102</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>103</sup>

Moreover, as consumption 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 percent.<sup>104</sup> Citations for public use of marijuana—also illegal even under legalization—have also risen in Colorado.<sup>105</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>106</sup> It is unclear if these costs are included in the Connecticut General Assembly’s estimate for administrative costs.

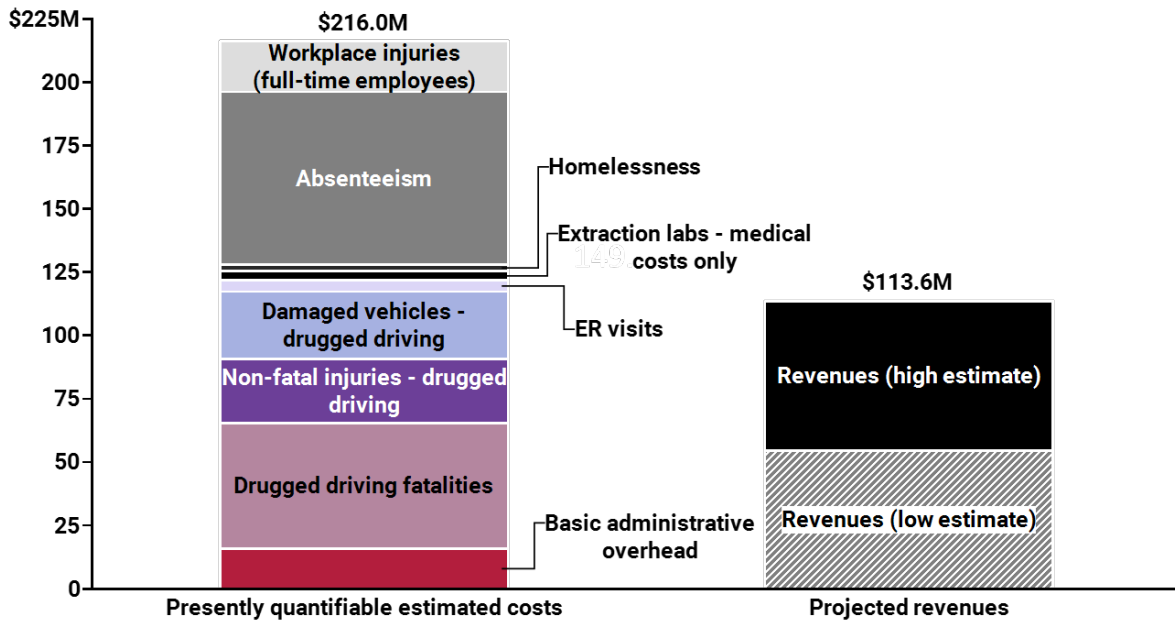
### III. Conclusion

Even under the conservative scenario developed in this working paper—and omitting important cost centers such as long-term health costs—marijuana legalization will cost Connecticut about \$216 million in 2020, over 90 percent more than the maximum official revenue estimate of \$113.6 million for that year, and almost 300 percent more than the minimum official revenue estimate of \$54.4 million. (Due to rounding, the “Total” number may not reflect the exact sum of the subtotals of the individual “Cost centers.”)

<b>Cost center</b>	<b>Projected annual cost</b>	<b>Percentage of projected revenues (high estimate)</b>	<b>Percentage of projected revenues (low estimate)</b>
Regulatory costs	\$15.9 million	14.0%	29.2%
Increased drugged-driving fatalities	\$49.5 million	43.6%	91.0%
Increased drugged-driving injuries	\$25.4 million	22.3%	46.6%
Increased property damage to vehicles related to drugged driving	\$26.5 million	23.3%	48.7%
Increased ER visits from marijuana intoxication	\$4.4 million	3.8%	8.0%
Marijuana-concentrate extraction lab explosions	\$3.6 million	3.2%	6.6%
Increased homelessness	\$2.7 million	2.4%	4.9%
Workplace: Increased absenteeism	\$68.1 million	59.9%	125.1%
Workplace: Injuries (full-time employees)	\$20.1 million	17.7%	36.9%
<b>TOTAL</b>	<b>\$216.0 million</b>	<b>190.1%</b>	<b>397.1%</b>
<i>Plus additional, presently unquantifiable costs</i>	<i>Unknown</i>	<i>Unknown</i>	<i>Unknown</i>



Estimated value for 2020  
(in millions of 2016 dollars)



*Even a limited number of estimated costs exceed the maximum official revenue estimate by over 90 percent. These costs are almost 300 percent higher than the minimum revenue estimate.*

Connecticut's employers will shoulder a significant portion of these costs, especially those from additional workplace injuries and absenteeism. Victims of drugged driving will bear a similar load.

