SAM Smart Approaches to Marijuana
preventing another big tobacco

WORKING PAPER ON PROJECTED COSTS OF MARIJUANA LEGALIZATION IN RHODE ISLAND

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I. Introduction/Summary

Much has been said about the revenues that marijuana legalization might bring to Rhode Island. 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.

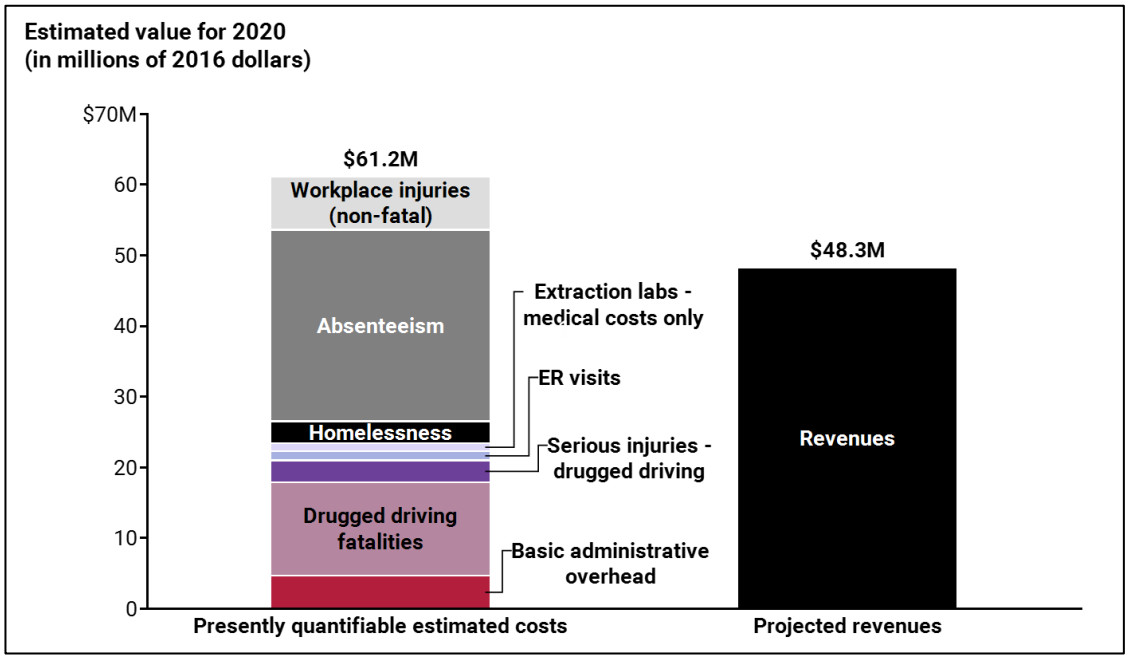
Although a full cost accounting of marijuana legalization would be impossible at present, enough data exists to make rough-and-ready estimates of certain likely direct and short-term costs, such as:

1. Administrative and enforcement costs for regulators
2. Increased drugged driving fatalities
3. Increased serious injuries from drugged driving crashes
4. Short-term health costs
    a. More emergency room visits for marijuana poisonings
    b. Injuries from marijuana concentrate extraction lab explosions/fires
5. Increased rates of homelessness
6. 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 Rhode Island approximately $61.2 million in 2020, over 25 percent above the $48.3 million pro-legalization activists have projected.[1] (Even without considering such costs, those projected revenues would account for just one-half of one percent of the Governor's proposed FY2018 budget of $9.2 billion.[2]) Such a conclusion is also consistent with well-established information about alcohol and tobacco, two legal drugs whose costs to society are at least ten times the revenue their sale generates for the state.[3]

These projected costs are broken down as follows:

Cost center	Projected annual cost	Percentage of projected revenues
Regulatory costs	$4.7 million	9.7%
Increased drugged driving fatalities	$13.2 million	27.3%
Increased drugged driving serious injuries	$3.1 million	6.4%
Increased ER visits	$1.3 million	2.7%
Marijuana concentrate extraction lab explosions	$1.1 million	2.3%
Increased homelessness	$3.1 million	6.4%
Workplace: Absenteeism	$27.1 million	56.1%
Workplace: Injuries (full-time employees)	$7.6 million	15.7%
TOTAL	**$61.2 million**	**126.6%**
Plus additional, presently unquantifiable costs	*Unknown*	*Unknown*



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,[4] 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]," [5] these costs could be quite significant.

II. Costs

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.[6]

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 peace officers, agricultural oversight of marijuana grows (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)[7]:

Program Description	Cost (FY 2015-16)[8]	Percentage of revenues ($156,701,018 in FY 2015-16) [9]
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%
TOTAL	**$15,336,327**	**9.7%[10]**

As an overall percentage of revenues, these basic administrative costs total 9.7% of total revenues collected. Applying the same logic to Rhode Island, basic administrative costs will total $4.7 million of the projected $48.3 million in revenues.

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[11]

Second, Colorado is a much more populous state than Rhode Island, with 5.54 million residents to Rhode Island's 1.06 million.[12] As much administrative overhead is a fixed, not variable, cost,[13] such overhead in a less populous state could represent an even higher percentage of overall revenue.

B. Increased Drugged Driving Fatalities

Marijuana legalization appears to spur large increases in driving while under the influence of marijuana. For example, the percentage of roadway fatalities in Washington state where a driver tested positive for recent marijuana use increased 104.6% the year recreational marijuana sales began (2014).[14] That also represents a 64.9% increase from the year before the legalization law passed (2011).[15]

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% from the year before legalization (2011) to 2015.[16] And the overall number of traffic deaths related to marijuana use rose 82.5 percent over the same four-year period—63 deaths in 2011, up to 115 in 2015.[17] That equates to a 16.2 percent average year-over-year increase, or compound annual growth rate (CAGR).

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

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

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.[18]

This information permits some rough calculations.[19] In the case of Rhode Island, there were 45 fatal crashes in 2015.[20] This number is falling at about 3.4 percent per year, apparently due to good highway safety measures. Although there is no data indicating the number of drivers who tested positive for marijuana in fatal crashes specifically, the same report indicates that in 33 percent of all crashes a driver tested positive for marijuana,[21] and it is reasonable to assume the same holds true for fatal crashes.

If this trend continued, Rhode Island would report 38 fatal crashes in 2020, approximately 12 of which would involve marijuana:

Base scenario						
Year	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**
Fatalities	45	44	42	41	39	38
Fatalities where driver tests positive for marijuana	15	14	14	13	13	12
(Roadway fatalities continue to decline at 3.4 percent annually. Numbers are rounded to the nearest integer.)						

