



# LESSONS LEARNED FROM STATE MARIJUANA LEGALIZATION

2 0 2 0 - 2 0 2 1   E d i t i o n

Reviewed by researchers from:  
University of Colorado at Denver  
Harvard Medical School  
Boston Children's Hospital  
University of Connecticut  
Yale University  
University of Kansas  
and more

**SAM** Smart  
Approaches to  
Marijuana  
preventing another big tobacco

[www.learnaboutsam.org](http://www.learnaboutsam.org)

# **SAM** Smart Approaches to Marijuana preventing another big tobacco

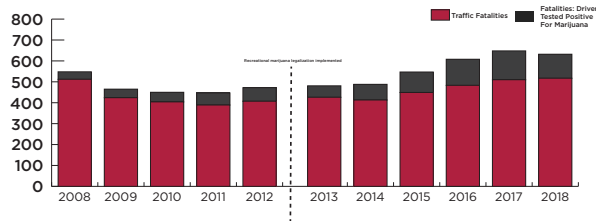
# DATA AND POLICY BACKGROUND

Contrary to federal law, under which the use and sale of marijuana for any purpose is illegal (Controlled Substances Act, 21 U.S.C. § 801), beginning in 2012 several states legalized the commercial sale of marijuana. Despite this, dozens of other states (as of September 2020)—including New York, New Jersey, Connecticut, Texas, Maryland, Arizona, New Mexico, Minnesota, North Dakota, Delaware, Ohio, and New Hampshire—have continued to reject marijuana legalization, as have the vast majority of localities in “legal” states that continue to ban marijuana production and retail sales.

We compiled publicly available state-level data, reports, and investigatory findings, peer-reviewed studies, and government health surveys to assemble this report. We have attempted to be as transparent as possible in our evaluation. For example, in reviewing the Substance Abuse and Mental Health Services Administration (SAMHSA) data taken from the state-level National Survey on Drug Use and Health (NSDUH), we included data from the District of Columbia and Vermont in our assessment of “legal” jurisdictions. They have legalized marijuana to some degree, though their measures differ from traditional recreational marijuana programs because they do not allow commercial sales.

# A SNAPSHOT

## COLORADO TRAFFIC FATALITIES WHERE THE DRIVER TESTED POSITIVE FOR MARIJUANA



(Colorado Department of Transportation, 2019)

## 83 MARIJUANA BUSINESSES



STATE REGULATORY FRAMEWORKS STRUGGLE TO KEEP UP WITH THE NUMBER OF LICENSED SHOPS.

(Oregon Liquor Control Commission, 2019)

## MARIJUANA HOSPITALIZATIONS INCREASES SINCE LEGALIZATION



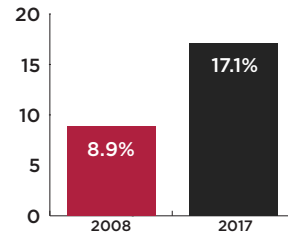
(Colorado Department of Public Health and Environment, 2013-2017; Alaska Department of Health and Social Services, 2020).

25% INCREASE

There was a 25% increase in Cannabis Use Disorder (CUD) among 12-17 year-olds in "legal" states.

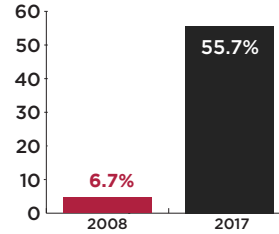
(Cerde et al., 2019)

## MARIJUANA PLANT POTENCY

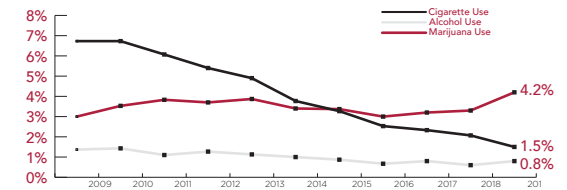


(Chandra et al., 2019)

## CONCENTRATE POTENCY

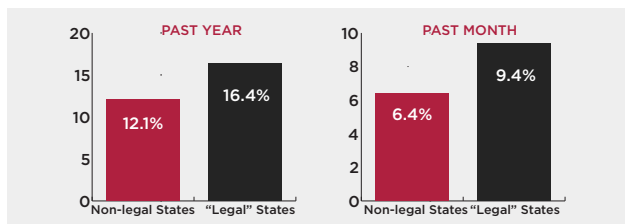


## DAILY MARIJUANA USE AMONG 8TH, 10TH, AND 12TH GRADERS



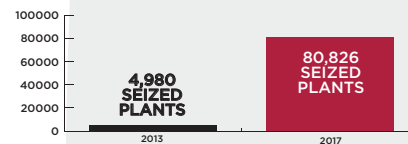
(Miech et al., 2019)

## PAST MONTH AND PAST YEAR YOUTH USE IN "LEGAL" STATES OUTPACES SUCH USE IN NON-LEGAL STATES.



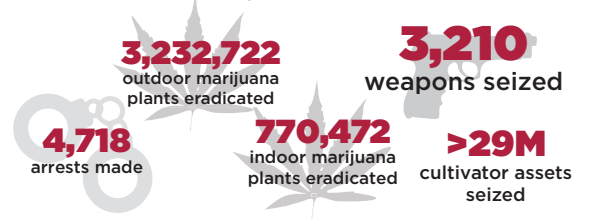
(NSDUH State Comparisons, 2019)

## ILLICIT MARIJUANA PLANTS SEIZED OFF OF COLORADO PUBLIC LANDS



(US Bureau of Land Management, 2017)

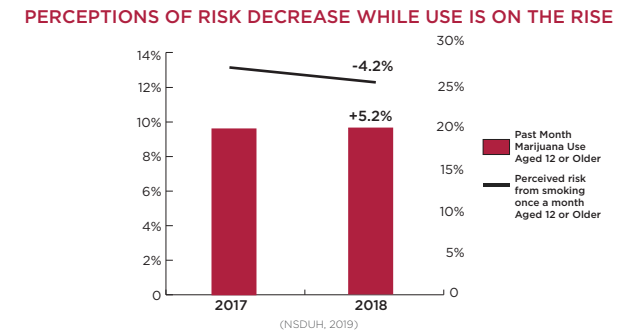
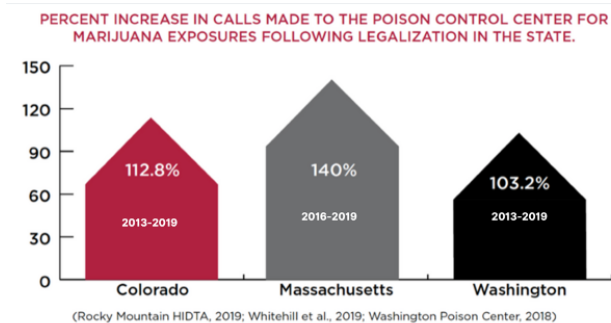
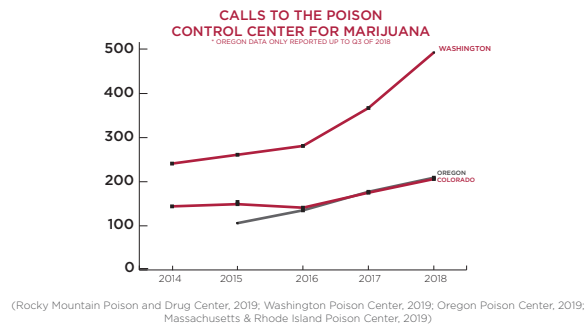
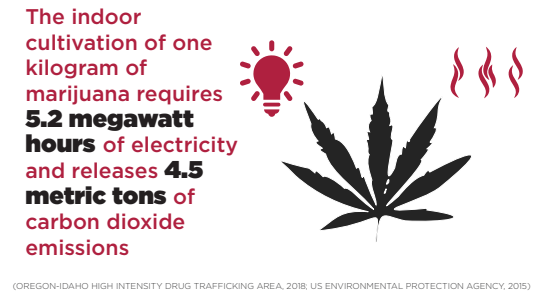
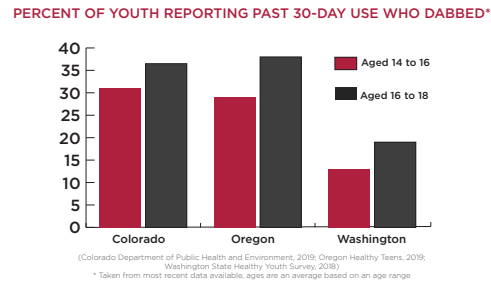
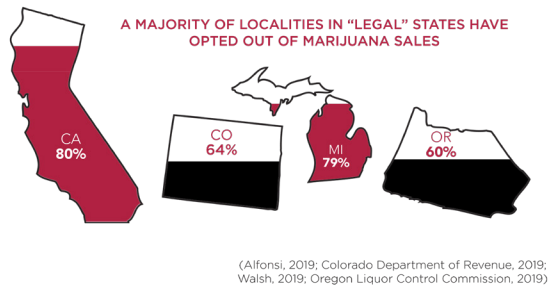
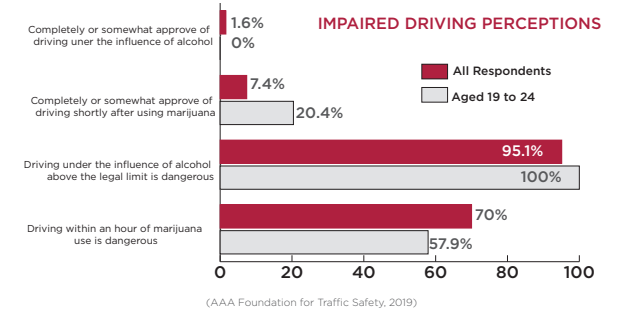
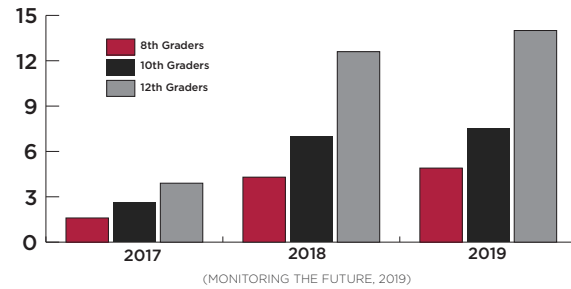
## 2019 DEA DOMESTIC CANNABIS ERADICATION/SUPPRESSION PROGRAM



(Drug Enforcement Administration, 2020)



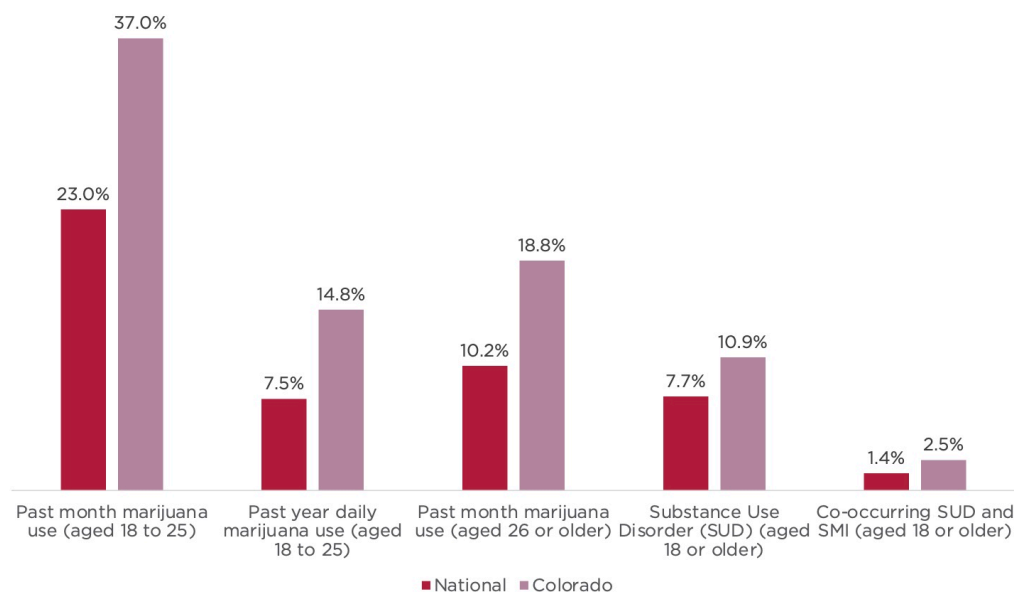
# YOUTH PAST MONTH VAPING HAS INCREASED DRAMATICALLY SINCE IT WAS FIRST RECORDED IN 2017.



In 2013, the U.S. Department of Justice (DOJ) decided to take a hands-off approach toward legalization at the state level. Officially, the DOJ stated it would only get involved if any of eight requirements laid out in the “Cole Memo” (e.g., sales to minors, increased drugged driving) were violated. Unfortunately, according to the U.S. Government Accountability Office (GAO), the DOJ took no meaningful action even as states routinely violated the “Cole Memo.” However, public health and safety departments and law enforcement agencies in states where legalization has occurred have produced primary data and impact reports that shine a light on how current marijuana policies are failing to protect the health and safety of the general population (Alaska State Troopers, 2017; Grondel et al., 2018; Oregon-Idaho High Intensity Drug Trafficking Area [OIHIDTA], 2020; Oregon Liquor Control Commission [OLCC], 2020; Oregon Public Health Division, 2016; Oregon State Police Drug Enforcement Section, 2017; RMHIDTA, 2019; Washington Office of Financial Management, 2019).

In 2018, the DOJ rescinded the Cole Memo policies, signaling an uncertain future for the marijuana industry. One thing is clear: by legalizing marijuana, states continue to violate federal laws. We now have eight years of data to show how these marijuana policy changes—and the industry they created—affect families and communities. This industry is chiefly driven by higher use rates and increased normalization, seeking to convert casual- and non-users into life-long customers. As we are only now beginning to address the far-reaching and devastating consequences of the addiction epidemic—driven largely, but not exclusively, by opioids—the rise of additional corporate promotion of drug use comes at an inopportune time.

Comparison rates: National vs. Colorado Data



Source: NSDUH, 2019: <https://www.samhsa.gov/data/report/2019-nsduh-detailed-tables>

# RESEARCH ON MARIJUANA HARMS

Scientific literature on the harms of marijuana use exists in abundance and will be discussed in this report. There are over 20,000 peer-reviewed research articles linking marijuana use to severe mental health outcomes, ranging from depression to psychosis, as well as consequences for physical health, and even negative outcomes for neonates exposed in utero and inhibited cognitive development. The connections between marijuana use and consequences to mental and physical health, and brain development, among other risks are often lost in conversations on legalization.

The distinction between medical and recreational marijuana has been deliberately blurred by an industry with a heavy hand in both markets. A recent study found that in spite of evidence that lower THC dosage is more appropriate for medical purposes, the medical marijuana products advertised in retail stores contain around the same amount of THC as recreational marijuana products—and generally contains upwards of 15% THC (Cash et al., 2020). Though there is potential for the medical use of certain components found within the marijuana plant, these components should be researched through well-designed clinical studies and under the guidance of the FDA.

These are just some examples of the conflict between data-driven research and marijuana normalization. The science is clear. Yet legalization proponents march forward, eyeing profits.





# KEY OUTCOMES

Like with our past in tobacco, the full consequences of marijuana commercialization will materialize over decades. However, we do not need to wait that long to understand some key outcomes. For example, the data in this report—and many others—show states that legalized marijuana have among the highest rates of marijuana use in the country, and use is sharply increasing in vulnerable demographics, like youth and young adults whose brains are still developing.

These states also have:

- Higher rates of marijuana-related driving fatalities.
- Issues with “legally” sold, but contaminated, marijuana vapes.
- More marijuana-related emergency department visits, hospitalizations, and accidental exposures.
- Expansive and lucrative criminal markets.
- Exacerbated racial disparities in marijuana industry participation and criminal justice enforcement.
- Increases in workplace problems, including labor shortages and accidents.





**“I don’t want anyone to mistake what I’m saying as implying that these products are considered safe for general adult usage.”**

U.S. Surgeon General, Jerome Adams (2019)

## COMMERCIALIZATION: A GROWING CONCERN

The commercialization of marijuana results in negative consequences for public health, social justice, and public safety. Medical marijuana legalization gave way to recreational marijuana legalization in states across the country and both industries are heavily capitalized. The result is the creation of a new and powerful addiction-for-profit industry.

More and more people are using marijuana while remaining largely ignorant of its negative consequences and use rates are surging across the United States after years of declines. More than 43.4 million people reported past year marijuana use in the U.S. in 2018, a more than six percent increase from the previous year. The alarming increase in use among young people, as well as pregnant women, in particular prompted U.S. Surgeon General Dr. Jerome Adams to issue a first-of-its-kind advisory on marijuana use (Office of the Surgeon General, 2019).

Though his advisory specifically addressed significant increases in use among youth and pregnant women, he does not shy away from cautioning against marijuana use more generally. At one congressional hearing, he told senators, “I don’t want anyone to mistake what I’m saying as implying that these products are considered safe for general adult usage” (Cornyn & Feinstein, 2019) .



**THC VAPING**  
**Over 2,700**  
**hospitalizations and**  
**more than 60 deaths.**

(Centers for Disease Control and Prevention, 2020)

## A "MASSIVE PUBLIC HEALTH EXPERIMENT"

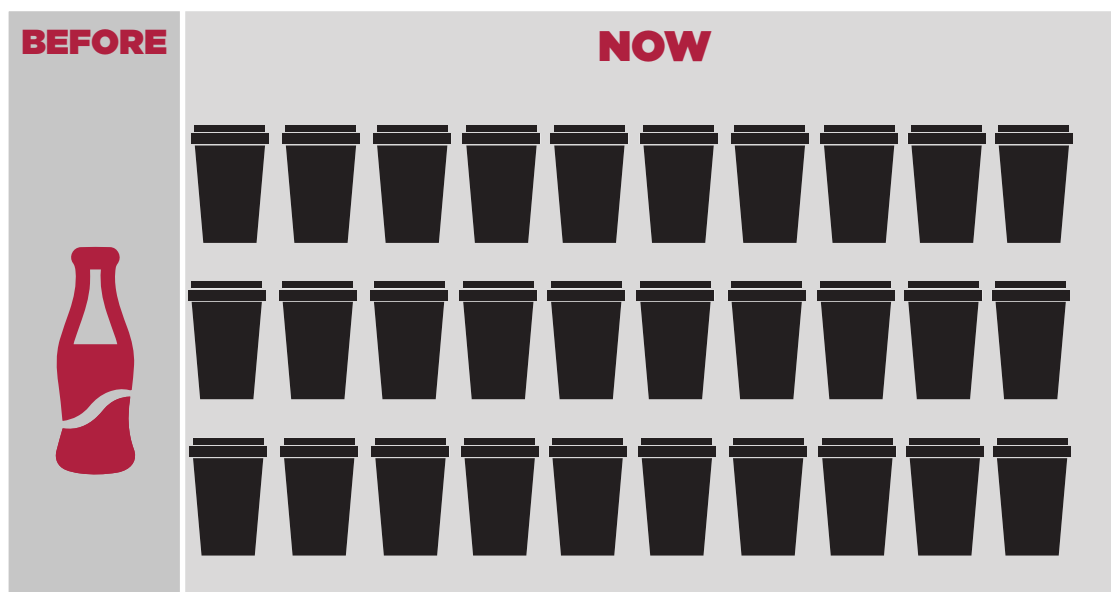
Dr. Adams continued to warn senators at the hearing of the "massive public health experiment," telling them: "We need to learn from our mistakes and be careful of normalization of behavior" (Cornyn & Feinstein, 2019). The commercialization of marijuana exemplifies just what Dr. Adams cautions against.

The sudden emergence in all 50 states and some U.S. territories of mysterious lung illnesses tied to vaping represents a unique case study on the impact of marijuana legalization. New technology and rapid commercialization drove an increase in the popularity of marijuana consumption through vaping devices. As demand increased subsequent use increased—and with it an epidemic resulting in over 2,700 hospitalizations (and more than 60 deaths) at the time of this report's publication, along with a double-lung transplant (Centers for Disease Control, 2019a).

In states where marijuana is “legal,” retail and medical licenses outnumber popular food chains. For example, in Colorado, marijuana retail locations outnumber all McDonald’s and Starbucks locations in the state combined (RMHIDTA, 2019). In 2019, there were 1,016 registered retail and medical locations combined (Colorado Department of Revenue, 2020) compared with 392 Starbucks and 208 McDonald’s (as of 2018). The sheer commonplace numbers of these stores promote and normalize marijuana use.

Adding to the danger of marijuana commercialization is the increasing market demand for high-potency products created by the combination of aggressive promotion and ever-increasing tolerance by heavy users. With innovation, the industry responded to meet the demand it had created, modifying marijuana to increase its potency. The commonly conceived “Woodstock weed” had only 1–3% THC, the psychoactive intoxicant responsible for the high. According to recent studies, today’s average marijuana flower—touted by industry advocates as a harmless plant—contains around 17.1% THC, though independent studies in “legal” states found the percentage to be even higher. Concentrates and edibles pack a more potent punch, containing an average of 55.7% THC (Chandra et al., 2019). But these products can be even more potent than that. Many marijuana retailers promote, and profit from, products containing up to 95–99% THC (Prince & Conner, 2019).

## Not Only Potency, But Consumption Levels: What Do Users Look Like Today?



(Caulkins, 2018)

**The change in marijuana potency today (daily users) versus 20 years ago (average weekend user) is akin to the caffeine change from one 20 oz cola a day, to thirty-three 16 oz cappuccinos a day.**



One significant problem with high-potency products is the lack of regulation. Numerous studies have found that product regulation in “legal” states is limited (Lamy et al., 2016; Peace et al., 2016; Yates & Speer, 2018) and internal audits conducted by state governments have exposed gaping holes in regulatory frameworks. In Oregon, for example, the Oregon Liquor Control Commission found that there is one state inspector per every 83 marijuana licenses (OLCC, 2020) . Perhaps more concerning, no state has limited the potency of these products—and attempts have been quickly blocked by the industry.



**STATE REGULATORY  
FRAMEWORKS  
STRUGGLE TO KEEP UP  
WITH THE NUMBER OF  
LICENSED SHOPS.**

(Oregon Liquor Control Commission, 2019)



The mislabeling of products also plagues the “legal” market. Studies have found that labeling of active ingredients in concentrates and edibles often misrepresents the actual ingredients in those products (Peace et al., 2016). Unsuspecting consumers often have no idea what exactly they are smoking or ingesting.

Furthermore, the adaptability of marijuana gives way to mass-marketed products modeled after popular consumer goods. Marijuana-infused “edibles” come in the form of cookies, candy, ice cream, sodas, and other sweet treats that are particularly appealing to children (O’Connor & Méndez, 2016). Marketing tactics make use of bright colors and catchy names, replicating images or appropriating the names of well-known commercial food products. For example, “Pop Tarts,” a widely consumed kid-friendly breakfast product, was used by one marijuana producer to market “Pot Tarts.” Unfortunately, these products are thought to be contributing to the increased accidental marijuana exposures among children and others.



These kinds of growth tactics by industry are not new. They largely mirror the boom of Big Tobacco in the early 1900s—and not by accident (Ayers et al., 2019; Richter & Levy, 2014). Though marijuana proponents operate under the guise of up-and-comers, they are now well financed and advised by professionals from the tobacco industry. For example, the corporate owner of the Marlboro brand, Altria, purchased a 35% stake in Juul shortly after acquiring a 45% stake in Cronos, one of the largest international distributors of marijuana (LaVito & Hirsch, 2018). The UK-based Imperial Brands invested around \$123 million CAD (~\$94M USD) in Auxly, a Canadian marijuana company. This partnership, which entitles Imperial Brands to a 20% stake in the company, will focus on utilizing Imperial Brand’s vaping technology to develop marijuana vaping products. The marijuana industry has also caught the attention of Big Pharma and Big Alcohol.

Former Purdue Pharma executive John Stewart left the pharmaceutical industry to create his own marijuana company (Murphy, 2016). Teva Pharmaceuticals signed an agreement to become a medical marijuana distributor in Israel (Helfand, 2016). And Sandoz, a subsidiary of Novartis, signed an agreement with Tilray to distribute marijuana products (RTT News, 2018).

Constellation Brands, maker of Corona, purchased a 9.9% stake in Canopy Growth for \$191 million, then upped the stake to 38% for \$4 billion in 2018. The company has the option to increase their investment and purchase up to 139.7 million new shares at a price of up to \$5 billion more (Sheetz, 2018). Anheuser-Busch InBev announced an upcoming partnership with marijuana giant, Tilray, to explore the potential for marijuana-infused beverages. Molson Coors and Blue Moon also made substantial investments in the marijuana industry (T. Hughes, 2019; Miller, 2018).

The investments of these big industry players coincide with more covert action taken to push legalization forward. In an investigative report, examining marijuana interests in the UK, journalist Jonathan Gornall linked several commercial organizations with vested interests in the creation of a recreational marijuana market with individuals and activists pushing for more access to medical marijuana. What's more, he found that several tobacco companies were funding studies on medical marijuana, an activity that calls for some questioning into the validity of that research (BMJ, 2020).