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
- Increases in opioid abuse
- Increases in short-term/long-term recovery for marijuana use disorders
- Greater marijuana use among minors, including students
- Property and other economic damage from marijuana-extraction lab explosions
- Controlling sales to minors, public intoxication, and a black market that has remained stable or possibly even expanded
- Other administrative burdens found in most states with legalization programs, such as:
  - Money for drugged-driving awareness campaigns
  - Drug prevention programs
  - 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. Connecticut lawmakers should bear these economic costs in mind when considering marijuana-legalization proposals—not just projected revenues. What seems like a good deal when considering revenues alone is almost certainly a money loser for the state when all costs are factored into the equation.

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## Endnotes

<sup>1</sup> Office of Fiscal Analysis, Connecticut General Assembly, *Retail Marijuana Revenue Estimate (Colorado and Massachusetts)* (2017), <https://assets.documentcloud.org/documents/3455513/Revenue-From-Legalizing-Pot.pdf>.

<sup>2</sup> Ibid. These revenue estimates include all projected revenues from state taxes, licensing, and local revenues. The report lists two scenarios: 1) a “Massachusetts” model in which, assuming a legalization bill passes during the 2017 session, annual revenues will total approximately \$54.4 million after three years; and 2) a “Colorado” model with projected annual revenues of \$113.6 million after three years. To be conservative, this working paper chooses the higher of the two numbers. Additionally, this working paper assumes that if legislation passes in 2017, the revenue numbers for “year three” of legalization refer to those that are raised in 2020. Also, the Connecticut revenues report does not indicate whether this figure represents the present value of the expected future revenues, or the absolute amount of revenues expected to be brought in. To be conservative, this report assumes that the report lists values in current dollars. Note also that these costs estimates are just that (as explicitly stated elsewhere). As with estimates about marijuana tax revenue, they are meant to provide useful approximations of impacts to inform decision-making, something only possible by assigning dollar values to various impacts. This report has quantified only the impacts where enough information exists to generate useful approximations.

<sup>3</sup> S. Haigh, “Malloy’s Revised Budget Cuts Funding to Cities and Towns,” *U.S. News & World Report* (May 15, 2016), <https://www.usnews.com/news/best-states/connecticut/articles/2017-05-15/malloys-revised-budget-cuts-funding-to-cities-and-towns>.

<sup>4</sup> Centers for Disease Control and Prevention, *Economic Trends in Tobacco* (March 3, 2017), [https://www.cdc.gov/tobacco/data\\_statistics/fact\\_sheets/economics/econ\\_facts/](https://www.cdc.gov/tobacco/data_statistics/fact_sheets/economics/econ_facts/); Campaign for Tobacco-Free Kids, *State Tobacco-Prevention Spending vs. State Tobacco Revenues and Annual Smoking-Caused Health Costs* (2017), <https://www.tobaccofreekids.org/research/factsheets/pdf/0219.pdf>.

<sup>5</sup> Ibid.

<sup>6</sup> J. N. Nestoros et al., “Long Lasting Effects of Chronic Heavy Cannabis Abuse,” *American Journal on Addictions* 26, no. 4 (2017): 335–42, <https://doi.org/10.1111/ajad.12529>.

<sup>7</sup> L. Silbaugh, *Distribution of Marijuana Tax Revenue*, 4th ed., vol. 16 [Issue Brief] (Denver, CO: Colorado Legislative Council, 2016), [https://www.colorado.gov/pacific/sites/default/files/1604%20Distribution%20of%20Marijuana%20Tax%20Revenue%20Updated\\_2.pdf](https://www.colorado.gov/pacific/sites/default/files/1604%20Distribution%20of%20Marijuana%20Tax%20Revenue%20Updated_2.pdf).

<sup>8</sup> Office of Fiscal Analysis, *Retail Marijuana Revenue Estimate*.

<sup>9</sup> AAA Foundation for Traffic Safety, *Prevalence of Marijuana Involvement in Fatal Crashes: Washington, 2010–2014* (2016), <https://www.aaafoundation.org/sites/default/files/PrevalenceOfMarijuanaInvolvement.pdf>.

<sup>10</sup> Ibid.

<sup>11</sup> Fatality Analysis Reporting System and Colorado Department of Transportation, as reported in Rocky Mountain High Intensity Drug Trafficking Area, *The Legalization of Marijuana in Colorado: The Impact*, vol. 4 (2016), [http://www.rmhidta.org/html/2016%20FINAL%20Legalization%20of%20Marijuana%20in%20Colorado%20The%](http://www.rmhidta.org/html/2016%20FINAL%20Legalization%20of%20Marijuana%20in%20Colorado%20The%20)

[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. Indeed, Colorado, Washington, and Oregon (the states providing this baseline data) had medical marijuana programs in place for over a decade (2000, 1998, 1998, respectively) and much purported medical use in many of those states was *de facto* recreational use. This means that the changes occurring in those states after recreational legalization are very likely to be related to the recreational legalization laws themselves, instead of being a consequence of medical marijuana laws. In contrast, Connecticut passed its medical marijuana law in 2012—suggesting that the impact of recreational legalization laws here may be even *more* severe than in those states that have had liberal medical marijuana programs in place for many years.