Assuming that the rate of fatal crashes involving a driver testing positive for marijuana would increase at the same 16.2 percent average annual rate that it has in Colorado, and that legalization is implemented in 2018, the current downward trend in roadway fatalities of -3.4 percent per year would increase to +12.6 percent per year. That translates to 20 marijuana-related roadway fatalities in 2020, the same year for which pro-legalization activists offers their revenue projections:[22]

Legalization scenario				
Year	**2017**	**2018**	**2019**	**2020**
Fatalities where driver tests positive for marijuana	14	16	18	20
(Roadway fatalities related to marijuana use now climb at approximately 12.6 percent annually, instead of falling at 3.4 percent annually. Numbers are rounded to the nearest integer.)				

Compared to the base scenario, this results in eight additional deaths in 2020, compared to the base scenario. Eight additional fatalities, valued at slightly more than $6.6 million per life using U.S. Department of Transportation data, is a cost of about $52.8 million in 2016 dollars. One

cannot, of course, be certain that marijuana use played a role in all such accidents, so to be conservative, this report assumes that in only one-third of such crashes was marijuana use a factor, and rounds down to the nearest whole number. (Marijuana use doubles the chance of being involved in a fatal crash, making this a safe assumption that likely underestimates the impact.[23]) This scenario yields an additional two fatalities due to marijuana legalization at a total cost of approximately $13.2 million, or 27.3 percent of total 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 425 serious roadway injuries in Rhode Island in 2015, declining at approximately 3.4 percent annually, as with fatal accidents. Applying the same approach used in the last section, one can project numbers for 2020 if this trend continues without marijuana legalization:[24]

Base scenario						
Year	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**
Serious injuries	425	411	397	383	370	357
Serious injuries where driver tests positive for marijuana	140	135	131	126	122	118
(Serious traffic injuries continue to decline at 3.4 percent annually. Numbers are rounded to the nearest integer.)						

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, instead of declining:

Legalization scenario				
Year	**2017**	**2018**	**2019**	**2020**
Serious injuries where driver tests positive for marijuana[25]	131	148	167	188
(Serious traffic injuries related to marijuana use now climb at approximately 12.6 percent annually, instead of falling at 3.4 percent annually. Numbers are rounded to the nearest integer.)				

The result is an additional 70 serious 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 accidents, to be conservative. That yields an additional 23 accidents in 2020. Per AAA, the average cost of each roadway injury (not a serious injury, but of an

average injury), is about $134,000 in 2016 dollars,[26] resulting in an additional cost of $3.1 million. That represents 6.4 percent 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. 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.[27] 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.[28]

Rhode Island's current population is relatively stable at approximately 1.056 million people.[29] Conservatively assuming that this population does not change by 2020, that yields approximately 1,012 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 Rhode Island.

$$1.056\ million\ people\ in\ RI * \left(\frac{958\ new\ ER\ cases\ per\ yr}{1\ million\ residents}\right) = 1{,}012\ new\ ER\ visits\ in\ RI$$

Per a 2013 study, the median charge for an emergency room visit was approximately $1,270 in 2016 dollars.[30] That results in costs of approximately $1.3 million, or about 2.7 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).[31] 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.[32] 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.[33] 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. Some significant portion of these costs would likely have to be paid from public Medicare and Medicaid funds, if hospital costs from marijuana concentrate extraction lab explosions (discussed immediately below) are any indication.[34]

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.[35] The resulting explosions not only hurt those present, they also crease major property damage and dislocation of nearby residents or businesses.[36]

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.[37] In the first twelve months after retail legalization (July 2015 – July 2016), the number of burn victims from marijuana concentrate extraction increased from seven 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.[38] This reversed a downward trend, as seen in the graphic below:

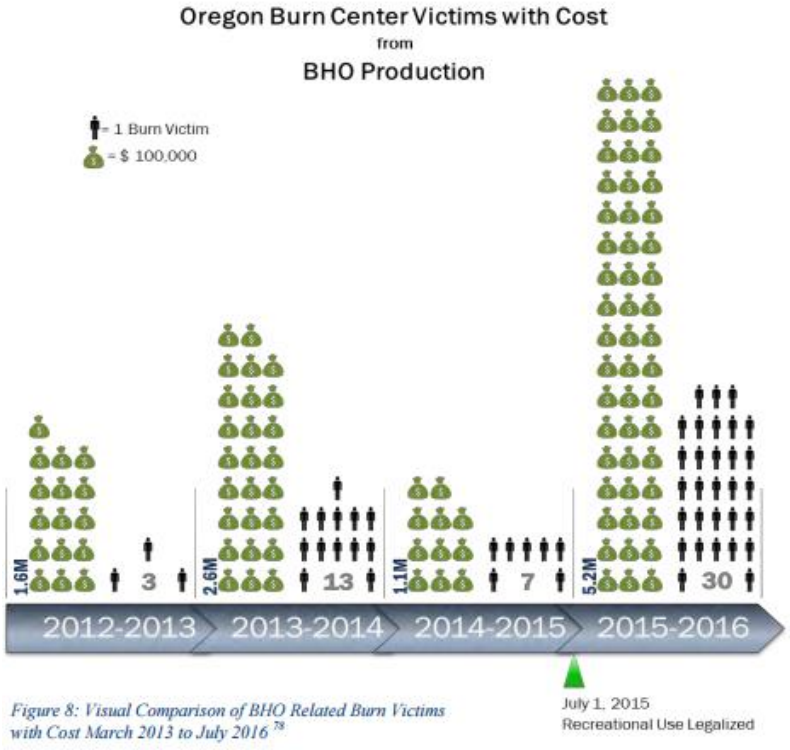


Figure 8: Visual Comparison of BHO Related Burn Victims with Cost March 2013 to July 2016 [78]

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 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.[39] Much of those costs had to be paid from Medicare and Medicaid funds.[40]

To arrive at a rough projection of total costs in Rhode Island, 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 period 2018-2020 in Rhode Island, and assume that the state's population remains stable at approximately 1.056 million people,[41] that translates into a cost in 2020 of $1.1 million, or about 2.3 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 state resulted in over $2 million in property damage and the death of a neighbor.[42] A similar blast in Washington state produced about $100,000 in property damage.[43] A third lifted the building containing the lab six inches off its foundations, creating an unspecified amount of property damage.[44]

Limited data for these economic costs also exists for the Providence area. In 2015, an extraction lab fire destroyed a Providence-area warehouse that was valued at $1.2 million.[45] The lab was housed inside a business apparently licensed to sell equipment for marijuana cultivation concealing this black-market operation, and was one of several such problems in the Providence area prosecuted by federal authorities that year.[46] Indeed, the warehouse fire prompted the Rhode Island Fire Marshal to state that he had "serious concerns" about marijuana facilities in the state.[47]

E. 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 to November 2015).[48] 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.[49] This report uses the 10 percent figure as a conservative estimate.

