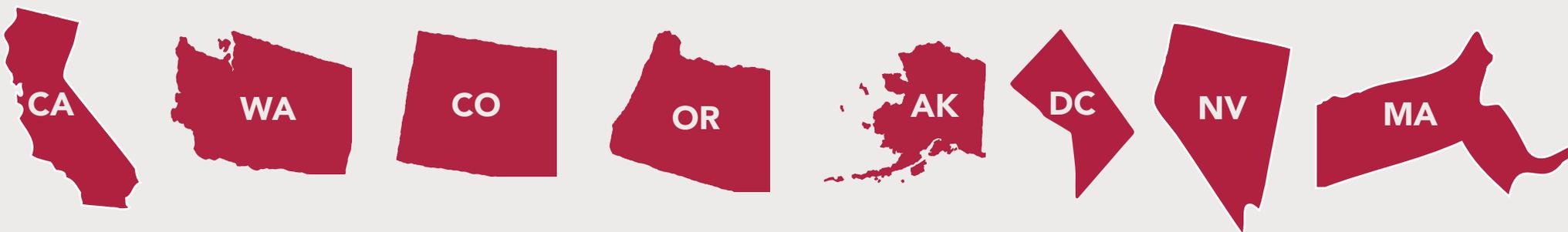


# LESSONS LEARNED FROM STATE MARIJUANA LEGALIZATION

M A Y 2 0 1 9



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

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

# EXECUTIVE HIGHLIGHTS

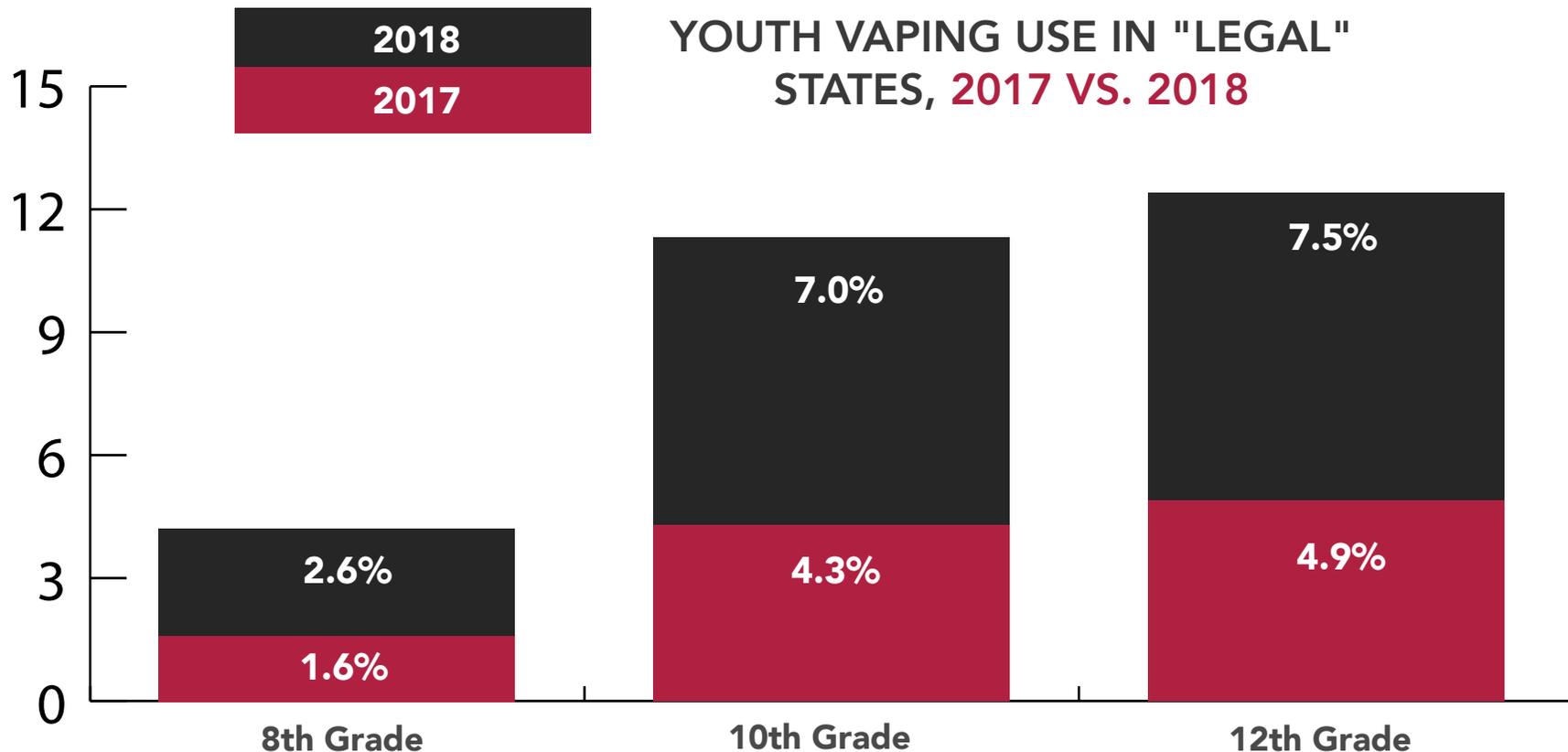
Today's highly potent marijuana represents a growing and significant threat to public health and safety, a threat that is amplified by a new marijuana industry intent on profiting from heavy use.

State laws allowing marijuana sales and consumption have permitted the marijuana industry to flourish, and in turn, the marijuana industry has influenced both policies and policy-makers. While the consequences of these policies will not be known for decades, early indicators are troubling.

This report, reviewed by prominent scientists and researchers, serves as an evidence-based guide to what we currently observe in various states. We attempted to highlight studies from all the "legal" marijuana states (i.e., states that have legalized the non-medical use of marijuana). Unfortunately, data does not exist for several "legal" states, and so this document synthesizes the latest research on marijuana impacts in states where information is available.

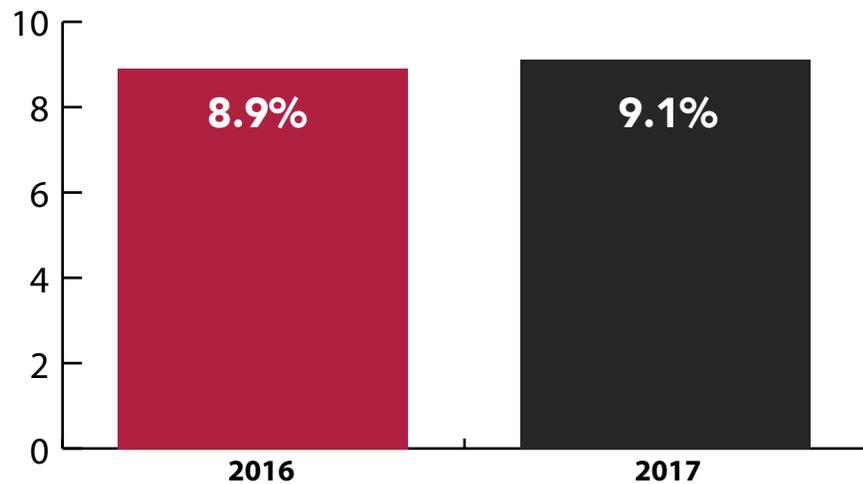
# YOUTH AND SCHOOL IMPACTS

While rates of almost every other drug are decreasing among youth, marijuana use remains stubbornly high. A new marijuana industry – teaming up with Big Pharma, Big Alcohol and Big Tobacco executives – is facilitating and encouraging this trend, presenting teens with new and appealing ways to ingest highly potent marijuana. According to the University of Michigan Monitoring the Future survey of American youth, between 2017 and 2018, the percentage of 8th and 10th graders who report “vaping” marijuana has increased 63%. Over the same timeframe, the percent of 12th graders who report vaping marijuana has increased by 53% (Johnston, Miech, Bachman, Schulenberg, & Patrick, 2018).

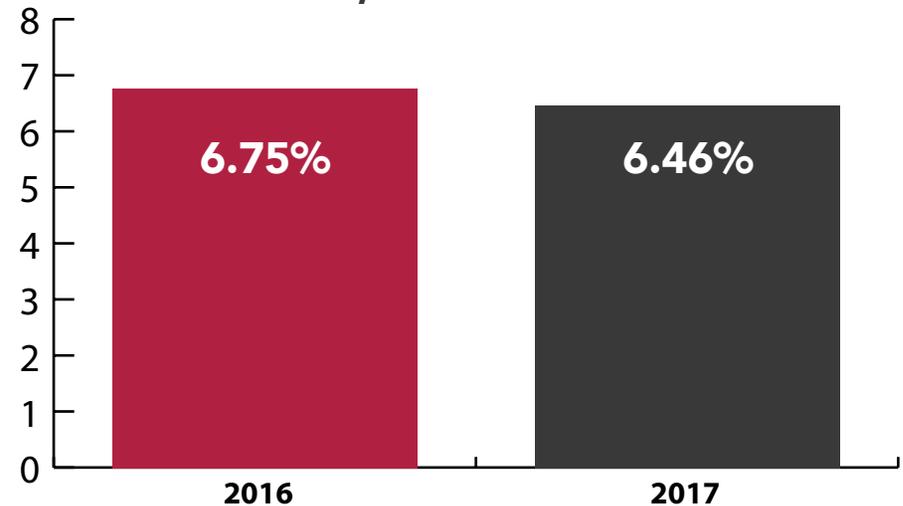


The percentage of youth aged 12-17 years old using marijuana is declining faster in states where marijuana is not "legal," and overall use is up in "legal" states while declining in non-legal states. According to a uniform survey of marijuana use conducted by the federal government across all states, the percentage of youth aged 12-17-years-old using marijuana in states where marijuana is "legal" was 7.7%, versus 6.2% in non-legal states (NSDUH State Reports 2016-2017).