These connections are unsurprising. Marijuana commercialization presents addiction-for-profit industries, long under public scrutiny, with a new and innovative pathway to profits.

## The true be-leaf-ers

The tangled connections between proponents of medicinal and recreational cannabis use

As Jonathan Gornall reveals in his investigation, there is a complicated network of relationships between those lobbying for greater availability of cannabis for medical and recreational use. This diagram presents the links between those calling for wider patient access to cannabis for medical use and the members of a parallel campaign to create a lucrative recreational market for the drug in the UK. Hover over nodes and links for more information.

### Category

-  Individual
-  Funder
-  Provider
-  Other organisation

### Interest

-  Medical use
-  Recreational use
-  Both

Area of circles is proportional to number of links connected



# ADVERSE HEALTH EFFECTS OF MARIJUANA

Contrary to popular belief, marijuana is a harmful drug. The main psychoactive ingredient in marijuana, THC, causes many different types of mental and physiological health problems— especially in children, young adults, and pregnant women. Its addictive properties exacerbate its potential harms as marijuana users become dependent on the drug. Its potency has skyrocketed in recent years.

Researchers found that marijuana is an addictive drug (Volkow et al., 2014). Brain scans of marijuana users show changes in the structure of the brain's reward center to be consistent with addiction (Gilman et al., 2014) and up to 47% of regular users experience withdrawal symptoms when they cease use (Hasin et al., 2008; Bahji et al., 2020). The National Institute on Drug Abuse reports that around 30% of marijuana users have some form of marijuana use disorder and that people who begin using marijuana before the age of 18 are four to seven times more likely to develop a marijuana use disorder compared with those who start later (National Institute on Drug Abuse, 2019b). One recent study on rats found that marijuana vaping may support "conditioned drug-seeking behavior," cause for concern as vaporized marijuana gains popularity (Freels et al., 2020).

Studies found marijuana use can cause severe consequences for mental health. Marijuana is increasingly linked to the onset of psychosis and schizophrenia (Henquet et al., 2005; Marconi et al., 2016; Mustonen et al., 2018; Niemi-Pynttari et al., 2013) and shows a more modest association with depression and anxiety (Agrawal et al., 2017; Duperrouzel et al., 2018; Gobbi et al., 2019). In one of the most comprehensive studies to date on marijuana and psychosis, Di Forti et al found that daily marijuana use is associated with an increased likelihood of developing psychosis. What's more, researchers reported a more than four-times odds of daily users of potent marijuana to develop psychosis (Di Forti et al., 2019).

“Compared with never users, participants who used high-potency cannabis daily had **four-times higher odds of psychosis** in the whole sample.”

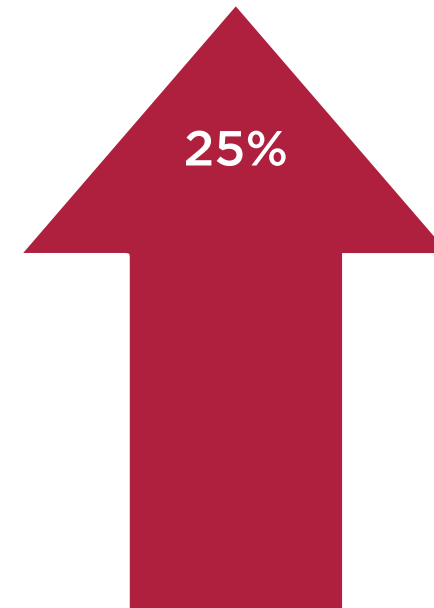
(Di Forti et. al., 2019)

Chronic marijuana use increases the likelihood of anxiety in adults in their late twenties and older, and those who met the criteria for cannabis use disorder (CUD) had a high risk of all mental health symptoms across all ages (Leadbeater et al., 2019).

These studies are worth noting, particularly as marijuana is increasingly marketed as a solution for anxiety and other mental health ailments.

Frequency of marijuana use, as well as higher THC potency, is associated with the most severe impact on mental health, which is evidenced by psychosis, suicidality, reshaping of brain matter, and addiction (Cinnamon Bidwell et al., 2018; Di Forti et al., 2019; Fischer et al., 2017; Pierre et al., 2016). The increasing demand for high potency marijuana products and the coinciding prevalence of marijuana use disorder are indicative of a future maelstrom with unknown consequences for public health, especially as the industry engages in a concerted effort to undermine scientifically proven risks of marijuana use. The legalization of marijuana coincides with a nationwide increase in marijuana use disorder. According to the Substance Abuse and Mental Health Services Administration's (SAMHSA) National Survey on Drug Use and Health (NSDUH), 4.4 million

Americans reported marijuana use disorder in 2018, up from just over 4 million the previous year (SAMHSA, 2019a). One study comparing marijuana use of respondents before and after legalization in their home state found a near 25% increase in people aged 12 to 17 who reported marijuana use disorder (Cerdá et al., 2020).



**There was a 25% increase in Cannabis Use Disorder (CUD) among 12-17 year-olds in “legal” states.**

(Cerde et. al., 2019)

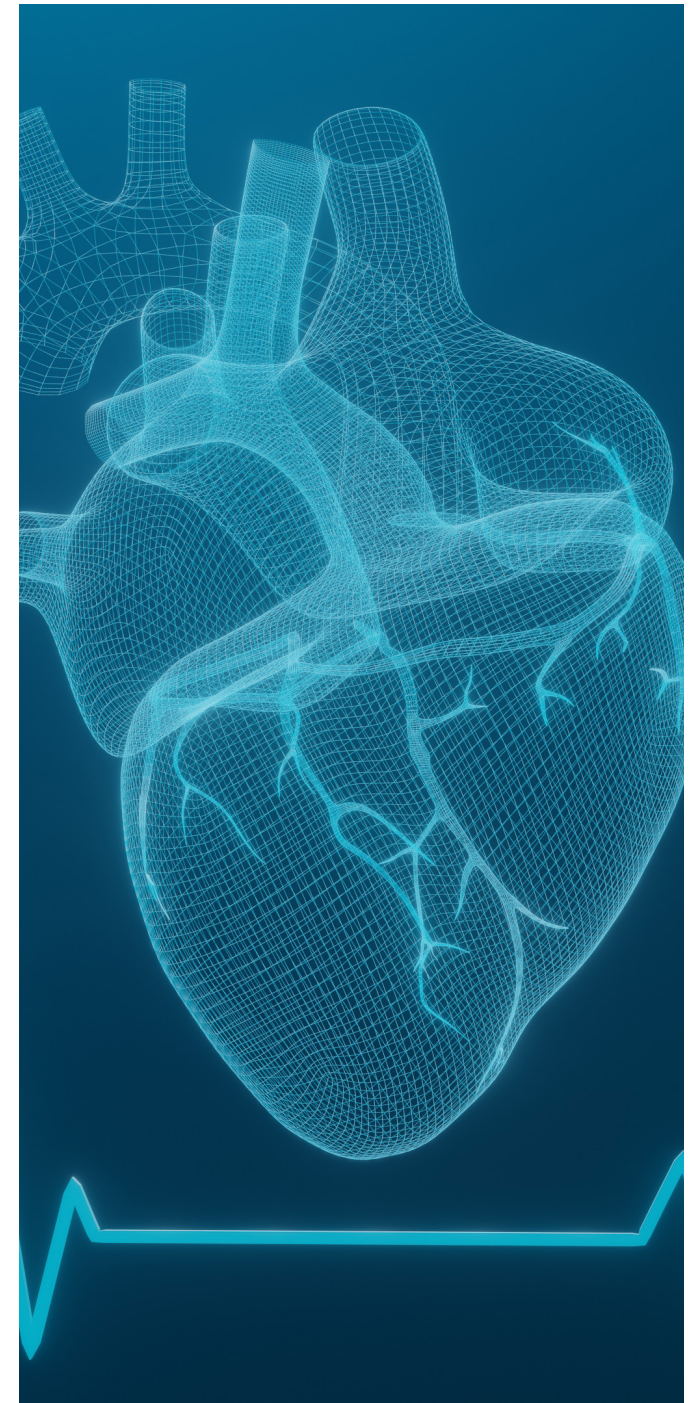


In addition to this alarming trend, more Americans who report any, or serious, mental illness issues also reported past-year marijuana use. Co-occurring mental illness and substance use disorder was higher among past-year marijuana users than past-year opioid users (SAMHSA, 2019a).

Marijuana is also linked to significant physical ailments. Researchers have found a connection between marijuana use and lung damage, as well as serious cardiovascular problems, including hypertension, myocardial infarction, cardiomyopathy, arrhythmias, stroke, and cardiac arrest (Bigay-Gamé et al., 2018; Hall & Lynskey, 2016; Pacher et al., 2018).

Studies find marijuana to be linked to certain types of cancer (Liu et al., 2020), including testicular cancer (Ghasemiesfe et al., 2019; Gurney et al., 2015).

Researchers at Boston University found that marijuana use among men may double the risk of partner miscarriage—regardless of the woman's use (McAlpine, 2019). Additionally, marijuana use during pregnancy is accompanied by a host of risks for the baby. Use during pregnancy may affect cognitive development by increasing the risk of hyperactivity, impulsivity, and inability to focus (Huizink & Mulder, 2006; G. S. Wang et al., 2017). Prenatal exposure to marijuana also predisposes offspring to neuropsychiatric disorders (Frau et al., 2019). A mother's marijuana use during pregnancy may also increase the risk of low birth weight and small for gestational age births, preterm births, and may also increase the risk of neonatal intensive care unit placement and developmental problems (Gunn et al., 2016; Kharbanda et al., 2020). Low birth weight and preterm birth increase the risk of short- and long-term complications for the child (Mayo Clinic, 2017).





Increasingly, government officials sound alarms on marijuana use during pregnancy after research and reports have revealed that more pregnant women are using the drug. In Alaska, for example, 9% of women who delivered a baby in 2017 reportedly used marijuana during their pregnancy (Alaska Department of Health and Social Services [ADHSS], 2020). In fact, in Colorado, researchers found that seven in 10 dispensaries recommended marijuana to women posing as pregnant women (Nedelman, 2018). Dr. Nora Volkow, the director of the National Institute of Health's National Institute on Drug Abuse, published a report in response to this alarming trend developing across the country of increased marijuana use during pregnancy and warned of the detrimental health risks of in utero cannabis exposure (Volkow et al., 2017). In 2019, the U.S. Surgeon General issued an advisory on marijuana use during pregnancy (Office of the Surgeon General, 2019). In 2019, a newborn whose mother reportedly used marijuana while pregnant was found dead at just 11 days old and doctors believed the cause was acute marijuana toxicity (Bao & Bao, 2019). The trend in marijuana use during pregnancy even prompted the U.S. Surgeon General to issue an advisory



that warned women not to use marijuana to alleviate nausea during pregnancy (Office of the Surgeon General, 2019). Commercialization advocates have also suggested that marijuana may help PTSD sufferers, a claim with important implications for veterans in particular. This may be a dangerous assumption. Two studies conducted on military personnel suffering from PTSD found an elevated risk for suicidal thoughts and behaviors among those using marijuana (Allan et al., 2019; Gentes et al., 2016).

Marijuana commercialization, normalization, and misinformation pose a significant risk to public health as the science continues to be downplayed or dismissed. Dr. Elinore McCance-Katz, Assistant Secretary at the Department of Health and Human Services, repeatedly asserts that the dangers posed by marijuana are “settled science,” yet pushback from the industry inhibits wider acceptance of that fact.

# MARIJUANA AND CO-USE WITH OTHER SUBSTANCES

Some industry proponents claimed that legalizing marijuana would have a positive impact on other substance use in the United States, such as alcohol and opioid use. Common industry rhetoric holds that former alcohol users will switch to marijuana if it is made legal. They also suggest that legalization will be “the exit to the opioid crisis” (MadMoney, 2018), and cite a since debunked and severely flawed study that seemed to show a decrease in opioid overdoses in states that legalized medical marijuana.

Amid the third wave of the decades long opioid crisis (Centers for Disease Control, 2019b) and in a population in which nearly 14.5 million people are impacted by alcohol use disorder (National Institute on Alcohol Abuse and Alcoholism [NIAAA], 2020), the false assertions by the marijuana industry are harmful and not backed by science.

A 2014 study (Bachhuber et al., 2014) suggested medical marijuana legalization was associated with a decrease in opioid-related deaths until 2010. However, a more recent study of that data showed the opposite. This 2019 study, which now includes more years of data, found instead that marijuana legalization coincided with a 23% increase in opioid-related deaths after 2010 (Shover et al., 2019). (However, the study notes that medical marijuana legalization, more likely than not, had no impact on opioid-

related deaths.) Medical marijuana users, according to findings from this study, represent 2.5% of the U.S. population and consequently medical marijuana legalization is likely incapable of exerting a demonstrable impact on opioid overdose deaths. Other studies have backed the finding (Caputi, 2019). The positive correlation found in this study is still worth further examination, given the relationship between marijuana use and opioid misuse.

Studies have found a link between marijuana and opioid use as well as marijuana and future use of other drugs. Marijuana exposure in adolescence in particular seems to impact future opioid use (Ellgren et al., 2007). A large proportion (44.7%) of lifetime marijuana users go on to use other drugs (Secades-Villa et al., 2015). A study by Azagba and colleagues (Azagba et al., 2019) found marijuana users were more likely than nonusers to report prescription opioid misuse, echoing an earlier study that demonstrated that participants who reported marijuana use in the previous year were 2.6 times more likely to abuse nonprescription opioids (Olfson et al., 2018).



A body of research shows early marijuana use is associated with more than doubling the likelihood of other drug use later in life (Olfson et al., 2018; Secades-Villa et al., 2015). In fact, according to the National Survey on Drug Use and Health, 95–97% of people who used cocaine or heroin started with marijuana (Substance Abuse and Mental Health Services Administration [SAMHSA], 2018). The scientifically validated relationship between substance abuse and marijuana use is difficult to ignore.

Marijuana is often lauded as a plausible substitute for opioids in the treatment of pain. But there is evidence to suggest that marijuana use—particularly chronic use—is associated with poor pain control (Salottolo et al., 2018). A recent study found adults with pain are vulnerable to adverse marijuana use outcomes, a finding that calls into question the prescribing of marijuana as pain relief (Hasin et al., 2020). Considering that severe pain continues to be one of the most common reasons for obtaining a medical marijuana card—93% of registered cardholders in Colorado reported severe pain as the reason for marijuana use (Colorado Department of Public Health and Environment, 2019)—current state policies should be reconsidered.

A four-year prospective study in the highly respected journal, *The Lancet Public Health*, followed patients with chronic non-cancer pain and found no evidence marijuana use mitigated pain severity or interference or that marijuana affected rates of opioid prescribing or opioid discontinuation (Campbell et al., 2018).

Rising alcohol use is also an issue. According to a 2018 report, Washington state saw a 9% increase in gallons of beer consumed since legalization (Sauter, 2018). Since legalization in Colorado, state officials recorded a 7% increase in gallons of alcohol consumed (RMHIDTA, 2019). Other studies showed no meaningful decrease in alcohol use since legalization (Haughwout et al., 2016). Further analysis found that, “Allowing for changes in the adult population over the period 2005–2017, the data show a continuing increase in wine servings alongside ... legalization” (Pellechia, 2018).

Rather than discouraging polysubstance use (the use of multiple drugs), marijuana legalization is associated with further use, misuse, and dependence on other drugs. While the “gateway” effect of marijuana is sometimes considered outdated, the association between use of marijuana and other drugs is supported by the science. Marijuana use often predicts future drug use—ranging from tobacco and alcohol use, to opioid use.



Marijuana use itself may be forecasted by other, seemingly less harmful drugs, such as tobacco and alcohol. Among high schoolers who first initiated alcohol use by 12th grade, subsequent marijuana use was more likely. Marijuana seems to both impact—and be impacted by—tobacco use in younger age groups (Keyes et al., 2019). The relationship that these drugs have on use of each other is important to note.

A 2018 study published in the *Journal of Studies on Alcohol and Drugs* found that, similar to tobacco and alcohol co-users, marijuana and alcohol co-users were more likely than non-marijuana alcohol users to overvalue alcohol, signaling a dependence on both drugs (Morris et al., 2018). Marijuana use is also associated with an increased likelihood of alcohol use disorder (Weinberger et al., 2016).

The commercialization of marijuana perpetuates an understatement of dangerous consequences of marijuana use, adding to the social burden of addiction rather than subtracting from it.





# THE VAPING EPIDEMIC

The vaping epidemic is the first national, marijuana-driven crisis in this country and is a direct result of marijuana normalization and commercialization. The vaping of marijuana in THC oil pods or cartridges is a relatively new marijuana-industry innovation. Vaping quickly delivers 70–90% THC concentrates to users by heating extracted oils so that they can be inhaled as vapor. No studies on consumer safety were conducted prior to the mass marketing of vaporizers, which are also popular among tobacco users.

The ensuing crisis, dubbed EVALI (e-cigarette or vaping product use-associated lung injury) by the Centers for Disease Control and Prevention (CDC), has left nearly 70 dead and resulted in the hospitalizations of 2,739 as of the publishing of this report (Centers for Disease Control, 2020). Many of these victims suffered lung damage that their bodies will never recover from. One hospitalization resulted in the double-lung transplant for a 17-year old (CNNwire, 2019).

Of EVALI cases, 52% of affected patients are under the age of 24. Victims killed by the vape-related lung illness ranged in age from 15 to 75. Cases of vaping illnesses have appeared in all 50 states as well as several U.S. territories (Centers for Disease Control, 2020). 15% of EVALI victims are under the age of 18—and therefore under the legal age limit to buy a marijuana vape. This is in keeping with the unfortunate and fast-moving upward trend in youth marijuana vaping (Miech et al., 2019).







**One in six cases  
were attributed  
to products sold  
in commercial  
shops.**

(Centers for Disease Control and Prevention, 2020)

82% of the vape cases investigated in connection with EVALI were found to contain marijuana. One in six of these cases were from vapes and oils sold by commercial shops. Yet when the CDC determined that the problem was likely a contaminant common in THC vapes, the marijuana industry immediately pointed to the underground market and used the epidemic to suggest that legalizing marijuana was the only solution to the public health crisis. The CDC, meanwhile, advised people to stop using THC vapes altogether, as scientists struggled to discern what could cause the kind of intense lung damage that was apparent in EVALI cases.

Various studies of lung biopsies point to different causes. One Mayo Clinic study revealed what researchers defined as a chemical burn (Butt et al., 2019)—a potential consequence associated with inhaling heated metal toxins from vape devices. Others pointed to vitamin E acetate, which is a chemical not meant to be inhaled. While the CDC continued to advise users not to use any THC vape products, because they could not definitively say that vitamin E acetate was the cause of illness, the marijuana industry continued to point to vitamin E acetate in order to assert that only illicit vapes were complicit in the disease—even as vitamin E acetate was found in some “legal” vapes.

Many victims obtained vapes initially purchased from “legal” dispensaries in “legal” states. In Oregon, two deaths were linked to marijuana products purchased state-licensed dispensaries (Selsky, 2019). A death in Tennessee was linked to a vape purchased at a dispensary in Colorado (WKRN, 2019). Cases in Delaware, Maryland, California, Washington, Michigan, and Massachusetts were linked to “legal” marijuana (Edwards, 2019; Janney, 2019; Newman, 2019; O’Donnell, 2019; Snyder, 2019; Stone, 2019).

Seeking clarity, SAM submitted a Freedom of Information Act request to the state of Massachusetts, which compelled the state to reveal six EVALI cases linked to the Massachusetts “legal” marijuana market (Grace, 2019; Edwards, 2019). In Michigan, the state’s regulatory agency was forced to issue a recall on products sold at state-licensed dispensaries after it was revealed that several of them contained vitamin E. acetate (Neavling, 2020). Another recall implicated 3,400 “legal” cartridges.

This tragic epidemic, which impacts users across the country, came about because of widespread legalization and relaxed attitudes towards marijuana. It’s unlikely that these issues will simply disappear. Many states that have implemented medical and recreational programs have run into continued problems with safety. In Michigan, vapes sold at “legal” dispensaries continue to be pulled from shelves for containing substances that violate the state’s standards. The Marijuana Regulatory Agency (MRA) recalled several thousand of vapes which contained vitamin E acetate, after the substance was banned in late November (Neavling, 2020). In the spring of 2020, a whistleblower revealed that Hawaii’s standards for medical vapes were far below the standard of any other state, putting patients at risk. Almost half of vapes subjected to a blind test were found to contain ethanol levels so high that the cartridges would be illegal if sold in the likes of California, Colorado, or Washington (Blair, 2020).

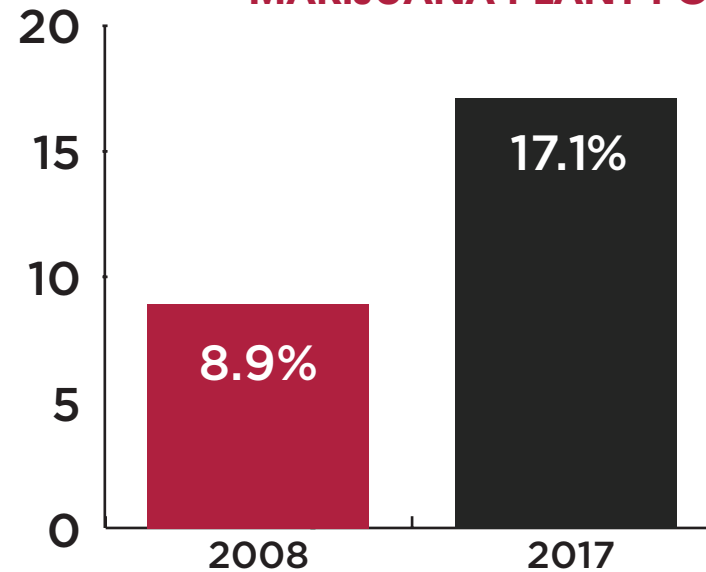
Legalization will not solve the problem of contaminated products, and that comes with deadly implications for consumers and patients alike.

# HIGH POTENCY MARIJUANA

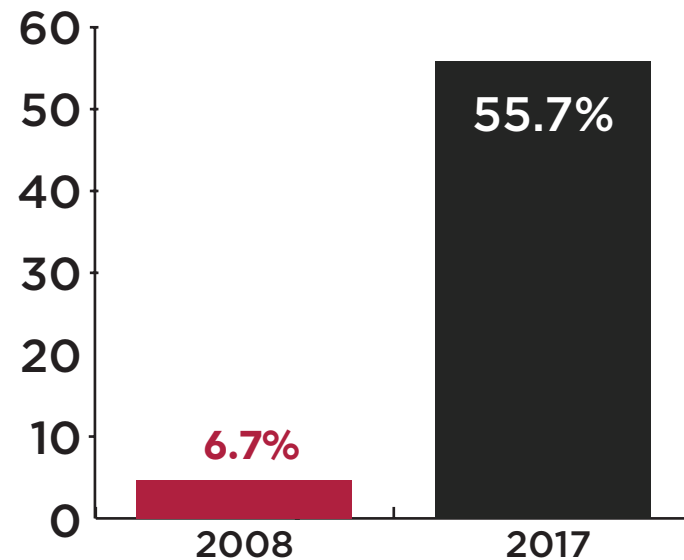
In the 1970s, “Woodstock Weed” contained roughly 1–3% THC (ElSohly et al., 2000), the psychoactive component of marijuana. Since then, products became increasingly potent, driven in large part by market demand as well as a shift in consumption methods. THC concentrates such as shatter, budder, and waxes—as well as gummies and edibles—are packed with more THC than joints ever were. Now, even the plant itself is genetically engineered to contain a greater percentage of THC. One study found that the average potency of the marijuana plant increased from 8.9% THC in 2008, to 17.1% THC in 2017. Concentrates, which contained an average potency of 6.7% THC in 2008, contained an average potency of 55.7% in 2017 (Chandra et al., 2019).

The market for marijuana flower hybrids and concentrates continues to rise with the increase in demand for products with higher THC potency levels. In Washington State, market share for flower products with 10–15% THC declined by 60.4% between 2014 and 2017, while the market share for flower products with more than 20% THC increased by 48.8% during that same period (Smart et al., 2017).

**MARIJUANA PLANT POTENCY**



**CONCENTRATE POTENCY**



In Oregon, concentrates and extracts easily surpassed flower marijuana in sales and comprise an increasingly large proportion of all marijuana sales. In the month of December of 2019 alone, nearly 1 million units of concentrates and extracts were sold in the state and the number of units of edibles sold exceeded the pounds of flower marijuana sold (OLCC, 2020). Retailers increasingly promote higher potency marijuana in order to drive profits—high potency marijuana sells.

The demand for stronger marijuana is dangerous. High potency marijuana exacerbates many of the consequences of marijuana use. Frequent marijuana users and users of higher potency marijuana are more likely than regular users to develop schizophrenia and psychosis (Di Forti et al., 2019). Users of Butane Hash Oil (BHO), a marijuana concentrate that yields a potency of between 70–99% THC, are more likely to have lifetime diagnoses of depression and anxiety while being more likely to report other substance use (Chan et al., 2017).