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,[50] to cover costs from emergency care to shelter to legal issues. In Rhode Island, estimates are similar—approximately $36,594 per homeless person per year in 2016 dollars.[51]

A rough estimate of the additional costs of homelessness stemming from legalization can be calculated using Colorado trends. Rhode Island's homeless population was 4,410 people in 2011 and 4,067 people in 2014, decreasing at a rate of about 2.66 percent per year on average (the

compound annual growth rate, or CAGR).[52] If this trend continues through 2020, one can assume that the total homeless population will fall to 3,459.

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

$$CAGR = \left(\left(\frac{4{,}067}{4{,}410}\right)^{\frac{1}{3}}\right) - 1 = -0.0266 = 2.66\%\ avg.\ decrease\ per\ year$$

$$4{,}067\ homeless\ in\ 2014 * (1 - 0.0266)^6 = 3{,}460\ homeless\ in\ 2017$$

The Colorado experience indicates a ten 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 Rhode Island, and that shelter usage is a useful proxy for homelessness over this period, one can calculate that in 2020, 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.[53]

In other words, instead of continuing to fall at an average of 2.7 percent per year from 2018 to 2020, homelessness will likely fall only at about 1.8 percent per year, attenuating the current decline.

In that case, legalization implies an additional 86 homeless individuals in 2020, with an attendant annual cost of about $3.1 million, measured in 2016 dollars. This represents 6.4 percent of total projected marijuana revenues. [54]

$$3{,}460 * 2.5\%\ increase\ by\ 2020 = 86\ additional\ homeless\ in\ Rhode\ Island\ by\ 2020$$

$$86 * \$36{,}594 = \$3.1\ million$$

F. 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.[55] As marijuana is by far the most widely used illegal drug, it is unsurprising that its use would trigger significant losses on its own.[56] These workplace costs are of particular concern in Rhode Island, which was ranked last in CNBC's "America's Top States for Business 2016" scorecard.[57]

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 percent more often than non-users, and had a rate of workplace injuries 85 percent higher than that control group.[58] (They were also involved in workplace disciplinary incidents as a rate 55 percent higher than the control group,[59] 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 percent more likely to have missed at least one day of work in the last month due to injury or sickness; and
- 106 percent 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."[60]

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.[61] In 2016 dollars, that translates to $3,258 and $4,412, respectively.

The total Rhode Island employed labor force at the start of 2017 was 493,000, excluding farm workers.[62] 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 percent per annual period in Colorado from 2012-13 to 2014-15.[63]

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

In Rhode Island, 13.3 percent of residents 18 years old and up have used marijuana in the past month. 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 Rhode Island post-legalization at the same rate that it did in Colorado, one can estimate that in 2020, the use rate will be 17.7 percent in 2020, an increase of 4.4 percentage points.

$$13.3\%\ current\ use\ rate * (115.4\%)^2 = 17.7\%\ use\ rate\ in\ 2020$$

Conservatively assuming that of these additional last-month marijuana users, only one in every two (2.2 percent of the total workforce) start to use marijuana in a way that creates absenteeism problems, that translates into 10,809 additional employees with absenteeism problems.

$$491{,}300\ employees * 2.2\% = 10{,}809\ add'l\ employees\ with\ absenteeism\ problems$$

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 * 0.77 = $2,509). That yields a total of $27.1 million annually, or 56.1 percent of total projected revenues.

$$10{,}809\ employees * \frac{\$3{,}258\ employee}{year} * 77\% = \$27.1\ million$$

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

As noted above, marijuana users are also 85 percent more likely to suffer workplace injuries than non-users,[64] 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.

Current fatal accident rates in Rhode Island are about 1.2 per every 100,000 employees,[65] 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. Although current state-level data for Rhode Island is lacking, the U.S. workplace averages 3.0 cases of non-fatal workplace injuries and illnesses per every 100 full-time workers, of which 95.2 percent are injuries (2.86 for every 100 full-time workers).[66] Due to increasingly good worker safety practices, the rate of non-fatal injuries has been slowly falling, at about 2.5 percent per year on average from 2010 to 2015, the last year federal data is available. That means by 2020, the rate will have reached 2.52 injuries per year per 100 full-time workers:

Base scenario						
Year	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**
Injuries per 100 full-time workers	2.86	2.79	2.72	2.65	2.58	2.52
(Average decrease of 2.5 percent per year.)						

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 2.14 injuries for every 100 full-time workers.

$$\frac{\left(\frac{2.52\ injuries}{year}\right)}{100\ workers} * 85\% = 2.14\ additional\ injuries\ per\ 100\ workers\ per\ year$$

Rhode Island has about 493,000 current employees, excluding farm workers. In 2016, the U.S. workforce was approximately 81.7 percent full-time,[67] and in the absence of state data, it is reasonable to assume that the same proportion holds in Rhode Island, yielding 402,781 full-time employees.

Referring to the sub-section above, one can assume that by 2020, legalization in Rhode Island will result in a 4.4 percentage point increase in the number of monthly marijuana users ages 26 and up. Again, to be conservative, let us assume that just a half of these new monthly marijuana users, or 2.2 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 8,861 workers (402,781 total full-time workers * 2.2%) will be injured at this higher rate as a result of legalization. They will have, on average, an additional 2.14 injuries annually for every 100 workers, or 190 additional injuries.

$$402{,}781\ full\ time\ workers\ in\ RI * 2.2\% = 8{,}861\ workers$$

$$(8{,}861\ workers * \frac{\left(\frac{2.14\ injuries}{year}\right)}{100\ workers} = 190\ additional\ injuries$$

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).[68] Thus, 190 additional workplace injuries annually yield a total cost of $7.6 million. That, taken alone, represents 15.7 percent of the total projected revenues—costs largely borne by private sector employers and insurance companies.

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.