<sup>12</sup> Ibid.

<sup>13</sup> National Highway Traffic Safety Administration, *Traffic Safety Facts* (2016), <https://crashstats.nhtsa.dot.gov/Api/Public/ViewPublication/812357>; National Highway Traffic Safety Administration, *Fatality Analysis Reporting System (FARS)* (n.d.), <https://www.nhtsa.gov/research-data/fatality-analysis-reporting-system-fars>; Colorado Department of Transportation, *2002–2017 Fatalities by Person Type* (June 19, 2017), [https://www.codot.gov/library/traffic/safety-crash-data/fatal-crash-data-city-county/fatalities-by-person-type/at\\_download/file](https://www.codot.gov/library/traffic/safety-crash-data/fatal-crash-data-city-county/fatalities-by-person-type/at_download/file). Indeed, even as Colorado’s population has increased, fatal crashes related to alcohol-impaired drivers have fallen during the era of recreational pot legalization, from 160 in 2011 to 143 in 2015 (in crashes where BAC was greater than or equal to 0.08 percent), an 11 percent drop over four years. At the same time, traffic fatalities overall have risen from 447 in 2011 to 608 in 2016, a 26 percent rise as drivers testing positive for marijuana use have risen sharply.

<sup>14</sup> US Department of Transportation, *Treatment of the Economic Value of a Statistical Life in Departmental Analyses: 2011 Interim Adjustment* (2011), [https://www.transportation.gov/sites/dot.gov/files/docs/Value\\_of\\_Life\\_Guidance\\_2011\\_Update\\_07-29-2011.pdf](https://www.transportation.gov/sites/dot.gov/files/docs/Value_of_Life_Guidance_2011_Update_07-29-2011.pdf). \$6.2 million in 2011 dollars. The median jury verdict for wrongful death is somewhat lower, around \$1 million. But this number is generalized for all wrongful deaths, does not focus on roadway fatalities specifically, and does not have any specific scientific grounding.

C. Sunstein and E. Posner, “Dollars and Death,” John M. Olin Program in Law and Economics Working Paper No. 222, 2004, [http://chicagounbound.uchicago.edu/law\\_and\\_economics/182/](http://chicagounbound.uchicago.edu/law_and_economics/182/). This valuation is in line with an American Automobile Association estimate of approximately \$6.4 million in 2016 dollars.

Larry Copeland, “AAA: Fatal Motor Vehicle Crash Costs \$6 Million,” *USA Today* (November 3, 2011), <https://usatoday30.usatoday.com/news/nation/story/2011-11-02/fatal-vehicle-crashes-cost-millions/51051030/1>.

<sup>15</sup> Canadian Centre on Substance Abuse and Addiction, *Collisions Attributable to Cannabis: Estimating the Harms and Costs in the Canadian Provinces* (2017), <http://www.ccsa.ca/Resource%20Library/CCSA-Collisions-Attributable-to-Cannabis-Report-at-a-Glance-2017-en.pdf>.

<sup>16</sup> It is, of course, difficult to distinguish between correlation and causation. Nonetheless, a string of strong correlative relationships is certainly sufficient to inform policy decisions. Evidence proving that tobacco smoking definitively caused lung cancer was only available in the 1990s, long after it had become clear the two were closely intertwined, and US society began to curtail the practice. (Indeed, it was the tobacco industry, whose profits were bound up in concealing this relationship that fought most strenuously to denigrate evidence of harms as “merely correlation.” Given the science showing how marijuana use impairs driving, it does not strain credulity—or common sense—to place confidence in evidence showing a correlation between marijuana legalization and increased drug-impaired driving.

<sup>17</sup> University of Connecticut, *Connecticut Crash Data Repository*, <http://www.ctcrash.uconn.edu/> [query of all cases under investigation and complete, 2013–2016, CAS2MUCC database].

<sup>18</sup> Ibid.

<sup>19</sup> Ibid.

<sup>20</sup> “AAA: Drugged Driving Worse in Connecticut Than In Most States,” *CBS Connecticut* (May 3, 2017), <http://connecticut.cbslocal.com/2017/05/03/aaa-drugged-driving-worse-in-connecticut-than-in-most-states/>. National data revealed that in Connecticut, a full 63 percent of drivers in fatal crashes tested positive for drugs, about 1.5 times the national average. Another recent AAA survey of Connecticut drivers revealed that 23 percent “regularly” or “fairly often” drove within an hour of using marijuana.

C. Dempsey, “AAA: Study Shows CT May Have More Drugged Drivers Than Other States,” *Hartford Courant*

(May 3, 2017), <http://www.courant.com/breaking-news/hc-drugged-driving-study-0504-20170503-story.html>.

Indeed, in neighboring Rhode Island, 33 percent of all drivers in fatal crashes test positive for marijuana.