The lucrative cash potential of high potency marijuana also emboldens illegal producers of BHO. Its production involves forcing raw marijuana and butane into a reaction chamber, which creates a highly combustible liquid that can easily explode when introduced to an ignition source. This has implications not only for public health but public safety as well.

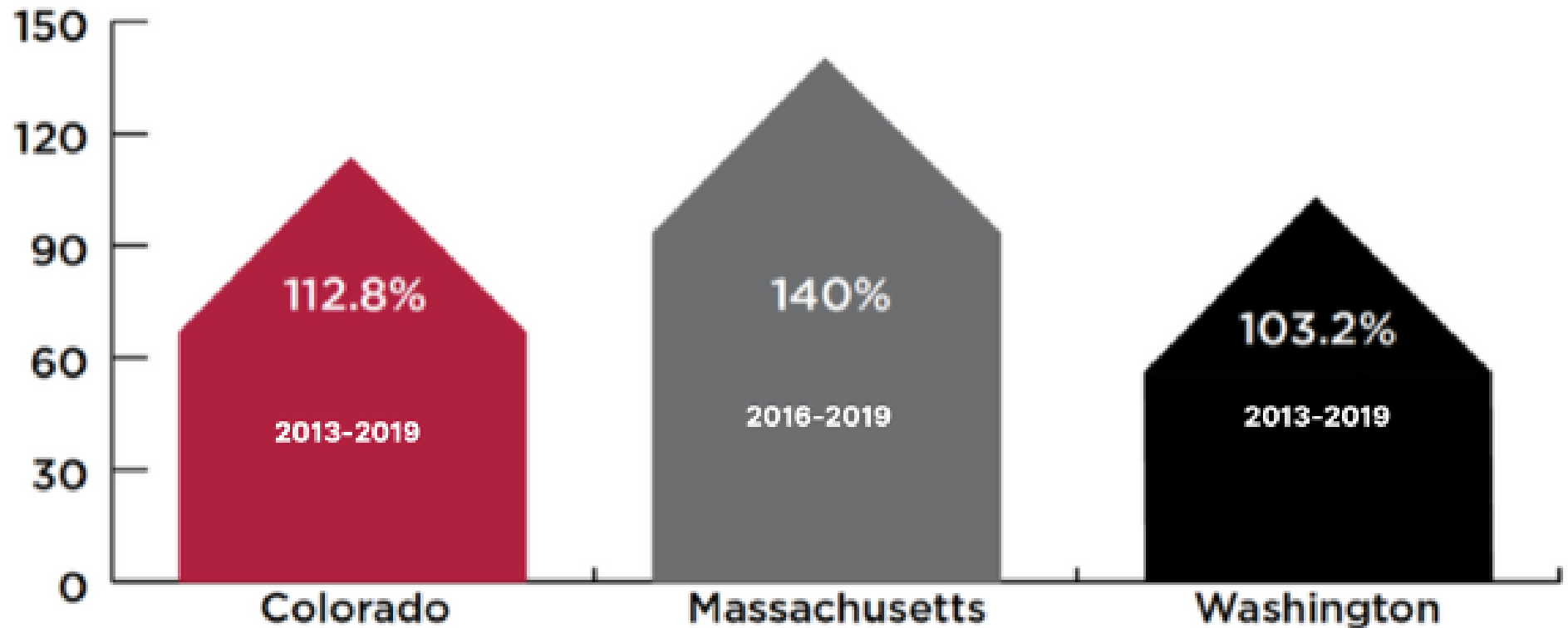
Between 2012 and 2018, over 100 marijuana extraction labs were seized in Oregon. Over 30 fires and explosions related to the production of this kind of marijuana were reported in the state in that time period (ORIDHIDTA, 2020). The number of labs seized in the area reached a new high of 37 in 2017 (ORIDHIDTA, 2020).

In addition to these concerns, BHO explosions led to an increasing number of BHO burn victims. The Oregon-Idaho High Intensity Drug Trafficking Area report found that 87 marijuana extraction burn victims were treated from 2015 to 2017. Since 2013, treatment costs for marijuana extraction burn victims totaled \$15 million (ORIDHIDTA, 2020).

Products with high amounts of THC proliferate with market demand and, as such, consequences associated with highly potent marijuana become more apparent.



## PERCENT INCREASE IN CALLS MADE TO THE POISON CONTROL CENTER FOR MARIJUANA EXPOSURES FOLLOWING LEGALIZATION IN THE STATE.



(Rocky Mountain HIDTA, 2019; Whitehill et al., 2019; Washington Poison Center, 2018)

## EMERGENCY & HOSPITAL ADMISSIONS

The widespread availability and accessibility of high potency marijuana due to legalization has resulted in an increasing number of marijuana-related poison control calls, hospitalizations, and ER visits.

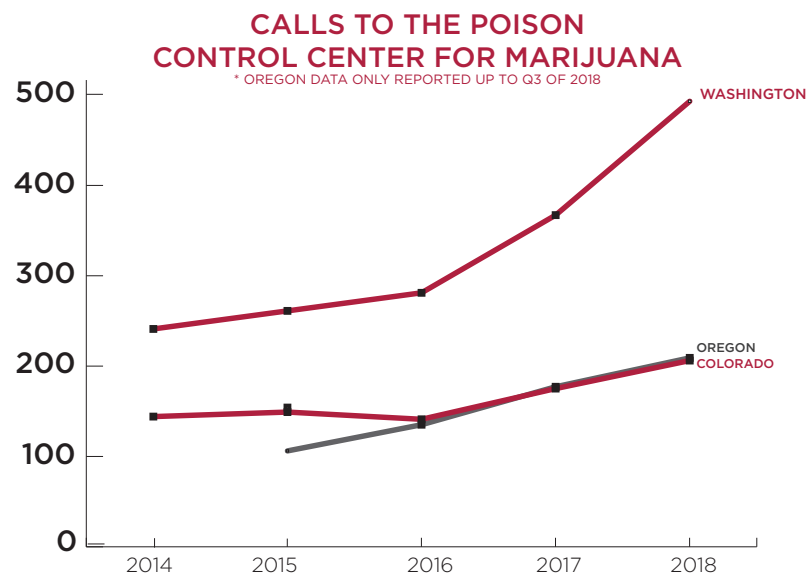
A 2020 study found that recreational marijuana commercialization is associated with between 66–77% increase in marijuana exposures. State-specific data shed greater light on this phenomenon (Shi & Liang, 2020).

In Colorado, the number of marijuana-related emergency department visits increased 54% from 2013 to 2017 (RMHIDTA, 2019). Yearly marijuana-related hospitalizations increased 101% in that same period (RMHIDTA, 2019). Calls to the poison control center for marijuana exposures also increased. In 2013, 125 calls were made for marijuana-related exposures. By 2018, that number jumped to 266, representing a 112.8% increase. Youth cases (instances of marijuana-related exposures of children aged 8 or younger) increased 126.2% from 2013 to 2018. In 2018, youth cases represented over half of all marijuana-related exposure calls (RMHIDTA, 2019).

A study by the Colorado Department of Public Health and Environment found that in 2018, over 23,000 homes in the state with children aged one to 14 years had marijuana products stored in an unsafe manner (Colorado Department of Public Health and Environment [CDPHE], 2018). In 2018, 60% of youth marijuana exposures involved edibles, compared with just 18% in 2016 (RMHIDTA, 2019). Even when packaging is compliant with Colorado's regulatory requirements, it fails to discourage or prevent children from accessing potent and dangerous marijuana.

Researchers who studied the impact of medical marijuana legalization also found many pediatric marijuana exposure cases in the state, despite childproof packaging and warning labels (Whitehill et al., 2019). During the eight-year period studied, the Regional Center for Poison Control and Prevention (RPC) recorded a 140% increase in single-substance (marijuana) exposures, with 81.7% of these calls regarding marijuana exposures of 15- to 19-year olds.

A study conducted in Washington State found that the rate of pediatric exposures to marijuana (children aged 9 or under) was 2.3 times higher following "legal" retail sales than before legalization (A. Thomas et al., 2019). Poison control center cases in Washington state have increased 103.2%. Cases for children aged 5 and younger increased in 176.5%. In 2018, there were 497 calls—compared with 245 when legalization in the state began (Washington Poison Center, 2018).



Rocky Mountain Poison and Drug Center, 2019; Washington Poison Center, 2019; Oregon Poison Center, 2019; Massachusetts & Rhode Island Poison Center, 2019)

In Alaska, 2017 there were a total of 3,296 inpatient discharges and 6,639 outpatient discharges related to marijuana (ADHSS, 2020). In Illinois, just several days after legalization, doctors reported a surge in emergency room visits and hospitalizations for marijuana, including several cases of marijuana-induced psychosis (McCall, 2020).

Though it is true that marijuana misuse does not result in the same kind of immediate overdose that other drugs may cause, cases of Cannabis Hyperemesis Syndrome (CHS)—or sometimes CVS (Cannabis Vomiting Syndrome)—have increased significantly since legalization. CHS is a disease that presents as episodes of screaming and vomiting, dubbed “scromiting,” and

the only effective treatment is the immediate stoppage of marijuana use. The disease appears to mainly affect heavy, daily users of marijuana.

From 2010 to 2014, researchers recorded a 46% increase in CHS cases in Colorado (Bhandari et al., 2019). Another study of CHS in Colorado found at least two deaths that were caused by CHS and recorded a third death that CHS is believed to have contributed to (Nourbakhsh et al., 2019). This phenomenon was not reported before 2004.

The dramatic increases in emergency cases related to marijuana exposure highlight the danger of commercialization. In many instances, the danger impacts unwitting children or people who mistakenly consume marijuana. Innocent and unwilling citizens are subjected to consequences of a situation that they did not create.

## MARIJUANA HOSPITALIZATION INCREASES SINCE LEGALIZATION



(Colorado Department of Public Health and Environment, 2013-2017; Alaska Department of Health and Social Services, 2020).

# IMPACT ON YOUTH

The legalization of marijuana has had a profound impact on youth use of the drug as well as perceptions of its harms.

Years of playing catch-up to alcohol and tobacco normalization have resulted in important downward trends in youth alcohol and cigarette use. But a new wave of substance use among children is appearing. Given the relationship between marijuana use, alcohol, and cigarette use, it is important to note that use rates of all substances among youth may rise if the dangers of youth marijuana use go ignored.

While some marijuana industry proponents have suggested that a strict legal marijuana market would limit youth use, marijuana use among youth is rapidly increasing concurrent with legalization—while perceptions of risk associated with use are decreasing. Compounding this problem are the increasing use rates of adults. A 2019 study found that parental marijuana use increases the likelihood of marijuana use among children in the household, as well as increases their risk of tobacco use and opioid misuse (Madras et al., 2019).

In part, the ease of obtaining marijuana has contributed to youth use in “legal” states. Restrictions on selling to minors have not stopped state-sanctioned vendors from selling the drug to underage consumers in “legal” states. In 2018, 46% of young people nationwide aged 12 to 17 reported that they perceived marijuana to be easy or fairly easy to obtain

(SAMHSA, 2019a). In Washington state, where marijuana is “legal,” this number is much higher, with 49% of 10th graders and 61% of 12th graders believing that marijuana was easy to obtain (Washington State Healthy Youth Survey [WSHYS], 2018).

In Washington state, marijuana violations have remained high since legalization in 2014. As of December 2019, 3,220 violations have been documented. Violations pertaining to the sale or service of marijuana to a minor, or for allowing a minor to frequent a restricted area, comprised 16.3% of all of these violations (Washington State Liquor and Cannabis Board, 2020).

Among Oregon 11th graders who currently use marijuana, 67% reported obtaining marijuana from a friend (Oregon Health Authority, 2016). Furthermore, 37.2% of 8th and 49.5% of 11th graders reported being exposed to online marijuana advertisements in the past 30 days (Oregon Health Authority, 2017). A recent study found that one in three youth living in a state where marijuana is “legal” engaged with marijuana promotions on social media. The same study found that youth who engaged with marijuana promotions were five times as likely to use marijuana (Trangenstein et al., 2019).

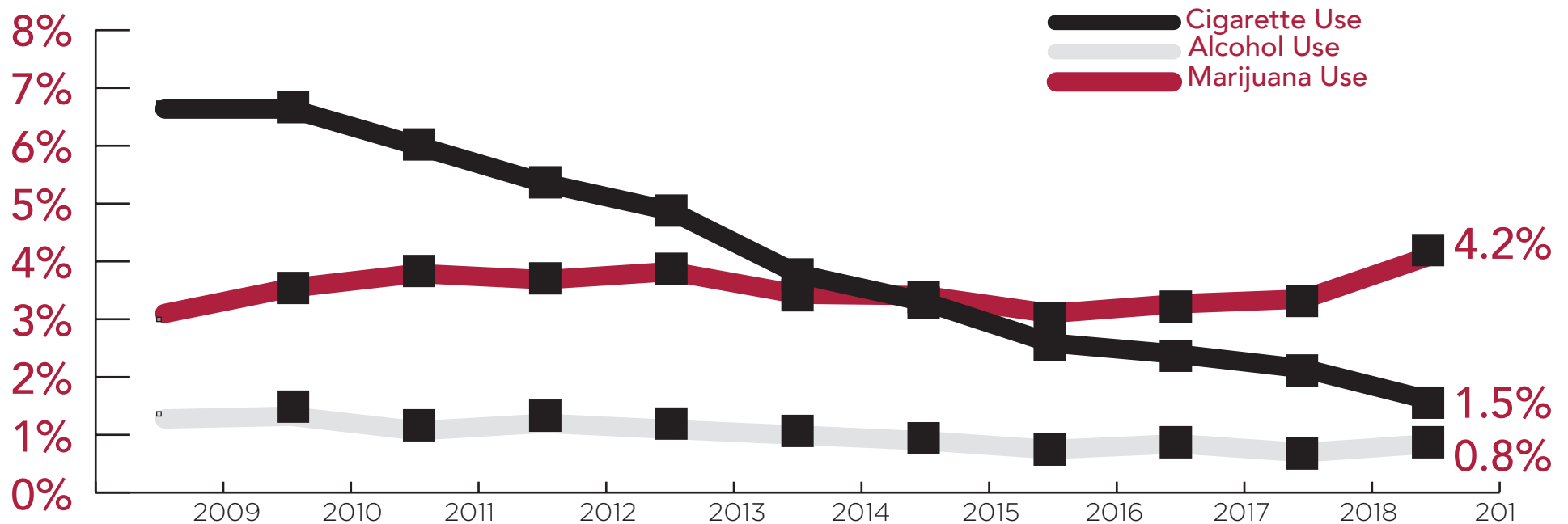
In Washington state, 22% of 6th and 8th graders believed there to be no or low risk from regular marijuana use, while 40% of 10th and 12th graders reported no or low risk from regular marijuana use. 67% of 10th and 12th graders in the state reported no or low risk of trying marijuana once or twice (WSHYS, 2018).



Additionally, near daily marijuana use—as reported by the University of Michigan’s Monitoring the Future (MTF) survey—increased dramatically from 2018 to 2019 with 6.4% of 12th graders, 4.8% of 10th graders, and 1.3% of 8th graders reporting near daily marijuana use in 2019. The increase in near-daily marijuana use among 8th graders is particularly concerning: 2019 near-daily use rates jumped 85.7% from 2018 to 2019 (Miech et al., 2019).

Youth marijuana vaping has added to the already-alarming trend of increasingly prevalent marijuana use among young people amid widespread commercialization. Trends in youth vaping have given way to a countrywide epidemic (Centers for Disease Control, 2019a) that present implications for youth marijuana use. Youth vaping of any kind (tobacco or flavors) has been shown in several studies to increase the likelihood of subsequent marijuana vaping or marijuana use generally (Chadi et al., 2019; Kowitt et al., 2019). As youth vaping of any kind has increased, so too has youth marijuana vaping.

## DAILY MARIJUANA USE AMONG 8TH, 10TH, AND 12TH GRADERS

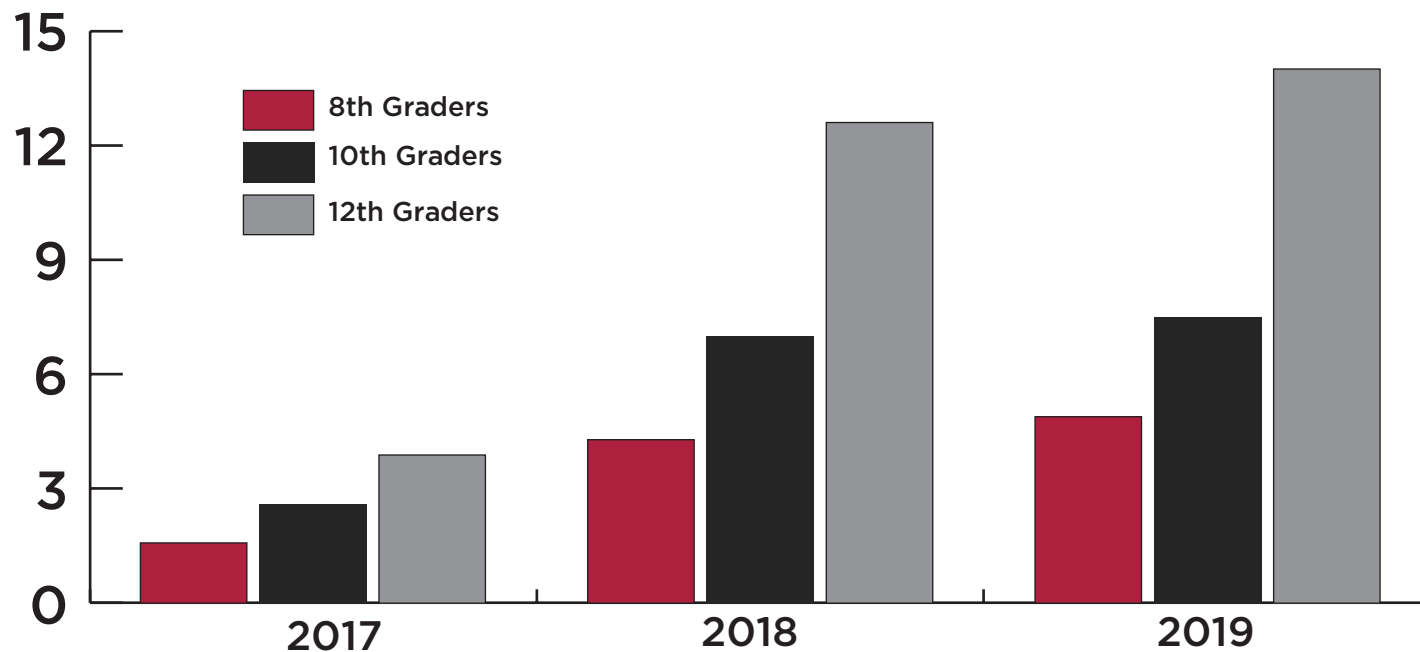


(Miech et al., 2019)

Past-year youth vaping of marijuana has increased dramatically since the MTF survey began recording data on the subject in 2017. As reported by this survey (Miech et al., 2019), lifetime, annual, and past-month marijuana vaping among 8th, 10th, and 12th graders have all dramatically increased in just one year. Past-month use among teenagers increased over 72% from 2018 to 2019. An average of 10% of teens reported past-month marijuana vaping in 2019. In 2019, MTF first recorded data on near-daily marijuana vaping and found that 2.4% of this age group vaped marijuana almost every day. That number exceeds near-daily cigarette and near-daily alcohol use among this group.

As marijuana legalization advocates have argued that youth marijuana use falls in conjunction with legalization, it is important to note trends in use in states that have legalized the drug. More young people are using marijuana in “legal” states—and they are using it more frequently. These trends are driven by the decreased perception of risk as well as the increased availability of marijuana that accompanies legalization.

## YOUTH PAST MONTH MARIJUANA VAPING INCREASED DRAMATICALLY



(Monitoring the Future, 2019)

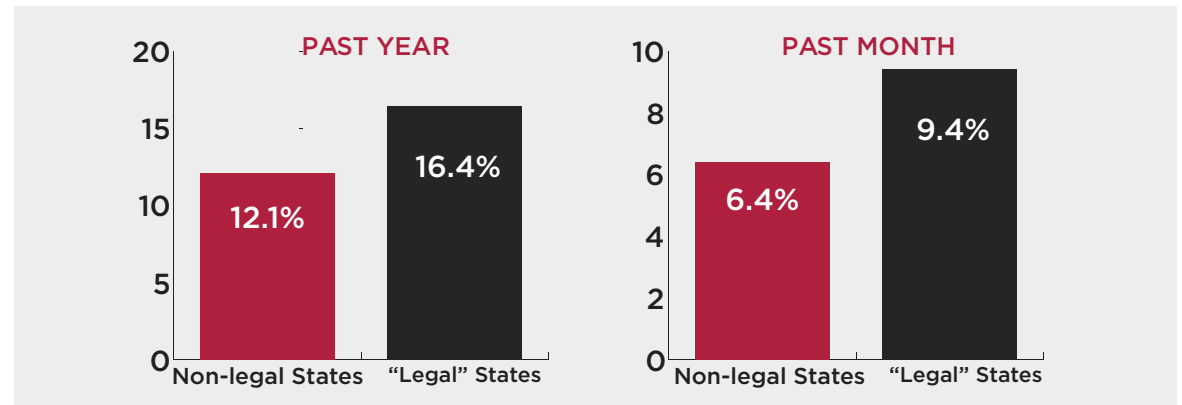
Nationally, fewer people, especially youth, perceive a risk from smoking marijuana. This downward trend is driven by the relaxed approach to marijuana in states where it's "legal."

Despite claims that adolescent use isn't up in legalization states, researchers using the Monitoring the Future study found increases in use post legalization in Washington state among 8th and 10th graders. This was confirmed by University of Washington researchers, who published in the American Journal of Preventive Medicine and found that marijuana legalization predicted a 6-fold increase of self-reported past-year marijuana use among youth when controlling birth cohort, sex, race, and parent education (Bailey et al., 2020)

from 2016/2017 to 2017/2018 (SAMHSA, 2019b) . An average of 16.4% of 12- to 17-year olds in "legal" states reported past-year use in 2017/2018, and an average of 9.4% reported past-month use. In California, Colorado, Massachusetts, and Nevada, past-month marijuana use among young people jumped over 4% in each state from 2016/2017 to 2017/2018. In Washington state, use increased even more dramatically: 9.9% of young people reported past-month marijuana use, marking a near 11% increase in past-month use from 2016/2017. An independent report in Alaska found that 22% of high schoolers in the state reported past-30-day use in 2017 (ADHSS, 2020).

These increases far exceed marijuana use rates among youth aged 12 to 17 in states where marijuana remains illegal (SAMHSA, 2019b). According to 2017/2018 NSDUH state-specific data, 12.1% of youth in non-legal states reported past-year marijuana use and 6.4% of young people in those states reported past-month use. Use rates in "marijuana-legal" states sit around three percentage points higher.

**PAST MONTH AND PAST YEAR YOUTH USE IN "LEGAL" STATES OUTPACES SUCH USE IN NON-LEGAL STATES.**



(NSDUH State Comparisons, 2019)

The issue of marijuana use among youth in “legal” states is further elucidated by data taken on first-use rates—the percentage of young people initiating marijuana use in the past year (SAMHSA, 2019b). The average rate of first use in “marijuana-legal” states was 7.4% in 2017/2018, up from 6.8% the previous year. In California, first-use rates have increased 10% from 2016/2017 to 2017/2018. In states where marijuana remains illegal, first-use among 12- to 17-year olds in 2017/2018 was 5.4%.

Marijuana commercialization—and the subsequent normalization of marijuana use—plays an important role in the increased marijuana use of young people. A 2017 study found that the longer duration of legalization and higher dispensary density was associated with increased use of vaping (inhaling vaporized marijuana oils) and consumption of edibles by 14- to 18-year olds (Borodovsky et al., 2017). Marijuana dispensary density has been linked to more use among youth, with 16% of 11th graders reporting marijuana use in areas with less dispensary density compared to 24.3% of the same age group reporting use in more retail-dense areas (Hatch, 2017).

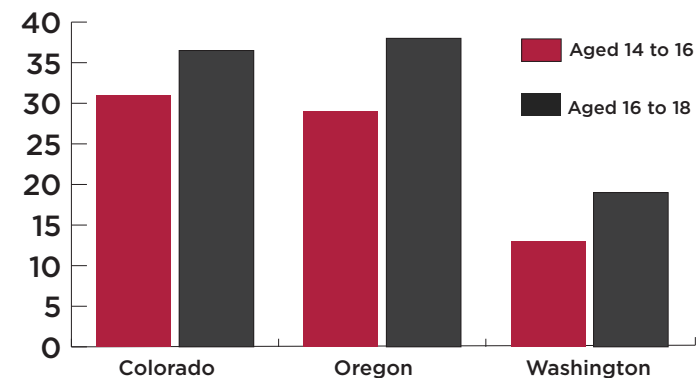
The commercialization of marijuana has also adversely impacted schools and youth academic performance. According to Joe Zawodny, director of secondary education for the Anchorage [Alaska] School District, “Because it’s legal in the community, I think, the stigma around marijuana use is decreasing. The data would seem to say there is increasing use” (Wohlforth, 2018). In Washington state, high schoolers reporting marijuana use also reported lower grades (more C’s, D’s, and F’s)

than those of their peers who did not smoke marijuana (WSHYS, 2018).