**YOUTH USE IN "LEGAL" STATES,  
2016 VS. 2017**

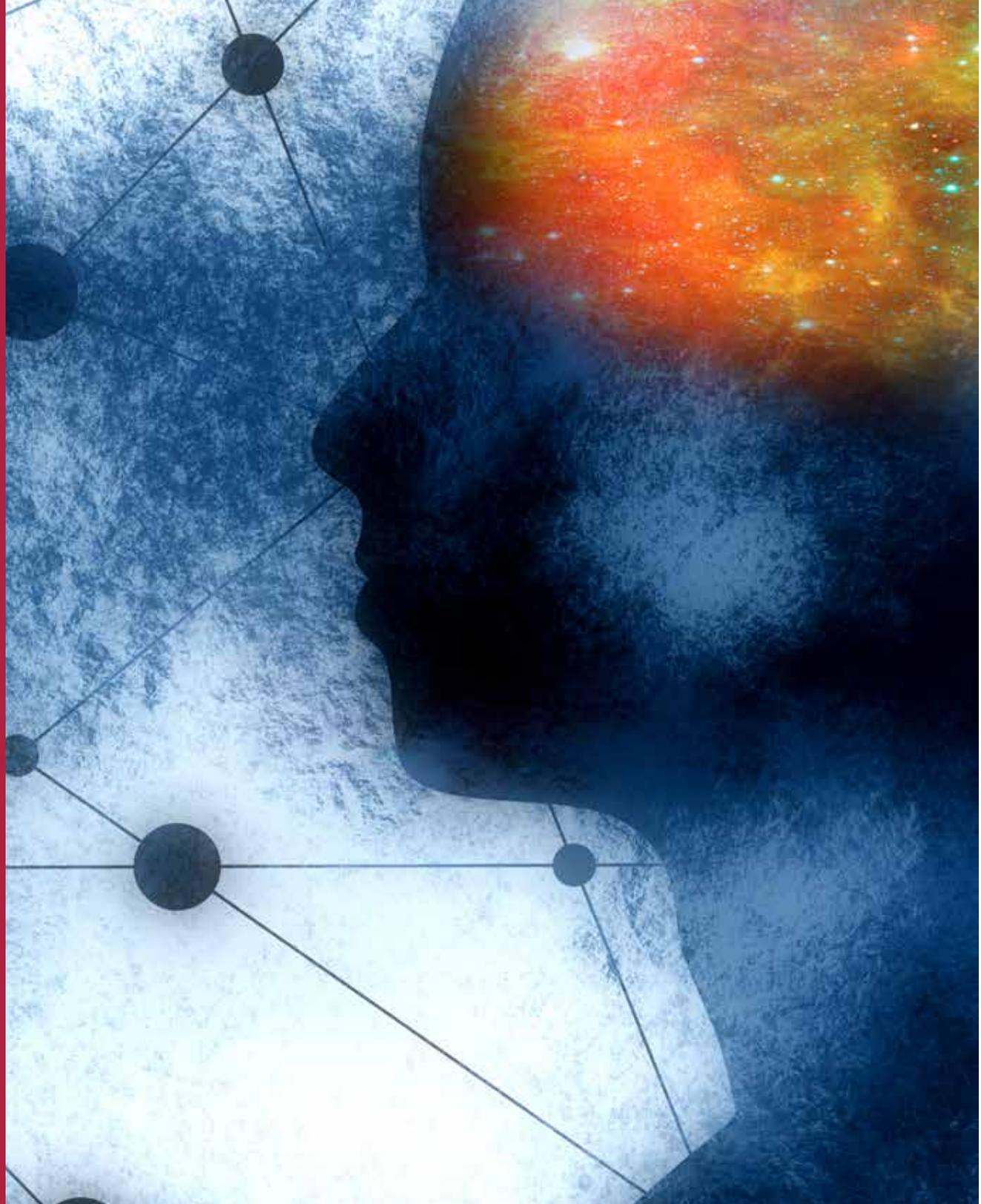


**YOUTH USE IN "NON-LEGAL"  
STATES, 2016 VS. 2017.**



# MENTAL HEALTH OUTCOMES

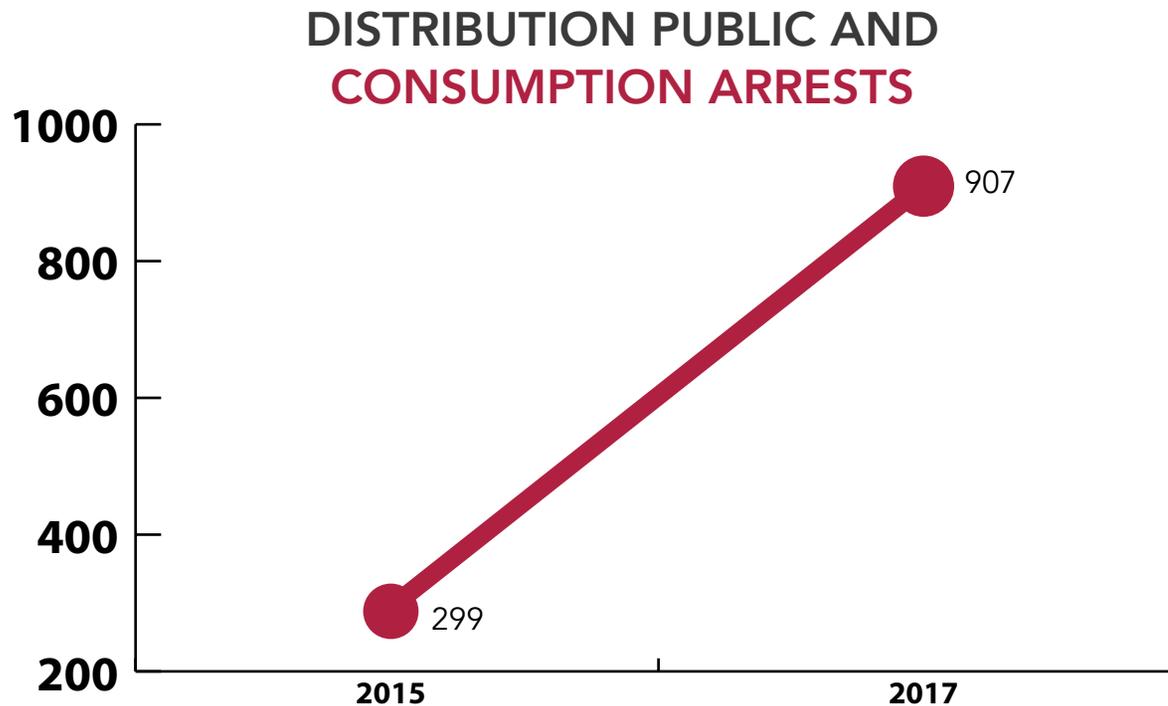
Furthermore, 2019 Colorado toxicology reports show the percentage of adolescent suicide victims testing positive for marijuana continues to increase. Between 2011 and 2013, 20.7% of suicide victims between the ages of 10 and 19 tested positive for marijuana (compared with 12.7% who tested positive for alcohol). Between 2014-2016, 22.4% tested positive for marijuana (compared with 9.3% for alcohol) (Colorado Department of Public Health and Environment, 2019). In two cross-sectional studies of Colorado youth in outpatient substance use treatment facilities, approximately one half to three quarters reported using diverted marijuana – marijuana accessed by adolescents from adults for purported medical purposes with legal access to it (Wilkinson, Yarnell, Radhakrishnan, Ball, & D’Zouza, 2016).



# IMPACT ON SOCIAL JUSTICE

Marijuana proponents predicted that legalizing marijuana would meaningfully mitigate disparities in criminal enforcement and enhance social justice. Unfortunately, these predictions have been unrealized, as ethnic and racial disparities in law enforcement persist.

In Washington D.C., between 2015 and 2017 (the years immediately following legalization), although total marijuana-related arrests have gone down, distribution and public consumption arrests more than tripled. Among adults, 89% of marijuana distribution or public consumption arrestees were African American (DC Metropolitan Policy Department, 2018). Juvenile marijuana-related arrests increased **114%** between the three years before and after marijuana legalization.

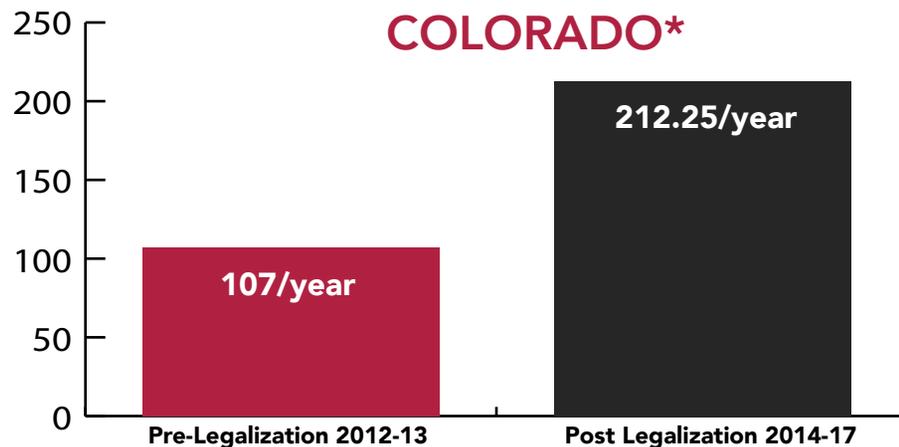


Between 2015 and 2017- the years immediately following legalization in Washington, D.C., distribution and public consumption arrests more than tripled from 299 to 907. Nearly all of those arrested for distribution and public consumption in D.C. were African American (DC Metropolitan Policy Department, 2018).

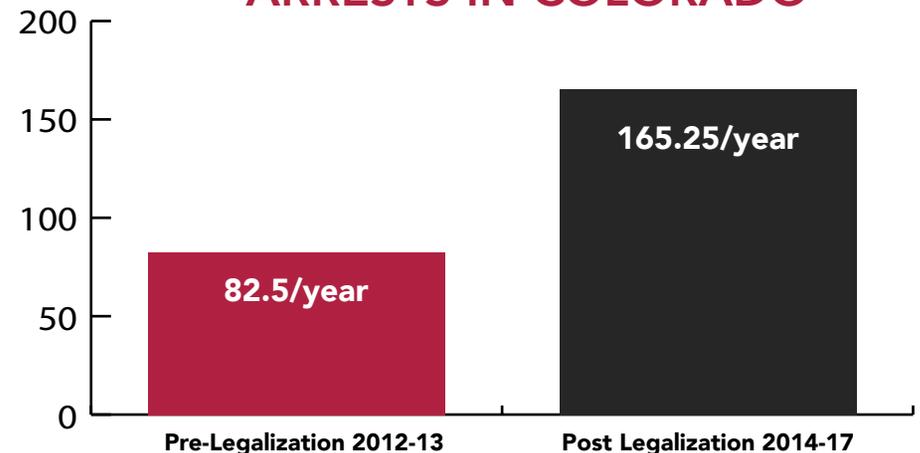
# IMPACT ON SOCIAL JUSTICE

The 2017 marijuana-related African American arrest rate in Colorado is nearly twice that of Caucasians (233 in 100,000 versus 118 in 100,000) (Colorado Department of Public Safety, 2018). In Colorado, 39% of African American marijuana-related arrests in 2017 were made without a warrant, while only 18% of Caucasians were arrested without one (Colorado Department of Public Safety, 2018). Drug suspension rates in Colorado schools with 76% or more students of color are over two times higher compared to Colorado schools with fewer than 25% students of color (Colorado Department of Public Safety, 2016). In Denver, the average number of annual Hispanic arrests for marijuana increased by 98% since legalization (107 average annual arrests pre-legalization vs 212.25 post-legalization); the average number of arrests for African Americans increased 100.3% from 82.5 per year to 165.25 per year (Colorado Department of Public Safety, 2018).

**AVERAGE HISPANIC  
ARRESTS IN  
COLORADO\***



**AVERAGE AFRICAN AMERICAN  
ARRESTS IN COLORADO\***

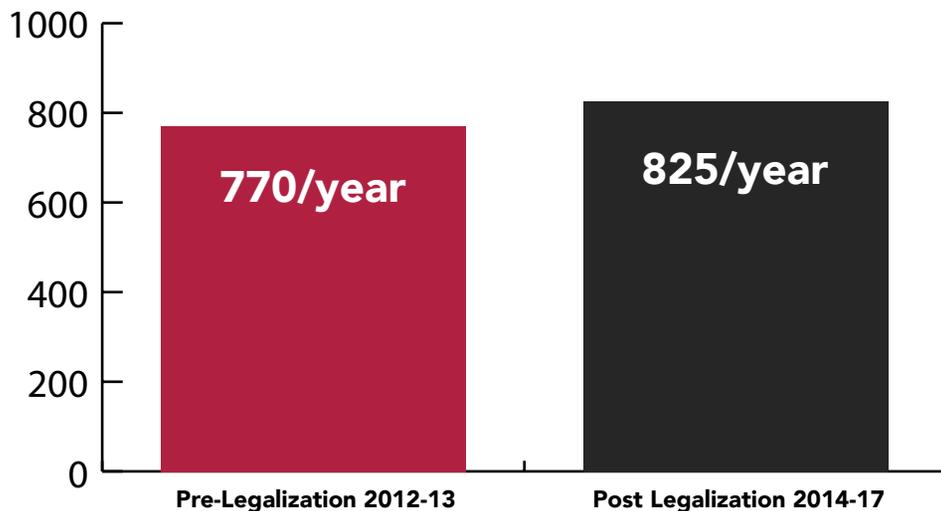


\*This figure uses data from an official report by the Colorado Division of Criminal Justice. However, due to issues with the reporting of marijuana-related crimes in Denver between 2012 and 2014, it is likely that the number of marijuana arrests made in the pre-legalization period are underestimated.

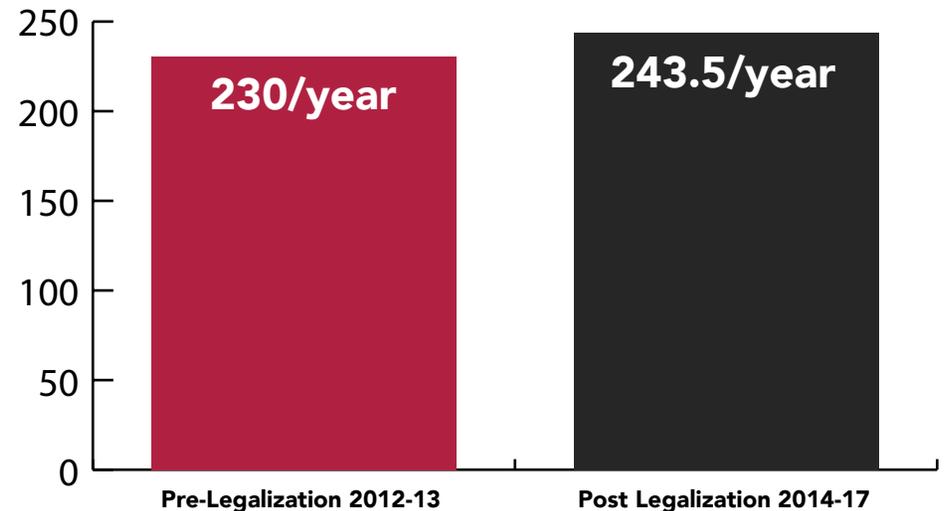
Across Colorado, minority juveniles suffered. The average number of marijuana-related arrests among Hispanic juveniles increased 7.3% (770/year to 825/year), and the average number of marijuana-related arrests among African-American juveniles increased 5.9% (230/year to 243.5/year) (Colorado Department of Public Safety, 2018).

## JUVENILE ARREST RATE

**AVERAGE HISPANIC  
ARRESTS IN COLORADO\***



**AVERAGE AFRICAN AMERICAN  
ARRESTS IN COLORADO\***



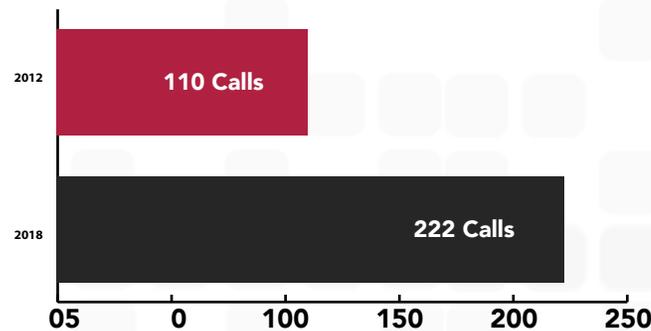
\*This figure uses data from an official report by the Colorado Division of Criminal Justice. However, due to issues with the reporting of marijuana-related crimes in Denver between 2012 and 2014, it is likely that the number of marijuana arrests made in the pre-legalization period are underestimated.

# IMPACT ON HOSPITAL AND ED VISITS

In the year immediately following recreational marijuana legalization in Colorado, calls to poison centers statistically significantly increased by 80% (Wang, et al., 2017).

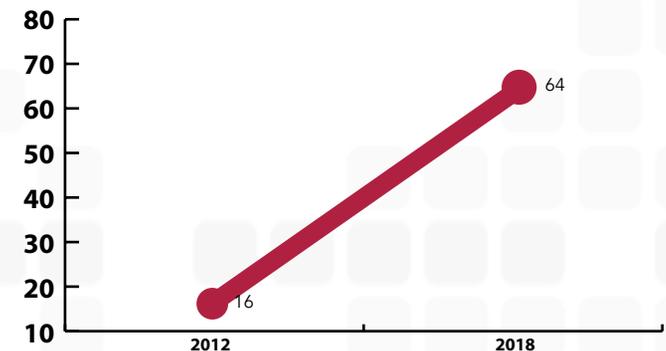
Since legalization, total marijuana exposure calls to poison control centers have more than doubled. The largest increase is among children 0-8-years-old with unintentional exposure to marijuana (Colorado Department of Public Health and Environment, 2019). Marijuana exposures among 0-8-year-olds reported to Colorado poison control have increased by 230% since legalization (Colorado Department of Public Health and Environment, 2019).

## MARIJUANA EXPOSURE CALLS TO COLORADO POISON CONTROL CENTERS



Since legalization, total marijuana exposure calls to Colorado poison control centers have more than doubled (110 calls in 2012 to 222 calls in 2018). The largest increase is among children 0-8 years old that suffered unintentional exposure to marijuana (Colorado Department of Public Health and Environment, 2019).