<sup>21</sup> As noted above, these numbers are rounded. There cannot, naturally, be a “fraction of a life,” but as intermediate numbers in calculations are not rounded, “fractions of a life” are used to calculate final numbers.

<sup>22</sup> R. L. Hartman and M. A. Huestis, “Cannabis Effects on Driving Skills,” *Clinical Chemistry* 59, no. 3 (2013): 478–92, doi:10.1373/clinchem.2012.194381; R. L. Hartman et al., “Cannabis Effects on Driving Lateral Control With and Without Alcohol,” *Drug Alcohol Dependency* 154 (2015): 25–37, doi: 10.1016/j.drugalcdep.2015.06.015; M.-C. Li et al., “Marijuana Use and Motor Vehicle Crashes,” *Epidemiologic Reviews* 34, no. 1(2012): 65–72, <http://doi.org/10.1093/epirev/mxr017>.

<sup>23</sup> University of Connecticut, *Connecticut Crash Data Repository*.

<sup>24</sup> Rocky Mountain Insurance Information Association, *Cost of Auto Crashes and Statistics* (2015), [http://www.rmiia.org/auto/traffic\\_safety/Cost\\_of\\_crashes.asp](http://www.rmiia.org/auto/traffic_safety/Cost_of_crashes.asp) (archived at <http://archive.is/CXJqX>).

<sup>25</sup> University of Connecticut, *Connecticut Crash Data Repository* [query of all cases under investigation and complete, 2013–2016, CAS2MUCC database].

<sup>26</sup> Rocky Mountain Insurance, *Cost of Auto Crashes*.

<sup>27</sup> University of Connecticut, *Connecticut Crash Data Repository*.

<sup>28</sup> Ibid.

<sup>29</sup> University of Connecticut, *Connecticut Crash Data Repository* [query of all cases under investigation and complete, 2015–2016, CAS2MUCC database].

<sup>30</sup> Rocky Mountain Insurance, *Cost of Auto Crashes*.

<sup>31</sup> Colorado Hospital Association and Colorado Department of Public Health and Environment, as reported in Rocky Mountain, *Legalization of Marijuana in Colorado*.

<sup>32</sup> A. Svaldi, “Colorado’s Population Jumped by 101,000 in 12 Months,” *Denver Post* (December 22, 2015), <http://www.denverpost.com/2015/12/22/colorados-population-jumped-by-101000-in-12-months/>. Colorado’s population was about 5.356 million in mid-2014.

<sup>33</sup> US Census Bureau, “Population Estimates, July 1, 2016” (2017), <https://www.census.gov/quickfacts/table/PST045215/09>.

<sup>34</sup> Nolan Caldwell et al., “‘How Much Will I Get Charged for This?’ Patient Charges for Top Ten Diagnoses in the Emergency Department,” *PLoS ONE* 8, no. 2 (2013): e55491, <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3584078/>.

<sup>35</sup> K. Finn and R. Salmore, “The Hidden Costs of Marijuana Use in Colorado: One Emergency Department’s Experience,” *Journal of Global Drug Policy and Practice* 10, no. 2 (2016): (2010), [http://www.globaldrugpolicy.org/Issues/Vol%2010%20Issue%202/Articles/The%20Hidden%20Costs%20of%20Marijuana%20Use%20in%20Colorado\\_Final.pdf](http://www.globaldrugpolicy.org/Issues/Vol%2010%20Issue%202/Articles/The%20Hidden%20Costs%20of%20Marijuana%20Use%20in%20Colorado_Final.pdf).

<sup>36</sup> Ibid.

<sup>37</sup> Ibid.

<sup>38</sup> Oregon State Police-Drug Enforcement Section, *A Baseline Evaluation of Cannabis Enforcement Priorities in Oregon* (Salem, OR: Author, 2017), <https://learnaboutsam.org/wp-content/uploads/2017/04/Oregon-State-Police-report-January-2017.pdf>. See comments that significant portions of health care costs from lab explosions in Oregon had to be paid out of public Medicare and Medicaid funds.

<sup>39</sup> “House Explosion Illustrates Hash Oil Danger,” *WoodTV8* (December 8, 2016), <http://woodtv.com/2016/12/08/house-explosion-illustrates-hash-oil-danger/>.

<sup>40</sup> “Man Seriously Injured When Butane Hash Lab Sparks Home Fire,” *12 News* (February 26, 2017), <http://www.12news.com/news/local/arizona/man-seriously-injured-when-butane-hash-lab-sparks-home-fire/414657213>.

<sup>41</sup> N. Crombie, “Blast Rocks Legal Marijuana Business in Astoria, Sends 2 to Burn Unit,” *The Oregonian/Oregon Live* (October 20, 2016), [http://www.oregonlive.com/marijuana/index.ssf/2016/10/blast\\_rocks\\_legal\\_marijuana\\_bu.html](http://www.oregonlive.com/marijuana/index.ssf/2016/10/blast_rocks_legal_marijuana_bu.html). Similar statistics are seen in Colorado, with 32 confirmed extraction lab explosions and 30 related injuries in 2014, two years post-legalization (up from 12 explosions and 18 injuries just the year before); J.