Marijuana was cited in 23% of Colorado school suspensions, the highest of all documented school offenses. Further, between 2012 and 2014, the percentage of 10- to 14-year olds who once or twice tested positive for THC increased from 19% to 23%; those who tested positive three or more times increased from 18% to 25% (Munoz et al., 2017). In Alaska, the number of youth referred for marijuana-related crimes jumped to a high of 302 (ADHSS, 2020).

Marijuana use among youth in “legal” states also coincides with marijuana misuse and substance disorder. A 2019 study (Cerdá et al., 2020) found that recreational marijuana legalization was followed by an 25% increase in adolescent cannabis use disorder (CUD).

**PERCENT OF YOUTH REPORTING PAST 30-DAY USE WHO DABBED\***



(Colorado Department of Public Health and Environment, 2019; Oregon Healthy Teens, 2019; Washington State Healthy Youth Survey, 2018)

\* Taken from most recent data available, ages are an average based on an age range

This trend speaks to the prevalence of higher potency of marijuana products. In Washington state, a 2018 youth survey showed that 13% of 8th and 10th graders, and 19% of 12th graders reported dabbing marijuana (WSHYS, 2018). Dabbing involves heating marijuana concentrate, often of unspecified potency that can reach up to 99% THC, and inhaling the vapor. One study on dabbing found that the process may deliver significant amounts of additional toxins, such as methacrolein and benzene (Meehan-Atrash et al., 2017).

There are intense ramifications to marijuana use by youth. Young, developing brains are especially susceptible to the negative effects of marijuana use and young users have demonstrated changes in grey matter volume, indicating negative consequences for brain development (Orr et al., 2019). Young users are also at a greater risk for mental health problems, dependence on marijuana, and future substance abuse of other drugs (Coffey & Patton, 2016). Chronic adolescent marijuana use has been correlated with cognitive impairment and worsened academic or work performance (Arria et al., 2015; Meier et al., 2012; Meier et al., 2015; Salmore & Finn, 2016; Schuster et al., 2018; Silins et al., 2014).

Youth marijuana use poses a significant risk for depression and suicide (Gobbi et al., 2019; Silins et al., 2014). In Colorado, where teen suicides have become the cause of one in five adolescent deaths (Daley, 2019), youth suicide toxicology reports have demonstrated this devastating effect. In 2013, marijuana was present in 10.6% of suicide toxicology reports for young people aged 15 to 19 years; in 2017, marijuana was present in over 30%\*<sup>1</sup> of suicide toxicology reports for young victims between the ages of 15 and 19 years (CDPHE, 2019).

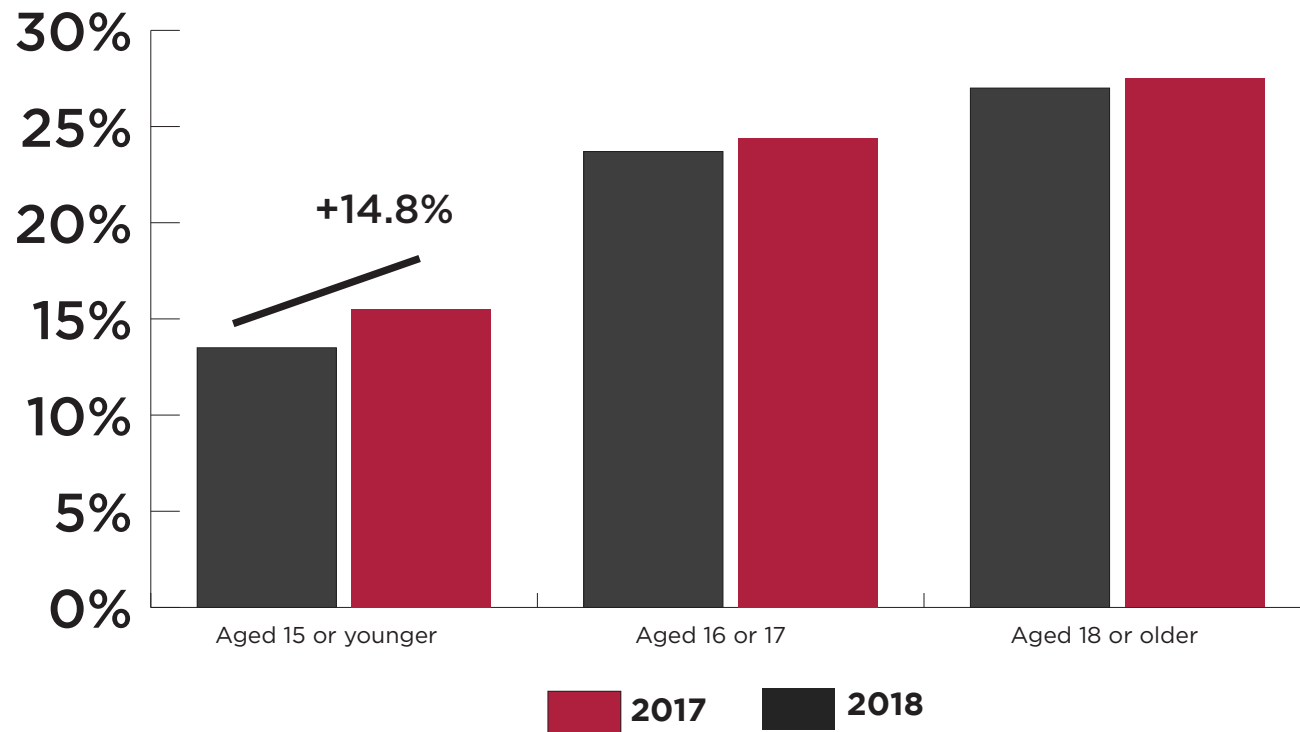
The efforts to legalize marijuana are playing out with devastating effects on youth across the country while public health agencies are ill-equipped to mitigate the consequences. But youth are not the only group at risk.

---

<sup>1</sup> Data taken from Colorado Department of Public Health and Environment's website was presented differently in several CDPHE resources. Should this conflict be resolved, this report will be updated.

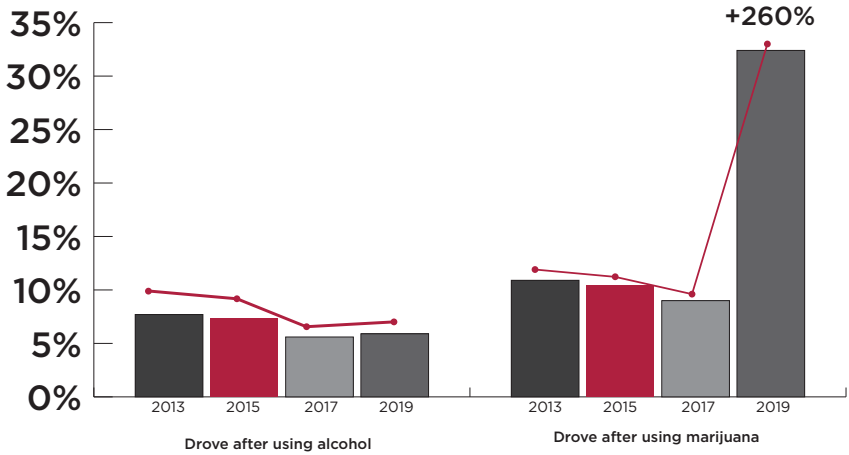


## CHANGES IN PAST MONTH YOUTH USE AMONG COLORADO STUDENTS



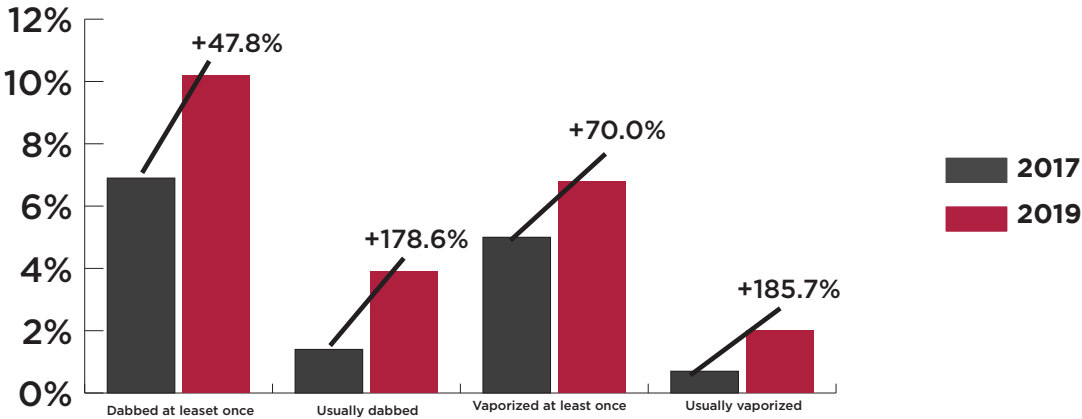
(Healthy Kids Colorado Survey, 2020)

PERCENT OF STUDENTS WHO REPORTED CURRENT ALCOHOL OR MARIJUANA USE AND WHO DROVE UNDER THE INFLUENCE OF ALCOHOL OR MARIJUANA



(Healthy Kids Colorado Survey, 2020)

MORE COLORADO STUDENTS REPORTED DABBING AND VAPING



(Healthy Kids Colorado Survey, 2020)

# IMPACT ON YOUNG ADULTS

Though the legal age for marijuana consumption in “legal” states is 21, marijuana use during young adulthood carries a host of adverse effects. Marijuana has a particularly strong impact on developing brains, which continue to develop through a person’s late twenties. Unfortunately, marijuana use in this age group is higher than that of any other.

The low perception of risk associated with marijuana use, as well as the highest use rates of all age categories, make marijuana an unexamined issue for many young adults.

According to data recorded by SAMHSA’s national NSDUH survey (SAMHSA, 2019a), in 2018 young adults across the country had the lowest percentages of perception of risk associated with marijuana use. Only 12% of young adults believed that smoking marijuana once a month was risky and only 15.4% perceived a great risk from smoking marijuana once or twice a week. This is far lower than the perception of risk of people aged 12 or older: 25% perceive great risk from smoking once a month and 30.6% perceive a great risk from smoking once or twice a week.

Young adult marijuana use outpaces other age groups in the United States. Young adults aged 18 to 25 reported lifetime, past-year, and past-month use in much higher numbers compared to other age groups at 51.1%, 34.8%, and 22.1%, respectively. Use reported among people aged 12 or older sits at 45.3%, 15.9%, and 10.1%, respectively (SAMHSA, 2019a). Daily or almost daily marijuana use rates of 18 to 25-year olds reached a new high in 2019. In 2019, more than 2.5 million, or 7.5%, of

that group reported daily or almost daily marijuana use in the past year, up more than 17% over just five years (SAMHSA, 2020).

Higher instances of marijuana use disorder have been reported by people aged 18 to 25, coinciding with higher rates of marijuana use. In 2018, after years of decreases, 5.9% of people aged 18 to 25 reported marijuana use disorder, marking an 11% increase from 2017 (SAMHSA, 2019a).

These trends in use are most dramatic in states that have legalized marijuana (SAMHSA, 2019b). The percentage of young adults, aged 18 to 25, reporting past-year and past-month use have increased significantly from 2016/2017 to 2017/2018. An average of 46.3% of young adults in these states reported past-year use in 2017/2018 and 31.6% reported past-month use in 2017/2018. In Nevada, for example, past-year and past-month young adult use jumped by 18.9% and 24.1% respectively from 2016/2017 to 2017/2018.

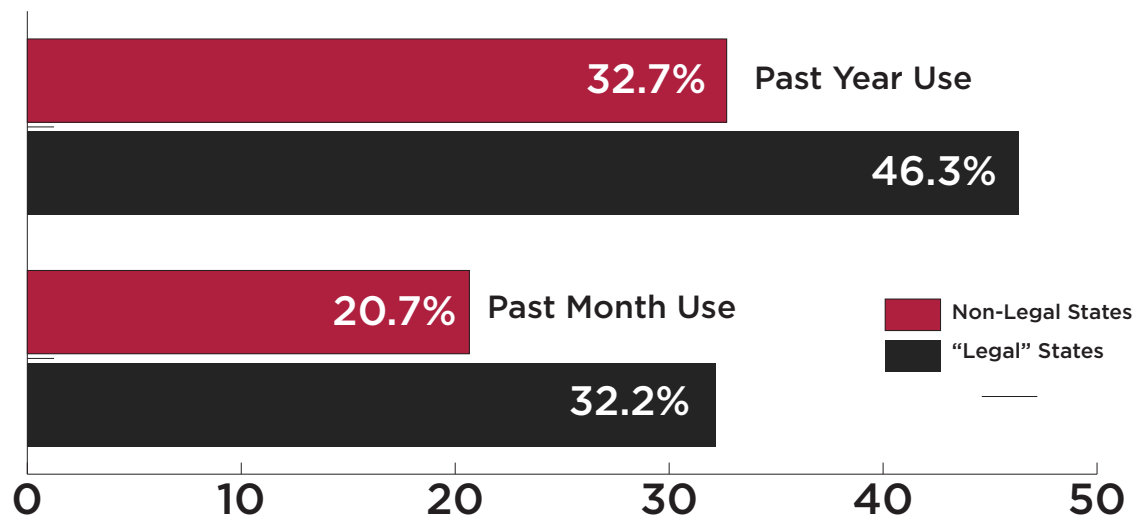
Use rates among this age group in “legal” states far exceeds those of states where marijuana is illegal (SAMHSA, 2019b), with 32.7% and 20.7% of 18- to 25-year olds reporting past-year and past-month use in not “legal” states: a difference of more than 10 percentage points compared with “legal” state-use rates. Legalization has not reduced use; it has encouraged and accelerated it.

Given what we know about marijuana's effects on the developing brain, young adults should be discouraged from using it, but the commercialization of marijuana instead heavily promotes the use—with no warnings about the risks. The same health risks faced by teen marijuana users affect young adult users. Although commencing marijuana use during the early teen years is thought to be associated with a greater risk of psychosis than if the use begins in young adulthood (Arseneault et al., 2002), this does not mean continuing use through young adulthood is safe even for those who have not yet exhibited marijuana-induced psychosis, nor that commencing use is safe after age 20. Often, the marijuana-induced psychotic symptoms develop in young adulthood, with consolidation of those symptoms into a chronic disorder occurring over a period of 8 years or more (Niemi-Pynttari et al., 2013). Frequency of use and potency of the product have been found to be more important than age at which use began for increasing the odds of a psychotic outcome (DiForti et al., 2019), and cessation of use is protective (Gonzalez-Pinto et al., 2011; Schoeler et al., 2016).

Co-use also presents a compounded harm to young-adult users. As this age group goes off to college,

where drinking, drug use, and other kinds of experimentation are prevalent, marijuana may be used in conjunction with a host of other drugs, presenting a risk for future substance use disorder. Researchers from Oregon State University found that college students who were binge drinkers before the age of 21 saw relatively large increases in marijuana use after legalization (Kerr et al., 2017)

#### PAST YEAR AND PAST MONTH YOUNG ADULT (18-25 YR OLD) USE IN “LEGAL” STATES OUTPACES SUCH USE IN NON-LEGAL STATES.



(NSDUH STATE COMPARISONS, 2019)



## IMPACT ON COMMUNITIES OF COLOR AND LOW-INCOME POPULATIONS

Marijuana legalization poses a significant threat to low-income and minority communities. Though industry proponents suggest that marijuana legalization will alleviate injustices against socioeconomically disadvantaged populations, disparities in use and criminal offense rates have persisted in states that legalized marijuana.

While it is important to evaluate the impact of incarceration within certain communities, it is also important to understand the impact of marijuana legalization on those same communities. It is inappropriate to suggest that only through marijuana legalization will social justice be achieved or criminal justice inequity remedied. In fact, no such effect has been demonstrated in the states where marijuana was made “legal.”

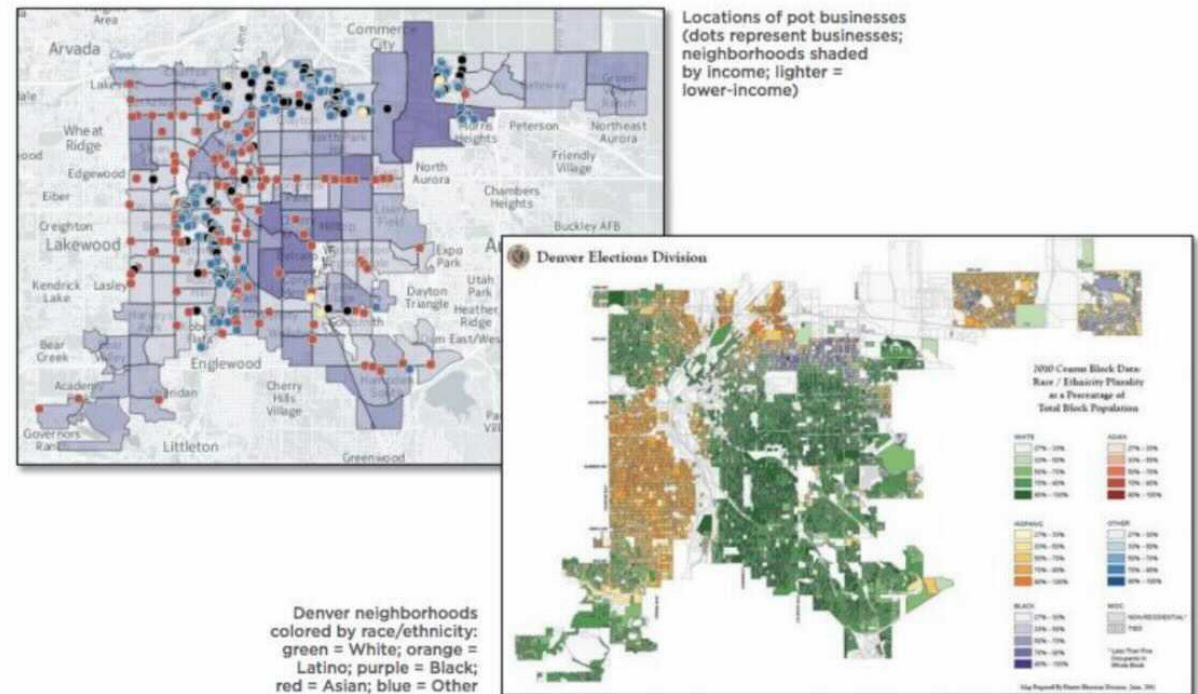


Instead of fixing social justice disparities in one fell swoop, legalization merely changes the nature of the arrest in lower income and minority communities. What's more, the marijuana industry has recognized an important new consumer base .

An early study of medical marijuana implementation in California found that marijuana dispensaries were disproportionately located within areas where the demand for marijuana was higher, where there were higher rates of poverty as well as a greater number of alcohol outlets (Morrison et al., 2014). In other words, when choosing where to locate dispensaries, owners followed the data to low-income communities. Further studies of Los Angeles marijuana

dispensaries found that the majority of dispensaries have opened primarily in African American communities (Thomas & Freisthler, 2017). And an overlay of socioeconomic data with the geographic location of pot shops in Denver shows marijuana stores are disproportionately located in disadvantaged neighborhoods (Hamm, 2016). In Oregon, the state conducted an analysis on the distribution of state-sanctioned dispensaries and found that sites were concentrated among low-income and historically disenfranchised communities (McVey, 2017; Smith, 2017).

As a result, the harms associated with marijuana dispensary locations (such as increased use and substance misuse, normalization, hospitalizations, etc.) are disproportionately concentrated within particularly vulnerable communities.



(Migoya, 2017)

The importance of this cannot be overstated. Historically, disadvantaged communities lack many of the resources to combat this kind of targeting by industry and also often lack adequate access to proper drug treatment facilities, thereby exposing community members to an increased likelihood of substance abuse with limited resources to combat the consequences (Kneebone & Allard, 2017). What the country has seen in the fallout of the opioid epidemic and the expansion of Big Tobacco (Truth Initiative, 2018) is being replicated by Big Marijuana.

Perceptions of risks associated with marijuana use among young people of color fall well below the national rates (SAMHSA, 2019a). Nationally, 34.9% of youth aged 12 to 17 perceived a great risk from using marijuana once or twice a week. Only 31.9% of African American youth, and 28.9% of American-Indian Alaska-Native (AIAN) youth perceive a great risk from using marijuana once or twice a week. As stated previously, frequent marijuana use among young people exacerbates the damaging health consequences associated with it.

The decreased perceptions of risk translate to increases in use. In 2018, past-year and past-month use among minority young people was higher than the average, as reported by SAMHSA (SAMHSA, 2019a) Past-month and past-year marijuana use among youth aged 12 to 17 years was more prevalent among African Americans and AIAN youth. For example, nationally, 6.7% of young people aged 12 to 17 reported past-month marijuana use, with 6.8% of Caucasian youth using in the past

month. Comparatively, 7.5% of African American youth and 9.4% of AIAN youth reported past-month marijuana use. Young people of color face enormous risks.

The decreased perception of risk associated with marijuana use during pregnancy has a particularly damaging impact on socioeconomically disadvantaged communities. A study by the American College of Obstetricians and Gynecologists reported that young, urban women from lower income levels have a 15–28% rate of marijuana use during pregnancy (American College of Obstetricians and Gynecologists, 2017). As previously stated, marijuana use during pregnancy has a host of dangerous consequences for neonates.

From an economic standpoint, advocates of the marijuana industry often argue that any detrimental effects of marijuana will be offset by the cash potential of the drug. Proponents of legalization suggest that the new industry presents previously disenfranchised groups with new economic opportunities. In reality, though some states have attempted to use legislation to protect and provide for minority marijuana business owners, the industry is largely bereft of diversity. Nationally, fewer than 2% of all marijuana businesses are owned by minorities (Schoenberg, 2018).



**fewer than 2% of all marijuana businesses are owned by minorities**

Massachusetts serves as a case study for this phenomenon. The state requires all “Marijuana Agents,” persons who work at marijuana businesses, to register with the state. Demographic analysis revealed that of 1,306 agents who applied in the city of Boston, 6% were Hispanic and 4% African American. This is unrepresentative of the city’s population (U.S. Census Bureau, 2019). Indeed, an exposé by the Boston Globe revealed that a handful of out-of-state marijuana corporations had locked-in almost all of the licenses through shell companies (Wallack & Adams, 2019).

In Chicago, Illinois, where not one of the 11 existing growers licensed to sell recreational marijuana was African American, the city council’s

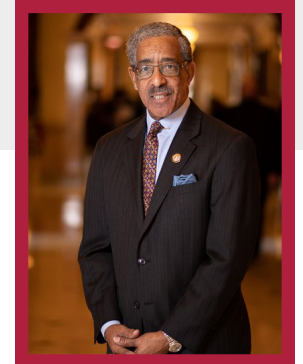
Black Caucus pushed back. Soon after the state legislature’s legalized recreational marijuana, local African American legislators took issue with the obvious discrepancy (Koziarz, 2019). Still, Chicago Mayor Lori Lightfoot, who received \$123,000 from the marijuana industry in her contentious bid for mayor, suggested that those councilmembers take the issue up with the state legislators in Springfield. Legalization was implemented on schedule.

New Jersey state Senator Ronald Rice has been among the most vocal leaders against marijuana legalization. He wrote in an op-ed, “Seeing firsthand how drugs eviscerate urban communities—and understanding how marijuana legalization will impact the health, education, economics, business, liability, and litigation complexities of our densely-populated, metropolitan-bookended state—I fully oppose it” (Rice, 2019).

Legalization is not a blanket solution to social injustice. In fact, it may perpetuate it.

“Seeing firsthand how drugs eviscerate urban communities – and understanding how marijuana legalization will impact the health, education, economics, business, liability and litigation complexities of our densely-populated, metropolitan-bookended state – **I fully oppose it**”

New Jersey State Senator, Ronald Rice (2019)





## IMPACT ON HOMELESSNESS

Though the extent to which a correlation in the increasing homeless population may have with the marijuana legalization is unclear, some trends in this area are notable.

In Colorado, the homelessness rate appears to have increased with the expansion of recreational marijuana. The U.S. Department of Housing and Urban Development reported a 13% increase in Colorado's homeless population from 2015 and 2016, while the national average decreased 3% (Burke & Acuna, 2017). Business owners and officials in Durango, Colorado, have testified that the resort town "suddenly became a haven for recreational pot users, drawing in transients, panhandlers, and a large number of homeless drug addicts" (Kolb, 2017).