G. Additional, presently unquantifiable 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 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 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.[69]

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:** "[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."[70]

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:[71]

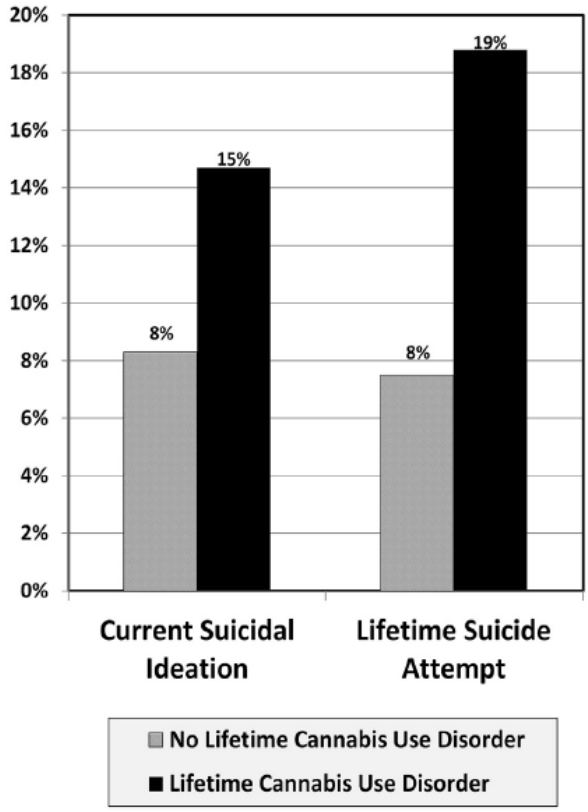


Fig. 1. Bivariate association between lifetime cannabis use disorder and current suicidal ideation and lifetime history of suicide Attempts.

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, among other factors.

This study expands on the aforementioned National Academies of Sciences report, which found only limited evidence that marijuana or cannabinoids could be effective in treating symptoms of PTSD.[72] In fact, the NAS report revealed a stronger association between marijuana use and social anxiety disorders, depressive disorders, and schizophrenia.[73] A 2015 Yale University study also showed a connection between marijuana use and PTSD symptoms.[74]

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.[75]

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]."[76] And 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. [77] This correlation remained even after controlling for confounding factors such as alcohol use, mental illness, and social problems.[78]

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 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.[79] 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.[80] 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.[81]

The marijuana industry's response to this demand has been to move rapidly to develop alcoholic beverages that contain THC.[82] 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."[83]

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.[84] This was true even among marijuana users that did not have any history of problems with alcohol use.[85]

- 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.[86] 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 rises in tobacco use, as well.[87]

- 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.[88] And according to the Centers for Disease Control (CDC), marijuana users are three times more likely to be addicted to heroin than non-users.[89]

  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."[90] 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.[91]

- 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.[92] 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 such new cases.[93] 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.[94] 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.[95]

- 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.[96] 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.[97]

- 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 percent of marijuana market activity is illegal—more than two of every three transactions.[98] Comments by the Colorado Attorney General indicate a similar dynamic in that state.[99] Indeed, recent reports suggest Mexican drug traffickers are using Colorado's lax marijuana laws to relocate marijuana growing operations from Mexico to Colorado.[100]

  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 five percent.[101]

Citations for public use of marijuana—also illegal even under legalization—have also risen in Colorado.[102]

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

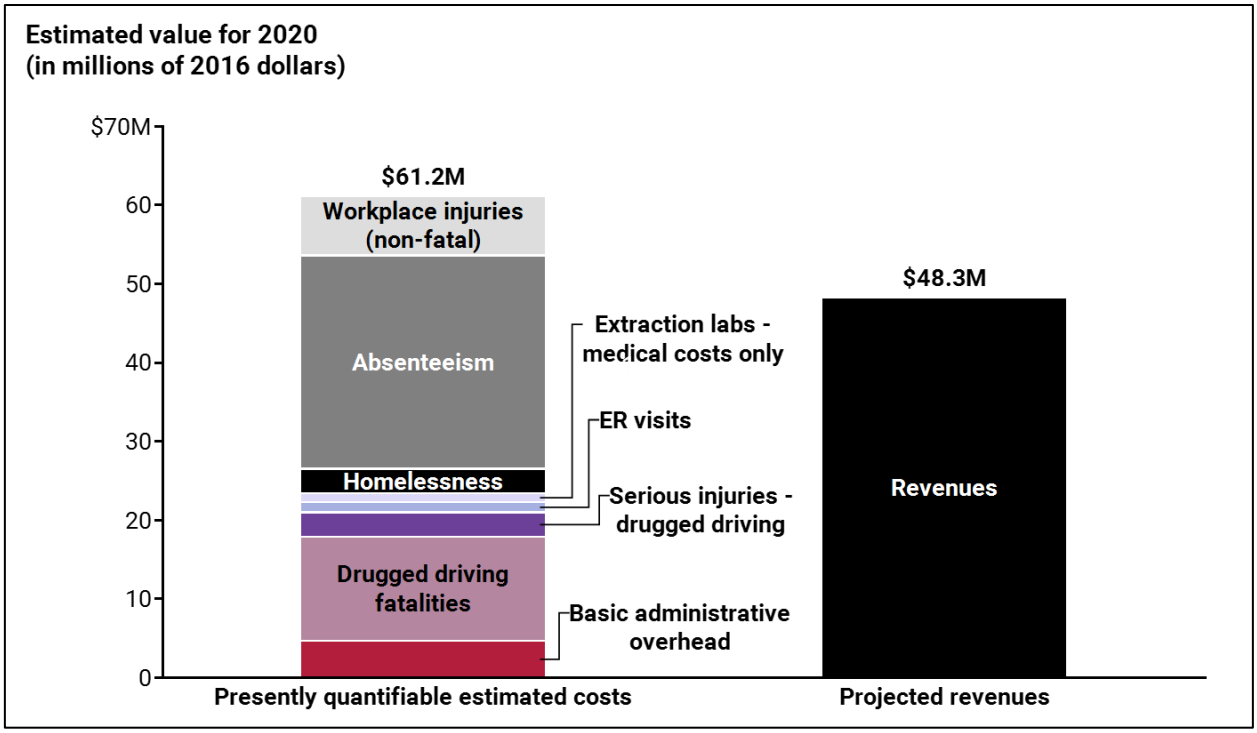
- Other administrative costs of state legalization programs:

  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.[103] 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 Rhode Island approximately $61.2 million in 2020, over 25 percent more than the $48.3 million in revenues that pro-legalization activists project for that year if their proposed legislation passes:

Cost center	Projected annual cost	Percentage of projected revenues
Regulatory costs	$4.7 million	9.7%
Increased drugged driving fatalities	$13.2 million	27.3%
Increased drugged driving serious injuries	$3.1 million	6.4%
Increased ER visits	$1.3 million	2.7%
Marijuana concentrate extraction lab explosions	$1.1 million	2.3%
Increased homelessness	$3.1 million	6.4%
Workplace: Absenteeism	$27.1 million	56.1%
Workplace: Injuries (full-time employees)	$7.6 million	15.7%
TOTAL	**$61.2 million**	**126.6%**
Plus additional, presently unquantifiable costs	*Unknown*	*Unknown*



Rhode Island's employers will shoulder a significant portion of these costs—those from additional workplace injuries and absenteeism.

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. Rhode Island 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 likely a money-loser for the state when costs are included.