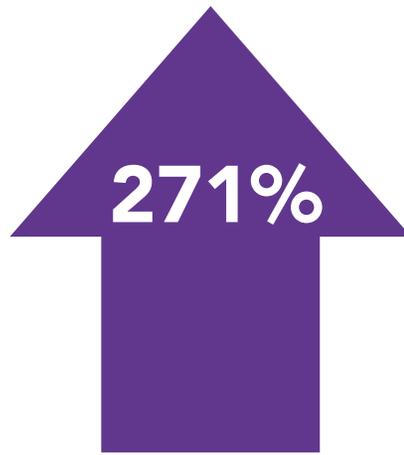
## MARIJUANA EXPOSURES AMONG 0-8 YEAR-OLDS REPORTED TO COLORADO POISON CONTROL CENTERS



Marijuana exposures among 0-8 year-olds reported to Colorado poison control have quadrupled since legalization, with 16 calls made in 2012 and 64 calls made in 2018 (Colorado Department of Public Health and Environment, 2019)

In Colorado, the annual rate of marijuana-related emergency department visits increased by 62% from 2012 to 2017 (Colorado Department of Public Health and Environment, 2019).

Marijuana-related poisoning hospitalization rates in Colorado rose by 143% from 2012 to 2017 (Colorado Department of Public Health and Environment, 2019).



Marijuana-related cases for children under 5 year old reported to the Oregon Poison Center rose by 271% between 2014 and 2017 (Oregon Poison Center, 2018).



Washington State has seen a 70% increase in marijuana-related calls to the Washington poison center between the three years before and after legalization (Washington State Office of Financial Management, 2017).



Marijuana-related cases for children under 5 years reported to the Oregon Poison Center rose by 271% from 14 cases in 2014 to 52 cases in 2017 (Oregon Poison Center, 2018)



Washington State has seen a 73% increase in marijuana-related calls between three-year averages before and after legalization (from an average of 155 between 2011 and 2013 to an average of 268 call between 2014 and 2016) (Washington State Office of Financial Management, 2017)

# IMPACT ON THE BLACK MARKET

Several different agencies across states have found that marijuana production in recreational marijuana states far exceeds the consumption demand in those states. For example, estimates from a law enforcement task force found that Oregon's current production capacity is between 5 and 10 times the consumption demands of the state (ORIDHIDTA, 2018). A 2019 audit by Oregon's Secretary of State found that the volume of marijuana produced in Oregon is approximately 7 times higher than its local consumption (Oregon Secretary of State, 2019). A report published by the California Department of Food and Agriculture found that the state produced 15.5 million pounds of marijuana in 2018 but only consumed 2.5 million pounds. Legal production is far higher than legal consumption likely because legal marijuana can be sold for higher prices on the black market, either within the same state or in states that have not legalized marijuana. The Oregon Secretary of State finds that black market prices for marijuana are several times higher than the legal market, thus making sales more profitable (Oregon Secretary of State, 2019), and many have suggested that California's excess legal marijuana is likely smuggled to states without recreational cannabis laws where black market prices can be far higher (Fuller, 2019).

California's projected marijuana tax revenue by July 2019 is nearly half of what was originally expected when the state began retail sales in 2018, since most consumers continue to purchase marijuana from the black market in order to avoid high taxes (Blood, 2019; Fuller, 2019).

Rates of marijuana investigative seizures in Colorado are over 9 times higher since legalization (Rocky Mountain HIDTA Strategic Intelligence Unit, 2018).

The average number of highway seizures of Colorado marijuana has increased 39% since legalization (Rocky Mountain HIDTA Strategic Intelligence Unit, 2018).

In Colorado, marijuana concentrates accounted for 26% of total marijuana seizures in 2017 and edibles accounted for another 16%. In 2012, concentrates and edibles combined made up only 10% of total seizures (Colorado Department of Public Safety, 2018).



# IMPACT ON CRIME

In 2017, the number of court filings charged with the Colorado Organized Crime Control Act that were linked to a marijuana charge increased 284% since 2012 (Colorado Department of Public Safety, 2018). A study funded by the National Institutes of Health (NIH) showed that the density of marijuana dispensaries was linked to increased property crimes in nearby areas. Researchers found that in Denver, Colorado, neighborhoods adjacent to marijuana businesses saw **84.8 more property crimes each year** than neighborhoods without a marijuana shop nearby (Freisthler, Gaidus, Tam, Ponicki, & Gruenewald, 2017). Motor vehicle theft rates in Alaska rose by over 100% between 2015, when recreational marijuana was legalized, and 2017 (Spears, 2018).



# 84.8

**MORE PROPERTY CRIMES EACH  
YEAR**



Colorado's crime rate in 2016 increased **11 times faster** than the 30 largest cities in the nation since legalization (Mitchell, 2017), with the Colorado Bureau of Investigation reporting an 8.2% increase in violent crimes (19,928 in 2015 to 21,570 in 2016) and a 5.3% increase in property crimes (171,404 in 2015 to 180,501 in 2016) between 2015 and 2016 (Colorado Bureau of Investigation, 2017).

# STONED DRIVING

A recent roadside study of **2,355 drivers** in Washington State found that, six months after introducing recreational sales of marijuana, the proportion of daytime drivers testing positive for THC (the hallucinogenic ingredient in marijuana) almost **tripled from 8% to 23%** (Eichelberger, 2019).

The percent of traffic fatalities that involved drivers intoxicated with marijuana in Colorado **rose by 86% between 2013 and 2017**, with over one-fifth of all traffic fatalities involving a driver testing positive for marijuana by 2017 (National Highway Traffic Safety Administration, 2006-2011; Colorado Department of Transportation, 2012-2017).

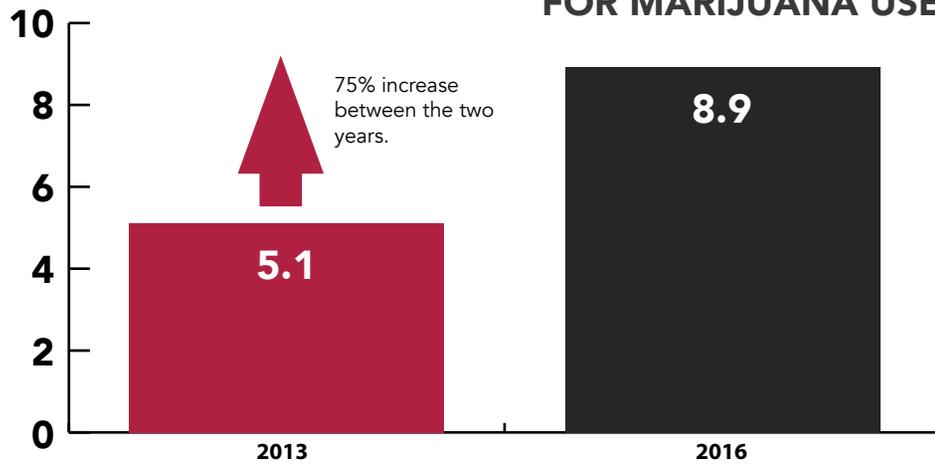
**65% of Coloradan drivers testing positive for marijuana in 2017** combined marijuana with alcohol and/or other illicit drugs (National Highway Traffic Safety Administration, 2006-2011; Colorado Department of Transportation, 2012-2017).

**Over 20% of 2018 DUI arrests in Colorado** also involved testing positive for marijuana (Colorado Department of Transportation, 2017).

Research by the Highway Loss Data Institute finds that following legalization of recreational marijuana in Colorado, Oregon and Washington, collision claims in these three states were significantly higher than in comparable, neighboring, non-legal states (Highway Loss Data Institute, 2018).

In Oregon, **50% of all drivers assessed by Drug Recognition Experts** in 2015 tested positive for THC. Toxicology reports show that the rate of drivers testing positive for THC has consistently increased, indicating an increase in instances of THC-related impaired driving (Oregon Liquor Control Commission, 2016).

## POSITIVE ORAL-FLUID TEST RESULTS FOR MARIJUANA USE



In the 3-year period following legalization in Colorado and Washington (2013–2016), positive oral-fluid test results for marijuana use increased almost 75%, from 5.1 to 8.9 percent (Quest Diagnostics, 2017)

## IMPACT ON THE WORKFORCE

Between 2013 and 2016, positive oral-fluid test results for recent marijuana use among the general U.S. workforce increased almost 75%, from 5.1 to 8.9 percent (Quest Diagnostics, 2017). [Figure 15] Increases in positive urine test results for marijuana in Washington and Colorado doubled the national average between 2015 and 2016. The rate of positive test results for marijuana use increased by 11% in Colorado and 9% in Washington, while the national rate increased only 4% (Quest Diagnostics, 2017).

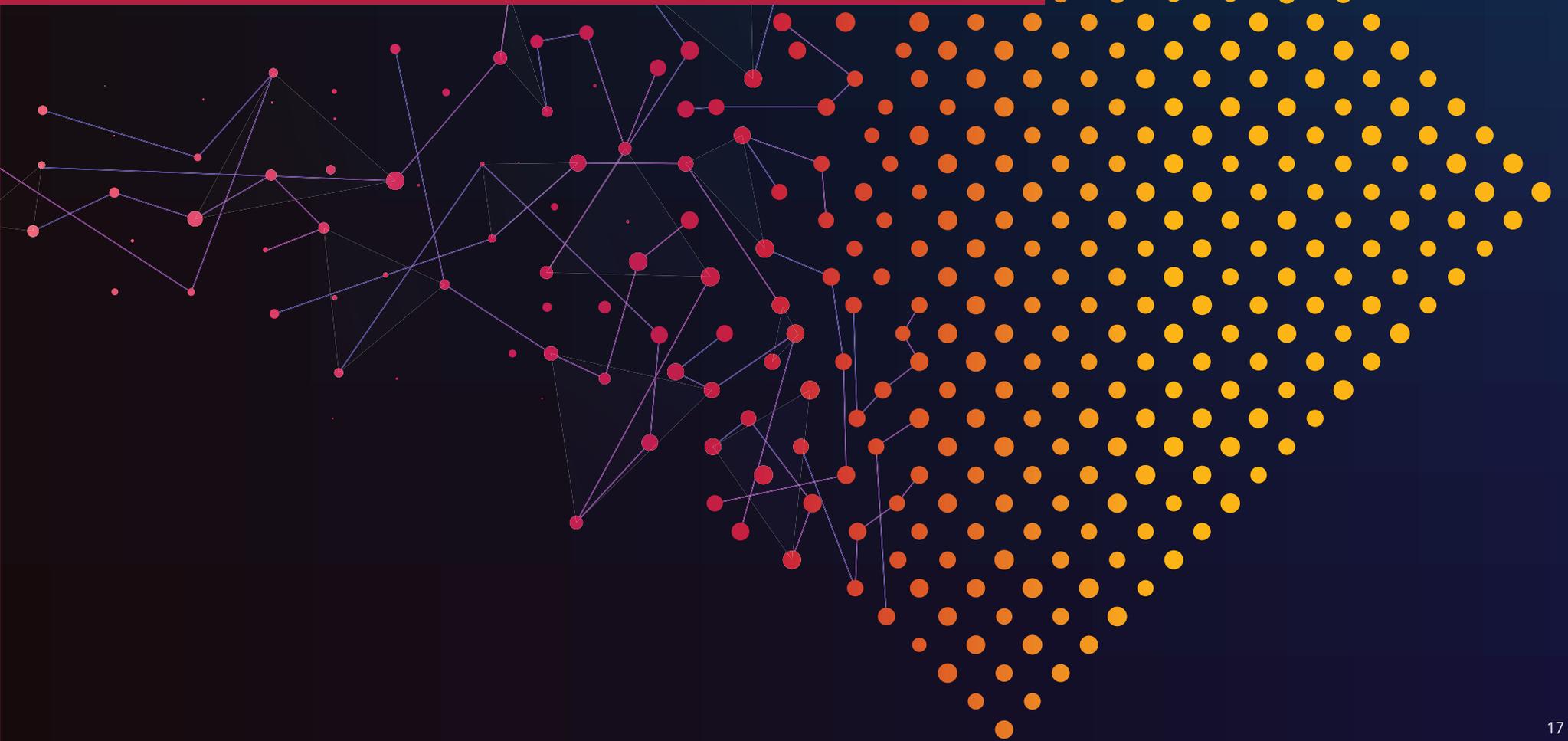
Between 2016 and 2017, positivity rates for marijuana in the workforce increased 43% in Nevada, 14% in Massachusetts, and 11% in California (Quest Diagnostics, 2017).

Workforce marijuana-positivity rates in all “legal” states but one (Alaska) are above the national average. For example, 2018 positivity rates in Maine (5.0%), Oregon (4.3%), Nevada (4.0%), Massachusetts (3.3%), Colorado (3.0%), California (2.5%), and Washington (2.4%) are higher than the national average (2.3%) (Quest Diagnostics, 2019). Most states that have legalized marijuana show an increasing trend in positivity rates.



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

# DATA AND POLICY BACKGROUND



# DATA AND POLICY BACKGROUND

Contrary to federal law, under which the use and sale of marijuana for any purpose is illegal (Controlled Substances Act), Colorado and Washington voted to legalize recreational marijuana in 2012. Alaska and Oregon followed by legalizing marijuana in 2014. The District of Columbia legalized cultivation and possession in 2014. California, Massachusetts and Nevada legalized recreational sales in 2016. Each state took 1-2 years to implement the supply/production side of their policies. Maine legalized recreational marijuana in 2016 and has yet to begin implementation. Michigan is the most recent state to legalize marijuana, having done so in the fall of 2018, though implementation is yet to begin. Despite these apparent victories for the legalization movement, many states – including Maryland, Arizona, New Mexico, Minnesota, North Dakota, Ohio, Delaware, New Hampshire, and Vermont – have continued to reject recreational marijuana initiatives since 2012, and the vast majority of localities in “legal” states have banned marijuana production and retail sales outright.

We now have six years of data, providing real-world evidence of the negative impacts of a legal marijuana industry on families and communities. During this time, it has become apparent that the goal of this new industry is to successfully convert young, casual users into heavy, more frequent users.

Given this nation’s overdose epidemic—driven largely by a massive increase in the use of opioids—the rise of lax legalization policies comes at an especially inopportune time. Peer-reviewed research has revealed early marijuana use more than doubles the likelihood of illegal non-marijuana drug use later in life (Olfson, Wall, Liu, & Blanco, 2017; Secades-Villa, Garcia-Rodriguez, Jin, Wang, & Blanco, 2015), and according to the National Survey on Drug Use and Health, 95%-97% of people who used cocaine or heroin started with marijuana (NSDUH, 2018).

There has been a lot of conversation surrounding the topic of medical marijuana as a substitute for opioids in the treatment of pain. A 4-year prospective study in the highly respected journal, *The Lancet Public Health*, followed patients with chronic non-cancer pain and found no evidence that marijuana use mitigated pain severity or interference or that marijuana affected rates of opioid prescribing or opioid discontinuation (Campbell, et al., 2018).