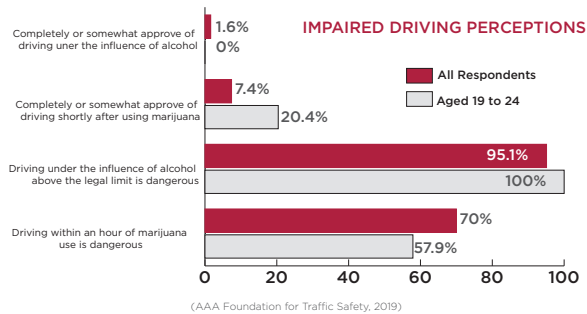
A 2018 study, conducted by the Colorado Division of Criminal Justice, surveyed seven Colorado jail populations. It yielded results that further link homelessness and marijuana use (CDCJ, 2018). The study, though small, found that 50.8% of respondents reported using marijuana 30 days prior to their time in jail. Additionally, 54.9% of respondents who were homeless prior to their jail time reported marijuana use 30 days prior to it (compared with 36.1% reporting alcohol use).

The study also found that of the respondents, 38.5% were Colorado natives and 61.5% were not. Of the non-Colorado natives surveyed, 35.1% reported marijuana as his or her reason for moving to Colorado after it was legalized in 2012 (CDCJ, 2018).

Considering the impact of homelessness on communities—and the resources required to help those impacted by it—it is worth investigating the correlation between homelessness and legalization.



# IMPACT ON IMPAIRED DRIVING



Driving while under the influence of marijuana has proved an increasingly damaging phenomenon due to the legalization and normalization of marijuana in the United States. The Centers for Disease Control and Prevention found that, in 2018, 12 million U.S. residents reported driving under the influence of marijuana. This represents 4.7% of the driving population (Azofeifa et al., 2019).

In Michigan, a survey found that 51% of medical marijuana users admitted to driving while “a little high,” and one in five of those surveyed admitted to driving while very high (CBS Morning Rounds, 2019). The reduced perception of risk and the prevalence of stoned drivers on the road bear consequences for road safety and raise questions for legislators and law enforcement going forward.

Driving under the influence of marijuana is dangerous. The National Institute on Drug Abuse holds that marijuana use impairs driving in a number of ways: by slowing reaction time, decreasing coordination, and impairing judgment of time and distance. Polysubstance use—using marijuana along with alcohol or another drug—compounds the risk of a vehicle crash more than the drugs being used alone (National Institute on Drug Abuse, 2019a). Nevertheless, marijuana-impaired driving is rising while the perception of its negative consequences is decreasing.

A survey conducted by AAA found that only 70% of drivers perceived driving within an hour of using marijuana as extremely dangerous or very dangerous, compared with 95.1% who felt that driving under the influence of alcohol above the legal limit was extremely or very dangerous (AAA Foundation for Traffic Safety, 2019). 7.4% of respondents completely or somewhat approving of driving shortly after using marijuana, compared with 1.6% who completely or somewhat approved with driving under the influence of alcohol above the legal limit. The answers from younger drivers were even more alarming. Of respondents between the ages of 19 and 24, only 57.9% believed that driving under the influence of marijuana was extremely or very dangerous. Among drivers between the ages of 19 and 24, 20.4% completely or somewhat approved of driving shortly after using marijuana (AAA Foundation for Traffic Safety, 2019). The downward trend in perception of risk has coincided with an increased percentage of marijuana-impaired drivers on the road.



According to the biological results of Washington's Roadside Survey, "nearly one in five daytime drivers may be under the influence of marijuana, up from less than one in 10 drivers prior to the implementation of marijuana retail sales" (Grondel et al., 2018).

The reduced perception of risk has reached young drivers in "legal" states as well. The Washington state Healthy Youth Survey found that in 2018, 16% of 12th graders drove after using marijuana and 24% rode with a driver who was using marijuana (WSHYS, 2018). In Alaska, one in 10 high school students had driven after using marijuana (ADHSS, 2020).

In Colorado, DUIDs (driving under the influence of drugs) have risen in recent years. The percentage of drivers testing THC-only positive increased 16.1% from 2016 to 2017. Of these drivers in 2017, 39.4% were under the age of 18. What's more, the percentage of drivers testing positive for alcohol with THC increased 10.9% in a single year from 2016 to 2017 (CDCJ, 2019a).

In a 2017 report of DUID data, of all case filings where a cannabinoid screen was conducted after a driver was pulled over for demonstrating impaired driving, marijuana was detected in 3,170 of the cases. Of these positive screens, 84.4% tested positive for 1.0 to 5.0+ active THC (CDCJ, 2019a). What's more, 59% of those who tested positive for THC tested positive for extremely high levels of the drug (THC level of 5.0 or higher).

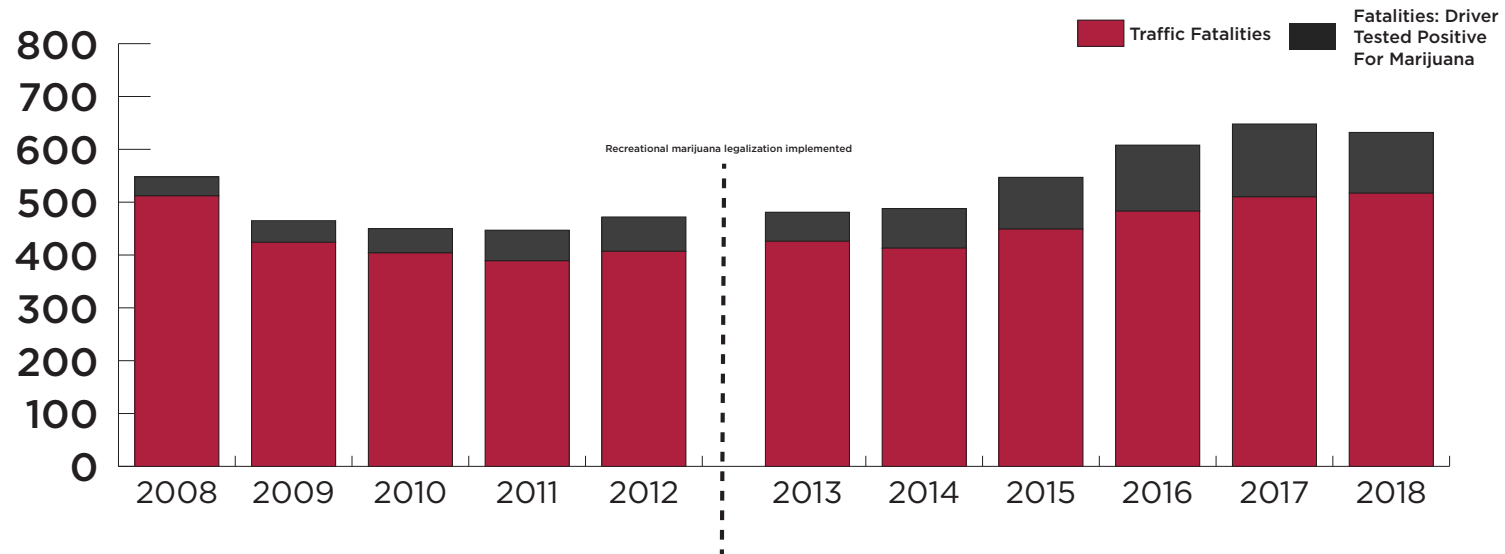
Additionally, some of these drivers found driving under the influence of marijuana (testing positive for 1.0 to 5.0+ THC) were also found to have a blood alcohol content (BAC) from 0.05 to 0.08 or higher in their system. Of the instances where THC was detected at 5.0 or higher and an alcohol screen was conducted, 47% of those tested with a BAC of 0.08 or higher (CDCJ, 2019a).



**47% of Colorado drivers** who tested positive for marijuana at a level of 5.0+ THC, also had a BAC of 0.08 or higher.

(Colorado Division of Criminal Justice, 2019)

## COLORADO TRAFFIC FATALITIES WHERE THE DRIVER TESTED POSITIVE FOR MARIJUANA



(Colorado Department of Transportation, 2019)

Vehicle crashes and traffic fatalities have surged after the legalization of marijuana. Research by the Highway Loss Data Institute found that the legalization of recreational marijuana in Colorado, Oregon, and Washington coincided with an increase in collision claims (Highway Loss Data Institute, 2018).

In Colorado, traffic fatalities increased over 31% since 2013. The rise in statewide traffic fatalities has coincided with a rise in instances of traffic fatalities where the driver tested positive for marijuana (active THC in the bloodstream). The number of traffic fatalities involving drivers who tested positive for marijuana in Colorado rose from 55 deaths in 2013 to 115 deaths in 2018. In 2018, 18.2% of all traffic fatalities in Colorado involved a driver who tested positive for marijuana (RMHIDTA, 2019).

A recent report released by AAA found that the number of drivers who tested positive for marijuana after a fatal crash doubled after legalization in Washington state. Researchers found that in the five years prior to legalization in the state, marijuana-impaired drivers comprised around 8.8% of all drivers implicated in traffic fatalities. In the years following, the rate jumped to around 18% (Stratton, 2020). The AAA writes, “AAA opposes the legalization of marijuana for recreational use because of its inherent traffic safety risks and because of the difficulties in writing legislation that protects the public and treats drivers fairly” (Stratton, 2020)

Compounding the risk of an increasingly stoned driving population is the difficulty posed to law enforcement officers who attempt to stop and detain marijuana-impaired drivers. The smell of marijuana in a suspected driver’s car is no longer enough to make an arrest in many states, even in states that have not yet legalized marijuana (Romo, 2019). Technology to determine THC levels is under-developed and lacks the certainty of traditional breathalyzers. The quick metabolism of THC renders it difficult to detect and tests must be administered quickly in suspected cases.

Additionally, many states have struggled to create a standard level of impairment when THC is detected (Queally & Parvini, 2018). Studies are mixed on what level of THC constitutes impairment. Recently, scientists found that drivers may still be impaired from marijuana use well after intoxication, demonstrating an increased likelihood of poor driving performance, increased accidents, and decreased rule-following (Dahlgren et al., 2020).

Many of the marijuana “legal” states failed to establish laws or guidance prior to legalizing marijuana, leaving law enforcement officers in the dark as legislators played catch-up to dangerous trends. As a result, road safety is compromised.



**“AAA opposes the legalization of marijuana for recreational use**

**because of its inherent traffic safety risks and because of the difficulties in writing legislation that protects the public and treats drivers fairly.”**

AAA Foundation for Traffic Safety (2020)

# TRENDS IN CRIME SINCE LEGALIZATION

Marijuana legalization advocates have argued that legalization will reduce overall crime. However, in states that have legalized marijuana crime rates have risen at a faster rate than other states across the country.

While it is difficult to say whether crime can be causally associated with marijuana legalization, some studies shed light on a correlation. A 2019 study conducted in Denver found that the existence of both recreational and medical marijuana dispensaries in Denver neighborhoods are significantly and positively associated with increased crime (L. Hughes et al., 2019).

Researchers found that Denver neighborhoods adjacent to marijuana businesses saw 84.8 more property crimes each year than those without a marijuana shop nearby (Freisthler et al., 2017). The number of court filings charged with the Colorado Organized Crime Control Act that were linked to a marijuana charge increased 639% from 2013 to 2017 (RMHIDTA, 2019). Further, Crimes Against Society (such as drug violations) have increased 44% since 2014 (RMHIDTA, 2019).

Colorado's crime rate in 2016 increased 11 times faster than the 30 largest cities in the nation since legalization (Mitchell, 2017). In 2018, data from the Colorado Bureau of Investigation demonstrates a 14.2% increase in property crime since 2013 (157,360 to 179,650) and a 36.5% increase in violent crime since 2013 (18,475 to 25,212).

Though arrests for marijuana offenses had declined in the years prior to legalization in Colorado, they are increasing again. In 2013, arrests for marijuana sales offenses were at a low of 337, having decreased 52.1% since 2008. From 2013 to 2018, arrests for marijuana sales offenses increased 29.4%. Additionally, prior to legalization, arrests for all drug sales offenses had declined 54.9% (from 2008 to 2013). In the years since, arrests for drug sales offenses have increased 11% (Federal Bureau of Investigation, 2018).

Overall, while increased crime has not been definitively linked to marijuana legalization, these upward trends in property crime and violent crime—as well as crimes against society—warrant further investigation.



“Domestic production and trafficking of marijuana **will likely increase** as more states adopt or change current marijuana laws to establish medical or recreational marijuana markets, allowing criminals to exploit state legality.”

Drug Enforcement Administration (2020)

## A THRIVING UNDERGROUND MARKET

Commercialization advocates have long argued that legalization will reduce black market marijuana activity in “legal” states. However, the legalization and commercialization of marijuana has led to greater black-market activity than ever before. This is driven by a number of causes.

Illegal marijuana originating from “legal” states is uncovered at increasingly high rates. Between July 2015 and January 2018, 14,550 pounds of illegally trafficked Oregon marijuana, worth approximately \$48 million, was seized en route to 37 different states (ORIDHIDTA, 2018). In 2018, Colorado law enforcement seized 12,150 pounds (6.1 tons) of bulk marijuana. Officials recorded 25 different states to which marijuana was destined (RMHIDTA, 2019). In its 2019 National Drug Threat Assessment report, the DEA (Drug Enforcement Administration [DEA], 2020a) found that states with the highest marijuana removals came from states with major border crossings or states with medical or recreational marijuana markets. These states give cover to illegal activity; black market problems abound.



Many marijuana proponents argued that a slew of benefits would result from the legalization of marijuana. Two of these were that legal weed would drive out the black market and that taxed marijuana would provide money-dry states with much needed revenue. Both have yet to pan out. Regulated marijuana is not the revenue cash cow for states that industry advocates promised. California's projected marijuana tax revenue by July 2019 was nearly half of what was originally expected when the state permitted retail sales in 2018 (Blood, 2019; Fuller, 2019). In Colorado, marijuana tax revenue represented nine tenths of one percent of Colorado's 2018 statewide budget (RMHIDTA, 2019). Even still, marijuana license holders complain that "marijuana-legal" states are too regulated and that taxes on the drug are too high (Alfosni, 2019). They go as far as to say that regulation and taxes are the reason the black market continues to dominate.

That contention is ill-founded for several reasons. The regulatory and compliance systems instituted in the "legal" states were instituted with little foresight. State compliance officials are left on their heels while various regulatory and compliance issues become exposed. The Oregon Liquor Control Commission wrote in a 2018 report that, "due to the legally required rapid implementation of the recreational program, OLCC has not been able to implement robust compliance monitoring and enforcement controls and processes for the recreational marijuana program" (OLCC, 2018).

The lack of oversight also bears consequences for consumer safety. An independent investigation in San Diego found that nearly 30% of marijuana samples purchased from licensed retailers in Southern California tested positive in labs for pesticides (Grover & Corral, 2019). States are ill-equipped to handle marijuana testing and even states with the most

stringent regulatory requirements have demonstrated significant lapses, which has allowed contaminated marijuana products to reach the market (Crombie, 2017). As a result, the states themselves are blurring the lines between "legal" and illegal marijuana, by allowing "legal" operators to skirt regulation. Licensed marijuana retailers are not incentivized to comply with the law and they benefit from that leeway while continuing to point fingers at the black market when problems arise.

Illicit activity has proliferated with marijuana legalization, much of it tied to "state-legal" marijuana. Many pro-marijuana figures have suggested the black market causes problems because other states have not legalized marijuana. This is not true. The unfettered black market will always be able to undercut the "legal" market.

The unchecked proliferation of the marijuana industry has abetted some of these significant problems. The market saturation and overproduction permitted and written into law by "marijuana-legal" states have caused tremendous problems for regulators and law enforcement.



**174 ILLEGAL MARIJUANA  
EXTRACTION LABS WERE  
UNCOVERED IN 2018.**

(Drug Enforcement Administration, 2020)

It is estimated that Oregon has a production capacity of approximately 2 million pounds, well over the estimated consumption capacity of the state, which is approximately 275,000 pounds (ORIDHIDTA, 2018). A 2019 audit by Oregon's Secretary of State found that the volume of marijuana produced in Oregon is nearly 7 times its local consumption (Oregon Secretary of State, 2019). Adding to this issue, the same Oregon audit found that black market marijuana fetches prices several times higher than "legal" marijuana. As the U.S. Attorney in Oregon reported in 2018, the state has "an identifiable and formidable marijuana overproduction and diversion problem" (Flaccus, 2018). Still, marijuana proponents in numerous states seek faster license approvals and more marijuana licenses (Alfosni, 2019).

In California, according to recent reports, the black market outsells the "legal" marijuana market at a rate of three to one. These illicit sellers have brazenly set up shop in cities across the state, hiding in plain sight and giving way to a perpetual game of "whack-a-mole," as one law enforcement officer described it. These companies also advertise on the popular marijuana website, Weedmaps, blending in with "legal" sellers. When the state warned Weedmaps to stop permitting illegal operators to advertise, CEO Chris Beals complained that the problem was not his company's fault but rather a result of the state prohibiting more retail marijuana licenses (Romero, 2019).

In "legal" states, illegal grow operations have easily blended their production facilities with "legal" ones and have taken advantage of rural cover to hide from law enforcement. Okanogan (WA) County Chief Criminal Deputy Steve Brown told NPR reporters that prior to legalization, operations of the kind he continues to uncover were "hidden up in the hills." Now he finds some just off of roads, within sight of neighbors. Other investigations have uncovered illegal operations run by people who were licensed in other "marijuana-legal" states (Kaste, 2018).

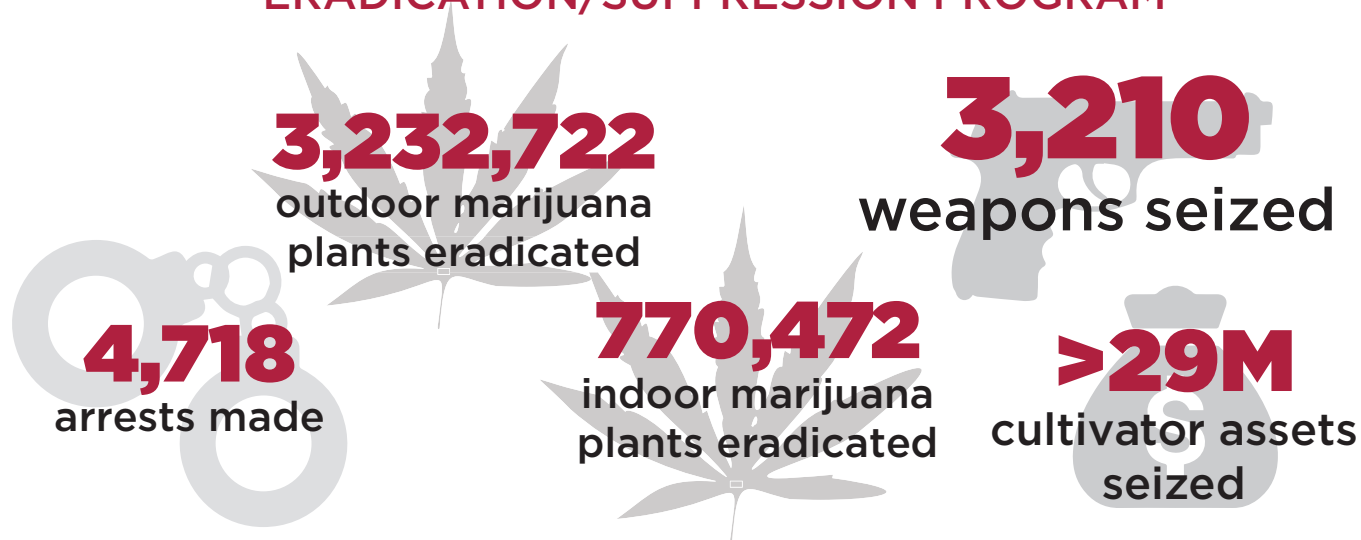
In a 60 Minutes story on marijuana in California, Sheriff Tom Allman took reporter Sharyn Alfonsi in a helicopter to survey a very obvious illegal grow site in "the emerald triangle"—an area of California known for marijuana. He was not surprised that the operation wasn't hidden. "Allman explained since Prop 64 and the legalization of marijuana, the black-market suppliers try to blend in with legal pot farmers sometimes on the same property" (Alfosni, 2019).

Another major promise of marijuana proponents was that a "legal" market would eliminate black market weed and allow law enforcement officials to focus on other things. Allman laughed at the idea and told Alfonsi that he was "looking forward to that day" (Alfosni, 2019). The very creation of the "legal" marijuana market in California has ushered a more powerful illicit market that had never existed before. What's more, Allman believes that his department lacks resources to combat the illegal operations. He estimates that it only has the capacity to handle 10% of the illegal grows.

Local illicit actors are not the only beneficiaries of “legal” marijuana. The proliferation of black-market marijuana bolsters the businesses of well-financed international cartels, which extend as far north as Alaska (Alaska State Troopers, 2016). The DEA found that Asian DTOs were operating grow facilities across the state of Washington (DEA, 2020a). Cartel presence in California has only expanded since legalization. In California, authorities suspect—based on phone records and wire transfer activity, as well as figurines commonly associated with cartels, such as those depicting Jesus Malverde—that illegal marijuana activity is tied to the Sinaloa and La Familia Michoacana cartels (Magdaleno, 2018). In 2018, the Oregon-Idaho High Intensity Drug Trafficking task force identified 58 drug trafficking organizations (DTOs) with foreign as well as domestic connections. Between January and April of 2019, the Oregon-Idaho High Intensity Drug Trafficking Area task force identified 13 new DTOs (ORIDHIDTA, 2019).

The Drug Enforcement Administration concluded in their National Drug Threat Assessment, published in early 2020: “Domestic production and trafficking of marijuana will likely increase as more states adopt or change current marijuana laws to establish medical or recreational marijuana markets, allowing criminals to exploit state legality” (DEA, 2020a). “Legal” marijuana continues to boost the black market.

## 2019 DEA DOMESTIC CANNABIS ERADICATION/SUPPRESSION PROGRAM



# FINAL HIGHLIGHTS

- The DEA's marijuana-dedicated task force, the Domestic Cannabis Eradication/Suppression Program (DCE/SP), eradicated over 4 million marijuana plants from illegal indoor and outdoor grow operations in 2019. The DCE/SP exclusively targets DTOs in its operations (DEA, 2020b).
- In 2018, 174 marijuana extraction labs (used to manufacture BHO) were uncovered, with 57% found in California, 26% in Oregon, and 35% of those labs listed at residential locations—posing an enormous threat to public safety (DEA, 2020a).
- In 2018 in Colorado, there were 257 completed investigations into illicit marijuana activity, up from 144 in the previous year, with 192 felony arrests made (RMHIDTA, 2019).
- The U.S. Postal Service intercepted 1,009 parcels containing marijuana mailed from Colorado to another state in 2017 alone (U.S. Postal Inspection Services, 2019).
- Around three quarters of parcels interdicted by the Oregon-Idaho task force between 2016 and 2018 were marijuana-related (ORIDHIDTA, 2019).
- In Alaska in 2017, the DEA seized 20.2 kilograms worth of illegal marijuana. Marijuana seizures ranked second among types of drug seized by amount in kilograms (Alaska State Troopers, 2017).
- Law enforcement officers in California seized over \$1.5 billion worth of illegally grown marijuana. Raids yielded over 950,000 plants from around 350 different sites; 150 people were arrested in connection with these raids (CBS News, 2019).
- In 2019, Massachusetts authorities arrested two brothers in connection with a multistate marijuana trafficking and money laundering scheme. Officers seized five cars, 100 pounds of illegal marijuana, over \$300,000 in cash, and over \$27,000 in casino chips, prepaid gift cards, jewelry, and drug ledgers (Office of Attorney General Maura Healey, 2019).
- In California, 7,200 marijuana vape cartridges were seized in a single bust of a warehouse tied to state-licensed Kushy Brands (Peltz, 2019).
- In early 2019, federal and local authorities teamed up in Colorado to bust what U.S. Attorney Jason Dunn deemed the largest marijuana drug enforcement action in the state, with 42 search warrants served and 80,000 plants and \$2.1 million in cash seized in connection with the operation (Trimble, 2019).

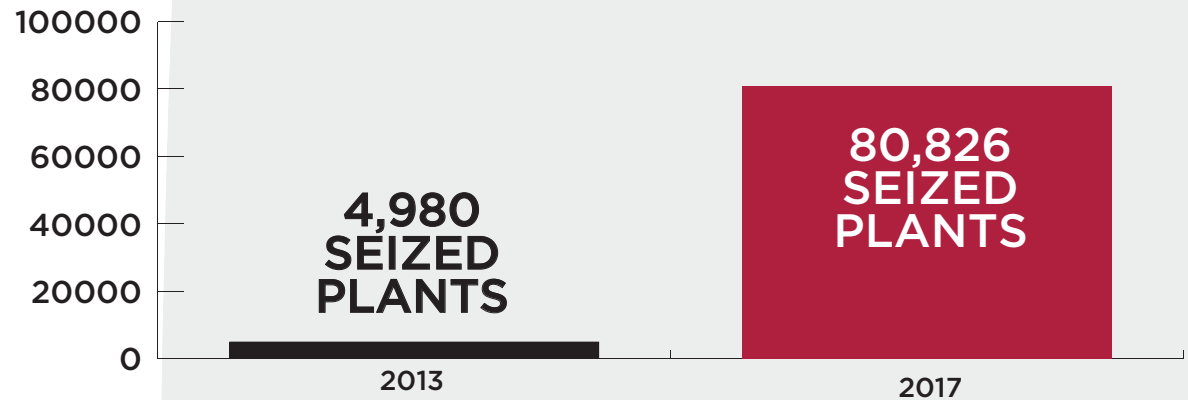
# ENVIRONMENTAL IMPACT

Conversations regarding the legalization of marijuana have largely ignored the threat that the industry poses to the environment. Given the lack of data, it is difficult to predict the full extent of marijuana's impact. However, early indications point to damaging consequences.