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[1] *Now is the time: Why Rhode Island should legalize, regulate and tax marijuana in 2017* (Report). (2017). RI: Regulate Rhode Island. https://www.regulateri.com/assets/files/pdf/2017/Now%20is%20the%20Time%20(RRI%20Report).pdf. The report does not indicate whether this figure represents the present value in 2016 dollars of the expected revenues in 2020. To be conservative, this report assumes that it represents $48.3 million in current 2016 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.

[2] State of Rhode Island Office of Management and Budget. (2017). State of Rhode Island and Providence Plantations Fiscal Year 2018 Budget. Retrieved April 5, 2017, from http://www.omb.ri.gov/documents/Prior%20Year%20Budgets/Operating%20Budget%202018/ExecutiveSummary/0_Complete%20FY%202018%20Executive%20Summary.pdf.

[3] Centers for Disease Control and Prevention. Economic Trends in Tobacco. (2017, March 03). Retrieved March 2017, from https://www.cdc.gov/tobacco/data_statistics/fact_sheets/economics/econ_facts/; Campaign for Tobacco-Free Kids. (2017). State Tobacco-Prevention Spending vs. State Tobacco Revenues and Annual Smoking- Caused Health Costs. Retrieved from https://www.tobaccofreekids.org/research/factsheets/pdf/0219.pdf

[4] *Id.*

[5] Nestoros, J. N., Vakonaki, E., Tzatzarakis, M. N., Alegakis, A., Skondras, M. D., & Tsatsakis, A. M. (2017, March). Long lasting effects of chronic heavy cannabis abuse. *The American Journal on Addictions.* Wiley-Blackwell. https://doi.org/10.1111/ajad.12529

[6] Silbaugh, L. (2016). *Distribution of Marijuana Tax Revenue* (04th ed., Vol. 16, Issue brief). CO: Colorado Legislative Council. https://www.colorado.gov/pacific/sites/default/files/16-04%20Distribution%20of%20Marijuana%20Tax%20Revenue%20Updated_2.pdf.

[7] Colorado's fiscal year runs from July 1 of every year to June 30 of the following year. *See* State of Colorado - Contract Management System - Powered By: Cobblestone Systems Corp. Retrieved March 29, 2017, from http://contractsweb.state.co.us/.

[8] Silbaugh, L. (2016). *Distribution of Marijuana Tax Revenue* (04th ed., Vol. 16, Issue brief). CO: Colorado Legislative Council. https://www.colorado.gov/pacific/sites/default/files/16-04%20Distribution%20of%20Marijuana%20Tax%20Revenue%20Updated_2.pdf.

[9] Colorado Department of Revenue. *Marijuana Tax Data*. Retrieved March 21, 2017, from https://www.colorado.gov/pacific/revenue/colorado-marijuana-tax-data (taxes and license fees).

[10] As in the rest of this document, individual percentages may not add up exactly to the total due to rounding. Here, 15,336,327 of 156,701,018 is 9.8%, not 9.7%, as would be calculated by adding up the percentages rounded to one decimal place.

[11] Silbaugh, L. (2016). *Distribution of Marijuana Tax Revenue* (04th ed., Vol. 16, Issue brief). CO: Colorado Legislative Council. https://www.colorado.gov/pacific/sites/default/files/16-04%20Distribution%20of%20Marijuana%20Tax%20Revenue%20Updated_2.pdf.

[12] United States Census Bureau. (2017). *QuickFacts:* Population. Web. 23 Mar. estimates, July 1, 2016. Retrieved March 20, 2017, retrieved from https://www.census.gov/quickfacts/table/PST045216/44,08.
[13] http://www.accountingtools.com/questions-and-answers/what-is-fixed-overhead.html
[14] AAA Foundation for Traffic Safety. *Prevalence of Marijuana Involvement in Fatal Crashes: Washington, 2010-2014*. May 2016. Retrieved from: https://www.aaafoundation.org/sites/default/files/PrevalenceOfMarijuanaInvolvement.pdf.
[15] *Id.*
[16] 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.
[17] *Id.*
[18] U.S. Department of Transportation (2011), "Treatment of the Economic Value of a Statistical Life in Departmental Analyses – 2011 Interim Adjustment". Retrieved from: 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, at 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. Sunstein, C., Posner, E., (2004) "Dollars and Death" *John M. Olin Program in Law and Economics Working Paper No. 222*. Retrieved from: 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. Copeland, Larry. "AAA: Fatal motor vehicle crash costs $6 million." *USA Today* 3 Nov. 2011 Retrieved from https://usatoday30.usatoday.com/news/nation/story/2011-11-02/fatal-vehicle-crashes-cost-millions/51051030/1.
[19] 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 U.S. 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.
[20] National Highway Traffic Safety Administration (2017). Rhode Island Highway Safety Plan FY 2017. Retrieved from: https://one.nhtsa.gov/links/StateDocs/FY17/FY17HSPs/RI_FY17HSP.pdf.
[21] *Id.*
[22] The average annual rate of increase would be estimated at 12.6 percent, or 16 percent minus the current trend of -3.4 percent per year. But one must count as additional costs the deaths that would have been averted by current highway safety policies absent legalization, as well, meaning that the full 16 percent increase should be considered.
[23] Hartman RL, Huestis MA. (2013). Cannabis effects on driving skills. *Clinical Chemistry*59(3):478-492. doi:10.1373/clinchem.2012.194381; Hartman RL, Brown TL, Milavetz G, et al. (2015) Cannabis effects on driving lateral control with and without alcohol. *Drug Alcohol Dependency*. 154:25-37. doi: 10.1016/j.drugalcdep.2015.06.015.
[24] National Highway Traffic Safety Administration (2017). Rhode Island Highway Safety Plan FY 2017. Retrieved from: https://one.nhtsa.gov/links/StateDocs/FY17/FY17HSPs/RI_FY17HSP.pdf.