Further, there is evidence to suggest that marijuana use, particularly chronic use, is associated with poor pain control. Researchers found that patients reporting marijuana use actually experienced more pain on average when admitted to the hospital following a traumatic injury than those who did not. Compared to non-users, marijuana users required more opioid medication to cope with the pain and consistently rated their pain higher during the duration of their stay (Salottolo, et al., 2018).

Although the full picture resulting from legalization will not be clear for decades, we need not wait that long to understand some key consequences.

The states that have legalized marijuana have among the highest rates of marijuana use in the country. These states also have:

- Higher rates of marijuana-related driving fatalities.
- More marijuana-related emergency department visits, hospitalizations, and accidental exposures.
- Expansion of a lucrative criminal market.
- Increases in marijuana-related crimes and juvenile offenses.
- Increases in workplace problems, including labor shortages and accidents.

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 were routinely in violation of the Cole Memo.” to 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 been in place the longest have produced primary data and impact reports that shine a light on how current marijuana policies are failing to protect the health of the general population (Oregon-Idaho High Intensity Drug Trafficking Area [ORHIDTA], 2018; Rocky Mountain High Intensity Drug Trafficking Area [RMHIDTA], 2018; Northwest High Intensity Drug Trafficking Area [NWHIDTA], 2016; Washington State Office of Financial Management, 2017; Oregon Public Health Division, 2016; Alaska State Troopers, 2017; Grondel, 2018; Colorado Department of Public Safety, 2016; Oregon State Police - Drug Enforcement Section, 2017).

In 2018, the DOJ rescinded the Cole Memo policies, signaling an uncertain future for the marijuana industry. In legalizing marijuana, states continue to violate federal laws and thus risk felony charges.

## COMMERCIALIZATION: A GROWING CONCERN

The rise of commercialization has inundated legalized communities with marijuana companies and paraphernalia.

In Colorado, legalization has led to more marijuana stores than McDonald's and Starbucks combined (1,018 retail marijuana outlets, with 486 located within medical marijuana outlets, versus 600 McDonald's and Starbucks) (RMHIDTA, 2018). These numbers are even more unsettling in the context that many local communities have opted out of legally selling marijuana in their neighborhoods. Both medical and retail marijuana licensing are banned in 65% of Colorado's local jurisdictions (RMHIDTA, 2018), and so nearly 70% of the total 3,101 licensed marijuana businesses in Colorado are concentrated in just four counties: Denver (1,226), El Paso (370), Pueblo (303), and Boulder (216) (Colorado Department of Public Health and Environment [CDPHE], 2018).

While many American voters reflect upon the marijuana they or their peers smoked in their youth, the products on today's market are vastly different. Since legalization of marijuana and creation of a commercialized market, the average THC potency of a typical marijuana flower product increased substantially. ElSohly et al. reported an average THC potency of 11.5% among marijuana flower products in 2014 (ElSohly, et al., 2016), while Smart et al. found an average THC potency among marijuana flower products for sale in Washington State between 2014 and 2016 of 20.6% (Smart, Caulkins, Kilmer, Davenport, & Midgette, 2017). This does not even address the alarming trends of high potency products seen with concentrates and edibles; concentrates in these products can reach up to 95% THC potency (Prince & Conner, 2018).

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 had 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, Caulkins, Kilmer, Davenport, & Midgette, 2017).

On its face, a regulated market should assume high quality testing of consumable products; however, emerging evidence suggests marijuana product regulation is poor. Numerous peer-reviewed studies have taken issue with the absence of regulation (Yates & Speer, 2018; Peace, Butler, Wolf, Poklis, & Poklis, 2016; Lamy, et al., 2016). Furthermore, due to convoluted regulatory systems largely driven by marijuana business' demands rather than the public

interest, laboratory testing facilities are incentivized to produce results favorable to the marijuana industry.

Even more alarming is the rampant mislabeling of the active cannabinoid ingredients in concentrates and edibles (Peace, Butler, Wolf, Poklis, & Poklis, 2016). The Food and Drug Administration (FDA) has published warning letters on the severe and consistent mislabeling of commercial products on the market since 2015 (U.S. Food and Drug Administration, 2017).

The industry has prospered in selling marijuana-infused “edibles” that come in the form of cookies, candy, ice cream, sodas, and other sweet treats that are particularly appealing to children. The marketing tactics used for their packaging mimic those of Big Tobacco, by using bright colors and catchy names and even by replicating images or re-appropriating the names of well-known commercial food products. For example, “Pop Tarts,” a widely consumed kid-friendly breakfast product, has been re-appropriated 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.



## COMMERCIALIZATION: A GROWING CONCERN

# ADVERSE HEALTH EFFECTS OF MARIJUANA

As commercialization increases in legalized states, false advertising of marijuana products as being “natural” and “healthier” than alcohol and tobacco have greatly decreased the perceived risk of harm related to marijuana use. Between 2015/2016 and 2016/2017, the percentage of youth aged 12-17-years-old who report a “great risk” from using marijuana once per month remains at 26% in non-legal states, compared to 19.4% in “legal” states (NSDUH, 2016-2017).

The main psychoactive ingredient in marijuana, THC, has now been observed to cause many different types of mental and physiological health problems— especially in children and youth.

Direct associations have been made between the frequency of marijuana use and higher THC potency with the development of mental health issues (psychosis, depression, anxiety, suicidality, reshaping of brain matter, and addiction) (Fischer, et al., 2017; Pierre, Gandal, & Son, 2016). Links to lung damage and serious cardiovascular problems have also been found (hypertension, myocardial infarction, cardiomyopathy, arrhythmias, stroke, and cardiac arrest) (Pacher, Steffens, Hasko, Schindler, & Kunos, 2017; Bigay-Game, et al., 2018; Hall & Lynskey, 2016). Marijuana use during pregnancy has also been shown to negatively affect the cognitive development of children by increasing their risk of hyperactivity, impulsivity, and inability to focus (Wang, et al., 2017; Huizink & Mulder, 2006).

These results are not surprising, as daily marijuana use among youth who begin before the age of 17 significantly increases the risk of suicide attempts (Silins, et al., 2014).

Dr. Nora Volkow, the director of the National Institute of Health’s National Institute on Drug Abuse, published a report in response to an 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, Han, Compton, & Blanco, 2017). Even more alarming, a recent study conducted in Colorado found that 70% of the 400 dispensaries surveyed in a “mystery caller” method were recommending marijuana products to expecting mothers experiencing morning-sickness in their first trimester (Dickson, et al., 2018).

Chronic adolescent marijuana use has been correlated with cognitive impairment and worsened academic or work performance (Schuster, et al., 2018; Finn, 2015; Meier, Hill, Small, & Luthar, 2015; Arria, Cladeira, Bugbee, Vincent, & O’Grady, 2015; Meier, et al., 2012). Marijuana has a variety of other interactions with mental health, particularly during young

adulthood. For example, marijuana use during young adulthood carries the highest risk of developing psychosis (Leadbeater, Ames, & Linden-Carmichael, 2018; Borodovsky, et al., 2017).

In the fall of 2018, the highly respected journal, *Addiction*, published an extensive review of the evidence surrounding the age-varying effects of marijuana use on mental health. The authors of the study found that regular use of marijuana correlated with significant increased risk of depressive symptoms in users between the ages 16-20, and for those older than 25. Chronic marijuana use increased 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, Ames, & Linden-Carmichael, 2018).

While the popular view holds that marijuana is not addictive, researchers generally do not agree (Volkow, Baler, Compton, & Weiss, 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 heavy users frequently experience withdrawal symptoms when they cease use (Hasin, et al., 2008).

Furthermore, several studies have identified marijuana's role in the pathway to other substance abuse (Keyes, Rutherford, & Miech, 2019). For example, a groundbreaking study of over 30,000 Americans showed that participants who reported marijuana use in the previous year were 2.6 times more likely to abuse prescription opioids (Olfson, Wall, Liu, & Blanco, 2017).



**U.S. Surgeon General** 

@Surgeon\_General

Following 

Science on marijuana says it isn't a harmless drug. Impact on younger brains is especially dangerous and addictive. [#SpreadTruth](#)  
[#AskSG](#)

10:30 AM - 25 Feb 2016

# IMPACT OF LEGALIZATION ON SCHOOLS & YOUTH

The most reliable survey on the prevalence of drug use among U.S. households is the National Survey on Drug Use and Health (NSDUH). According to NSDUH data, in all jurisdictions with legalized recreational marijuana (Alaska, California, Colorado, the District of Columbia, Maine, Massachusetts, Michigan, Nevada, Oregon, Vermont, though only personal use and growing is legal there, and Washington), past-month drug use among youth aged 12-17 continues to sit above the national average (NSDUH, 2016-2017). Colorado, where recreational marijuana has been legal since 2012, has the highest rate of first-time marijuana use among youth (ages 12-17) and young adults (ages 18-25) (NSDUH State Estimates, 2016-2017).

The percentage of youth aged 12-17 years old using marijuana is declining in states where marijuana is not “legal,” unlike in “legal” states; in 2016/2017, the rate of past month 12-17-year-old marijuana use in “legal” states was 7.7%, versus 6.2% in non-legal states.<sup>1</sup> (NSDUH State Reports 2016-2017). [Figure 2] The national rate of 18-to-25-year-old past month marijuana use is 21.5%. The rate for “legal” states, however, is much higher -- 29.2%. The rate in non-legal states is close to the national average, standing

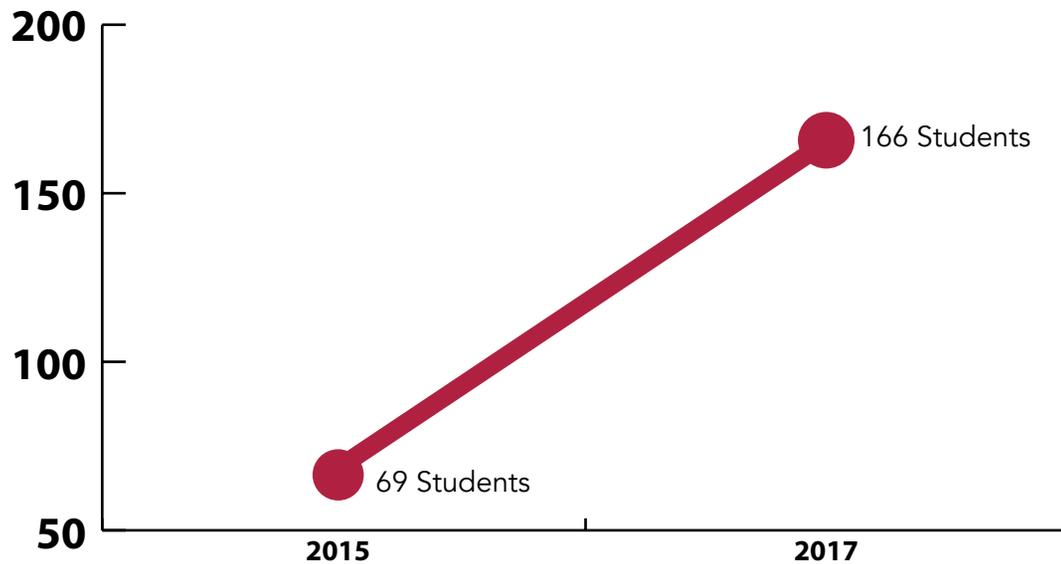
These calculations represent unweighted prevalence, calculated as the simple average of prevalence across states by legalization status as of 2016. These changes/differences are calculated within state first and then averaged. (Weighted prevalence by population also found similar results; increases in “legal” states and decreases in non-legal states.)

at 20.8% (NSDUH, 2016-2017). Additionally, one recent study showed that longer duration of legalization and higher dispensary density was associated with increased use of vaping and edibles by 14-18-year-olds (Borodovsky, et al., 2017).

In Nevada, where recreational marijuana was legalized in 2016, past-month and past-year use among adolescents (12-17 years) has increased between 2015/2016 and 2016/2017 (NSDUH, 2015-2016; NSDUH, 2016-2017).

The marijuana industry has capitalized on the extensive marketing campaigns by tobacco vaping companies like Juul, which successfully made e-cigarettes into a chic and trendy lifestyle choice among teens, by promoting marijuana vaping.

## ANCHORAGE, SCHOOL SUSPENSIONS FOR MARIJUANA USE AND POSSESSION



In Anchorage, Alaska, school suspensions for marijuana use and possession increased more than 141% from 2015 (when legalization was implemented) to 2017 (Wohlforth, 2018).

While many assume Juul and other e-cigarette companies are only in the business of marketing nicotine, these assumptions are wrong. Recently, Marlboro-owner, Altria (formerly Philip Morris), purchased a 35% stake in Juul, shortly after acquiring a 45% stake in Cronos, one of the largest distributors of marijuana in Canada and internationally (LaVito & Hirsch, 2018). The results? According to one of the most well-respected longitudinal youth behavioral surveys conducted, the University of Michigan's Monitoring the Future (MTF) survey, marijuana vaping is increasing rapidly among youths. Between 2017 and 2018, past-month marijuana vaping increased from 1.6%, 4.3%, and 4.9% of 8th, 10th and 12th graders, respectively, to 2.6%, 7.0%, and 7.5%, reflecting a 63% increase among 8th and 10th graders, and a 53% increase among 12th graders (Johnston, Miech, Bachman, Schulenberg, & Patrick, 2018).

Colorado toxicology reports show the percentage of adolescent suicide victims testing positive for marijuana continues to increase. 20.7% of suicide victims between the ages of 10 and 17 tested positive for marijuana between 2011 and 2013; by 2014-2016, this number had increased to 22.4% (Colorado Department of Public Health and Environment, 2019). In comparison, only 9.3% of suicide victims between the ages of 10 and 17 tested positive for alcohol between 2014 and 2016. This trend does not suggest direct causation, but the rise is concerning. Another study in Colorado found that 50%-75% of youth in outpatient substance abuse treatment reported using diverted marijuana – marijuana accessed by adolescents from adults with legal access to it (Wilkinson, Yarnell, Radhakrishnan, Ball, & D'Zouza, 2016). And in Anchorage, school suspensions for marijuana use and possession increased more than 141% from 69 students in 2015 (when legalization was implemented) to 166 students in 2017 (Wohlforth, 2018).