Coe-Harris, “Marijuana: BHO Explosions on the Rise,” *Daily Reporter* (April 17, 2016), <http://www.thedailyreporter.com/news/20160417/marijuana---bho-explosions-on-rise>.

<sup>42</sup> Oregon State Police-Drug Enforcement Section, *A Baseline Evaluation*.

<sup>43</sup> US Census Bureau, “Population Estimates, July 1, 2016,” (2017), <https://www.census.gov/quickfacts/table/PST045216/41>. Oregon’s population in 2016 was 4.093 million.

<sup>44</sup> Oregon State Police-Drug Enforcement Section, *A Baseline Evaluation*.

<sup>45</sup> US Census Bureau, “Population Estimates, July 1, 2016,” (2017), <https://www.census.gov/quickfacts/table/PST045215/09>.

<sup>46</sup> G. Johnson, “Man Sentenced to 9 Years in Fatal Bellevue Hash-Oil Blast,” *Komo News* (June 7, 2015), <http://komonews.com/news/local/man-sentenced-to-9-years-in-fatal-bellevue-hash-oil-blast>. According to media reports, one of the men responsible later stated in a court filing that “I only got involved in this because I thought that the legalization movement of marijuana in Washington would provide me with funds to be a part of my boys [sic] lives, and it went so far in the opposite direction I can’t think of it without crying, or having a panic attack. Looking back and seeing the percentage that marijuana took up of my life makes me sick.”

<sup>47</sup> “2 Sentenced to Federal Prison for Kirkland Hash Oil Explosion,” *Seattle Times* (March 3, 2015), <http://www.seattletimes.com/seattle-news/2-sentenced-to-federal-prison-for-kirkland-hash-oil-explosion/>.

<sup>48</sup> J. Sullivan, “Powerful Mount Baker Explosion Blamed on Hash Oil,” *Seattle Times* (January 7, 2014), <http://blogs.seattletimes.com/today/2014/01/powerful-blast-rocks-mount-baker-apartment-building/>.

<sup>49</sup> Joel Warner, “Marijuana Legalization in Colorado: How Recreational Weed Is Attracting People, But Spiking the State’s Homeless Rate,” *International Business Times* (June 20, 2016), <http://www.ibtimes.com/marijuana-legalization-colorado-how-recreational-weed-attracting-people-spiking-2374204>.

<sup>50</sup> Ibid.

<sup>51</sup> L. DePillis, “Why Denver is Trucking Its Homeless to the Middle of Nowhere,” *Washington Post* (August 8, 2014), [https://www.washingtonpost.com/news/storyline/wp/2014/08/08/why-denver-is-trucking-its-homeless-to-the-middle-of-nowhere/?utm\\_term=.5ac87b981cd4](https://www.washingtonpost.com/news/storyline/wp/2014/08/08/why-denver-is-trucking-its-homeless-to-the-middle-of-nowhere/?utm_term=.5ac87b981cd4); State of Colorado, “Fort Lyon Provides New Tool in Statewide Effort to End Homelessness [Press release],” (May 24, 2013), <https://www.colorado.gov/governor/news/fort-lyon-provides-new-tool-statewide-effort-end-homelessness>. \$43,240 in 2012 dollars.

<sup>52</sup> K. Flaherty, “Cost to Connecticut Taxpayers of a Homeless Person for a Year: \$33,000,” *CT Viewpoints* (April 27, 2017), <https://ctviewpoints.org/2017/04/27/cost-to-connecticut-taxpayers-of-a-homeless-person-for-a-year-33000/>. Citing official testimony of the commissioner of the Connecticut Department of Housing.

<sup>53</sup> Connecticut Coalition to End Homelessness, *Connecticut Counts: 2016 Report on Homelessness in Connecticut* (Hartford, CT: Author, 2016), <http://cceh.org/wp-content/uploads/2016/05/CT-Counts-2016.pdf>; Connecticut Coalition to End Homelessness, *Connecticut Counts 2015: The Experience of Homelessness Statewide* (Hartford, CT: Author, 2015), <http://cceh.org/wp-content/uploads/2015/09/Connecticut-Counts-2015-STATE.pdf>.

<sup>54</sup> Indeed, the overall number of homeless individuals in Colorado has increased over 8 percent since 2013 and the number of homeless households has risen over 27 percent in the same time period, according to reports from the US Department of Health and Human Services.

<sup>55</sup> The Weather Channel, “Denver, CO Monthly Weather Forecast,” (June 24, 2017), <https://weather.com/weather/monthly/1/USCO0105>; The Weather Channel, “Hartford, CT Monthly Weather Forecast,” (June 14, 2017), <https://weather.com/weather/monthly/1/USCT0094:1:US>. Of course, patterns of homelessness are different from state to state, and some of the same patterns driving homelessness in Colorado may be different in Connecticut. Nonetheless, it is worth noting that Denver has colder average low temperatures in the winter than Hartford.