[25] Again, numbers in the text may vary slightly due to rounding.
[26] Copeland, Larry. "AAA: Fatal motor vehicle crash costs $6 million." *USA Today* 3 Nov. 2011 Retrieved from https://usatoday30.usatoday.com/news/nation/story/2011-11-02/fatal-vehicle-crashes-cost-millions/51051030/1.
[27] CO Hospital Association and CO Dept. of Public Health and Environment, as reported in Rocky Mountain HIDTA Investigative Support Center Strategic Intelligence Unit. (2016). The Legalization of Marijuana in Colorado: The Impact, Volume 4. Sept. 2016.
[28] Colorado's population was about 5.356 million in mid-2014. *See*
Svaldi, A. (2015, December 22). Colorado's population jumped by 101,000 in 12 months. *Denver Post.* Retrieved from http://www.denverpost.com/2015/12/22/colorados-population-jumped-by-101000-in-12-months/.
[29] United States Census Bureau (2017). Population estimates, July 1, 2016. Retrieved March 20, 2017, from https://www.census.gov/quickfacts/table/PST045215/44.
[30] Caldwell, Nolan et al. (2013) "'How Much Will I Get Charged for This?' Patient Charges for Top Ten Diagnoses in the Emergency Department." Ed. Harry Zhang. *PLoS ONE* 8.2 (2013): e55491. *PMC*. Web. 22 Mar. 2017. Retrieved from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3584078/.
[31] Finn, K., Salmore, R., (2010). The Hidden Costs of Marijuana Use in Colorado: One Emergency Department's Experience. *The Journal of Global Drug Policy and Practice.* Retrieved from: http://www.globaldrugpolicy.org/Issues/Vol%2010%20Issue%202/Articles/The%20Hidden%20Costs%20of%20Marijuana%20Use%20in%20Colorado_Final.pdf.
[32] *Id.*
[33] *Id.*
[34] *See A Baseline Evaluation of Cannabis Enforcement Priorities in Oregon* (Rep.). (2017). OR: Oregon State Police-Drug Enforcement Section. Retrieved from http://media.oregonlive.com/marijuana/other/2017/03/20/statepolicesmaller.pdf (commenting that significant portions of health care costs from lab explosions in Oregon had to be paid out of public Medicare and Medicaid funds).
[35] House explosion illustrates hash oil danger. (2016, December 8). *WoodTV8*. Retrieved from http://woodtv.com/2016/12/08/house-explosion-illustrates-hash-oil-danger/.
[36] 12 News, Man seriously injured when butane hash lab sparks home fire. (2017, February 26). Retrieved March 2017, from http://www.12news.com/news/local/arizona/man-seriously-injured-when-butane-hash-lab-sparks-home-fire/414657213.
[37] Crombie, N. (2016, October 20). Blast rocks legal marijuana business in Astoria, sends 2 to burn unit. *The Oregonian/Oregon Live*. Retrieved from http://www.oregonlive.com/marijuana/index.ssf/2016/10/blast_rocks_legal_marijuana_bu.html. Similar statistics are seen in Colorado. The state had 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. Coe-Harris, J. (2016, April 17). Marijuana — BHO explosions on the rise. *The Daily Reporter.* Retrieved from http://www.thedailyreporter.com/news/20160417/marijuana---bho-explosions-on-rise
[38] *A Baseline Evaluation of Cannabis Enforcement Priorities in Oregon* (Rep.). (2017). OR: Oregon State Police-Drug Enforcement Section. Retrieved from http://media.oregonlive.com/marijuana/other/2017/03/20/statepolicesmaller.pdf.
[39] United States Census Bureau (2017). Population estimates, July 1, 2016. Retrieved March 20, 2017, from https://www.census.gov/quickfacts/table/PST045216/41. Oregon's population in 2016 was 4.093 million -
[40] *A Baseline Evaluation of Cannabis Enforcement Priorities in Oregon* (Rep.). (2017). OR: Oregon State Police-Drug Enforcement Section. Retrieved from http://media.oregonlive.com/marijuana/other/2017/03/20/statepolicesmaller.pdf.
[41] United States Census Bureau (2017). Population estimates, July 1, 2015. Retrieved March 20, 2017, from https://www.census.gov/quickfacts/table/PST045215/44.

[42] Johnson, G., Man sentenced to 9 years in fatal Bell. (2015, June 7). *Komo News.* Retrieved from 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, "'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.'")
[43] Seattle Times Staff. 2 Sentenced to federal prison for Kirkland hash oil explosion. (2015, March 3). *Seattle Times*. Retrieved from http://www.seattletimes.com/seattle-news/2-sentenced-to-federal-prison-for-kirkland-hash-oil-explosion/.
[44] Sullivan, J. (2014, January 7). Powerful Mount Baker Explosion blamed on. *The Seattle Times*. Retrieved from: http://blogs.seattletimes.com/today/2014/01/powerful-blast-rocks-mount-baker-apartment-building/
[45] U.S. Department of Justice. Dangers of Butane Hash Oil Labs Cited as Five are Charged. (2016, March 30). Retrieved March 2017, from https://www.justice.gov/usao-ri/pr/dangers-butane-hash-oil-labs-cited-five-are-charged; McGowan, D. (2015, September 28). Email: EDC lawyer pushed family property for 38 Studios HQ. Retrieved March 29, 2017, from http://wpri.com/2015/09/28/email-edc-lawyer-pushed-family-property-for-38-studios-hq/.
[46] U.S. Department of Justice. Dangers of Butane Hash Oil Labs Cited as Five are Charged. (2016, March 30). Retrieved March 2017, from https://www.justice.gov/usao-ri/pr/dangers-butane-hash-oil-labs-cited-five-are-charged.
[47] Nagle, K. (2015, March 10). Marijuana Growing Facilities "Serious Concern," Says RI Fire Marshal. Retrieved March 29, 2017, from http://www.golocalprov.com/news/marijuana-growing-facilities-serious-concern-says-ri-fire-marshal.
[48] Warner, Joel. (2016) "Marijuana Legalization in Colorado: How Recreational Weed Is Attracting People, But Spiking the State's Homeless Rate." *International Business Times*. 20 June 2016. Retrieved from: http://www.ibtimes.com/marijuana-legalization-colorado-how-recreational-weed-attracting-people-spiking-2374204.
[49] *Id.*
[50] DePillis, L. (2014, August 8). Why Denver is trucking its homeless to the middle of nowhere. *Washington Post.* Retrieved from 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. (2013, May 24). *Fort Lyon provides new tool in statewide effort to end homelessness* [Press release]. Retrieved from https://www.colorado.gov/governor/news/fort-lyon-provides-new-tool-statewide-effort-end-homelessness ($43,240 in 2012 dollars).
[51] Hirsch, E., PhD, & Glasserq, I., PhD. (2007). *Rhode Island's Housing First Program First Year Evaluation* (Rep.). Page 2. RI. Retrieved from: https://www.muni.org/Departments/health/Documents/Rhode%20Island%20Housing%20First%20Evaluation.pdf ($31,617 in 2007 dollars).
[52] Rhode Island Coalition for the Homeless, *Homelessness Statistics.* Retrieved from: http://www.rihomeless.org/AboutHomelessness/HomelessnessStatistics/tabid/248/Default.aspx.
[53] Indeed, the overall number of homeless individuals in Colorado has increased over eight percent since 2013, and the number of homeless households has risen over 27 percent in the same time period, according to reports from the U.S. Department of Health and Human Services.
[54] 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 Rhode Island. Nonetheless, Denver has colder average low temperatures in the winter than Providence and a considerably lower population density (making transportation without a car more challenging). The Weather Channel, Denver, CO Monthly Weather Forecast. (2016, January 28). Retrieved March, 2017, from https://weather.com/weather/monthly/l/USCO0105 (Denver); The Weather Channel, Providence, RI Monthly Weather Forecast (2016, January 28). Retrieved March 2017, from https://weather.com/weather/monthly/l/02906:4:US (Providence); Governing. (n.d.). Population Density for U.S.