# SELLING TO MINORS

It is illegal for youth to purchase marijuana in “legal” states. Among Oregon 11th graders who currently use marijuana, 67% reported obtaining marijuana from a friend (Oregon Public Health Division, 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, 2018). 30% of 8th and 62% of 11th graders reported that it is “sort of easy” or “very easy” to obtain marijuana (Oregon Public Health Division, 2016).

Additionally, 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).

Washington State law enforcement has documented a total of 2,887 violations among licensed marijuana businesses. Of these, 251 violations pertained to selling marijuana to minors and 231 violations were for allowing minors access to a restricted area (Washington State Liquor and Cannabis Board). In January of 2018, the Oregon Liquor Control Commission conducted a random inspection of licensed marijuana retailers and found that 11% of the businesses were selling marijuana to minors (Oregon Liquor Control Commission, 2018).





## IMPACTS OF LEGALIZATION ON YOUTH & YOUNG ADULTS

Often overlooked, the percentage of young adults (18-25-year-olds) reporting past-month marijuana use increased between 2015/2016 and 2016/2017 at a higher rate in “legal” states versus non-legal ones (NSDUH, 2016-2017). The national rate of 18-to-25-year-old past month marijuana use is 21.5%, while the rate for “legal” states is much higher – 29.2%. The rate in non-legal states is close to the national average, standing at 20.8% (NSDUH, 2016-2017).

Researchers from Oregon State University found that college students who are binge drinkers under the age of 21 saw relatively large increases in marijuana use after legalization (Kerr, Bae, Phibbs, & Kern, 2017). Nationally, youth and young adults continue to report lower perceptions of risk from smoking marijuana once a month than years past (NSDUH, 2016-2017).

In Nevada, past-year use among young adults rose by 6.4 percentage points between 2015/16 and 2016/17, while past month-use rose by 7.6 percentage points (NSDUH, 2015-2016; NSDUH, 2016-2017). The trend of young adults using marijuana will have implications for future generations.

# BLACK MARKET ACTIVITY SINCE LEGALIZATION

Commercialization advocates have long argued that legalization will reduce black market marijuana activity in legalized states. However, criminal activity has only been amplified as highway interdiction seizures and confiscations of illegal marijuana growing operations become increasingly common.

Oregon has been a hub of black market activity since legalization. A 2019 audit by Oregon's Secretary of State finds that black market prices for marijuana are several times higher than the legal market, thus making sales on the black market more profitable. The report finds that the volume of marijuana produced in Oregon is nearly 7 times its local consumption (Oregon Secretary of State, 2019). The Oregon Police Department reported that at least 70% of marijuana sales in 2016 were on the black market and that around three to five times the amount of marijuana sold in Oregon leaves the state for illegal sales (Hughes, 2017; Associated Press, 2017a, August 14; OSPDES, 2017).

The U.S. Attorney in Oregon reported in 2018 that Oregon has "an identifiable and formidable marijuana overproduction and diversion problem" (Flaccus, 2018). It is estimated that Oregon has a production capacity of approximately 2 million pounds, well over the estimated consumption capacity of the state (approx. 275,000 pounds) (ORIDHIDTA, 2018). Between July 2015 and January 2018, 14,550 pounds of illegally trafficked Oregon marijuana was seized en route to 37 different states, approximately \$48 million worth (ORIDHIDTA, 2018). In 2017 alone, Colorado law enforcement confiscated 14,692 pounds of bulk marijuana en route to 24 states, more than double the 7,116 pounds confiscated in 2016 (RMHIDTA, 2018). These confiscations come in conjunction with an increase of approximately 50% in illegal grow operations across rural areas in the state (Stewart, 2017).

In the last half of 2017, \$1 million in cash linked to marijuana transactions was seized at Portland International Airport (Williams, 2018). Law enforcement across 16 states have reported seizing marijuana coming from Oregon (Flaccus, 2018). In Colorado, concentrates accounted for 26% of total marijuana seizures in 2017 and edibles accounted for another 16%. For comparison, in 2012, concentrates and edibles combined made up only 10% of total seizures (Colorado Department of Public Safety, 2018).

Legalization has made it easier for the black market to thrive in rural areas due to the difficulties involved in distinguishing between legal and criminal marijuana farms. About \$6.5 million worth of illegal marijuana was destroyed by federal agencies in the White River National Forest in Aspen, Colorado, and 9,200 illegal marijuana plants were found growing on islands in the middle of the Colorado River (Associated Press, 2017b; Roy, 2017). There is now a strong presence of cartel activity in Alaska (Alaska State Troopers, 2016), perhaps because the ability to hide black market activity in legalized states has encouraged drug trafficking organizations (DTOs) and Mexican cartels to begin growing marijuana illegally within the United States.

# BLACK MARKET ACTIVITY SINCE LEGALIZATION

Lancaster County sheriff's deputies in Nebraska arrested a licensed marijuana processor from Oregon who was intending to distribute the 110 pounds of raw marijuana and 25 pounds of shatter (super-high potency THC wax) in his vehicle (Johnson R. , 2017).

Notably, California's projected marijuana tax revenue by July 2019 is nearly half of what was originally expected when the state permitted retail sales in 2018, since most consumers continue to purchase marijuana from the black market in order to avoid high taxes (Blood, 2019; Fuller, 2019).

Black market challenges abound in legalized states, with data too exhaustive to include in this report. Some final highlights:

- The number of edibles seized in Colorado tripled since 2016, going from 2,111 in 2016 to 6,462 in 2017 (RMHIDTA, 2018).
- Rates of marijuana investigative seizures in Colorado are over 9 times higher since legalization (Rocky Mountain HIDTA Strategic Intelligence Unit, 2018).
- The number of highway seizures of Colorado marijuana has increased by 39% since legalization, from an average of 242 seizures between 2009 and 2012, to an average of 336 seizures between 2013 and 2017 (Rocky Mountain HIDTA Strategic Intelligence Unit, 2018). [Figure 11]
- The U.S. mail system has also been affected by the black market, seeing a 1,042% increase in marijuana seizures since legalization in Colorado (U.S. Postal Inspection Service, 2018).
- Between July 2015 through January 2018, Oregonian law enforcement identified 64 illegal cannabinoid extraction laboratories (ORHIDTA, 2018).
- It is estimated that Oregon has a production capacity of approximately 2 million pounds, well over the estimated consumption capacity of the state (approx. 275,000 pounds) (ORHIDTA, 2018).
- In Colorado, concentrates accounted for 26% of total marijuana seizures in 2017 and edibles accounted for another 16%. In 2012, concentrates and edibles combined made up only 10% of total seizures (Colorado Department of Public Safety, 2018).
- Narcotics officers in Colorado have been forced to respond to an approximate 50% increase in illegal grow operations across rural areas of the state.

# TRENDS IN CRIME SINCE LEGALIZATION

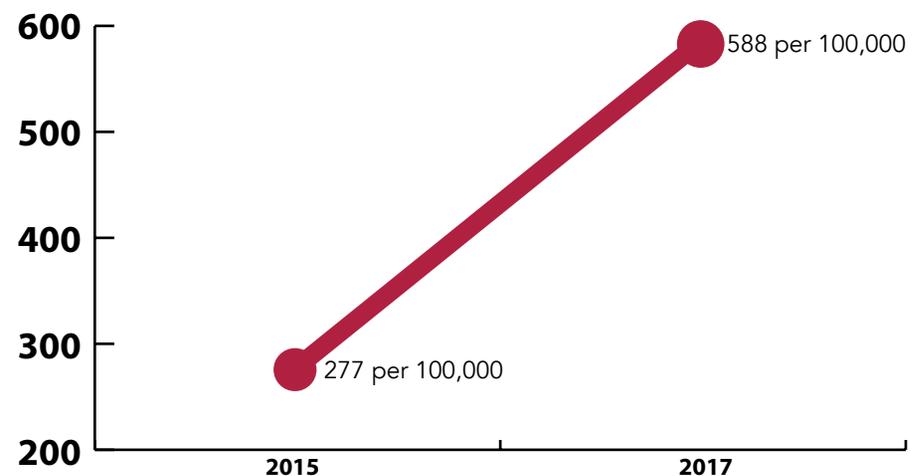
Apart from black market activity, legalization has potentially exacerbated other crimes, as well. Though it cannot be said that crime has increased because of legalization, some trends are worth noting.

Colorado's crime rate in 2016 increased 11 times faster than the 30 largest cities in the nation since legalization (Mitchell, 2017), with the Colorado Bureau of Investigation reporting an 8.2% increase in violent crimes (19,928 in 2015 to 21,570 in 2016) and a 5.3% increase in property crimes (171,404 in 2015 to 180,501 in 2016) between 2015 and 2016 (Colorado Bureau of Investigation, 2017). While this is not evidence of causation, the trend must be noted. In addition, a 2019 study conducted in Denver finds that the existence of both recreational and medical marijuana dispensaries in Denver neighborhoods are significantly and positively associated with increased crime (Hughes, Schaible, & Jimmerson, 2019). Along with the increase in property crimes, the Boulder Police Department reported a 176% increase in public consumption of marijuana citations by the third year after legalization (Boulder Police Department, 2017).

A link between looser laws and crime has been explored in the scientific literature. A study funded by the National Institutes of Health (NIH) showed

that the density of marijuana dispensaries was linked to increased property crimes in nearby areas. Researchers found that in Denver, Colorado, neighborhoods adjacent to marijuana businesses saw 84.8 more property crimes each year than neighborhoods without a marijuana shop nearby (Freisthler, Gaidus, Tam, Ponicki, & Gruenewald, 2017).

The number of court filings charged with the Colorado Organized Crime Control Act that were linked to a marijuana charge increased 284% from 31 in 2012 to 119 in 2017 (Colorado Department of Public Safety, 2018) (Colorado Department of Public Safety, 2018). In Alaska, crime rose 6% from 2016 and 2017 (Spears, 2018) and compared to 2013, the property crime rate in Alaska was up last year by 22 percent and violent crime rate was up 34 percent (Zak & Hopkins, 2018). Moreover, motor vehicle theft rates rose by over 100% since legalization in 2015 from 278 per 100,000 persons to 577 per 100,000 persons (Spears, 2018).



Alaskan motor vehicle theft rates in 2017 rose by over 100% since legalization in 2015. From 277 per 100,000 persons to 588 per 100,000 persons (Spears, 2018)



**“Because it’s legal in the community, I think, the stigma around marijuana use is decreasing,” said Joe Zawodny, director of secondary education for the [Anchorage] school district. “The data would seem to say there is increasing use” (Wohlforth, 2018).**

The percentage of Colorado school suspensions for marijuana is 23%, the highest number for any school offense. The proportion of 18-25-year old probationers testing positive for THC increased, from 32% in 2012 and 41% in 2017. Further, between 2012 and 2014, the percentage of 10 to 14-year-olds who tested positive for THC once or twice increased from 19% to 23%, and those who tested positive for THC three or more times increased from 18% to 25%.

In the same time frame, the percentage of 15- to 17-year-olds who tested positive for THC once or twice decreased from 26% to 25% and those testing positive for THC three or more times increased from 23% to 25%.

(Munoz, Flick, & English, 2017). 103 law enforcement agencies reported 6,727 qualifying incidents in 554 public schools during the 2015-16 academic year (Munoz, Flick, & English, 2017).

In Colorado, the number of cases with a marijuana-related felony as the top charge has doubled since 2014, a phenomenon at odds with what pro-legalization advocates promised (Colorado Department of Public Safety, 2018).

# IMPACTS OF LEGALIZATION ON COMMUNITIES OF COLOR AND LOW-INCOME POPULATIONS

With the advent of legalization, communities of color are subject to disproportionate targeting by the marijuana industry. As pro-marijuana lobbyists argue that legalization will improve social justice in legalized states, disparities among use and criminal offense rates persist across race, ethnicity, and income levels.

The 2017 marijuana-related African American arrest rate in Colorado is nearly twice that of Caucasians (Colorado Department of Public Safety, 2018). 39% of African American marijuana-related arrests in 2017 were made without a warrant, while only 18% of Caucasians were arrested without one (Colorado Department of Public Safety, 2018).

In Washington D.C., between 2015 and 2017 (the years immediately following legalization), although total marijuana-related arrests have gone down, distribution and public consumption arrests more than tripled. Among adults, 89% of marijuana distribution or public consumption arrestees were African American (DC Metropolitan Police Department, 2018). Juvenile marijuana-related arrests increased 114% between the three years before and after marijuana legalization.

Colorado schools that had 25% or fewer youth of color had 313 marijuana-related suspensions per 100,000 students compared to 658 marijuana-related suspensions per 100,000 students for schools comprised of populations with 76% or more youth of color (Colorado Department of Public Safety, 2016). Between 2012 and 2014, the percentage of Hispanic and African American arrests for teens under 18 years old increased 29% and 58%, respectively (Colorado Department of Public Safety, 2016).

**“All this bill means is that the rich are going to get richer and the poor are going to get poorer ... I know what racism is and I know what injustice is and this stinks of it.”**

– New Jersey State Senator Ronald Rice, November 27, 2018 <https://www.njspotlight.com/stories/18/11/27/amid-complaints-curtailed-comments-and-confusion-recreational-marijuana-bill-goes-to-full-senate/>

In Los Angeles, the majority of dispensaries have opened primarily in African-American communities (Thomas & Feisthler, 2017). Additionally, an overlay of socioeconomic data with the geographic location of pot shops in Denver shows marijuana stores are located disproportionately in disadvantaged neighborhoods (Hamm, 2016).

In Oregon, the state conducted an analysis on the distribution of state-sanctioned dispensaries and found that sites were disproportionately concentrated among low-income and historically disenfranchised communities (McVey, 2017; Smith, 2017).

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. Between 34 and 60% of marijuana users continue marijuana use throughout pregnancy due to a decreased perception of risk and stigma (The American College of Obstetricians and Gynecologists, 2017).

# IMPACT OF LEGALIZATION ON HOMELESSNESS

The increased availability of marijuana after legalization also appears to have a possible link to Colorado's growing homeless population. Colorado's 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).

The number of homeless children in Colorado increased 50% between 2007/2008 and 2014/2015 (Zubrzycki, 2016).

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).