<sup>56</sup> National Drug Intelligence Center, *The Economic Impact of Illicit Drug Use on American Society: 2011* (Washington, DC: US Department of Justice, 2011), <https://www.justice.gov/archive/ndic/pubs44/44731/44731p.pdf>.

<sup>57</sup> A. Halsey III, “Amtrak Engineer in Fatal Crash Tested Positive for Marijuana, NTSB Says,” *Washington Post* (January 26, 2017), [https://www.washingtonpost.com/local/trafficandcommuting/amtrak-engineer-in-fatal-crash-tested-positive-for-marijuana-opioids-ntsb-says/2017/01/26/27e7fba6-e3f0-11e6-a453-19ec4b3d09ba\\_story.html?utm\\_term=.ab53162c3c70](https://www.washingtonpost.com/local/trafficandcommuting/amtrak-engineer-in-fatal-crash-tested-positive-for-marijuana-opioids-ntsb-says/2017/01/26/27e7fba6-e3f0-11e6-a453-19ec4b3d09ba_story.html?utm_term=.ab53162c3c70). Recent incidents in the United States and abroad underline this point. The



engineer involved in a 2016 train crash that killed two line workers in Pennsylvania tested positive for marijuana use after the wreck, per a National Transportation Safety Board report.

A. Brown, “Stoned Assembly Line Workers Cost BMW \$1 Million in One Day, Report Claims,” *The Drive* (March 20, 2017), [http://www.thedrive.com/news/8449/stoned-assembly-line-workers-cost-bmw-1-million-in-one-dayreportclaimsutm\\_content=inf\\_10\\_3522\\_2&xid=socialedge\\_pd&tse\\_id=INF\\_930fda1010e911e7af245d7f4020bc76](http://www.thedrive.com/news/8449/stoned-assembly-line-workers-cost-bmw-1-million-in-one-dayreportclaimsutm_content=inf_10_3522_2&xid=socialedge_pd&tse_id=INF_930fda1010e911e7af245d7f4020bc76). And more recently, two employees at a German BMW plant who got high just before reporting to their stations caused over \$1 million in losses after they caused an assembly line stoppage.

<sup>58</sup> “America’s Top States for Business 2016: The List and Ranking,” *CNBC.com* (2016), <http://www.cnbc.com/2016/07/12/americas-top-states-for-business-2016-the-list-and-ranking.html>.

<sup>59</sup> C. Zwerling, “The Efficacy of Preemployment Drug Screening for Marijuana and Cocaine in Predicting Employment Outcome,” *Journal of the American Medical Association* 264, no. 20 (1990): 2639.

<sup>60</sup> *Ibid.*

<sup>61</sup> Substance Abuse and Mental Health Services Administration, *National Survey on Drug Use and Health, 2014* (Rockville, MD: Author, 2015).

<sup>62</sup> “Shift Work and Absenteeism: The Bottom Line Killer,” *Circadian* (n.d.), <http://www.workforceinstitute.org/wp-content/themes/revolution/docs/Absenteeism-Bottom-Line.pdf>; Investopedia, “The Causes and Costs of Absenteeism in the Workplace,” *Forbes* (July 10, 2013), <https://www.forbes.com/sites/investopedia/2013/07/10/the-causes-and-costs-of-absenteeism-in-the-workplace/#77f8b93b3eb6>; D. Wilkie, “Part-Time Employees More Likely to Be Depressed, Miss More Work,” *Society for Human Resource Management* (August 7, 2013), <https://www.shrm.org/resourcesandtools/hr-topics/employee-relations/pages/part-time-employees-more-likely-depressed-miss-work.aspx>. Note that part-time absenteeism likely costs employers more per year due to the higher absenteeism rate among that cohort, as well as the potential greater difficulty in covering an absent part-time employee’s specific shift as compared to a full-time employee who misses a day.

<sup>63</sup> Connecticut Department of Labor, “Nonfarm Employment/Residents Employed: State of Connecticut,” (May 18, 2017), <https://www1.ctdol.state.ct.us/lmi/ctnonfarmemployment.asp>.

<sup>64</sup> Substance Abuse and Mental Health Services Administration, *National Survey on Drug Use and Health: 2016* (Rockville, MD: Author, 2016). The NSDUH reports state-level data annually as the average of the previous two-year period, and data for the over 18 age cohort from the recent past is available starting in 2012–2013. This is likely a conservative estimate—if the average annual rate of increase in Colorado is calculated using data for the other relevant age cohort (that of people 26 years of age or older), the average annual change is even higher in this time period.

<sup>65</sup> C. Zwerling, “The Efficacy of Preemployment Drug Screening for Marijuana and Cocaine in Predicting Employment Outcome,” *Journal of the American Medical Association* 264, no. 20 (1990): 2639.