Cities Map. Retrieved March 27, 2017, from http://www.governing.com/gov-data/population-density-land-area-cities-map.html.

[55] *Drugs and the Workplace* (Issue brief). (n.d.). Retrieved March 29, 2017, from National Council on Alcoholism and Drug Dependence Inc. website: http://www.ocpa-oh.org/Drugs%20and%20the%20Workplace.pdf.

[56] 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. Halsey, A., III. (2017, January 26*). Amtrak engineer in fatal crash tested positive for marijuana, NTSB says.* Retrieved March 29, 2017, from 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.

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. Brown, A. (2017, March 20). Stoned *Assembly Line Workers Cost BMW $1 Million in One Day, Report Claims*. Retrieved March 29, 2017, from http://www.thedrive.com/news/8449/stoned-assembly-line-workers-cost-bmw-1-million-in-one-day-reportclaimsutm_content=inf_10_3522_2&xid=socialedge_pd&tse_id=INF_930fda1010c911e7af245d7f4020bc76.

[57] CNBC.com. (2016). *America's Top States for Business 2016: The list and ranking.* Retrieved from http://www.cnbc.com/2016/07/12/americas-top-states-for-business-2016-the-list-and-ranking.html.

[58] Zwerling, C., (1990). "The Efficacy of Preemployment Drug Screening for Marijuana and Cocaine in Predicting Employment Outcome." *JAMA: The Journal of the American Medical Association.* 264.20. 2639.

[59] *Id.*

[60] Substance Abuse and Mental Health Services Administration (SAMHSA). (2015) National Survey on Drug Use and Health, 2014. Rockville, MD: Office of Applied Studies, SAMHSA.

[61] Circadian. *Absenteeism- The Bottom Line Killer* (Rep.). Retrieved from http://www.workforceinstitute.org/wp-content/themes/revolution/docs/Absenteeism-Bottom-Line.pdf; Investopedia. The Causes and Costs of Absenteeism in the Workplace. (2013, July 10). *Forbes*. Retrieved from: https://www.forbes.com/sites/investopedia/2013/07/10/the-causes-and-costs-of-absenteeism-in-the-workplace/#77f8b93b3eb6.

[62] Rhode Island Department of Labor and Training. Rhode Island Establishment Employment - Seasonally Adjusted Current Month Comparison. (2017). Retrieved from http://www.dlt.ri.gov/lmi/ces/cescompare.htm.

[63] Substance Abuse and Mental Health Services Administration (SAMHSA). (2016) National Survey on Drug Use and Health. Rockville, MD: Office of Applied Studies, SAMHSA. The NSDUH reports state-level data annually as the average of the previous two-year period, and data for the 18+ age cohort from the recent past is available starting in 2012-13. 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.

[64] Zwerling, C., (1990). "The Efficacy of Preemployment Drug Screening for Marijuana and Cocaine in Predicting Employment Outcome." *JAMA: The Journal of the American Medical Association* 264.20.2639.

[65] U.S. Bureau of Labor Statistics. Fatal occupational injury rates by industry, 2015, Rhode Island. (2016, December 16). Retrieved from https://www.bls.gov/iif/oshwc/cfoi/rate2015ri.htm.

[66]U.S. Bureau of Labor Statistics. Occupational Injuries and Illnesses (Annual) News Release. (2016, October 27). Retrieved from https://www.bls.gov/news.release/archives/osh_10272016.htm.

[67] Table A-9. Selected employment indicators. (2017, March 10). Retrieved March 29, 2017, from U.S. Bureau of Labor Statistics: https://www.bls.gov/news.release/empsit.t09.htm. (seasonally-adjusted data for Feb 2016)

[68] National Safety Council. (2013). *Injury Facts. 2013 Edition.* Retrieved from: http://www.mhi.org/downloads/industrygroups/ease/technicalpapers/2013-National-Safety-Council-Injury-Facts.pdf

[69] The National Academies of Science, Engineering and Medicine. *The Health Effects of Cannabis and Cannabinoids-Chapter Highlights* (Issue brief). (2017, January). Retrieved from:

http://nationalacademies.org/hmd/~/media/Files/Report%20Files/2017/Cannabis-Health-Effects/Cannabis-chapter-highlights.pdf.

[70] United States Public Health Service, Office of the Surgeon General (2016.). *Facing addiction in America: The Surgeon General's report on alcohol, drugs and health*. Retrieved from: https://addiction.surgeongeneral.gov/surgeon-generals-report.pdf.

[71] Kimbrel et al., Cannabis use disorder and suicide attempts in Iraq/Afghanistan-era veterans. *Journal of Psychiatric Research.* 89, 1-5. Retrieved from: https://www.ncbi.nlm.nih.gov/m/pubmed/28129565/.

[72] The National Academies of Science, Engineering and Medicine. *The Health Effects of Cannabis and Cannabinoids-Chapter Highlights* (Issue brief). (2017, January). Retrieved from: http://nationalacademies.org/hmd/~/media/Files/Report%20Files/2017/Cannabis-Health-Effects/Cannabis-chapter-highlights.pdf.

[73] Kimbrel et al., Cannabis use disorder and suicide attempts in Iraq/Afghanistan-era veterans. *Journal of Psychiatric Research.* 89, 1-5. Retrieved from: https://www.ncbi.nlm.nih.gov/m/pubmed/28129565/.

[74] Wilkinson et al., (2015). Marijuana Use is Associated with Worse Outcomes in Symptom Severity and Violent Behavior in Patients with Posttraumatic Stress Disorder. *Journal of Clinical Psychiatry. 76 (9), 1174-1180.* Retrieved from*:* https://www.ncbi.nlm.nih.gov/pubmed/26455669.

[75] Max et al., (2014). *The Cost of Smoking in California, 2009*. San Francisco, CA: Institute for Health & Aging, University of California, San Francisco. Retrieved from http://www.trdrp.org/files/cost-smoking-ca-final-report.pdf.

[76] Nestoros, J. N., Vakonaki, E., Tzatzarakis, M. N., Alegakis, A., Skondras, M. D., & Tsatsakis, A. M. (2017, March). Long lasting effects of chronic heavy cannabis abuse. *The American Journal on Addictions.* Wiley-Blackwell. https://doi.org/10.1111/ajad.12529

[77] Manrique-Garcia, E., Ponce de Leon, A., Dalman, C., Andréasson, S., & Allebeck, P. (2016, August). Cannabis, Psychosis, and Mortality: A Cohort Study of 50,373 Swedish Men. *American Journal of Psychiatry*. American Psychiatric Publishing. https://doi.org/10.1176/appi.ajp.2016.14050637

[78] *Id.*

[79] Rocky Mountain HIDTA Investigative Support Center Strategic Intelligence Unit. *The Legalization of Marijuana in Colorado: The Impact, Volume 4*. Sept. 2016 (citing CO Department of Revenue).