## ALCOHOL CONSUMPTION IS RISING IN LEGAL STATES

Some industry backers also claim that loosening marijuana laws will decrease alcohol use among consumers. But the opposite has been observed in legalized states. According to a 2018 report, **Colorado has seen a 5% increase in the gallons of beer consumed over the past five years – and Washington has seen a 9% increase (Sauter, 2018)** Other studies show no meaningful decrease in alcohol use since legalization (Haughwout & Slater, 2017). 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” (Pallechia, 2018). By the end of 2018, the gallons of alcohol consumed in Colorado was 12% higher than it was in 2013 (Colorado Department of Revenue, 2013-2018).

A study of six universities in states without recreational marijuana laws compared to a public university in Oregon finds that for undergraduate students, rates of marijuana use among binge drinkers are significantly higher among Oregonian students compared to students at university in non-legal states (Kerr, Bae, Phibbs, & Kern, 2017).

Furthermore, major alcohol interests are getting financially involved in the marijuana industry. Constellation Brands, for example, has invested \$4 billion in marijuana. Molson Coors and Blue Moon are other alcohol juggernauts who have made substantial investments in the marijuana industry (Miller, 2018; Hughes, 2018).

The increase in marijuana availability due to legalization has led to increasing numbers of marijuana-related poison control calls, hospitalizations, and ER visits.

In the two years immediately following recreational marijuana legalization in Colorado, calls to poison centers significantly increased by over 100% from 110 in 2012 to 229 in 2015 (Wang, et al., 2017).

Since legalization, total marijuana exposure calls to Colorado poison control centers have more than doubled (127 calls in 2013 to 265 calls in 2018). The largest increase is a 230% increase of children 0-8 years old that suffered unintentional exposure to marijuana since legalization, with 27 calls made in 2013 and 89 made in 2018 (Colorado Department of Public Health and Environment, 2019).

A recent study by the Colorado Department of Public Health and Environment found that in 2018, over 23,000 homes in the state had children aged 1-14 in the household and were storing marijuana products unsafely (Colorado Department of Public Health and Environment, 2018). Research conducted by an emergency medicine physician in Colorado finds that, between 2013 and 2018, overall drug use by Pueblo County patients checking into the ER has increased by over 40%. Among those, patients who test positive for cannabis have risen by over 55% (Randall, 2019).

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 retail sales than it was before legalization (Thomas, et al., 2019).

Other concerning healthcare indicators include:

- A recent study conducted in Colorado finds that following recreational marijuana commercialization in 2013, marijuana-detection rates significantly increased among traumatic injury patients in Colorado hospitals (Chung, et al., 2019).
- Washington has seen a 73% increase in poison control between three-year averages before and after legalization (from an average of 155 between 2011 and 2013 to an average of 268 calls between 2014 and 2016) (Washington State Office of Financial Management, 2017).
- In Colorado, the annual rate of marijuana-related emergency department visits increased by 62% from 701 per 100,000 visits in 2012 to 1,139 per 100,000 visits in 2017, and marijuana-related hospitalizations in Colorado rose by 143% from 1,418 per 100,000 hospitalizations in 2012 to 3,439, per 100,000 hospitalizations in 2017 (Colorado Department of Public Health and Environment, 2019).
- Oregon Poison Control had 81 marijuana-related calls in the first quarter of 2018 alone (Oregon Poison Center, 2018). For children 5 years or younger, the number rose by 271% from 14 cases in 2014 to 52 cases in 2017 (Oregon Poison Center, 2018).
- An independent investigation in San Diego found that nearly 30% of marijuana samples purchased from licensed retailers in Southern California lab-tested positive for pesticides (Grover & Corral, 2019).



## COSTS RELATED TO HIGH POTENCY THC

The increase in marijuana-related emergency department visits includes a growing number of Butane Hash Oil (BHO) burn victims. BHO is a marijuana concentrate that yields a THC potency of 70–99% and is highly lucrative. Production of BHO involves forcing raw marijuana and butane into a reaction chamber, which creates a highly combustible liquid that easily explodes when introduced to an ignition source.

The Oregon State Police claims that the growth of BHO lab operations since legalization is "... arguably the most immediate cannabis threat facing the state" (Oregon State Police - Drug Enforcement Section, 2017). According to the Oregon Burn Center, Butane Hash Oil explosions between July 2015 to January 2018 has resulted in an estimated \$9.6 million in total treatment costs (Legacy Emmanuel Oregon Burn Center, 2013-2017). During this same period, Oregon investigated 64 illegal extraction labs and 21 of them resulted in either an explosion or fire (US Drug Enforcement Administration, 2018).

# IMPACT OF LEGALIZATION ON THE WORKFORCE

Legalization of marijuana has had serious ramifications for businesses across legalized states. Increased marijuana availability and use has also increased the number of employees testing positive for marijuana in the workforce. Workforce marijuana-positivity rates in all “legal” states but one (Alaska) are above the national average. For example, 2018 positivity rates in Maine (5.0%), Oregon (4.3%), Nevada (4.0%), Massachusetts (3.3%), Colorado (3.0%), California (2.5%), and Washington (2.4%) are higher than the national average (2.3%) (Quest Diagnostics, 2018).

Washington and Colorado had increases to the rate of positive marijuana urine tests more than double the increases for the nation (Quest Diagnostics, 2017). In the 3-year period following legalization in Colorado and Washington (2013– 2016), positive oral-fluid test results for marijuana use in the workplace increased almost 75%, from 5.1 to 8.9 percent, nationwide. From 2015 and 2016, there was a nearly 10% increase in positivity rates for the safety-sensitive workforce, which includes pilots and bus drivers.

Marijuana is the most commonly detected substance and has the highest drug positivity rate among all other tested substances across the majority of industry sectors in the U.S. (Quest Diagnostics, 2017). Among the top-ranking industries for the highest rates of positive marijuana testing, transportation and warehousing was number one with 33.3%. Meanwhile the construction industry had an average of 26.7% positive marijuana testing (Quest Diagnostics, 2018).

It is now difficult for employers to find job applicants who can pass a drug test. Colorado construction company GE Johnson was forced to hire out-of-state construction workers because too many Coloradans were failing pre-employment drug tests (The Gazette, 2015).

A study conducted in Washington during 2011-2014 found that the percentage of work-related injuries and illnesses was significantly higher among marijuana users (8.9%) compared to non-users (Marcum, Chin, Anderson, & Bonauto, 2017). Insurance claims have become a growing concern among companies in legalized states because, if marijuana use is allowed or drug testing ignored, employers are at risk of liability claims when a marijuana-related injury or illness occurs onsite (Hlavac & Easterly, 2016).

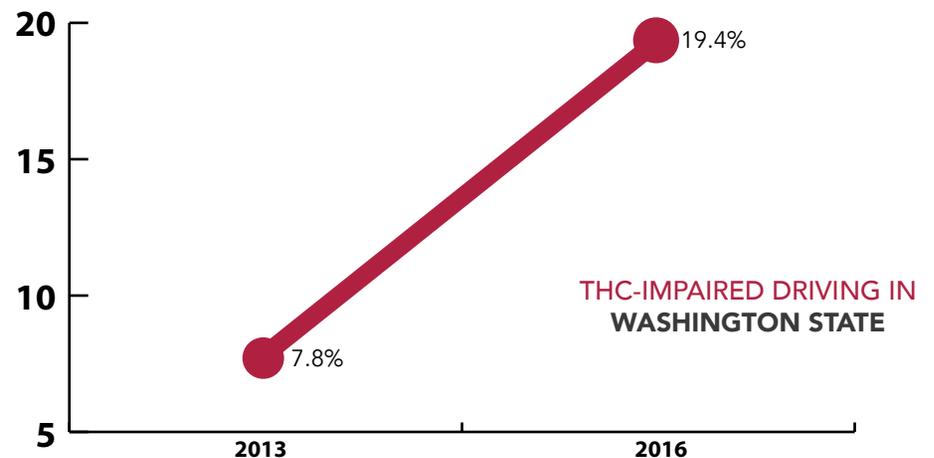
# STONED DRIVING

Drugged driving and motor vehicle fatalities have increased in states that have legalized recreational marijuana. 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, 2018).

A 2019 study of over 2,000 drivers in Washington State reports that six months immediately after introducing retail sales of marijuana, the proportion of THC-positive drivers was almost three times as great as the month before retail sales (Eichelberger, 2019).

A statistically larger percentage of Colorado youth report driving after marijuana use than driving after alcohol use (Colorado Department of Public Health and Environment, 2019).

The rate of traffic fatalities involving drivers who tested positive for marijuana in Colorado rose from 55 in 2013 to 138 people killed in 2017. Over one-fifth of all traffic fatalities in 2017 included a driver testing positive for marijuana (National Highway Traffic Safety Administration, 2006-2011; Colorado Department of Transportation, 2012-2017). From 2013 to 2016, THC-impaired driving in Washington State nearly tripled from 7.8% before retail sales to 19.4% one year after sales (Grondel, 2018).



Between 2013 and 2016, the rate of THC-impaired driving in Washington State nearly tripled from 7.8% to 19.4% (Grondel, 2018)

# STONED DRIVING

Driving under the influence of drugs (DUIDs) has also risen in Colorado, with 74% of statewide DUIDs in 2017 involving marijuana, and 69% of marijuana users admitting to driving high within the last year (Colorado State Patrol, 2018). In Oregon, approximately half of all drivers assessed by Drug Recognition Experts in 2015 tested positive for THC. Toxicology reports show that testing positive for THC has consistently increased, indicating an increase in THC-related impaired driving (Oregon Liquor Control Commission, 2016).

Research by the Highway Loss Data Institute finds that recreational legalization of marijuana in Colorado, Oregon and Washington is significantly associated with an increase in collision claims (Highway Loss Data Institute, 2018).

Unfortunately, Alaska does not have reliable DUIDs data available. While many factors contribute to pedestrian fatalities, it turns out that states that legalized marijuana for medical and/or recreational use saw a 16.4 percent surge in such deaths in the first six months of 2017 compared to the first six months of 2016, while non-legal states saw a drop of 5.8 percent in pedestrian fatalities over the same time (Boudette, 2018).



# IMPACT OF LEGALIZATION ON THE ENVIRONMENT

The full effects of the industry on the natural environment are only beginning to be recognized. These impacts occur even in a so-called “regulated” environment, as the vast amounts of water and electricity needed to power marijuana farms are damaging to the environment.

Legalization, and the industry it has created, has caused irreparable damage to rainforests and other elements of the ecosystem. In California, farms generating marijuana crops have polluted plants and other natural life to the point of being hazardous to surrounding communities (Bernstein, 2017). Additionally, pollution caused by illegal grow sites has inflicted animal casualties. The poison used to reduce rodent population at farms has in turn killed large numbers of spotted owls, a species marked as “threatened” according to the Endangered Species Act (Chua, 2018).

The average mature cannabis plant consumes approximately 22.7 liters of water a day (Bauer, et al., 2015). The Pacific Northwest has been facing drought and water shortages despite marijuana production for years, however, with the new market, regions like the Rogue River Basin are under critical strain (Mann, 2016).

In 2017 alone, there were 80,826 plants seized off Colorado public lands, compared to 4,980 plants seized in 2013 (US Bureau of Land Management, 2017). For example, in 2015 the DOJ announced a wave of prosecutions, many of which on federal land, resulting in seizure of 20,000 marijuana plants and over 300 kilograms of dried marijuana in Colorado. Suspects included Mexican nationals with ties to transnational criminal groups (U.S. Attorney’s Office, 2015).

Power consumption is a similar story. In 2012, marijuana growing consumed 1% of the nation’s electricity, six times the amount of power the entire U.S. pharmaceutical industry uses (Mills, 2012). Indoor cultivation of one kilogram of marijuana releases carbon dioxide emissions comparable to that of a passenger car in one year and uses two times as much energy as an average refrigerator in a year (US Environmental Protection Agency, 2018; Energy Star, 2018).

This enormous energy use derives from both the quantity of marijuana grown and the large amount of energy it demands. Marijuana is almost four times more energy intensive than oil or coal (Mills, 2012). It uses so much power that indoor marijuana production in Colorado is responsible for 2% of the state’s electrical load and 45% of all new electricity demand coming online (Crombie, 2016). In fact, Mother Jones magazine indicated that the marijuana market “has placed a huge burden on the grid that distributes electricity throughout the state” (Colorado Department of Transportation, 2012-2017; Mock, 2015).

# RECOMMENDATIONS

Policy makers and the public need real-time data on both the consequences of legalization and the related monetary costs. Meanwhile, 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 representative data sets.
- 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, and impact on employee productivity.
- Track minority impacts, including arrests, placement of marijuana establishments, and quality of life indicators.
- Track environmental impacts, including water and power usage.

# REFERENCE LIST

Agence France-Presse. (2015, November 27). Everyday Actions that Contribute to Carbon Dioxide Emissions. *ABC-CBN.com*. Retrieved February 2019, from <https://news.abs-cbn.com/focus/11/27/15/everyday-actions-that-contribute-to-carbon-dioxide-emissions>

Alaska Department of Public Safety. (2014-2017). *Uniform Crime Reports*. Retrieved February 2019, from <https://dps.alaska.gov/statewide/r-i/ucr>

Alaska State Troopers. (2016). *Annual Drug Report*. Retrieved February 2019, from <https://dps.alaska.gov/getmedia/f259530b-5277-408e-9d45-4999958fe530/2016-annual-drug-report-6-28-17final;.aspx>

Alaska State Troopers. (2017). *Annual Drug Report*. Retrieved February 2019, from <https://dps.alaska.gov/getmedia/1c42905b-dc16-453e-aad5-cfc99d9bc425/2017-Annual-Drug-Report-Final-UPDATED-090718.pdf>

Arria, A. M., Cladeira, 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.

Associated Press. (2017a, August 14). Marijuana-legal states struggle with black-market weed. *Los Angeles Daily News*. Retrieved February 2019, from <https://www.dailynews.com/2017/08/14/marijuana-legal-states-struggle-with-black-market-weed/>

Associated Press. (2017b, September 29). Federal agencies raid pot grow operation in Aspen area. *The Denver Channel*. Retrieved February 2019, from <https://www.thedenverchannel.com/news/crime/federal-agencies-raid-pot-grow-operation-in-aspen-area>

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.

Bernstein, S. (2017, August 6). Toxic waste from U.S. pot farms alarms

experts. *Thomson Reuters*. Retrieved February 2019, from <https://www.reuters.com/article/us-usa-marijuanaenvironment/toxic-waste-from-u-s-pot-farms-alarms-experts-idUSKBN1AMOC3>

Bigay-Game, L., Bota, S., Greillier, L., Monnet, I., Madroszyk, A., Corre, R., . . . Chouaid, C. (2018). Characteristics of Lung Cancer in Patients Younger than 40 Years: A Prospective Multicenter Analysis in France. *Oncology, 95*, 337-343.