The environment is at risk of pollution from both "legal" and illegal marijuana operations. Regulatory standards are lacking and enforcement is low. The lack of clarity in regulation has blurred the line between "legal" and illegal marijuana cultivation practices. Furthermore, limited resources have prevented law enforcement officials from investigating illegal grow sites—which are well disguised on state and federally protected land. In 2017 alone, for example, 80,826 plants were seized from Colorado public lands, compared to 4,980 plants seized in 2013 (RMHIDTA, 2019).

Surrounding communities and ecosystems are at stake. Marijuana facilities on federal land in California are estimated to contain up to 731,000 pounds of solid fertilizer, 491,000 ounces of liquid fertilizer, and 200,000 pounds of toxic pesticides (Bernstein, 2017). These chemicals threaten the surrounding environment and have devastated local animal species. An illegal rodent poison has been associated with a rise in instances of death of the northern spotted owl, a threatened species native to the northwest (Franklin et al., 2018).

## ILLICIT MARIJUANA PLANTS SEIZED OFF OF COLORADO PUBLIC LANDS



(US Bureau of Land Management, 2017)



In California, officials estimate that 70% of the illegal market is cultivated on public lands. According to one investigative report, nine out of every 10 illegal marijuana farms raided in 2018 contained traces of carbofuran, an extremely toxic and banned chemical. From 2012 to 2017, six times as many chemicals have been found at these operations. “These places are toxic garbage dumps. Food containers attract wildlife, and the chemicals kill the animals long after the sites are abandoned,” said Rich McIntyre, director of the Cannabis Removal on Public Lands (CROP) Project, which is dedicated to restoring lands devastated by criminal grow sites on state and federal property in California (Weber, 2019). “We think there’s a public health time bomb ticking,” 60% of California’s water comes from national forest land. The reclamation of such illegal grow sites costs an average of \$40,000 per site (Weber, 2019).

As marijuana legalization expands, so does the illicit market and the threat it poses to the environment. But illegal marijuana is not the only culprit. Marijuana cultivation uses a significant amount of power. The indoor cultivation of one kilogram of marijuana requires 5.2 megawatt hours of electricity and releases 4.5 metric tons of carbon dioxide emissions, comparable to that of a passenger car in one year (ORIDHIDTA, 2018; U.S. Environmental Protection Agency, n.d.). Marijuana production is nearly four times more energy intensive than coal or oil production (Mills, 2012).

A 2015 study on the impact of marijuana cultivation on watersheds in California found that individual marijuana plants require 22.7 liters of water—daily. Production facilities range in daily water demand from 523,144 liters to 724,016 liters (Bauer et al., 2015).

Additional studies have further highlighted the need for a better understanding of the consequences of marijuana farming. A 2016 study focused on marijuana production in Humboldt County, California, found that 68% of the grow sites were less than 500 meters from developed roads, introducing a risk of landscape fragmentation; that 22% of grows were on steep slopes, posing a risk for erosion, sedimentation, and landslide; and that 5% were less than 100 meters from threatened fish habitats (Butsic & Brenner, 2016). A subsequent study found that marijuana farming has drastic impacts on its surrounding environment, an important observation as the industry seeks to expand (I. J. Wang et al., 2017).

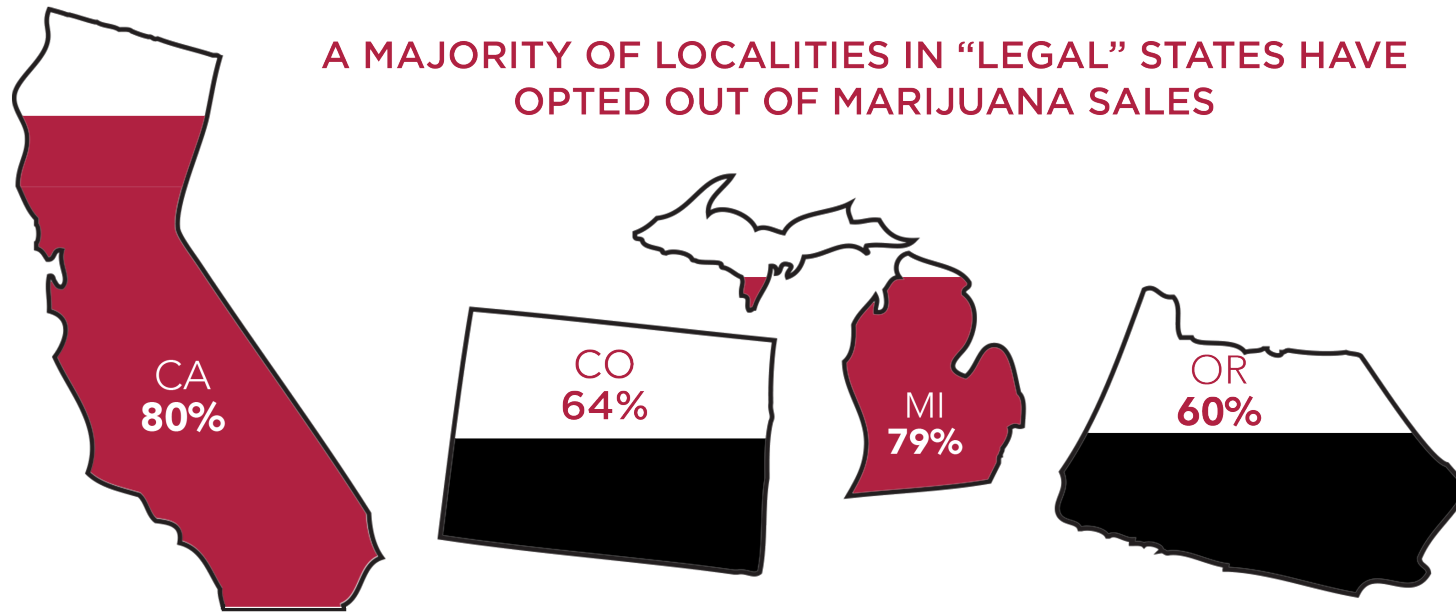
From 2012–2016, the number of marijuana farms in Northern California increased 58% and the total area under cultivation expanded 91%. Expansion of these farms occurred in locations of extreme environmental sensitivity. However, budgetary accommodations for regulating marijuana farm expansion was relatively low compared with other regulatory programs (Butsic et al., 2018).

Legalization has thus far resulted in extreme environmental damage, and the consequences may not be fully understood in time to prevent worse outcomes, as the industry expands.

The indoor  
cultivation of one  
kilogram of  
marijuana requires  
**5.2 megawatt  
hours** of electricity  
and releases **4.5  
metric tons** of  
carbon dioxide  
emissions



(OREGON-IDAHO HIGH INTENSITY DRUG TRAFFICKING AREA, 2018; US ENVIRONMENTAL PROTECTION AGENCY, 2015)



(Alfonsi, 2019; Colorado Department of Revenue, 2019; Walsh, 2019; Oregon Liquor Control Commission, 2019)

## LOCALITIES OPT-OUT OF RETAIL MARIJUANA

Though marijuana legalization has passed through ballots in several states, the picture at the local level is very different. The perception that legalization is welcomed by the citizens of marijuana-friendly states is not accurate.

Proposition 64, the marijuana ballot measure in California, received just over 57% of the vote when it appeared on the ballot in 2016. Yet 80% of California localities have denied marijuana businesses from setting up shop (Alfosni, 2019). This means that the approximately 630 stores licensed by the state are concentrated within 20% of the towns and cities.

What's more, licensed operators have expressed frustration with the restrictive policies of the localities, prompting one legislator to craft a law that would require towns that opted out to permit at least one marijuana business for every four bars or restaurants. According to an Los Angeles Times report, that would result in nearly 2,200 new marijuana shops across the state (McGreevy, 2019). The legislation runs counter to what the citizenry was promised in the ballot initiative.

The shocking discrepancy has been replicated across the country. When it comes to ballot measures regarding marijuana, voters may think the issue is very important. The picture changes when legalization hits home. Voters choose to opt-out of marijuana in their communities in large numbers. This raises questions about the political process of legalization.

In Michigan, where recreational marijuana sales began in December of 2019, more than 1,400 of Michigan's 1,773 municipalities opted out of recreational marijuana—with 40 of 83 counties reporting none of their municipalities allowing the sale of medical marijuana (WXYZ Detroit, 2019). That amounts to around 79% of the state's municipalities opting out of marijuana. Detroit voted to extend its ban on marijuana sales through at least March 31, 2020 (Williams, 2020).

Colorado, another state known to be marijuana-friendly, 64% of jurisdictions banned both recreational and medical marijuana sales (RMHIDTA, 2019). As a result, nearly 59% of licensed medical and recreational marijuana locations are concentrated in four counties: Denver (345), El Paso (125), Boulder (68), and Pueblo (58) (Colorado Department of Revenue, 2019).







Over 60% of municipalities and counties in Oregon have opted out of marijuana sales. Though some of those jurisdictions voted after shops set up in their cities, no new marijuana retail stores are permitted. As such, 50% of Oregon dispensaries are concentrated in three counties, with a whopping 196 of the total 666 dispensaries located in the county of Multnomah (OLCC, 2020).

In Illinois, similar debates are raging, with more community mobilization than many legislators and community organizers have ever seen, according to a report by the Chicago Tribune (McCoppin et al., 2019). The wave of anti-marijuana sentiment surprised some, since the measure passed fairly easily in the state legislature. That being said, an investigative report by Illinois-based newspapers found that—from January of 2017 to the spring of 2019—marijuana companies, executives, and lobbyists donated over \$630,000 to various politicians in the state (Grace, 2019).

While it may pay to gain the favor of legislators, localities are far less certain about “legal” marijuana taking over their hometowns.

**SAM** Smart  
Approaches to  
Marijuana  
preventing another big tobacco



# RECOMMENDATIONS

Policy makers and the public need real-time data on both the consequences of legalization and related monetary costs. Meanwhile, we should pause future legalization efforts and implement public health measures such as potency caps in places that have legalized. In addition, the industry's influence on policy should be significantly curtailed. SAM recommends research efforts and data collection focus on the following categories:

- Emergency room and hospital admissions related to marijuana.
- Marijuana potency and price trends in the “legal” and illegal markets.
- School incidents related to marijuana, including studies involving representative datasets.
- Extent of marijuana advertising toward youth and its impact.
- Marijuana-related car crashes, including THC levels even when testing positive for alcohol.
- Mental health effects of marijuana.
- Admissions to treatment and counseling intervention programs.
- Cost of implementing legalization from law enforcement to regulators.
- Cost of mental health and addiction treatment related to increased marijuana use.
- Cost of needing, but not receiving, treatment.
- Effect on the market for alcohol and other drugs.
- Cost to workplace and employers, including impact on employee productivity.
- Effect on minority communities, including arrests, placement of marijuana establishments, and quality of life indicators.
- Effect on the environment, including water and power usage.

# REFERENCE LIST

- AAA Foundation for Traffic Safety. (2019). *2018 traffic safety culture index*. <https://us.vocuspr.com/Newsroom/ViewAttachment.aspx?SiteName=AAACS&Entity=PRAsset&AttachmentType=F&EntityID=110440&AttachmentID=dac31258-48b7-4707-8ec6-186932cffb96>
- Agrawal, A., Nelson, E. C., Bucholz, K. K., Tillman, R., Grucza, R. A., Statham, D. J., Madden, P. A., Martin, N. G., Heath, A. C., & Lynskey, M. T. (2017). Major depressive disorder, suicidal thoughts and behaviours, and cannabis involvement in discordant twins: A retrospective cohort study. *The Lancet Psychiatry*, 4(9), 706–714. [https://doi.org/10.1016/S2215-0366\(17\)30280-8](https://doi.org/10.1016/S2215-0366(17)30280-8)
- Alaska Department of Health and Social Services. (2020). *Marijuana use and public health in Alaska*. [http://dhss.alaska.gov/dph/Director/Documents/marijuana/MarijuanaUse\\_PublicHealth\\_Alaska\\_2020.pdf](http://dhss.alaska.gov/dph/Director/Documents/marijuana/MarijuanaUse_PublicHealth_Alaska_2020.pdf)
- Alaska State Troopers. (2016). *Alaska State Troopers annual drug report*. <https://dps.alaska.gov/getmedia/f259530b-5277-408e-9d45-4999958fe530/2016-Annual-Drug-Report-6-28-17final;.aspx>
- Alaska State Troopers. (2017). *2017 annual drug report*. <https://dps.alaska.gov/getmedia/1c42905b-dc16-453e-aad5-cfc99d9bc425/2017-Annual-Drug-Report-Final-UPDAT-ED-090718.pdf>
- Alfosni, S. (2019, October 27). How red tape and black market weed are buzzkills for California’s legal marijuana industry. 60 Minutes. <https://www.cbsnews.com/news/marijuana-in-california-black-market-weed-buzzkills-for-california-legal-weed-industry-60-minutes-2019-10-27/>
- Allan, N. P., Ashrafioun, L., Kolnogorova, K., Raines, A. M., Hoge, C. W., & Stecker, T. (2019). Interactive effects of PTSD and substance use on suicidal ideation and behavior in military personnel: Increased risk from marijuana use. *Depression and Anxiety*, 36(11), 1072–1079. <https://doi.org/10.1002/da.22954>
- American College of Obstetricians and Gynecologists. (2017, October). *Marijuana use during pregnancy and lactation*. <https://www.acog.org/Clinical-Guidance-and-Publications/Committee-Opinions/Committee-on-Obstetric-Practice/Marijuana-Use-During-Pregnancy-and-Lactation?IsMobile-Set=false>
- Arria, A. M., Caldeira, K. M., Bugbee, B. A., Vincent, K. B., & O’Grady, K. E. (2015). The academic consequences of marijuana use during college. *Psychology of Addictive Behaviors*, 29(3), 564–575. <https://doi.org/10.1037/ad0000108>
- Ayers, J. W., Caputi, T., & Leas, E. C. (2019). The need for federal regulation of marijuana marketing. *JAMA*. <https://doi.org/10.1001/jama.2019.4432>
- Azagba, S., Shan, L., Manzione, L., Qeadan, F., & Wolfson, M. (2019). Trends in opioid misuse among marijuana users and non-users in the U.S. from 2007–2017. *International Journal of Environmental Research and Public Health*, 16(22),

4585. <https://doi.org/10.3390/ijerph16224585>
- Azofeifa, A., Rexach-Guzmán, B. D., Hagemeyer, A. N., Rudd, R. A., & Sauber-Schatz, E. K. (2019). Driving under the influence of marijuana and illicit drugs among persons aged  $\geq 16$  years—United States, 2018. *Morbidity and Mortality Weekly Report*, 68(50), 1153–1157. <https://doi.org/10.15585/mmwr.mm6850a1>
- Bachhuber, M. A., Saloner, B., Cunningham, C. O., & Barry, C. L. (2014). Medical cannabis laws and opioid analgesic overdose mortality in the United States, 1999–2010. *JAMA Internal Medicine*, 174(10), 1668–1673. <https://doi.org/10.1001/jamainternmed.2014.4005>
- Bahji, A., Stephenson, C., Tyo, R., Hawken, E., & Seitz, D. (2020). Prevalence of cannabis withdrawal symptoms among people with regular or dependent use of cannabinoids: A systematic review and meta-analysis. *JAMA Netw Open*, 3(4), e202370. doi:10.1001/jamanetworkopen.2020.2370
- Bao, C., & Bao, S. (2019). Neonate death due to marijuana toxicity to the liver and adrenals. *American Journal of Case Reports*, 20, 1874–1878. <https://doi.org/10.12659/AJCR.919545>
- Bauer, S., Olson, J., Cockrill, A., van Hattem, M., Miller, L., Tauzer, M., & Leppig, G. (2015). Impacts of surface water diversions for marijuana cultivation on aquatic habitat in four northwestern California watersheds. *PLOS ONE*, 10(3), e0120016. <https://doi.org/10.1371/journal.pone.0120016>
- Bernstein, S. (2017, August 6). Toxic waste from U.S. pot farms alarms experts. *Reuters*. <https://www.reuters.com/article/us-usa-marijuana-environment-idUSKBN1AM0C3>
- Bhandari, S., Jha, P., Lisdahl, K. M., Hillard, C. J., & Venkatesan, T. (2019). Recent trends in cyclic vomiting syndrome-associated hospitalisations with liberalisation of cannabis use in the state of Colorado. *Internal Medicine Journal*, 49(5), 649–655. <https://doi.org/10.1111/imj.14164>
- Bigay-Gamé, L., Bota, S., Greillier, L., Monnet, I., Madroszyk, A., Corre, R., Mastroianni, B., Falchero, L., Mazières, J., Colineaux, H., Lepage, B., Chouaid, C., & GFPC Investigators. (2018). Characteristics of lung cancer in patients younger than 40 years: A prospective multicenter analysis in France. *Oncology*, 95(6), 337–343. <https://doi.org/10.1159/000489784>
- Blood, M. R. (2019, May 9). Weaker-than-expected marijuana sales ding California budget. *U.S. News & World Report*. <https://www.usnews.com/news/best-states/california/articles/2019-05-09/weaker-than-expected-marijuana-sales-ding-california-budget>
- Blood, M. R. (2019, May 9). Weaker-than-expected marijuana sales ding California budget. *U.S. News & World Report*. <https://www.usnews.com/news/best-states/california/articles/2019-05-09/weaker-than-expected-marijuana-sales-ding-california-budget>
- BMJ. (2020, March 18). Concern over industry support for wider access to medical cannabis. *BMJ Open*. <https://www.bmj.com/company/newsroom/concern-over-industry-support-for-wider-access-to-medical-cannabis/>
- Borodovsky, J. T., Lee, D. C., Crosier, B. S., Gabrielli, J. L., Sargent, J. D., & Budney, A. J. (2017). U.S. cannabis legalization and use of vaping and edible products among youth. *Drug and Alcohol Dependence*, 177, 299–306. <https://doi.org/10.1016/j.drugalcdep.2017.02.017>
- Burke, K. D., & Acuna, A. (2017, July 10). Colorado tries to fight homeless problem that may have been triggered by pot law. *Fox News*. <https://www.foxnews.com/us/colorado-tries-to-fight-homeless-problem-that-may-have-been-triggered-by-pot-law>
- Butsic, V., & Brenner, J. C. (2016). Cannabis (*Cannabis sativa* or *C. indica*) agriculture and the environment: A systematic

- ic, spatially-explicit survey and potential impacts. *Environmental Research Letters*, 11(4), 044023. <https://doi.org/10.1088/1748-9326/11/4/044023>
- Butsic, V., Carah, J. K., Baumann, M., Stephens, C., & Brenner, J. C. (2018). The emergence of cannabis agriculture frontiers as environmental threats. *Environmental Research Letters*, 13(12), 124017. <https://doi.org/10.1088/1748-9326/aaeade>
- Butt, Y. M., Smith, M. L., Tazelaar, H. D., Vaszar, L. T., Swanson, K. L., Cecchini, M. J., Boland, J. M., Bois, M. C., Boyum, J. H., Froemming, A. T., Khoor, A., Mira-Avendano, I., Patel, A., & Larsen, B. T. (2019). Pathology of vaping-associated lung injury. *New England Journal of Medicine*, 381(18), 1780–1781. <https://doi.org/10.1056/NEJMc1913069>
- Campbell, G., Hall, W. D., Peacock, A., Lintzeris, N., Bruno, R., Larance, B., Nielsen, S., Cohen, M., Chan, G., Mattick, R. P., Blyth, F., Shanahan, M., Dobbins, T., Farrell, M., & Degenhardt, L. (2018). Effect of cannabis use in people with chronic non-cancer pain prescribed opioids: Findings from a 4-year prospective cohort study. *The Lancet Public Health*, 3(7), e341–e350. [https://doi.org/10.1016/S2468-2667\(18\)30110-5](https://doi.org/10.1016/S2468-2667(18)30110-5)
- Caputi, T. L. (2019). Medical marijuana, not miracle marijuana: Some well-publicized studies about medical marijuana do not pass a reality check. *Addiction*, 114(6), 1128–1129. <https://doi.org/10.1111/add.14580>
- Caputi, T. L., & Humphreys, K. (2018). Medical marijuana users are more likely to use prescription drugs medically and non-medically. *Journal of Addiction Medicine*, 12(4), 295–299. <https://doi.org/10.1097/ADM.0000000000000405>
- Cash, M. C., Cunnane, K., Fan, C., & Romero-Sandoval, E. A. (2020, March 26). Mapping cannabis potency in medical and recreational programs in the United States. *PLOS One*. <https://doi.org/10.1371/journal.pone.0230167>
- CBS Morning Rounds. (2019, January 19). *Police struggle to address driving while high on marijuana*. <https://www.cbsnews.com/video/police-struggle-to-address-driving-while-high-on-marijuana/>
- CBS News. (2019, November 4). *California seizes \$1.5 billion in illegally grown marijuana plants*. <https://www.cbsnews.com/news/marijuana-drug-raid-california-seizes-1-5-billion-illegally-grown-marijuana-2019-11-04/>
- Centers for Disease Control. (2019a, April 9). *Surgeon General's advisory on e-cigarette use among youth*. [https://www.cdc.gov/tobacco/basic\\_information/e-cigarettes/surgeon-general-advisory/index.html](https://www.cdc.gov/tobacco/basic_information/e-cigarettes/surgeon-general-advisory/index.html)
- Centers for Disease Control. (2019b, July 24). *Understanding the epidemic*. <https://www.cdc.gov/drugoverdose/epidemic/index.html>
- Centers for Disease Control and Prevention. (2020, February 25). *Outbreak of lung injury associated with the use of e-cigarette, or vaping, products*. [https://www.cdc.gov/tobacco/basic\\_information/e-cigarettes/severe-lung-disease.html](https://www.cdc.gov/tobacco/basic_information/e-cigarettes/severe-lung-disease.html)
- Cerdá, M., Mauro, C., Hamilton, A., Levy, N. S., Santaella-Tenorio, J., Hasin, D., Wall, M. M., Keyes, K. M., & Martins, S. S. (2020). Association between recreational marijuana legalization in the United States and changes in marijuana use and cannabis use disorder from 2008 to 2016. *JAMA Psychiatry*, 77(2), 165. <https://doi.org/10.1001/jamapsychiatry.2019.3254>
- Chadi, N., Schroeder, R., Jensen, J. W., & Levy, S. (2019). Association between electronic cigarette use and marijuana use among adolescents and young adults: A systematic review and meta-analysis. *JAMA Pediatrics*, 173(10), e192574. <https://doi.org/10.1001/jamapediatrics.2019.2574>
- Chan, G. C. K., Hall, W., Freeman, T. P., Ferris, J., Kelly, A. B., &