<sup>66</sup> US Bureau of Labor Statistics, “Fatal Occupational Injury Rates by Industry, 2015: Connecticut,” (December 16, 2016), <https://www.bls.gov/iif/oshwc/cfoi/rate2015ct.htm>.

<sup>67</sup> US Bureau of Labor Statistics, “Incidence Rates of Nonfatal Occupational Injuries and Illnesses by Industry and Case Types, 2010,” (n.d.), <https://www.bls.gov/iif/oshwc/osh/os/pr106ct.pdf>.

<sup>68</sup> US Bureau of Labor Statistics, “Occupational Injuries and Illnesses (Annual) [News Release],” (October 27, 2016), [https://www.bls.gov/news.release/archives/osh\\_10272016.htm](https://www.bls.gov/news.release/archives/osh_10272016.htm).

<sup>69</sup> US Bureau of Labor Statistics, “Table A-9: Selected Employment Indicators,” (March 10, 2017), <https://www.bls.gov/news.release/empsit.t09.htm>. Seasonally adjusted data for February, 2016.

<sup>70</sup> National Safety Council, *Injury Facts: 2013 Edition* (Itasca, IL: Author, 2013), <http://www.mhi.org/downloads/industrygroups/ease/technicalpapers/2013-National-Safety-Council-Injury-Facts.pdf>.

<sup>71</sup> G. C. Hlavac and E. J. Easterly, *Legal Issues: Marijuana in the Workplace* (Bethlehem, PA: National Association of Colleges and Employers, 2016), <http://www.nacweb.org/public-policy-and-legal/legal-issues/legal-issues-marijuana-in-the-workplace/>.

- <sup>72</sup> National Academies of Science, Engineering, and Medicine, *The Health Effects of Cannabis and Cannabinoids: Chapter Highlights* [Issue brief]. (Washington, DC: Author, 2017), <http://nationalacademies.org/hmd/~media/Files/Report%20Files/2017/Cannabis-Health-Effects/Cannabis-chapter-highlights.pdf>.
- <sup>73</sup> US Public Health Service, *Facing Addiction in America: The Surgeon General's Report on Alcohol, Drugs, and Health* (Washington, DC: US Department of Health and Human Services, Office of the Surgeon General, 2016), <https://addiction.surgeongeneral.gov/surgeon-generals-report.pdf>.
- <sup>74</sup> Kimbrel et al., “Cannabis Use Disorder and Suicide Attempts in Iraq/Afghanistan-Era Veterans,” *Journal of Psychiatric Research* 89 (2017): 1–5, <https://www.ncbi.nlm.nih.gov/m/pubmed/28129565/>.
- <sup>75</sup> National Academies of Science, *Health Effects of Cannabis and Cannabinoids*.
- <sup>76</sup> Kimbrel, “Cannabis Use Disorder.”
- <sup>77</sup> Wilkinson et al., “Marijuana Use is Associated with Worse Outcomes in Symptom Severity and Violent Behavior in Patients with Posttraumatic Stress Disorder,” *Journal of Clinical Psychiatry* 76, no. 9 (2015): 1174–80, <https://www.ncbi.nlm.nih.gov/pubmed/26455669>.
- <sup>78</sup> Max et al., *The Cost of Smoking in California, 2009* (San Francisco, CA: Institute for Health and Aging, University of California, San Francisco, 2014), <http://www.trdrp.org/files/cost-smoking-ca-final-report.pdf>.
- <sup>79</sup> J. N. Nestoros et al., “Long Lasting Effects of Chronic Heavy Cannabis Abuse,” *American Journal on Addictions* 26, no. 4 (2017): 335–42, <https://doi.org/10.1111/ajad.12529>.
- <sup>80</sup> E. Manrique-Garcia et al., “Cannabis, Psychosis, and Mortality: A Cohort Study of 50,373 Swedish Men,” *American Journal of Psychiatry* 173, no. 8 (2016): 790–98, <https://doi.org/10.1176/appi.ajp.2016.14050637>
- <sup>81</sup> Ibid.
- <sup>82</sup> Colorado Department of Revenue, as cited in Rocky Mountain, *Legalization of Marijuana in Colorado*.
- <sup>83</sup> M. S. Subbaraman and W. C. Kerr, “Simultaneous Versus Concurrent Use of Alcohol and Cannabis in the National Alcohol Survey,” *Alcoholism: Clinical and Experimental Research* 39, no. 5 (2015): 872–79, <https://doi.org/10.1111/acer.12698>.
- <sup>84</sup> Ibid.
- <sup>85</sup> Danielle Tullo, “There’s A Weed-Infused Wine On The Market: But There’s A Catch,” *Cosmopolitan* (October 11, 2016), <http://www.cosmopolitan.com/food-cocktails/a5274780/pot-wine-canna-vine/>.
- <sup>86</sup> More Kaplan, “Cannabis Cocktails? Constellation Sees Opening As Pot Laws Ease,” *Bloomberg.com* (November 10, 2016), <https://www.bloomberg.com/news/articles/2016-11-10/weed-liquor-corona-executive-sees-opportunity-in-legalization>.
- <sup>87</sup> A. H. Weinberger et al., “Is Cannabis Use Associated with an Increased Risk of Onset and Persistence of Alcohol Use Disorders? A Three-Year Prospective Study among Adults in the United States,” *Drug and Alcohol Dependence* 161 (2016): 363–67, <https://doi.org/10.1016/j.drugalcdep.2016.01.014>.
- <sup>88</sup> Ibid.
- <sup>89</sup> National Academies of Science, *Health Effects of Cannabis and Cannabinoids*.
- <sup>90</sup> Anna Gorman, “Will Legal Marijuana Lead To More People Smoking Tobacco?” *NPR.org* (November 18, 2016), <http://www.npr.org/sections/health-shots/2016/11/18/502567273/will-legal-marijuana-lead-to-more-people-smoking-tobacco>.
- <sup>91</sup> R. Secades-Villa et al., “Probability and Predictors of the Cannabis Gateway Effect: A National Study,” *International Journal of Drug Policy* 26, no. 2 (2015): 135–42.
- <sup>92</sup> Centers for Disease Control and Prevention, *Today’s Heroin Epidemic: More People At Risk, Multiple Drugs Abused* (Atlanta, GA: Author, 2015), <https://www.cdc.gov/vitalsigns/heroin/>.
- <sup>93</sup> National Academies of Science, *Health Effects of Cannabis and Cannabinoids*.
- <sup>94</sup> L. Zielinski et al., “Association Between Cannabis Use and Methadone Maintenance Treatment Outcomes: An Investigation into Sex Differences,” *Biology of Sex Differences* 8, no. 1 (2017): 1–10, <https://doi.org/10.1186/s13293-017-0130-1>.
- <sup>95</sup> Colorado Department of Human Services, as reported in Colorado Division of Criminal Justice, Office of Research and Statistics, *Marijuana Legalization in Colorado: Early Findings* (Denver: Colorado Department of Public Safety, 2016).