Blood, M. R. (2019, January 10). California pot taxes lag as illegal market flourishes. *Associate Press News*. Retrieved February 2019, from <https://apnews.com/37866c4831844c5f8b82ddd87c2fe7c6>

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.

Boudette, N. E. (2018, February 2018). Where Pedestrian Deaths Are Up, Is Marijuana to Blame? *New York Times*. Retrieved February 2019, from <https://www.nytimes.com/2018/02/28/business/pedestrian-deaths-marijuana.html>

Boulder Policy Department. (2017). *Records and Information Services*. As found in RMHIDTA report. Retrieved February 2019, from <https://www.rmhidta.org/html/FINAL%202017%20Legalization%20of%20Marijuana%20in%20Colorado%20The%20Impact.pdf>

Burke, K., & Acuna, A. (2017, July 10). Colorado tries to fight homeless problem that may have been triggered by pot law. *FoxNews.com*. Retrieved February 2019, from <https://www.foxnews.com/us/colorado-tries-to-fight-homeless-problem-that-may-have-been-triggered-by-pot-law>

Campbell, G., Hall, W. D., Peacock, A., Lintzeris, N., Bruno, R., Larance, B., . . . 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), PE341-E350.

Chua, J. M. (2018, January 11). Owls Dying Near Marijuana Farms (Here's Why). *Live Science*. Retrieved February 2019, from <https://www.livescience.com/61403-marijuana-farms-dying-owls.html>

Chung, C., Salottolo, K., Tanner (II), A., Carrick, M. M., Madayag, R., Berg, G., . . . Bar-Or, D. (2019). The impact of recreational marijuana commercialization on traumatic injury. *Injury Epidemiology*, 6(3).

Colorado Bureau of Investigation. (2017). Colorado Crime Statistics. Retrieved February 2019, from <https://www.colorado.gov/pacific/cbi/colorado-crime-stats>

Colorado Department of Public Health and Environment. (2018). *Monitoring Health Concerns Related to Marijuana in Colorado: 2018 Summary*.

Colorado Department of Public Health and Environment. (2019). Colorado Healthy Kids Data. Retrieved February 2019, from <https://www.colorado.gov/pacific/marijuanahealthinfo/HKCS-data>

Colorado Department of Public Health and Environment. (2019). Colorado Hospital Association Data. Retrieved February 2019, from <https://www.colorado.gov/pacific/marijuanahealthinfo/CHA-data>

Colorado Department of Public Health and Environment. (2019). *Colorado Violent Death Reporting System*. Colorado Health and Environment Data. Retrieved February 2019, from [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 Public Health and Environment. (2019). Poison Center Data. Retrieved February 2019, from <https://www.colorado.gov/pacific/marijuanahealthinfo/poison-center-data>

Colorado Department of Public Safety. (2016). *Marijuana Legalization in Colorado: Early Findings - A Report Pursuant to Senate Bill 13-283*.

Colorado Department of Public Safety. (2018). *Impacts of Marijuana Legalization in Colorado: A Report Pursuant to Senate Bill 13-283*. Division of Criminal Justice.

Colorado Department of Revenue. (2013-2018). Liquor Excise Tax Report. Retrieved March 2019, from <https://www.colorado.gov/pacific/revenue/colorado-liquor-excise-taxes>

Colorado Department of Transportation. (2012-2017). As found in RMHIDTA report. Retrieved February 2019, from <https://rmhidta.org/files/D2DF/FINAL-%20Volume%205%20UPDATE%202018.pdf>

Colorado Department of Transportation. (2017). Colorado Drugged Driving at a Glance. Retrieved February 2019, from <https://www.codot.gov/safety/alcohol-and-impaired-driving/druggeddriving>

Colorado State Patrol. (2018). *Citations for Drug Impairment by Drug Type*. Retrieved February 2019, from <https://rmhidta.org/files/D2DF/FINAL-%20Volume%205%20UPDATE%202018.pdf>

Crombie, N. (2016, June 8). Task force looks at energy, water use related to marijuana production. *The Oregonian*. Retrieved February 2019, from [https://www.oregonlive.com/marijuana/2016/06/task\\_force\\_looks\\_at\\_energy\\_wat.html](https://www.oregonlive.com/marijuana/2016/06/task_force_looks_at_energy_wat.html)

DC Metropolitan Policy Department. (2018). Marijuana Arrest Data. Washington, District of Columbia. Retrieved February 2019, from <https://mpdc.dc.gov/node/1347766>

Dickson, B., Mansfield, C., Guiahi, M., Allshouse, A., Borgelt, L., Sheeder, J., . . . Metz, T. (2018). Recommendations From Cannabis Dispensaries About First-Trimester Cannabis Use. *Obstetrics & Gynecology*, 131(6), 1031-1038.

Eichelberger, A. H. (2019). Marijuana use and driving in Washington State: Risk perceptions and behaviors before and after implementation of retail sales. *Traffic Injury Prevention*. doi:10.1080/15389588.2018.1530769

ElSohly, M. A., Mehmedic, Z., Foster, S., Gon, C., Chandra, S., & Church, J. C. (2016). Changes in Cannabis Potency Over the Last 2 Decades (1995–2014): Analysis of Current Data in the United States. *Biological Psychiatry*, 79(7), 613-619.

Energy Star. (2018). Energy Star Most Efficient 2018. Retrieved February 2019, from <http://adai.uw.edu/mfiles/docs/2018assessmentcannabisOregon.pdf>

Federal Bureau of Investigation. (n.d.). Crime in the United States, 1960-2015 (Oregon and Alaska). (D. Center, Compiler) Retrieved April 2019, from <http://www.disastercenter.com/crime/orcrime.htm>

Finn, K. (2015). The hidden costs of marijuana use in Colorado: One emergency department's experience. *Journal of Global Drug Policy and Practice*, 10(2), 1-26.

Finn, K., & Salmore, R. (2016). The Hidden Costs of Marijuana Use in Colorado: One Emergency Department's Experience. *Journal of Global Drug Policy and Practice*, 10(2), 1-26.

Fischer, B., Russell, C., Sabioni, P., van den Brink, W., Le Foll, B., Hall, W., . . . Room, R. (2017). Lower-Risk Cannabis Use Guidelines: A Comprehensive Update of Evidence and Recommendations. *American Journal of Public Health*, 107(8), e1-e12.

Flaccus, G. (2018, February 2). *US prosecutor: Oregon has big pot overproduction problem*. Retrieved from AP News: <https://www.apnews.com/833bc51a456d4819b1e9882cb17b46ef>

Foeller, M. E., & Lyell, D. J. (2017). Marijuana Use in Pregnancy: Concerns in an Evolving Era. *Journal of Midwifery and Women's Health*, 62(3).

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. *The Journal of Primary Prevention*, 38(3), 249-263.

Fry, W. (2018, January 5). Doctor Sees Increase in Marijuana Poisoning. *NBCSanDiego.com*. Retrieved February 2019, from <https://www.nbcsandiego.com/news/local/Doctor-Sees-Increase-in-Marijuana-Poisoning-468206833.html>

Fuller, T. (2019, January 2). Now for the Hard Part: Getting Californians to Buy Legal Weed. *New York Times*. Retrieved February 2019, from <https://www.nytimes.com/2019/01/02/us/buying-legal-weed-in-california.html>

Grondel, D. T. (2018). *Marijuana Use, Alcohol Use, and Driving in Washington State: Emerging Issues With Poly-Drug Use on Washington Roadways*. Washington Traffic Safety commission.

Grover, J., & Corral, A. (2019, February 26). Poisonous Pot Found in Some Los Angeles-Area Stores. *NBC San Diego*. Retrieved February 2019, from <https://www.nbcsandiego.com/investigations/national-investigations/Marijuana-Poison-Pot-Investigation-506356011.html>

Hall, W., & Lynskey, M. (2016). Evaluating the public health impacts of legalizing recreational cannabis use in the United States. *Addiction*, 111(10).

Hamm, K. (2016, January 2). *Marijuana in Denver: Map of pot-related businesses by neighborhood with income data, school locations*. Retrieved from The Daily 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.

Hatch, A. (2017, April 14). Researchers tracking public health impacts of marijuana legalization. *Washington State University Nursing*. Retrieved February 2019, from <https://nursing.wsu.edu/2017/04/14/13255/>

Haughwout, S. P., & Slater, M. E. (2017). *Apparent Per Capita Alcohol Consumption: National, State, and Regional Trends, 1977-2015*. Arlington: National Institutes of Health. Retrieved from <https://pubs.niaaa.nih.gov/publications/surveillance108/CONS15.pdf>

Hawryluk, M. (2016, November 14). Mainstreaming Marijuana: Pot legalization is revealing unintended consequences. *The Bend Bulletin*. Retrieved February 2019, from <https://www.bendbulletin.com/health/4718634-151/mainstreaming-marijuana>

Highway Loss Data Institute. (2018, April). Recreational marijuana and collision claim frequencies. 35(8).

Hlavac, G. C., & Easterly, E. J. (2016). Legal Issues: Marijuana in the Workplace. *NACE Journal*.

Hughes, L. A., Schaible, L. M., & Jimmerson, K. (2019). Marijuana Dispensaries and Neighborhood Crime and Disorder in Denver Colorado. *Justice Quarterly*. doi:10.1080/07418825.2019.1567807

Hughes, T. (2017, August 1). Marijuana's legalization fuels black market in other states. *USA Today*. Retrieved February 2019, from <https://www.usatoday.com/story/news/nation/2017/07/31/marijuana-black-market/507417001/>

Hughes, T. (2018, March 28). Blue Moon's brewer launching marijuana-infused 'beer'. *USA Today*. Retrieved April 2019, from USA Today: <https://www.usatoday.com/story/news/2018/03/28/blue-moon-brewer-marijuana-infused-beer/467110002/>

Huizink, A. C., & Mulder, E. J. (2006). Maternal smoking, drinking or cannabis use during pregnancy and neurobehavioral and cognitive functioning in human offspring. *Neuroscience and Biobehavioral Reviews*, *30*(1), 24-41.

Institute for Behavior and Health. (n.d.). Drug Legalization: A False Hope. *Drug Policy Perspectives*. Retrieved February 2019, from <https://www.ibhinc.org/drug-legalization/>

Johnson, R. (2017, November 9). Oregon pot processor arrested in Lincoln after \$1.1M in cannabis extract found. *Lincoln Journal Star*. Retrieved February 2019, from [https://journalstar.com/news/local/crime-and-courts/oregon-pot-processor-arrested-in-lincoln-after-m-in-cannabis/article\\_26e24d67-7ed1-52e2-b27c-a4b7a60f3db9.html](https://journalstar.com/news/local/crime-and-courts/oregon-pot-processor-arrested-in-lincoln-after-m-in-cannabis/article_26e24d67-7ed1-52e2-b27c-a4b7a60f3db9.html)

Johnson, T. (2016, May 10). Fatal Road Crashes Involving Marijuana Double After State Legalizes Drug. *AAA Newsroom*. Retrieved February 2019, from <https://newsroom.aaa.com/2016/05/fatal-road-crashes-involving-marijuana-double-state-legalizes-drug/>

Johnston, L. D., Miech, R. A., Bachman, J. G., Schulenberg, J. E., & Patrick, M. E. (2018). *Monitoring the Future National Survey Results on Drug Use 1975-2018. Overview, Key Findings on Adolescent Drug Use*. Ann Arbor: Institute for Social Research, University of Michigan.

Kent, K. (2016, February 24). C.O. hospitals see dramatic spike in pot-related illnesses. *KTVZ.com*. Retrieved February 2019, from <https://www.ktvz.com/news/bend/c-o-hospitals-see-dramatic-spike-in-pot-related-illnesses/69167250>

Kerr, D. C., 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).

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.

Kolb, J. J. (2017, May 17). Legalized marijuana turns Colorado resort town into homeless magnet. *FoxNews.com*. Retrieved February 2019, from <https://www.foxnews.com/us/legalized-marijuana-turns-colorado-resort-town-into-homeless-magnet>

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.

LaVito, A., & Hirsch, L. (2018, December 21). *Altria looks to a future beyond cigarettes but investors aren't cheering its \$15 billion bet*. Retrieved February 2019, from CNBC.com: <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. (2018). Age-varying effects of cannabis use frequency and disorder on symptoms of psychosis, depression and anxiety in adolescents and adults. *Addiction*, *114*(2).

Legacy Emmanuel Oregon Burn Center. (2013-2017). *BHO Burn Victims*. As found in ORHIDTA report. Retrieved February 2019, from <http://adai.uw.edu/mfiles/docs/2018assessmentcannabisOregon.pdf>

Mann, D. (2016, December 19). Officials worry water will go to pot. *Mail Tribune*. Retrieved February 2019, from <http://mailtribune.com/news/happening-now/officials-worry-water-will-go-to-pot>

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*.

McVey, E. (2017, July 31). Chart: Recreational marijuana stores are clustered in low-income areas of Denver, Seattle. *Marijuana Business Daily*. Retrieved February 2019, from <https://mjbizdaily.com/chart-recreational-marijuana-stores-clustered-low-income-areas-denver-seattle/>

Meier, M. H., Caspi, A., Ambler, A., Harrington, H., Houts, R., Keefe, R. S., . . . Moffitt, T. E. (2012). Persistent cannabis users show neuropsychological decline from childhood to midlife. *Proceedings of the National Academy of Sciences of the United States of America*, *109*(40), E2657-E2664.

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.

Migoya, D. (2016, January 2). Denver's pot businesses mostly in low-income, minority neighborhoods. *The Denver Post*. Retrieved February 2019, from <https://www.denverpost.com/2016/01/02/denvers-pot-businesses-mostly-in-low-income-minority-neighborhoods/>

Miller, B. (2018, August 1). *Molson Coors makes cannabis-infused beverage deal in Canada*. Retrieved from CNBC: <https://www.cnbc.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. *The Denver Post*. Retrieved February 2019, from <https://www.denverpost.com/2017/07/11/colorado-sees-big-increase-crime-10-percent-higher-murder-rate/>

Mock, B. (2015, July 8). This Is How Much Energy It Takes to Legalize Weed. *Mother Jones*. Retrieved February 2019, from <https://www.motherjones.com/environment/2015/07/marijuana-energy-denver/>

Munoz, E., Flick, P., & English, K. (2017). *Summary of Law Enforcement and District Attorney Reports of Student Contacts: Pursuant to House Bill 15-1273*. Colorado Department of Public Safety.