- Winstock, A. (2017). User characteristics and effect profile of Butane Hash Oil: An extremely high-potency cannabis concentrate. *Drug and Alcohol Dependence*, 178, 32–38. <https://doi.org/10.1016/j.drugalcdep.2017.04.014>
- Chandra, S., Radwan, M. M., Majumdar, C. G., Church, J. C., Freeman, T. P., & ElSohly, M. A. (2019). New trends in cannabis potency in USA and Europe during the last decade (2008–2017). *European Archives of Psychiatry and Clinical Neuroscience*, 269(1), 5–15. <https://doi.org/10.1007/s00406-019-00983-5>
- Cinnamon Bidwell, L., YorkWilliams, S. L., Mueller, R. L., Bryan, A. D., & Hutchison, K. E. (2018). Exploring cannabis concentrates on the legal market: User profiles, product strength, and health-related outcomes. *Addictive Behaviors Reports*, 8, 102–106. <https://doi.org/10.1016/j.abrep.2018.08.004>
- CNNwire. (2019, November 13). *Teen receives double lung transplant after vaping-related illness*. <https://fox8.com/news/teen-receives-double-lung-transplant-after-vaping-related-illness/>
- Coffey, C., & Patton, G. C. (2016). Cannabis use in adolescence and young adulthood: A review of findings from the victorian adolescent health cohort study. *Canadian Journal of Psychiatry*, 61(6), 318–327. <https://doi.org/10.1177/0706743716645289>
- Colorado Department of Public Health and Environment. (2018). *Monitoring health concerns related to marijuana in Colorado 2018: Summary*. <https://marijuanahealthinfo.colorado.gov/summary>
- Colorado Department of Public Health and Environment. (2019). *Suicides in Colorado: Counts*. [https://cohealthviz.dphe.state.co.us/t/HSEBPublic/views/CoVDRS\\_12\\_1\\_17/Story1?embed=y&showAppBanner=false&showShareOptions=true&display\\_count=no&showVizHome=no#4](https://cohealthviz.dphe.state.co.us/t/HSEBPublic/views/CoVDRS_12_1_17/Story1?embed=y&showAppBanner=false&showShareOptions=true&display_count=no&showVizHome=no#4)
- Colorado Department of Revenue. (2019). *MED licensed facilities*. <https://www.colorado.gov/pacific/enforcement/med-licensed-facilities>
- Colorado Division of Criminal Justice. (2018). *A study of homelessness in seven Colorado jails*. [https://cdpsdocs.state.co.us/ors/docs/reports/2018\\_Jail\\_Homelessness\\_Study.pdf](https://cdpsdocs.state.co.us/ors/docs/reports/2018_Jail_Homelessness_Study.pdf)
- Colorado Division of Criminal Justice. (2019a). *Driving under the influence of drugs and alcohol*. [http://cdpsdocs.state.co.us/ors/docs/reports/2019-DUI\\_HB17-1315.pdf](http://cdpsdocs.state.co.us/ors/docs/reports/2019-DUI_HB17-1315.pdf)
- Colorado Division of Criminal Justice. (2019b, September 3). *Offense/arrest/court filing*. <https://www.colorado.gov/pacific/dcj-ors/Offense/Arrest/CourtFiling>
- Controlled Substances Act, 21 U.S.C. § 801 et. seq., Pub.L. 91–513, 84 Stat. 1236, enacted October 27, 1970.
- Cornyn, J., & Feinstein, D. (2019). *Marijuana and America’s health: Questions and issues for policy makers*. U.S. Senate Caucus on International Narcotics Control [public hearing]. <https://www.youtube.com/watch?v=bYEgAyK2W9o&feature=youtu.be>
- Crombie, N. (2017, June 18). *Contaminated marijuana still reaching consumers in Oregon*. Oregonlive. [https://www.oregonlive.com/marijuana/2017/06/contaminated\\_marijuana\\_still\\_r.html](https://www.oregonlive.com/marijuana/2017/06/contaminated_marijuana_still_r.html)
- Dahlgren, M. K., Sagar, K. A., Smith, R. T., Lambros, A. M., Kuppe, M. K., & Gruber, S. A. (2020). Recreational cannabis use impairs driving performance in the absence of acute intoxication. *Drug and Alcohol Dependence*, 208, 107771. <https://doi.org/10.1016/j.drugalcdep.2019.107771>
- Daley, J. (2019, September 17). *The rate of teen suicide in Colorado increased by 58% in 3 years, making it the cause of 1 in 5 adolescent deaths*. Colorado Public Radio. <https://www.cpr.org/2019/09/17/the-rate-of-teen-suicide-in-colorado-increased-by-58-percent-in-3-years-making-it-the-cause-of-1-in-5-adolescent-deaths/>



- Di Forti, M., Quattrone, D., Freeman, T. P., Tripoli, G., Gayer-Anderson, C., Quigley, H., Rodriguez, V., Jongsma, H. E., Ferraro, L., La Cascia, C., La Barbera, D., Tarricone, I., Berardi, D., Szöke, A., Arango, C., Tortelli, A., Velthorst, E., Bernardo, M., Del-Ben, C. M., ... van der Ven, E. (2019). The contribution of cannabis use to variation in the incidence of psychotic disorder across Europe (EU-GEI): A multicentre case-control study. *The Lancet Psychiatry*, 6(5), 427–436. [https://doi.org/10.1016/S2215-0366\(19\)30048-3](https://doi.org/10.1016/S2215-0366(19)30048-3)
- Drug Enforcement Administration. (n.d.). *The controlled substances act*. Retrieved April 24, 2020, from <https://www.dea.gov/controlled-substances-act>
- Drug Enforcement Administration. (2020a). *2019 national drug threat assessment*. [https://www.dea.gov/sites/default/files/2020-01/2019-NDTA-final-01-14-2020\\_Low\\_Web-DIR-007-20\\_2019.pdf](https://www.dea.gov/sites/default/files/2020-01/2019-NDTA-final-01-14-2020_Low_Web-DIR-007-20_2019.pdf)
- Drug Enforcement Administration. (2020b). *Domestic cannabis suppression/eradication program*. <https://www.dea.gov/domestic-cannabis-suppression-eradication-program>
- Duperrouzel, J., Hawes, S. W., Lopez-Quintero, C., Pacheco-Colón, I., Comer, J., & Gonzalez, R. (2018). The association between adolescent cannabis use and anxiety: A parallel process analysis. *Addictive Behaviors*, 78, 107–113. <https://doi.org/10.1016/j.addbeh.2017.11.005>
- Edwards, E. (2019, December 6). *Not just counterfeit: Legal THC vaping products linked to lung illnesses*. NBC News. <https://www.nbcnews.com/health/vaping/not-just-counterfeit-legal-thc-vaping-products-linked-lung-illnesses-n1097011>
- Ellgren, M., Spano, S. M., & Hurd, Y. L. (2007). Adolescent cannabis exposure alters opiate intake and opioid limbic neuronal populations in adult rats. *Neuropsychopharmacology: Official Publication of the American College of Neuropsychopharmacology*, 32(3), 607–615. <https://doi.org/10.1038/sj.npp.1301127>
- ElSohly, M. A., Ross, S. A., Mehmedic, Z., Arafat, R., Yi, B., & Bana-han, B. F. (2000). Potency trends of delta9-THC and other cannabinoids in confiscated marijuana from 1980–1997. *Journal of Forensic Sciences*, 45(1), 24–30.
- Federal Bureau of Investigation. (2018). *Crime data explorer*. <https://crime-data-explorer.fr.cloud.gov/explorer/state/colorado/arrest>
- Fischer, B., Russell, C., Sabioni, P., van den Brink, W., Le Foll, B., Hall, W., Rehm, J., & Room, R. (2017). Lower-risk cannabis use guidelines: A comprehensive update of evidence and recommendations. *American Journal of Public Health*, 107(8), e1–e12. <https://doi.org/10.2105/AJPH.2017.303818>
- Flaccus, G. (2018, February 2). *US prosecutor: Oregon has big pot overproduction problem*. AP News. <https://apnews.com/833bc51a456d4819b1e9882cb17b46ef/US-prosecutor:-Oregon-has-big-pot-overproduction-problem>
- Franklin, A. B., Carlson, P. C., Rex, A., Rockweit, J. T., Garza, D., Culhane, E., Volker, S. F., Dusek, R. J., Shearn-Bochsler, V. I., Gabriel, M. W., & Horak, K. E. (2018). Grass is not always greener: Rodenticide exposure of a threatened species near marijuana growing operations. *BMC Research Notes*, 11(1), 94. <https://doi.org/10.1186/s13104-018-3206-z>
- Frau, R., Miczán, V., Traccis, F., Aroni, S., Pongor, C. I., Saba, P., Serra, V., Sgheddu, C., Fanni, S., Congiu, M., Devoto, P., Cheer, J. F., Katona, I., & Melis, M. (2019). Prenatal THC exposure produces a hyperdopaminergic phenotype rescued by pregnenolone. *Nature Neuroscience*, 22(12), 1975–1985. <https://doi.org/10.1038/s41593-019-0512-2>
- Freels, T., Baxter-Potter, L., Lugo, J., Glodosky, N., Wright, H., Baglot, S., Petrie, G., Yu, Z., Clowers, B., Cuttler, C., Fuchs, R., Hill, M., & McLaughlin, R. (2020). Vaporized cannabis

- extracts have reinforcing properties and support conditioned drug-seeking behavior in rats. *Journal of Neuroscience*, 40(9), 1897–1908. <https://doi.org/10.1523/JNEUROSCI.2416-19.2020>
- Freisthler, B., Gaidus, A., Tam, C., Ponicki, W. R., & Gruenewald, P. J. (2017). From medical to recreational marijuana sales: marijuana outlets and crime in an era of changing marijuana legislation. *Journal of Primary Prevention*, 38(3), 249–263. <https://doi.org/10.1007/s10935-017-0472-9>
- Fuller, T. (2019, January 2). Now for the hard part: Getting Californians to buy legal weed. *New York Times*. <https://www.nytimes.com/2019/01/02/us/buying-legal-weed-in-california.html>
- Gentes, E. L., Schry, A. R., Hicks, T. A., Clancy, C. P., Collie, C. F., Kirby, A. C., Dennis, M. F., Hertzberg, M. A., Beckham, J. C., & Calhoun, P. S. (2016). Prevalence and correlates of cannabis use in an outpatient VA posttraumatic stress disorder clinic. *Psychology of Addictive Behaviors*, 30(3), 415–421. <https://doi.org/10.1037/adb0000154>
- Ghasemiesfe, M., Barrow, B., Leonard, S., Keyhani, S., & Korenstein, D. (2019). Association between marijuana use and risk of cancer: A systematic review and meta-analysis. *JAMA Network Open*, 2(11), e1916318. <https://doi.org/10.1001/jamanetworkopen.2019.16318>
- Gilman, J. M., Kuster, J. K., Lee, S., Lee, M. J., Kim, B. W., Makris, N., Kouwe, A. van der, Blood, A. J., & Breiter, H. C. (2014). Cannabis use is quantitatively associated with nucleus accumbens and amygdala abnormalities in young adult recreational users. *Journal of Neuroscience*, 34(16), 5529–5538. <https://doi.org/10.1523/JNEUROSCI.4745-13.2014>
- Gobbi, G., Atkin, T., Zytynski, T., Wang, S., Askari, S., Boruff, J., Ware, M., Marmorstein, N., Cipriani, A., Dendukuri, N., & Mayo, N. (2019). Association of cannabis use in adolescence and risk of depression, anxiety, and suicidality in young adulthood: A systematic review and meta-analysis. *JAMA Psychiatry*, 76(4), 426. <https://doi.org/10.1001/jamapsychiatry.2018.4500>
- Gold, M. (2019, April 11). Marijuana testing of job applicants is barred by city in groundbreaking measure. *New York Times*. <https://www.nytimes.com/2019/04/11/nyregion/marijuana-drug-testing-nyc.html>
- Grace, C. (2019, September 6). *Big Marijuana, Big Money, Big Politics: Part One — Illinois*. SAM: Smart Approaches to Marijuana. <https://learnaboutsam.org/big-marijuana-big-money-big-politics-part-one-illinois/>
- Grace, C. (2019, December 17). *Massachusetts Health Officials Confirm Vaping Illnesses Tied to “Legal” Market Following SAM FOIA*. SAM: Smart Approaches to Marijuana. <https://learnaboutsam.org/massachusetts-health-officials-confirm-vaping-illnesses-tied-to-legal-market-following-sam-foia/>
- Grondel, D., Hoff, S., & Doane, D. (2018). *Marijuana use, alcohol use, and driving in Washington State*. Washington Traffic Safety Commission. [http://wtsc.wa.gov/wp-content/uploads/dlm\\_uploads/2018/05/Marijuana-and-Alcohol-Involvement-in-Fatal-Crashes-in-WA\\_FINAL.pdf](http://wtsc.wa.gov/wp-content/uploads/dlm_uploads/2018/05/Marijuana-and-Alcohol-Involvement-in-Fatal-Crashes-in-WA_FINAL.pdf)
- Grover, J., & Corral, A. (2019, February 26). *Poisonous pot found in some Los Angeles-area stores*. NBC Los Angeles. <https://www.nbclosangeles.com/news/local/marijuana-poison-pot-investigation/5913/>
- Gunn, J. K. L., Rosales, C. B., Center, K. E., Nuñez, A., Gibson, S. J., Christ, C., & Ehiri, J. E. (2016). Prenatal exposure to cannabis and maternal and child health outcomes: A systematic review and meta-analysis. *BMJ Open*, 6(4), e009986. <https://doi.org/10.1136/bmjopen-2015-009986>
- Gurney, J., Shaw, C., Stanley, J., Signal, V., & Sarfati, D. (2015).

- Cannabis exposure and risk of testicular cancer: A systematic review and meta-analysis. *BMC Cancer*, 15(1), 897. <https://doi.org/10.1186/s12885-015-1905-6>
- Hall, W., & Lynskey, M. (2016). Evaluating the public health impacts of legalizing recreational cannabis use in the United States: Impacts of legalizing recreational cannabis use. *Addiction*, 111(10), 1764–1773. <https://doi.org/10.1111/add.13428>
- Hamm, K. (2016, January 2). Marijuana in Denver: Map of pot-related businesses by neighborhood with income data, school locations. *Denver Post*. <https://www.denverpost.com/2016/01/02/marijuana-in-denver-map-of-pot-related-businesses-by-neighborhood-with-income-data-school-locations/>
- Hasin, D. S., Keyes, K. M., Alderson, D., Wang, S., Aharonovich, E., & Grant, B. F. (2008). Cannabis withdrawal in the United States: Results from NESARC. *Journal of Clinical Psychiatry*, 69(9), 1354–1363. <https://doi.org/10.4088/jcp.v69n0902>
- Hasin, D. S., Shmulewitz, D., Cerdá, M., Keyes, K. M., Olfson, M., Sarvet, A. L., & Wall, M. M. (2020, January 22). U.S. adults with pain, a group increasingly vulnerable to nonmedical cannabis use and cannabis use disorder: 2001–2002 and 2012–2013. *American Journal of Psychiatry*. <https://doi.org/10.1176/appi.ajp.2019.19030284>
- Hatch, A. (2017, April 14). *Researchers tracking public health impacts of marijuana legalization*. Washington State University. <https://nursing.wsu.edu/2017/04/14/13255>
- Haughwout, S. P., LaVelle, R. A., & Castle, I.-J. P. (2016, March). *Apparent per capita alcohol consumption: National, state, and region trends, 1977–2014*. National Institute on Alcohol Abuse and Alcoholism (NIAAA). <https://pubs.niaaa.nih.gov/publications/surveillance104/CONS14.htm>
- Henquet, C., Krabbendam, L., Spauwen, J., Kaplan, C., Lieb, R., Wittchen, H.-U., & van Os, J. (2005). Prospective cohort study of cannabis use, predisposition for psychosis, and psychotic symptoms in young people. *BMJ (Clinical Research Ed.)*, 330(7481), 11. <https://doi.org/10.1136/bmj.38267.664086.63>
- Helfand, C. (2016, November 28). Teva inks trailblazing cannabis pact with Israel's Syqe Medical. *Fierce Pharma*. <https://www.fiercepharma.com/marketing/teva-inks-trailblazing-cannabis-pact-israel-s-syqe-medical>
- Highway Loss Data Institute. (2018). *Recreational marijuana and collision claim frequencies*. [https://www.iihs.org/media/e0028841-76ee-4315-a628-32a704258980/gmJeDw/HLDI%20Research/Bulletins/hldi\\_bulletin\\_35-08.pdf](https://www.iihs.org/media/e0028841-76ee-4315-a628-32a704258980/gmJeDw/HLDI%20Research/Bulletins/hldi_bulletin_35-08.pdf)
- High-potency cannabis, or frequent use, raises the risk of psychosis. (2019, March 21). *The Economist*. <https://www.economist.com/science-and-technology/2019/03/21/high-potency-cannabis-or-frequent-use-raises-the-risk-of-psychosis>
- Hlavac, G., & Easterly, E. J. (2016, February 1). *Legal issues: Marijuana in the workplace*. National Association of Colleges and Employers. <https://www.nacweb.org/public-policy-and-legal/legal-issues/legal-issues-marijuana-in-the-workplace/>
- Hughes, L. A., Schaible, L. M., & Jimmerson, K. (2019). Marijuana dispensaries and neighborhood crime and disorder in Denver, Colorado. *Justice Quarterly*, 37(3), 1–25. <https://doi.org/10.1080/07418825.2019.1567807>
- Hughes, T. (2019, December 19). Blue Moon brewer launches marijuana-infused “beer.” *USA Today*. <https://www.usatoday.com/story/news/2018/03/28/blue-moon-brewer-marijuana-infused-beer/467110002/>
- Huizink, A. C., & Mulder, E. J. H. (2006). Maternal smoking, drinking or cannabis use during pregnancy and neurobehavioral and cognitive functioning in human offspring. *Neuroscience & Biobehavioral Reviews*, 30(1), 24–41. <https://doi.org/10.1016/j.neubiorev.2005.08.001>

org/10.1016/j.neubiorev.2005.04.005

Janney, E. (2019, October 3). *23 vaping-related lung illnesses reported in Maryland*. Patch: Baltimore, MD. <https://patch.com/maryland/baltimore/23-vaping-related-lung-illnesses-reported-maryland>

Kaste, M. (2018, May 16). *Despite legalization, marijuana black market hides in plain sight*. NPR. <https://www.npr.org/2018/05/16/610579599/despite-legalization-marijuana-black-market-hides-in-plain-sight>

Kerr, D. C. R., Bae, H., Phibbs, S., & Kern, A. C. (2017). Changes in undergraduates' marijuana, heavy alcohol and cigarette use following legalization of recreational marijuana use in Oregon. *Addiction*, 112(11), 1992–2001. <https://doi.org/10.1111/add.13906>

Keyes, K. M., Rutherford, C., & Miech, R. (2019). Historical trends in the grade of onset and sequence of cigarette, alcohol, and marijuana use among adolescents from 1976–2016: Implications for “gateway” patterns in adolescence. *Drug and Alcohol Dependence*, 194, 51–58. <https://doi.org/10.1016/j.drugalcdep.2018.09.015>

Kharbanda, E. O., Vazquez-Benitez, G., Kunin-Batson, A., Nordin, J. D., Olsen, A., & Romitti, P. A. (2020). Birth and early developmental screening outcomes associated with cannabis exposure during pregnancy. *Journal of Perinatology*, 40(3), 473–480. <https://doi.org/10.1038/s41372-019-0576-6>

Kneebone, E., & Allard, S. W. (2017, September 25). *A nation in overdose peril: Pinpointing the most impacted communities and the local gaps in care*. Brookings. <https://www.brookings.edu/research/pinpointing-opioid-in-most-impacted-communities/>

Kolb, J. (2017, May 16). *Legalized marijuana turns Colorado resort town into homeless magnet*. Fox News. <https://www.foxnews.com/us/legalized-marijuana-turns-colorado-re>

sort-town-into-homeless-magnet

Kowitt, S. D., Osman, A., Meernik, C., Zarkin, G. A., Ranney, L. M., Martin, J., Heck, C., & Goldstein, A. O. (2019). Vaping cannabis among adolescents: Prevalence and associations with tobacco use from a cross-sectional study in the USA. *BMJ Open*, 9(6), e028535. <https://doi.org/10.1136/bmjopen-2018-028535>

Koziaz, J. (2019, October 16). *City Council approves controversial marijuana zoning ordinance*. Curbed Chicago. <https://chicago.curbed.com/2019/10/16/20917215/chicago-recreational-marijuana-city-council-zoning-black-caucus>

Lamy, F. R., Daniulaityte, R., Sheth, A., Nahhas, R. W., Martins, S. S., Boyer, E. W., & Carlson, R. G. (2016). “Those edibles hit hard”: Exploration of Twitter data on cannabis edibles in the U.S. *Drug and Alcohol Dependence*, 164, 64–70. <https://doi.org/10.1016/j.drugalcdep.2016.04.029>

LaVito, A., & Hirsch, L. (2018, December 21). *Altria looks to a future beyond cigarettes but investors aren't cheering its \$15 billion bet*. CNBC. <https://www.cnbc.com/2018/12/20/juul-cronos-investments-could-diversify-altria-beyond-cigarettes.html>

Leadbeater, B. J., Ames, M. E., & Linden-Carmichael, A. N. (2019). Age-varying effects of cannabis use frequency and disorder on symptoms of psychosis, depression and anxiety in adolescents and adults. *Addiction*, 114(2), 278–293. <https://doi.org/10.1111/add.14459>

Liu, C., Sadat, S. H., Ebisumoto, K., Sakai, A., Panuganti, B. A., Ren, S., Goto, Y., Haft, S., Fukusumi, T., Ando, M., Saito, Y., Guo, T., Tamayo, P., Yeerna, H., Kim, W., Hubbard, J., Sharabi, A. B., Gutkind, J. S., & Califano, J. A. (2020, April 14). Cannabinoids promote progression of HPV positive head and neck squamous cell carcinoma via p38 MAPK activation. *Clinical Cancer Research*. <https://doi.org/10.1158/1078-0432.CCR->



- MadMoney. (2018, June 21). *MedMen CEO: Forget "stoner?"* YouTube. <https://www.youtube.com/watch?v=aOm2yCy6V20>
- Madras, B. K., Han, B., Compton, W. M., Jones, C. M., Lopez, E. I., & McCance-Katz, E. F. (2019). Associations of parental marijuana use with offspring marijuana, tobacco, and alcohol use and opioid misuse. *JAMA Network Open*, 2(11), e1916015. <https://doi.org/10.1001/jamanetworkopen.2019.16015>
- Magdaleno, J. (2018, January 10). Mexican drug cartels may use legal marijuana to increase their presence in Northern California. *Newsweek*. <https://www.newsweek.com/2018/01/19/mexican-drug-cartels-taking-over-california-legal-marijuana-775665.html>
- Marconi, A., Di Forti, M., Lewis, C. M., Murray, R. M., & Vassos, E. (2016). Meta-analysis of the association between the level of cannabis use and risk of psychosis. *Schizophrenia Bulletin*, 42(5), 1262–1269. <https://doi.org/10.1093/schbul/sbw003>
- Marcum, J. L., Chin, B., Anderson, N. J., & Bonauto, D. K. (2017). Self-reported work-related injury or illness—Washington, 2011–2014. *Morbidity and Mortality Weekly Report*, 66(11), 302–306. <https://doi.org/10.15585/mmwr.mm6611a6>
- Mayo Clinic. (2017, December 21). *Premature birth: Symptoms and causes*. <https://www.mayoclinic.org/diseases-conditions/premature-birth/symptoms-causes/syc-20376730>
- McAlpine, K. (2019). *Male marijuana use might double the risk of partner's miscarriage*. Boston University. <http://www.bu.edu/articles/2019/marijuana-use-and-miscarriage-risk/>
- McCall, R. (2020, January 9). Just a week after recreational marijuana was legalized in Illinois, Chicago doctors report a spike in ER visits. *Newsweek*. <https://www.newsweek.com/recreational-weed-legalized-illinois-chicago-doctors-reporting-spike-er-visits-1481226>
- McCoppin, R., Hegarty, E., & Cullotta, K. A. (2019, November 19). When Illinois legalized marijuana, it sparked a backlash from suburban residents who don't want pot shops in their towns. *Chicago Tribune*. <https://www.chicagotribune.com/marijuana/illinois/ct-illinois-marijuana-opt-out-feud-20191119-hb-keqeug6nc67fturytz5x7lay-story.html>
- McGreevy, P. (2019, May 13). California might triple the number of marijuana shops across state. *Los Angeles Times*. <https://www.latimes.com/politics/la-pol-ca-california-pot-shops-liquor-stores-legislature-mandate-20190513-story.html>
- McVey, E. (2017, July 31). Chart: Recreational marijuana stores are clustered in low-income areas of Denver, Seattle. *Marijuana Business Daily*. <https://mjbizdaily.com/chart-recreational-marijuana-stores-clustered-low-income-areas-denver-seattle/>
- Meehan-Atrash, J., Luo, W., & Strongin, R. M. (2017). Toxicant formation in dabbing: The terpene story. *ACS Omega*, 2(9), 6112–6117. <https://doi.org/10.1021/acsomega.7b01130>
- Meier, M. H., Caspi, A., Ambler, A., Harrington, H., Houts, R., Keefe, R. S. E., McDonald, K., Ward, A., Poulton, R., & Moffitt, T. E. (2012). Persistent cannabis users show neuropsychological decline from childhood to midlife. *Proceedings of the National Academy of Sciences*, 109(40), E2657–E2664. <https://doi.org/10.1073/pnas.1206820109>
- Meier, M. H., Hill, M. L., Small, P. J., & Luthar, S. S. (2015). Associations of adolescent cannabis use with academic performance and mental health: A longitudinal study of upper middle class youth. *Drug and Alcohol Dependence*, 156, 207–212. <https://doi.org/10.1016/j.drugalcdep.2015.09.010>
- Metropolitan Police Department of the District of Columbia. (2019, January 17). *MPD adult arrests (2013–2017)*. <https://mpdc.dc.gov/node/1379551>
- Miech, R., Schulenberg, J., Johnston, L., Bachman, J., O'Malley, P., & Patrick, M. (2019). *National adolescent drug trends press*