[80] Subbaraman, M. S., & Kerr, W. C. (2015, April 14). Simultaneous Versus Concurrent Use of Alcohol and Cannabis in the National Alcohol Survey. *Alcoholism: Clinical and Experimental Research*. Wiley-Blackwell. https://doi.org/10.1111/acer.12698

[81] *Id.*

[82] Tullo, Danielle. "There's A Weed-Infused Wine On The Market — But There's A Catch". *Cosmopolitan*. Oct. 11, 2016. Retrieved from: http://www.cosmopolitan.com/food-cocktails/a5274780/pot-wine-canna-vine/.

[83] Kaplan, More. "Cannabis Cocktails? Constellation Sees Opening As Pot Laws Ease". *Bloomberg.com*. Nov. 10, 2016. Retrieved from: https://www.bloomberg.com/news/articles/2016-11-10/weed-liquor-corona-executive-sees-opportunity-in-legalization.

[84] Weinberger, A. H., Platt, J., & Goodwin, R. D. (2016, April). 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*. Elsevier BV. https://doi.org/10.1016/j.drugalcdep.2016.01.014

[85] *Id.*

[86] The National Academies of Science, Engineering and Medicine. *The Health Effects of Cannabis and Cannabinoids-Chapter Highlights* (Issue brief). (2017, January). Retrieved from: http://nationalacademies.org/hmd/~/media/Files/Report%20Files/2017/Cannabis-Health-Effects/Cannabis-chapter-highlights.pdf.

[87] *See, e.g.*, Gorman, Anna. "Will Legal Marijuana Lead To More People Smoking Tobacco?". *NPR.org*. Nov. 18, 2016. Retrieved from: http://www.npr.org/sections/health-shots/2016/11/18/502567273/will-legal-marijuana-lead-to-more-people-smoking-tobacco.

[88] Secades-Villa R, Garcia-Rodríguez O, Jin CJ, Wang S, Blanco C. Probability and predictors of the cannabis gateway effect: a national study. *Int J Drug Policy*. 2015;26(2):135-142
[89] Centers for Disease Control. *Today's heroin epidemic Infographics more people at risk, multiple drugs abused*. CDC, 7 July 2015. Retrieved from: https://www.cdc.gov/vitalsigns/heroin/.
[90] The National Academies of Science, Engineering and Medicine. *The Health Effects of Cannabis and Cannabinoids-Chapter Highlights* (Issue brief). (2017, January). Retrieved from: http://nationalacademies.org/hmd/~/media/Files/Report%20Files/2017/Cannabis-Health-Effects/Cannabis-chapter-highlights.pdf.
[91] Zielinski, L., Bhatt, M., Sanger, N., Plater, C., Worster, A., Varenbut, M., … Samaan, Z. (2017, March 30). Association between cannabis use and methadone maintenance treatment outcomes: an investigation into sex differences. *Biology of Sex Differences*. Springer Nature. https://doi.org/10.1186/s13293-017-0130-1
[92] Colorado Department of Human Services, as reported in Colorado Department of Public Safety, Division of Criminal Justice, Office of Research and Statistics. (2016) *Marijuana Legalization in Colorado: Early Findings*. Denver.
[93] Colorado Bureau of Investigation & Colorado State Judicial Branch, as reported in Colorado Department of Public Safety, Division of Criminal Justice, Office of Research and Statistics. (2016). *Marijuana Legalization in Colorado: Early Findings. Denver*.
[94] Sillins et al., (2014). Young adult sequelae of adolescent cannabis use: an integrative analysis. *The Lancet Psychiatry. 1(4), 286-293.* Retrieved from: http://dx.doi.org/10.1016/S2215-0366(14)70307-4.
[95] Belfield, C.R., Levin, H.M., & Rosen, R., *The Economic Value of Opportunity Youth* (2012). (prepared for the White House Council on Community Solutions), retrieved from http://www.civicenterprises.net/MediaLibrary/Docs/econ_value_opportunity_youth.pdf (finding 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).
[96] Wang, X., Derakhshandeh, R., Liu, J., Narayan, S., Nabavizadeh, P., Le, S., … Springer, M. L. (2016). One Minute of Marijuana Secondhand Smoke Exposure Substantially Impairs Vascular Endothelial Function. *Journal of the American Heart Association: Cardiovascular and Cerebrovascular Disease*, *5*(8), e003858. http://doi.org/10.1161/JAHA.116.003858 ("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. ").
[97] The Centers for Disease Control and Prevention. *Economic Trends in Tobacco.* (2017, March 03). Retrieved from https://www.cdc.gov/tobacco/data_statistics/fact_sheets/economics/econ_facts/.
[98] *A Baseline Evaluation of Cannabis Enforcement Priorities in Oregon* (Rep.). (2017). OR: Oregon State Police-Drug Enforcement Section. Retrieved from http://media.oregonlive.com/marijuana/other/2017/03/20/statepolicesmaller.pdf.
[99] "Special report, 'Clearing the haze:' Black market is thriving in Colorado." *Colorado Springs Gazette*, 20 Mar. 2015. Retrieved from: http://gazette.com/special-report-clearing-the-haze-black-market-is-thriving-in-colorado/article/1548305.
[100] *See, e.g.*, Mamdooh, Sally. "Mexican drug cartels are taking full advantage of Colorado's marijuana laws." *7NEWS*, 8 Apr. 2016. Retrieved from: http://www.thedenverchannel.com/news/local-news/marijuana/mexican-drug-cartels-are-taking-full-advantage-of-colorados-marijuana-laws.
[101] Colorado Department of Public Safety, Division of Criminal Justice, Office of Research and Statistics. *Marijuana Legalization in Colorado: Early Findings*. Denver, Mar. 2016. (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 white kids for marijuana fell eight percent in the same timeframe.)
[102] Rocky Mountain HIDTA Investigative Support Center Strategic Intelligence Unit. *The Legalization of Marijuana in Colorado: The Impact, Volume 4*. Sept. 2016.
[103] Silbaugh, L. (2016). *Distribution of Marijuana Tax Revenue* (04th ed., Vol. 16, Issue brief). CO: Colorado Legislative Council. https://www.colorado.gov/pacific/sites/default/files/16-04%20Distribution%20of%20Marijuana%20Tax%20Revenue%20Updated_2.pdf.