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<sup>96</sup> Colorado Division of Criminal Justice, *Marijuana Legalization in Colorado*.

<sup>97</sup> Sillins et al., “Young Adult Sequelae of Adolescent Cannabis Use: An Integrative Analysis,” *The Lancet Psychiatry* 1, no. 4 (2014): 286–93, [http://dx.doi.org/10.1016/S2215-0366\(14\)70307-4](http://dx.doi.org/10.1016/S2215-0366(14)70307-4).

<sup>98</sup> C. R. Belfield et al., *The Economic Value of Opportunity Youth* (Washington, DC: Corporation for National and Community Service and White House Council on Community Solutions, 2012), [http://www.civcenterprises.net/MediaLibrary/Docs/econ\\_value\\_opportunity\\_youth.pdf](http://www.civcenterprises.net/MediaLibrary/Docs/econ_value_opportunity_youth.pdf). Findings include a lifetime taxpayer burden of \$235,680 and a lifetime social burden of \$704,020, calculated as the present value of those lifetime costs in 2011 dollars.

<sup>99</sup> X. Wang et al., “One Minute of Marijuana Secondhand Smoke Exposure Substantially Impairs Vascular Endothelial Function,” *Journal of the American Heart Association: Cardiovascular and Cerebrovascular Disease* 5, no. 8 (2016): e003858, <http://doi.org/10.1161/JAHA.116.003858>. Quote: “One minute of exposure to marijuana [second-hand smoke, or] SHS substantially impairs endothelial function in rats for at least 90 minutes, considerably longer than comparable impairment by tobacco SHS.”

<sup>100</sup> Centers for Disease Control, *Economic Trends in Tobacco*.

<sup>101</sup> Oregon State Police-Drug Enforcement Section, *A Baseline Evaluation*.

<sup>102</sup> “Special Report, ‘Clearing the Haze:’ Black Market is Thriving in Colorado,” *Colorado Springs Gazette* (March 20, 2015), <http://gazette.com/special-report-clearing-the-haze-black-market-is-thriving-in-colorado/article/1548305>.

<sup>103</sup> Sally Mamdooh, “Mexican Drug Cartels Are Taking Full Advantage of Colorado’s Marijuana Laws,” *7NEWS* (April 8, 2016), <http://www.thedenverchannel.com/news/local-news/marijuana/mexican-drug-cartels-are-taking-full-advantage-of-colorados-marijuana-laws>.

<sup>104</sup> Colorado Department of Public Safety, *Marijuana Legalization in Colorado*. Perversely, the increase in arrests were localized to Latino and African-American youth, whose arrest numbers rose 29 percent and 58 percent respectively. Arrests of Caucasian youth for marijuana fell 8 percent during the same timeframe.

<sup>105</sup> Rocky Mountain, *Legalization of Marijuana in Colorado*.

<sup>106</sup> Silbaugh, *Distribution of Marijuana Tax Revenue*.