- release: Text & tables. Monitoring the Future. <http://www.monitoringthefuture.org/data/19data.html#2019data-drugs>
- Miller, B. (2018, August 1). Molson Coors makes cannabis-infused beverage deal in Canada. *CNBC*. <https://www.cnn.com/2018/08/01/molson-coors-makes-cannabis-infused-beverage-deal-in-canada.html>
- Mills, E. (2012). The carbon footprint of indoor Cannabis production. *Energy Policy*, 46, 58–67.
- Mitchell, K. (2017, July 11). Crime rate in Colorado increases much faster than rest of the country. *Denver Post*. <https://www.denverpost.com/2017/07/11/colorado-sees-big-increase-crime-10-percent-higher-murder-rate/>
- Morris, V., Patel, H., Vedelago, L., Reed, D. D., Metrik, J., Aston, E., MacKillop, J., & Amlung, M. (2018). Elevated behavioral economic demand for alcohol in co-users of alcohol and cannabis. *Journal of Studies on Alcohol and Drugs*, 79(6), 929–934.
- Morrison, C., Gruenewald, P. J., Freisthler, B., Ponicki, W. R., & Remer, L. G. (2014). The economic geography of medical cannabis dispensaries in California. *International Journal of Drug Policy*, 25(3), 508–515. <https://doi.org/10.1016/j.drugpo.2013.12.009>
- Munoz, E., Flick, P., & English, K. (2017). *Summary of law enforcement and district attorney reports of student contacts*. <https://cdpsdocs.state.co.us/ors/docs/reports/2017-HB15-1273-StudentContacts.pdf>
- Murphy, J. (2016, November 25). Ex-big pharma executive behind OxyContin sells medical marijuana. *BBC News, Toronto*. <https://www.bbc.com/news/world-us-canada-38083737>
- Mustonen, A., Niemelä, S., Nordström, T., Murray, G. K., Mäki, P., Jääskeläinen, E., & Miettunen, J. (2018). Adolescent cannabis use, baseline prodromal symptoms and the risk of psychosis. *British Journal of Psychiatry*, 212(4), 227–233. <https://doi.org/10.1192/bjp.2017.52>
- National Institute on Alcohol Abuse and Alcoholism. (2020, February). *Alcohol facts and statistics*. <https://www.niaaa.nih.gov/publications/brochures-and-fact-sheets/alcohol-facts-and-statistics>
- National Institute on Drug Abuse. (2019a, December). *Drugged driving*. <https://www.drugabuse.gov/publications/drugfacts/drugged-driving>
- National Institute on Drug Abuse. (2019b, December). *Is marijuana addictive?* <https://www.drugabuse.gov/publications/research-reports/marijuana/marijuana-addictive>
- Neavling, S. (2020, February 7). 5 more Michigan dispensaries sold cannabis vape cartridges tainted with potentially deadly vitamin E acetate. *Detroit Metro Times*. <https://www.metro-times.com/detroit/5-more-michigan-dispensaries-sold-cannabis-vape-cartridges-tainted-with-potentially-deadly-vitamin-e-acetate/Content?oid=23798607>
- Nedelman, M. (2018, May 10). *Marijuana shops recommend products to pregnant women, against doctors' warnings*. CNN. <https://www.cnn.com/2018/05/10/health/cannabis-marijuana-dispensaries-pregnancy-study/index.html>
- Newman, M. (2019, October 3). State: Delawarean believed to have died from vaping-related lung injury. *Delaware Online*. <https://www.delawareonline.com/story/news/health/2019/10/03/state-delawarean-believed-have-died-vaping-related-lung-injury/3850705002/>
- Niemi-Pynttari, J. A., Sund, R., Putkonen, H., Vorma, H., Wahlbeck, K., & Pirkola, S. P. (2013). Substance-induced psychoses converting into schizophrenia: A register-based study of 18,478 Finnish inpatient cases. *Journal of Clinical Psychiatry*, 74(1), e94–99. <https://doi.org/10.4088/JCP.12m07822>
- Nourbakhsh, M., Miller, A., Gofton, J., Jones, G., & Adeagbo, B. (2019). Cannabinoid hyperemesis syndrome: Reports of fatal

- cases. *Journal of Forensic Sciences*, 64(1), 270–274. <https://doi.org/10.1111/1556-4029.13819>
- O'Connor, S., & Méndez, S. (2016). *Concerning cannabis-infused edibles: Factors that attract children to foods*. University of Washington School of Law. <https://lcb.wa.gov/publications/Marijuana/Concerning-MJ-Infused-Edibles-Factors-That-Attract-Children.pdf>
- O'Donnell, J. (2019, September 23). Sketchy THC vape products: Sneaky teens; How patchwork regulations on e-cigarettes led to health crisis. *USA Today*. <https://www.usatoday.com/story/news/health/2019/09/23/vaping-illnesses-crisis-teens-black-market-thc-no-regulation/2209009001/>
- Office of Attorney General Maura Healey. (2019, June 27). *Two Braintree brothers arrested, arraigned in connection with major money laundering and marijuana trafficking operation*. <https://www.mass.gov/news/two-braintree-brothers-arrested-arraigned-in-connection-with-major-money-laundering-and>
- Office of the Surgeon General. (2019, August 29). *Marijuana use and the developing brain*. U.S. Department of Health & Human Services. <https://www.hhs.gov/surgeongeneral/reports-and-publications/addiction-and-substance-misuse/advisory-on-marijuana-use-and-developing-brain/index.html>
- Olfson, M., Wall, M. M., Liu, S.-M., & Blanco, C. (2018). Cannabis use and risk of prescription opioid use disorder in the United States. *American Journal of Psychiatry*, 175(1), 47–53. <https://doi.org/10.1176/appi.ajp.2017.17040413>
- Oregon Health Authority. (2016). *Marijuana use, attitudes and health effects in Oregon*. <https://www.oregon.gov/oha/ph/PreventionWellness/marijuana/Documents/oha-8509-marijuana-report.pdf>
- Oregon Health Authority. (2017). *Oregon healthy teens survey*. <https://www.oregon.gov/oha/PH/BIRTHDEATHCERTIFICATES/SURVEYS/OREGONHEALTHYTEENS/Pages/2017.aspx>
- Oregon Liquor Control Commission. (2018). *Cannabis information systems properly functioning but monitoring and security enhancements are needed*. <https://sos.oregon.gov/audits/documents/2018-07.pdf>
- Oregon Liquor Control Commission. (2020). *Metrc cannabis tracking system*. <https://www.oregon.gov/olcc/marijuana/Documents/CTS/OregonCannabisTrackingSystemData.pdf>
- Oregon Public Health Division. (2016). *Marijuana report: Marijuana use, attitudes and health effects in Oregon*. <https://www.oregon.gov/oha/ph/PreventionWellness/marijuana/Documents/oha-8509-marijuana-report.pdf>
- Oregon Secretary of State. (2019). *Oregon's framework for regulating marijuana should be strengthened to better mitigate diversion risk and improve laboratory testing*. <https://sos.oregon.gov/audits/Documents/2019-04.pdf>
- Oregon State Police Drug Enforcement Section. (2017). *A baseline evaluation of cannabis enforcement priorities in Oregon*. [https://mass-cannabis-control.com/wp-content/uploads/2017/12/A-Baseline-Evaluation-of-Cannabis-Enforcement-Priorities-in-Oregon\\_.pdf](https://mass-cannabis-control.com/wp-content/uploads/2017/12/A-Baseline-Evaluation-of-Cannabis-Enforcement-Priorities-in-Oregon_.pdf)
- Oregon-Idaho High Intensity Drug Trafficking Area. (2018). *An initial assessment of cannabis production, distribution, and consumption in Oregon 2018*. [https://static1.squarespace.com/static/579bd717c534a564c72ea7bf/t/5b69d694f950b7f0399c4bfe/1533662876506/An+Initial+Assessment+of+Cannabis+Production+Distribution+and+Consumption+in+Oregon+2018\\_OR-ID+HIDTA\\_8-6-18.pdf](https://static1.squarespace.com/static/579bd717c534a564c72ea7bf/t/5b69d694f950b7f0399c4bfe/1533662876506/An+Initial+Assessment+of+Cannabis+Production+Distribution+and+Consumption+in+Oregon+2018_OR-ID+HIDTA_8-6-18.pdf)
- Oregon-Idaho High Intensity Drug Trafficking Area. (2019). *Drug threat assessment: Program year 2020*. <https://static1.squarespace.com/static/579bd717c534a564c72e>

a7bf/t/5d08088507db5c0001ed3f21/1560807567416/  
PY+2020+OREGON-IDAHO+HIDTA+Threat+Assessment\_  
FINAL\_061719.pdf

- Oregon-Idaho High Intensity Drug Trafficking Area. (2020). *Threat assessment and strategy*. <http://oridhidta.org/reports>
- Orr, C., Spechler, P., Cao, Z., Albaugh, M., Chaarani, B., Mackey, S., D'Souza, D., Allgaier, N., Banaschewski, T., Bokde, A. L. W., Bromberg, U., Büchel, C., Quinlan, E. B., Conrod, P., Desrivieres, S., Flor, H., Frouin, V., Gowland, P., Heinz, A., ... Garavan, H. (2019). Grey matter volume differences associated with extremely low levels of cannabis use in adolescence. *Journal of Neuroscience*, 39(10), 1817–1827. <https://doi.org/10.1523/JNEUROSCI.3375-17.2018>
- Pacher, P., Steffens, S., Haskó, G., Schindler, T. H., & Kunos, G. (2018). Cardiovascular effects of marijuana and synthetic cannabinoids: The good, the bad, and the ugly. *Nature Reviews Cardiology*, 15(3), 151–166. <https://doi.org/10.1038/nrcardio.2017.130>
- Peace, M. R., Butler, K. E., Wolf, C. E., Poklis, J. L., & Poklis, A. (2016). Evaluation of two commercially available cannabidiol formulations for use in electronic cigarettes. *Frontiers in Pharmacology*, 7. <https://doi.org/10.3389/fphar.2016.00279>
- Pellechia, T. (2018, February 12). Does legalizing marijuana threaten wine (and beer) consumption? *Forbes*. <https://www.forbes.com/sites/thomaspellechia/2018/02/12/does-legalizing-marijuana-threaten-wine-and-beer-consumption/#3e-9a73b77dfb>
- Peltz, J. (2019, December 3). Marijuana vaping busts on rise; over 500k seized in 2 years. *U.S. News & World Report*. <https://www.usnews.com/news/us/articles/2019-12-03/over-500k-pot-vapes-seized-in-2-years-as-busts-rise-in-us>
- Pierre, J. M., Gandal, M., & Son, M. (2016). Cannabis-induced psychosis associated with high potency “wax dabs.” *Schizophrenia Research*, 172(1–3), 211–212. <https://doi.org/10.1016/j.schres.2016.01.056>

- Prince, M. A., & Conner, B. T. (2019). Examining links between cannabis potency and mental and physical health outcomes. *Behaviour Research and Therapy*, 115, 111–120. <https://doi.org/10.1016/j.brat.2018.11.008>
- Queally, J., & Parvini, S. (2018, March 22). For police, catching stoned drivers isn't so easy. *Los Angeles Times*. <https://www.latimes.com/local/lanow/la-me-ln-marijuana-dui-20180322-story.html>
- Quest Diagnostics. (2018). *Drug testing index: Overall positivity rate 2018*. <http://www.dtidrugmap.com>
- Quest Diagnostics. (2019, September 11). *Workforce drug positivity increases in more than one-third of U.S. industry sectors examined, according to quest diagnostics multi-year analysis*. Quest Diagnostics Newsroom. <https://newsroom.questdiagnostics.com/2019-09-11-Workforce-Drug-Positivity-Increases-in-More-Than-One-Third-of-U-S-Industry-Sectors-Examined-According-to-Quest-Diagnostics-Multi-Year-Analysis>
- Rice, R. (2019, October 22). Sen. Rice: Legalizing pot won't stop social injustice in the black and brown community. *NJ.com*. <https://www.nj.com/opinion/2019/10/sen-rice-legalizing-pot-wont-stop-social-injustice-in-the-black-and-brown-community.html>
- Richter, K. P., & Levy, S. (2014). Big marijuana: Lessons from big tobacco. *New England Journal of Medicine*, 371(5), 399–401. <https://doi.org/10.1056/NEJMp1406074>
- Ritter, K. (2019, June 12). Nevada law prevents most employers from rejecting pot-users. *AP News*. <https://apnews.com/0fe555109df746afb2e76924cbb26175>
- Rocky Mountain High Intensity Drug Trafficking Area. (2019). *The legalization of marijuana in Colorado: The impact*. <https://rmhidta.org/files/D2DF/FINAL-Volume6.pdf>
- Romano, E., Kelley-Baker, T., Hoff, S., Eichelberger, A., & Ramírez,

- A. (2019). Use of alcohol and cannabis among adults driving children in Washington State. *Journal of Studies on Alcohol and Drugs*, 80(2), 196–200. <https://doi.org/10.15288/jsad.2019.80.196>
- Romero, D. (2019, September 20). California's cannabis black market is eclipsing its legal one. *NBC News*. <https://www.nbcnews.com/news/us-news/california-s-cannabis-black-market-has-eclipsed-its-legal-one-n1053856>
- Romo, V. (2019, August 16). Maryland court rules marijuana odor not enough to search a person. *NPR*. <https://www.npr.org/2019/08/16/751783763/maryland-court-rules-marijuana-odor-not-enough-to-search-a-person>
- RTT News. (2018, December 18). TLRy Teams Up With Novartis, TLSA To Report Data In Q2, RARX Marches Ahead. *Nasdaq*. <https://www.nasdaq.com/articles/tlry-teams-novartis-tlsa-report-data-q2-rarx-marches-ahead-2018-12-18>
- Salmore, R., & Finn, K. (2016). The hidden costs of marijuana use in Colorado: One emergency department's experience. *Journal of Global Drug Policy and Practice*, 10(Summer), 1–26.
- Salottolo, K., Peck, L., Tanner II, A., Carrick, M. M., Madayag, R., McGuire, E., & Bar-Or, D. (2018). The grass is not always greener: A multi-institutional pilot study of marijuana use and acute pain management following traumatic injury. *Patient Safety in Surgery*, 12(1), 16. <https://doi.org/10.1186/s13037-018-0163-3>
- Sauter, M. (2018, May 2). Which state's residents drink the most beer? Brews news you can use for your next bar bet. *USA Today*. <https://247wallst.com/special-report/2018/04/30/states-drinking-the-most-beer-2>
- Schoenberg, S. (2018, December 5). Boston grapples with diversity in marijuana industry. *MassLive*. [https://www.masslive.com/politics/2018/12/boston\\_grapples\\_with\\_lack\\_of\\_d.html](https://www.masslive.com/politics/2018/12/boston_grapples_with_lack_of_d.html)
- Schuster, R. M., Gilman, J., Schoenfeld, D., Evenden, J., Hareli, M., Ulysse, C., Nip, E., Hanly, A., Zhang, H., & Evins, A. E. (2018). One month of cannabis abstinence in adolescents and young adults is associated with improved memory. *Journal of Clinical Psychiatry*, 79(6). <https://doi.org/10.4088/JCP.17m11977>
- Secades-Villa, R., Garcia-Rodríguez, O., Jin, C. J., Wang, S., & Blanco, C. (2015). Probability and predictors of the cannabis gateway effect: A national study. *International Journal of Drug Policy*, 26(2), 135–142. <https://doi.org/10.1016/j.drugpo.2014.07.011>
- Selsky, A. (2019, September 26). 2nd death in Oregon from vaping-related illness. *Seattle Times*. <https://www.seattletimes.com/seattle-news/health/2nd-oregonian-dies-from-vaping-related-illness/>
- Sheetz, M. (2018, August 15). Corona beer maker Constellation ups bet on cannabis with \$4 billion investment in Canopy Growth. *CNBC*. <https://www.cnbc.com/2018/08/15/corona-maker-constellation-ups-bet-on-cannabis-with-4-billion-investm.html>
- Shi, Y., & Liang, D. (2020, February 20). The association between recreational cannabis commercialization and cannabis exposures reported to the US National Poison Data System. *Addiction*. <https://doi.org/10.1111/add.15019>
- Shover, C. L., Davis, C. S., Gordon, S. C., & Humphreys, K. (2019). Association between medical cannabis laws and opioid overdose mortality has reversed over time. *Proceedings of the National Academy of Sciences*, 116(26), 12624–12626. <https://doi.org/10.1073/pnas.1903434116>
- Silins, E., Horwood, L. J., Patton, G. C., Fergusson, D. M., Ols-son, C. A., Hutchinson, D. M., Spry, E., Toumbourou, J. W., Degenhardt, L., Swift, W., Coffey, C., Tait, R. J., Letcher, P., Copeland, J., & Mattick, R. P. (2014). Young adult sequelae of adolescent cannabis use: An integrative analysis. *The*



- Lancet Psychiatry*, 1(4), 286–293. [https://doi.org/10.1016/S2215-0366\(14\)70307-4](https://doi.org/10.1016/S2215-0366(14)70307-4)
- Smart, R., Caulkins, J. P., Kilmer, B., Davenport, S., & Midgette, G. (2017). Variation in cannabis potency and prices in a newly legal market: Evidence from 30 million cannabis sales in Washington state; Legal cannabis potency and price variation. *Addiction*, 112(12), 2167–2177. <https://doi.org/10.1111/add.13886>
- Smith, P. (2017, August 19). Why are so many pot shops in poor neighborhoods? *Salon*. [https://www.salon.com/2017/08/19/why-are-so-many-pot-shops-in-poor-neighborhoods\\_partner/](https://www.salon.com/2017/08/19/why-are-so-many-pot-shops-in-poor-neighborhoods_partner/)
- Snyder, K. (2019, October 18). Maumee man's hospitalization possibly linked to vaping THC. *Toledo Blade*. <https://www.toledoblade.com/news/medical/2019/10/18/vaping-respiratory-illness-ban-e-cigarette-lung-raphael-rodriguez/stories/20191018120>
- Stone, W. (2019, October 26). Some states with legal weed embrace vaping bans, warn of black market risks. *NPR*. <https://www.npr.org/sections/health-shots/2019/10/26/770377080/some-states-with-legal-weed-embrace-vaping-bans-warn-of-black-market-risks>
- Stratton, J. (2020, January 30). *Fatal crashes involving drivers who test positive for marijuana increase after state legalizes drug*. AAA NewsRoom. <https://newsroom.aaa.com/2020/01/fatal-crashes-involving-drivers-who-test-positive-for-marijuana-increase-after-state-legalizes-drug/>
- Substance Abuse and Mental Health Services Administration. (2019a). *National survey on drug use and health 2018 (NSDUH-2018-DS0001)*. <https://www.datafiles.samhsa.gov/study-dataset/national-survey-drug-use-and-health-2018-nsduh-2018-ds0001-nid18758>
- (2019b). *State data tables and reports from the 2017–2018 NSDUH*. <https://www.samhsa.gov/data/nsduh/state-reports-NSDUH->
- 2018 Substance Abuse and Mental Health Services Administration. (2020). National survey on drug use and health 2019 (NSDUH-2019-DS0001). <https://www.samhsa.gov/data/report/2019-nsduh-detailed-tables>
- Thomas, A. A., Von Derau, K., Bradford, M. C., Moser, E., Garrard, A., & Mazor, S. (2019). Unintentional pediatric marijuana exposures prior to and after legalization and commercial availability of recreational marijuana in Washington State. *Journal of Emergency Medicine*, 56(4), 398–404. <https://doi.org/10.1016/j.jemermed.2019.01.004>
- Thomas, C., & Freisthler, B. (2017). Evaluating the change in medical marijuana dispensary locations in Los Angeles following the passage of local legislation. *Journal of Primary Prevention*, 38(3), 265–277. <https://doi.org/10.1007/s10935-017-0473-8>
- Trangenstein, P. J., Whitehill, J. M., Jenkins, M. C., Jernigan, D. H., & Moreno, M. A. (2019). Active cannabis marketing and adolescent past-year cannabis use. *Drug and Alcohol Dependence*, 204, 107548. <https://doi.org/10.1016/j.drugalcdep.2019.107548>
- Trimble, M. (2019, January 31). Authorities busted up to 50 suspected marijuana grow houses in Colorado. *U.S. News & World Report*. <https://www.usnews.com/news/national-news/articles/2019-01-31/federal-agents-police-bust-suspected-marijuana-grow-houses-in-colorado>
- Truth Initiative. (2018, January 25). *'Worth More' campaign exposes Big Tobacco for its manipulation of lower-income communities*. <https://truthinitiative.org/research-resources/targeted-communities/worth-more-campaign-exposes-big-tobacco-its-manipulation>



- U.S. Census Bureau. (2019). *QuickFacts: Boston city, Massachusetts*. <https://www.census.gov/quickfacts/fact/table/boston-citymassachusetts/RHI225218>
- U.S. Environmental Protection Agency. (n.d.). *Green vehicle guide*. Retrieved July 22, 2015, from <https://www.epa.gov/green-vehicles>
- U.S. Postal Inspection Service. (2019). retrieved from *The legalization of marijuana in Colorado: The impact*. <https://rmhidta.org/files/D2DF/FINAL-Volume6.pdf>
- Volkow, N. D., Baler, R. D., Compton, W. M., & Weiss, S. R. B. (2014). Adverse health effects of marijuana use. *New England Journal of Medicine*, 370(23), 2219–2227. <https://doi.org/10.1056/NEJMra1402309>
- Volkow, N. D., Han, B., Compton, W. M., & Blanco, C. (2017). Marijuana use during stages of pregnancy in the United States. *Annals of Internal Medicine*, 166(10), 763–764. <https://doi.org/10.7326/L17-0067>
- Wallack, T., & Adams, D. (2019, March 27). Massachusetts marijuana regulators investigating whether companies violated license limits. *Boston Globe*. <https://www.bostonglobe.com/metro/2019/03/27/massachusetts-marijuana-regulators-investigating-whether-companies-violating-ownership-limits/jshf4znu16AaNxD3P1NdBK/story.html>
- Wang, G. S., Hall, K., Vigil, D., Banerji, S., Monte, A., & VanDyke, M. (2017). Marijuana and acute health care contacts in Colorado. *Preventive Medicine*, 104, 24–30. <https://doi.org/10.1016/j.ypmed.2017.03.022>
- Wang, I. J., Brenner, J. C., & Butsic, V. (2017). Cannabis, an emerging agricultural crop, leads to deforestation and fragmentation. *Frontiers in Ecology and the Environment*, 15(9), 495–501. <https://doi.org/10.1002/fee.1634>
- Washington Office of Financial Management. (2019). *Monitoring impacts of recreational marijuana legalization: 2019 update report*. <https://www.ofm.wa.gov/pubs-reports/monitoring-impacts-recreational-marijuana-legalization-2019-update-report>
- Washington Poison Center. (2018). *Cannabis data reports*. <https://www.wapc.org/data/data-reports/cannabis-data-report/>
- Washington State Healthy Youth Survey. (2018). *Healthy youth survey*. <https://www.askhys.net/FactSheets>
- Washington State Liquor and Cannabis Board. (2020). *Violations dataset*. <https://data.lcb.wa.gov/dataset/Violations-Dataset/dx3i-tzh2/data>
- Weber, C. (2019, November 17). Illegal pot farm leaves ‘toxic garbage dump’ in northern California national forest. *OregonLive/The Oregonian*. <https://www.oregonlive.com/nation/2019/11/illegal-pot-farm-leaves-toxic-garbage-dump-in-northern-california-national-forest.html>
- Weinberger, A. H., Platt, J., & Goodwin, R. D. (2016). 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, 363–367. <https://doi.org/10.1016/j.drugalcdep.2016.01.014>
- Whitehill, J. M., Harrington, C., Lang, C. J., Chary, M., Bhutta, W. A., & Burns, M. M. (2019). Incidence of pediatric cannabis exposure among children and teenagers aged 0 to 19 years before and after medical marijuana legalization in Massachusetts. *JAMA Network Open*, 2(8), e199456. <https://doi.org/10.1001/jamanetworkopen.2019.9456>
- Williams, C. (2020, January 28). Detroit City Council extends temporary ban on pot sales. *AP News*. <https://apnews.com/0683c9e3a1aede7be8340f120b6f5fbd>
- WKRN. (2019, October 17). *Minnesota native identified as Tennessee’s first vaping-related death*. <https://www.wkrn.com/news/local-news/minnesota-man-identified-as-tennes->

sees-first-vaping-related-death/

Wohlforth, C. (2018, January 11). Marijuana school suspensions more than doubled after legalization. *Anchorage Daily News*. <https://www.adn.com/opinions/2018/01/11/marijuana-school-suspensions-more-than-doubled-after-legalization/>

WXYZ Detroit. (2019, November 26). *Here's a list of the 1,400+ communities that have opted out of recreational marijuana*. <https://www.wxyz.com/news/heres-a-list-of-the-1-300-communities-that-have-opted-out-of-recreational-marijuana>

Yates, D., & Speer, J. (2018). Over and under-regulation in the Colorado Cannabis industry: A data-analytic perspective. *International Journal of Drug Policy*, 59, 63–66. <https://doi.org/10.1016/j.drugpo.2018.06.001>

Addendum: Jennifer A. Bailey, Marina Epstein, Joseph N. Roscoe, Sabrina Oesterle, Rick Kosterman, Karl G. Hill. Marijuana Legalization and Youth Marijuana, Alcohol, and Cigarette Use and Norms. *American Journal of Preventive Medicine*, 2020; DOI: 10.1016/j.amepre.2020.04.008



“While laboratory animals are an expensive way of understanding the risks of cannabis use, **North Americans come free.**”

The Economist (2019)