Murray, D. M. (2016, July 2). Misrepresenting Colorado Marijuana. *Hudson Institute*. Retrieved February 2019, from <https://www.hudson.org/research/12615-misrepresenting-colorado-marijuana>

National Highway Traffic Safety Administration. (2006-2011). Fatality Analysis Reporting System (FARS). Retrieved February 2019, from <https://rmhidta.org/files/D2DF/FINAL-%20Volume%205%20UPDATE%202018.pdf>

NSDUH. (2014-2015). National Survey on Drug Use and Health, SAMHSA, HHS, State Estimates.

NSDUH. (2015-2016). National Survey on Drug Use and Health, SAMHSA, HHS, State Estimates.

NSDUH. (2016-2017). National Survey on Drug Use and Health, SAMHSA, HHS, State Estimates.

NWHIDTA. (2016). *Washington State Marijuana Impact Report*. Retrieved February 2019, from <http://www.riag.ri.gov/documents/NWHIDTAMarijuanaImpactReportVolume1.pdf>

Olfson, M., Wall, M. M., Liu, S.-M., & Blanco, C. (2017). Cannabis Use and Risk of Prescription Opioid Use Disorder in the United States. *The American Journal of Psychiatry*.

Oregon Health Authority. (2018). *2017 Oregon Healthy Teens Survey*. Retrieved from [https://www.oregon.gov/oha/PH/BIRTHDEATHCERTIFICATES/SURVEYS/OREGONHEALTHYTEENS/Documents/2017/2017\\_OHT\\_State\\_Report.pdf](https://www.oregon.gov/oha/PH/BIRTHDEATHCERTIFICATES/SURVEYS/OREGONHEALTHYTEENS/Documents/2017/2017_OHT_State_Report.pdf)

Oregon Liquor Control Commission. (2016). *2015 House Bill 3400 DUII Legislative report*. Retrieved from [https://www.oregon.gov/olcc/marijuana/Documents/HB3400\\_2015\\_DUIILegislativeReport.pdf](https://www.oregon.gov/olcc/marijuana/Documents/HB3400_2015_DUIILegislativeReport.pdf)

Oregon Liquor Control Commission. (2018, February 22). News Release: Retailers Improve in Marijuana Minor Decoy Checks. Portland, Oregon.

Oregon Poison Center. (2018). *Cannabis Report 2014-2017*. Retrieved February 2019, from <https://www.ohsu.edu/xd/outreach/oregon-poison-center/you-and-your-family/upload/Cannabis-report-FINAL-first-quarter-2018.pdf>

Oregon Public Health Division. (2016). *Marijuana Use, Attitudes and Health Effects in Oregon*. Portland: Oregon Health Authority.

Oregon Secretary of State. (2019). *Oregon's Framework for Regulating Marijuana Should Be Strengthened to Better Mitigate Diversion Risk and Improve Laboratory Testing*. Retrieved from <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*. Retrieved February 2019, from [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)

ORHIDTA. (2018). *An Initial Assessment of Cannabis Production, Distribution, and Consumption in Oregon 2018 - An Insight Report*. Retrieved February 2019, from <http://adai.uw.edu/mfiles/docs/2018assessmentcannabisOregon.pdf>

Pacher, P., Steffens, S., Hasko, G., Schindler, T. H., & Kunos, G. (2017). Cardiovascular effects of marijuana and synthetic cannabinoids: the good, the bad, and the ugly. *Nature Reviews Cardiology*, *15*, 151-166.

Pallechia, T. (2018, February 12). Does Legalizing Marijuana Threaten Wine (And Beer) Consumption? *Forbes*. Retrieved March 2019, from <https://www.forbes.com/sites/thomaspallechia/2018/02/12/does-legalizing-marijuana-threaten-wine-and-beer-consumption/#f729e517dfbf>

Paschall, M. J., Grube, J. W., & Biglan, A. (2017). Medical Marijuana Legalization and Marijuana Use Among Youth in Oregon. *The Journal of Primary Prevention*, *38*(3), 329-341.

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*.

Pierre, J. M., Gandal, M., & Son, M. (2016). Cannabis-induced psychosis associated with high potency "wax dabs". *Schizophrenia Research*, *172*(1-3), 211-212.

Prince, M. A., & Conner, B. T. (2018). Examining links between cannabis potency and mental and physical health outcomes. *Behaviour Research and Therapy*. doi:10.1016/j.brat.2018.11.008

Quest Diagnostics. (2017, May 16). Increases in Illicit Drugs, Including Cocaine, Drive Workforce Drug Positivity to Highest Rate in 12 Years, Quest Diagnostics Analysis Finds. *Quest Diagnostics News Releases*. Retrieved February 2019, from <http://newsroom.questdiagnostics.com/2017-05-16-Increases-in-Illicit-Drugs-Including-Cocaine-Drive-Workforce-Drug-Positivity-to-Highest-Rate-in-12-Years-Quest-Diagnostics-Analysis-Finds>

Quest Diagnostics. (2018, May 8). Workforce Drug Positivity at Highest Rate in a Decade, Finds Analysis of More Than 10 Million Drug Test Results. *Quest Diagnostics News Releases*. Retrieved February 2019, from [http://newsroom.questdiagnostics.com/2018-05-08-Workforce-Drug-Positivity-at-Highest-Rate-in-a-Decade-Finds-Analysis-of-More-Than-10-Million-Drug-Test-Results#assets\\_30649\\_137071-129](http://newsroom.questdiagnostics.com/2018-05-08-Workforce-Drug-Positivity-at-Highest-Rate-in-a-Decade-Finds-Analysis-of-More-Than-10-Million-Drug-Test-Results#assets_30649_137071-129)

Quest Diagnostics. (2019). Drug Testing Index: Overall positivity rate in 2018. Retrieved April 2019, from <http://www.dtidrugmap.com/>

Randall, K. (2019). *American Academy of Emergency Medicine*. Las Vegas, NV.

RMHIDTA. (2018). *The Legalization of Marijuana in Colorado: The Impact Volume 5*. Retrieved February 2019, from <https://rmhidta.org/files/D2DF/FINAL-%20Volume%205%20UPDATE%202018.pdf>

Rocky Mountain HIDTA Strategic Intelligence Unit. (2018). *The Legalization of Marijuana in Colorado: The Impact Volume 5*. Rocky Mountain High Intensity Drug Trafficking Area (RMHITDA). Retrieved February 2019, from <https://rmhidta.org/files/D2DF/FINAL-%20Volume%205%20UPDATE%202018.pdf>

Roy, A. (2017, September 7). Marijuana grow found on two islands in the Colorado River. *KUSA*. Retrieved February 2019, from <https://www.9news.com/article/news/crime/marijuana-grow-found-on-two-islands-in-the-colorado-river/472187162>

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. *BMC Patient Safety in Surgery*, *12*(16).

Sauter, M. B. (2018, May 2). Which state's residents drink the most beer? Brews news you can use for your next bar bet. *USA Today*. Retrieved March 2019, from <https://www.usatoday.com/story/money/personalfinance/2018/05/02/which-states-residents-drink-most-beer/569430002/>

Schuster, R., Gilman, J., Schoenfeld, D., Evenden, J., Hareli, M., Ulysse, C., . . . Ewins, A. (2018). One Month of Cannabis Abstinence in Adolescents and Young Adults Is Associated With Improved Memory. *Journal of Clinical Psychiatry*, *79*(6).

Secades-Villa, R., Garcia-Rodriguez, 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), pp. 135-142.

Silins, E., Horwood, L., Patton, G. C., Fergusson, D. M., Olsson, C. A., Hutchinson, D. M., . . . Mattick, R. P. (2014). Young adult sequelae of adolescent cannabis use: an integrative analysis. *The Lancet Psychiatry*, *1*(4), 286-293.

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. *Addiction*, *112*(12), 2167-2177.

Smith, P. (2017, August 9). Why Are Pot Shops Mainly in Poor Neighborhoods? *The Daily Chronic*. Retrieved February 2019, from <http://www.thedailychronic.net/2017/75557/pot-shops-mainly-poor-neighborhoods/>

Spears, C. L. (2018). *Crime in Alaska: Uniform Crime Reporting program Annual Report*.

Stewart, M. (2017, September 27). Rural marijuana grows rising in the state of Colorado: DEA agents busy in rural areas with pot grows. *The Denver Channel*. Retrieved February 2019, from <https://www.thedenverchannel.com/news/local-news/marijuana/rural-marijuana-grows-rising-in-the-state-of-colorado>

The American College of Obstetricians and Gynecologists. (2017, October). Marijuana Use During Pregnancy and Lactation. *ACOG Committee Opinions*, 722.

The Gazette. (2015, March 24). Drug use a problem for employers. *The Gazette*. Retrieved February 2019, from [https://gazette.com/news/drug-use-a-problem-for-employers/article\\_ab53e66f-4923-55a5-a48c-00b05cf262f9.html](https://gazette.com/news/drug-use-a-problem-for-employers/article_ab53e66f-4923-55a5-a48c-00b05cf262f9.html)

The Gazette. (2015, March 20). Special report, 'Clearing the Haze:' Black market is thriving in Colorado. *The Gazette*. Retrieved February 2019, from [https://gazette.com/news/special-report-clearing-the-haze-black-market-is-thriving-in/article\\_3f7aeba6-d22c-5094-8f48-507664204994.html](https://gazette.com/news/special-report-clearing-the-haze-black-market-is-thriving-in/article_3f7aeba6-d22c-5094-8f48-507664204994.html)

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, In Press*. doi:10.1016/j.jemermed.2019.01.004

Thomas, C., & Feisthler, B. (2017). Evaluating the Change in Medical Marijuana Dispensary Locations in Los Angeles Following the Passage of Local Legislation. *The Journal of Primary Prevention*, 38(3), 265-277.

Thompson, K., Merrin, G. J., Ames, M. E., & Leadbeater, B. (2018). Marijuana trajectories in Canadian youth: Associations with substance use and mental health. *Canadian Journal of Behavioural Science/Revue canadienne des sciences du comportement*, 50(1), 17028.

U.S. Attorney's Office. (2015). *Confronting Wave of Illicit Marijuana Cultivation, Federal, State and Local Authorities Discover and Destroy Major Marijuana Grows in Locations Across Colorado*. Department of Justice, Denver. Retrieved February 2019, from <https://www.justice.gov/usao-co/pr/confronting-wave-illicit-marijuana-cultivation-federal-state-and-local-authorities>

U.S. Food and Drug Administration. (2017). *Warning Letters and Test Results for Cannabidiol-Related Products*. Retrieved March 2019, from <https://www.fda.gov/newsevents/publichealthfocus/ucm484109.htm>

U.S. Postal Inspection Service. (2018). *Prohibited Mailings of Narcotics*. As found in RMHIDTA report. Retrieved February 2019, from <https://rmhidta.org/files/D2DF/FINAL-%20Volume%205%20UPDATE%202018.pdf>

US Bureau of Land Management. (2017). Retrieved February 2019, from <https://rmhidta.org/files/D2DF/FINAL-%20Volume%205%20UPDATE%202018.pdf>

US Drug Enforcement Administration. (2018). El Paso Intelligence Center Data. Retrieved February 2019, from <http://adai.uw.edu/mfiles/docs/2018assessmentcannabisOregon.pdf>

US Environmental Protection Agency. (2018). Green Vehicle Guide. Retrieved February 2019, from <http://adai.uw.edu/mfiles/docs/2018assessmentcannabisOregon.pdf>

US Government Accountability Office. (2015). *DOJ should document its approach to monitoring the effects of legalization*.

Volkow, N. D., Baler, R. D., Compton, W. M., & Weiss, S. R. (2014). Adverse Health Effects of Marijuana Use. *New England Journal of Medicine*, 2219-2227.

Volkow, N., Han, B., Compton, W., & Blanco, C. (2017). Marijuana Use During Stages of Pregnancy in the United States. *Annals of Internal Medicine*, 166(10), 763-764.

Wang, G., Hall, K., Vigil, D., Banerji, S., Monte, A., & VanDyke, M. (2017). Marijuana and Acute Health Care Contacts in Colorado. *Preventative Medicine*, 104, 24-30.

Washington State Liquor and Cannabis Board. (n.d.). Enforcement and Compliance Data. Retrieved February 2019, from <https://data.lcb.wa.gov/stories/s/WSLCBMarijuana-Dashboard/hbnp-ia6v/>

Washington State Office of Financial Management. (2017). *Monitoring Impacts of Recreational Marijuana Legalization: 2016 Update Report*. Retrieved February 2019, from [https://www.ofm.wa.gov/sites/default/files/public/legacy/reports/marijuana\\_impacts\\_update\\_2016.pdf](https://www.ofm.wa.gov/sites/default/files/public/legacy/reports/marijuana_impacts_update_2016.pdf)

Wilkinson, S. T., Yarnell, S., Radhakrishnan, R., Ball, S. A., & D'Zouza, D. (2016). Marijuana Legalization: Impact on Physicians and Public Health. *Annual Review of Medicine*, 67, 453-466.

Williams, B. J. (2018, January 12). *U.S. Attorney: A call for transparency and action on marijuana (Guest opinion)*. Retrieved from Oregon Live: [https://www.oregonlive.com/opinion/2018/01/us\\_attorney\\_a\\_call\\_for\\_transpa.html](https://www.oregonlive.com/opinion/2018/01/us_attorney_a_call_for_transpa.html)

Wohlforth, C. (2018, January 11). Marijuana school suspensions more than doubled after legalization. *Anchorage Daily News*. Retrieved February 2019, from <https://www.adn.com/opinions/2018/01/11/marijuana-school-suspensions-more-than-doubled-after-legalization/>

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.

Zak, A., & Hopkins, K. (2018, August 15). *Alaska crime rate increased 6 percent in 2017*. Retrieved from Anchorage Daily News: <https://www.adn.com/alaska-news/crime-courts/2018/08/15/crime-rose-6-percent-across-alaska-in-2017/>

Zubrzycki, J. (2016, May 19). Colorado Sees Surge in Child Homelessness. *The Colorado Trust*. Retrieved February 2019, from <https://www.coloradotrust.org/content/story/colorado-sees-surge-child-homelessness>



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